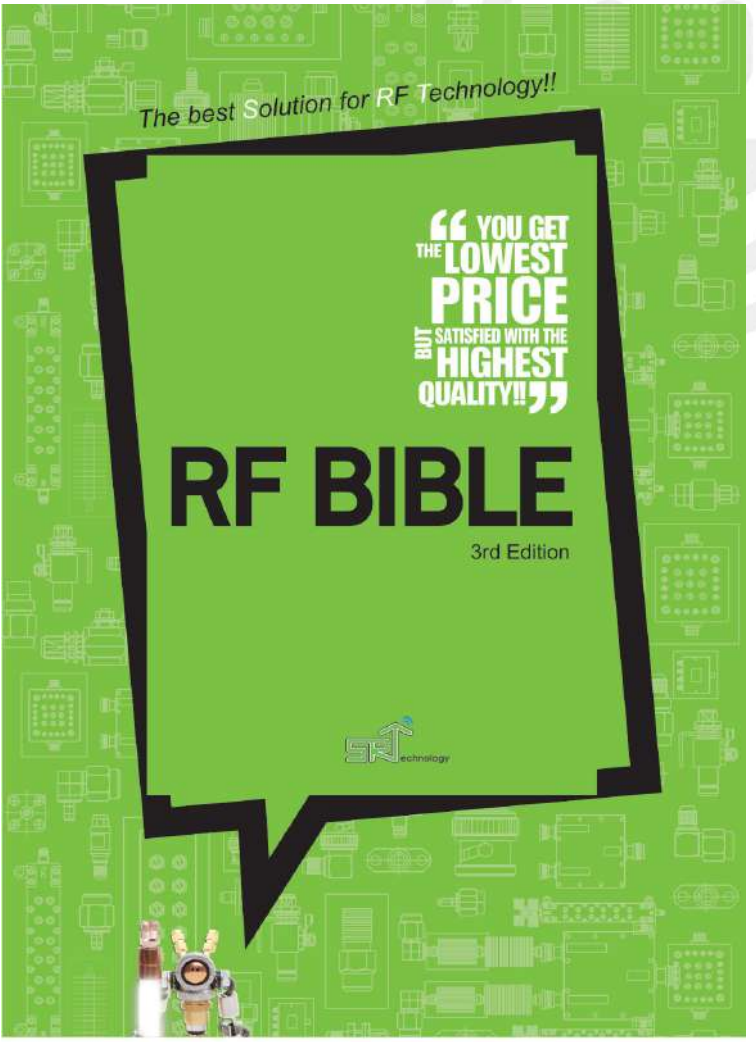

SRTechnology Corp.

Registered office
SRTechnology Corporate, 614 (Guro-dong, E-space), 36 Digital-ro 27-gil, Guro-gu, Seoul, 08381, South Korea

Preface

It is our pleasure to publish 3rd edition of RF Bible. Since we published 1st RF Bible in 2014, engineers in RF field, global partners and customers would like the uniqueness and concept of RF Bible which has showed the RF theory, product specification, and product's application to system. It is indeed gratifying to know that many of customers and engineers are satisfied with our RF Bible for their coworkers and junior colleagues to learn the product with applications. We have noticed that many of RF companies take advantages of RF Bible and use them onto their promotional materials in publication and on their website. It is one of our objective to publish RF Bible in RF industry.

Since there are lots of applications and requests for the RF products, SRTechnology have devoted much time to listen customer's and engineer's requirements, the key factors affect the product's best performance to the system and other conditions that purchasing team can obtain the reliable products without deep consideration. In 3rd edition of RF Bible, we have tried to introduce World Best Power terminations, Power attenuators and Power dividers to you with their features, applications, and full specification for each product that nobody inform you what are really needed in the field.

Many thanks to global partners, R&D engineers, production managers and designers who researched, suggested and reviewed for 3rd edition of RF Bible in SRTechnology Corporate. We, sincerely, hope the RF Bible helps you to understand RF business and grow your business.

If you have any question to RF Bible or suggestion to SRTechnology, please feel free to contact us at any time. We, SRTechnology Corporate, appreciate the opportunity to be of service of the Best Solution of RF Technology.

Prologue

This is our pleasure to publish 3rd edition of RF BiBLE. Since the 1st edition of RF BiBLE had been published, there have been a lot of positive feedbacks and encouragements from customers, partners and users in RF industry. We appreciate all of them for enjoyment and good response from this book. So we think that our objectives of RF BiBLE at 1st edition which helps a beginner in RF business, somebody who has a hard time to get a reliable products or the student majoring in RF has been achieved According to the purpose of RF BiBLE.

There have been inquires about Filters and other products after the 1st edition RF BiBLE. So we decided to publish 3rd edition with more Filter contents which had many inquiries and other products information additionally to enhance the convenience and information for the users of this book.

Many thanks to R&D engineers, global and local marketers and production managers who researched, wrote, designed, suggested and reviewed for 3rd edition of RF BiBLE in SRTechnology Corporate. They worked devotedly for 3rd edition for the sake of our customers, partners and users who read this book.

If you have any question or suggestion regarding this book, please feel free to contact SRTechnology Corporate at any time. We will do our best to give you a great solution. Thank you!

MAY 2015.

It has already passed about 20 years for a new world of mobile communications. In the initial period, most of engineers majored in electronics engineering, started to study RF and they have developed RF in wireless communication systems, even they did not specialized in RF. Therefore, the currently 4th Generation technology has brought about enormous changes in our lives.
Let's look back on their lives how they started to study RF about 20 years ago. They began the study by just memorizing the products, specification and products catalogues even they did not know the scientific theory and the applicable theory. Even we have still picked them up from our colleagues. It is unexpectedly more difficult than you can get the organized theory and data in order to specialize in systematically. Even, when you try to get some information, it is usually said about RF theory, there is not rational connection with theory and products, and we had no idea how to get the products. Of course, there are lots of developments in wireless communication, the development lead way of prosperous markets and there are a lot of special publication and electronic major at present. However, as long as practitioner's point of view, they are hard books to understand and the information which can't apply them in the field.

Since SRTechnology Corporate (SRT) has specialized in this RF business over decade, we also looked back on SRT's past experience. SRT at present hope to provide hands others who endure the same problem at present.

That is the reason why we start "RF BiBLE". Now we take our first step carefully. We hope that RF BiBLE will help the student majoring in RF, beginner in RF business or the one who have a hard time to get the reliable products, it is the right cause of Bible in RF published. Right here, all of executives and staffs in SRTechnology have an earnest mind that the book named "RF BiBLE".

SRTechnology wish you tremendous success in RF business you do.

MAY 2014.

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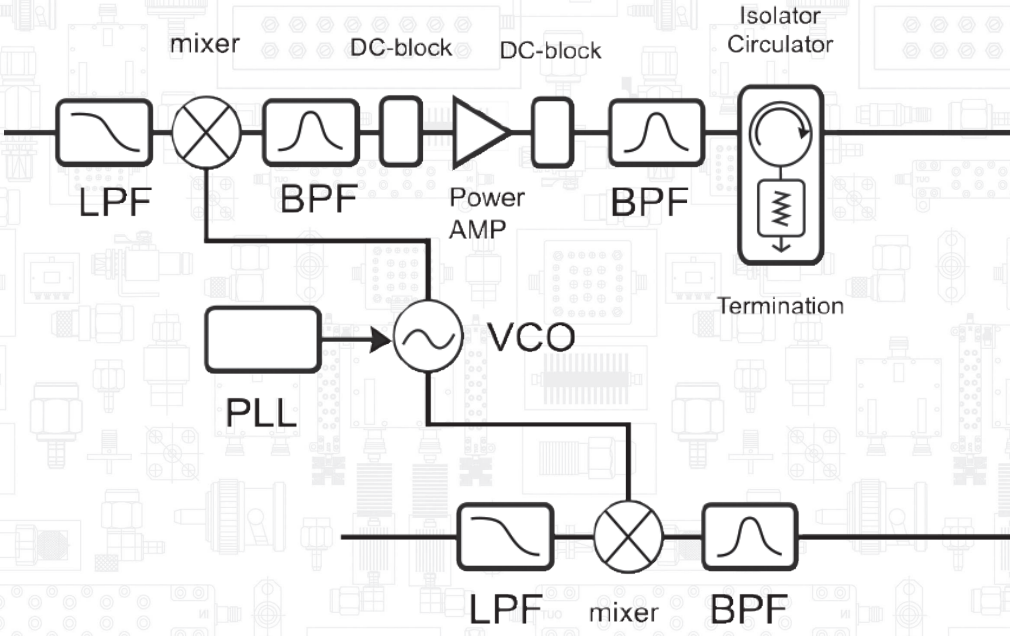
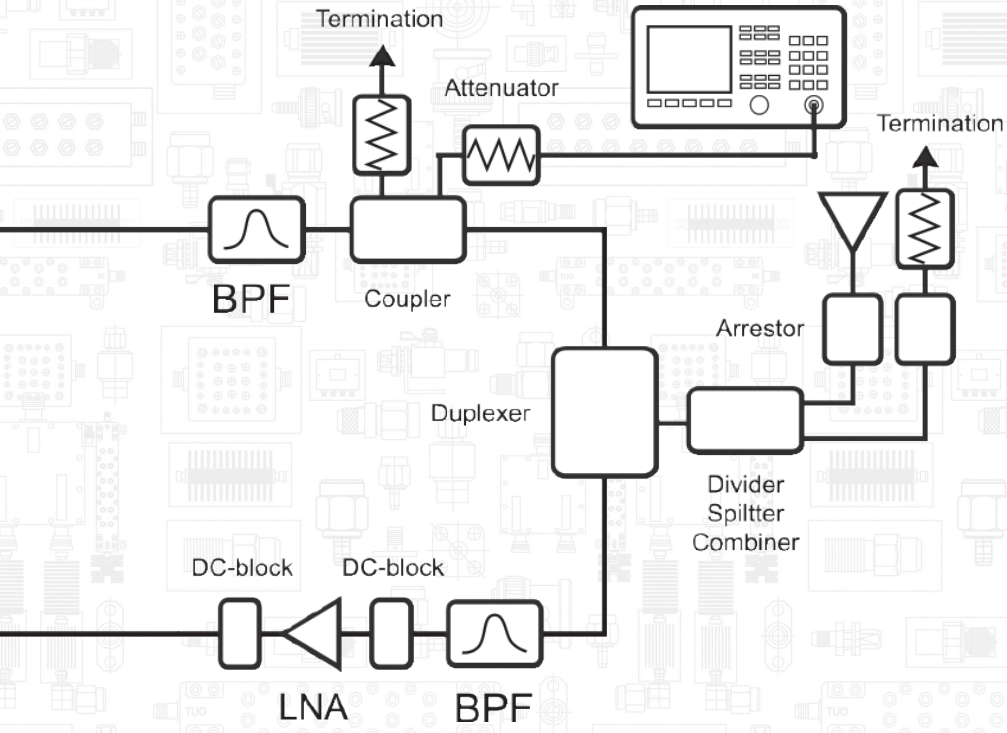
Block Diagram




Termination
Attenuator
Termination
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Coupler
Arrestor
Duplexer
Divider
Spiltter
Combiner
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DC-block
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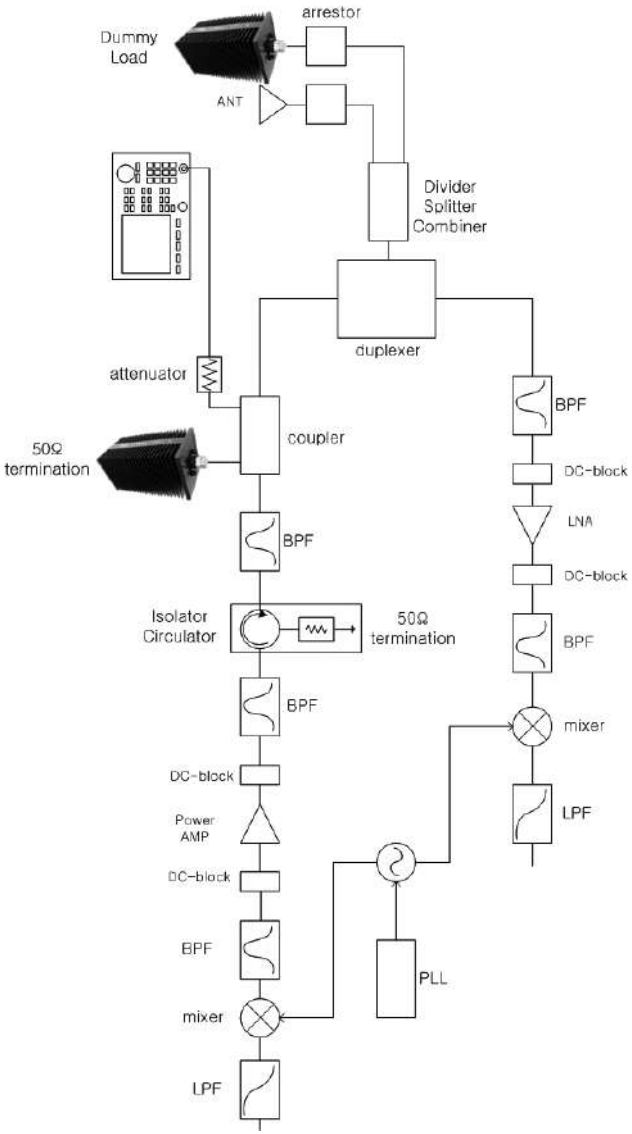
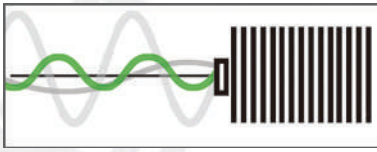
BPF

1 Passive components

01 Termination
Block Diagram





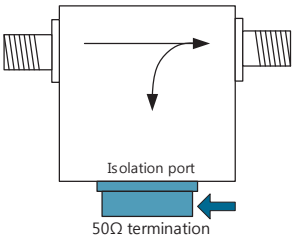
Termination

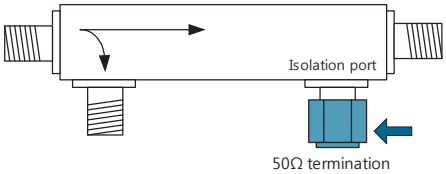
The best Solution for RF Technology!

About Termination

You may remember the movie “Terminator“ if you are in the middle of 30 ~ 40 years old. Even though he got shot and there are lots of obstacles to him, terminator chased and removed until the target is terminated in the end, There is also Terminator in RF circuit. The terminator’s target in RF circuit is the noise which ruins the RF circuit performance.

Termination in RF system is composed of that 50Ω resistor is connected with Ground(GND). In a coupler or isolator, 50Ω resistor is connected with isolation port which is connected with GND. By connecting this way, the reflective wave is diffused to the heat energy, and the signal of reflective wave is terminated. There is another purpose of using terminator that it prevent a minute signal, which should not be occurred, from occurring beside of terminating the signal.





(Dra. 2-1) Termination in Isolator **(Dra. 2-2) Termination in Coupler**

The above pictures on Dra. 2-1 and Dra. 2-2 are shown the termination examples in isolator and coupler from the left to right. The termination in isolator is installed in order to diffusing the reflective signal to the heat. The termination in coupler is installed on isolation port in order to remove the minute signal, even though signal would not be occurred at the isolation port actually.

If there are more than 3 input and output ports in the power divider, coupler and circulator, the termination is also used to check the electrical performance of the power divider, coupler and circulator after selecting them. Termination is connected to the un-using port while other two ports are checked in use.

Let’s see how the termination is worked in coupler.

When we measure S11 or S21 in Network analyzer, Coupler should be connected with terminator not only isolation port but coupled port. Some of input signals from input port are transferred to the coupled port. The transferred signal to coupled port could be returned to the input port if the coupled port is not installed by termination. The S11 and S21 in coupler can't be measured properly without termination in coupled port.

Power divider is same as like coupler. Termination is connected with port No. 3 when it is checked S21 value, and terminator is connected at port No. 2 port when we measure to get S31 value in order not to occur a reflective wave.

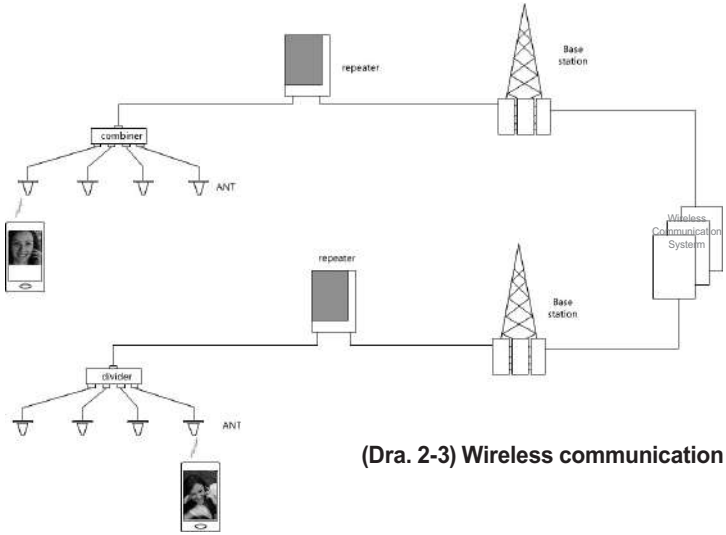
There is a dummy load which concept is similar to the termination.
When it is designed RF transmitter system, antenna is the final object to radiate the signal. Let's try to power on and send an input signal to test into transmitter whether this transmitter works properly or not. If the transmitter is designed well, the input signal is modulated and amplified, and the output signal is radiated through antenna. But if the transmitter is not designed properly even in some small parts, signal would be radiated away. It could be against the law if this radiated signal get out of his originally intended frequency range or exceed allowed transmitting power. It is also required to get permission from government to transmit intended signal.
At this time, we need the dummy load. If the dummy load is installed on the port instead of antenna, all of the signal, which is supposed to be radiated at the final stage in transmitter system, will be absorbed and diffused to heat energy without any reflective signal to the out of the system. The signal is looked like to be radiated through Antenna in transmitter system. In general, Dummy load has a large area of heatsink in order to bear high input power.

If you would understand the above explanation, the return loss is very important in termination. Since there is only 1 port, you don't need to care about the insertion loss but return loss only.

The additional thing for the consideration is the input power. While Termination is working, the energy of electromagnetic waves are diffused to the heat and the waves are terminated. When it is tried to remove an electromagnetic wave energy, heat is generated. If we would compare the same 3GHz frequency range applied

termination with other types of termination, their application and the area of surface should be different from 1Watt 3GHz termination and 100Watt 3GHz termination. If the input power is higher, it will generate more heat, and the termination requires more area of surface and a large heatsink to cooling it down.
For example, if transmitter send the 50dBm power into antenna port, 1Watt(30dBm) of termination which is installed on the port of antenna is not good enough to cover the 50dBm input power. 100Watt(50dBm) termination should be used at least or it is recommended to use more than 100Watt termination such as 125Watt or 150Watt termination. The termination will be safe just in case by this way.

As the principle in termination and dummy load is same, it is all right to use any kind of termination or dummy load if applied input power and coverage of frequency is capable for.
In the conclusion, Termination delete useless input signal by diffusing way at the end of RF circuit.
Termination can be used in all telecommunication equipment and devices including not only mobile telecommunication system but wired and wireless telecommunication systems.

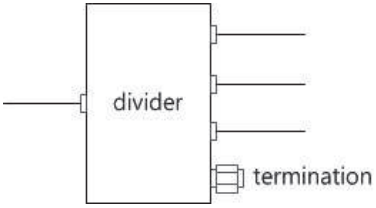


(Dra. 2-3) Wireless communication system

It will be easy to understand of the application of the termination with the explanation of using mobile telecommunication system.

When you input number in your mobile, and then push 'Send' to call your friend. The signal from your mobile phone is transmitted to the antenna located in the building. The antenna transmits the signal to the combiner(or divider) which is connected to the antenna. The combiner(divider) transmits the signal to repeater, and the repeater transmits the received signal to base station, and then the base station finally transmits the signal to the system operator. The signal is transmitted to the receiver in a reverse way. The signal which is transmitted to the base station goes through the repeater and then is transmitted to the antenna which is installed in the building through the divider(combiner). And the signal is finally transmitted to the other mobile phone receiver.

As you can see Dra. 2-3 Mobile telecommunication system, the sender and the receiver used the divider(combiner). You probably know that the divider is an asymmetrical circuit for input and output. When the divider is used in reverse, it works as the combiner and when the combiner is used in reverse, it works as the divider. Please refer to the divider section in this RF Bible at the page 108.
The divider can be used as 2, 3, 4, 8 or more ways of output port depending on the installation environment. However, all the ports are not available according to the installation environment. It means that one port may not be available while the remaining three ports are available although the divider is used as 4 ways. For such cases, you need to add termination to the port which is not used in order to prevent reflected signals.



(Dra. 2-4) Connected termination at divider

It is recommended to select termination with a certain handling power margins in accordance with each output port power which are divided by the output port of power divider from the input power. The reason for using the over power of termination is to secure the safety of system from the uncertain over input power to the termination.
I took the divider which is connected to the repeater as an example, and the repeater is also recommended to be terminated with over coverage handling power

termination on the output port which is not used. Termination is usually used with connecting chains to the repeater to prevent loss.

(Dra. 2-5) Termination with chain

It is exampled the isolator and coupler to explain the application of the termination. As explained, termination is designed with connection to many products such as isolator, circulator, coupler, cavity filter and so on having signals corresponding to the purpose of the product or system, or is used in connection to the external port of the product. As you look into wireless routers, mini repeaters and other various modules which are commonly used, you can see that terminations are frequently used to terminate signals which are injected to the unused ports of various devices.

It is good for you to consider the following in advance when you select terminations.

First of all, you need to check what kind of connectors is connected for each product, module or system.
You need to understand what kind of connector is when you develop or purchase a product to connect it to the end of the RF circuit. If you don't know how to distinguish connector types, please refer to 144 page of this RF Bible to find out the same connector and check the gender of the male or female.

