1. Description

The DMTH4004LK3-13(ES) is N-Channel enhancement MOS Field Effect Transistor. Using advanced shielded gate trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product DMTH4004LK3-13(ES) is Pb-free.

2. Features

- 40V, $R_{DS(ON)}$=2.1mΩ(Typ.) @V_{GS}=10V
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Reel	Flammability Rating	Reel Size
DMTH4004LK3-13(ES)	TO-252	GNQ04R027/ LOT	Halogen free	Tape & Reel	2,500 PCS	UL 94V-0	13 Inches

Table-1 Ordering information

5. Pin Configuration and Functions

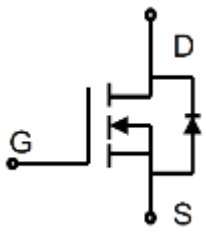
Pin	Function	Outline	Circuit Diagram
1	Gate	Note 1 	
3	Source		
2	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 ˚C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	140	A
	T_C=100°C		84	
Maximum Power Dissipation	T_C=25°C	P_D	96	W
Pulsed Drain Current		I_{DM}	560	A
Avalanche energy[2]		E_{AS}	225	mJ
Operating Junction Temperature		T_J	-55 to 150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.3	°C/W

Notes:

1. This diagram is only an electrical schematic, and the actual pin size is based on POD.
2. Starting TJ=25˚C, VDD=20V, VG=10V, L=0.5mH, RG=25Ω, IAS=30A.

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Electrical Characteristics

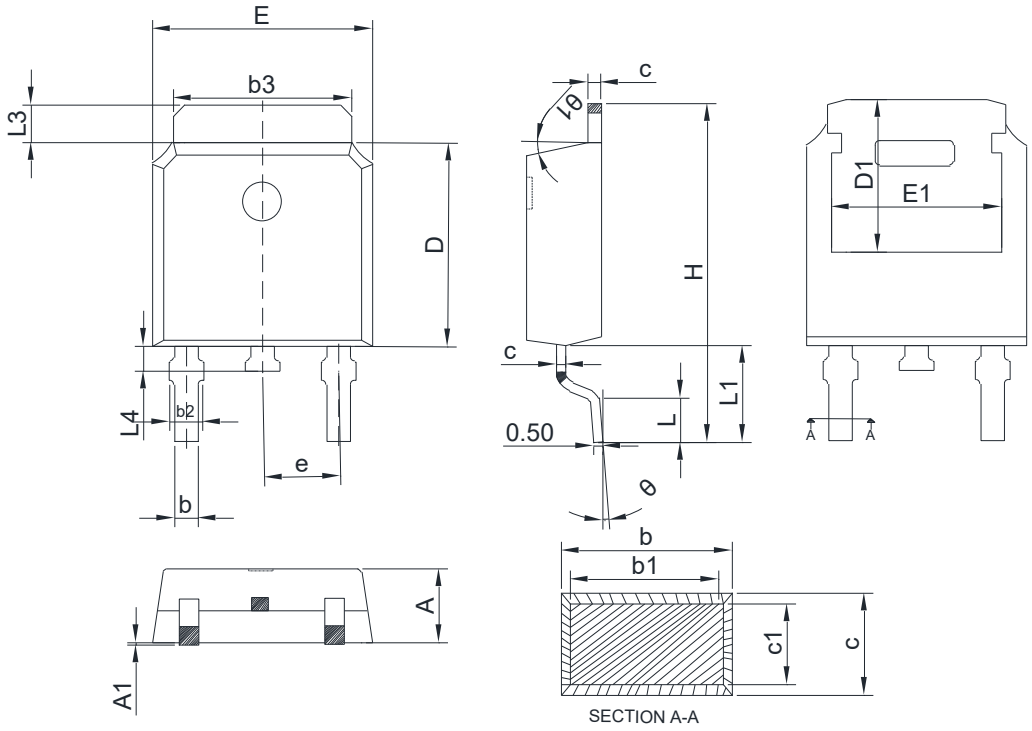
At TA = 25℃ unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V, V_{GS}=0V			1.0	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250uA	2.0	2.6	3.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=30A		2.1	2.7	mΩ
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS}=0V, f=1MHz, V_{DS}=20V		3543		pF
Output Capacitance	C_{OSS}			1447		
Reverse Transfer Capacitance	C_{RSS}			29		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=0 to 10V, V_{DS}=20V, I_D=30A		70		nC
Gate-to-Source Charge	Q_{GS}			10		
Gate-to-Drain Charge	Q_{GD}			9		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS}=10V, V_{DD}=20V, I_D=30A, R_G=3Ω		900		ns
Rise Time	t_r			20		
Turn-Off Delay Time	$t_{d(OFF)}$			72		
Fall Time	t_f			33		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS}=0V, I_S=30A			1.2	V

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7. Dimension (TO-252)

