

## 2500W, 50V High Power RF LDMOS Paired FETs

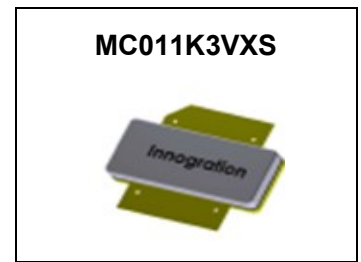
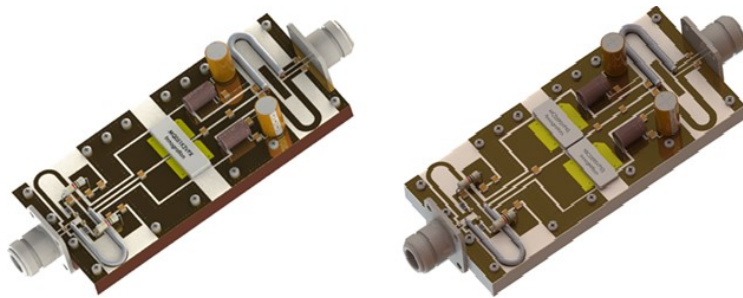
### Description

The MC011K3VXS itself is a 1300watt capable, high performance, unmatched single ended and earless LDMOS FET.

**It is recommended to use paired MC011K3VXS to enable industry leading RF power up to 2500W at 50V, for ISM applications within frequencies HF to 150MHz.**

Compared to equivalent dual-path packaged device, it offers better thermal management and easier maintenance, while maintaining the same size.

Demonstration of paired MC011K3VXS(right) Vs single dual-path device(left) mounted on the same design as below



- Typical performance(on 100MHz narrow band application board with **2\*MC011K3VXS** devices soldered)

$V_{DS}=50V, I_{DQ}=200mA$ , Pulsed CW, 10% duty cycle, 100us pulse width

Vds	Pin(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)
46	43.53	2152.8	6.4	19.8	76
50	44.5	2570.4	7.03	19.6	76
55	44.5	3006.1	7.76	20.28	73

- Typical performance(on 13.56MHz narrow band application board with **2\*MC011K3VXS** 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	1222	20.9	24	81
40	37	1493	23.1	24.8	80
45	37	1905	25.8	25.8	82
50	37	2229	28.5	26.5	78

### 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

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**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain--Source Voltage	$V_{DS}$	+140	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
Transient thermal impedance from junction to case $T_j = 85^\circ\text{C}$ ; $t_p = 100\ \mu\text{s}$ ; 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** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**DC Characteristics (per half section)**

Drain-Source Voltage $V_{GS}=0, I_{DS}=1.0\text{mA}$	$V_{(BR)DSS}$		140		V
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$ )	$I_{DSS}$	---	---	1	$\mu\text{A}$
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 50\text{V}, V_{GS} = 0\text{V}$ )	$I_{DSS}$	---	---	1	$\mu\text{A}$
Gate--Source Leakage Current ( $V_{GS} = 10\text{V}, V_{DS} = 0\text{V}$ )	$I_{GSS}$	---	---	1	$\mu\text{A}$
Gate Threshold Voltage ( $V_{DS} = 50\text{V}, I_D = 600\ \mu\text{A}$ )	$V_{GS(th)}$	---	2.0	---	V
Gate Quiescent Voltage ( $V_{DD} = 50\text{V}, I_D = 300\text{mA}$ , Measured in Functional Test)	$V_{GS(Q)}$	---	3.06	---	V

**Load Mismatch (In Innogration Test Fixture, 50 ohm system):**  $V_{DD} = 50\text{Vdc}$ ,  $I_{DQ} = 300\text{mA}$ ,  $f = 100\text{MHz}$ , pulse width:100us, duty