Secondly, you need to check the maximum frequency available to each connector.
MIL-C-39012 specifies BNC connectors as DC-4GHz, SMA connectors as DC-18GHz and N connectors as DC-11GHz (or DC-18GHz). So it may not be available if you are looking for the termination of BNC connector type with 10GHz.

Thirdly, you need to check the output power from the equipment, in other words, input power of Termination.
After checking the output power of the RF circuit for which you want to use the termination, you may consider the termination with the input power same as the output power. However, it is recommended to get the termination with 30%~50% of the additional Termination power coverage for safety reason from the over power

incidentally by the system. Somebody select the terminations with the input power same as the output power of the RF circuits, but most of them use terminations which have more power up to 30%~50% normally than actual input power to termination. Because, if the unintended over power due to an unstable power system may be transmitted to the termination, and the termination may degrade or deteriorate the function. The over power may be transmitted to the system, and the expensive system may be broken so that the high power of termination of application rather than the real input power as an insurance characteristic is recommended to use.

Fourthly, you need to consider the size of the product.
Terminations are designed and manufactured for either indoor or outdoor purpose. Indoor terminations are installed within devices or buildings. So the size matters when the termination is installed within a device. As the power increases, the size of heatsink of the termination increases. It means that high power terminations may not be used in a small system device or in a narrow space. Under the same input power, smaller size of the termination including the heatsink means better efficiency. However, those terminations with higher input power and smaller size are relatively expensive.
Outdoor terminations mean they can be used in external environments. External environments mean the terminations comply with IP rating standard in its own function. Please refer to 270 page of RF Bible for the explanation of IP rating.
Fifthly, we have checked the physical conditions of the product, and now you need to check the electrical functionality of the product.
As explained above, the termination is a 1-port device. Therefore it only has return loss and doesn't have insertion loss. So you need to check the bandwidth of the RF circuit that you are designing, and then you can check the Return loss in that bandwidth or V.S.W.R. values.

We have reviewed the definition of terminations, their applications and considerations for selection of proper product. Though termination seems simple devices but if you look into them you will understand they are very critical products in telecommunication system.

SMA Termination

Features

Check out the Difference!

Reliable V.S.W.R. Specification; 1.20:1 Max

100% of input power test approved under severe conditions

Full data files (Test data, Outlined drawing and Product photos) are available

Customized design available

Within 1 week of delivery

RoHS Compliant

Connector Type	Power	Frequency	V.S.W.R.(max)	PN	Page
SMA Male	1 Watt	DC ~ 6GHz	1.20 : 1	E01-A0106-01	21
SMA Male	1 Watt	DC ~ 18GHz	1.20 : 1	E01-A0118-02	22
SMA Male	2 Watt	DC ~ 6GHz	1.15 : 1	E01-A0206-02	23
SMA Male	2 Watt	DC ~ 18GHz	1.20 : 1	E01-A0218-03	24
SMA Male	5 Watt	DC ~ 6GHz	1.15 : 1	E01-A0506-02	25
SMA Male	5 Watt	DC ~ 18GHz	1.20 : 1	E01-A0518-01	26

SMA Male 1Watt 6GHz

Part No. : E01-A0106-01

- Excellent V.S.W.R. 1.15 : 1 (max) @ 6GHz
- Broad application such as LTE, 5G Sub-6GHz and 5.8GHz WiFi
- Easy Installation
- Same day Shipment

SPECIFICATION

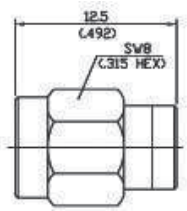
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input Power rating (max)	1 Watt (CW)
V.S.W.R. (max)	1.15 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Gold plating
Coupling nut	Brass / Gold plating
Center contact (Pin)	Brass / Gold plating

DRAWING



SMA Male 1Watt 18GHz

Part No. : E01-A0118-02

- Excellent V.S.W.R. 1.20 : 1 (max) @ 18GHz
- Very broad application such as LTE,
  5G Sub-6GHz, 5.8GHz WiFi, satellite and other
  Microwave performance
- Easy installation
- Same day Shipment

SPECIFICATION

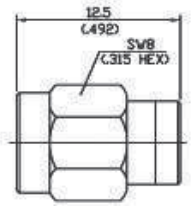
Electrical Specification

Item	Specification
Frequency range	DC ~ 18 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	1 Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Gold plating
Coupling nut	Brass / Gold plating
Center contact (Pin)	Brass / Gold plating

DRAWING



SMA Male 2Watt 6GHz

Part No. : E01-A0206-02

- World Best V.S.W.R. 1.15 : 1 (max) @ 6GHz
- Broad application such as, LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power test approved
- Stainless Steel SMA coupling Nut for reliable 500 mating life cycle
- Tri-Alloy plating for housing and connector body
- Smallest diameter for limited inner and outer space

SPECIFICATION

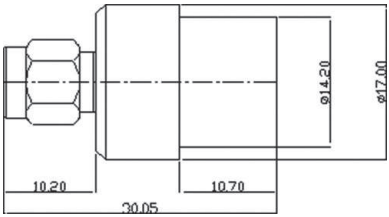
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2 Watt (CW)
V.S.W.R. (max)	1.15 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	SUS / Passivated
Center contact (Pin)	Brass / Gold plating
Dimension	Ø17 * 30mm

DRAWING



SMA Male 2Watt 18GHz

Part No. : E01-A0218-03

- World Best V.S.W.R. 1.20 : 1 (max) @ 18GHz
- Very Broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, satellite and other Microwave purpose
- Input power test approved
- Stainless Steel SMA coupling nut for reliable 500 Mating life cycle
- Tri-Alloy plating for Termination housing and connector body

SPECIFICATION

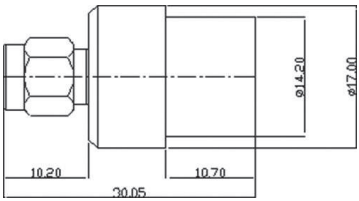
Electrical Specification

Item	Specification
Frequency range	DC ~ 18 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	SUS / Passivated
Center contact (Pin)	Brass / Gold plating
Dimension	Ø17 * 30mm

DRAWING



SMA Male 5Watt 6GHz

Part No. : E01-A0506-02

- World Best V.S.W.R. 1.15 : 1 (max.) @ 6GHz
- Broad application such as, LTE, 5G Sub-6GHz, and 5.8GHz WiFi.
- Input power test approved
- Tri-Alloy plating for Termination body and connector body
- Stainless Steel SMA coupling Nut for reliable 500 mating life cycle
- Minimized 20mm cooling heat sink diameter

SPECIFICATION

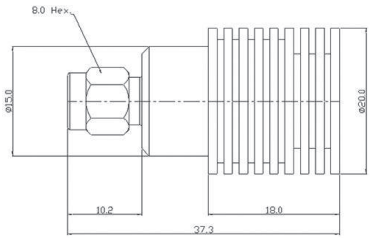
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	5Watt (CW)
V.S.W.R. (max)	1.15 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body & Housing	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	SUS / Passivated
Center contact (Pin)	Brass / Gold plating
Dimension	Ø20 * 37.3mm

DRAWING



SMA Male 5Watt 18GHz

Part No. : E01-A0518-01

- World Best V.S.W.R. 1.20 : 1 (max) @ 18GHz
- Very Broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, satellite and other Microwave purpose
- Input power test approved
- Tri-Alloy plating for Termination body and connector body
- Stainless Steel SMA coupling Nut for 500 Mating life cycle
- Minimizing 20mm Cooling pin Diameter

SPECIFICATION

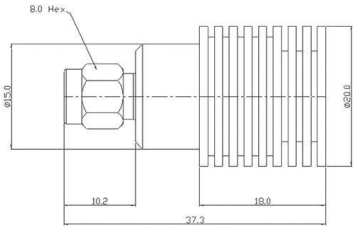
Electrical Specification

Item	Specification
Frequency range	DC ~ 18 GHz
Impedance (Nominal)	50Ω
Input power rating	5Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	SMA male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body & Housing	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	SUS / Passivated
Center contact (Pin)	Brass / Gold plating
Dimension	Ø20 * 37.3mm

DRAWING



N Termination

Check out the Difference!

Features

Reliable V.S.W.R. Specification; 1.20:1 max

100% of input power test approved under severe conditions

Full data files (Test data, Outlined drawing and Product photos) are available

Customized design available upon request

Short delivery within 1 week of delivery from valuable order

RoHS Compliant

Connector Type	Power	Frequency	V.S.W.R.(max)	PN	Page
N Male	2 Watt	DC ~ 6GHz	1.15 : 1	E04-A0206-01	29
N Male	2 Watt	DC ~ 18GHz	1.18 : 1	E04-A0218-05	30
N Male	5 Watt	DC ~ 6GHz	1.15 : 1	E04-A0506-04	31
N Male	5 Watt	DC ~ 18GHz	1.20 : 1	E04-A0518-03	32
N Male	10 Watt	DC ~ 4GHz	1.20 : 1	E04-A1004-04	33
N Male	30 Watt	DC ~ 4GHz	1.20 : 1	E04-A3004-07	34
N Male	50 Watt	DC ~ 4GHz	1.20 : 1	E04-A5004-08	35
N Male	50 Watt	DC ~ 6GHz	1.20 : 1	E04-A5006-02	36
N Male	100 Watt	DC ~ 3GHz	1.20 : 1	E04-H1003-11	37

N Male 2Watt 6GHz

Part No. : E04-A0206-01

- World Best lowest V.S.W.R. 1.15 : 1 (max) @ 6GHz
- Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power test approved
- Same day shipment

SPECIFICATION

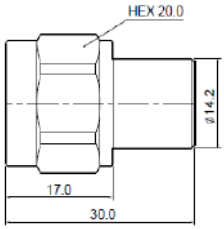
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (Max)	1.15 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø14.2 * 30mm

DRAWING



N Male 2Watt 18GHz

Part No. : E04-A0218-05

- World Best lowest V.S.W.R. 1.20 : 1 (max) @ 18GHz
- Very Broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, satellite and other Microwave purpose
- Input power test approved
- Same day shipment

SPECIFICATION

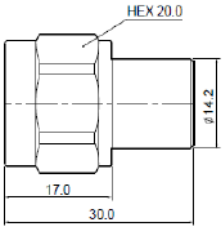
Electrical Specification

Item	Specification
Frequency range	DC ~ 18 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø14.2 * 30mm

DRAWING



N Male 5Watt 6GHz

Part No. : E04-A0506-04

- World Best lowest V.S.W.R. 1.15 : 1 (max) @ 6GHz
- Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power test approved
- Tri-Alloy plating for Termination body and connector body
- Minimizing 20mm Cooling heat sink Diameter

SPECIFICATION

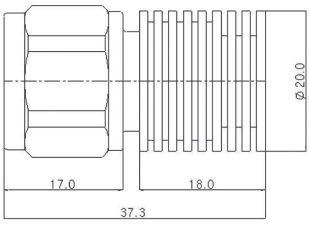
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	5Watt (CW)
V.S.W.R. (max)	1.15 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body & Housing	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø20 * 37.3mm

DRAWING



N Male 5Watt 18GHz

Part No. : E04-A0518-03

- World Best lowest V.S.W.R. 1.20 : 1 (max) @ 18GHz
- Very Broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, satellite and other Microwave purpose
- Input power test approved
- Tri-Alloy plating for Termination and connector body
- Minimized 20mm Cooling heat sink Diameter

SPECIFICATION

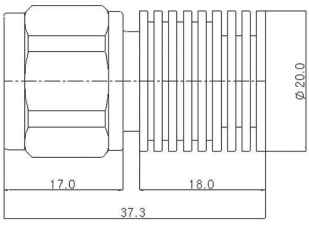
Electrical Specification

Item	Specification
Frequency range	DC ~ 18 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	5Watt (CW)
V.S.W.R. (Max)	1.20 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body & Housing	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø20 * 37.3mm

DRAWING



N Male 10Watt 4GHz

Part No. : E04-A1004-04

- World Best lowest V.S.W.R. 1.20 : 1 (max) @ 4GHz
- 3G, 4G LTE application
- Input power test approved
- Shortest delivery
- Smallest dimension for 10Watt termination

SPECIFICATION

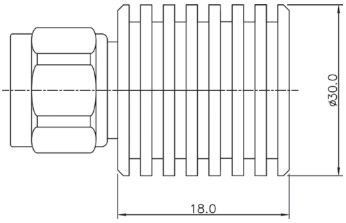
Electrical Specification

Item	Specification
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	10Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	N male (plug)
Operating Temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body & Housing	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø14.2 * 30mm

DRAWING



N Male 30Watt 4GHz

Part No. : E04-A3004-07

- Reliable V.S.W.R. 1.20 : 1 (max) @ 4GHz
- 3G, 4G LTE application
- Input power test approved
- Shortest delivery
- 3 years long life warranty

SPECIFICATION

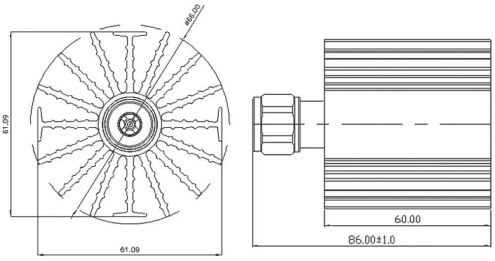
Electrical Specification

Item	Specification
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	30Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

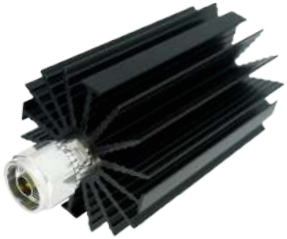
Material specification

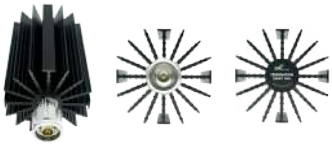
Item	Specification
Housing	Aluminum / Black Anodizing
Body	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating

DRAWING



N Male 50Watt 4GHz





Part No. : E04-A5004-08

- Reliable V.S.W.R. 1.20 : 1 (max) @ 4GHz
- 3G, 4G LTE application
- Input power test approved
- Shortest delivery
- 3 years long life warranty

SPECIFICATION

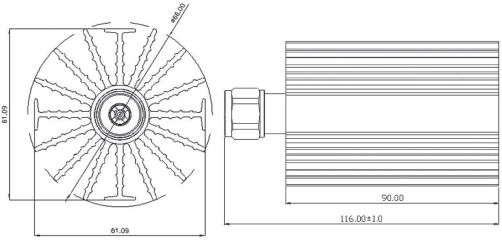
Electrical Specification

Item	Specification
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	50Watt (CW)
V.S.W.R. (max)	1.15 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

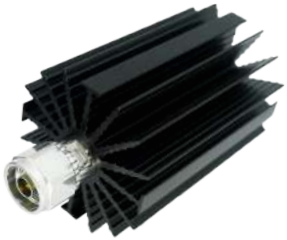
Material specification

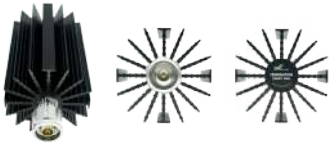
Item	Specification
Housing	Aluminum / Black Anodizing
Body	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating

DRAWING



N Male 50Watt 6GHz





Part No. : E04-A5006-02

- Reliable V.S.W.R. 1.20 : 1 (max) @ 6GHz.
- Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power Test approved
- Shortest delivery
- 3 years long life warranty

SPECIFICATION

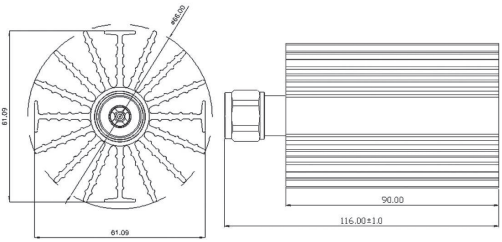
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	50Watt (CW)
V.S.W.R. (Max)	1.20 : 1
Connector type	N male (plug)
Operating temperature	-65°C ~ +85°C

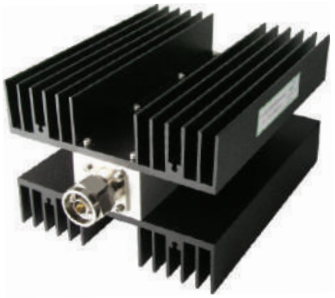
Material specification

Item	Specification
Housing	Aluminum / Black Anodizing
Body	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø66 * 116mm

DRAWING



N Male 100Watt 3GHz



Part No. : E04-H1003-11

- Reliable V.S.W.R. 1.20 : 1 (max) @ 3GHz
- Telecommunication application
- Input power test approved
- Shortest delivery
- 3 years long life warranty

SPECIFICATION

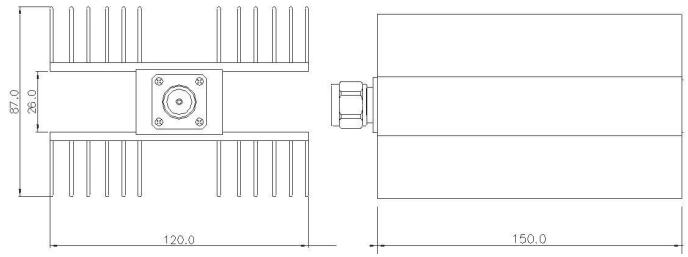
Electrical Specification

Item	Specification
Frequency range	DC ~ 3 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	100Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	N male (plug)
Operating Temperature	-65°C ~ +85°C

Material specification

Item	Specification
Housing	Aluminum / Black Anodizing
Body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Connector body	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating

DRAWING



7/16DIN Termination

Features

Check out the Difference!

Reliable V.S.W.R. Specification, 1.20:1 max
100% of Input power test approved under severe conditions
Full data files (Test data, Outlined drawing and Product photos) are available
Customized design available upon request
Within 2 weeks of short delivery from valuable order

Connector Type	Power	Frequency	V.S.W.R.(max)	PN	Page
7/16DIN Male	2 Watt	DC ~ 7.5GHz	1.20 : 1	E05-A0208-01	39
7/16DIN Male	30 Watt	DC ~ 4GHz	1.20 : 1	E05-A3004-02	40
7/16DIN Male	50 Watt	DC ~ 4GHz	1.20 : 1	E05-A5004-01	41
7/16DIN Male	100 Watt	DC ~ 3GHz	1.20 : 1	E05-H1003-04	42

7/16DIN Male 2Watt 7.5GHz

Part No. : E05-A0208-01

- World Best V.S.W.R. 1.20 : 1 (max) @ 7.5GHz
- Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power test approved
- Tri-Alloy plating for Termination body and connector body
- 3 Years long life Warranty

SPECIFICATION

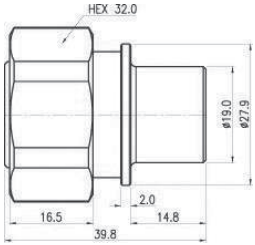
Electrical Specification

Item	Specification
Frequency range	DC ~ 7.5 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	7/16DIN male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Gold plating
Dimension	Ø27.9 * 39.8mm

DRAWING



7/16DIN Male 30Watt 4GHz

Part No. : E05-A3004-02

- Reliable V.S.W.R. 1.20 : 1 (max) @ 4GHz
- 3G, 4G LTE application
- Input power test approved
- 3 years long life warranty

SPECIFICATION

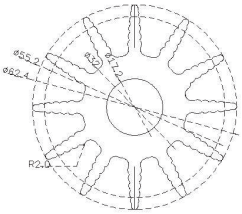
Electrical Specification

Item	Specification
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input Power rating (max)	30Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	7/16DIN male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Housing	Aluminum / Black Anodizing
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Silver plating

DRAWING



7/16DIN Male 50Watt 4GHz

Part No. : E05-A5004-01

- Reliable V.S.W.R. 1.20 : 1 (max) @ 4GHz
- 3G, 4G LTE application
- Input power test approved
- IP 65 Water and dust-proof rating for outdoor application
- 3 years long life warranty

SPECIFICATION

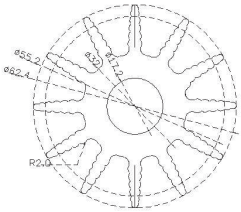
Electrical Specification

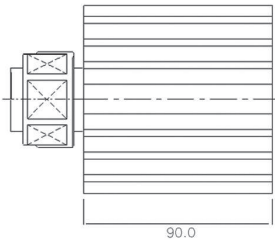
Item	Specification
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input Power rating (max)	50Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	7/16DIN male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Housing	Aluminum / Black Anodizing
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass / Silver plating

DRAWING





7/16DIN Male 100Watt 3GHz

Part No. : E05-H1003-04

- Reliable V.S.W.R. 1.20 : 1 (max) @ 3GHz
- Telecommunication application
- Input power test approved
- 3 years long life warranty

SPECIFICATION

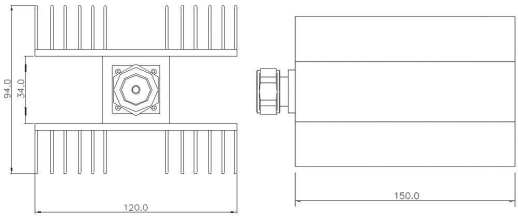
Electrical Specification

Item	Specification
Frequency range	DC ~ 3 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	100 Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	7/16DIN male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Housing	Aluminum / Black Anodizing
Body	Aluminum / Black Anodizing
Connector body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center Contact (Pin)	Brass / Silver plating

DRAWING



Other Termination

Check out the Difference!

