Document Number: A2T27S007N
Rev. 0, 01/2018

RF Power LDMOS Transistor

N–Channel Enhancement–Mode Lateral MOSFET

This 28.8 dBm RF power LDMOS transistor is designed for cellular base station applications covering the frequency range of 400 to 2700 MHz.

2100 MHz

- Typical Single–Carrier W–CDMA Characterization Performance: V_{DD} = 28 Vdc, I_{DQ} = 50 mA, P_{out} = 28.8 dBm Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.(1)

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)	IRL (dB)
2110 MHz	22.0	22.8	9.5	–42.8	–9
2140 MHz	21.9	22.5	9.4	–43.1	–11
2170 MHz	21.8	22.8	9.5	–43.5	–11
2200 MHz	21.2	22.4	9.3	–43.8	–9

1800 MHz

- Typical Single–Carrier W–CDMA Performance: V_{DD} = 28 Vdc, I_{DQ} = 60 mA, P_{out} = 28.8 dBm Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.(1)

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)	IRL (dB)
1805 MHz	24.4	23.5	9.4	–41.3	–6
1840 MHz	24.8	24.5	8.9	–41.8	–10
1880 MHz	24.3	24.8	8.8	–42.2	–9

1. All data measured in fixture with device soldered to heatsink.

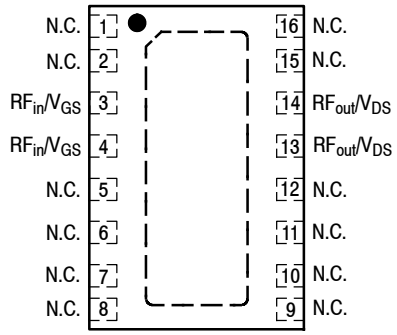
Features

- Greater negative gate–source voltage range for improved Class C operation
- Designed for digital predistortion error correction systems
- Universal broadband driver
- Optimized for Doherty applications

A2T27S007NT1

400–2700 MHz, 28.8 dBm AVG., 28 V AIRFAST RF POWER LDMOS TRANSISTOR

DFN 4 × 6 PLASTIC



(Top View)

Note: Exposed backside of the package is the source terminal for the transistor.

Figure 1. Pin Connections

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	–0.5, +65	Vdc
Gate-Source Voltage	V_{GS}	–6.0, +10	Vdc
Operating Voltage	V_{DD}	32, +0	Vdc
Storage Temperature Range	T_{stg}	–65 to +150	°C
Case Operating Temperature Range	T_C	–40 to +150	°C
Operating Junction Temperature Range (1,2)	T_J	–40 to 225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (2,3)	Unit
Thermal Resistance, Junction to Case Case Temperature 91°C, 28.8 dBm CW, 28 Vdc, I_{DQ} = 50 mA, 2140 MHz	$R_{\theta JC}$	3.8	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	1C
Charge Device Model (per JESD22-C101)	C3

Table 4. Moisture Sensitivity Level

Test Methodology	Rating	Package Peak Temperature	Unit
Per JESD22-A113, IPC/JEDEC J-STD-020	3	260	°C

Table 5. Electrical Characteristics (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Zero Gate Voltage Drain Leakage Current (V_{DS} = 65 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 32 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	1	μAdc
Gate-Source Leakage Current (V_{GS} = 10 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 7.7 μAdc)	$V_{GS(th)}$	0.8	1.2	1.6	Vdc
Gate Quiescent Voltage (V_{DD} = 28 Vdc, I_D = 50 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	1.4	1.8	2.2	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 77 mAdc)	$V_{DS(on)}$	0.1	0.2	0.3	Vdc

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at http://www.nxp.com/RF/calculators.
3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.nxp.com/RF and search for AN1955.

