DC35GN-15-D3

15 Watts • 50 Volts
30 - 3500 MHz Broadband Transistor

PRELIMINARY

GENERAL DESCRIPTION

The DC35-15-D3 is an unmatched, COMMON SOURCE, class AB GaN on SiC HEMT transistor capable of providing over 18dB gain, 15 Watts of RF output power across the 30-3500 MHz band. This transistor can be used for narrow or broadband pulsed or CW applications. Housed in a 3x6mm Plastic DFN SMT package and offering small size and weight.

ABSOLUTE MAXIMUM RATINGS

Maximum Power Dissipation

Device Dissipation @ 85°C	20	W

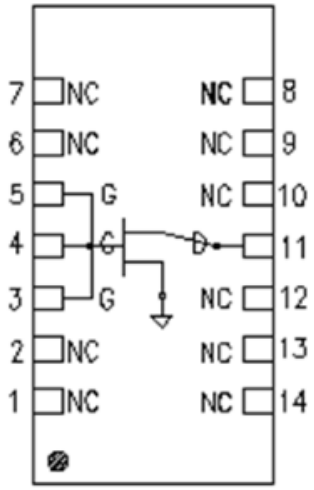
Maximum Voltage and Current

Drain-Source Voltage (V_{DS})	65	V
Gate-Source Voltage (V_{GS})	-8 to -2	V

Maximum Temperatures

Storage Temperature (T_{STG})	-65 to +150	°C
Operating Junction Temperature	+200	°C

PACKAGE OUTLINE
Functional Schematic



ELECTRICAL CHARACTERISTICS @ 25°C

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
P_{OUT}	Output Power	Freq=960, 1090, 1215 MHz	15			W
G_P	Power Gain	Pout=15W, Freq=960, 1090, 1215 MHz		18.0		dB
η_D	Drain Efficiency	Pout=15W, Freq=960, 1090, 1215 MHz		65		%
Dr	Droop	Pout=15W, Freq=960, 1090, 1215 MHz			0.5	dB
VSWR-T	Load Mismatch Tolerance	Pout=15W, Freq= 1215MHz			10:1	
Θ_{JC}	Thermal Resistance	Pulse Width=128uS, Duty=10%			4.2	°C/W

- **Bias Condition: Vdd=+50V, Idq=60mA average current (Vgs= -2.0 ~ -4.5V) with constant gate bias**

FUNCTIONAL CHARACTERISTICS @ 25°C

$I_{D(Off)}$	Drain leakage current	V_{GS} = -8V, V_D = 50V			12	mA
$I_{G(Off)}$	Gate leakage current	V_{GS} = -8V, V_D = 0V			2	mA

Export Classification: EAR-99

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TYPICAL AVIONICS BAND CW PERFORMANCE DATA – Vdd=50V

Frequency	P_{OUT} (W)	IRL (dB)	ηD (%)	G_P (dB)	Droop (dB)
960 MHz	17	-15.6	65.0	17.5	-
1090 MHz	18	-9.2	67.0	18	-
1215 MHz	18	-10.0	69.9	17	-

TYPICAL WIDE BAND CW PERFORMANCE DATA – Vdd=50V

Parameter	30MHz	1GHz	2.5GHz	3.5GHz	Units
Gain	25	23	17	16	dB
Psat	19	19	17	15	W
Gp at Psat	22	19	15	14	dB
PAE at Psat	75	69	60	60	%

CORRECT BIAS SEQUENCING

Turning the device ON

1. Set V_{GS} to the pinch-off (V_P), typically -5 V.
2. Turn on V_{DS} to nominal voltage (50 V).
3. Increase V_{GS} until the I_{DS} current is reached.
4. Apply RF power to desired level.

Turning the device OFF

1. Turn the RF power off.
2. Decrease V_{GS} down to V_P.
3. Decrease V_{DS} down to 0 V.
4. Turn off V_{GS}

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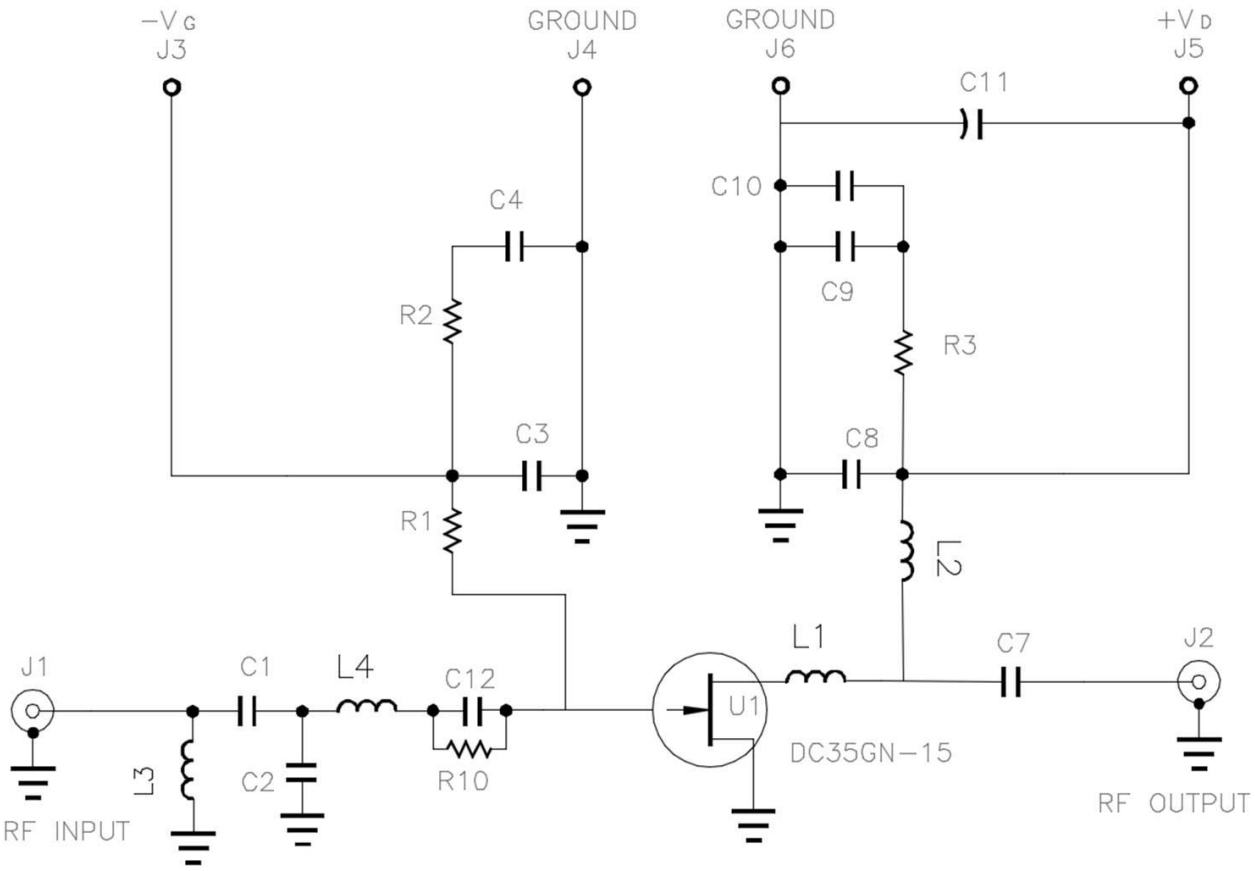
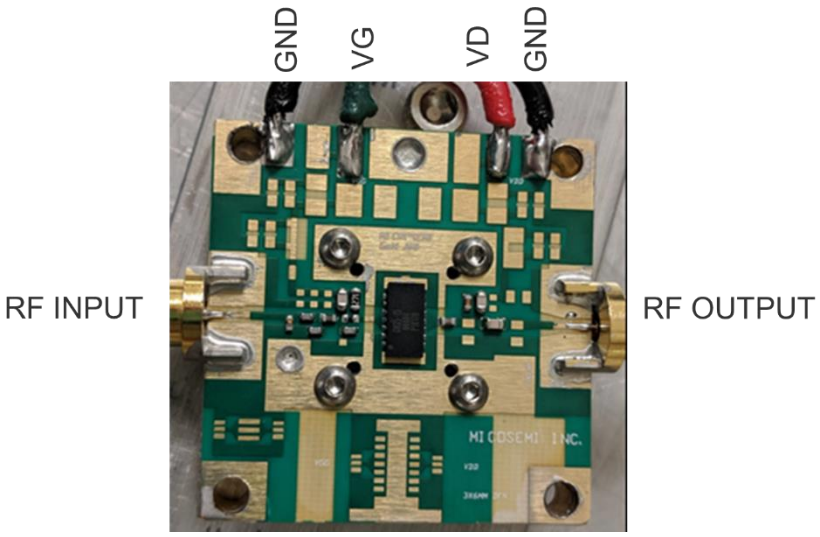
EVALUATION BOARD MATCHING SCHEMATIC INFORMATION
960-1215MHz





