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**DESCRIPTION**

The LX5510B is a power amplifier optimized for WLAN applications in the 2.4-2.5 GHz 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 a single supply of 3.3 volts and a low quiescent current of 70mA the power gain is 19dB 2.4 – 2.5GHz.

For +19dBm OFDM output power (64QAM, 54Mbps), the PA provides a low EVM (Error-Vector Magnitude) of 3.0%, and consumes 135mA total DC current with the nominal 3.3V bias.

The LX5510B 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 LX5510B an ideal solution for medium-gain power amplifier requirements for IEEE 802.11b/g applications

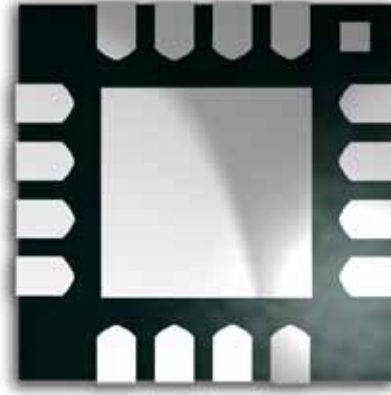
**KEY FEATURES**

- Advanced InGaP HBT
- 2.4 – 2.5GHz Operation
- Single-Polarity 3.3V Supply
- Low Quiescent Current  $I_{CQ}$  ~70mA
- Power Gain ~19dB @ 2.45GHz and  $P_{out}$  = 19dBm
- Total Current 135mA for  $P_{out}$  = 19dBm @ 2.45GHz OFDM
- EVM ~ 3.0% for 64QAM / 54Mbps and  $P_{out}$  = 19dBm
- Small Footprint (3 x 3 mm<sup>2</sup>)
- Low Profile (0.9mm)

**APPLICATIONS**

- IEEE 802.11b/g

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

**PRODUCT HIGHLIGHT**

**PACKAGE ORDER INFO**

|            |           |                          |
|------------|-----------|--------------------------|
| $T_A$ (°C) | <b>LQ</b> | Plastic MLPQ<br>16 pin   |
|            |           | RoHS Compliant / Pb-free |
| 0 to 70    |           | <b>LX5510BLQ</b>         |

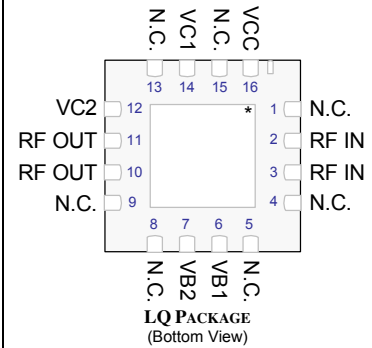
Note: Available in Tape & Reel. Append the letters "TR" to the part number. (i.e. LX5510BLQ-TR)

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

**ABSOLUTE MAXIMUM RATINGS**

|  |                 |
|--|-----------------|
| DC Supply Voltage, RF off .....  | 6V              |
| Collector Current .....  | 400mA           |
| Total Power Dissipation.....   | 2W              |
| RF Input Power .....   | 15dBm           |
| Operation Ambient Temperature .....                                      | -40°C to +85°C  |
| Storage Temperature.....   | -65°C to +150°C |
| Package Peak Temp. for Solder Reflow (40 seconds maximum exposure) ..... | 260°(+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**


