

**DESCRIPTION**

The LX5503 is a power amplifier optimized for the FCC Unlicensed National Information Infrastructure (U-NII) band and HiperLAN2 applications in the 5.15-5.85GHz frequency range. The PA is implemented as a two-stage monolithic microwave integrated circuit (MMIC) with active bias and input/output pre-matching. The device is manufactured with an InGaP/GaAs Heterojunction Bipolar Transistor (HBT) IC process (MOCVD). It operates at a single low voltage supply of 3.3V with +25dBm of P1dB and 22dB power gain between 5.15-5.35GHz and 18dB gain up to 5.85GHz.

For +18dBm OFDM output power (64QAM, 54Mbps), the PA provides a very low EVM (Error-Vector Magnitude) of 4%, and consumes less than 200mA total DC current.

The LX5503 is available in a 16-pin 3mmx3mm micro-lead package (MLP). The compact footprint, low profile, and excellent thermal capability of the MLP package makes the LX5503 an ideal solution for broadband, medium-gain power amplifier requirements for IEEE 802.11a, and Hiperlan2 portable WLAN applications.

**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**KEY FEATURES**

- Advanced InGaP HBT
- 5.15-5.85GHz Operation
- Single-Polarity 3.3V Supply
- Low Quiescent Current I<sub>q</sub> ~100mA
- P1dB ~ +25dBm across 5.15~5.85GHz
- Power Gain ~ 22dB at 5.25GHz & Pout=18dBm
- Power Gain ~ 18dB at 5.85GHz & Pout=18dBm
- Total Current < 200mA for Pout=18dBm
- EVM ~ 4% for 64QAM/ 54Mbps & Pout=18dBm
- Excellent Temperature Performance
- Simple Input/Output Match
- Minimal External Components
- Small Footprint: 3x3mm<sup>2</sup>
- Low Profile: 0.9mm

**APPLICATIONS/BENEFITS**

- FCC U-NII Wireless
- IEEE 802.11a
- HiperLAN2

**PRODUCT HIGHLIGHT**

**PACKAGE ORDER INFO**

T <sub>J</sub> (°C)	Package	Part Number
-40 to 85	LQ Plastic 16-Pin	LX5503-LQ

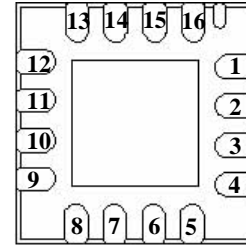
Note: Available in Tape & Reel (3K parts per reel).  
 Append the letter "T" to the part number.  
 (i.e. LX5503-LQT)

This device is classified as ESD Level 1 in accordance with MIL-STD-883, Method 3015 (HBM) testing. Appropriate ESD procedures should be observed when handling this device.

**ABSOLUTE MAXIMUM RATINGS**

DC Supply Voltage, RF off.....	6V
Collector Current.....	500mA
Total Power Dissipation.....	3 W
RF Input Power.....	10dBm
Operation Ambient Temperature.....	-40 to +85°C
Storage Temperature.....	-60 to +150°C

Note: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of specified terminal.

**PACKAGE PIN OUT**


LQ PACKAGE  
(Bottom View)

**FUNCTIONAL PIN DESCRIPTION**

Pin Name	Pin Number	Description
RF IN	2, 3	RF input for the power amplifier. This pin is DC-shorted to GND but AC-coupled to the transistor base of the first stage. For 5.15-5.35GHz this pin is pre-matched to 50Ω.
Vb1	6	Bias current control voltage for the first stage.
Vb2	7	Bias current control voltage for the second stage. The VB2 pin can be connected with the first stage control voltage (VB1) into a single reference voltage (referred to as Vref) through an external resistor bridge(R1/R2).
Vcc	9	Supply voltage for the bias reference and control circuits. The VCC feed line should be terminated with a 1 μF bypass capacitor as close to the device as possible. This pin can be combined with both VC1 and VC2 pins, resulting in a single supply voltage (referred to as Vc).
RF OUT	10, 11	RF output for the power amplifier. This pin is AC-coupled and does not require a DC-blocking capacitor.
Vc1	15	Power supply for first stage amplifier. The VC1 feedline should be terminated with a 220pF bypass capacitor as close to the device as possible, followed by a 1 μF bypass capacitor at the supply side. This pin can be combined with VC2 and VCC pins, resulting in a single supply voltage (referred to as Vc).
Vc2	14	Power supply for second stage amplifier. The VC2 feedline should be terminated with a 220pF bypass capacitor as close to the device as possible, followed by a 1 μF bypass capacitor at the supply side. This pin can be combined with VC1 and VCC pins, resulting in a single supply voltage (referred to as Vc).
GND		The center metal base of the MLP package provides both DC and RF ground as well as heat sink for the power amplifier.

