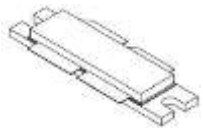
MQ0590RVP LDMOS TRANSISTOR

Document Number: MQ0590RVP
Preliminary Datasheet V1.4

900W, 50V High Power RF LDMOS FETs

MQ0590RVP



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 **340-380MHz microstrip balun narrow band** with device soldered

VDS=50V VGS=3.18V Idq=250mA CW						
Freq(MHz)	**Pin(dBm)**	**Psat(dBm)**	**Psat(W)**	**IDS(A)**	**Gain(dB)**	**Eff(%)**
340	40.3	59.81	957	2.97	19.5	70.4
350	40.4	59.77	948	2.86	19.4	72.7
360	40.4	59.77	948	2.87	19.4	72.4
370	40.6	59.78	951	2.93	19.2	70.9
380	40.7	59.60	912	2.88	18.9	69.4

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

VDS=50V VGS=2.8V Idq=100mA 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

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- Application data in **100-350MHz 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 (%)	2nd (dBc)	3rd (dBc)
100	633.9	3.74	37.98	20.04	75.46	-32.53	-12.76
150	668.3	4.36	38.91	19.34	67.59	-35.37	-14.77
200	712.9	4.75	40.97	17.56	65.86	-35.83	-12.36
250	736.2	5.42	40.69	17.98	59.22	-36.32	-20.66
300	955.0	6.06	41.45	18.35	68.37	-32.07	-19.2
350	699.8	4.16	41.73	16.72	74.39	-34.58	-27.32

At 42V, it can deliver >400W CW

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	Tstg	-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, I_{DQ} = 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

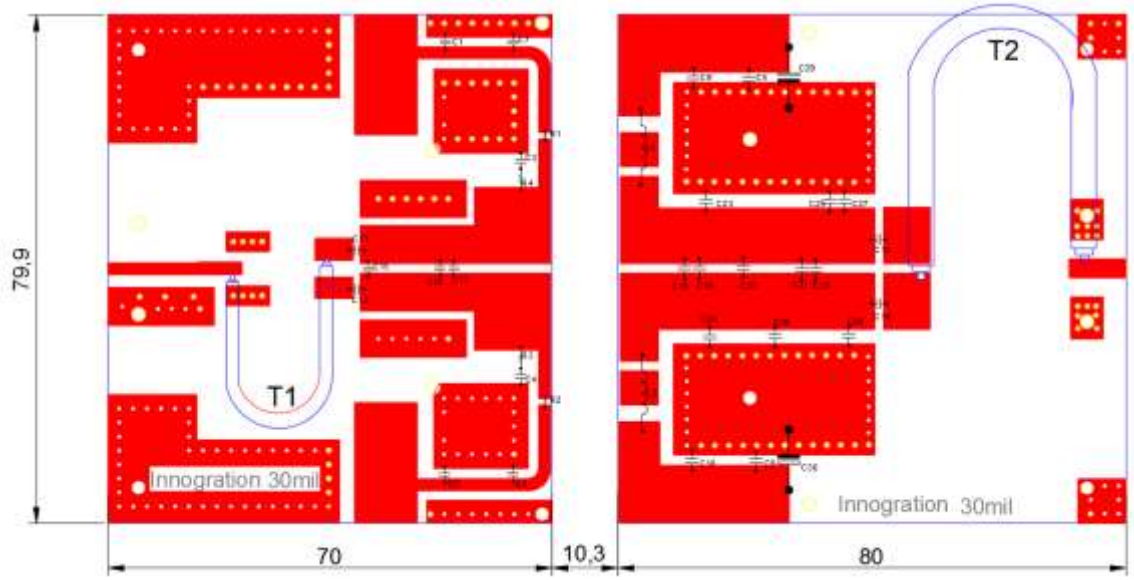
Table 4. Electrical Characteristics (TA = 25 ℃ unless otherwise noted)

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	I_{DSS}	——	——	1	μA

(V_{DS} = 50V, V_{GS} = 0 V)					
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 μA)	$V_{GS(th)}$	——	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	Rds(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

