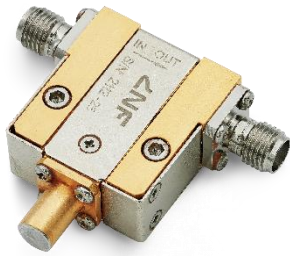


Datasheet

LNF-ISC4_8A and LNF-CIC4_8A

4-8 GHz Cryogenic Isolator or Circulator



LNF-ISC4_8A



LNF-CIC4_8A

Product Features

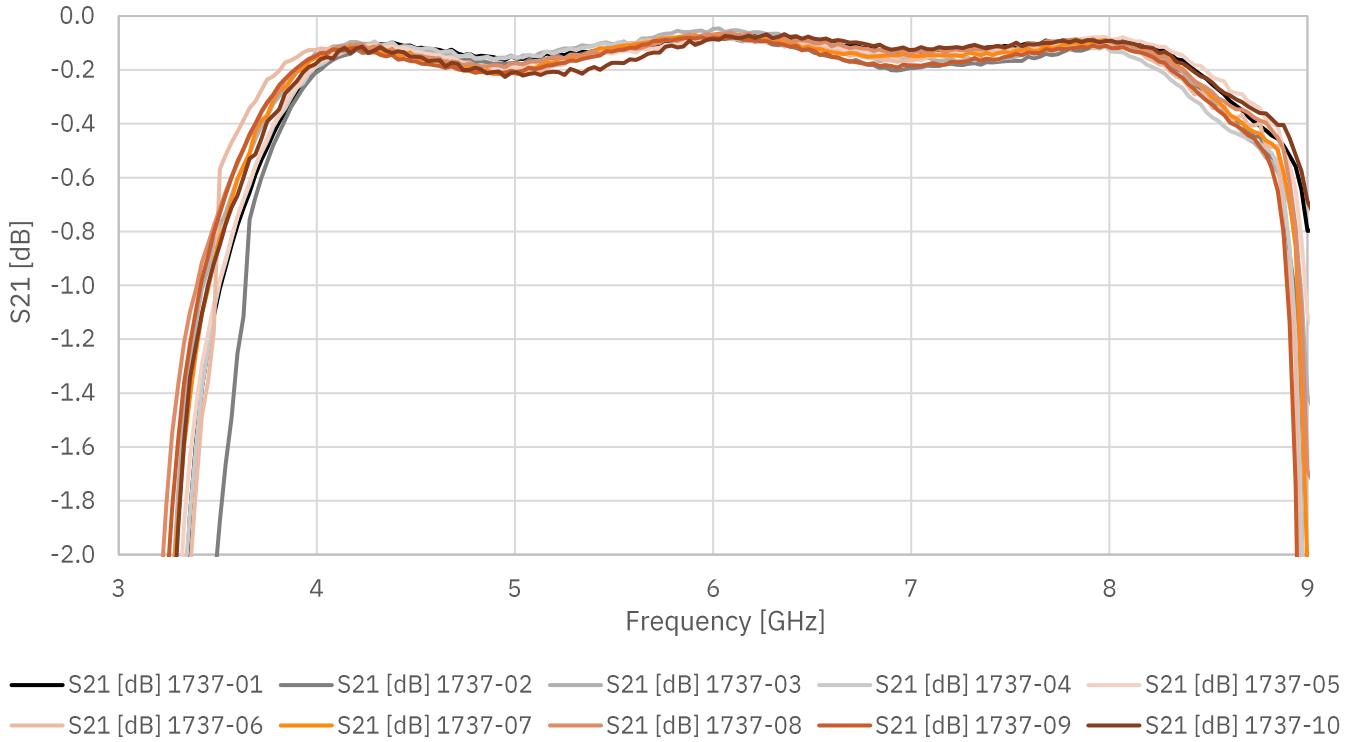
| | |
|------------------------|-----------------|
| RF Bandwidth | 4-8 GHz |
| Insertion Loss at 5 K | 0.17 dB typical |
| Insertion Loss at 77 K | 0.2 dB typical |
| Isolation | 22 dB typical |
| Port Match | 22 dB typical |
| RF Connectors | Female SMA |
| | |
| | |

