

## Preliminary Information

This document contains information on a new product. The parametric information, although not fully characterized, is the result of testing initial devices.



# CX77133

## *Power Amplifier Module for CDMA PCS (1850–1910 MHz)*

The CX77133 Power Amplifier Module (PAM) is a fully matched, 6-pin surface mount module developed for Personal Communications Service (PCS) and wireless local loop applications. This small and efficient Power Amplifier packs a full 1850–1910 MHz bandwidth coverage into a single compact package.

The CX77133 meets the stringent spectral linearity requirements of Code Division Multiple Access (CDMA) PCS transmission with high power added efficiency for power output of up to 28 dBm. A single Gallium Arsenide (GaAs) Microwave Monolithic Integrated Circuit (MMIC) contains all the active circuitry in the module. The MMIC contains on-board bias circuitry, as well as input and interstage matching circuits. Output match is realized off-chip within the module package to optimize efficiency and power performance into a 50  $\Omega$  load.

This device is manufactured with Skyworks' GaAs Heterojunction Bipolar Transistor (HBT) process, which provides for all positive voltage DC supply operation while maintaining high efficiency and good linearity. Primary bias to the CX77133 is supplied directly from a three-cell nickel cadmium, a single-cell lithium ion, or other suitable battery with an output in the 3–4 volt range. Power down is accomplished by setting the voltage on the low current reference pin to zero volts. No external supply side switch is needed as typical "off" leakage is a few microamperes with full primary voltage supplied from the battery.

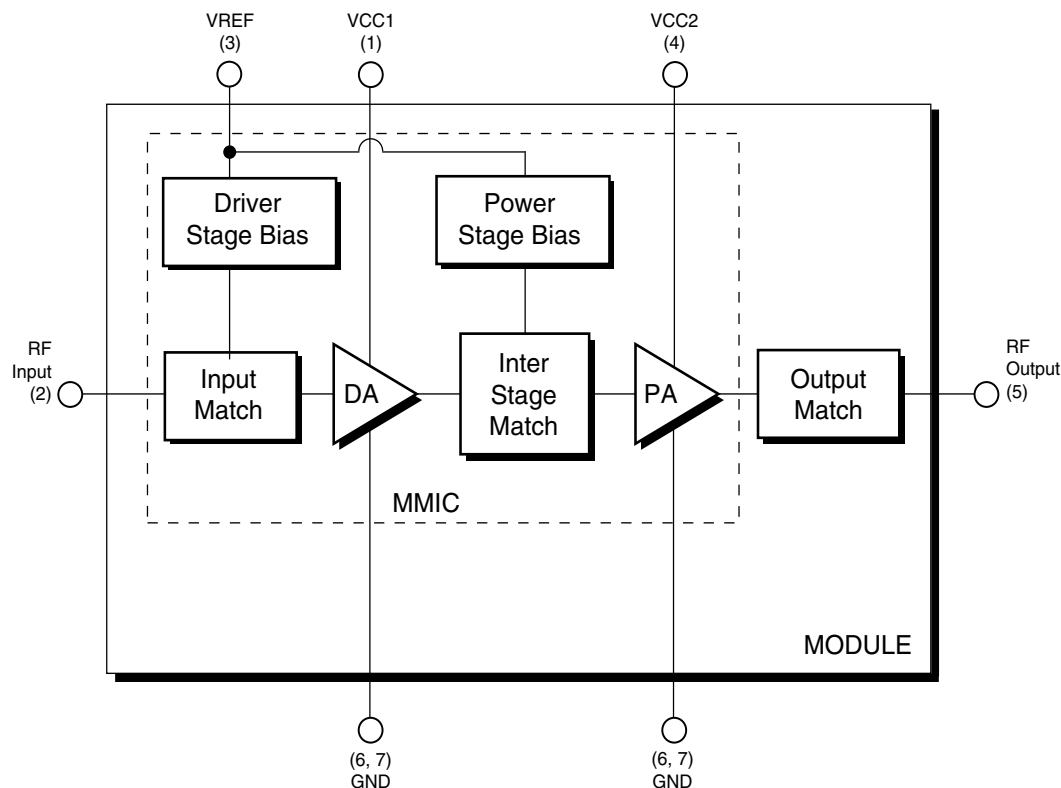
### Distinguishing Features

- Low voltage positive bias supply (3 to 4 Volts)
- Good linearity
- High efficiency
- Large dynamic range
- 6-pin package (6 x 6 x 1.5 mm)
- Power down control

### Applications

- Personal communications services (PCS)
- Wireless local loop (WLL)

### Functional Block Diagram



## Electrical Specifications

The following tables list the electrical characteristics of the CX77133 Power Amplifier. Table 1 lists the absolute maximum rating for continuous operation.

