

Product Features

- 100 - 2300MHz
- 33 dBm P1dB
- High Linearity: 49 dBm OIP3
- 11 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 ECP200 is a single stage, 2.0W 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 multicarriers 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 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: $T_a = 25^\circ\text{C}$, $V_{CC} = +5\text{ V}$ $V_{ref} = +5\text{ V}$ $I_{cq} = 800\text{ mA}$ (class A operation)

SYMBOL	PARAMETER		LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		100		2300	MHz	
G	Gain (Small Signal)	f = 450MHz		24.0		dB	
		f = 900MHz	16.0	17.0			
		f = 1960MHz	10.0	11.0			
		f = 2140MHz	9.0	10.5			
P1dB	Output Power @ 1dB Compression	f = 450MHz		33.0		dBm	
		f = 900MHz	32.5	33.0			
		f = 1960MHz	32.5	33.0			
		f = 2140MHz	32.0	33.0			
OIP3	Output Third Order Intercept	f = 450MHz		49.0		dBm	Note 1
		f = 900MHz	47.0	49.0			
		f = 1960MHz	47.0	49.0			
		f = 2140MHz	47.0	48.0			
ACPR1	Pout = 26.5dBm (IS-95)	f = 1960MHz		-45		dBc	9 ch. Fwd.
ACPR1	Pout = 25.0dBm (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		12.0		dB	
Icop	Operational Current @ P1dB			950		mA	
Vde	Device Voltage			5.0		Vdc	
θ_{jc}	Thermal Resistance			15		$^\circ\text{C/W}$	Note 3

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

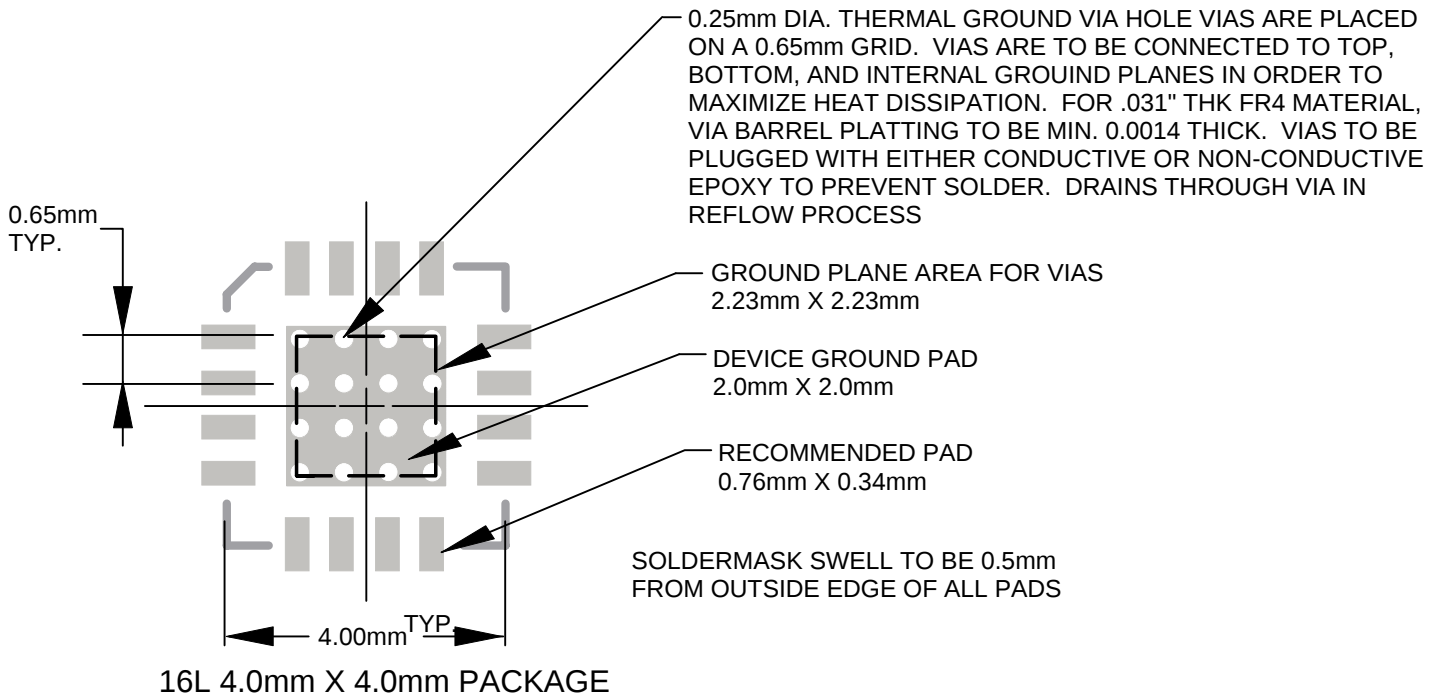
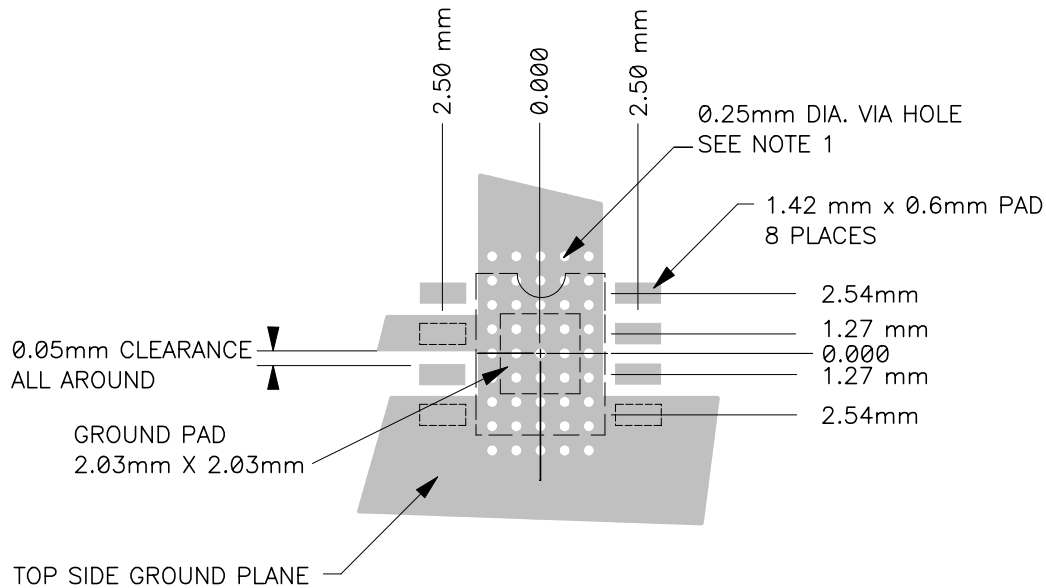
Note 2: ACPR measured for 3GPP test model 1, 64 DPCH. Channel Bandwidth = 3.84MHz. Frequency offset: +/- 5MHz.

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	1400	mA
RF Power Input	+28	dBm
Storage Temperature	-65 to +150	°C
Ambient Operating Temperature	-40 to +85	°C
Absolute Maximum DC Power	8	Watts

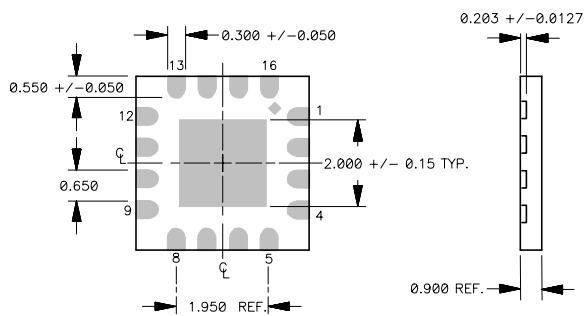
Note: Exceeding any of the absolute maximum ratings may cause permanent damage to the device.

