

Features

- DC to 2500 MHz
- 42 dBm Typical OIP3 at 1900 MHz
- Highly Reliable InGaP HBT
- 15.5 dB Typical Gain at 900 MHz
- 23.5 dBm Typical P1dB at 1900 MHz
- 5.1 dB Typical Noise Figure at 900 MHz
- Excellent Stability

Package Available

(-B) SOT-89

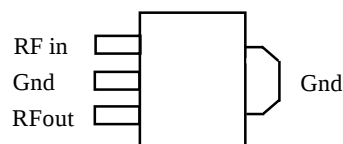
Description

The EC-1089 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 can be matched to achieve low VSWR and high OIP3 over the DC to 2500 MHz range. Typical OIP3 at 1900 MHz is +42 dBm. The EC-1089 operates from a single 5 volt power supply.

Applications

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

Package



SOT-89 (Top View)

Electrical Specifications

Test Conditions: $T_a = 25^{\circ}\text{C}$, $V = 5.0\text{ V}$

SYMBOL	PARAMETER		LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		DC		2500	MHz	
G	Gain (Small Signal)	$f = 900\text{ MHz}$ $f = 1900\text{ MHz}$ $f = 2400\text{ MHz}$	11.5	15.5 12.2 10		dB	
P_{1dB}	Output Power @ 1 dB Compression	$f = 900\text{ MHz}$ $f = 1900\text{ MHz}$ $f = 2400\text{ MHz}$		23.5		dBm	
OIP3	Output Third Order Intercept	$f = 900\text{ MHz}$ $f = 1900\text{ MHz}$ $f = 2400\text{ MHz}$	40	41 42 41		dBm	Note 1
RL_{IN}	Input Return Loss, 50 Ohm	900 to 2400 MHz		15.0		dB	
RL_{OUT}	Output Return Loss, 50 Ohm	900 to 2400 MHz		10.0		dB	
NF	Noise Figure	$f = 900\text{ MHz}$ $f = 1900\text{ MHz}$		5.1 5.9		dB	
I_c	Supply Current		140	160	175	mA	
	Output Mismatch without Spurs			10:1			

Note 1: $OIP3 = P_{out} \text{ (by power meter, total 2-tone power)} + (IM3 \text{ (dBc)}) / 2 - 3 \text{ dB}$

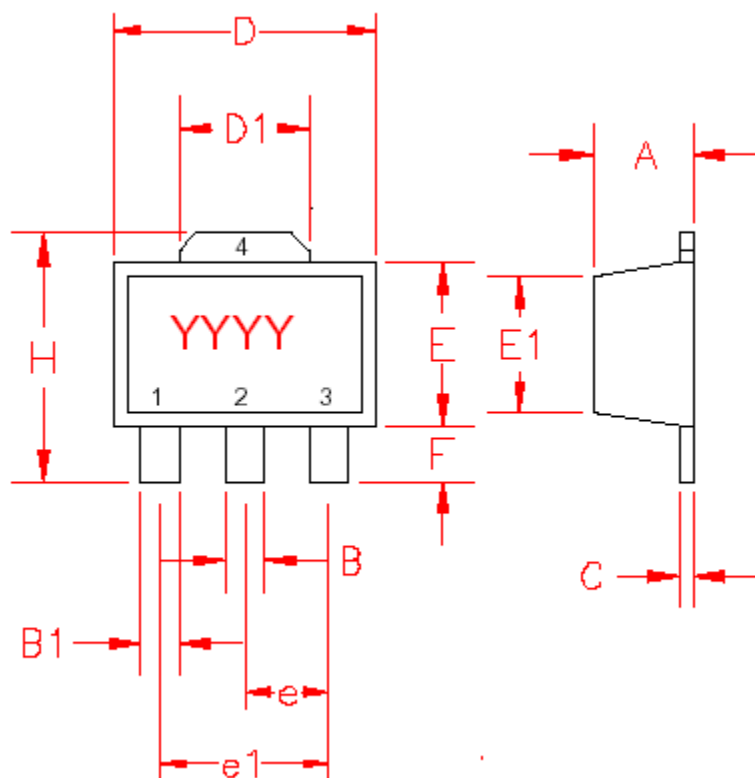


CAUTION!