Reference Circuit of Test Fixture (370-470MHz)

(Layout file upon request)

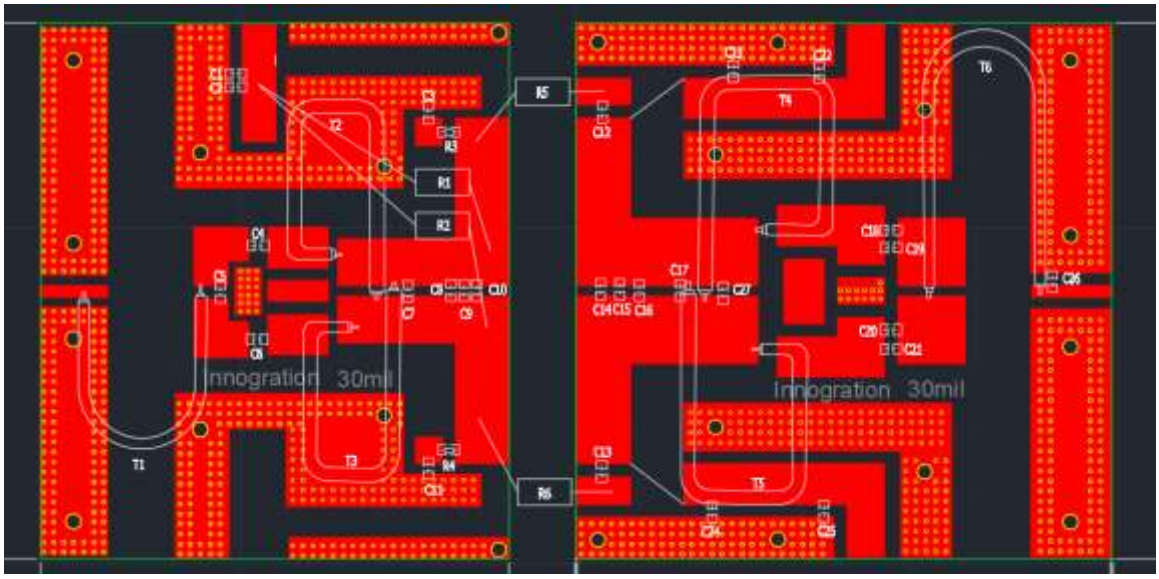


Part	description	Model
C1~C6	10uF 1210	Ceramic multilayer capacitor
C7~C10	470pF MQ101111	
C11,C12	200pF MQ101111	
C13,C14	270pF MQ102525	

C15	15pF MQ10111	
C16	18pF MQ301111	
C17	12pF MQ301111	
C18	18pF MQ101111	
C19,C25,C27,C28	10pF MQ301111	
C20,C23,C24,C26	12pF MQ101111	
C21	4.3pF MQ301111	
C22	20pF MQ301111	
C29,C30	4700uF/63V	Electrolyic Capacitor
R1,R2	270 Ω 0805	Chip Resistor
R3,R4	10Ω 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	

Reference Circuit of Test Fixture (225-400MHz)

(Layout file upon request)

