

Product Features

- 100 - 2300MHz
- 31 dBm P1dB
- High Linearity: 47 dBm OIP3
- High Efficiency: PAE > 45%
- 12 dB Linear Gain at 1.96GHz
- Single 5V Supply
- High Reliability
- Class A or AB operation

Applications

- Basestations and Repeaters
- CDMA/GSM/TDMA/EDGE
- PCS/CDMA2000/IMT2000/UMTS
- Multi-carrier systems

Packages Available

- QFN-16 (4x4mm)
- SOIC-8

Product Description

The ECP100 is a single stage, 1.0W power amplifier that offers excellent linearity and efficiency. This device was developed using EiC's proprietary InGaP Heterojunction Bipolar Transistor (HBT) process. The devices have a partially matched input impedance. It is optimized for multicarrier applications and allows customers to use class A or class AB operations. The devices can be easily matched in output side to obtain the optimum power, linearity and efficiency. The product is targeted for use as a driver amplifier for wireless infrastructure applications. It is available in two surface-mount plastic packages: QFN-16 (4x4mm) and SOIC-8. Please refer to page 2 for important mounting information.

Electrical Specifications

Test Conditions: $T_a = 25^{\circ}\text{C}$, $V_{cc} = +5\text{ V}$ $V_{ref} = +5\text{ V}$ $I_{cq} = 450\text{ mA}$ (class A operation)

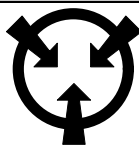
SYMBOL	PARAMETER		LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		100		2300	MHz	
G	Gain (Small Signal)	f = 900MHz	16.0	17.0		dB	
		f = 1960MHz	11.0	12.0			
		f = 2140MHz	10.0	11.5			
P1dB	Output Power @ 1dB Compression	f = 900MHz	30.0	30.5		dBm	
		f = 1960MHz	30.0	31.0			
		f = 2140MHz	29.5	31.0			
OIP3	Output Third Order Intercept	f = 900MHz	45.0	47.0		dBm	Note 1
		f = 1960MHz	45.0	47.0			
		f = 2140MHz	45.0	46.0			
ACPR1	Pout = 25.5dBm (IS-95)	f = 1960MHz		-45		dBc	(9 ch. Fwd.)
ACPR1	Pout = 23dBm (WCDMA)	f = 2140MHz		-45		dBc	Note 2
	Gain Flatness (120MHz Band)	f = 2140MHz		± 0.5		dB	
RL in	Input Return Loss (50 Ohm)	f = 2140MHz		15.0		dB	
Icop	Operational Current @ P1dB			540		mA	
Vde	Device Voltage			5.0		Vdc	
θ_{jc}	Thermal Resistance			30		$^{\circ}\text{C/W}$	Note 3

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

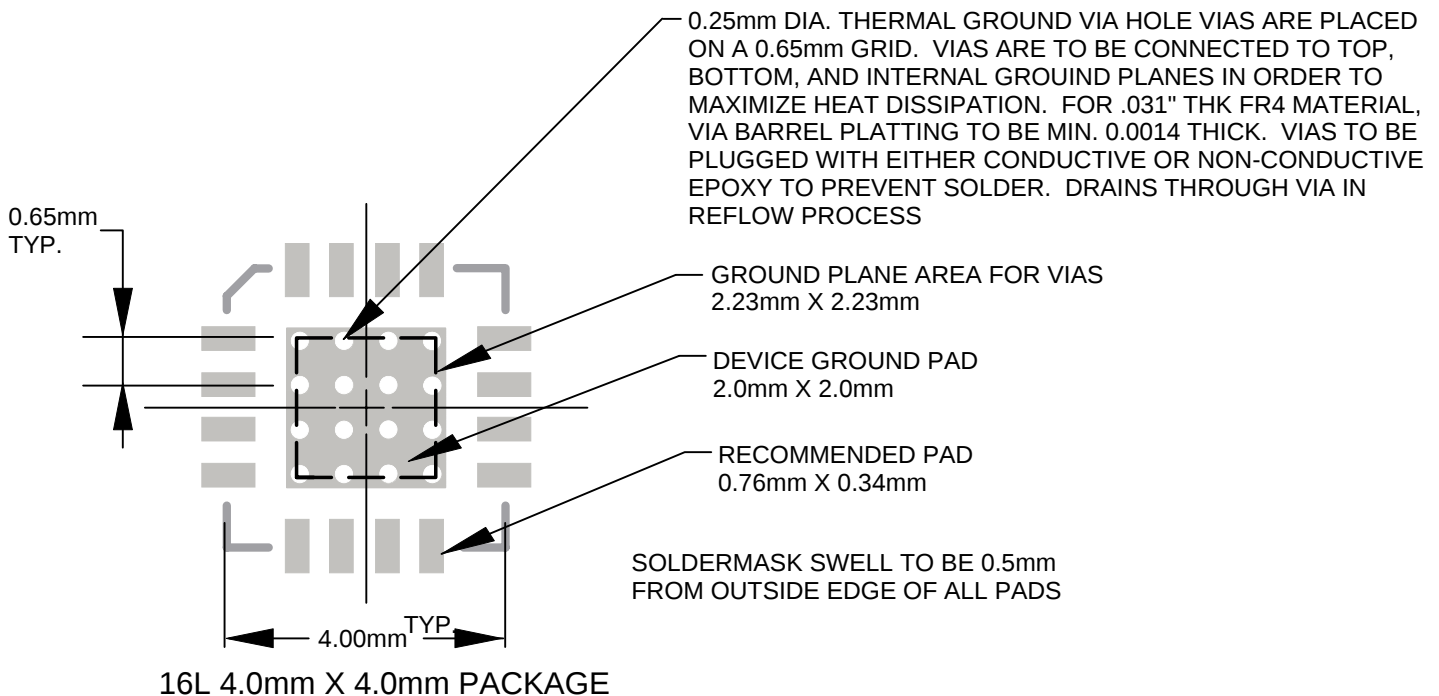
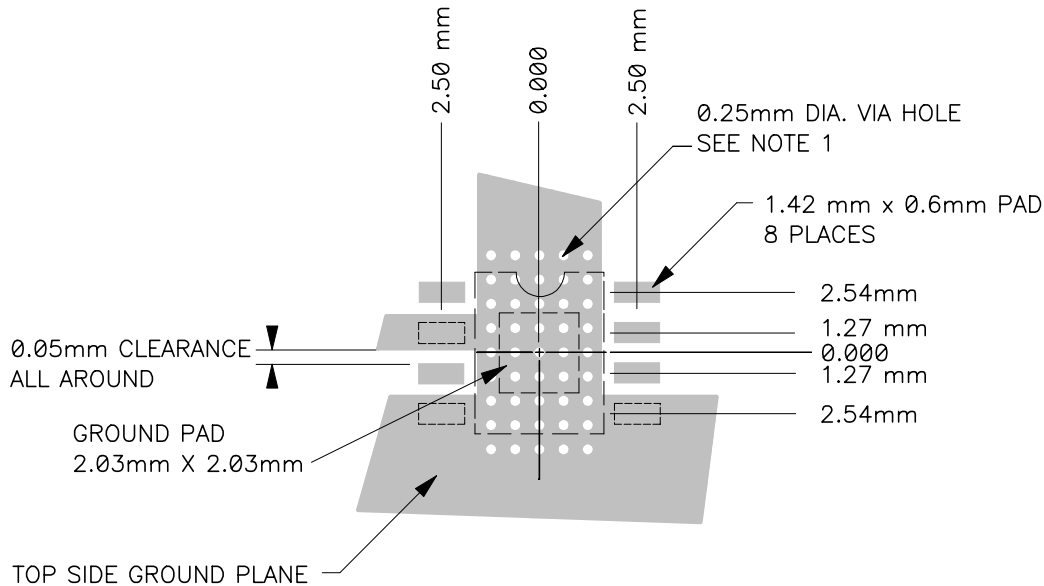
Note 2: ACPR measured for 3GPP test model 1, 64 DPCH. Channel bandwidth = 3.84MHz. Frequency offset: +/- 5MHz.

Note 3: θ_{jc} is measured between the device junction and the exposed die attach pad.

Note 4: For the recommended mounting solution please refer to APNOTE AP-000556-000.



CAUTION!
SENSITIVE ELECTRONIC DEVICE

Important Mounting Information**RECOMMENDED PCB LAND PATTERN**

Absolute Maximum Ratings

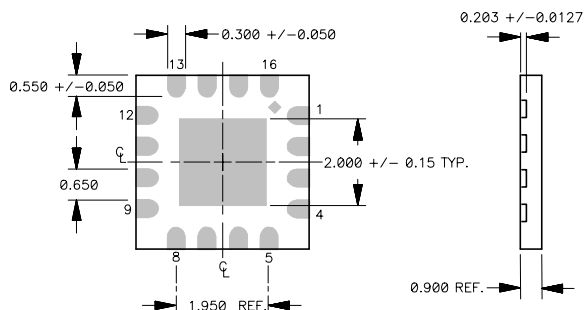
PARAMETER	RATING	UNIT
Supply Voltage	8	Volts
Supply Current	900	mA
RF Power Input	+26	dBm
Storage Temperature	-65 to +150	°C
Ambient Operating Temperature	-40 to +85	°C
Absolute Maximum DC Power	5	Watts

Note: Exceeding any of the absolute maximum ratings may cause permanent damage to the device.

