

**DESCRIPTION**

The LX5512B is a power amplifier optimized for WLAN applications in the 2.4-2.5 GHz frequency range. The PA is implemented as a three-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 32 dB 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%, and consumes 140mA total DC current.

The LX5512B is available in a 16-pin 3mmx3mm micro-lead package (MLP). The compact footprint, low profile, and excellent thermal capability of LX5512B meets the requirements of high-gain power amplifiers for IEEE 802.11b/g applications.

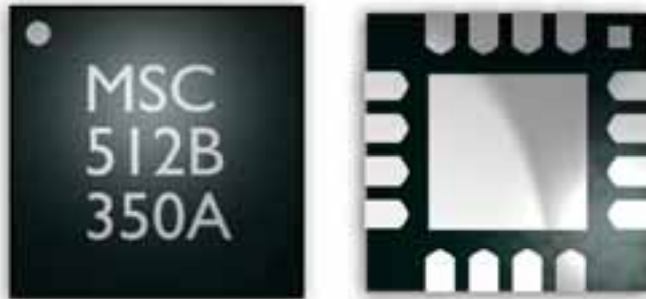
**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**KEY FEATURES**

- Advanced InGaP HBT
- 2.4-2.5GHz Operation
- Single-Polarity 3.3V Supply
- Low Quiescent Current  $I_{CQ}$  ~65mA
- Power Gain ~ 32 dB at 2.45GHz & Pout=19dBm
- Total Current ~140mA for Pout=19dBm at 2.45 GHz OFDM
- EVM ~3 % for 64QAM/ 54Mbps & Pout=19dBm
- Small Footprint: 3x3mm<sup>2</sup>
- Low Profile: 0.9mm

**APPLICATIONS**

- IEEE 802.11b/g

**PRODUCT HIGHLIGHT**

**PACKAGE ORDER INFO**
**LQ**
**Plastic MLPQ  
16 pin**
**LX5512BLQ**

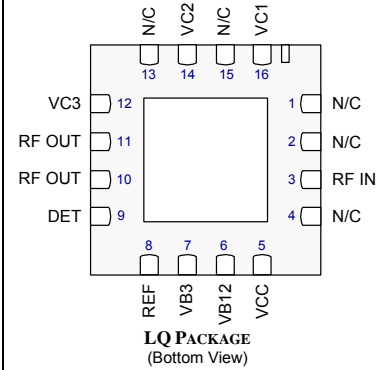
Note: Available in Tape & Reel. Append the letters "TR" to the part number.  
(i.e. LX5512BLQTR)

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.....   | 7V            |
| Collector Current.....   | 500mA         |
| Total Power Dissipation.....   | 2W            |
| RF Input Power.....  | 5dBm          |
| Operation Ambient Temperature.....                                     | -40 to +85°C  |
| Storage Temperature.....   | -60 to +150°C |
| Package Peak Temp for Solder Reflow (40 Seconds Maximum Exposure)..... | 255°C(+5, -0) |

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**


Pb-free 100% Matte Tin Lead Finish

**THERMAL DATA**
**LQ Plastic MLPQ 16-Pin**

|   |               |
|---|---------------|
| <b>THERMAL RESISTANCE-JUNCTION TO CASE, <math>\theta_{JC}</math></b>    | <b>10°C/W</b> |
| <b>THERMAL RESISTANCE-JUNCTION TO AMBIENT, <math>\theta_{JA}</math></b> | <b>50°C/W</b> |

Junction Temperature Calculation:  $T_J = T_A + (P_D \times \theta_{JA})$ .

