



0510GN-25-CP

25 Watts • 50 Volts • Pulsed & CW
50MHz-1GHz Broadband GaN Amplifier
Ceramic SMT Package

GENERAL DESCRIPTION

The 0510GN-25-CP is a COMMON SOURCE, class-AB, GaN on SiC HEMT transistor amplifier for 50MHz-1GHz broadband pulsed and CW RF power applications. The transistor is housed in a Ceramic SMT package with high-thermal conductivity to provide superior electrical and thermal performance with excellent reliability & ruggedness.

FEATURES:

- Wide-band 50MHz-1GHz general purpose driver applications
- Single lumped-element Broadband application circuit
- Ideal for Pulsed Radar, Avionics, ISM, and CW Communication
- Commercial & Military Applications
- 25 W Pulsed/CW Psat, 16 dB Power Gain and 50 % Drain Efficiency
- Low-cost Ceramic SMT package with excellent RF & Thermal performance, reliability & ruggedness
- 50V Bias Operation with high breakdown voltage

ABSOLUTE MAXIMUM RATINGS

Maximum CW Power Dissipation

Device Dissipation @ 25°C 25 W

Maximum Voltage and Current

Drain-Source Voltage (V_{DS}) 125 V

Gate-Source Voltage (V_{GS}) -8 to +0 V

Supply Current (I_{DD}) 1400 mA

Maximum Temperatures

Storage Temperature (T_{STG}) -55 to +150° C

Operating Junction Temperature +200 °C

PACKAGE OUTLINE Ceramic SMT 160X200 MIL



TYPICAL CW BROADBAND PERFORMANCE SUMMARY ¹ @ 25°C

Parameter	Units	50 MHz	300 MHz	500 MHz	700 MHz	900 MHz	1 GHz
Output Power Psat	W	33	36	31	27	29	27
Power Gain	dB	16	16.5	16	15.5	15.7	15.5
η_D Drain Efficiency	%	85	75	61	50	52	52

¹ Bias Condition: Vdd=+50V, Idq= 120 mA (V_{GS} = -2.0 ~ -4.5V typical), Pin = 29 dBm
RF performance measured on the recommended broadband evaluation circuit board.

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DC FUNCTIONAL CHARACTERISTICS @ 25°C

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
$I_{D(Off)}$	Drain leakage current	$V_{GS} = -8V, V_{DD} = 50V$			2	mA
$I_{G(Off)}$	Gate leakage current	$V_{GS} = -8V, V_{DD} = 0V$			0.4	mA
BV_{DSS}	Drain-Source breakdown voltage	$V_{GS} = -8V, I_{DD} = 4\text{ mA}$	125			V
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = 50V, I_{DD} = 4\text{ mA}$	-4.8	-3.4	-2.5	V

ELECTRICAL CHARACTERISTICS¹ @ 25°C

Symbol	Characteristics	Test Conditions ¹	Min	Typ	Max	Units
P_{out}	Output Power	$P_{in}=0.8W$ Freq= 50 MHz -1000 MHz, CW		28		W
G_p	Power Gain	$P_{in}=0.8W$ Freq= 500 MHz, CW		16		dB
η_D	Drain Efficiency	$P_{in}=0.8W$ Freq= 500 MHz, CW		61		%
P_{out}	Output Power	$P_{in}=0.8W$ Freq= 1000 MHz, Pulsed ²		31		W
G_p	Power Gain	$P_{in}=0.8W$ Freq= 1000 MHz, Pulsed ²		16		dB
η_D	Drain Efficiency	$P_{in}=0.8W$ Freq= 1000 MHz, Pulsed ²		54		%
Dr	Droop	$P_{in}=0.8W$ Freq= 1000 MHz, Pulsed ²		0.1		dB
VSWR-T	Load Mismatch Tolerance	$P_{in}=0.8W$ Freq=1000 MHz			5:1	
Θ_{jc}	Thermal Resistance including PCB, $T_{base} = 85\text{ °C}$	Pulse Width=1 mS Duty=10% CW		1.7 4.2		°C/W

¹ Bias Condition: $V_{dd}=+50V$, $I_{dq}= 120\text{ mA}$ ($V_{gs} = -2.0 \sim -4.5V$ typical), CW

