

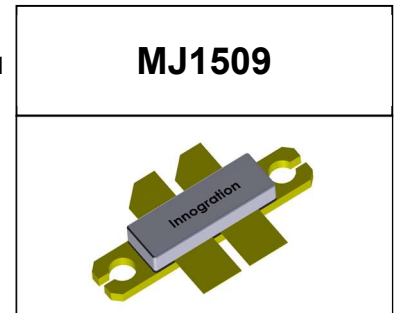
MJ1509 LDMOS TRANSISTOR

Document Number: MJ1509
Preliminary Datasheet V1.1

90W, 28V High Power RF LDMOS FETs

Description

The MJ1509 is a 90-watt, highly rugged, unmatched LDMOS FET, designed for wide-band commercial and industrial applications at frequencies HF to 1.5 GHz. It can be used in Class AB/B and Class C for all typical modulation formats.



•Typical Performance (On Innogration fixture with device soldered):

$V_{DD} = 28$ Volts, $I_{DQ} = 500$ mA, CW.

Frequency	Gp (dB)	P _{-1dB} (W)	$\eta_D@P_{-1}$ (%)
1000 MHz	18	90	60

•Typical Performance (In Innogration broadband demo): $V_{DD} = 28$ Volts, $I_{DQ} = 200$ mA, CW.

Freq (MHz)	Gp (dB)	P _{-1dB} (W)	$\eta_D@P_{-1}$ (%)
30	18.2	57.5	49.3
60	18.7	75.9	57.4
100	20.0	79.4	60.2
200	20.7	79.4	64.0
300	20.3	67.6	61.8
400	18.3	57.5	56.3
512	16.9	51.3	55.5

Features

- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Excellent thermal stability, low HCI drift
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Pb-free, RoHS-compliant

Suitable Applications

- 2-30MHz (HF or Short wave communication)
- 30-88MHz (Ground communication)
- 54-88MHz (TV VHF I)
- 88-108MHz (FM)
- 118 -140MHz (Avionics)
- 136-174MHz (Commercial ground communication)
- 160-230MHz (TV VHF III)
- 30-512MHz (Jammer, Ground/Air communication)
- 470-860MHz (TV UHF)
- 100kHz - 1000MHz (ISM, instrumentation)

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+95	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+40	Vdc
Storage Temperature Range	T_{stg}	-65 to +150	°C
Case Operating Temperature	T_c	+150	°C
Operating Junction Temperature	T_j	+225	°C

Table 2. Thermal Characteristics

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Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_C = 85^\circ\text{C}$, $T_J = 200^\circ\text{C}$, DC test	$R_{\theta JC}$	0.7	$^\circ\text{C/W}$

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22--A114)	Class 2

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

Characteristic	Symbol	Min	Typ	Max	Unit
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DC Characteristics (per half section)

Drain-Source Voltage $V_{GS} = 0$, $I_{DS} = 1.0\text{mA}$	$V_{(BR)DSS}$	95			V
Zero Gate Voltage Drain Leakage Current ($V_{DS} = 28\text{V}$, $V_{GS} = 0\text{V}$)	I_{DSS}	—	—	1	μA
Gate--Source Leakage Current ($V_{GS} = 10\text{V}$, $V_{DS} = 0\text{V}$)	I_{GSS}	—	—	1	μA
Gate Threshold Voltage ($V_{DS} = 28\text{V}$, $I_D = 150\mu\text{A}$)	$V_{GS(th)}$	—	2.17	—	V
Gate Quiescent Voltage ($V_{DD} = 28\text{V}$, $I_D = 500\text{mA}$, Measured in Functional Test)	$V_{GS(Q)}$	—	3.3	—	V
Common Source Input Capacitance ($V_{GS} = 0\text{V}$, $V_{DS} = 28\text{V}$, $f = 1\text{MHz}$)	C_{ISS}		54		pF
Common Source Output Capacitance ($V_{GS} = 0\text{V}$, $V_{DS} = 28\text{V}$, $f = 1\text{MHz}$)	C_{OSS}		18		pF
Common Source Feedback Capacitance ($V_{GS} = 0\text{V}$, $V_{DS} = 28\text{V}$, $f = 1\text{MHz}$)	C_{RSS}		1.2		pF

Functional Tests (In Demo Test Fixture, 50 ohm system) $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 500\text{mA}$, $f = 1000\text{MHz}$, CW Signal Measurements.

