LX5510

InGaP HBT 2.4 – 2.5 GHz Power Amplifier

PRELIMINARY DATA SHEET

DESCRIPTION

The LX5510 is a power amplifier optimized for WLAN applications in the 2.4-2.5GHz 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). With single low voltage supply of 3.3V 20dB power gain between 2.4-2.5GHz, at a low quiescent current of 65mA.

For +19dBm OFDM output power (64QAM, 54Mbps), the PA provides a low EVM (Error-Vector Magnitude) of 3.0%, and consumes 120mA total DC current with the nominal 3.3V bias. With increased bias of 4.5V EVM is ~ 5% at 23dBm.

The LX5510 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 LX5510 an ideal solution for medium-gain power amplifier requirements for IEEE 802.11b/g applications

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

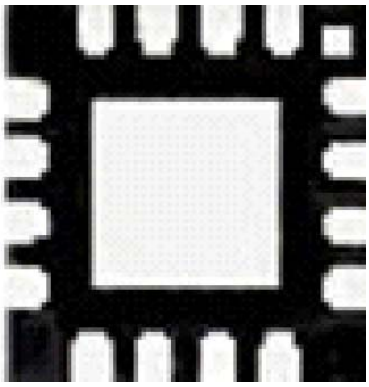
KEY FEATURES

- Advanced InGaP HBT
- 2.4 – 2.5GHz Operation
- Single-Polarity 3.3V Supply
- Low Quiescent Current Icq ~65mA
- Power Gain ~20dB @ 2.45GHz and Pout = 19dBm
- Total Current 120mA for Pout = 19dBm @ 2.45GHz OFDM
- EVM ~ 3.0% for 64QAM / 54Mbps and Pout = 19dBm
- Small Footprint (3x3mm^2)
- Low Profile (0.9mm)

APPLICATIONS

- IEEE 802.11b/g

PRODUCT HIGHLIGHT



PACKAGE ORDER INFO

LQ	Plastic MLPQ 16 pin
LX5510-LQ	

Note: Available in Tape & Reel.
Append the letter "T" to the part number.
(i.e. LX5510-LQT)

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INTEGRATED PRODUCTS

LX5510

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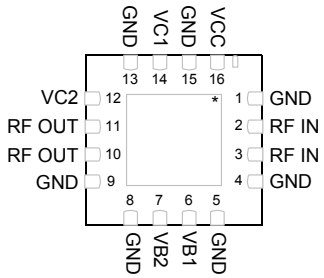
ABSOLUTE MAXIMUM RATINGS

DC Supply Voltage, RF off 6V
Collector Current 400mA
Total Power Dissipation 2W
RF Input Power 15dBm
Maximum Junction Temperature (T_J max) ..... 150°C
Operation Ambient Temperature ..... -40°C to +85°C
Storage Temperature ..... -60°C 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.
x denotes respective pin designator 1, 2, or 3

PACKAGE PIN OUT



* Pad is Ground

LQ PACKAGE
(Bottom View)

FUNCTIONAL PIN DESCRIPTION

Name	Description
RF IN	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	Bias current control voltage for the first stage.
VB2	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.
VCC	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 Vc).
RF OUT	RF output for the power amplifier.
VC1	Power supply for first stage amplifier. The VC1 feedline should be terminated with a 4pF bypass capacitor 50mil apart from the device, followed by a 8.2nH blocking inductor 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	Power supply for second stage amplifier. The VC2 feedline should be driven with a 8.2nH AC blocking inductor and 1uF bypass capacitor. 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.

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ELECTRICAL CHARACTERISTICS

Unless otherwise specified, the following specifications apply over the operating ambient temperature 0°C ≤ T_A ≤ 70°C except where otherwise noted and the following test conditions: Vc = 3.3V, Vref = 2.85V, Icq = 65mA, T_A = 25°C

Parameter	Symbol	Test Conditions	LX5510			Units
			Min	Typ	Max	
Frequency Range	f		2.4		2.5	GHz
Power Gain at Pout = 19dBm	Gp			20		dB
EVM at Pout = 19dBm		64QAM / 54Mbps		3.0		%
Total Current at Pout = 19dBm	Ictotal			120		mA
Quiescent Current	Icq			65		mA
Bias Control Reference Current	Iref	For Icq = 65mA		1.2		mA
Small-Signal Gain	S21			20		dB
Gain Flatness	ΔS21	Over 100MHz		±0.5		dB
Gain Variation Over Temperature	ΔS21	-40°C to +85°C		TBD		dB
Input Return Loss	S11			10		dB
Output Return Loss	S22			10		dB
Reverse Isolation	S12			-40		dB
Second Harmonic		Pout = 19dBm		-60		dBc
Third Harmonic		Pout = 19dbm		-50		dBc
Noise Figure	NF			TBD		dB
Ramp-On Time	t_{ON}	10 ~ 90%			100	ns

Note: All measured data was obtained on a 10mil GETEK evaluation board without heat sink.