SENSITIVE ELECTRONIC DEVICE

Absolute Maximum Ratings

Device Voltage	6.0	V
Device Current	220	mA
RF Power Input	12	dBm
Operating Temperature	-40 to +85	°C
Storage Temperature	-65 to +150	°C
Junction Temperature	200	°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

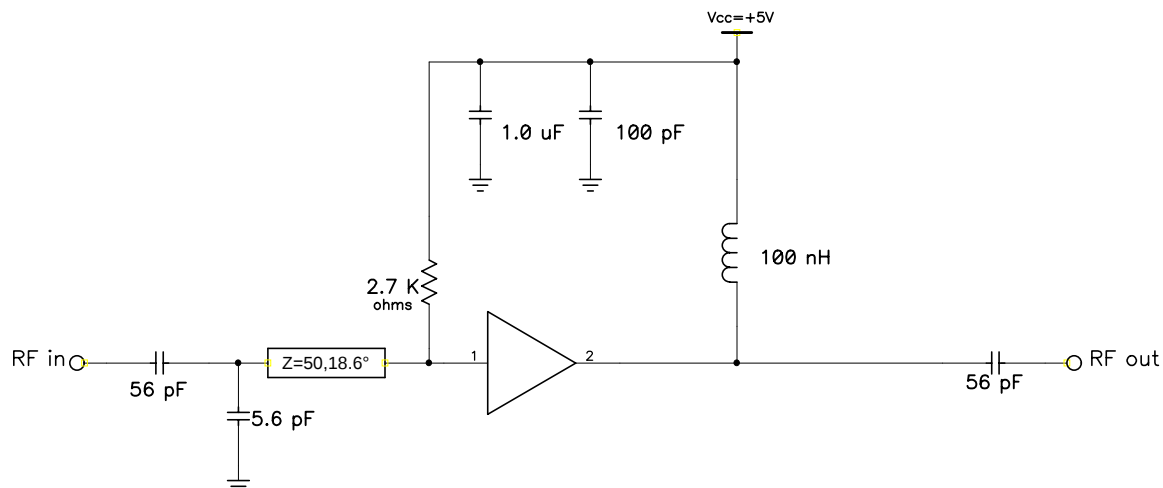
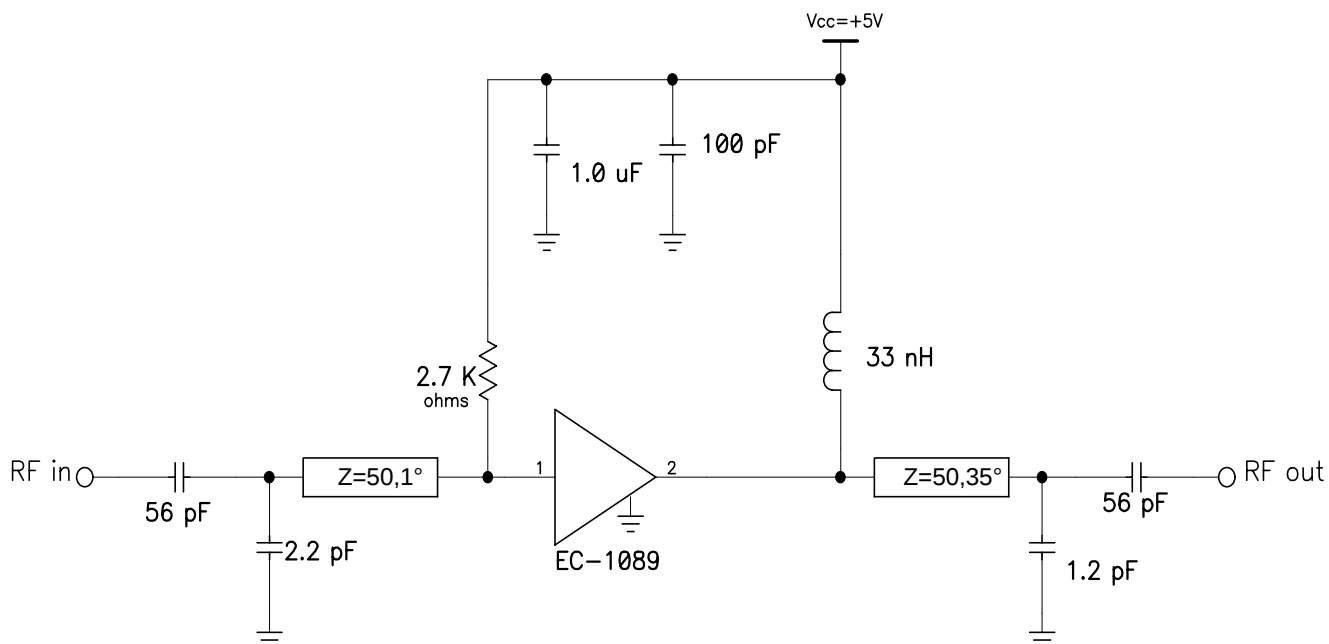
Pin Definitions

Pin #	Pin	Definition
1	RFin	This pin has a non-zero DC potential, requiring a DC blocking capacitor. Input matching is required to achieve a low VSWR.
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	DC bias is applied to this pin through a RF choke. A bypass capacitor (1.0 micro farad) on the DC side of the choke 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.

