Document Number: A2T18H450W19S
Rev. 0, 9/2016

RF Power LDMOS Transistor

N-Channel Enhancement-Mode Lateral MOSFET

This 89 W asymmetrical Doherty RF power LDMOS transistor is designed for cellular base station applications requiring very wide instantaneous bandwidth capability covering the frequency range of 1805 to 1880 MHz.

1800 MHz

- Typical Doherty Single-Carrier W-CDMA Performance: V_{DD} = 30 Vdc, I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, P_{out} = 89 W Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.

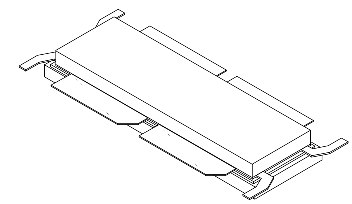
Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)
1805 MHz	16.6	47.1	7.9	–31.4
1840 MHz	16.7	47.5	8.0	–32.9
1880 MHz	16.5	47.7	7.9	–38.8

Features

- Advanced High Performance In-Package Doherty
- Designed for Wide Instantaneous Bandwidth Applications
- Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- Able to Withstand Extremely High Output VSWR and Broadband Operating Conditions
- Designed for Digital Predistortion Error Correction Systems

A2T18H450W19SR6

1805–1880 MHz, 89 W AVG., 30 V AIRFAST RF POWER LDMOS TRANSISTOR



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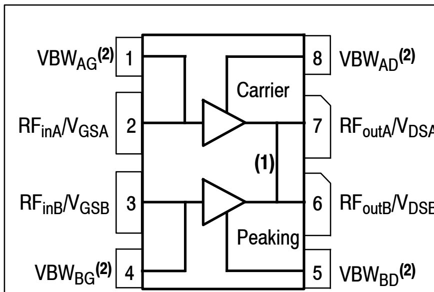

(Top View)

Figure 1. Pin Connections

1. Pin connections 6 and 7 are DC coupled and RF independent.
2. Device cannot operate with the V_{DD} current supplied through pins 1, 4, 5, and 8.

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 +125	°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 73°C, 89 W Avg., W-CDMA, 30 Vdc, I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, 1840 MHz	$R_{\theta JC}$	0.27	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	2
Machine Model (per EIA/JESD22-A115)	B
Charge Device Model (per JESD22-C101)	IV

Table 4. 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}	—	—	5	μAdc
Gate-Source Leakage Current [4] (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics - Side A, Carrier					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 200 μAdc)	$V_{GS(th)}$	0.8	1.2	1.6	Vdc
Gate Quiescent Voltage (V_{DD} = 30 Vdc, I_{DA} = 800 mAdc, Measured in Functional Test)	$V_{GSA(Q)}$	1.6	1.8	1.9	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 2.0 Adc)	$V_{DS(on)}$	0.05	0.15	0.3	Vdc
On Characteristics - Side B, Peaking					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 360 μAdc)	$V_{GS(th)}$	0.8	1.2	1.6	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 3.6 Adc)	$V_{DS(on)}$	0.05	0.15	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.
4. Each side of device measured separately.

(continued)