Features

Reliable V.S.W.R. Specification; 1.20:1 max

100% of input power test approved under severe conditions

Full data files (Test data, Outlined drawing and Product photos) are available

Customized design available upon request

Within 2 weeks of short delivery

RoHS Compliant

Connector Type	Power	Frequency	V.S.W.R.(max)	PN	Page
BNC Male	1 Watt	DC ~ 3GHz	1.20 : 1	E02-A0103-01	45
BNC Male	2 Watt	DC ~ 3GHz	1.20 : 1	E02-A0203-01	46
TNC Male	2 Watt	DC ~ 6GHz	1.20 : 1	E03-A0206-01	47

BNC Male 1Watt 3GHz

Part No. : E02-A0103-01

- V.S.W.R. 1.20 : 1 (max) @ 3GHz
- Telecommunication and radio application
- Input power test approved
- 3 years long life warranty

SPECIFICATION

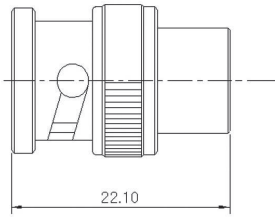
Electrical Specification

Item	Specification
Frequency range	DC ~ 3 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	1Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	BNC male (plug)
Operating Temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Nickel plating
Connector Body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating

DRAWING



BNC Male 2Watt 3GHz

Part No. : E02-A0203-01

- V.S.W.R. 1.20 : 1 (max) @ 3GHz
- Telecommunication and radio application
- Input power test approved
- Long 3 years life warranty

SPECIFICATION

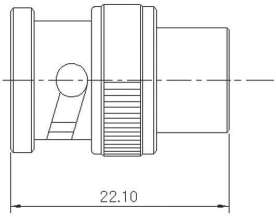
Electrical Specification

Item	Specification
Frequency range	DC ~ 3 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (max)	1.20 : 1
Connector type	BNC male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass / Gold plating

DRAWING



TNC Male 2Watt 6GHz

Part No. : E03-A0206-01

- V.S.W.R. 1.25 : 1 (max) @ 6GHz
- Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Input power test approved
- Same day shipment

SPECIFICATION

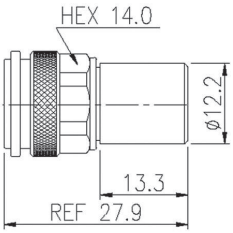
Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
V.S.W.R. (max)	1.25 : 1
Connector type	TNC male (plug)
Operating temperature	-65°C ~ +85°C

Material specification

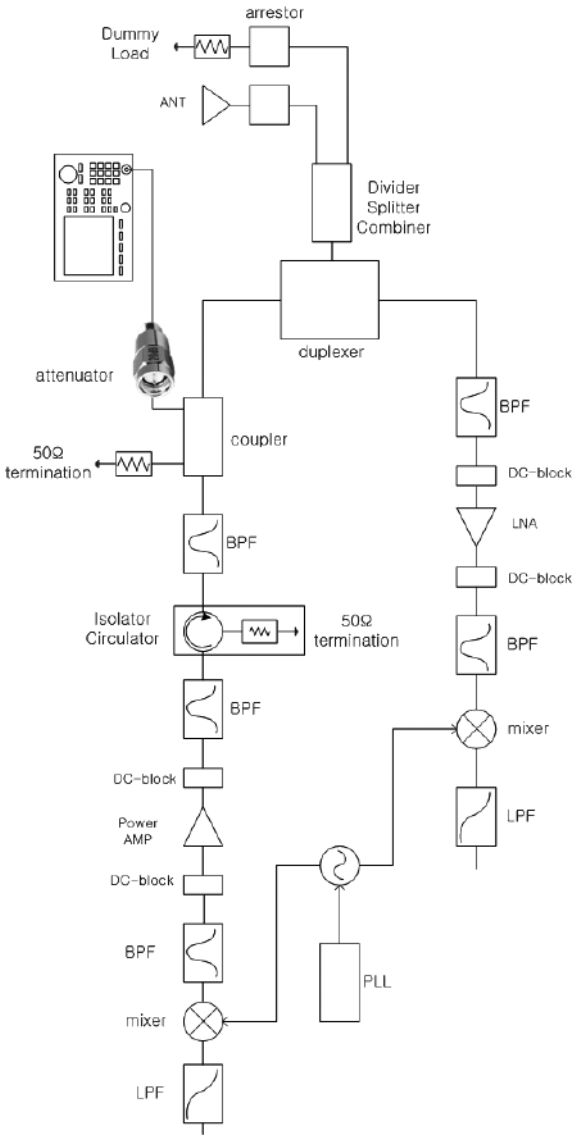
Item	Specification
Body	Brass / Tri-alloy plating
Connector body	Brass / Tri-alloy plating
Coupling nut	Brass / Tri-alloy plating
Center contact (Pin)	Brass / Gold plating

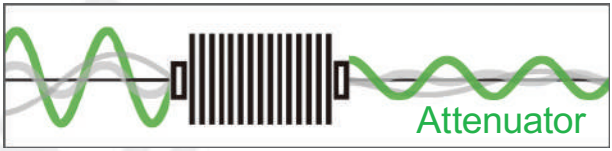
DRAWING



02 Attenuator

Block Diagram





The best Solution for RF Technology!

About Attenuator

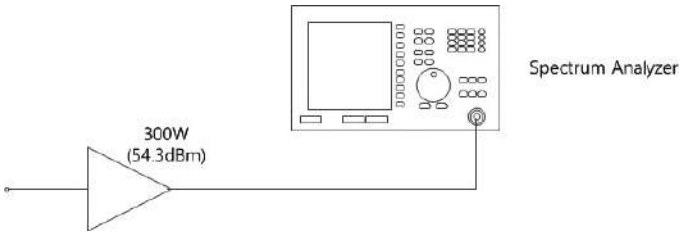
Attenuator makes decreasing output power in some module or RF system without distorting or transforming of signal waveform or data when the output power is too high and could cause damage on the system or equipment.

There are some reasons to attenuate a power.

1. Attenuator is used to improve the Impedance matching and secure the reliability of circuit. Attenuator is also used to adapt the level between the two different circuits or devices. For example, if there are Power Amplifier(hereinafter we refer to Amplifier as AMP) which output power is +15dBm at the first and then connected duplexer which the input power range is 0 ~ +5dBm, the -12dB of attenuator is used between Power AMP and duplexer to revise the gap of output and input power between both equipments to protect duplexer safely from the exceed input power.

2. Beside of this case, Attenuator is used to attenuate the power when there is not coupler for power monitoring, or even the coupled power seems too high enough to brake connected next equipment, attenuator could be applied to keep safe the equipment from undesired excessive input power.

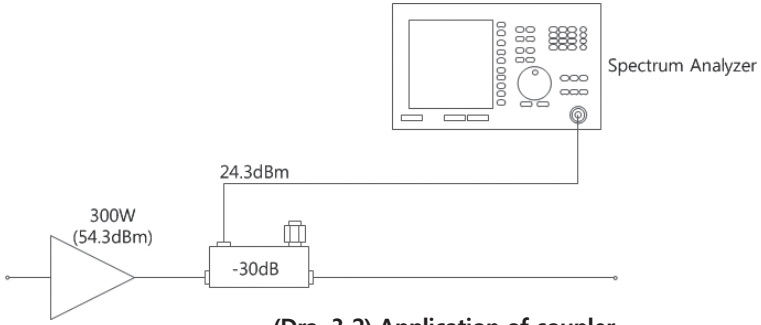
For example, when we try to monitor the output waveform and power of power AMP which generate +54.3dBm(300Watt), it is highly risky to connect directly the power AMP to spectrum analyzer. The valuable spectrum analyzer could be damaged due to the excessive high input power which is out of coverage of handling power.



(Dra. 3-1)

In order to prevent this problem in advance, we measure the power and waveform of the signal while a -30dB of coupler is connected with power AMP, and the coupled port

in coupler is connected to spectrum analyzer. If it works well in normal, the waveform is same and the power is measured -30dB lower at the coupling port.

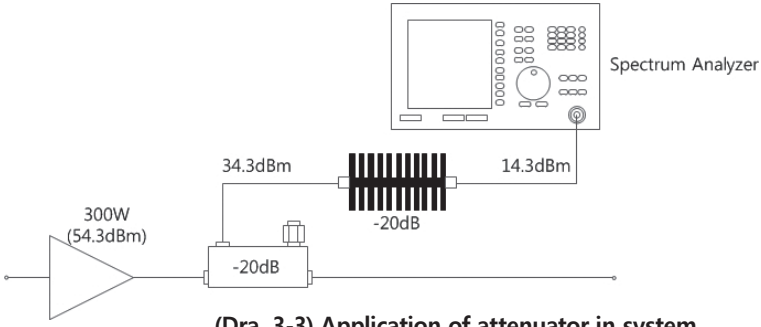


(Dra. 3-2) Application of coupler

However, even though the -30dB coupler is applied or not on the system, it would be highly risky if the spectrum analyzer's input power handling capability is lower than the output power to the spectrum analyzer which is lowered by the coupler.

If there is -20dB coupler, the output power of coupled port get lower to +34.3dBm from +54.3dBm input power of AMP. But it is still high power level to the spectrum analyzer. -20dB 10Watt(40dBm) attenuator could be applied to attenuate the high output power on the coupled port.

Otherwise, the same –20dB 10Watt(40dBm) attenuator could be connected to the input port of spectrum analyzer which has low capability of handling power.



(Dra. 3-3) Application of attenuator in system

When you say that the input power range of the measuring instrument is low, it means the level of the input power to which the measuring instrument is tolerable is low. Most of the measuring instruments have their power levels between mWatt and a few Watts which are not that high.

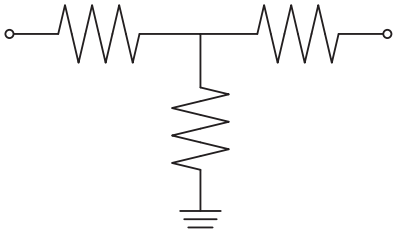
Whenever you use any kind of measuring instruments, you need to check the input power level of the instrument in before using it to ensure that the input power appropriate to the level is injected. When the input power level of the measuring instrument is lower than the output power of the device to be measured, you must use an attenuator to protect your measuring instrument.

When do you need to use the attenuator in practices?

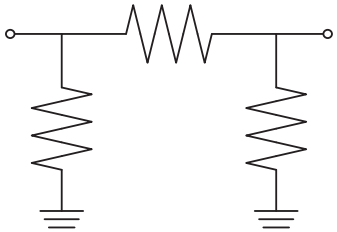
As explained above, the attenuator decreases the output power of Power Amp or instrument down to a requiring level. You can face the situation that the actual output power of a Power AMP or other device is higher than the power which was initially designed. In such cases, you can easily, safely and reasonably verify the functions of the product without modifing or tuning, by decreasing the output power as assigned by the attenuator rather than carrying out a new design and development.

When the product design is successfully completed and the production line begins manufacturing, the production line and the Quality Control will occasionally inspect the quality of the products for the next step. At this time, there may be dangers of injecting or outputting the power under the actual field condition. Especially for products like AMP which have higher output power, this will cause damages to the measuring instruments, production lines and production personnel. Because of these dangerous situations, the attenuator should be connected at the out port of AMP so that the damages can be prevented at the production lines.

Attenuator is consisted of 3 resistors in circuit which is placed like T-type shape or π type shape to attenuate input power by diffusing to heat.



(Dra. 3-4) T-type pattern



(Dra. 3-5) π type pattern

There are two types of attenuators. One is fixed attenuator and the other is variable attenuator.

Until now, the above explained attenuator is the fixed attenuator. Variable attenuator is the attenuator which attenuation dB can be adjusted and can be used to measure

a various dB easily with the variable attenuator itself. Variable attenuator is more expensive than the fixed attenuator but it is very convenient for use.

The key factors to choose the attenuator are insertion loss(S21) in the frequency range, a flatness of insertion loss, return loss(S11) and power handling capability in input power. As below, you can see the explanation for key factors with the examples.

Let's try to choose the attenuator for the 2GHz +50dBm output power system. Coupler is the one of the good option. It is possible to measure a power through coupled port of coupler simply out of +50dBm output power. But we just suppose there is not a coupler available at this moment. If maximum handling input power is +30dBm at spectrum analyzer, it would be desirable to give +20dBm or lower power to protect spectrum analyzer. +50dBm is converted into 100Watt in watt scale. You can check the dBm and Watt table in this RF Bible (Page 258). Therefore, at least 100Watt attenuator should be used. It could be happened a bounced power in a moment so that the margin over 100watt at the attenuator is recommended. Even though someone choose the attenuator with margin in power, the unexpected over power could be flowed into the attenuator, and the attenuator could be out of order. You should check it out the nominal input power and peak power in attenuator before selecting the attenuator. Because of the over power, the attenuator could not carry out its function and could make damage to the equipment when attenuator is damaged and the input signal would return to the equipment.
The insertion loss(S21) should be -30 dB to attenuate the input power from + 50dBm to +20dBm. The working frequency with a margin is recommended that 2.5GHz or 3GHz of attenuator is better than 2GHz attenuator itself. Because the return loss and insertion loss is getting worse from the 2GHz frequency, as long as the product guarantee the electrical specification upto 2GHz. In conclusion, 150Watt -30dB 2.5GHz attenuator is recommended to select with the 2GHz +50dBm output power system. If it is not available -30dB attenuator, it could be connected -10dB and -20dB attenuator together alternatively. But you should pay attention that -20dB attenuator is placed in front of the other. Then +50dBm of power is attenuated to +30dBm, through -20dB attenuator, and 1watt will be carried after the -20dB attenuator. Therefore it could be used 2watt -10dB attenuator even if you would consider the attenuating margin.

The next step to consider is to check S11 and S21 S-parameter specification graph. It is

same way to check V.S.W.R., instead of S11 as the final outcome. You can refer to the concept of V.S.W.R. and S-parameter at this RF Bible(Page 259, 262).

It should be careful at the direction of attenuator. If you would connect the attenuator in reversed direction at the power test, the attenuator could be burned out so that it could cause severe damage to the test equipment and circuit. Mostly there is an input and output mark at the high power attenuator. If there is not a mark, the male (plug) connector port is input port and female (jack) connector port is output normally. There is bi-directional attenuator which could be used on the both side, but it is usually cost higher than directional attenuator.

One more thing you need to consider is the type of the input and output connectors.
You need to clearly check the type of the cable assembly or connector of the device which is connected to the attenuator so that you can determine the appropriate type of the connector for the attenuator. Usually SMA type connectors are used for the power less than 10Watt and N type or 7/16DIN type connectors are used for the power of 50Watt, 100Watt, 200Watt or more.
SMA type connectors can be used up to 18GHz bandwidth despite of their lower injected power while N type connectors are limited to 18GHz despite of their higher injected power.

SMA 2Watt DC~4GHz Attenuator

Check out the Difference!

Features

Outstanding flatness of Attenuation accuracy value

Stainless steel material for the long life usage and reliable specification

Excellent power capacity in anti-burnout.

Full data files (Test data, Outlined drawing and Product photos) are available

Optimized for Telecommunication application

Various dB (1 ~ 40dB) available

1 week of fastest delivery

RoHS Compliant

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
SMA 2Watt 1dB DC~4GHz	1.18:1	1 ±0.35dB	F01-B0401-03	58
SMA 2Watt 2dB DC~4GHz	1.18:1	2 ±0.35dB	F01-B0402-03	
SMA 2Watt 3dB DC~4GHz	1.18:1	3 ±0.4dB	F01-B0403-03	59
SMA 2Watt 4dB DC~4GHz	1.18:1	4 ±0.4dB	F01-B0404-03	
SMA 2Watt 5dB DC~4GHz	1.18:1	5 ±0.4dB	F01-B0405-03	
SMA 2Watt 6dB DC~4GHz	1.18:1	6 ±0.4dB	F01-B0406-03	
SMA 2Watt 7dB DC~4GHz	1.18:1	7 ±0.55dB	F01-B0407-03	60
SMA 2Watt 8dB DC~4GHz	1.18:1	8 ±0.55dB	F01-B0408-03	
SMA 2Watt 9dB DC~4GHz	1.18:1	9 ±0.55dB	F01-B0409-03	
SMA 2Watt 10dB DC~4GHz	1.18:1	10 ±0.55dB	F01-B0410-03	

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
SMA 2Watt 11dB DC~4GHz	1.18:1	11 ±0.55dB	F01-B0411-03	60
SMA 2Watt 12dB DC~4GHz	1.18:1	12 ±0.55dB	F01-B0412-03	
SMA 2Watt 13dB DC~4GHz	1.18:1	13 ±0.55dB	F01-B0413-03	
SMA 2Watt 14dB DC~4GHz	1.18:1	14 ±0.55dB	F01-B0414-03	
SMA 2Watt 15dB DC~4GHz	1.18:1	15 ±0.55dB	F01-B0415-03	
SMA 2Watt 16dB DC~4GHz	1.18:1	16 ±0.55dB	F01-B0416-03	
SMA 2Watt 17dB DC~4GHz	1.18:1	17 ±0.55dB	F01-B0417-03	
SMA 2Watt 18dB DC~4GHz	1.18:1	18 ±0.55dB	F01-B0418-03	
SMA 2Watt 19dB DC~4GHz	1.18:1	19 ±0.55dB	F01-B0419-03	
SMA 2Watt 20dB DC~4GHz	1.18:1	20 ±0.55dB	F01-B0420-03	
SMA 2Watt 21dB DC~4GHz	1.18:1	21 ±0.55dB	F01-B0421-03	
SMA 2Watt 22dB DC~4GHz	1.18:1	22 ±0.55dB	F01-B0422-03	
SMA 2Watt 23dB DC~4GHz	1.18:1	23 ±0.55dB	F01-B0423-03	
SMA 2Watt 24dB DC~4GHz	1.18:1	24 ±0.55dB	F01-B0424-03	
SMA 2Watt 25dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0425-03	61
SMA 2Watt 26dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0426-03	
SMA 2Watt 27dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0427-03	
SMA 2Watt 28dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0428-03	
SMA 2Watt 29dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0429-03	
SMA 2Watt 30dB DC~4GHz	1.18:1	25 ±0.55dB	F01-B0430-03	

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

SMA 2Watt 1~2 dB DC~4GHz

- 2 Watt Bi-directional type
- 2 Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

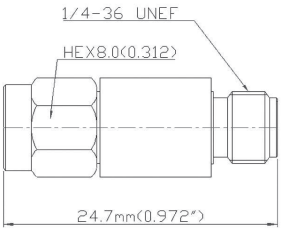
Electrical Specification

Item	Specification	
Part number	F01-B0401-03	F01-B0402-03
Frequency range	DC ~ 4 GHz	
Impedance (Nominal)	50Ω	
Input power rating (max)	2 Watt (CW)	
Attenuation accuracy	1 ±0.35 dB	2 ±0.35 dB
V.S.W.R. (max)	1.18 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass (male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt 3~6 dB DC~4GHz

- 2 Watt Bi-directional type
- 2 Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

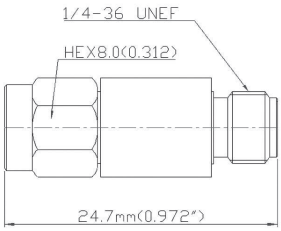
Electrical Specification

Item	Specification	
Part number	F01-B0403-03	F01-B0404-03
	F01-B0405-03	F01-B0406-03
Frequency range	DC ~ 4 GHz	
Impedance (Nominal)	50Ω	
Input power rating (max)	2 Watt (CW)	
Attenuation accuracy	3 ±0.4 dB	4 ±0.4 dB
	5 ±0.4 dB	6 ±0.4 dB
V.S.W.R. (max)	1.18 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass (male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt 7~24 dB DC~4GHz

- 2 Watt Bi-directional type
- 2 Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

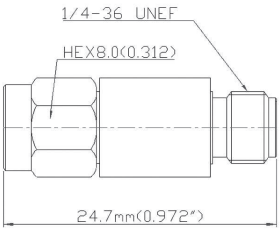
Electrical Specification

Item	Specification
Part number	F01-B0407-03 ~ F01-B0424-03 (ex, F01-B04**dB-03 / **: 07~24dB)
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2 Watt (CW)
Attenuation accuracy	7 ~ 24 ±0.55 dB
V.S.W.R. (max)	1.18 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass(male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt 25~30 dB DC~4GHz

- World Best ±0.55dB Attenuation accuracy
- 2 Watt Bi-directional type
- 2 Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

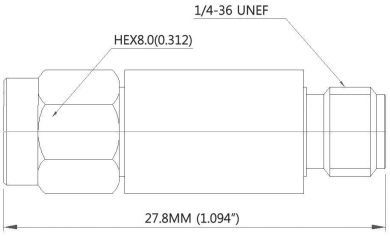
Electrical Specification

Item	Specification
Part number	F01-B0425-03 ~ F01-B0430-03 (ex, F01-B04**dB-03 / **: 25~30dB)
Frequency range	DC ~ 4 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2 Watt (CW)
Attenuation accuracy	25 ~ 30 ±0.55 dB
V.S.W.R. (max)	1.18 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass(male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt DC~8GHz Attenuator

Check out the Difference!