RoHS / Pb-free 100% Matte Tin Lead Finish

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

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

**FUNCTIONAL PIN DESCRIPTION**

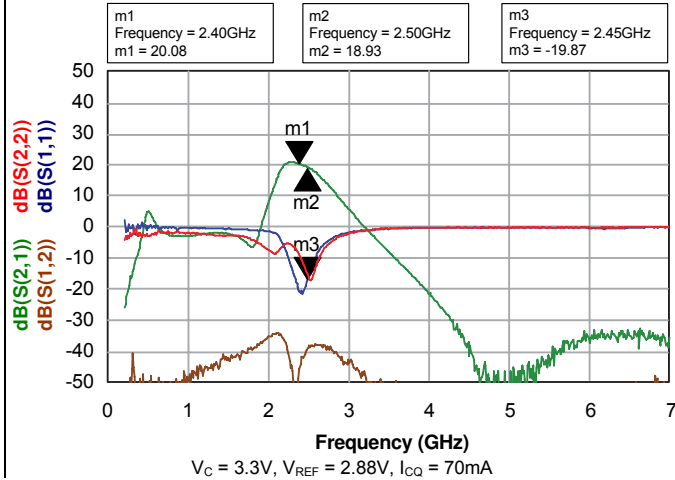
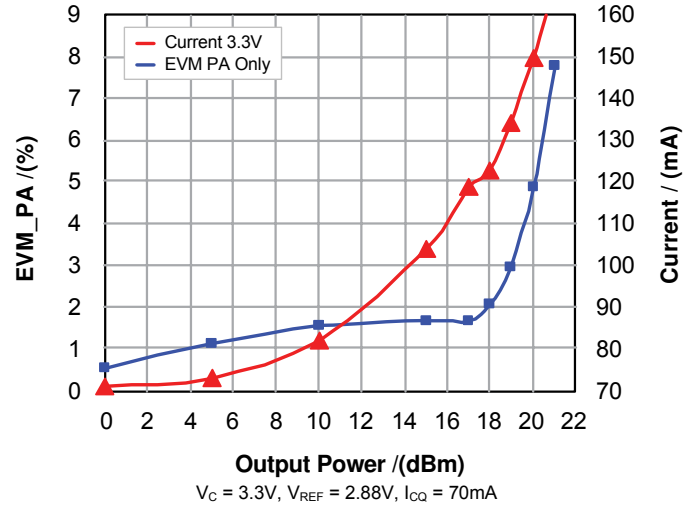
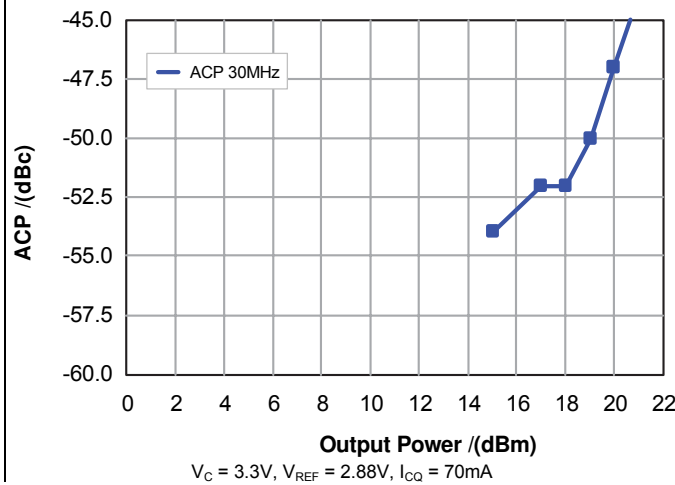
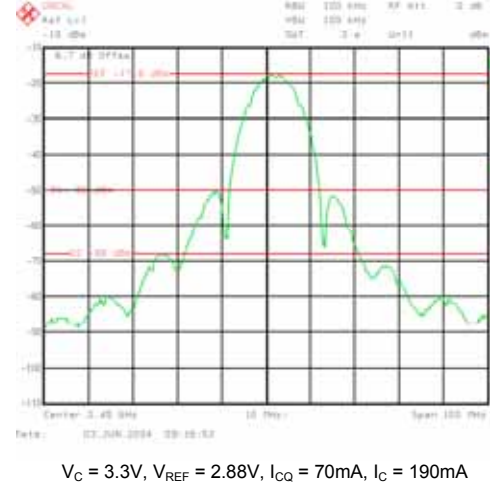
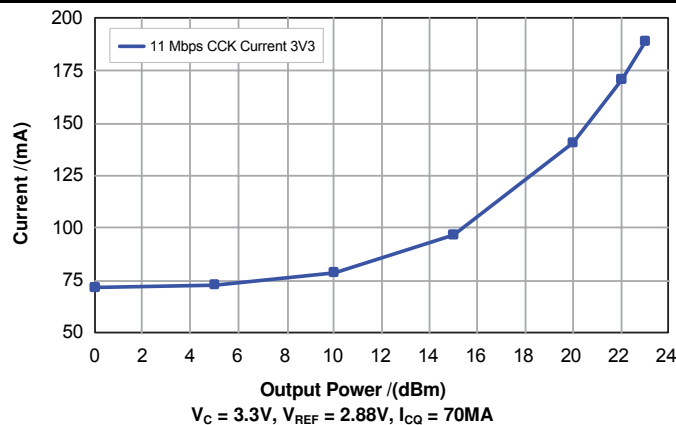
| Name   | Description  |
|--------|--|
| RF IN  | RF input for the power amplifier. This pin is DC-short to GND but AC-coupled to the transistor base of the first stage.  |
| VB1    | Bias current control voltage for the first stage.  |
| VB2    | Bias current control voltage for the second stage. The VB2 pin can be connected with the first stage control voltage (VB1) into a single reference voltage (referred to as $V_{REF}$ ) 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 $V_C$ ).   |
| RF OUT | RF output for the power amplifier.   |
| VC1    | Power supply for first stage amplifier. The VC1 feed line should be terminated with a 3.9pF bypass capacitor 50 mil 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 $V_C$ ). |
| VC2    | Power supply for second stage amplifier. The VC2 feed line should be driven with a 8.2nH AC blocking inductor and 1μF bypass capacitor. This pin can be combined with VC1 and VCC pins, resulting in a single supply voltage (referred to as $V_C$ ).  |
| GND    | The center metal base of the MLP package provides both DC and RF ground as well as heat sink for the power amplifier.  |

