

MQ0590RVP LDMOS TRANSISTOR

Document Number: MQ0590RVP
Preliminary Datasheet V1.2

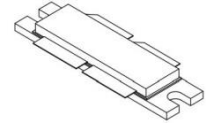
900W, 50V High Power RF LDMOS FETs

Description

The MQ0590RVP is a 900W capable, highly rugged, unmatched LDMOS FET, designed for commercial and industrial applications from 200MHz up to 500MHz, supporting both pulse and CW applications.

It is featured for industry leading high power and high ruggedness, suitable for Industrial, Scientific and Medical application, as well as VHF communication, UHF TV and Aerospace applications.

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- Application data in **370-470MHz** wide band with device soldered

VDS=50V VGS=2.8V Idq=10mA Pulse width 100us 10%						
Freq(MHz)	Psat(dBm)	Psat(W)	IDS(A)	Pin(dBm)	Gain(dB)	Eff(%)
370	59.63	918.33	2.61	44.51	15.12	70.37
390	59.77	948.42	2.66	44.62	15.15	71.31
410	60.01	1002.31	2.95	45.29	14.72	67.95
430	60.36	1086.43	3.21	46	14.36	67.69
450	60.31	1073.99	3.14	45.84	14.47	68.41
470	59.9	977.24	2.92	46.68	13.22	66.93

- Application data in **225-400MHz wide band** with device soldered

VDS=50V VGS=3.28V IDQ=300mA Signal mode: Pulse Width=100us,Duty Cycle=10%

Freq (MHz)	Psat (W)	Ids (A)	Pin (dBm)	Gain (dB)	Eff (%)	2 nd (dBc)	3 rd (dBc)
225	801.7	2.6	41.77	17.27	66.25	-24.3	-27
250	805.4	2.39	43.02	16.04	72.88	-19	-25
300	837.5	2.57	42.55	16.68	70.09	-18.5	-21.2
350	922.6	2.81	40.21	19.44	70.16	-30.9	-18.5
400	891.3	2.85	40.14	19.36	66.76	-36.7	-25.5

Features

- High breakdown voltage enable high ruggedness
- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Excellent thermal stability, low HCI drift
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V _{DSS}	115	Vdc
Gate--Source Voltage	V _{GS}	-10 to +10	Vdc

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Operating Voltage	V_{DD}	+55	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 ,Case Temperature 85°C, 800W Pulsed CW, 50 Vdc, IdQ = 300 mA	$R_{\theta JC}$	0.16	°C/W

