EiC Corp.
Excellence in Communications

DATA SHEET

ECG014

BROADBAND HIGH OIP3 AMPLIFIER

50 - 2000 MHz

Features

- 50 to 2000 MHz
- 41 dBm Typical OIP3 at 1900 MHz
- Highly Reliable InGaP HBT
- 20.5 dB Typical Gain at 900 MHz
- 23.5 dBm Typical P1dB at 1900 MHz
- Excellent Stability

Applications

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

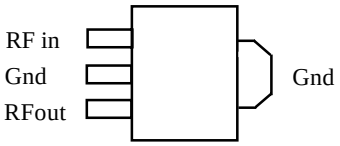
Package Available

(-B) SOT-89

Description

The ECG014 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 50 to 2000 MHz range. Typical OIP3 at 1900 MHz is +42 dBm. The ECG014 operates from a single 8 volt power supply.

Package



SOT-89 (Top View)

Electrical Specifications

Test Conditions: Ta = 25°C, Vd = 5.0 V

SYMBOL	PARAMETER		LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		50		2000	MHz	
G	Gain (Small Signal)	f = 900 MHz f = 1900 MHz	18.5 17.0	20.5 18.0		dB	
P_{1dB}	Output Power @ 1 dB Compression	f = 900 MHz f = 1900 MHz	23.0 21.5	24 24		dBm	
OIP3	Output Third Order Intercept	f = 900 MHz f = 1900 MHz	38 38	40 41		dBm	Note 1
RL_{IN}	Input Return Loss, 50 Ohm	900 to 2000 MHz		15.0		dB	
RL_{IN}	Input Return Loss, 50 Ohm	900 & 1900 MHz	15.0	17.0		dB	Note 2
RL_{OUT}	Output Return Loss, 50 Ohm	900 to 2000 MHz		10.0		dB	
NF	Noise Figure	f = 900 MHz f = 1900 MHz		5.0 5.0		dB	
I_c	Supply Current		85	100	135	mA	Note 2
	Output Mismatch without Spurs			10:1			
R_{th}, j-l	Thermal Resistance	Junction to Lead		85		°C/W	
Note 1: OIP3 = Pout (by power meter, total 2-tone power) + (IM3 (dBc)) / 2 - 3 dB							
Note 2: Tested at Vcc= 8.0V Rs= 30 ohms on an eval board with recommended matching circuit							

CAUTION!
SENSITIVE ELECTRONIC DEVICE

ECG014

BROADBAND HIGH OIP3 AMPLIFIER

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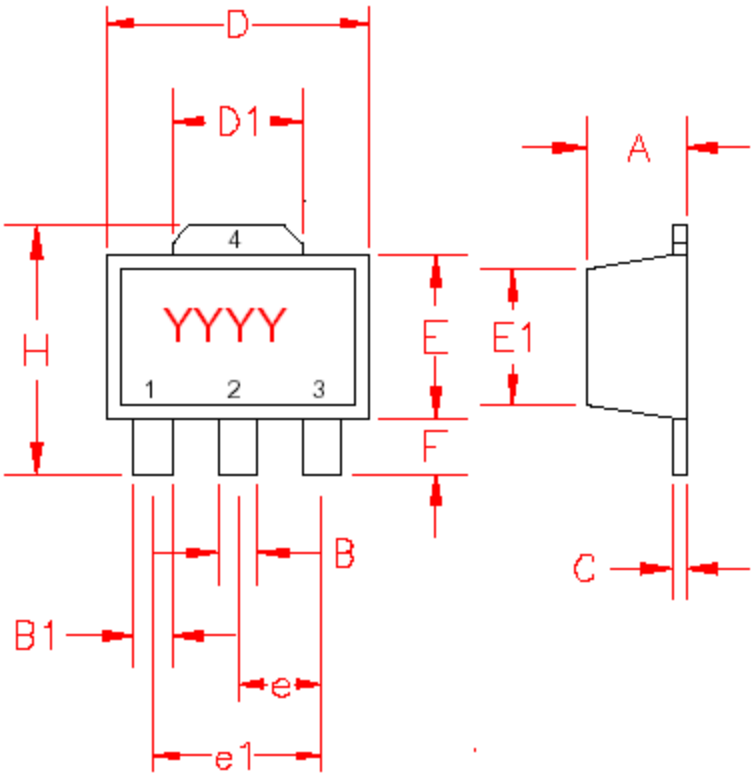
Absolute Maximum Ratings

