

**DESCRIPTION**

The LX5503E is a power amplifier optimized for high-efficiency low-power applications in the FCC Unlicensed National Information Infrastructure (U-NII) band, Europe HyperLAN2, and Japan WLAN in the 4.9-5.85GHz 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 supply of 3.3V with +26dBm of P1dB, and power gain of 21dB between 4.9-5.35GHz and 16dB up to 5.85GHz.

For +18dBm OFDM output power (64QAM, 54Mbps), the PA provides a very low EVM (Error Vector Magnitude) of 3%, and consumes 150mA total DC current.

The LX5503E is available in a 16-pin 3x3mm<sup>2</sup> micro-lead package (MLP). The compact footprint, low profile, and excellent thermal capability of the micro-lead package make the LX5503E 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>

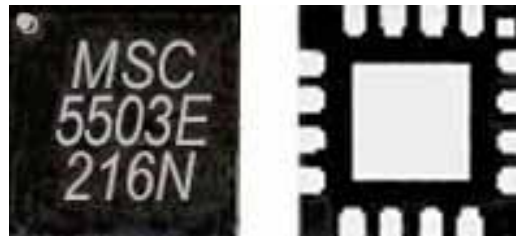
**KEY FEATURES**

- Advanced InGaP HBT
- 4.9-5.85GHz Operation
- Single-Polarity 3.3V Supply
- Total Current ~ 150mA for Pout=18dBm at 5.25GHz
- P1dB ~ +26dBm across 4.9~5.85GHz
- Power Gain ~ 21dB at 5.25GHz & Pout=18dBm
- Power Gain ~ 16dB at 5.85GHz & Pout=18dBm
- EVM ~ 3% for 64QAM/ 54Mbps & Pout=18dBm
- Excellent Temperature Performance
- Simple Input/Output Match
- Minimal External Components
- Optional low-cost LDO for Optimal System Performance
- Small Footprint: 3x3mm<sup>2</sup>
- Low Profile: 0.9mm

**APPLICATIONS/BENEFITS**

- FCC-UNII Wireless
- IEEE 802.11a
- HiperLAN2

**PRODUCT HIGHLIGHT**



**PACKAGE ORDER INFO**

**LQ** Plastic MLPQ  
**16-Pin**  
**LX5503ELQ**  
 RoHS Compliant / Pb-free Transition DC: 0418

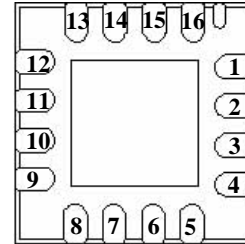
Note: Available in Tape & Reel. Append the letters "TR" to the part number.  
 (i.e. LX5503ELQ-TR)

This device is classified as ESD Level 0 in accordance with JESD22-A114-B, (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.....	3W
RF Input Power .....	10dBm
Operation Ambient Temperature .....	-40 to +85°C
Maximum Junction Temperature (T <sub>JMAX</sub> ).....	150°C
Storage Temperature.....	-65 to 150°C
Peak Package Solder Reflow Temp. (40 seconds maximum exposure).....	260°C (+0, -5)

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)

RoHS / Pb-free 100% Matte Tin Lead Finish

**FUNCTIONAL PIN DESCRIPTION**

Name	Pin #	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.
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 VB1 into a single reference voltage (V <sub>ref</sub> ) through an external resistor bridge.
VCC	9	Supply voltage for the Bias reference and control circuits. This pin can be combined with both VC1 and VC2 pins, resulting in a single supply voltage (referred to as V <sub>c</sub> ).
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 1μF bypass capacitor at the supply side. This pin can be combined with VC2 and VCC pins, resulting in a single supply voltage (V <sub>c</sub> ).
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 1μF bypass capacitor at the supply side. This pin can be combined with VC1 and VCC, resulting in a single supply voltage (V <sub>c</sub> ).
GND	Center Metal	The center metal base of the MLPQ package provides both DC/RF ground as well as heat sink for the power amplifier.