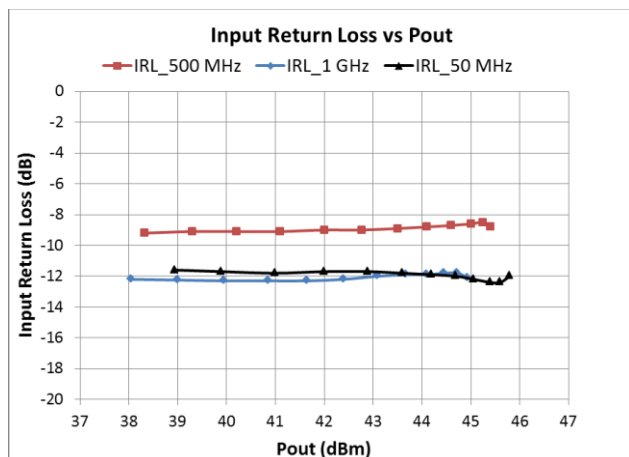
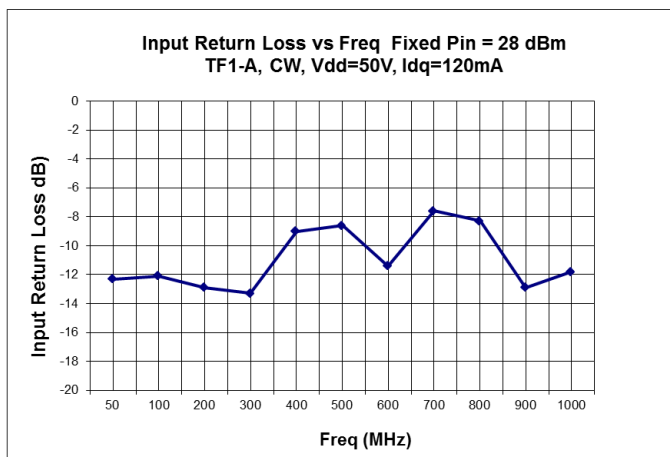
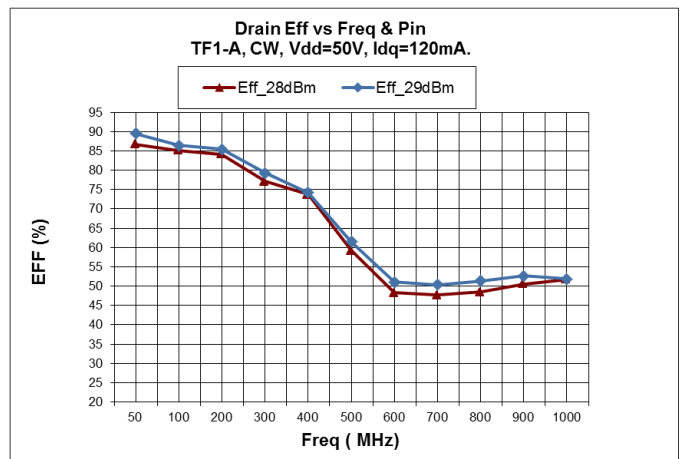
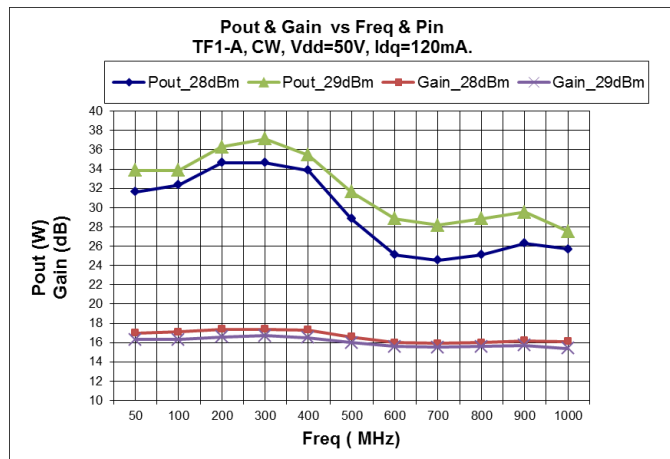
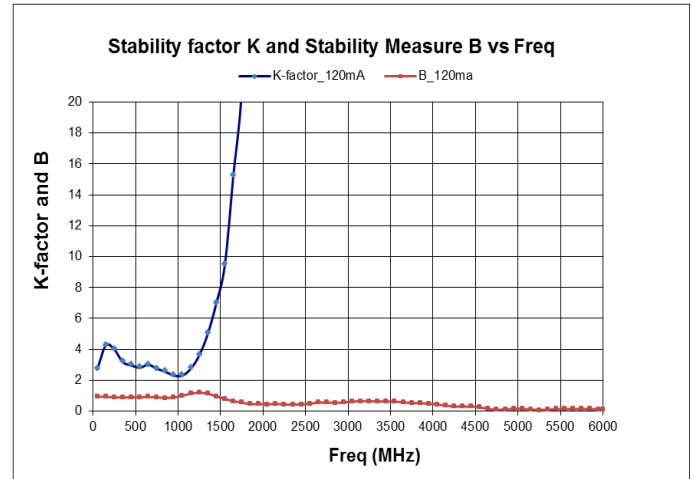
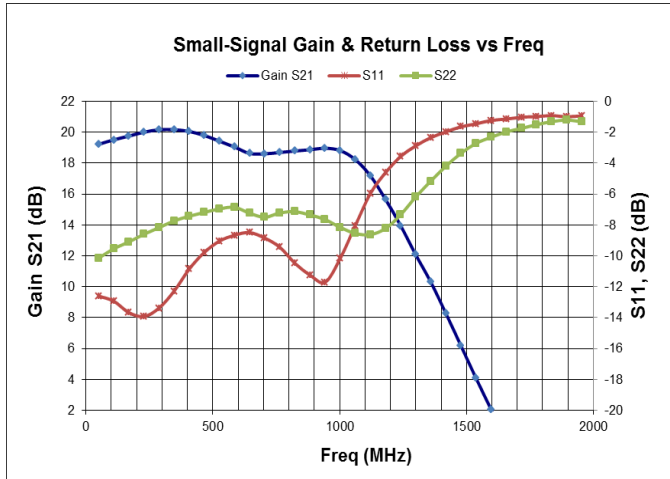
² Bias Condition: $V_{dd}=+50V$, $I_{dq}= 80\text{ mA}$ ($V_{gs} = -2.0 \sim -4.5V$ typical), PW = 1mS, DC = 10%
RF performance measured on the recommended broadband evaluation board.



