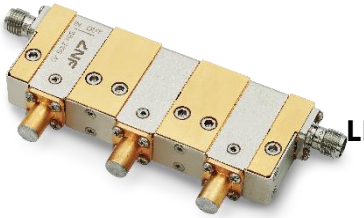
Date
2022-04-07

Low Noise Factory

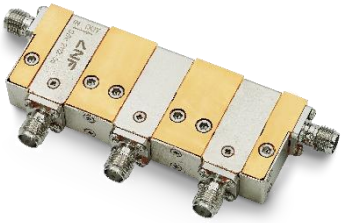
Datasheet

LNF-xxxxxxC4.3_4.9A

4.3-4.9 GHz Cryogenic Triple Junction Isolator or Circulator



LNF-ISISISC4.3_4.9A



LNF-CICICIC4.3_4.9A

Product Features	
RF Bandwidth	4.3-4.9GHz
Insertion Loss at 5 K	0.4 dB typical
Insertion Loss at 77 K	0.4 dB typical
Isolation	70 dB typical
Port Match	25 dB typical
RF Connectors	Female SMA

Absolute Maximum Ratings

Parameter	Min	Max
Operating Temperature	0.01 K	100 K
RF Drive Level		30 dBm
DC Voltage on RF Input and Output	-50 V	50 V

Typical RF Characteristics at 5 K

Parameter	Condition	Value	Unit
Insertion Loss	4.3-4.9 GHz	0.4	dB
Isolation	4.3-4.9 GHz	65	dB
Port Match	4.3-4.9 GHz	25	dB

LNF-xxxxxxC4.3_4.9A is ultra-low insertion loss cryogenic isolator/circulator operating in the 4.3-4.9 GHz frequency range. They have been designed from ground up to meet the strict requirements of ultra-low temperature physics research. The gold plated OFHC copper body ensures minimum loss and that this loss reaches the lowest possible temperature to minimize thermal noise. The isolator/circulator is packaged in a slim coaxial module using industry standard SMA connectors. The module measures 67.06x24.64x10.16 mm excluding the connectors.

