

# Datasheet

## LNF-ISC4\_8A and LNF-CIC4\_8A

4-8 GHz Cryogenic Isolator or Circulator



**LNF-ISC4\_8A**



**LNF-CIC4\_8A**

### Product Features

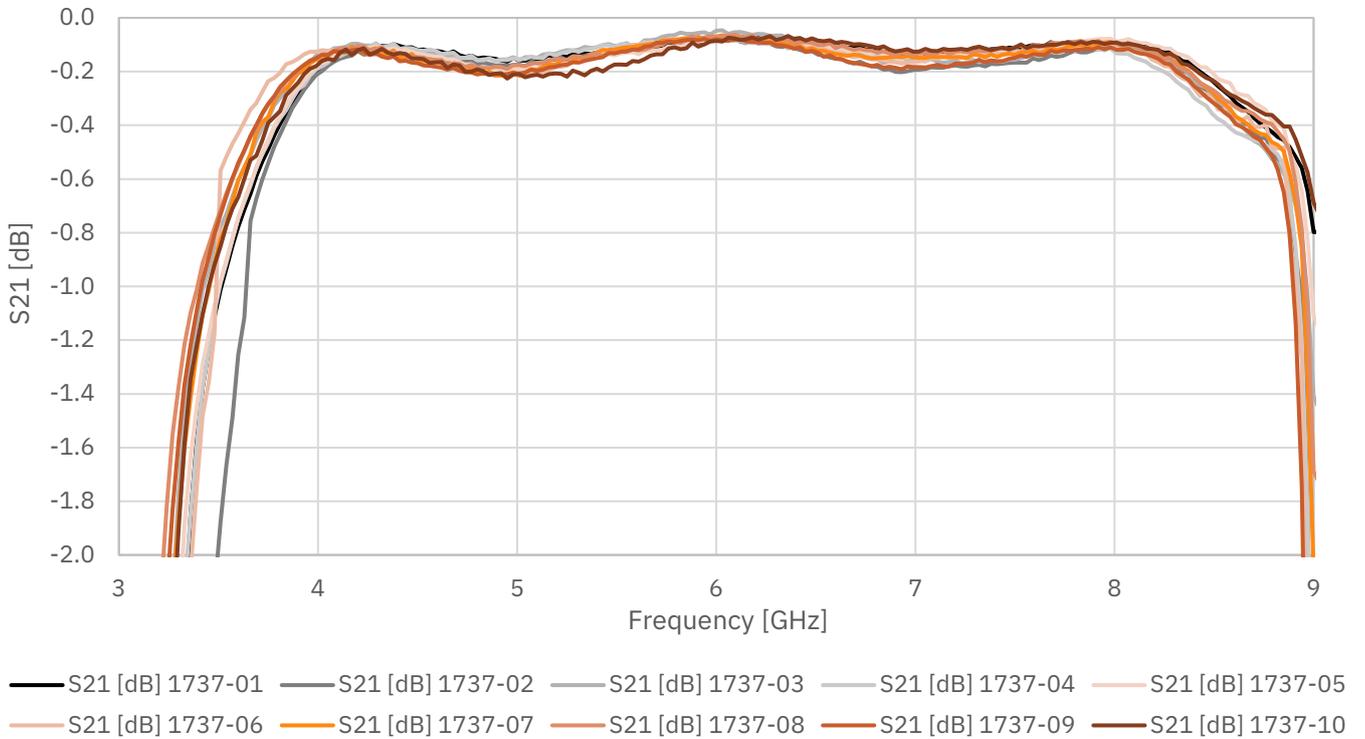
RF Bandwidth	4-8 GHz
Insertion Loss at 5 K	0.17 dB typical
Insertion Loss at 77 K	0.2 dB typical
Isolation	22 dB typical
Port Match	22 dB typical
RF Connectors	Female SMA

Absolute Maximum Ratings			Typical RF Characteristics at 77 K			
Parameter	Min	Max	Parameter	Condition	Value	Unit
Operating Temperature	0.01 K	100 K	Insertion Loss	4-12 GHz	0.2	dB
RF Drive Level		30 dBm	Isolation	4-12 GHz	22	dB
DC Voltage on RF Input and Output	-50 V	50 V	Port Match	4-12 GHz	22	dB

