NXP Semiconductors
Technical Data

Document Number: AFT27S012N
Rev. 0, 07/2017

RF Power LDMOS Transistor

N-Channel Enhancement-Mode Lateral MOSFET

This 1.26 W RF power LDMOS transistor is designed for cellular base station applications covering the frequency range of 728 to 2700 MHz.

- Typical Single-Carrier W-CDMA Performance: V_{DD} = 28 Vdc, I_{DQ} = 90 mA, P_{out} = 1.26 W Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.(1)

2100 MHz

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)	IRL (dB)
2110 MHz	20.8	22.0	9.8	–41.1	–9
2140 MHz	20.9	22.6	9.6	–40.7	–10
2170 MHz	20.9	22.8	9.4	–40.8	–10
2200 MHz	20.8	22.9	9.3	–40.4	–9

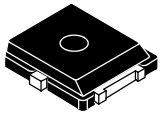
1. All data measured in fixture with device soldered to heatsink.

Features

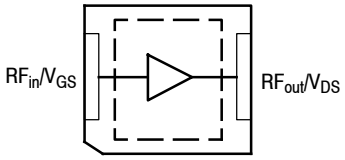
- Greater negative gate-source voltage range for improved Class C operation
- Designed for digital predistortion error correction systems
- Universal broadband driven device with internal RF feedback

AFT27S012NT1

728–2700 MHz, 1.26 W AVG., 28 V AIRFAST RF POWER LDMOS TRANSISTOR



PLD-1.5W PLASTIC



(Top View)

Note: The center pad on the 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 +150	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (2,3)	Unit
Thermal Resistance, Junction to Case Case Temperature 77°C, 1.3 W CW, 28 Vdc, I_{DQ} = 110 mA, 2450 MHz	$R_{\theta JC}$	3.4	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	1B
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} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 15.4 μAdc)	$V_{GS(th)}$	0.8	1.2	1.6	Vdc
Gate Quiescent Voltage (V_{DD} = 28 Vdc, I_D = 90 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	1.5	1.8	2.3	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 154 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)