(continued)

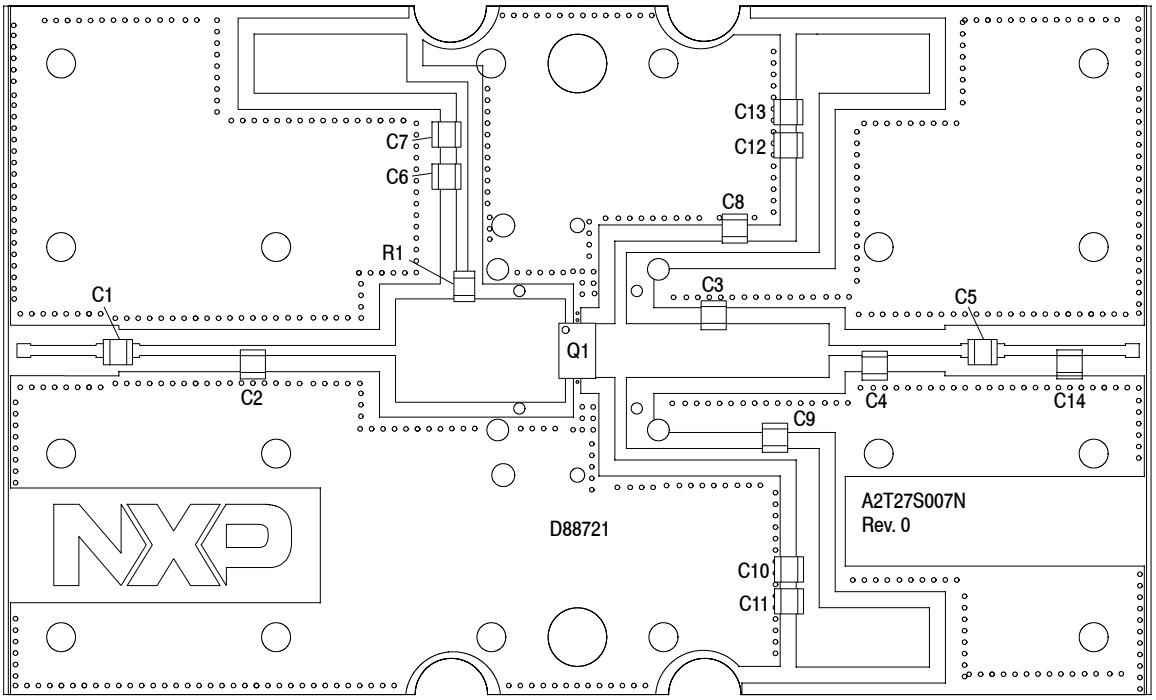
Table 5. Electrical Characteristics (T_A = 25°C unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
Functional Tests (In NXP Production Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 50 mA, P_{out} = 28.8 dBm Avg., f = 2170 MHz, Single-Carrier W-CDMA, IQ Magnitude Clipping, Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF. ACPR measured in 3.84 MHz Channel Bandwidth @ ±5 MHz Offset.					
Power Gain	G_{ps}	18.3	18.9	22.3	dB
Drain Efficiency	η_D	18.9	19.6	—	%
Adjacent Channel Power Ratio	ACPR	—	–45.5	–43.5	dBc
Input Return Loss	IRL	—	–7	–4	dB
Load Mismatch (1) (In NXP Characterization Test Fixture, 50 ohm system) I_{DQ} = 70 mA, f = 2110 MHz					
VSWR 10:1 at 32 Vdc, 8.1 W CW Output Power (3 dB Input Overdrive from 6 W CW Rated Power)	No Device Degradation				
Typical Performance (1) (In NXP Characterization Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 50 mA, 2110–2200 MHz Bandwidth					
P_{out} @ 1 dB Compression Point, CW	P1dB	—	7	—	W
AM/PM (Maximum value measured at the P3dB compression point across the 2110–2200 MHz frequency range.)	Φ	—	–19	—	°
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW_{res}	—	80	—	MHz
Gain Flatness in 90 MHz Bandwidth @ P_{out} = 28.8 dBm Avg.	G_F	—	0.2	—	dB
Gain Variation over Temperature (–30°C to +85°C)	ΔG	—	0.011	—	dB/°C
Output Power Variation over Temperature (–30°C to +85°C)	ΔP1dB	—	0.002	—	dB/°C

Table 6. Ordering Information

Device	Tape and Reel Information	Package
A2T27S007NT1	T1 Suffix = 1,000 Units, 16 mm Tape Width, 7-inch Reel	DFN 4 × 6

1. All data measured in fixture with device soldered to heatsink.



Note: All data measured in fixture with device soldered to heatsink.

