EiC Corp.
Excellence in Communications

PRELIMINARY DATA SHEET

ECG003

BROADBAND HIGH OIP3 AMPLIFIER

DC - 3000 MHz

Features

- DC to 3000 MHz
- 39 dBm Typical OIP3 at 900 MHz
- 36 dBm Typical OIP3 at 1900 MHz
- Highly Reliable InGaP HBT
- 20.0 dB Typical Gain at 900 MHz
- 24.0 dBm Typical P1dB at 900 MHz
- 23.0 dBm Typical P1dB at 1900 MHz
- 3.4 dB Typical Noise Figure at 900 MHz
- Excellent Stability

Applications

- Multi-carrier Systems
- High Linearity Amplifiers
- Cellular, PCS, WLL

Package Available

(-B) SOT-89

Description

The ECG003 is a high reliability, high OIP3 amplifier in a low cost SOT-89 package, optimized for the commercial communications market. The device is manufactured using advanced Indium Gallium Phosphide Heterojunction Bipolar Transistor (InGaP HBT) technology. The amplifier is internally matched to achieve low VSWR and high OIP3 over the DC to 3000 MHz range. Typical OIP3 is 39dBm at 900 MHz and 36dBm at 1900 MHz. The ECG003 operates with a device voltage of 7.2 V. The ECG003 is designed in the Darlington configuration with direct feedback. Its operation frequency at low end is limited only by the DC blocking capacitor and the RF choke inductor (large values are required in both cases).

Electrical Specifications

Test Conditions: Ic= 110mA Ta = 25°C,

SYMBOL	PARAMETER		LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		DC		3000	MHz	
G	Gain (Small Signal)	f = 1000 MHz f = 2000 MHz f = 3000 MHz	18	20.0 19.0 18.0		dB	
P_{1dB}	Output Power @ 1 dB Compression	f = 1000 MHz f = 2000 MHz		24 23		dBm	
OIP3	Output Third Order Intercept	f = 1000 MHz f = 2000 MHz f = 3000 MHz	34	39 36 32		dBm	Note 1
RL_{IN}	Input Return Loss, 50 Ohm	1000 to 3000 MHz		13.0		dB	
RL_{OUT}	Output Return Loss, 50 Ohm	1000 to 2000 MHz		10.0		dB	
RL_{OUT}	Output Return Loss, 50 Ohm	3000 MHz		8.0		dB	
NF	Noise Figure	f = 1000 MHz f = 2000 MHz		3.4 3.5		dB	
Vde	Device Voltage		6.7	7.2	7.5	V	
	Output Mismatch without Spurs			10:1			

Note 1: OIP3 = Pout (by power meter, total 2-tone power) + (IM3 (dBc)) / 2 - 3 dB

CAUTION!
SENSITIVE ELECTRONIC DEVICE

ECG003

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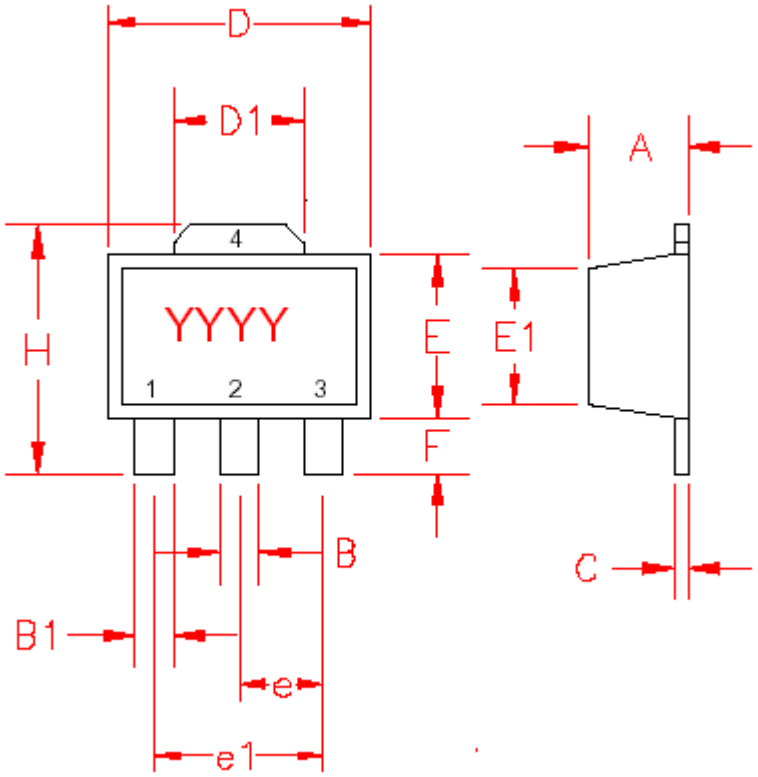
DC - 3000 MHz

