

P-Channel Enhancement Mode Power MOSFET

Description

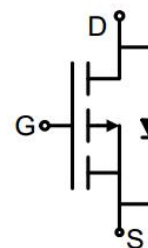
The G70P02K uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

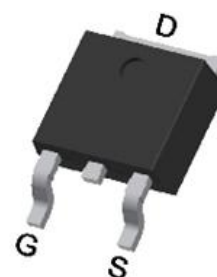
- V_{DS} -20V
- I_D (at $V_{GS} = -10V$) -45A
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 7.5m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -2.5V$) < 10m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-252

Ordering Information

Device	Package	Marking	Packaging
G70P02K	TO-252	G70P02	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	-45	A
		-29	
Pulsed Drain Current (note1)	I_{DM}	-180	A
Gate-Source Voltage	V_{GS}	± 12	V
Power Dissipation	P_D	63	W
Single pulse avalanche energy (note2)	E_{AS}	49	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}	60	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	2	$^\circ\text{C/W}$

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 = -15A	--	5.9	7.5	mΩ
		V _{GS} = -2.5V, I _D = -15A	--	7.6	10	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -15A	--	72	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -10V, f = 1.0MHz	--	4800	--	pF
Output Capacitance	C _{oss}		--	650	--	
Reverse Transfer Capacitance	C _{rss}		--	590	--	
Total Gate Charge	Q _g	V _{DD} = -10V, I _D = -15A, V _{GS} = -10V	--	111	--	nC
Gate-Source Charge	Q _{gs}		--	7	--	
Gate-Drain Charge	Q _{gd}		--	15	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -10V, I _D = -15A, R _G = 3Ω	--	18	--	ns
Turn-on Rise Time	t _r		--	32	--	
Turn-off Delay Time	t _{d(off)}		--	136	--	
Turn-off Fall Time	t _f		--	59	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-45	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -15A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -15A, V _{GS} = 0V di/dt=-500A/us	--	100	--	nC
Reverse Recovery Time	T _{rr}		--	33	--	ns

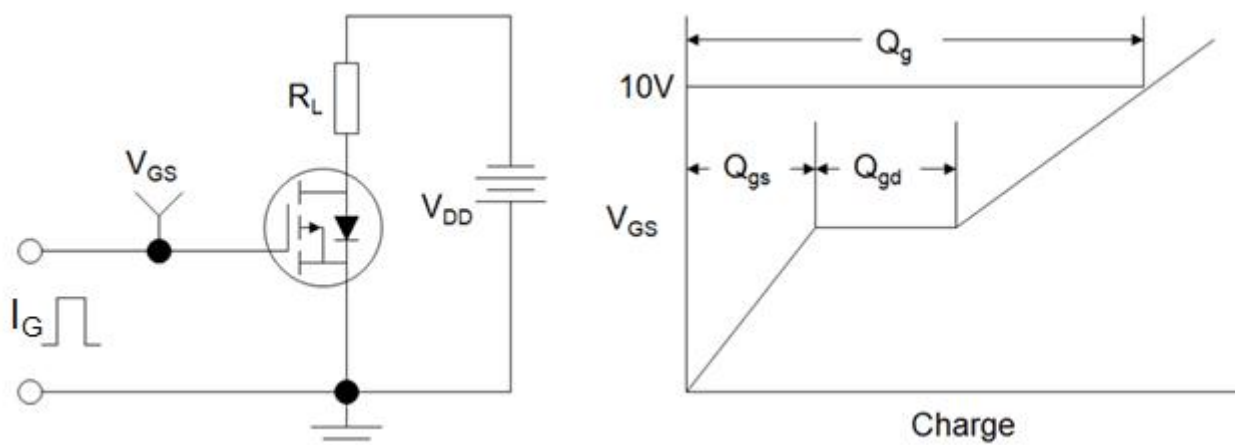
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^{\circ}\text{C}, V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$