Table 4. Electrical Characteristics (T_A = 25°C unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
Functional Tests - 1805 MHz [1,2,3] (In Freescale Doherty Test Fixture, 50 ohm system) V_{DD} = 30 Vdc, I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, P_{out} = 89 W Avg., f = 1805 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}	15.5	16.6	18.5	dB
Drain Efficiency	η_D	45.0	47.1	—	%
Output Peak-to-Average Ratio @ 0.01% Probability on CCDF	PAR	7.5	7.9	—	dB
Adjacent Channel Power Ratio	ACPR	—	–31.4	–30.0	dBc
Functional Tests - 1880 MHz [1,2,3] (In Freescale Doherty Test Fixture, 50 ohm system) V_{DD} = 30 Vdc, I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, P_{out} = 89 W Avg., f = 1880 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}	15.5	16.5	18.5	dB
Drain Efficiency	η_D	45.0	47.7	—	%
Output Peak-to-Average Ratio @ 0.01% Probability on CCDF	PAR	7.5	7.9	—	dB
Adjacent Channel Power Ratio	ACPR	—	–33.8	–30.0	dBc
Load Mismatch [3] (In Freescale Doherty Test Fixture, 50 ohm system) I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, f = 1840 MHz, 12 μsec(on), 10% Duty Cycle					
VSWR 10:1 at 32 Vdc, 420 W Pulsed CW Output Power (3 dB Input Overdrive from 250 W Pulsed CW Rated Power)	No Device Degradation				
Typical Performance [3] (In Freescale Doherty Test Fixture, 50 ohm system) V_{DD} = 30 Vdc, I_{DQA} = 800 mA, V_{GSB} = 0.9 Vdc, 1805–1880 MHz Bandwidth					
P_{out} @ 1 dB Compression Point, CW	P1dB	—	199	—	W
P_{out} @ 3 dB Compression Point [4]	P3dB	—	550	—	W
AM/PM (Maximum value measured at the P3dB compression point across the 1805–1880 MHz frequency range)	Φ	—	–20	—	°
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW_{res}	—	140	—	MHz
Gain Flatness in 75 MHz Bandwidth @ P_{out} = 89 W Avg.	G_F	—	0.4	—	dB
Gain Variation over Temperature (–30°C to +85°C)	ΔG	—	0.008	—	dB/°C
Output Power Variation over Temperature (–30°C to +85°C)	ΔP1dB	—	0.027	—	dB/°C

Table 5. Ordering Information

Device	Tape and Reel Information	Package
A2T18H450W19SR6	R6 Suffix = 150 Units, 56 mm Tape Width, 13-inch Reel	NI-1230S-4S4S

1. V_{DDA} and V_{DDB} must be tied together and powered by a single DC power supply.
2. Part internally matched both on input and output.
3. Measurements made with device in an asymmetrical Doherty configuration.
4. P3dB = P_{avg} + 7.0 dB where P_{avg} is the average output power measured using an unclipped W-CDMA single-carrier input signal where output PAR is compressed to 7.0 dB @ 0.01% probability on CCDF.

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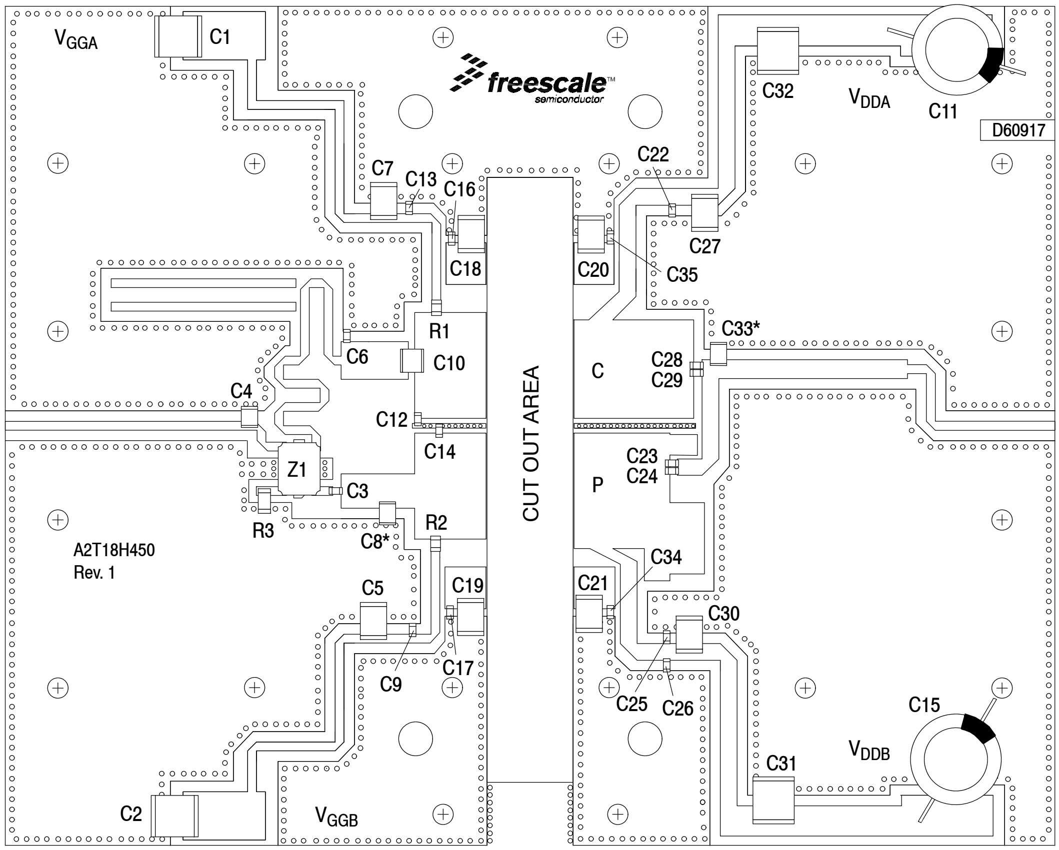