Absolute Maximum Ratings

Device Current	160	mA
RF Power Input	10	dBm
Storage Temperature	-65 to +150	°C
Ambient Operating Temperature	-40 to +85	°C
Junction Temperature at 85°C Ambient	+150	°C

Package Outline



Symbol	Inches	
	MIN.	MAX.
A	.055	.063
B	.017	.022
B1	.014	.019
C	.014	.017
D	.173	.181
D1	.064	.072
E	.090	.102
E1	.084	.090
e	.059	
e1	.118	
F	.035	.047
H	.155	.167

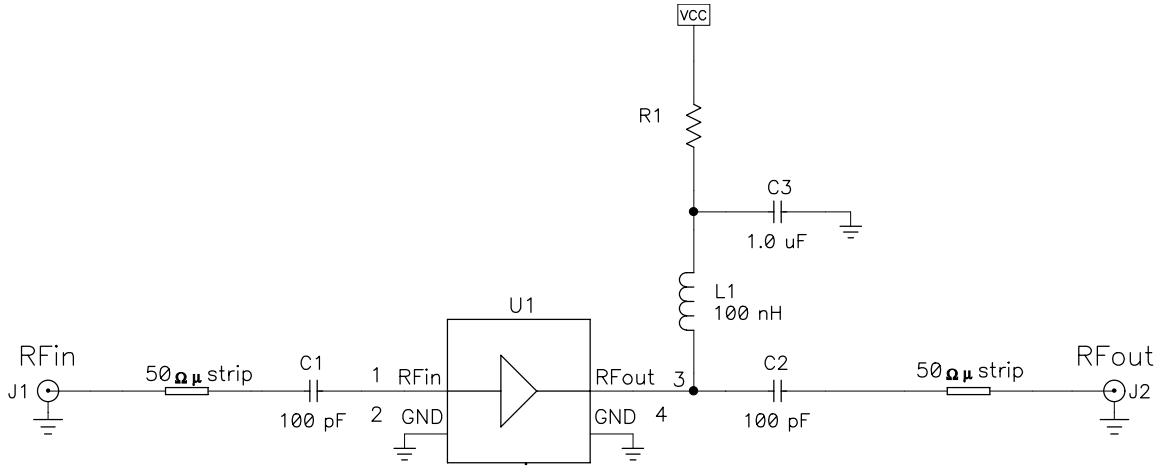
Pin Definitions

Pin #	Pin	Definition
1	RFin	This pin has a nominal 50 ohm input impedance. It requires a DC blocking capacitor large enough to handle the lowest frequency used.
2, 4	Gnd	The two ground connections should be directly connected together to the ground plane on the PCB. The ground connection also serves as a heatsink.
3	RFout	This pin has a nominal 50 ohm output impedance. It requires a DC bias of 110mA through a series inductor and a resistor. A bypass capacitor (1.0 micro Farad) on the DC side of the inductor is recommended for providing instantaneous current during a modulated RF signal. Use a DC blocking capacitor on the output with similar requirements as the input side.

