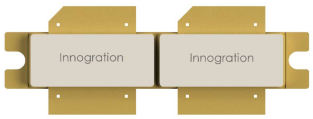
MO012K5VPX LDMOS TRANSISTORs

Document Number: MO012K5VPX
Preliminary Datasheet V1.0

2500W, 50V High Power RF LDMOS Paired FETs

MO012K5VPX



Description

The MO012K5VPX is a 2500W capable, highly rugged, Push pull and unmatched LDMOS FET, designed for commercial and industrial applications with frequencies HF to 150MHz. It is featured for industry leading high power and high ruggedness, suitable for Industrial, Scientific and Medical application, as well as HF communication, VHF TV and Aerospace applications.

- Typical performance(on 100MHz narrow band application board with devices soldered)

V_{DS}=50V,I_{DQ}=200mA, CW,

Vds	Pin(dBm)	Pout(W)	Gain(dB)	Eff(%)
46	43.53	2152	19.8	76
50	44.5	2570	19.6	76
55	44.5	3006	20.28	73

- Typical performance(on 13.56MHz narrow band application board with devices soldered)

V_{DS}=50V,I_{DQ}=200mA, Pulsed CW, 50% duty cycle, 500us pulse width

Vds	Pin(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)
36	37	1250	20.9	24	81
40	37	1500	23.1	24.8	80
45	37	1900	25.8	25.8	82
50	37	2250	28.5	26.5	78

✓ **For load varied applications like 13.56/27.12/40.68MHz etc RF generator used for semiconductor or solar panel etc, it is recommended to run device at lower voltages according to different load conditions for ruggedness margin.**

✓ **For load fixed and good matching application like 88-108MHz FM radio application, it is recommended to run device at standard 50V to maximize its power output.**

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 = 85° C; tp = 100 us; Duty cycle = 10 %	Zth	0.015	°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} = 75V, V_{GS} = 0 V)	I_{DSS}	——	——	1	μA
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)	$V_{GS(Q)}$	——	3.06	——	V

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 50 Vdc, I_{DQ} = 300 mA, f = 108MHz, pulse width:100us, duty cycle:10%,

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

Reference Circuit of Test Fixture (100MHz Power Amplifier)