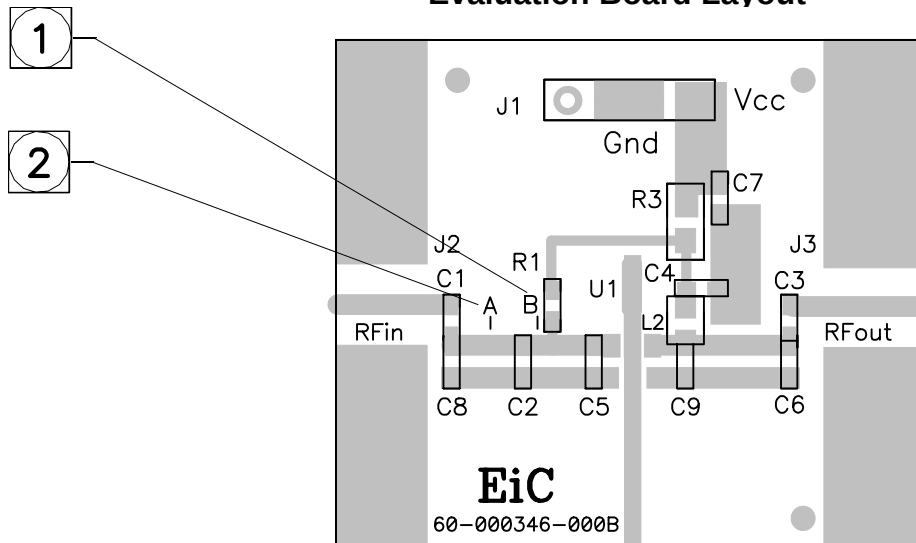
Typical S-Parameters

V_c = 5V, I_c = 150mA

FREQ-GHZ	MAG[S11]	ANG[S11]	MAG[S21]	ANG[S21]	MAG[S12]	ANG[S12]	MAG[S22]	ANG[S22]
0.05	0.487	-149.304	9.06	147.964	0.073	17.688	0.393	-111.873
0.15	0.572	-165.464	6.158	144.904	0.083	8.25	0.429	-146.667
0.25	0.6	-173.025	5.246	143.436	0.086	5.386	0.442	-161.071
0.35	0.612	-177.37	4.853	140.437	0.088	3.214	0.451	-167.981
0.45	0.622	179.399	4.629	136.026	0.089	1.539	0.46	-172.69
0.55	0.633	176.554	4.437	130.982	0.09	0.295	0.468	-176.322
0.65	0.642	173.742	4.255	125.751	0.091	-0.684	0.478	-179.377
0.75	0.652	170.999	4.07	120.404	0.092	-1.918	0.486	177.708
0.85	0.663	168.23	3.918	114.935	0.093	-3.315	0.494	174.839
0.95	0.672	165.613	3.757	109.86	0.095	-4.539	0.502	172.19
1.05	0.681	162.795	3.601	104.666	0.096	-5.77	0.512	169.481
1.15	0.69	159.968	3.458	99.902	0.097	-7.168	0.519	166.738
1.25	0.696	157.123	3.315	94.682	0.098	-8.619	0.527	163.963
1.35	0.701	154.113	3.186	90.031	0.099	-10.215	0.534	161.202
1.45	0.708	151.065	3.072	85.447	0.101	-11.635	0.542	158.677
1.55	0.713	148.023	2.954	81.158	0.101	-13.001	0.548	155.944
1.65	0.717	144.944	2.812	76.461	0.102	-14.502	0.553	153.143
1.75	0.721	141.764	2.707	72.275	0.103	-16.215	0.558	150.287
1.85	0.726	138.637	2.6	68.121	0.104	-17.789	0.563	147.521
1.95	0.731	135.528	2.499	64.016	0.104	-19.429	0.567	144.806
2.05	0.735	132.512	2.413	59.976	0.105	-21.228	0.571	141.915
2.15	0.741	129.592	2.325	55.902	0.106	-22.977	0.574	139.124
2.25	0.745	126.499	2.261	52.157	0.107	-24.685	0.578	136.329
2.35	0.749	123.543	2.171	48.604	0.108	-26.368	0.583	133.483
2.45	0.752	120.522	2.102	44.767	0.109	-28.172	0.585	130.451
2.5	0.755	118.933	2.063	42.858	0.109	-29.221	0.582	129.04

900 MHz Application Circuit**1900 MHz Application Circuit**

Evaluation Board Layout



REWORK INSTRUCTIONS

1. For 2140MHz APPLICATION: CUT INPUT TRACE AT LOCATION MARKED 'B' AND SOLDER COMPONENT C100 IN SERIES WITH INPUT AT LOCATION 'B'.
2. For 270MHz APPLICATION: CUT INPUT TRACE AT LOCATION MARKED 'A' AND SOLDER COMPONENT L100 IN SERIES WITH INPUT AT LOCATION 'A'.