**ELECTRICAL CHARACTERISTICS**

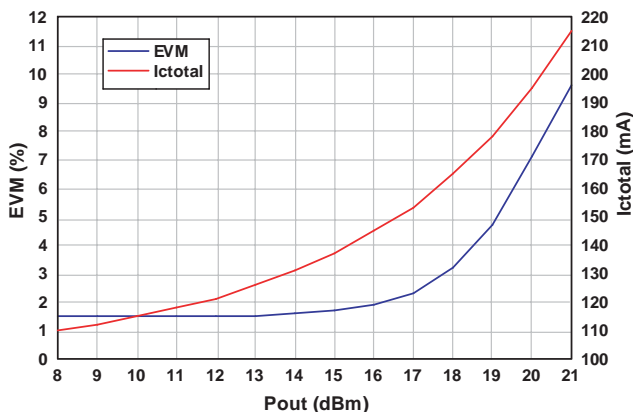
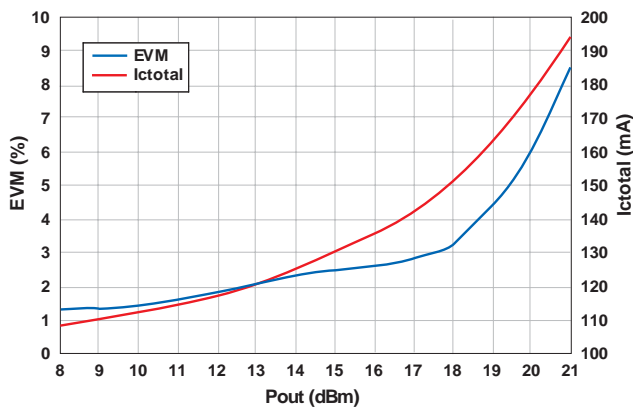
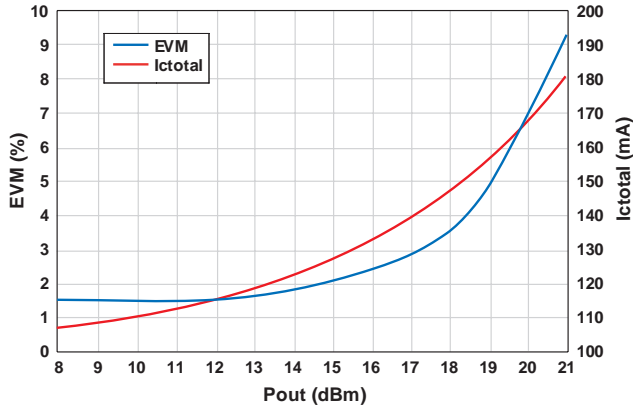
Unless otherwise specified, the following specifications apply over the following test conditions:  $V_{cc} = 3.3V$ ,  $I_{cq} = 100mA$ ,  $T_A = 25^\circ C$

PARAMETER	CONDITION	SYMBOL	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	UNIT
Frequency Range		f	4.9		5.35	5.7		5.85	GHz
Output Power at 1dB Compression		Pout	25	26		25	26		dBm
Power Gain at Pout=18dBm		Gp		21			16		dB
EVM at Pout=18dBm	64QAM/54Mbps			3			3		%
Total Current at Pout=18dBm		Ic_total		150			160		mA
Quiescent Current		Icq		100			100		mA
Bias Control Reference Current	For Icq=100mA	Iref		1.5			1.5		mA
Small-Signal Gain		S21		19			15		dB
Gain Flatness	Over 200MHz	$\Delta S21$		+/-0.5			+/-0.5		dB
Gain Variation Over Temperature	-40 to +85°C	$\Delta S21$		+/-1			+/-1		dB
Input Return Loss		S11		-15	-10		-12	-10	dB
Output Return Loss		S22		-7			-8		dB
Reverse Isolation		S12		-35			-35		dB
Second Harmonic	Pout = 18dBm			-40			-35		dBc
Third Harmonic	Pout = 18dBm			-45			-45		dBc
Ramp-On Time	10~90%	ton		100			100		ns

CHARACTERISTIC CURVES

Typical EVM & Total Current vs. Output Power

(Vc=3.3V, Icq=100mA, 64QAM/54Mbps)