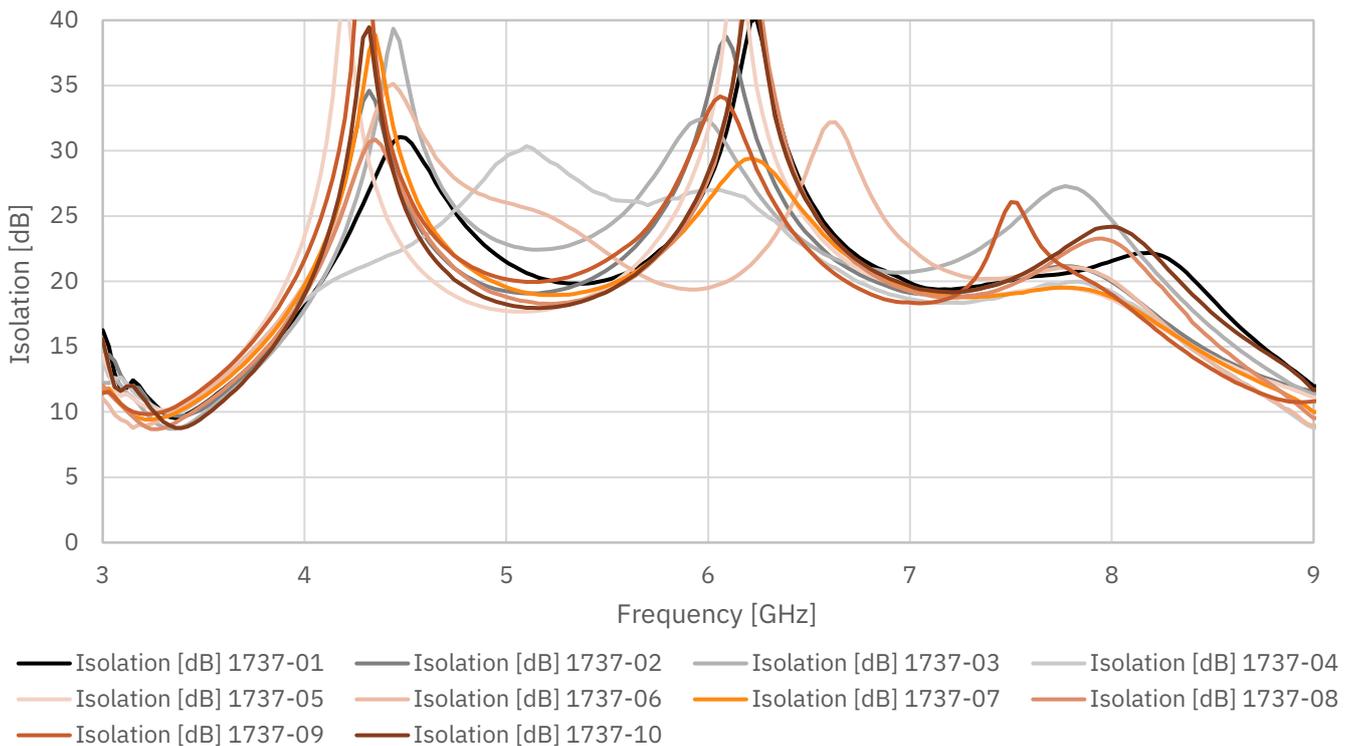
LNF-ISC4\_8A and LNF-CIC4\_8A are ultra-low insertion loss cryogenic isolators and circulators operating in the 4-8 GHz frequency range. They have been designed from ground up to meet the strict requirements of ultra-low temperature physics research. The gold plated OFHC copper body ensures minimum loss 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 22.35x24.64x10.16 mm excluding the connectors.

