CX65102

1700 – 2200 MHz Linear Power Amplifier

Conexant's CX65102 power amplifier is a fully matched 6-pin Leadless Chip Carrier (LCC) surface mount module, developed for Personal Communication System (PCS) and Wireless Local Loop (WLL) applications. This small, power-efficient amplifier has a full 1700 to 2200 MHz bandwidth coverage packed into a single compact package. All active circuitry in the module is contained in a single Gallium Arsenide (GaAs) Microwave Monolithic Integrated Circuit (MMIC). This device is manufactured with Conexant's Aluminum (Al)GaAs Heterojunction Bipolar Transistor (HBT) process, which allows for single supply operation while maintaining high efficiency and good linearity.

Figure 1 shows a functional block diagram for the CX65102. The device package and pinout are shown in Figure 2.

Distinguishing Features

- Typical P_{OUT} of 28 dBm
- High linearity
- Low power consumption
- 6-pin LCC package
- Single +3.4 V supply

Applications

- PCS/DCS/UMTS
- Repeaters
- WLL, and Industrial, Scientific, Medical (ISM) bands
- Telematics

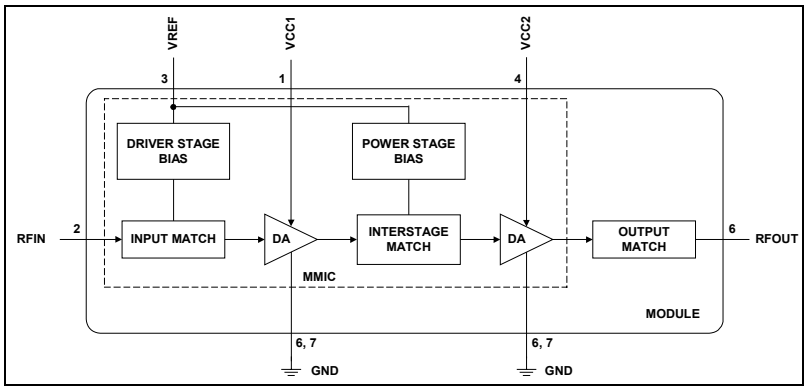


Figure 1. CX65102 Functional Block Diagram

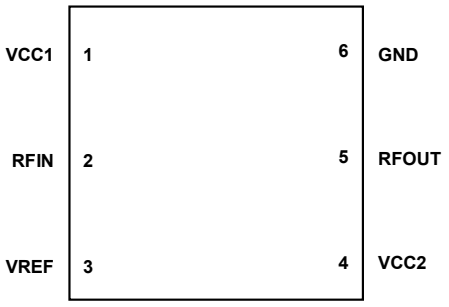


Figure 2. CX65102 Pinout – 6-Pin LCC Package Top View

Electrical and Mechanical Specifications

The signal pin assignments and functions are described in Table 1. The absolute maximum ratings of the CX65102 are provided in Table 2. The recommended operating conditions are specified in Table 3 and electrical specifications are provided in Table 4.

Typical performance characteristics over temperature of the CX65102 are illustrated in Figures 3, 4, 5, 6, 7, and 8.

Table1. CX65102 Signal Descriptions

Pin #	Name	Description
1	VCC1	Supply voltage
2	RFIN	RF input
3	VREF	Reference voltage
4	VCC2	Supply voltage
5	RFOUT	RF output
6	GND	Ground

Table 2. CX65102 Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Units
RF input power	P_{IN}			7	dBm
Supply voltage	VCC			5	V
Reference voltage	V_{REF}			3.3	V
Case operating temperature	T_C	–30		110	°C
Storage temperature	T_{ST}	–55		125	°C
Note: No damage to device if only one parameter is applied at a time with other parameters at nominal conditions.					

