Ku-Band Low Noise Amplifiers

Introduction

VertexRSI LK-12000 series Ku-Band Ultra Low Noise Amplifiers are specially designed for satellite earth station and other telecommunications applications. Utilizing state-of-the-art HEMT and GaAs FET technology, these amplifiers have been designed for both fixed and transportable applications. High performance models are available with noise temperatures of 90 K, 80 K, 70 K, or 65 K. All noise temperature specifications are guaranteed over the full bandwidth of the LNA and are verified by cold load testing.

Features

- Noise temperatures to 65 K
- High reliability HEMT design
- Input/output isolators
- Reverse polarity protection
- Wide operating temperature range, -40 °C to +70 °C
- Form ‘C’ alarm

Options

- Low gain, 50 dB
- High output power, +20 dBm
- Type N(F) RF output connector
- Redundant configurations (1:1, 1:2)
- Universal input ac power supply

LK-12000 Series Typical Noise vs. Frequency

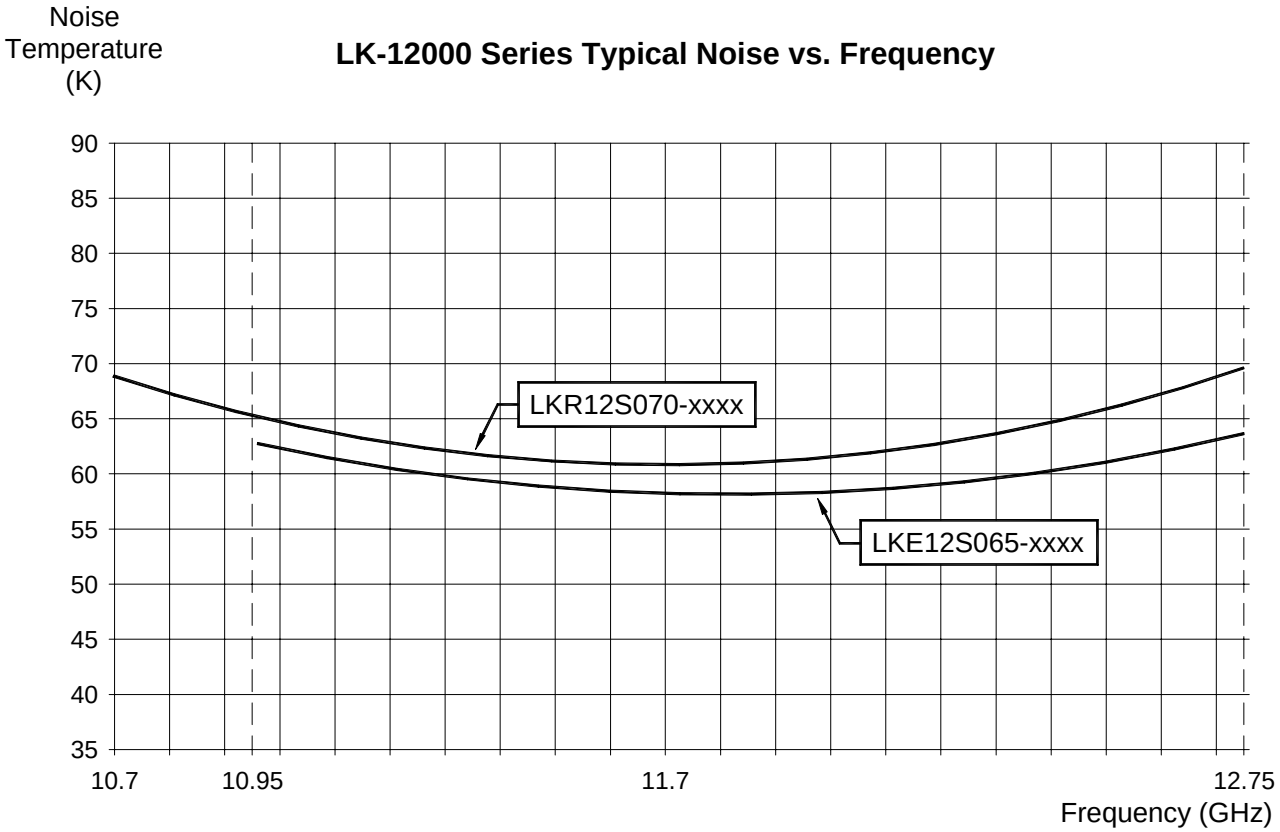

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Table 1 — Part Number/Ordering Information

LK□12S□□-□□□□

RF Out Connector
X = SMA Female
7 = Type N Female

Frequency Range	Noise Temperature	Gain	Output Power	Power Config.
E = 10.95-12.75 GHz R = 10.70-12.75 GHz	90 = 90 K ‖ 70 = 70 K 80 = 80 K ‖ 65 = 65 K	X = 60 dB min. 1 = 50 dB min.	X = +12 dBm 2 = +20 dBm	X = +11 to +24 Vdc 4 = 90-265 Vac, 47-63 Hz

Consult factory for custom configurations.

