

# MM10R5 LDMOS TRANSISTOR

Document Number: MM10R5  
Product Datasheet V3.0

## 5W, 28V High Power RF LDMOS FETs

### Description

The MM10R5 is a 5-watt, highly rugged, unmatched LDMOS FET, designed for wide-band commercial and industrial applications at frequencies HF to 2.7 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):

$P_{-1dB}$  = 5 Watts @ 1000 MHz,  $V_{DD}$  = 28 Volts,  $I_{DQ}$  = 40 mA, CW.

Frequency	Gp (dB)	$P_{-1dB}$ (W)	$\eta_D@P_{-1}$ (%)
1000 MHz	22	5	60

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

Freq=1.3GHz,  $V_{DD}$  = 24 Volts,  $I_{DQ}$  = 10 mA, CW.

Gp (dB)	$P_{OUT}$ (dBm)	$\eta_D$ (%)
17.1	30.6	30.4%
17.2	31.7	34.1%
17.2	32.6	37.7%
17.0	33.4	40.6%
16.5	34.0	42.2%

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

$V_{DD}$  = 28 Volts,  $I_{DQ}$  = 65 mA, Pulse CW, Pulse Width=100 us, Duty cycle=10% .

Frequency	Gp (dB)	$P_{-1dB}$ (dBm)	$\eta_D@P_{-1}$ (%)
610 MHz	18.4	37.8	55
645 MHz	18.1	37.1	58
680 MHz	17.7	37.6	58



### 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

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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**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_c = 85^\circ\text{C}$ , $T_J = 200^\circ\text{C}$ , DC test	$R_{\theta JC}$	4.5	°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

Drain-Source Voltage $V_{GS} = 0$ , $I_{DS} = 1.0\text{mA}$	$V_{(BR)DSS}$	95	—		V
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 75\text{V}$ , $V_{GS} = 0\text{V}$ )	$I_{DSS}$	—	—	1	$\mu\text{A}$
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 28\text{V}$ , $V_{GS} = 0\text{V}$ )	$I_{DSS}$	—	—	1	$\mu\text{A}$
Gate--Source Leakage Current ( $V_{GS} = 10\text{V}$ , $V_{DS} = 0\text{V}$ )	$I_{GSS}$	—	—	1	$\mu\text{A}$
Gate Threshold Voltage ( $V_{DS} = 28\text{V}$ , $I_D = 20\mu\text{A}$ )	$V_{GS(th)}$	—	2.08	—	V
Gate Quiescent Voltage ( $V_{DD} = 28\text{V}$ , $I_D = 100\text{mA}$ , Measured in Functional Test)	$V_{GS(Q)}$	—	2.64	—	V
Common Source Input Capacitance ( $V_{GS} = 0\text{V}$ , $V_{DS} = 28\text{V}$ , $f = 1\text{MHz}$ )	$C_{ISS}$		8.6		pF
Common Source Output Capacitance ( $V_{GS} = 0\text{V}$ , $V_{DS} = 28\text{V}$ , $f = 1\text{MHz}$ )	$C_{OSS}$		3.4		pF
Common Source Feedback Capacitance ( $V_{GS} = 0\text{V}$ , $V_{DS} = 28\text{V}$ , $f = 1\text{MHz}$ )	$C_{RSS}$		0.2		pF

**Functional Tests** (In Demo Test Fixture, 50 ohm system)  $V_{DD} = 28\text{Vdc}$ ,  $I_{DQ} = 40\text{mA}$ ,  $f = 1000\text{MHz}$ , CW Signal Measurements.

Power Gain	$G_p$	—	22	—	dB
Drain Efficiency@P1dB	$\eta_D$	—	60	—	%
1 dB Compression Point	$P_{-1dB}$	—	5	—	W
Input Return Loss	IRL	—	-10	—	dB

**Load Mismatch (In Innogration Test Fixture, 50 ohm system):**  $V_{DD} = 28\text{Vdc}$ ,  $I_{DQ} = 40\text{mA}$ ,  $f = 1000\text{MHz}$

VSWR 20:1 at 5W pulse CW Output Power	No Device Degradation
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## Reference Circuit of Test Fixture Assembly Diagram

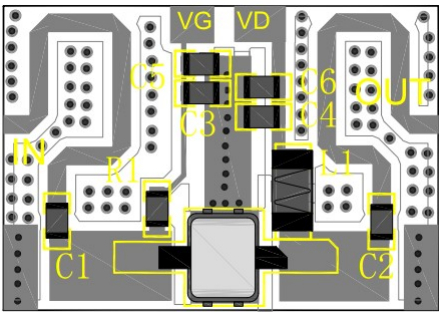


Figure 1. MM10R5 Test Circuit Component Layout (610MHz~680MHz)