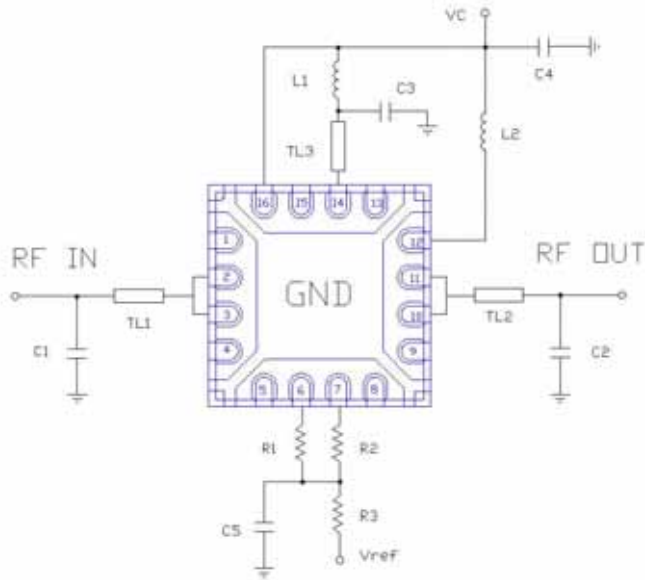
**ELECTRICAL CHARACTERISTICS**

Unless otherwise specified, the following specifications apply over the operating ambient temperature  $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$  except where otherwise noted and the following test conditions:  $V_C = 3.3\text{V}$ ,  $V_{\text{REF}} = 2.88\text{V}$ ,  $I_{\text{CQ}} = 70\text{mA}$ ,  $T_A = 25^{\circ}\text{C}$

