Document Number: A3V07H600-42N
Rev. 0, 08/2020

RoHS

RF Power LDMOS Transistor

N-Channel Enhancement-Mode Lateral MOSFET

This 112 W asymmetrical Doherty RF power LDMOS transistor is designed for cellular base station applications covering the frequency range of 616 to 870 MHz.

717–768 MHz

- Typical Doherty Single-Carrier W-CDMA Performance: V_{DD} = 48 Vdc, I_{DQA} = 900 mA, V_{GSB} = V_{GSC} = 1.0 Vdc(1), P_{out} = 112 W Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.(2)

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)
717 MHz	16.9	52.8	8.0	–30.7
742 MHz	17.0	51.3	8.1	–32.0
768 MHz	17.1	51.8	7.7	–32.4

616–870 MHz(3)

- Typical Doherty Single-Carrier W-CDMA Performance: V_{DD} = 48 Vdc, I_{DQA} = 900 mA, V_{GSB} = V_{GSC} = 1.1 Vdc(1), P_{out} = 112 W Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)
616 MHz	18.2	45.4	7.7	–32.4
632 MHz	18.5	47.1	7.7	–31.9
650 MHz	18.7	47.7	7.8	–31.0
717 MHz	19.1	44.4	8.3	–36.2
732 MHz	19.1	43.4	8.5	–38.3
750 MHz	19.2	42.9	8.5	–39.5
840 MHz	19.1	44.9	8.1	–33.3
850 MHz	18.7	43.9	8.1	–32.7
860 MHz	18.4	42.8	8.0	–32.6
870 MHz	18.0	41.7	7.8	–32.4

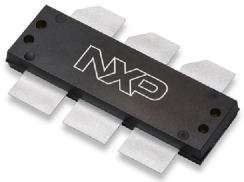
1. V_{GSB} = V_{GSC} = peaking bias voltage.
2. All data measured in fixture with device soldered to heatsink.
3. Fixture designed with a wideband match.

Features

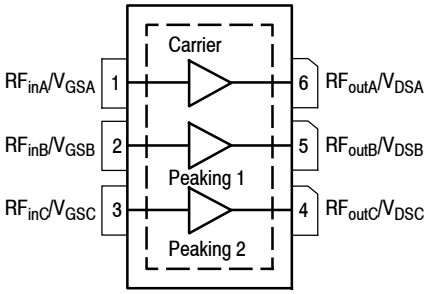
- Advanced high performance in-package Doherty
- Greater negative gate-source voltage range for improved Class C operation
- Designed for digital predistortion error correction systems

A3V07H600-42N

616–870 MHz, 112 W Avg., 48 V AIRFAST RF POWER LDMOS TRANSISTOR



OM-1230-6L PLASTIC



(Top View)

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

Figure 1. Pin Connections

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Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	–0.5, +105	Vdc
Gate-Source Voltage	V_{GS}	–6.0, +10	Vdc
Operating Voltage	V_{DD}	55, +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 88°C, 112 W Avg., W-CDMA, 48 Vdc, I_{DQA} = 900 mA, V_{GSB} = 1.0 Vdc, 742 MHz	$R_{\theta JC}$	0.28	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JS-001-2017)	2
Charge Device Model (per JS-002-2014)	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 (4)					
Zero Gate Voltage Drain Leakage Current (V_{DS} = 105 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 55 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 — Sides A, B and C (4)					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 194 μAdc)	$V_{GS(th)}$	1.0	1.8	2.5	Vdc
Gate Quiescent Voltage (V_{DD} = 48 Vdc, I_D = 900 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	2.0	2.4	3.0	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 1.9 Adc)	$V_{DS(on)}$	0.1	0.3	0.5	Vdc

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at http://www.nxp.com.
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)