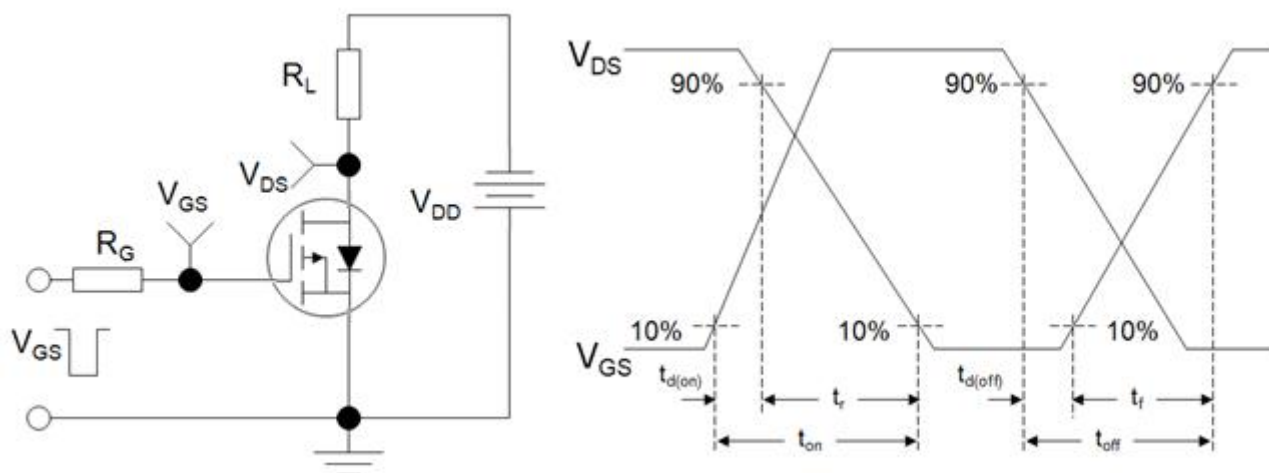
The table shows the minimum avalanche energy, which is 132mJ when the device is tested until failure

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

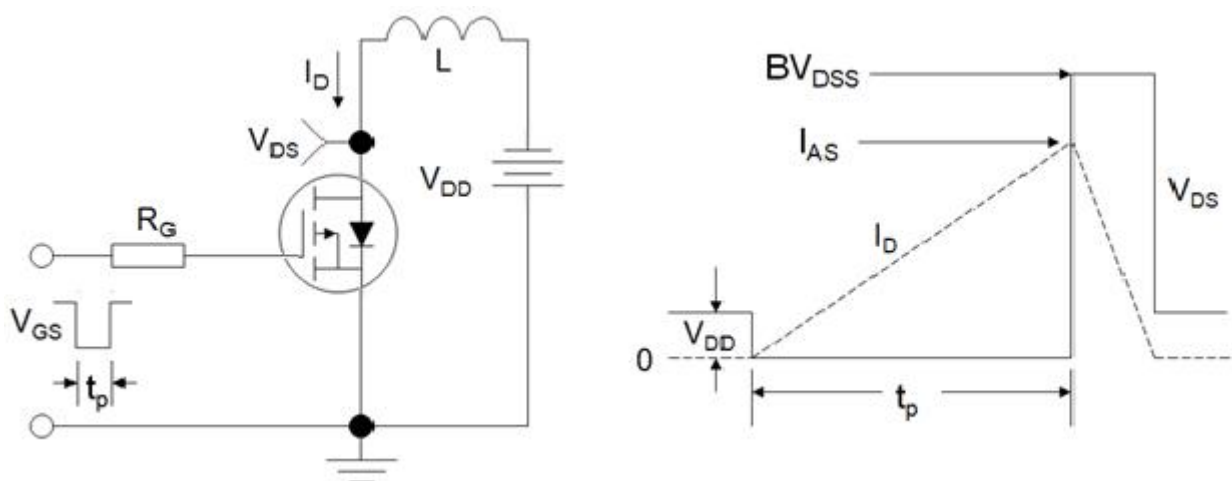
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

