Ku-Band Low Noise Amplifiers

Introduction

MAXTECH 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 from 110 °K to 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
- Overvoltage protection
- Wide operating temperature range, -40 °C to +70 °C

Options

- Custom frequency bands
- Redundant configurations (1:1, 1:2)
- Transmit reject filter
- AC power supply
- Form ‘A’ or Form ‘C’ alarm

LK-12000 SERIES TYPICAL NOISE vs. FREQUENCY

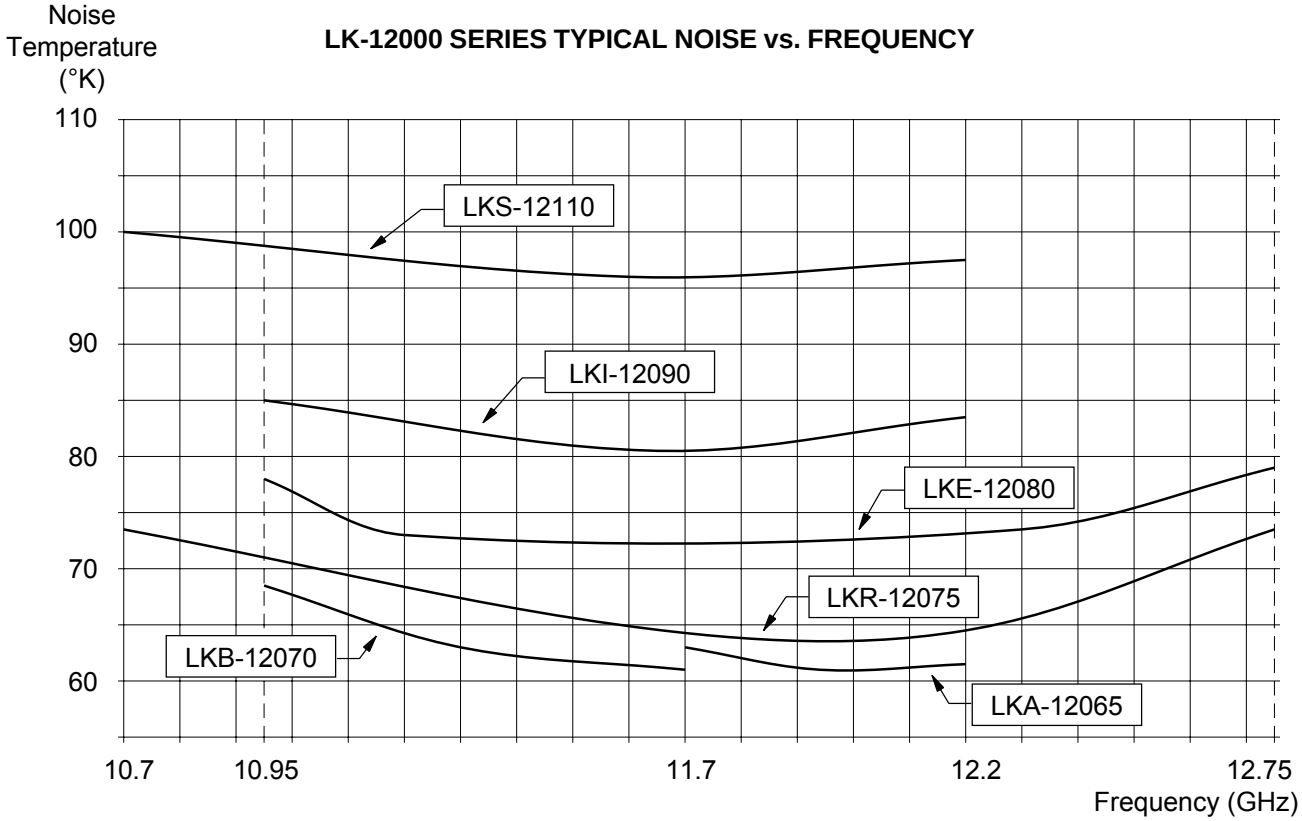


Table 1 — Part Number/Ordering Information

LK□-12 [ ] [ ]

Frequency Range

A	=	11.70-12.20 GHz
B	=	10.95-11.70 GHz
D	=	12.20-12.75 GHz
E	=	10.95-12.75 GHz
I	=	10.95-12.20 GHz
L	=	11.70-12.75 GHz
R	=	10.70-12.75 GHz
S	=	10.70-12.20 GHz

Max. Noise Temperature

110 =	110 °K	080 =	80 °K
100 =	100 °K	075 =	75 °K
090 =	90 °K	070 =	70 °K
085 =	85 °K	065 =	65 °K*

* Note: Consult factory for Band R.