Note: Do not exceed more than one parameter at the same time.

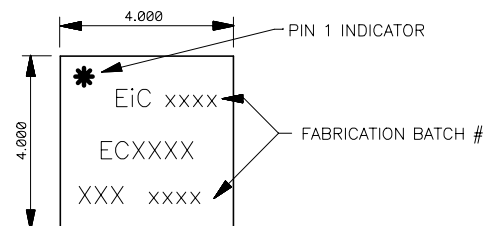
QFN-16 (4x4mm) Package Outline**Package**

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS



BOTTOM VIEW

SIDE VIEW

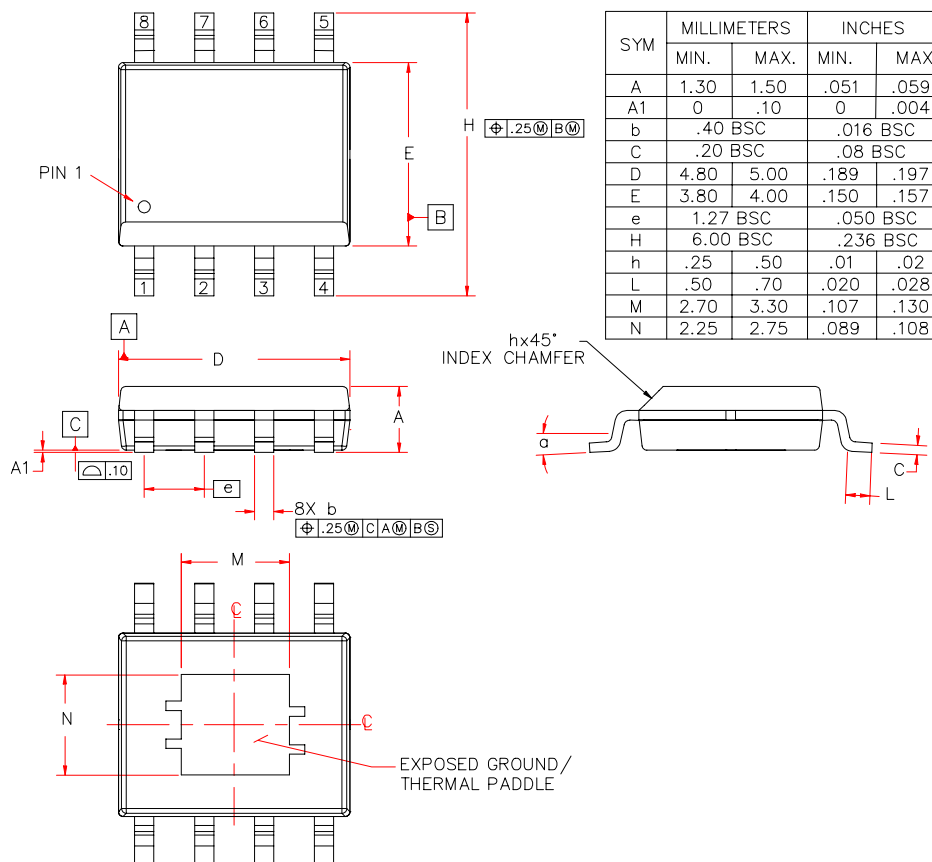
DEVICE MARKING

TOP VIEW

Pin Definitions

PIN	FUNCTION	DEFINITION
1	Vref/pd	This pin sets the reference / quiescent current.
2,4-9, 12-15	N/C	These pins are not connected but should be grounded.
3	RF in	This pin connects to the input of the amplifier. It will have a dc voltage around 1.25 to 1.3 VDC. External circuit should provide DC blocking.
10,11	RF out	These are the output pins, which connects to the collector of the transistor. On the PCB, the two pins should also be tied together. Vcc connects to these through an inductor. A DC blocking capacitor is required.
16	Vbias	This pin provides current to the bias circuit , typically Vbias = Vcc. Bypass capacitors should be placed as close as practically possible to this pin.
Slug	GND	This pin provides ground and heat sinking.

SOIC-8 Package Outline



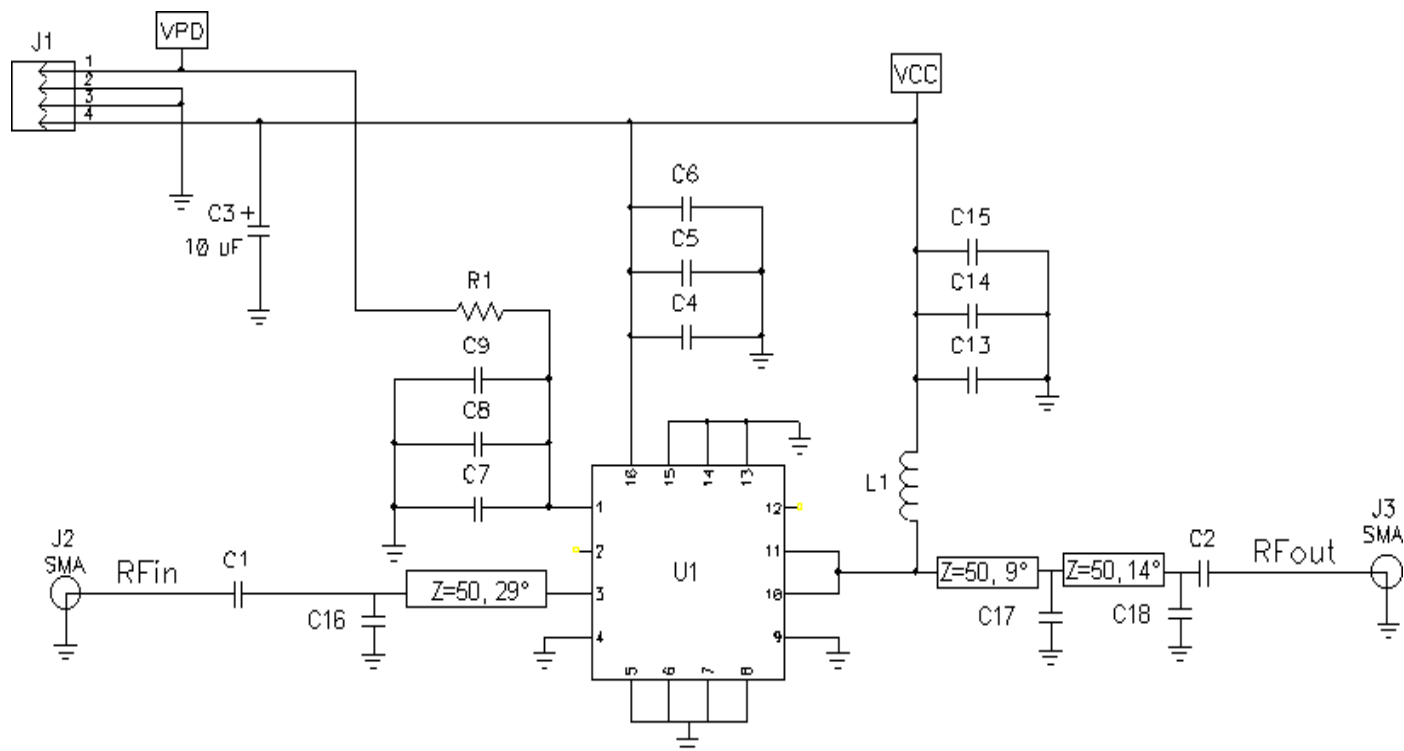
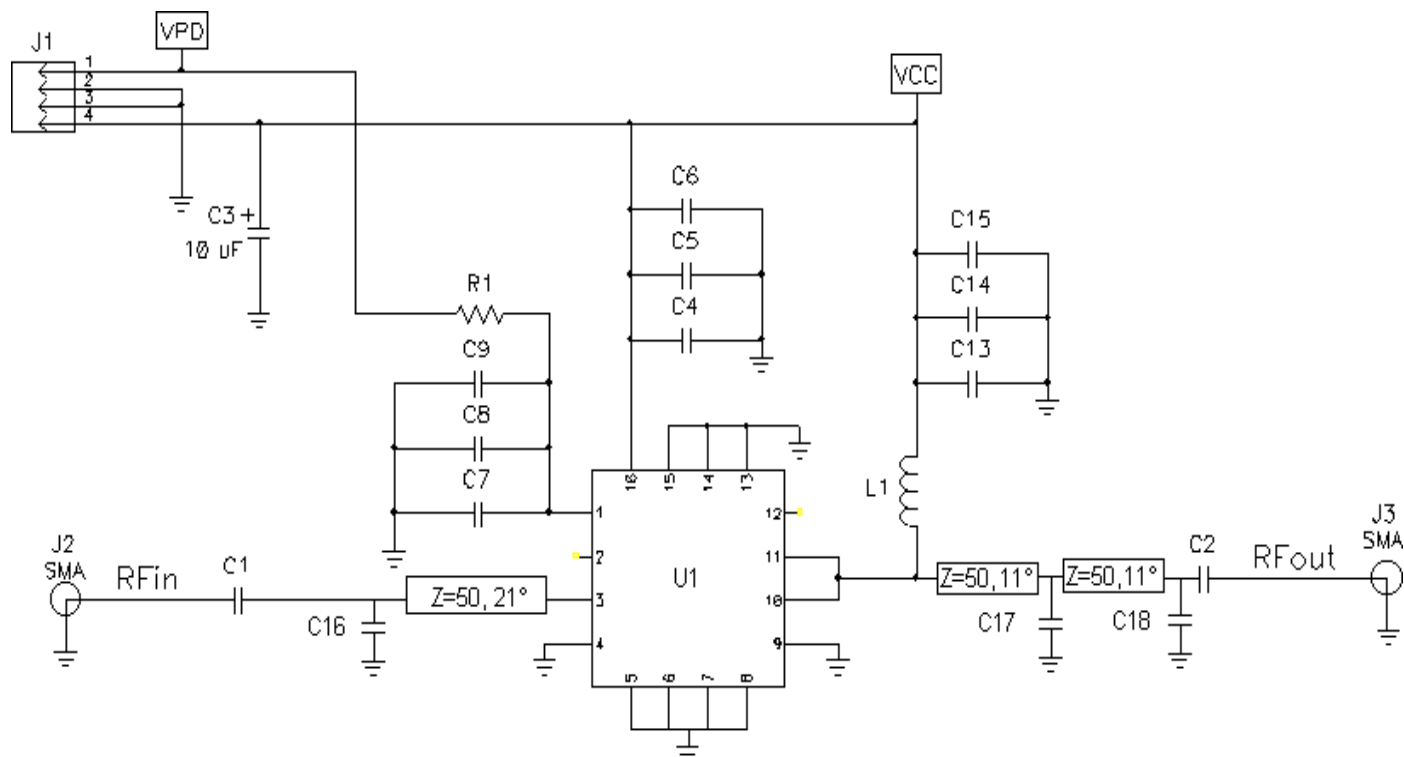
1. MOLD FLASH, PROTRUSIONS AND GATE BURRS AT THE END OF THE PACKAGE BODY SHALL NOT EXCEED 0.0006" PER SIDE.