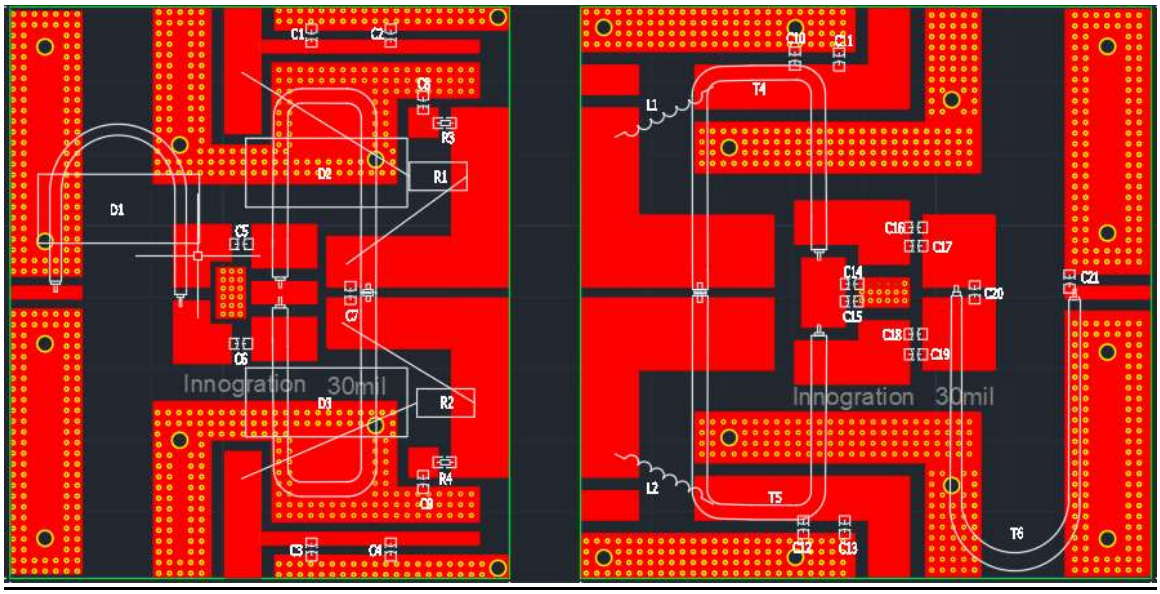


C1,C3,C11,C22,C25	10uF/1210	/
C2,C4,C6,C23,C24	470pF/MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C12,C13	2.2uF/1210	/
C5	2.7pF/MQ301111	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.
C7	24pF/MQ301111	
C8,C10	39pF/MQ301111	
C9	9.1pF/MQ301111	

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	330Ω	/
R3,R4	10Ω/1210	/
R5,R6	300Ω	/
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

Reference Circuit of Test Fixture (100-350MHz)

(Layout file upon request)



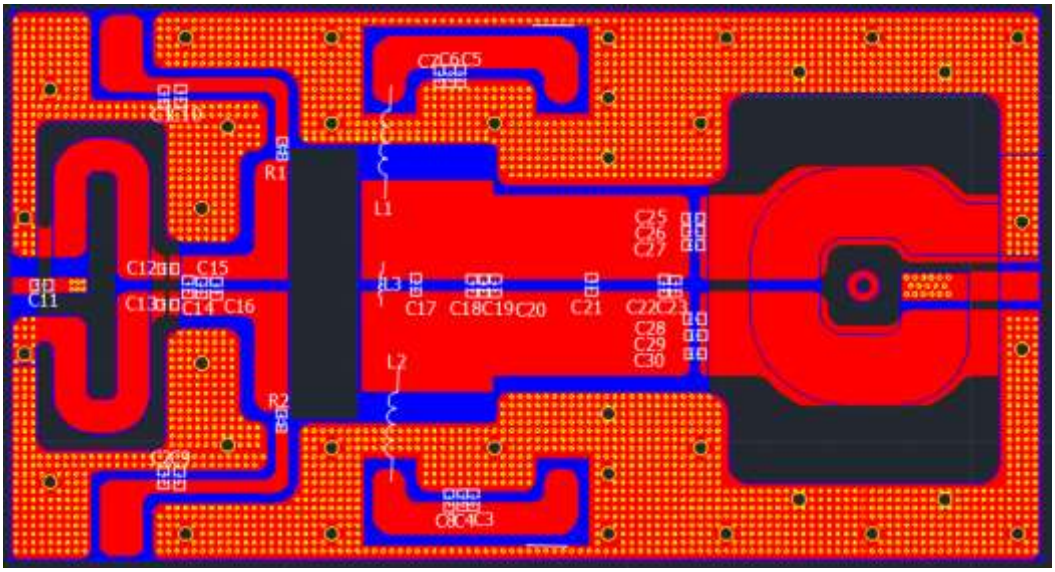
C1, C3, C8, C9, C11 C13, C14, C15	10uF/1210	/
C2, C4, C5, C6, C10, C12	1000pF/MQ301111	
C7	15pF/MQ301111	
C16, C17, C18, C19	470pF/MQ301111	
C20	1.2pF/MQ301111	
C21	3.6pF/MQ301111	
R1, R2	330Ω	/