Features

Stainless Steel material for the long life usage and reliability specification

Outstanding flatness of Attenuation value

Excellent power capacity in anti-burnout
Full data files (Test data, Outlined drawing and Product photos) are available

Optimized for Various application, from FM Radio to WiMax including telecommunication system such as 3G, 4G, 5G LTE

1~ 2weeks of shortest delivery from your valuable order

RoHS Compliant

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
SMA 2Watt 1dB DC~8GHz	1.20:1	1 ±0.35dB	F01-B0801-05	64
SMA 2Watt 2dB DC~8GHz	1.20:1	2 ±0.35dB	F01-B0802-05	
SMA 2Watt 3dB DC~8GHz	1.20:1	3 ±0.4dB	F01-B0803-05	65
SMA 2Watt 4dB DC~8GHz	1.20:1	4 ±0.4dB	F01-B0804-05	
SMA 2Watt 5dB DC~8GHz	1.20:1	5 ±0.4dB	F01-B0805-05	
SMA 2Watt 6dB DC~8GHz	1.20:1	6 ±0.4dB	F01-B0806-05	
SMA 2Watt 7dB DC~8GHz	1.20:1	7 ±0.55dB	F01-B0807-05	66
SMA 2Watt 8dB DC~8GHz	1.20:1	8 ±0.55dB	F01-B0808-05	
SMA 2Watt 9dB DC~8GHz	1.20:1	9 ±0.55dB	F01-B0809-05	
SMA 2Watt 10dB DC~8GHz	1.20:1	10 ±0.55dB	F01-B0810-05	

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
SMA 2Watt 11dB DC~8GHz	1.20:1	11 ±0.55dB	F01-B0811-05	66
SMA 2Watt 12dB DC~8GHz	1.20:1	12 ±0.55dB	F01-B0812-05	
SMA 2Watt 13dB DC~8GHz	1.20:1	13 ±0.55dB	F01-B0813-05	
SMA 2Watt 14dB DC~8GHz	1.20:1	14 ±0.55dB	F01-B0814-05	
SMA 2Watt 15dB DC~8GHz	1.20:1	15 ±0.55dB	F01-B0815-05	
SMA 2Watt 16dB DC~8GHz	1.20:1	16 ±0.55dB	F01-B0816-05	
SMA 2Watt 17dB DC~8GHz	1.20:1	17 ±0.55dB	F01-B0817-05	
SMA 2Watt 18dB DC~8GHz	1.20:1	18 ±0.55dB	F01-B0818-05	
SMA 2Watt 19dB DC~8GHz	1.20:1	19 ±0.55dB	F01-B0819-05	
SMA 2Watt 20dB DC~8GHz	1.20:1	20 ±0.55dB	F01-B0820-05	
SMA 2Watt 21dB DC~8GHz	1.20:1	21 ±0.55dB	F01-B0821-05	
SMA 2Watt 22dB DC~8GHz	1.20:1	22 ±0.55dB	F01-B0822-05	
SMA 2Watt 23dB DC~8GHz	1.20:1	23 ±0.55dB	F01-B0823-05	
SMA 2Watt 24dB DC~8GHz	1.20:1	24 ±0.55dB	F01-B0824-05	
SMA 2Watt 25dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0825-05	67
SMA 2Watt 26dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0826-05	
SMA 2Watt 27dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0827-05	
SMA 2Watt 28dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0828-05	
SMA 2Watt 29dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0829-05	
SMA 2Watt 30dB DC~8GHz	1.20:1	25 ±0.55dB	F01-B0830-05	

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

SMA 2Watt 1~2 dB DC~8GHz

- 2 Watt Bi-directional type
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

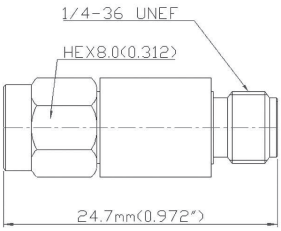
Electrical Specification

Item	Specification	
Part number	F01-B0801-05	F01-B0802-05
Frequency range	DC ~ 8 GHz	
Impedance (Nominal)	50Ω	
Input Power rating (max)	2 Watt (CW)	
Attenuation accuracy	1 ±0.35 dB	2 ±0.35 dB
V.S.W.R. (max)	1.20 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass (male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt 3~6 dB DC~8GHz

- 2 Watt Bi-directional type
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

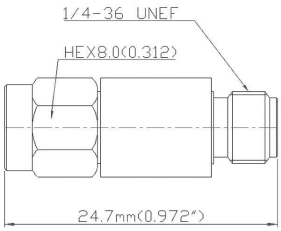
Electrical Specification

Item	Specification	
Part number	F01-B0803-05	F01-B0804-05
	F01-B0805-05	F01-B0806-05
Frequency range	DC ~ 8 GHz	
Impedance (Nominal)	50Ω	
Input Power rating (max)	2 Watt (CW)	
Attenuation accuracy	3 ±0.4 dB	4 ±0.4 dB
	5 ±0.4 dB	6 ±0.4 dB
V.S.W.R. (max)	1.20 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass (male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt 7~24 dB DC~8GHz

- 2 Watt Bi-directional type
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

Electrical Specification

Item	Specification
Part number	F01-B0807-05 ~ F01-B0824-05 (ex, F01-B08**dB-05 / **: 07~24dB)
Frequency range	DC ~ 8 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2 Watt (CW)
Attenuation accuracy	7 ~ 24 ±0.55 dB
V.S.W.R. (max)	1.20 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass(male), Be-Cu(female)/ Gold plating

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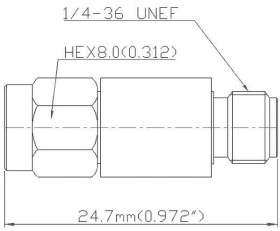


SMA 2Watt 25~30 dB DC~8GHz

- World Best ±0.55dB Attenuation accuracy
- 2 Watt Bi-directional type
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed
- Stainless steel material
- Same day shipment
- Reverse polarity connector type available

SPECIFICATION

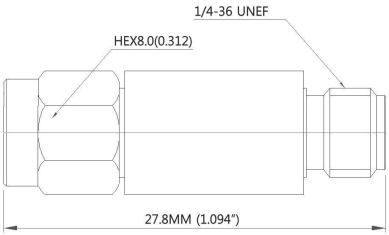
Electrical Specification

Item	Specification
Part number	F01-B0825-05 ~ F01-B0830-05 (ex, F01-B08**dB-05 / **: 25~30dB)
Frequency range	DC ~ 8 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2 Watt (CW)
Attenuation accuracy	25 ~ 30 ±0.55 dB
V.S.W.R. (max)	1.20 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass(male), Be-Cu(female)/ Gold plating

DRAWING



SMA 2Watt DC~18GHz

- Stainless Steel material for the long life usage and reliable specification
- Outstanding flatness of Attenuation Value
- Excellent power capacity in anti-burnout
- Full data files (Test data, Outlined drawing and Product photos) are available
- Optimized for various application, such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, satellite and other Microwave performance
- 1~ 2weeks of short delivery from your valuable order
- RoHS Compliant

SPECIFICATION

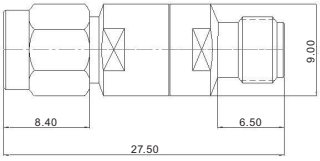
Electrical Specification

Description	V.S.W.R.(max)	Attenuation accuracy	Part number
SMA 2Watt 3dB DC~18GHz	1.35:1	3 ±1.0dB	F01-B1803-04
SMA 2Watt 5dB DC~18GHz	1.35:1	5 ±1.0dB	F01-B1805-04
SMA 2Watt 6dB DC~18GHz	1.35:1	6 ±1.0dB	F01-B1806-04
SMA 2Watt 10dB DC~18GHz	1.35:1	10 ±1.0dB	F01-B1810-04
SMA 2Watt 20dB DC~18GHz	1.35:1	20 ±1.0dB	F01-B1820-04
SMA 2Watt 30dB DC~18GHz	1.35:1	30 ±1.0dB	F01-B1830-04

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass (male), Be-Cu(Female)/ Gold plating



SMA 5Watt 10~30dB DC~3GHz

- Telecommunication application
- Uni-directional way
- Excellent power capacity in anti-burnout.
- Reliable power cooling structure
- Small Ø29.8 heatsink diameter structure

SPECIFICATION

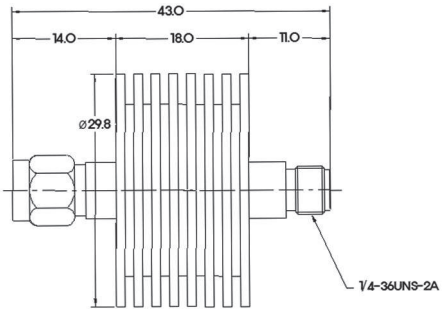
Electrical Specification

Item	Specification		
Part number	F01-C0310-04	F01-C0320-04	F01-C0330-01
Frequency range	DC ~ 3 GHz		
Input power rating (max)	5 Watt (CW)		
Attenuation accuracy	10 ±1.0dB	20 ±1.0dB	30 ±1.5dB
V.S.W.R. (max)	1.20 : 1		

Material specification

Item	Specification
Housing	Aluminum / Nickel plating
Body	Brass / Nickel plating
Connector body	Brass / Nickel plating
Coupling nut	Brass / Gold plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating
Dimension	Ø29.8*43mm

DRAWING



2.92mm 2Watt DC~40GHz

- Stainless Steel material for the long life usage and reliable specification
- Outstanding flatness of Attenuation Value
- Excellent power capacity in anti-burnout
- Full data files (Test data, Outlined drawing and Product photos) are available
- Optimized for Various application, from LTE, 5G Sub-6GHz, 5.8GHz WiFi, 5G, Connected car and other Microwave & Military performance
- RoHS Compliant

SPECIFICATION

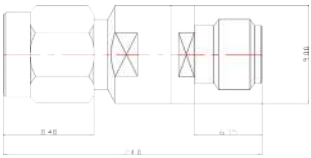
Electrical Specification

Description	V.S.W.R.(max)	Attenuation accuracy	Part number
2.92mm 2Watt 3dB DC~40GHz	1.35:1	3 ±1.0dB	F17-B4003-02
2.92mm 2Watt 5dB DC~40GHz	1.35:1	5 ±1.0dB	F17-B4005-02
2.92mm 2Watt 6dB DC~40GHz	1.35:1	6 ±1.0dB	F17-B4006-02
2.92mm 2Watt 10dB DC~40GHz	1.35:1	10 ±1.0dB	F17-B4010-02
2.92mm 2Watt 20dB DC~40GHz	1.35:1	20 ±1.0dB	F17-B4020-02
2.92mm 2Watt 30dB DC~40GHz	1.35:1	30 ±1.0dB	F17-B4030-02

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

Material specification

Item	Specification
Body	Stainless steel / Passivated
Coupling nut	Stainless steel / Passivated
Center contact (Pin)	Brass(male), Be-Cu(female)/ Gold plating



N 2Watt DC~4GHz Attenuator

Check out the Difference!

Features

Outstanding flatness of Attenuation Value

Excellent power capacity in anti-burnout

Full data files (Test data, Spec. Outlined drawing and Product photos) are available

Optimized for Telecommunication application such as 3G, 4G, 5G LTE

Various dB (1 ~ 40dB) of attenuators are available

Customized design available upon request

1~ 2weeks of fast delivery from your valuable order.

RoHS Compliant

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
N 2Watt 1dB DC~4GHz	1.18:1	1 ±0.35dB	F04-B0401-01	73
N 2Watt 2dB DC~4GHz	1.18:1	2 ±0.35dB	F04-B0402-01	
N 2Watt 3dB DC~4GHz	1.18:1	3 ±0.4dB	F04-B0403-01	74
N 2Watt 5dB DC~4GHz	1.18:1	5 ±0.4dB	F04-B0405-01	
N 2Watt 6dB DC~4GHz	1.18:1	6 ±0.4dB	F04-B0406-01	
N 2Watt 10dB DC~4GHz	1.18:1	10 ±0.55dB	F04-B0410-01	75
N 2Watt 20dB DC~4GHz	1.18:1	20 ±0.55dB	F04-B0420-01	
N 2Watt 30dB DC~4GHz	1.18:1	30 ±0.55dB	F04-B0430-01	

N 2Watt 1~2 dB DC~4GHz

- World Best ±0.35dB Attenuation accuracy
- 2Watt Bi-directional type
- Best performance at 3G, 4G, 5G LTE
- 2Watt full power guaranteed
- Brass with Tri-Alloy plating
- Stainless steel material is available
- Same day shipment

SPECIFICATION

Electrical Specification

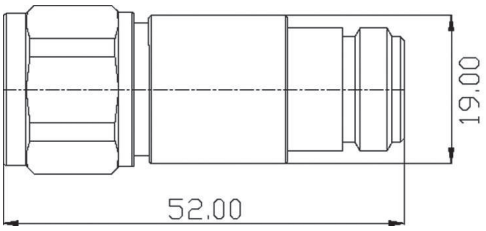
Item	Specification	
Part number	F04-B0401-01	F04-B0402-01
Frequency range	DC ~ 4GHz	
Impedance (Nominal)	50Ω	
Input power rating(max)	2 Watt (CW)	
Attenuation accuracy	1 ±0.35 dB	2 ±0.35 dB
V.S.W.R. (max)	1.18 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

DRAWING



N 2Watt 3, 5, 6dB DC~4GHz

- World Best ±0.4dB Attenuation accuracy
- 2Watt Bi-directional type
- Best performance at 3G, 4G, 5G LTE
- 2Watt full power guaranteed
- Brass with Tri-Alloy plating
- Stainless steel material is available
- Same day shipment

SPECIFICATION

Electrical Specification

Item	Specification		
Part number	F04-B0403-01	F04-B0405-01	F04-B0406-01
Frequency range	DC ~ 4 GHz		
Impedance (Nominal)	50Ω		
Input power rating(max)	2Watt (CW)		
Attenuation accuracy	3 ± 0.4 dB	5 ± 0.4 dB	6 ± 0.4 dB
V.S.W.R. (max)	1.18 : 1		
Operating temperature	-65°C ~ +85°C		

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

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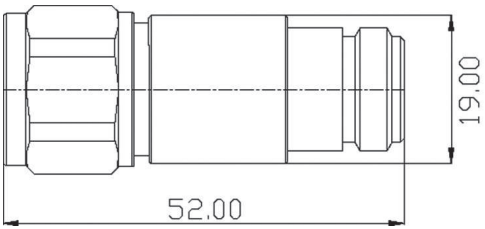

N 2Watt 10, 20, 30dB DC~4GHz

- World Best ±0.55dB Attenuation accuracy
- 2Watt Bi-directional type
- Best performance at 3G, 4G and 5G LTE
- 2Watt full power guaranteed
- Brass with Tri-Alloy plating
- Stainless steel material is available
- Same day shipment

SPECIFICATION

Electrical Specification

Item	Specification		
Part number	F04-B0410-01	F04-B0420-01	F04-B0430-01
Frequency range	DC ~ 4 GHz		
Impedance (Nominal)	50Ω		
Input power rating(max)	2Watt (CW)		
Attenuation accuracy	10 ± 0.55 dB	20 ± 0.55 dB	30 ± 0.55 dB
V.S.W.R. (max)	1.18 : 1		
Operating temperature	-65°C ~ +85°C		

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

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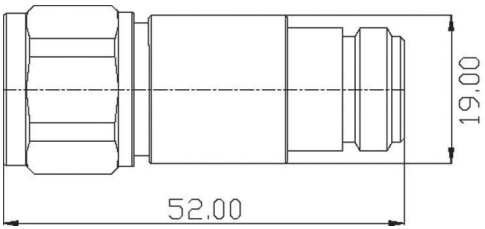


N 2Watt DC~8GHz Attenuator

Check out the Difference!

Features

Outstanding flatness of Attenuation value

Excellent power capacity in anti-burnout

Full data files (Test data, Outlined drawing and Product photos) are available

Optimized for Various application, from FM Radio, 2G, 3G, 4G, 5G to WiMax

Customized design available upon request

1~ 2weeks of fast delivery from your valuable order

RoHS Compliant

Description	V.S.W.R.(max)	Attenuation accuracy	Part number	Page
N 2Watt 3dB DC~8GHz	1.22:1	3 ±0.45dB	F04-B0803-02	77
N 2Watt 5dB DC~8GHz	1.22:1	5 ±0.5dB	F04-B0805-02	78
N 2Watt 6dB DC~8GHz	1.22:1	6 ±0.5dB	F04-B0806-02	
N 2Watt 10dB DC~8GHz	1.22:1	10 ±0.5dB	F04-B0810-02	
N 2Watt 20dB DC~8GHz	1.22:1	20 ±0.5dB	F04-B0820-02	
N 2Watt 30dB DC~8GHz	1.22:1	30 ±0.6dB	F04-B0830-02	79

N 2Watt 3dB DC~8GHz

- World Best ±0.45 dB Attenuation accuracy
- 2 Watt Bi-directional type
- Very Broad application such as LTE, 5G Sub-6GHz and 5.8GHz WiFi
- 2Watt full power guaranteed
- Brass with Tri-Alloy plating
- Stainless steel material is available
- Same day shipment

SPECIFICATION

Electrical Specification

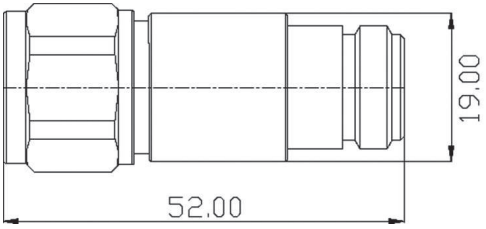
Item	Specification
Part No.	F04-B0803-02
Frequency range	DC ~ 8 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
Attenuation accuracy	3 ±0.45 dB
V.S.W.R. (max)	1.22 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

DRAWING



N 2Watt 5, 6, 10, 20dB DC~8GHz

- 2Watt Bi-directional type
- World Best ±0.5dB Attenuation accuracy
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed.
- Brass with Tri-Alloy plating
- Stainless steel material available
- Same day shipment

SPECIFICATION

Electrical Specification

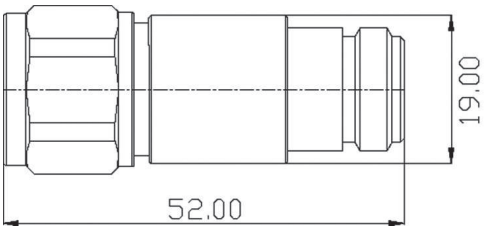
Item	Specification	
Part number	F04-B0805-02	F04-B0806-02
	F04-B0810-02	F04-B0820-02
Frequency range	DC ~ 8GHz	
Impedance (Nominal)	50Ω	
Input power rating(max)	2 Watt (CW)	
Attenuation accuracy	5 ± 0.5 dB	6 ± 0.5 dB
	10 ± 0.5 dB	20 ± 0.5 dB
V.S.W.R. (max)	1.22 : 1	
Operating temperature	-65°C ~ +85°C	

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

DRAWING



N 2Watt 30dB DC~8GHz

- 2Watt Bi-directional type
- World Best ±0.6dB Attenuation accuracy
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- 2Watt full power guaranteed
- Brass with Tri-Alloy plating
- Stainless steel material available
- Same day shipment

SPECIFICATION

Electrical Specification

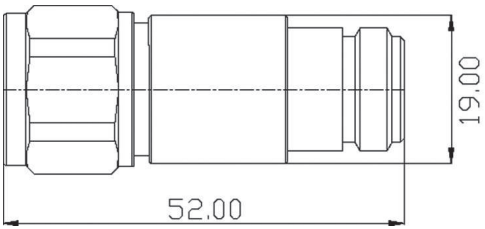
Item	Specification
Part No.	F04-B0830-02
Frequency range	DC ~ 8 GHz
Impedance (Nominal)	50Ω
Input power rating (max)	2Watt (CW)
Attenuation accuracy	30 ±0.6 dB
V.S.W.R. (max)	1.22 : 1
Operating temperature	-65°C ~ +85°C

Material specification

Item	Specification
Body	Brass / Tri-Alloy plating
Coupling nut	Brass / Tri-Alloy plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

(Data sheets which are not shown in this RF Bible are showed on SRT website; www.srtechnology.com)

DRAWING



N 5Watt DC~3GHz Attenuator

Check out the Difference!

Features

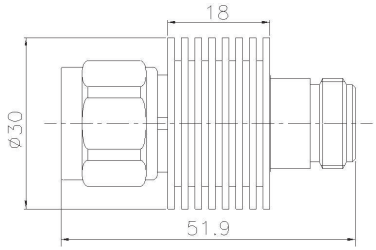
Broad application, from VHF to Telecommunication
5 Watt Uni-directional type
Reliable Attenuation value and V.S.W.R.
Excellent power capacity in anti-burnout
3 years long life warranty
Smallest size of cooling pin
1~2 weeks of fast delivery from order

Description	V.S.W.R.(max)	Attenuation accuracy	Part number
N 5Watt 10dB DC~3GHz	1.20:1	10 ±1.0dB	F04-C0310-02
N 5Watt 20dB DC~3GHz	1.20:1	20 ±1.0dB	F04-C0320-02
N 5Watt 30dB DC~3GHz	1.20:1	30 ±1.5dB	F04-C0330-02

Material specification

Item	Specification
Heatsink	Aluminum / Nickel plating
Connector body & coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

DRAWING



N 30Watt DC~3GHz Attenuator

Features

Check out the Difference!

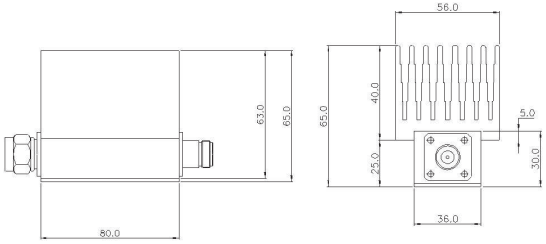
Broad application, from VHF to Telecommunication
30 Watt Uni-directional type
Reliable Attenuation value and V.S.W.R.
Excellent power capacity in anti-burnout
3 years long life warranty
Smallest size of cooling heatsink
1~2 weeks of fast delivery from order

Description	V.S.W.R.(max)	Attenuation accuracy	Part number
N 30Watt 10dB DC~3GHz	1.20:1	10 ±1.0dB	F04-G0310-04
N 30Watt 20dB DC~3GHz	1.20:1	20 ±1.0dB	F04-G0320-04
N 30Watt 30dB DC~3GHz	1.20:1	30 ±1.5dB	F04-G0330-03

Material specification

Item	Specification
Housing and Heatsink	Aluminum / Nickel plating & Anodizing
Connector body & coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass(male), Beryllium Copper(female) / Gold plating

DRAWING

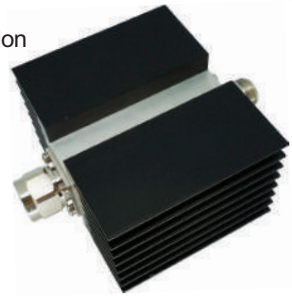


N 50Watt DC~3GHz Attenuator

Check out the Difference!