Table 5. MM10R5 (610Mz~680MHz) Test Circuit Component Designations and Values

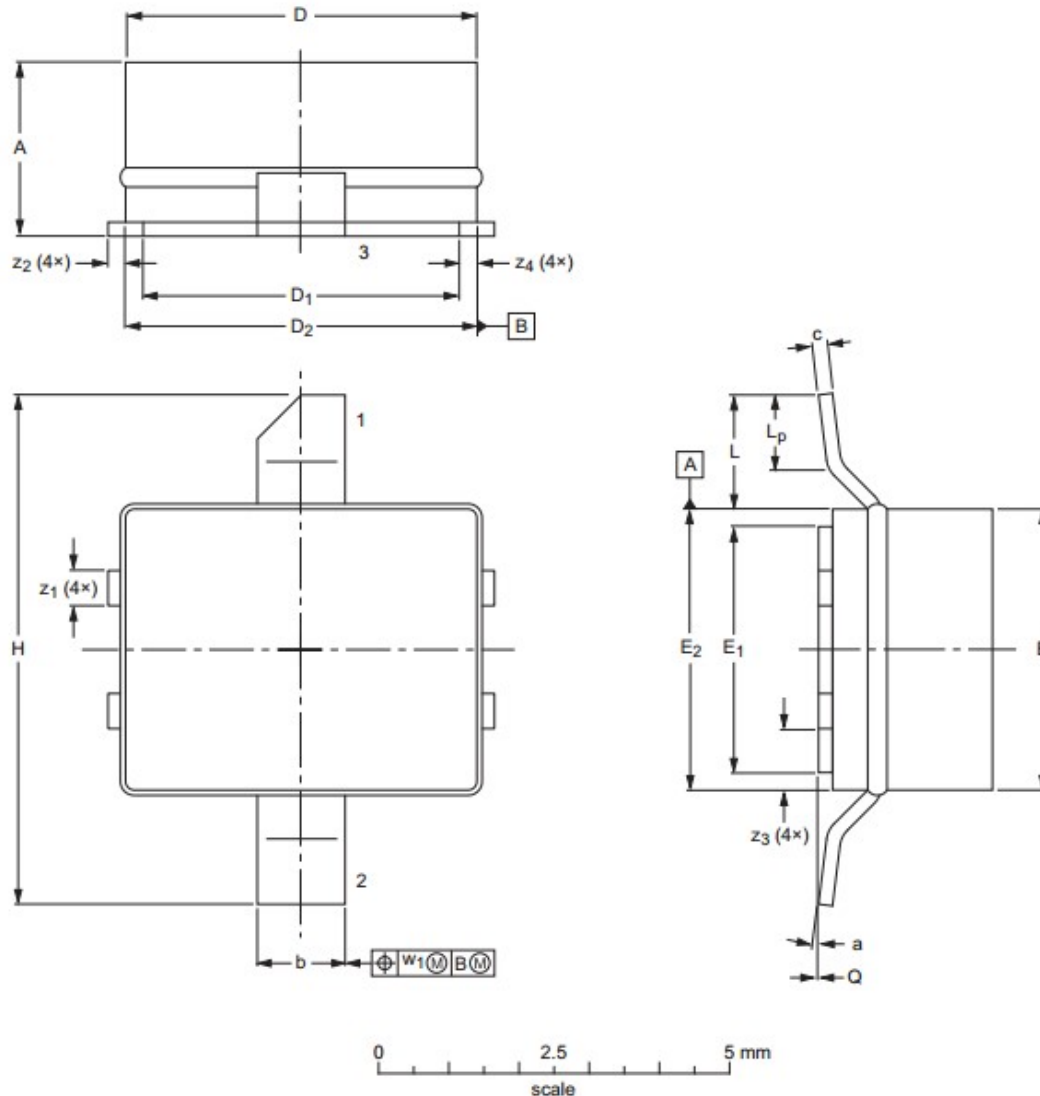
Component	Description	Suggested Manufacturer	P/N
C1,C2,C3,C4	Ceramic Capacitor,47pF	ATC	
C5,C6	Capacitor,10uF	Murata	
L1	2 Turns $\Phi$ 5mm Enamel wire		
R1	Chip Resistor,10 $\Omega$	Digi-Key	
PCB	0.76mm [0.030"] thick, $\epsilon_r$ =3.48, Rogers RO4350, 1 oz. copper		

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## Package Outline

### Earless Flanged ceramic package; 2 leads(1-Drain,2-Gate,3-Source)



UNIT	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	E <sub>2</sub>	H	L	L <sub>p</sub>	Q	w <sub>1</sub>	z <sub>1</sub>	z <sub>2</sub>	z <sub>3</sub>	z <sub>4</sub>	α
mm	2.34	1.35	0.23	5.16	4.65	4.14	3.63	4.14	7.49	2.03	1.02	0.1	0.25	0.58	0.25	0.97	0.51	7°
	2.13	1.19	0.18	5.00	4.50	3.99	3.48	3.99	7.24	1.27	0.51	0.0		0.43	0.18	0.81	0.00	0°

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-MM					18/6/2014

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## Revision history

Table 6. Document revision history

Date	Revision	Datasheet Status
2016/4/29	Rev 1.0	Preliminary Datasheet
2016/8/8	Rev 2.0	Preliminary Datasheet
2017/2/22	Rev 3.0	Product Datasheet

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