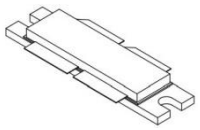
MQ012K1UPX LDMOS TRANSISTOR

Document Number: MQ012K1UPX
Preliminary Datasheet V1.2

1600W/2100W, 50V/60V High Power LDMOS FETs

MQ012K1UPX



Description

The MQ012K1UPX is a 50V/60V 1600W/2100W capable, high performance, unmatched LDMOS FET, designed for commercial and industrial applications with frequencies HF to 225MHz.It can be used for both CW and pulse application.

At popular 50V,It is the ruggedness enhancement of MQ051K5VPX/MQ011K3VPX, and could be the drop-in replacement of BLF188XR/MRFE6VP61K25H.

It is featured for high power and high ruggedness, suitable for Industrial, Scientific and Medical application, as well as FM radio, HF communication, VHF TV and Aerospace applications.

- Typical **High Efficiency 13.56MHz** tuning (On Innogration narrowband fixture with device soldered):

V_{DD} = 50 Volts, I_{DQ} = 200 mA, CW

Freq(MHz)	Pin(dBm)	Pout(W)	Gain(dB)	Eff(%)
13.56	35	1611	27.2	87

Load mismatch/Ruggedness test, result : **passed**

Freq(MHz)	Signal	VSWR	Pout (W)	Voltage(V)
13.56	CW	70:1 at all phase	1500	50

- Typical **High Power 13.56MHz** tuning (On Innogration narrowband fixture with device soldered):

V_{DD} = 50 Volts, I_{DQ} = 200 mA, CW

Freq(MHz)	Pin(dBm)	Pout(W)	Gain(dB)	Eff(%)
13.56	36.4	2065	26.5	80

Load mismatch/Ruggedness test, result : **passed**

Freq(MHz)	Signal	VSWR	Pout (W)	Voltage(V)
13.56	CW	70:1 at all phase	2000	50

- Typical **5-10MHz** performance (On Innogration narrowband fixture with device soldered):

V_{DD} = 50 Volts, I_{DQ} = 200 mA, CW

Freq (MHz)	Pin (dBm)	Pout (dBm)	Pout (W)	I (A)	Gain (dB)	Eff (%)	2nd	3rd
5	34.2	61.65	1462	33.57	27.5	87.1	-36.20	-9.50
6	34.2	61.66	1466	33.50	27.5	87.5	-36.50	-11.50
7	34.2	61.62	1452	33.10	27.4	87.7	-37.40	-13.80
8	34.2	61.52	1419	32.50	27.3	87.3	-38.50	-16.00
9	34.2	61.37	1371	31.70	27.2	86.5	-38.20	-18.80
10	34.2	61.18	1312	30.73	27.0	85.4	-37.00	-21.00

Features

- High Efficiency and Linear Gain Operations
- On chip RC network enable high stability and ruggedness
- 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}	165	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+60	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, 1500W CW, 50 Vdc, I_{DQ} = 70 mA	$R_{\theta JC}$	0.12	°C/W
Transient thermal impedance from junction to case Tj = 150° C; tp = 100 us; Duty cycle = 20 %	Zth	0.02	°C/W

