MF012K5VPX LDMOS TRANSISTORs

Document Number: MF012K5VPX
Preliminary Datasheet V2.2

2500W, 50V High Power RF LDMOS Paired FETs

MF012K5VPX

Description

The MF012K5VPX is a 2500W capable, highly rugged, Push pull and unmatched LDMOS FET, designed for commercial and industrial applications with frequencies HF to 200MHz. It is featured for industry leading high power and high ruggedness, suitable for Industrial, Scientific and Medical application, as well as HF communication under the signal condition of CW or pulsed CW or any modulation format

- Typical performance on different narrow band application board with devices soldered

Freq(MHz)	Voltage(V)	Signal type	Pin(dBm)	Pout(W)	Power Gain(dB)	Eff(%)	Remark
13.56	36	CW	42.5	1250	19	83	Compact LC
27.12	36	CW	43	1250	18.5	83	Compact LC
40.68	36	CW	44	1400	17.5	82	Compact LC
60	42/36	CW	42	1450/1050	19.8	90	Microwave Balun
98	50	Pulse	46	2800	18	75	High power tuning
175	50	CW	48	1800	14.5	80	

Application reports upon request

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

- 30-88MHz (Ground communication)
- 54-88MHz (TV VHF I)
- 88-108MHz (FM)
- 136-174MHz (Commercial ground communication)
- Laser Exciter
- Synchrotron
- MRI
- Plasma generator
- Weather Radar

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+140	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
Transient thermal impedance from junction to case Tj = 95° C; measured under RF condition	Zth	0.013	°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 ℃ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DC Characteristics (per half section)					
Drain-Source Voltage V_{GS}=0, I_{DS}=1.0mA	$V_{(BR)DSS}$		140		V
Zero Gate Voltage Drain Leakage Current (V_{DS} = 50 V, 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)	$V_{GS(th)}$	——	2.0	——	V
Gate Quiescent Voltage (V_{DD} = 50 V, I_D = 300 mA, Measured in Functional Test)	$V_{GS(Q)}$	——	3.2	——	V

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 50 Vdc, I_{DQ} = 300 mA, f = 98MHz, pulse width:100us, duty cycle:10%,

65：1, at 2500W Pulsed CW Output Power	No Device Degradation

Reference Circuit of Test Fixture (98MHz Power Amplifier)

Note: This demo board is used for short time demonstration only, for long time CW operation, heat management for some components might needed