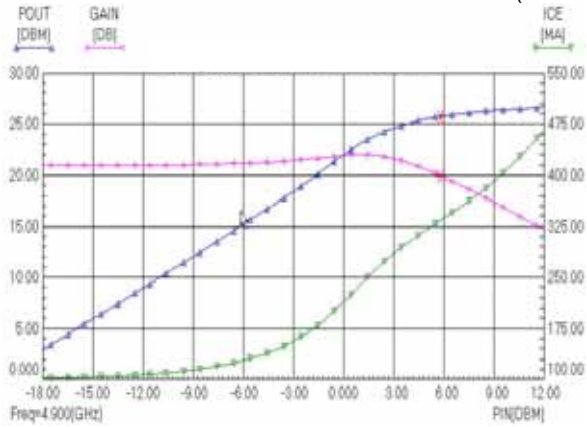


Notes: All EVM data are for OFDM signal of 64QAM/54Mbps and are actual measured data without any de-embedding. Source EVM from is around 1.4~1.8% for the input power levels for test.

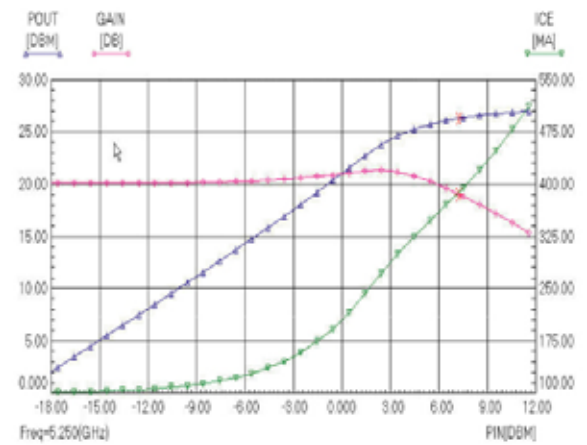
**CHARACTERISTIC CURVES**

**Typical Power Sweep Data at Room Temperature**

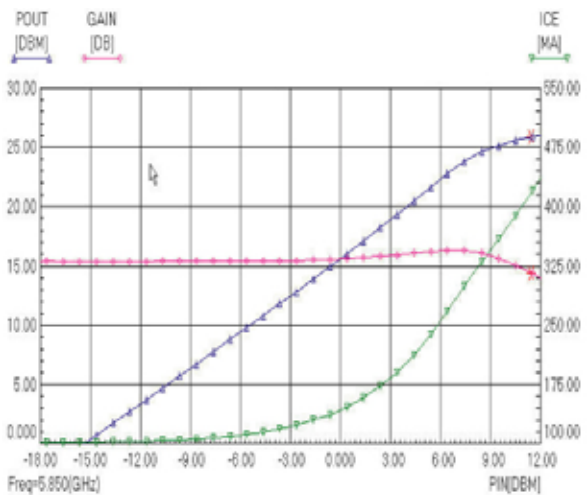
(Vc=3.3V, Icq=100mA)