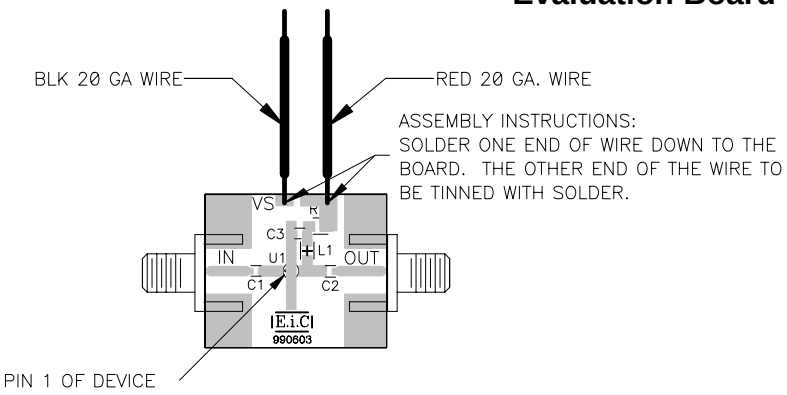
Evaluation Board Schematic
SOT-89

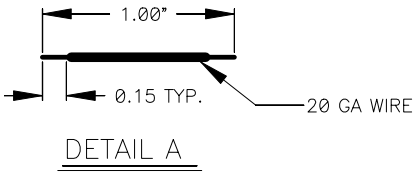
Recommended Bias Resistor Values
R = (Vcc-Vde)/Icc = (Vcc-7.2)/0.110

Approximate Supply Voltage (V_{cc}) based on standard values for R1	9	10	11	12
R1 (Ohms)	16	24	33	43



Evaluation Board Layout





Evaluation Board Materials

QTY	DESIGNATOR	VALUE	DESCRIPTION	MANUFACTURER &P/N	
2	C1, C2	100pF	CAPACITOR, 0603	MARUWA CE101J1NO	NOTE 1
1	C3	1.0uF	CAPACITOR, 0603	MARUWA CE105K1NR	NOTE 1
1	R1	10 Ω	RESISTOR, 0603	ROHM MCR10J100	NOTE 1
1	L1	100 nH	INDUCTOR, 0805	TOKO LL2012-FR10K	NOTE 1
2	J1, J2		SMA CONNECTOR	EF JOHNSON 142-0701-881	NOTE 1
1		---	IC, ECG003	EiC Corp	
RED		---	20 GA, WIRE 1.0”	ANY	SEE DETAIL A
BLACK		---	20 GA, WIRE 1.0”	ANY	SEE DETAIL A
		---	PCB	EiC Corp 60-000009-003B	

1. EiC RECOMMENDED COMPONENTS ARE SHOWN. EQUIVALENT COMPONENTS MAY BE USED.
2. LARGER VALUES GIVE BETTER LOW FREQUENCY RESPONSE (<500 MHz)
NOTES: UNLESS OTHERWISE SPECIFIED

Figure 1

Icc vs. Vde
(IC Tested on Eval Board)

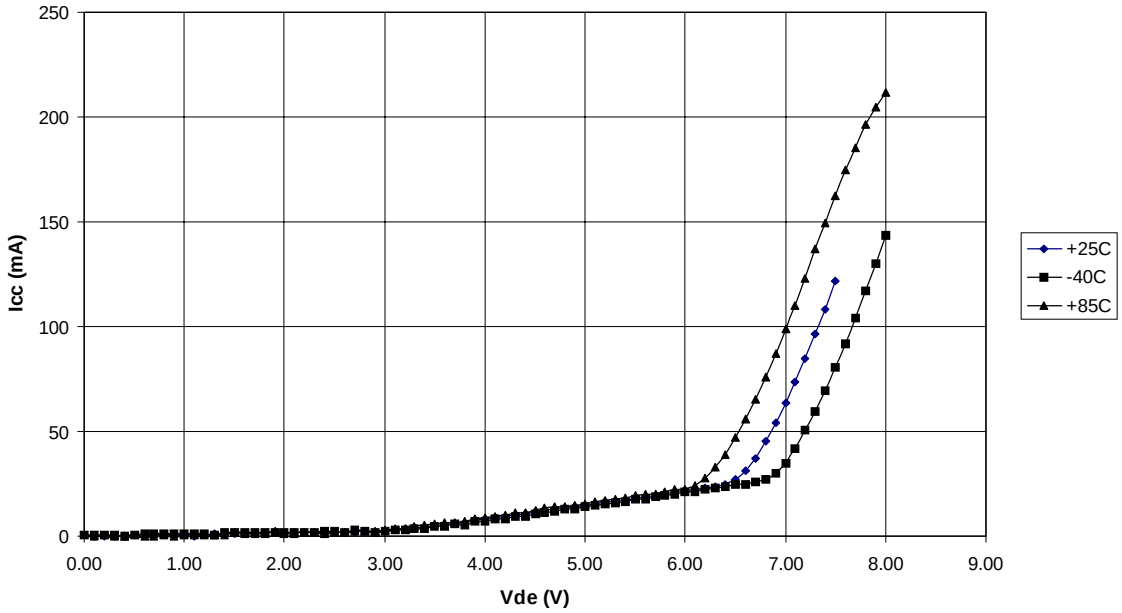


Figure 2

P1dB vs. Frequency
(IC Tested on Eval Board)