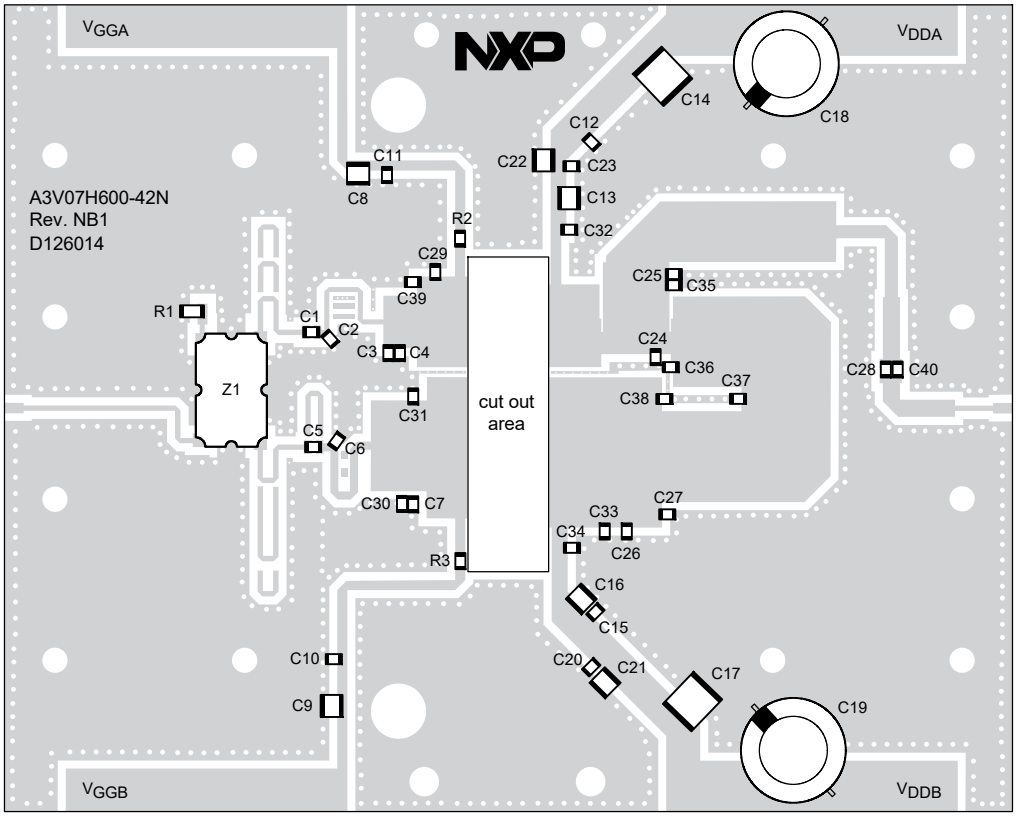
Table 5. Electrical Characteristics (T_A = 25°C unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
Functional Tests (1) (In NXP Doherty Test Fixture, 50 ohm system) V_{DD} = 48 Vdc, I_{DQA} = 900 mA, V_{GSB} = V_{GSC} = 1.0 Vdc, P_{out} = 112 W Avg., f = 717 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}	15.7	16.9	19.0	dB
Drain Efficiency	η_D	43.0	49.5	—	%
P_{out} @ 3 dB Compression Point, CW	P3dB	57.0	59.0	—	dB
Adjacent Channel Power Ratio	ACPR	—	–34.8	–28.0	dBc
Wideband Ruggedness (In NXP Doherty Test Fixture, 50 ohm system) I_{DQA} = 900 mA, V_{GSB} = V_{GSC} = 1.0 Vdc, f = 742 MHz, Additive White Gaussian Noise (AWGN) with 10 dB PAR					
ISBW of 300 MHz at 55 Vdc, 229 W Avg. Modulated Output Power (3 dB Input Overdrive from 112 W Avg. Modulated Output Power)	No Device Degradation				
Typical Performance (In NXP Doherty Test Fixture, 50 ohm system) V_{DD} = 48 Vdc, I_{DQA} = 900 mA, V_{GSB} = V_{GSC} = 1.0 Vdc, 717–768 MHz Bandwidth					
P_{out} @ 3 dB Compression Point (2)	P3dB	—	794	—	W
AM/PM (Maximum value measured at the P3dB compression point across the 717–768 MHz frequency range)	Φ	—	–16	—	°
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW_{res}	—	105	—	MHz
Gain Flatness in 51 MHz Bandwidth @ P_{out} = 112 W Avg.	G_F	—	0.12	—	dB
Gain Variation over Temperature (–40°C to +85°C)	ΔG	—	0.001	—	dB/°C
Output Power Variation over Temperature (–40°C to +85°C)	ΔP1dB	—	0.014	—	dB/°C

Table 6. Ordering Information

Device	Tape and Reel Information	Package
A3V07H600-42NR6	R6 Suffix = 150 Units, 56 mm Tape Width, 13-inch Reel	OM-1230-6L

1. Part internally input matched.
2. 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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Figure 2. A3V07H600-42N Production Test Circuit Component Layout