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

QFN-16 (4x4mm) Package Outline

Package

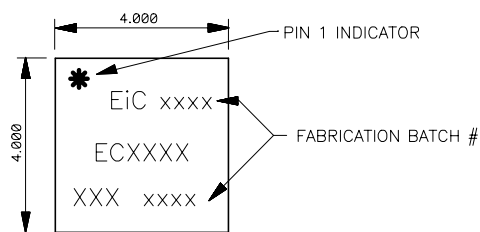
NOTE: ALL DIMENSIONS ARE IN MILLIMETERS



BOTTOM VIEW

SIDE VIEW

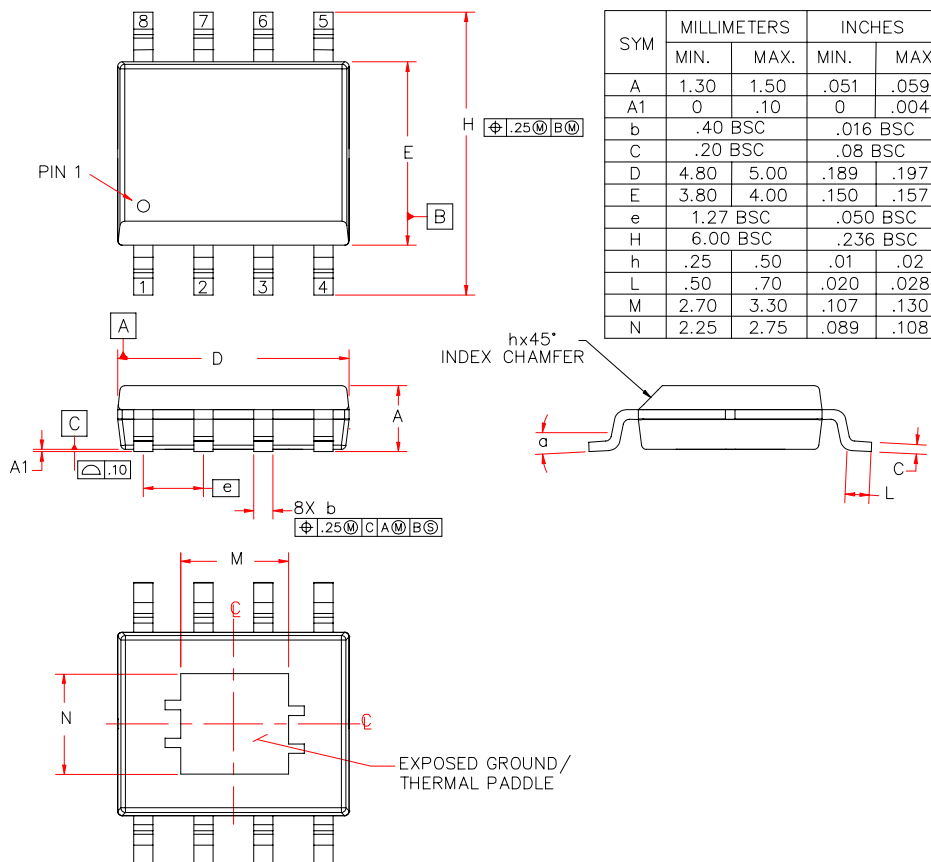
DEVICE MARKING



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


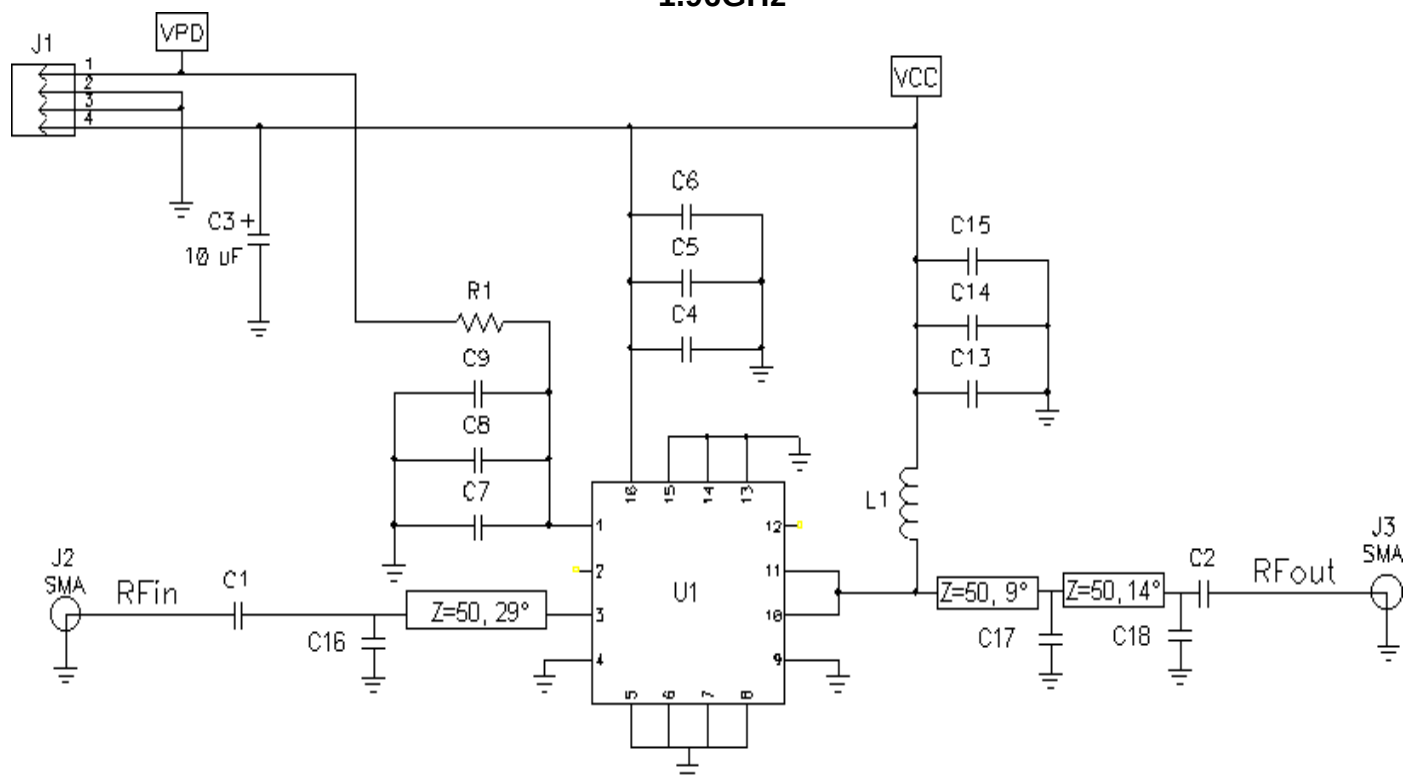
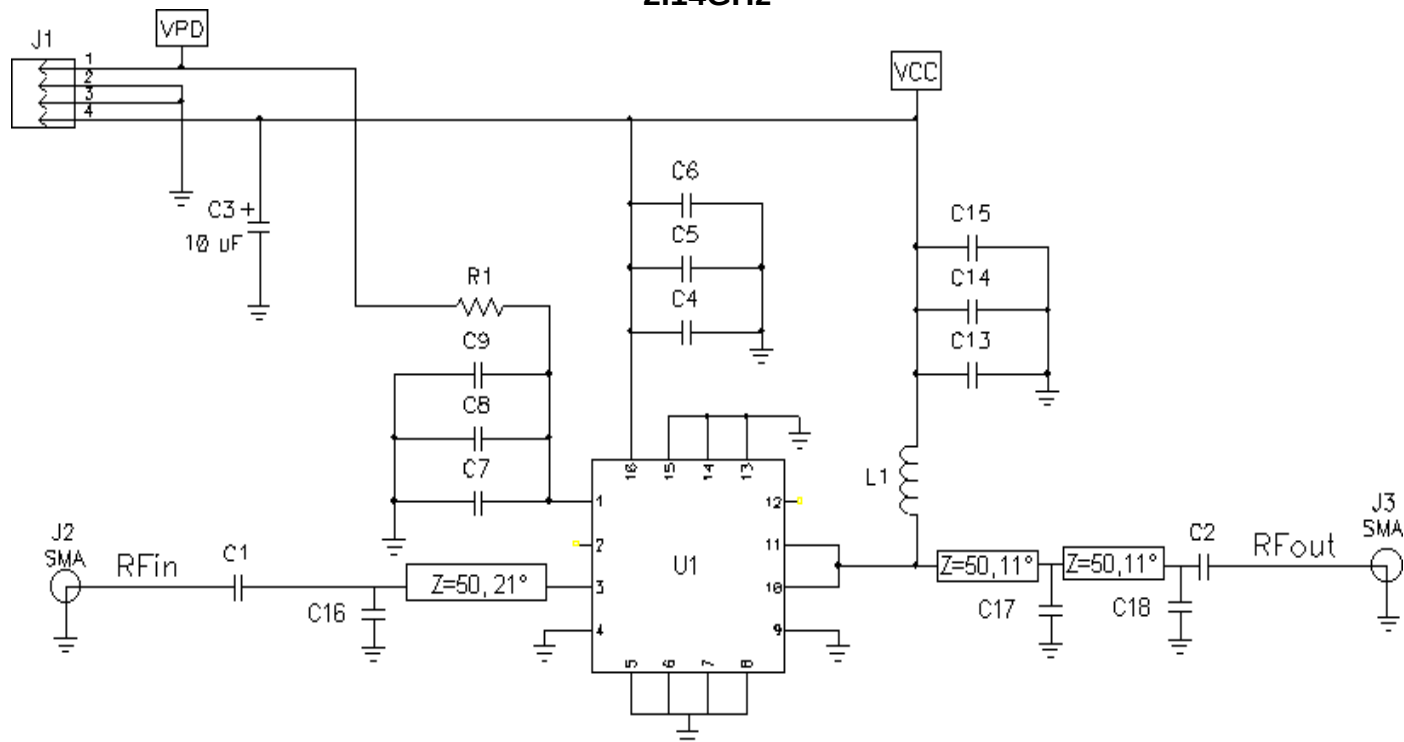
1. MOLD FLASH, PROTRUSIONS AND GATE BURRS AT THE END OF THE PACKAGE BODY SHALL NOT EXCEED 0.0006" PER SIDE.

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.