Evaluation Board Materials

270MHz	.9GHz	1.9GHz	2.14GHz	2.45GHz	DESIG.	VALUE	DESCRIPTION	MANUFACTURER &P/N
--	2	2	2	2	C1, C3	56pF	CAPACITOR, 0603	ROHM MCH185A560JK
2	--	--	--	--	C1, C3	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z
--	1	--	--	--	C8	5.6pF	CAPACITOR, 0603	ROHM MCH185A5R6DK
1	--	--	--	--	C8	22pF	CAPACITOR, 0603	ROHM MCH185A220JK
1	1	1	1	1	C4	100pF	CAPACITOR, 0603	ROHM MCH185A5101JK
--	--	1	--	--	C5	2.2pF	CAPACITOR, 0603	ROHM MCH185A2R2DK
--	--	1	--	--	C6	1.2pF	CAPACITOR, 0603	ROHM MCH185A1R2DK
1	1	1	1	1	C7	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z
--	--	--	1	--	C2	1.5pF	CAPACITOR, 0603	ROHM MCH185A1R5DK
--	--	--	1	--	C100	1.5pF	CAPACITOR, 0603	ROHM MCH185A1R5DK
--	--	--	--	1	C5	1.2pF	CAPACITOR, 0603	ROHM MCH185A1R2DK
--	--	--	1	1	C9	.7pF	CAPACITOR, 0603	NOVA N0R7C500NT
1	1	1	1	1	R1	2.7K Ω	RESISTOR, 0603	ROHM MCR03J272
1	1	1	1	1	R3	0 Ω	RESISTOR, 0603	ROHM MCR03J000
--	--	1	1	1	L2	33 nH	INDUCTOR, 0805	CTLL 2012-33N
1	--	--	--	--	L2	390 nH	INDUCTOR, 0805	CTLL 2012-391N
--	1	--	--	--	L2	100 nH	INDUCTOR, 0805	CTLL 2012-101N
1	--	--	--	--	L100	10 nH	INDUCTOR, 0805	CTLL 2012-10N
2	2	2	2	2	J2, J3	---	SMA CONNECTOR	EF JOHNSON 142-0701-881
1	1	1	1	1	J1	---	RT ANG. CONN.	SULLINS ELEC PZC04SGAN
1	1	1	1	1		---	IC, EC1089	EiC Corp
1	1	1	1	1		---	PCB	EiC Corp 60-000346-000B

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1. EiC RECOMMENDED COMPONENTS ARE SHOWN.
EQUIVALENT COMPONENTS MAY BE USED.