The  $\theta_{JA}$  numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

**FUNCTIONAL PIN DESCRIPTION**

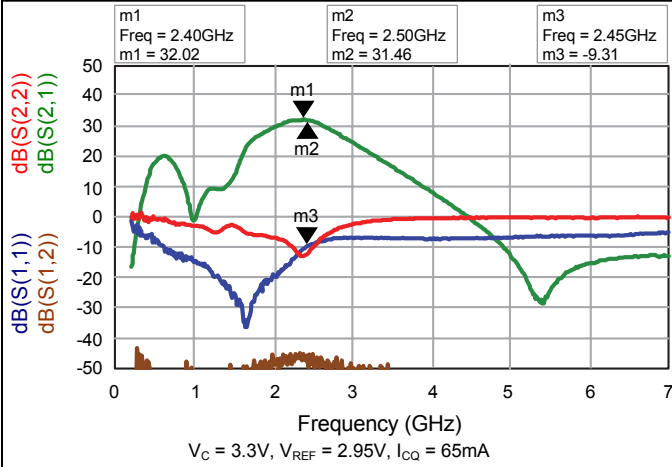
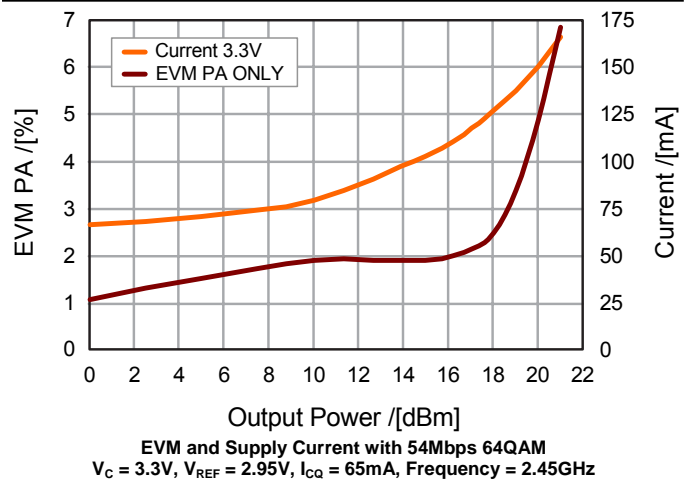
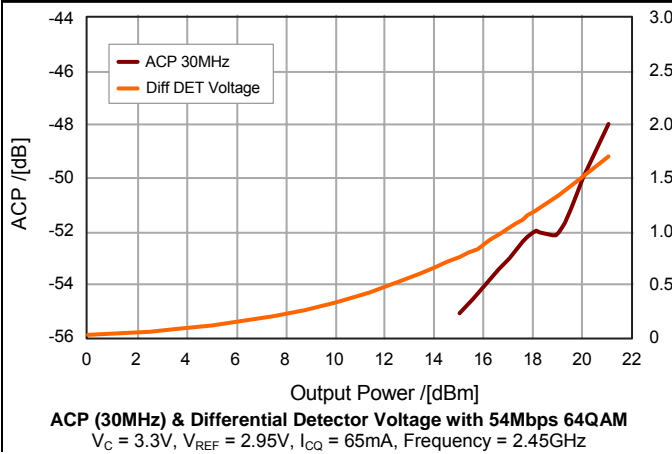
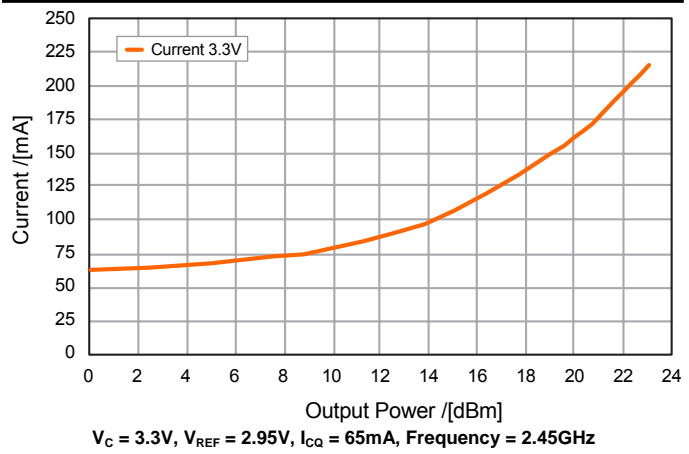
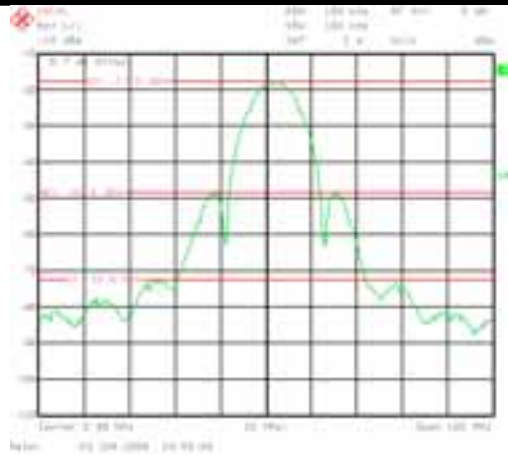
| Name   | Description  |
|--------|--|
| RF IN  | RF input for the power amplifier. This pin is directly connected to base, a 10pF decoupling capacitor may be needed.   |
| VB12   | Bias current control voltage for the first and second stage.   |
| VB3    | Bias current control voltage for the third stage. The VB3 pin can be connected with the first and second stage control voltage (VB12) into a single reference voltage (referred to as $V_{REF}$ ) through an external resistor bridge.                                     |
| VCC    | Supply voltage for the bias reference and control circuits. The VCC feed line should be terminated with a 10nF bypass capacitor close to connector pin. This pin can be combined with VC1, VC2 and VC3 pins, resulting in a single supply voltage (referred to as $V_C$ ). |
| RF OUT | RF output for the power amplifier. This pin is DC-decoupled from the transistor collector of the third stage.  |
| VC1    | Power supply for first stage amplifier. The VC1 feed line should be terminated with a 10pF bypass capacitor, followed by a 36 Ohm resistor. This pin can be combined with VC2, VC3 and VCC pins, resulting in a single supply voltage (referred to as $V_C$ ).             |
| VC2    | Power supply for second stage amplifier. The VC2 feed line should be terminated with a 18pF bypass capacitor. This pin can be combined with VC1, VC3 and VCC pins, resulting in a single supply voltage (referred to as $V_C$ ).   |
| VC3    | Power supply for the third stage amplifier. The VC3 feed line should be terminated with 27 pF and 10 nF bypass capacitors. This pin can be combined with VC1, VC2 and VCC pins, resulting in a single supply voltage (referred to as $V_C$ ).                              |
| REF    | Power detector reference output pin should be terminated with a 100K $\Omega$ loading resistor   |
| DET    | Power detector output pin should be terminated with a 100K $\Omega$ loading resistor   |
| GND    | The center metal base of the MLP package provides both DC and RF ground as well as heat sink for the power amplifier.  |