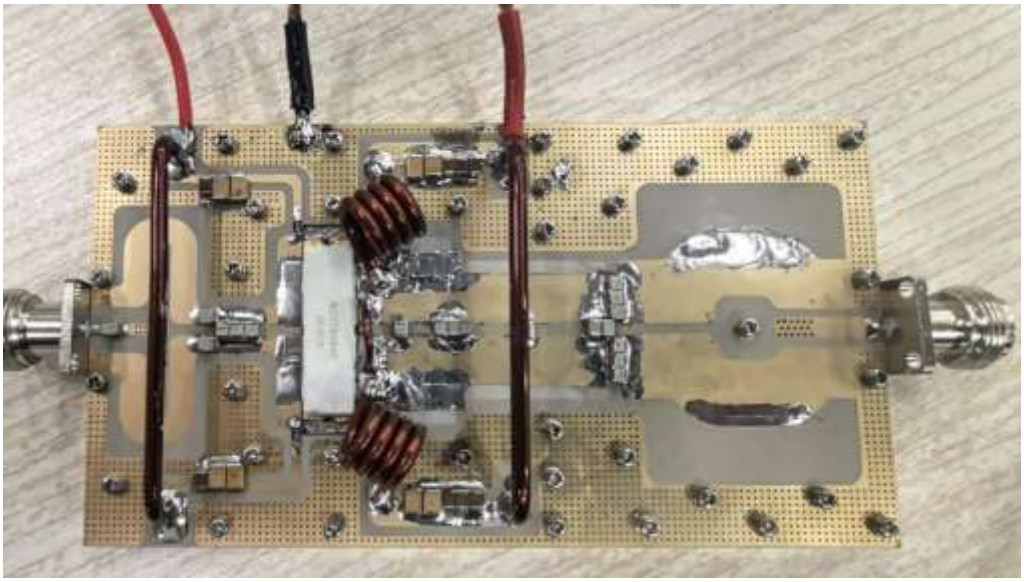
R3, R4	10Ω/1210	/
L1, L2	2mm wire, 6turns, Φ=5mm	DIY
D1	50 Ohm, 70mm	RFSFBU-086-50 + BN-61-202
D2, D3	16.7 Ohm, 70mm	SFF-16.7-1.5 + BN-61-202
T4, T5	16.7 Ohm, 130mm	SFF-12.5-3
T6	50 Ohm, 150mm	SFF-50-3

Figure 5: Network analyzer output, S11 (Vds=48V,Idq=700mA, Vgs=3.45V)

Reference Circuit of Test Fixture (340-380MHz)

(Layout file upon request)