Table 3. ESD Protection Characteristics

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

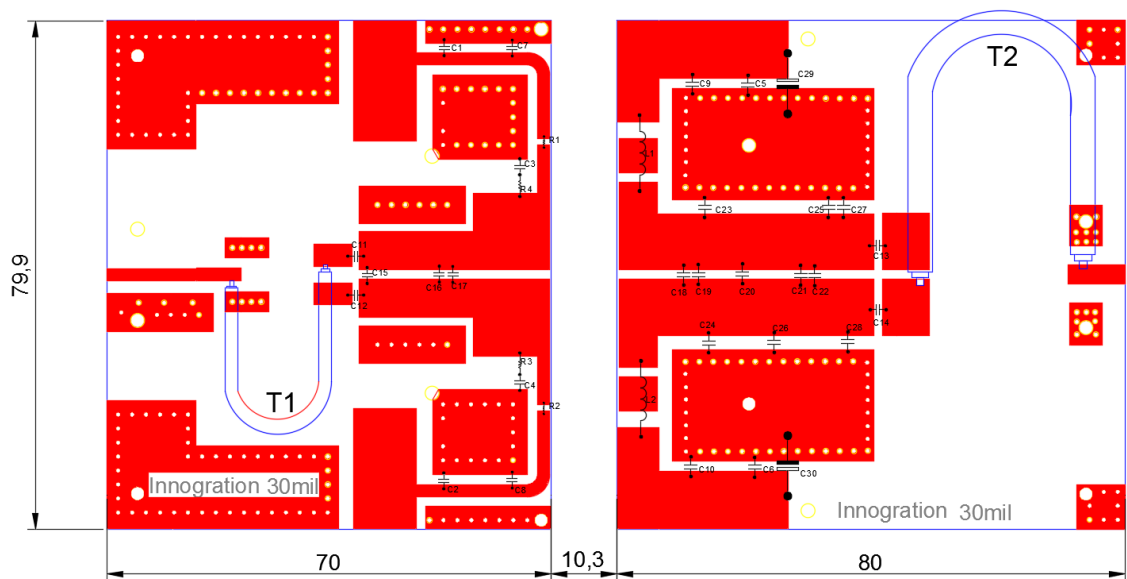
Table 4. Electrical Characteristics (TA = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DC Characteristics					
Drain-Source Voltage $V_{GS}=0V$, $I_{DS}=1.0mA$	$V_{(BR)DSS}$		115		V
Zero Gate Voltage Drain Leakage Current ($V_{DS} = 50V$, $V_{GS} = 0 V$)	I_{DSS}	—	—	1	μA
Gate—Source Leakage Current ($V_{GS} = 10 V$, $V_{DS} = 0 V$)	I_{GSS}	—	—	1	μA
Gate Threshold Voltage ($V_{DS} = 50V$, $I_D = 600 \mu A$)	$V_{GS(th)}$	—	2.54	—	V
Gate Quiescent Voltage ($V_{DD} = 50 V$, $I_D = 300 mA$, Measured in Functional Test)	$V_{GS(Q)}$	—	3.28	—	V
Drain source on state resistance ($V_{DS} = 0.1V$, $V_{GS} = 10 V$) Each section side of device measured	$R_{ds(on)}$		48		mΩ
Common Source Input Capacitance ($V_{GS} = 0V$, $V_{DS} = 50 V$, $f = 1 MHz$) Each section side of device measured	C_{ISS}		250		pF
Common Source Output Capacitance ($V_{GS} = 0V$, $V_{DS} = 50 V$, $f = 1 MHz$) Each section side of device measured	C_{OSS}		100		pF
Common Source Feedback Capacitance ($V_{GS} = 0V$, $V_{DS} = 50 V$, $f = 1 MHz$) Each section side of device measured	C_{RSS}		2.6		pF

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Reference Circuit of Test Fixture (370-470MHz) (Layout file upon request)



Part	description	Model
C1~C6	10uF 1210	Ceramic multilayer capacitor
C7~C10	470pF MQ101111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C11,C12	200pF MQ101111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C13,C14	270pF MQ102525	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C15	15pF MQ101111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C16	18pF MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C17	12pF MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C18	18pF MQ101111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C19,C25,C27,C28	10pF MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C20,C23,C24,C26	12pF MQ101111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C21	4.3pF MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C22	20pF MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C29,C30	4700uF/63V	Electrolytic Capacitor

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R1,R2	270 Ω	0805	Chip Resistor
R3,R4	10 Ω	1206	Chip Resistor
L1,L2	2mm enamelled wire, inner diameter 8mm, 2turns		DIY
T1	25ohm 5mm	RFSG-141-25BC	
T2	16.7ohm 10mm	SFF-16.7-3	
PCB	30mil Rogers 4350B		

