

Description

The ECM060 is a 10 pin 4 X 4 mm power amplifier module at 3.5V Vcc with high efficiency. This device was developed using EiC's proprietary InGaP Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process. It is optimized for WCDMA in the 1.92 GHz to 1.98 GHz band. It operates from a positive voltage (3.2 - 4.2V Vcc) and includes a power-down feature. The input and output are both matched to 50 Ω internally. It is housed in a 4 X 4 mm Land Grid Array package with 10 pins

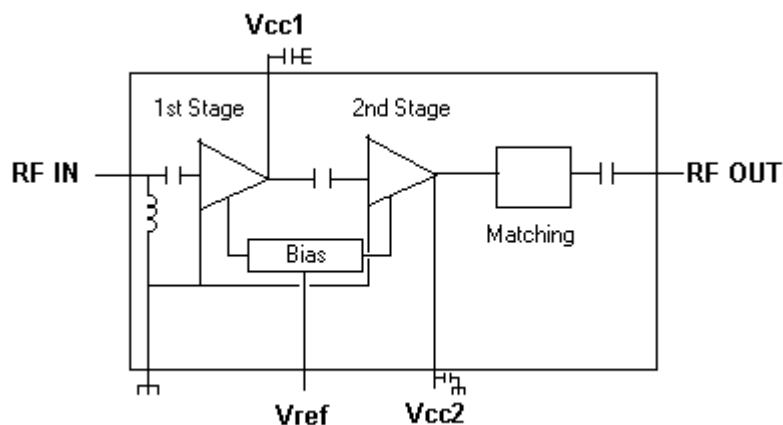
Features

- 4 X 4 mm LGA Module with 10 Pins
- Single 3.5V Supply for 3-Cell Ni or Li-Ion Battery
- Power-down activated when Vref pin <1V
- 27.0 dBm WCDMA Power with 43% Efficiency
- 50mA Typical Quiescent Current, no switch required
- High Reliability InGaP Design

Applications

- 3.5 V WCDMA Handsets

Functional Block Diagram



CAUTION!
SENSITIVE ELECTRONIC DEVICE

ELECTRICAL SPECIFICATIONS

The following tables list the electrical characteristics of the ECM060 Power Amplifier Module. Table 1 lists the electrical performance of the ECM060 for nominal operating conditions for the WCDMA band. Table 2 lists the absolute maximum ratings for continuous operation.

Electrical Specifications

Test Conditions: $T_a = 25^\circ\text{C}$, $V_{CC} = +3.5\text{ V}$, $V_{REF/PD}$ (reference / power-down voltage) = +2.9 V, $F = 1.92$ to 1.98 GHz

SYMBOL	PARAMETER	CONDITION	LIMITS			UNIT	TEST CONDITION
			MIN.	TYP.	MAX.		
F	Frequency		1.92		1.98	GHz	
G	Gain (WCDMA Modulation)	$P_o = 27\text{ dBm}$	25	27		dB	
P	Output Power (WCDMA)	$P_o = 27\text{ dBm}$	27			dBm	NOTE 1
ACPR	Adjacent Channel Power Rejection			-42	-38	dBc	NOTE 2
Alt CPR	Alternate Channel Power Rejection			-55	-48	dBc	NOTE 3
PAE	Power Added Efficiency (WCDMA)	$P_o = 27\text{ dBm}$		43		%	
PAE	Power Added Efficiency (WCDMA)	$P_o = 16\text{ dBm}$		11		%	
I _{cc}	Total Current	$P_o = 27\text{ dBm}$		330		mA	
I _{cc}	Total Current	$P_o = 22\text{ dBm}$		190		mA	
I _{cc}	Total Current	$P_o = 16\text{ dBm}$		105		mA	
	Output Load Stability			6:1			NOTE 4
	Ruggedness for output VSWR Mismatch			10:1			No Damage
I _{co}	Quiescent Current (No RF)	No RF Applied		50	70	mA	
	Leakage Current $V_{CC} = 3.5\text{V}$, $V_{ref} = 0\text{V}$	No RF Applied		3	20	uA	
$V_{ref/pd}$	$V_{ref/pd}$ Voltage			2.9		V	
V_{CC}	Supply Voltage			3.5		V	
IRL	Input Return Loss			-10		dB	
	Harmonics, 2f, 3f, 4f	$P_o = 27\text{ dBm}$		-40		dBc	
RXBN	Receiver Band Noise	$P_o = 27\text{ dBm}$		-140		dBm/Hz	
T _{ON/OFF}	Power Down On/Off Time			<100		ns	
NOTE 1: Using Application Schematic. Tuned for WCDMA							
NOTE 2: @ 5 MHz offset from band center, $P_{out} \leq 27\text{ dBm}$							
NOTE 3: @ 10MHz offset from band center, $P_{out} \leq 27\text{ dBm}$							
NOTE 4: Spur < -60dBc for all phase angles							