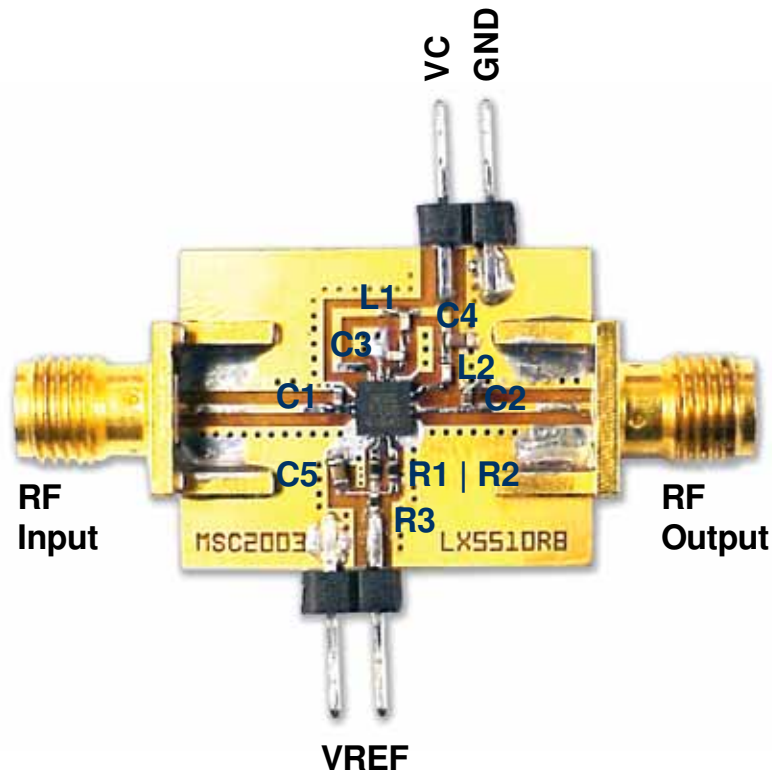
| Parameter                                       | Symbol                | Test Conditions                              | LX5510B |           |     | Units |
|---|-----------------------|--|---------|-----------|-----|-------|
|   |                       |  | Min     | Typ       | Max |       |
| <b>SECTION HEADER</b>                           |                       |  |         |           |     |       |
| Frequency Range                                 | f                     |  | 2.4     |           | 2.5 | GHz   |
| Power Gain at $P_{\text{OUT}} = 19\text{dBm}$   | $G_P$                 |  |         | 19        |     | dB    |
| EVM at $P_{\text{out}} = 19\text{dBm}$          |                       | 64QAM / 54Mbps OFDM                          |         | 3.0       |     | %     |
| Total Current @ $P_{\text{OUT}} = 19\text{dBm}$ | $I_{\text{C\_TOTAL}}$ |  |         | 135       |     | mA    |
| Quiescent Current                               | $I_{\text{CQ}}$       |  |         | 70        |     | mA    |
| Bias Control Reference Current                  | $I_{\text{REF}}$      | For $I_{\text{CQ}} = 70\text{mA}$            |         | 1.5       |     | mA    |
| Small-Signal Gain                               | S21                   |  |         | 19        |     | dB    |
| Gain Flatness                                   | $\Delta\text{S21}$    | Over 100MHz                                  |         | $\pm 0.5$ |     | dB    |
| Gain Variation Over Temperature                 | $\Delta\text{S21}$    | $0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ |         | $\pm 0.5$ |     | dB    |
| Input Return Loss                               | S11                   |  |         | 10        |     | dB    |
| Output Return Loss                              | S22                   |  |         | 10        |     | dB    |
| Reverse Isolation                               | S12                   |  |         | 40        |     | dB    |
| Second Harmonic                                 |                       | $P_{\text{out}} = 19\text{dBm}$              |         | -55       |     | dBc   |
| Third Harmonic                                  |                       | $P_{\text{out}} = 19\text{dBm}$              |         | -55       |     | dBc   |
| 2 <sup>nd</sup> Side Lobe                       |                       | 23 dBm 11 Mbps CCK                           |         | -50       |     | dBc   |
| Total current $P_{\text{out}}=23\text{ dBm}$    |                       | 11 Mbps CCK                                  |         | 190       |     | mA    |
| Ramp-On Time                                    | $t_{\text{ON}}$       | 10 ~ 90%                                     |         |           | 100 | ns    |

