

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.

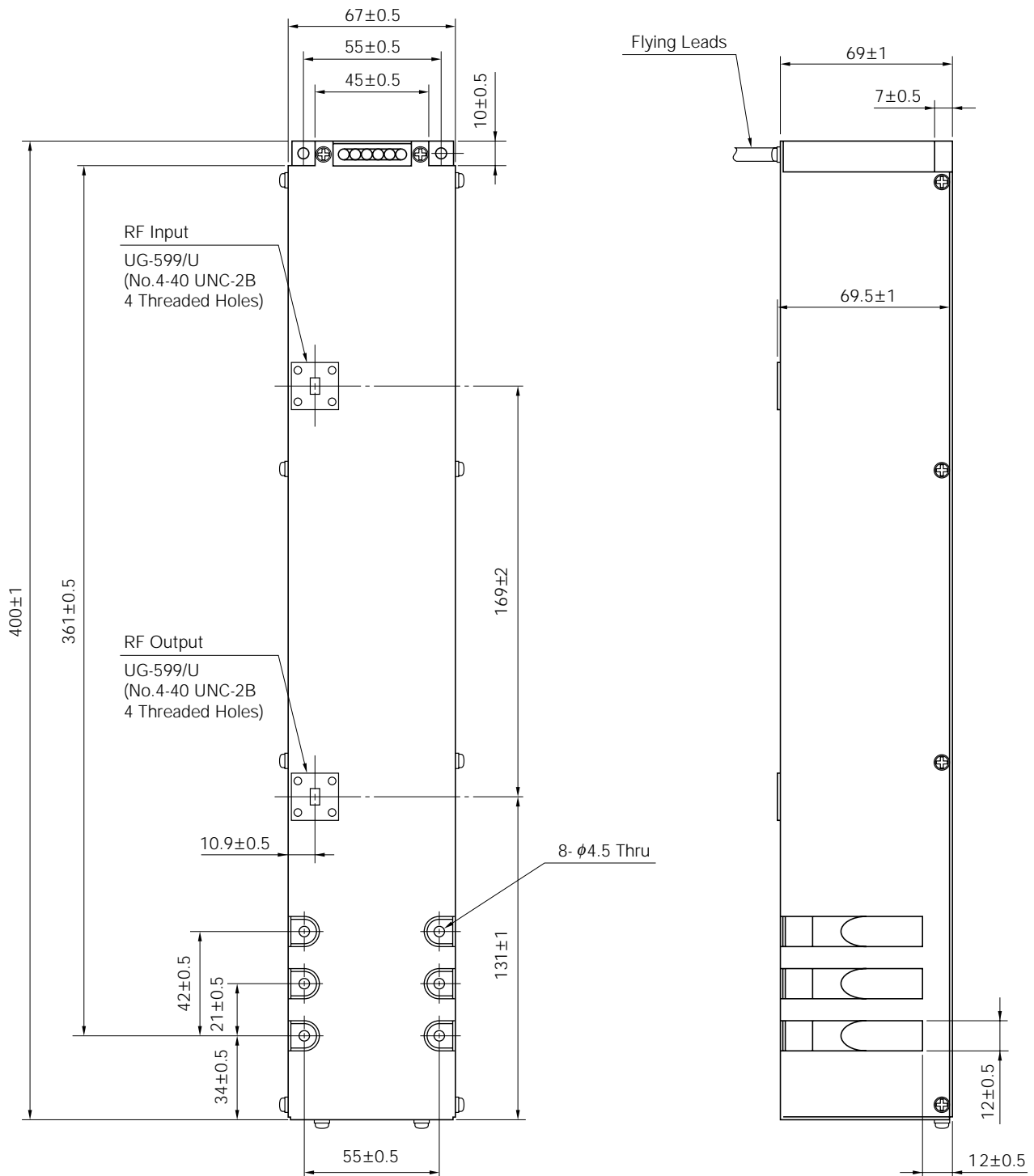
Note 2 : The tube body is at ground potential in operation.

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.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its electronic components, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC electronic component, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books.

If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.