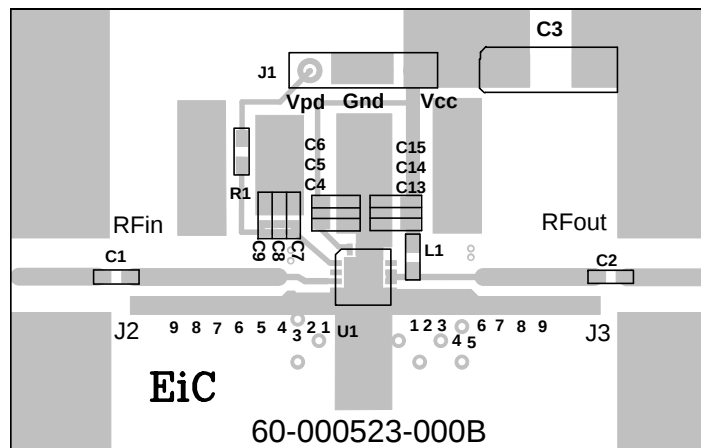
Evaluation Board Application Schematics (4X4)**1.96GHz****2.14GHz**

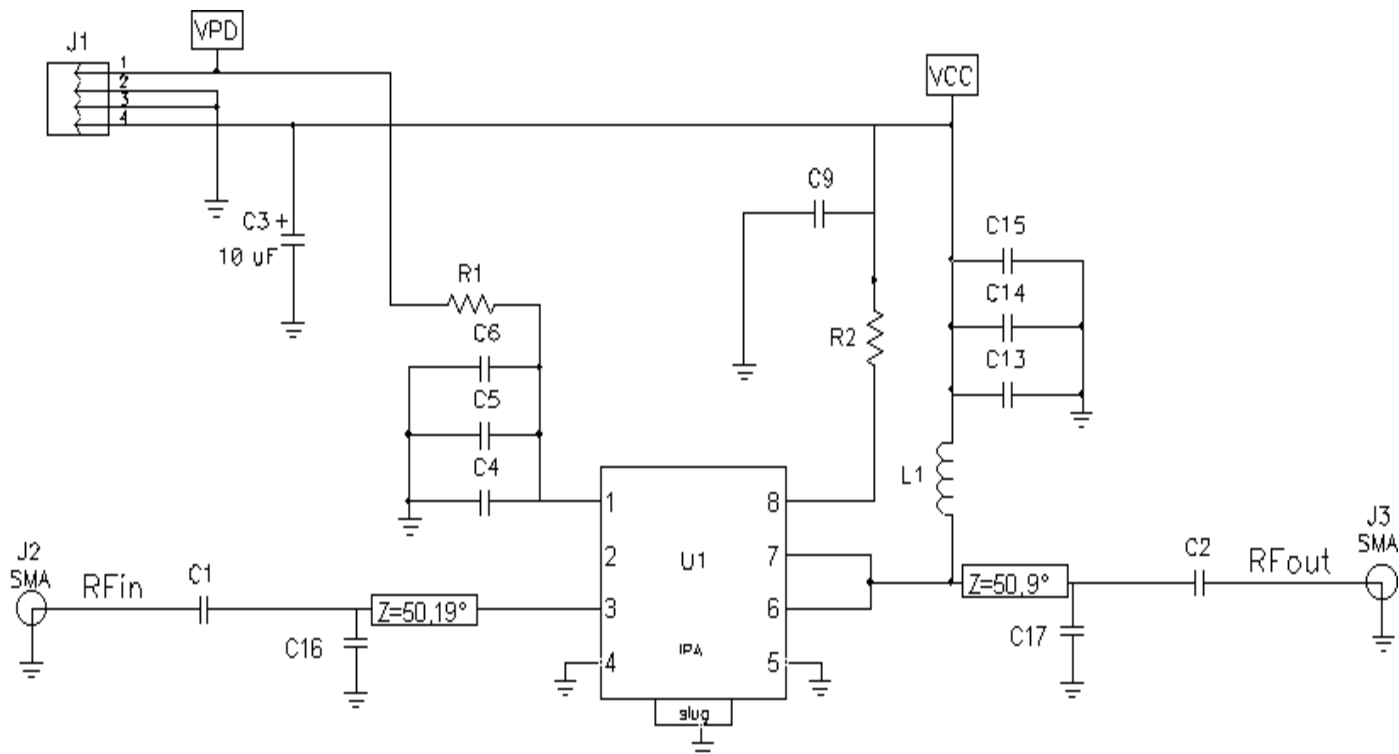
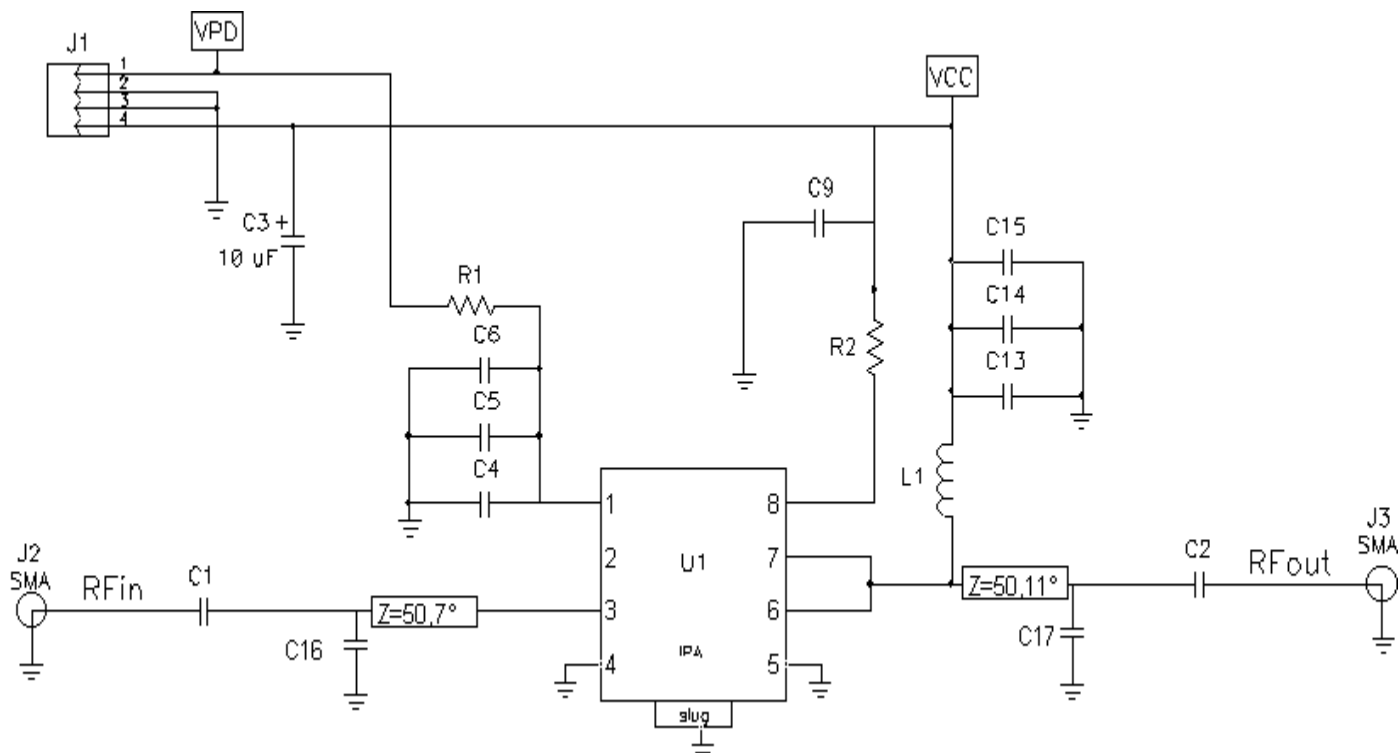
Evaluation Board Bill of Material (4X4)