Measured data,  $T_{amb} = 77\text{ K}$

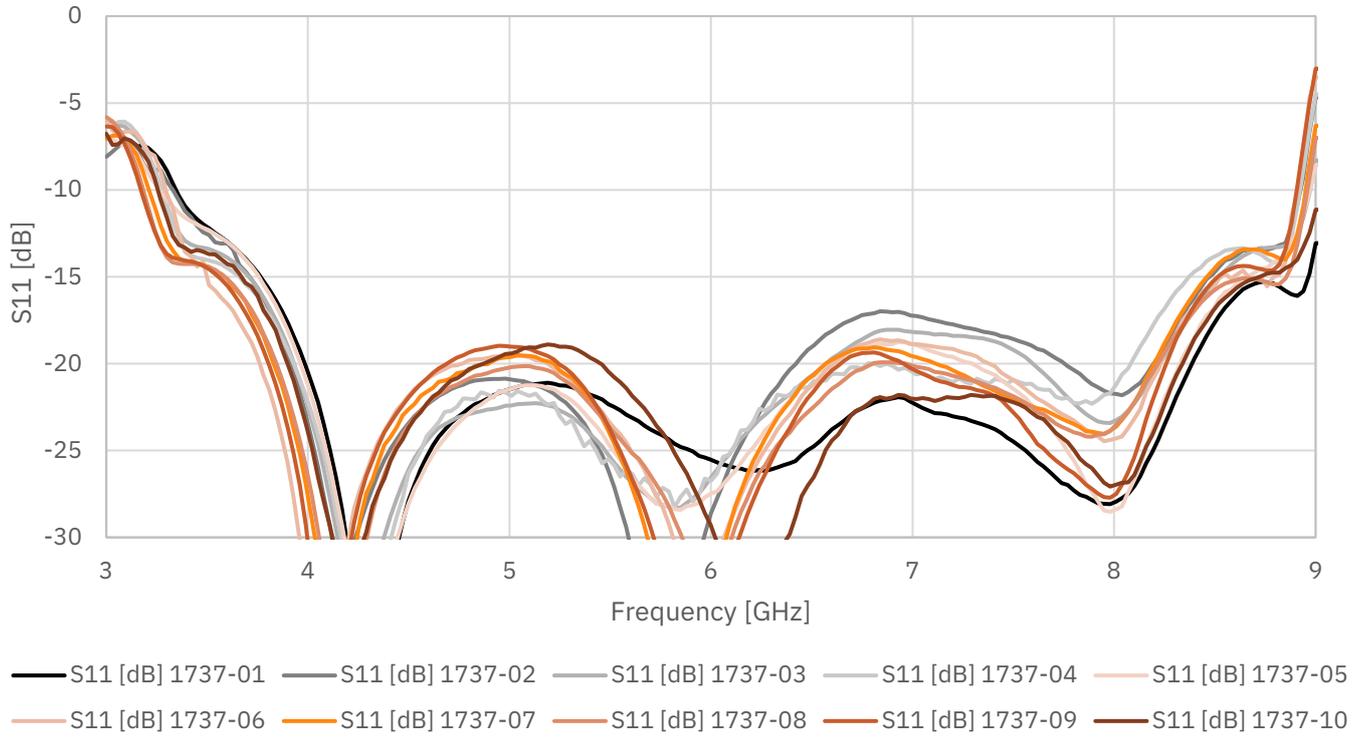
Insertion Loss of 10 Units at 77 K



Isolation of 10 Units at 77 K

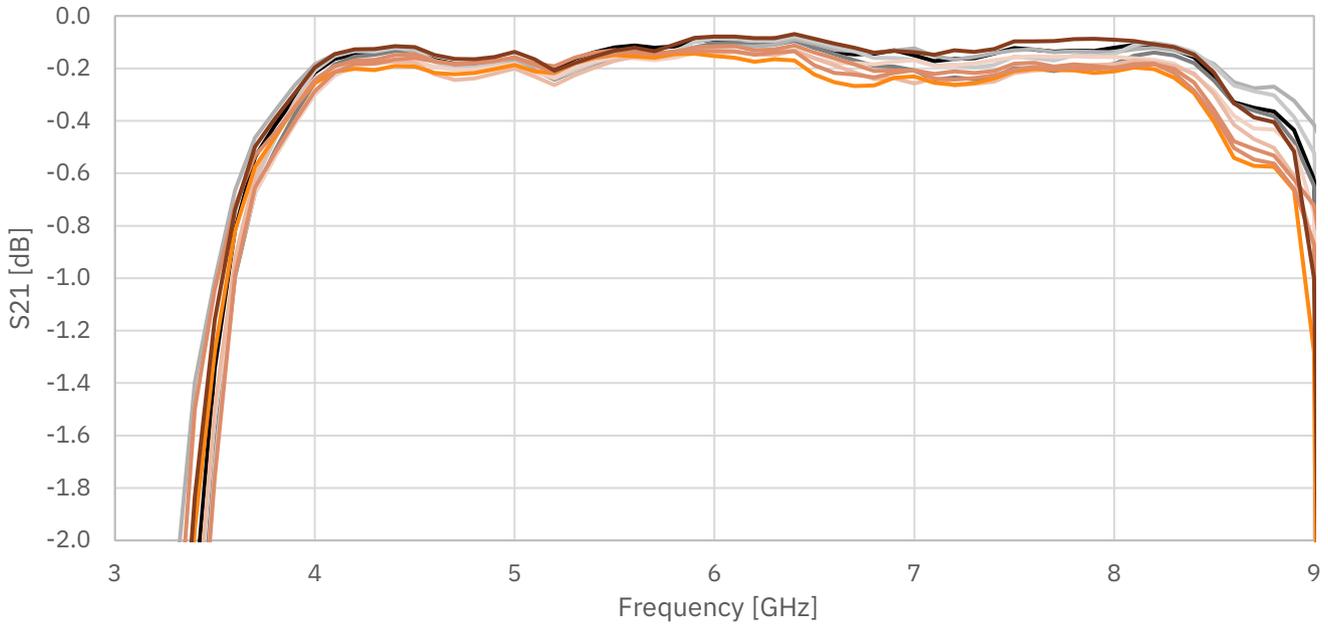