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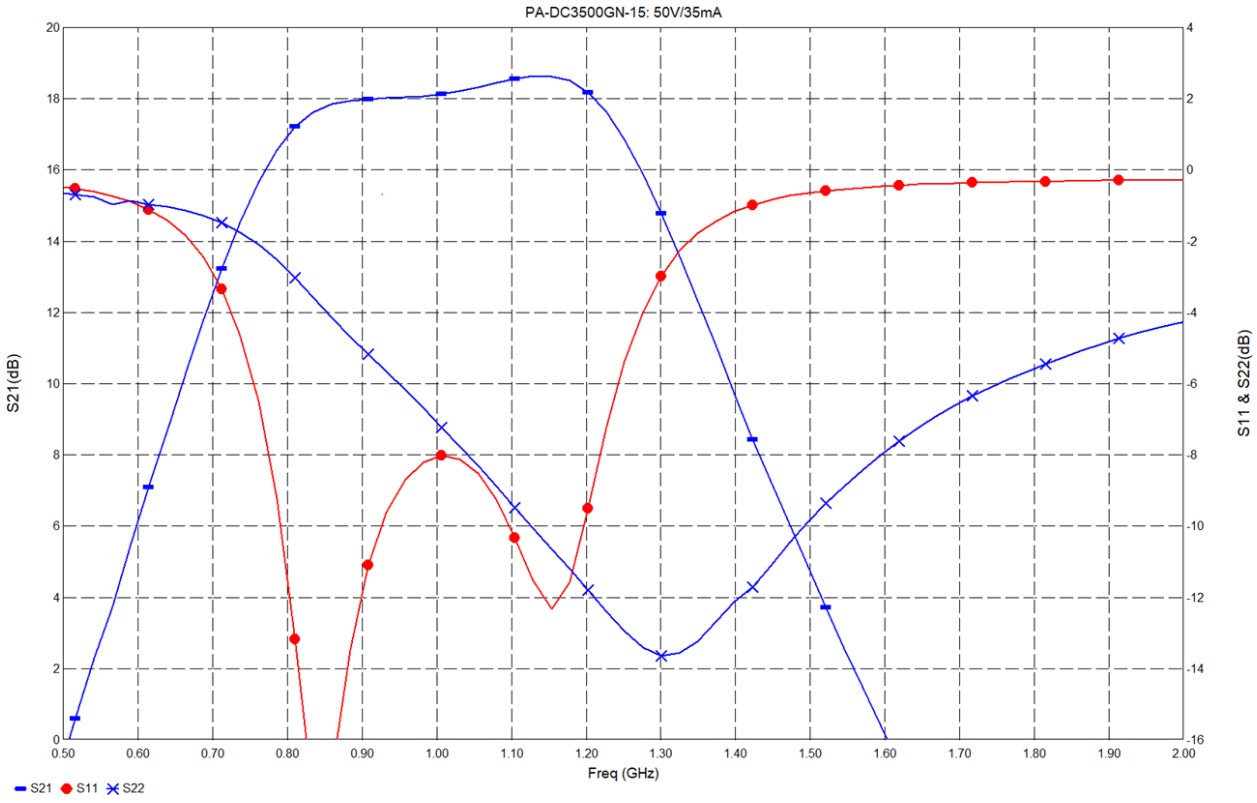
TRANSISTOR MATCHING SCHEMATIC INFORMATION – 960-1215MHz

Ref Des	Value	Description	Manufacturer	Part Number
U1	-	15W GaN discrete PA in 3x6mm DFN	Microchip	DC35GN-15-D3
J1, J2	-	SMA connector		1521-60102
L1	1.8 nH	Inductor, 1A, 0402	Coilcraft	0402CS-1N8XGE
L2	5.1 nH	Inductor, 0.8A, 2%, 0402	Coilcraft	0402CS-5N1XGLU
L3	4.3 nH	Inductor, 1.6A, 2%, 0402	Coilcraft	0402HP-4N3XGLU
L4	2 nH	Inductor, 1A, 2%, 0402	Coilcraft	0402CS-2N0XGLU
C1	5.6 pF	Capacitor, 200V, 5%, 0402	PPI	0402N5R6BW201
C2	6.8 pF	Capacitor, 200V, 5%, 0402	PPI	0402N6R8BW201
C12	12 pF	Capacitor, 200V, 5%, 0402	PPI	0402N120JW201
C3, C8	82 pF	Capacitor, 250V, 5%, 0603	PPI	0603N820JW251
C7	39 pF	Capacitor, 250V, 5%, 0603	PPI	0603N390JW251
R1	270 Ohm	Resistor, 5%, 1/10 W, 0603	Panasonic	ERJ-3GEYJ271V
R10	10 Ohm	Resistor, 1%, 1/20 W, 0201	Yageo	RC0201FR-0710R

Parts Measured on evaluation board – 12mil thick – RO4350. Electrical and Thermal Gd is provided using copper filled via hole array and evaluation board is mounted to a heat sink.