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

Package Outline

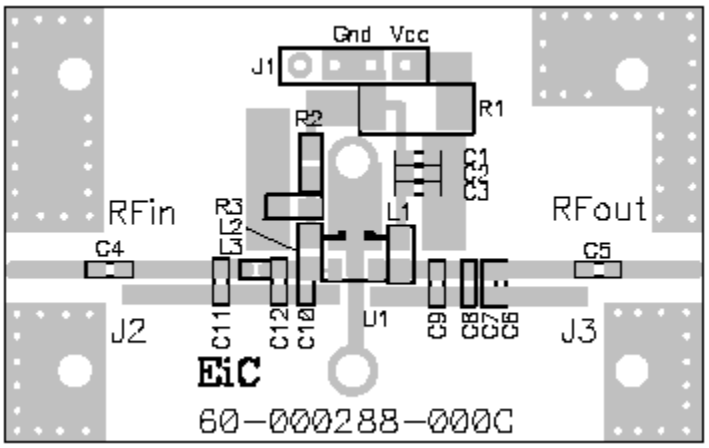


SYMBOL	Inches MIN.	MAX.
A	.055	.063
B	.017	.022
B1	.014	.019
C	.014	.017
D	.173	.181
D1	.064	.072
E	.090	.102
E1	.084	.090
e	.059	
E1	.118	
F	.035	.047
H	.155	.167

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 low frequency modulation signal.