**Table 1. Absolute Maximum Ratings<sup>(1)</sup>**

Parameter	Symbol	Minimum	Nominal	Maximum	Unit
RF Input Power	P <sub>IN</sub>	—	4.0	7.0	dBm
Supply Voltage	V <sub>CC</sub>	—	3.4	6.0	Volts
Reference Voltage	V <sub>REF</sub>	—	3.0	3.3	Volts
Case Operating Temperature	T <sub>C</sub>	–30	+25	+110	°C
Storage Temperature	T <sub>STG</sub>	–55	—	+125	°C
<b>NOTE(S):</b> <sup>(1)</sup> No damage assuming only one parameter is set at limit at a time with all other parameters set at or below nominal value.					

Table 2 lists the recommended operating conditions and Table 3 lists the electrical performance of the CX77133 Power Amplifier for nominal operating conditions.

**Table 2. Recommended Operating Conditions**

Parameter	Symbol	Min	Nominal	Max	Unit
Supply Voltage	V <sub>CC</sub>	3.2	3.4	4.2	Volts
Reference Voltage	V <sub>REF</sub>	2.95	3.0	3.2	Volts
Operating Frequency	F <sub>0</sub>	1850.0	1880.0	1910.0	MHz
Case Operating Temperature	T <sub>C</sub>	–30	+25	+85	°C

**Table 3. Electrical Specification for Nominal Operating Conditions**<sup>(1)</sup>

Characteristics	Condition	Symbol	Minimum	Typical	Maximum	Unit
Quiescent Current	Nominal	$I_q$	70.0	120.0	130.0	mA
Leakage Current	$V_{REF} = 0\text{ V}$ $V_{CC} = 3.4\text{ V}$	$I_{lk}$	—	—	7.0	$\mu\text{A}$
Gain	$P_0 = 0\text{ dBm}$	$G$	25.5	26.5	28.0	dB
	$P_0 = 28\text{ dBm}$	$G_p$	27.0	28.5	30.0	dB
Power Added Efficiency	$P_0 = 28\text{ dBm}$	PAEd 28	32.0	36.0	—	%
Adjacent Channel Power	$P_0 \leq 28\text{ dBm}$ <sup>(2)</sup>	ACP	—	–50.0	–48.5	dBc
Harmonic Suppression Second Third	$P_0 \leq 28\text{ dBm}$	DFo2	—	–38.0	–32.0	dBc
	$P_0 \leq 28\text{ dBm}$	DFo3	—	–44.0	–37.5	dBc
Noise Power in RX Band 1930-1990 MHz	$P_0 \leq 28\text{ dBm}$	RxBN	—	–135.0	–133.0	dBm/Hz
Noise Figure	—	NF	—	4.0	5.5	dB
Input Voltage Standing Wave Ratio	—	VSWR	—	1.2	1.4	—
Stability (spurious output)	5:1 VSWR All Phases	S	—	—	–60.0	dBc
Ruggedness – No damage	$P_0 \leq 28\text{ dBm}$	Ru	10:1	—	—	VSWR
<b>NOTE(S):</b> <sup>(1)</sup> $V_{CC} = +3.4\text{ V}$ , $V_{REF} = +3.0\text{ V}$ , Freq. = 1880 MHz, $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified. <sup>(2)</sup> ACP is specified per IS95 as the ratio of the total in-band power (1.23 MHz BW) to adjacent power in a 30 kHz BW						

**Table 4. Electrical Specification Limits for Recommended Operating Conditions**<sup>(1)</sup>

Characteristics	Condition	Symbol	Minimum	Maximum	Unit
Quiescent Current	Nominal	$I_q$	—	180.0	mA
Gain	$P_o = 0$ dBm	G	24.0	29.5	dB
	$P_o = 28$ dBm	$G_p$	23.0	32.5	dB
Power Added Efficiency	$V_{cc} = 3.4$ V $P_o = 28$ dBm	PAEd 28	31.5	—	%
Adjacent Channel Power <sup>(2)</sup>	$P_o \leq 28$ dBm	ACP	—	–44.0	dBc
Harmonic Suppression	$P_o \leq 28$ dBm	DFo2	—	–30.0	dBc
	$P_o \leq 28$ dBm	DFo3	—	–35.0	dBc
Noise Power in RX Band 1930-1990 MHz	$P_o \leq 28$ dBm	RxBN	—	–131.0	dBm/Hz
Noise Figure	—	NF	—	8.0	dB
Input Voltage Standing Wave Ratio	—	VSWR	—	2.0	—
Stability (spurious output)	5:1 VSWR All Phases	S	—	–60.0	dBc
Ruggedness—No damage	$P_o \leq 28$ dBm	Ru	10:1	—	VSWR
<b>NOTE(S):</b> <sup>(1)</sup> Per Table 2, unless otherwise specified. <sup>(2)</sup> ACP is specified per IS95 as the ratio of the total in-band power (1.23 MHz BW) to adjacent power in a 30 kHz BW. Worst case ACPR is –43dBc at +85 °C, $V_{cc} = 3.2$ V.					