Figure 1

Average CDMA ACPR@900MHz T=25

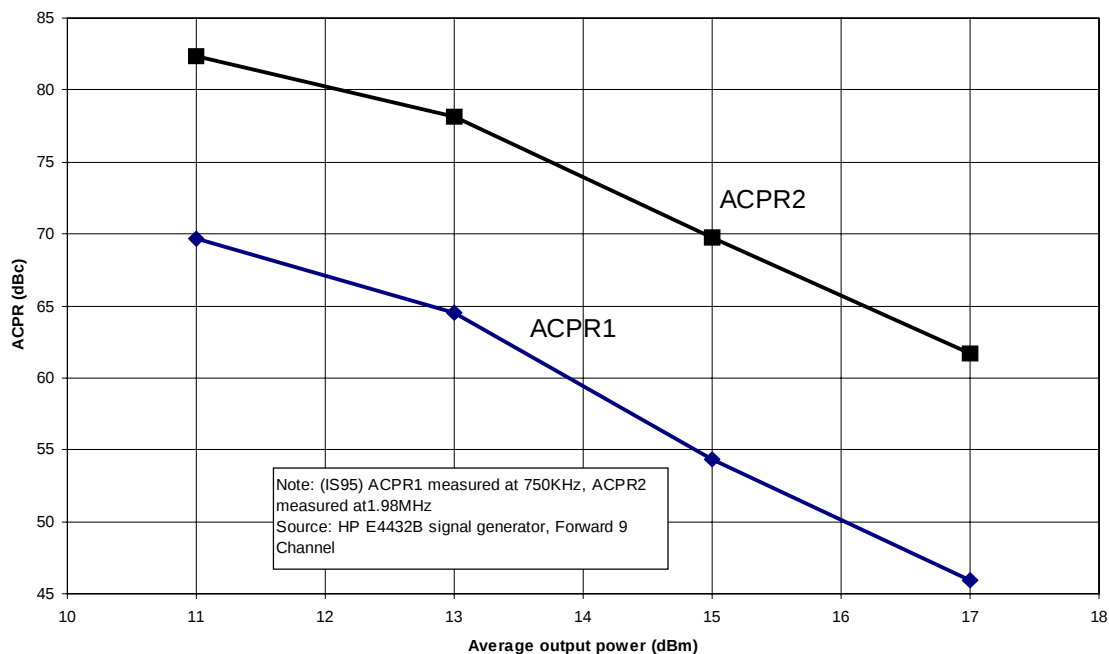


Figure 2

Average CDMA ACPR@1.9GHz T=25

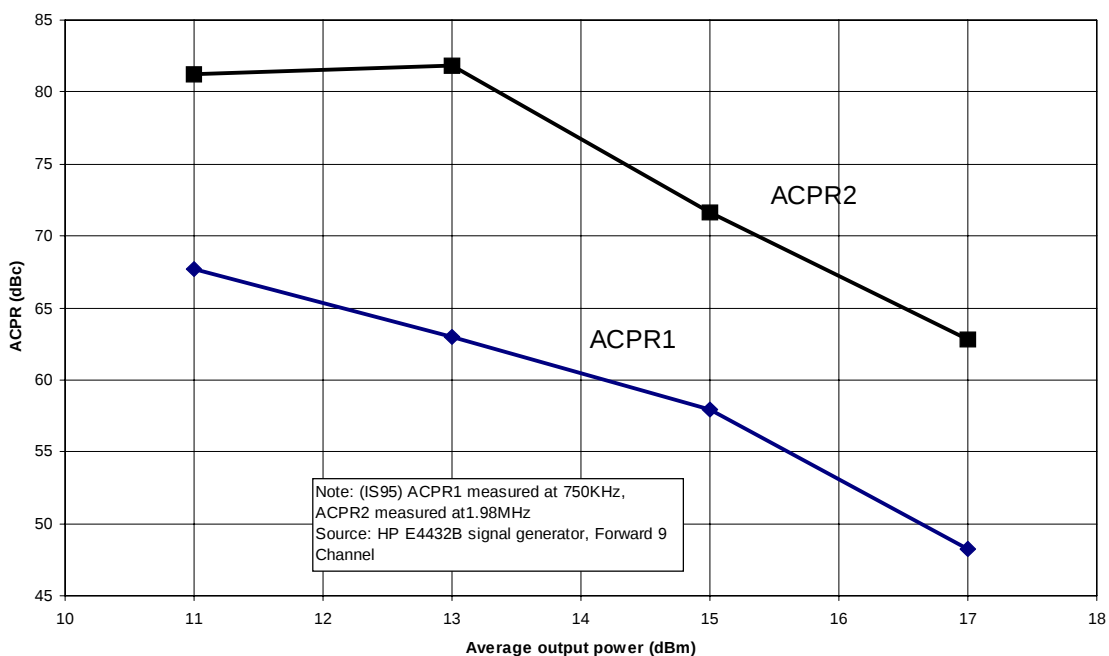


Figure 3

**P out & Gain vs. Temperature
EC1089**