Table 2 — Noise Temperature vs. Ambient Temperature

Noise temperature vs. ambient temperature can be found from the equation:

$$\frac{N\,T_2}{NT_1} = \left(\frac{T_2}{T_1}\right)^{1.8}$$

where NT_2 = Noise Temperature at T_2
NT_1 = Noise Temperature at T_1
T_2 = Temperature 2 in K
T_1 = Temperature 1 in K
(K = °C + 273)

For the case where T_1 = 296 K (+23 °C), the ratio NT_2/NT_1 is shown in the table:

Ambient Temperature T_2 (°C)	Ratio NT_2/NT_1
0	0.86
+23	1.00
+40	1.11
+50	1.17
+60	1.24

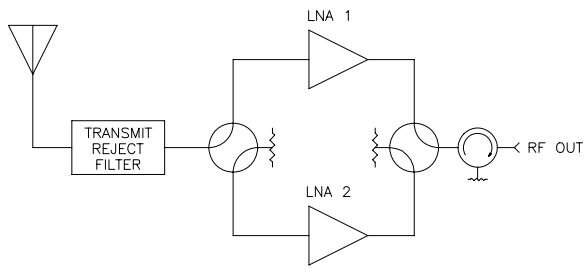
Example: For model LKE12S90-XXXX, NT_1 = 90 K at +23 °C; what is NT_2 at +50 °C?

From the table, NT_2/NT_1 at 50 °C = 1.17:

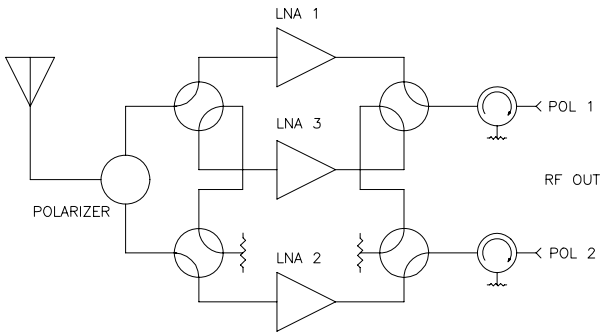
NT_2 = 1.17 x (90 K) = 105 K at 50 °C

Typical Applications

1:1 Redundant Systems



1:2 Redundant Systems



SPECIFICATIONS LK-12000 Series

Parameter	Notes	Min	Nom./Typ.[a]	Max	Units
Frequency Range	Band "E" Band "R"	10.95 10.70		12.75 12.75	GHz GHz
Gain	Standard Option 1	60 50	64 53	66 56	dB dB
Gain Flatness	Full Band Per 40 MHz			±0.5 ±0.2	dB dB
VSWR	Input Output		1.20 1.20	1.25 1.50	:1 :1
Noise Temperature[b]	At +23 °C Versus temperature		See Table 2	See Table 1	
Power Output at 1 dB compression	Standard Option 2	+12 +20	+15 +22		dBm dBm
3rd Order Output Intercept Point	Standard Option 2	+22 +30	+25 +32		dBm dBm
Group Delay per 40 MHz	Linear Parabolic Ripple			0.01 0.001 0.1	ns/MHz ns/MHz^2 ns p-p
AM/PM Conversion	-5 dBm output power			0.05	°/dB
Gain Stability (Constant Temp.)	Short term (10 min) Medium term (24 hrs) Long term (1 week)			±0.1 ±0.2 ±0.5	dB dB dB
Gain Stability	Versus temperature		-0.04		dB per °C
Maximum Input Power	Damage threshold Desens. threshold, 13.75-14.50 GHz			0 -20	dBm dBm
Connectors	Input Output, standard Output, Option 7 Power, standard[c]		WR75 Cover Flange SMA Female Type N Female MS3112E10-6P (mate supplied)		
Power Requirements	Voltage Current, standard Current, with Option 2	11	15 140 270	24 210 330	V mA mA
Operating Temperature		-40		+70	°C
MTBF (MIL-HDBK-217F)	Ground fixed, +40 °C		130,000		hours

Notes:

a When there is only one entry on a line, the Nom./Typ. column is a nominal value; otherwise it is a typical value. Typical values are intended to illustrate typical performance, but are not guaranteed.