Evaluation Board Description

The evaluation board is a platform for testing and interfacing design circuitry. To accommodate the interface testing of the CX77133, the evaluation board schematic and diagrams are included for preliminary analysis and design. Figure 1 shows the basic schematic of the board for the 1850 MHz to 1910 MHz range. Figure 2 illustrates the board layout.

Figure 1. Evaluation Board Schematic

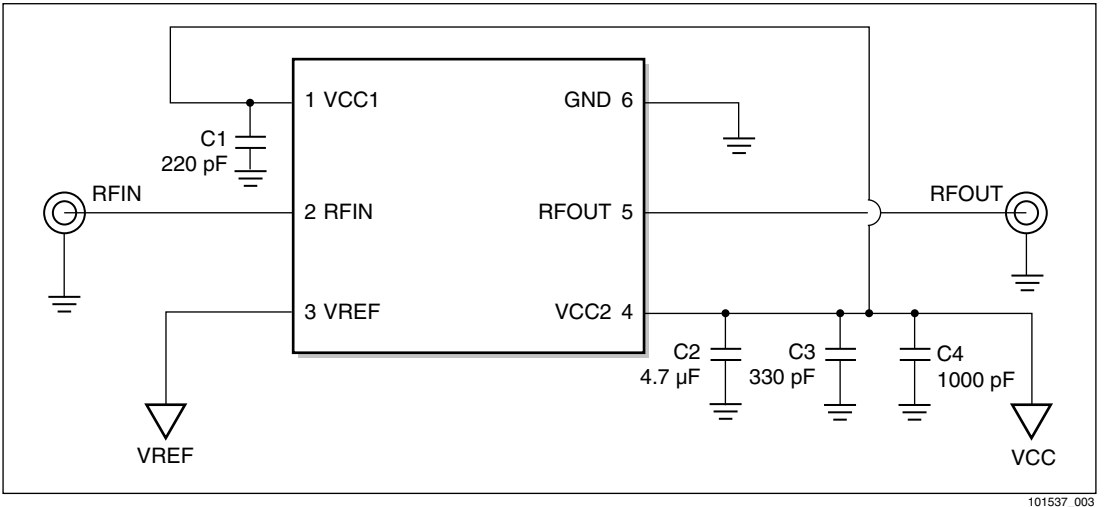
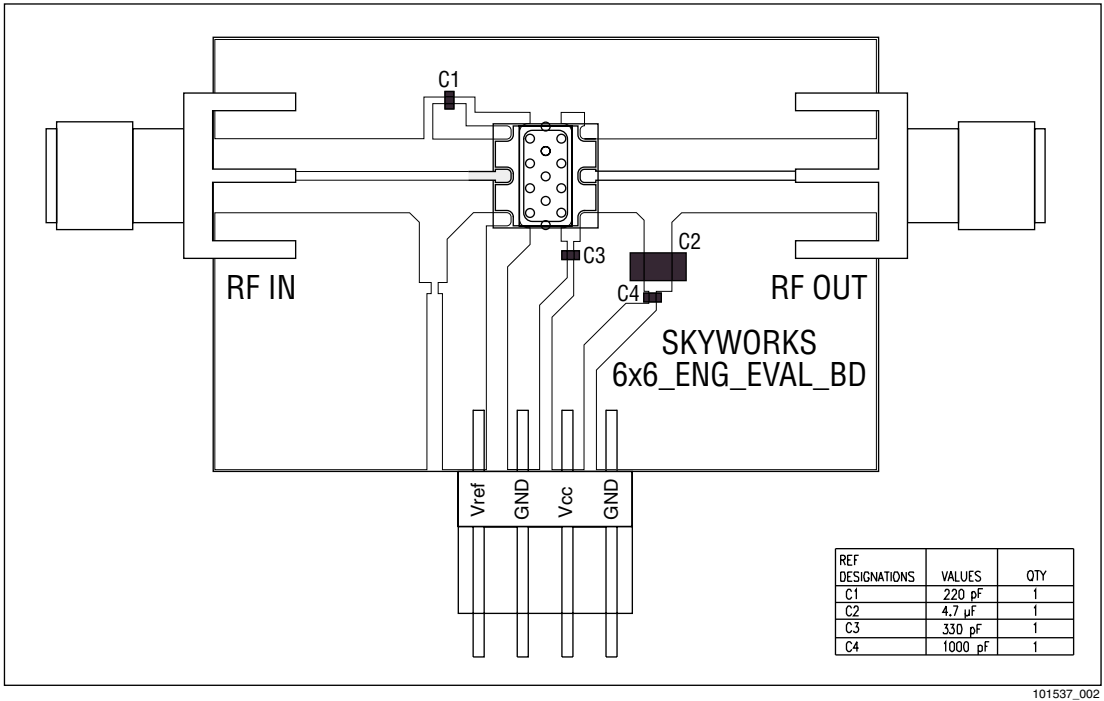