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CW PERFORMANCE PLOTS @ VDD=50 V, IDQ = 120mA, T = 25°C

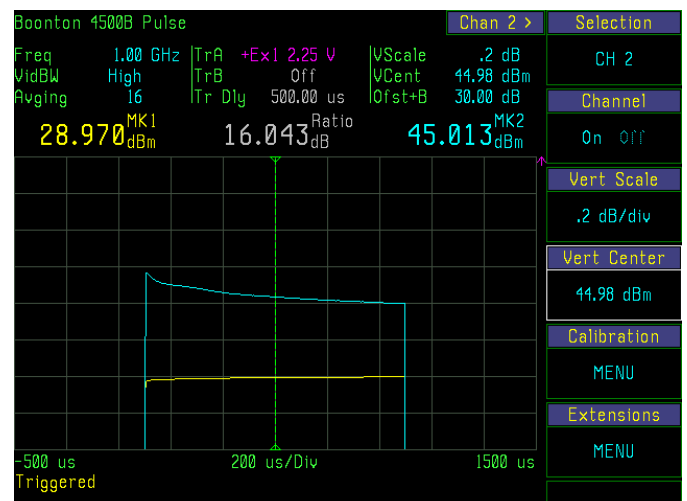
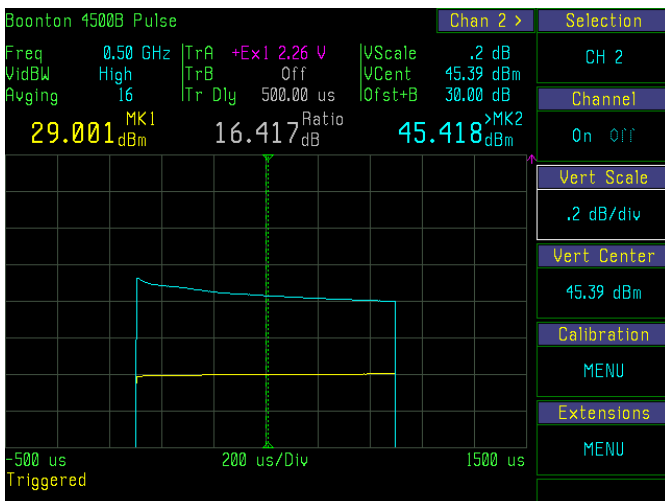