2. UNIT = INCH

NOTES: UNLESS OTHERWISE SPECIFIED

Pin Definitions

PIN	FUNCTION	DEFINITION
1	Vref/pd	This pin sets the reference / quiescent current.
2,4,5	N/C	These pins are not connected but should be grounded.
3	RF in	This pin connects to the input of the amplifier. It will have a dc voltage around 1.25 to 1.3 VDC. External circuit should provide DC blocking.
6,7	RF out	These are the output pins, which connects to the collector of the transistor. On the PCB, the two pins should also be tied together. Vcc connects to these through an inductor. A DC blocking capacitor is required.
8	Vbias	This pin provides current to the bias circuit , typically Vbias = Vcc. Bypass capacitors should be placed as close as practically possible to this pin.
Slug	GND	This pin provides ground and heat sinking.

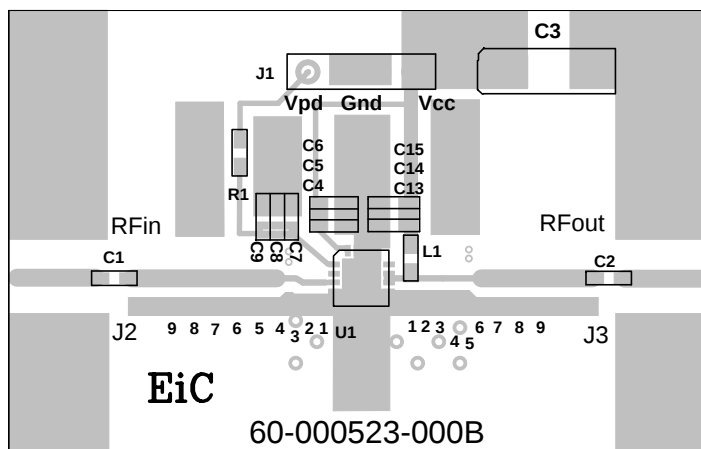
Evaluation Board Application Schematic (4X4)**1.96GHz****2.14GHz**

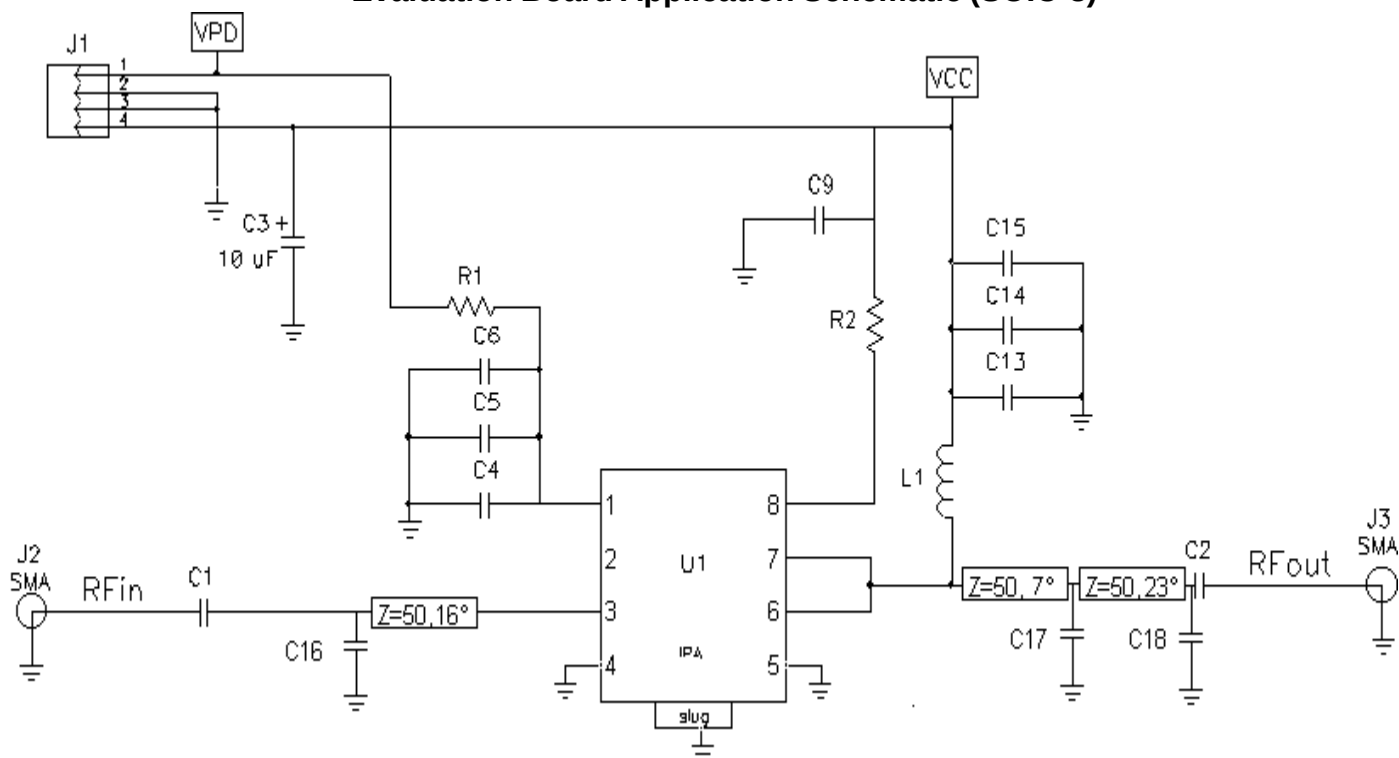
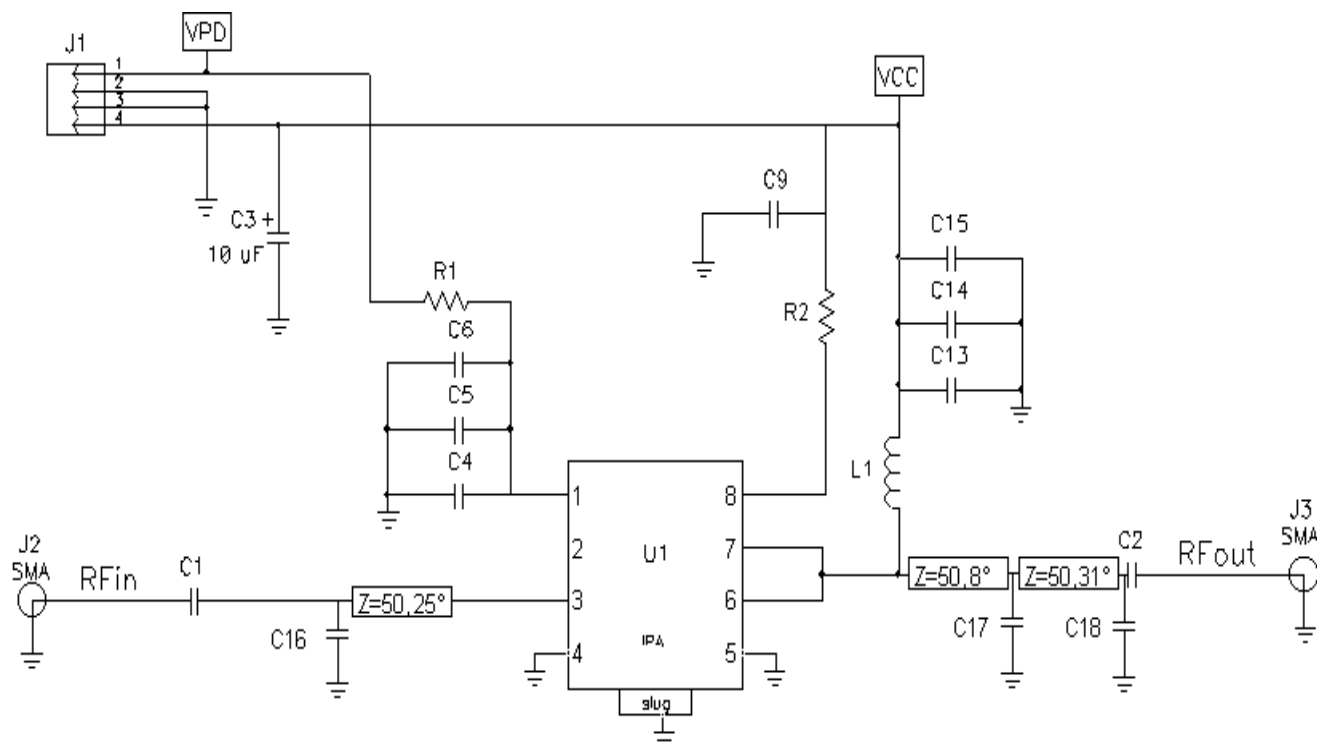
Evaluation Board Bill of Material (4X4)

