

P-Channel Enhancement Mode Power MOSFET

Description

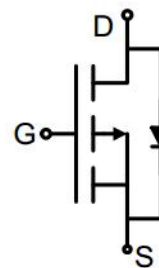
The G040P02K uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

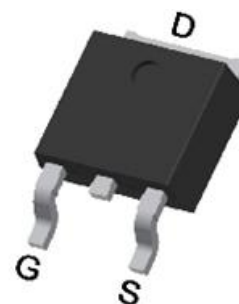
- V_{DS} -20V
- I_D (at $V_{GS} = -10V$) -90A
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 5m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -2.5V$) < 6m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-252

Ordering Information

Device	Package	Marking	Packaging
G040P02K	TO-252	G040P02	2500pcs/Reel

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Continuous Drain Current	I_D	-90	A
Pulsed Drain Current (note1)	I_{DM}	-360	A
Gate-Source Voltage	V_{GS}	± 12	V
Power Dissipation	P_D	125	W
Single pulse avalanche energy (note2)	E_{AS}	81	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	40	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	1	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-20	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -20V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±12V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-0.5	-0.65	-1.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -4.5V, I _D = -20A	--	3.4	5.0	mΩ
		V _{GS} = -2.5V, I _D = -20A	--	4.3	6.0	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -20A	--	120	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -10V, f = 1.0MHz	--	9245	--	pF
Output Capacitance	C _{oss}		--	1570	--	
Reverse Transfer Capacitance	C _{rss}		--	1183	--	
Total Gate Charge	Q _g	V _{DD} = -10V, I _D = -20A, V _{GS} = -10V	--	134	--	nC
Gate-Source Charge	Q _{gs}		--	32	--	
Gate-Drain Charge	Q _{gd}		--	15	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -10V, I _D = -20A, R _G = 6Ω	--	22	--	ns
Turn-on Rise Time	t _r		--	171	--	
Turn-off Delay Time	t _{d(off)}		--	91	--	
Turn-off Fall Time	t _f		--	23	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-90	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -20A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -20A, V _{GS} = 0V di/dt=-100A/us	--	56	--	nC
Reverse Recovery Time	T _{rr}		--	63	--	ns

Notes

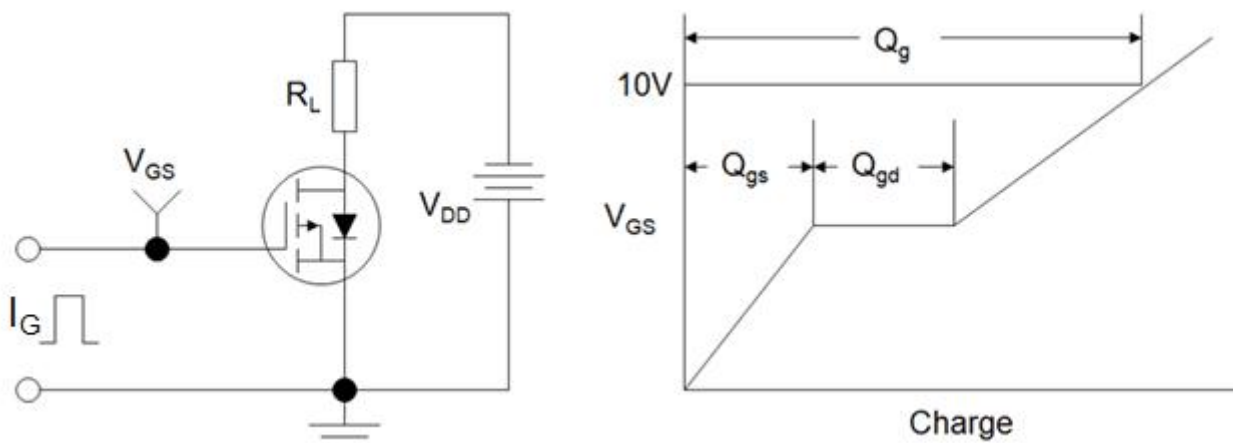
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^{\circ}\text{C}$, $V_{DD} = -20V$, $V_{GS} = -10V$, $L = 0.5mH$, $R_g = 25\Omega$