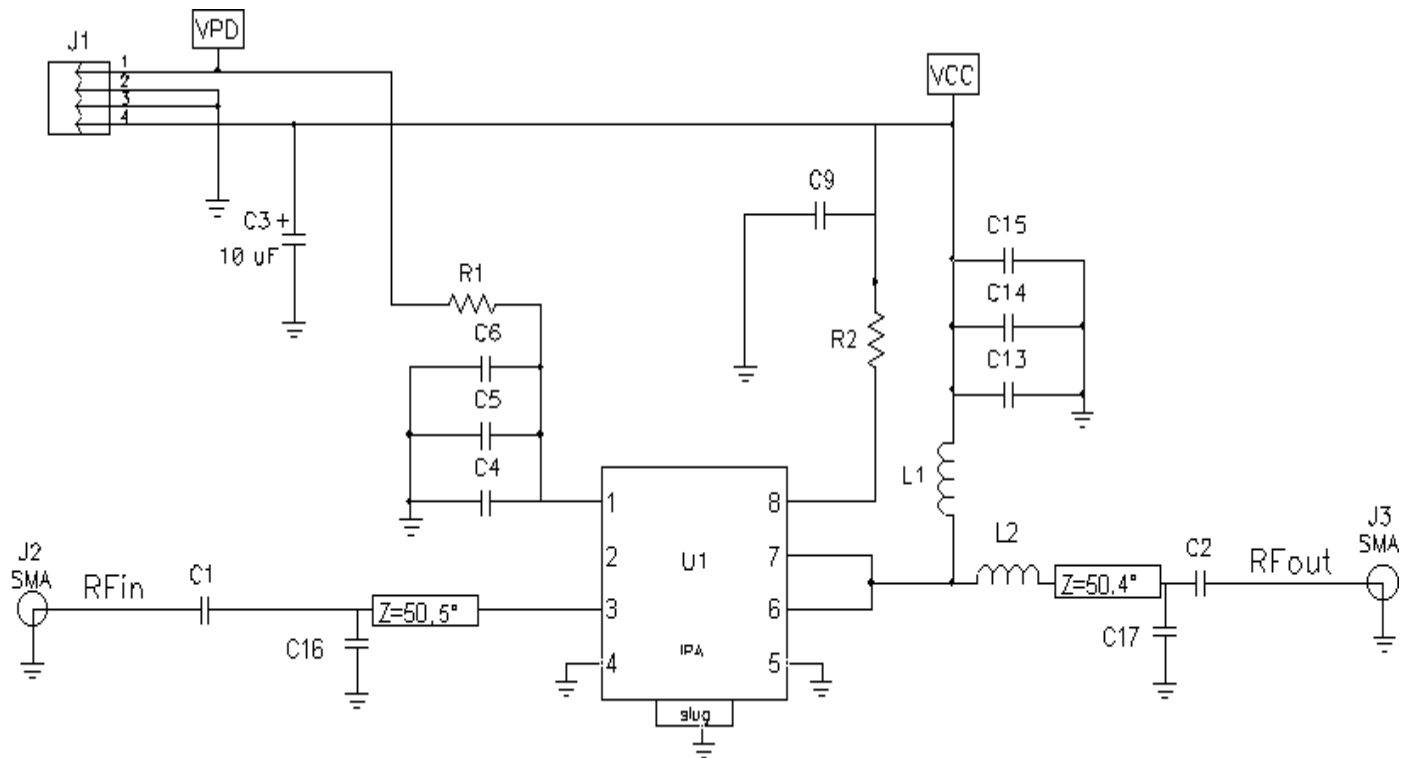
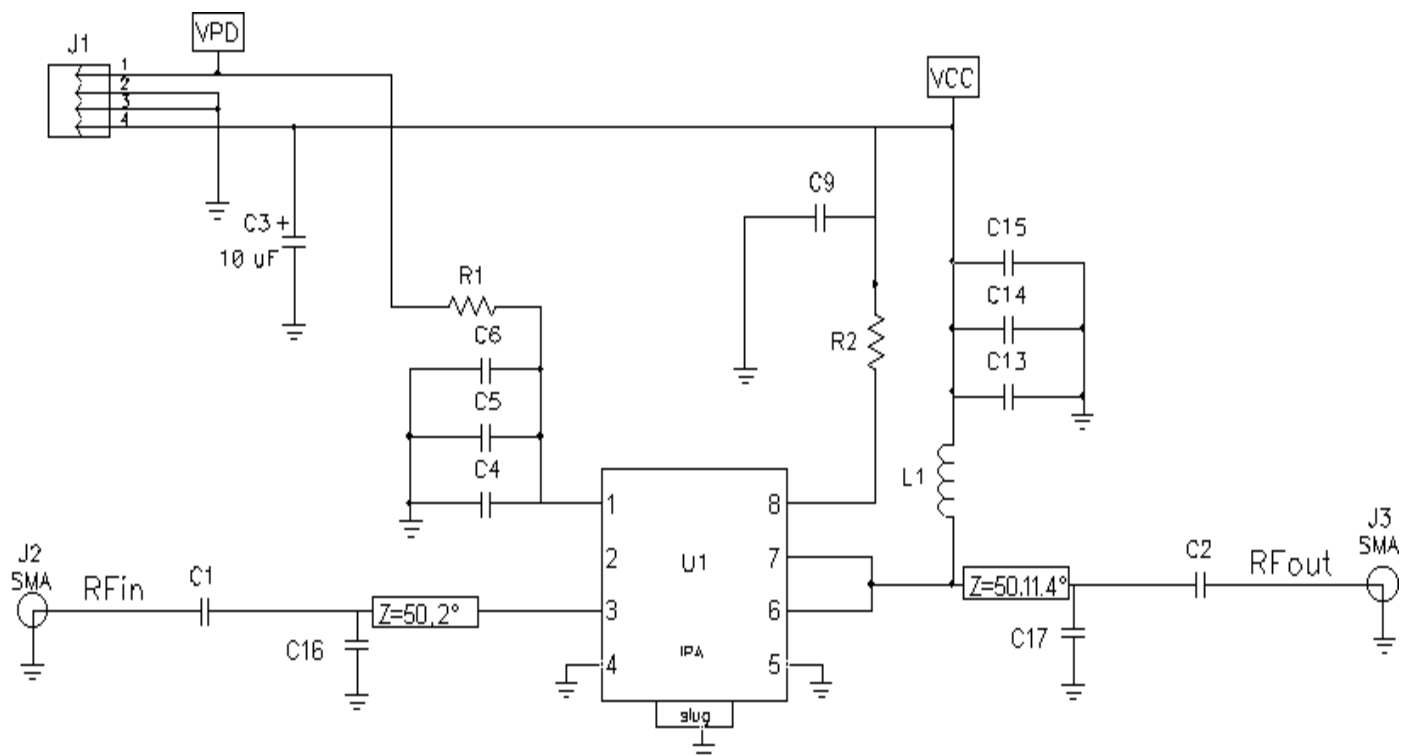
1.9GHz Qty.	2.14GHz Qty.	Location (See eval brd. Layout)	DESIG.	VALUE	DESCRIPTION	MANUFACTURER & P/N	
1	1		C1	10pF	CAPACITOR, 0603	ROHM MCH185A100DK	NOTE1
1	1		C2	100pF	CAPACITOR, 0603	ROHM MCH185A101JK	NOTE1
1	1		C3	10.0uF	CAPACITOR, 2512	PANASONIC ECS-H1CC106R	NOTE1
3	3		C4, C7, C13	18pF	CAPACITOR, 0603	ROHM MCH185A180JK	NOTE1
3	3		C5, C8, C14	1000pF	CAPACITOR, 0603	ROHM MCH185C102KK	NOTE1
3	3		C9, C6, C15	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z	NOTE1
--	1	INPUT 4 5	C16	3pF	CAPACITOR, 0603	ROHM MCH185A020CK	NOTE1
1	--	INPUT 6	C16	2.7pF	CAPACITOR, 0603	ROHM MCH185A2R7CK	NOTE1
--	1	OUTPUT 2	C17	3.9pF	CAPACITOR, 0603	ROHM MCH185A3R9CK	NOTE1
1	--	OUTPUT 1 2	C17	3.9pF	CAPACITOR, 0603	ROHM MCH185A3R9CK	NOTE1
	1	OUTPUT 4	C18	1.5pF	CAPACITOR, 0603	ROHM MCH185A1R5CK	NOTE1
1	--	OUTPUT 5	C18	1.5pF	CAPACITOR, 0603	ROHM MCH185A1R5CK	NOTE1
1	1		R1	15 Ω	RESISTOR, 0603	ROHM MCR03EZJH150	NOTE1
1	1		L1	18 nH	INDUCTOR, 2520	1008HQ-18NX_B	NOTE1
2	2		J2, J3	---	SMA CONNECTOR	EF JOHNSON 142-0701-631	NOTE1
1	1		J1	---	RT ANG. CONN.	SULLINS ELEC PZC04SGAN	NOTE1
1	1			---	IC, ECP200D (4X4)	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

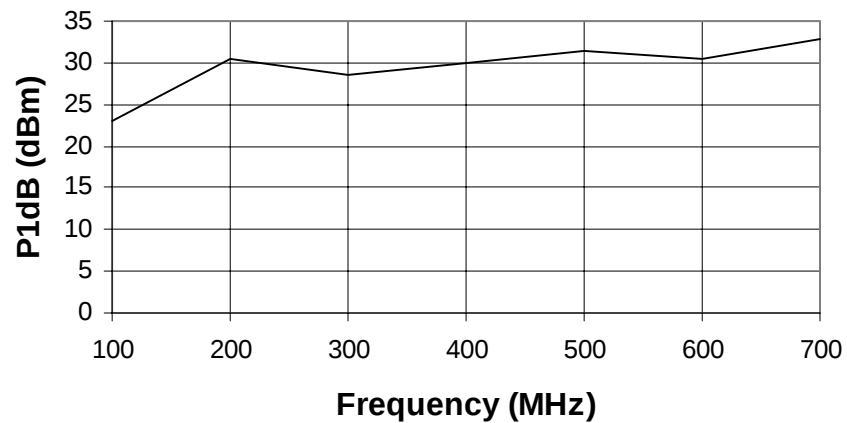
Evaluation Board Layout



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

Evaluation Board Application Schematic (SOIC-8)**450MHz****900MHz**

Due to the onchip biasing choke low frequency
performance degrades.