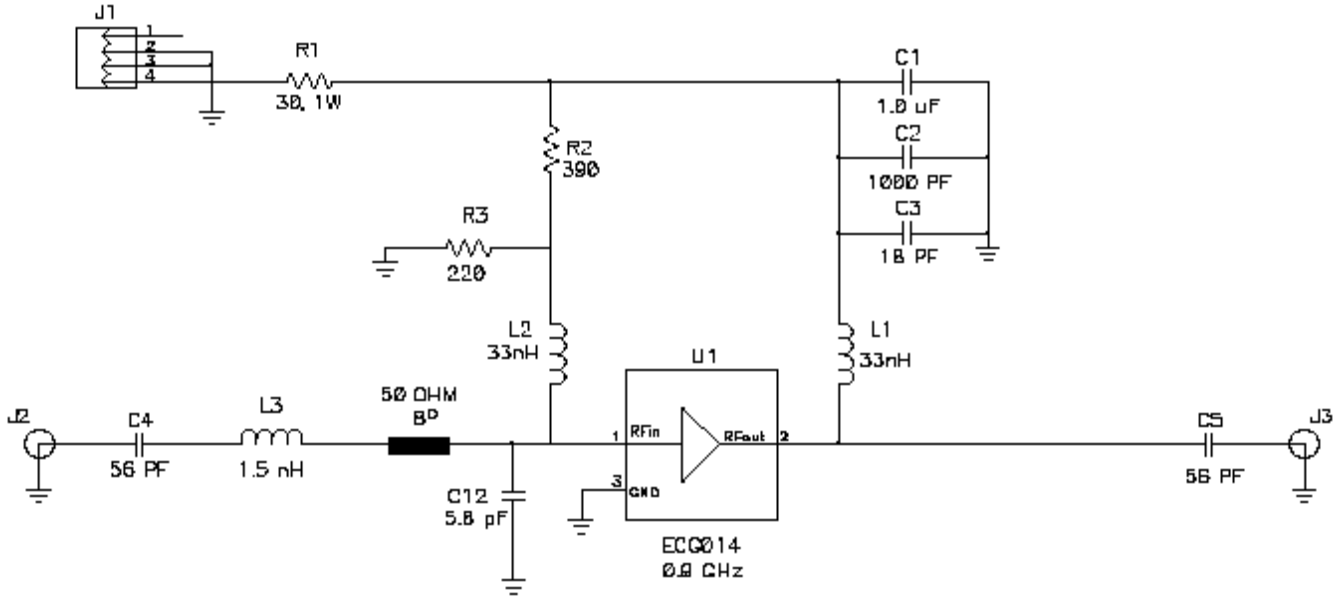
Evaluation Board Layout



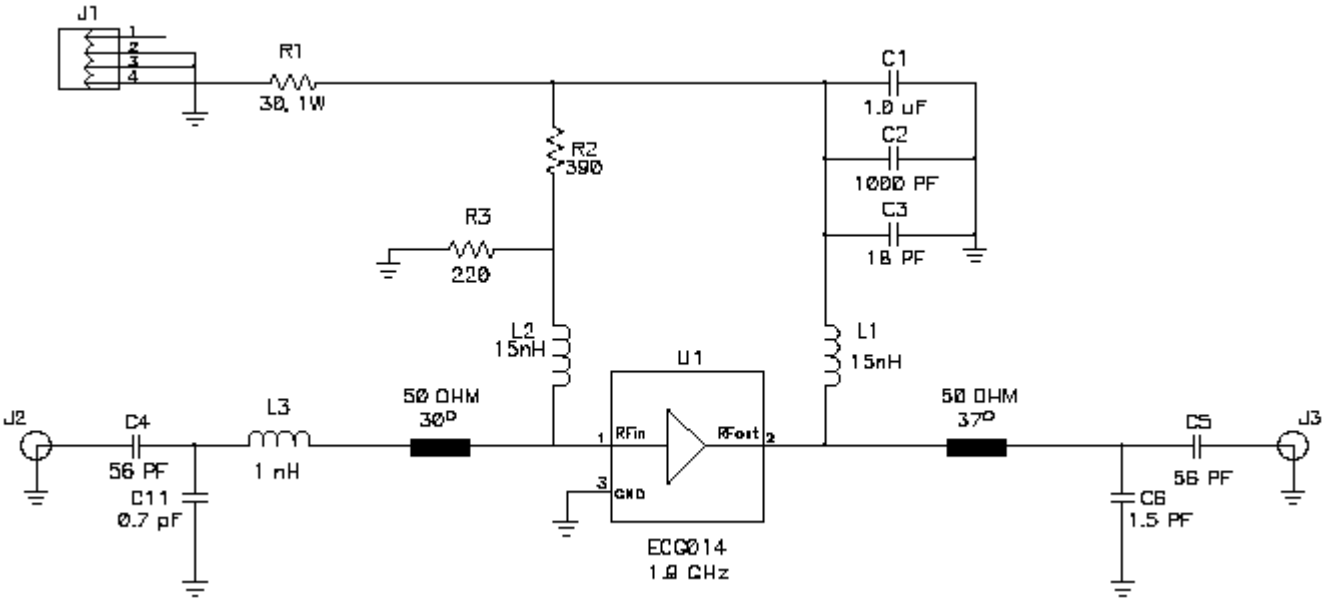
ECG014					
0.9GHz	1.9GHz	VALUE	DESCRIPTION	MANUFACTURER &P/N	
R1	R1	30 Ω	RESISTOR, 2512 1W	ROHM MCR100JW300	NOTE 1
R2	R2	390 Ω	RESISTOR, 0805	ROHM MCR10JW391	NOTE 1
R3	R3	220 Ω	RESISTOR, 0805	ROHM MCR10JW221	NOTE 1
L1,L2	---	33 nH	INDUCTOR, 0805	TOKO LL1608-F33NK	NOTE 1
---	L1,L2	15 nH	INDUCTOR, 0805	TOKO LL1608-F15NK	NOTE 1
L3		1.5 nH	INDUCTOR, 0805	TOKO LL1608-FH1N5S	NOTE 1
---	L3	1.0nH	INDUCTOR, 1005	TOKO LL1005-FH1N0S	NOTE 1
C1	C1	1.0 uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z	NOTE 1
C2	C2	1000pF	CAPACITOR, 0603	ROHM MCH185C102KK	NOTE 1
C3	C3	18 pF	CAPACITOR, 0603	ROHM MCH185A180JK	NOTE 1
C4,C5	C4,C5	56 pF	CAPACITOR, 0603	ROHM MCH185A560JK	NOTE 1
---	C6	1.5 pF	CAPACITOR, 0603	ROHM MCH185A1R5CK	NOTE 1
C12	---	5.6 pF	CAPACITOR, 0603	ROHM MCH185A5R6DK	NOTE 1
---	C11	.7 pF	CAPACITOR, 0603	NOVA N0R7C500NT	NOTE 1
---	---	---	C7, 8, 9, 10	NOT LOADED	
U1	U1	---	IC, ECG014	EiC Corp	
1	1	---	HEATSINK	EiC Corp MD-000290-000	
J1	J1	---	CONN, 4 POS	SULLINS ELEC PZC04SGAN	
J2,J3	J2,J3	---	CONN, SMA	CDI 5260CC	
1	1	---	PCB	EiC Corp 60-000288-000C	

NOTE 1. EiC RECOMMENDED COMPONENTS ARE SHOWN.
EQUIVALENT COMPONENTS MAY BE USED.
NOTE UNLESS OTHERWISE SPECIFIED

900MHz Schematic



1.9GHz Schematic



Recommended Bias Resistor Values

R = (Vcc-Vde)/Icc = (Vcc-5.0)/0.10

Approximate Supply Voltage (V_{cc}) based on standard values for R1	7	8	10	12
R1 (Ohms)	20	30	51	68