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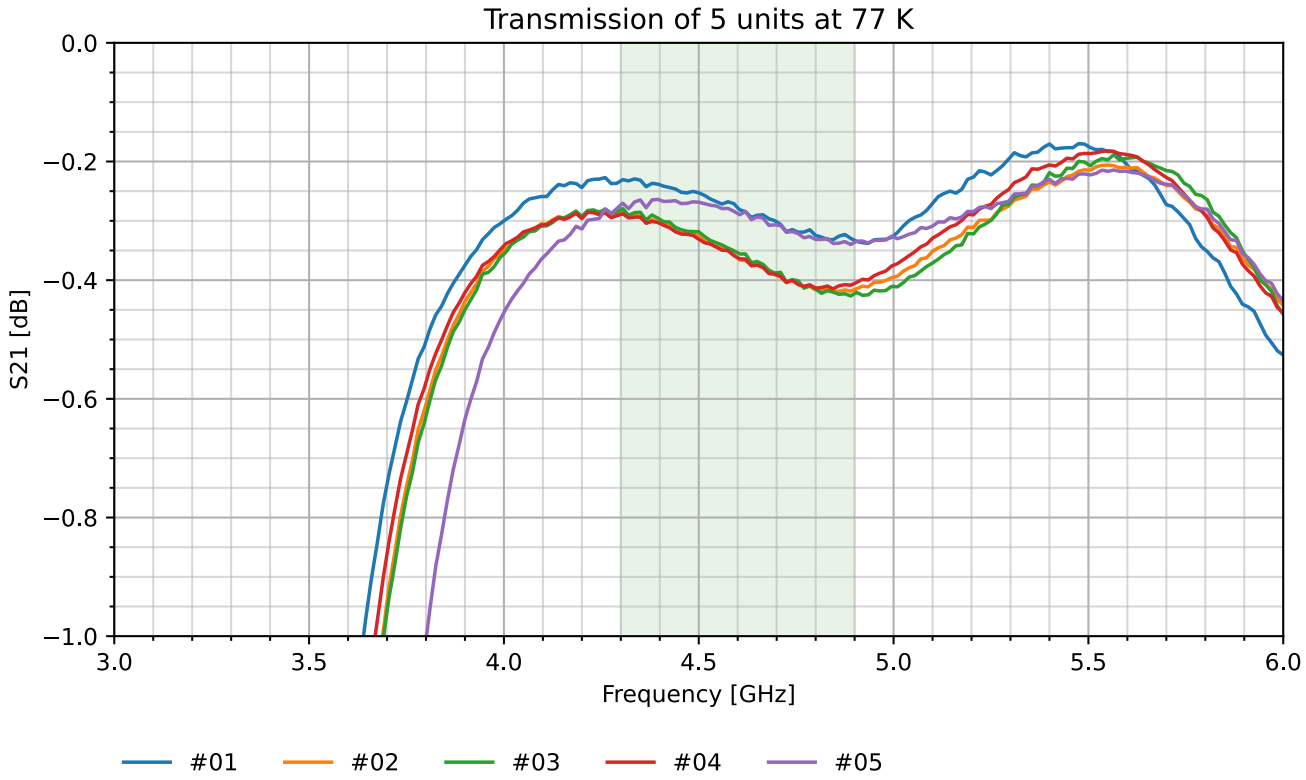