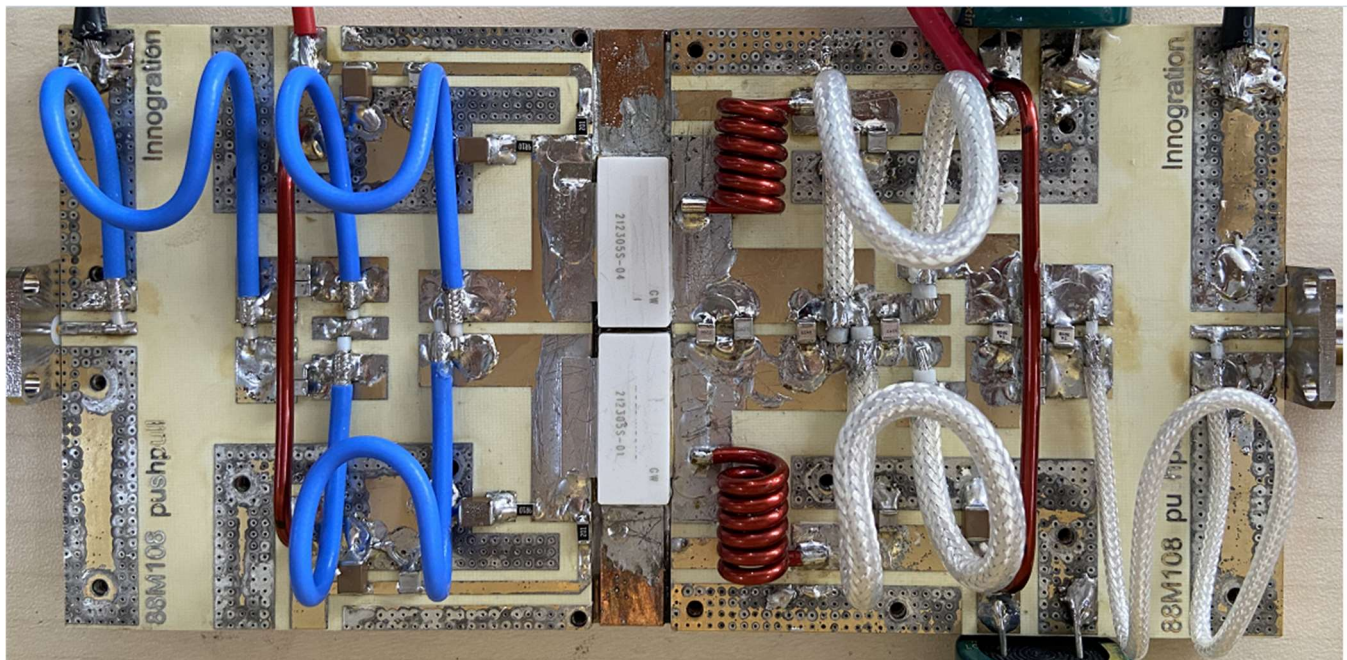
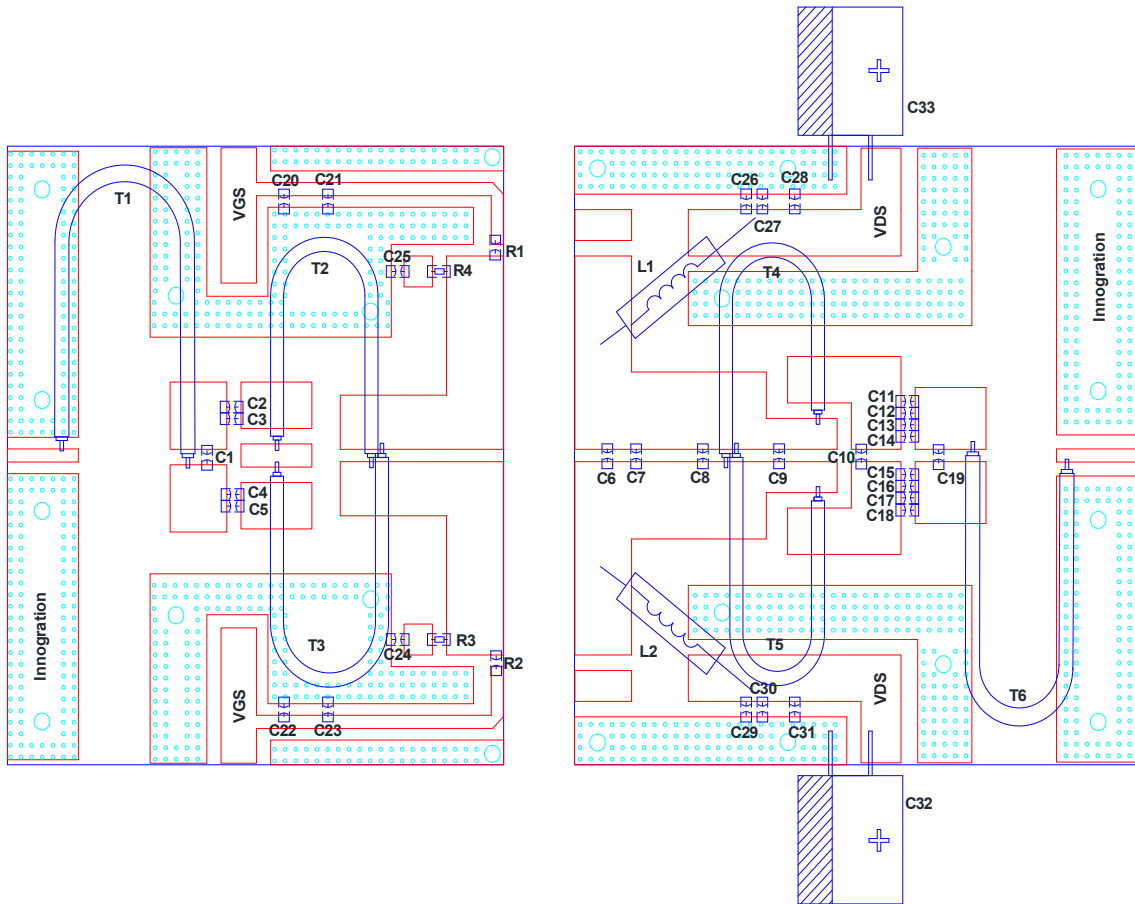
cycle:10%, 2 piece of MC011K3VXS combined

