Preliminary Information

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

SKYWORKS™

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 Ω 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.

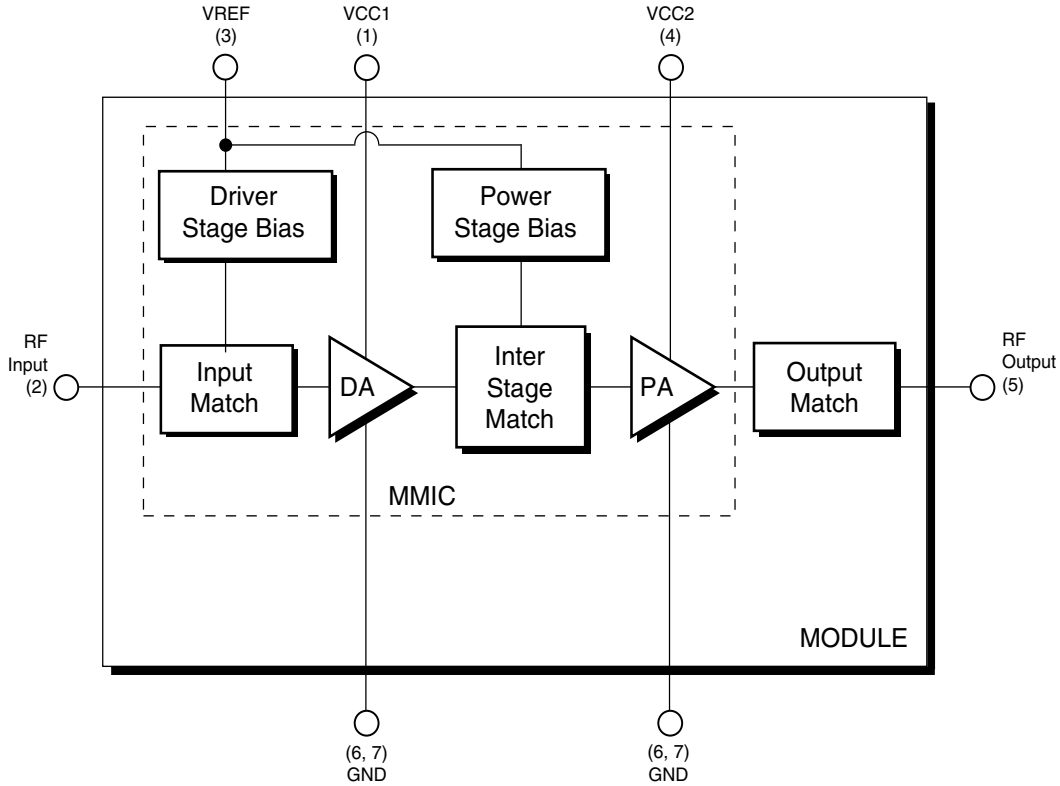
Distinguishing Features

- 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(1)

Parameter	Symbol	Minimum	Nominal	Maximum	Unit
RF Input Power	P_{IN}	—	4.0	7.0	dBm
Supply Voltage	V_{CC}	—	3.4	6.0	Volts
Reference Voltage	V_{REF}	—	3.0	3.3	Volts
Case Operating Temperature	T_C	–30	+25	+110	°C
Storage Temperature	T_{STG}	–55	—	+125	°C

NOTE(S):
(1) 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_{CC}	3.2	3.4	4.2	Volts
Reference Voltage	V_{REF}	2.95	3.0	3.2	Volts
Operating Frequency	F_O	1850.0	1880.0	1910.0	MHz
Case Operating Temperature	T_C	–30	+25	+85	°C

Table 3. Electrical Specification for Nominal Operating Conditions [1]