Table 3. CX65102 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units
Supply voltage	VCC		3.4		V
Reference voltage	V_{REF}		3		V
Operating frequency	F_O	1700	1900	2200	MHz
Case operating temperature	T_C	–30	25	85	°C

Table 4. CX65102 Electrical Characteristics
(VCC = 3.4 V, V_{REF} = 3 V, Frequency = 1900 MHz, T_C = 25 °C)

Parameter	Symbol	Test Conditions	Min	Typical	Max	Units
Analog Inputs						
Frequency range			1700	1900	2200	MHz
Quiescent current	Iq			95	130	mA
Small signal gain	G	P_{IN} = –15 dBm	20	22		dB
Output power	P_{OUT}	P_{IN} = 4 dBm	26	28		dBm
Efficiency	PAE	P_{IN} = 4 dBm	19	24		%
Noise Figure (NF)	NF			4.2	5	dB
Output IP3	OIP3	Two tones with P_{IN} = 0 dBm per tone	35	39		dBm
Note: The above specifications apply only to the 1900 MHz operating frequency.						

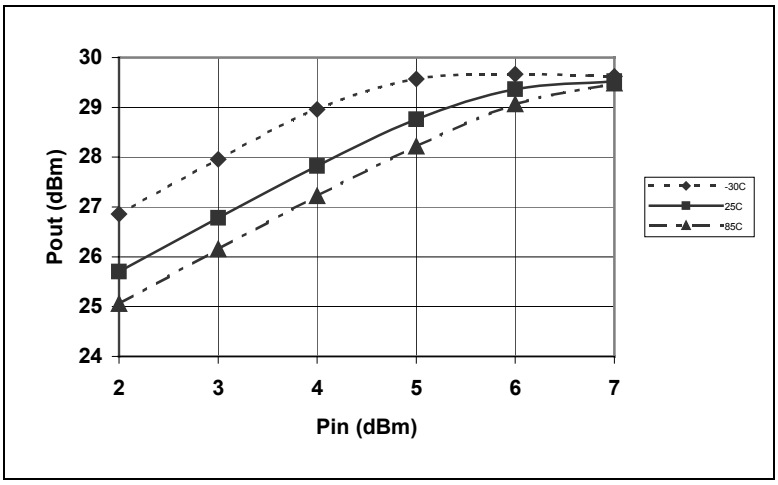


Figure 3. Typical P_{OUT} vs P_{IN} Over Temperature

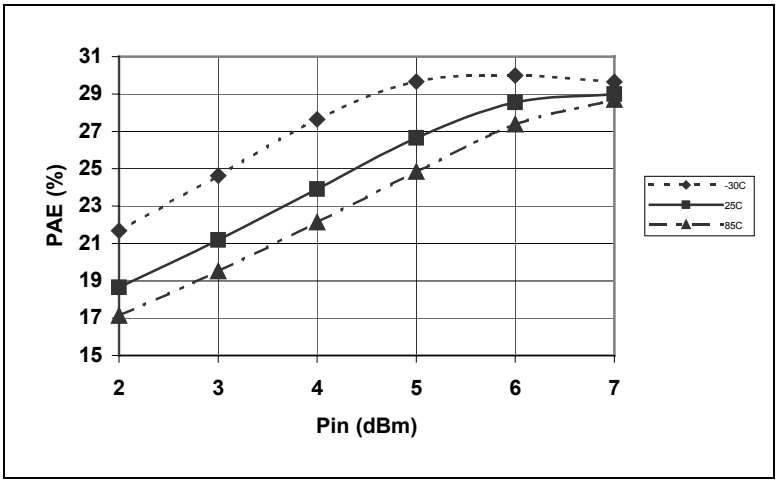


Figure 4. Typical PAE vs P_{IN} Over Temperature

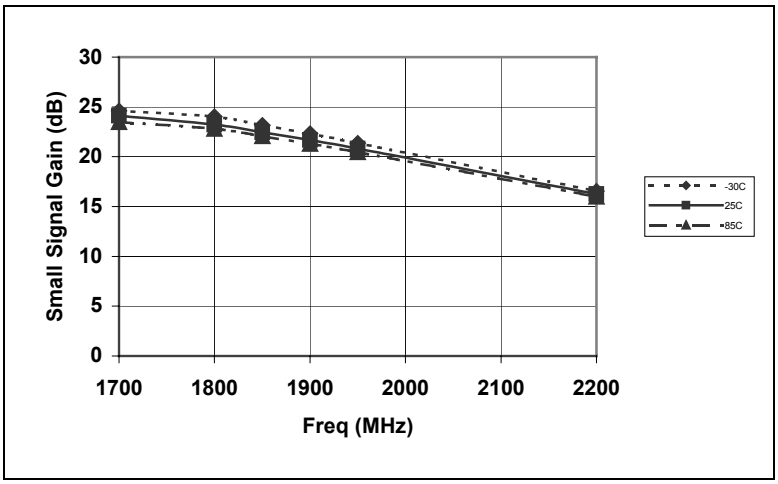


Figure 5. Typical Small Signal Gain vs Frequency Over Temperature

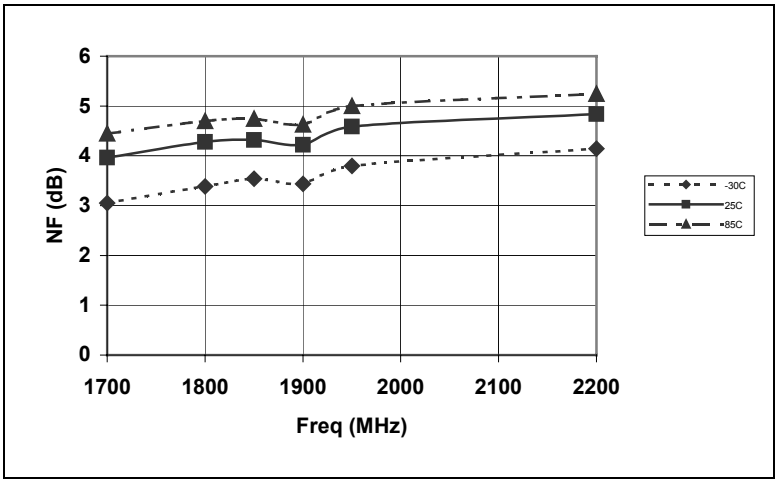


Figure 6. Typical Noise Figure vs Frequency Over Temperature

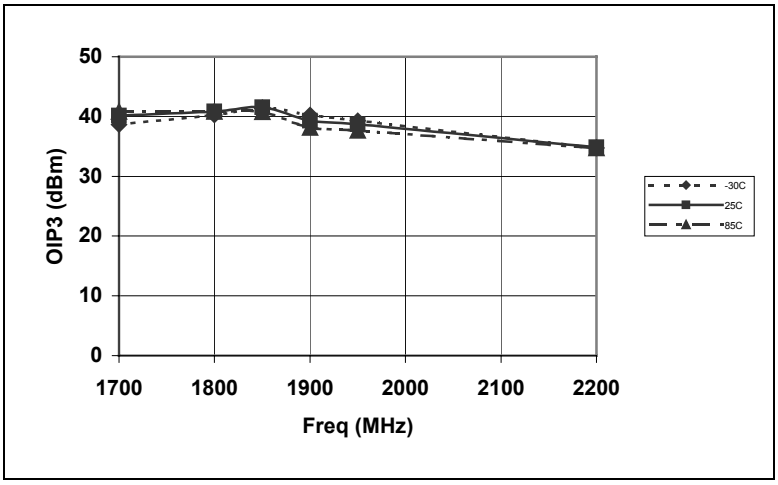


Figure 7. Typical OIP3 vs Frequency Over Temperature

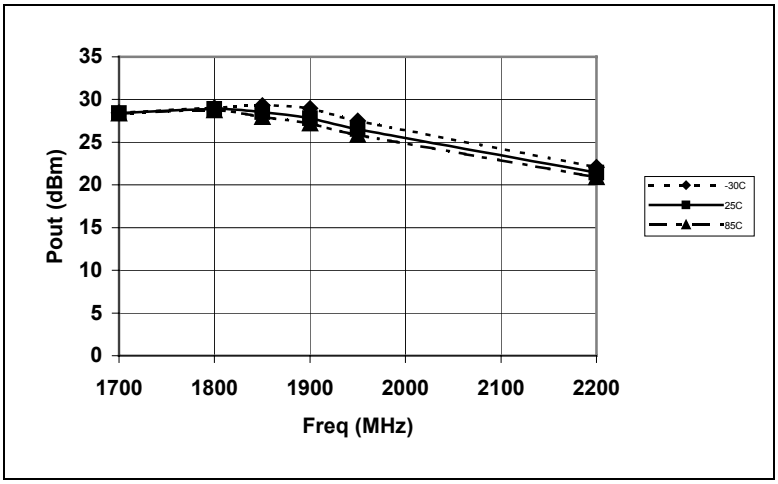


Figure 8. Typical POUT vs Frequency Over Temperature

Evaluation Board Description