**ELECTRICAL CHARACTERISTICS**

 Test conditions:  $V_{cc}=3.3V$ ,  $V_{ref}=2.86V$ ,  $I_{cq}=100mA$ ,  $T_A=25^{\circ}C$ .

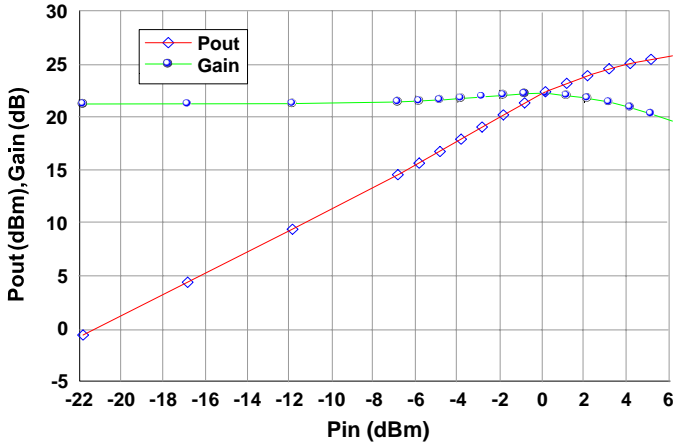
Parameter	Condition	Symbol	Min.	Typ.	Max.	Min.	Typ.	Max.	Unit
Frequency Range		f	5.15		5.35	5.7		5.85	GHz
Output Power at 1dB Compression		P <sub>out</sub>	24	25		24	25		dBm
Power Gain at P <sub>out</sub> =18dBm		G <sub>p</sub>	20	22		16	18		dB
EVM at P <sub>out</sub> =18dBm	64QAM/54Mbps			4			4		%
Total Current at P <sub>out</sub> =18dBm		I <sub>c_total</sub>		200			180		mA
Quiescent Current		I <sub>cq</sub>		100			100		mA
Bias Control Reference Current	For I <sub>cq</sub> =100mA	I <sub>ref</sub>		1.6			1.6		mA
Small-Signal Gain		S <sub>21</sub>		21			17		dB
Gain Flatness	Over 100MHz	$\Delta S_{21}$		+/-0.2			+/-0.5		dB
Gain Variation Over Temperature	-40 to +85°C	$\Delta S_{21}$		+/-1			+/-1		dB
Input Return Loss		S <sub>11</sub>		-15	-10		-12	-10	dB
Output Return Loss		S <sub>22</sub>		-9			-10		dB
Reverse Isolation		S <sub>12</sub>		-40			-40		dB
Second Harmonic	P <sub>out</sub> = 18dBm			-45			-42		dBc
Third Harmonic	P <sub>out</sub> = 18dBm			-37			-37		dBc
Noise Figure		NF		6			6		dB
Ramp-On Time	10~90%	t <sub>ON</sub>		100			100		ns

Note: All measured data was obtained on a 5 mil GETEK evaluation board without heat sink.

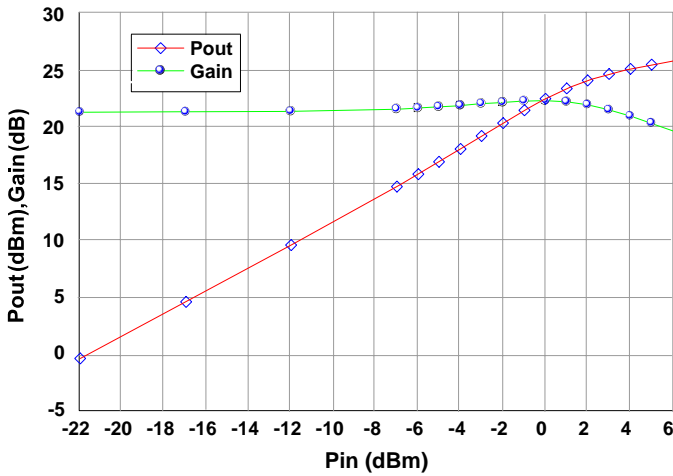
**CHARTS**

**Typical Power Sweep Data at Room Temperature**

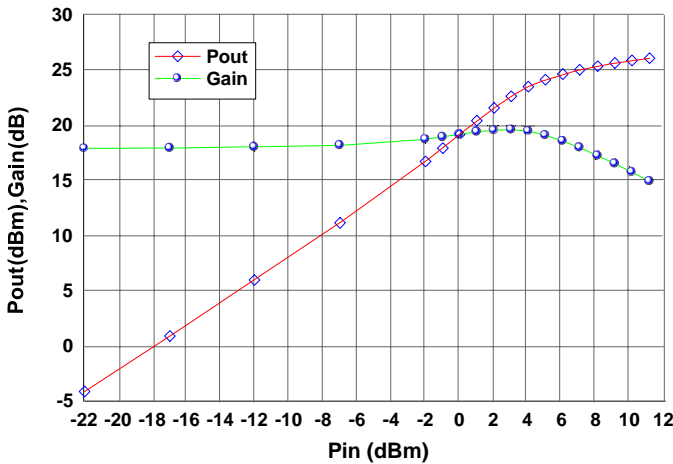
( $V_c=3.3V$ ,  $V_{ref}=2.86V$ ,  $I_{cq}=100mA$ )