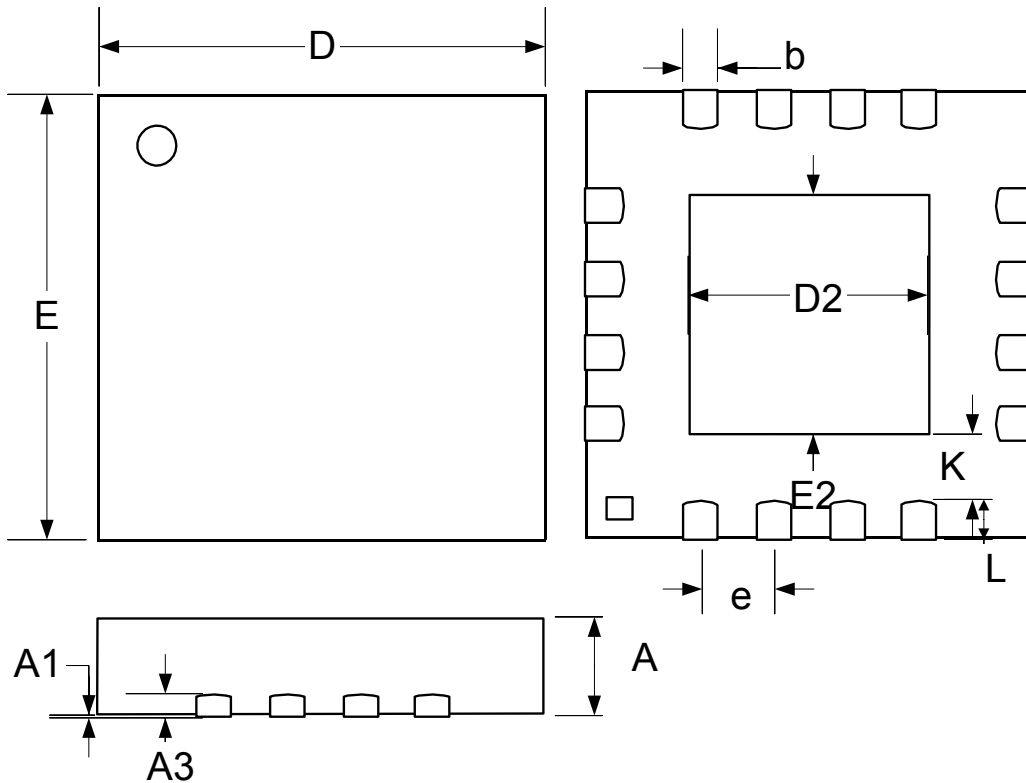
**ELECTRICAL CHARACTERISTICS**

 Test conditions:  $V_C = 3.3V$ ,  $V_{REF} = 2.95V$ ,  $I_{CQ} = 65mA$ ,  $T_A = 25^\circ C$ 

| Parameter                         | Symbol         | Test Conditions     | LX5512B |            |     | Units |
|-----------------------------------|----------------|---------------------|---------|------------|-----|-------|
|                                   |                |                     | Min     | Typ        | Max |       |
| Frequency Range                   | f              |                     | 2.4     |            | 2.5 | GHz   |
| Power Gain @ $P_{OUT} = 19dBm$    | Gp             |                     |         | 32         |     | dB    |
| EVM @ $P_{OUT} = 19dBm$           |                | 64QAM / 54Mbps      |         | 3.0        |     | %     |
| Total Current @ $P_{OUT} = 19dBm$ | $I_{C\_TOTAL}$ |                     |         | 140        |     | mA    |
| Quiescent Current                 | $I_{CQ}$       |                     |         | 65         |     | mA    |
| Bias Control Reference Current    | $I_{REF}$      | For $I_{CQ} = 65mA$ |         | 1.8        |     | mA    |
| Small-Signal Gain                 | S21            |                     |         | 32         |     | dB    |
| Gain Flatness                     | $\Delta S21$   | Over 100MHz         |         | $\pm 0.25$ |     | dB    |
| Gain Variation Over Temperature   | $\Delta S21$   | 0 to $+85^\circ C$  |         | $\pm 0.25$ |     | dB    |
| Input Return Loss                 | S11            |                     |         | 10         |     | dB    |
| Output Return Loss                | S22            |                     |         | 10         |     | dB    |
| Reverse Isolation                 | S12            |                     |         | 45         |     | dB    |
| Second Harmonic                   |                | $P_{OUT} = 19dBm$   |         | -40        |     | dBc   |
| Third Harmonic                    |                | $P_{OUT} = 19dBm$   |         | -40        |     | dBc   |
| Total Current @ $P_{OUT} = 23dBm$ |                | 11Mbps CCK          |         | 215        |     | mA    |
| 2 <sup>nd</sup> Side Lobe @ 23dBm |                | 11Mbps CCK          |         | -55        |     | dBc   |
| Ramp-On Time                      | $t_{ON}$       | 10 ~ 90%            |         |            | 100 | ns    |
| Differential Detector Response    |                | 19dBm OFDM          |         | 1.4        |     | V     |

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

**S-PARAMETER DATA**

**EVM & SUPPLY CURRENT**

**ACP & DIFF DETECTOR VOLTAGE**

**CURRENT @ 11MBPS CCK**

**23DBM OUTPUT @ 11MBPS CCK**

 $V_C = 3.3V, V_{REF} = 2.95V, I_{CQ} = 65mA, \text{Frequency} = 2.45GHz$

**PACKAGE DIMENSIONS**
**LQ** 16-Pin MLPQ 3x3 (67x67 mil DAP)


| 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 |



**Microsemi**<sup>®</sup>

**LX5512B**

**InGaP HBT 2.4 – 2.5 GHz Power Amplifier**

**PRODUCTION DATA SHEET**

**NOTES**

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