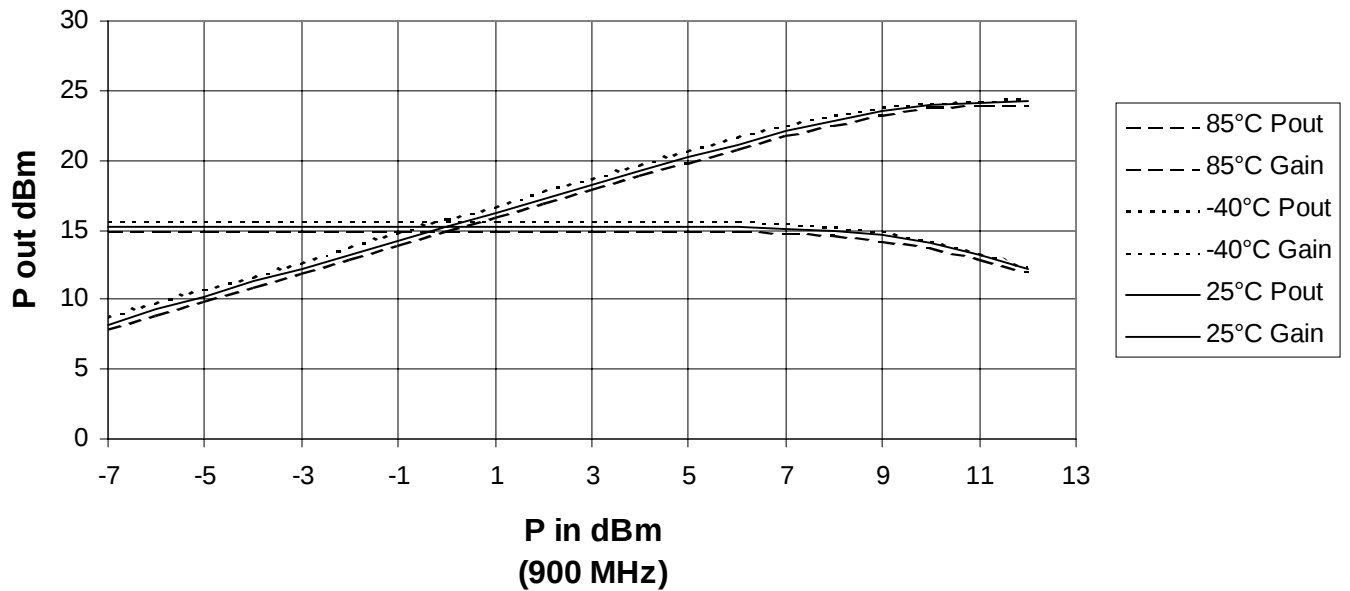


Figure 4

**P out & Gain VS. Temperature
EC1089**

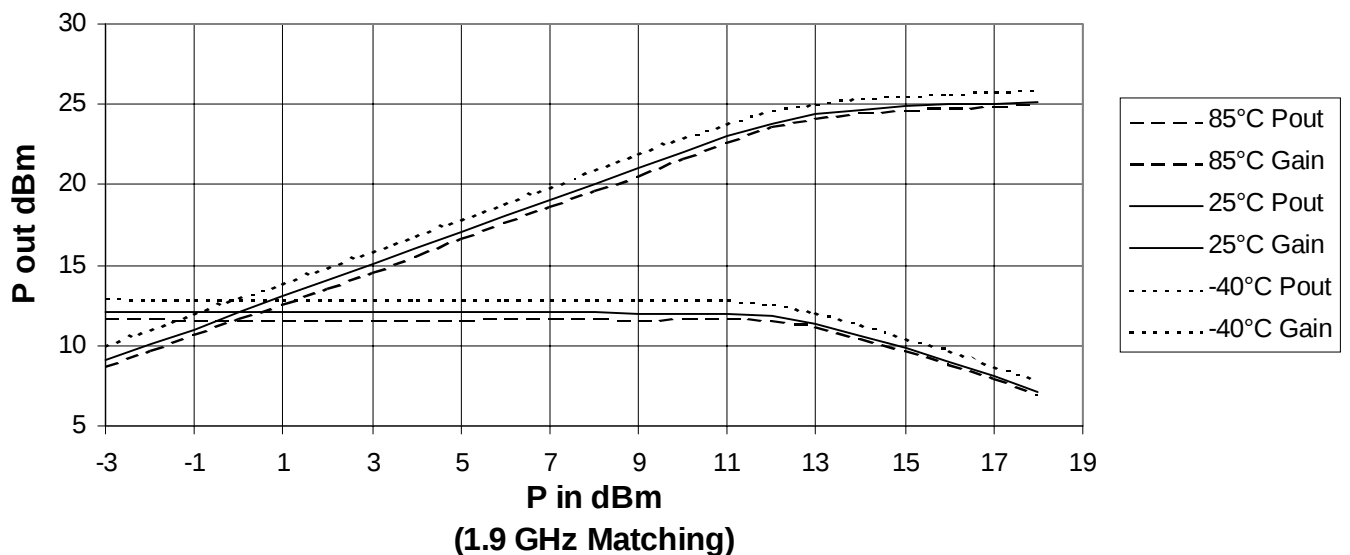


Figure 5

P out & Gain vs. Temperature
EC1089

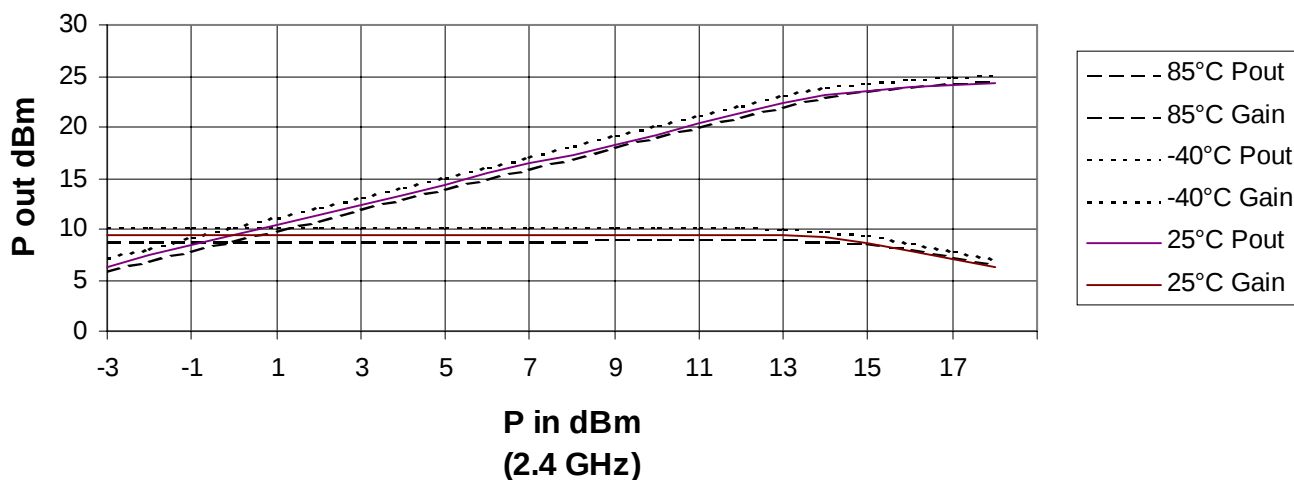