1.9GHz Qty.	2.14GHz Qty.	Location (See eval brd. Layout)	DESIG.	VALUE	DESCRIPTION	MANUFACTURER & P/N	
1	1		C1	10pF	CAPACITOR, 0603	ROHM MCH185A100DK	NOTE 1
1	1		C2	100pF	CAPACITOR, 0603	ROHM MCH185A101JK	NOTE 1
1	1		C3	10.0uF	CAPACITOR, 2512	PANASONIC ECS-H1CC106R	NOTE 1
3	3		C4, C7, C13	18pF	CAPACITOR, 0603	ROHM MCH185A180JK	NOTE 1
3	3		C5, C8, C14	1000pF	CAPACITOR, 0603	ROHM MCH185C102KK	NOTE 1
3	3		C9, C6, C15	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z	NOTE 1
--	1	INPUT 7	C16	1.0pF	CAPACITOR, 0603	ROHM MCH185A010CK	NOTE 1
1	--	INPUT 3	C16	.8pF	CAPACITOR, 0603	AVX 06035J0R8BBT	NOTE 1
--	1	OUTPUT 3	C17	2.4pF	CAPACITOR, 0603	ROHM MCH185A2R4DK	NOTE 1
1	--	OUTPUT 3	C17	3.3pF	CAPACITOR, 0603	ROHM MCH185A3R3CK	NOTE 1
1	--	OUTPUT 9	C18	.8pF	CAPACITOR, 0603	AVX 06035J0R8BBT	NOTE 1
1	1		R1	51 Ω	RESISTOR, 0603	ROHM MCR03J510	NOTE 1
1	1		L1	18 nH	INDUCTOR, 2520	1008HQ-18NX_B	NOTE 1
2	2		J2, J3	---	SMA CONNECTOR	EF JOHNSON 142-0701-631	NOTE 1
1	1		J1	---	RT ANG. CONN.	SULLINS ELEC PZC04SGAN	NOTE 1
1	1			---	IC, ECP100D	EiC Corp	
1	1			---	PCB (4X4)	EiC Corp 60-000523-000B	

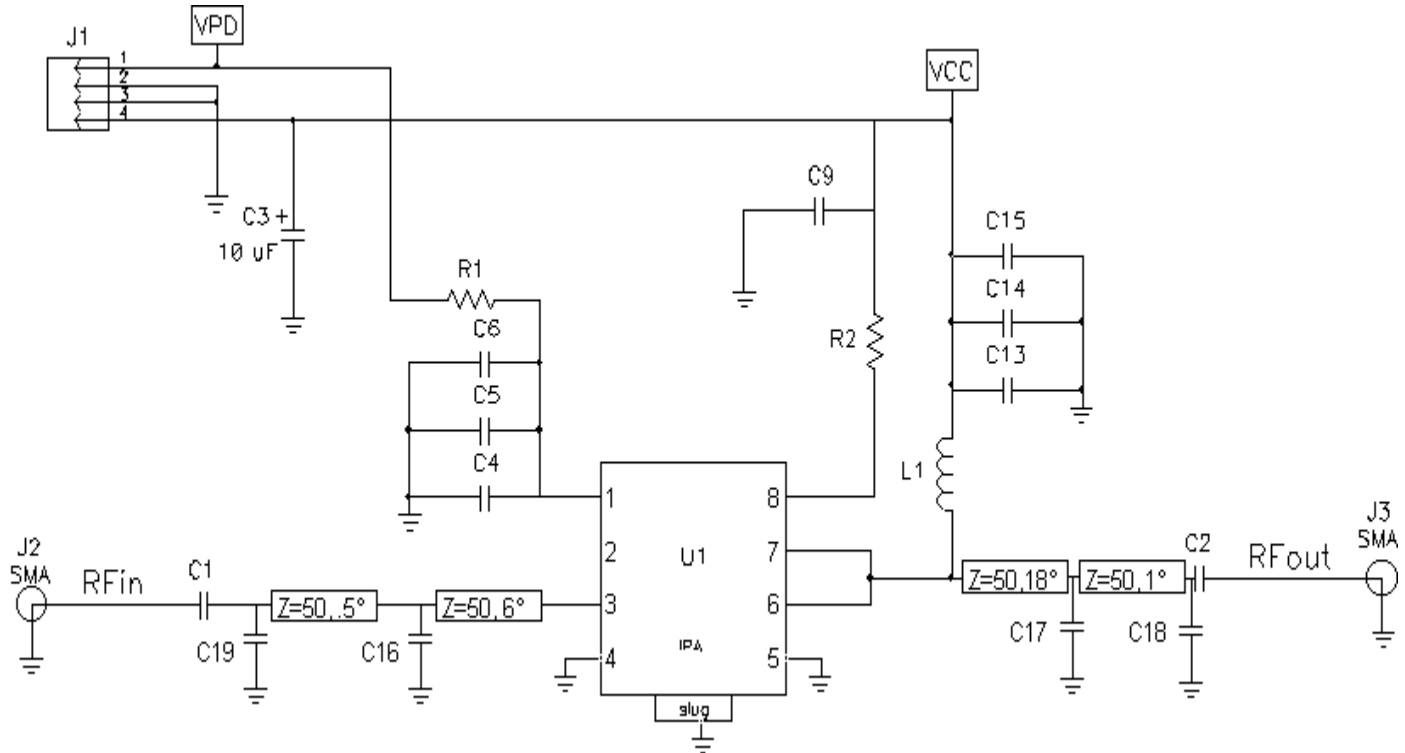
1. EiC RECOMMENDED COMPONENTS ARE SHOWN. EQUIVALENT COMPONENTS MAY BE USED.

NOTES: UNLESS OTHERWISE SPECIFIED

Evaluation Board Layout


Evaluation Board Application Schematic (SOIC-8)**1.96GHz****2.14GHz**

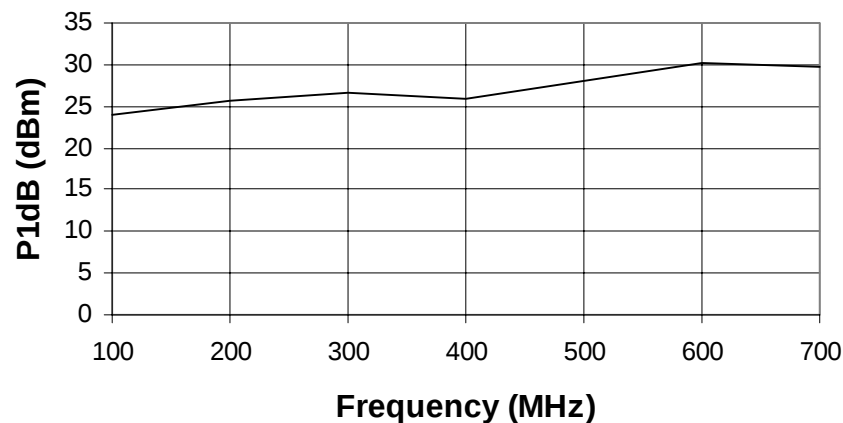
Evaluation Board Application Schematic (SOIC-8)



900MHz

Due to the onchip biasing choke low frequency performance degrades.