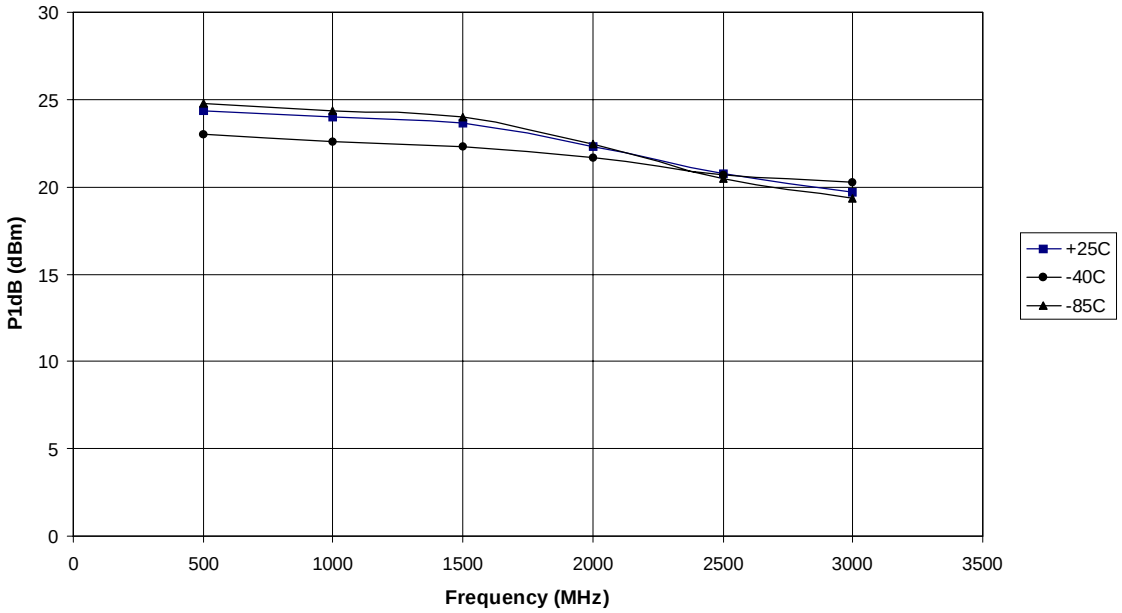


Figure 3

Gain vs. Frequency
(IC Tested on Eval Board)

