MK1520C LDMOS TRANSISTOR

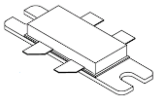
Document Number: MK1520C
Preliminary Datasheet V2.0

200W, 28V High Power RF LDMOS FETs

Description

The MK1520C is a 200-watt high performance, unmatched LDMOS FET, designed for wide-band commercial and industrial applications with frequencies HF to 1.5 GHz.

MK1520C



- **Typical performance(on 108-512MHz wideband board with device soldered)**

Signal:CW ,Vgs=2.75V,Vds=28V, Idq=900mA

Freq(MHz)	Pin(dBm)	Pav(dBm)	Pav(W)	IDS(A)	Gain(dB)	Eff(%)
108	24.2	49	80	4.96	24.8	58%
150	25.1	49	80	5.22	23.9	55%
200	24.3	49	80	5.25	24.7	54%
250	24.8	49	80	5.01	24.2	57%
300	24.8	49	80	4.95	24.2	58%
350	25.2	49	80	5.28	23.8	54%
400	25.6	49	80	5.64	23.4	51%
450	24.4	49	80	5.37	24.6	53%
512	24.7	49	80	5.2	24.3	55%

Signal：Two-tone space 1.6MHz Vgs=2.75V,Vds=28V, Idq=900mA

Freq(MHz)	Pin(dBm)	Pavg(dBm)	Imd3 @40WPavg	IDS(A)	Gain(dB)	Eff(%)
108	21.3	46	-29	3.27	24.7	43%
150	22.3	46	-30	3.45	23.7	41%
200	21.4	46	-33	3.43	24.6	41%
250	21.8	46	-35	3.28	24.2	43%
300	21.9	46	-32	3.23	24.1	44%
350	22.2	46	-34	3.43	23.8	41%
400	22.8	46	-29	3.66	23.2	39%
450	21.4	46	-30	3.48	24.6	41%
512	21.4	46	-27	3.33	24.6	43%

- **Typical performance(on 30-512MHz wideband board with device soldered)**

Freq(MHz)	Pin(dBm)	P1dB(dBm)	P1dB(W)	IDS(A)	Gain(dB)	Eff(%)
30	29.2	52	158	8.83	22.8	64
100	30.6	52.2	166	10.16	21.6	58
200	29.9	51.6	145	10.45	21.7	49
300	32.1	52.4	174	10.95	20.3	57
400	30.3	52.5	178	11.34	22.2	56
512	30.8	53	200	11.96	22.2	60

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Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
30	31.3	52.55	180	9.39	21.25	68
100	34.7	53.5	224	11.95	18.8	67
200	35	53.3	214	13.65	18.3	56
300	36.2	53.9	245	13.67	17.7	64
400	32.4	52.9	195	12.26	20.5	57
512	32.8	53.5	224	13.22	20.7	60

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}	+65	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+32	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	RθJC	0.35	°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	$V_{(BR)DSS}$	65	70		V
Zero Gate Voltage Drain Leakage Current (V_{DS} = 28 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} = 28V, I_D = 600 μA)	$V_{GS}(th)$	——	1.98	——	V
Gate Quiescent Voltage (V_{DD} = 28 V, I_D = 220 mA, Measured in Functional Test)	$V_{GS(Q)}$	——	2.53	——	V
Drain source on state resistance (V_{DS} = 0.1V, V_{GS} = 10 V)	Rds(on)		100		mΩ
Common Source Input Capacitance (V_{GS} = 0V, V_{DS} =28 V, f = 1 MHz)	C_{ISS}		92		pF
Common Source Output Capacitance (V_{GS} = 0V, V_{DS} =28 V, f = 1 MHz)	C_{OSS}		39		pF
Common Source Feedback Capacitance (V_{GS} = 0V, V_{DS} =28 V, f = 1 MHz)	C_{RSS}		1.58		pF

Functional Tests (In Demo Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 220 mA, f = 1300 MHz, CW Signal Measurements.

Power Gain	Gp	——	18	——	dB
Drain Efficiency@P1dB	η_D	——	65	——	%
1 dB Compression Point	P_{-1dB}	——	200	——	W
Input Return Loss	IRL	——	-7	——	dB

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 28 Vdc, I_{DQ} = 220 mA, f = 1300 MHz