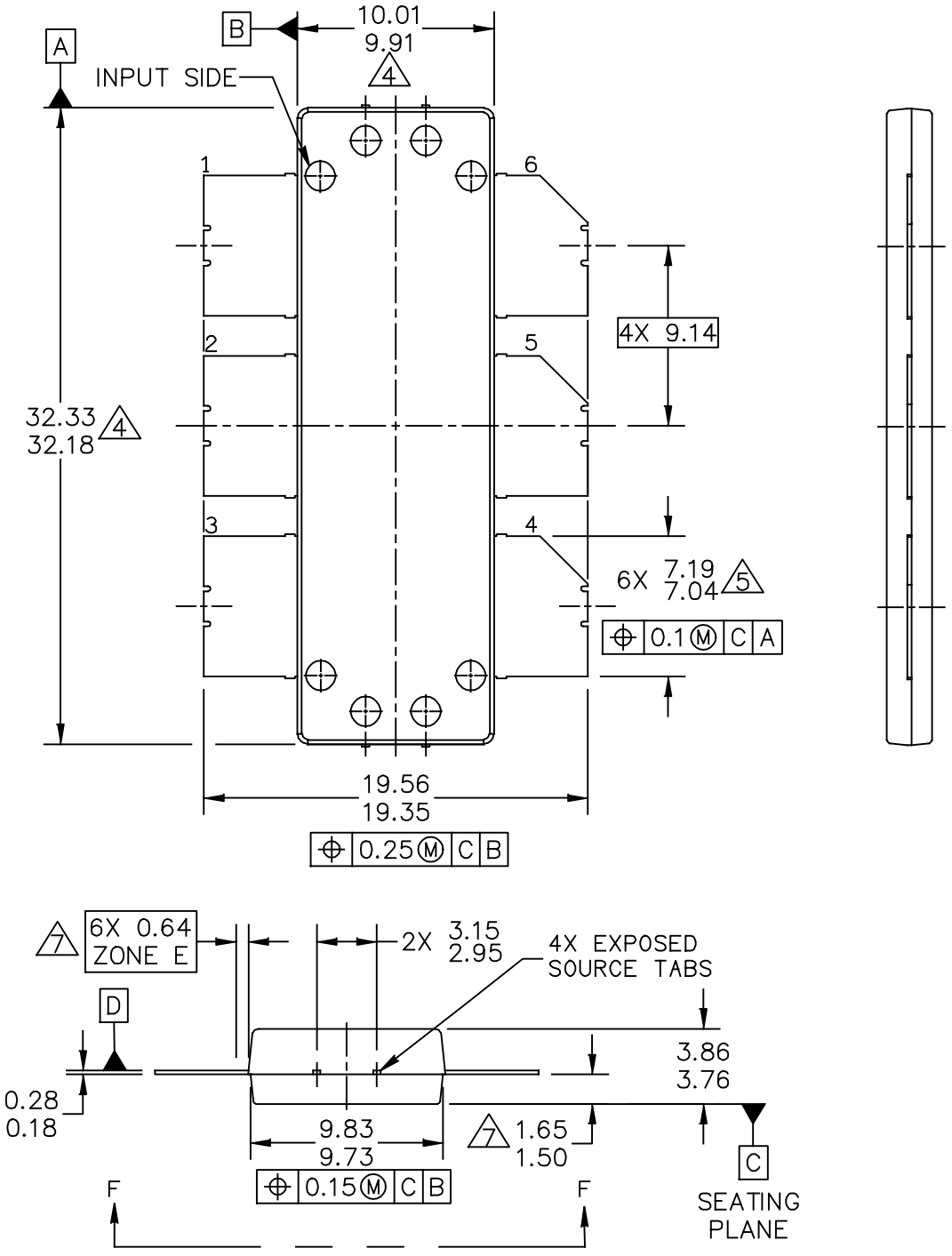
Table 7. A3V07H600-42N Production Test Circuit Component Designations and Values

Part	Description	Part Number	Manufacturer
C1, C5, C10, C11, C12, C15, C32	100 pF Chip Capacitor	600F101JT250XT	ATC
C2, C33	4.7 pF Chip Capacitor	600F4R7BT250XT	ATC
C3	3.3 pF Chip Capacitor	600F3R3BT250XT	ATC
C4	3 pF Chip Capacitor	600F3R0BT250XT	ATC
C6, C7	6.8 pF Chip Capacitor	600F6R8BT250XT	ATC
C8, C9	10 μF Chip Capacitor	C3225X7S1H106K	TDK
C13, C16	4.7 μF Chip Capacitor	C4532X7S2A475M	TDK
C14, C17	10 μF Chip Capacitor	C5750X7S2A106M	TDK
C18, C19	220 μF, 100 V Electrolytic Capacitor	MCGPR100V227M16X26	Multicomp
C20, C23	0.01 μF Chip Capacitor	GRM319R72A103KA01D	Murata
C21, C22	0.1 μF Chip Capacitor	GRM319R72A104KA01D	Murata
C24, C29, C31, C34	5.6 pF Chip Capacitor	600F5R6BT250XT	ATC
C25	12 pF Chip Capacitor	600F120JT250XT	ATC
C26, C27	15 pF Chip Capacitor	600F150JT250XT	ATC
C28, C40	100 pF Chip Capacitor	600F101JT250XT	ATC
C30	8.2 pF Chip Capacitor	600F8R2BT250XT	ATC
C35, C37	2.2 pF Chip Capacitor	600F2R2BT250XT	ATC
C36, C38	3.9 pF Chip Capacitor	600F3R9BT250XT	ATC
C39	4.3 pF Chip Capacitor	600F4R3BT250XT	ATC
R1	50 Ω, 10 W Termination Chip Resistor	C8A50Z4	Anaren
R2, R3	3.9 Ω, 1/4 W Chip Resistor	CRCW12063R90FKEA	Vishay
Z1	700–900 MHz, 90°, 2 dB Asymmetric Coupler	CMX09A1P5	RN2 Technologies
PCB	RO4360, 0.020″, ε_r = 6.4	D126014	MTL