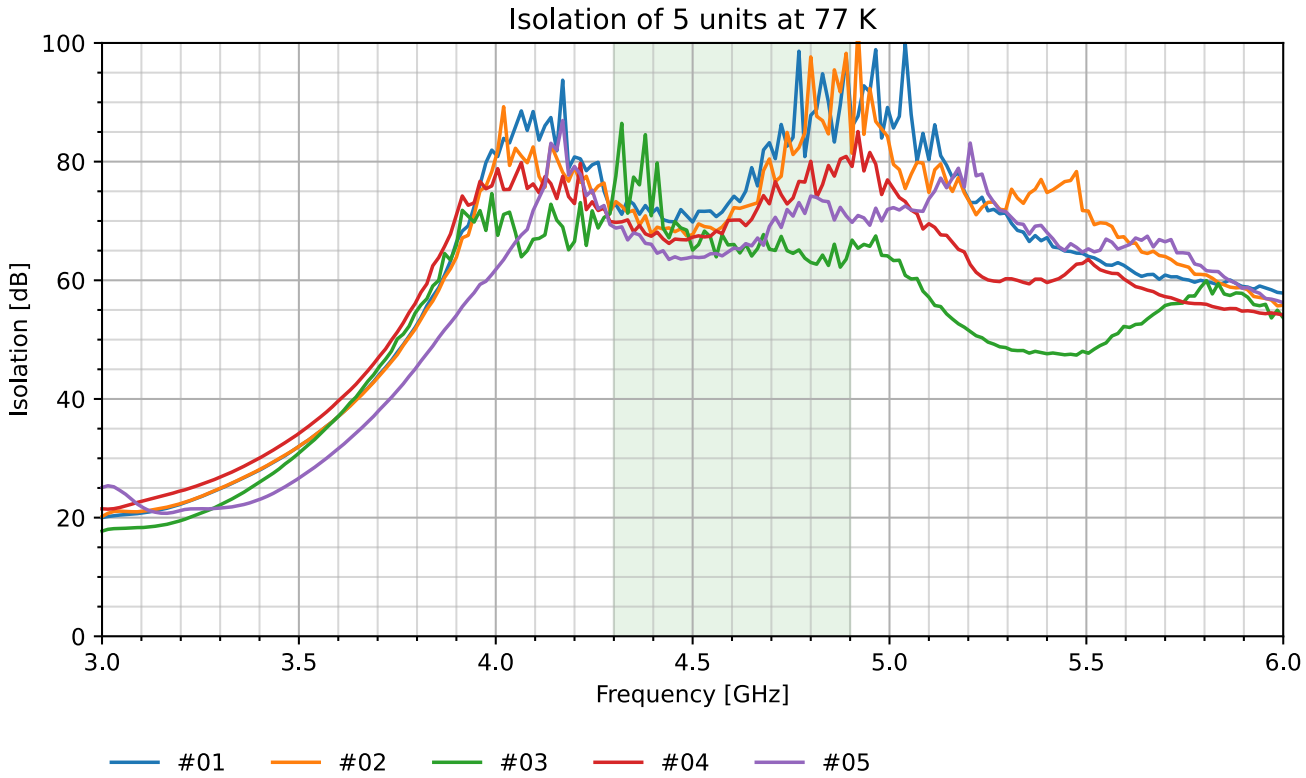
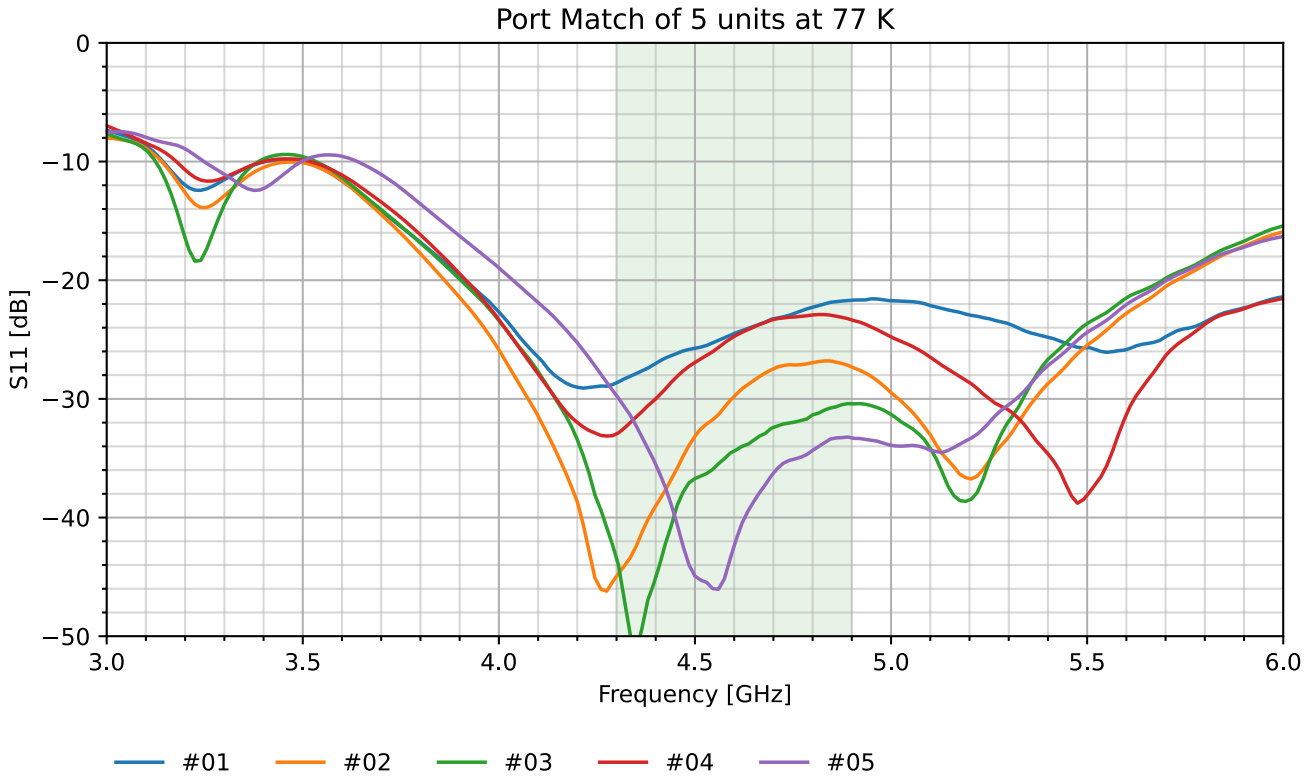
Measured data, T_{amb} = 77 K







