

## APPLICATION NOTE 1002

## MAX2291 for W-CDMA Application

*The MAX2291 is a chip-scale-packaged linear RF power amplifier (PA) which was designed for use in N-CDMA handsets at the PCS band. It performs well in the 1920MHz to 1980MHz W-CDMA band by changing the input and output match circuits. Bench measurements for the high-power path show -38dBc ACP1, -64dB ACP2, and 37% PAE at +28dBm at 1950MHz. Bench measurements for the low-power path show -38dBc ACP1, -53dBc ACP2, and 12% PAE at +16dBm at 1950MHz.*

The MAX2291 is a chip-scale-packaged linear RF power amplifier which was designed for use in N-CDMA handsets at the PCS band. It performs well in the 1920MHz to 1980MHz W-CDMA band by changing the input and output match circuits. The following performance was measured on the P5 EV board, with the parts used listed in the Bill of Materials below.

### High-Power-Mode Measurements (Vcc at 3.5VDC):

- Pout = 28dBm
- Frequency = 1.95GHz
- ACP1 = -38dBc (measured at 5MHz offset in 3.84MHz bandwidth)
- ACP2 = -64dBc (measured at 10MHz offset in 3.84MHz bandwidth)
- Power-added efficiency = 37%
- Idle Icc = 97mA

Gain was measured at approximately 27dB with a -2dB slope over the band.

### Low-Power-Mode Measurements (Vcc at 3.5VDC):

- Pout = 16dBm
- Frequency = 1.95GHz
- ACP1 = -38dBc (measured at 5MHz offset in 3.84MHz bandwidth)
- ACP2 = -53dBc (measured at 10MHz offset in 3.84MHz bandwidth)
- Power-added efficiency = 12%
- Idle Icc = 30mA

Gain was measured at approximately 13dB with a -2dB slope over the band.

## W-CDMA Application Test Setup

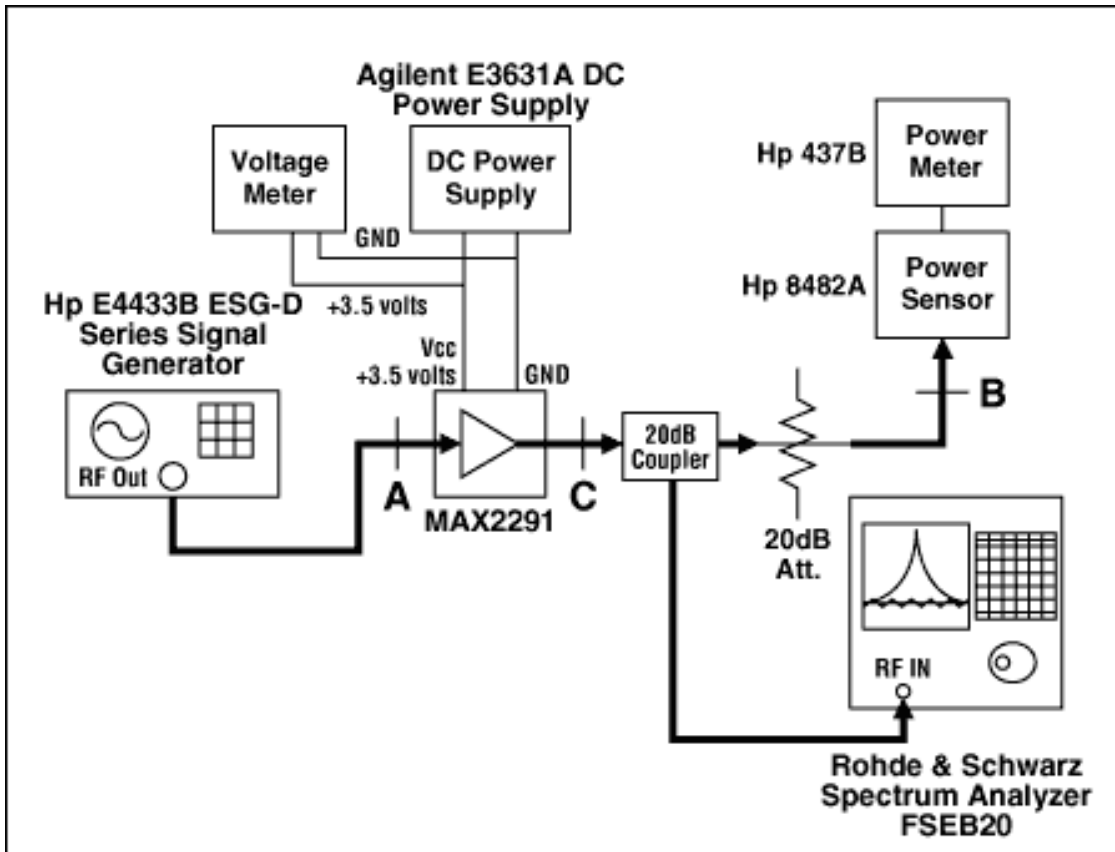
### Equipment Used (See the Diagram Below):