### Port Match of 10 Units at 77 K



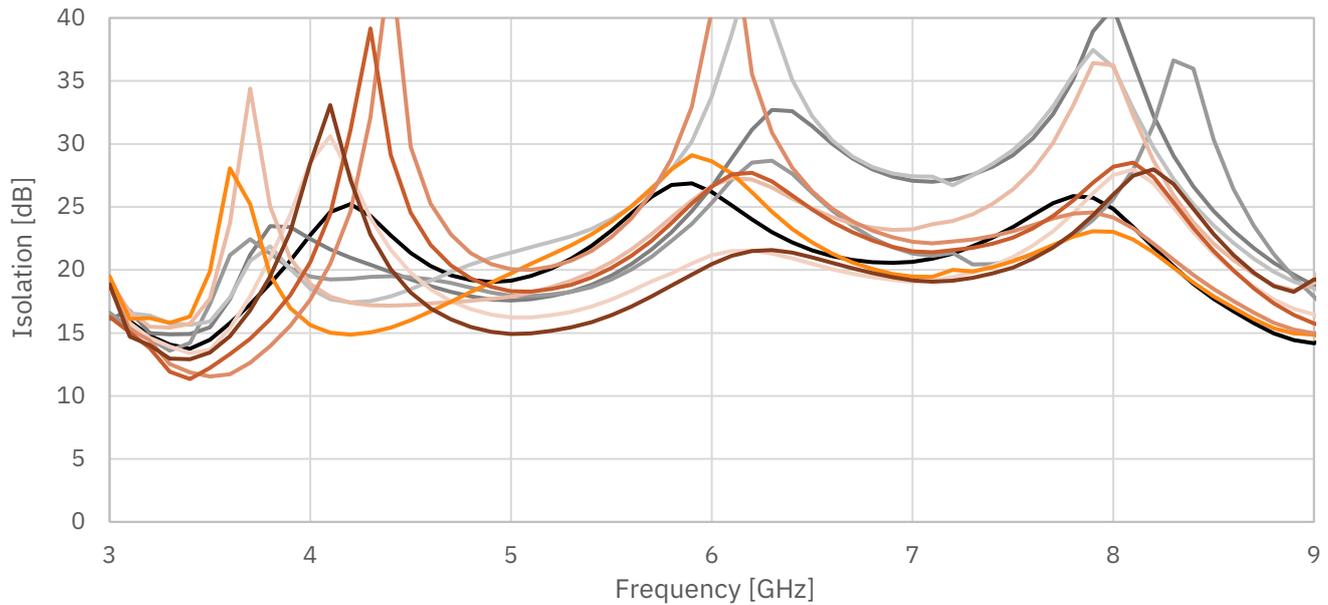
Measured data,  $T_{amb} = 5\text{ K}$

Insertion Loss of 10 Units at 5 K



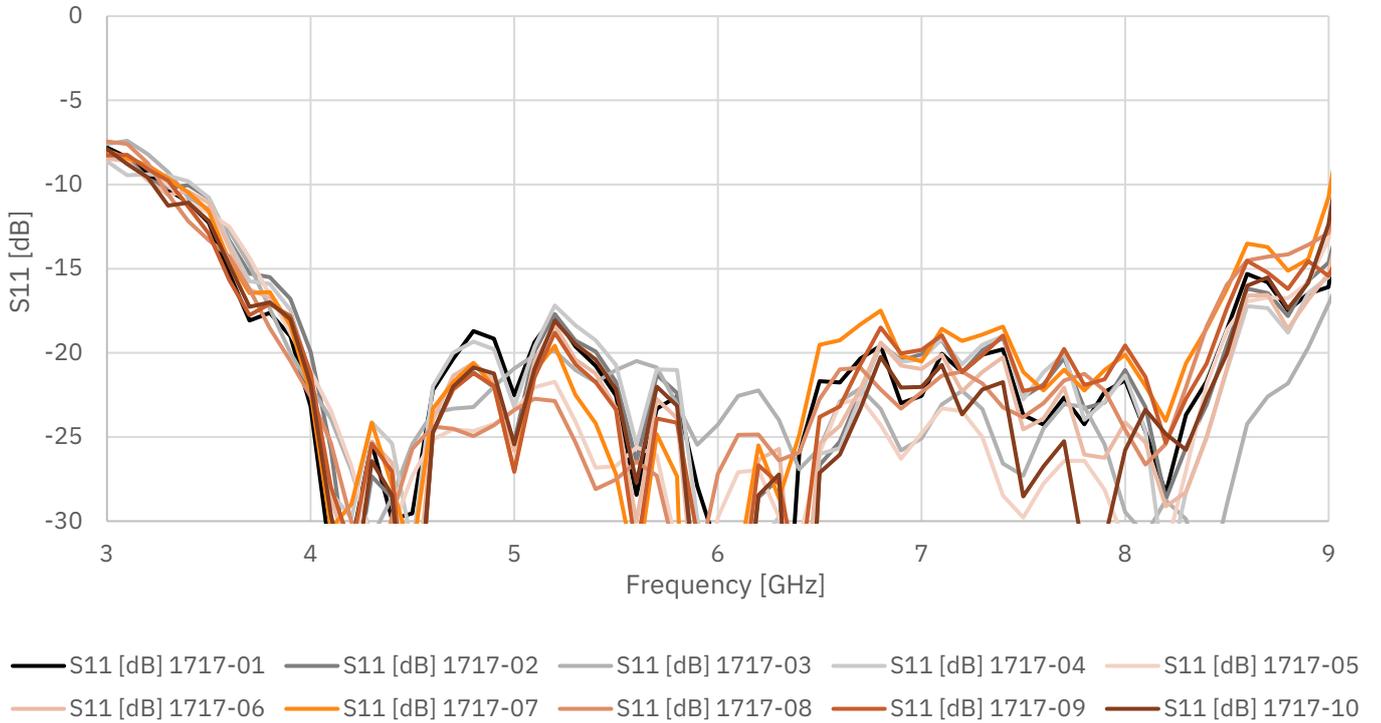
— S21 [dB] 1717-01 — S21 [dB] 1717-02 — S21 [dB] 1717-03 — S21 [dB] 1717-04 — S21 [dB] 1717-05  
— S21 [dB] 1717-06 — S21 [dB] 1717-07 — S21 [dB] 1717-08 — S21 [dB] 1717-09 — S21 [dB] 1717-10