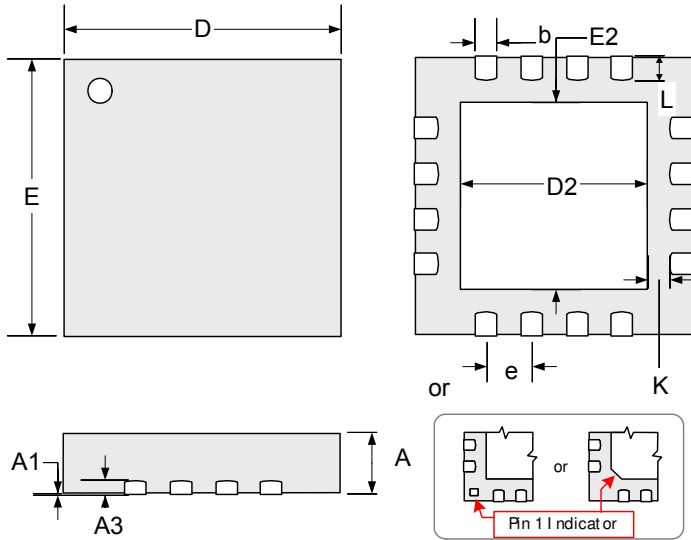
Note: All measured data was obtained on a 10 mil GETEK evaluation board without heat sink.

**S PARAMETER DATA**

**EVM DATA WITH 54MB/S64QAM OFDM**

**ACP DATA WITH 54MB/S 64 QAM OFDM**

**SPECTRUM WITH 23DBM 11MB/S CCK**

**SUPPLY CURRENT WITH 11MB/S CCK**


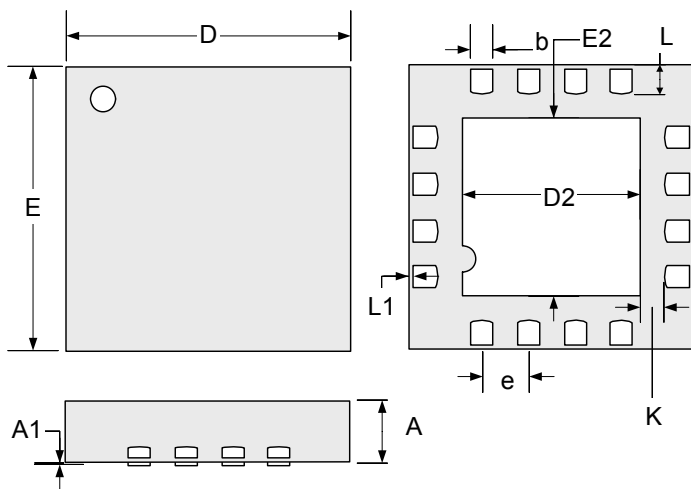
**EVALUATION BOARD**

**Recommended BOM**

| Location  | Value                                  |
|-----------|--|
| C1        | 2.7pF (0402)                           |
| C2        | 2.4pF (0402)                           |
| C3        | 3.9pF (0402)                           |
| C4,C5     | 1μF (0603)                             |
| L1,L2     | 8.2nH(0402)                            |
| R1        | 350 Ω (0402)                           |
| R2        | 200 Ω (0402)                           |
| R3        | 100 Ω (0402)                           |
| TL1       | 30/22 mil (L/W)                        |
| TL2       | 100/10 mil (L/W)                       |
| TL3       | 60/10 mil (L/W)                        |
| Substrate | 10 mil GETEK                           |
|           | $\epsilon_r = 3.9, \tan \delta = 0.01$ |
|           | 50Ω Microstrip width: 22 mil           |