ECP100G P1dB vs. Frequency

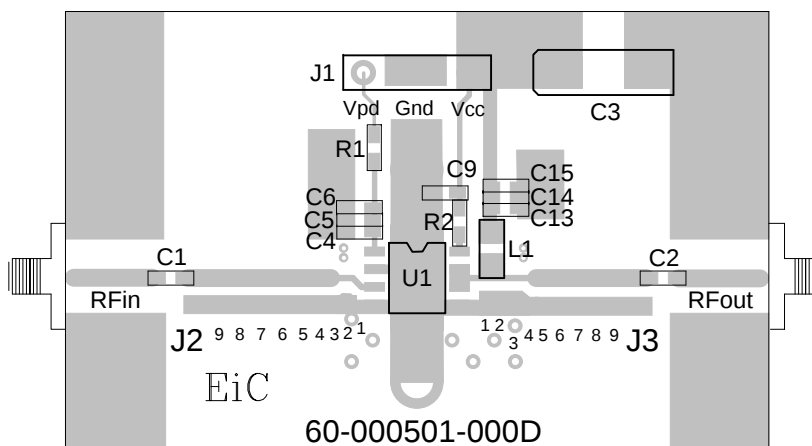


Evaluation Board Bill of Material (SOIC-8)

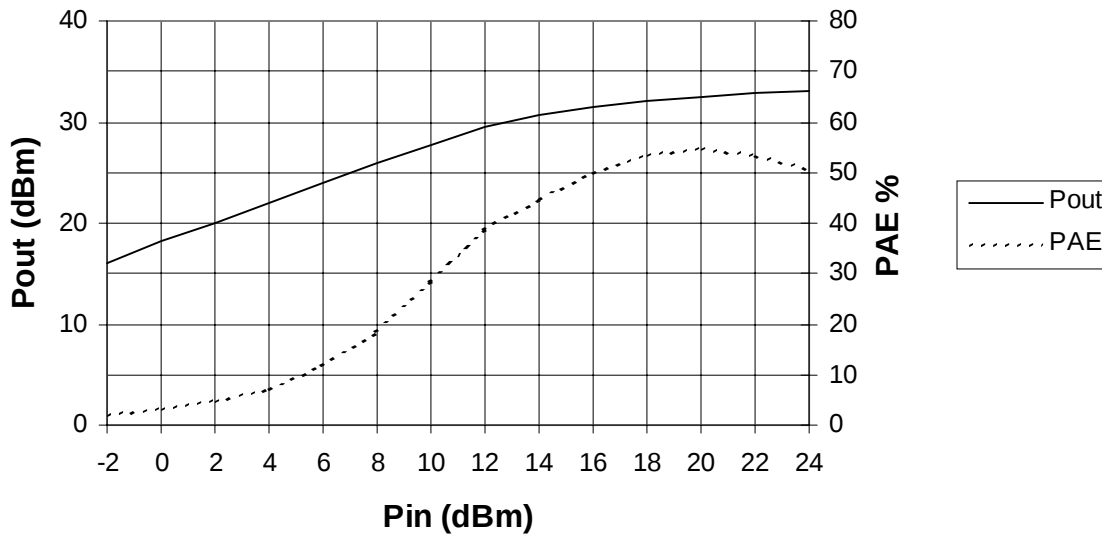
900MHz Qty.	1.9GHz Qty.	2.14GHz Qty.	Location (See eval brd. Layout)	DESIG.	VALUE	DESCRIPTION	MANUFACTURER & P/N	
1	1	1		C1	10pF	CAPACITOR, 0603	ROHM MCH185A100DK	NOTE 1
1	1	1		C2	100pF	CAPACITOR, 0603	ROHM MCH185A101JK	NOTE 1
1	1	1		C3	10.0uF	CAPACITOR, 2512	PANASONIC ECS-H1CC106R	NOTE 1
2	2	2		C4, C13	18pF	CAPACITOR, 0603	ROHM MCH185A180JK	NOTE 1
2	2	2		C5, C14	1000pF	CAPACITOR, 0603	ROHM MCH185C102KK	NOTE 1
3	3	3		C6, C9, C15	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z	NOTE 1
1	--	--	INPUT 1	C16	7pF	CAPACITOR, 0603	ROHM MCH185A070DK	NOTE 1
--	1	--	INPUT 1	C16	.8pF	CAPACITOR, 0603	AVX 06035J0R8BBT	NOTE 1
--	--	1	INPUT 6	C16	1.0pF	CAPACITOR, 0603	ROHM MCH185A010CK	NOTE 1
--	--	1	OUTPUT 1	C17	2.7pF	CAPACITOR, 0603	ROHM MCH185A2R7CK	NOTE 1
--	1	--	OUTPUT 1 2	C17	3.3pF	CAPACITOR, 0603	ROHM MCH185A3R3CK	NOTE 1
--	--	1	OUTPUT 6	C18	.5pF	CAPACITOR, 0603	AVX 06035J0R5BBT	NOTE 1
--	1	--	OUTPUT 9	C18	.8pF	CAPACITOR, 0603	AVX 06035J0R8BBT	NOTE 1
1	--	--	OUTPUT 8	C17	7pF	CAPACITOR, 0603	ROHM MCH185A070DK	NOTE 1
1	1	1		R1	51 Ω	RESISTOR, 0603	ROHM MCR03J510	NOTE 1
1	1	1		R2	20 Ω	RESISTOR, 0603	ROHM MCR03J200	NOTE 1
--	1	1		L1	18 nH	INDUCTOR, 2520	1008HQ-18NX_B	NOTE 1
1	--	--		L1	33 nH	INDUCTOR, 2520	1008HQ-33NX_B	NOTE 1
2	2	2		J2, J3	---	SMA CONNECTOR	EF JOHNSON 142-0701-631	NOTE 1
1	1	1		J1	---	RT ANG. CONN.	SULLINS ELEC PZC04SGAN	NOTE 1
1	1	1			---	IC, ECP100G	EiC Corp	
1	1	1			---	PCB (SOIC-8)	EiC Corp 60-000501-000D	