Conexant's CX65102 Evaluation Board is used to test the CX65102 power amplifier's performance. The CX65102 Evaluation Board schematic diagram is shown in Figure 9. The schematic shows the basic design of the board for the 1700 to 2200 MHz range. Figure 10 provides the Evaluation Board assembly diagram. Figure 11 provides the Evaluation Board layer detail.

Circuit Design Considerations

The following design considerations are general in nature and must be followed regardless of final use or configuration:

1. Paths to ground should be made as short as possible.
2. The ground pad of the CX65102 power amplifier has special electrical and thermal grounding requirements. This pad is the main thermal conduit for heat dissipation. Since the circuit board acts as the heat sink, it must shunt as much heat as possible from the amplifier. As such, design the connection to the ground pad to dissipate the maximum wattage produced to the circuit board. Multiple vias to the grounding layer are required.
3. Two external output bypass capacitors, 1000 pF and 4.7 µF, are required on the VCC2 (pin 4) supply input. The same two capacitors are also required on the VCC1 supply input, but VCC1 and VCC2 are hardwired together on the Evaluation Board (see Figure 9). Both capacitors should be placed in parallel between the supply line and ground. Also, a bypass capacitor of 0.01 µF is required on the VREF input (pin 3). See Figure 9 for a detailed diagram.

4. At the RF input (pin 2), a DC blocking capacitor is required.

5. The RF output includes an onboard internal DC blocking capacitor. All impedance matching is provided internally. Therefore, the application only needs to provide a good 50 Ω load.

Testing Procedure