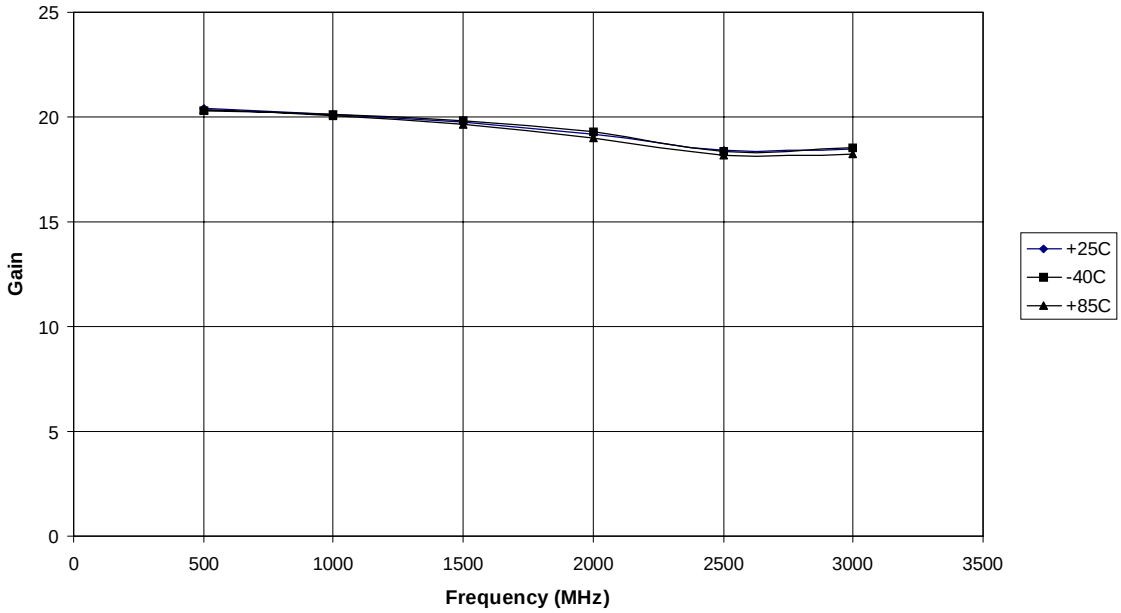


Figure 4

Gain vs. Frequency, T=25 degree C
(IC Tested in a 50 Ohm Fixture)

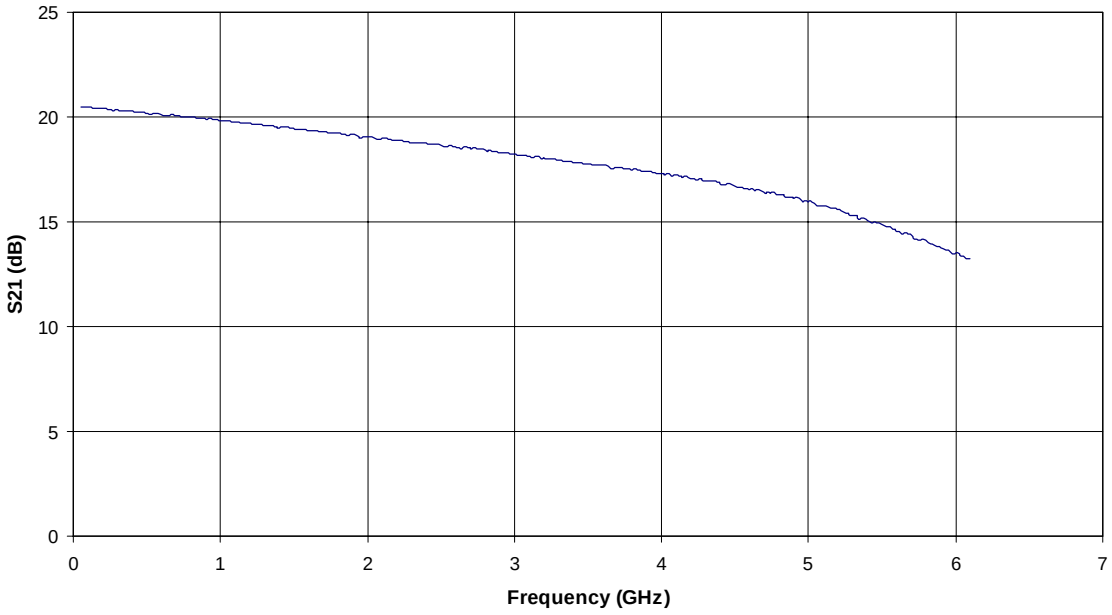


Figure 5

S11, S22 vs. Frequency, T=25 degree C
(IC Tested in a 50 Ohm Fixture)