Features

Broad application, from VHF to Telecommunication
50 Watt Uni-directional type
Reliable Attenuation value and V.S.W.R.
Excellent power capacity in anti-burnout
3 years long life warranty
Smallest size of cooling heatsink
1~2 weeks of fast delivery from order

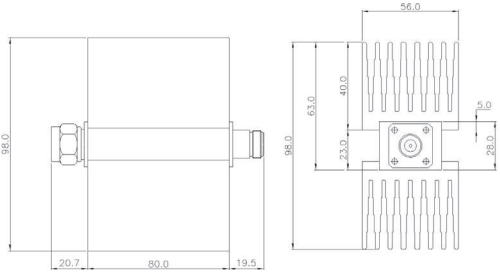


Description	V.S.W.R.(max)	Attenuation accuracy	Part number
N 50Watt 10dB DC~3GHz	1.20:1	10 ±1.0dB	F04-H0310-03
N 50Watt 20dB DC~3GHz	1.20:1	20 ±1.0dB	F04-H0320-03
N 50Watt 30dB DC~3GHz	1.20:1	30 ±1.5dB	F04-H0330-10

Material specification

Item	Specification
Housing and Heatsink	Aluminum / Nickel plating & Anodizing
Connector body & coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass(male), Beryllium Copper (female) / Gold plating

DRAWING

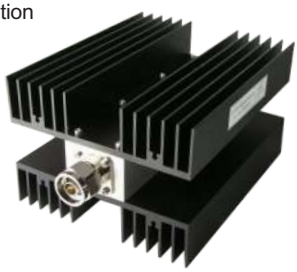


N 100Watt DC~3GHz Attenuator

Check out the Difference!

Features

- Repeater, RRH and Broadcasting equipment application
- Broad Application, from VHF to Telecommunication
- 100 Watt Uni-directional type
- Excellent power capacity in anti-burnout
- Full data files (Test data, Outlined drawing and Product photos) are available
- Optimized for telecommunication application
- 1~ 2weeks of delivery from valuable order
- 3 Years long life warranty



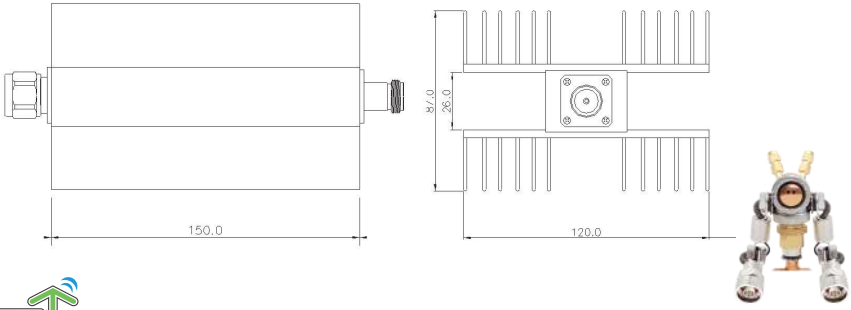
ATTENUATOR

Description	V.S.W.R.(max)	Attenuation accuracy	Part number
N 100Watt 10dB DC~3GHz	1.20:1	10 ±1.0dB	F04-J0310-06
N 100Watt 20dB DC~3GHz	1.20:1	20 ±1.0dB	F04-J0320-04
N 100Watt 30dB DC~3GHz	1.20:1	30 ±1.5dB	F04-J0330-02

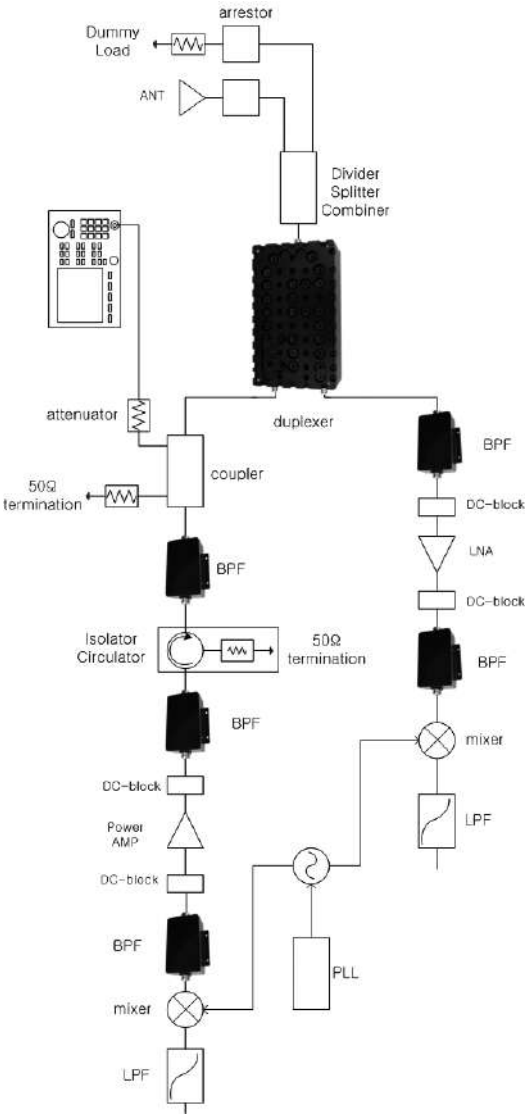
Material specification

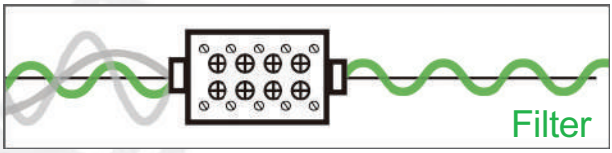
Item	Specification
Housing and Heatsink	Aluminum / Nickel plating & Anodizing
Connector body & coupling nut	Brass / Nickel plating
Center contact (Pin)	Brass(male), Beryllium Copper (female) /Gold plating

DRAWING



03 Filter
Block Diagram





The best Solution for RF Technology!

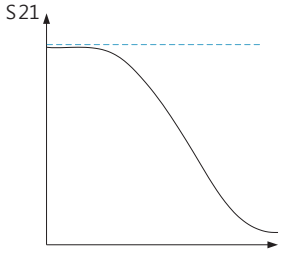
About Filter

Filter is the core product out of RF passive products. Filter is more important than any other passive components in the repeater and the base station, even though other components are important. As the system operators all over the world use different frequencies, and there are quite a lot of signals in the air for televisions, military use, weather research and other purposes. The most important role of the filter is to select desired signals for use.
Filter is very the most applied module in RF system. There are lots of filters based on the kinds of applications. When we talk about the concept only, it does not look like hard subject to understand, but 500 pages of a book is not good enough to know about the details and every part of filter.

Filter carries out the same function as filter in water purifier which sifts out impurities in water. Filter gets rid of the noise and output the clean signal what I want to get. If you are well aware of S-parameter, you will easily understand the explanation below. As explained above, the filter performs to filter the frequency noise, but at the same time it also can performs to select desired frequency depending on its purpose. There is an explanation about S-parameter in RF Bible(Page 259) at the end of this book for your better understanding.

1. Filter types based on the passband characteristic.
Filter can be classified roughly into the 7 types, based on the passband characteristic.

(1) Low Pass Filter



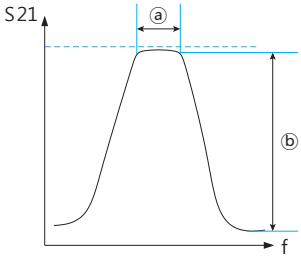
(Dra. 1-1) Low Pass Filter graph

At first, it is Low Pass Filter (Hereinafter we refer to Low Pass Filter as LPF). LPF passes the low frequency and filters the high frequency. LPF is used to get rid of ripple on DC power supply line or noise of signal line, because LPF passes the signal from DC to the specified frequency. It is also used to remove the high frequency spurious band or harmonics. LPF combines with simple matching circuit.

It is often used for the actual JIG and the noise components which are not filtered by the band pass filter or duplexer can be used for the better frequency characteristics using LPF.
Sometimes LPF is built in the band pass filter or duplexer to eliminate the harmonic components which are generated at integer multiple frequencies of the center frequency such as multiples of 2, 3, and 4.
However, the characteristics to eliminate the harmonic components will be improved as LPF is attached but at the same time there may be a demerit that the overall insertion loss of the filter increases. So when you require LPF for designing the filter, you need to carefully calculate the insertion loss. In addition, as LPF also occupies the space within the filter, the size and volume of the filter vary depending on the position of the filter.

(2) Band Pass Filter

Band Pass Filter (Hereinafter we refer to Band Pass Filter as BPF) is the most frequently used filter. BPF passes the bandwidth of specified frequency and suppress the other frequency. BPF, filtering out the requiring frequency, is very important in the system these days which the variety of frequency are used to be divided minutely

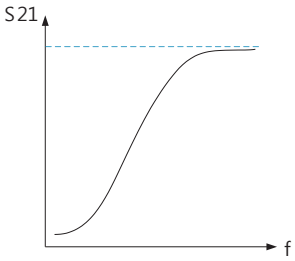


(Dra. 1-2) Band Pass Filter graph

As you can see in the BPF characteristic table(Dra. 1-2) in the above, nearby frequencies can be avoided depending on how sharp the inclination of the ⓑ section. This can be identified by the characteristic value called attenuation among filter standards. Attenuation value can be determined depending on the value of the insertion loss(S21) value by assigning a certain point (frequency) of the ⓑ section. When the attenuation value is high, it means that the inclination of the ⓑ section is sharp. Therefore correct signals can pass through not affected by signals from the nearby frequencies. But here we have a very important issue not to be overlooked. As you can see the chart in the above, when the ⓑ section becomes sharper, the ⓐ point (edge of the band) part collides and therefore the insertion loss value in the band becomes worse. Like this, there is a trade-off between Attenuation and Insertion Loss. It is a big dilemma for all of RF engineers to design effective system.

BPF is usually used at transmitter and receiver and applied at almost kinds of the RF system. Please refer to page 101, Band Pass Filter at RF Bible.

(3) High Pass Filter

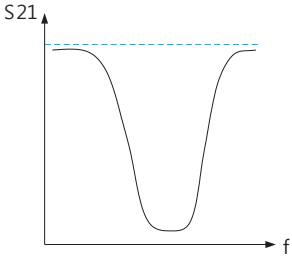


(Dra. 1-3) High Pass Filter graph

High Pass Filter (Hereinafter we refer High Pass Filter as HPF) passes the high frequency and sift out the low frequency. HPF is not quite commonly used these days. In the RF passive products, as long as the frequency is getting high, the loss of passive product is also getting high. But high frequency band with high loss is not quite easy to be passed even though low frequency pressed down when the engineer should design HPF with passive elements.

(4) Band Reject Filter

Filter has the S21 graph as right figure on Dra. 1-4 is Band Stop Filter, Band Reject Filter, or Notch Filter. This filter passes all the frequency but suppress the frequency what you want.
It is used to remove the interfering noise into in-band signal that you want to use. This characteristic is often used to test the characteristics of other frequencies rather than self-signals and is frequently used for terminals and test JIG. Unexpectedly, this filter is commonly used and it can be seen in Intermediate Frequency(IF).



(Dra. 1-4) Band Reject Filter graph

IF is used in a super heterodyne method of communication system. When the Baseband(BB) signal which contained Audio, Video, Data and other information, is shifted to RF, the baseband signal is shifted as an intermediate step. For example BB -> IF -> RF. There is ZIF (zero – IF) communication system which does not have IF method. It is mostly used for the price or size sensitive devices. Please refer to page 102, Band Reject Filter part at this RF Bible.

(5) Duplexer.

There is a filter called duplexer. This Duplexer is a filter which is used to share the Tx and Rx signals in a single antenna. It means that BPF of the Tx band and BPF of the Rx band are tied together to be used. The important part of the main specification for the duplexer is to design it without the interference between Tx and Rx based on how sharp the isolation between the Tx band and the Rx band is made. So the isolation is a very critical characteristic of the duplexer among others.
The duplexer consists of 3 ports including a port connected to the antenna, Tx port and Rx port. Please refer to page 103, Duplexer at this RF Bible.

(6) Diplexer, Multiplexer

Diplexer works in a similar way to the Duplexer. The difference is that two or more filters are attached to the Diplexer. As I mentioned before, the Duplexer uses two BPFs of Tx BPF and Rx BPF. On the other hand, the Diplexer usually uses a combination of LPF and HPF or a combination of BPFs with different frequencies.
You can use the Triplexer to use three signals and you can use the multiplexer to combine 4 or more signals into a single path and then release them.
The main purpose of using the Diplexer or the Multiplexer is to reduce the cost for additional system establishment by sending signals with different frequencies into a single transmission cable.
When you use Tx antenna and Rx antenna separately in a RF system, you need BPF filters for each antenna. You must use two BPFs although you use one antenna. However, when you use the Duplexer, you can establish the front-end only with the duplexer and one antenna. So both the space and cost for the system can be saved.

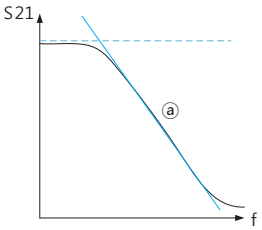
(7) Filter Module

While the multiplexer is a product which combines various filters into one, Filter module is a product in which different components are installed with the filter.
The filter module has functions of the coupler, arrestor or LNA added to the filter. A coupling port is added to the filter to measure the power outputted through the filter or an arrester is added to protect the filter from overpower or surge. Please refer to

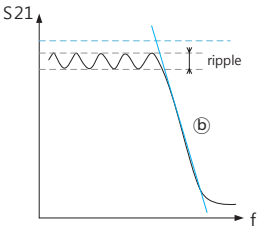
page 106, Filter Module at this RF Bible.

2. Filter types depending on the pass characteristic.

Filter can be classified according to the above 7 types based on passband characteristic, but also can be classified with the 2 types depending on the pass characteristic itself, regardless of band pass characteristic. One is Butterworth type and the other is Chebyshev type.



(Dra. 1-5) Butterworth type graph



(Dra. 1-6) Chebyshev type graph

Left drawing on Dra. 1-5 is Butterworth type and right drawing on Dra. 1-6 is Chebyshev type.

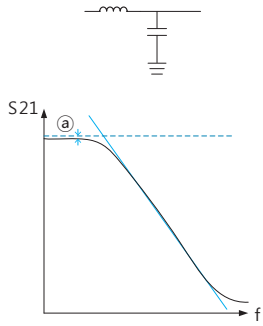
When you compare with two, the big differences are the in-band loss, ripple and skirt characteristic.

In Butterworth type, a passband range is quite flat, loss is not big and skirt characteristic is gradual. In other words, the frequency can be sifted out with small loss but the out-band signals can't be suppressed completely.

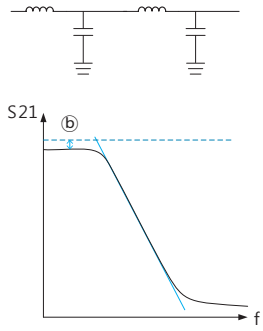
In Chebyshev type, the skirt characteristic is precipitous when it is comparing with Butterworth type, and it filters the passband out sharply. However, there is ripple in passband, and in-band insertion loss is big. There is a trade-off relationship between a good skirt characteristic and big ripple & loss.

Let's see the ripple here. Ripple is a necessary evil caused by the chebyshev design. When you look into the characteristics of the repeater, Ripples are calculated by the total sum of each ripple by each part when parts are connected. Signals also pass through the ripples which are obstructive factors. So it is required to reduce the insertion loss of each part, but it is also important to reduce the ripples so that the signals can easily pass through. Usually the ripple standard of the filter specifies 50% to 60% of the insertion loss.

In fact, it is related with the order characteristic which is composed of the filter. If order is composed a lot of passive component, the skirt characteristic is better but loss characteristic is worse. Look at the below two drawings on Dra. 1-7 and Dra. 1-8.



(Dra. 1-7) 3rd order LPF circuit



(Dra. 1-8) 4th order LPF circuit

The left circuit on Dra. 1-7 is 3rd order LPF circuit which is composed of 1 inductor and 1 capacitor. The right circuit on Dra. 1-8 is 4th order LPF circuit which is composed of 2 left circuits. Let's see the differences while the order is changed from 2th to 4th. You can see the loss of 4th order LPF is bigger in passband, the loss of 4pcs of Reactance, above Insertion loss ⓑ (Dra. 1-8), shall be bigger than the loss of 2 pcs of Reactance, above Insertion loss ⓐ (Dra. 1-7). and the skirt characteristic is precipitous. You should choose key factor for designing filter whether the Insertion loss in passband is important or the precipitous skirt characteristic is important.
Its principle is simple. Where are many obstructive factors in the path of the signals, the loss increases. However, the skirt characteristic needs to be sharp to minimize the nearby frequencies and interferences, therefore it is inevitable to increase the order. It is what the most of Filter engineer have thought about.

At this time, you should choose the right type to design whether we focus on the insertion loss of pass band or sharp skirt characteristic.

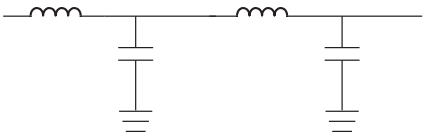
3. Filter types depending on the manufacturing method.

Filter is classified by the way of manufacturing method and material; such as LC filter, Transmission line filter, Cavity filter (Comb-Line, Inter-Digital), DR Filter (Cavity DR Filter), Ceramic Filter, Coaxial Filter (Tubular type filter), Wave Guide Filter, Saw Filter.

(1) LC Filter

LC filter is mainly used at the low frequency and low price of products. LC filter is made by the Inductor and Capacitor's arrangement on PCB. Engineers directly calculate the figures by themselves and use it. It is used at the low frequency lower than 2GHz or small RF circuits just like mobile phone. It can peform as a matching circuit behind the active devices such as amplifiers (AMP), and also eliminate the harmonic content components by materializing LPF. Nevertheless, It has big insertion loss but also has a strong points which are that engineer can calculate the value number of inductor and capacitor by himself on the design to use, and LC filter can be tuned easily. LC filter is small and price is inexpensive. L and C chips on the PCB are used and therefore they are vulnerable to the power and cannot be used in the high power system.

As above, LC filter is explained for example. As below drawing on Dra. 1-9, it is composed of L(inductor) and C(capacitor).



(Dra. 1-9) Composition of LC filter

Transmission line filter is mostly used from 3GHz to some GHz frequency ranges. Based on the frequency, the wavelength (λ) is determined. If the frequency is higher, the wavelength is shorter so that the transmission line is smaller and it is convenient for designing in small size package products. As long as the frequency is getting higher, engineers use an extremely limited lumped element because of a self resonation frequency which the characteristic of inductor and capacitor is changed. It is another reason to use transmission line filter.

Transmission line filter is made of transmission line and the patterns(open and short

stub) on PCB. Mostly, microstrip line with open stub type is preferred due to the easiness at designing and tuning. Engineers can design the characteristic what they want to make it as similar as LC filter. At the low frequency range, the microstrip line filter size could be bigger because the wavelength is longer.
As below, the 2 examples of LPF and BPF are shown.
At first, they are the pattern for the LPF.

(Dra. 1-10) LPF pattern

(Dra. 1-11) LPF pattern

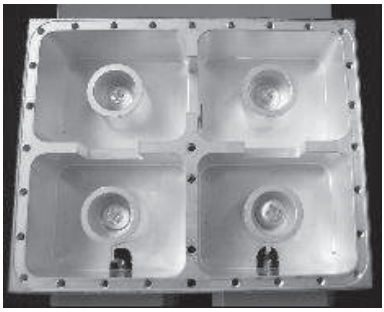
They are BPF pattern as below. BPF is used at various applications in many parts so that their patterns are vary.

(Dra. 1-12) BPF pattern

(Dra. 1-13) BPF pattern

(2) Cavity Filter

Cavity filter and DR Filter are usually used at base station(BTS) and large repeater, and metal is its main material to be manufactured. Band pass frequency range is determined by the height of metal resonator. If the height is high, the frequency range is low. You can easily understand this by considering that the frequency and the wave length are reciprocal to each other.

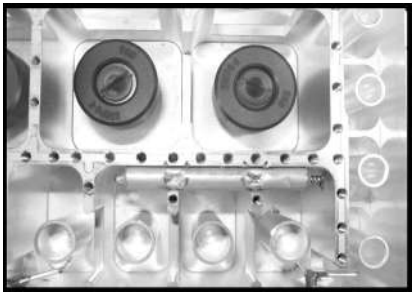


(Pic. 1-1) Cavity Filter

The environmental characteristic(temperature characteristic) may differ depending on the metal materials of the resonator. As the metals have a characteristic of thermal expansion index, the characteristic to the heat can be improved depending on the materials used for the resonator. However, the price will be increased

accordingly.
It is mostly used in below 3GHz. Cavity filter is used mostly in BTS and repeater, because of its capability to handle high power.

(3) DR Filter



(Pic. 1-2) DR Filter

DR Filter is used at BTS and repeater for PCS. As same as Cavity filter, the metal is used for the main material. Ceramic DR (Dielectric Resonator), instead of metal resonator, is used and determines the band pass frequency range. This is biggest difference between cavity filter and DR filter.
DR filter has an excellent skirt characteristic compared to the cavity filter with respect to insertion loss, and therefore Telecommunication system operators would prefer DR filters from the PCS band where they gather close to avoid the frequency interference.
However, this DR filter is vulnerable to humidity, its price is expensive and it is also vulnerable to shock. As the DR filter is made of ceramics, it tends to absorb the moisture well although it was baked in high temperature and pressure. In addition, the DR resonator requires complicated manufacturing process while metal resonators just require simple processing and electroplating. Raw materials of ceramic DR are more expensive than those of metal resonators. DR filter could be easily broken by tiny shocks due to the characteristics of ceramics. Nevertheless, it is very popular as it has excellent electrical property compared to the cavity filter.
DR filter is usually used under 3GHz. Though it could be designed at low MHz frequency range as well, the filter size should be bigger as long frequency wave and DR costs high. Due to these weaknesses, DR filter is not used in 1.5GHz below.

(4) Ceramic Filter.
Piezo Ceramic has a characteristic that it sets up a vibration when AC current is applied to it. We can make a filter resonating at a certain frequency, because AC current frequency is determined by ceramic size when it sets vibration up.
As right picture on Pic. 1-3, a square ceramic resonator is plated by silver, and

the filter is made of a numbers of resonator combined. As there is written on this chapter at the
beginning, the skirt characteristic is better when it combine a lot of resonators, but the insertion loss is getting worse. It is used IF band or FM band, because it works well during at the low frequency range(100 ~ 300MHz). However the weak points are big inserion loss and weakness of high power handling capability. It requires many workers for turning by manual work.