Options:

/1 = 50 dB gain
/2 = +20 dBm output
/3 = 110 Vac, 47-63 Hz
/4 = 220 Vac, 47-63 Hz
/5 = Form 'A' alarm
/6 = Form 'C' alarm
/7 = Type N Female output connector
/C = Custom Specifications

Table 2 — Noise Temperature vs. Ambient Temperature

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

$$\frac{NT_2}{NT_1} = \left(\frac{T_2}{T_1}\right)^{1.8}$$

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

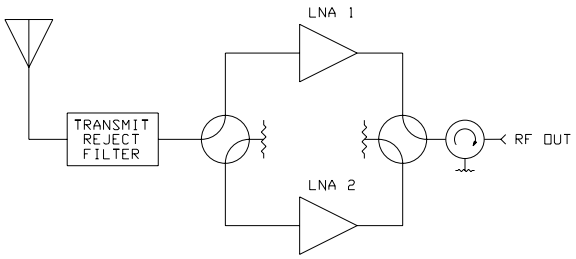
Example: For model LKE-12100, NT_1 = 100 °K at +23 °C; what is NT_2 at +50 °C?

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

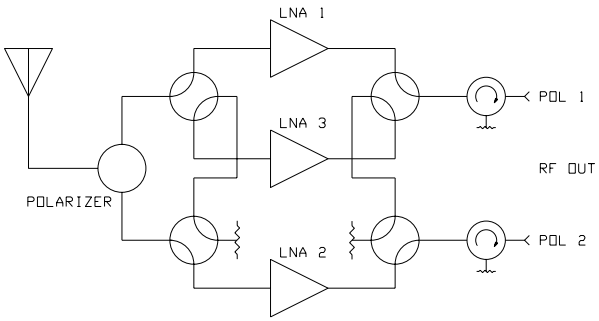
NT_2 = 1.17 x (100 °K) = 117 °K at 50 °C

Typical Applications

1:1 Redundant Systems



1:2 Redundant Systems



SPECIFICATIONS LK-12000 Series

Parameter	Notes	Min	Nom./Typ.[a]	Max	Units
Frequency			See Table 1		
Gain	Standard Option 1	60 50	63 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			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
Transmit Rejection	13.75-14.5 GHz	30			dB
Max. Input Power	Damage Threshold Desens. Threshold, 13.75-14.5 GHz			0 -20	dBm dBm
Connectors	Input Output Power, Standard[c]		WR75 Cover Flange SMA Female MS3112E8-3P (mate supplied)		
Power Requirements	Voltage Current, Standard Current, with Option 2 Current, with Opt. 5 or 6	11	15 140 270 Additional 30 mA	24 180 300	V mA mA
Operating Temp.		-40		+70	°C
MTBF (MIL-HDBK-217F)	Ground fixed, +40 °C		130,000		hours

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 valu es 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 Power may be supplied either via the RF output connector (cable powered) or via the power connector, user choice.

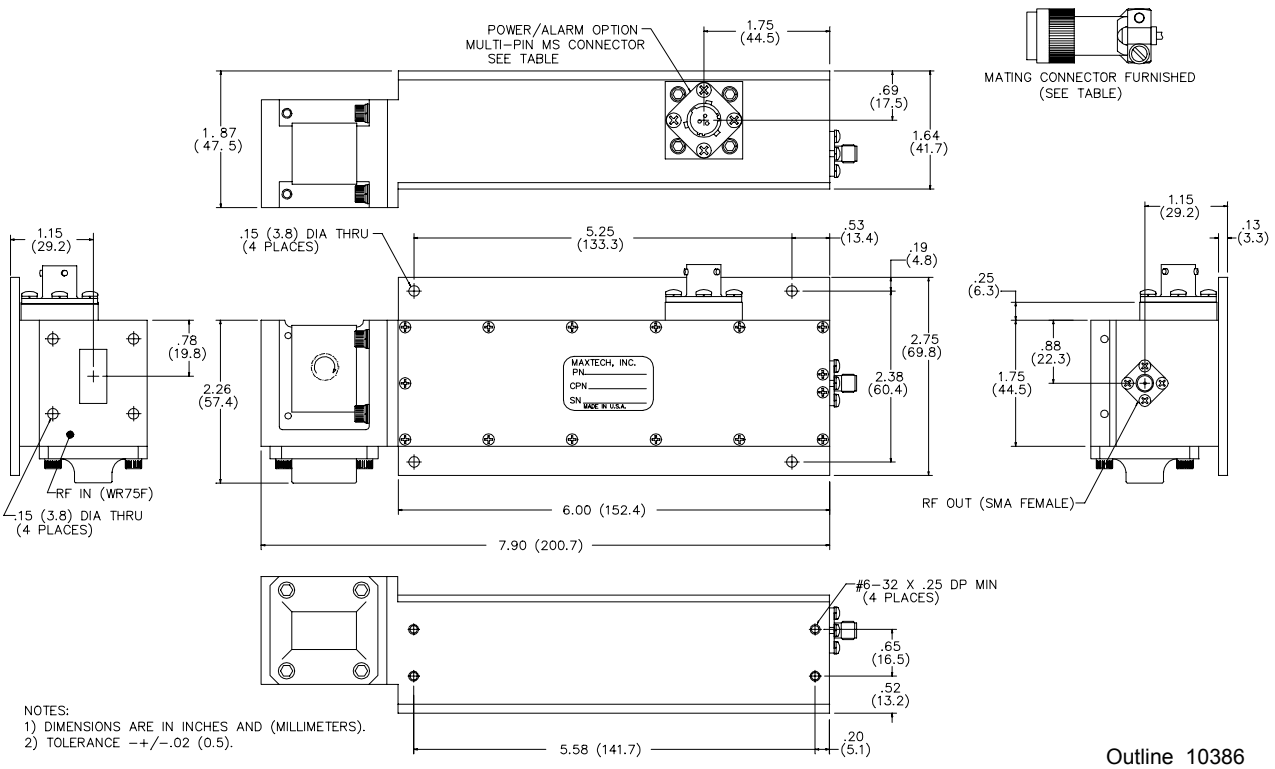
Specifications are subject to change at MAXTECH's discretion.