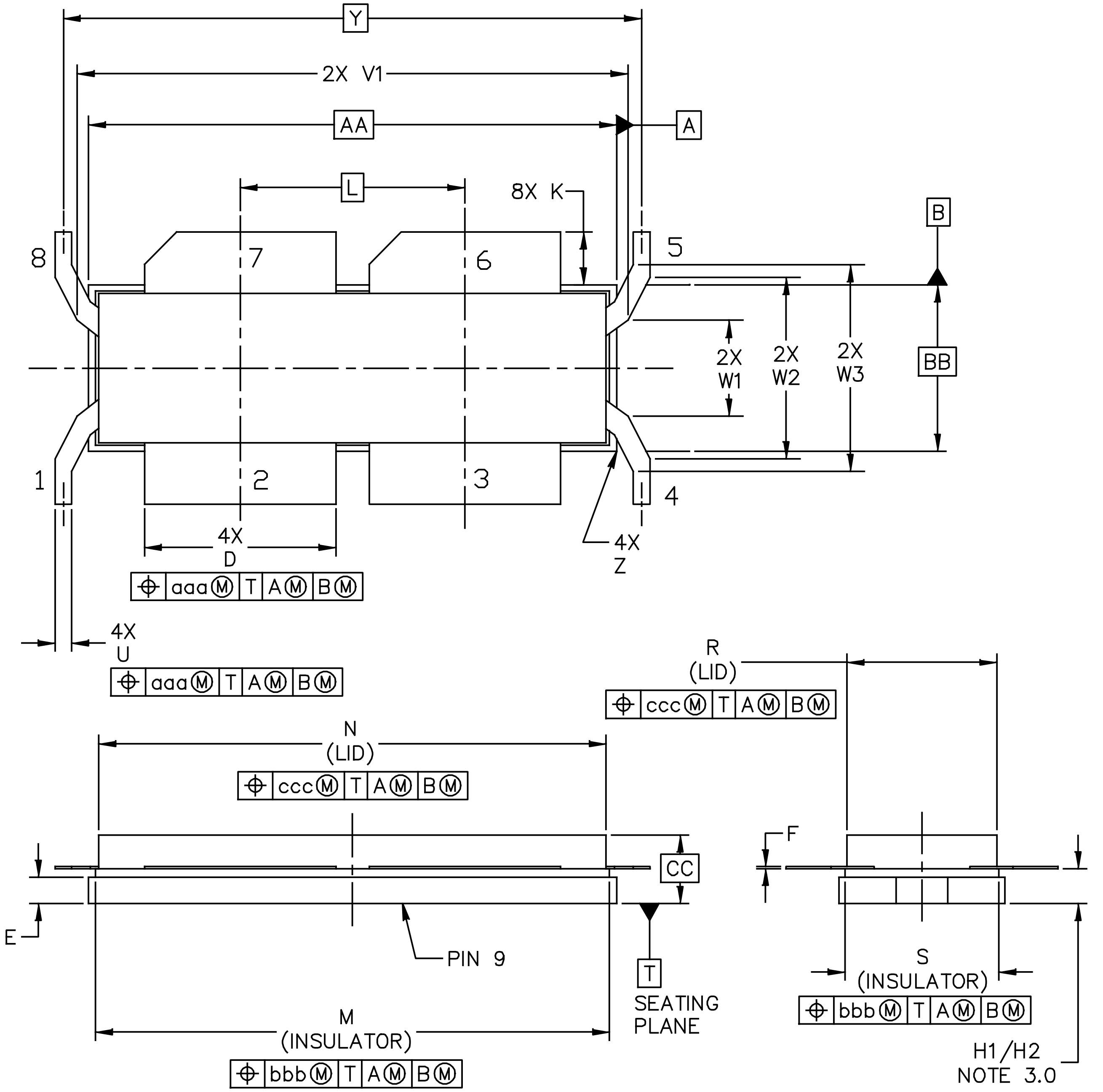
*C8 and C33 are mounted vertically.

