NEC

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)

Document No. ET0215EJ3V0DS00 (3rd edition)
Date Published August 1998 M
Printed in Japan

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 (two equal carriers, 20 W total)		–28.5	dBc

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.

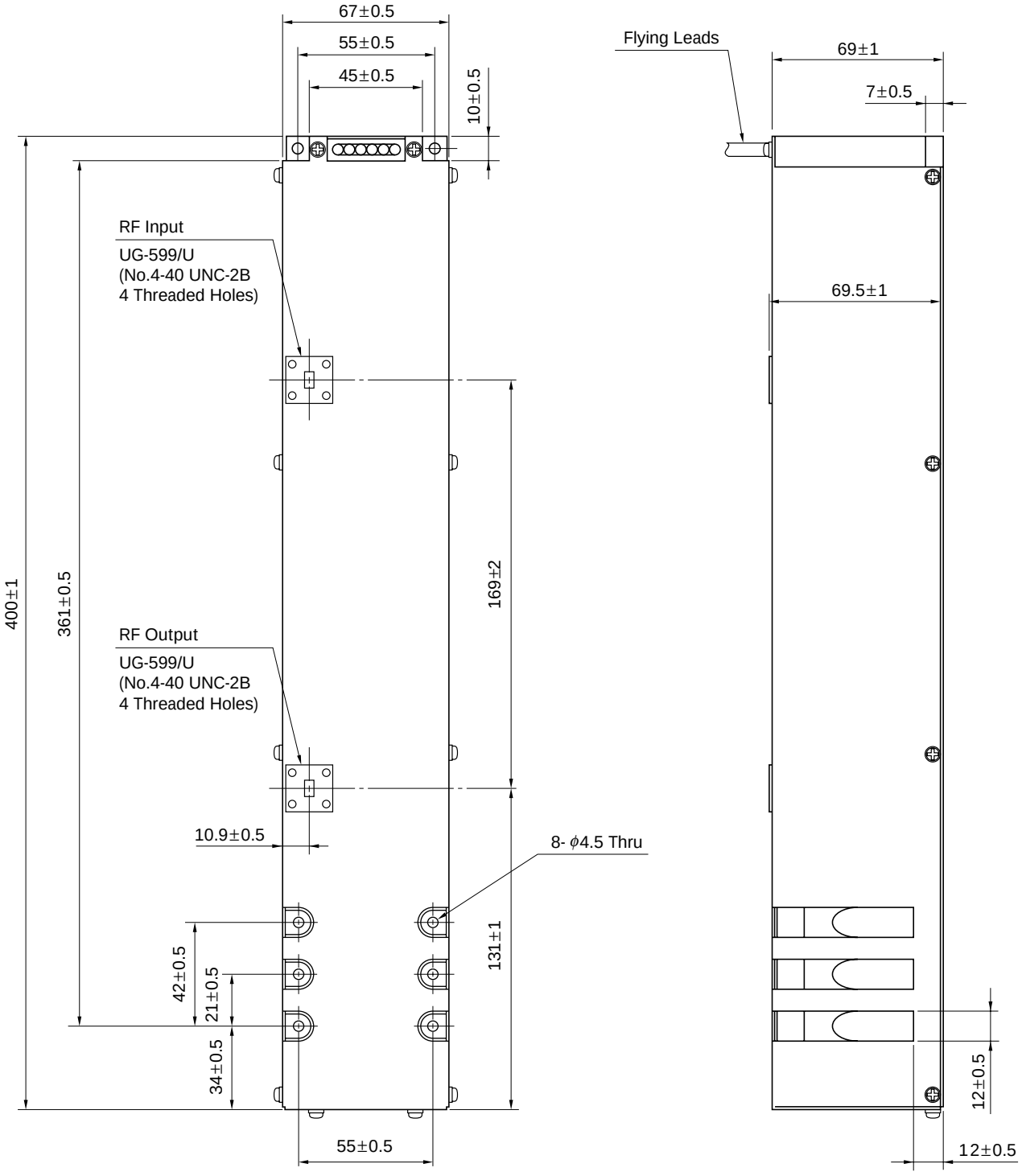
Note 2 : The tube body is at ground potential in operation.

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.