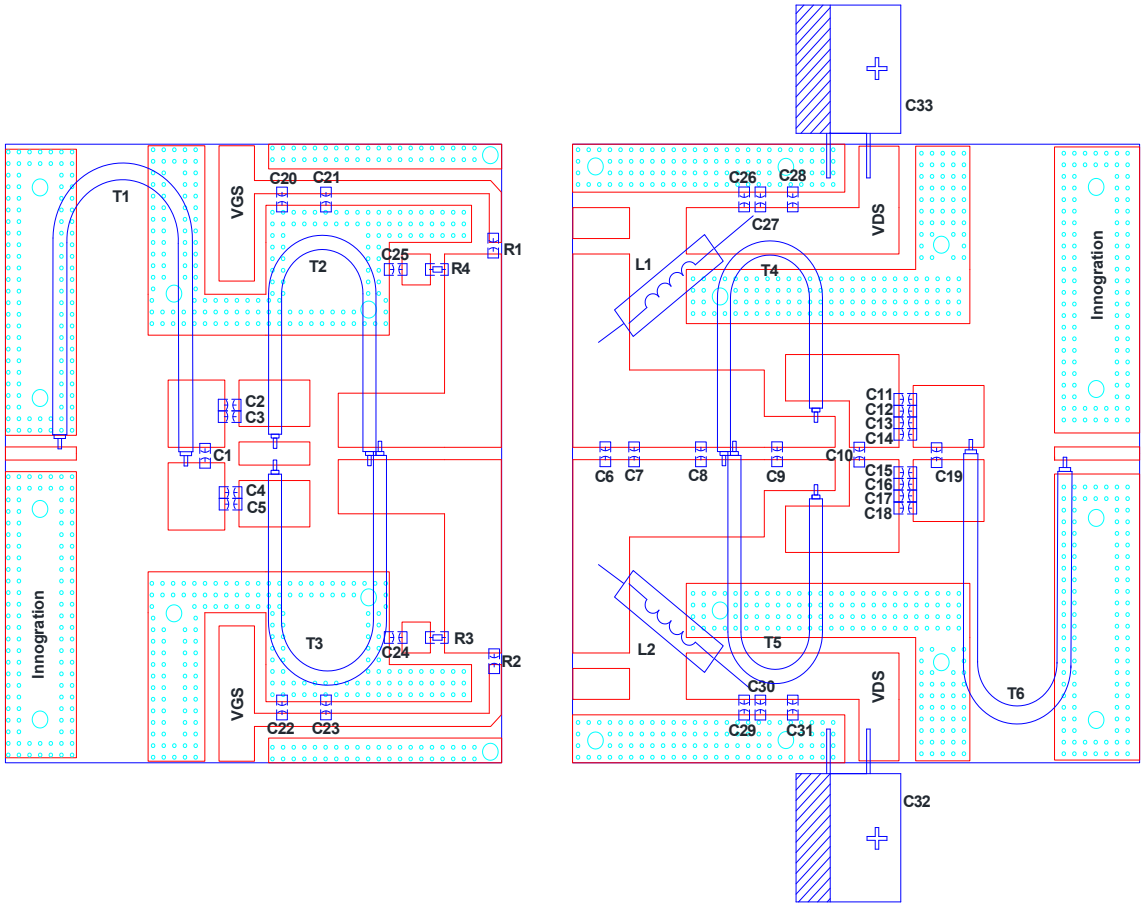
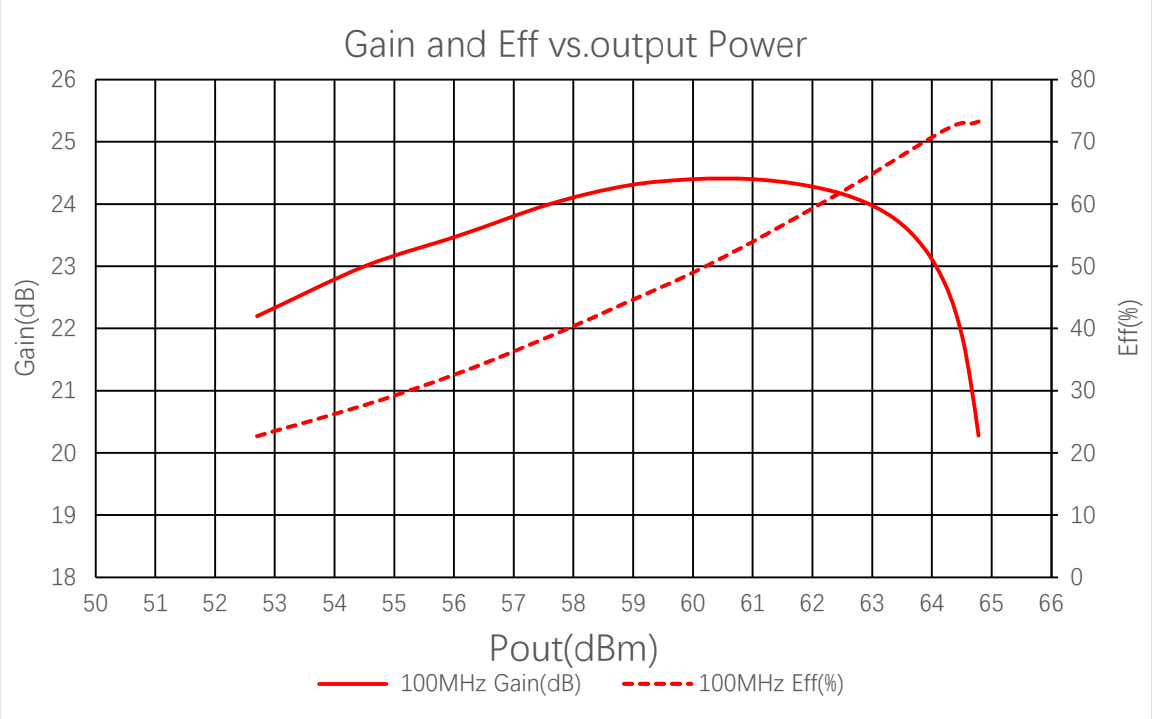