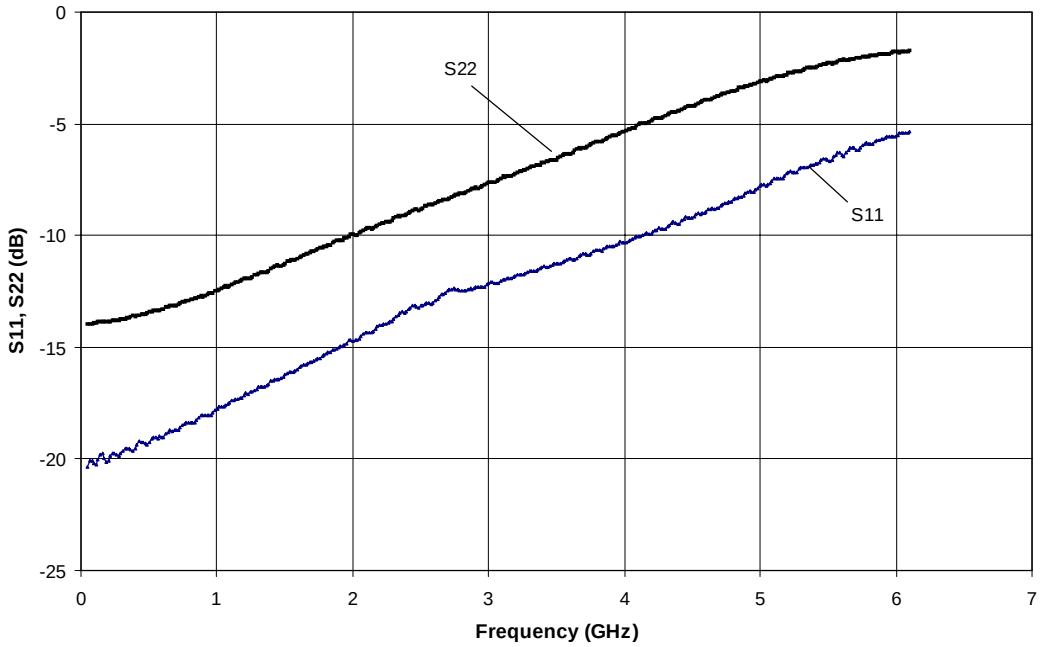


Figure 6

Reverse Isolation vs. Frequency, T=25 degree C
(IC Tested in a 50 Ohm Fixture)

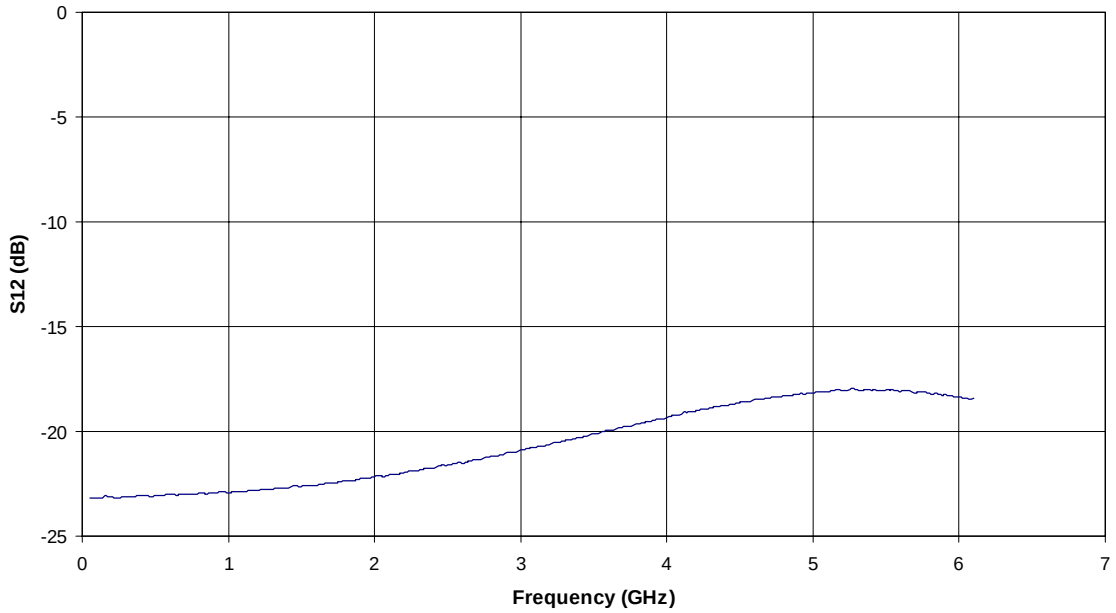


Figure 7

OIP3 vs. Frequency
(IC Tested on Eval Board)