Freq.=5.15GHz



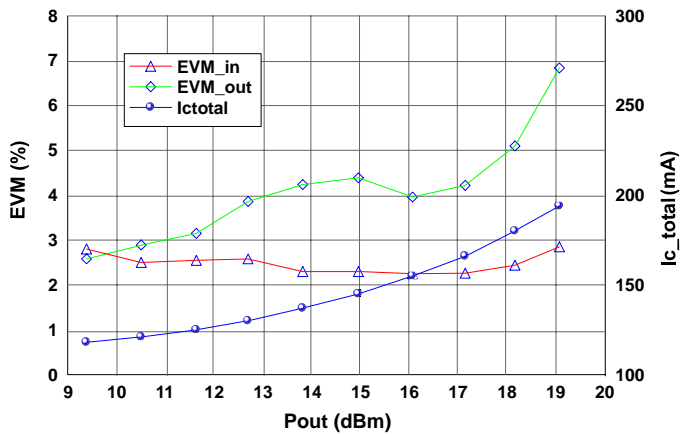
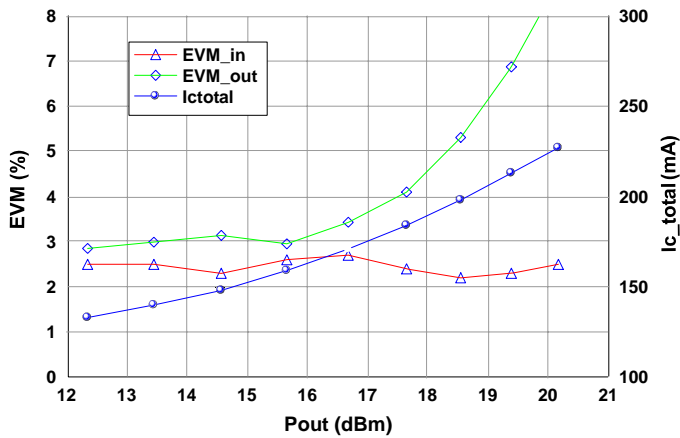
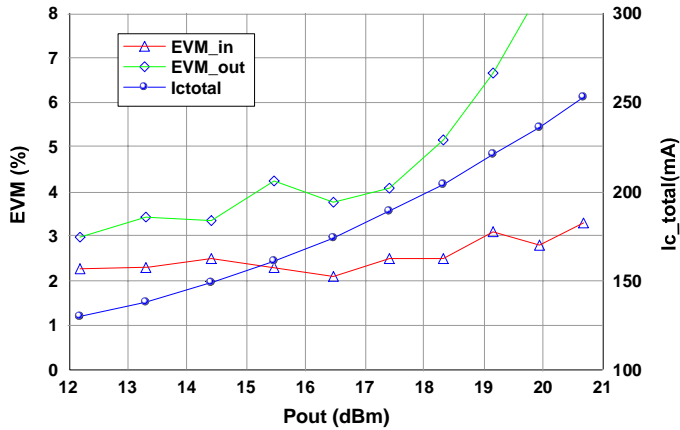
Freq.=5.25GHz