| 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 |

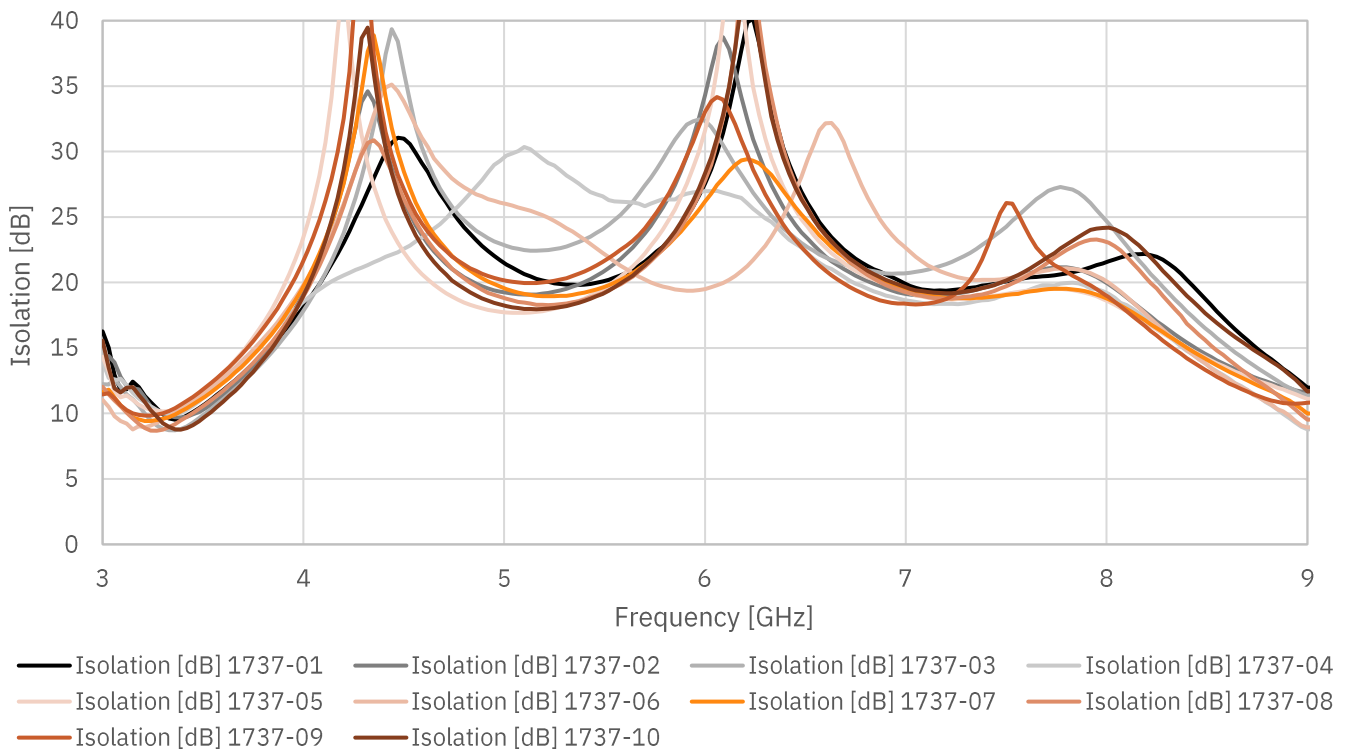
LNF-ISC4_8A and LNF-CIC4_8A are ultra-low insertion loss cryogenic isolators and circulators operating in the 4-8 GHz frequency range. They have been designed from ground up to meet the strict requirements of ultra-low temperature physics research. The gold plated OFHC copper body ensures minimum loss 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, $T_{amb} = 77\text{ K}$