Freq=4.97GHz



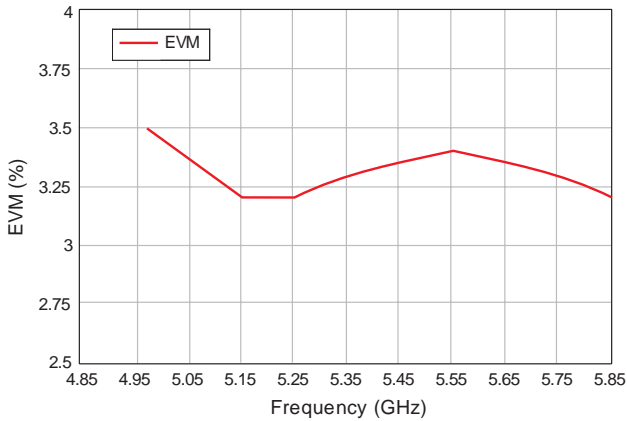
Freq=5.25GHz



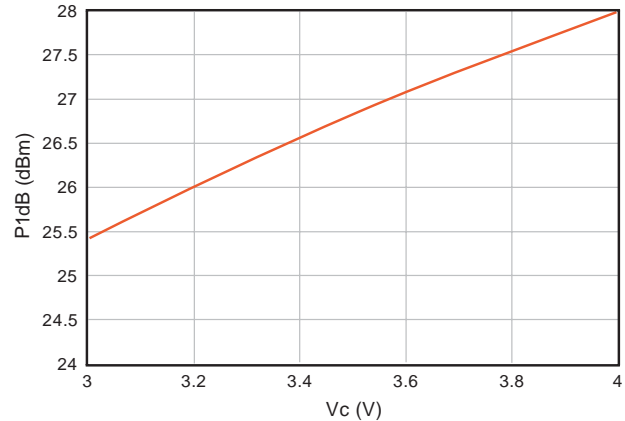
Freq=5.85GHz

CHARACTERISTIC CURVES

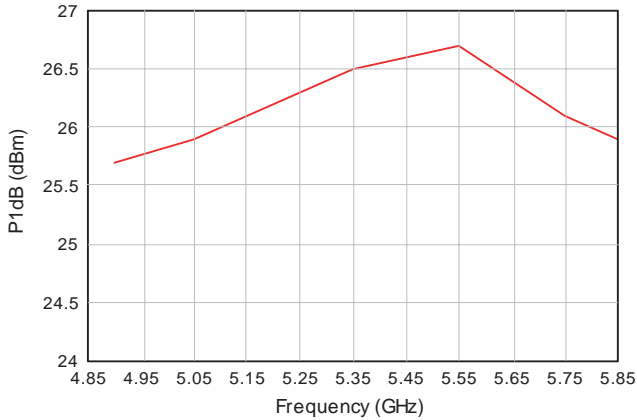
Typical EVM vs. Frequency  
(Vc=3.3V, Icq=100mA, Pout=18dBm, 64QAM/54Mbps)



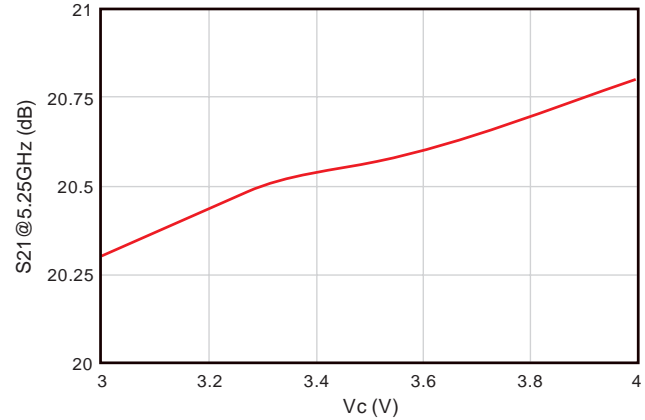
Typical P1dB vs. Supply Voltage  
(Vc=3.3V, Icq=100mA, Freq=5.25GHz)



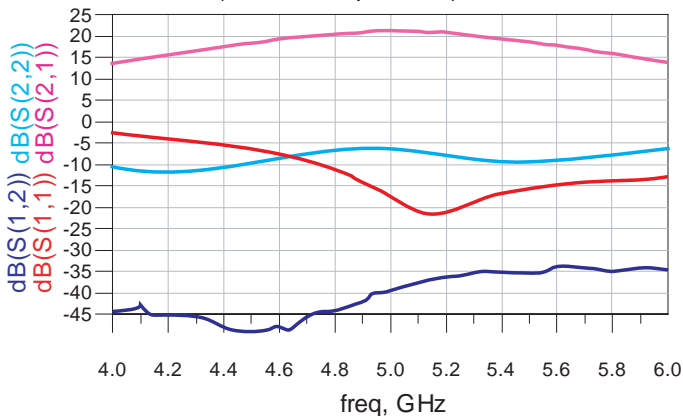
Typical P1dB vs. Frequency  
(Vc=3.3V, Icq=100mA)