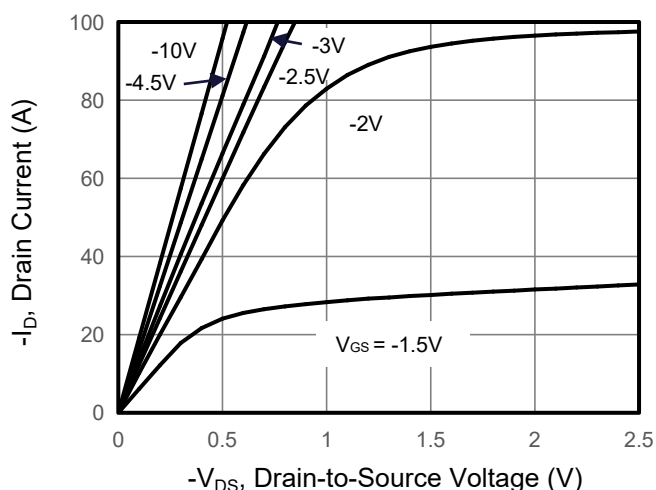


Figure 2. Transfer Characteristics

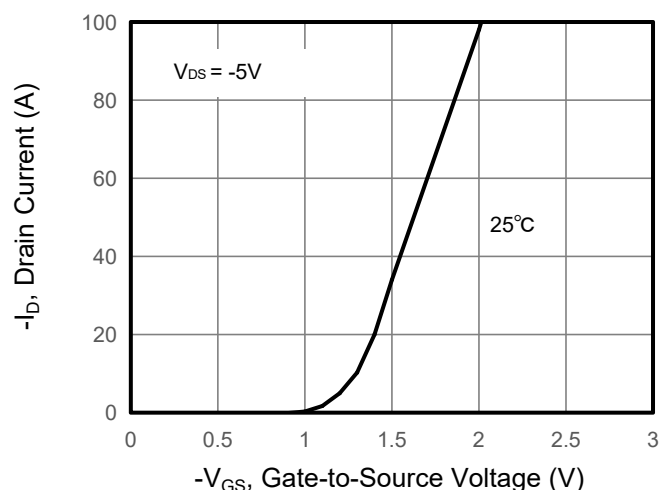


Figure 3. Drain Source On Resistance

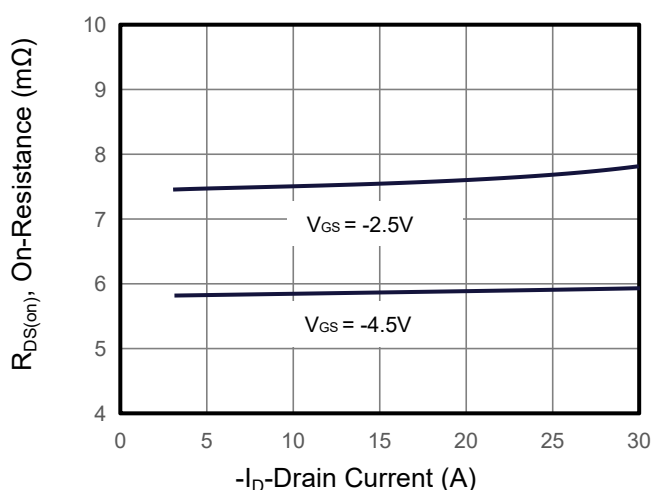