Open and short, at 2500W Pulsed CW Output Power	No Device Degradation
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## Reference Circuit of Test Fixture (100MHz Power Amplifier)

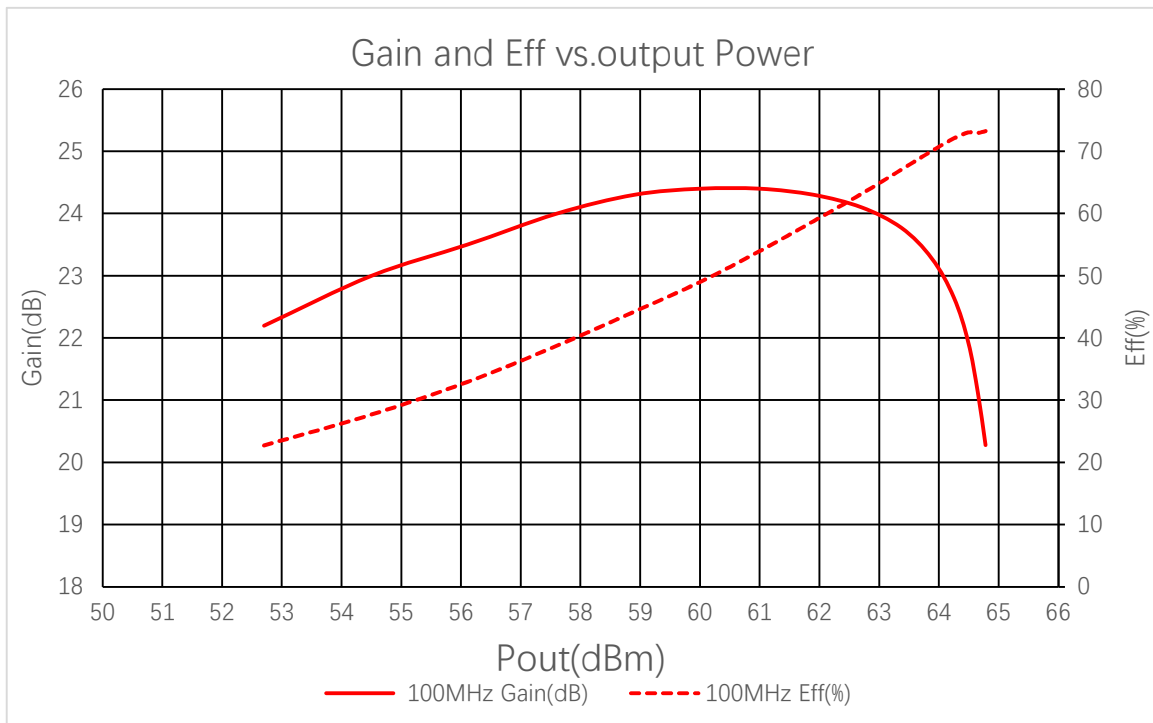


**Table 5. Test Circuit Component Designations and Values**

Component	Description	Suggested Manufacturer
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	