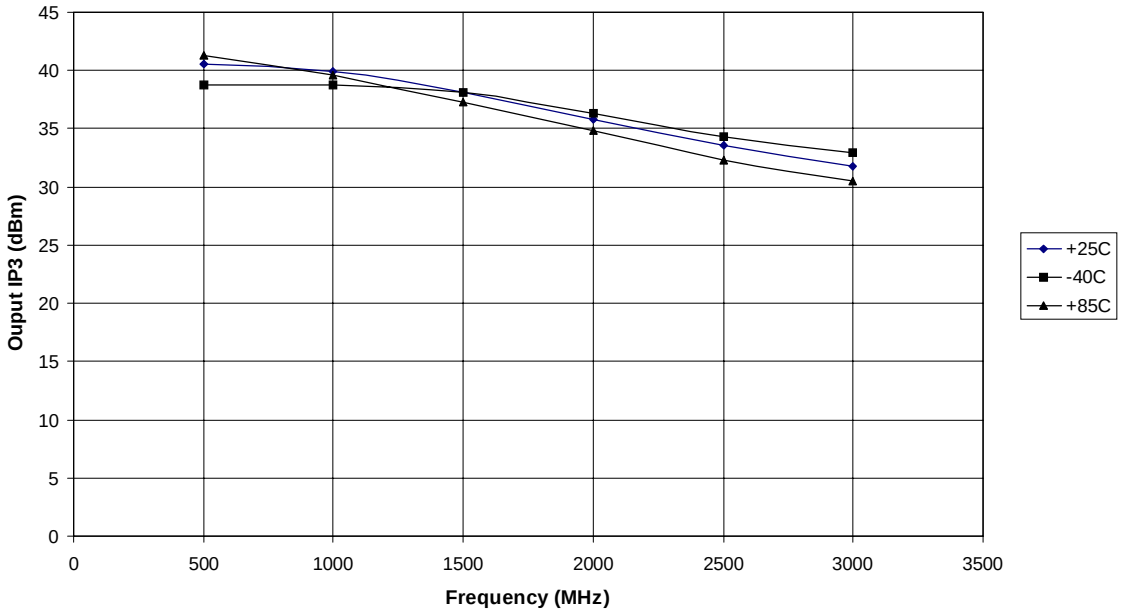
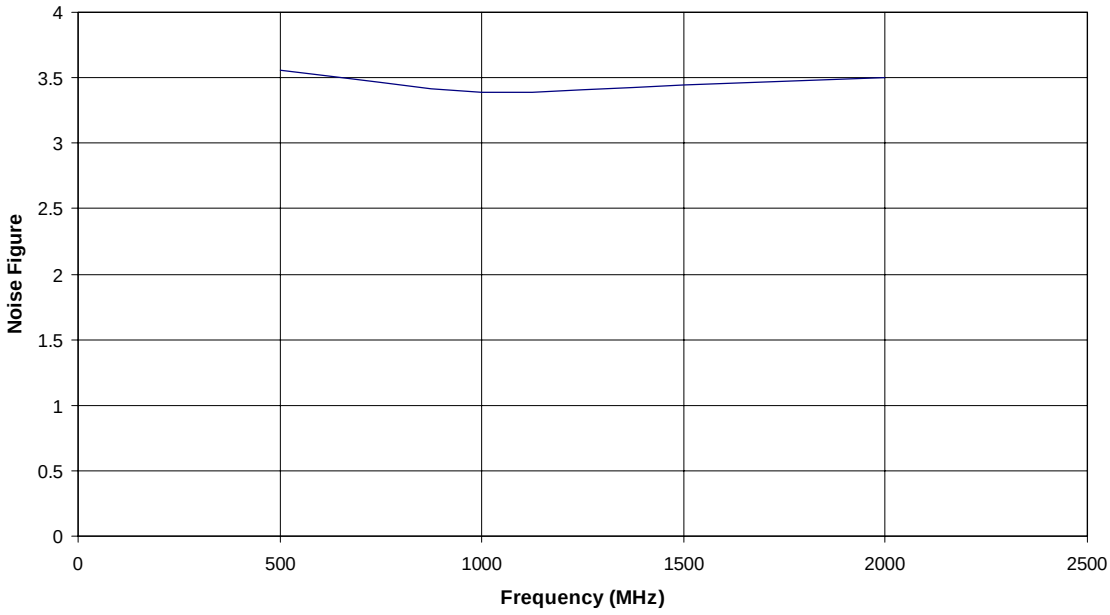


Figure 8

Noise Figure vs. Frequency
(IC Tested on Eval Board)



APPLICATION NOTES

Please visit our website at www.eiccorp.com to view or download the following documents. You may also call our Customer Service to request a hardcopy.

Document #	Description
AP-000192-000	Discussion of Technology and Reliability Enhancements
AP-000194-000	Biasing and Performance Enhancements
AP-000487-000	Tape and Reel Specifications and Package Drawings
AP-000515-000	Voltage Spike Suppression
AP-000516-000	Application Note Index