Use the following procedure to set up the CX65102 Evaluation Board for testing. Refer to Figure 12 for guidance:

1. Connect a +3.4 V supply voltage to VCC1 and VCC2, and +3.0 V supply voltage to VREF. If available, enable the current limiting function of the power supplies to 1.0 A for the +3.4 V supply current and 30 mA for the +3.0 V supply current.

2. Connect a signal generator to the RF signal input port. Set it to the desired RF frequency at a power level of 4 dBm or less to the Evaluation Board but do NOT enable the RF signal.

3. Connect a spectrum analyzer to the RF signal output port.

4. Enable the power supply.

5. Enable the RF signal.

6. Take measurements.

***Caution**: If the input signal exceeds the rated power, the CX65102 Evaluation Board can be permanently damaged.*

Package Dimensions

Figure 13 shows the package dimensions for the 6-pin CX65102 LCC and Figure 14 provides the tape and reel dimensions.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

If the part is attached in a reflow oven, the temperature ramp rate should not exceed 5 °C per second. Maximum temperature should not exceed 225 °C and the time spent at a temperature that exceeds 210 °C should be limited to less than 10 seconds. If the part is manually attached, precaution should be taken to ensure that the part is not subjected to a temperature that exceeds 300 °C for more than 10 seconds.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. For additional details on both attachment techniques, precautions, and recommended handling procedures, refer to the Conexant document *Solder Reflow Application Note*, document number 101536.

