

**Ku-Band Low Noise Amplifiers**

**Introduction**

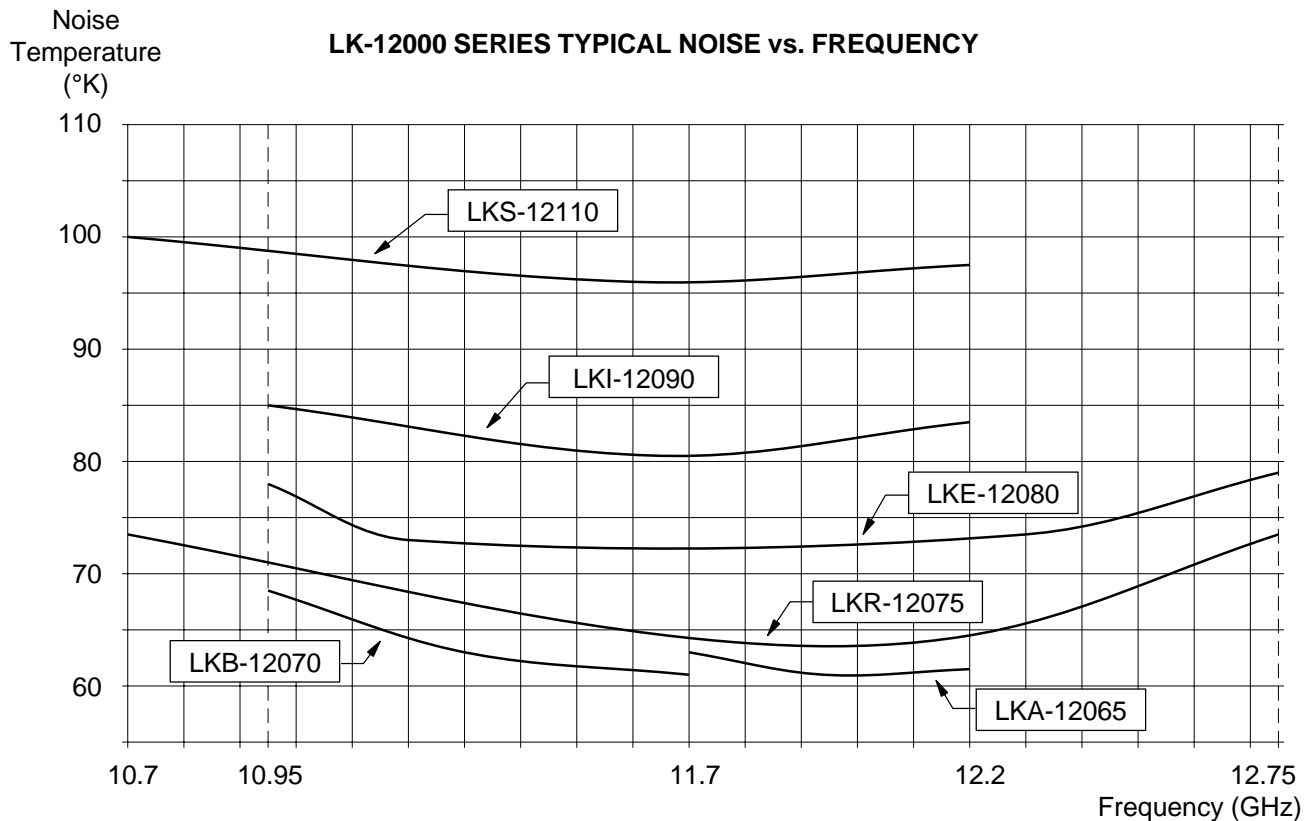
MAXTECH LK-12000 series Ku-Band Ultra Low Noise Amplifiers are specially designed for satellite earth station and other telecommunications applications. Utilizing state-of-the-art HEMT and GaAs FET technology, these amplifiers have been designed for both fixed and transportable applications. High performance 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