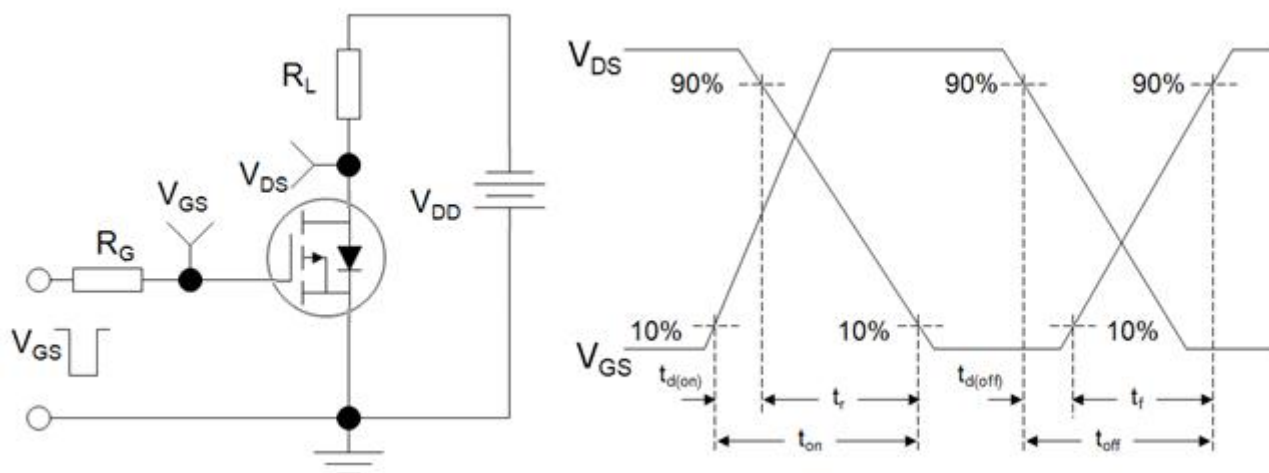
The table shows the minimum avalanche energy, which is 225mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

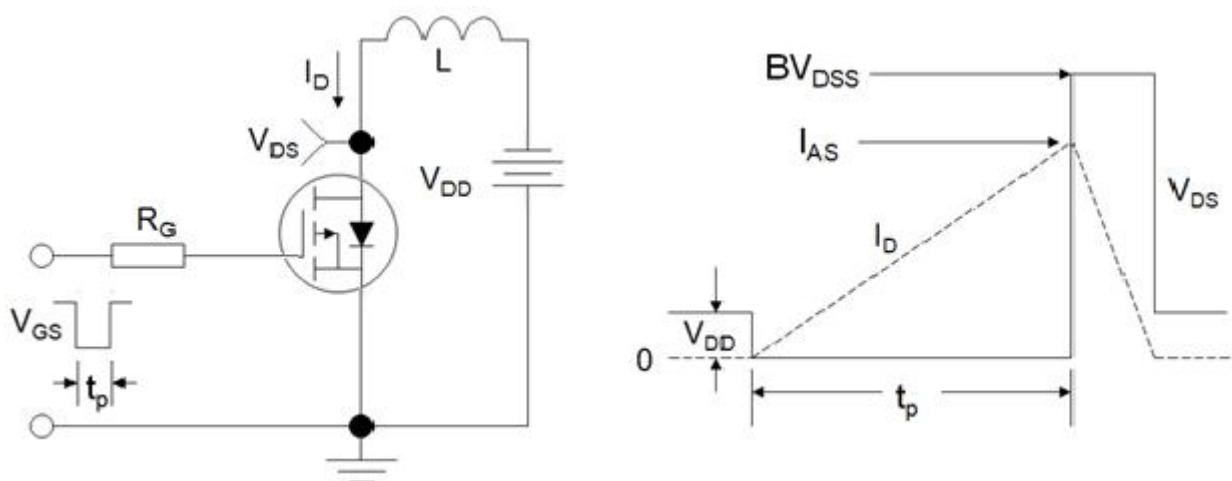
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