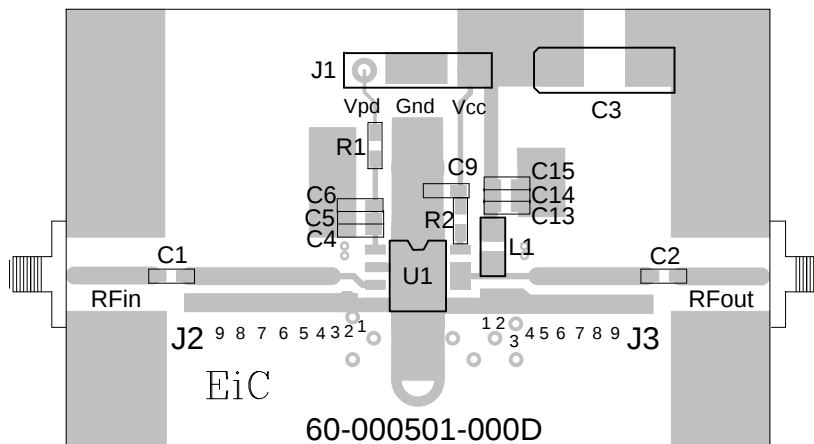
ECP200G P1dB vs. Frequency

Evaluation Board Bill of Material (SOIC-8)

450MHz Qty.	900MHz Qty.	1.9GHz Qty.	2.14GHz Qty.	POSITION	DESIG.	VALUE	DESCRIPTION	MANUFACTURER & P/N	
--	1	1	1		C1	10pF	CAPACITOR, 0603	ROHMMCH185A100DK	NOTE1
C1, C2	1	1	1		C2	100pF	CAPACITOR, 0603	ROHMMCH185A101JK	NOTE1
1	1	1	1		C3	10.0uF	CAPACITOR, 2512	PANASONIC ECS-H1CC106R	NOTE1
2	2	2	2		C4, C13	18pF	CAPACITOR, 0603	ROHMMCH185A180JK	NOTE1
2	2	2	2		C5, C14	1000pF	CAPACITOR, 0603	ROHMMCH185C102KK	NOTE1
3	3	3	3		C6, C9, C15	1.0uF	CAPACITOR, 0603	PANASONIC ECJ-1VF1A105Z	NOTE1
1	--	--	--	INPUT 5	C16	22pF	CAPACITOR, 0603	ROHMMCH185A220JK	NOTE1
--	1	--	--	INPUT 1	C16	7pF	CAPACITOR, 0603	ROHMMCH185A070DK	NOTE1
--	--	--	1	INPUT 2	C16	3pF	CAPACITOR, 0603	ROHMMCH185A030CK	NOTE1
--	--	1	--	INPUT 5	C16	2.4pF	CAPACITOR, 0603	ROHMMCH185A2R4CK	NOTE1
--	--	--	1	OUTPUT 1 2	C17	3pF	CAPACITOR, 0603	ROHMMCH185A030CK	NOTE1
--	--	1	--	OUTPUT 2	C17	3.3pF	CAPACITOR, 0603	ROHMMCH185A3R3CK	NOTE1
--	1	--	--	OUTPUT 5 6	C17	10pF	CAPACITOR, 0603	ROHMMCH185A100DK	NOTE1
1	--	--	--	OUTPUT 4	C17	22pF	CAPACITOR, 0603	ROHMMCH185A220JK	NOTE1
1	1	1	1		R1	15 Ω	RESISTOR, 0603	ROHMMCR03J150	NOTE1
1	1	1	1		R2	20 Ω	RESISTOR, 0603	ROHMMCR03J200	NOTE1
1	--	--	--		L2	4.7 nH	INDUCTOR, 0603	LL1608-F4N7J	NOTE1
1	1	--	--		L1	33 nH	INDUCTOR, 2520	1008HQ-33NX_B	NOTE1
--	--	1	1		L1	18 nH	INDUCTOR, 2520	1008HQ-18NX_B	NOTE1
2	2	2	2		J2, J3	---	SMA CONNECTOR	EF JOHNSON 142-0701-631	NOTE1
1	1	1	1		J1	---	RT ANG. CONN.	SULLINS ELEC PZC04SGAN	
1	1	1	1			---	IC, ECP200G	EiC Corp	
1	1	1	1			---	PCB (SOIC8)	EiC Corp 60-000501-000D	

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

NOTES: UNLESS OTHERWISE SPECIFIED

Evaluation Board Layout


**ECP200 @ 25°C CW Pout & PAE
vs. Pin @ 900MHz Class A
5Vcc & 800mA**

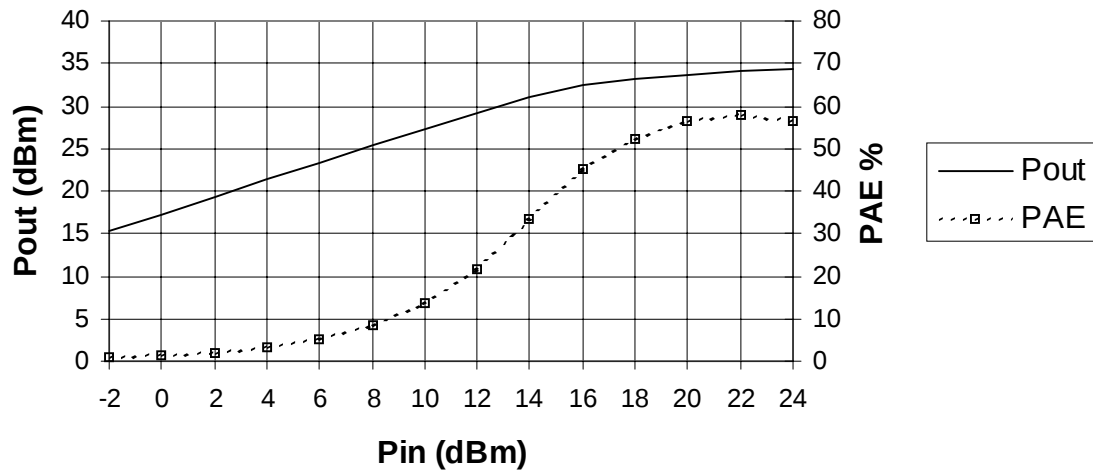


Figure 1

ECP200 @ 25°C CW Pout vs. Frequency vs. Pin

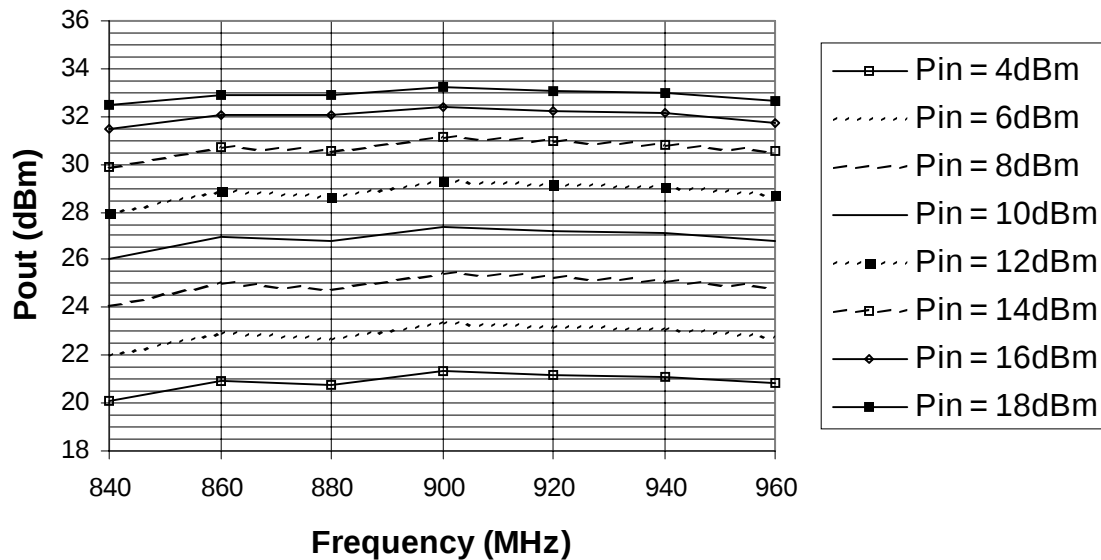


Figure 2

ECP200 @ 25°C IM3 & PAE vs. Pout @ 900MHz
Class A Icq = 800mA Class AB Icq = 450mA