1. EIC RECOMMENDED COMPONENTS ARE SHOWN. EQUIVALENT COMPONENTS MAY BE USED.
NOTES: UNLESS OTHERWISE SPECIFIED

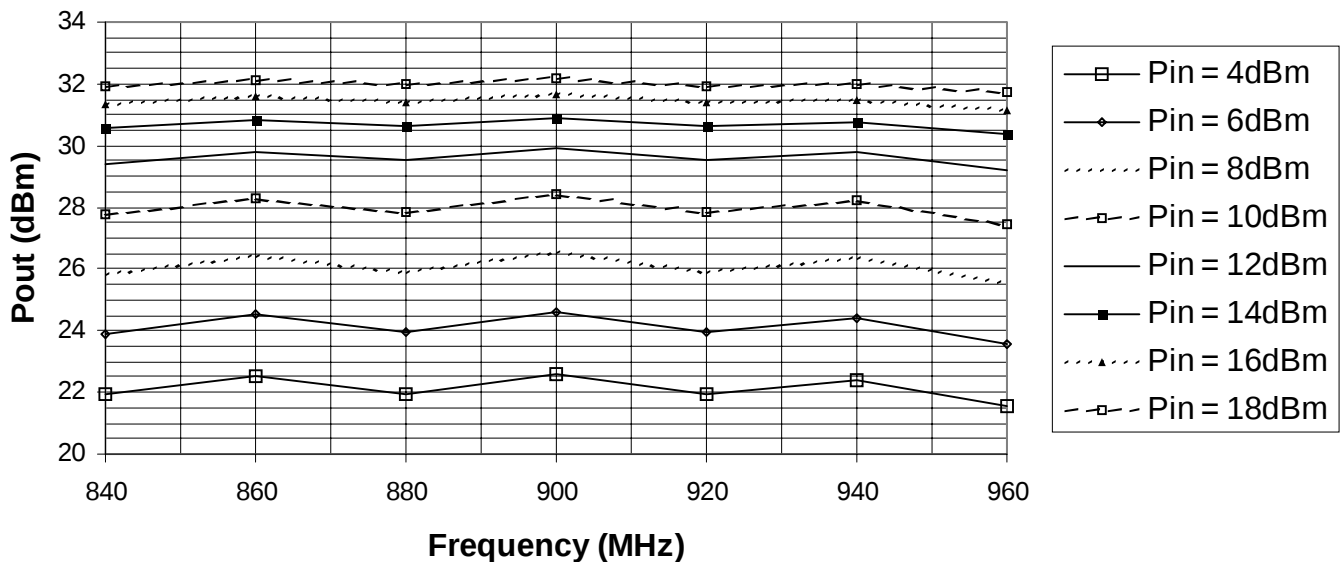
Evaluation Board Layout

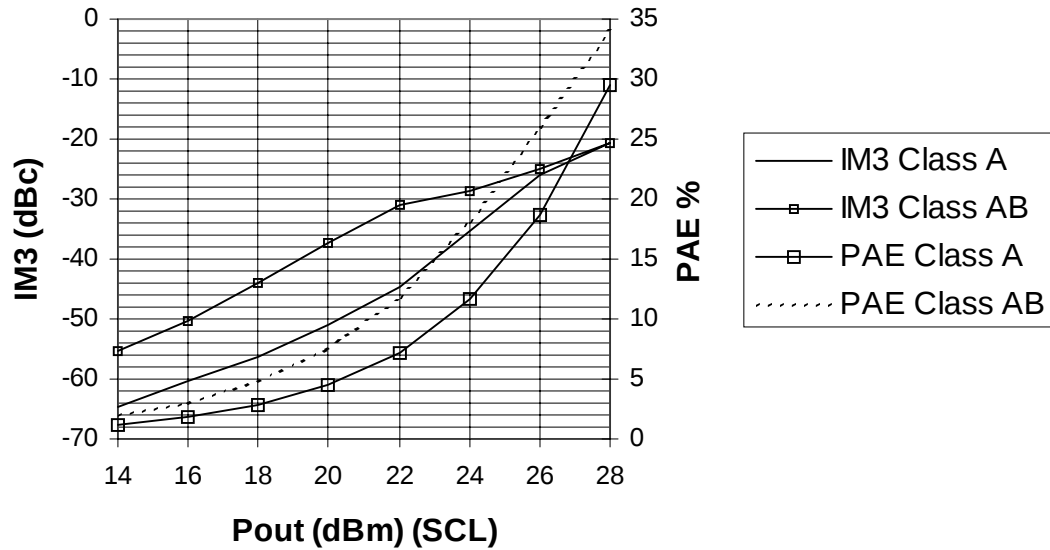
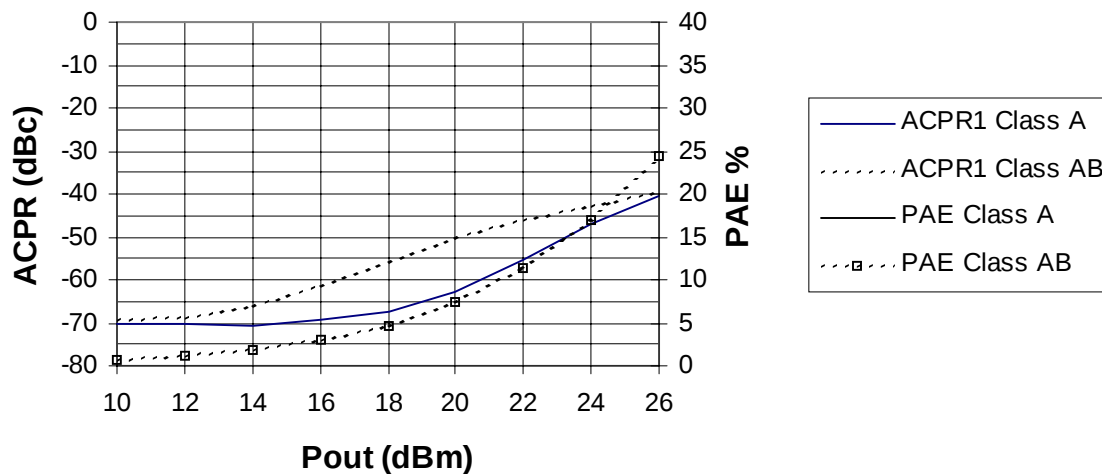


**ECP100 @ 25°C CW Pout & PAE
vs. Pin @ 900MHz Class A
5Vcc & 450mA**

**Figure 1**

ECP100 @ 25°C CW Pout vs. Frequency vs. Pin

**Figure 2**

ECP100 @ 25°C IM3 & PAE vs. Pout @ 900MHz**Class A Icq = 450mA Class AB Icq = 250mA****Figure 3****ECP100 @900MHz ACPR1 & PAE****vs. Pout @ 25°C Class A 450mA****Class AB 250mA (IS-95)****Figure 4**

ECP100 OIP3 & PAE vs. Pout vs. Temperature
@ 900MHz Class A 5Vcc & 450mA Icq

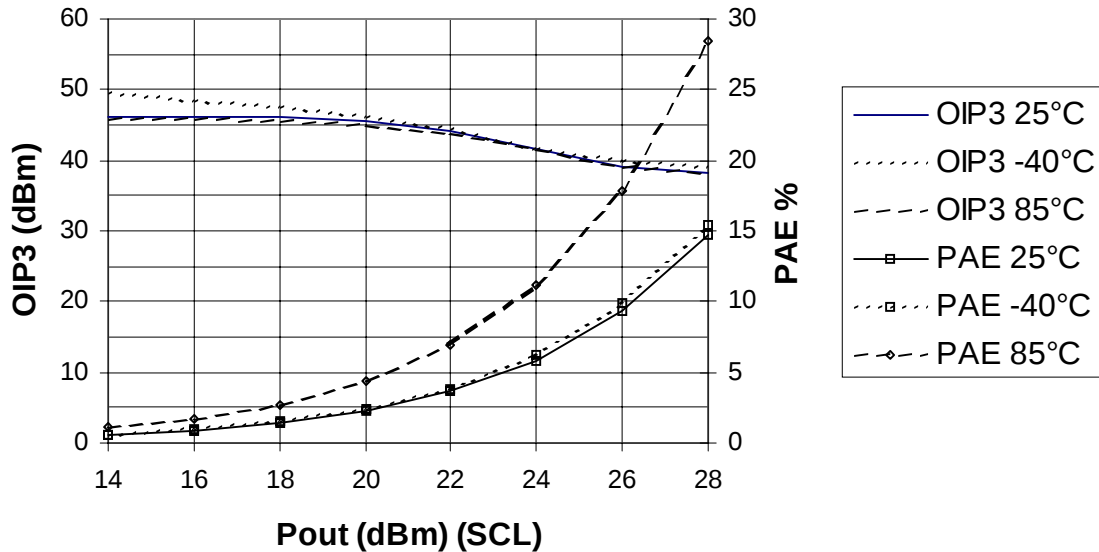


Figure 5

ECP100 ACPR vs. Pout vs. Temperature
@ 900MHz Class A 5Vcc & 450mA (IS-95)