Table 5. Test Circuit Component Designations and Values

Component	Description	Suggestion
C1,C7	68pF	ATC800B
C2,C3,C4,C5,C11,C12,C13,C14,C15,C16, C17,C18,C21,C23,C26,C27,C29,C30	1000pF	DLC70B
C6	20pF	DLC70B
C8,C9	24pF	DLC70B
C10,C19	3pF	DLC70B
C20,C22,C24,C25,C28,C31	10uF	10uF/100V
C32,C33	4700uF/63V	4700uF/63V
R1,R2	Chip Resistor,200ohm	1206
R3,R4	Chip Resistor,10ohm	1206
T1	50ohm,Line length=135mm	SF-086-50
T2,T3	25ohm,Line length=135mm	SF-086-25
T4,T5	12.5ohm,Line length=135mm	SFF-12.5-3
T6	17ohm,Line length=170mm	SFF-17-1.5
L1,L2	6 turns, Inside diameter 5mm	

TYPICAL CHARACTERISTICS

Figure 1: Pulsed CW Gain and Power Efficiency as a Function of Pout @100MHz at 55V



Reference Circuit of Test Fixture (13.56MHz Power Amplifier)

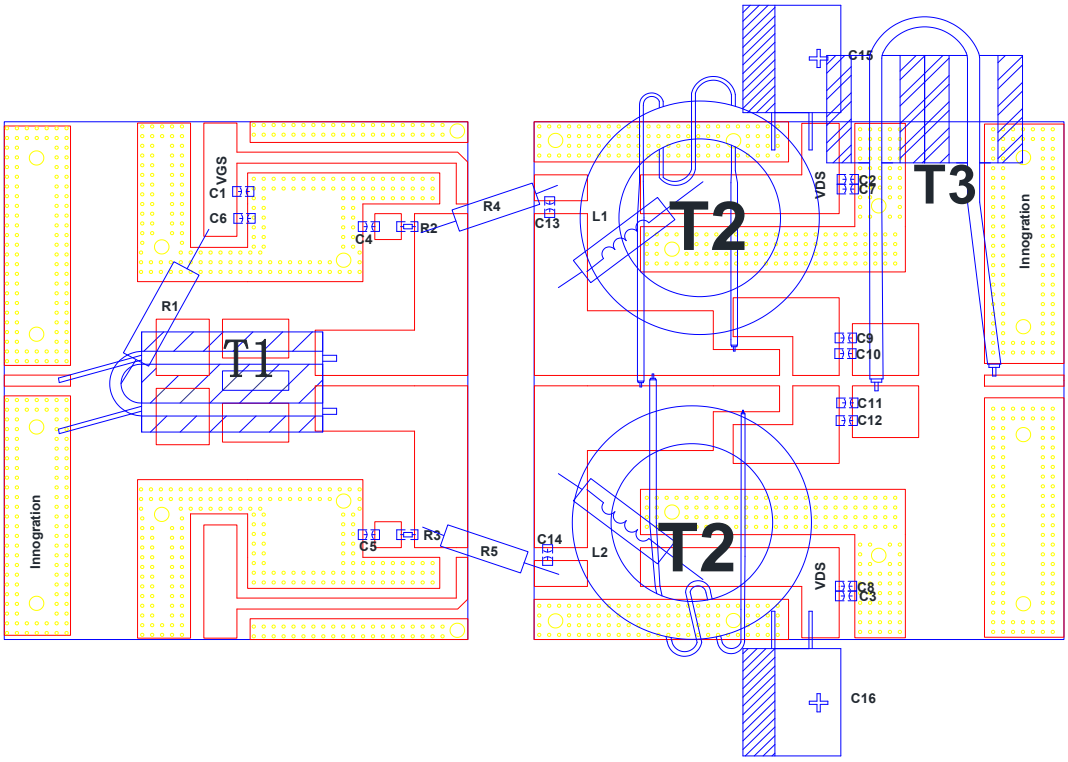
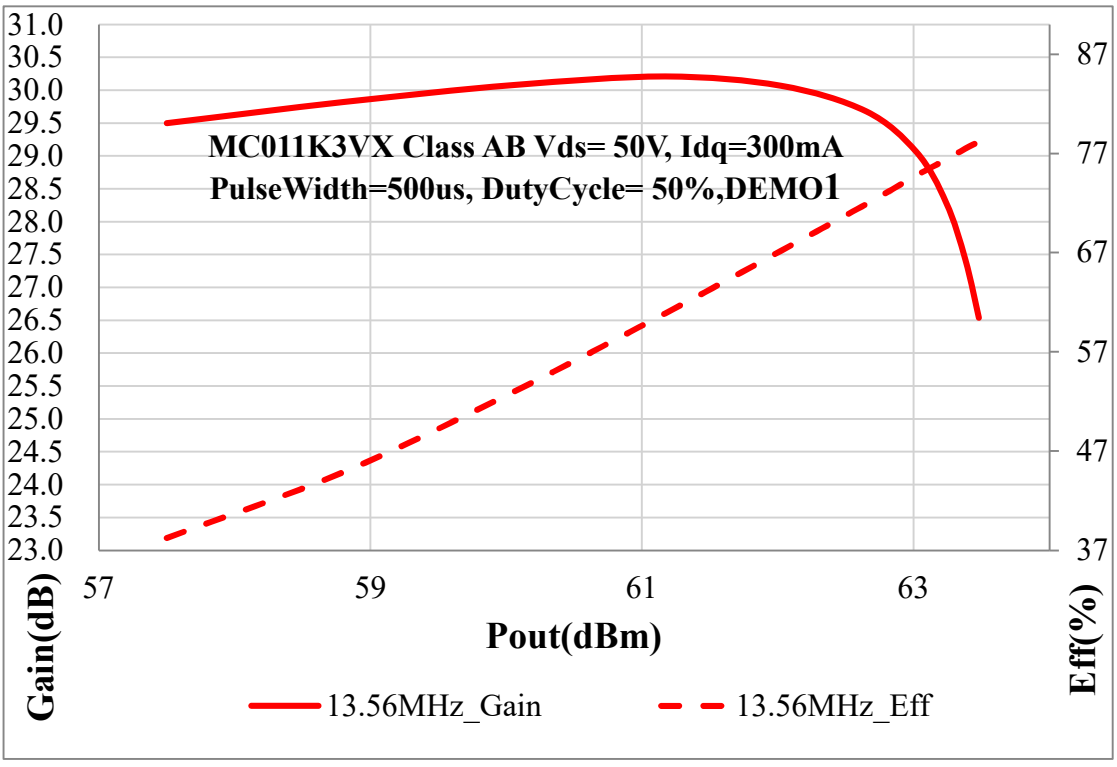


Table 6. Test Circuit Component Designations and Values

Part	description	Model
C1,C2,C3,C4,C5	10uF/100V	Ceramic multilayer capacitor
C6~C14	10nF	Ceramic multilayer capacitor
C15,C16	4700uF	63V/4700uF
R1	360 Ω	Plug-in electric resistance
R2,R3	220 Ω *4	Chip Resistor
R4,R5	186 Ω	
T1	4:1	BN-43-3312
T2	12.5ohm/450mm	FT-50-43
T3	12.5ohm/300mm	RF-800-1708
L1，L2	35turns,D=5mm d=1.5mm	DIY air core inductance
PCB	0.762mm [0.030"] thick, εr=3.50, Rogers 4350B, 1 oz. copper	