Table 2 - Absolute Maximum Ratings

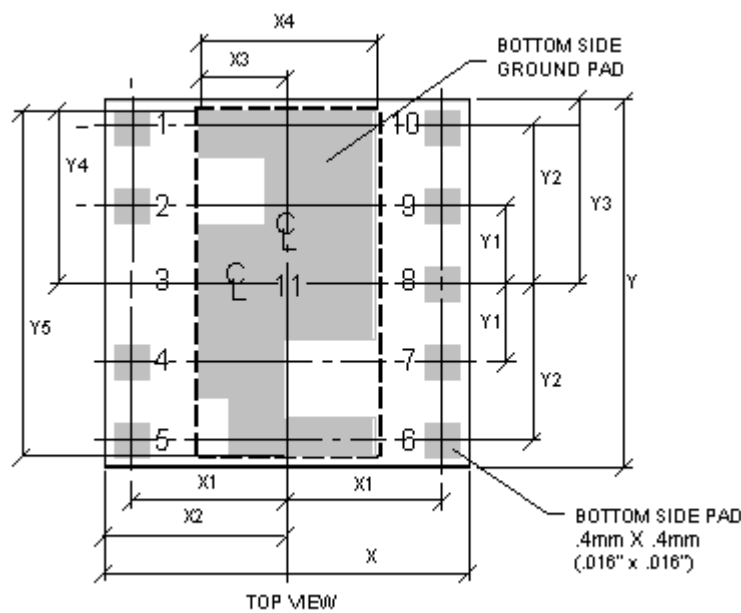
Exceeding any of the absolute maximum ratings may cause permanent damage to the device. No damage assuming only one parameter is set at limit at a time with other parameters set at or below nominal value.

PARAMETER	RATING	UNIT	TEST CONDITION
Supply Voltage	7	Volts	$V_{REF/PD} = 2.9\text{V}$
Reference / Power-down Voltage($V_{CC}=V_{REF/PD}$)	4	Volts	$V_{CC} = 3.5\text{V}$
RF Power Input	+15	dBm	$V_{CC}, V_{REF/PD} = 2.9\text{V}$
Ambient Operating Temperature	-40 to +110	°C	
Storage Temperature	-65 to +140	°C	

PACKAGE DIMENSIONS AND MARKINGS

The ECM060 is a laminate based, overmold encapsulated modular package designed for surface-mounted solder attachment to a printed circuit board.