- E4433B signal generator
- Rohde & Schwartz FSEA or FSEB
- Power supply, RF coupler, 20dB pad, RF power meter

On the E4433B, select 3GPP modulation, *up link*, DPCCH + 1 DPDCH.

## ACPR Measurements:

- Channel BW = 3.84MHz
- First offset = +/-3.5MHz in 30kHz
- Second offset = +/-5MHz in 3.84MHz
- Third offset = +/-10MHz in 3.84MHz



MAX2291 application as W-CDMA power amplifier

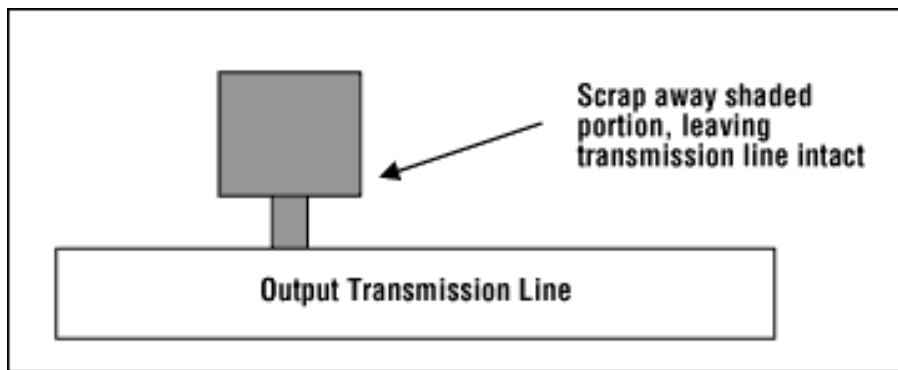
**Table 1. Bill of Materials**

DESIGNATION	QTY	DESCRIPTION
C90	1	ATC 3.9pF $\pm$ 0.1pF ATC600S3R9BW (see Special Assembly Instructions, 4)
C91	1	ATC 3.3pF $\pm$ 0.1pF ATC600S3R3BW (see Special Assembly Instructions, 4)
C92	1	Murata 0.5pF $\pm$ 0.1pF GRM36COG0R5B50 (see Special Assembly Instructions, 1)
C17, C46, C47, C50, L8, L12, D1, R2, IN4SMA	9	No install
C45, C54, C57, C64	4	Murata 0.01uF GRM36X7R103K16
C48	1	Murata 470pF GRM36X7R471K50
C49	1	Murata 5.6pF $\pm$ 0.1pF GRM36COG5R6B50
C52	1	Murata 1.3pF $\pm$ 0.1pF GRM36COG1R3B50
C56	1	Murata 9.1pF $\pm$ 0.1pF GRM36COG9R1B50

C58	1	Murata 4.0pF $\pm 0.1$ pF GRM36COG4R0B50
C62	1	Murata 0.01uF GRM39X7R103K16
C65	1	10uF 6.3V 100m $\Omega$ Taiyo Yuden Ceramic, 1206 case size
C66	1	Murata 22pF GRM36COG220J50
L7	1	Alpha Pin Diode SMP1320-079
L9	1	0 $\Omega$ 5% resistor
L11	1	Coilcraft 0906-3 (see Special Assembly Instructions, 2)
L14	1	Murata 33nH LQP10A33G00
L15	1	Bus wire (see Special Assembly Instructions, 3)
R14	1	27.4k $\Omega$ 1% resistor (0402)
R15, R16	2	24k $\Omega$ 5% resistor (0402)
R17	1	15k $\Omega$ 1% resistor (0402)
R18	1	33.2k $\Omega$ 1% resistor (0402)
R19	1	8.25k $\Omega$ 1% resistor (0402)
U1	1	MAX2291 5x5uCSP Lot#249-17-C
VCCC, GNDC	2	Banana Jacks (red for Vcc and black for GND), solder to 2-pin headers straight up
VCCC, GNDC	2	2-pin header (0.1" centers)
IN5, OUT4	2	0.031" edge mount SMA
JU7, JU8, JU9	3	3-pin header (0.1" centers)