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S PARAMETER (3.3V)

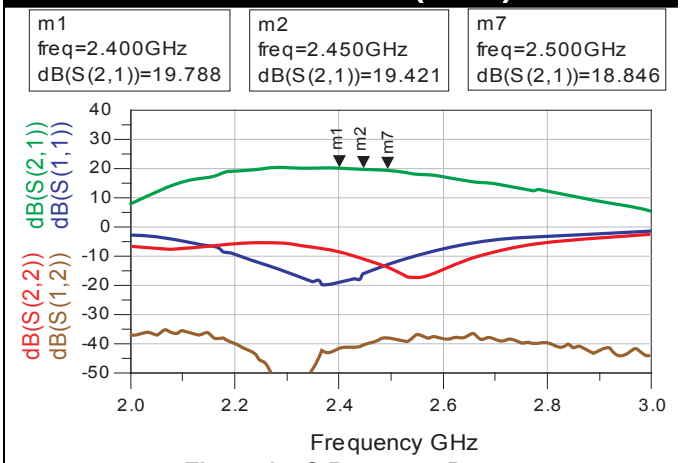

Figure 1 – S-Parameter Data
(VC = 3.3V, VREF = 2.85V, Icq = 65mA)

POWER SWEEP

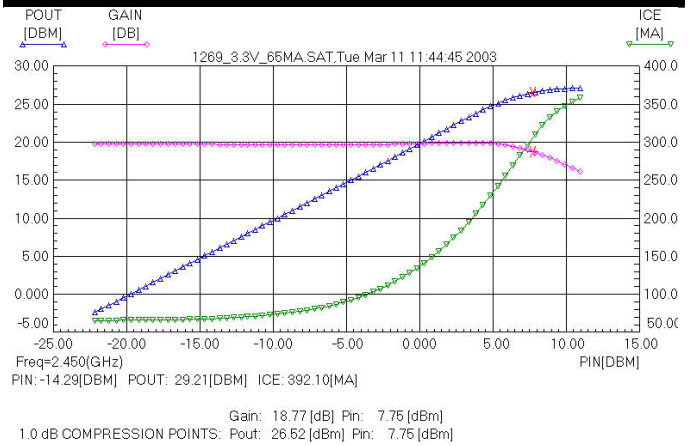

Figure 2 – Power Sweep
(Vc = 3.3V, Vref = 2.85V, Icq = 65mA)

EVM DATA

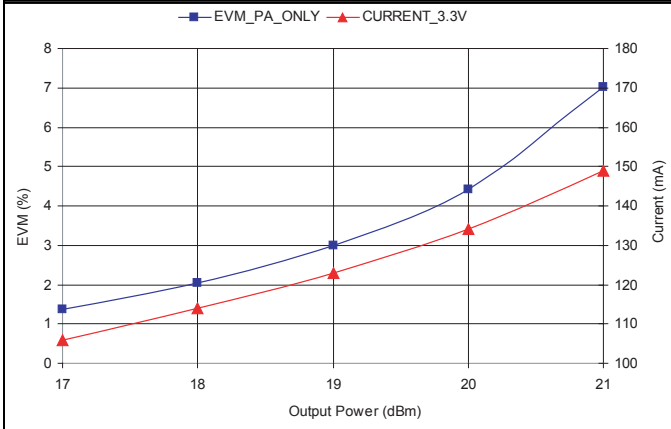

Figure 3 – EVM Data with 54Mbps 64QAM OFDM
(Vc = 3.3V, Vref = 2.85V, Icq = 65mA, Frequency = 2.45GHz)

ACP DATA

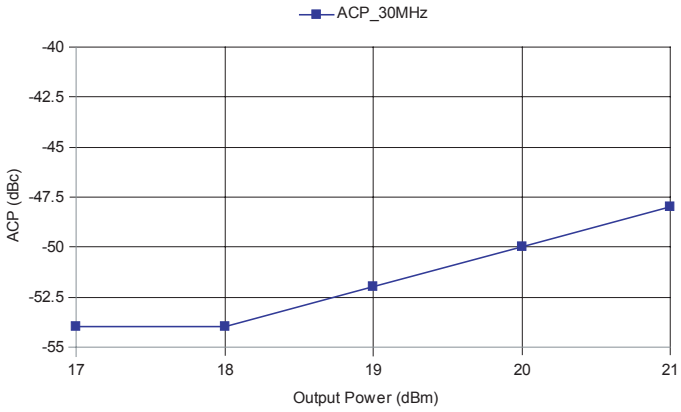

Figure 4 – ACP Data with 54Mbps 64QAM OFDM
(VC = 3.3V, Vref = 2.85V, Icq = 65mA, Frequency = 2.45GHz)