Figure 1

ACPR1 and ACPR2 vs. Temperature vs. Pout at 900MHz (See note below)

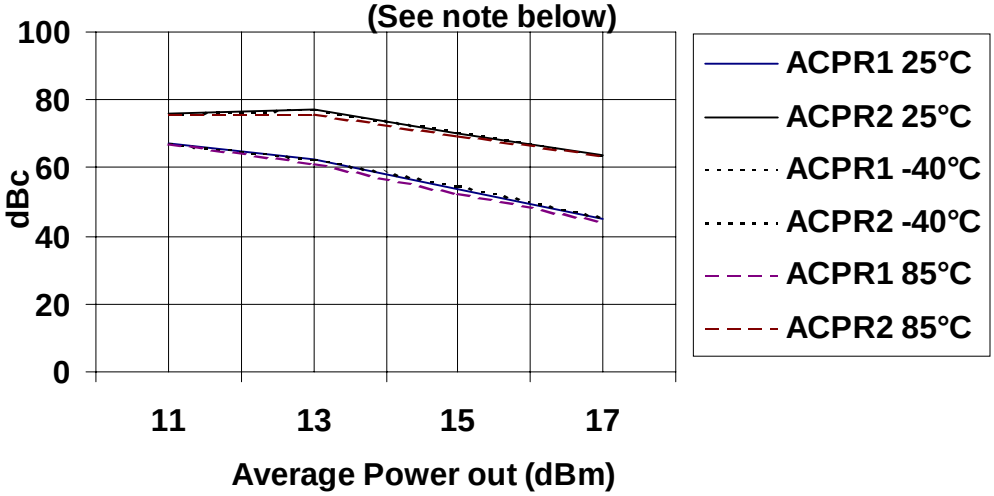
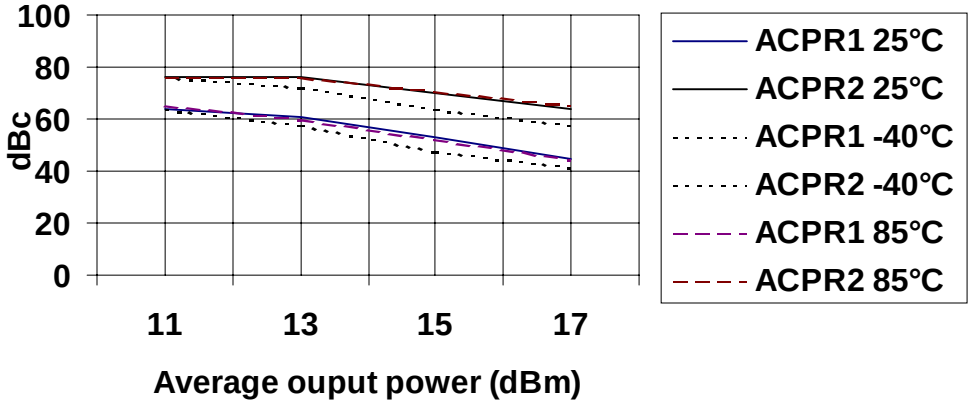


Figure 2

ACPR1 and ACPR2 vs. Temperature vs. Pout at 1.9GHz (See note below)



Note: (IS95) ACPR1 measured at 750KHz
ACPR2 at 1.98MHz Forward 9 Channel
Signal Generator:HP E4432B