Figure 4. Gate Charge

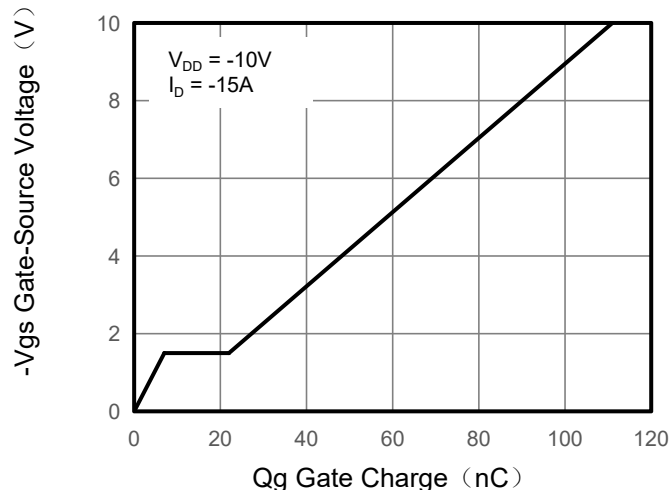


Figure 5. Capacitance

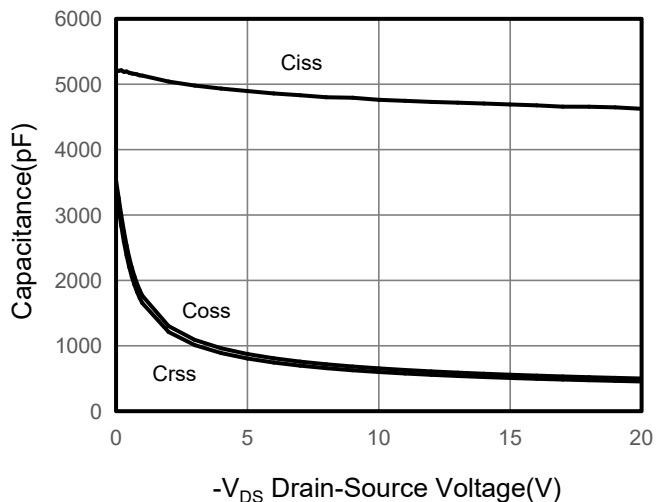
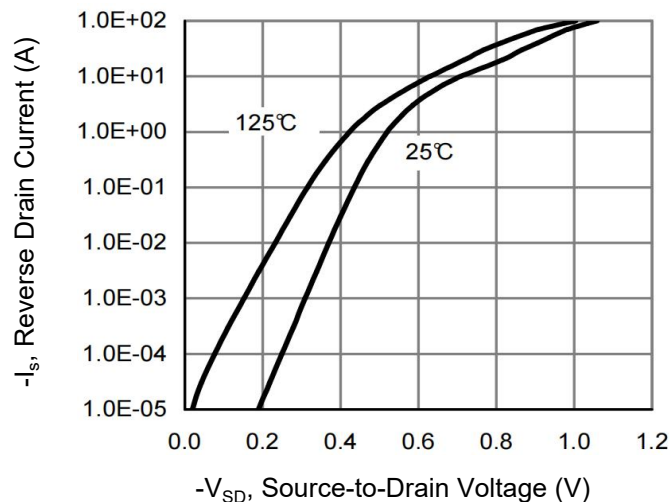