Isolation of 10 Units at 5 K

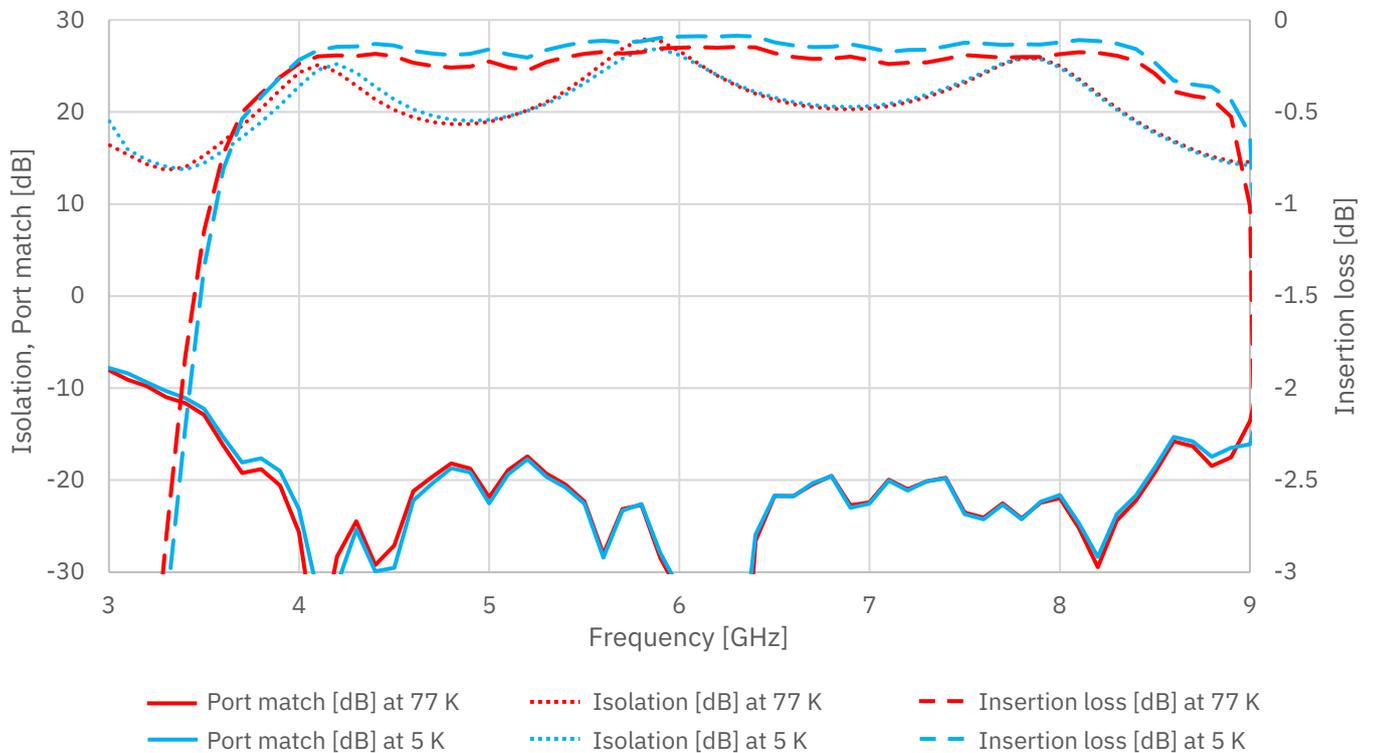


— Isolation [dB] 1717-01 — Isolation [dB] 1717-02 — Isolation [dB] 1717-03 — Isolation [dB] 1717-04  
— Isolation [dB] 1717-05 — Isolation [dB] 1717-06 — Isolation [dB] 1717-07 — Isolation [dB] 1717-08  
— Isolation [dB] 1717-09 — Isolation [dB] 1717-10

### Port Match of 10 Units at 5 K



### 77 K vs 5 K Performance



Insertion loss improves with 0.07 dB when cooled down from 77 K to 5 K.

## Magnetic flux density generated by internal magnet

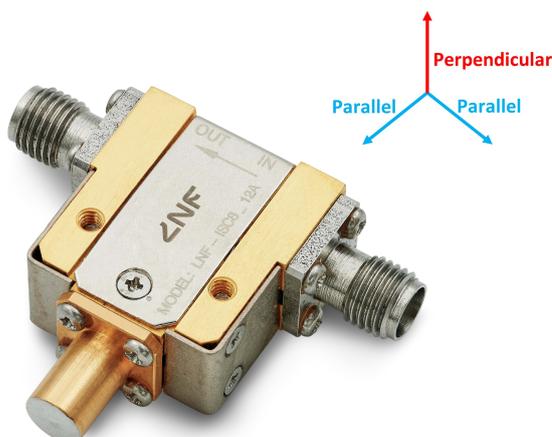
Parameter	Condition	Value	Unit
Magnetic flux density with standard shielding*	6 mm from chassis	< 4	Gauss
Magnetic flux density with optional shielding	6 mm from chassis	< 0.1	Gauss