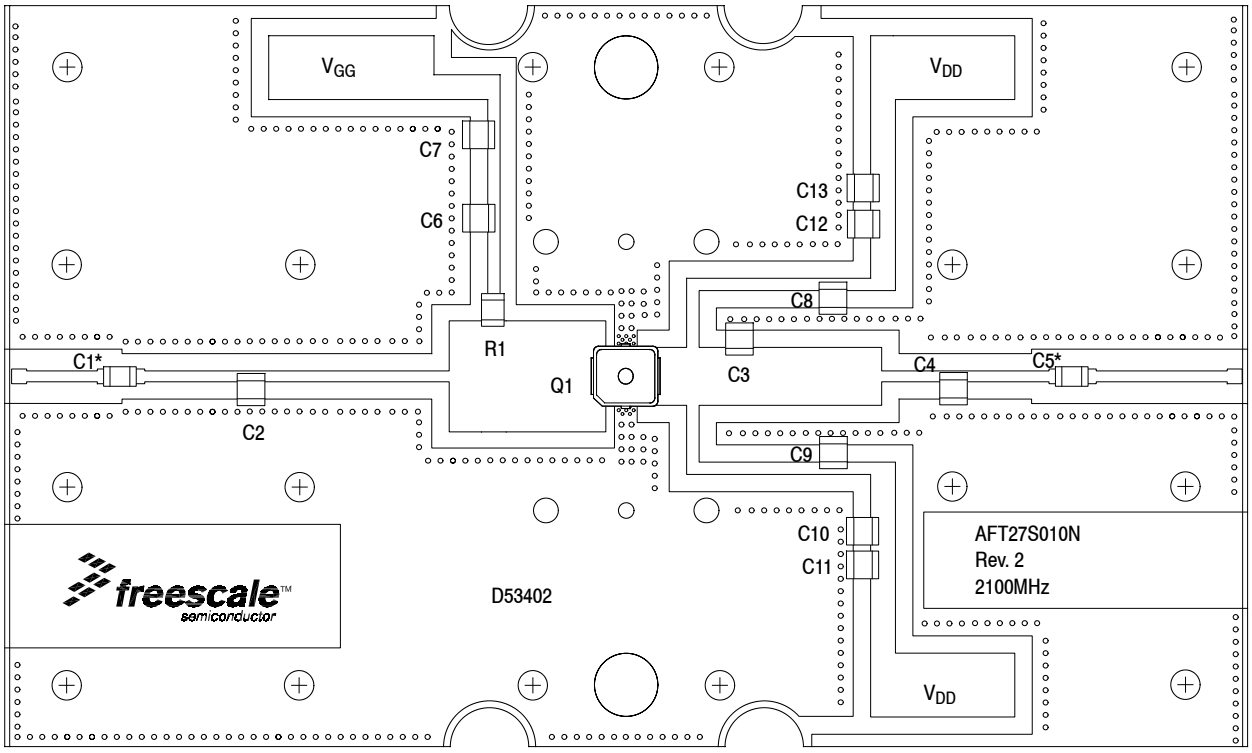
Table 5. Electrical Characteristics (T_A = 25°C unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
Functional Tests (In NXP Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 90 mA, P_{out} = 1.26 W 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}	20.0	20.9	—	dB
Drain Efficiency	η_D	18.5	22.8	—	%
Adjacent Channel Power Ratio	ACPR	—	-40.8	–37.9	dBc
Input Return Loss	IRL	—	-12	–9	dB
Load Mismatch (In NXP Test Fixture, 50 ohm system) I_{DQ} = 90 mA, f = 2140 MHz					
VSWR 10:1 at 32 Vdc, 16.6 W CW Output Power (3 dB Input Overdrive from 125 mW CW Rated Power)	No Device Degradation				
Typical Performance(1) (In NXP Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 90 mA, 2110-2200 MHz Bandwidth					
P_{out} @ 1 dB Compression Point, CW	P1dB	—	13	—	W
AM/PM (Maximum value measured at the P3dB compression point across the 2110-2200 MHz frequency range.)	Φ	—	–13	—	°
Gain Flatness in 90 MHz Bandwidth @ P_{out} = 1.26 W Avg.	G_F	—	0.20	—	dB
Gain Variation over Temperature (-30°C to +85°C)	ΔG	—	0.004	—	dB/°C
Output Power Variation over Temperature (-30°C to +85°C)	ΔP1dB	—	0.010	—	dB/°C

Table 6. Ordering Information

Device	Tape and Reel Information	Package
AFT27S012NT1	T1 Suffix = 1000 Units, 16 mm Tape Width, 7-inch Reel	PLD-1.5W

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



*C1 and C5 are mounted vertically.

NOTE: All data measured in fixture with device soldered to heatsink. AFT27S012N uses the AFT27S0101N production fixture; board and parts list are identical.

Figure 2. AFT27S010NT1 Test Circuit Component Layout — 2110–2200 MHz

Table 7. AFT27S010NT1 Test Circuit Component Designations and Values — 2110–2200 MHz

Part	Description	Part Number	Manufacturer
C1, C5, C6, C8, C9	9.1 pF Chip Capacitors	ATC100B9R1JT500XT	ATC
C2	1.1 pF Chip Capacitor	ATC100B1R1JT500XT	ATC
C3	2.0 pF Chip Capacitor	ATC100B2R0JT500XT	ATC
C4	1.0 pF Chip Capacitor	ATC100B1R0JT500XT	ATC
C7, C10, C11, C12, C13	10 μF Chip Capacitors	GRM32ER61H106KA12L	Murata
Q1	RF Power LDMOS Transistor	AFT27S010N	NXP
R1	2.37 Ω Chip Resistor	CRCW12062R37FKEA	Vishay
PCB	Rogers RO4350B, 0.020″, ε_r = 3.66	D53402	MTL