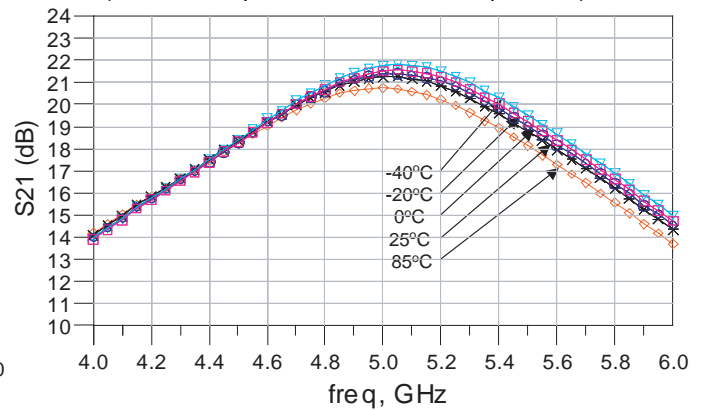
Typical Small-Signal Gain vs. Supply Voltage  
(Vc=3.3V, Icq=100mA, Freq=5.25GHz)



Typical S-Parameter Data at Room Temperature  
(Vc=3.3V, Icq=100mA)

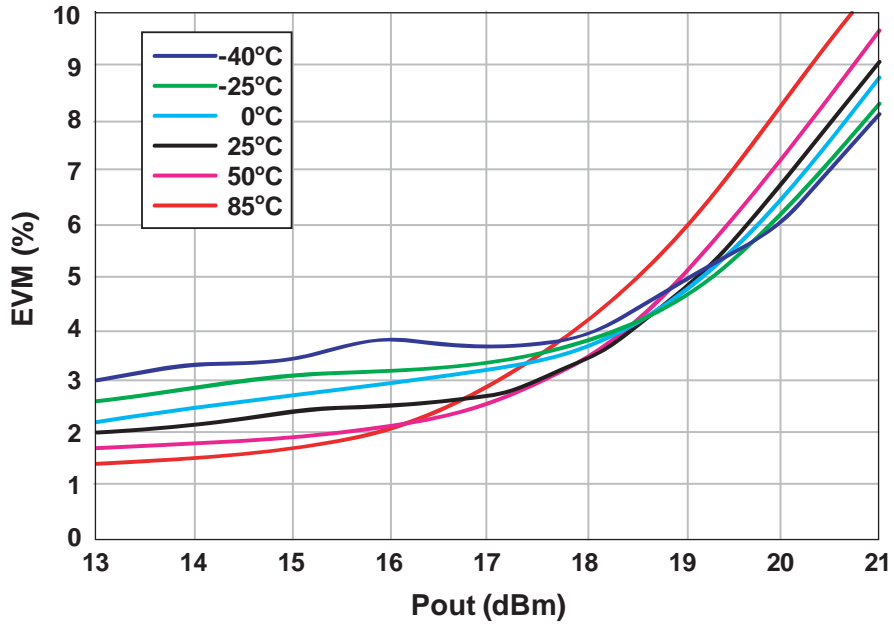


Typical Small-Signal Gain Variation Over Temperature  
(Vc=3.3V, Icq=100mA at Room Temperature)