Characteristics	Condition	Symbol	Minimum	Typical	Maximum	Unit
Quiescent Current	Nominal	I_q	70.0	120.0	130.0	mA
Leakage Current	V_{REF} = 0 V V_{CC} = 3.4 V	I_{lk}	—	—	7.0	µA
Gain	P_O = 0 dBm P_O = 28 dBm	G G_p	25.5 27.0	26.5 28.5	28.0 30.0	dB dB
Power Added Efficiency	P_O = 28 dBm	PAEd 28	32.0	36.0	—	%
Adjacent Channel Power	$P_O \leq$ 28 dBm [2]	ACP	—	–50.0	–48.5	dBc
Harmonic Suppression Second Third	 $P_O \leq$ 28 dBm $P_O \leq$ 28 dBm	 DF_O2 DF_O3	 — —	 –38.0 –44.0	 –32.0 –37.5	 dBc dBc
Noise Power in RX Band 1930-1990 MHz	$P_O \leq$ 28 dBm	R_XBN	—	–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	$P_O \leq$ 28 dBm	Ru	10:1	—	—	VSWR

NOTE(S):

[1] V_{CC} = +3.4 V, V_{REF} = +3.0 V, Freq. = 1880 MHz, T_C = 25 °C, unless otherwise specified.

[2] 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 [1]

Characteristics	Condition	Symbol	Minimum	Maximum	Unit
Quiescent Current	Nominal	I_q	—	180.0	mA
Gain	P_O = 0 dBm P_O = 28 dBm	G G_p	24.0 23.0	29.5 32.5	dB dB
Power Added Efficiency	V_{CC} = 3.4 V P_O = 28 dBm	PAEd 28	31.5	—	%
Adjacent Channel Power[2]	$P_O \leq$ 28 dBm	ACP	—	–44.0	dBc
Harmonic Suppression Second Third	 $P_O \leq$ 28 dBm $P_O \leq$ 28 dBm	 DF_O2 DF_O3	 —	 –30.0 –35.0	 dBc dBc
Noise Power in RX Band 1930-1990 MHz	$P_O \leq$ 28 dBm	R_XBN	—	–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

NOTE(S):

[1] Per Table 2, unless otherwise specified.

[2] 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, Vcc = 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