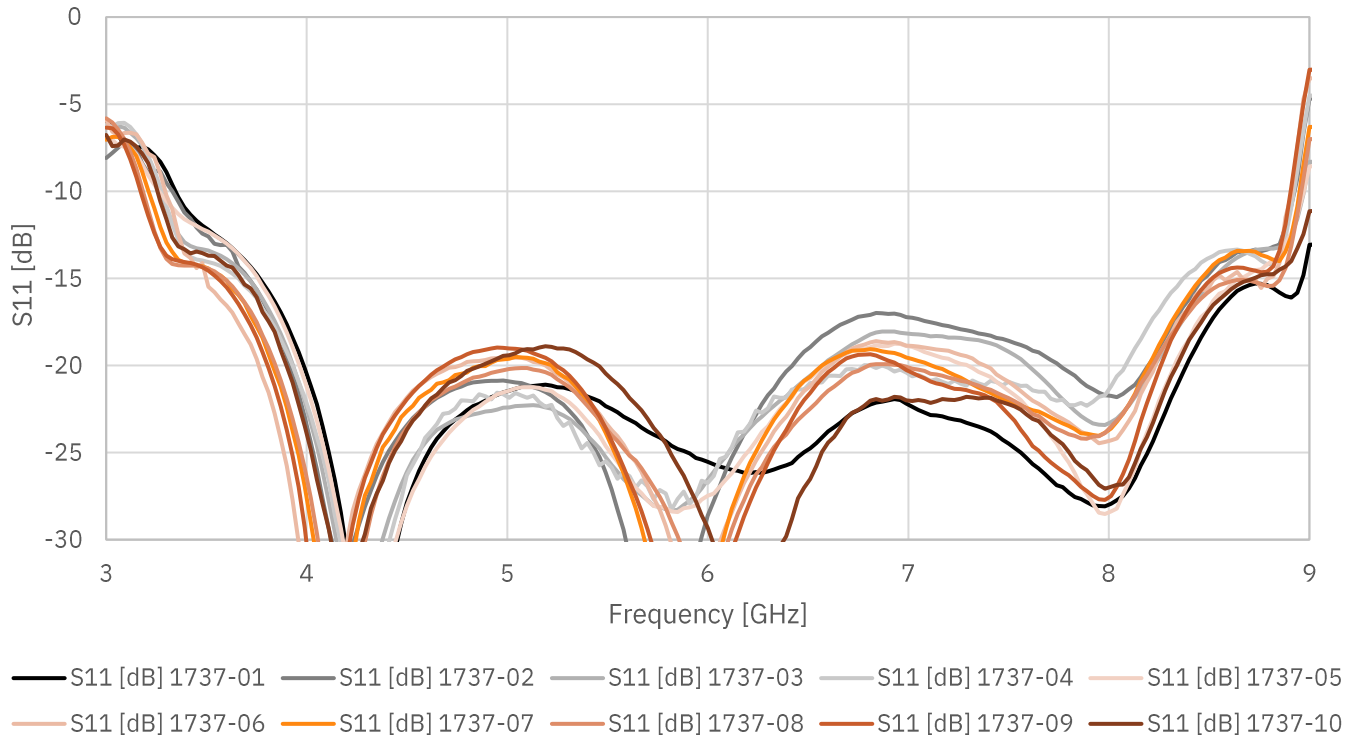
Insertion Loss of 10 Units at 77 K



Isolation of 10 Units at 77 K

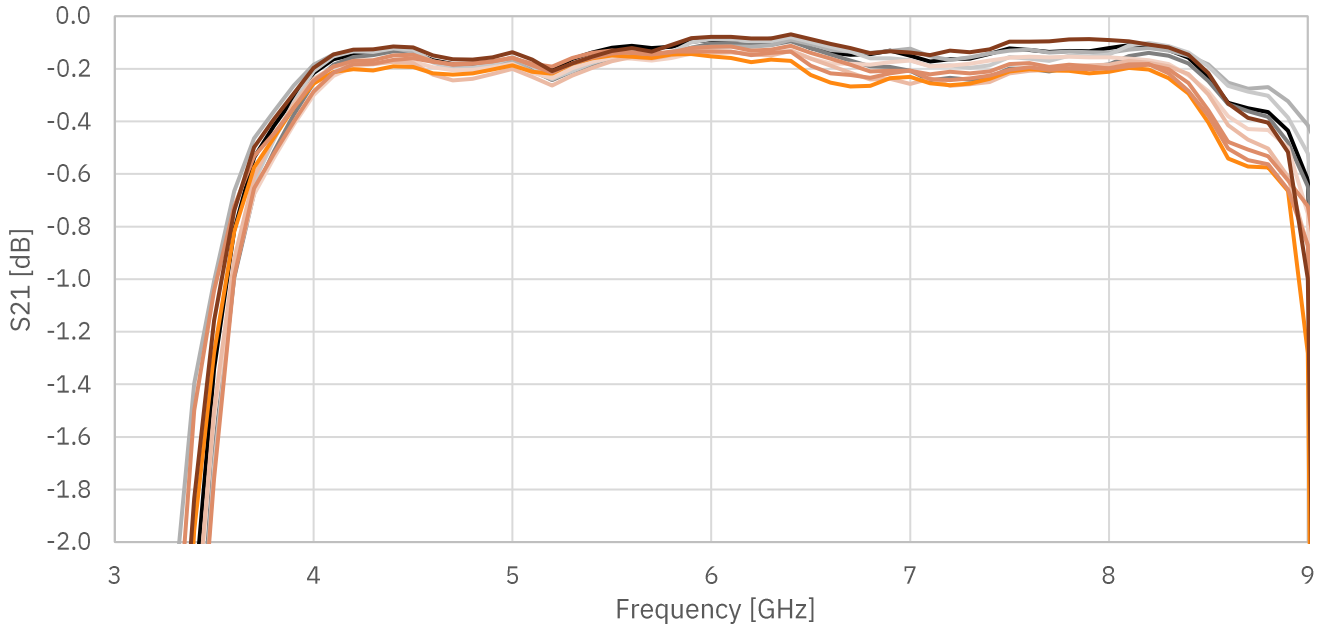


Port Match of 10 Units at 77 K