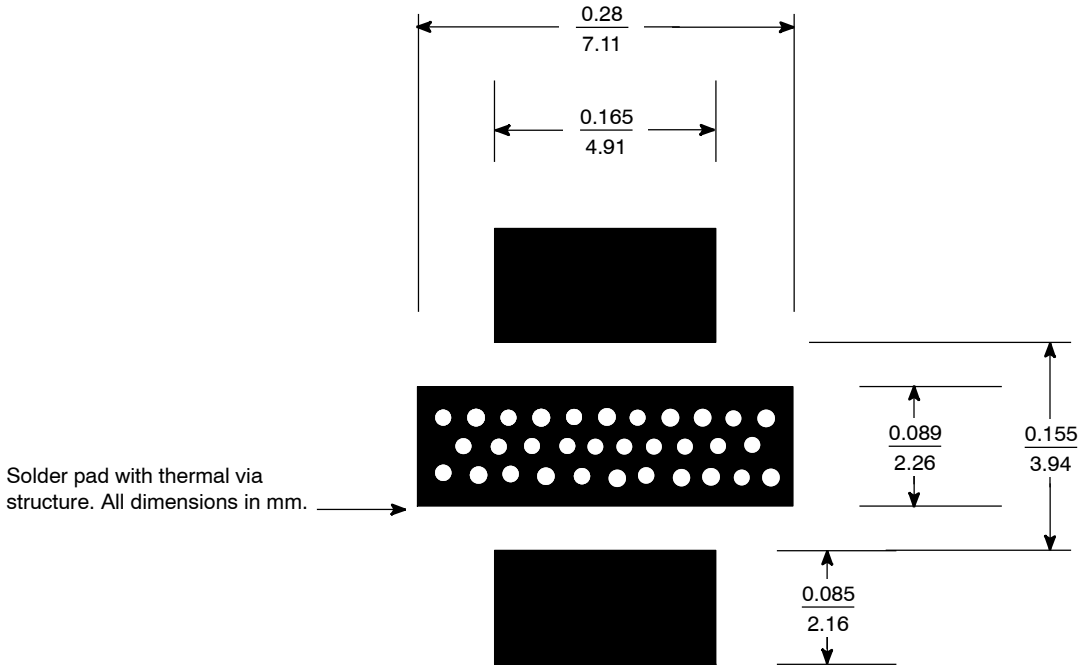
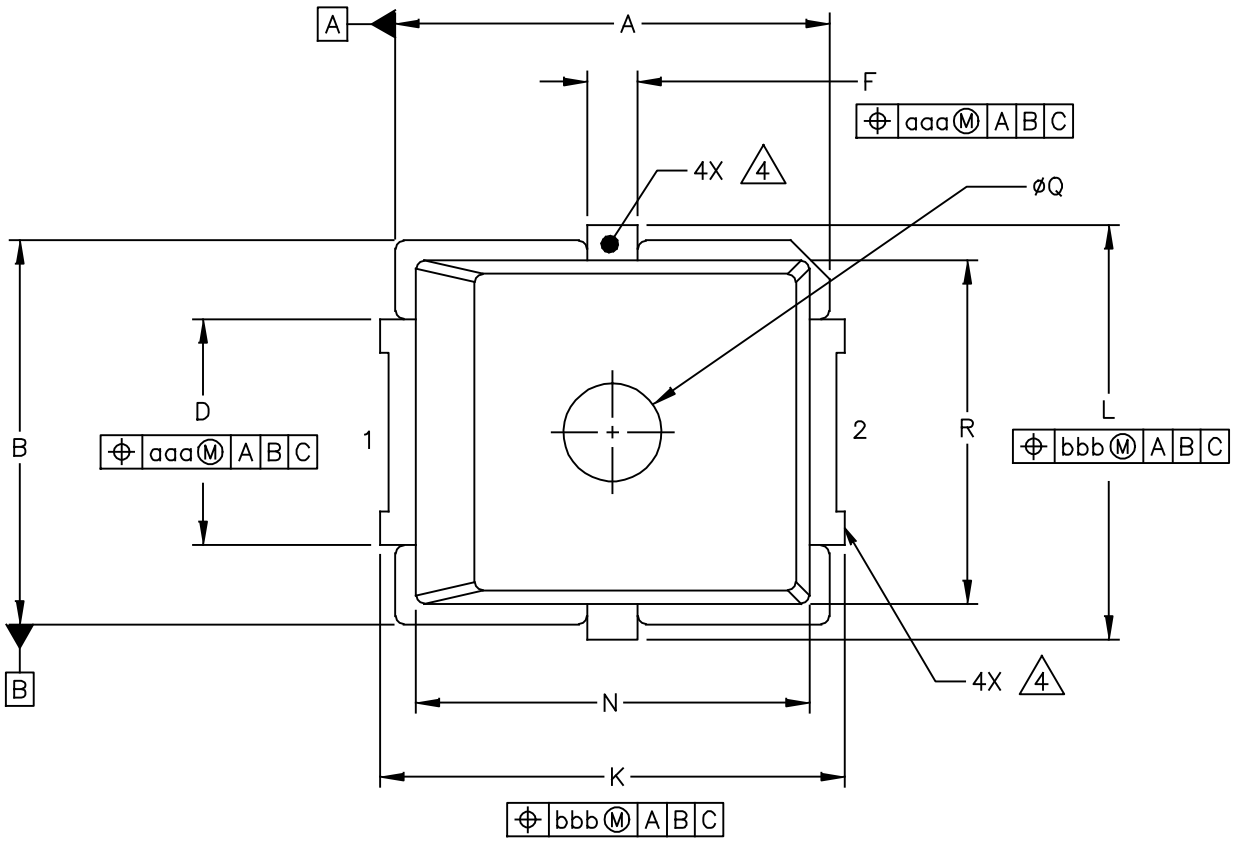