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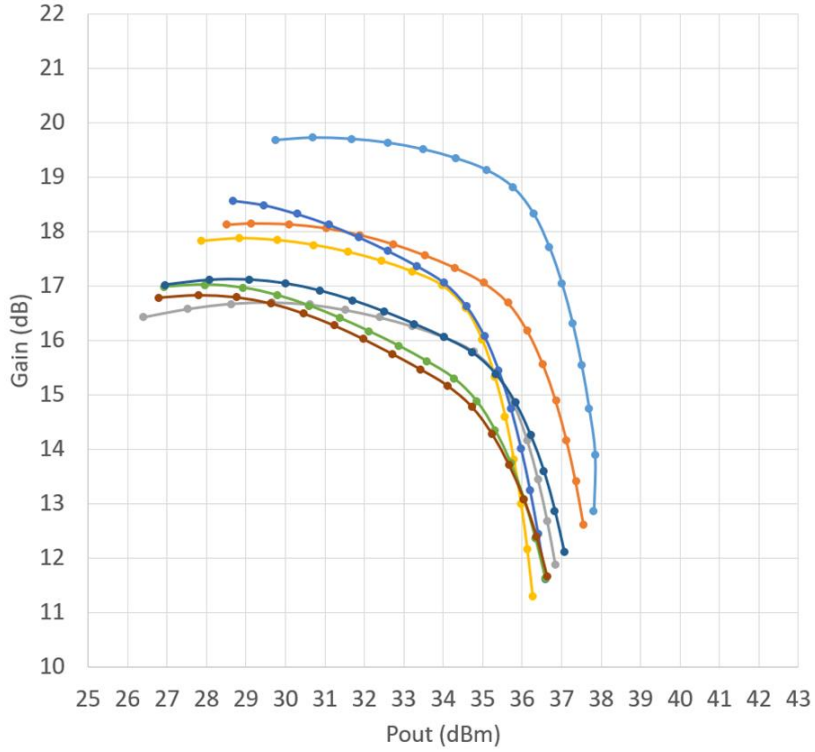
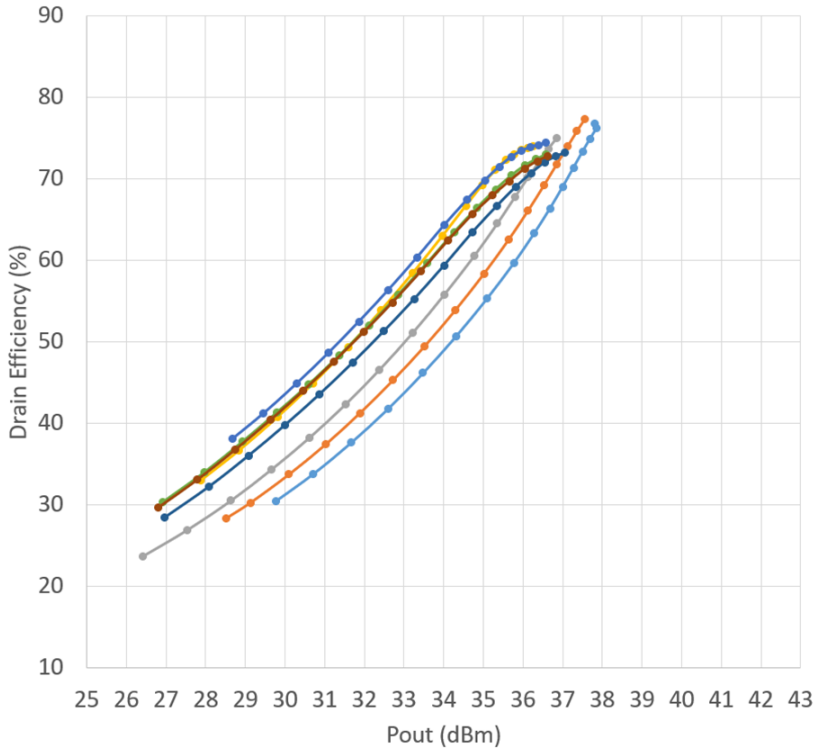
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=24V, Idq= 10mA





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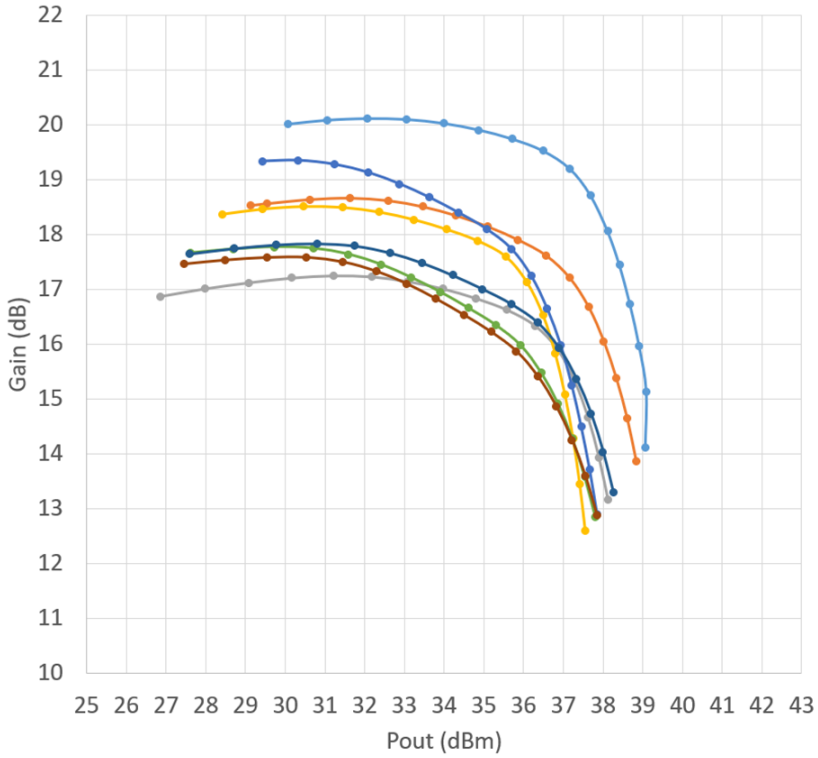