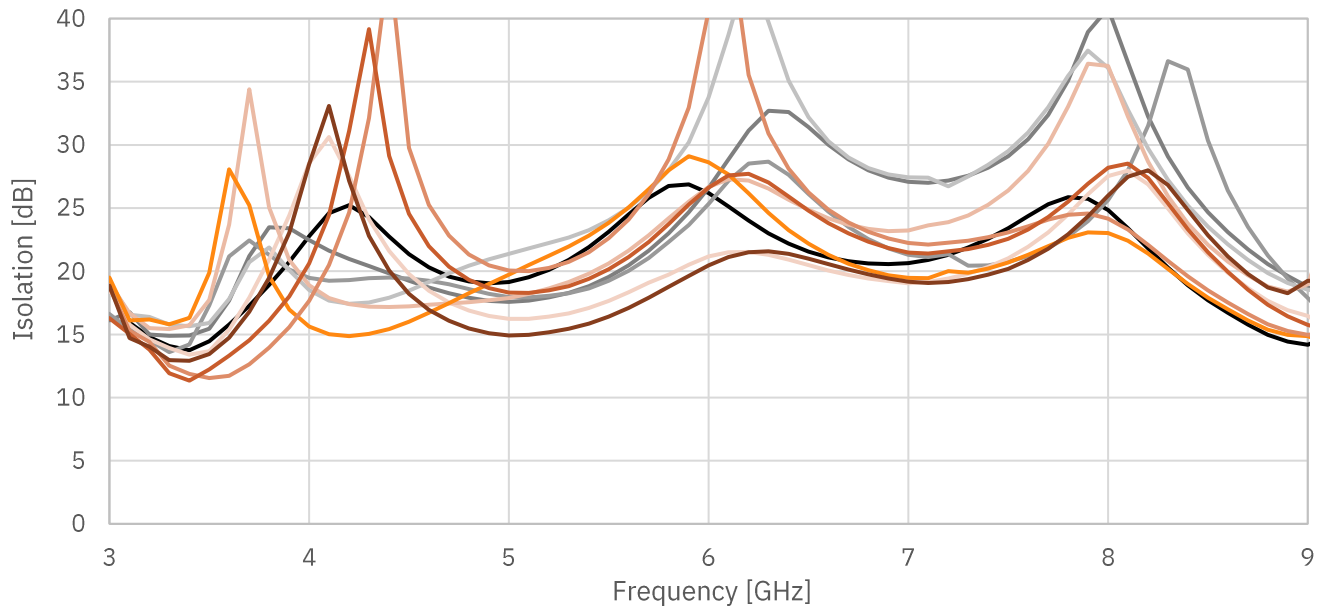
Measured data, $T_{amb} = 5\text{ K}$

Insertion Loss of 10 Units at 5 K



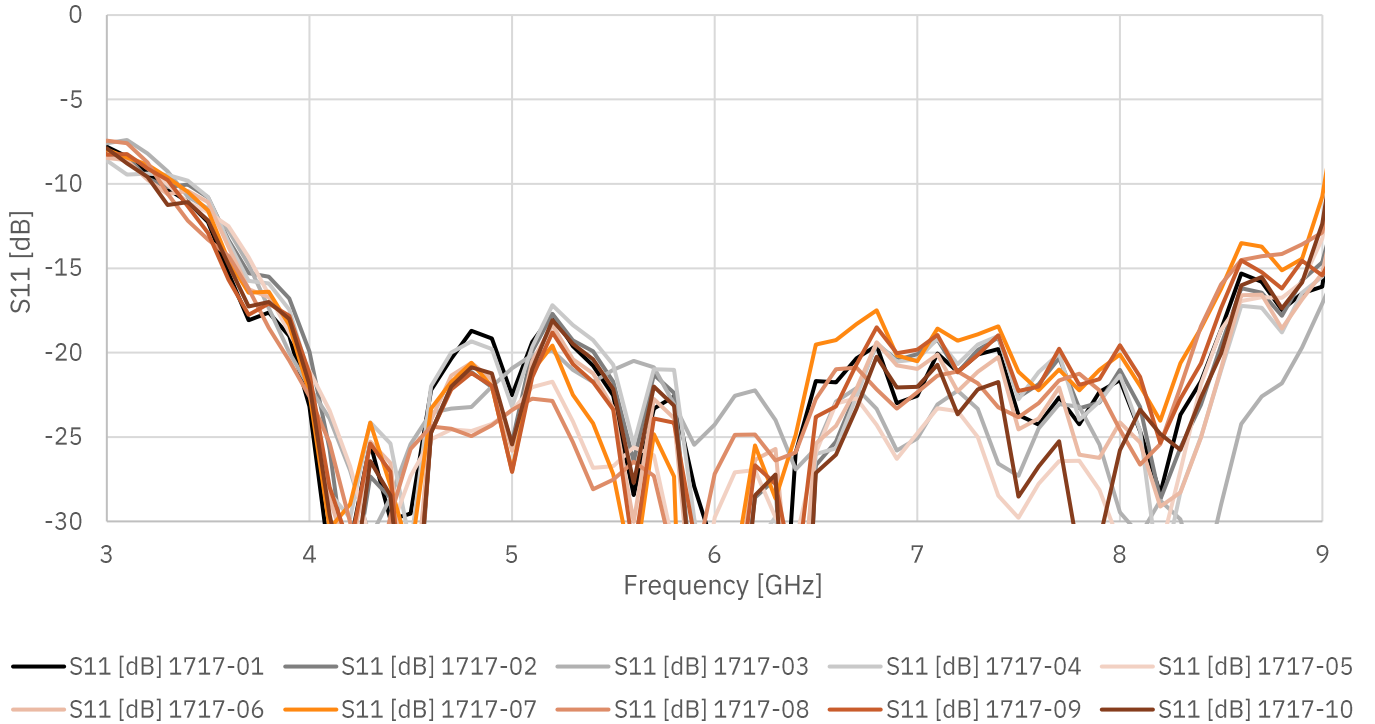
— S21 [dB] 1717-01 — S21 [dB] 1717-02 — S21 [dB] 1717-03 — S21 [dB] 1717-04 — S21 [dB] 1717-05
— S21 [dB] 1717-06 — S21 [dB] 1717-07 — S21 [dB] 1717-08 — S21 [dB] 1717-09 — S21 [dB] 1717-10