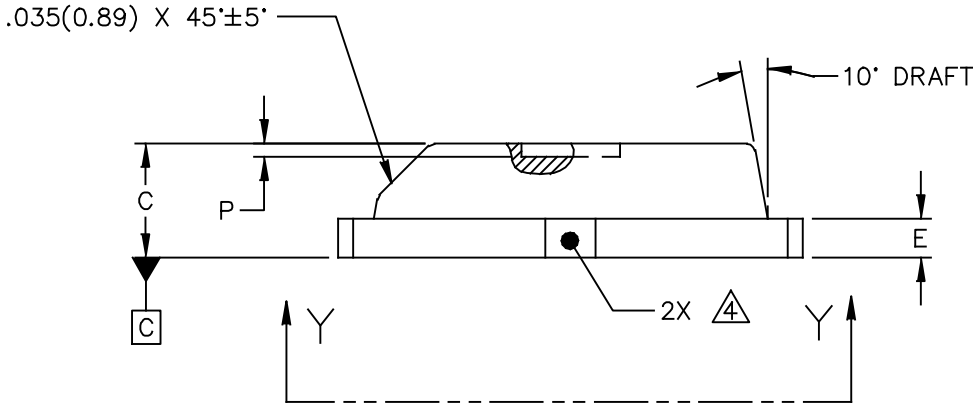