Production quantities of this product are shipped in a standard tape and reel format. For packaging details, refer to the Conexant document *Tape and Reel Information Application Note*, document number 101568.

Electrostatic Discharge (ESD) Sensitivity

The CX65102 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper ESD precautions.

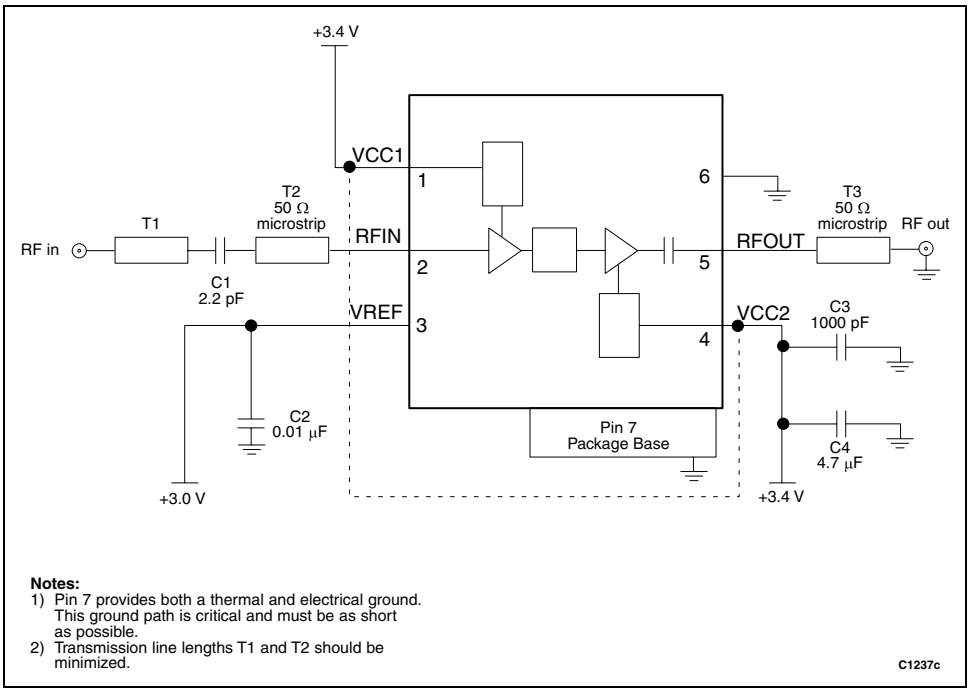


Figure 9. Evaluation Board Schematic, 1700 MHz to 2200 MHz

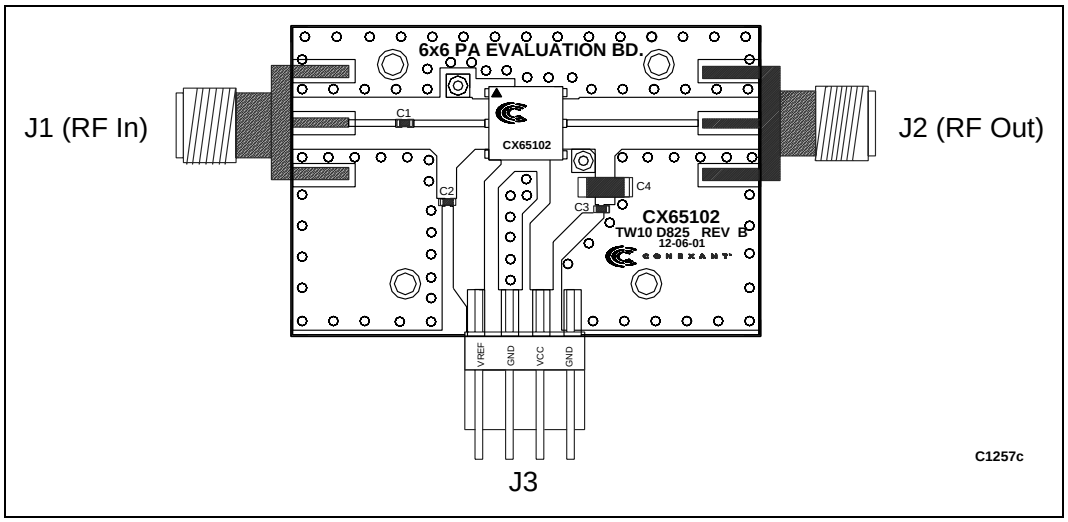
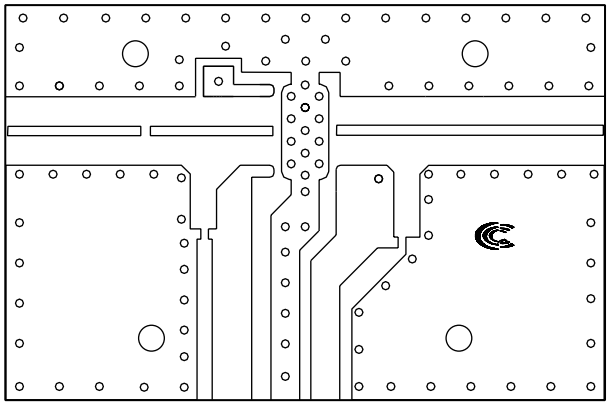
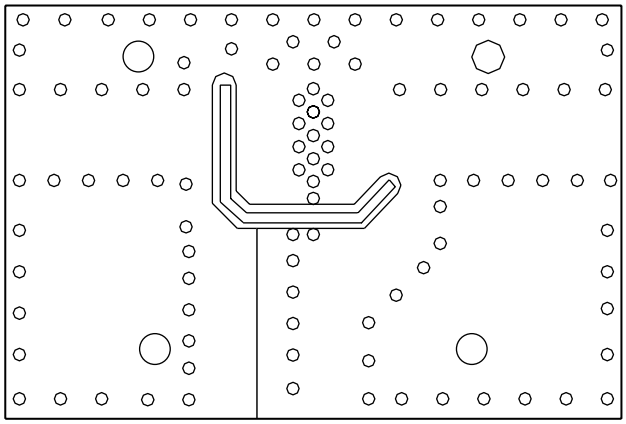


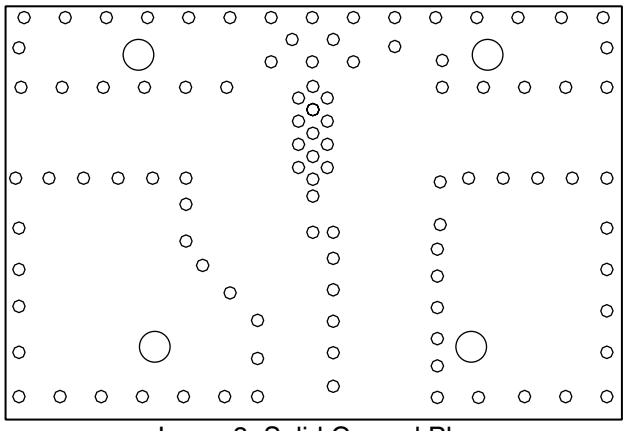
Figure 10. Evaluation Board Assembly Diagram (Top View)