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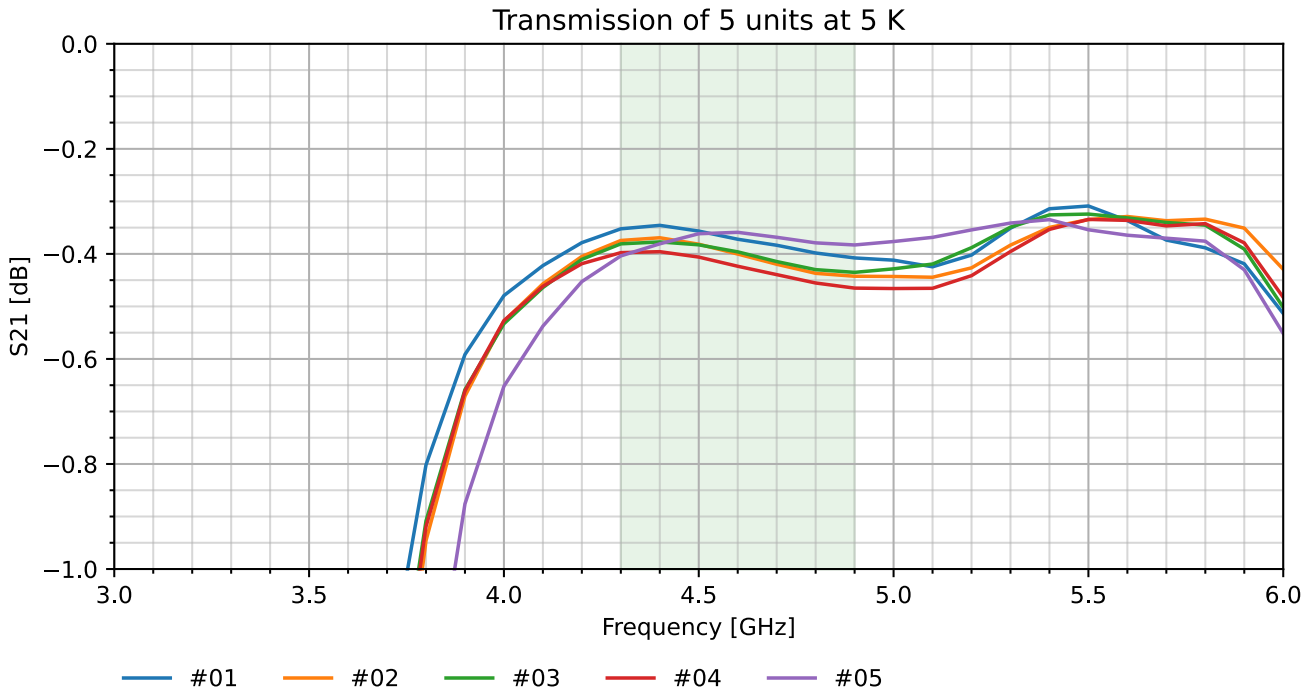