Figure 3. PCB Pad Layout for PLD-1.5W

Figure 4. Product Marking

PACKAGE DIMENSIONS





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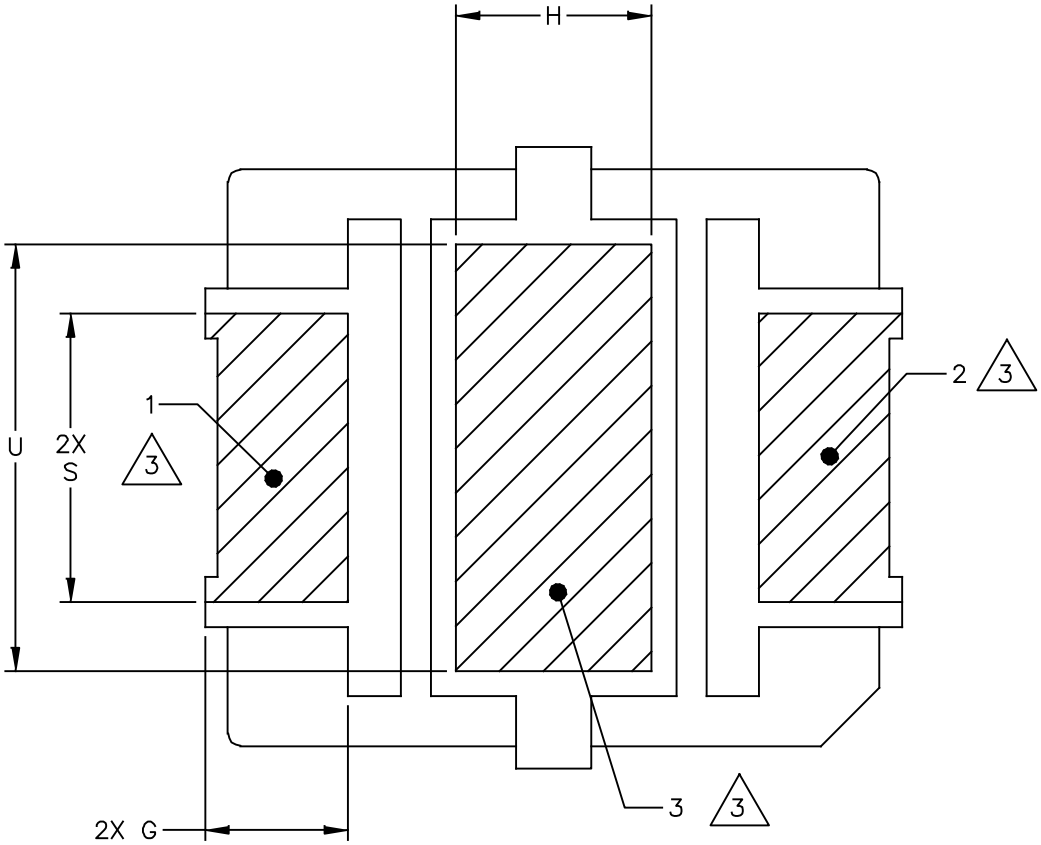
TITLE: PLD−1.5W	DOCUMENT NO: 98ASA00476D	REV: A
	STANDARD: NON−JEDEC	
	SOT1811−2	08 FEB 2016



VIEW Y–Y

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	STANDARD: NON–JEDEC	
	SOT1811–2	08 FEB 2016

NOTES:

1. CONTROLLING DIMENSION: INCH.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.
3. HATCHING REPRESENTS THE EXPOSED AND SOLDERABLE AREA. DIMENSIONS G, S, H AND U REPRESENT THE VALUES BETWEEN THE TWO OPPOSITE POINTS ALONG THE EDGES OF EXPOSED AREA.
4. THESE SURFACES ARE NOT PART OF THE SOLDERABLE SURFACES AND MAY REMAIN UNPLATED.

DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	.255	.265	6.48	6.73	Q	.055	.063	1.40	1.60
B	.225	.235	5.72	5.97	R	.200	.210	5.08	5.33
C	.065	.072	1.65	1.83	S	.110	–	2.79	–
D	.130	.150	3.30	3.81	U	.156	–	3.96	–
E	.021	.026	0.53	0.66	aaa		.004		0.10
F	.026	.044	0.66	1.12	bbb		.005		0.13
G	.038	–	0.97	–					
H	.069	–	1.75	–					
J	.160	.180	4.06	4.57					
K	.273	.285	6.93	7.24					
L	.245	.255	6.22	6.48					
N	.230	.240	5.84	6.10					
P	.000	.008	0.00	0.20					

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PRODUCT DOCUMENTATION

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

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	July 2017	• Initial release of data sheet

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