Figure 2. A2T27S007NT1 Characterization Test Circuit Component Layout — 2110–2200 MHz

Table 7. A2T27S007NT1 Characterization Test Circuit Component Designations and Values — 2110–2200 MHz

Part	Description	Part Number	Manufacturer
C1, C5, C6, C8, C9	9.1 pF Chip Capacitor	ATC100B9R1JT500XT	ATC
C2	2.2 pF Chip Capacitor	ATC100B2R2JT500XT	ATC
C3	3 pF Chip Capacitor	ATC100B3R0CT500XT	ATC
C4	1.7 pF Chip Capacitor	ATC100B1R7BT500XT	ATC
C7, C10, C11, C12, C13	10 μF Chip Capacitor	GRM32ER61H106KA12L	Murata
C14	0.1 pF Chip Capacitor	ATC100B0R1BT500XT	ATC
Q1	RF Power LDMOS Transistor	A2T27S007N	NXP
R1	4.75 Ω, 1/4 W Chip Resistor	CRCW12061ROOFKEA	Vishay
PCB	Rogers RO4350B, 0.020″, ε_r = 3.66	D88721	MTL

TYPICAL CHARACTERISTICS — 2110–2200 MHz

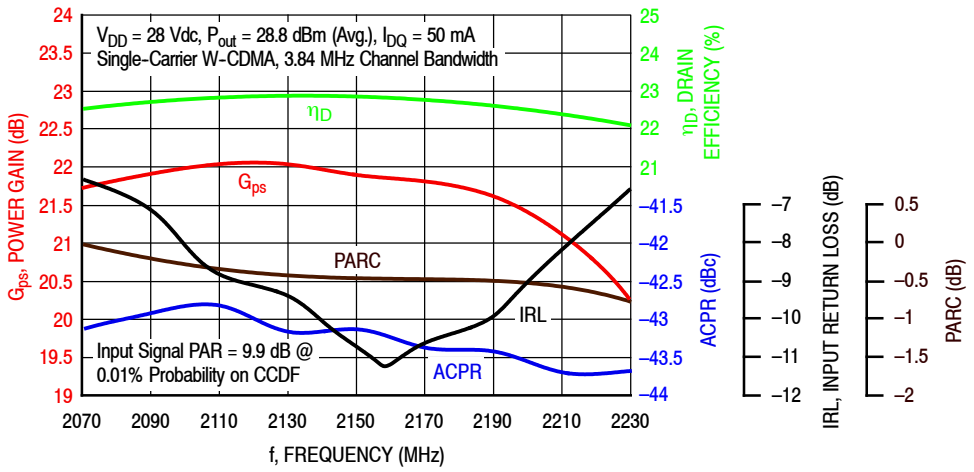


Figure 3. Single-Carrier Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @ P_{out} = 28.8 dBm Avg.

