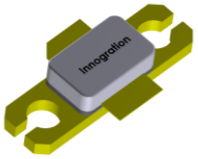
MU1020V LDMOS TRANSISTOR

Document Number: MU1020V
Preliminary Datasheet V1.3

HF-1GHz, 200W, 50V RF LDMOS FETs

MU1020V



Description

The MU1020V is a 200-watt, highly rugged, unmatched LDMOS FET, designed for wide-band commercial and industrial applications at frequencies HF to 1GHz.

It is recommended to use it under pulsed CW condition.

•Typical narrow band Performance (On Innogration narrow band fixture with device soldered):

Pulsed CW, 1ms/50%, VDS=48V, VGS=3.3V, Idq=200mA

Freq(MHz)	Pin(dBm)	Pout(dBm)	Gain(dB)	EFF(%)
410-600	36.3	53.1-54	16.8-18.8	>57.5%

•Typical broad band Performance on **VLMS layout(**On Innogration narrow band fixture with device soldered):

Pulsed CW, 100us/10%, VDS=50V, VGS=3.3V, Idq=200mA

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)	2^{nd}	3^{rd}
150	39.75	53.83	241	1.44	14.08	40.00	-32.0	-10.5
200	39.28	55.52	354	1.5	16.44	57.42	-19.9	-14.5
250	39.59	55.51	355	1.24	15.92	68.39	-15.3	-10.8
300	39.6	55.04	319	1.55	15.44	47.28	-15.3	-16.4
350	39.32	54.51	282	1.62	15.19	40.79	-14.4	-16.4
400	39.73	54.37	273	1.42	14.64	44.84	-11.2	-13.8
450	39.34	54.88	307	1.3	15.54	55.93	-26.0	-24.0
500	39.25	55.17	328	1.53	15.92	49.45	-39.0	-24.0
550	38.97	54.78	300	1.72	15.81	40.55	-27.0	-43.0
600	40.28	54.98	314	1.74	14.7	40.88	-50.0	-51.0
650	39.9	55.38	345	1.52	15.48	52.29	-22.0	-40.0
700	40.3	54.43	277	1.15	14.13	58.39	-26.0	-40.0

When using at 28V, it can deliver >100W CW from 150-650MHz

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

- 2-30MHz (HF or Short wave communication)
- 30-88MHz (Ground communication)
- 54-88MHz (TV VHF I)
- 88-108MHz (FM)
- 118 -140MHz (Avionics)
- 136-174MHz (Commercial ground communication)
- 160-230MHz (TV VHF III)
- 30-512MHz (Jammer, Ground/Air communication)
- 470-860MHz (TV UHF)
- 100kHz - 1000MHz (ISM, instrumentation)

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	120	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 T_C= 85°C, T_J=200°C, DC test	$R_{\theta JC}$	0.58	°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}=1.0mA	$V_{(BR)DSS}$		122		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)	$V_{GS}(th)$	——	2.73	——	V
Gate Quiescent Voltage (V_{DD} = 50 V, I_D = 200 mA, Measured in Functional Test)	$V_{GS(Q)}$	——	3.3	——	V
Common Source Input Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz)	C_{ISS}		150		pF
Common Source Output Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz)	C_{OSS}		56		pF
Common Source Feedback Capacitance (V_{GS} = 0V, V_{DS} =50 V, f = 1 MHz)	C_{RSS}		1.6		pF