Freq.=5.85GHz

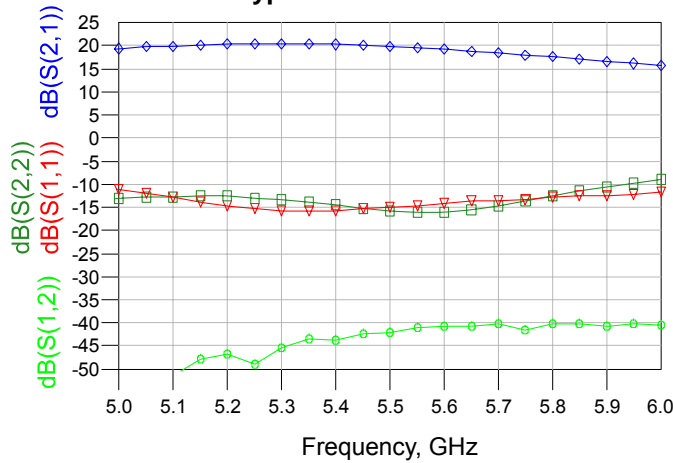
CHARTS

**Typical EVM & Total Current vs. Output Power**  
(Vc=3.3V, Vref=2.86V, Icq=100mA, 64QAM/54Mbps)

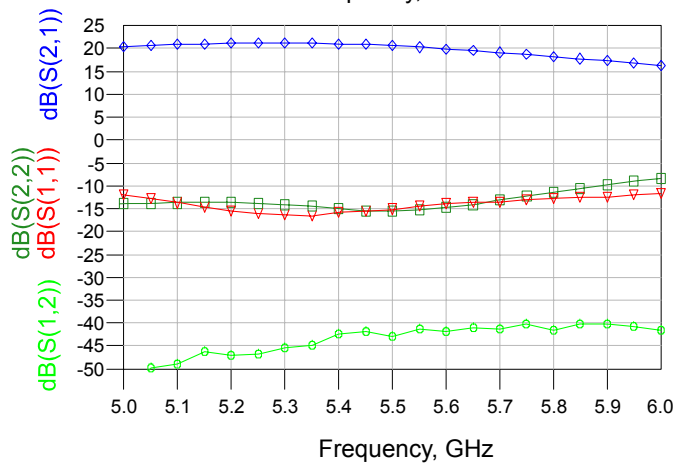


**CHARTS**

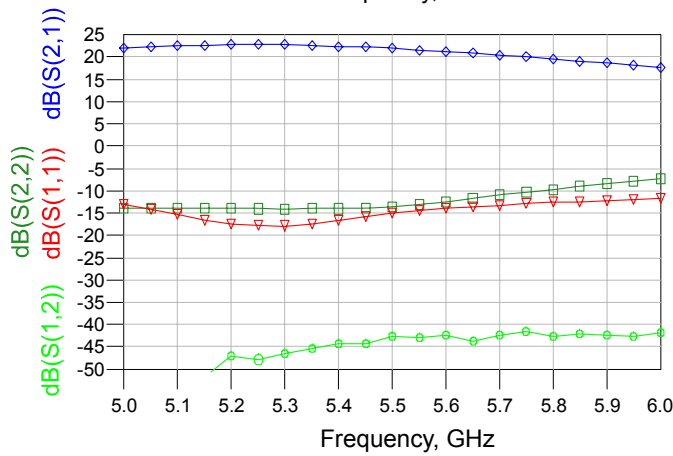
**Typical S-Parameter Data at Room Temperature**