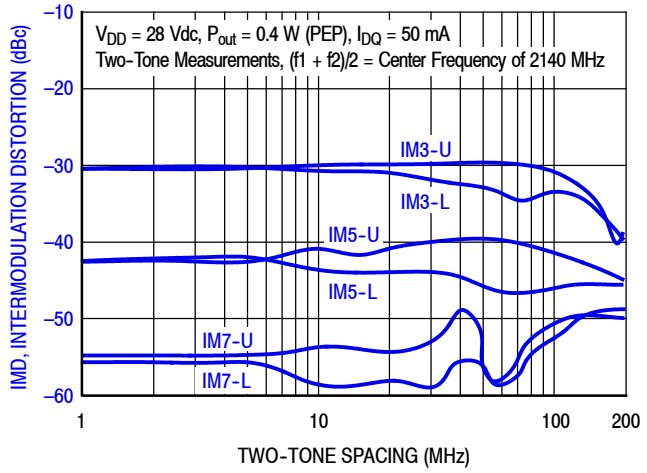


Figure 4. Intermodulation Distortion Products versus Two-Tone Spacing

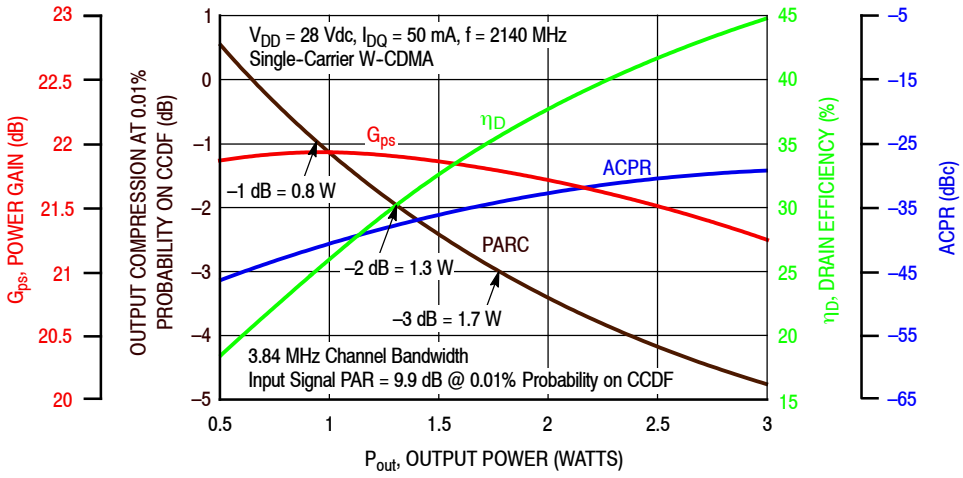


Figure 5. Output Peak-to-Average Ratio Compression (PARC) versus Output Power

TYPICAL CHARACTERISTICS — 2110–2200 MHz

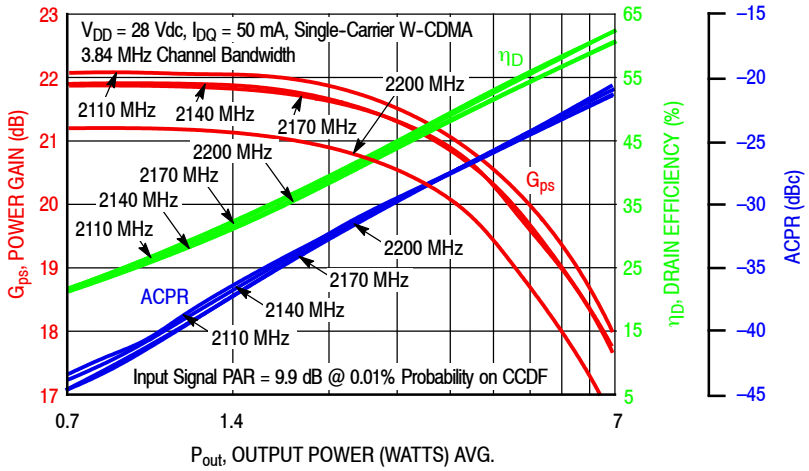


Figure 6. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power

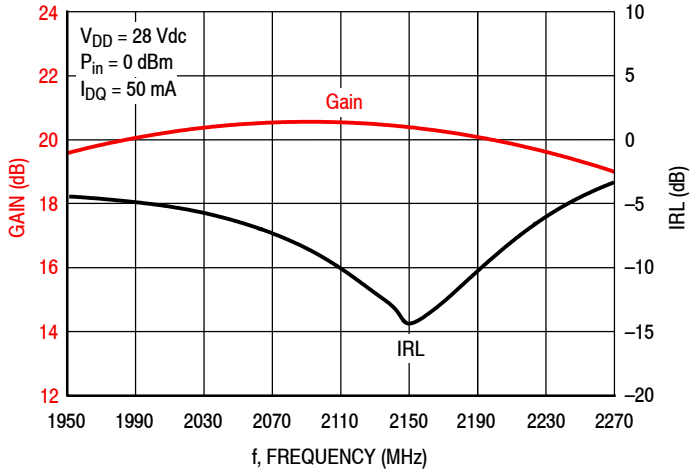
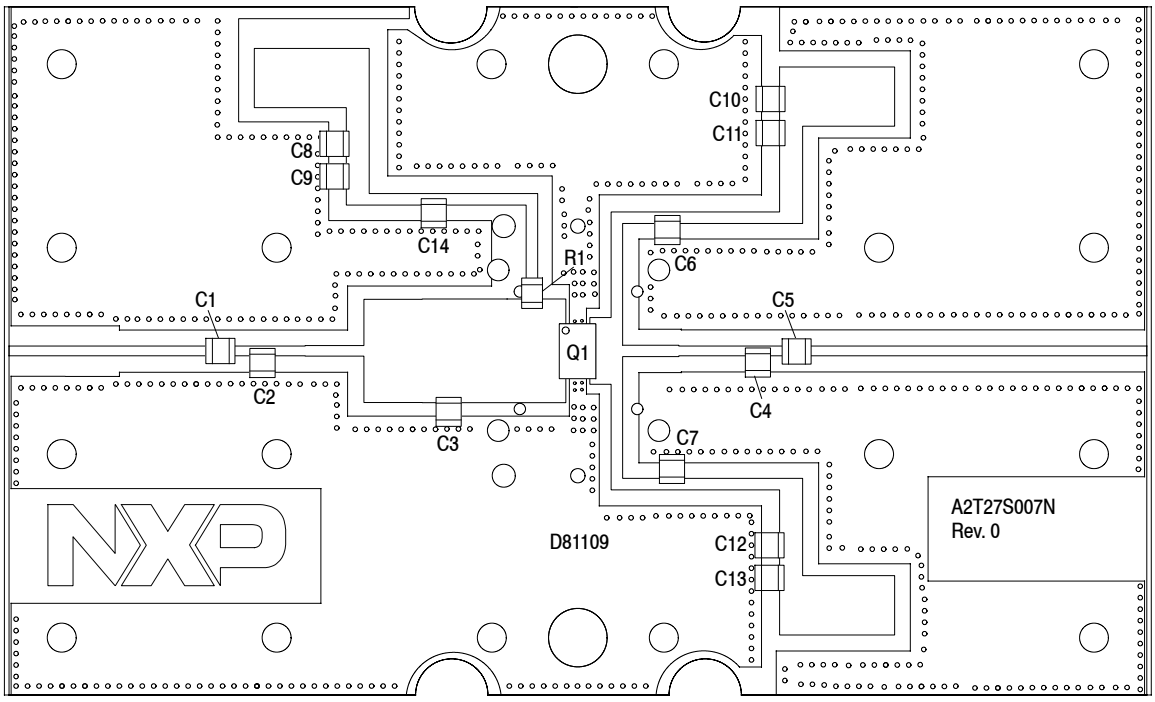


Figure 7. Broadband Frequency Response



NOTE: All data measured in fixture with device soldered to heatsink.

Figure 8. A2T27S007NT1 Test Circuit Component Layout — 1805–1880 MHz

Table 8. A2T27S007NT1 Test Circuit Component Designations and Values — 1805–1880 MHz

Part	Description	Part Number	Manufacturer
C1	1.5 pF Chip Capacitor	ATC100B1R5BT500XT	ATC
C2	2.2 pF Chip Capacitor	ATC100B2R2JT500XT	ATC
C3, C4	2.4 pF Chip Capacitor	ATC800B2R4B500XT	ATC
C5	13 pF Chip Capacitor	ATC100B130JT500XT	ATC
C6, C7	11 pF Chip Capacitor	ATC100B110JT500XT	ATC
C8, C9, C10, C11, C12, C13	10 μF Chip Capacitor	GRM32ER61H106KA12L	Murata
C14	12 pF Chip Capacitor	ATC100B120JT500XT	ATC
Q1	RF Power LDMOS Transistor	A2T27S007N	NXP
R1	2.2 Ω, 1/4 W Chip Resistor	CRCW12062R20JNEA	Vishay
PCB	Rogers RO4350B, 0.020″, ε_r = 3.66	D81109	MTL