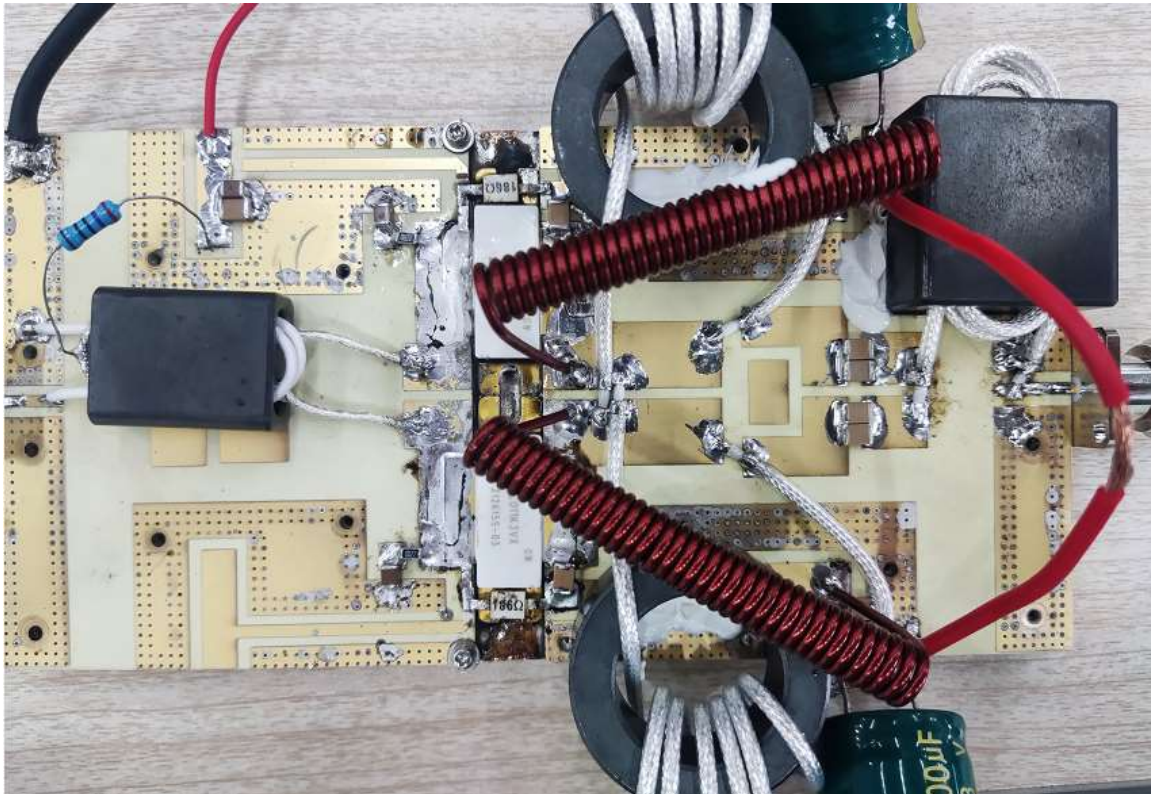