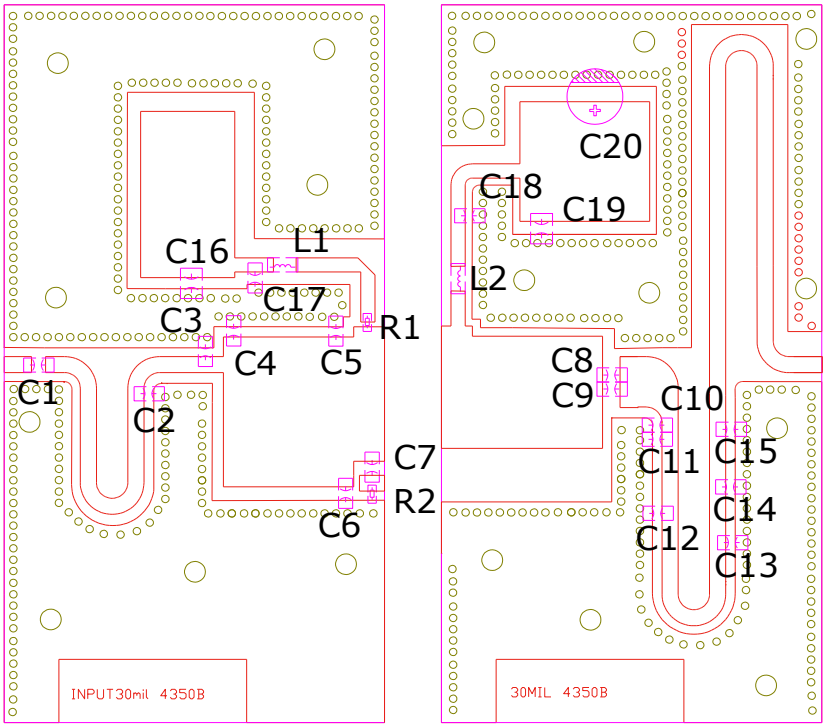
Functional Tests (In Demo Test Fixture, 50 ohm system) V_{DD} = 48 Vdc, I_{DQ} = 100mA, f = 600 MHz, CW Signal Measurements, Pin=36dBm

Power Gain@Pout	Gp	——	17	——	dB
Output Power	Pout	30	200		W
Drain Efficiency@Pout	η_D	——	60	——	%
Input Return Loss	IRL	——	-7	——	dB

400-600M

Reference Circuit of Test Fixture Assembly Diagram

Class AB (Layout file upon request,)



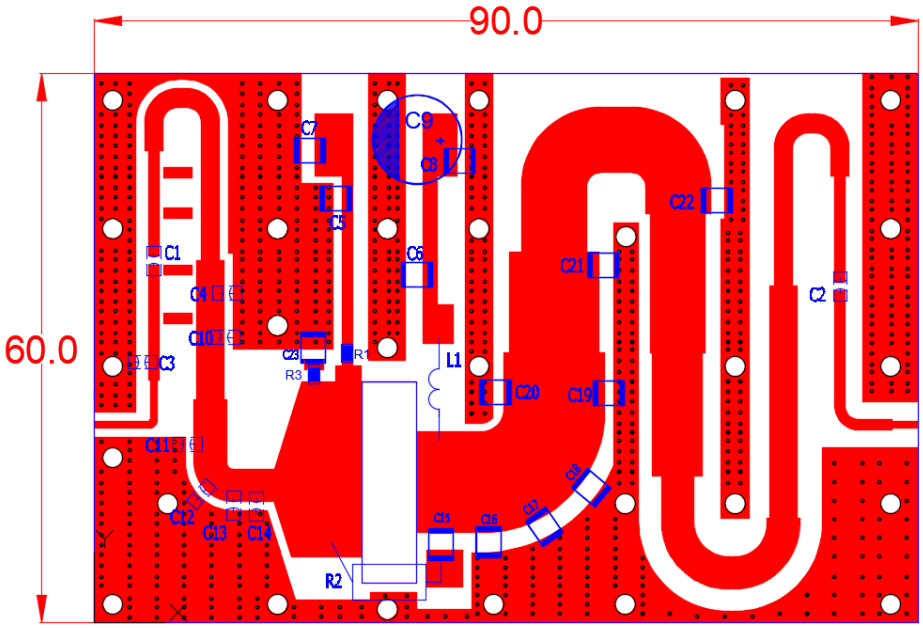
Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C1	100pF	ATC600F
C2,	15pF	ATC800B
C3	6.8pF	ATC800B
C4	20pF	ATC800B
C5, C6, C10	24pF	ATC800B
C8, C9, C17, C18	56pF	ATC600F
C11	8.2pF	ATC800B
C12	18pF	ATC800B
C13, C14	4.7pF	ATC800B
C15	3.3pF	ATC800B
C7, C16, C19	10uF 100V	Ceramic multilayer capacitor
C20	470uF,63V	Electrolytic Capacitor
R1, R2	9.1Ω， 1206	Chip Resistor
L1, L2	10nH	DIY air core inductance
PCB	0.762mm [0.030"] thick, εr=3.50, Rogers 4350B, 1 oz. copper	