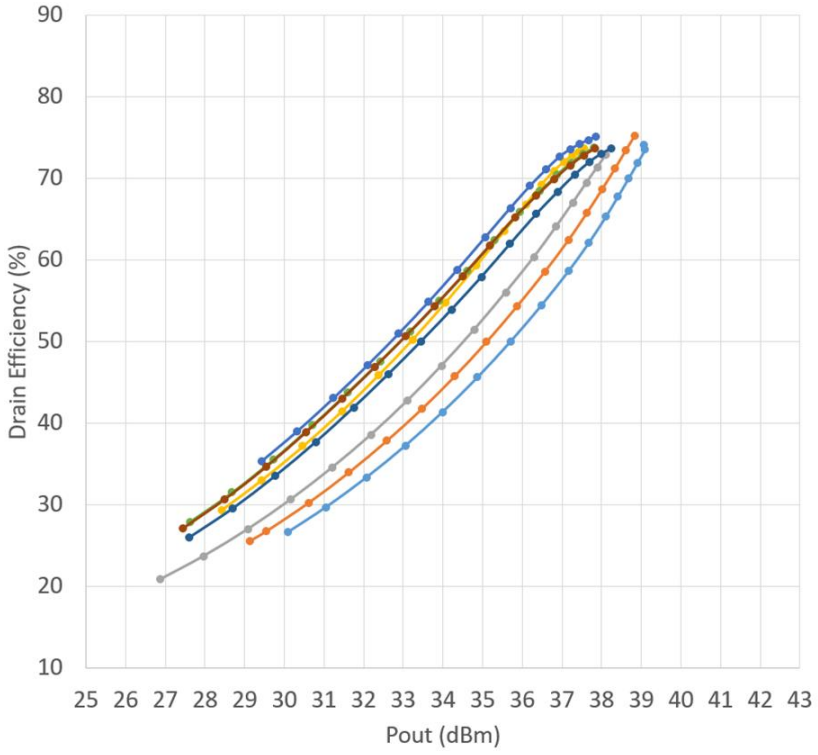

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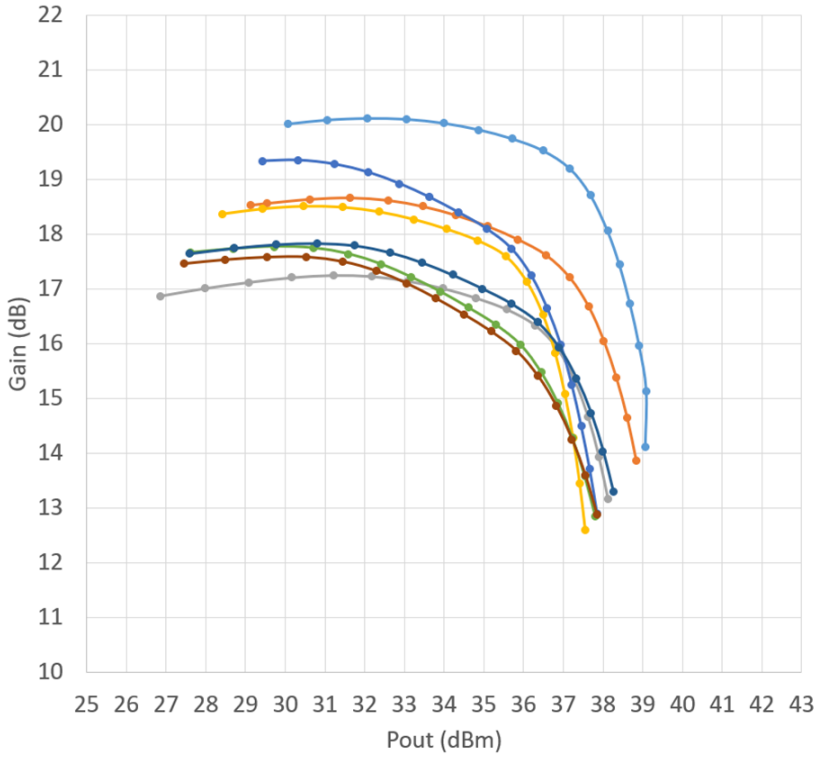
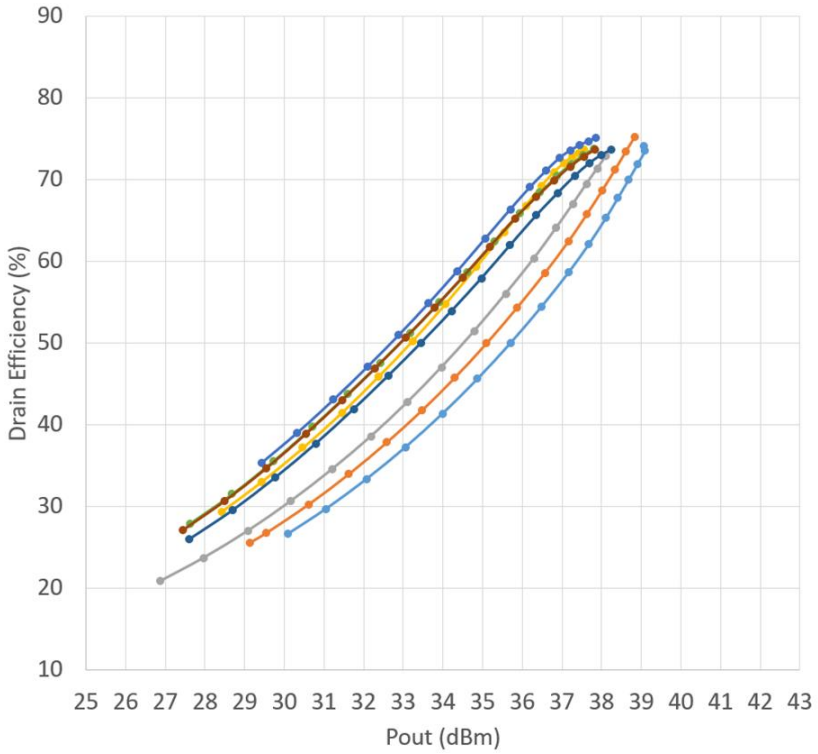
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=28V, Idq= 10mA





