

# RF Power LDMOS Transistor

## High Ruggedness N-Channel Enhancement-Mode Lateral MOSFET

This high ruggedness device is designed for use in high VSWR industrial, medical, broadcast, aerospace and mobile radio applications. Its unmatched input and output design supports frequency use from 1.8 to 512 MHz.

**Typical Performance:**  $V_{DD} = 65$  Vdc

Frequency (MHz)	Signal Type	$P_{out}$ (W)	$G_{ps}$ (dB)	$\eta_D$ (%)
1.8–54 (1)	CW	40 CW	23.0	62.6
30–512 (1)	CW	35 CW	17.3	32.0
230	CW	35 CW	24.8	75.8

### Load Mismatch/Ruggedness

Frequency (MHz)	Signal Type	VSWR	$P_{in}$ (dBm)	Test Voltage	Result
230	CW	> 65:1 at all Phase Angles	23.5 (3 dB Overdrive)	65	No Device Degradation

1. The values shown are the minimum measured performance numbers across the indicated frequency range.

### Features

- Unmatched input and output allowing wide frequency range utilization
- 50 ohm native output impedance
- Device can be used single-ended or in a push-pull configuration
- Qualified up to a maximum of 65 V<sub>DD</sub> operation
- Characterized from 30 to 65 V for extended power range
- High breakdown voltage for enhanced reliability
- Suitable for linear application with appropriate biasing
- Integrated ESD protection with greater negative gate-source voltage range for improved Class C operation
- Included in NXP product longevity program with assured supply for a minimum of 15 years after launch

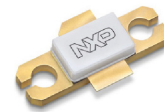
### Typical Applications

- Industrial, scientific, medical (ISM)
  - Laser generation
  - Plasma generation
  - Particle accelerators
  - MRI, RF ablation and skin treatment
  - Industrial heating, welding and drying systems
- Radio and VHF TV broadcast
- Aerospace
  - HF communications
  - Radar
- Mobile radio
  - HF and VHF communications
  - PMR base stations

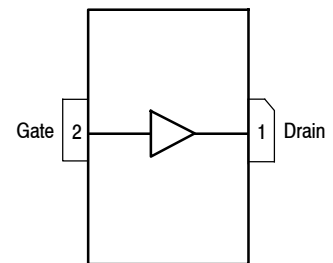
**MRFX035H**

PREPRODUCTION

**1.8–512 MHz, 35 W CW, 65 V  
WIDEBAND  
RF POWER LDMOS TRANSISTOR**



NI-360H-2SB



(Top View)

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

**Figure 1. Pin Connections**

This document contains information on a preproduction product. Specifications and information herein are subject to change without notice.

**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-0.5, +179	Vdc
Gate-Source Voltage	$V_{GS}$	-6.0, +10	Vdc
Storage Temperature Range	$T_{stg}$	-65 to +150	°C
Case Operating Temperature Range	$T_C$	-40 to +150	°C
Operating Junction Temperature Range <sup>(1,2)</sup>	$T_J$	-40 to +225	°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	154 0.769	W W/°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value <sup>(2,3)</sup>	Unit
Thermal Resistance, Junction to Case CW: Case Temperature $74.2^\circ\text{C}$ , 35 W CW, 65 Vdc, $I_{DQ} = 15\text{ mA}$ , 230 MHz	$R_{\theta JC}$	1.3	°C/W

**Table 3. ESD Protection Characteristics**

Test Methodology	Class
Human Body Model (per JS-001-2017)	2, passes 2500 V
Charge Device Model (per JS-002-2014)	C3, passes 1200 V

**Table 4. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**Off Characteristics**

Gate-Source Leakage Current ( $V_{GS} = 5\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	400	nAdc
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 250\text{ }\mu\text{Adc}$ )	$V_{(BR)DSS}$	179	193	—	Vdc
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 65\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	10	$\mu\text{Adc}$
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 179\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	300	$\mu\text{Adc}$

**On Characteristics**

Gate Threshold Voltage ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 640\text{ }\mu\text{Adc}$ )	$V_{GS(th)}$	1.7	2.75	3.0	Vdc
Gate Quiescent Voltage ( $V_{DD} = 65\text{ Vdc}$ , $I_D = 15\text{ mAdc}$ , Measured in Functional Test)	$V_{GS(Q)}$	2.5	3.0	3.5	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 100\text{ mAdc}$ )	$V_{DS(on)}$	—	0.17	—	Vdc

**Dynamic Characteristics**

Reverse Transfer Capacitance ( $V_{DS} = 65\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz, $V_{GS} = 0\text{ Vdc}$ )	$C_{rss}$	—	0.13	—	pF
Output Capacitance ( $V_{DS} = 65\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz, $V_{GS} = 0\text{ Vdc}$ )	$C_{oss}$	—	13.7	—	pF
Input Capacitance ( $V_{DS} = 65\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz)	$C_{iss}$	—	42.8	—	pF

1. Continuous use at maximum temperature will affect MTTF.

2. MTTF calculator available at <http://www.nxp.com/RF/calculators>. (Calculator available when part is in production.)

3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.nxp.com/RF> and search for AN1955.