150-650M

Reference Circuit of Test Fixture Assembly Diagram

Class AB (Layout file upon request,)

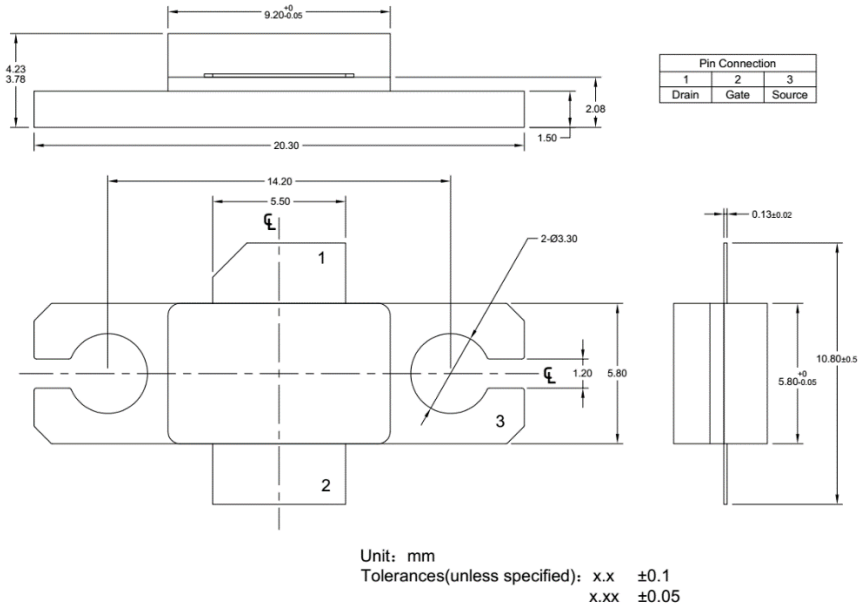


Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C1	200pF/MQ300805	
C2	100pF/ MQ301111	
C9	470uF	
C7,C8,C23	10uF	
C5, C6	10nF	
C15	470pF/ MQ301111	
C3，C11, C14	4.3pF/ MQ300805	
C4, C10	5.1pF/ MQ300805	
C12, C13	6.8pF/ MQ300805	
C16, C17, C18,	12pF/ MQ301111	
C19, C20	8.2pF/ MQ301111	
C21	5.6pF/ MQ301111	
C22	5.1pF/ MQ301111	
L1	1mm，5 turns, diameter :5mm	DIY air core inductance
R2	330,ohm	---
R3	51,ohm	
R1	10,ohm/1206	Chip Resistor
PCB	F4BTMS1000 ,r=10.2 ,30 mil	

Package Outline

Flanged ceramic package; 2 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-GXB					10/10/2017

Figure 1. Package Outline PKG-G2E

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2021/6/11	V1.0	Preliminary Datasheet Creation
2024/9/26	V1.1	G2E package drawing finalized
2025/5/1	V1.2	Change the upper limits to 1GHz, and preferred application from CW to pulsed CW
2026/8/25	V1.3	Add 150-650M no-Balun VLMS broadband application result

Application data based on TK-21-03

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