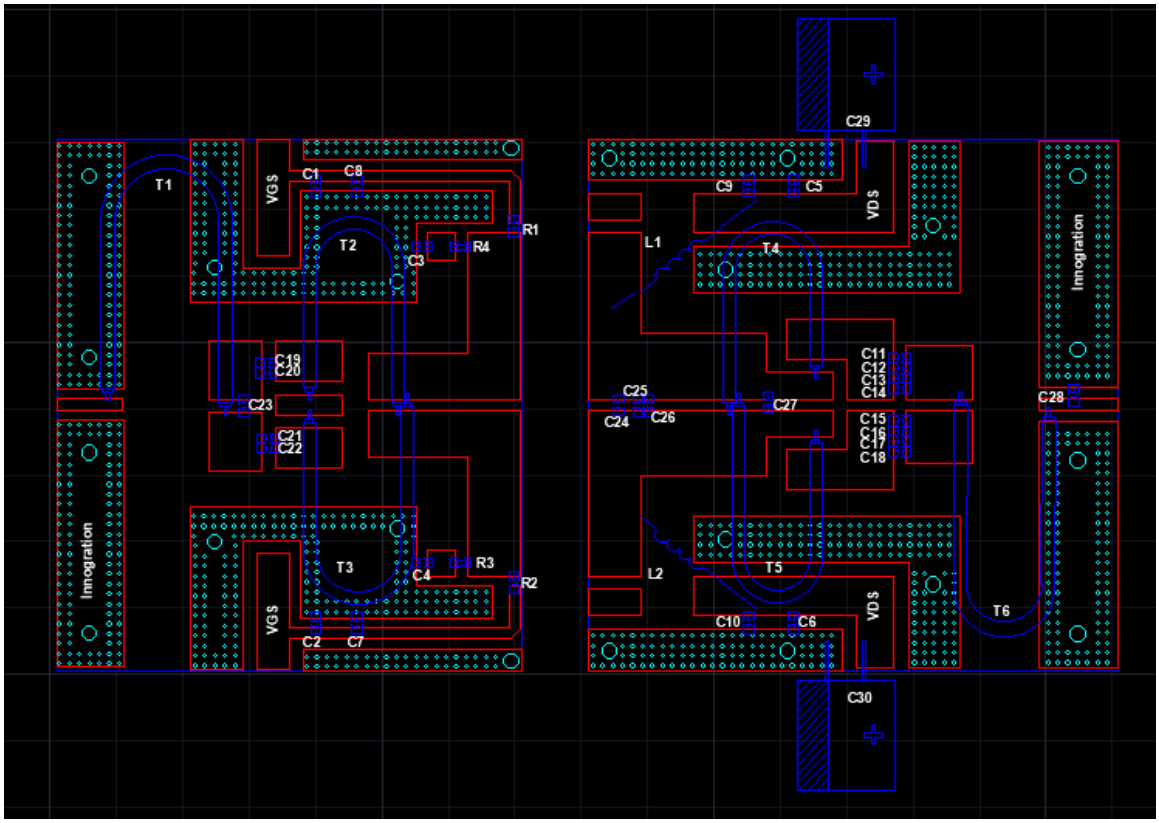


Table 5. Test Circuit Component Designations and Values

Component	Description	Suggestion
C1~C6	10uF	10uF/100V
C7~C22	910pF	MQ101111
C23,C25	68pF	MQ101111
C24	20pF	MQ101111
C26,C27	30pF	MQ101111
C28	3pF	MQ101111
C29,C30	4700uF/63V	Electrolytic Capacitor
R1,R2	220Ω	Chip Resistor
R3,R4	10Ω	Chip Resistor
T1	50 ohm,135mm	RFSFBU-086-50
T2,T3	25ohm,135mm	RFSFBU-086-25
T4,T5	12.5ohm，135mm	SFF-12.5-3
T6	16.7ohm,200mm	SFF-16.7-3
L1,L2	d=2mm,D=5mm,4Turns	
PCB	30Mil Rogers4350	

TYPICAL CHARACTERISTICS

Figure 1: Pulsed CW Gain and Power Efficiency as a Function of Pout @98MHz at 50V