(Pic. 1-3) Ceramic Filter

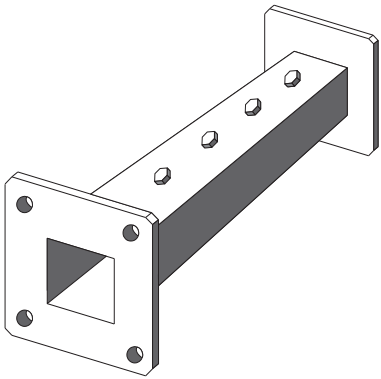
(5) Coaxial Filter

(Pic. 1-4) Coaxial Filter

Coaxial filter is generally used in Low pass Filter. It is utilizing the characteristic of coaxial cable's resonation and is put into the cable between system and antenna. Coaxial filter is used for the prevention of noise interference and filtering the side band. It looks like cable so that it can be installed between the cables.

(6) Waveguide Filter

Waveguide Filter is mostly used at the high frequency or high power application such as microwave communication or base station for the telecommunication which require KW units of high power. With adjustment of waveguide size, it filters out frequency which you do not want. It can make an effect on the filter's specification by adjusting screw on the waveguide. It is important to keep quality of surface condition and processing condition of tolerance at machining, because

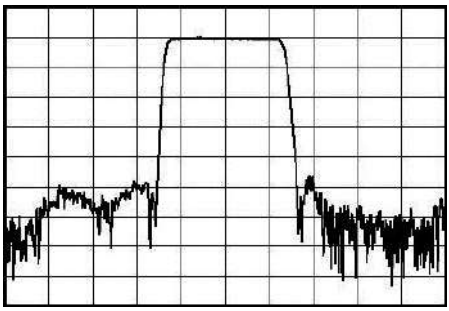


(Pic. 1-5) Waveguide Filter

these factors effect on the specification of waveguide sensitively.

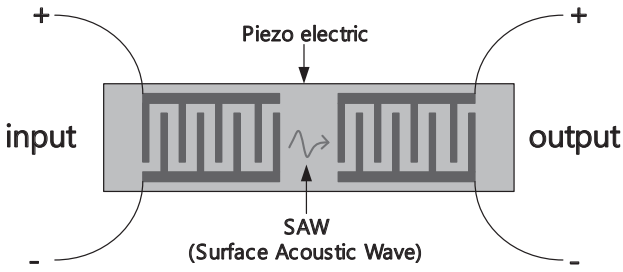
(7) Saw Filter

Saw filter is abbreviation of Surface Acoustic Wave Filter, and feature is steep keen skirt specification as like sharp blade. Comparing with LC filter and Ceramic filter, it could be made in small size and has a wonderful skirt specification so that it is used in mobile phone.



(Dra. 1-14) SAW filter graph

If comb structure of electrode is put on the piezo-material cornerwise, Surface Acoustic Wave is generated. Saw filter passes the frequency which is a similar with characteristic frequency of surface acoustic wave and sifts out other frequency.



(Dra. 1-15) SAW filter structure

4. Specifications of the filter to select

(1) Filter type selection

It is required to know filter specification to select a right LPF or BPF if you like to use it. It will be explained what kind of filters to use depending on situations. The most popular types of filters are LPF and BPF.

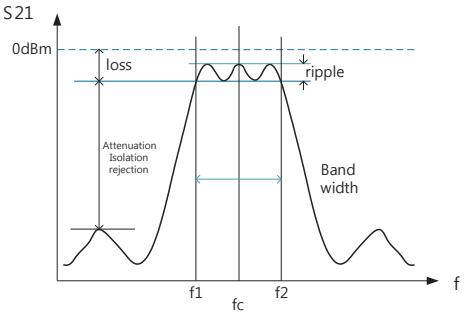
LPF is used to eliminate the high frequency noises which mainly came from the power input line or eliminate the harmonic and spurious components which are generated behind the active devices.

There is one input port and one output port in BPF. BPF let the wanted frequency band (Tx or Rx) pass through and filter the rest frequency components. In general, BPF is more popular than LPF.

(2) Electrical specifications.

The important specifications are center frequency (Fc), cut-off frequency, band width, insertion loss(S21), return loss(S11) and skirt specification.

Recently, Harmonics and PIMD (Passive Inter-Modulation Distortion) are getting focused on other key factors to filter characteristics.



(Dra. 1-16) Electrical specifications in filter

Cut-off frequency is, when the insertion loss (S21) start to drop, the frequency where drop down -3dB from the start. It is band width in BPF.

In case of BPF, the center frequency and band width are key factors to consider within passband. Let's see the above graph on Dra. 1-16.

Loss means the insertion loss in passband, and we call it as S21 in S-parameter. Insertion loss is good as low as possible, but it has a trade-off with the gentle skirt characteristic and low insertion loss. Generally speaking, filter which has low insertion loss and good skirt specification is more expensive so that we should compromise it within permissible range to save cost.

Return loss is usually referred to as S11 and when the return loss is -20dB or less which is considered excellent specification. However, some products require lower

return loss. In practices, minus is omitted to refer the return loss and therefore you need to keep in mind that the return loss is always with negative numbers.

Fc is a Center Frequency in passband. Bandwidth of BPF is that the point of -3dB is fallen S21 specification value down from its original specification. In this picture, the bandwidth is f1 ~ f2. As you can see the pass band in the above figure, smaller means better for the ripple. When we say that the ripple is big, it means that the deviation between the maximum value and the minimum value of the ripple for the signals which passed through BPF is big. And it does not have positive effects on the system. There is in trade-off with the skirt and ripple characteristic. The skirt characteristic needs to be moderate to reduce the ripple. In reverse, when the skirt characteristic becomes sharp, the ripple increases. So you need to make a compromise for the mutual electrical specifications to an appropriate level.

Usually, when you make an actual filter, the insertion loss value tends to be twice as big as the ripple value. So when you review the specification that you want, you need to compare the insertion loss value to the ripple value so that you can identify whether the filter is feasible to make or whether the insertion loss value or the ripple value that you want is too excessive.

While we are discussing specifications, the term skirt character continuously appears. The name comes from the look of skirts that women wear. When the skirt characteristic curve is moderate, it is hard to accurately filter the nearby noises except the correct frequency band. So it can negatively affect the functionality of the overall system.

On the other hand, when the skirt characteristic is sharp, it can select the correct frequency band only. Instead, the loss or ripple characteristics of the pass band may be bad and the price is expensive.

Filters with sharp skirt characteristic and with minimum ripple and loss are very rare to purchase and very hard to develop and therefore their price is very high. You need to determine the specification required by the filter for the overall system and, based on this specification, you need to discuss with the filter specialist for the final specification.

When you see the filter specification, you can see the Q value. The Q value is calculated by dividing the center frequency by 3dB bandwidth. Here in the (Dra 1-16), the Q value will be the divided value of fc by f2-f1. When we say that the Q value is big, it means that the bandwidth is narrow. And it means that the skirt characteristic is very sharp. So the Q value indicates how sharply the filter selects

the frequency.

The center frequency and band width are determined by the system engineer who design the system. In general, most of filters are customized products which have their specified frequency according to the application.
The attenuation, isolation and rejection mean the characteristic of suppression band. If there are in-band characteristics of filter such as S21(Loss), ripple, and bandwidth, attenuation, isolation and rejection, it shows how the filter suppress out-band frequency. If this figure is big, it means the other frequencies of out-band are filtered out.

When you look into the specification required by your system or product, you see that it requests the second harmonic or the third harmonic values. It indicates the band stop characteristics at the integer multiple frequencies of the center frequency such as multiples of two. A more precise system or a system which does not want the interference of the harmonic components sometimes requests the second and the third harmonic values.

The term 'trade-off' is mentioned previously. Trade-off means that if you improve one function, the other will be less functional.
Recently, the size of the filter required by the system becomes smaller and the unit price of the product becomes lower while the specification requirements become stricter.
However, it is very hard to satisfy all the electrical properties covering attenuation, insertion loss, harmonic, group delay, PIM, coupling and others. Depending on your applications, you need to concentrate on certain essential specifications first and let others be less focused. You need to make some trade-offs.
In addition, the environmental conditions are as important as the electrical specification for the filter. Usually there are standards for the temperature, humidity, vibration, shock and other external environmental conditions, and it is very important for you to select filters which conforms to those standards as much as their electrical specifications.

Filter

Check out the Difference!

Features

Even 1 pc of sample is pleased to be designed and customized upon request

Various filter development and OEM welcomed

Low PIM, High power handing, low insertion loss and excellent Attenuation value

Excellent temperature stability

Minimizing filter dimension with price competitiveness

Perfect product for wide range of radio microwave frequency, such as Telecommunication system, IEEE 802. 11b/g, RFID, Tetra, Wi-Fi, WiMax, Satellite and Military applications

SRTechnology's best Service for Customer

- 3 Years warranty

- Flexible payment Terms within 30 days from B/L Date

- No Minimum Order Quantity

- Convenient Door to Door shipping service

- Quick and cooperative Feedback from SRTechnology's professional sales team within 12 hours

- Raw materials are in stock to speed up the delivery

- Various product ranges according to frequency ranges, input power, connector type

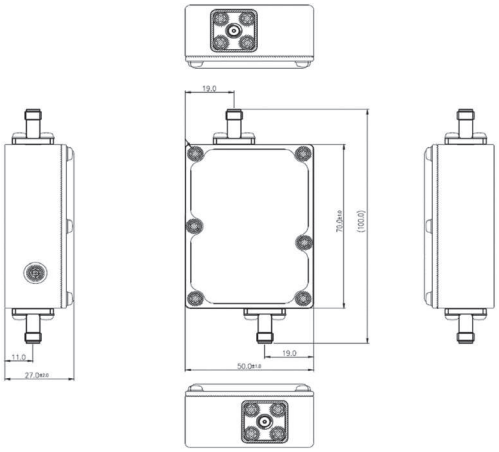
Band Pass Filter

Part No. : R01-M4950-01

- Band pass filter for WLAN
- IP66 Rating for outdoor conditions
- Smallest size and light weight for the restricted area
- Better Ripple specification

SPECIFICATION

Items		Specification
Frequency range		4,900 ~ 5,000 MHz
Insertion Loss		≤ 1.0 dB
Ripple		≤ 0.4 dB
Attenuation	4830 ~ 4870 MHz	≥ 15 dB
	5270 ~ 7000 MHz	≥ 20 dB
Impedance		50 Ω
Temperature range		-33 ℃ ~ +55 ℃
IP Rating		IP66
Connector Type		N Female (Jack)
Weight		< 1.0Kg
Dimensions (W x H x D / mm)		50.0 x 70.0 x 27.0



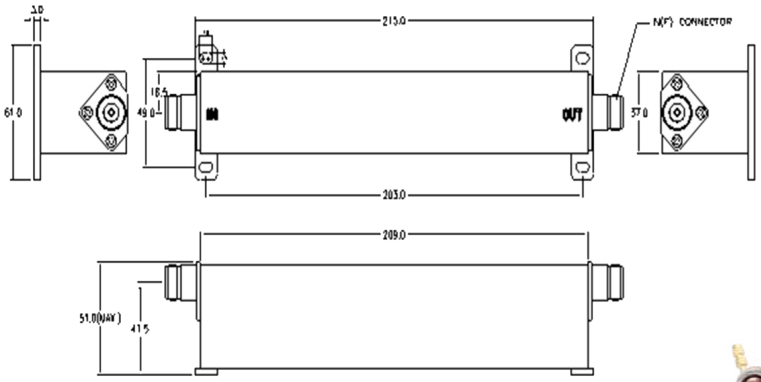
Band Rejection Filter

Part No. : R02-M2125-01

- 50Watt of high power application
- Band rejection band 2,115~2,135MHz with 20dB Attenuation
- Designed for the minimized width
- Focused on good insertion loss value

SPECIFICATION

Items		Specification
Frequency range	2,115 MHz ~ 2,135 MHz	-
Insertion Loss (max)	300 KHz~2,100 MHz	1.0 dB
	2,150 MHz~3,000 MHz	1.0 dB
Return Loss (min)	300 KHz~2100 MHz	12.0 dB
	2,150 MHz~3,000 MHz	12.0 dB
Attenuation (min)	2,115 MHz ~2,135 MHz	20.0 dB
Impedance		50Ω
Handling Power (max)		50Watt (Average)
Connector type		N Female (Jack)
Dimensions (W x H x D / mm)		61.0 X 51.0 X 215.0 mm [Excluding connector]



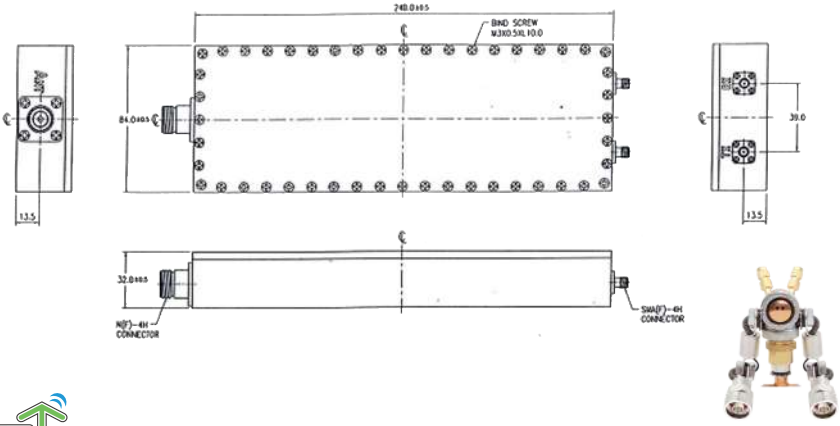
Duplexer

Part No. : R04-M2310-01

- Duplexer for WiFi
- 50 Watt input power for optical repeater application
- Outstanding attenuation from adjacent band to band
- Improving output efficiency of repeater by good insertion loss

SPECIFICATION

Items	Specification	
Pass Band Frequency	2,305 ~ 2,315 MHz	2,350 ~ 2,360 MHz
Return Loss (V.S.W.R.)	20 dB min (1.22:1)	20 dB min (1.22:1)
Insertion Loss	1.0dB max	1.0dB max
Pass Band Ripple	0.4dB max	0.4dB max
Attenuation	80dB min (10 ~ 2,270 MHz)	80dB min (10 ~ 2,315 MHz)
	80dB min (2,350 ~ 6,000 MHz)	80dB min (2,395 ~ 6,000 MHz)
Isolation	80dB min (2,350 ~ 2,360 MHz)	80dB min (2,305 ~ 2,315 MHz)
Impedance	50Ω	
Handling Power	50 Watt (average)	
Connector(All Ports)	Com. : N Female (Jack), Other : SMA Female (Jack)	
Operating Temperature	+10℃ ~ +60℃	
Dimension (W x H x D / mm)	145.0 × 50.0 × 85.0	



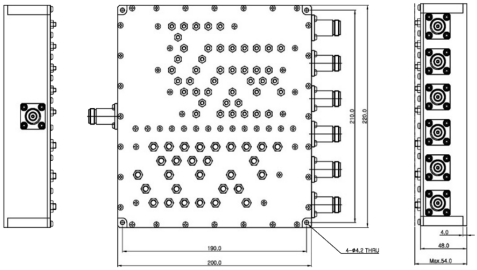
Combiner

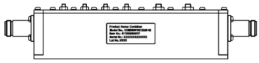
Part No. : R06-M1775-01

- Combiner for CDMA, GSM, IMT, DCS and BRS
- DAS System application
- 6 pcs of N connector in compact size and max 4.0 Kg for light weight
- IP 67 rating for outdoor conditions

SPECIFICATION

Items		Specification	
Frequency range		825 ~ 2,700 MHz	
Frequency band		Tx	Rx
		825 ~ 837.5 MHz	870 ~ 880 MHz
		885 ~ 915 MHz	935 ~ 960 MHz
		1,710 ~ 1,785 MHz	1,805 ~ 1,880 MHz
		1,920 ~ 1,980 MHz	2,110 ~ 2,170 MHz
		2,300 ~ 2,400 MHz	
		2,500 ~ 2,570 MHz	2,620 ~ 2,690 MHz
Insertion Loss		≤ 1.0 dB	
Return Loss		≥ 18 dB	
Ripple		≤ 1.0 dB	
Impedance		50 Ω	
Input Power	Average	≥ 50 Watt	
	Peak	≥ 500 Watt	
PIMD		≥ 100 dBm @ 20Watt * 2 Tone	
Temperature range		-20℃ ~ +70℃	
Connector Type		N Female (Jack)	
Weight		≤ 4.0 Kg	
Dimension (W x D x H / mm)		200.0 × 220.0 × 54.0	





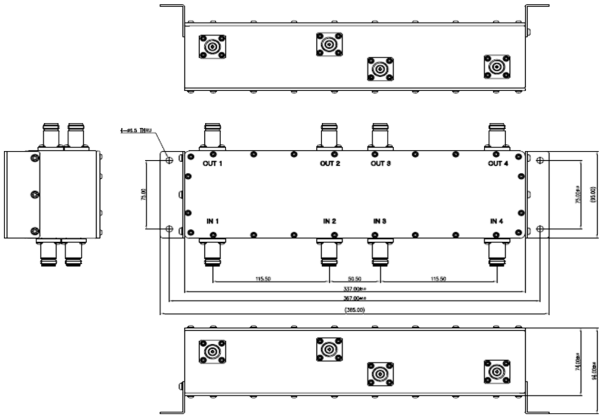
Hybrid Combiner, 4 * 4

Part No. : R05-M2149-02

- Broad application from LTE 698 MHz to Wimax 3.5GHz
- 161dBc PIMD (20Watt / 2Tone) for the whole band
- IP67 rating for outdoor conditions
- 200Watt High power handing

SPECIFICATION

Item	Specification
Frequency Range	698 ~ 3,600 MHz
RF Power	200Watt max
Insertion Loss	7.0 dB max
Isolation	20 dB min
VSWR	1.3 :1 max
PIMD	161dBc Typical [20Watt 2tone]
Impedance	50 Ω
Temperature range	-30℃ ~ +60℃
IP Rating	IP67
Connector Type	N Female (Jack)
Dimensions (W x D x H / mm)	337.0 x 95.0 x 74.0



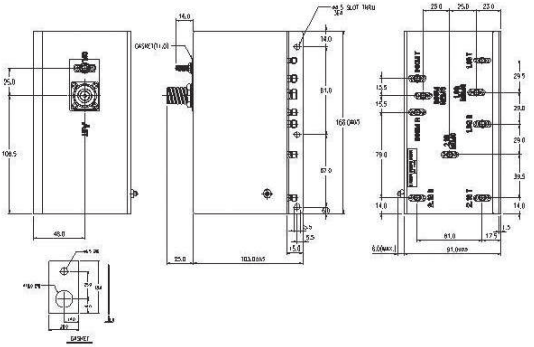
Filter Module

Part No. : R03-M0910-02

- One Filter Module for GSM, PCS and WCDMA
- One Antenna port for GSM, PCS and WCDMA
- All Tx port used coupler for moniting
- Arrestor inside for protecting lightning

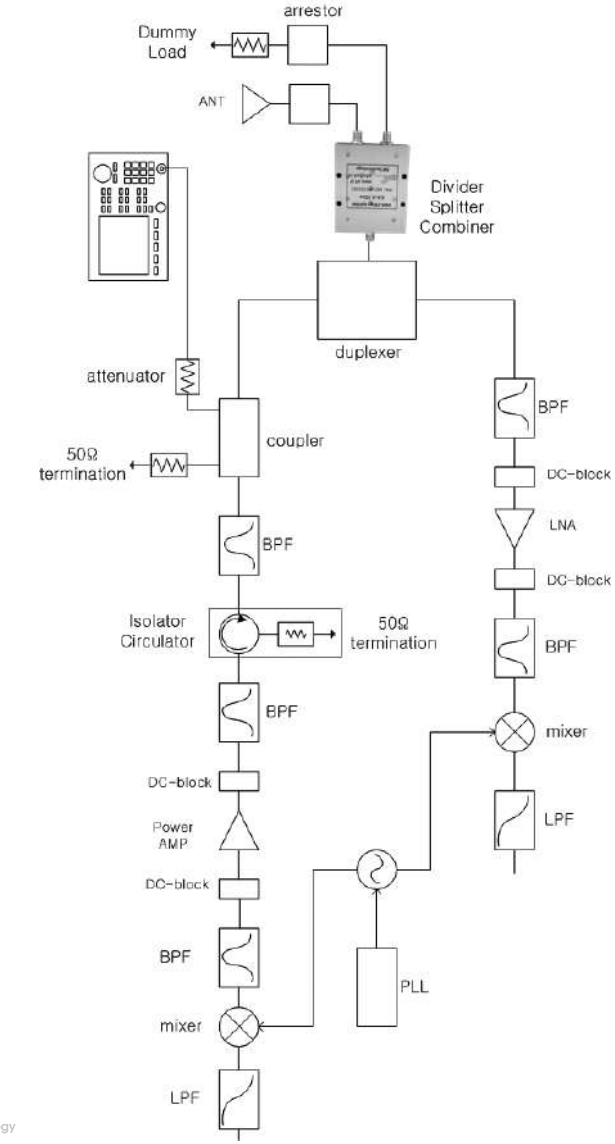
SPECIFICATION

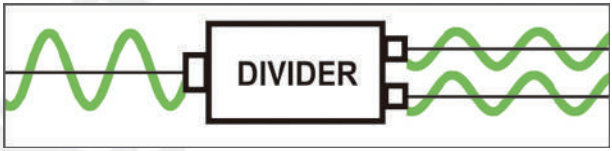
ITEMS	Specification (900MHz Band)		Specification (1.8GHz Band)		Specification (2.1GHz Band)	
	Rx	TX	Rx	TX	Rx	TX
Frequency Range	905 ~ 915MHz	950 ~ 960MHz	1735 ~ 1755MHz	1830 ~ 1850MHz	1960 ~ 1980 MHz	2150~2170 MHz
Insertion Loss (max)	1.5dB					
Return Loss (Min.)	20.0dB					
Ripple (max)	0.8dB					
Isolation (Min.)	TX Band : 100.0dBc	RX Band : 100.0dBc	TX Band : 100.0dBc	RX Band : 100.0dBc	TX Band : 100.0dBc	RX Band : 100.0dBc
Attenuation (Min.)	Fc±10MHz 7.0dBc	Fc±10MHz 7.0dBc	Fc±15MHz 7.0dBc	Fc±15MHz 7.0dBc	Fc±15MHz 7.0dBc	Fc±15MHz 7.0dBc
	Fc±15MHz 15.0dBc	Fc±15MHz 15.0dBc	Fc±20MHz 15.0dBc	Fc±20MHz 15.0dBc	Fc±20MHz 15.0dBc	Fc±20MHz 15.0dBc
	884 ~ 894MHz: 27dBc	-				
3rd Harmonic (Min.)	80dBc					
Coupling Value	-	40.0±1.5dB		40.0±1.5dB		40.0±1.5dB
Impedance	50Ω					
Temperature	-30℃ ~ 80℃					



04 Power Divider

Block Diagram



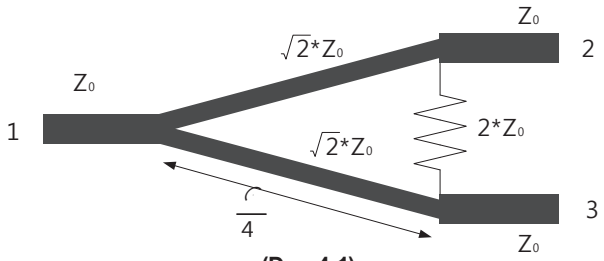


The best Solution for RF Technology!