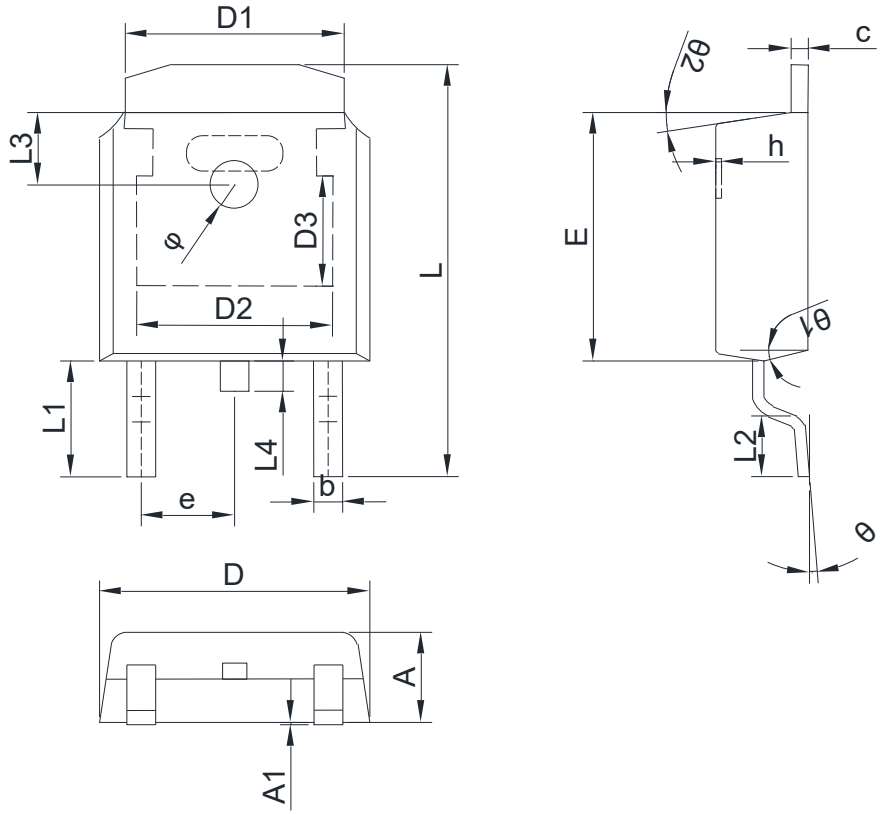
POD A(Q)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.20	2.30	2.40	D1	5.21	-	-
A1	0.00	-	0.12	E	6.50	6.60	6.70
b	0.65	-	0.89	E1	4.32	-	-
b1	0.64	0.76	0.79	H	9.70	9.95	10.20
b2	0.76	0.86	1.10	L	1.40	1.50	1.60
b3	5.20	5.33	5.46	L1	2.84REF		
c	0.48	-	0.60	e	2.29BSC		
c1	0.47	0.51	0.55	θ	0°	-	10°
D	6.00	6.10	6.20	θ1	0°	-	15°
L3	0.90	-	1.27	L4	0.60	0.80	1.00

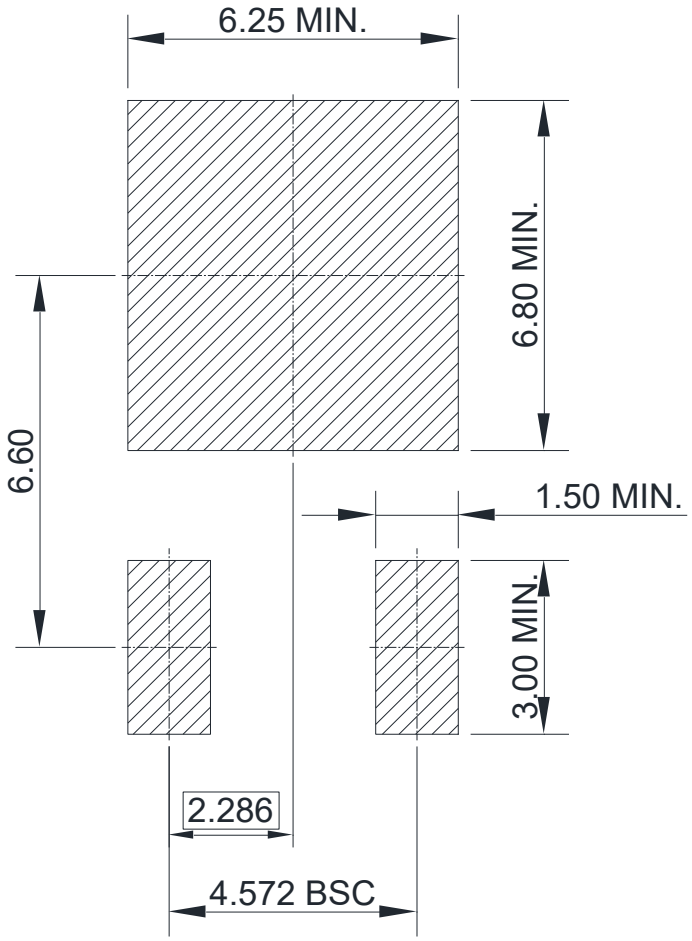
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POD B(X)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.200	2.300	2.400	h	0.000	0.100	0.200
A1	0.000		0.127	L	9.900	10.100	10.300
b	0.640	0.690	0.740	L1	2.888 REF		
c(电镀后)	0.460	0.520	0.580	L2	1.400	1.550	1.700
D	6.500	6.600	6.700	L3	1.600 REF		
D1	5.334 REF			L4	0.600	0.800	1.000
D2	4.826 REF			ϕ	1.100	1.200	1.300
D3	3.166 REF			θ	0°		8°
E	6.000	6.100	6.200	θ1	9° TYP		
e	2.286 TYP			θ2	9° TYP		

8. Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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