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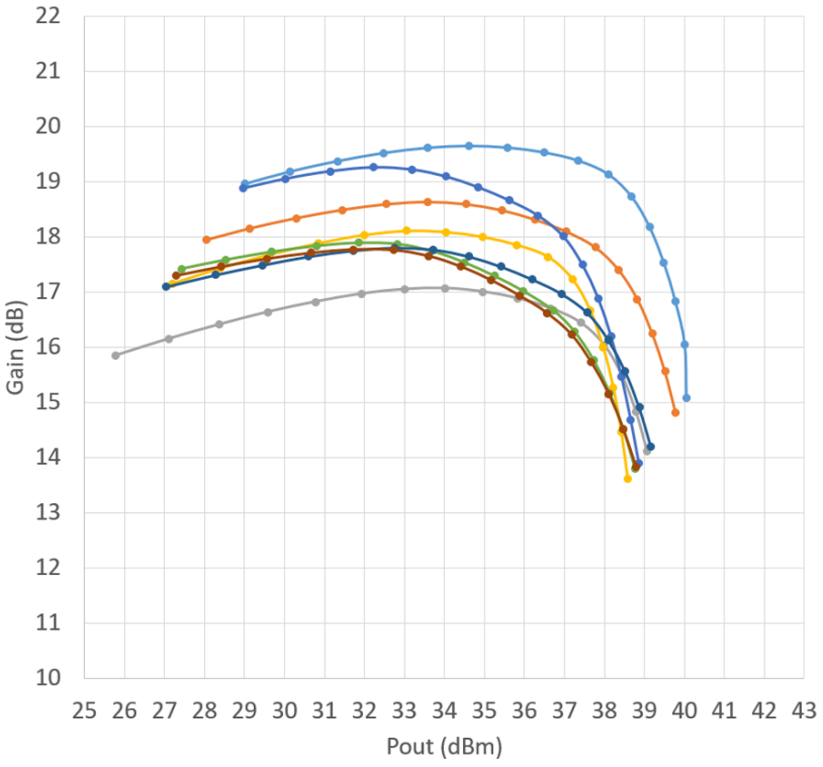
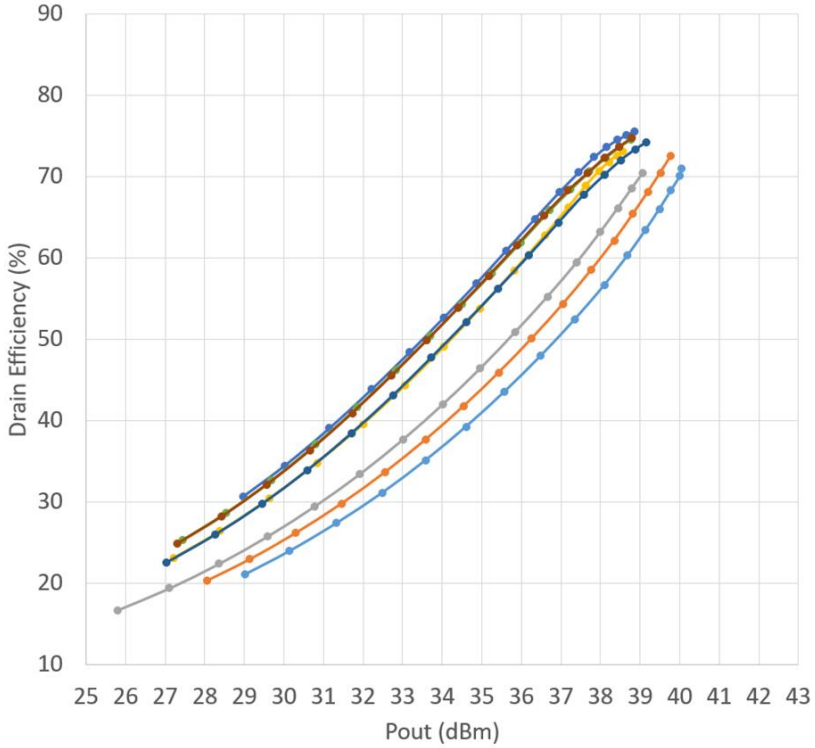
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=32V, Idq= 10mA





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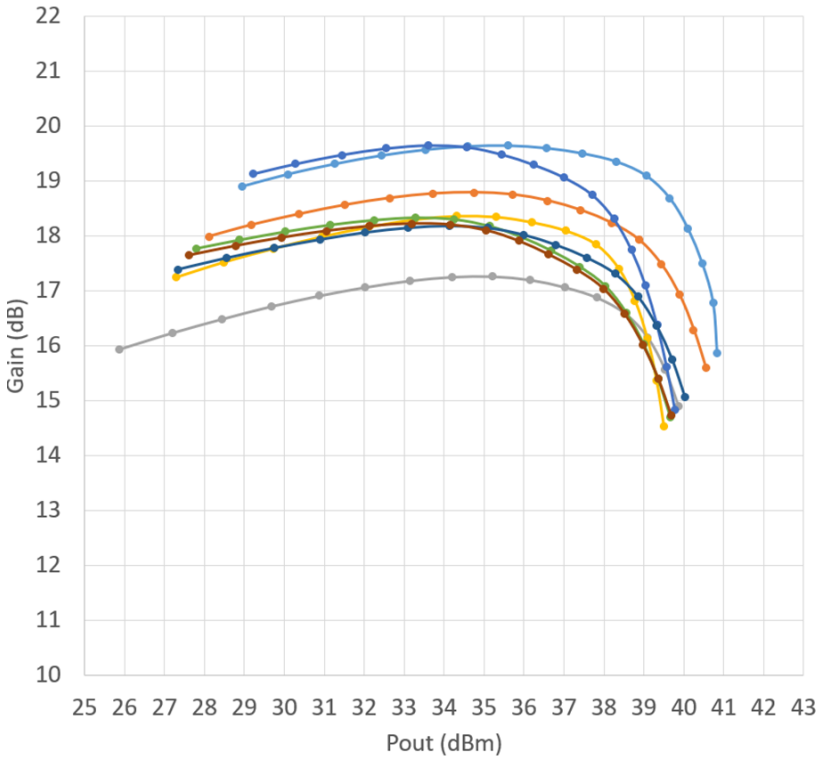
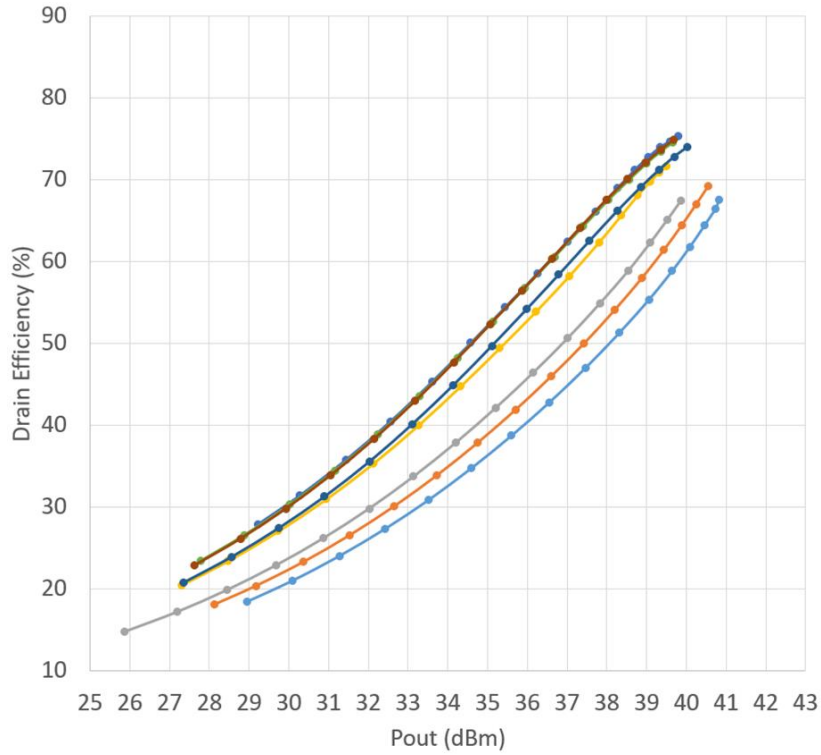
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=36V, Idq= 10mA