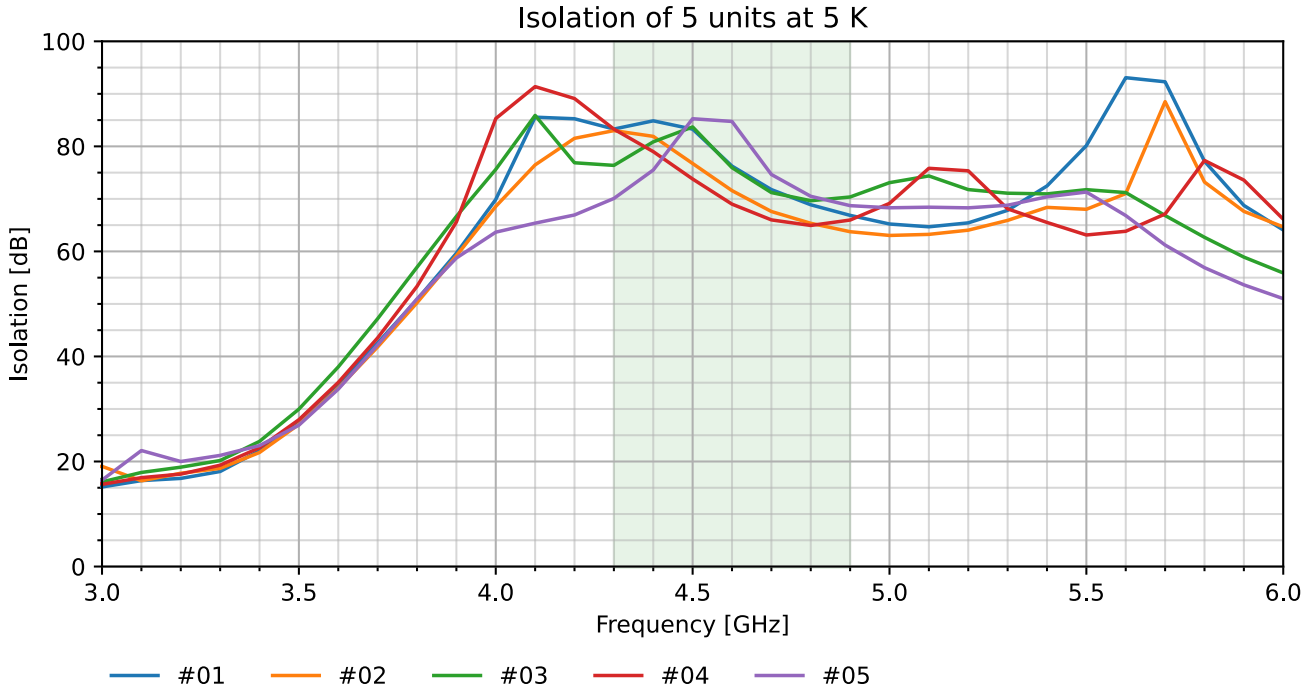
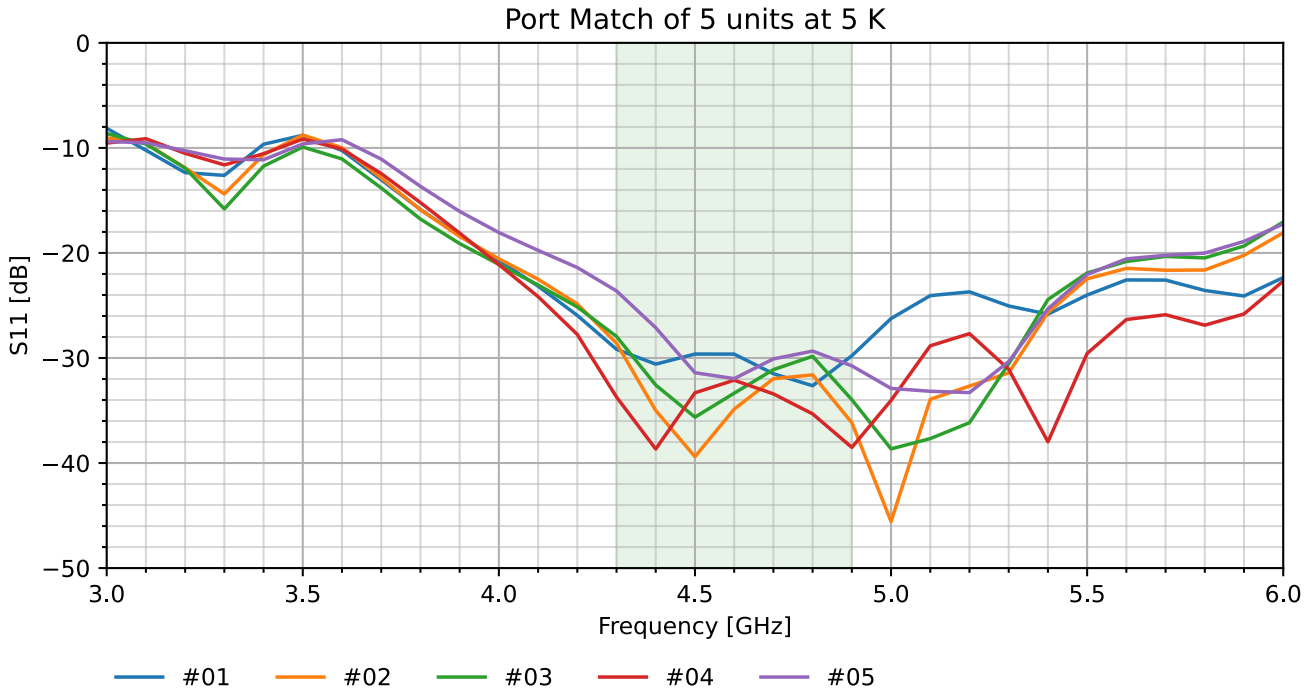
Measured data, T_{amb} = 5 K