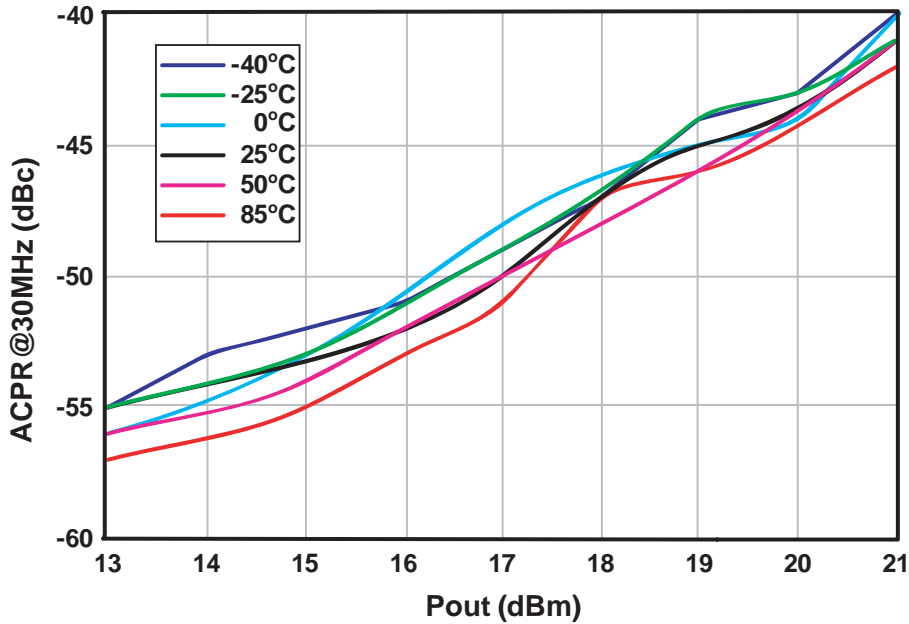


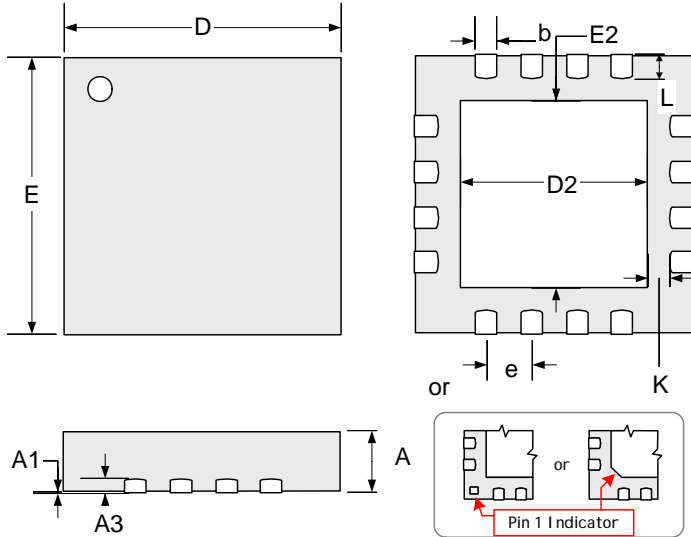
CHARACTERISTIC CURVES

**Typical EVM Variation Over Temperature**  
 (Vc=3.3V, Icq=100mA at Room Temperature, Pout=18dBm, Freq=5.25GHz)

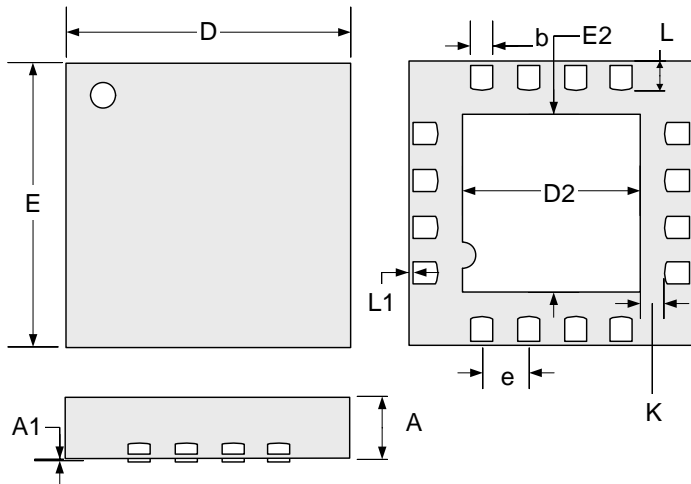


**Typical ACPR Variation Over Temperature**  
 (Vc=3.3V, Icq=100mA at Room Temperature, Pout=18dBm, Freq=5.25GHz)



**PACKAGE DIMENSIONS**
**LQ 16-Pin MLPQ 3x3**


Or



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0	0.05	0	0.002
A3	0.20 REF		0.008 REF	
b	0.18	0.30	0.007	0.012
D	3.00 BSC		0.118 BSC	
E	3.00 BSC		0.118 BSC	
e	0.50 BSC		0.020 BSC	
D2	1.30	1.55	0.051	0.061
E2	1.30	1.55	0.051	0.061
K	0.2	-	0.008	-
L	0.35	0.50	0.012	0.020
L1	-	0.15	-	0.006

**Note:**

- 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.
- Due to multiple qualified assembly sub-contractors either package (with different pin one indicators) may be shipped. Package type will be consistent within the smallest individual container.





LX5503E

InGaP HBT 4 – 6GHz Power Amplifier

PRODUCTION DATA SHEET

NOTES

www.Microsemi.com

NOTES

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