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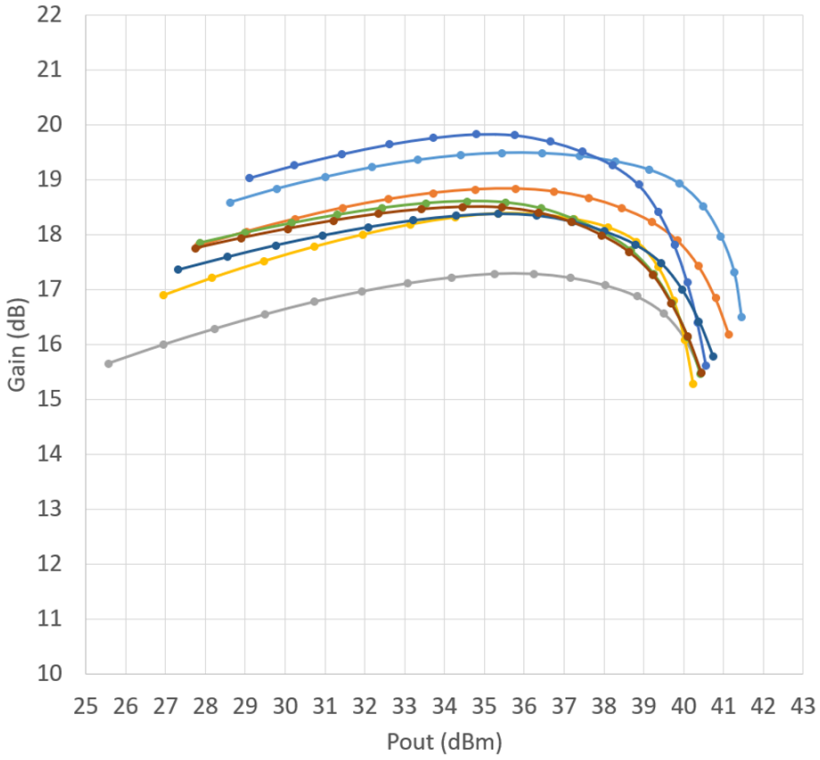
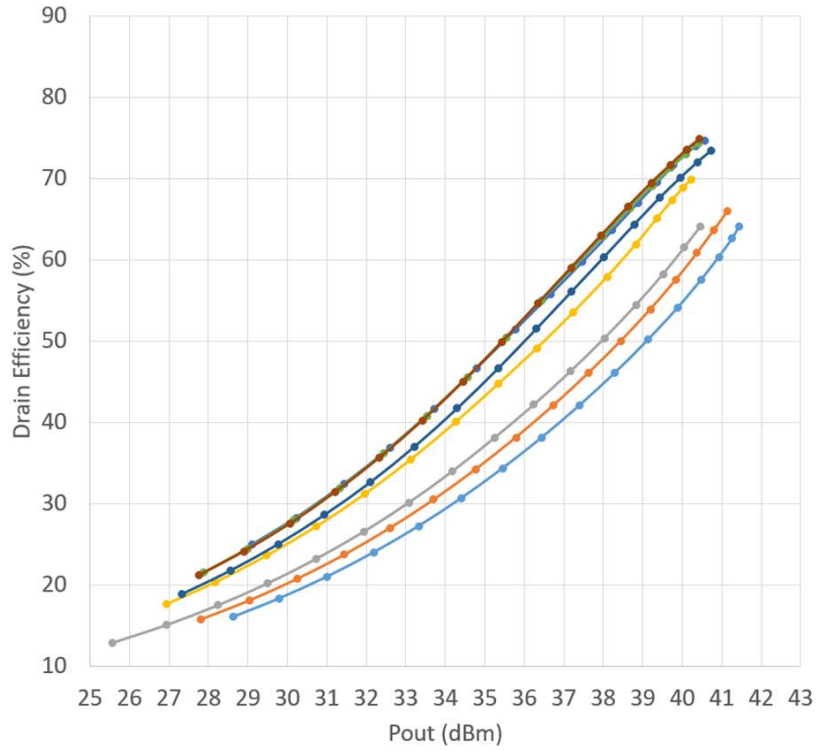
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=40V, Idq= 10mA





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DC35GN-15-D3

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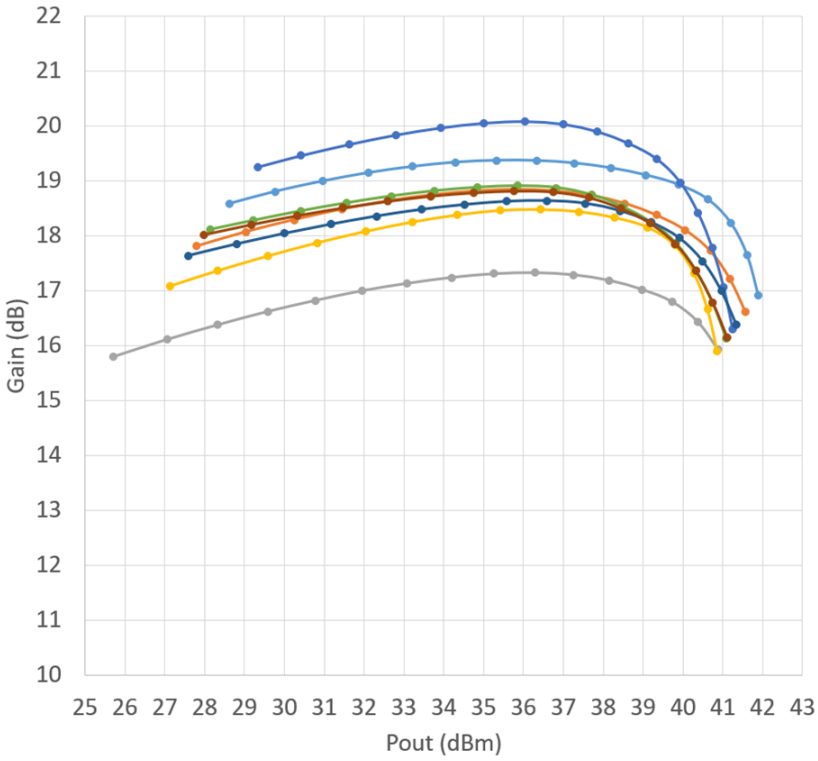
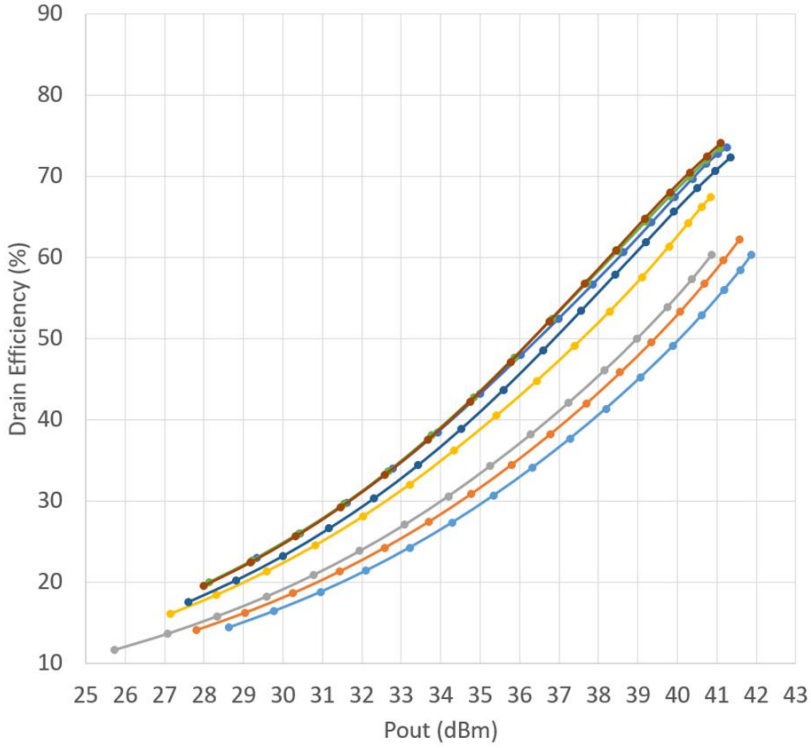
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=44V, Idq= 10mA