TYPICAL CHARACTERISTICS

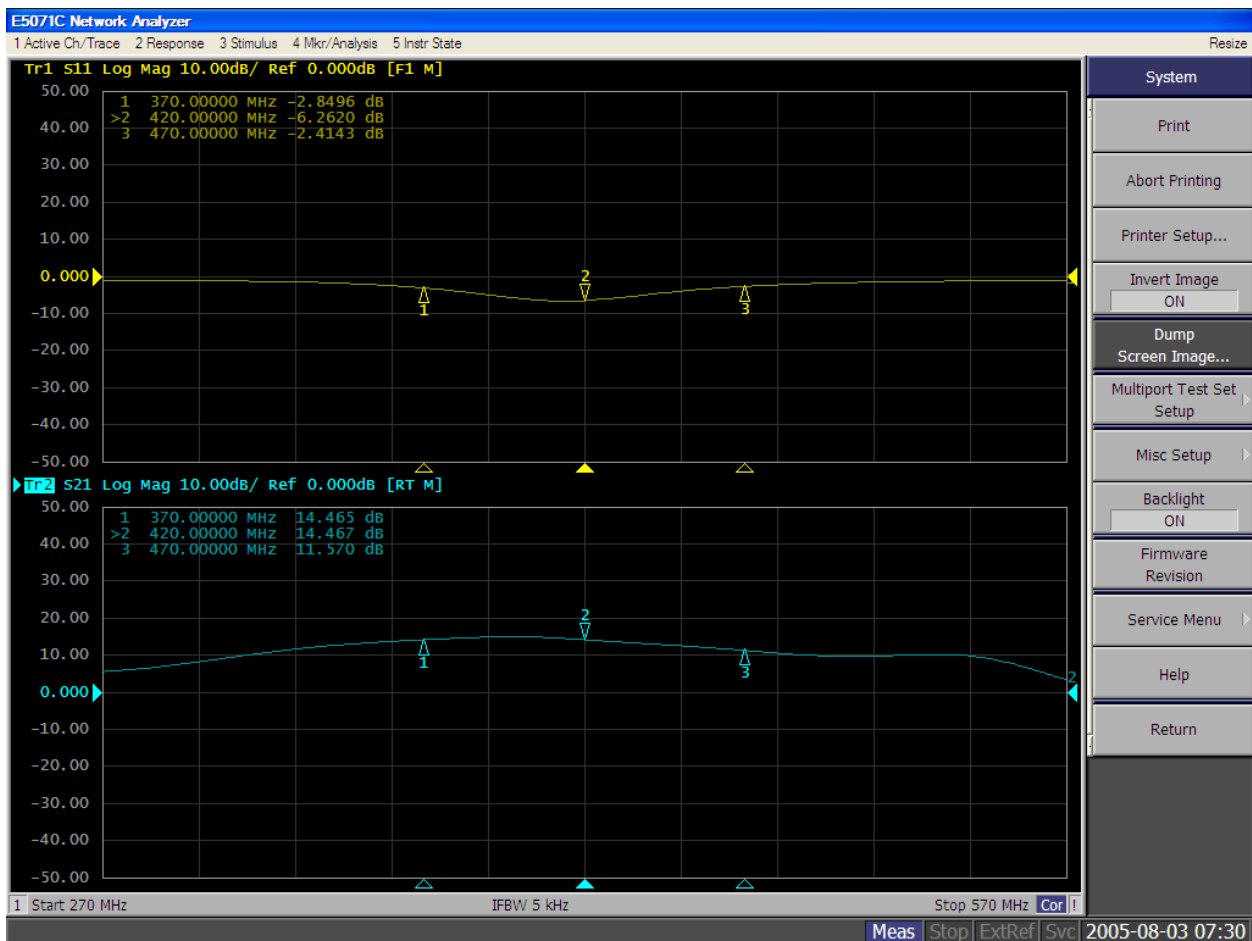
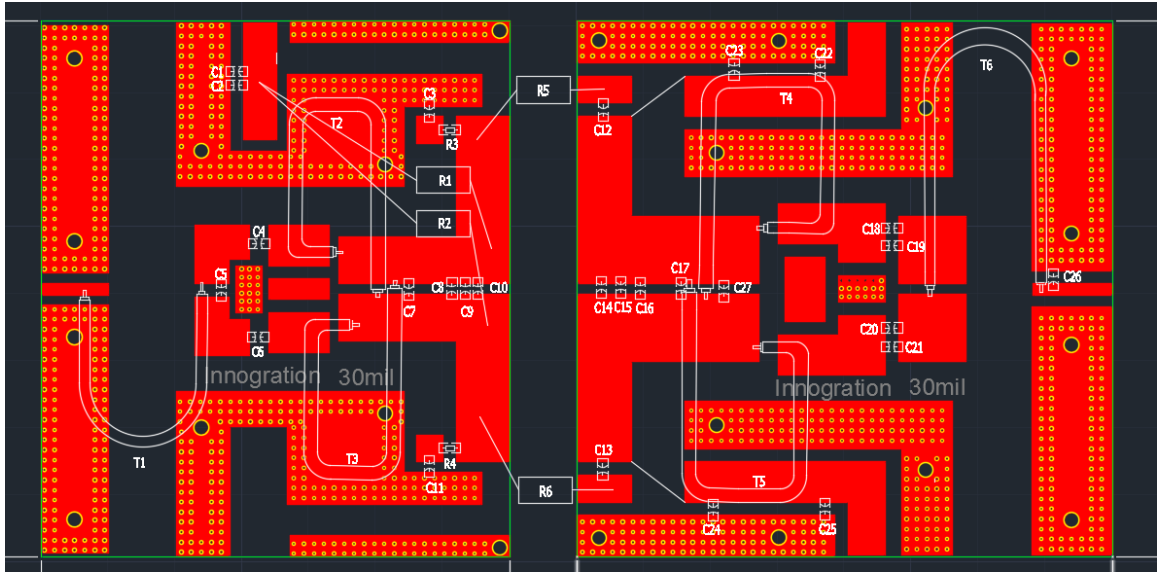