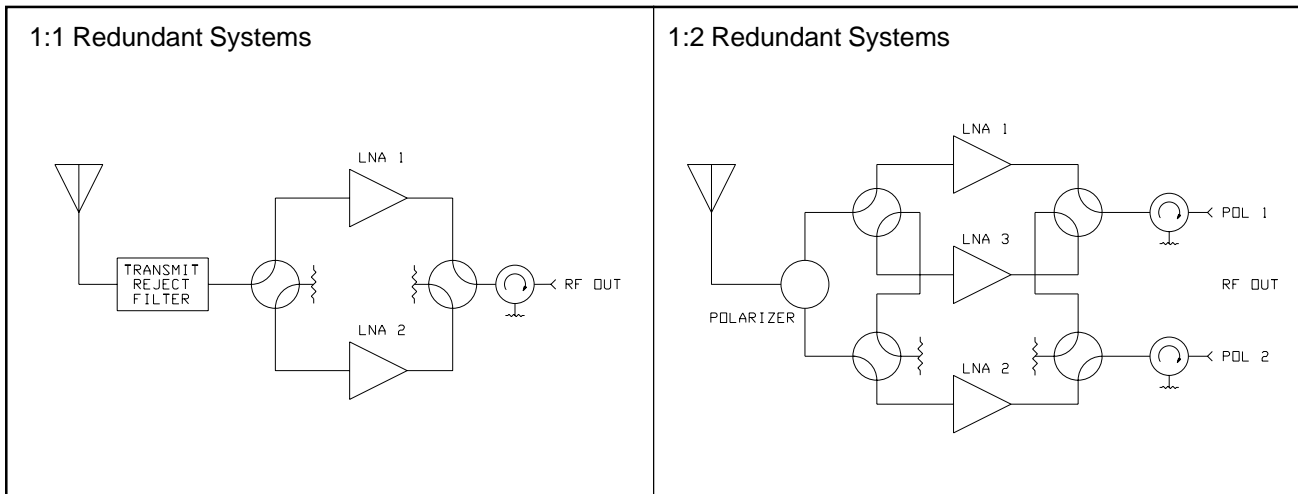
**Table 1 — Part Number/Ordering Information**

<h1 style="margin: 0;">LK <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span>-12 <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span></h1>										
<p><b>Frequency Range</b></p> <p>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</p>	<p><b>Max. Noise Temperature</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">110 = 110 °K</td> <td style="width: 50%;">080 = 80 °K</td> </tr> <tr> <td>100 = 100 °K</td> <td>075 = 75 °K</td> </tr> <tr> <td>090 = 90 °K</td> <td>070 = 70 °K</td> </tr> <tr> <td>085 = 85 °K</td> <td>065 = 65 °K*</td> </tr> </table> <p><small>* Note: Consult factory for Band R.</small></p>	110 = 110 °K	080 = 80 °K	100 = 100 °K	075 = 75 °K	090 = 90 °K	070 = 70 °K	085 = 85 °K	065 = 65 °K*	<p><b>Options:</b></p> <p>/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</p>
110 = 110 °K	080 = 80 °K									
100 = 100 °K	075 = 75 °K									
090 = 90 °K	070 = 70 °K									
085 = 85 °K	065 = 65 °K*									

**Table 2 — Noise Temperature vs. Ambient Temperature**

<p>Noise temperature vs. ambient temperature can be found from the equation:</p>	$\frac{NT_2}{NT_1} = \left(\frac{T_2}{T_1}\right)^{1.8}$	<p>where <math>NT_2</math> = Noise Temperature at <math>T_2</math>  <math>NT_1</math> = Noise Temperature at <math>T_1</math>  <math>T_2</math> = Temperature 2 in °K  <math>T_1</math> = Temperature 1 in °K          (°K = °C + 273)</p>												
<p>For the case where <math>T_1 = 296</math> °K (+23 °C), the ratio <math>NT_2/NT_1</math> is shown in the table:</p>	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Ambient Temperature <math>T_2</math> (°C)</th> <th>Ratio <math>NT_2/NT_1</math></th> </tr> </thead> <tbody> <tr><td>0</td><td>0.86</td></tr> <tr><td>+23</td><td>1.00</td></tr> <tr><td>+40</td><td>1.11</td></tr> <tr><td>+50</td><td>1.17</td></tr> <tr><td>+60</td><td>1.24</td></tr> </tbody> </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	<p><b>Example:</b> For model LKE-12100, <math>NT_1 = 100</math> °K at +23 °C; what is <math>NT_2</math> at +50 °C?</p> <p>From the table, <math>NT_2/NT_1</math> at 50 °C = 1.17:  <math>NT_2 = 1.17 \times (100 \text{ °K}) = 117 \text{ °K}</math> at 50 °C</p>
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													