Figure 3

Ssg, OIP3 and P1dB vs. Temperature at 900MHz

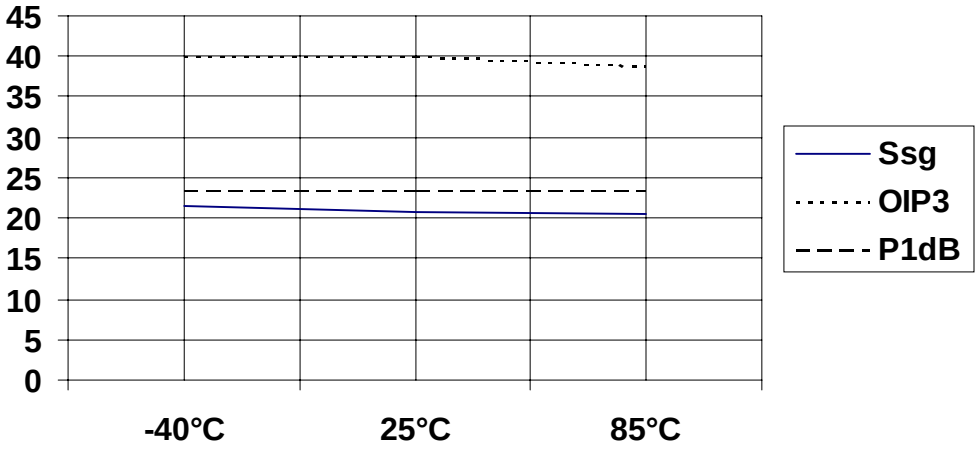
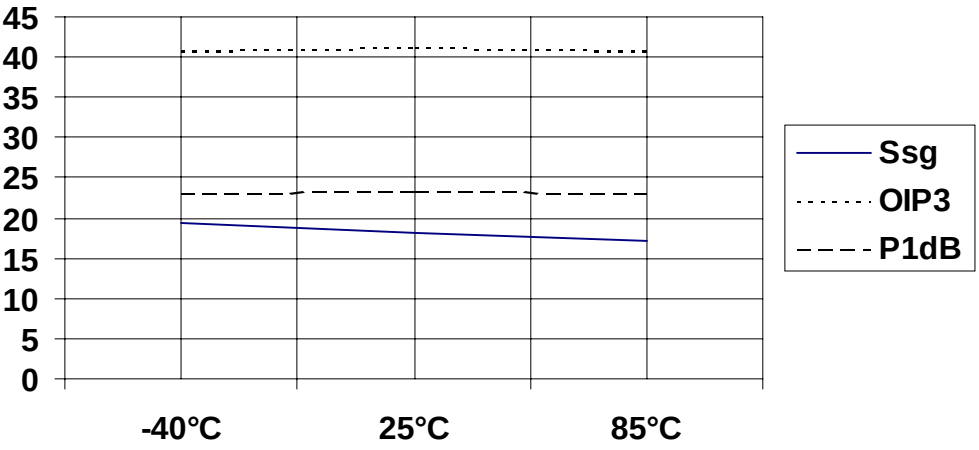


Figure 4

Ssg, OIP3 and P1dB vs. Temperature at 1.9GHz



Typical S-Parameters: Temperature 25°C
Icc = 100mA

Frequency (MHz)	S11 (Mag)	S11 (Ang)	S21 (Mag)	S21 (Ang)	S12 (Mag)	S12 (Ang)	S22 (Mag)	S22 (Ang)
50	0.5454	-156.2736	24.3308	141.0278	0.0245	16.1860	0.4834	-128.3192
100	0.5682	-170.4243	18.2563	145.2137	0.0262	8.5222	0.4205	-157.9701
200	0.5838	-177.6572	16.0482	138.3140	0.0278	6.8843	0.4000	-172.0869
300	0.5941	177.4621	14.5821	128.4880	0.0268	9.0406	0.3877	-177.6652
400	0.6084	173.2536	13.2216	118.3425	0.0294	8.0739	0.3777	178.7455
500	0.6226	168.4401	12.0968	109.0742	0.0290	4.4210	0.3714	176.4763
600	0.6301	163.2572	11.1317	100.3350	0.0309	6.1378	0.3638	174.2330
700	0.6188	157.9194	10.2675	92.8513	0.0298	3.8713	0.3541	172.8019
800	0.6172	152.6621	9.6361	85.1457	0.0325	2.6385	0.3519	171.4364
900	0.6075	146.6524	9.2070	77.4851	0.0333	-1.4880	0.3489	170.2148
1000	0.5907	139.9545	8.7668	69.6150	0.0324	-1.6943	0.3524	169.6828
1100	0.5584	133.5982	8.4191	63.0590	0.0337	-8.2974	0.3502	169.7751
1200	0.5227	126.5782	8.2751	54.9736	0.0342	-11.2360	0.3564	171.0185
1300	0.4719	118.0417	8.1862	46.8780	0.0340	-19.8714	0.3737	172.7403
1400	0.4012	108.4183	8.0925	37.5772	0.0321	-27.0957	0.4002	175.4450
1500	0.3132	96.7043	8.0510	27.2239	0.0287	-38.3530	0.4440	176.9271
1600	0.2127	83.5472	8.0486	17.7380	0.0279	-52.3945	0.4904	179.1622
1700	0.0792	50.1704	7.9857	5.1744	0.0228	-71.5689	0.5808	179.1389
1800	0.1096	-88.0716	7.7293	-8.4459	0.0186	-109.3402	0.6824	176.2076
1900	0.2904	-115.8272	7.2321	-23.3040	0.0157	-154.3713	0.7822	170.7023
2000	0.4439	-131.6839	6.6408	-36.8610	0.0187	162.1729	0.8553	164.7642

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