Vc=3.3V  
Vref=2.81V  
Icq=80mA



Vc=3.3V  
Vref=2.86V  
Icq=100mA

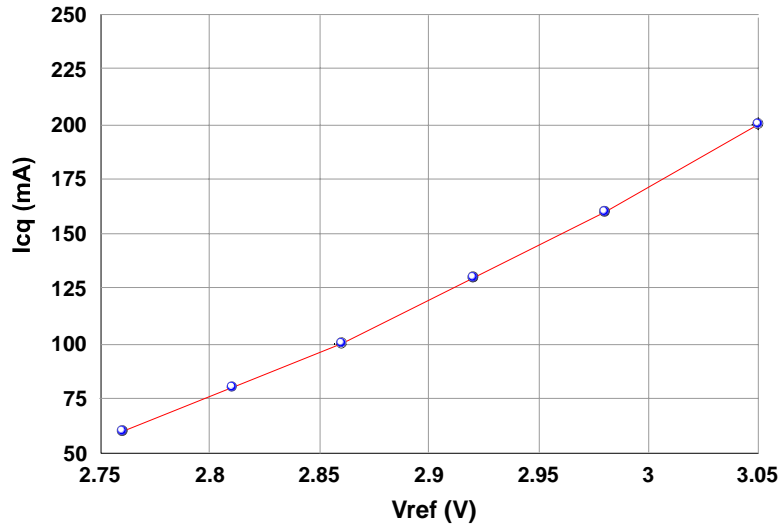


Vc=3.3V  
Vref=2.98V  
Icq=160mA

**CHARTS**

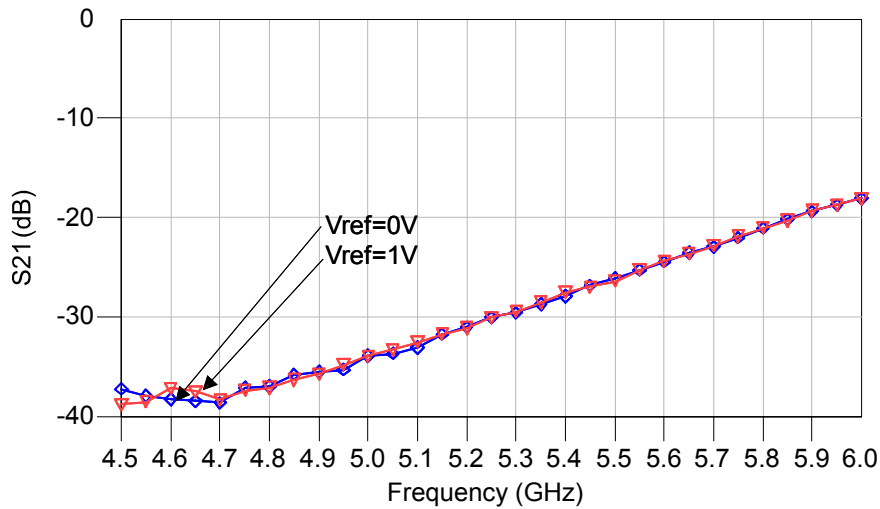
**Quiescent Current vs. Vref**

(Vc1=Vc2=VCC=Vc=3.3V)



**Power Down Isolation**

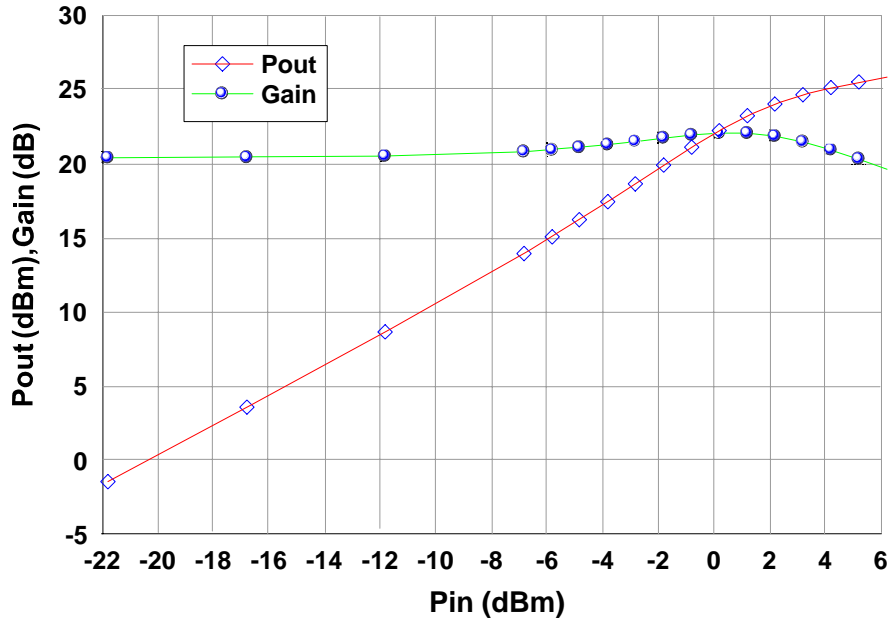
(Vc=3.3V, Vref=0 to 1V, Icq<2μA)



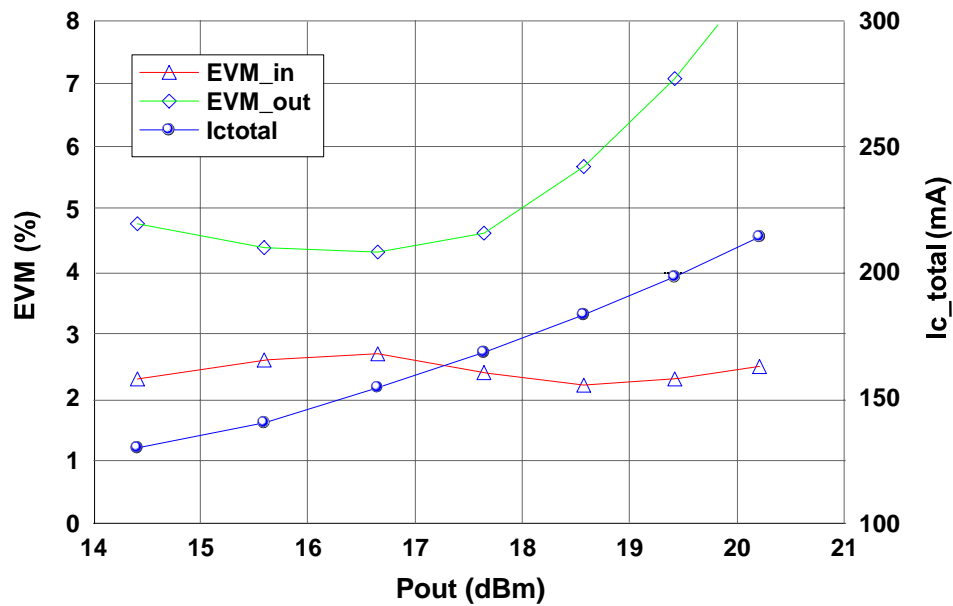
CHARTS

**Power, EVM & Current for Low Quiescent Current**  
(Recommended for High Efficiency Operation)  
(Vc=3.3V, Vref=2.81V, Icq=80 mA, Freq.=5.25GHz)