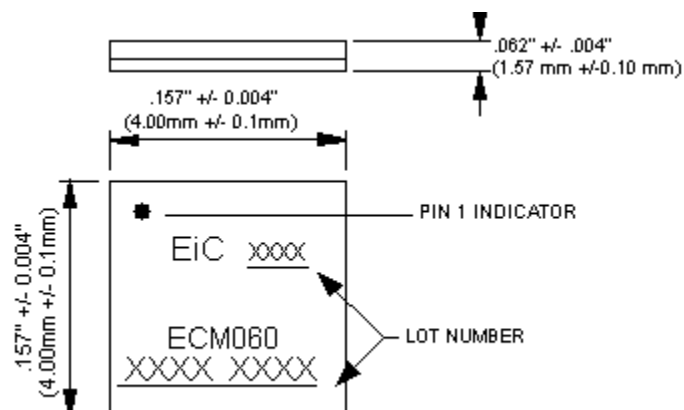
Package Dimension



	English inches			Metric millimeters		
	min	nom	max	min	nom	max
X	.154	.158	.162	3.90	4.00	4.10
X1	.063	.067	.071	1.60	1.70	1.80
X2	.075	.079	.083	1.90	2.00	2.10
X3	.033	.037	.041	0.84	0.94	1.04
X4	.072	.076	.080	1.84	1.94	2.04
Y	.154	.158	.162	3.90	4.00	4.10
Y1	.030	.034	.038	0.75	0.85	0.95
Y2	.063	.067	.071	1.60	1.70	1.80
Y3	.075	.079	.083	1.90	2.00	2.10
Y4	.070	.074	.078	1.78	1.88	1.98
Y5	.144	.148	.152	3.65	3.75	3.85

English values are converted from Metric values.
English values are rounded off.

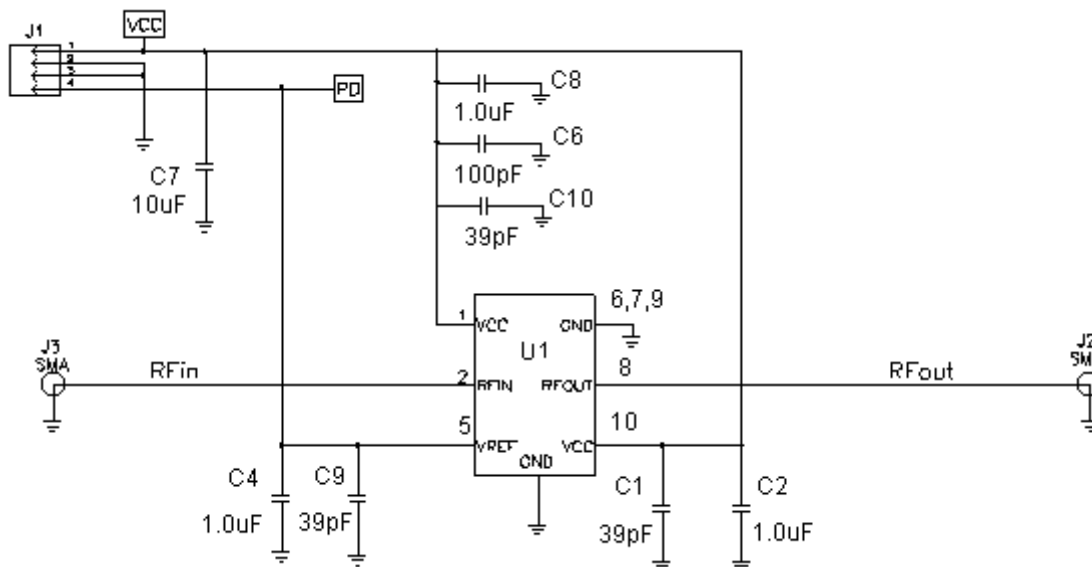
Device Marking



PINOUT

1	Vcc1
2	RFin
3	N/A
4	N/A
5	Vpd
6	Gnd
7	Gnd
8	RFout
9	Gnd
10	Vcc2
11	Gnd

Schematic



Pin Description

PIN	FUNCTION	DESCRIPTION
1	Vcc1	PIN 1 connects to the driver stage HBT collector.
2	RF In	RF input port connects to internally matched 50 ohm circuit.
3, 4	N/A	No Connection
5	Vref / Vpd	Ref. Voltage for the bias circuit. No significant amplifier current is drawn until Vref reaches approximately 2.5V.
10	Vcc2	Vcc2 connects to the power amplifier stage HBT collector.
8	RF Out	RF out is internally matched to 50 ohms and expects a 50 ohm load impedance.
6, 7, 9	GND	Ground
11	GND	Ground. This ground also serves as heat sink and must connect well to the PCB RF ground and heat sink.
Notes:		All supply pins may be connected together at the supply.