TYPICAL CHARACTERISTICS — 1805–1880 MHz

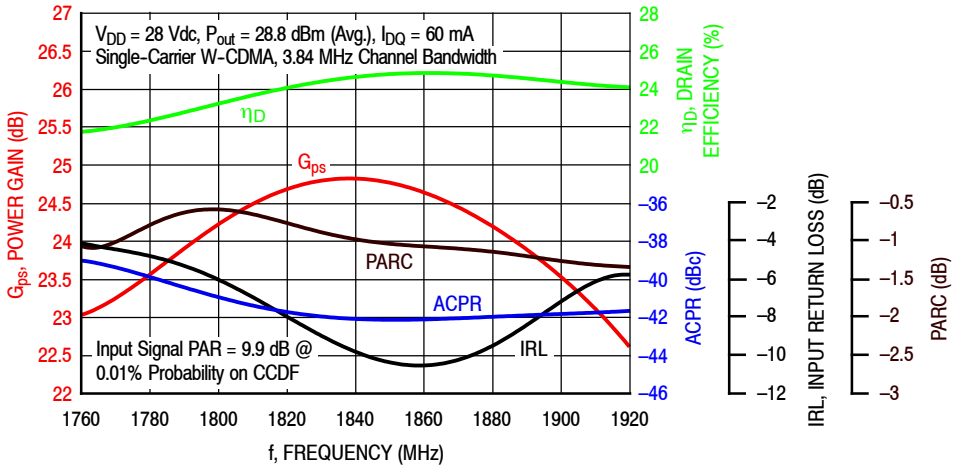


Figure 9. Single-Carrier Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @ P_{out} = 28.8 dBm Avg.