Figure 2. Evaluation Board Assembly Diagram

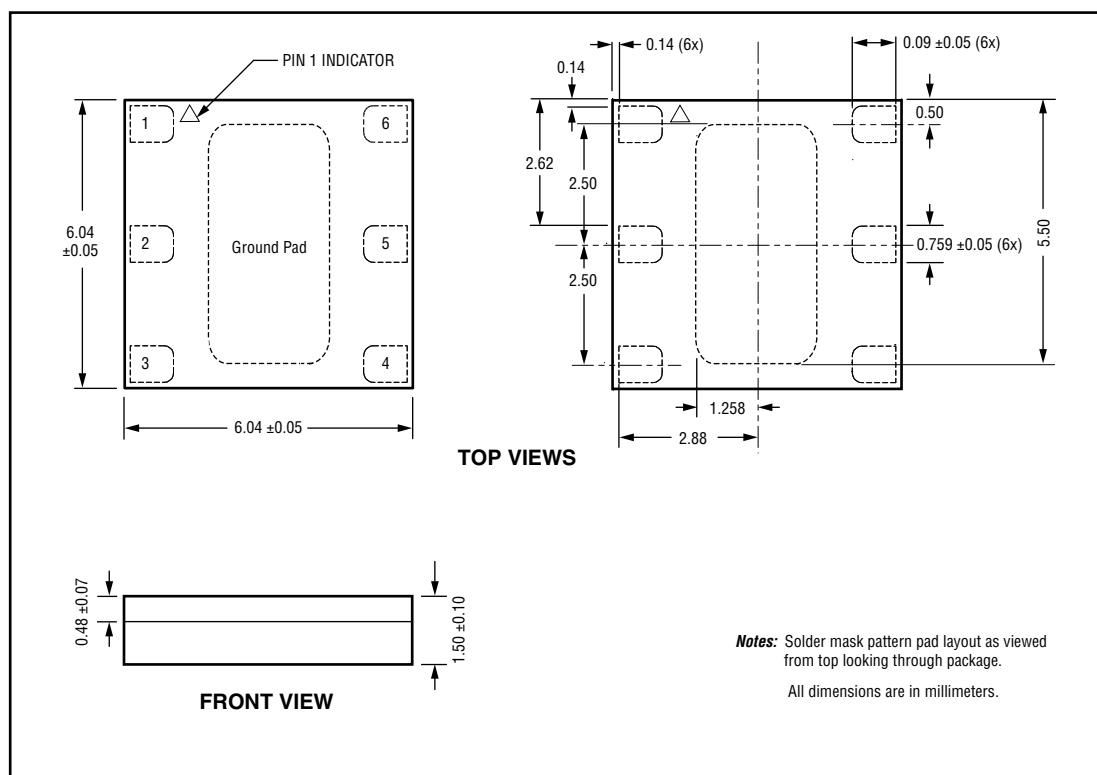


## Package Dimensions and Pin Descriptions

The CX77133 is a multi-layer laminate base, overmold encapsulated modular package designed for surface-mounted solder attachment to a printed circuit board.

Figure 3 is a mechanical drawing of the pad layout for this package and Figure 4 illustrates typical case markings. The pin numbering convention starts with pin 1 in the upper left, as indicated in Figure 3, and increments counter-clockwise around the package. Table 5 describes each pin function.

**Figure 3. CX77133 Package Dimensions**



101537\_007

**Table 5. Pin Description**

Pin #	1	2	3	4	5	6	GND PAD
Function	VCC1 <sup>(1)</sup>	RF Input	VREF	VCC2 <sup>(1)</sup>	RF Output	GND	GND <sup>(2)</sup>
<b>NOTE(S):</b> (1) All supply pins may be connected together at the supply. (2) Package underside is GND.							