PRELIMINARY

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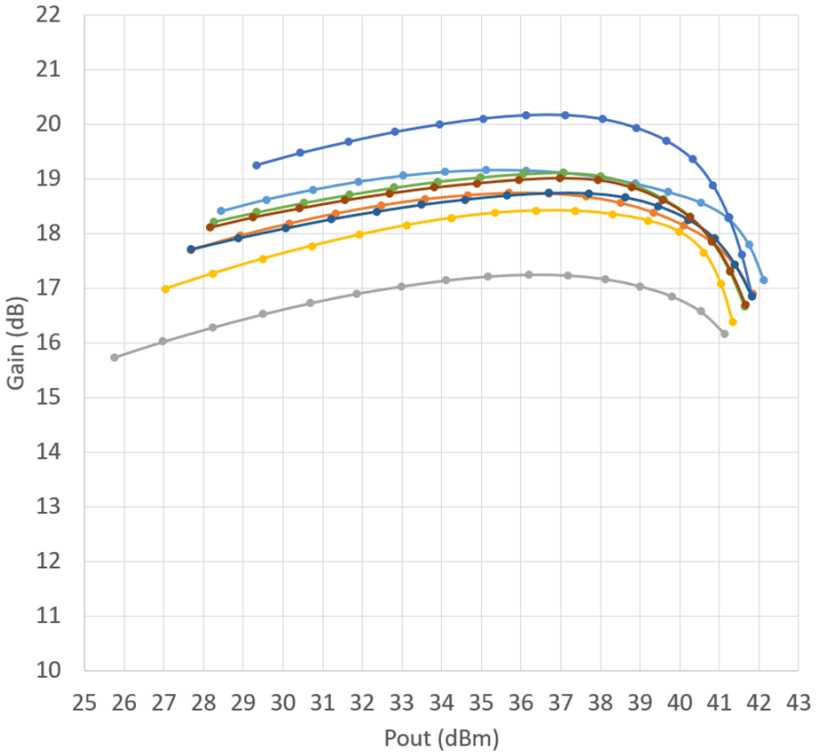
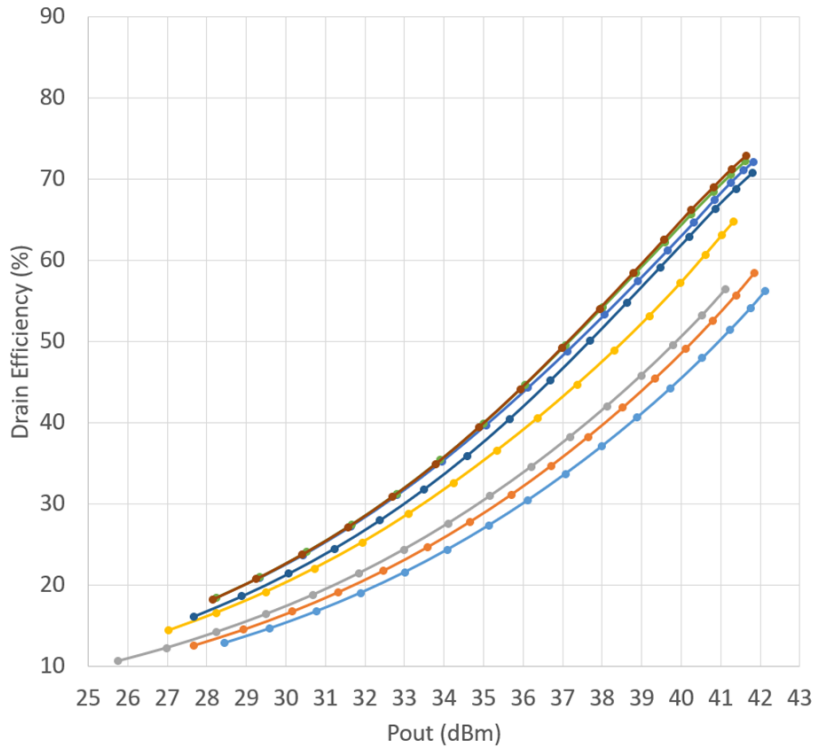
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=48V, Idq= 10mA