**WCDMA Gain vs. Temperature
vs. Frequency @ 27dBm**

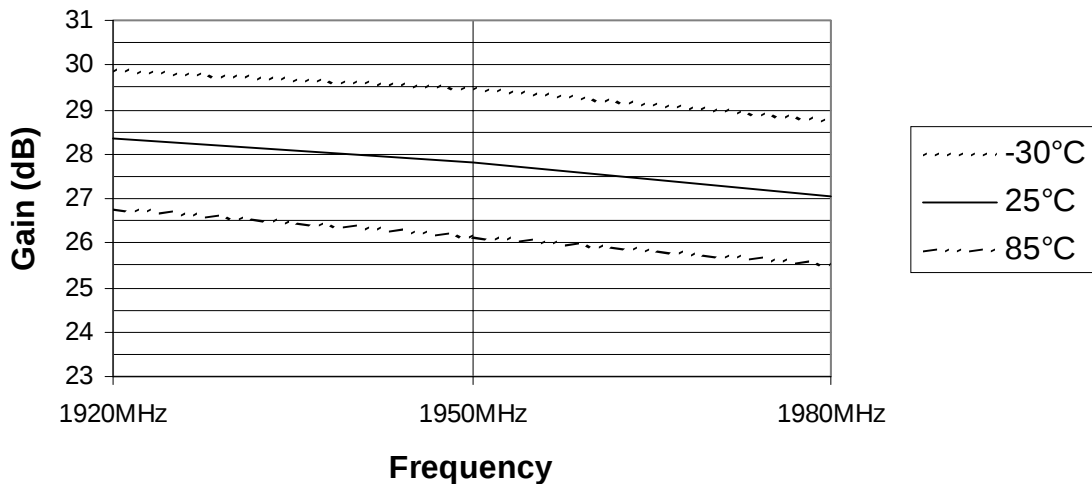
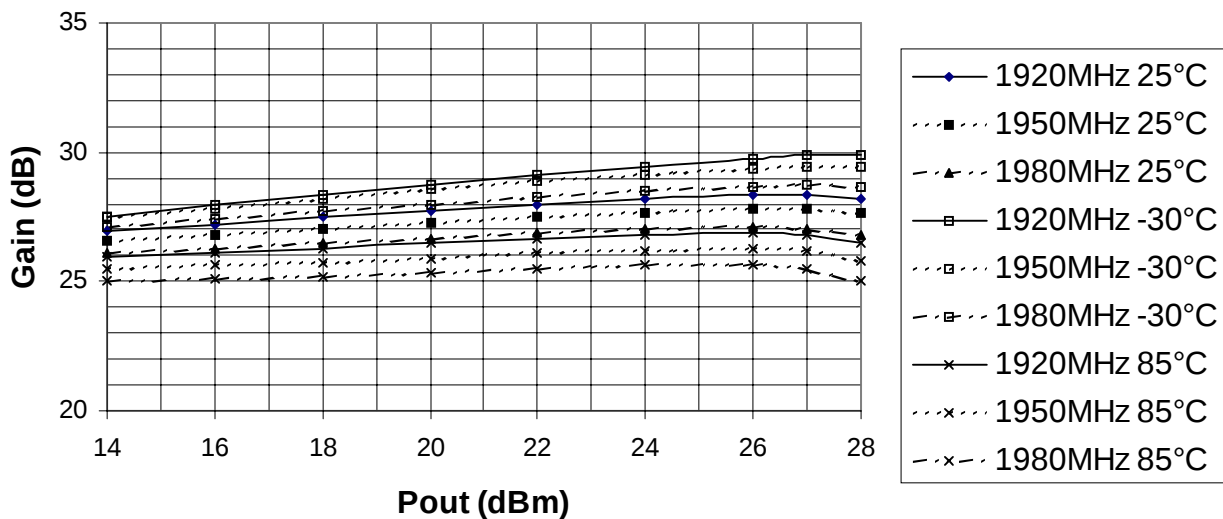


