

# MQ0590RVP LDMOS TRANSISTOR

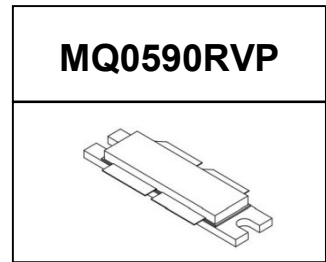
Document Number: MQ0590RVP  
Preliminary Datasheet V1.0

## 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.



- Application data in **430-470MHz wide band** with device soldered

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

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
430	58.03	635.8	52.4	20.33	59.41	872.7	55.3
450	58.4	692.6	59.2	19.68	59.3	851.8	59.5
470	58	631.3	62.3	18.56	58.59	723.6	60.9

### 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
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

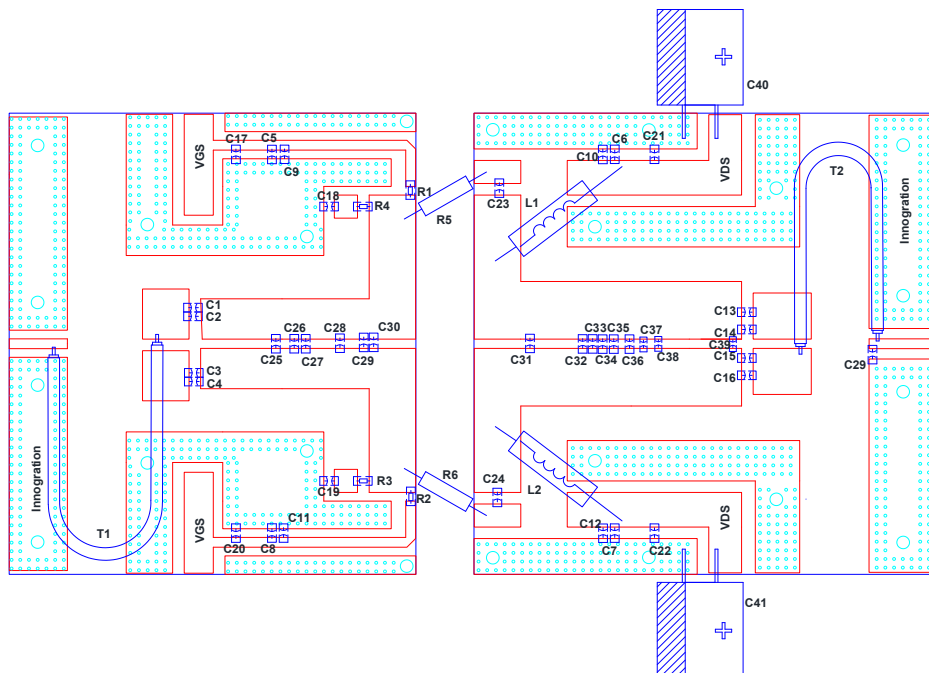
# MQ0590RVP LDMOS TRANSISTOR

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Preliminary Datasheet V1.0

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

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

**Reference Circuit of Test Fixture (430-470MHz)**  
(Layout file upon request)



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Document Number: MQ0590RVP  
Preliminary Datasheet V1.0

Part	description	Model
C1~C8	200pF	Beijing YN MQ101111
C9~C12	120pF	Beijing YN MQ101111
C13~C16	470pF	Beijing YN MQ101111
C17~C22	10uF	Ceramic multilayer capacitance
C23,C24	10nF	Ceramic multilayer capacitance
C25	10pF	Beijing YN MQ101111
C26	3.3pF	Beijing YN MQ101111
C27,C29	22pF	Beijing YN MQ101111
C28	8.2pF	Beijing YN MQ101111
C30	20pF	Beijing YN MQ101111
C31	18pF	Beijing YN MQ101111
C32	4.7pF	Beijing YN MQ101111
C33	4.7pF+2.0pF	Beijing YN MQ101111
C34	10pF+3.3pF	Beijing YN MQ101111
C35	18pF	Beijing YN MQ101111
C36	2.7pF	Beijing YN MQ101111
C37~C39	1.5pF	DLC75D
C40,C41	4700uF/63V	Electrolytic Capacitor
R1,R2	6.8 $\Omega$	Chip Resistor
R3,R4	9.1 $\Omega$	Chip Resistor
R5,R6	200 $\Omega$ /250W Power resistor	RHD-250-200
T1	25ohm/50mm	
T2	25ohm/80mm	
L1,L2	2turns,绕径 5mm 线径 1mm	DIY air core inductance
PCB	0.762mm [0.030"] thick, $\epsilon_r=3.50$ , Rogers 4350B, 1 oz. copper	