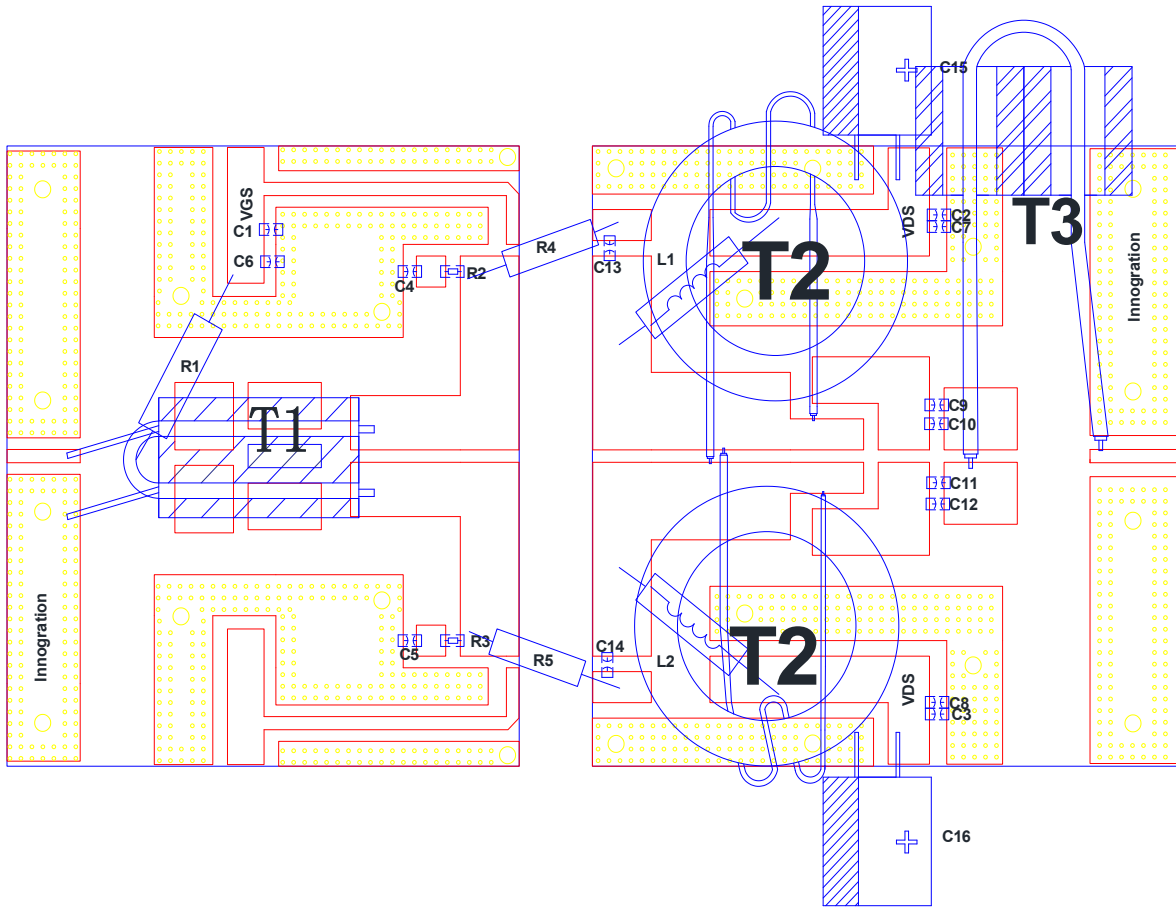
## TYPICAL CHARACTERISTICS