CCK SPECTRUM

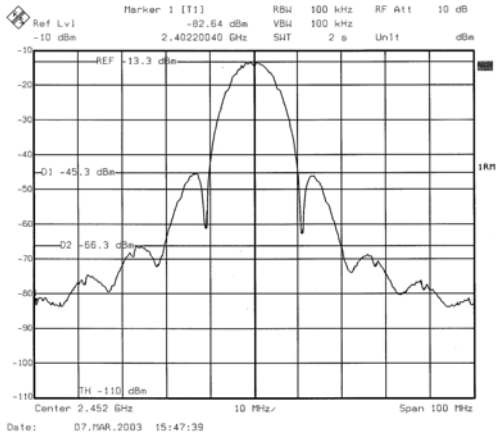

Figure 5 – Spectrum with 23dBm 11Mb/s CCK
(Vc = 3.3V, Vref =2.85V, Icq = 65mA, Ic = 180mA, Freq = 2.45GHz)

S PARAMETER (4.5V)

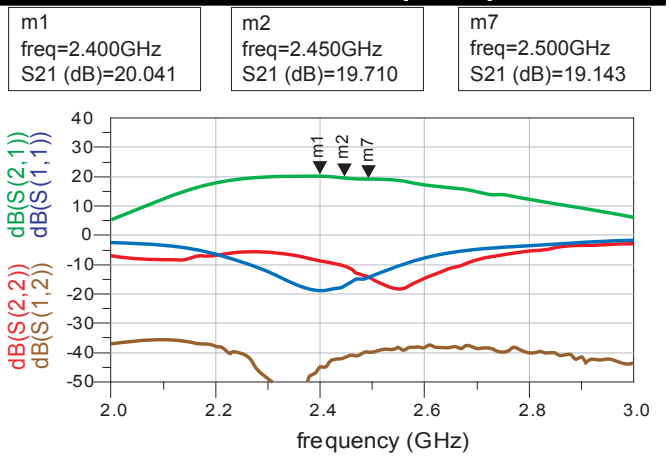

Figure 6 – S-Parameter Data
(Vc = 4.5V, Vref = 2.85V, Icq = 65mA)

POWER SWEEP

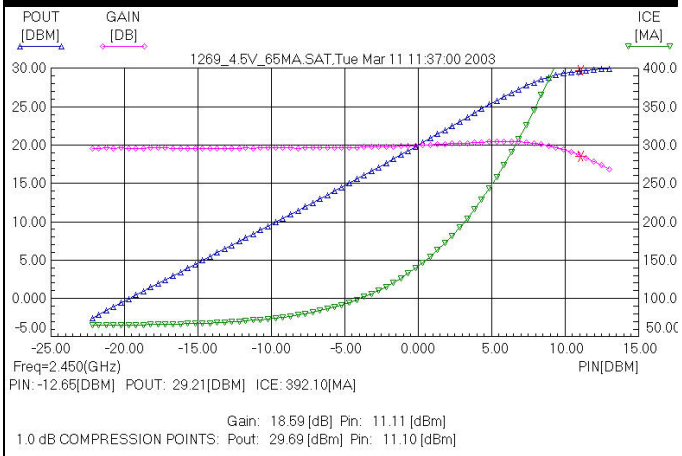

Figure 7 – Power Sweep
(Vc = 4.5V, Vref = 2.85V, Icq = 65mA)

EVM DATA

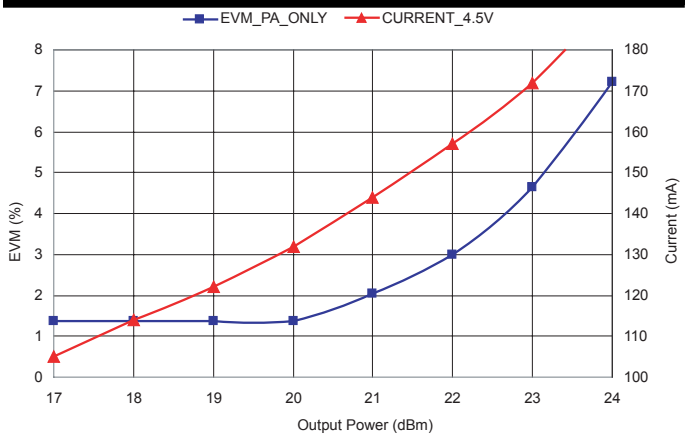

Figure 8 – EVM Data with 54Mbps 64QAM OFDM
(Vc = 4.5V, Vref = 2.85V, Icq =65mA, Frequency =2.45GHz)