Port Match of 5 units at 5 K
S11 [dB]
0
−10
−20
−30
−40
−50
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Frequency [GHz]
#01
#02
#03
#04
#05

Magnetic flux density generated by internal magnet

Parameter	Condition	Value	Unit
Magnetic flux density with standard shielding*	6 mm from chassis	< 4	Gauss
Magnetic flux density with optional shielding	6 mm from chassis	< 0.1	Gauss

- This is the magnetic field generated by the internal magnet inside the isolator/circulator chassis, which potentially may influence nearby components.
- Two isolators/circulators can be placed 3.3 mm apart without interfering with each other.

Maximum external magnetic field imposed on the isolator

Parameter	Condition	Value	Unit
Maximum perpendicular external magnetic field	At chassis	650	Gauss
Maximum parallel external magnetic field	At chassis	1500	Gauss

- “Maximum field” means the field when the passband frequency edge has shifted 150 MHz, and insertion loss degradation becomes noticeable.
- The optional MuMetal shield improves the maximum external magnetic field very little. MuMetal alloys are good at shielding very low level “stray” magnetics fields, however the material saturates quickly and doesn’t shield well against high field external sources.

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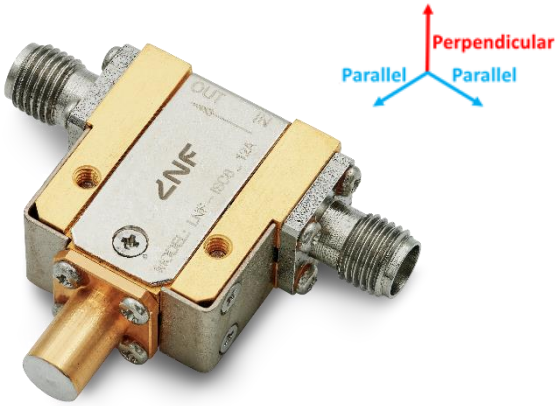