VSWR 10:1 at 200W CW Output Power	No Device Degradation

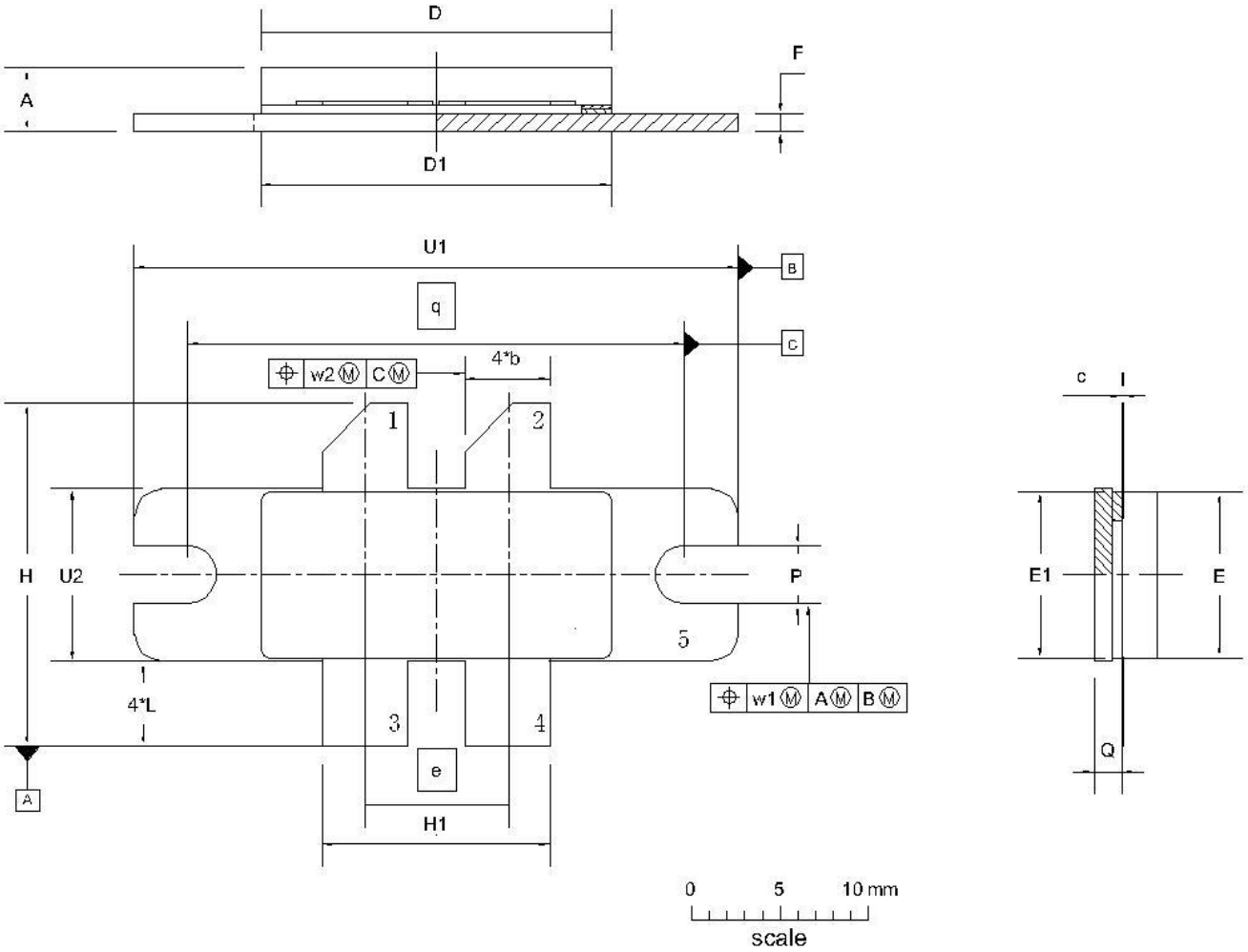
Figure 1: 30-512MHz wideband application circuit picture

Bill of Materials

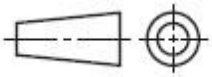
C1,C2	270PF	ATC800B
C3,C11, C13	470PF	ATC100B
C4,C12, C14	10UF	10UF/50V
C5	18PF	ATC800B
C11,C12	1000PF	ATC100B
C10	1.5PF	ATC100B
C6,C7, C8,C9	220PF	ATC100B
R1,R2	51Ω	
R3,R4	300Ω	
T1	50Ω,120mm	No 61*2
T2,T3	12Ω,70mm	No 61
T4,T5	12Ω,60mm	No 61
T6	50Ω,70mm	No 61
L1,L2	1.5 turn	No 61

Package Outline

Flanged ceramic package; 2 mounting holes; 4 leads



UNIT	A	b	c	D	D_1	e	E	E_1	F	H	H1	L	p	Q	q	U_1	U_2	W_1	W_2
mm	4.72 3.43	3.94 3.68	0.15 0.08	20.02 19.61	19.96 19.66	8.89	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	12.83 12.57	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.135	0.155 0.145	0.006 0.003	0.788 0.772	0.786 0.774	0.35	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.505 0.495	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B4E					03/12/2013

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2017/6/27	Rev 1.0	Preliminary Datasheet Creation
2017/8/2	Rev 2.0	Application data modified and CV data added

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