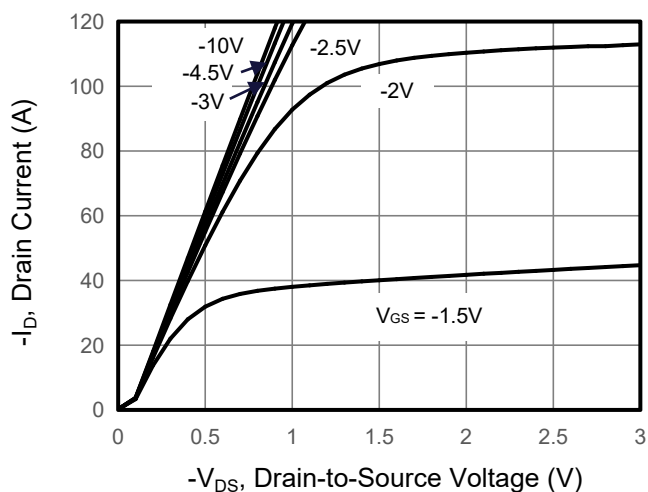


Figure 2. Transfer Characteristics

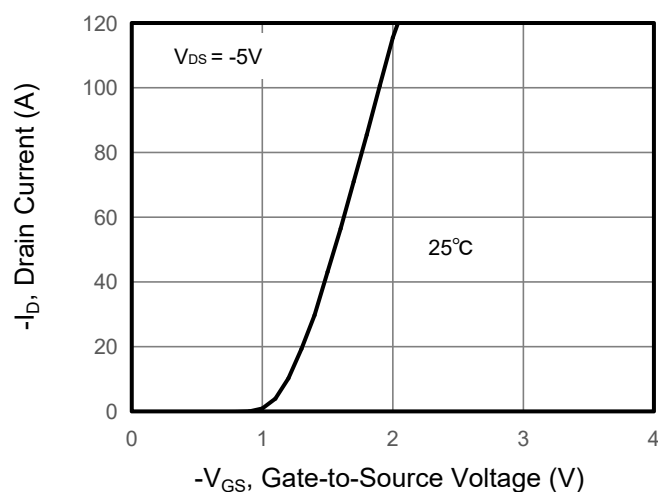


Figure 3. Drain Source On Resistance

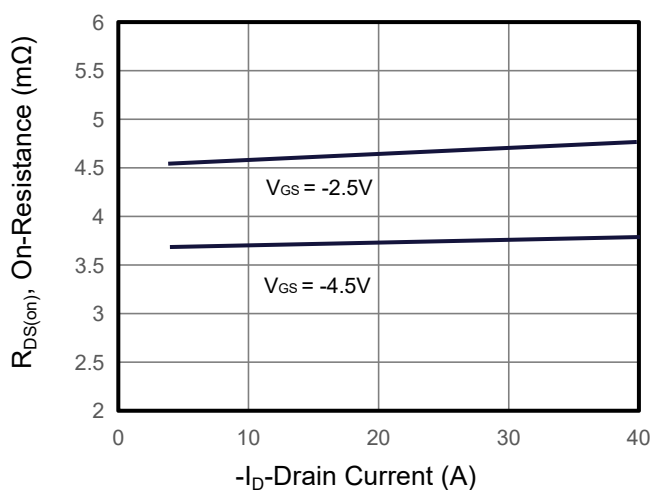


Figure 4. Gate Charge

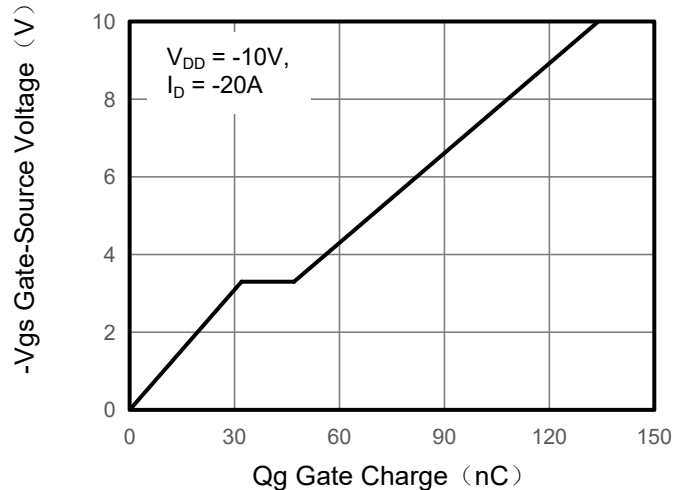


Figure 5. Capacitance

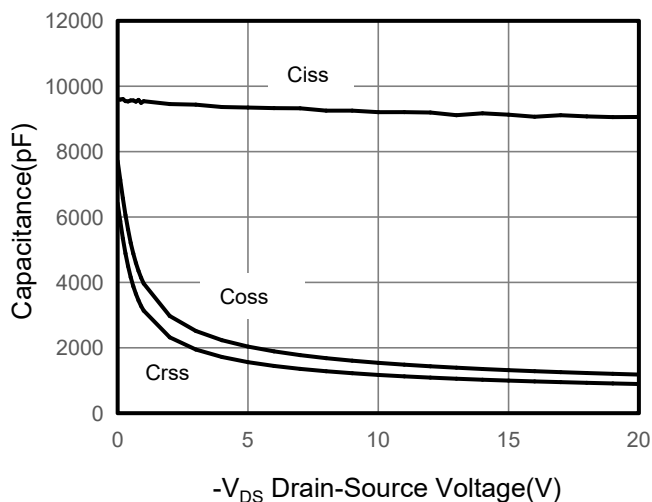
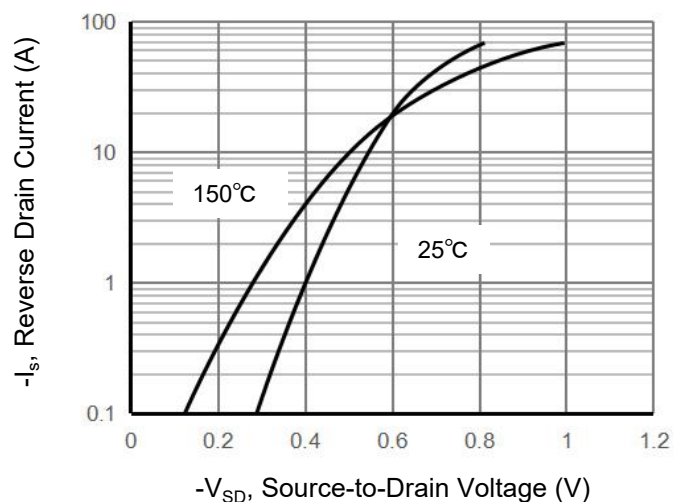


