

2550 Gray Falls Dr., Suite#128, Houston, TX, 77077 USA TEL: 1-281-870-8822 EMAIL:Sales@DynamicEng.com

## **Features and Benefits**

17.7-20.2GHz Frequency Range Gain Flatness <±1.5dB Typical N.F. <2.0dB High Gain (50dB) Typical I/O VSWR <1.3:1/1.3:1 Advance PHEMT Technology Reverse Voltage Protection MIL-883, MIL45208 construction and reliability Painted Weatherproofed WR-42 Input and Output Flanges

### **Typical Applications**

SATCOM Receiver Front End Radar Systems Point-to-Point Systems Telemetry

### **Description**

The LNA9947X-17.7GHz-20.2GHz-A is a K-Band, high gain, low noise waveguide amplifier with very low input and output return loss. The device is designed for receiving systems for radar, SATCOM and other telecom applications.

### **Mechanical Drawing & Pin Connections**



RF INPUT

Drawing No:MD170008-1

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Revision: 1

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# Key Specifications at 23°C

#### LNA9947X-17.7GHz-20.2GHz-A

K-band Waveguide Amplifier

Deremeter		Value		Unit	Note		
Parameter	Min.	Тур.	Max.				
Frequency	17.7		20.2	GHz	Customizable		
Gain	50	52	-	dB	Customizable		
Gain Flatness	-	±1.5	±1.5	dB	Customizable		
In/Out VSWR	-	1.2	1.3	-	Customizable		
P@1dB	+8	+12	-	dBm	Customizable		
DC Power	+18	-	+18	V@mA	@230 mA		
Noise Figure	-	2.0	2.1	dB	@23°C		
Outline / Package	-	-	-	-	Custom		

# **Absolute Maximum Ratings**

Parameter	Min.	Max.	Unit	Note
Operating Temperature (Case)	-40	+95	C°	95% humidity, non-condensing
Storage Temperature (Case)	-54	+115	C°	95% humidity, non-condensing
RF Input Power	-	+16	dBm	CW
Die Junction Temp (Tj)	-	+150	C°	For GaAs devices
Positive Supply Voltage	-	+16	V	At +V DC Terminal
Negative Voltage	-	-10	V	Reverse Voltage

# Typical Measured Data – Gain

File File	View	Channel	Sweep	Calibration	n Trace	Scale N	larker S	System	Window	Help	P		_ 8 ×
Stimulu	s			Start 17.0	00000000	) GHz 🕂	Sta	art	Stop		Cent	er	Span
S21 3.000dB/		65.00	dB S21							1: 2:	17.7000	00 GHz 00 GHz	52.250 dB 50.991 dB
50.0dB	LogM	62.00						-	_	3: > 4:	19,7000	00 GHz 00 GHz	50.325 dB 50.430 dB
		59.00							_	_			
		56.00							_	_			
		53.00			~				_	_			
		50.00 🖌		1			2			-			
		47.00 -						-		3			
		44.00								-			
		41.00							_	_			
		38.00							_	_			
		35.00	Ch 1 Avg	= 25									
			Ch1: Start	17.0000 G	Hz —							Stop 2	1.0000 GHz
Cont.	CH	1: S21		С	2-Port		Avg=	25 Smo	oth=3.48%	5			LCL

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## Typical Measured Data – Input Return Loss



# Typical Measured Data – Output Return Loss

PNA File	View	Channel	Sweep	Calibration	n Trace	Scale	Marker	System	Window	Hel	p		_ 8 ×
Trigger							Cont	nuous	Singl	е	Hole	±	Restart
S22 5.000dB/	LoaM	7.00	JB S22							1: 2:	17.7000 18.7000 19.7000	00 GHz 00 GHz 00 GHz	29.789 dB 21.512 dB 26.203 dB
10.000	COGIM	2.00								4: > 5:	20.2000	00 GHz 00 GHz	39.034 dB 22.850 dB
		-3.00											
		-8.00						+		-			
		-13.00						+	+				
		-18.00						_		_			
		-23.00 -						-	_	_5			
		-28.00										~	
		33.00											
		38.00	$\bigvee$										
		-43.00	Ch 1 Avg	= 16									4
			Ch1: Start	17.7000 G	Hz <del>—</del>							Stop 20	.2000 GHz
Hold	CH	1: <u>\$22</u>		C	2-Port		Avg	=16 Smo	oth=2.49%	6		L	.CL

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### LNA9947X-17.7GHz-20.2GHz-A

K-band Waveguide Amplifier

# Typical Measured Data – Gain and Group Delay



## \*\*\*Important\*\*\* - must use heat sink if case temperature exceeds 50°C

Specificatio	ons at +	23°C						
Frequency (nom.):			17.7 - 20.2	Output Power	@ 1 dB			
Trequency (	nonn.).		GHz	Compr. Pt. (mi	n)	+8 dBm		
Gain (Min):			50 dB	DC Power				
Gain Stabilit	y @ cor	ist temp. (max)		Voltage (nom).		+18V to +24V		
Short term (	10 min)		±0.1 dB	Current (max):				
Medium terr	n (24 hr:	S)	±0.2 dB	200 117				
Long term (	l week)		±0.5 dB	@ Max Voltage	of 24\/·	152mA		
Gain stabilit	y vs. ten	וp. (max)	-0.05 dB/°C		. 01 24 0.	132mA		
Gain Flatnes	ss (max.	) full band	±1.5 dB	Third-order Inte	ercept	18		
Gain Flatnes	ss (max.	) in 40 MHz	±0.2 dB	point IP3 (min.)	)	Measured +22 dBm		
VSWR Input	t (max.)		1.30:1	Noise Figure (	Max.):	2.1 dB		
VSWR Output (max.) in linear:			1.30:1	Outline W/G (b	ox):			
@ impedance Z <sub>0</sub>			50 Ohms	Outline LNA (S	SMA con.):			
Input Power w/o damage (max.)			0 dBm	AM/PM conver	sion for	0.05 deg./dB		
input i owei	input Power w/o damage (max.)			-5 dBm out po	wer (max.)			
Group delay in any 40MHz band				Group delay in	any			
Linear (max.), ns/MHz			0.01	40 MHz band				
Parabolic (n	nax.), ns	/MHz	0.001	Ripple (max.),	ns p-p:	0.1		
Note: Test	data tak	en with case ter	nperature of +23°	O.				
Frequency	Gain	VS	WR	Noise Figure	P1dB compr	Group delay		
(GHz)	(dB)	In	Out	(dB)	(+dBm)	lin. Ns		
	(uD)		Out	(0D)	('abiii)			
17.7	52.6	1.15	1.06	1.62	12	1.73		
18.7	51.4	1.10	1.17	1.73	12	1.63		
19.7	50.7	1.17	1.11	1.90	12	1.58		
20.2	50.9	1.08	1.15	2.00	12	1.60		

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