

P-Channel Trench MOSFET

Description

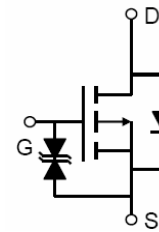
The G12P10TE uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} -100V
- I_D (at $V_{GS} = -10V$) -12A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 200 m Ω
- 100% Avalanche Tested
- RoHS Compliant
- ESD protection

Application

- Power switch
- DC/DC converters



Schematic diagram



Device	Package	Marking	Packaging
G12P10TE	TO-220	G12P10	50pcs/Tube

Absolute Maximum Ratings ($T_C=25^{\circ}C$ unless otherwise noted)			
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-12	A
Drain Current-Continuous($T_C=100^{\circ}C$)	$I_D(100^{\circ}C)$	-9.2	A
Pulsed Drain Current	I_{DM}	-52	A
Single pulse avalanche energy ^(Note 5)	E_{AS}	65	mJ
Maximum Power Dissipation	P_D	40	W
Derating factor		0.32	W/ $^{\circ}C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.13	$^{\circ}C/W$

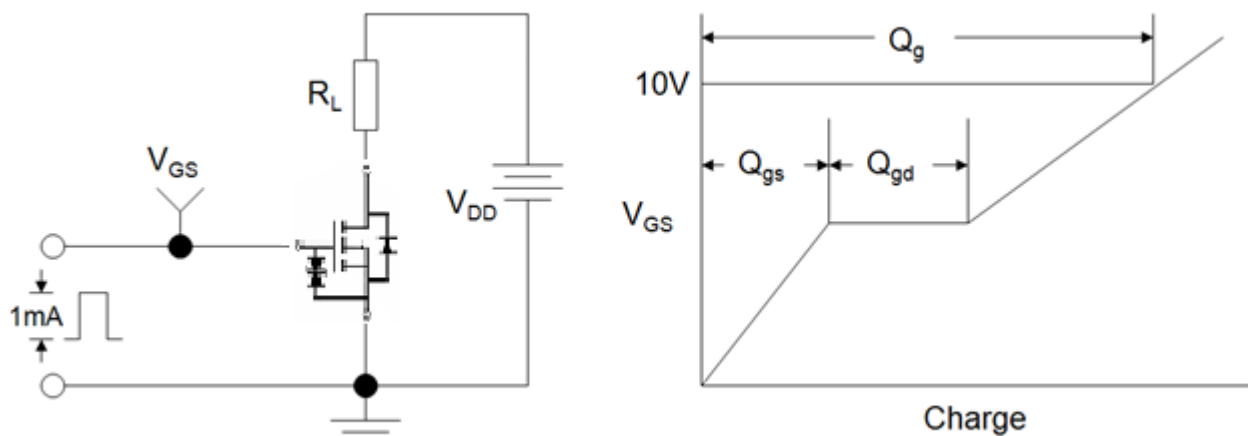
Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-100V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±10	μA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.9	-3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-6A	-	170	200	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-15V, I _D =-5A	12	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{i ss}	V _{DS} =-25V, V _{GS} =0V, F=1.0MHz	-	760	-	pF
Output Capacitance	C _{oss}		-	260	-	pF
Reverse Transfer Capacitance	C _{rss}		-	170	-	pF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-50V, I _D =-10A V _{GS} =-10V, R _{GEN} =9.1Ω	-	14	-	nS
Turn-on Rise Time	t _r		-	18	-	nS
Turn-Off Delay Time	t _{d(off)}		-	50	-	nS
Turn-Off Fall Time	t _f		-	18	-	nS
Total Gate Charge	Q _g	V _{DS} =-50V, I _D =-10A, V _{GS} =-10V	-	25	-	nC
Gate-Source Charge	Q _{gs}		-	5	-	nC
Gate-Drain Charge	Q _{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =-10A	-	-	-1.2	V
Diode Forward Current ^(Note 2)	I _S	-	-	-	-13	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =-10A di/dt = 100A/μs ^(Note3)	-	35	-	nS
Reverse Recovery Charge	Q _{rr}		-	46	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