PACKAGE INFORMATION

H-PFM-F-6 I/O 32.255 X 9.96 X 3.81 PKG, 9.14 PITCH-6L
OM-1230-6L

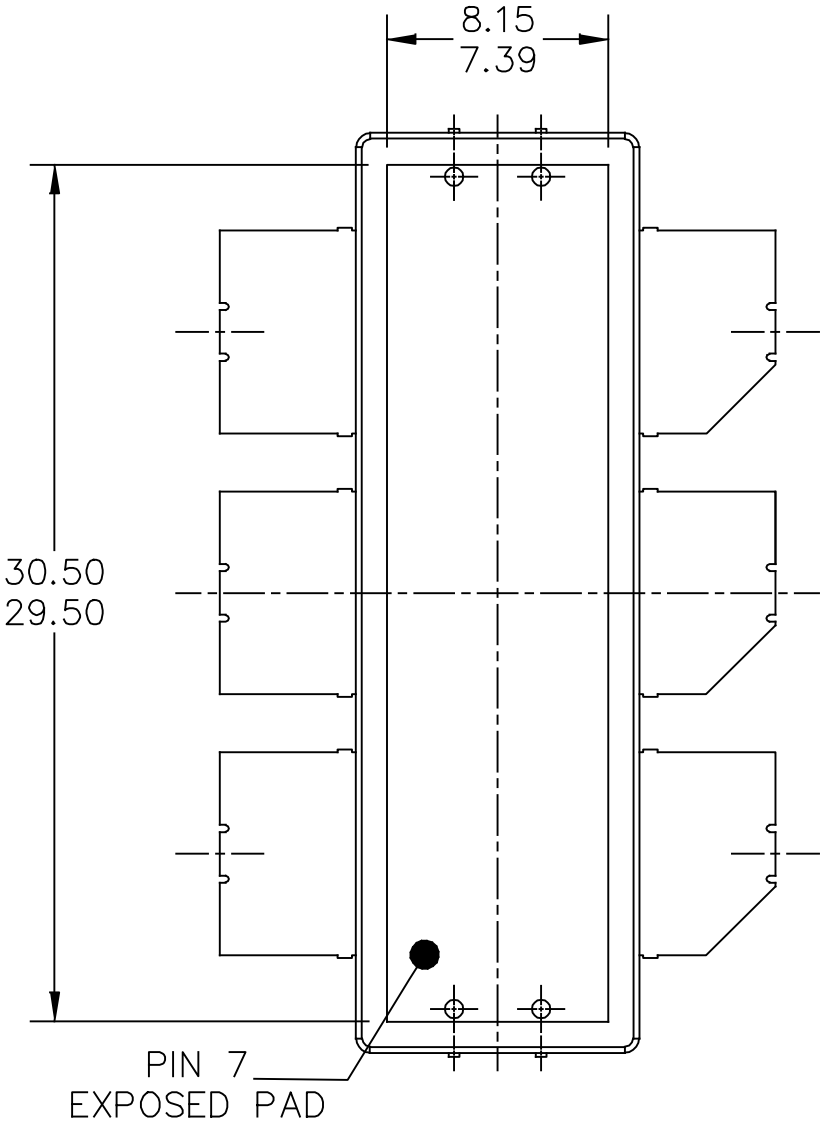
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BOTTOM VIEW
VIEW F-F

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NOTES:

1. CONTROLLING DIMENSION: MILLIMETER
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.
3. DATUM PLANE D IS LOCATED AT TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.
4. DIMENSIONS DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.15 MM PER SIDE. DIMENSIONS DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE D.
5. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 MM TOTAL IN EXCESS OF THE DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUMS A AND B TO BE DETERMINED AT DATUM PLANE D.
7. DIMENSION APPLIES WITHIN ZONE E ONLY.

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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

Software

- Electromigration MTTF Calculator
- .s2p File

Development Tools

- Printed Circuit Boards

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Aug. 2020	• Initial release of data sheet

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