Table 3. ESD Protection Characteristics

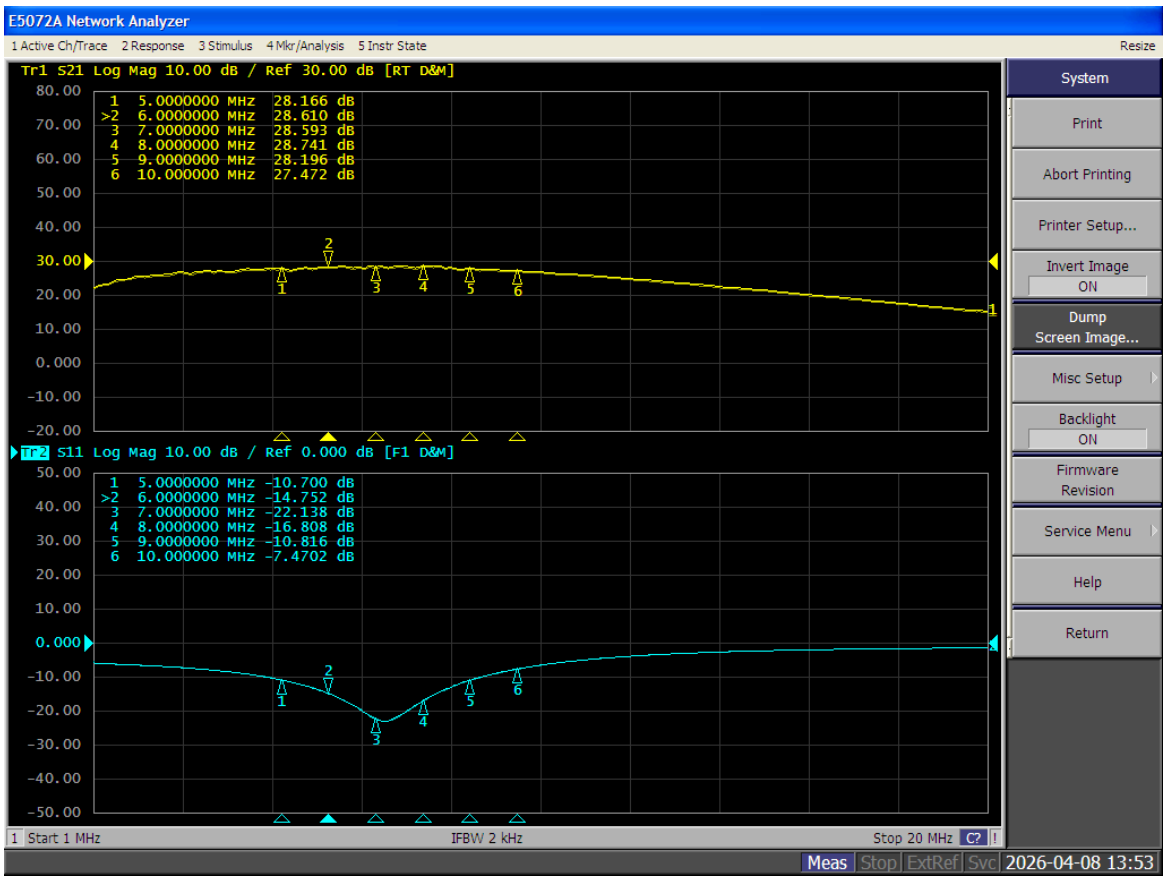
Test Methodology	Class
Human Body Model (per JESD22--A114)	Class 2

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

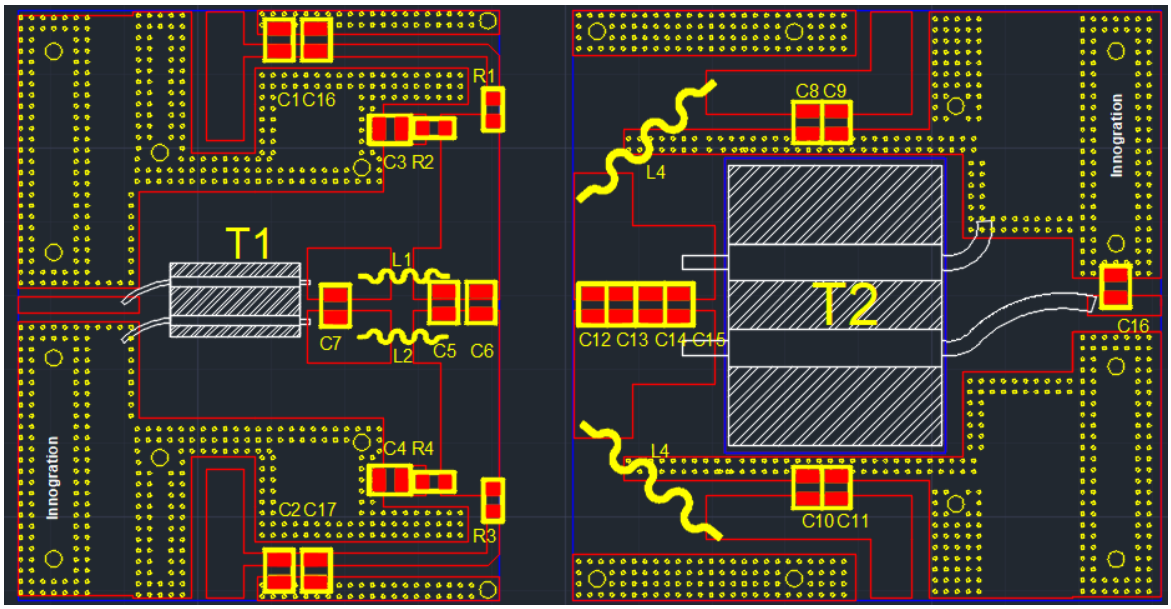
Characteristic	Symbol	Min	Typ	Max	Unit
DC Characteristics					
Drain-Source Voltage V_{GS}=0, I_{DS}=20.0mA	$V_{(BR)DSS}$		165		V
Zero Gate Voltage Drain Leakage Current (V_{DS} = 50V, V_{GS} = 0 V)	I_{DSS}	——	——	1	μA
Gate—Source Leakage Current (V_{GS} = 10 V, V_{DS} = 0 V)	I_{GSS}	——	——	1	μA
Gate Threshold Voltage (V_{DS} = 50V, I_D = 600 μA)	$V_{GS(th)}$	——	2.54	——	V
Gate Quiescent Voltage (V_{DD} = 50 V, I_D = 70 mA, Measured in Functional Test)	$V_{GS(Q)}$	——	3	——	V
Drain source on state resistance (V_{DS} = 0.1V, V_{GS} = 10 V) Each section side of device measured	Rds(on)		85		mΩ
Common Source Input Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz) Each section side of device measured	C_{ISS}		1300		pF
Common Source Output Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz) Each section side of device measured	C_{OSS}		330		pF
Common Source Feedback Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz) Each section side of device measured	C_{RSS}		4.2		pF