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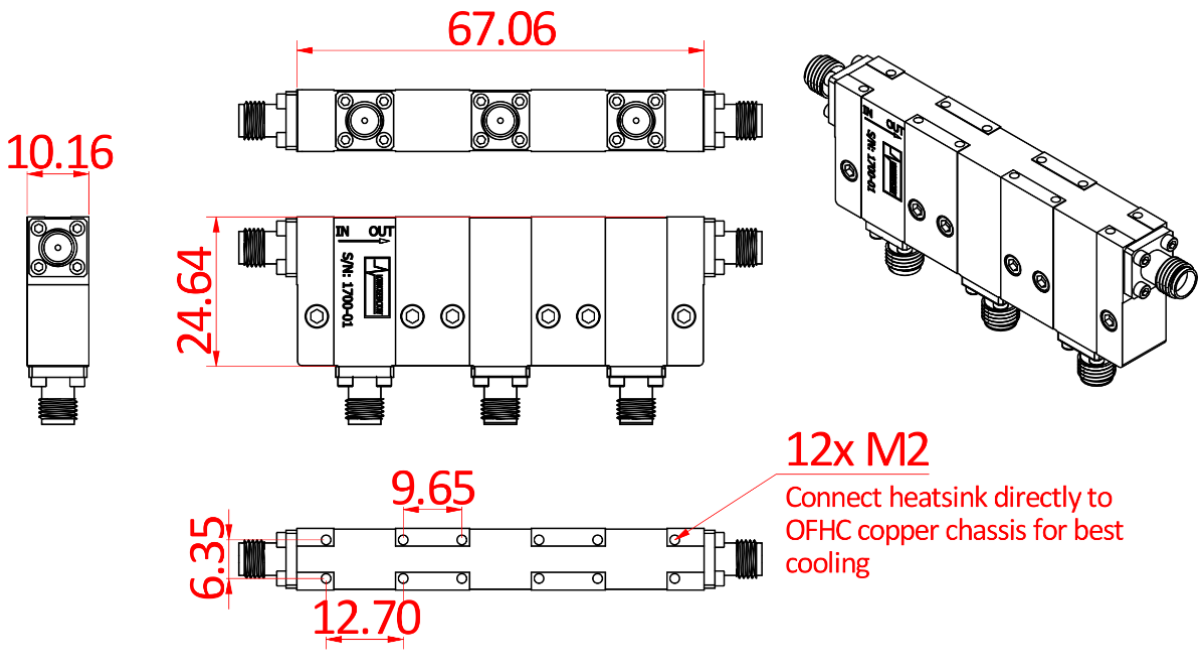
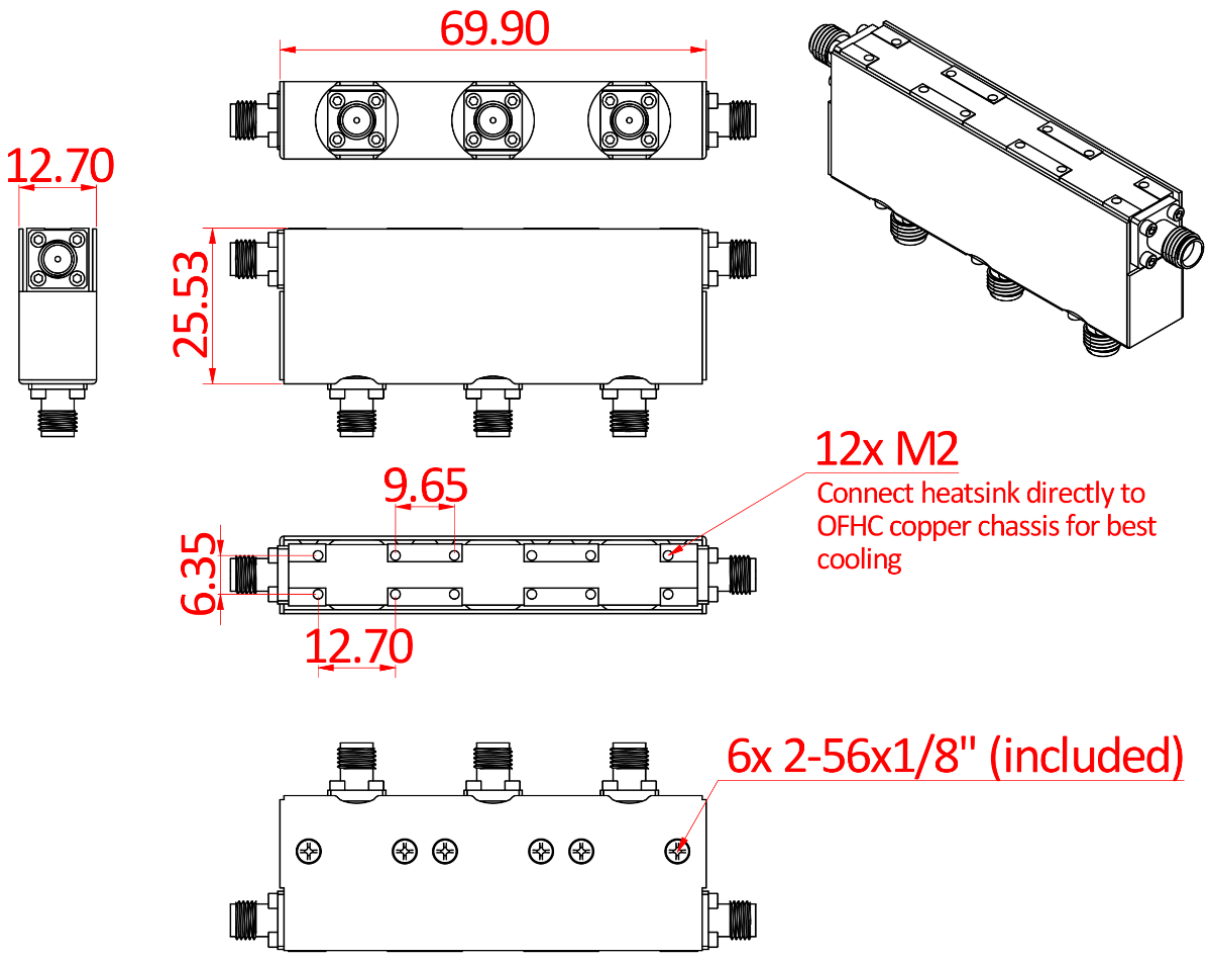
Dimensions without aditional shielding