Layer 1: Top - Metal



Layer 2: Inner Traces



Layer 3: Solid Ground Plane

C1253c

Figure 11. Evaluation Board Layer Detail

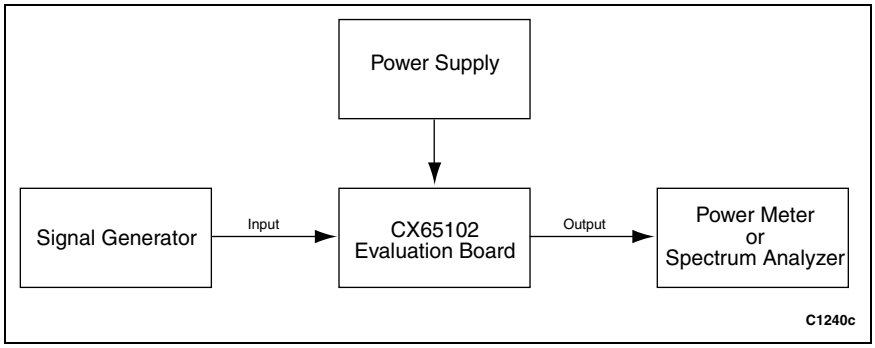


Figure 12. CX65102 Evaluation Board Testing Configuration

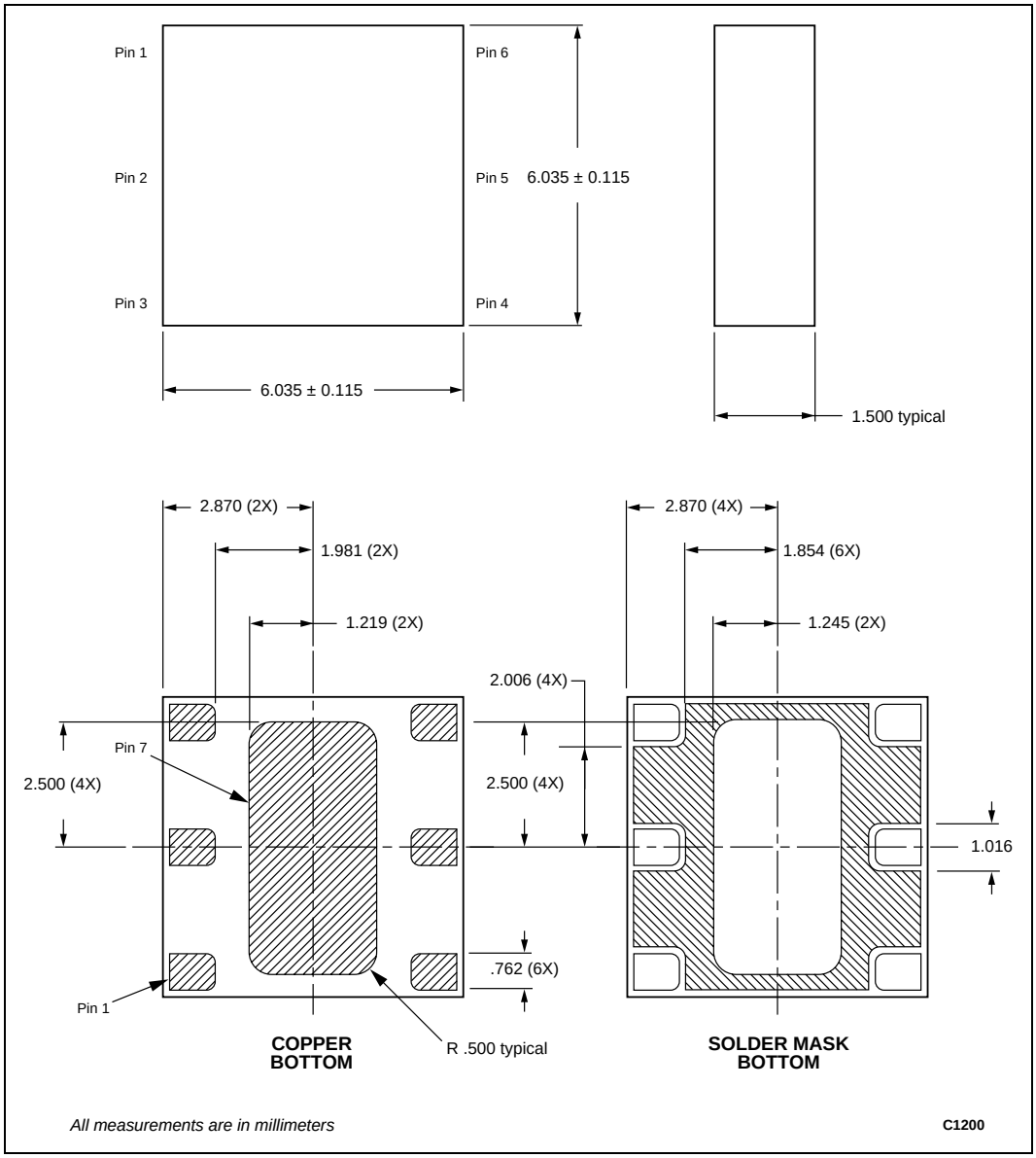


Figure 13. CX65102 6-Pin LCC Package Dimension Drawing