Isolation of 10 Units at 5 K

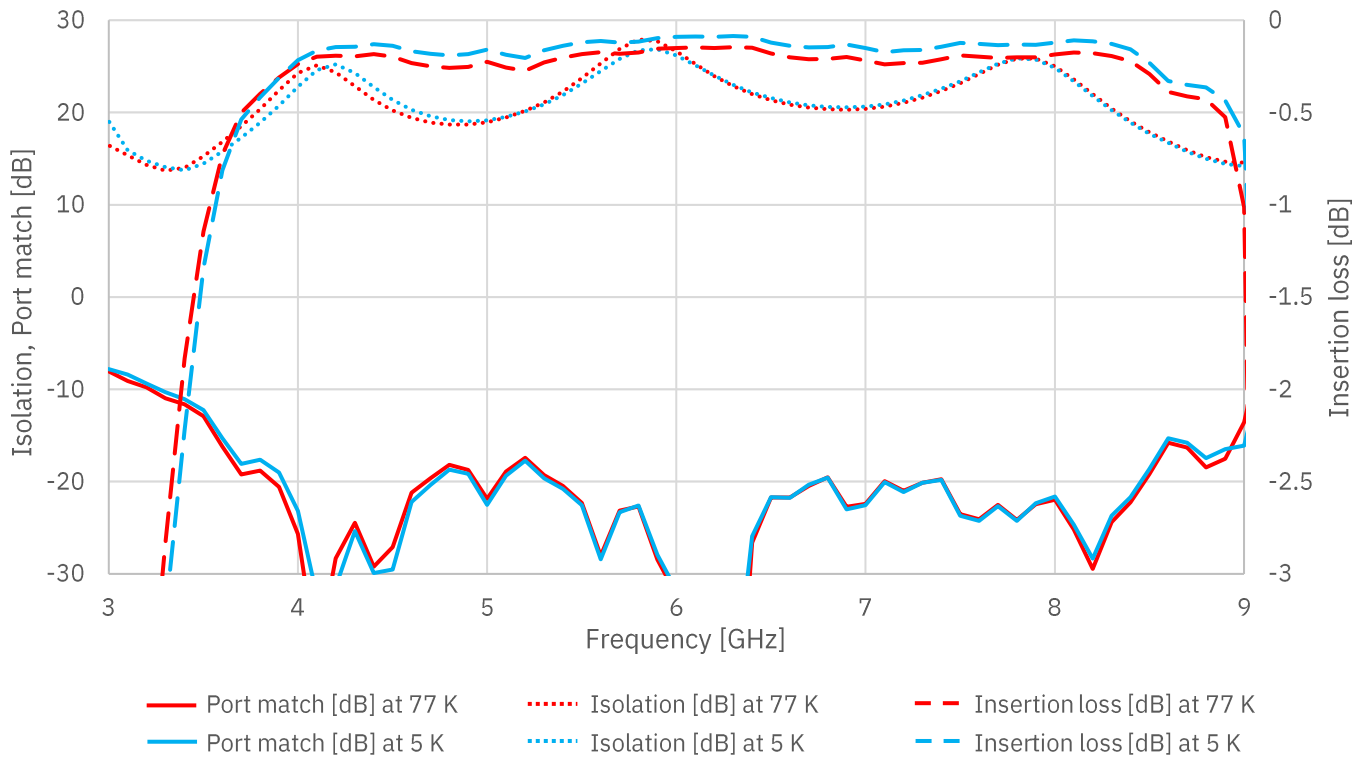


— Isolation [dB] 1717-01 — Isolation [dB] 1717-02 — Isolation [dB] 1717-03 — Isolation [dB] 1717-04
— Isolation [dB] 1717-05 — Isolation [dB] 1717-06 — Isolation [dB] 1717-07 — Isolation [dB] 1717-08
— Isolation [dB] 1717-09 — Isolation [dB] 1717-10

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

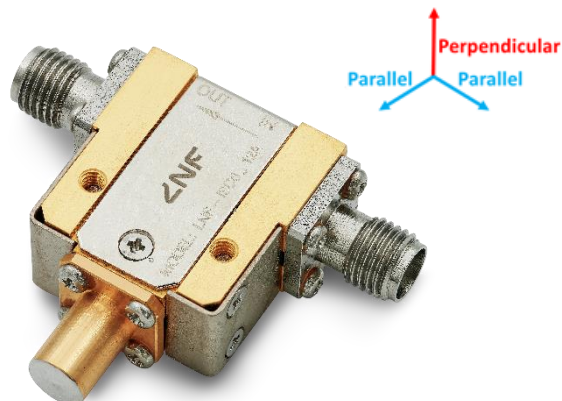
| Parameter | Condition | Value | Unit |
|--|-------------------|-------|-------|