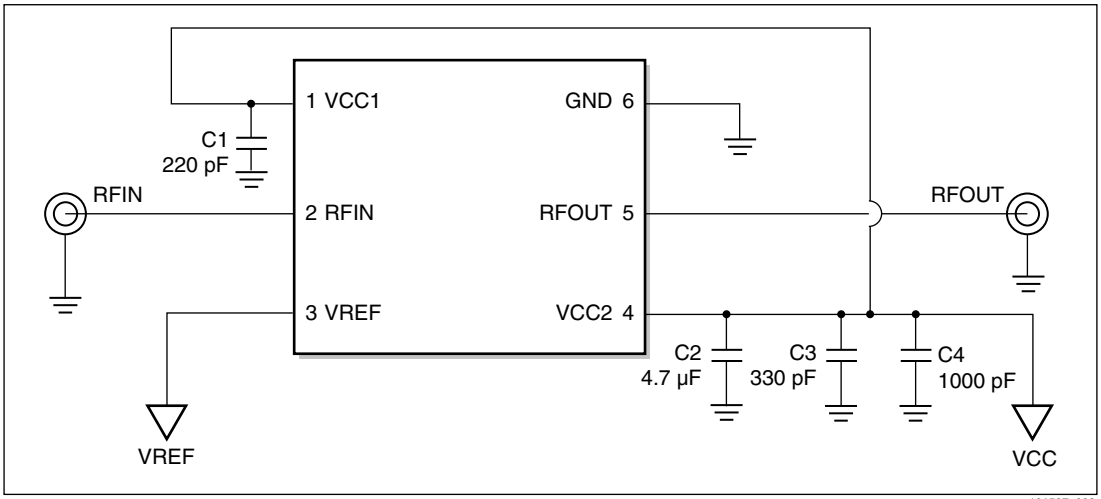
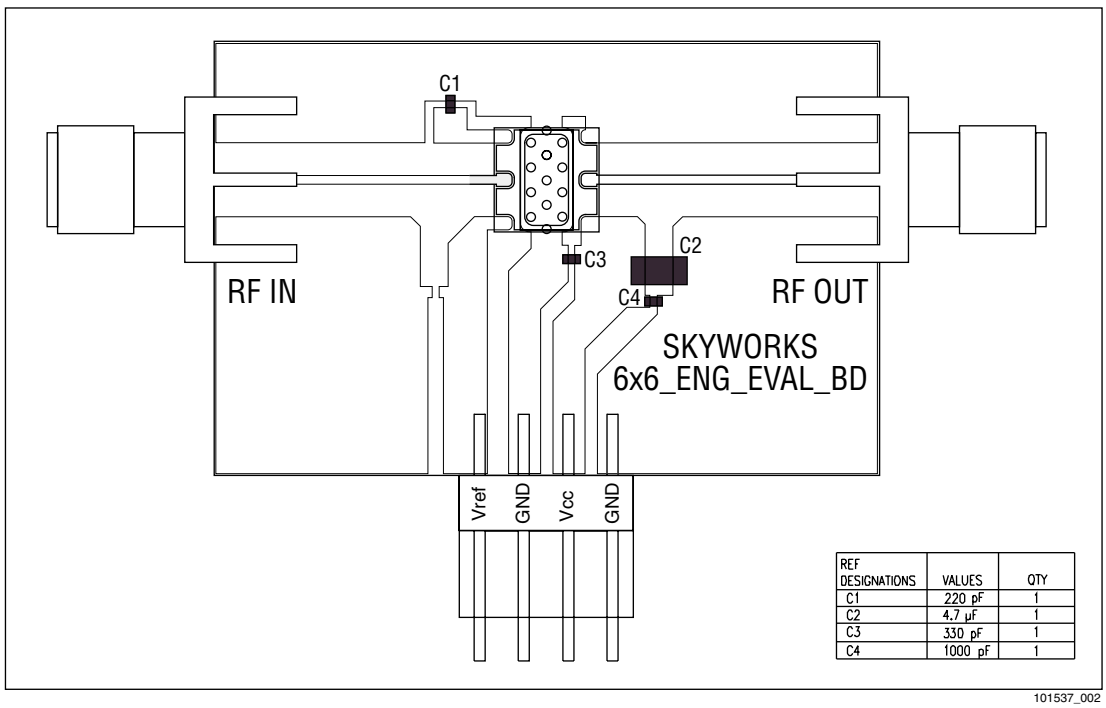