Figure 1

**Gain vs. Pout vs. Frequency
vs. Temperature**



**PAE vs. Pout vs. Frequency
vs. Temperature**

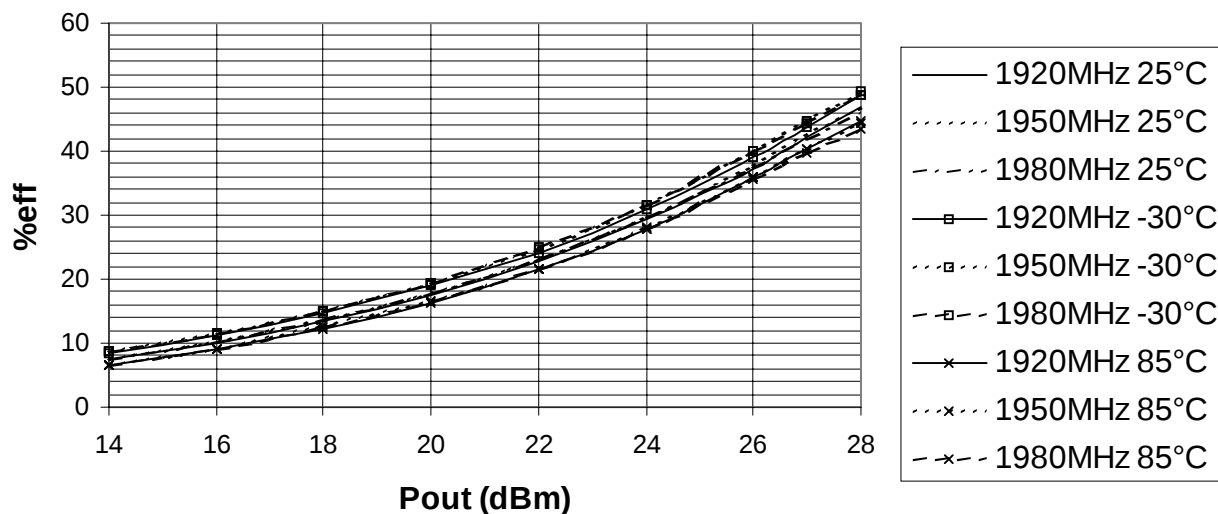


Figure 3

**ACPR1 vs. Pout vs. Frequency
vs. Temperature Using WCDMA Signal (3.5v)**