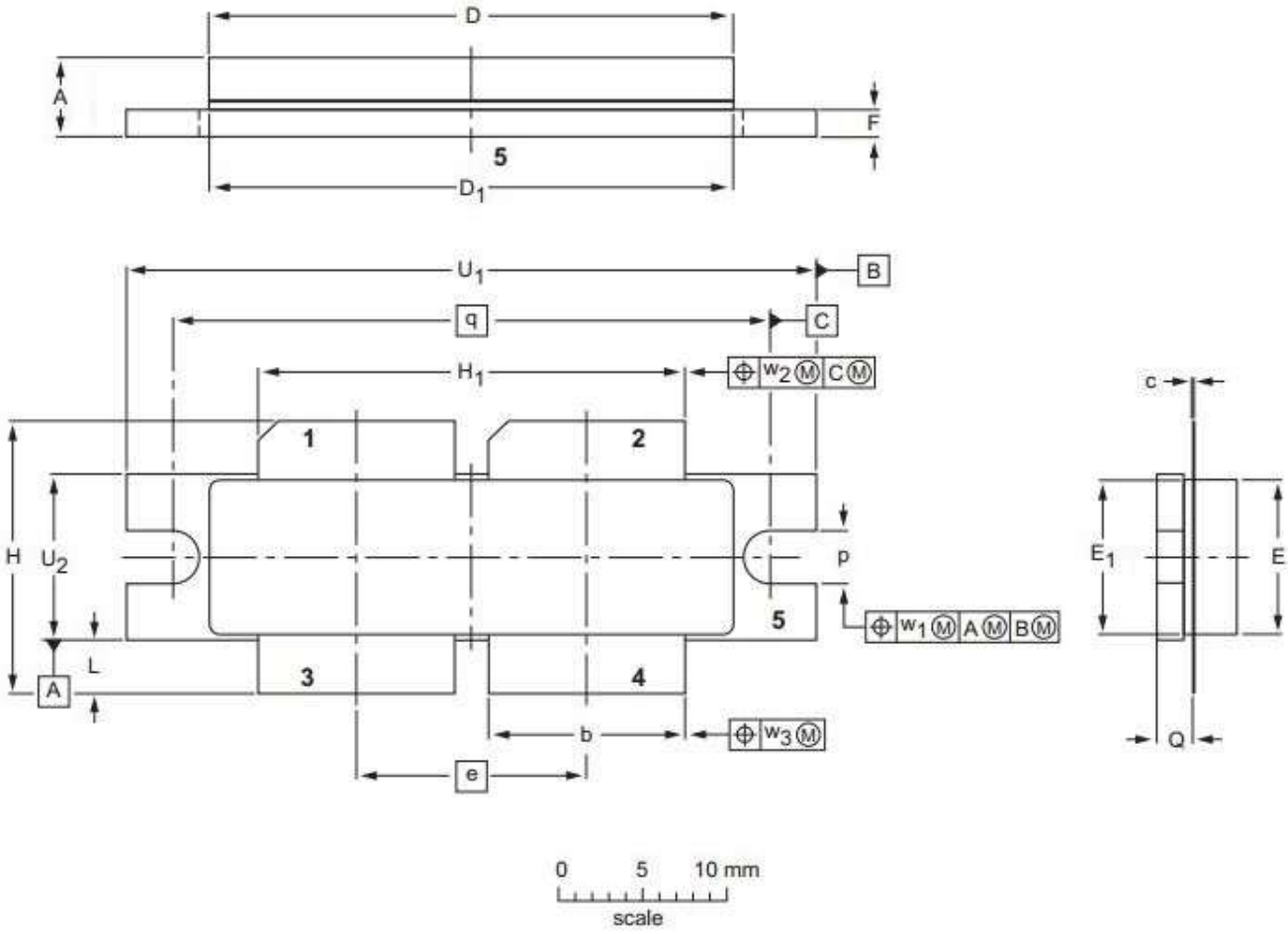


Component	Description	Suggested Manufacturer
C1,C2	10uF/200V-1210	Ceramic multilayer capacitor
C4,C6,C9,C10	2.2uF/200V-1210	Ceramic multilayer capacitor

C3,C5	3*10uF/200V-1210	Ceramic multilayer capacitor
C7,C8	10nF/200V-1210	Ceramic multilayer capacitor
C11	100pF	
C12,C13	36pF	
C14,C16	33pF	
C15	30pF	
C17	22pF	
C19	24pF	
C18,C21	12pF	
C20	18pF	
C22	15pF	
C23	20pF	
C25~C30	75pF	
R1,R2	51Ω-1206	Chip Resistor
L1,L2	2mm wire ， 8mm inner diameter， 4Turns	DIY
L3	1.5mm wire ，8mm inner diameter，0.8Turns	DIY
PCB	30Mil Rogers tc350	

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 4.2	11.81 11.56	0.18 0.10	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.48 2.97	3.30 3.05	2.26 2.01	35.56	41.28 41.02	10.29 10.03	0.25	0.51	0.25
inches	0.185 0.165	0.465 0.455	0.007 0.004	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.137 0.117	0.130 0.120	0.089 0.079	1.400	1.625 1.615	0.405 0.395	0.01	0.02	0.01

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

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
2026/6/17	Rev 1.3	Add 100-350MHz application result
2026/10/27	Rev 1.4	Add 340-380MHz microstrip balun base circuit

Application data based on HL-22-34/SJJ-24-05/HL-24-40/SJJ-26-12, SYX-26-49

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