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

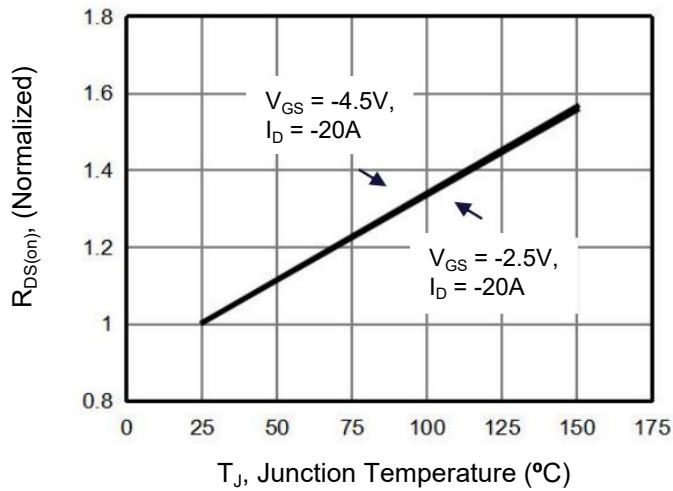


Figure 10. Safe Operation Area

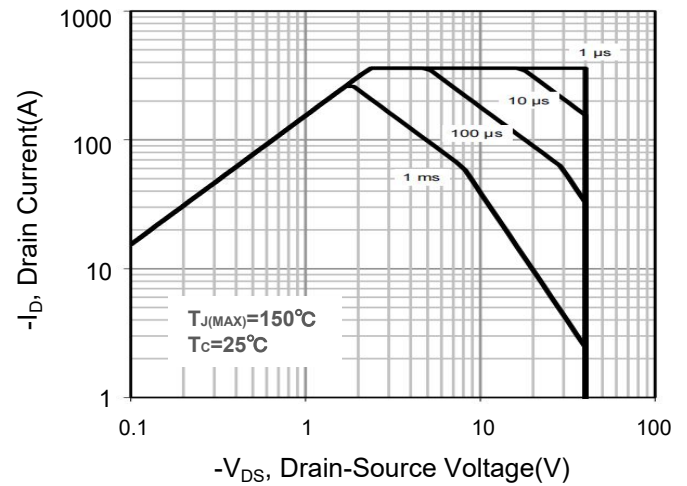