TYPICAL CHARACTERISTICS (5-10MHz)

Figure 1: Efficiency and power gain as the function of Pout (Vds=50V, Idq=2000mA)



Reference Circuit of Test Fixture



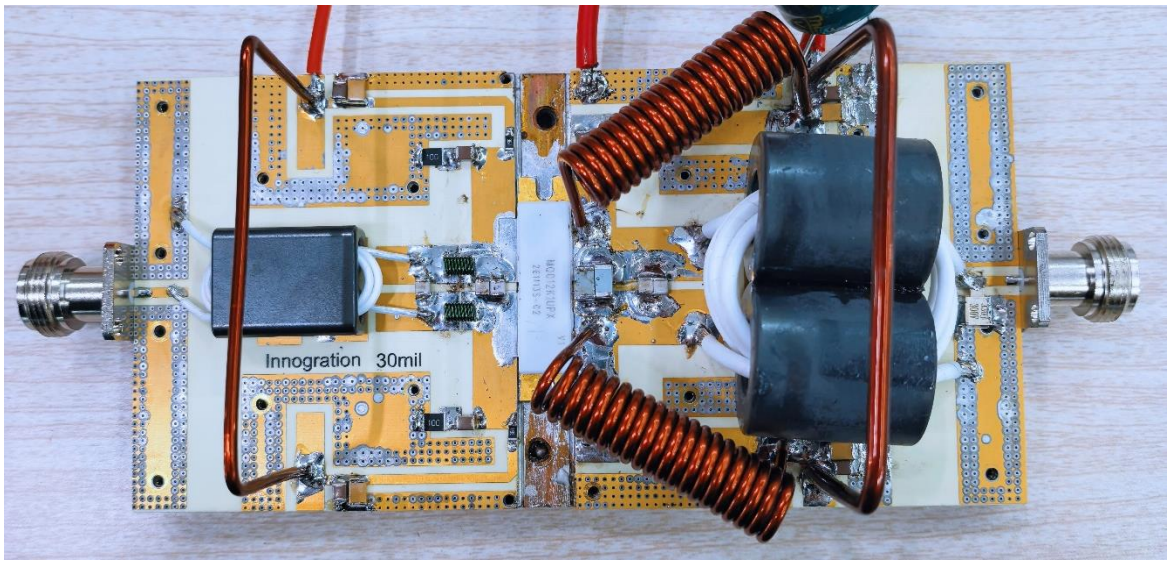
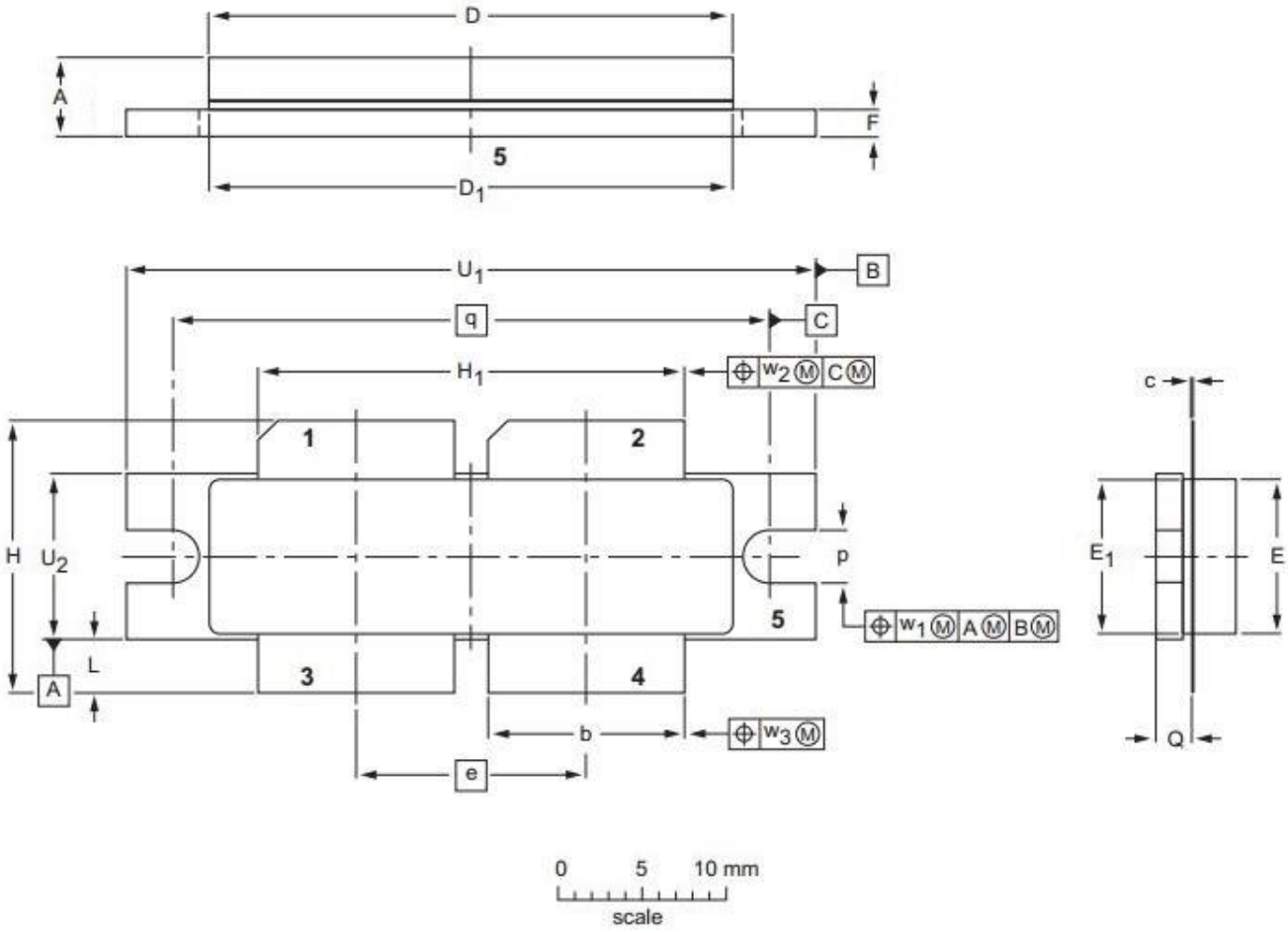


Table 5. Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C1~C4,C11,C9	10uF 1210	///
R1,R3	360Ω 0805	///
R2,R4	10Ω 0805	///
C5，C7	820pF MQ301111	
C16,C17,C8,C10	10uF 1210	
C6	430pF MQ301111	
C12	560pF MQ102525	
C13	470pF MQ102525	
C14	240pF MQ102525	
C15	360pF MQ102525	
C16	36pF MQ102525	
L1,L2	82nH 1515SQ-82NGEC	///
L3,L4	2.0mm wire ，8mm inner diameter, 20Turns	///
T1	BN-43-3312 9:1	//
T2	MFB-75-1020 9:1	///

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
2026/1/22	Rev 1.0	Preliminary Datasheet
2026/3/9	Rev 1.1	state it as 1600W device according to high eff tuning, add high power tuning to show 2KW capability
2026/4/8	Rev 1.2	Add 5-10MHz application data

Application data based on SYX-26-05/15/21

Disclaimers

Specifications are subject to change without notice. Innogration believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Innogration for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Innogration . Innogration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose."Typical" parameters are the average values expected by Innogration in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Innogration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility. For any concerns or questions related to terms or conditions, pls check with Innogration and authorized distributors