About Power Divider

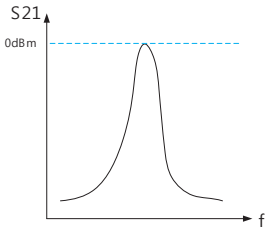
Divider is simply dividing the signals as the words.
Divider is used to divide the signals from the filter or send the divided signal to antenna.
It divides the input signal to output port as a number of output port. The phase and signal in output ports are same, and only the power is divided. Therefore, it is called Power divider.

It varies a number of output ports, 2way, 3way 4way or 8way divider, based on the number of output port.

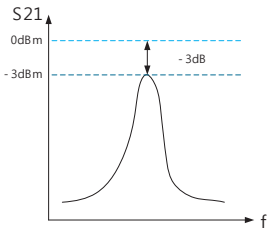


(Dra. 4-1)

We will see the Wilkinson divider for better understanding as shown below drawing on Dra. 4-1.
Impedance is 50Ω matched in RF, if characteristic impedance is Z0 = 50 Ω, the impedance of λ/4 transmission line is 70.7Ω, and the resistor which is set to get the secure the divider circuit reliability in the middle of output port, is 100Ω.



(Dra. 4-2)



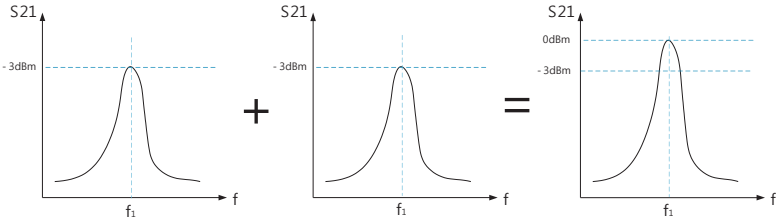
(Dra. 4-3)

As above two drawings on Dra. 4-2 and Dra. 4-3, if the 0dBm of signal is given into the input port of power divider, -3dB of signal at each output port is supposed to get. Therefore, it is also named as -3dB power divider.
Shall we check it out about the 4way and 8way power divider?

4way divider is that additional 2way divider is added at 2way divider which divided 1/2(-3dB) output power at each ports.
In short, 1/4(-6dB) of signal is output at each of 4 ports. 8way divider is as same as like dividers which are explained. Therefore, 2 way divider has typical -3dB(1/2) of insertion loss at each ports, 4 way divider has -6dB(1/4) of insertion loss at each ports and 8 way divider has -9dB(1/8) of insertion loss at each ports. So, when we talk about the insertion loss, you should think of the original insertion loss at each ports.

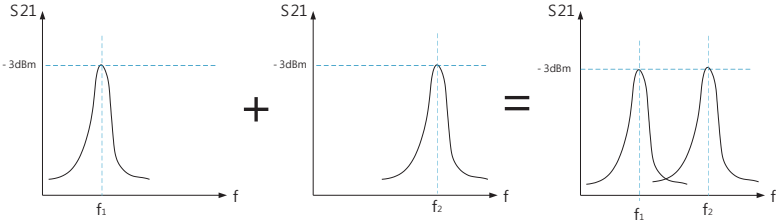
What if the impedance, one of two transmission lines, is changed in this Wilkinson power divider, what is going to happen? For example, if one transmission line is 70.7Ω and the other is 35Ω, are the same output powers at both ports?
Naturally, the more power is likely to flow into the low impedance port, and the less power is delivered to the high impedance port. The power of 70.7Ω and 35Ω would have 1:2 ratios. Ratio of output power can be adjusted by the engineer as this way at unequalled output power divider, this type is applied at in-building installation in wireless telecommunication system by integrators.

Divider is also called as splitter. They are the same products with different names. If the signal is sent to the 2 output ports and single signal comes out to the input port after 2 signals are combined, we call it as Combiner. If the two signals would have same frequency, the power is combined.



(Dra. 4-4) **(Dra. 4-5)** **(Dra. 4-6)**

If the two input frequency are different from each other, the two signals are come out to 1 port as their frequency.

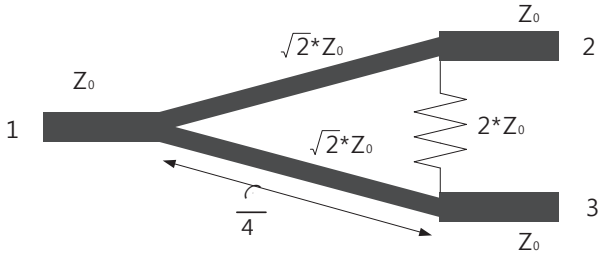


(Dra. 4-7) **(Dra. 4-8)** **(Dra. 4-9)**

In other words, like these divider and combiner, their names can be changed based on how they work for their application. Based on their direction of input and output port, we can call them as divider or combiner..

When you choose the power divider, you should check the return loss and insertion loss as well as other RF products.

If you see the Wilkinson divider drawing as shown below on Dra. 4-10. Return loss is to be checked on S11, S22 and S33 as well, and all of value should be -20dB or less. As there are 2 output ports and the same signal, power should come out to output port, therefore S21 and S31 values should be considered. Besides, the value should be same as -3dB with a little more loss in transmission lines.



(Dra. 4-10)

Additionally there is one more important factor.

There is the isolation between port No. 2 and No. 3. If the two output ports are not isolated each other and if divider is used as combiner, the signal from port No. 2 can across over port No. 3 when the signal is allowed to port No. 2 and 3. On the contrary, the signal from port No. 3 can across over port No. 2 as well. Normally isolation (S23, S32) should satisfy under -18dB.

Based upon this theory, a high power divider over 100Watt can be designed. Most of high power divider is used between the outdoor antenna and repeater in telecommunication system. You can see the variety of power divider at the following pages.

Power Divider

Check out the Difference!

Features

World best Insertion loss, Isolation and V.S.W.R.

Excellent temperature stability

Perfect product for wide range of radio microwave frequency such as, Telecommunication system, IEEE 802. 11b/g, RFID, Tetra, Wi-Fi, WiMax, Satellite and Military applications

Minimized Power divider dimension with price competitiveness

Excellent Power divider design

RoHS compliant

SRTechnology's best Service for Customer

- 3 Years long life warranty

- Flexible payment Terms within 30 days from B/L Date

- No Minimum Order Quantity

- Convenient Door to Door shipping service

- Quick and cooperative Feedback from SRTechnology's professional sales team within 12 hours

- Raw materials are in stock to speed up the delivery

- 1~2 Weeks of short delivery from your valuable order

- Various product ranges with frequency ranges, input power, connector type

Power Divider SMA 2Way

Check out the Difference!

Features

World best Insertion loss, Isolation, and V.S.W.R.

Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, Satellite and Microwave

Max 35Watt input power handing

Beautiful designed outlook

Customized design is available upon request

Item	Description			
Part Number	D01-A3004-02	D01-A3011-02	D01-A3016-01	D01-A3018-01
Frequency range	0.7~4.0GHz	0.5~6.0GHz	10 ~ 18GHz	2~18GHz
Impedance (nominal)	50Ω	50Ω	50Ω	50Ω
V.S.W.R. / Input (max)	1.30 : 1	1.55 : 1 (0.5~0.7GHz) 1.30 : 1 (0.7~6.0GHz)	1.35 : 1	1.50 : 1
V.S.W.R. / Output (max)	1.30 : 1	1.30 : 1	1.30 : 1	1.50 :1
Insertion loss (max)	0.6 dB	0.7 dB	1.0 dB	1.0 dB
Amplitude unbalance	±0.3 dB	±0.3 dB	±0.4 dB	±0.4 dB
Isolation (min)	20 dB	15 dB (0.5~0.7GHz) 20 dB (0.7~6.0GHz)	20 dB	18 dB
Phase unbalance	±2˚	±2˚	±5˚	±5˚
Input Power	35Watt (forward)	35Watt (forward)	35Watt (forward)	35Watt (forward)
	2Watt (reverse)	2Watt (reverse)	2Watt (reverse)	2Watt (reverse)
Page	116	117	118	119

Power Divider SMA 2Way 0.7~4.0GHz

Part No. : D01-A3004-02

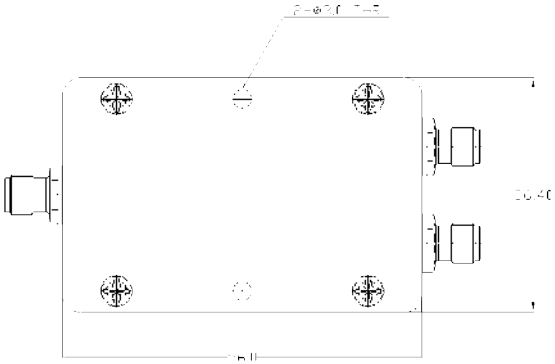
- World best Insertion loss, Isolation, and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Max 35Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

SPECIFICATION

Electrical Specification

Item	Specification	Item	Specification
Frequency range	0.7~4.0GHz	Amplitude unbalance	±0.3 dB
Impedance (nominal)	50Ω	Isolation (min)	20 dB
V.S.W.R. / Input (max)	1.30 : 1	Phase unbalance	±2°
V.S.W.R. / Output (max)	1.30 : 1	Input Power	35Watt (forward)
Insertion loss (max)	0.6 dB		2Watt (reverse)

DRAWING



Power Divider SMA 2Way 0.5~6.0GHz

Part No. : D01-A3011-02

- World best Insertion loss, Isolation, and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi and Microwave
- Max 35Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

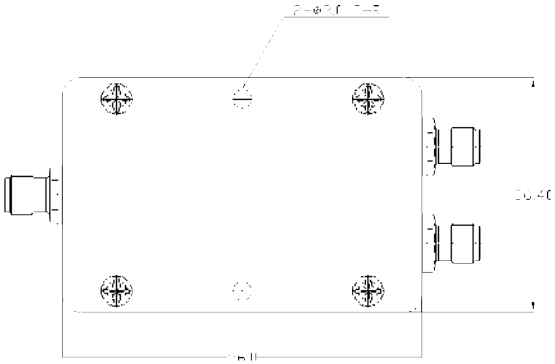
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	0.5~6.0GHz
Impedance (nominal)	50Ω
V.S.W.R. / Input (max)	1.55 : 1 (0.5~0.7GHz) 1.30 : 1 (0.7~6.0GHz)
V.S.W.R. / Output (max)	1.30 : 1
Insertion loss (max)	0.7 dB

Item	Specification
Amplitude unbalance	±0.3 dB
Isolation (min)	15 dB (0.5~0.7GHz) 20 dB (0.7~6.0GHz)
Phase unbalance	±2°
Input Power	35Watt (forward)
	2Watt (reverse)

DRAWING



Power Divider SMA 2Way 10~18GHz

Part No. : D01-A3016-01

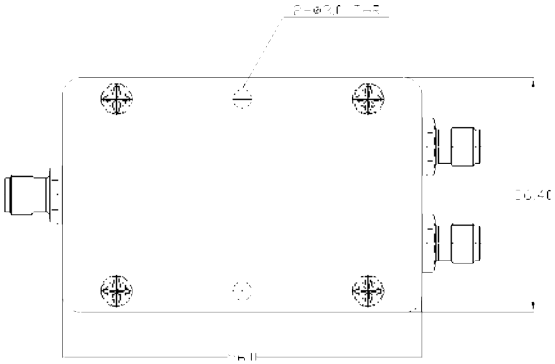
- World best Insertion loss, Isolation, and V.S.W.R.
- Very broad application such as Satellite and Microwave
- Max 35Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

SPECIFICATION

Electrical Specification

Item	Specification	Item	Specification
Frequency range	10 ~ 18GHz	Amplitude unbalance	±0.4 dB
Impedance (nominal)	50Ω	Isolation (min)	20 dB
V.S.W.R. / Input (max)	1.35 : 1	Phase unbalance	±5°
V.S.W.R. / Output (max)	1.30 : 1	Input Power	35Watt (forward)
Insertion loss (max)	1.0dB		2Watt (reverse)

DRAWING



Power Divider SMA 2Way 2~18GHz

Part No. : D01-A3018-01

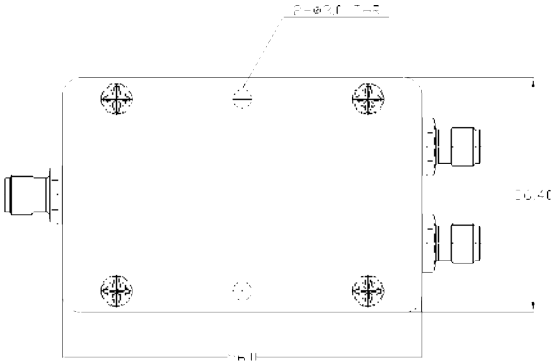
- World best Insertion loss, Isolation, and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, Satellite and Microwave
- Max 35Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

SPECIFICATION

Electrical Specification

Item	Specification	Item	Specification
Frequency range	2 ~ 18GHz	Amplitude unbalance	±0.4 dB
Impedance (nominal)	50Ω	Isolation (min)	18 dB
V.S.W.R. / Input (max)	1.50 : 1	Phase unbalance	±5°
V.S.W.R. / Output (max)	1.50 :1	Input Power	35Watt (forward)
Insertion loss (max)	1.0 dB		2Watt (reverse)

DRAWING



Power Divider SMA 4Way

Check out the Difference!

Features

World best Insertion loss, Isolation, and V.S.W.R.

Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, Satellite and Microwave

Max 35Watt input power handing

Beautiful designed outlook

Customized design is available upon request

Item	Description			
Part Number	D01-C3004-02	D01-C3011-02	D01-C3016-01	D01-C3018-01
Frequency range	0.7 ~ 4.0GHz	0.5 ~ 6.0GHz	10 ~ 18GHz	2 ~ 18GHz
Impedance (nominal)	50Ω	50Ω	50Ω	50Ω
V.S.W.R. / Input (max)	1.40 : 1	1.45 : 1 (0.5~0.7GHz) 1.40 : 1 (0.7~6.0GHz)	1.40 : 1	1.80 : 1
V.S.W.R. / Output (max)	1.35 : 1	1.35 : 1	1.35 : 1	1.80 : 1
Insertion loss (max)	0.8 dB	1.1 dB	1.5 dB	3.0 dB
Amplitude unbalance	±0.3 dB	±0.3 dB	±0.5 dB	±1.2 dB
Isolation (min)	18 dB (0.7~0.9GHz) 20 dB (0.9~4.0GHz)	10.5 dB (0.5~0.7GH) 18 dB (0.7~0.9GHz) 20 dB (0.9~6.0GHz)	20 dB	15 dB
Phase unbalance	±3˚	±5˚	±5˚	±5˚
Input Power	30Watt (forward)	30Watt (forward)	30Watt (forward)	30Watt (forward)
	2Watt (reverse)	2Watt (reverse)	2Watt (reverse)	2Watt (reverse)
Page	121	122	123	124

Power Divider SMA 4Way 0.7~4.0GHz

Part No. : D01-C3004-02

- World best Insertion loss, Isolation, and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Max 30Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

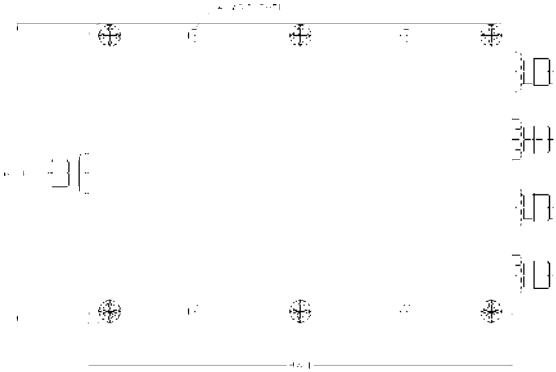
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	0.7~4.0 GHz
Impedance (nominal)	50Ω
V.S.W.R. / Input (max)	1.40 : 1
V.S.W.R. / Output (max)	1.35 : 1
Insertion loss (max)	0.8 dB

Item	Specification
Amplitude unbalance	±0.3 dB
Isolation (min)	18 dB (0.7~0.9GHz) 20 dB (0.9~4.0GHz)
Phase unbalance	±3˚
Input Power	30Watt (forward)
	2Watt (reverse)

DRAWING



Power Divider SMA 4Way 0.5~6.0GHz

Part No. : D01-C3011-02

- World best Insertion loss, Isolation and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi and Microwave
- Max 30Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

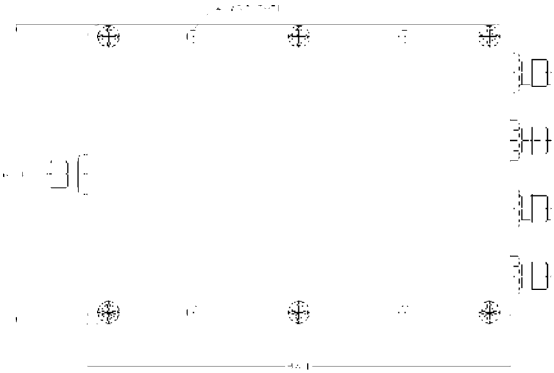
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	0.5 ~ 6.0GHz
Impedance (nominal)	50Ω
V.S.W.R. / Input (max)	1.45 : 1 (0.5~0.7GHz) 1.40 : 1 (0.7~6.0GHz)
V.S.W.R. / Output (max)	1.35 : 1
Insertion loss (max)	1.1 dB

Item	Specification
Amplitude unbalance	±0.3 dB
Isolation (min)	10.5 dB (0.5~0.7GH) 18 dB (0.7~0.9GHz) 20 dB (0.9~6.0GHz)
Phase unbalance	±5˚
Input Power	30Watt (forward)
	2Watt (reverse)

DRAWING



Power Divider SMA 4Way 10~18GHz

Part No. : D01-C3016-01

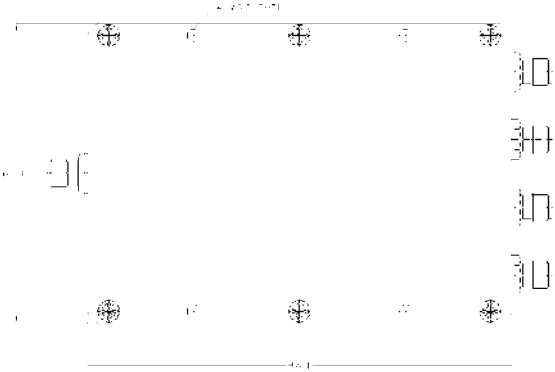
- World best Insertion loss, Isolation and V.S.W.R.
- Very broad application such as Satellite and Microwave
- Max 30Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

SPECIFICATION

Electrical Specification

Item	Specification	Item	Specification
Frequency range	10 ~ 18GHz	Amplitude unbalance	±0.5 dB
Impedance (nominal)	50Ω	Isolation (min)	20 dB
V.S.W.R. / Input (max)	1.40 : 1	Phase unbalance	±5°
V.S.W.R. / Output (max)	1.35 : 1	Input Power	30Watt (forward)
Insertion loss (max)	1.5 dB		2Watt (reverse)

DRAWING



Power Divider SMA 4Way 2~18GHz

Part No. : D01-C3018-01

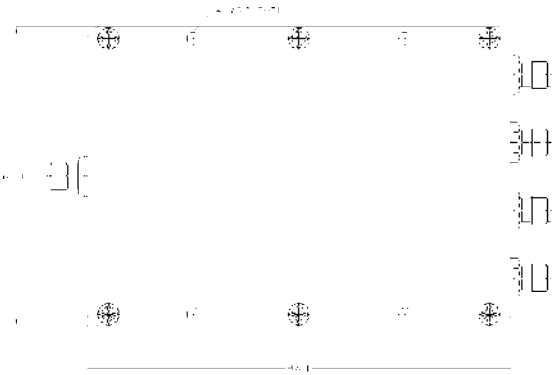
- World best Insertion loss, Isolation and V.S.W.R.
- Very broad application such as LTE, 5G Sub-6GHz, 5.8GHz WiFi, Satellite and Microwave
- Max 35Watt input power handing
- Beautiful designed outlook
- Customized design is available upon request

SPECIFICATION

Electrical Specification

Item	Specification	Item	Specification
Frequency range	2 ~ 18GHz	Amplitude unbalance	±1.2 dB
Impedance (nominal)	50Ω	Isolation (min)	15 dB
V.S.W.R. / Input (max)	1.80 : 1	Phase unbalance	±5°
V.S.W.R. / Output (max)	1.80 : 1	Input Power	30Watt (forward)
Insertion loss (max)	3.0 dB		2Watt (reverse)

DRAWING



Power Divider N 2Way 698MHz~2.7GHz

Part No. : D02-A1003-02

- Best performance for Telecommunication
- PIMD - 130dBc, 37dBm @ 2Tone
- Max 20Watt input power handing
- In-building application