**Typical Applications**



# SPECIFICATIONS

# LK-12000 Series

Parameter	Notes	Min	Nom./Typ. <sup>a</sup>	Max	Units
Frequency			See Table 1		
Gain	Standard	60	63	66	dB
	Option 1	50	53	56	dB
Gain Flatness	Full Band			±0.5	dB
	Per 40 MHz			±0.2	dB
VSWR	Input		1.20	1.25	:1
	Output		1.20	1.50	:1
Noise Temperature <sup>b</sup>	At +23 °C			See Table 1	
	Versus temperature		See Table 2		
Power Output at 1 dB compression	Standard	+12	+15		dBm
	Option 2	+20	+22		dBm
3rd Order Output Intercept Point	Standard	+22	+25		dBm
	Option 2	+30	+32		dBm
Group Delay per 40 MHz	Linear			0.01	ns/MHz
	Parabolic			0.001	ns/MHz <sup>2</sup>
	Ripple			0.1	ns p-p
AM/PM Conversion	-5 dBm Output			0.05	°/dB
Gain Stability (Constant Temp)	Short Term (10 min)			±0.1	dB
	Medium Term (24 hrs)			±0.2	dB
	Long Term (1 week)			±0.5	dB
Gain Stability	Versus temperature		-0.04		dB per °C
Transmit Rejection	13.75-14.5 GHz	30			dB
Max. Input Power	Damage Threshold			0	dBm
	Desens. Threshold, 13.75-14.5 GHz			-20	dBm
Connectors	Input		WR75 Cover Flange		
	Output		SMA Female		
	Power, Standard <sup>c</sup>		MS3112E8-3P (mate supplied)		
Power Requirements	Voltage	11	15	24	V
	Current, Standard		140	180	mA
	Current, with Option 2		270	300	mA
	Current, with Opt. 5 or 6		Additional 30 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 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 Power may be supplied either via the RF output connector (cable powered) or via the power connector, user choice.

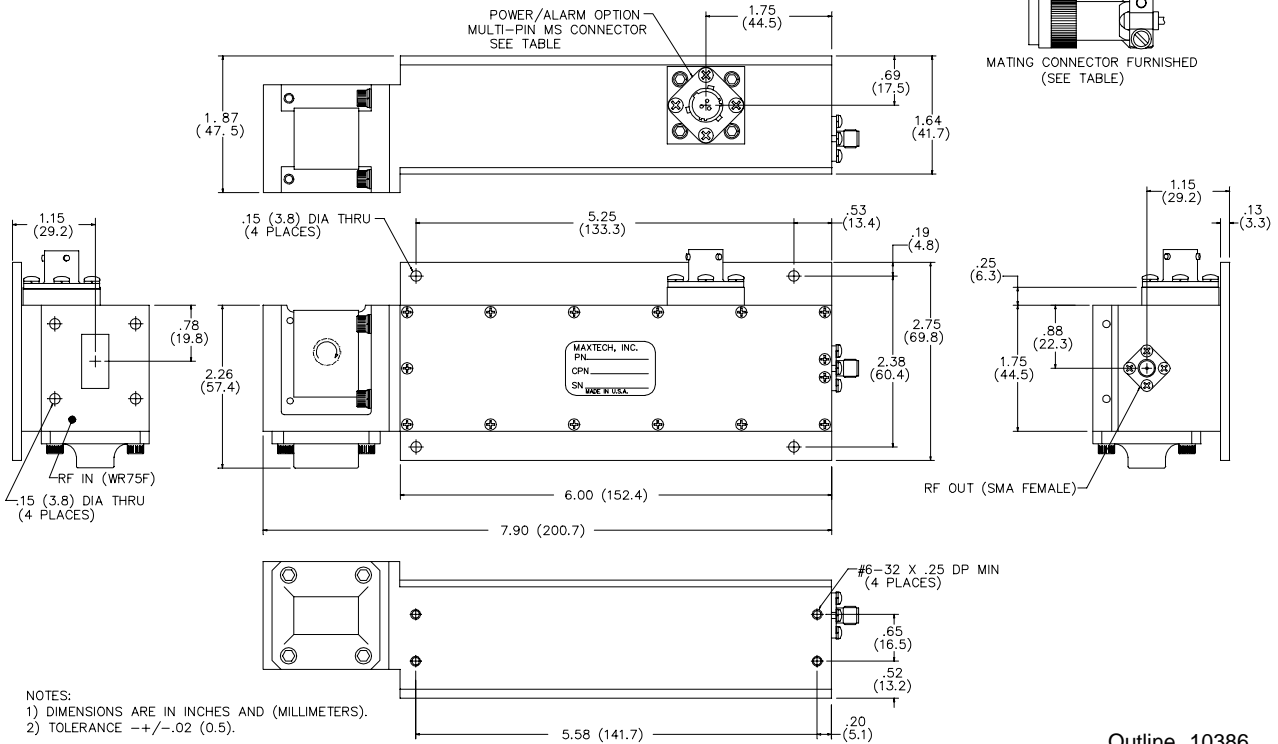
Specifications are subject to change at MAXTECH's discretion.