(continued)

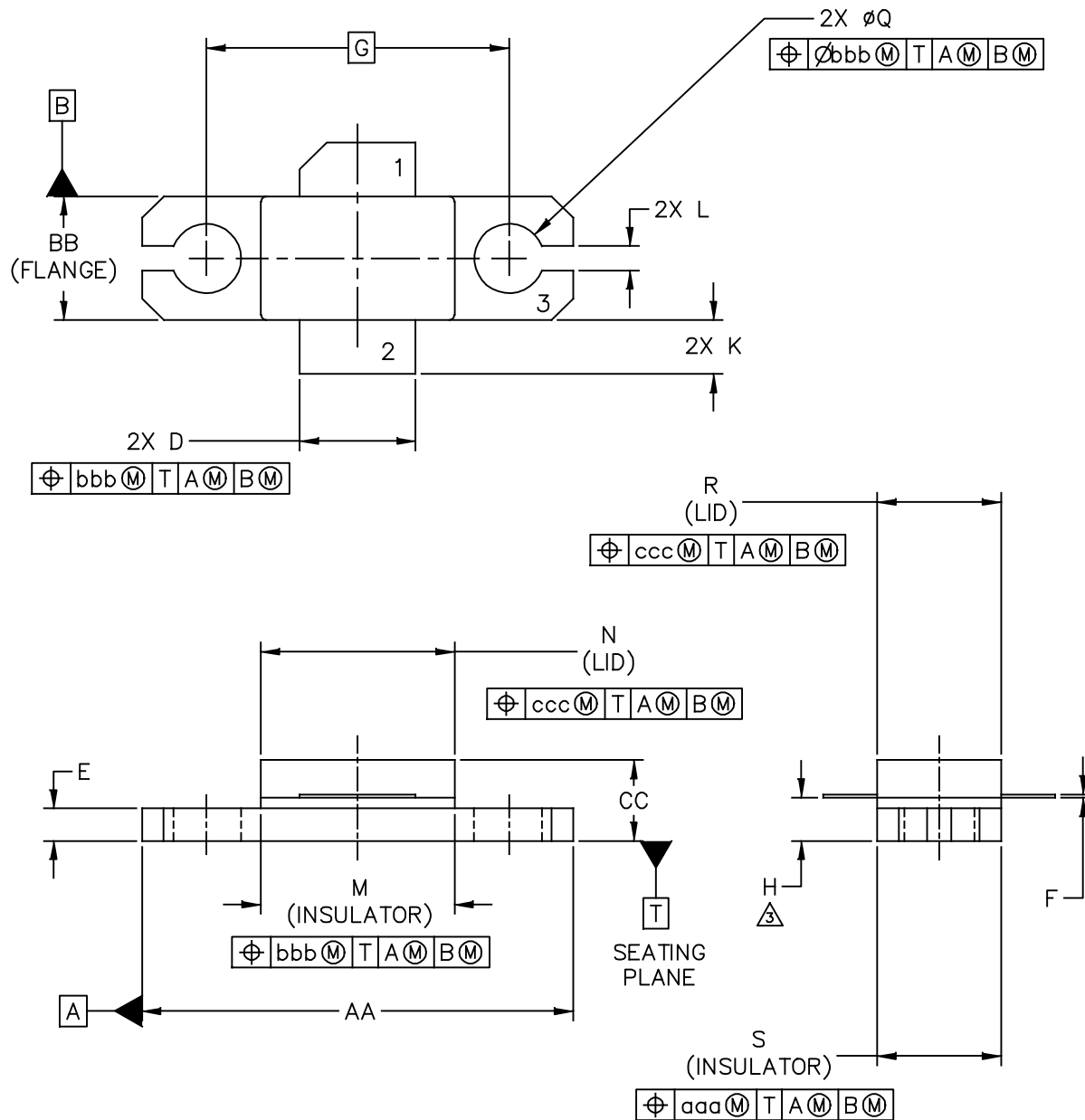
**Table 4. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Functional Tests</b> (In NXP Production Test Fixture, 50 ohm system) $V_{DD} = 65\text{ Vdc}$ , $I_{DQ} = 15\text{ mA}$ , $P_{out} = 35\text{ W CW}$ , $f = 230\text{ MHz}$					
Power Gain	$G_{ps}$	23.5	24.8	26.5	dB
Drain Efficiency	$\eta_D$	72.0	75.8	—	%
Input Return Loss	IRL	—	-16	-11	dB

**Load Mismatch/Ruggedness** (In NXP Production Test Fixture, 50 ohm system)  $I_{DQ} = 15\text{ mA}$ 

Frequency (MHz)	Signal Type	VSWR	$P_{in}$ (dBm)	Test Voltage, $V_{DD}$	Result
230	CW	> 65:1 at all Phase Angles	23.5 (3 dB Overdrive)	65	No Device Degradation

# PACKAGE DIMENSIONS



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	STANDARD: NON-JEDEC	
	SOT1791-1      17 FEB 2016	

NOTES:

1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH

3. DIMENSION H IS MEASURED .030 INCH (0.762 MM) AWAY FROM THE FLANGE TO CLEAR THE EPOXY FLOW OUT REGION PARALLEL TO DATUM B.

INCH			MILLIMETER		INCH			MILLIMETER	
DIM	MIN	MAX	MIN	MAX	DIM	MIN	MAX	MIN	MAX
AA	.795	.805	20.19	20.45	N	.357	.363	9.07	9.22
BB	.225	.235	5.72	5.97	Q	.125	.135	3.18	3.43
CC	.125	.175	3.18	4.45	R	.227	.233	5.77	5.92
D	.210	.220	5.33	5.59	S	.225	.235	5.72	5.97
E	.055	.065	1.40	1.65					
F	.004	.006	0.10	0.15	aaa	.005		0.13	
G	.562 BSC		14.28 BSC		bbb	.010		0.25	
H	.077	.087	1.96	2.21	ccc	.015		0.38	
K	.085	.115	2.16	2.92					
L	.040	.050	1.02	1.27					
M	.355	.365	9.02	9.27					
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