Figure 6

OIP3 vs. Temperature vs. Frequency
EC1089

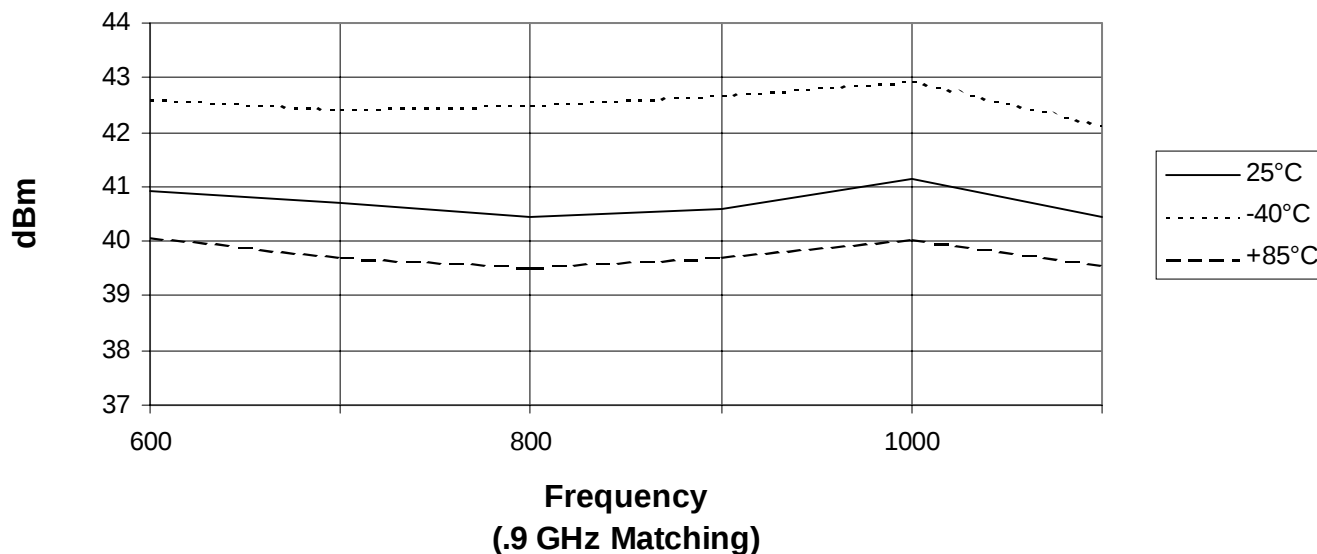


Figure 7

**OIP3 vs. Temperature vs. Frequency
EC1089**

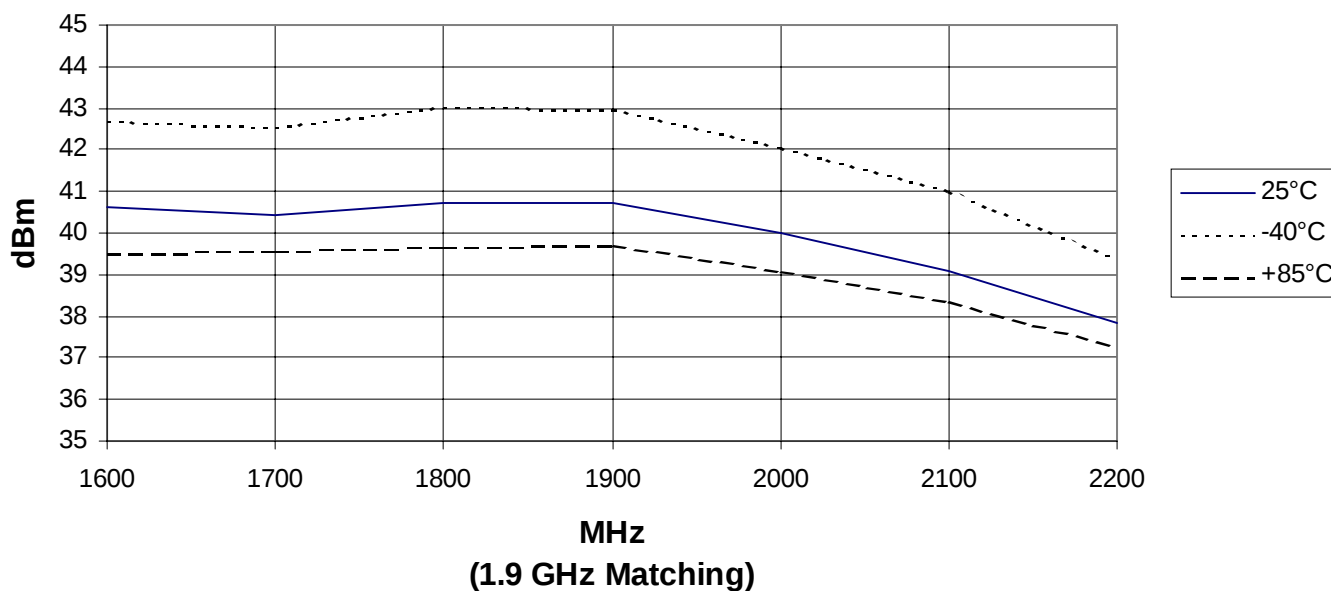


Figure 8