Power Gain	G_p		18		dB
Drain Efficiency@P1dB	η_D		60		%
1 dB Compression Point	P_{-1dB}		90		W
Input Return Loss	IRL		-7		dB

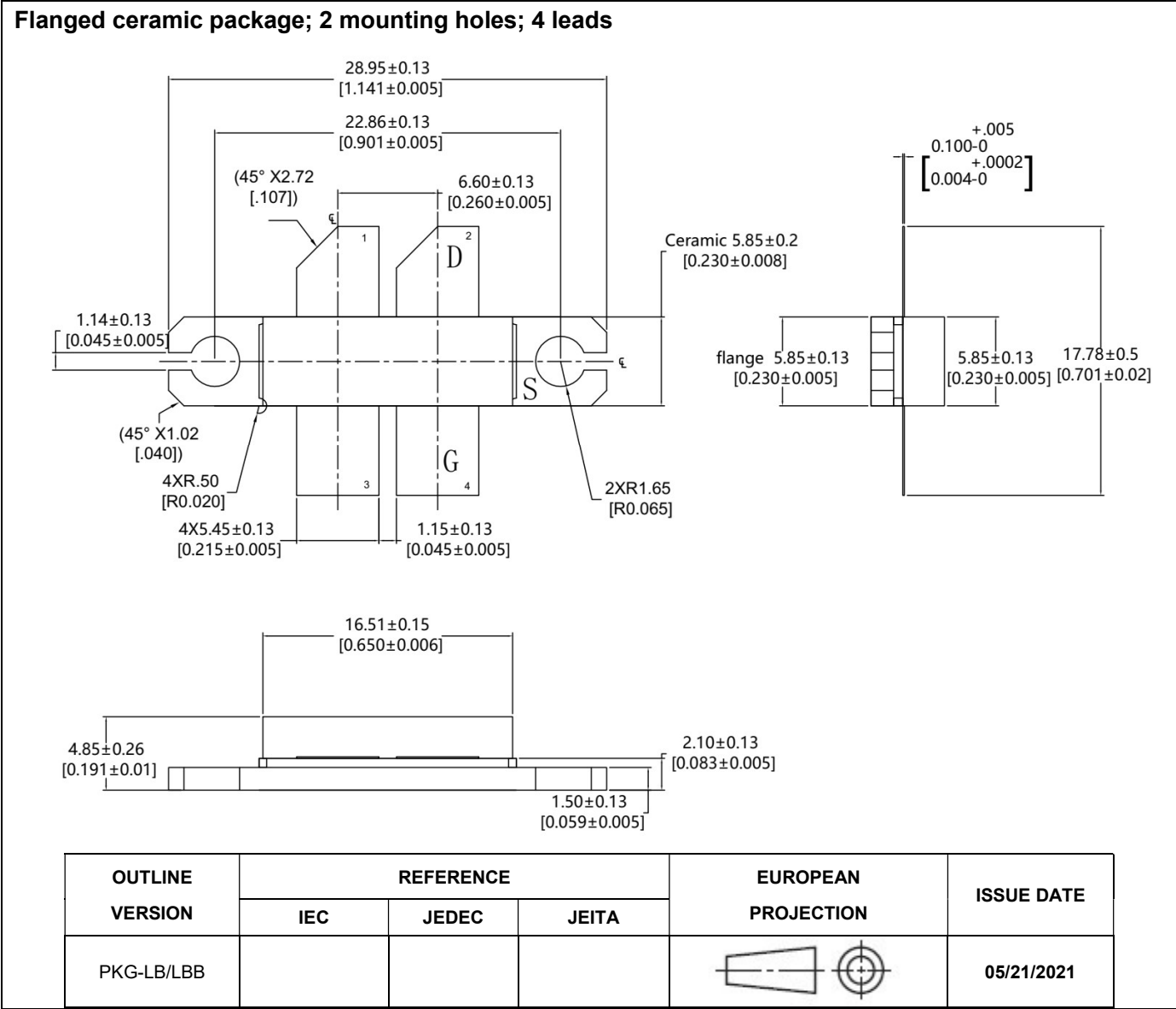
Load Mismatch (In Innogration Test Fixture, 50 ohm system): $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 500\text{mA}$, $f = 1000\text{MHz}$

VSWR 20:1 at 90W pulse CW Output Power	No Device Degradation
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Package Outline



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Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2017/05/20	Rev 1.0	Preliminary Datasheet
2022/9/19	Rev 1.1	LBB outline updated

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