Figure 2. Evaluation Board Assembly Diagram



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

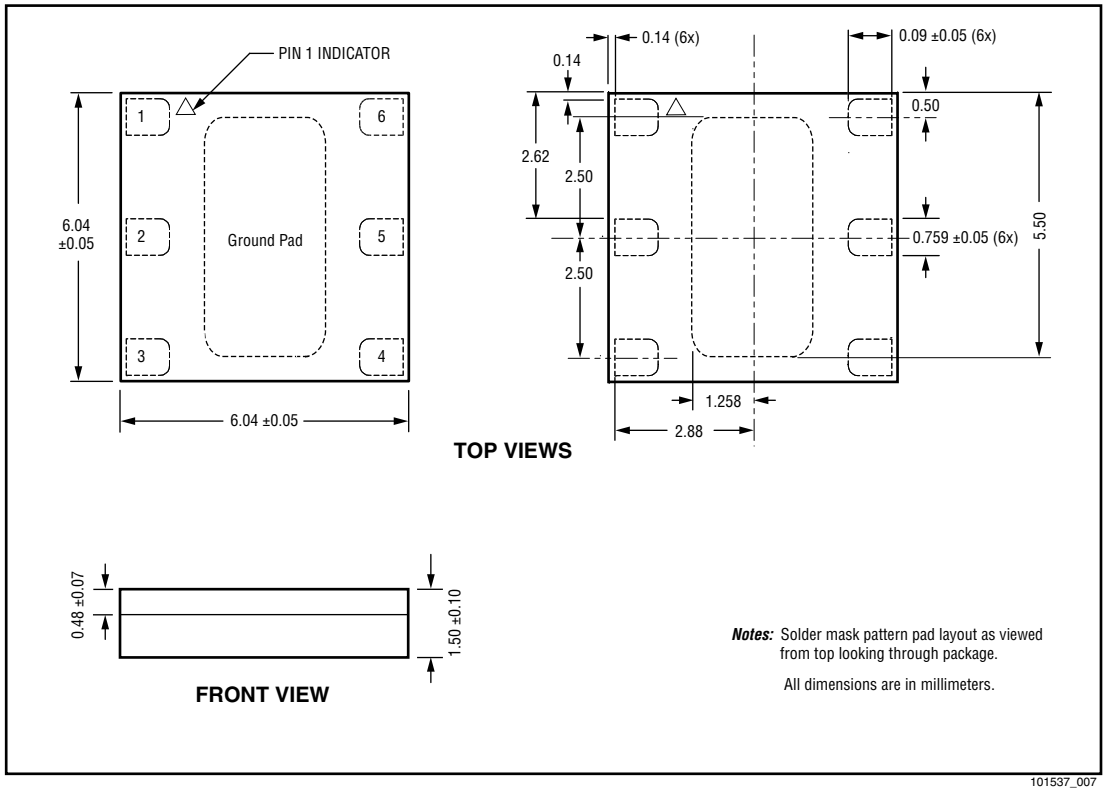


Table 5. Pin Description

Pin #	1	2	3	4	5	6	GND PAD
Function	VCC1(1)	RF Input	VREF	VCC2(1)	RF Output	GND	GND(2)

NOTE(S):
(1) All supply pins may be connected together at the supply.
(2) Package underside is GND.

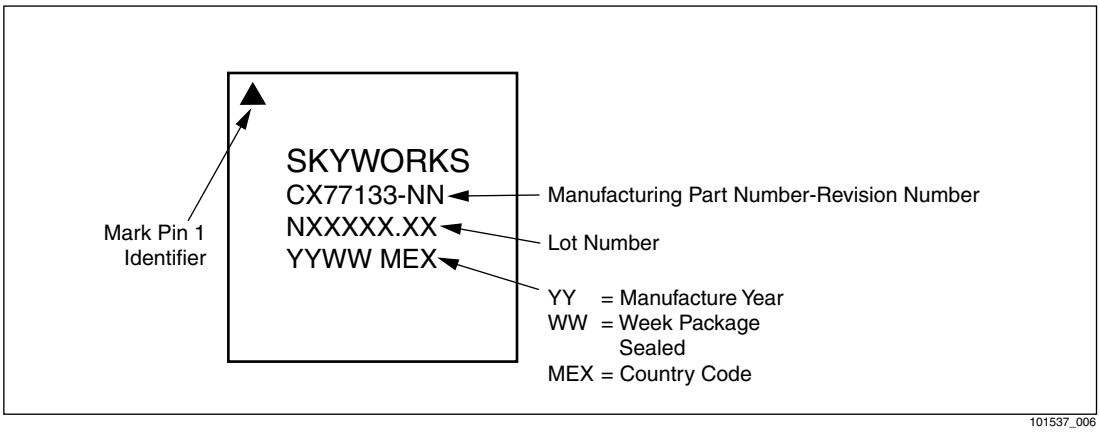
Package and Handling Information

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

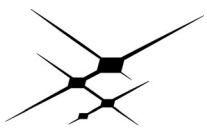
Revision History

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

General Information:
Skyworks Solutions, Inc.
4311 Jamboree Rd.
Newport Beach, CA. 92660-3007
www.skyworksinc.com



SKYWORKS™
BREAKTHROUGH SIMPLICITY