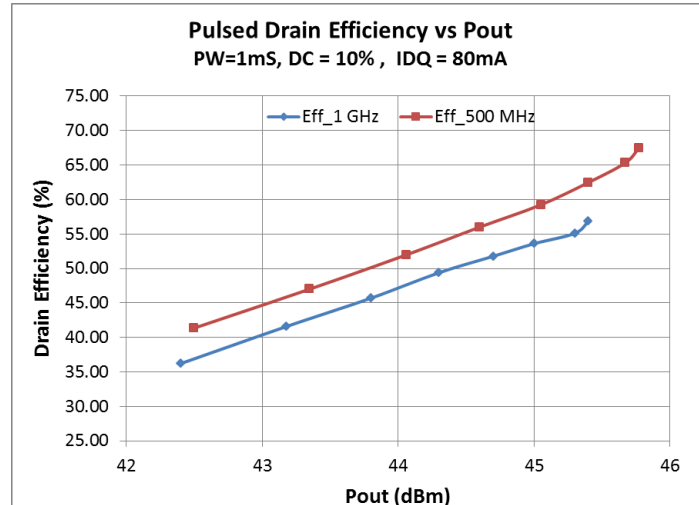
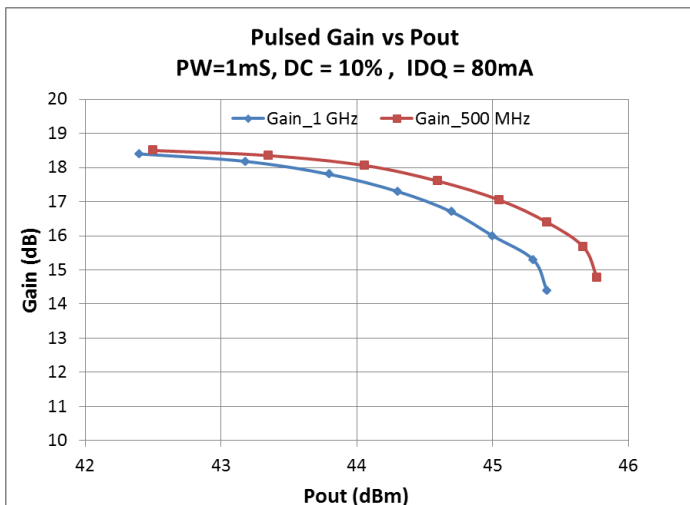
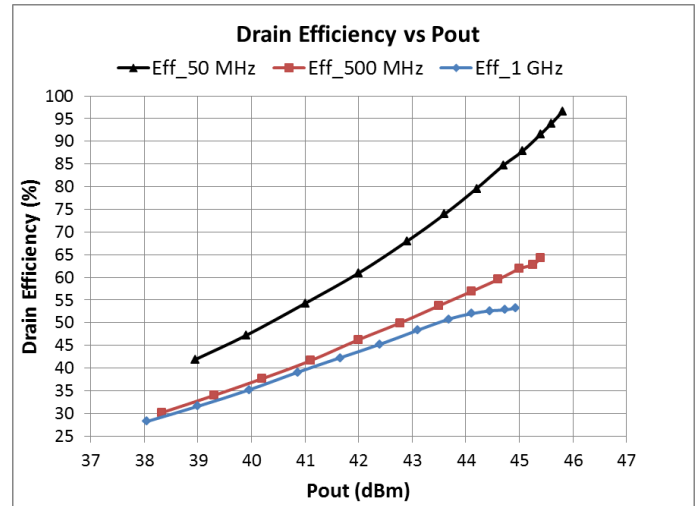
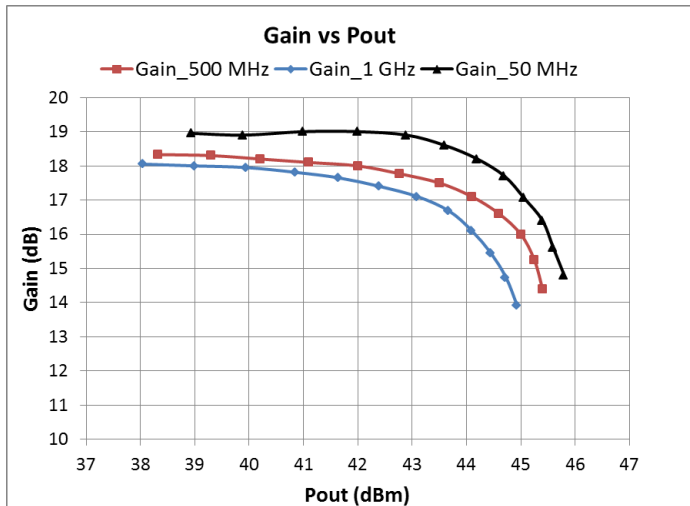