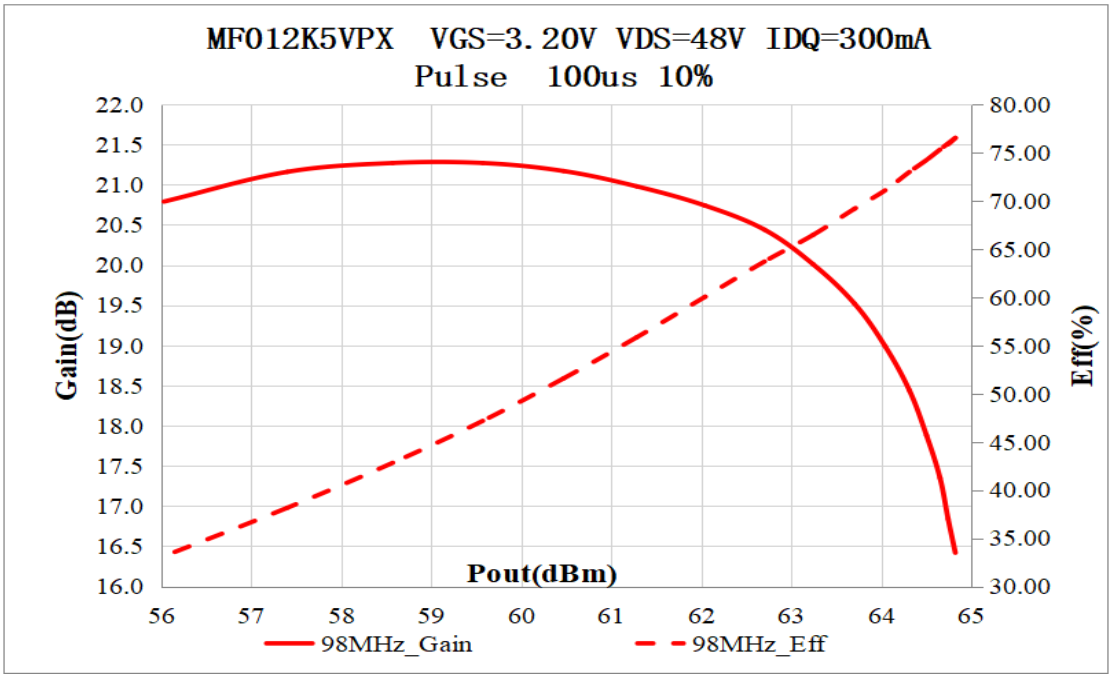
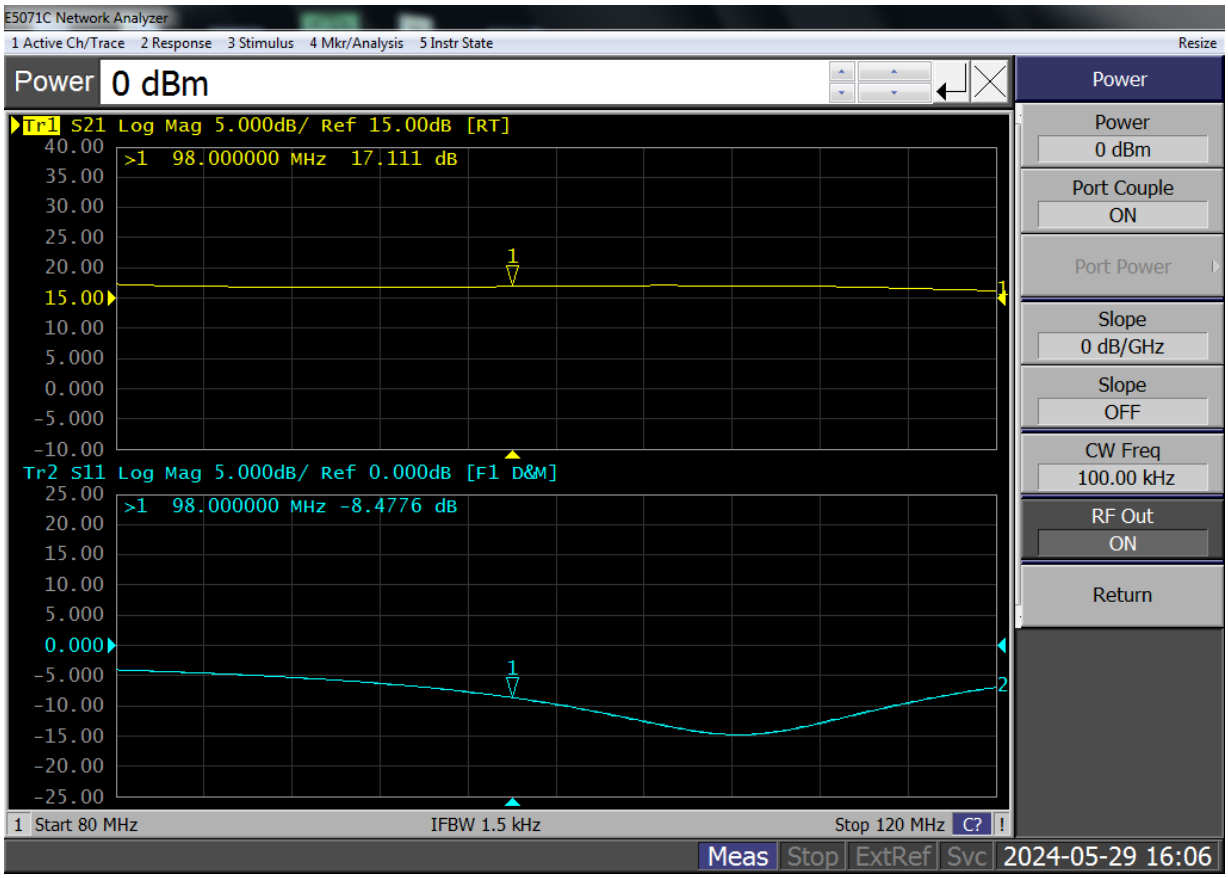
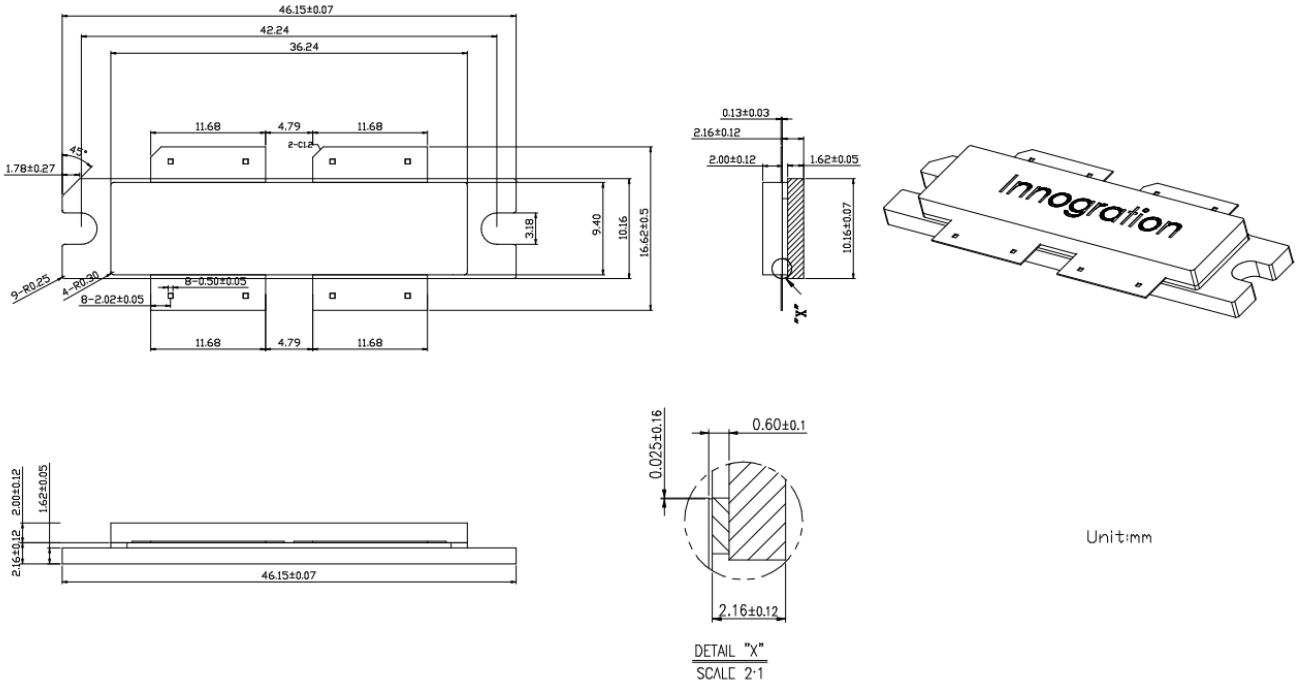


Figure 2: Network analyzer output S11/S21



Package Outline

Flanged ceramic package;



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-O4E					**5/6/2024**

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2023/11/24	Rev 1.0	Preliminary datasheet creation
2024/5/6	Rev 2.0	Package applied to finalized O4E
2024/5/29	Rev 2.1	Change the characterization using 98MHz new data
2024/8/23	Rev 2.2	Add 13.56M/175MHz/60M/40.68M application data，change the upper limits to 200MHz

Application data based on HL-24-18&36/LBG-24-26/SYX-24-30/HL-24-38/39

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