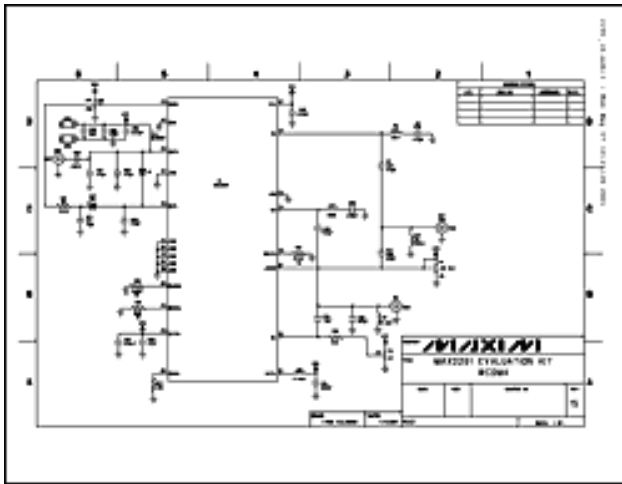
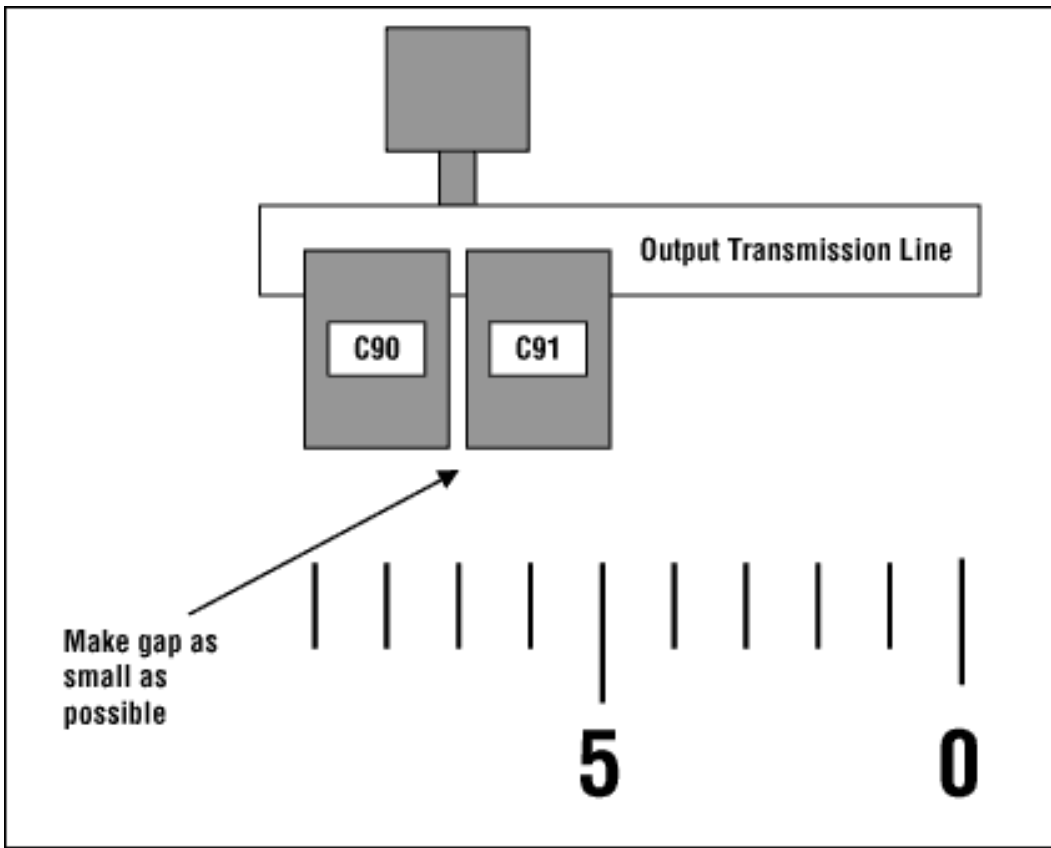
## Special Assembly Instructions

1. Mount between the outside edge of C52 (facing SMA) and the ground pad of L9.
2. Before mounting L11, the lower pad should be removed, as illustrated below:



The top lead of the inductor should be clipped to fit the upper pad. The bottom lead should be bent so that it reaches the output transmission line, where it will be soldered down.

3. Cut a small piece of bus wire, and solder it between the pads designated L15.
4. C90 should be at the left edge of tick mark #10, and C91 should be placed immediately adjacent, as shown below:



[For larger image \(PDF, 324k\)](#)

MAX2291 Evaluation Kit, W-CDMA

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