| Magnetic flux density with standard shielding* | 6 mm from chassis | < 4 | Gauss |
| Magnetic flux density with optional shielding | 6 mm from chassis | < 0.1 | Gauss |

- 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

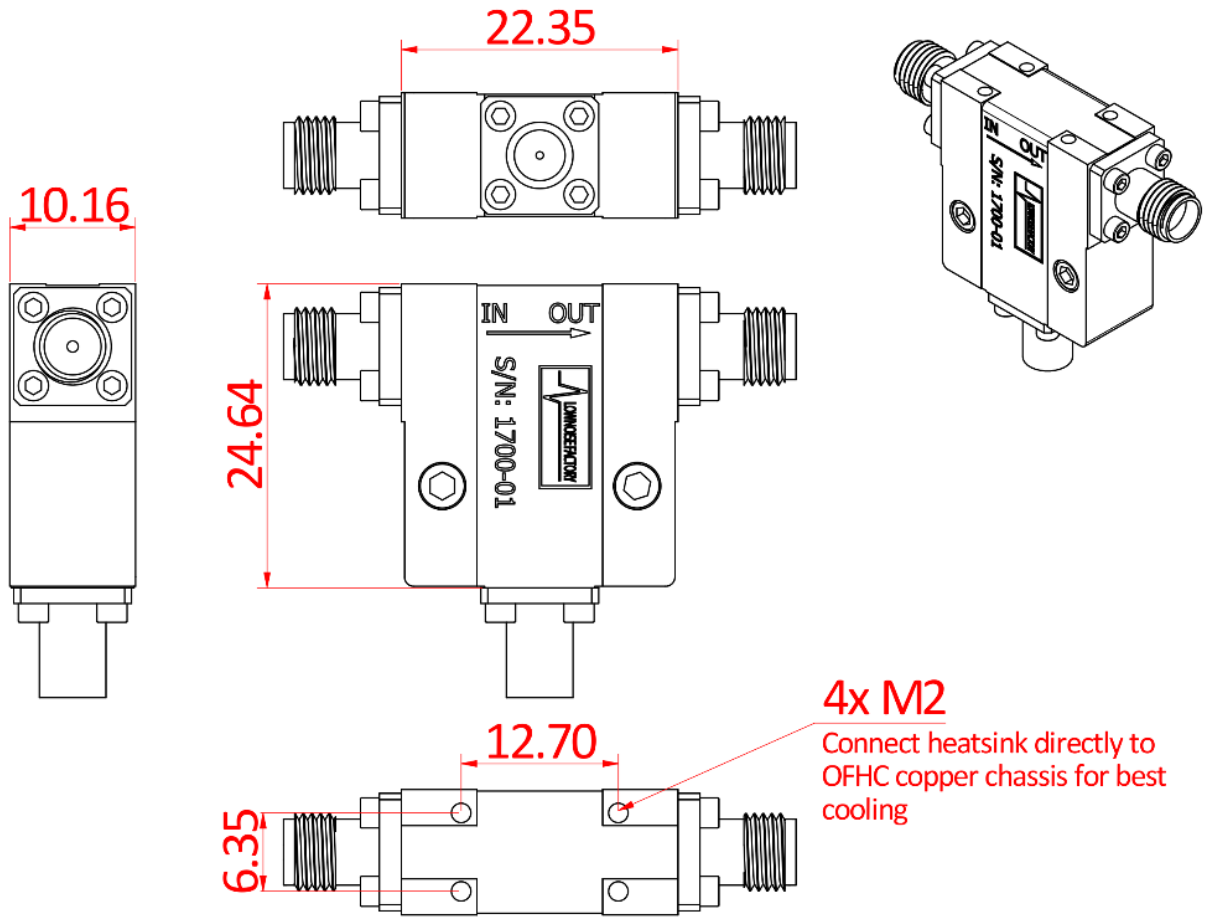
| Parameter | Condition | Value | Unit |
|---|------------|-------|-------|
| Maximum perpendicular external magnetic field | At chassis | 650 | Gauss |
| Maximum parallel external magnetic field | At chassis | 1500 | Gauss |