Figure 2: Network analyzer output, S11 ($V_{ds}=40V, I_{dq}=670mA, V_{gs}=3.52V$)

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Reference Circuit of Test Fixture (225-400MHz) (Layout file upon request)



C1,C3,C11,C22,C25	10uF/1210	/
C2,C4,C6,C23,C24	470pF/MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C12,C13	2.2uF/1210	/
C5	2.7pF/MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C7	24pF/MQ301111	
C8,C10	39pF/MQ301111	
C9	9.1pF/MQ301111	
C14	5.6pF/MQ301111	
C15	8.2pF/MQ301111	
C16	3.6pF/MQ301111	
C17	2.4pF/MQ301111	
C18,C19,C20,C21	220pF/MQ301111	
C26	3pF/MQ301111	
C27	36pF/MQ301111	
R1,R2	330 Ω	/
R3,R4	10 Ω /1210	/
R5,R6	300 Ω	/
T1	50 Ohm,65mm	RFSFBU-086-50
T2,T3	12.5 Ohm,70mm	SFF-12.5-1.5
T4,T5	12.5 Ohm,70mm	SFF-12.5-1.5
T6	50 Ohm,65mm	SFF-50-3

TYPICAL CHARACTERISTICS



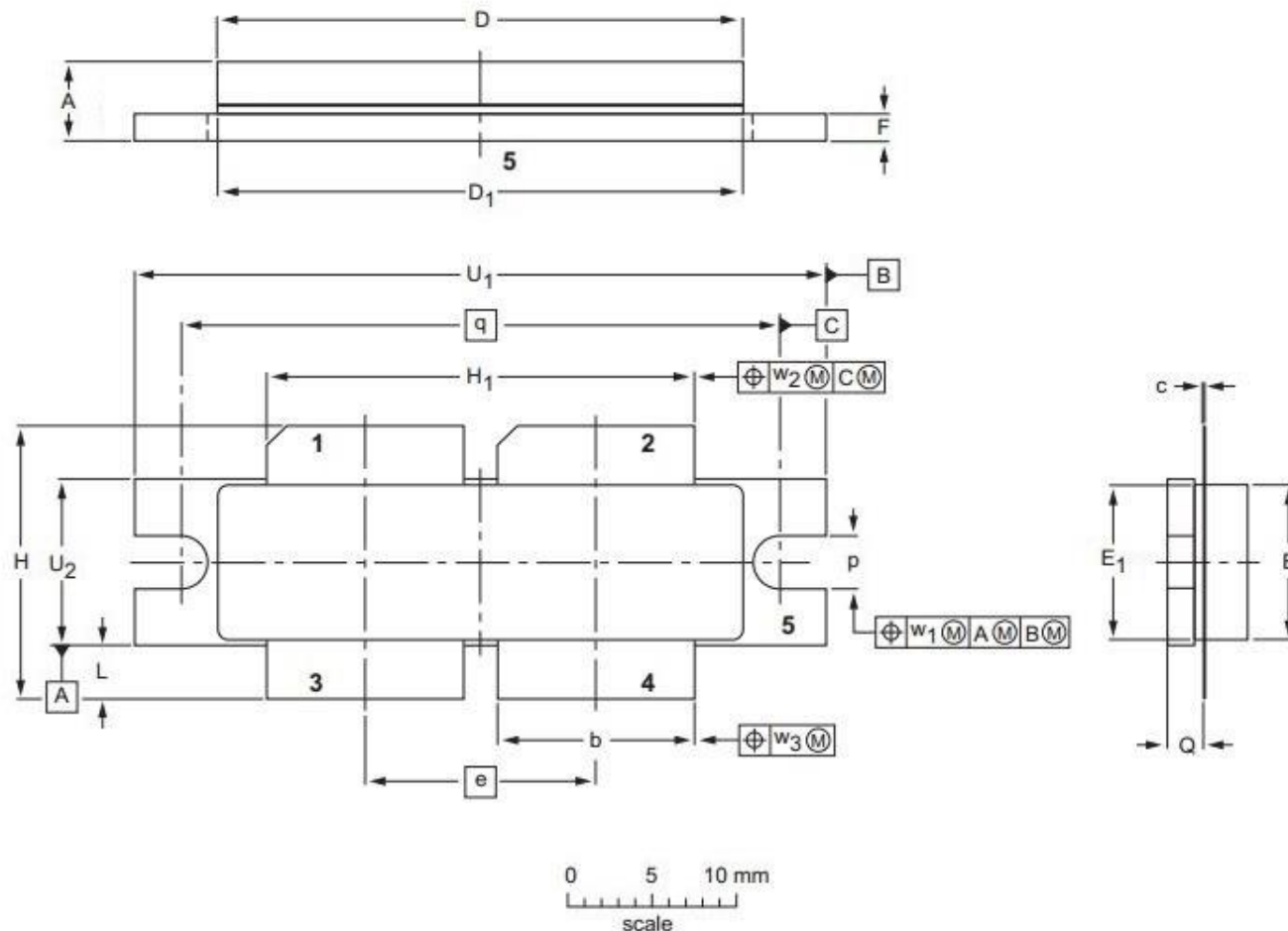
Figure 4: Network analyzer output, S11 (Vds=50V, Idq=700mA, Vgs=3.45V)

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Package Outline