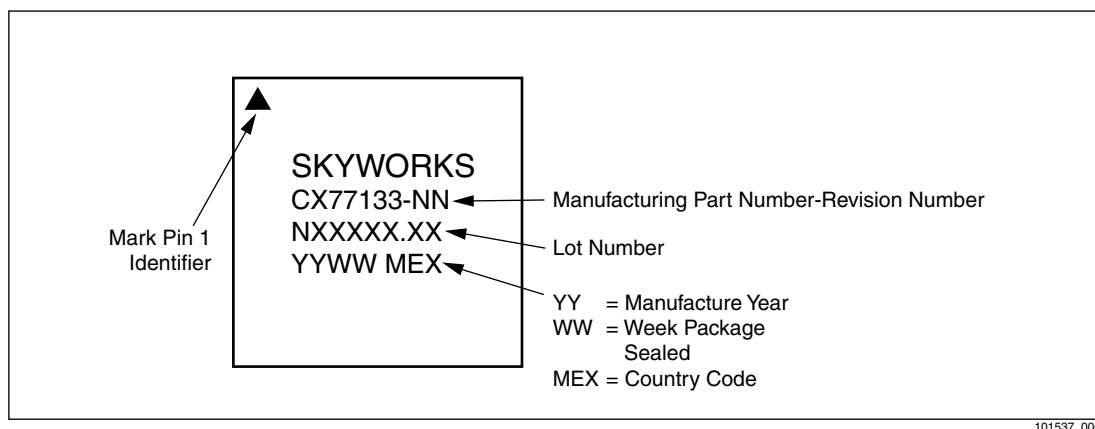
## Package and Handling Information

Because of its sensitivity to moisture absorption, this device package is baked and vacuum packed prior to shipment. Instructions on the shipping container label must be followed regarding exposure to moisture after the container seal is broken, otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The CX77133 is capable of withstanding an MSL 3/225 °C solder reflow. Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. 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. If the part is manually attached, precaution should be taken to insure that the part is not subjected to temperatures exceeding 225 °C for more than 10 seconds. For details on both attachment techniques, precautions, and handling procedures recommended by Conexant, please refer to *Application Note: PCB Design and SMT Assembly/Rework*, Document Number 101752. Additional information on standard SMT reflow profiles can also be found in the *JEDEC Standard J-STD-020A*.

Production quantities of this product are shipped in the standard tape-and-reel format. For packaging details, refer to *Application Note: Tape and Reel*, Document Number 101568.

**Figure 4. Typical Case Markings**







## Ordering Information

Model Number	Manufacturing Part Number	Product Revision	Package	Operating Temperature
CX77133	CX77133-12	12	6x6LM-6	-30 °C to +85 °C

## Revision History

Revision	Level	Date	Description
P1		March 2001	Preliminary Information
P2		July 2001	Revise: Table 1, Figures 1, 2, 4. Add: Table 4 Remove: Table 5, Figure 5
P3		August 2001	Revise: Table 3
P4		October 2001	Revise: Figure 3
P5		March 8, 2002	Revise: Tables 3, 4, and 5; Figure 3.
P6		March 27, 2002	Revise: Table 4 footnotes; Figure 3.

## References

Application Note: PCB Design and SMT Assembly/Rework, Document Number 101752

Application Note: Tape and Reel, Document Number 101568

JEDEC Standard J-STD-020A

© 2002, Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products. These materials are provided by Skyworks as a service to its customers and may be used for informational purposes only. Skyworks assumes no responsibility for errors or omissions in these materials. Skyworks may make changes to its products, specifications and product descriptions at any time, without notice. Skyworks makes no commitment to update the information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from future changes to its products and product descriptions.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as may be provided in Skyworks' Terms and Conditions of Sale for such products, Skyworks assumes no liability whatsoever.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF SKYWORKS™ PRODUCTS INCLUDING WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. SKYWORKS FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THESE MATERIALS.

Skyworks™ products are not intended for use in medical, lifesaving or life-sustaining applications. Skyworks' customers using or selling Skyworks™ products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

The following are trademarks of Skyworks Solutions, Inc.: Skyworks™, the Skyworks symbol, and "Breakthrough Simplicity"™. Product names or services listed in this publication are for identification purposes only, and may be trademarks of third parties. Third-party brands and names are the property of their respective owners.

Additional information, posted at [www.skyworksinc.com](http://www.skyworksinc.com), is incorporated by reference.

General Information:  
Skyworks Solutions, Inc.  
4311 Jamboree Rd.  
Newport Beach, CA. 92660-3007  
[www.skyworksinc.com](http://www.skyworksinc.com)