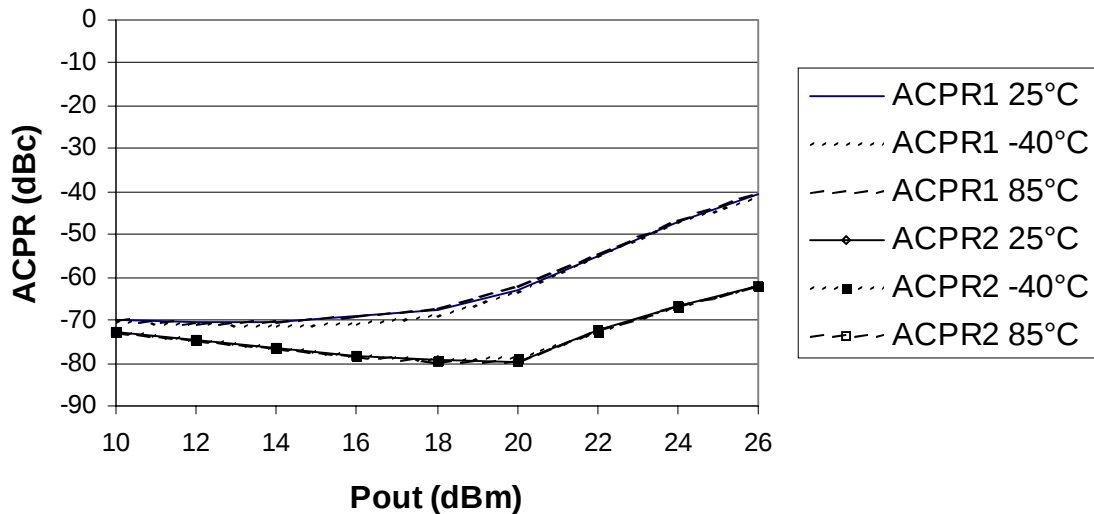


Figure 6

**ECP100 @ 25°C CW Pout & PAE
vs. Pin @ 1.96GHz Class A
5Vcc & 450mA Icq**

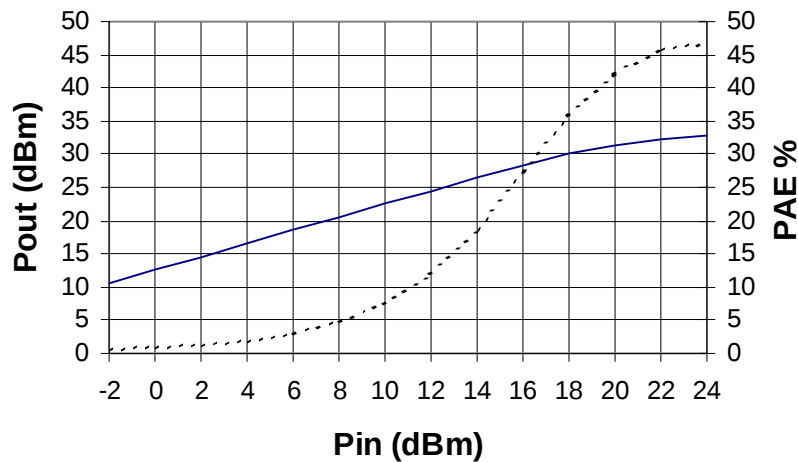


Figure 7

**ECP100 @ 25°C Pout vs. Frequency
vs. Pin Class A 5Vcc & 450mA Icq**

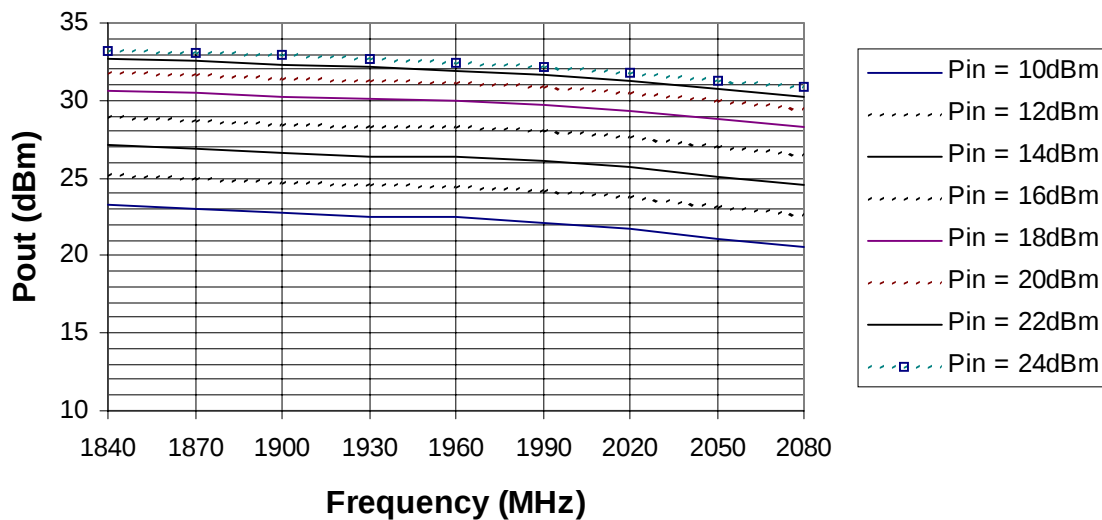
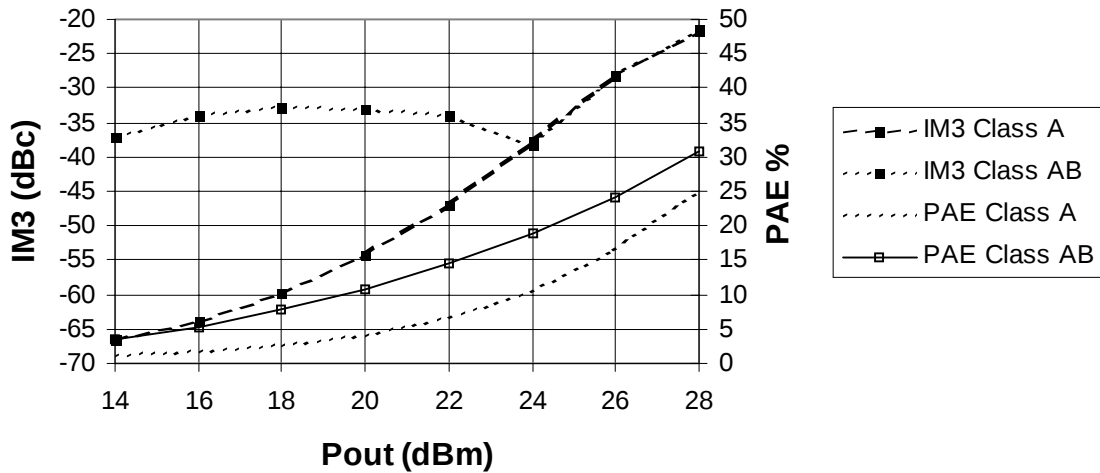
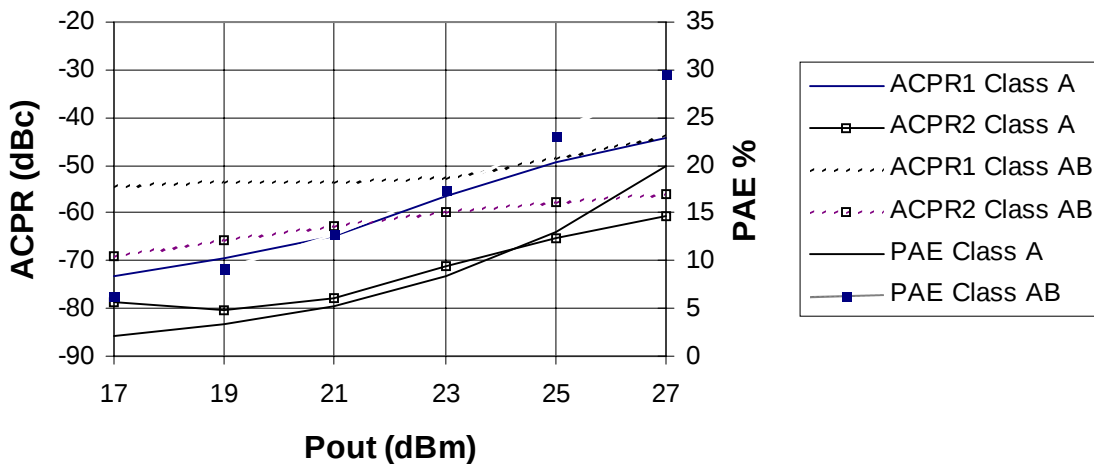


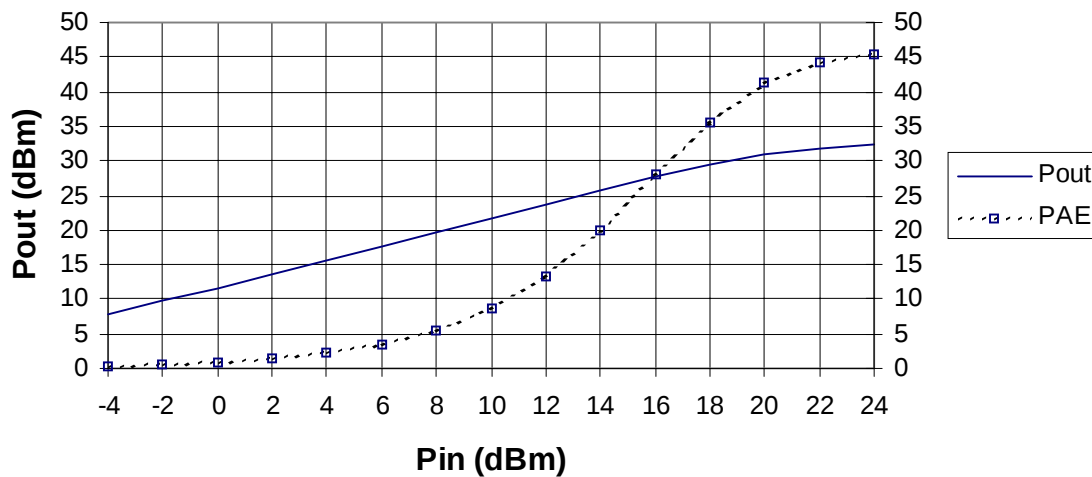
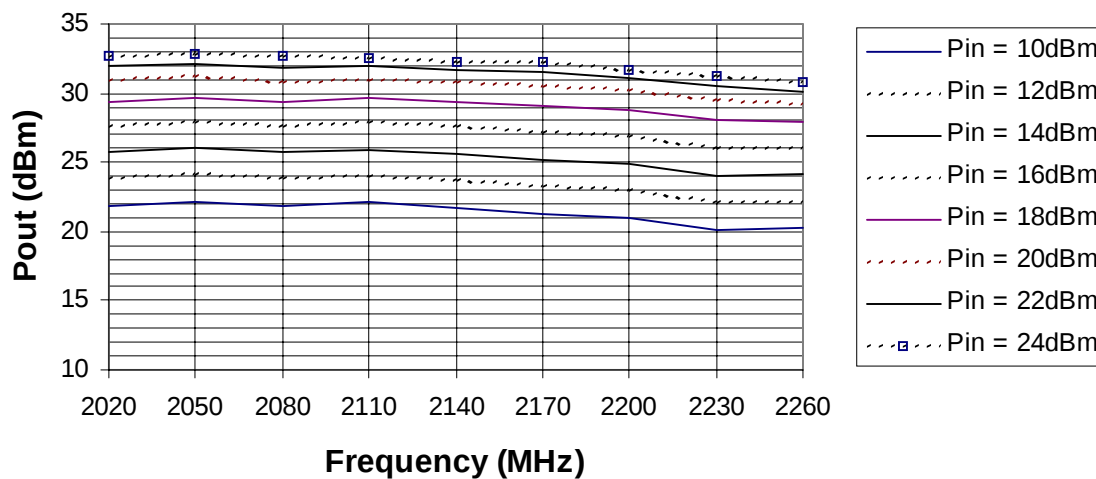
Figure 8

**ECP100 @ 25°C IM3 & PAE
vs. Pout (SCL) Class AB $I_{cq} = 112\text{mA}$
($I_{cq} = 25\%$ Class A I_{cq})**

**Figure 9**

**ECP100 5Vcc, 25°C ACPR (IS-95)
& PAE vs. Pout (F = 1.96GHz)
Class AB $I_{cq} = 225\text{mA}$ (50% Class A)**

**Figure 10**

**ECP100 @ 25°C CW Pout & PAE
vs. Pin @ 2.14GHz Class A
5Vcc & 450mA Icq****Figure 11****ECP100 @ 25°C CW Pout vs. Frequency
vs. Pin @ 2.14GHz Class A
5Vcc & 450mA Icq****Figure 12**