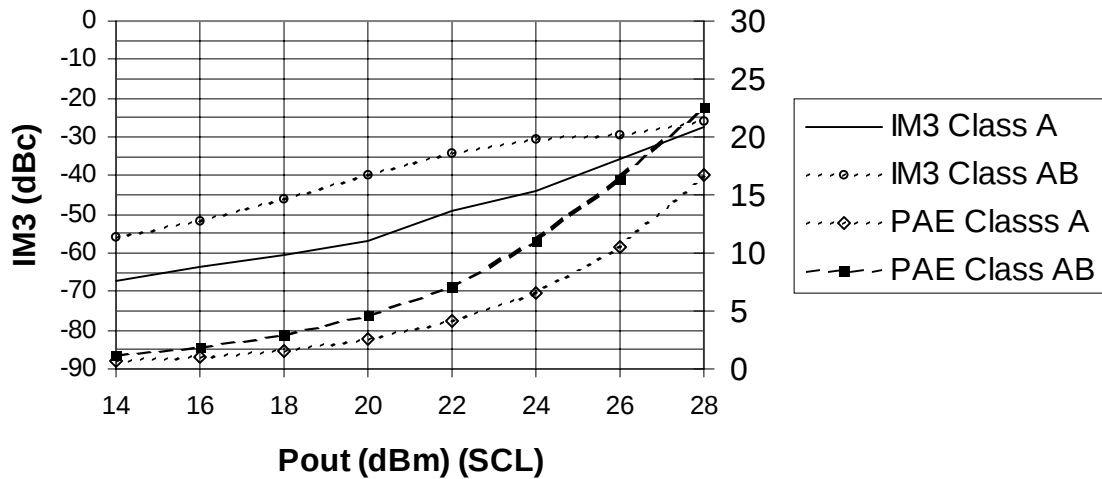


Figure 3

ECP200 @ 900MHz ACPR1 & PAE
vs. Pout @ 25°C Class A 800mA
Class AB 400mA (IS-95)

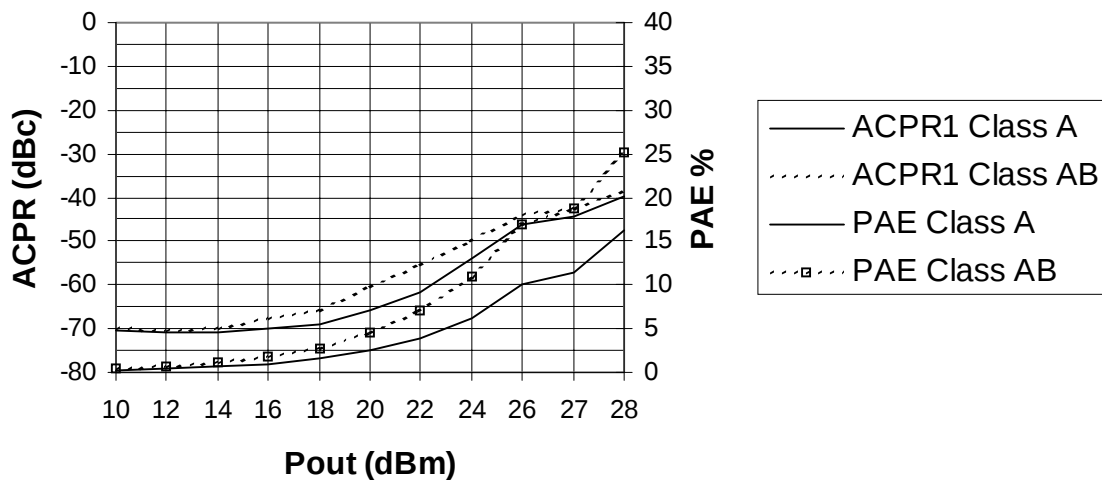


Figure 4

ECP200 OIP3 & PAE vs. Pout vs. Temperature
@ 900MHz Class A 5Vcc & 800mA

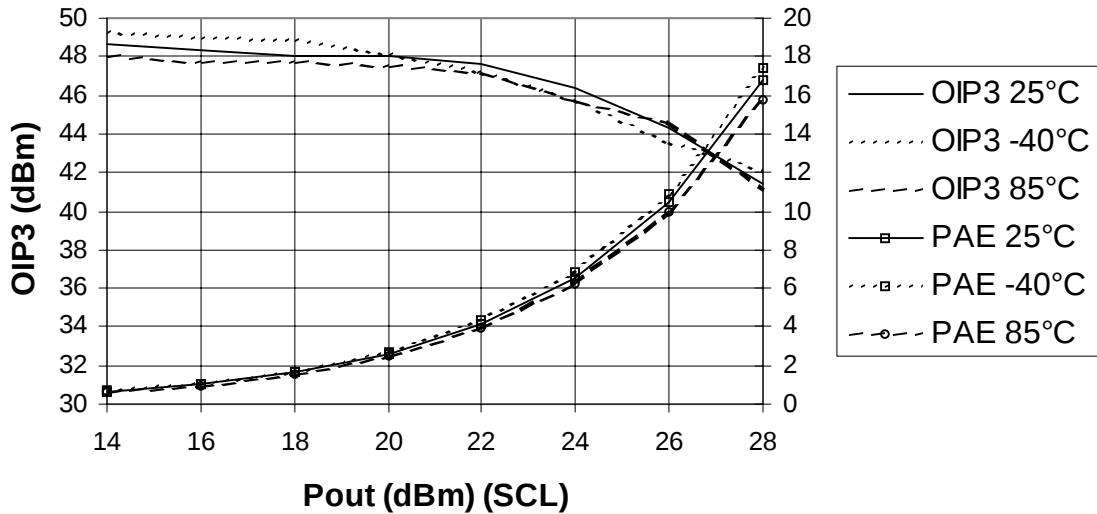


Figure 5

ECP200 ACPR vs. Pout vs. Temperature
@ 900MHz Class A 5Vcc & 800mA (IS-95)