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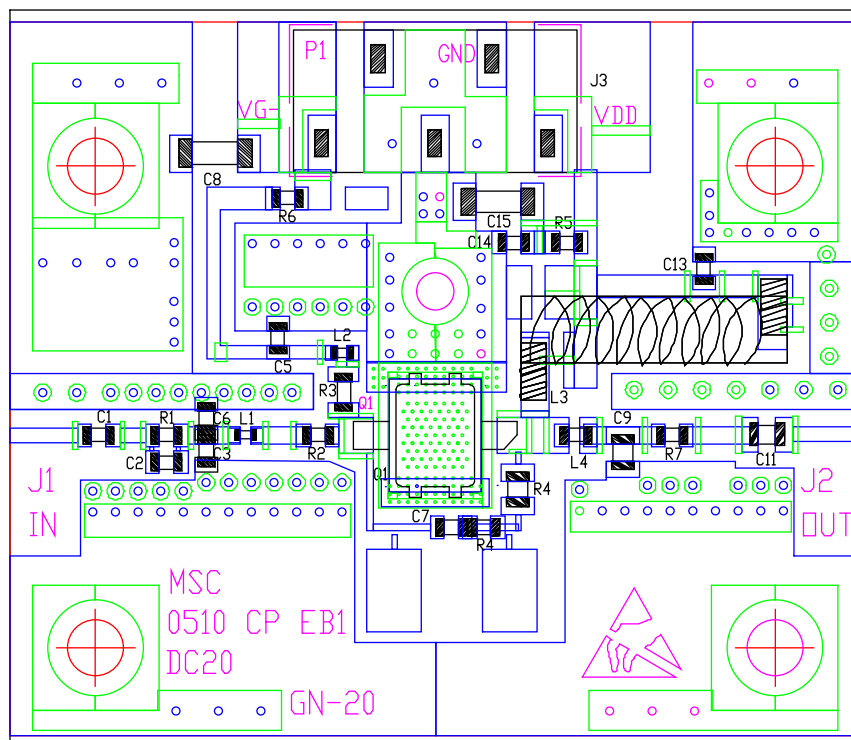
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EVALUATION BOARD LAYOUT 0510 CP EB1 ASSEMBLY DIAGRAM AND BOM FOR BROADBAND 50 MHz to 1 GHz



Board Material: Rogers RO4003C, 12 Mil Thickness, Er = 3.38, 1 OZ Cu
8 Mil Dia Vias below package, Qty: 85, Solid Plated Cu Filled. Board Size: 1.5 x 1.3 inches