**Power & Gain vs. Pout**



**EVM & Total Current vs. Pout**

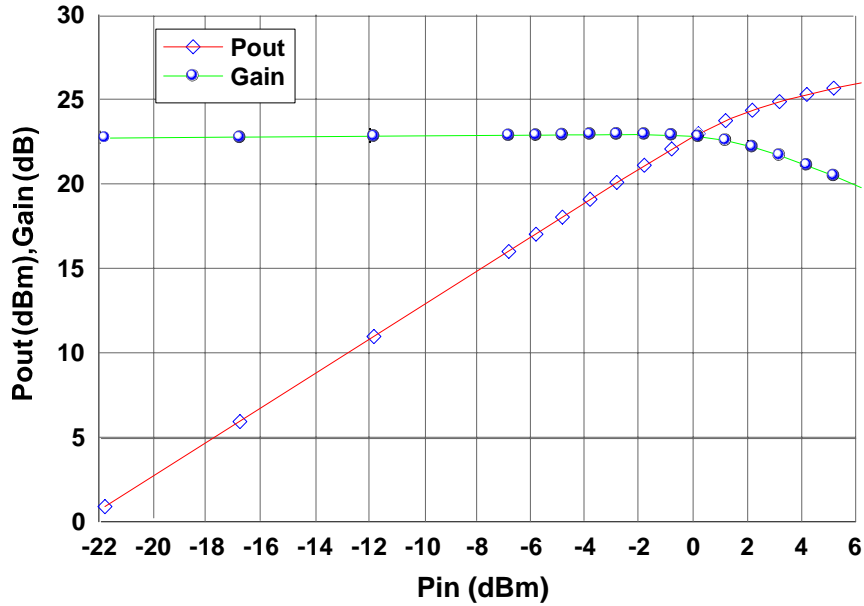




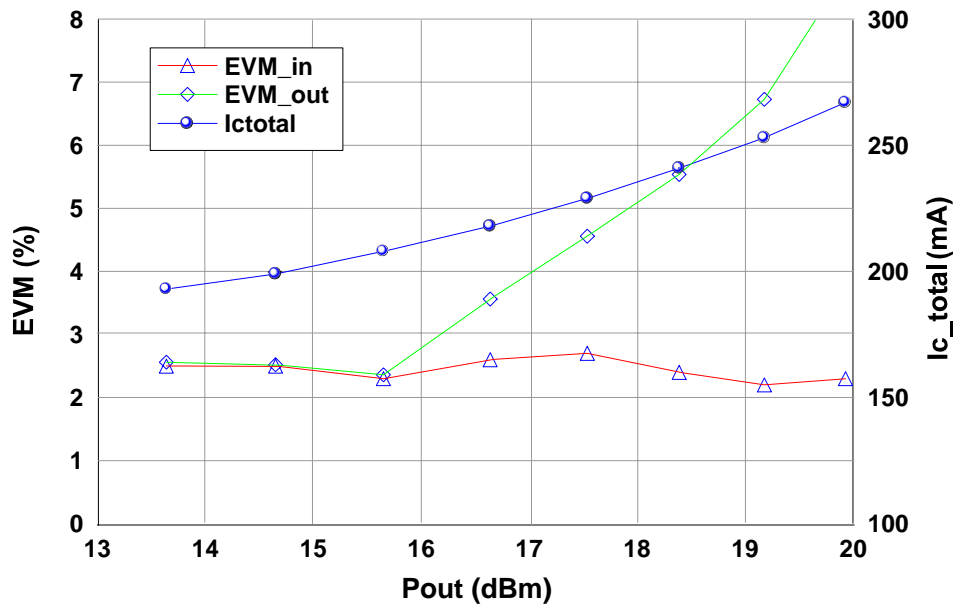
CHARTS

**Power, EVM & Current for High Quiescent Current**  
(Recommended for High Gain Operation)  
(Vc=3.3V, Vref=2.98V, Icq=160 mA, Freq.=5.25GHz)