PRELIMINARY

DC35GN-15-D3

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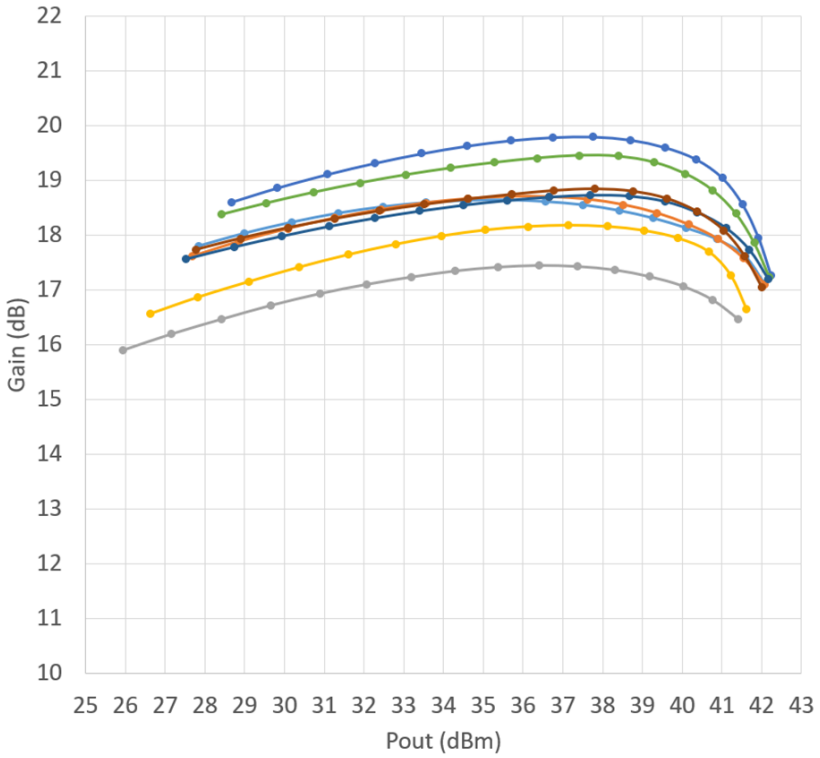
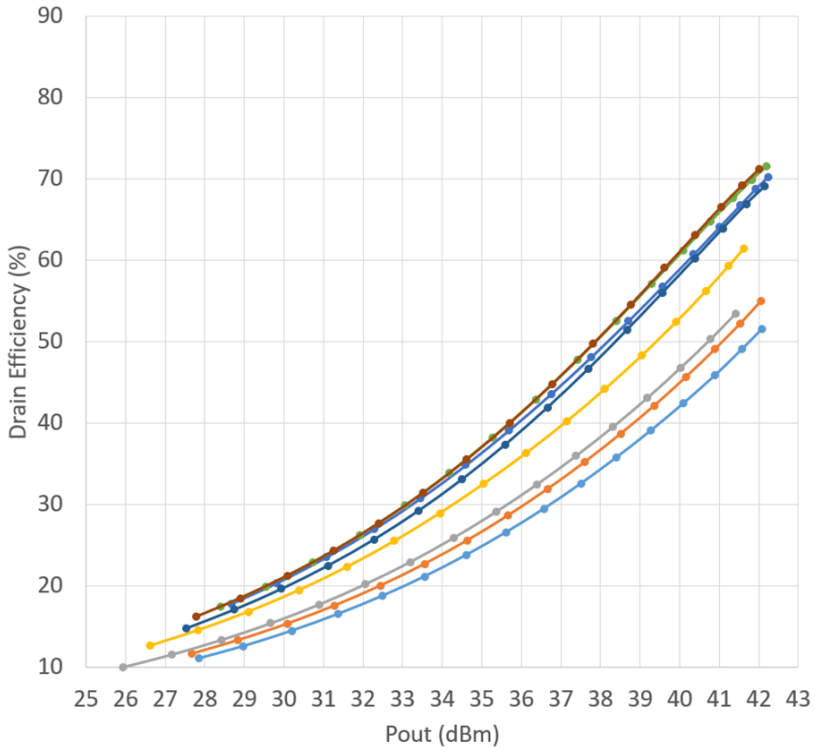
PERFORMANCE INFORMATION – 960-1215MHz – Vdd=52V, Idq= 10mA





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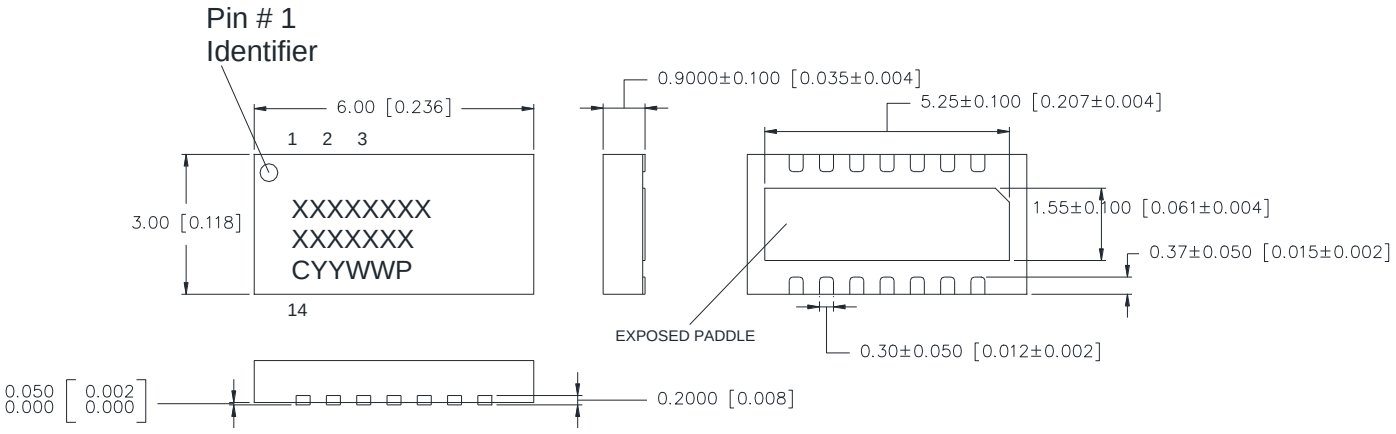
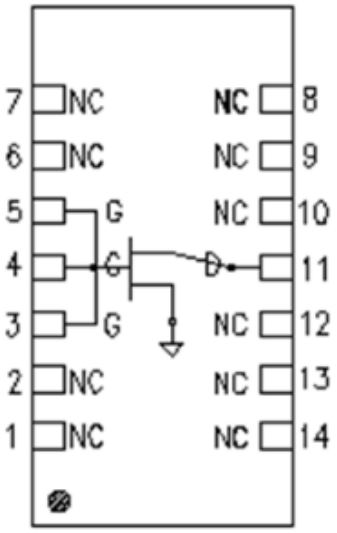
PRELIMINARY

Lead Free 3x6mm 14-LD DFN - PACKAGE DIMENSION



MARKINGS:
XXXXXXXX = Part No
XXXXXXX = Wafer Lot No
C=Country of Origin, YYWW = Date Code, P=Plating

Notes:
1. Reference package outline drawing for additional dimensional and tolerance information
2. All dimensions shown as mm/in



Pin Configuration

Pin No.	Function	Pin No.	Function
1	No Connection	8	No Connection
2	No Connection	9	No Connection
3	V_{GG}/RF_{IN}	10	No Connection
4	V_{GG}/RF_{IN}	11	V_{DD}/RF_{OUT}
5	V_{GG}/RF_{IN}	12	No Connection
6	No Connection	13	No Connection
7	No Connection	14	No Connection
	RF/DC GND	15	Paddle

Handling Procedures

Please observe the following precautions to avoid damage

Static Sensitivity

GaN Devices and Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B devices

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About Microsemi

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for communications, defense & security, aerospace and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, Calif., and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

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Revision History

Revision Level / Date	Para. Affected	Description
07 Oct 2019	-	Preliminary Release