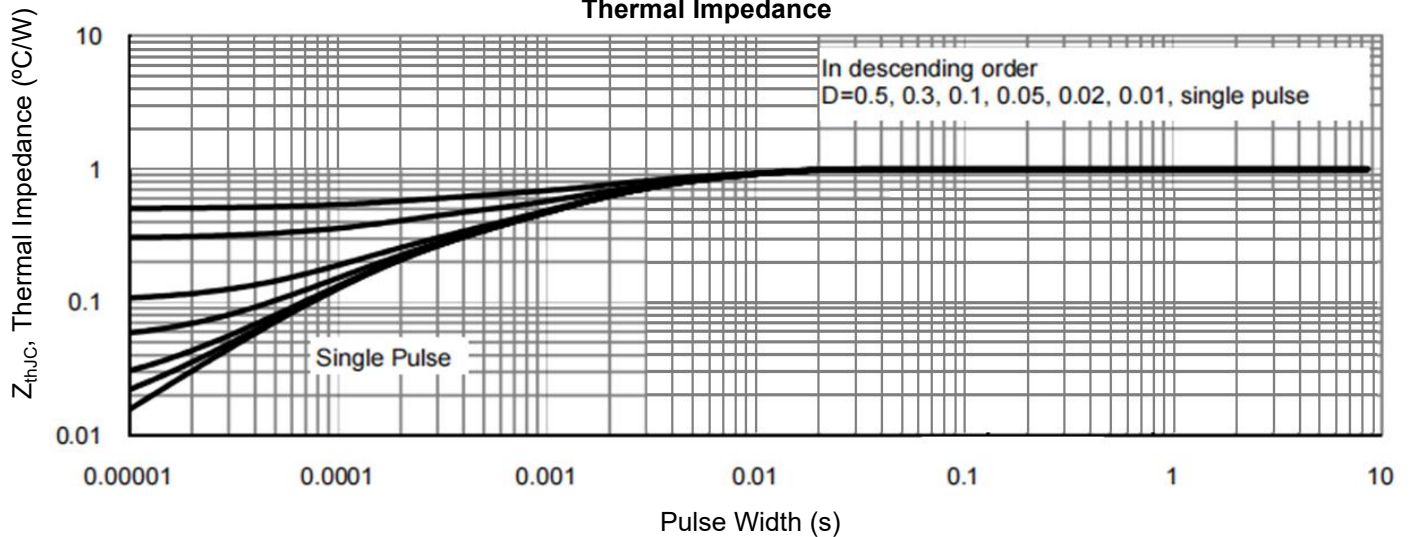
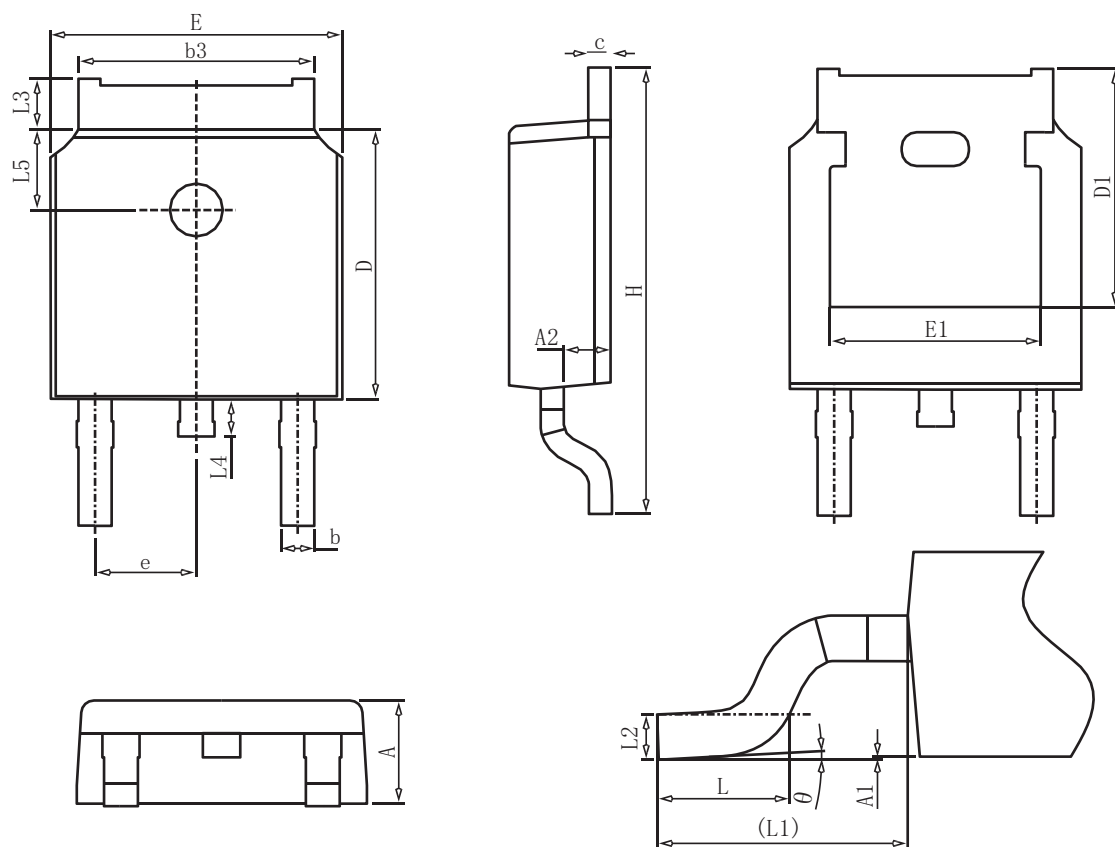


Figure 9. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°