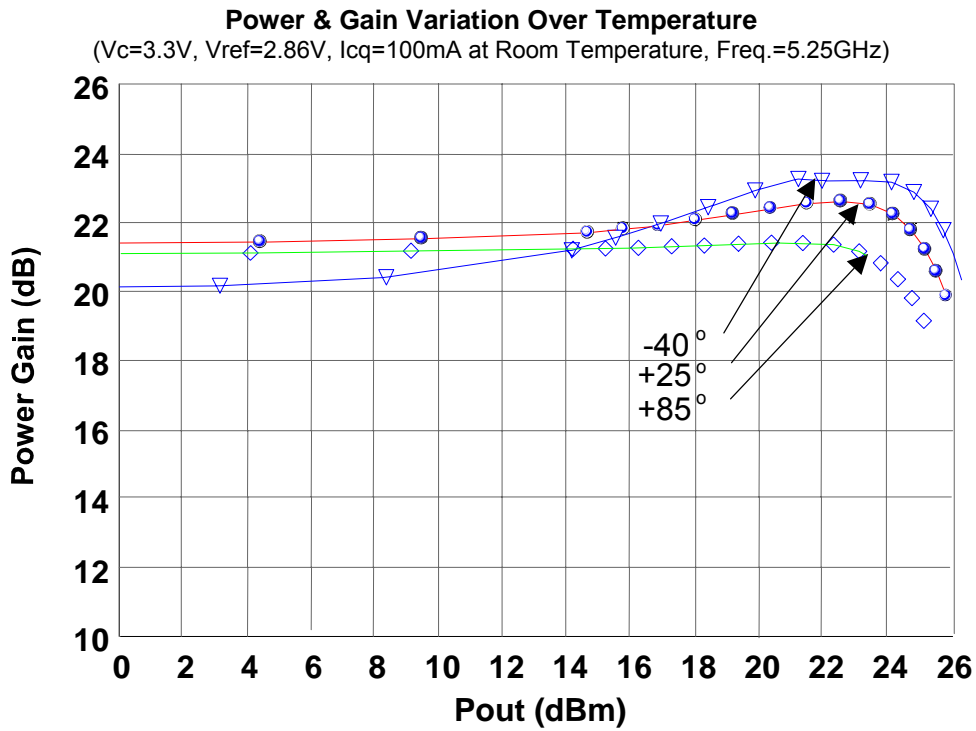
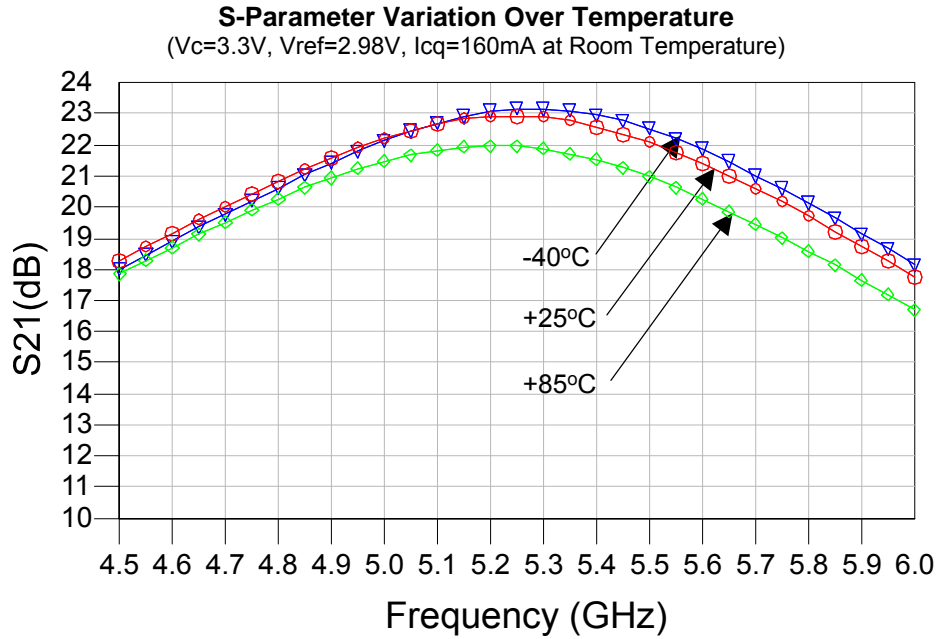
**Power & Gain vs. Pout**