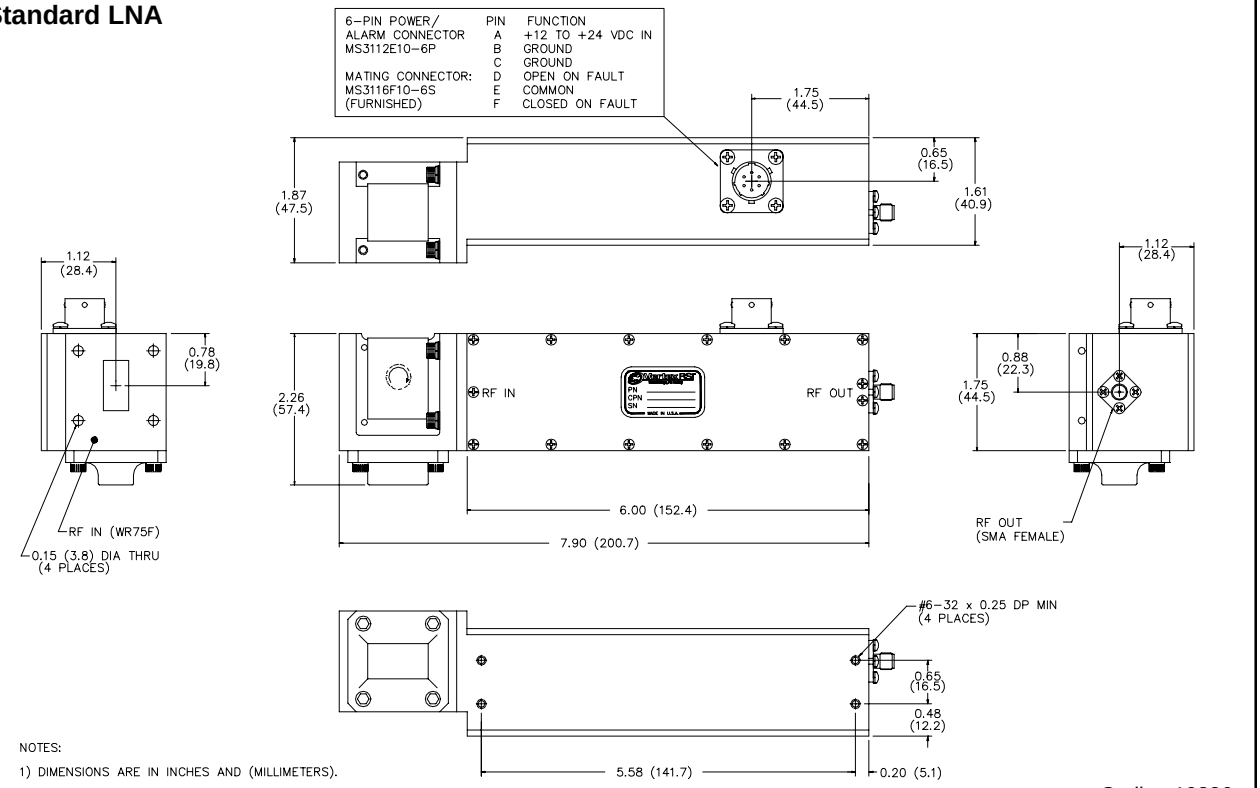
b Maximum noise temperature at +23 °C at any frequency in the specified band.

c DC power may be supplied either via the RF output connector (cable powered) or via the MS-type power connector, user choice.

Specifications are subject to change at GD SATCOM's discretion.

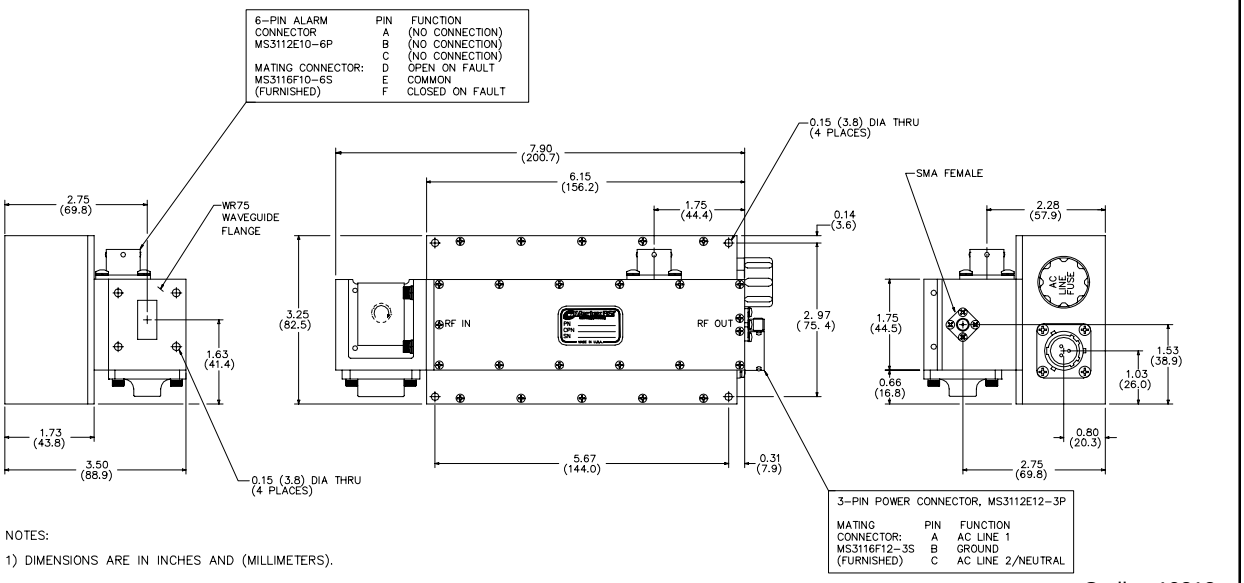
Outline Drawings

Standard LNA



Outline 10386

LNA with AC Power Supply



Outline 10813