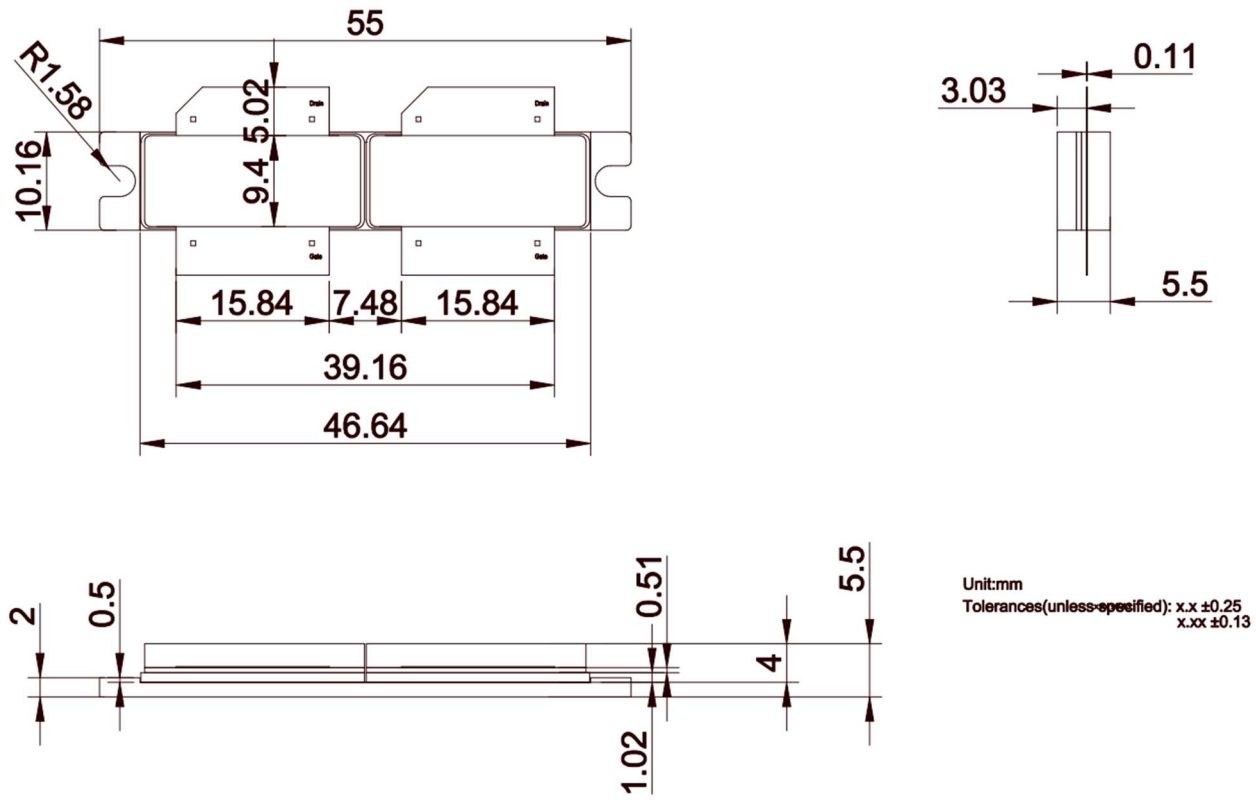
TYPICAL CHARACTERISTICS

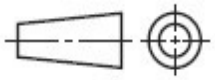
Figure 2: Pulsed CW Gain and Power Efficiency as a Function of Pout @13.56MHz at 50V



Package Outline

Flanged ceramic package;



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-O4E					11/21/2023

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2023/11/24	Rev 1.0	Preliminary datasheet creation

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