Note: V_{DDA} and V_{DDB} must be tied together and powered by a single DC power supply.

Figure 2. A2T18H450W19SR6 Test Circuit Component Layout

Table 6. A2T18H450W19SR6 Test Circuit Component Designations and Values

Part	Description	Part Number	Manufacturer
C1, C2, C31, C32	10 μF Chip Capacitors	C5750X7R1H106M230KB	TDK
C3, C9, C13, C16, C17, C22, C23, C24, C25, C26, C34, C35	22 pF Chip Capacitors	ATC600S220JT250XT	ATC
C4	0.4 pF Chip Capacitor	ATC100B0R4BT500XT	ATC
C5, C7, C18, C19, C20, C21, C27, C30	4.7 μF Chip Capacitors	C4532X7R1H475M200KB	TDK
C6	0.2 pF Chip Capacitor	ATC600S0R2BT250XT	ATC
C8	1.8 pF Chip Capacitor	ATC100B1R8BT500XT	ATC
C10	22 pF Chip Capacitor	ATC100B220GT500XT	ATC
C11, C15	470 μF, 63 V Electrolytic Capacitors	MCGPR63V477M13X26-RH	Multicomp
C12	3 pF Chip Capacitor	ATC600S3R0BT250XT	ATC
C14	2.4 pF Chip Capacitor	ATC600S2R4BT250XT	ATC
C28, C29	4.7 pF Chip Capacitors	ATC600S4R7CT250XT	ATC
C33	0.2 pF Chip Capacitor	ATC100B0R2BT500XT	ATC
R1	4.7 Ω, 1/8 W Chip Resistor	WCR0805-4R7F	Welwyn
R2	2.2 Ω, 1/8 W Chip Resistor	WCR0805-2R2F	Welwyn
R3	50 Ω, 10 W Chip Termination	060120A25X50-2	Anaren
Z1	1700–2000 MHz Band, 90°, 5 dB Directional Coupler	X3C19P1-05S	Anaren
PCB	Rogers RO4350B, 0.020″, ε_r = 3.66	D60917	MTL



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	STANDARD: NON–JEDEC	
	SOT1795–1 31 MAY 2016	

NOTES:

1.0 INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.

2.0 CONTROLLING DIMENSION: INCH

3.0 DIMENSION H1 AND H2 ARE MEASURED .030 (0.762 MM) AWAY FROM FLANGE TO CLEAR EPOXY FLOW OUT PARALLEL TO DATUM B. H1 APPLIES TO PINS 2,3,6,7. H2 APPLIES TO PINS 1,4,5,8.

4.0 –DELETED–

	INCH		MILLIMETER			INCH		MILLIMETER	
DIM	MIN	MAX	MIN	MAX	DIM	MIN	MAX	MIN	MAX
AA	1.265	1.275	32.13	32.39	N	1.218	1.242	30.94	31.55
BB	.397	.403	10.08	10.24	R	.365	.375	9.27	9.53
CC	.150	.200	3.81	5.08	S	.365	.375	9.27	9.53
D	.455	.465	11.56	11.81	U	.035	.045	0.89	1.14
E	.062	.066	1.57	1.68	V1	1.320	1.330	33.53	33.78
F	.004	.007	0.10	0.18	T3	DELETED		DELETED	
H1	.082	.090	2.08	2.29	W1	.225	.235	5.72	5.97
H2	.078	.094	1.98	2.39	W2	.431	.441	10.95	10.20
K	.117	.137	2.97	3.48	W3	.491	.501	12.47	12.73
L	.540 BSC		13.72 BSC		Y	1.390 BSC		35.31 BSC	
M	1.219	1.241	30.96	31.52	Z	---	R.040	---	R1.02
					aaa	.005		0.13	
					bbb	.010		0.25	
					ccc	.020		0.51	

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PRODUCT DOCUMENTATION AND TOOLS

Refer to the following resources to aid your design process.

Application Notes

- AN1908: Solder Reflow Attach Method for High Power RF Devices in Air Cavity Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

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	Sept. 2016	• Initial release of data sheet

How to Reach Us:

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Rev. 0, 9/2016

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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9