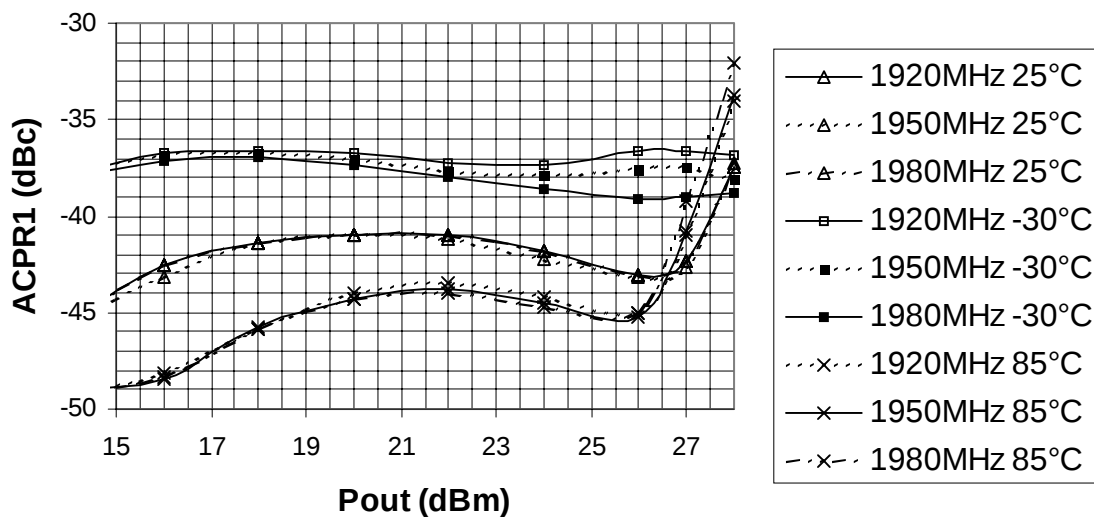


Figure 4

**ACPR1 & 2 vs. PAE vs.
Temperature @ 27dBm**

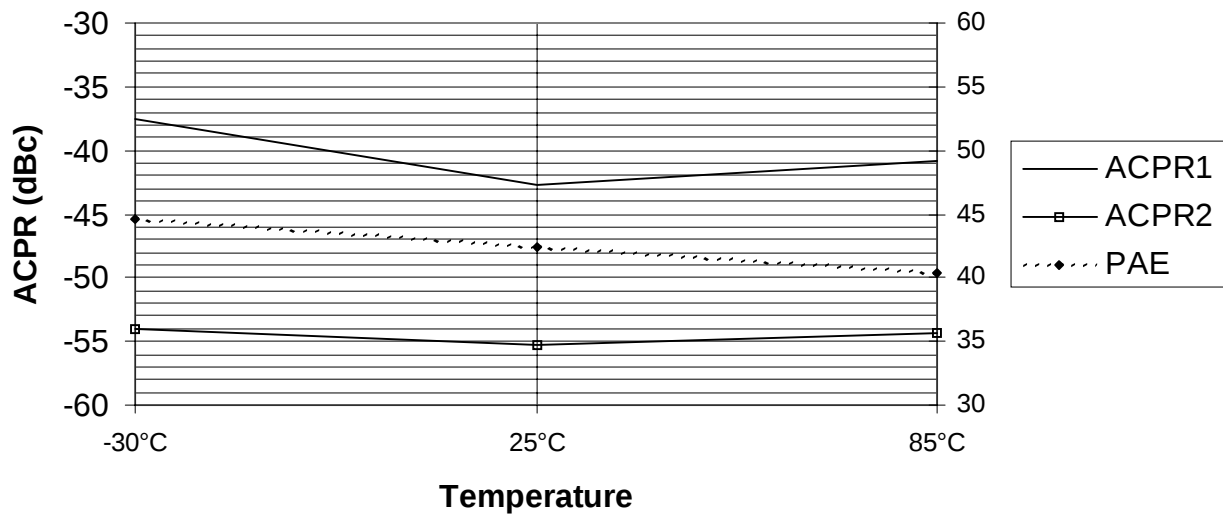


Figure 5

**ACPR2 vs. Pout vs. Frequency vs.
Temperature Using WCDMA Signal**

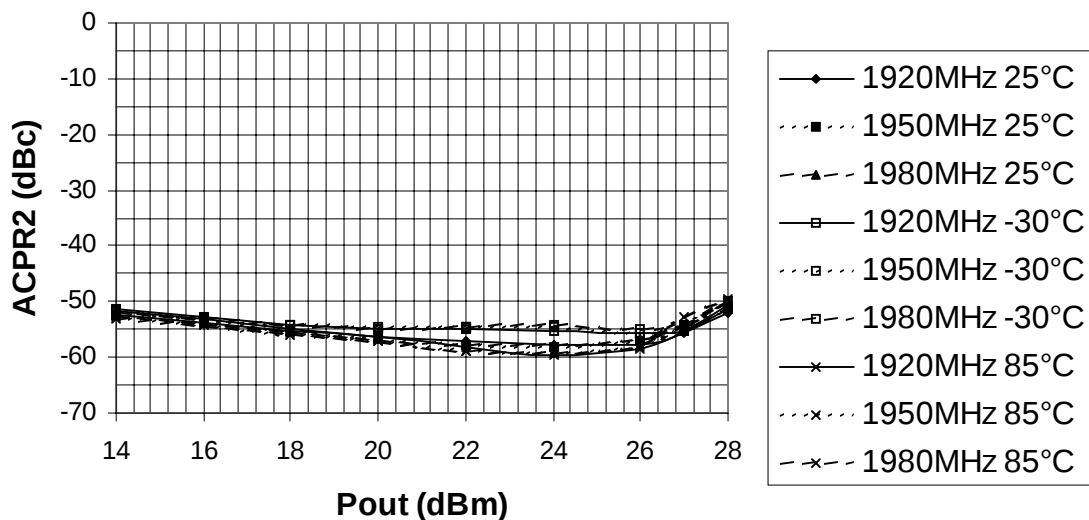


Figure 6