- 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

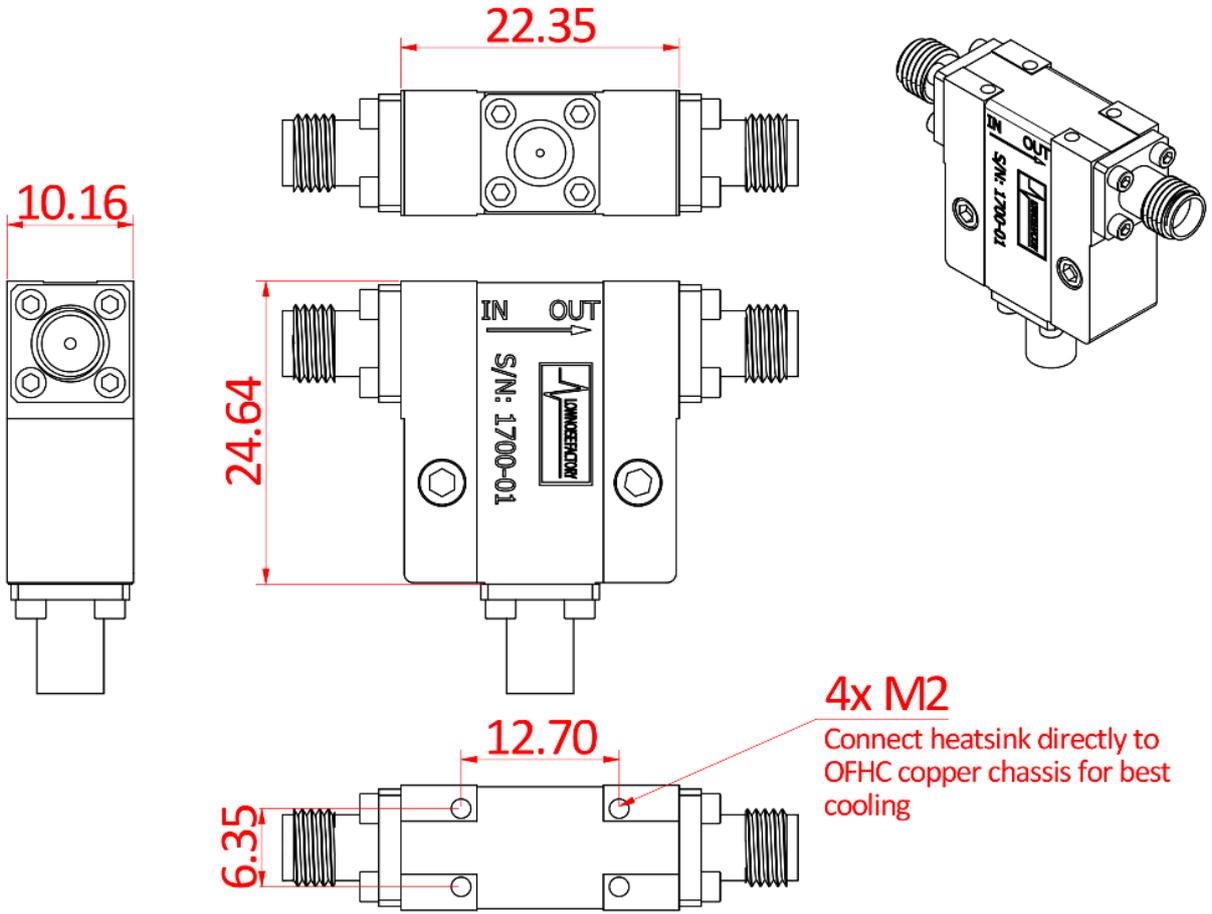
Parameter	Condition	Value	Unit
Maximum perpendicular external magnetic field	At chassis	650	Gauss
Maximum parallel external magnetic field	At chassis	1500	Gauss

- “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” magnetic fields, however the material saturates quickly and doesn’t shield well against high field external sources.