Flanged ceramic package; 2 mounting holes; 4 leads (1, 2—DRAIN, 3, 4—GATE, 5—SOURCE)



UNIT	A	b	c	D	D ₁	e	E	E ₁	F	H	H ₁	L	p	Q	q	U ₁	U ₂	W ₁	W ₂	W ₂
mm	4.7	11.81	0.18	31.55	31.52	13.72	9.50	9.53	1.75	17.12	25.53	3.48	3.30	2.26	35.56	41.28	10.29	0.25	0.51	0.25
	4.2	11.56	0.10	30.94	30.96		9.30	9.27	1.50	16.10	25.27	2.97	3.05	2.01		41.02	10.03			
inches	0.185	0.465	0.007	1.242	1.241	0.540	0.374	0.375	0.069	0.674	1.005	0.137	0.130	0.089	1.400	1.625	0.405	0.01	0.02	0.01
	0.165	0.455	0.004	1.218	1.219		0.366	0.365	0.059	0.634	0.995	0.117	0.120	0.079		1.615	0.395			

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-D4E					03/12/2013

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Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2022/8/12	Rev 1.0	Preliminary Datasheet
2024/8/30	Rev 1.1	Add 225-400MHz application data
2024/9/23	Rev 1.2	Modify 430-470MHz application to 370-470MHz application

Application data based on HL-22-34/SJJ-24-05/HL-24-40

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