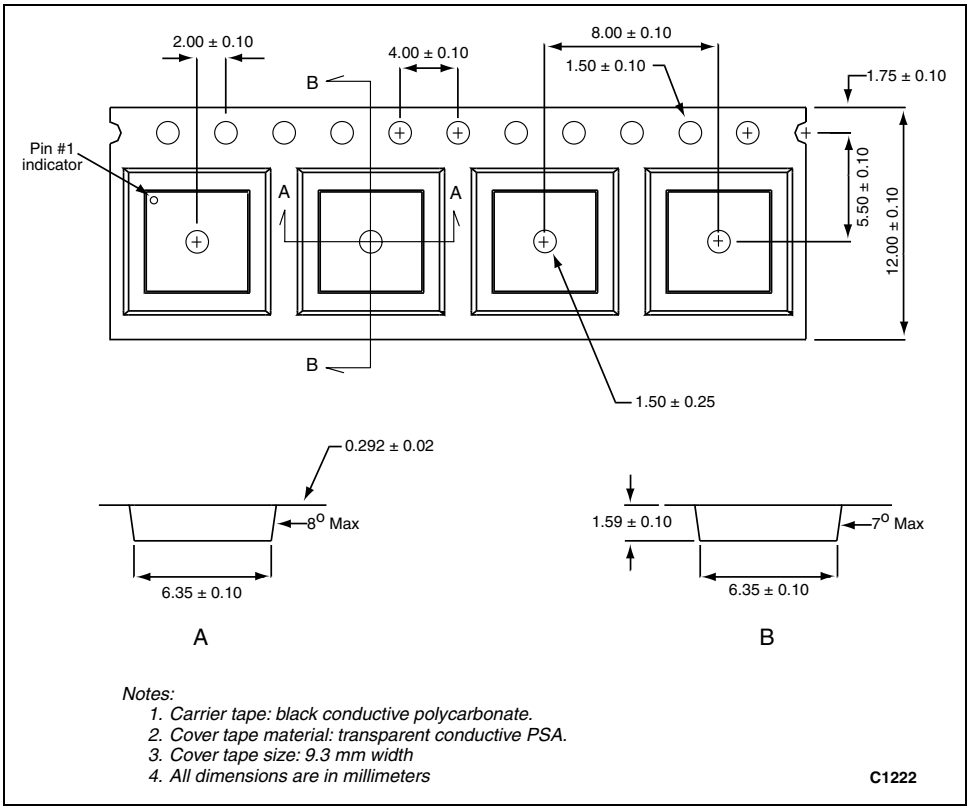


Figure 14. CX65102 6-Pin LCC Tape and Reel Dimensions

Ordering Information

Model Name	Ordering Part Number	Evaluation Kit Part Number
CX65102 1700-2200 MHz Linear Power Amplifier	CX65102-11	TW10-D822

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