

HIGH POWER TRAVELING WAVE TUBE FOR COMMUNICATIONS LD7235 SERIES

30 GHz, 150 W CW, CONDUCTION COOLING, HIGH POWER GAIN

GENERAL DESCRIPTION

The NEC LD7235 series of PPM-focused traveling wave tubes are designed for use as final amplifiers in the earth-to-satellite communications transmitter, LMDS (Local Multipoint Distribution Service) and other advanced communication systems.

Three models of the LD7235 series are capable of delivering an output power of 150 W over the range of 26.5 GHz to 31.1 GHz and provide a high power gain of 50 dB at 150 W output power. These are equipped with dual-stage depressed collector for enhancing overall efficiency and a single collector.

Furthermore, they are of rugged and reliable design offering long-life service.



FEATURES

- High Power Gain
The power gain is typically 50 dB at 150 W level.
- Simple Cooling System
The tubes are conduction-cooled, so that the cooling systems are greatly simplified.
- PPM Focusing
The tubes are PPM (Periodic Permanent Magnet) -focused, eliminating entirely the focusing power supplies and interlock circuits.
- Rugged Construction
The tubes are designed to be rugged, therefore they are suitable for transportable systems.
- Long Life and High Stability
The tubes employ an advanced impregnated cathode with a low operating temperature for long life.
- Microdischarge Free
The tubes are carefully designed to be free from microdischarge in the electron gun for long term operation, therefore they are suitable for digital communication service.

For safe use of microwave tubes, refer to NEC document "Safety instructions to all personnel handling electron tubes" (ET0048EJ*V*UM00)

The information in this document is subject to change without notice.

GENERAL CHARACTERISTICS

ELECTRICAL

| | |
|----------------------------|--------------------------------|
| Frequency | 26.5 to 28.6 GHz |
| | 27.5 to 30.0 GHz |
| | 30.0 to 31.3 GHz |
| Output Power | 150 W |
| Heater Voltage | 6.3 V |
| Heater Current | 1.05 A |
| Type of Cathode | Indirectly heated, Impregnated |
| Cathode Warm-up Time | 300 s |

MECHANICAL

| | |
|------------------------------|----------------------------|
| Dimensions | See Outline |
| Weight | 3.5 kg approx. |
| Focusing | Periodic Permanent Magnet |
| Mounting Position | Any |
| Electrical Connections | Flying Leads |
| RF Connections | |
| Input | Mates with UG-599/U Flange |
| Output | Mates with UG-599/U Flange |
| Cooling | Conduction |

ABSOLUTE RATINGS (Note 1, 2 and 3)

ELECTRICAL

| | Min. | Max. | Unit |
|-----------------------------|------|----------|------|
| Heater Voltage | 6.0 | 6.6 | V |
| Heater Surge Current | - | 1.6 | A |
| Heater Current | - | 1.5 | A |
| Heater Warm-up Time | 300 | - | s |
| Helix Voltage | 12.0 | 13.0 | kV |
| Helix Current | - | 3.0 | mA |
| ★ Isolated Anode Type | | | |
| Anode Voltage | 0 | 11.0 | kV |
| Anode Current | 0 | 1.0 | mA |
| ★ Single Collector Type | | | |
| Collector Voltage | 4.0 | 6.0 | kV |
| Collector Current | - | 140 | mA |
| ★ Dual-stage Collector Type | | | |
| Collector Voltage-1 | 4.0 | 6.0 | kV |
| Collector Current-1 | - | 80 | mA |
| Collector Voltage-2 | 2.0 | 3.0 | kV |
| Collector Current-2 | - | 140 | mA |
| Cathode Current | - | 140 | mA |
| RF Drive Power | - | 3.0 | mW |
| Load VSWR | - | 1.25 : 1 | - |

ENVIRONMENTAL

| | Min. | Max. | Unit |
|-----------------------------|------|------|------|
| Heat Sink Temperature | -15 | +110 | °C |
| Ambient Temperature | | | |
| Storage | -55 | +100 | °C |
| Operation | -30 | +75 | °C |

TYPICAL OPERATION (Note 2, 3, 4 and 5)

| | | Unit |
|--|-------|----------|
| Frequency | 30.0 | GHz |
| Output Power | 150 | W |
| Heater Voltage (Note 4) | 6.3 | V |
| Heater Current | 1.05 | A |
| Helix Voltage | 12.6 | kV |
| Helix Current | 0.5 | mA |
| ★ Isolated Anode Type | | |
| Anode Voltage | 9.4 | kV |
| Anode Current | 0.01 | mA |
| ★ Single Collector Type | | |
| Collector Voltage | 4.6 | kV |
| Collector Current | 109 | mA |
| ★ Dual-stage Collector Type | | |
| Collector Voltage-1 | 4.6 | kV |
| Collector Current-1 | 51 | mA |
| Collector Voltage-2 | 2.3 | kV |
| Collector Current-2 | 58 | mA |
| Cathode Current | 110 | mA |
| Power Gain at 20 W | 57 | dB |
| at 150 W | 51 | dB |
| Gain Variation at 20 W | 0.15 | dB/60MHz |
| Gain Slope at 20 W | 0.005 | dB/MHz |
| AM-PM Conversion | | |
| at 20 W | 1.2 | deg./dB |
| at 150 W | 2.0 | deg./dB |
| 3rd Order Intermodulation | -28.5 | dBc |
| (two equal carriers, 20 W total) | | |

Note 1 : Absolute rating should not be exceeded under continuous or transient conditions. A single absolute rating may be the limitation and simultaneous operation at more than one absolute rating may not be possible.