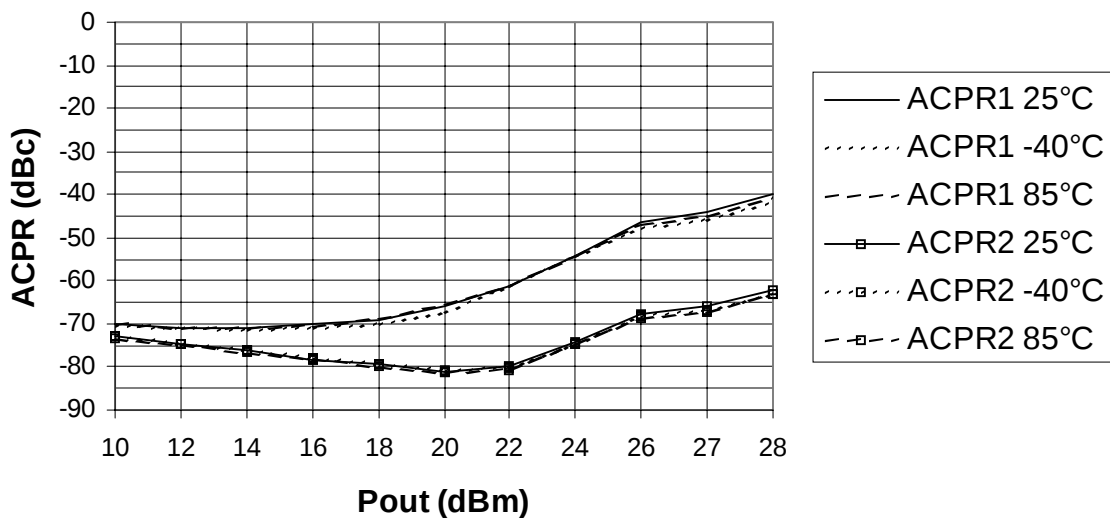


Figure 6

ECP200 @ 25°C CW Pout & PAE vs. Pin @ 1.96GHz
Class A 5Vcc 800mA Icq

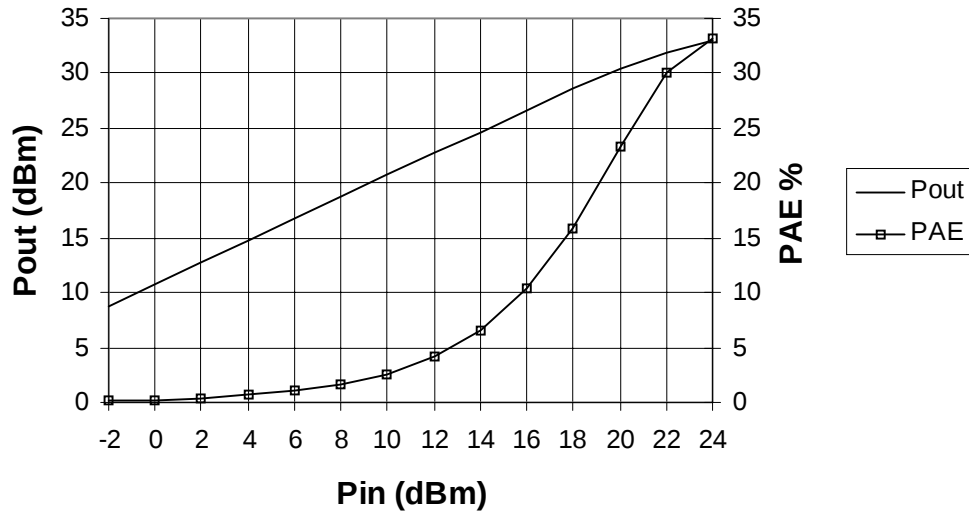


Figure 7

ECP200 @ 25°C Pout vs. Frequency
vs. Pin Class A 5Vcc 800mA Icq

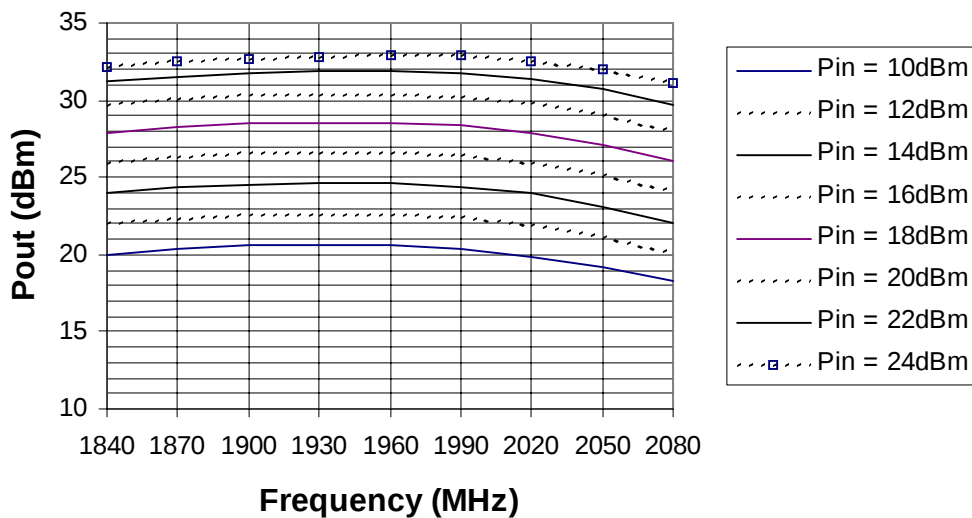


Figure 8

ECP200 @ 25°C IM3 & PAE vs. Pout
1.96GHz Class AB Icq =400mA
Class A 5Vcc 800mA Icq

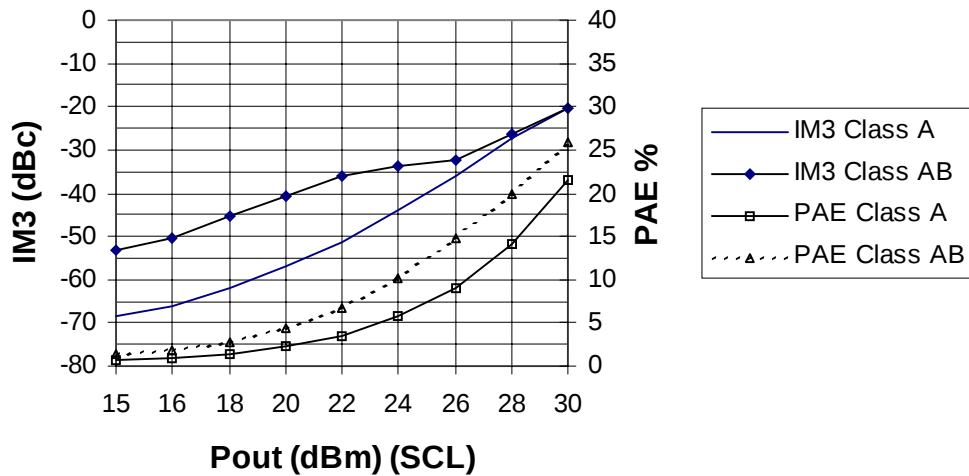


Figure 9

ECP200 ACPR & PAE vs. Pout @ 1.96GHz Icq:
Class AB = 400mA Class A = 800mA Vcc = 5V
@ 25°C (IS-95 9ch. fwd)