**ECP100 @ 25°C IM3 & PAE
vs. Pout (SCL) @ 2.14GHz
Class A 5Vcc & 450mA Icq Class AB 225mA**

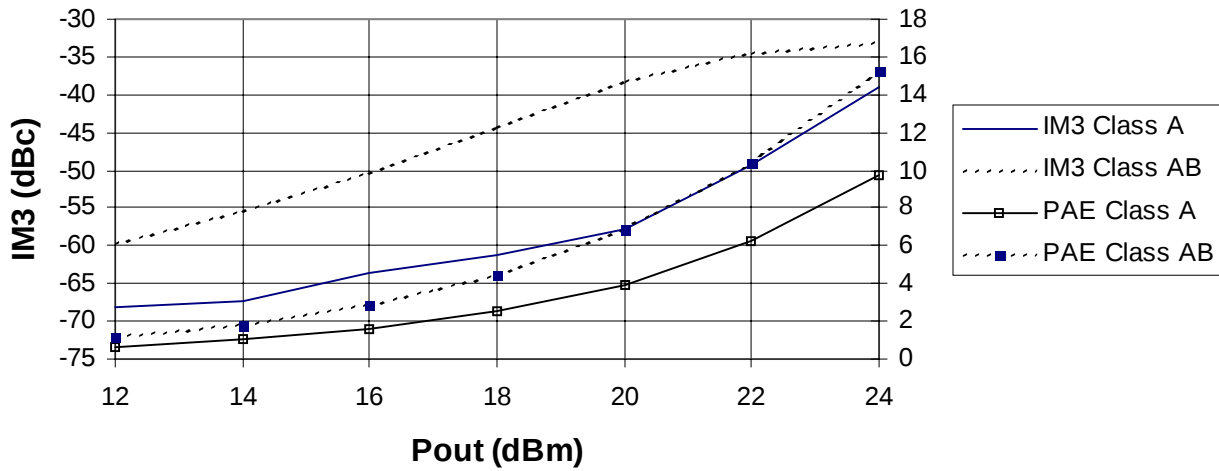


Figure 13

**ECP100 @ 2.14GHz WCDMA
ACPR & PAE vs. Pout (25°C)
Class A 5Vcc & 450mA Icq Class AB 225mA**

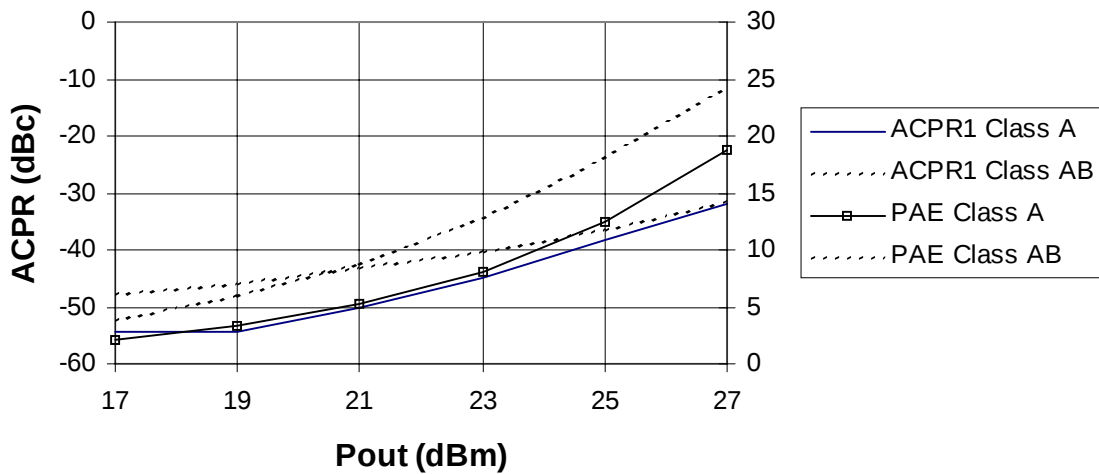


Figure 14

Note: Test Model 1, 64 DPCH, Class AB Icq = 225mA

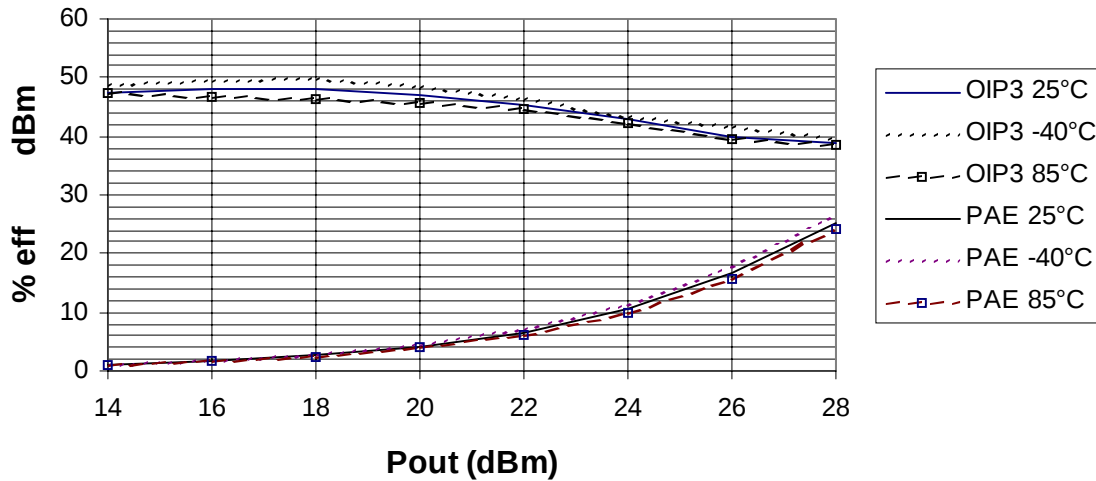
ECP100 OIP3 & PAE vs. Pout vs. Temperature
@ 1.96GHz Class A 5Vcc & 450mA Icq

Figure 15

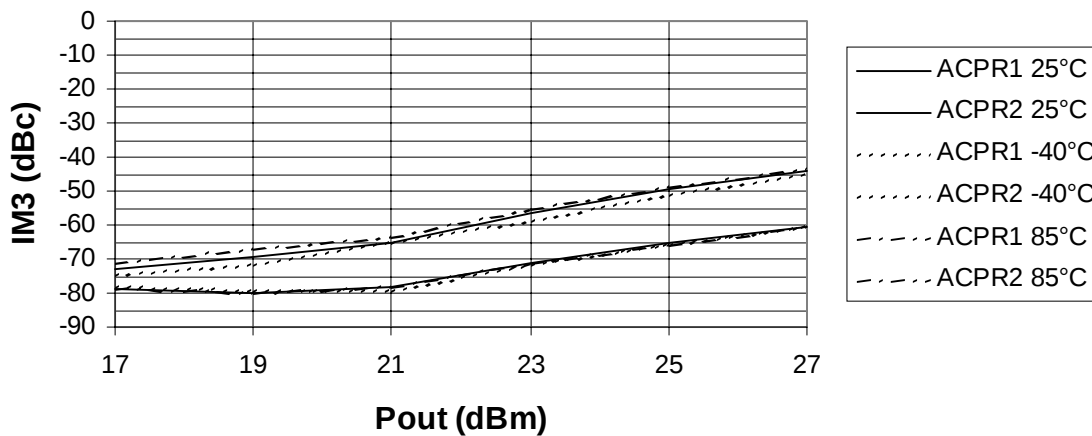
ECP100 ACPR vs. Pout
vs. Temperature @ 1.96GHz
Class A 5Vcc & 450mA Icq

Figure 16

**ECP100 Pout vs. Frequency
vs. Temperature (Pin= 18dBm)
Class A 5Vcc & 450mA Icq**

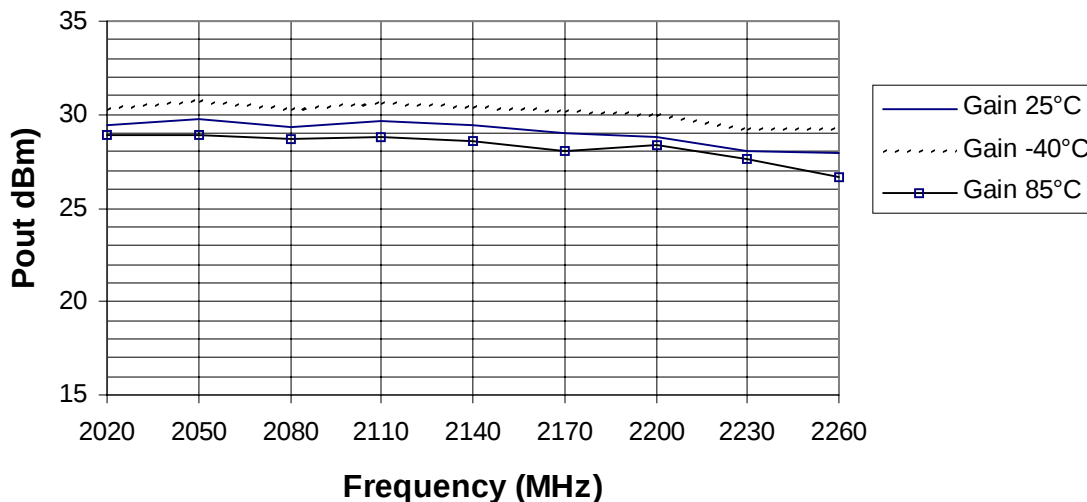


Figure 17

APPLICATION NOTE

- All of EiCs IPAs use the same evaluation board, bypass and DC blocking capacitors. The values are the same for all the capacitors except for matching.
- Matching circuits are described by the schematics. The values of the components are listed in the bill of material.
- The DC power connector consists of four pins. The two inside pins are for ground.
- The Vref/pd pin of the IC can be used to set the amplifier in class A operation when connected to 5V, or varying degree of Class AB by adjusting the voltage lower (typically >3.0 volts). The bias condition can also be set by varying the value of R1 while keeping the Vref/pd at 5V.
- The Vcc pin can operate up to 7 volts Vcc. The bias current can be adjusted by the reference voltage or R1 value.

ORDERING INFORMATION

	PKG. TYPE	REEL QTY.
ECP100G	SOIC 8	BULK
ECP100G-500	SOIC 8	500
ECP100G-1000	SOIC 8	1000
ECP100D	QFN-16(4X4mm)	BULK
ECP100D-500	QFN-16(4X4mm)	500
ECP100D-1000	QFN-16(4X4mm)	1000