ACP DATA

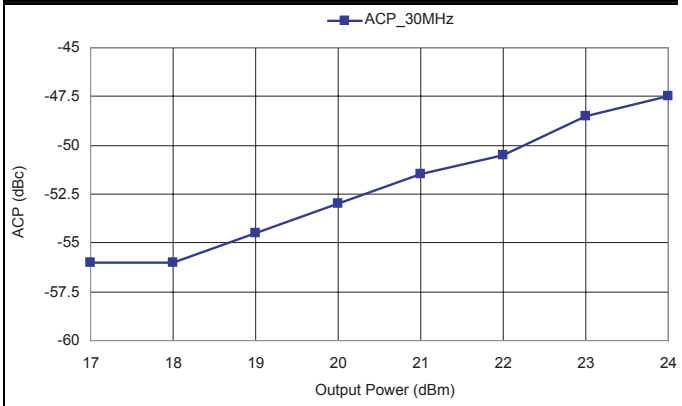

Figure 9 – ACP Data with 54Mbps 64QAM OFDM
(Vc = 4.5V, Vref = 2.85V, Icq = 65mA, Frequency = 2.45GHz)

CCK SPECTRUM

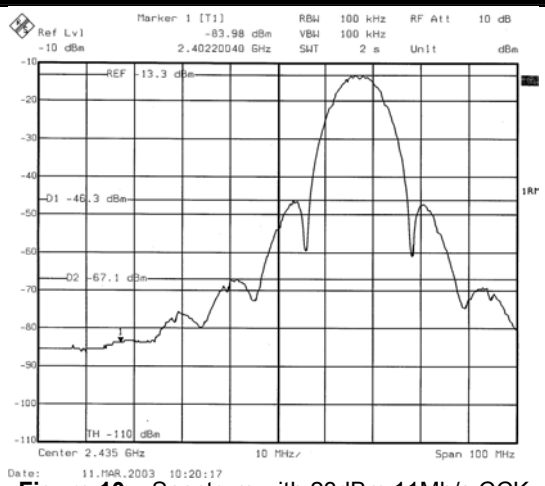

Figure 10 – Spectrum with 23dBm 11Mb/s CCK
(Vc = 4.5V, Vref = 2.85V, Icq = 65mA, Ic = 180mA, Freq = 2.45GHz)

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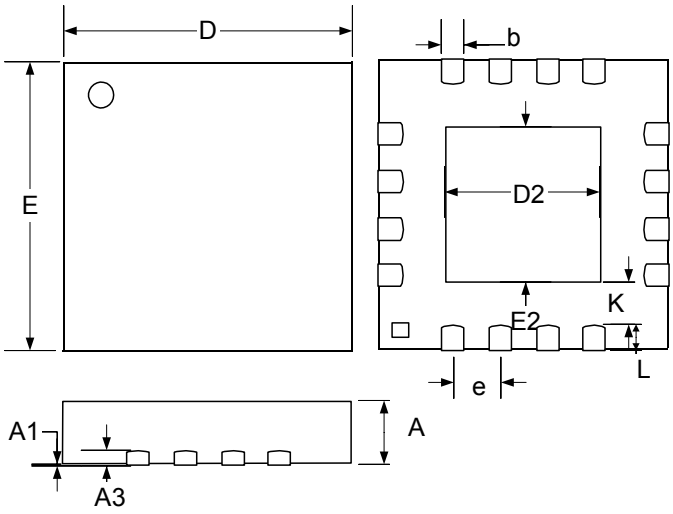
PACKAGE DIMENSIONS

LQ 16-Pin MLPQ Plastic (3x3mm EP)



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0	0.05	0	0.002
A3	0.18	0.30	0.007	0.012
b	0.18	0.30	0.007	0.012
D	3.00 BSC		0.118 BSC	
E	3.00 BSC		0.118 BSC	
e	0.5 BSC		0.020 BSC	
D2	1.50	1.80	0.051	0.061
E2	1.50	1.80	0.051	0.061
K	0.2	-	0.008	-
L	0.35	0.45	0.012	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.

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NOTES