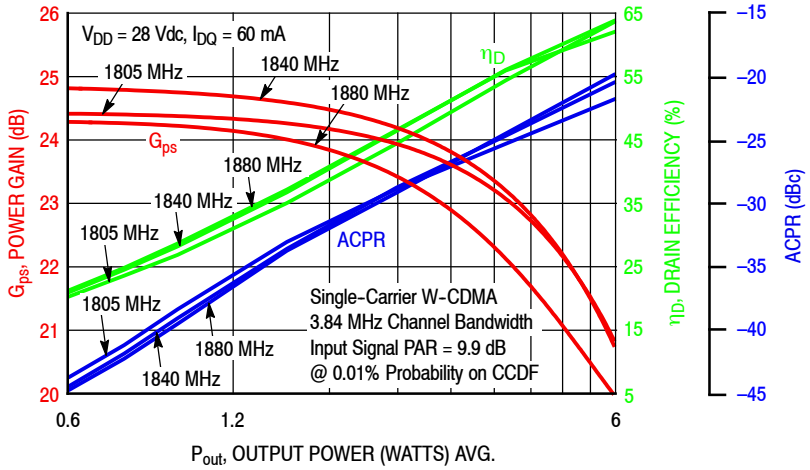


Figure 10. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power

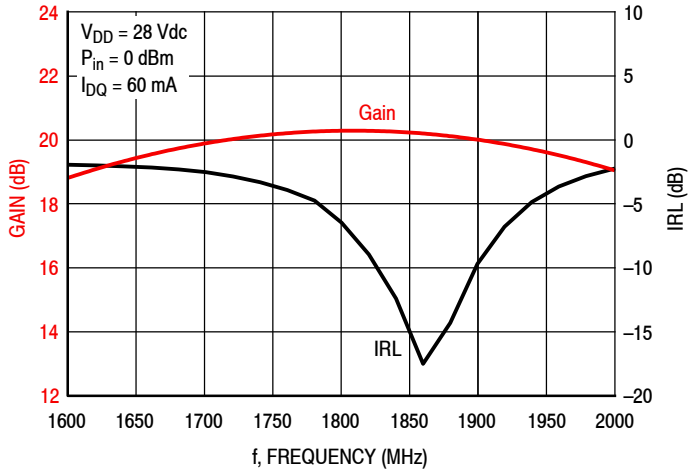


Figure 11. Broadband Frequency Response

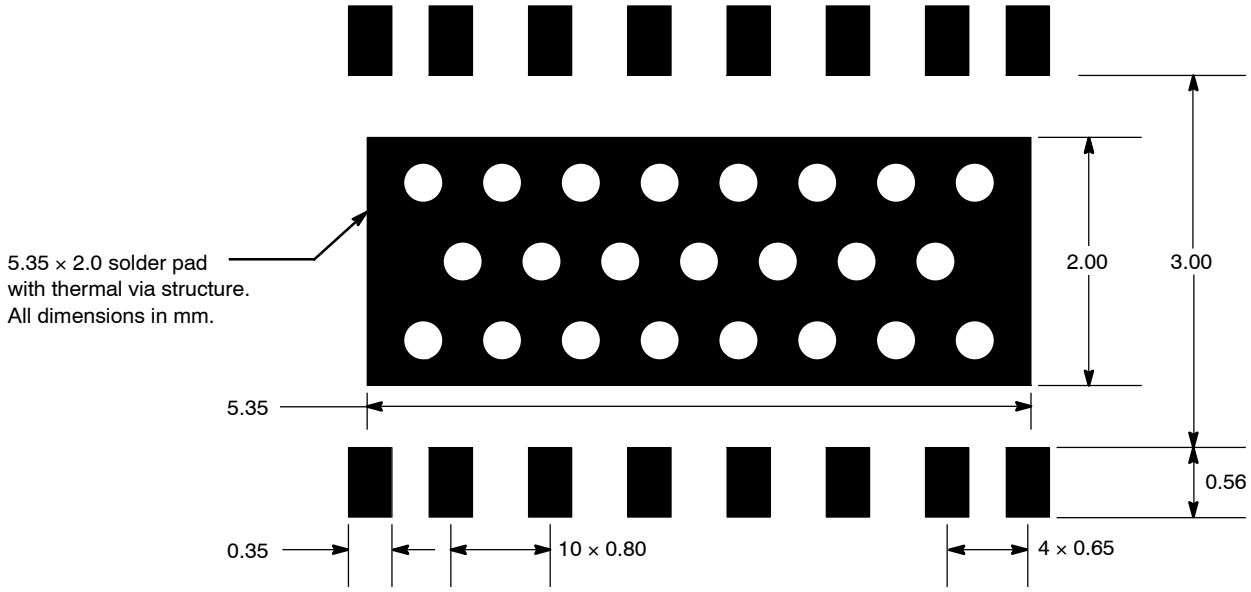
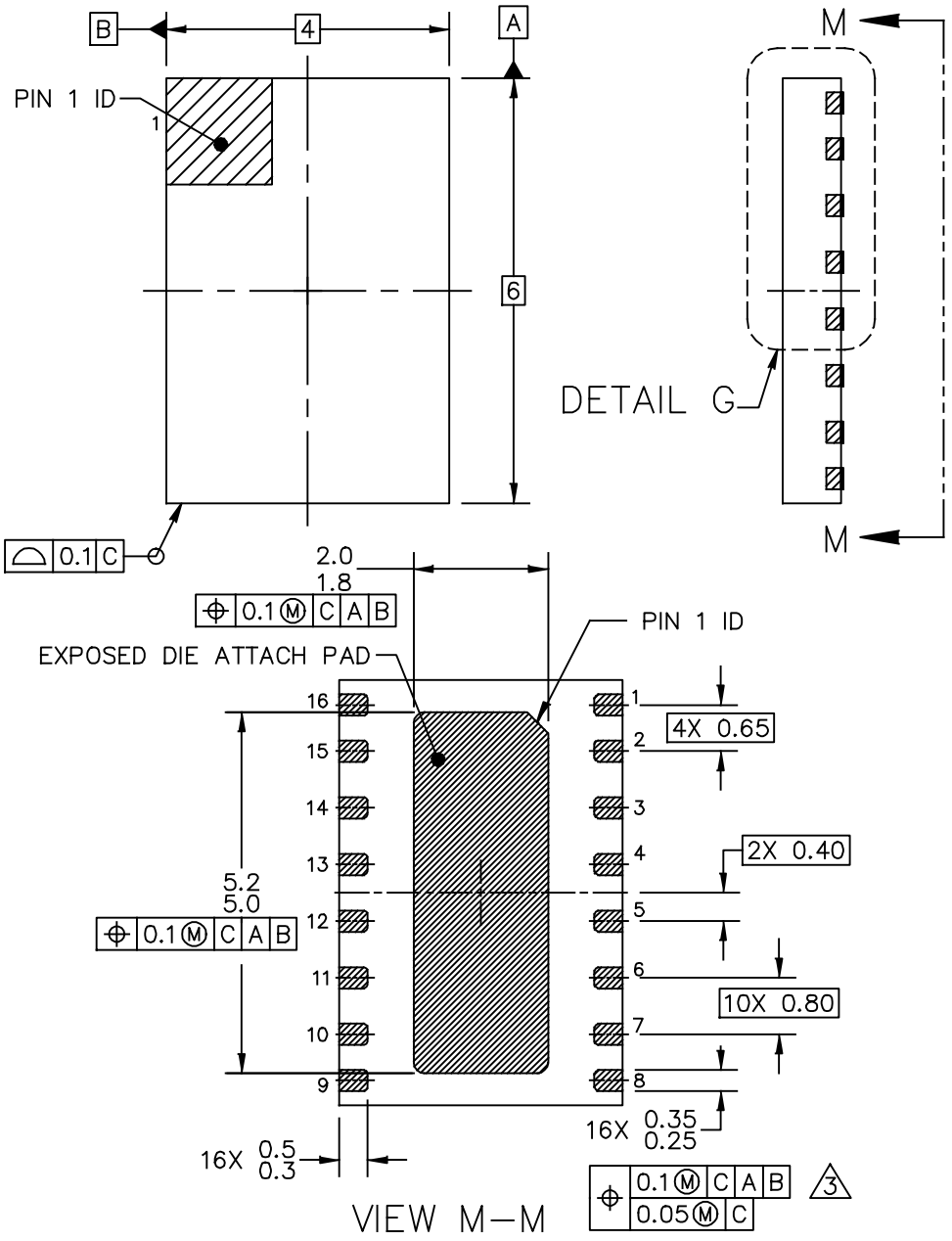