# Outline Drawings

## Standard Ku-Band LNA

### POWER CONNECTOR OPTIONS

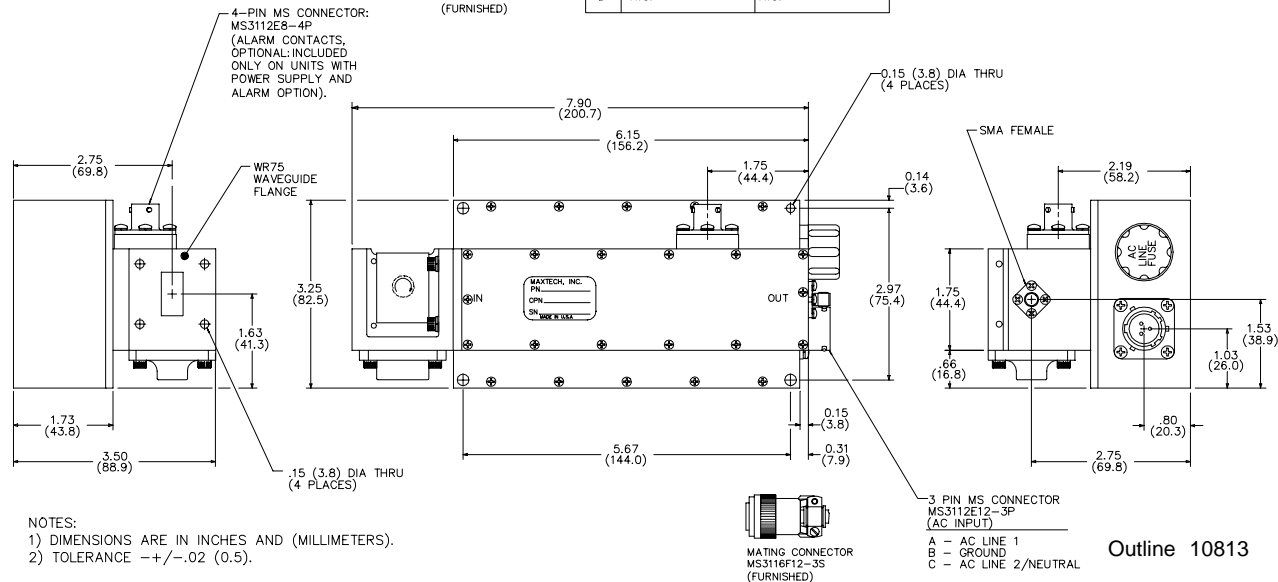
	STANDARD LNA (3-PIN)	FORM "A" ALARM (4-PIN)	FORM "C" ALARM (6-PIN)
PIN	MS3112E8-3P	MS3112E8-4P	MS3112E10-6P
A	+11 TO +24 Vdc	+11 TO +24 Vdc	+11 TO +24 Vdc
B	GROUND	GROUND	GROUND
C	GROUND	OPEN ON FAULT	OPEN ON FAULT
D	-	COMMON	COMMON
E	-	-	COMMON
F	-	-	CLOSED ON FAULT
MATING CONNECTOR: (SUPPLIED)	MS3116F8-3S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



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.



Outline 10813