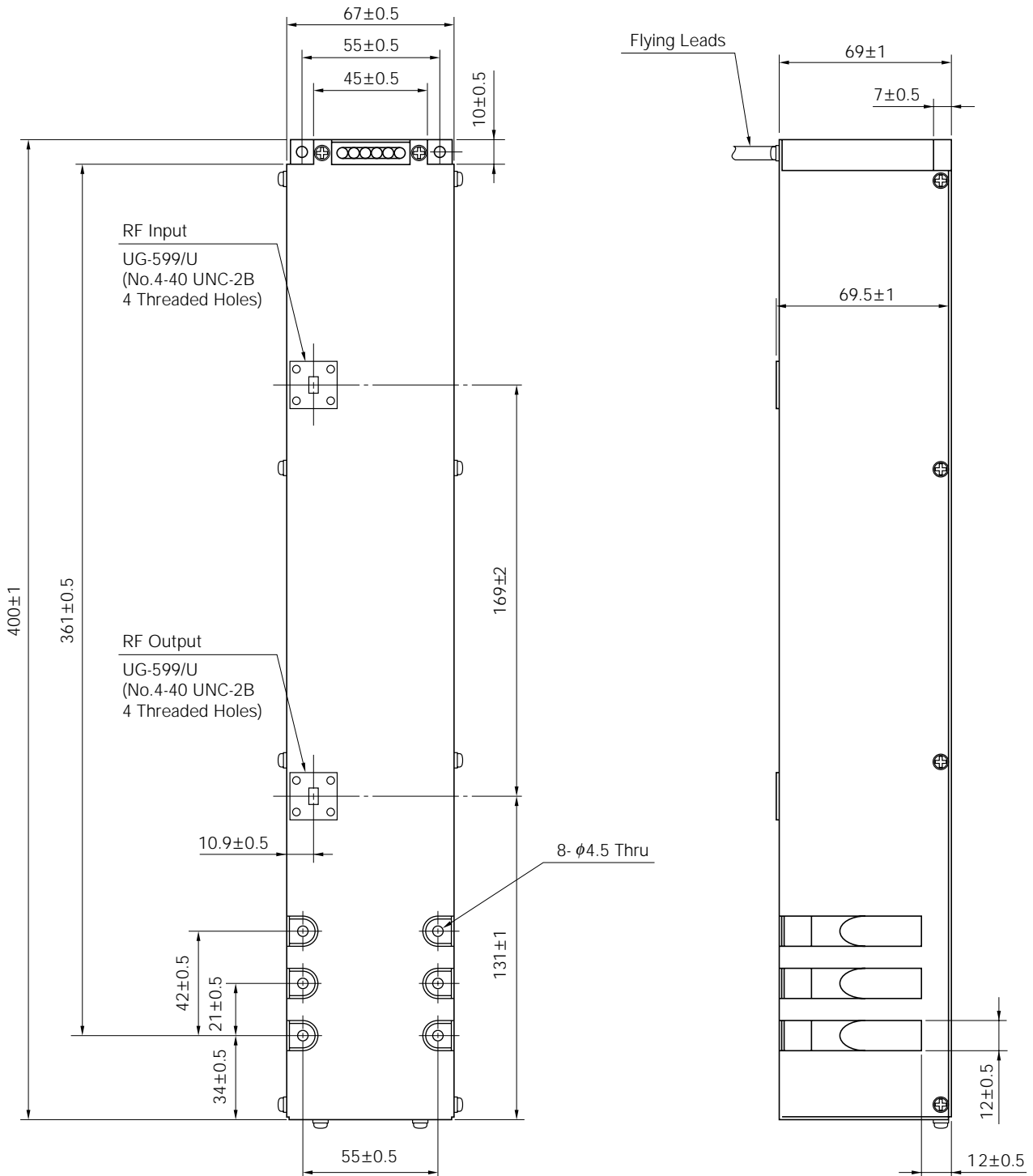
Note 2 : The tube body is at ground potential in operation.

Note 3 : All voltages are referred to the cathode potential except the heater voltage.

Note 4 : The optimum operating parameters are shown on a test performance sheet for each tube.

Note 5 : These characteristics and operating values may be changed as a result of additional information or product improvement. NEC should be consulted before using this information for equipment design. This data sheet should not be referred to a contractual specification.

LD7235 SERIES OUTLINE (Unit in mm)



| Lead Color | Lead Connections |
|------------|------------------|
| Brown | Heater |
| Yellow | Heater-Cathode |
| Blue | Anode (*1) |
| Black | Helix |
| Red | Collector-1 |
| White | Collector-2 (*2) |

*1. For the type without an isolated anode, the blue lead line will not be provided.

*2. For the single collector type, the white lead line will not be provided.

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Anti-radioactive design is not implemented in this product.