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

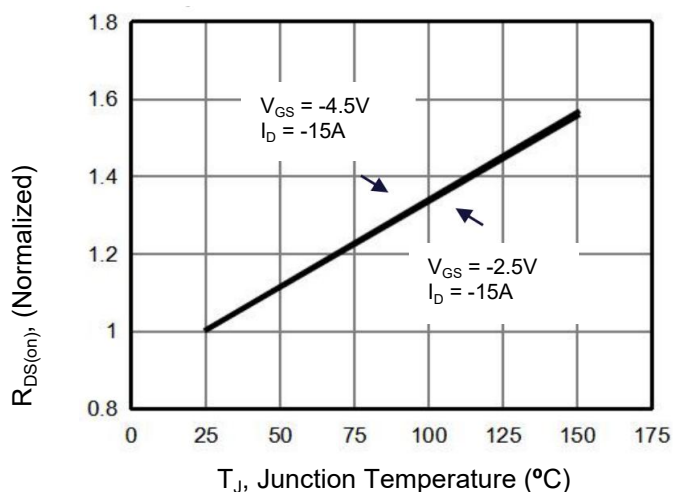


Figure 8. Safe Operation Area

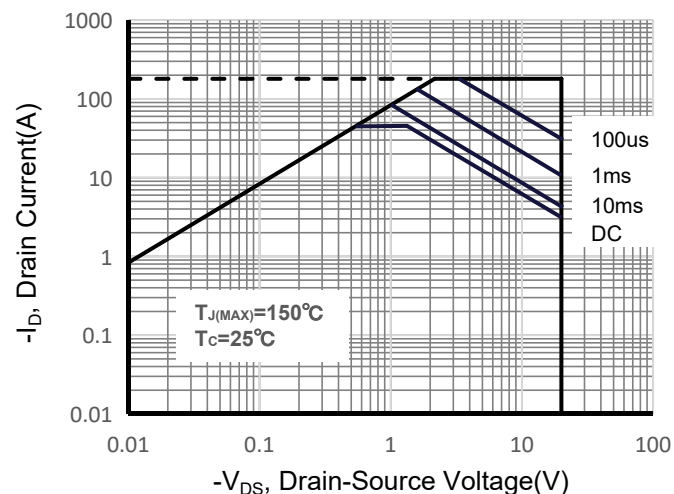


Figure 9. Maximum Continuous Drain Current vs Case Temperature

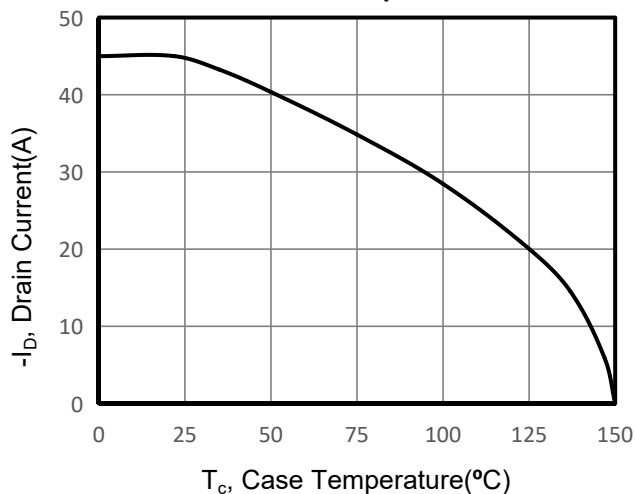
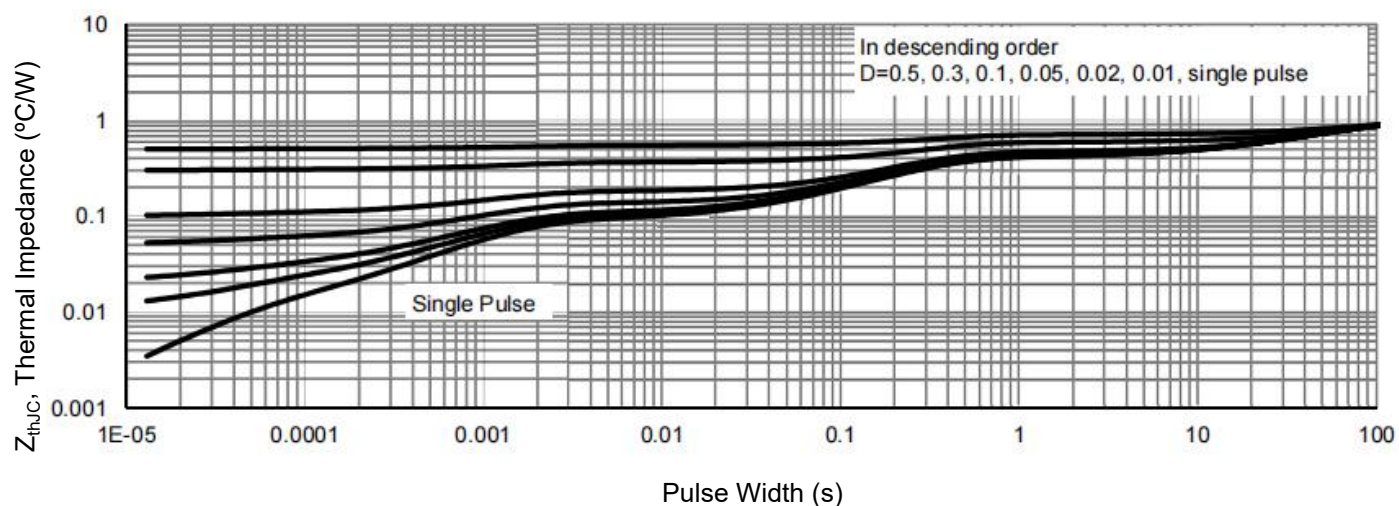
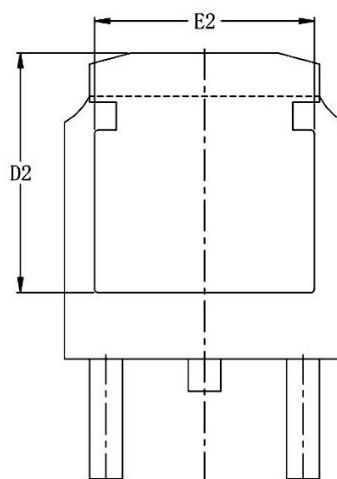
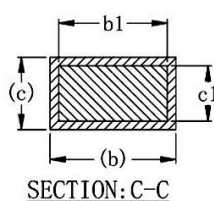
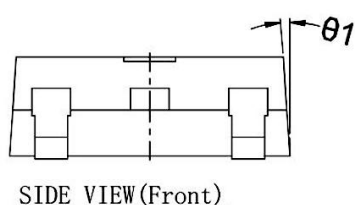
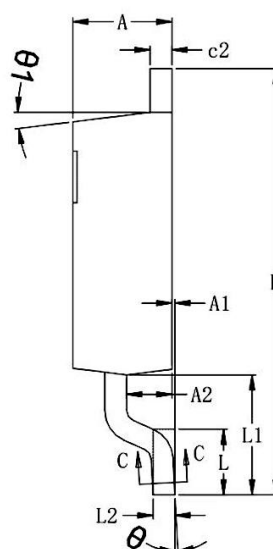
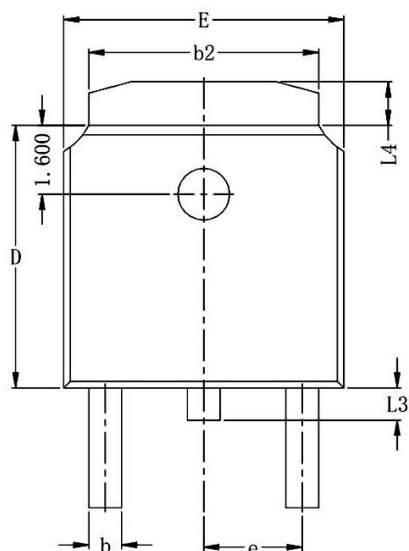


Figure 10. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



DIM SYMBOL	MIN.	NOM.	MAX.	DIM SYMBOL	MIN.	NOM.	MAX.
A	2.200	2.300	2.400	E	6.400	6.500	6.600
A1	0.000	0.070	0.130	E2	4.900	5.100	5.300
A2	0.950	1.050	1.150	e	2.286 BSC.		
b	0.700	0.800	0.900	H	9.700	9.900	10.100
b1	0.660	0.760	0.860	L	1.380	1.525	1.725
b2	5.134	5.334	5.534	L1	2.588	2.788	2.988
c	0.448	0.548	0.648	L2	0.508 BSC.		
c1	0.458	0.508	0.558	L3	0.600	0.750	0.950
c2	0.448	0.548	0.648	L4	0.812	1.012	1.212
D	6.000	6.100	6.200	θ	1°	3°	5°
D2	5.372	5.572	5.772	θ1	6°	7°	8°