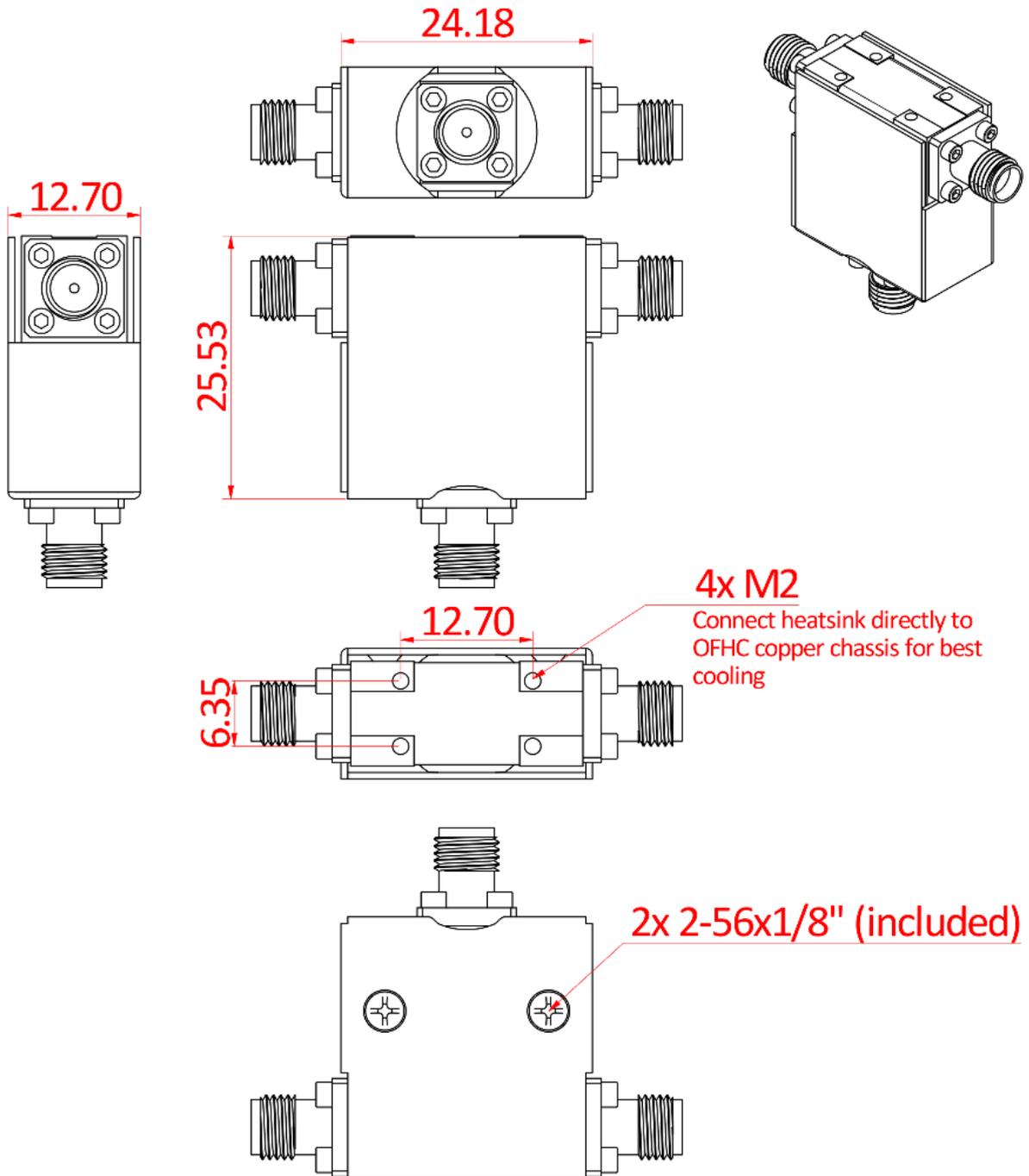
## Dimensions without additional shielding

Units: mm

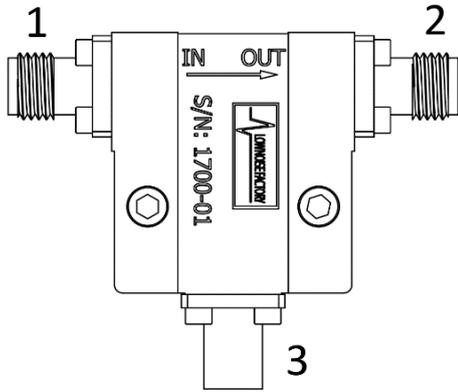


## Dimensions with additional shielding

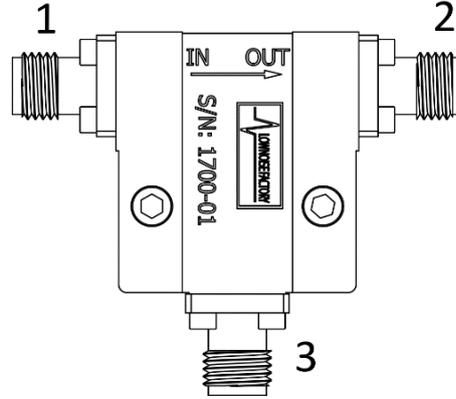
Units: mm



## Model numbering



**LNF-ISC4\_8A**  
Single Junction Isolator  
Port 1: Female SMA  
Port 2: Female SMA  
Port 3: Termination



**LNF-CIC4\_8A**  
Single Junction Circulator  
Port 1: Female SMA  
Port 2: Female SMA  
Port 3: Female SMA

Version	Model number
Isolator	LNF-ISC4_8A
Circulator	LNF-CIC4_8A
Extra shield	LNF-SHIELD4_8_SJ

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## Array



\* Consult with factory for array options.