**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)

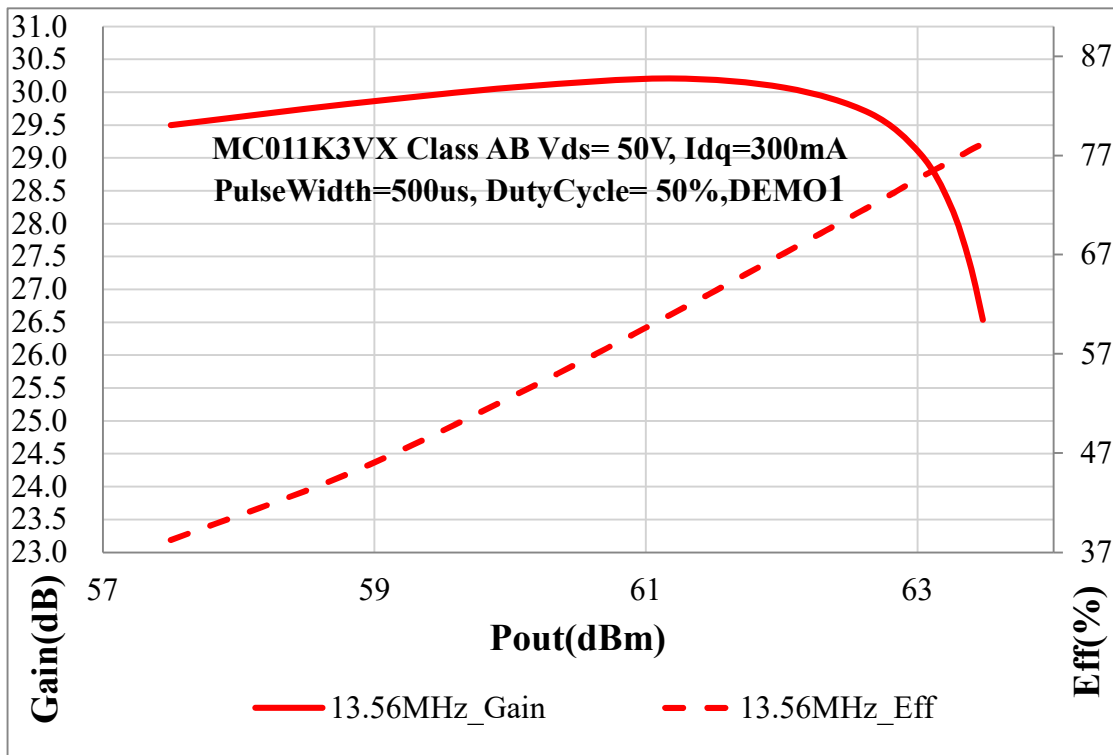


**Table 6. Test Circuit Component Designations and Values**

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 并联	Chip Resistor
R4,R5	186 Ω 功率电阻	
T1	4:1	BN-43-3312
T2	12.5ohm/450mm	FT-50-43
T3	12.5ohm/300mm	RF-800-1708
L1, L2	35turns,绕径 5mm 线径 1.5mm	DIY air core inductance
PCB	0.762mm [0.030"] thick, εr=3.50, Rogers 4350B, 1 oz. copper	

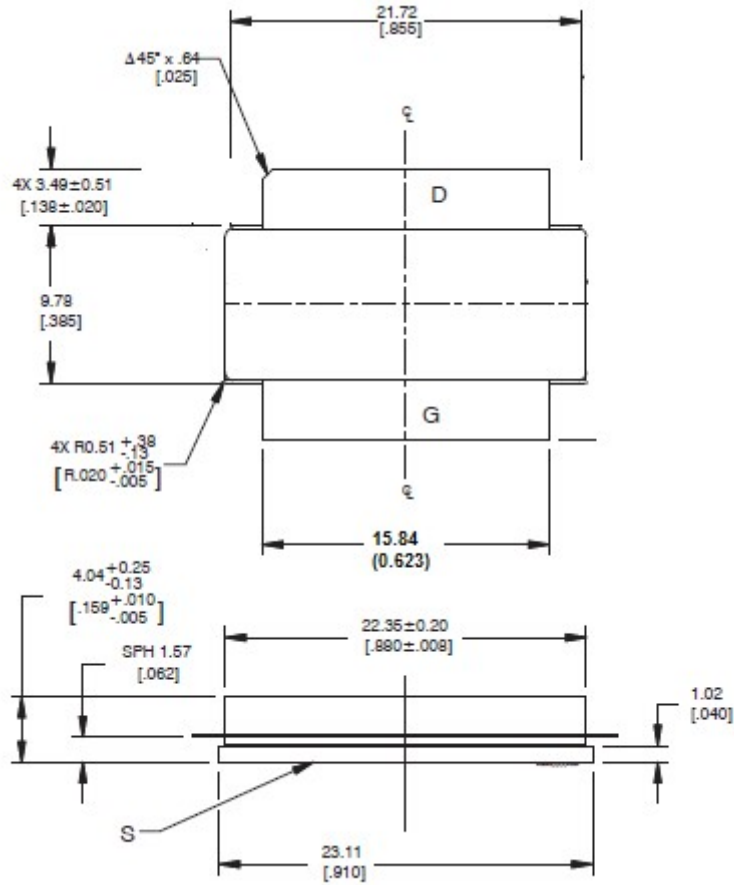
## TYPICAL CHARACTERISTICS

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



## Package Outline

Flangeless ceramic package;



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-C2					09/27/2018

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## Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2021/6/25	Rev 1.0	Advanced datasheet
2022/4/12	Rev 1.1	Preliminary datasheet according to 13.56MHz data added
		Modify some words on 1 <sup>st</sup> page

Application data based on ZL-21-16/HL-22-18

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