Figure 12. PCB Pad Layout for 16-Lead DFN 4 × 6

Figure 13. Product Marking

PACKAGE DIMENSIONS



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	STANDARD: NON–JEDEC	
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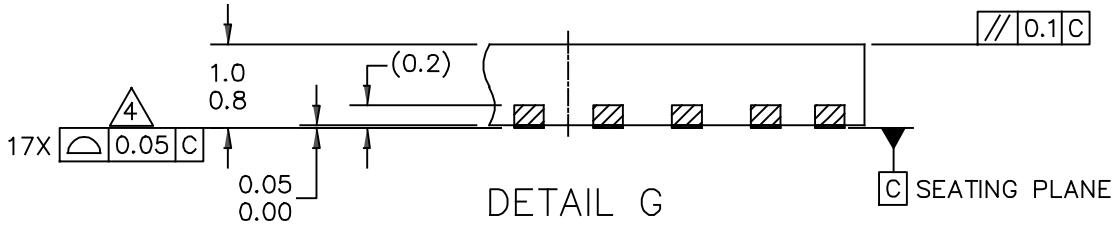

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	STANDARD: NON–JEDEC	
	SOT1862–1	27 JUL 2016

NOTES:

1. DIMENSIONING & TOLERANCING CONFIRM TO ASME Y14.5M–1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.
3. THIS DIMENSION APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 MM AND 0.30 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED HEAT SLUG AS WELL AS THE TERMINALS.

MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE

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	STANDARD: NON–JEDEC
	SOT1862–1 27 JUL 2016

PRODUCT DOCUMENTATION, SOFTWARE AND TOOLS

Refer to the following resources to aid your design process.

Application Notes

- AN1907: Solder Reflow Attach Method for High Power RF Devices in Plastic Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

Software

- Electromigration MTTF Calculator
- .s2p File

Development Tools

- Printed Circuit Boards

To Download Resources Specific to a Given Part Number:

1. Go to http://www.nxp.com/RF
2. Search by part number
3. Click part number link
4. Choose the desired resource from the drop down menu

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Jan. 2018	• Initial release of data sheet

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