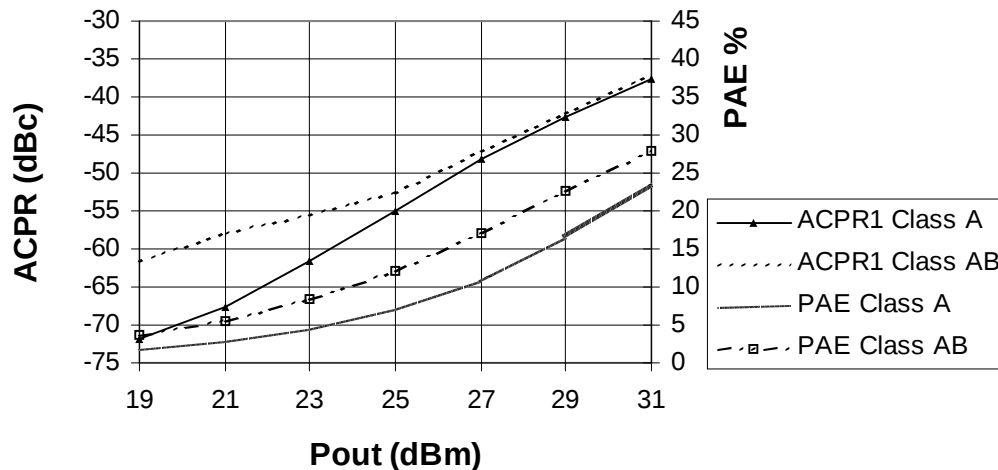


Figure 10

**ECP200 @ 25°C CW Pout & PAE vs. Pin
@ 2.14GHz Class A 5Vcc 800mA Icq**

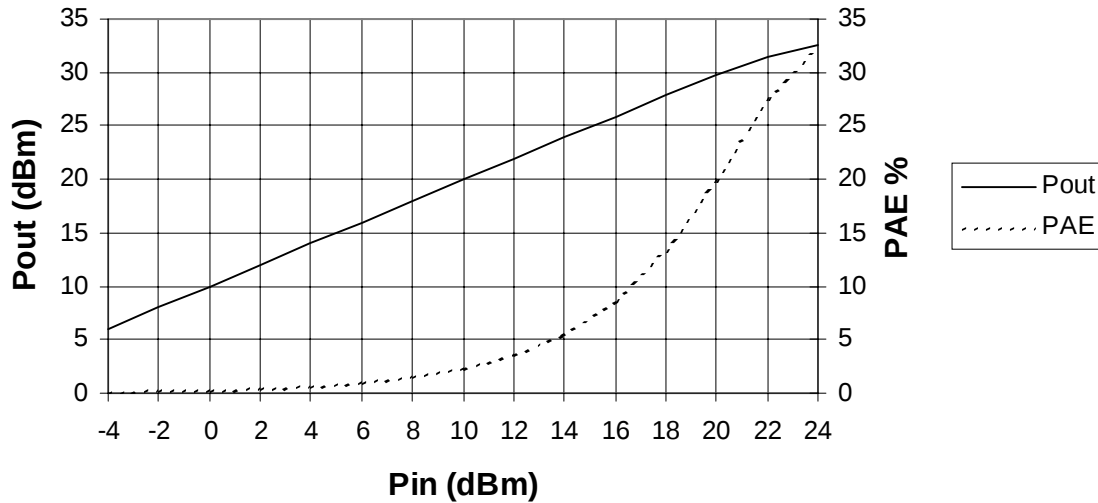


Figure 11

**ECP200 @ 25°C CW Pout vs. Frequency vs. Pin
Class A 5Vcc 800mA Icq**

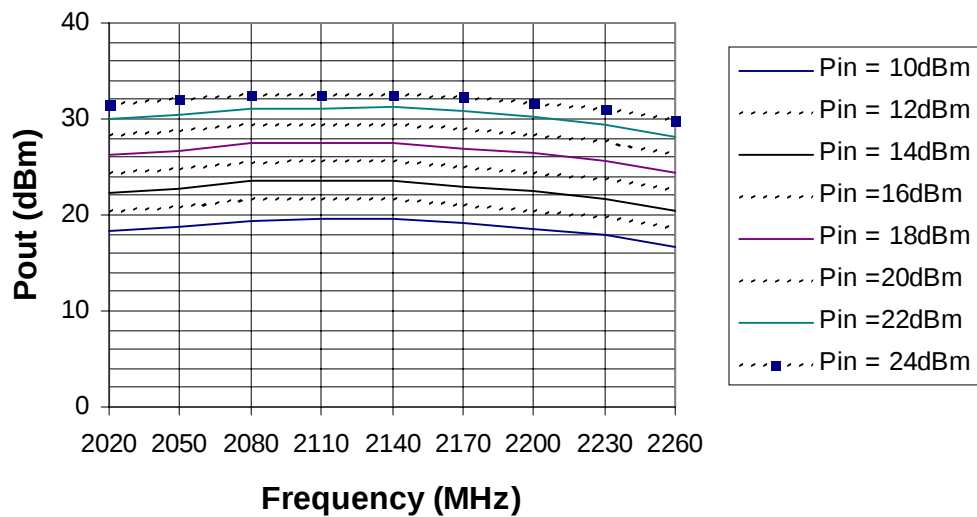


Figure 12

**ECP200 @ 25°C 2.14GHz IM3 &
PAE vs. Pout 5Vcc, Icq = Class AB 400mA,
Class A 800mA**

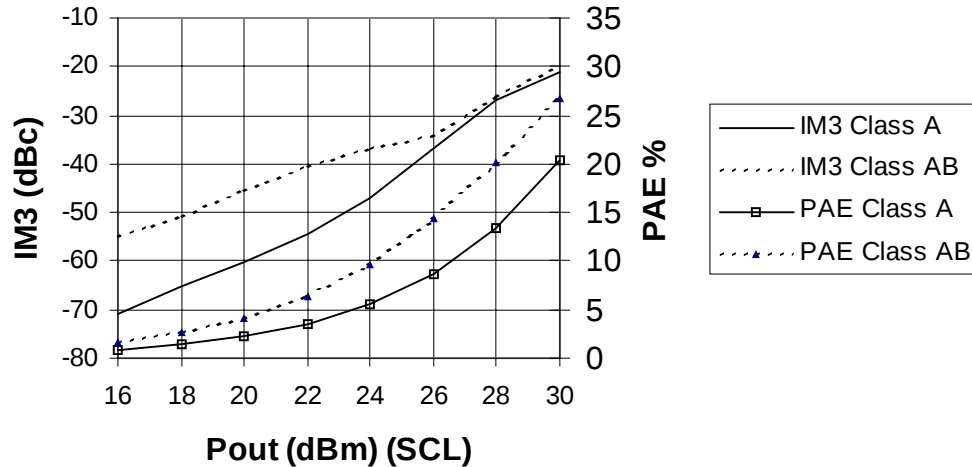


Figure 13

**ECP200 @ 25° WCDMA ACPR & PAE vs. Pout
5Vcc, Icq = Class A 800mA, Class AB 400mA
2.14GHz**

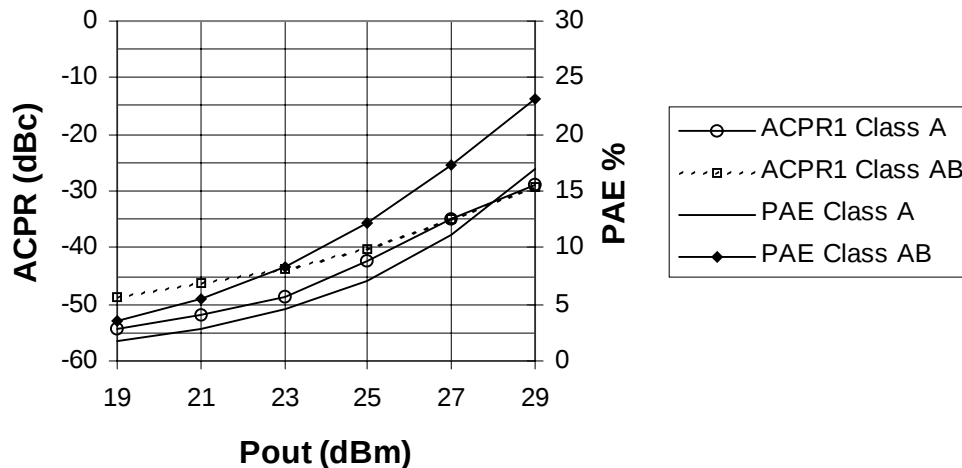


Figure 14

Note: Test Model 1, 64 DPCH, Class AB Icq = 400mA

**ECP200 OIP3 & PAE vs. Pout vs. Temperature
@ 2.14GHz Class A 5Vcc 800mA Icq**

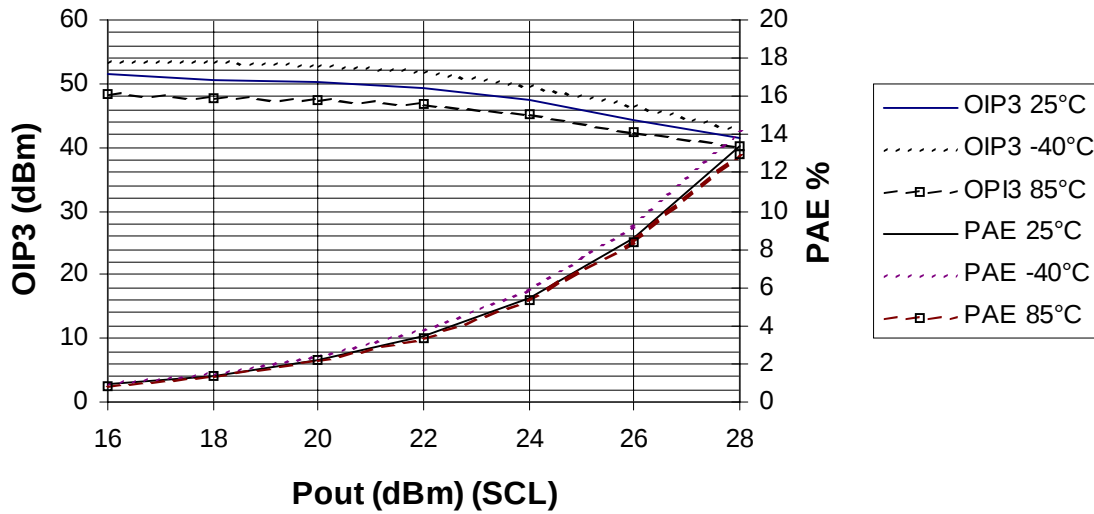


Figure 15

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

**ECP200 ACPR1 & 2 (WCDMA) vs. Temperature
vs. Pout Class A 5Vcc 800mA Icq**

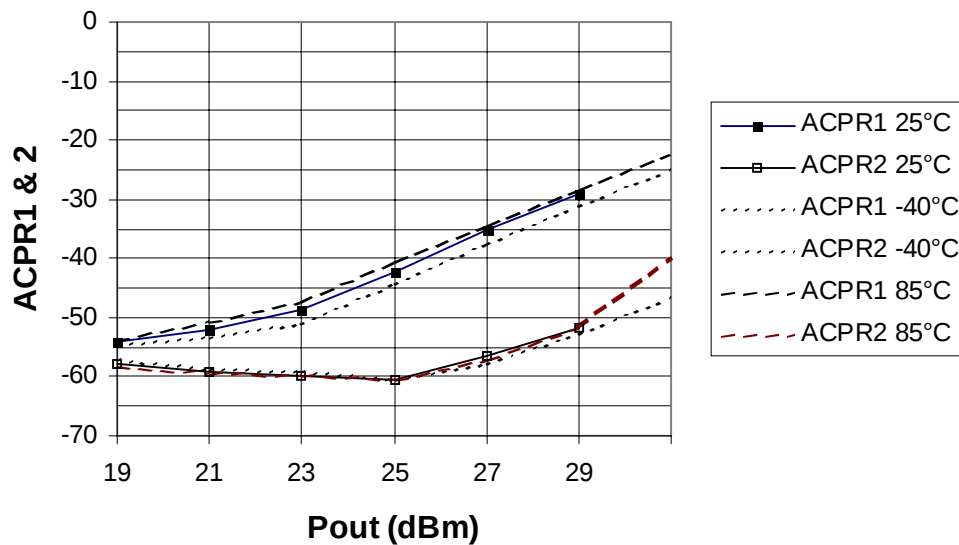
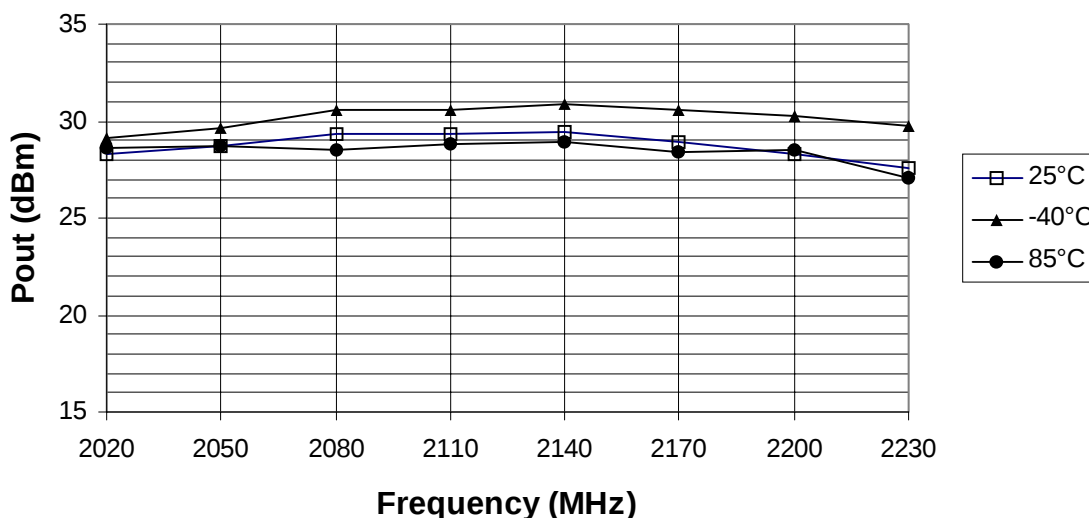


Figure 16

ECP200 Gain vs. Frequency vs. Temperature
Class A 5Vcc Icq = 800mA Pin = 20dBm**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.
ECP200G	SOIC 8	BULK
ECP200G-500	SOIC 8	500
ECP200G-1000	SOIC 8	1000
ECP200D	QFN-16(4X4mm)	BULK
ECP200D-500	QFN-16(4X4mm)	500
ECP200D-1000	QFN-16(4X4mm)	1000