Outline Drawings

Standard Ku-Band LNA

POWER CONNECTOR OPTIONS

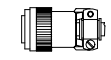
PIN	STANDARD LNA (3–PIN) MS3112E8–3P	FORM "A" ALARM (4–PIN) MS3112E8–4P	FORM "C" ALARM (6–PIN) MS3112E10–6P
A	+11 TO +24 Vdc	+11 TO +24 Vdc	+11 TO +24 Vdc
B	GROUND	GROUND	GROUND
C	GROUND	OPEN ON FAULT	GROUND
D	–	COMMON	OPEN ON FAULT
E	–	–	COMMON
F	–	–	CLOSED ON FAULT
MATING CONNECTOR: (SUPPLIED)	MS3116F8–3S	MS3116F8–4S	MS3116F10–6S



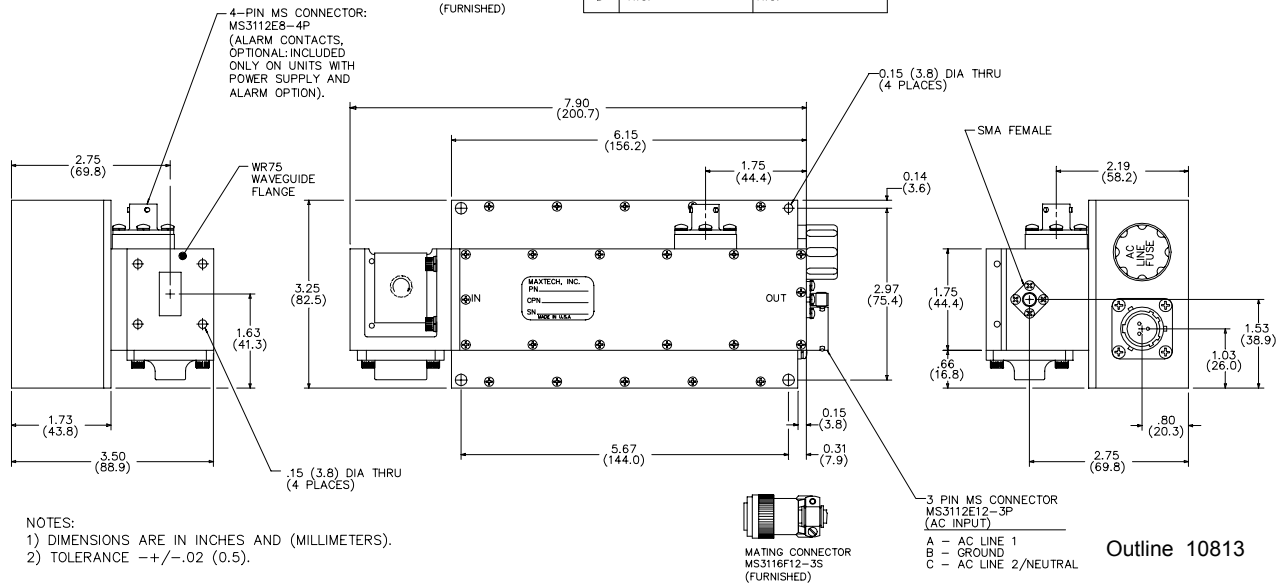
NOTES:
1) DIMENSIONS ARE IN INCHES AND (MILLIMETERS).
2) TOLERANCE –+/–.02 (0.5).

Outline 10386

Ku-Band LNA with Power Supply



PIN	w/ FORM "A" ALARM	w/ FORM "C" ALARM
A	OPEN ON FAULT	OPEN ON FAULT
B	COMMON	COMMON
C	N.C.	CLOSED ON FAULT
D	N.C.	N.C.



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Outline 10813