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


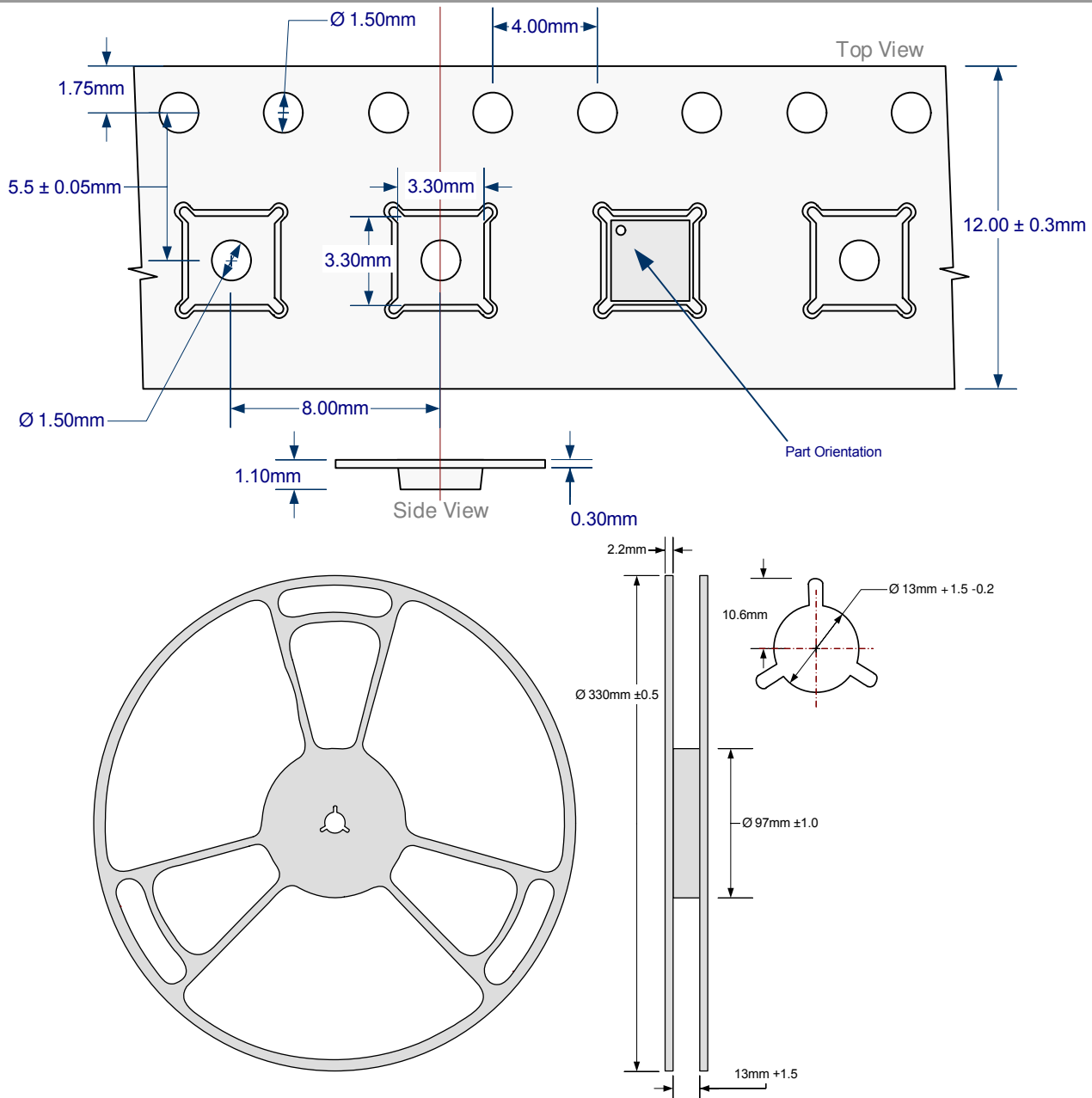
Or



| 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.

**TAPE AND REEL**
**Tape And Reel Specification**






**Microsemi**<sup>®</sup>

**LX5510B**

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

**PRODUCTION DATA SHEET**

**NOTES**

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