## TYPICAL CHARACTERISTICS

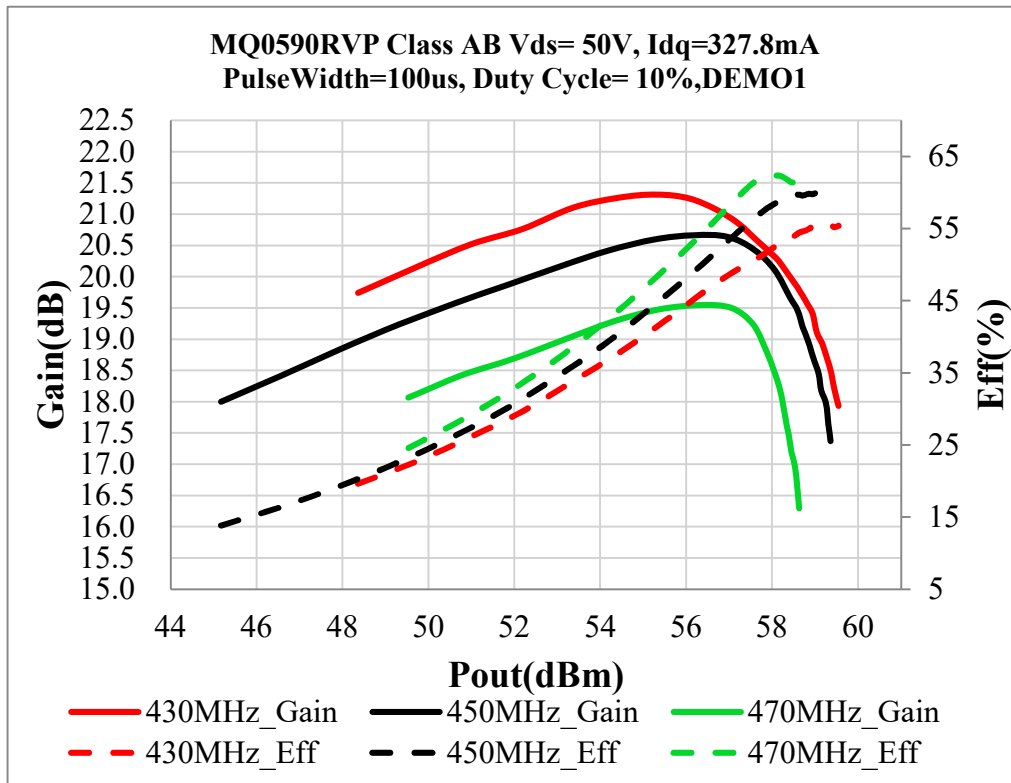


Figure 1: Efficiency and power gain as the function of Pout

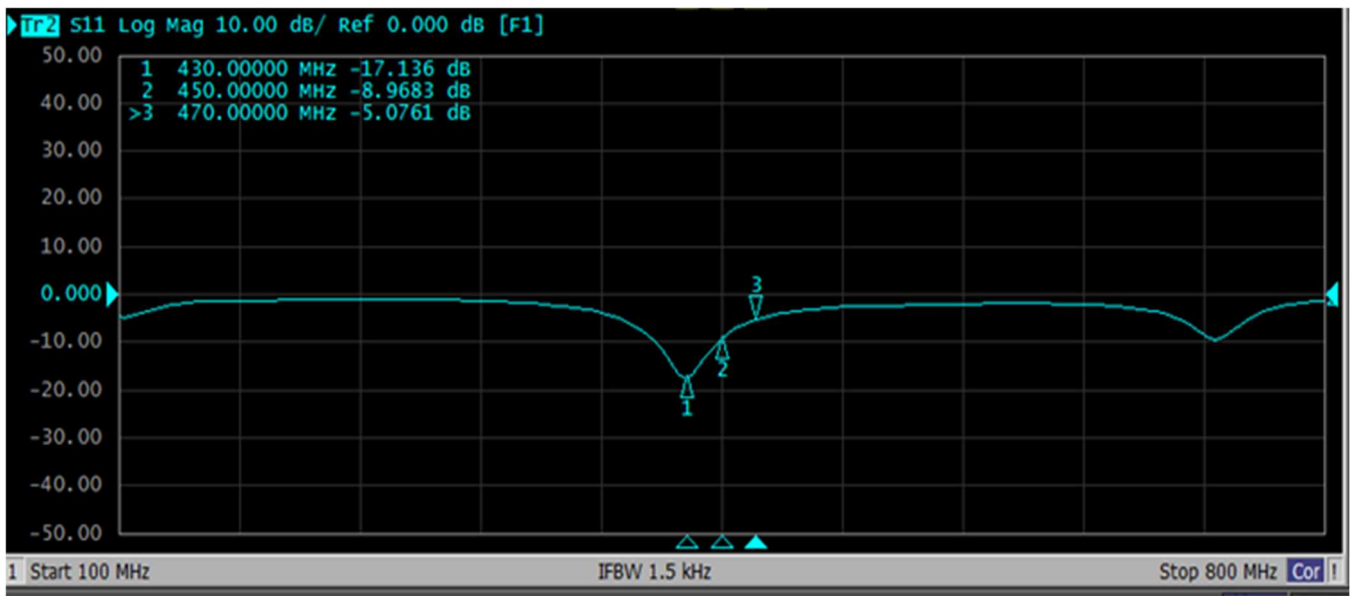


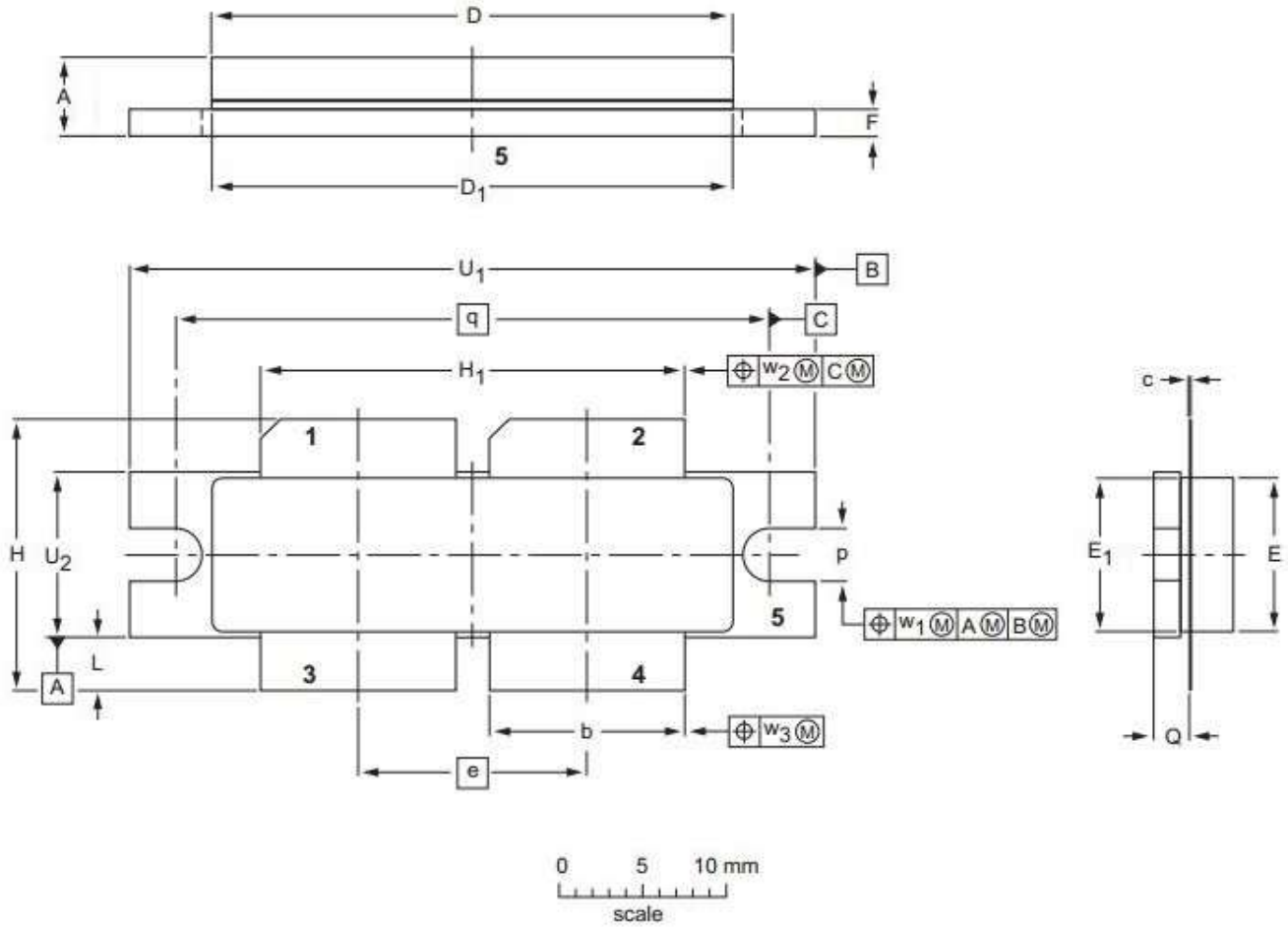
Figure 2: Network analyzer output, S11 ( $V_{ds}=50V$ ,  $I_{dq}=600mA$ ,  $V_{gs}=3.42V$ )

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Preliminary Datasheet V1.0

## Package Outline

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



UNIT	A	b	c	D	D <sub>1</sub>	e	E	E <sub>1</sub>	F	H	H <sub>1</sub>	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>
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

Application data based on HL-22-34

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