**EVM & Total Current vs. Pout**



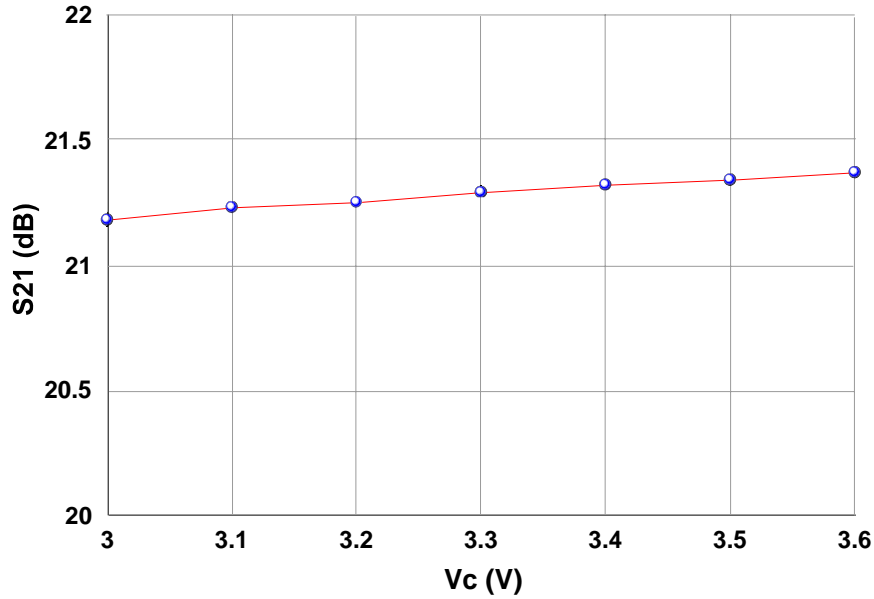
**CHARTS**



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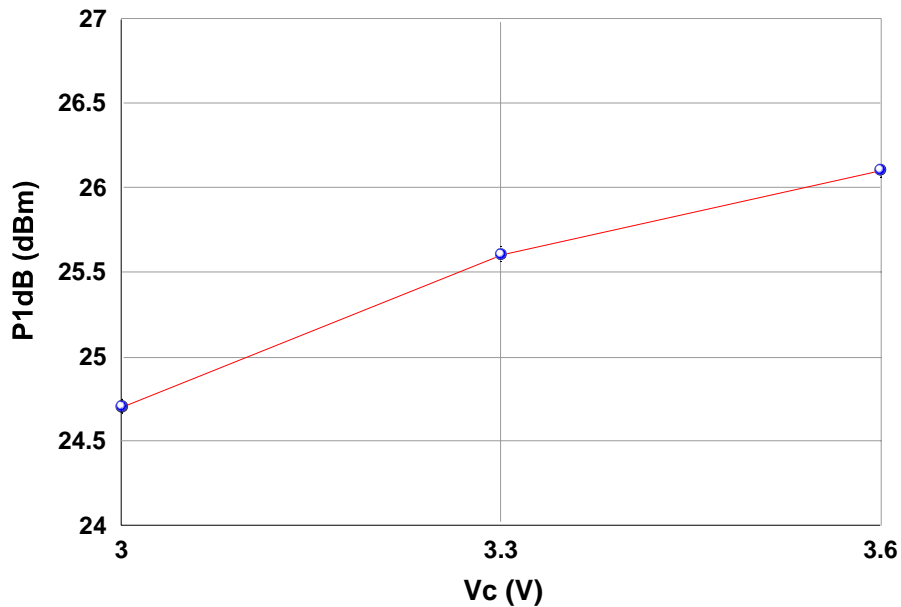
**Small-Signal Gain vs. Supply Voltage**

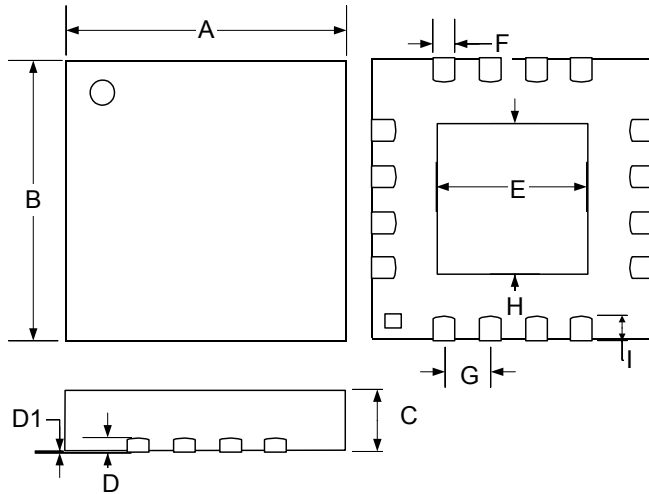
(Vref=2.86V, Icq=100mA for Vc=3.3V)



**P1dB vs. Supply Voltage**

(Vref=2.86V, Icq=100mA for Vc=3.3V)



**MECHANICAL DRAWING**
**LQ 16-Pin MLPQ Plastic (3x3mm EP)**


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.00 BSC		0.118 BSC	
B	3.00 BSC		0.118 BSC	
C	0.80	1.00	0.031	0.039
D	0.18	0.30	0.007	0.011
D1	0	0.05	0	0.002
E	1.30	1.55	0.051	0.061
F	0.18	0.30	0.007	0.011
G	0.50 BSC		0.019 BSC	
H	1.30	1.55	0.051	0.061
I	0.30	0.50	0.011	0.020

**Note:**

1. Dimensions do not include mold flash or protrusions; these shall not exceed 0.155mm(.006") on any side. Lead dimension shall not include solder coverage.

**NOTES**

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