**OIP3 VS. Temperature vs. Frequency
EC1089**

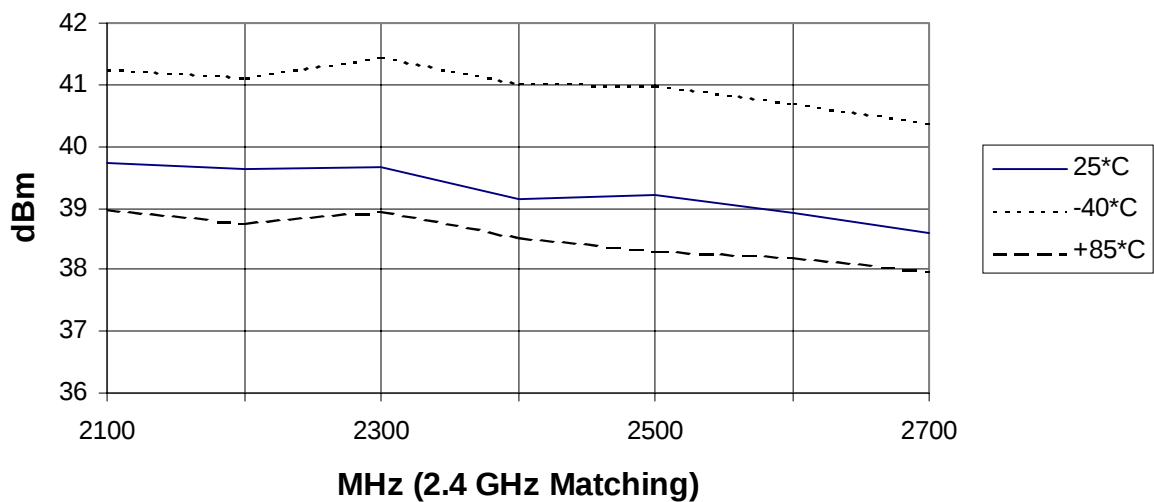
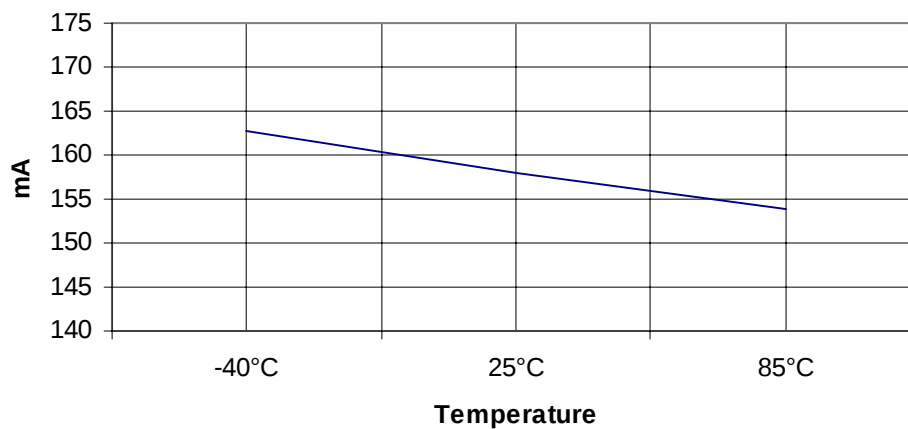


Figure 9

1089 Icc vs. Temperature



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