Units: mm

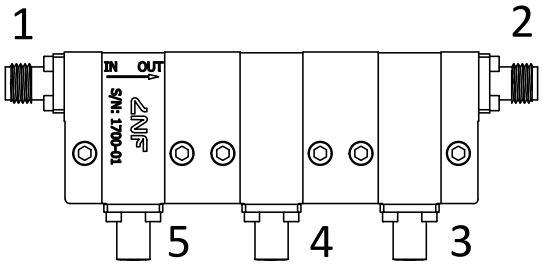


Dimensions with aditional shielding

Units: mm

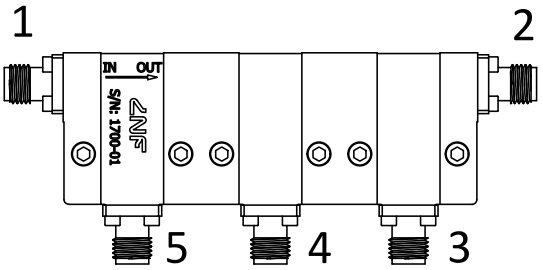


Model numbering



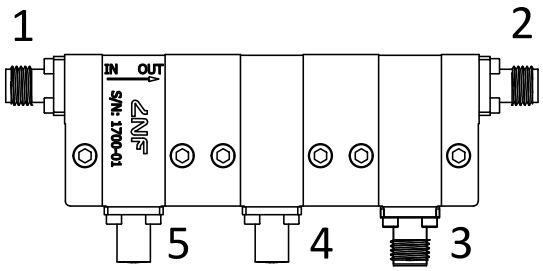
LNF-ISISISC4.3_4.9A

Triple Junction Isolator-Isolator-Isolator
Port 1: Female SMA
Port 2: Female SMA
Port 3: Termination
Port 4: Termination
Port 5: Termination



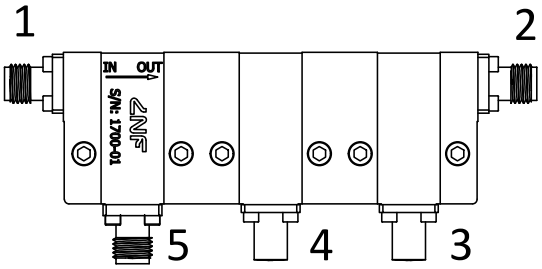
LNF-CICICIC4.3_4.9A

Triple Junction Circulator-Circulator-Circulator
Port 1: Female SMA
Port 2: Female SMA
Port 3: Female SMA
Port 4: Female SMA
Port 5: Female SMA



LNF-ISISCIC4.3_4.9A

Triple Junction Isolator-Isolator-Circulator
Port 1: Female SMA
Port 2: Female SMA
Port 3: Female SMA
Port 4: Termination
Port 5: Termination



LNF-CIISISC4.3_4.9A

Triple Junction Circulator-Isolator-Isolator
Port 1: Female SMA
Port 2: Female SMA
Port 3: Termination
Port 4: Termination
Port 5: Female SMA

Version	Model number
Triple Isolator	LNF-ISISISC4.3_4.9A
Triple Circulator	LNF-CICICIC4.3_4.9A
Isolator-Isolator-Circulator	LNF-ISISCIC4.3_4.9A
Circulator-Isolator-Isolator	LNF-CIISISC4.3_4.9A
Extra shield	LNF-SHIELD4_8_TJ