Item	Description 50 MHz - 1 GHz
C2	0603, 12 pF, $\pm 5\%$, 250V, ATC 600S
C3	0603, 3.3 pF, $\pm 5\%$, 250V, ATC 600S
C6	0603, 1 pF, $\pm 5\%$, 250V, ATC 600S
C9	0603, 1.8 pF, $\pm 0.25\text{pF}$, 250V, ATC 600S
C13	0603, 470 pF, $\pm 5\%$, 100V, AVX, X7R
C1, C11, C7	0603, 1000 pF $\pm 10\%$, 100V, AVX, X7R
C5, C14	0603, 10000 pF, $\pm 10\%$, 100V, AVX, X7R
C8, C15	1206, 4.7 uF, $\pm 10\%$, 100V, AVX, X7S
R1	0603 6.2 Ω
R5, R6, R7	0603 0.0 Ω JUMPER
R2	0603 3 Ω
R3	0603 24 Ω
R4	NDP-0505WA 1K ohm, 5%, IMS
L1	0402HP, 2.7 nH, 5% Coilcraft
L2	0402PA, 5.8 nH, 5% Coilcraft
L3	4310LC-132KEB, 1.3uH, Coilcraft
L4	0603HP, 6.0 nH, 5% Coilcraft
J3	TSM-105-01-S-SV-A, SAMTEC
Q1	0510GN-25-CP
Note: Board Material: Rogers RO4003C, 12 Mil Thickness, Er = 3.38, 1 OZ Cu	

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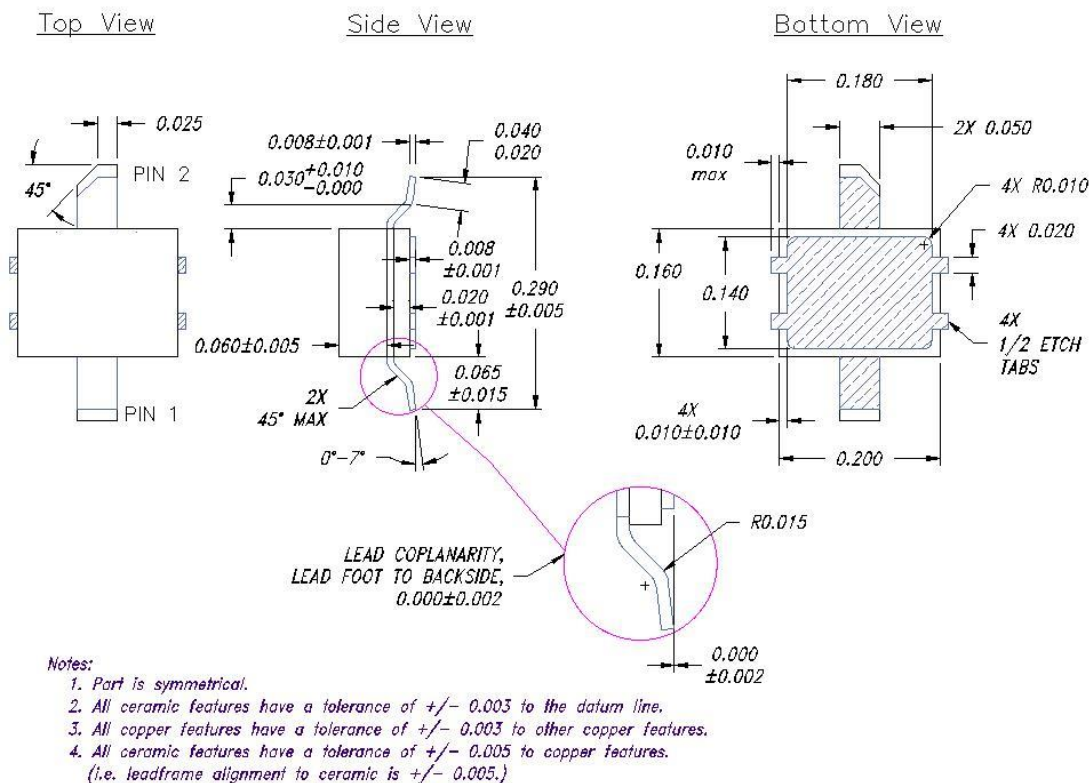


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CERAMIC SMT PACKAGE 160X200 MIL OUTLINE & DIMENSIONS

All Dimensions are in inches



PIN	FUNCTION
1	Gate (RF/DC Input)
2	Drain (RF Output/DC Input)
Backside Exposed Pad	Source (RF/ DC GND & Thermal Pad)

Notes:

1. Backside exposed pad must be connected to Solid Plated Cu filled vias for optimum RF & Thermal performance. See recommended evaluation board layout

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Revision History

Revision	Date	Affected Section(s)	Description
1.0	5-13-15	-	Initial Preliminary Release
2.0	6-21-15	Page 1	Package photo updated

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