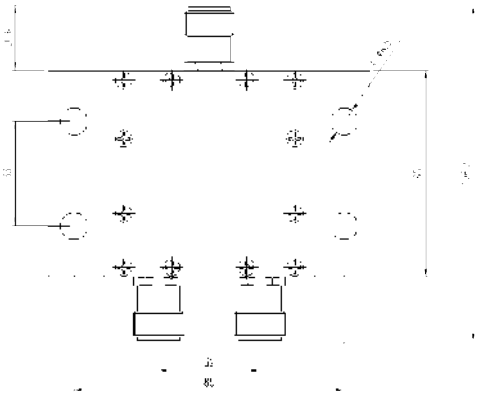
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	698MHz~2.7GHz
Impedance (nominal)	50Ω
V.S.W.R. (max)	1.20 : 1
Insertion loss (max)	3.5 dB
PIMD	- 130dBc (37dBm @ 2tone)

Item	Specification
Amplitude unbalance	±0.3 dB
Isolation (min)	20 dB
Phase unbalance	±2°
Input power	20Watt

DRAWING



Power Divider N 4Way 824MHz~2,655GHz

Part No. : D02- C1003-01

- Best performance for Telecommunication
- PIMD - 130dBc, 2tone @ 37dBm
- Max 10Watt power handing
- In-building application

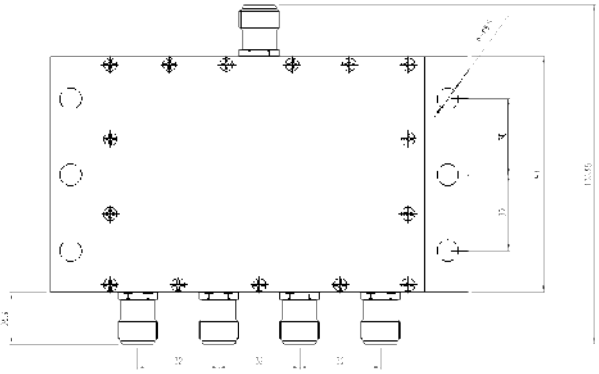
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	824MHz~2,655GHz
Impedance (nominal)	50Ω
V.S.W.R. (max)	1.20 : 1
Insertion loss (max)	7.0 dB
PIMD	- 130dBc (37dBm @ 2tone)

Item	Specification
Amplitude unbalance	±0.3 dB
Isolation (min)	20 dB
Phase unbalance	±2˚
Input power	10Watt (CW)

DRAWING



Power Divider 7/16DIN 2Way 1.7~2.4GHz

Part No. : D03-F3X12-01

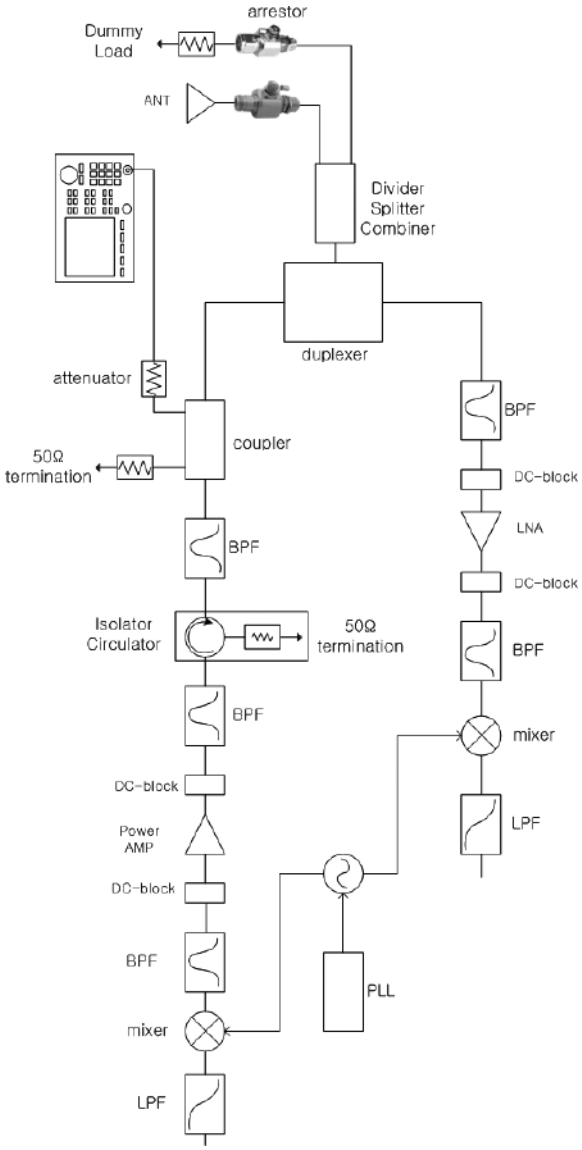
- Best performance for Telecommunication
- PIMD - 150dBc, 43dBm @ 2tone
- Max 200Watt input power handing
- IP 68 of water & dust-proof for outdoor application

SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	1.7~2.4 GHz
Impedance (nominal)	50Ω
V.S.W.R. (max)	1.25 : 1
Insertion loss (max)	2.0 dB
Input power (max)	200 Watt
PIMD	- 150dBc (43dBm @ 2tone)
Isolation (min)	20 dB
IP rating	IP 68

05 Arrestor
Block Diagram



About Arrestor

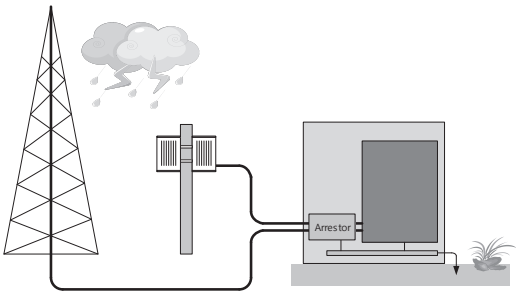
In general, a surge means a voltage which is increased 5~6% or more comparing the normal or a impulse signal upto a few thousand volt with very short time (ns, us, ms terms). For example, there is a momentary overvoltage, is occurred at power switch on/off situation or lightning. If the surge is flowed into the circuit, semi-conductor chip and the transmission lines could be burned out. The performance of whole system is tended to be degraded, and it is caused fatal breakdown. It is quite nuisance in RF circuit.

Most of products have protection circuit, such as varistor, zenor diode or tantal, to prepare the surge occurred at connection parts with connectors. However, it is still not safe for the outdoor repeater or base station which is connected with the jumper cable from the antenna from the lightning. Moreover, the antenna is tend to draw the lightning so that the repeater and base station(BTS) is quite weak at lightning. Then the arrestor is required to protect them.

Where we should install the arrestor? If you are in system integrating business, you should pay attention. Let's see the example for the BTS.

Under the picture, the arrestor is installed ahead position to protect the green equipment and GND is connected the earth. If you look at the picture carefully, there are the power line from the power source and cable line from antenna. It means that the arrestor should be connected with all of each lines, such as power line, signal line and communication line.

Gas Discharge Tube (GDT) and λ/4(Air type) type of arrestors are used. The GDT type of arrestor is mostly used. The arrestor which is insulator (10GΩ) as close as an infinite, does not do any function as usual, but the spark gab is terminated if the momentary overvoltage surge or lightning is flowed through lines. There is



(Dra. 5-1)

the electric charge carrier in discharge area in the gas tube arrester, when the spark gab is terminated the electric charge is moved into the electron in fast. The high accelerated electrons are collided with gas molecule and the electron is separated from the gas molecule. During this procedure, the momentary surge by rapidly increased electron carrier is flowed fast.

The energy by momentary surge is rapidly flowed to earth through an effective grounding so that the equipment can be protected safely. The surge voltage is varnished and the charged electron is recombined to the gas molecule. When the gas tube arrestor is burned out, the gas tube capsule or gas tube arrestor itself should be changed for the next protection.

Surge Arrestor

Check out the Difference!

Features

Excellent surge capability

World best V.S.W.R. and Insertion Loss

Excellent temperature stability

Perfect product for wide range of radio microwave frequency, such as Telecommunication system, IEEE 802. 11b/g, RFID, Tetra, Wi-Fi and WiMax

RoHS compliant

SRTechnology's best Service for Customer

- 3 Years long life warranty

- Flexible payment Terms within 30 days from B/L Date

- No Minimum Order Quantity

- Convenient Door to Door shipping service

- Quick and cooperative Feedback from SRTechnology's professional sales team within 12 hours

- Raw materials are in stock to speed up the delivery

- 1~2 Weeks of short delivery from your valuable order

- Various product ranges with frequency ranges, input power, connector type

Surge Arrestor, N, DC~3GHz

- Excellent and reliable surge capability
- Best selling items for various purpose
- Very Broad application such as LTE, 5G Sub-6GHz, and other telecommunication system

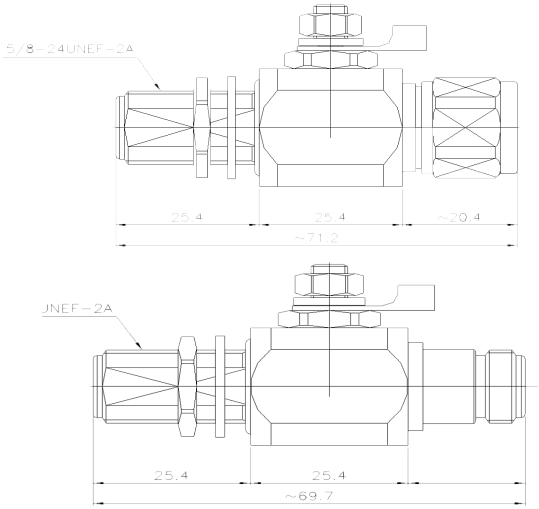
SPECIFICATION

Electrical Specification

Item	Specification	
Part Number	G02-G0101-01	G02-G0102-01
Frequency range	DC ~ 3 GHz	
Impedance (nominal)	50Ω	
V.S.W.R. (max)	1.20 : 1	
Insertion Loss (max)	0.2 dB	

Item	Specification	
Part Number	G02-G0101-01	G02-G0102-01
Surge capability (Nominal)	10KA (8X20μs)	
Connector	N male(plug) to female(jack)	N female(jack) to female(jack)
RoHS	Compliant	

DRAWING



Surge Arrestor, N, DC~6GHz

Part No. : G02-G0102-07

- Excellent and reliable surge capability
- Reliable V.S.W.R. and Insertion loss
- Very Broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Reliable surge capability

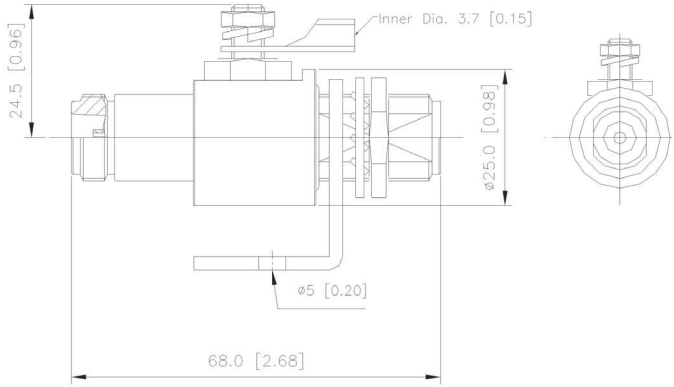
SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	DC ~ 6 GHz
Impedance (nominal)	50Ω
V.S.W.R (max)	1.35 : 1
Insertion Loss (max)	0.4 dB

Item	Specification
SURGE CAPABILITY (nominal)	5*20KA (8X20μs)
Connector	N female(jack) to female(jack)
RoHS	Compliant

DRAWING



Surge Arrestor, 7/16DIN λ/4, 0.8~2.7GHz

Part No. : G03-A0201-02

- Excellent and reliable surge capability
- World Best performance for V.S.W.R. and Insertion Loss
- Good PIMD - 155dBc (43dBm @ 2 Tone)
- Reliable 100kA surge capability
- IP68 for water & dust-proof

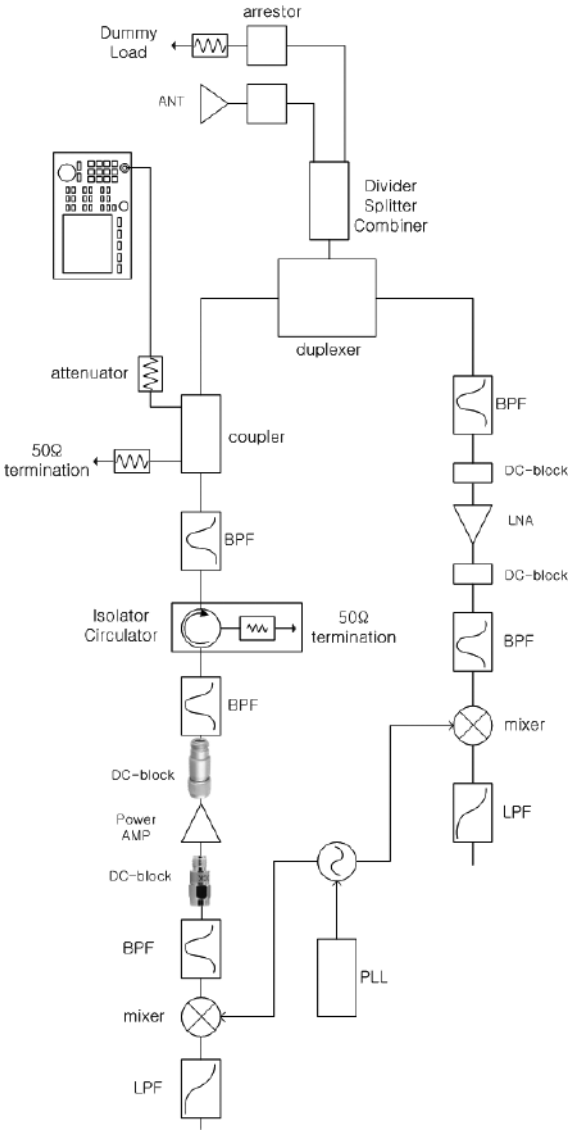
SPECIFICATION

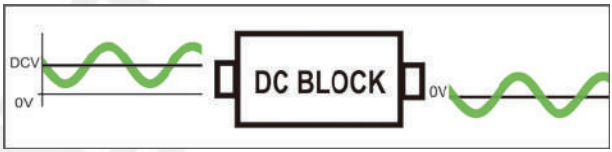
Electrical Specification

Item	Specification
Frequency	800~2,700MHz
V.S.W.R.	< 1.1
Insertion loss	< 0.1dB
Impedance	50 Ω
PIMD	< -155dBc (+43dBm / 2tone)
Power	3kW (avg.) , @900MHz 40kW (peak)
Lightning surge capability	100 times @ 20ka
Lightning surge capability test method	IEE C62.42-1991
Lightning surge capability waveform	8/20us
Lightning surge current	100kA
Lightning surge current waveform	8/20us
Throughput energy	2.0 mJ@30kA, 25.0 uJ@2kA
Connectors	7/16Din male(plug) to 7/16DIN female(jack)
Operating temperature	-40℃ ~ +80℃
Material & Plating	Brass / Tri Alloy plating
Weight	685gram
Water and dust proof	IP68

05 DC Block & Bias Tee

Block Diagram





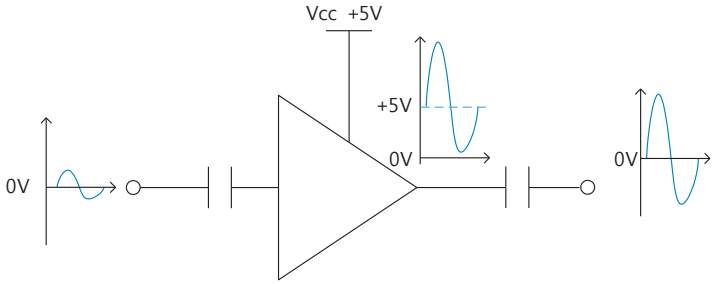
The best Solution for RF Technology!

About DC Block

RF circuit is composed of active and passive device. Active device generate a power and passive device does not require the power. Amplifer (AMP) is the one of the representative products in active devices.

AMP amplifies the input signal while AMP get DC power and consume a current. if the DC power from the AMP flowing into an equipment that is supposed to get the AC signal only, the circuit will be damaged or out of order. In the worst case, high valued measuring equipment such as network analyzer will be damaged. Therefore, power which is supposed to be supplied to AMP should supply only to AMP and it should not be flowed into any device in RF circuit.

AC signal is input to AMP which is supplied DC at the same time output amplified AC signal as intended. When you monitor the input and output in AMP, Vcc Voltage +5V is biased and AC signal is created as +5V. Overall, it is + signal. Then if DC block is used proper at this situation, DC +5V is blocked out and AC signal is passed so that the amplified signal does not be affected and the circuit could be protected.



(Dra. 6-1)

At this procedure, Capacitor blocks the DC power, so DC block is named as its functional work. As you have been seen example of AMP as above, DC block can be used any circuit which should block the DC out and pass the AC.

DC block should verify insertion loss(S21) and return loss(S11, V.S.W.R.) form DC to the working frequency .

As a circuit drawing in the AMP above, if the DC Block has a big return loss, the signal can't be flowed to the AMP, returned back from DC block. Amp may not get

the signal.

It is preferred that insertion loss will be as close as 0dB. If the DC block would have a bad insertion loss, the little survived signal through DC block will be flowed to the AMP.

There are three basic forms of DC blocks. Inner DC block have a capacitor with the center conductor, outer DC block have a capacitor with the outer conductor, and inner/outer DC block have capacitors with both the inner and outer conductors. The DC block is classified by connector type, voltage and maximum frequency range.

DC Block & Bias Tee

Check out the Difference!

Features

World best V.S.W.R. and Insertion Loss

Perfect product for wide range of radio microwave frequency, such as Telecommunication system, IEEE 802. 11b/g, RFID, Tetra, Wi-Fi and WiMax

RoHS compliant

SRTechnology's best Service for Customer

- 3 Years long life warranty

- Flexible payment Terms within 30 days from B/L Date

- No Minimum Order Quantity

- Convenient Door to Door shipping service

- Quick and cooperative Feedback from SRTechnology's professional sales team within 12 hours

- Raw materials are in stock to speed up the delivery

- 1~2 Weeks of short delivery from your valuable order

- Various product ranges with frequency ranges, input power, connector type

DC Block - SMA type

Part No. : H01-A0006-03

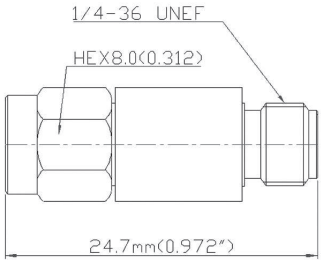
- World Best V.S.W.R. and Insertion loss
- Very broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi

SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	DC ~ 6.0 GHz
Impedance (nominal)	50Ω
V.S.W.R. (max)	1.20 : 1
Insertion loss (max)	0.4 dB
Voltage	50V
Connector type	SMA male(plug) - SMA female(jack)
Center Contact (pin)	Brass(male), Beryllium copper(female) / Gold plating
Body	SUS / Passivated
Insulator	PTFE
Dimension	Φ7.8 * 20.6mm

DRAWING



DC Block - N type

Part No. : H04-A0006-03

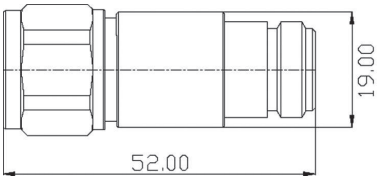
- World Best V.S.W.R. and Insertion loss
- Very broad application such as LTE, 5G Sub-6GHz, and 5.8GHz WiFi
- Stainless steel material is available

SPECIFICATION

Electrical Specification

Item	Specification
Frequency range	DC ~ 6.0 GHz
Impedance (nominal)	50Ω
V.S.W.R. (max)	1.20 : 1
Insertion loss (max)	0.4 dB
Voltage	50V
Connector type	N male(plug) - N female(jack)
Center Contact (pin)	Brass(male), Beryllium copper(female) / Gold plating
Body	Brass / Tri-Alloy plating
Insulator	PTFE
Dimension	Φ 13.5 * 52mm

DRAWING



Bias Tee, 690MHz ~ 3,600MHz

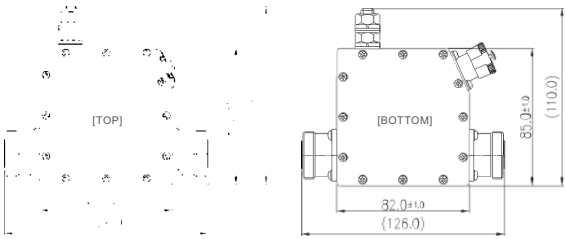
- Compliant to AISG2.0 / 3GPP
- Wide broad band frequency application for Telecommunication at 0.7~3.6GHz
- Water and Dust-proof, IP67 Rating for outdoor application
- Easy Installation and maintenance for various Antenna on the top of the tower
- Low PIM, - 160dBc and Low Insertion Loss, 0.12dB Max

SPECIFICATION

Electrical Specification

Item	Specification	
Part Number	H05-A0004-03	H05-A0004-04
Frequency range	690MHz ~ 3,600MHz	690MHz ~ 3,600MHz
Impedance(nominal)	50Ω	50Ω
Return loss	20dB (max)	20dB (max)
Insertion loss	0.12dB (max)	0.12dB (max)
Input power	750 Watt	750 Watt
Lighting protection	RET port: ±5 kA, 8/20us	RET port: ±5 kA, 8/20us
	ANT port: ±3 kA, 10/350us	ANT port: ±3 kA, 10/350us
Intermodulation	< -160dBc (3rd order, 2 x 20W)	< -160dBc (3rd order, 2 x 20W)
Modem carrier Frequency	2.176MHz	2.176MHz
IP rating	IP 67	IP 67
Weight	< 600g	< 600g
Dimension	82.0×85.0×41.0 mm (without connector)	82.0×85.0×41.0 mm (without connector)
Connector	7/16DIN female / Ant. port	7/16DIN female / BTS port
	7/16DIN female / Feeder port	7/16DIN female / Feeder port
RoHS	Compliant	Compliant

DRAWING



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