- “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.



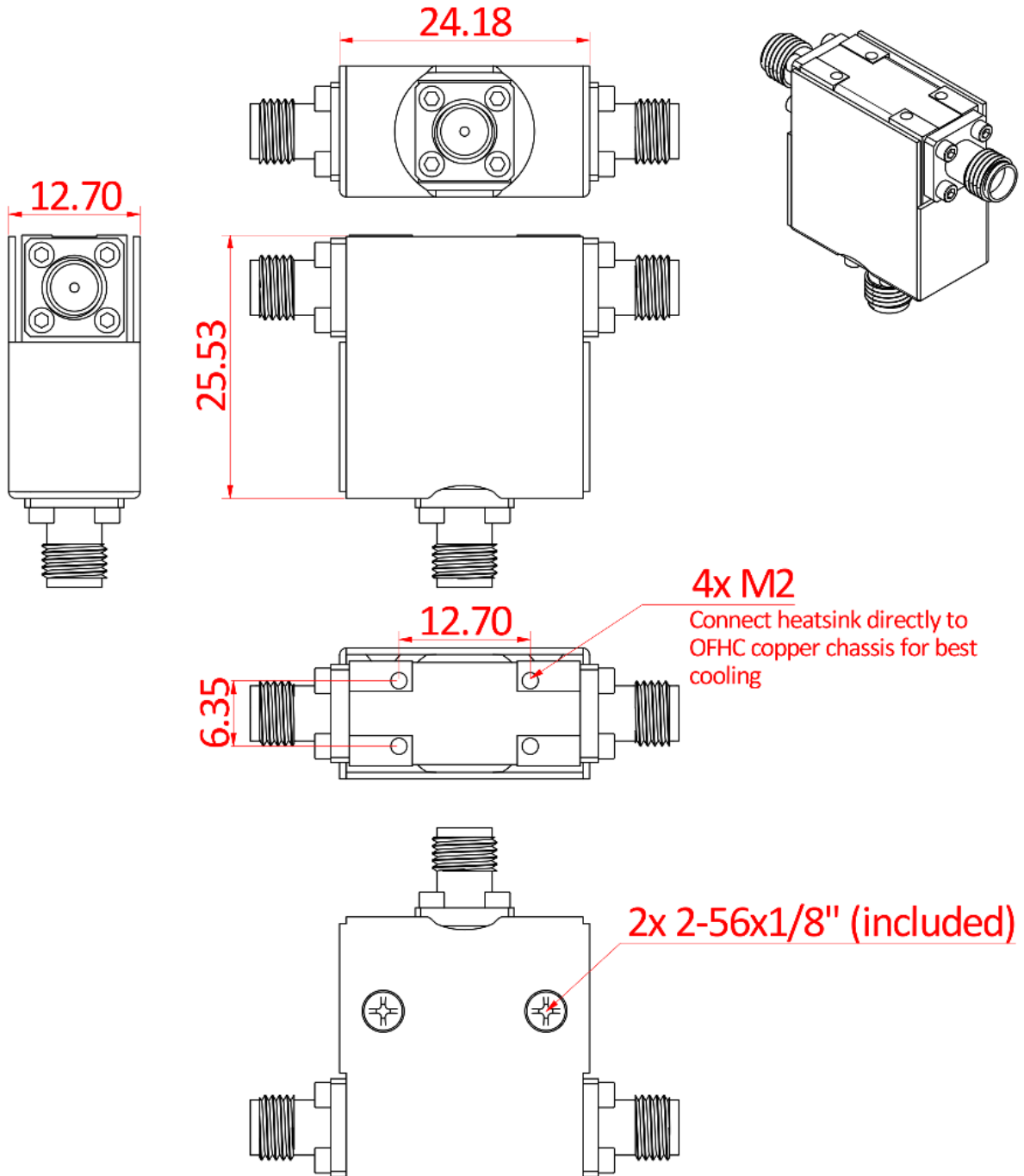
Dimensions without additional shielding

Units: mm

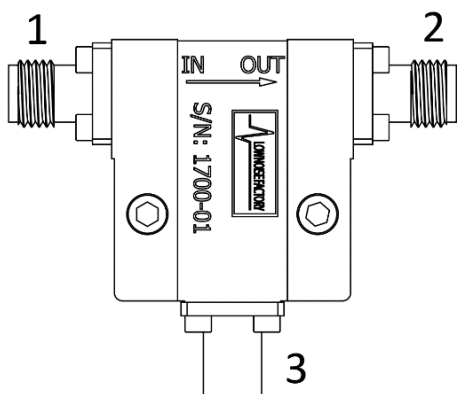


Dimensions with additional shielding

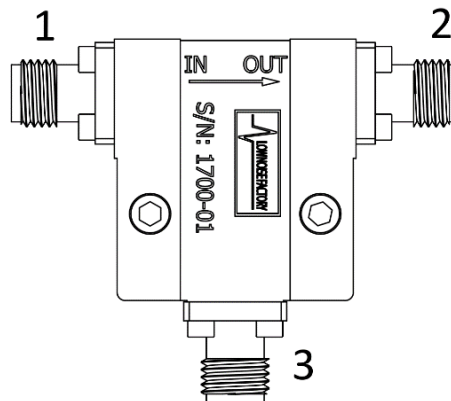
Units: mm



Model numbering



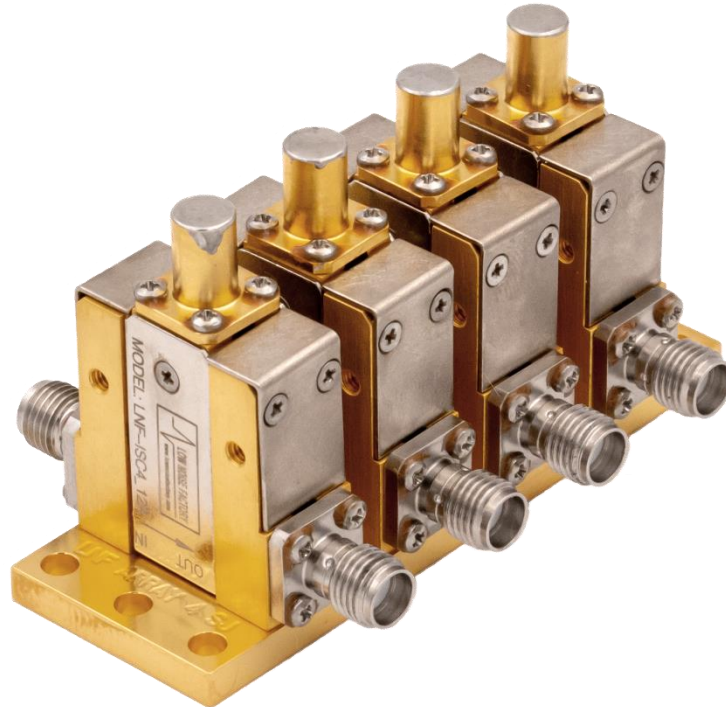
LNF-ISC4_8A
Single Junction Isolator
Port 1: Female SMA
Port 2: Female SMA
Port 3: Termination



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 |

Array



* Consult with factory for array options.