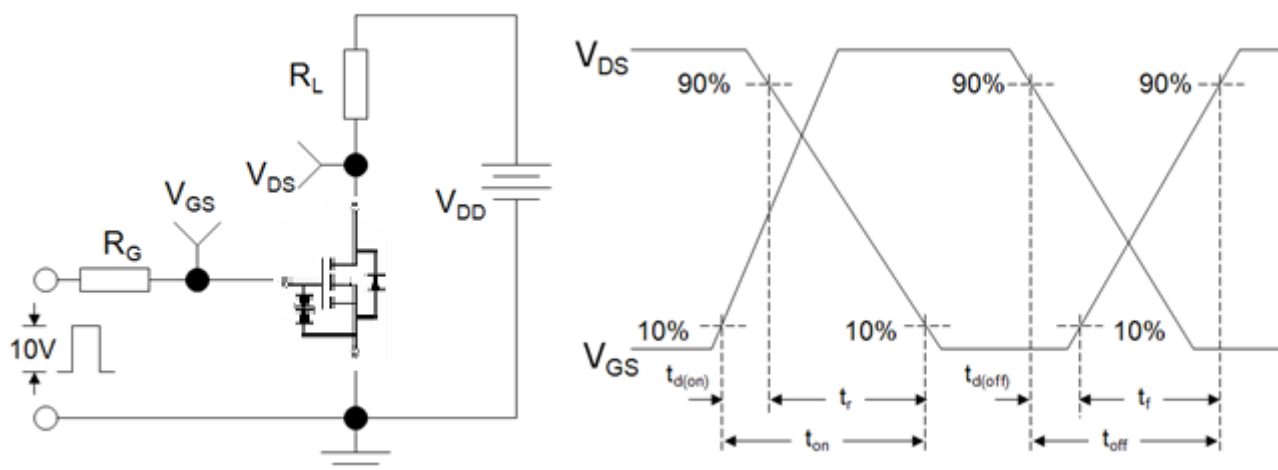
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: $T_J=25^{\circ}\text{C}, V_{DD}=-50V, V_G=-10V, L=0.5mH, R_g=25\Omega$

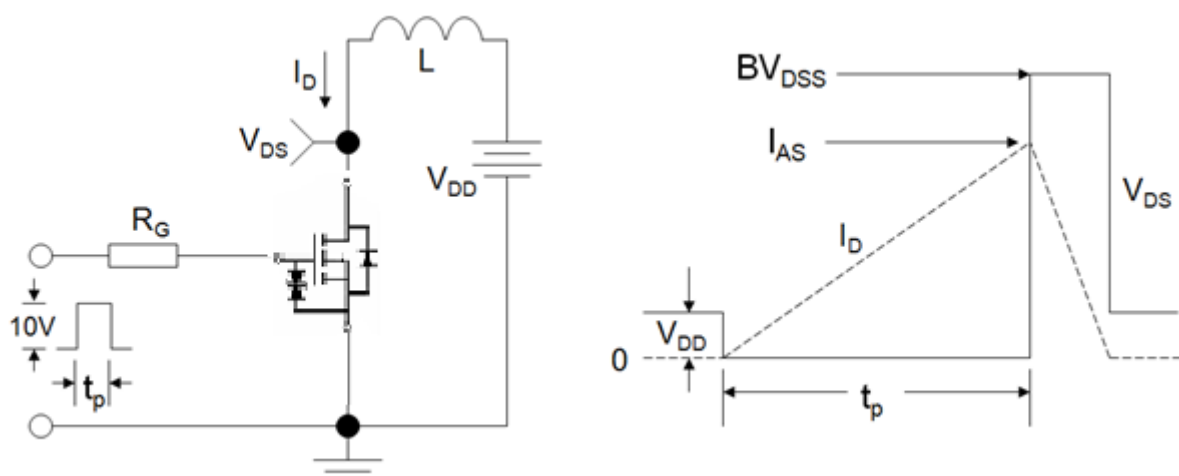
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

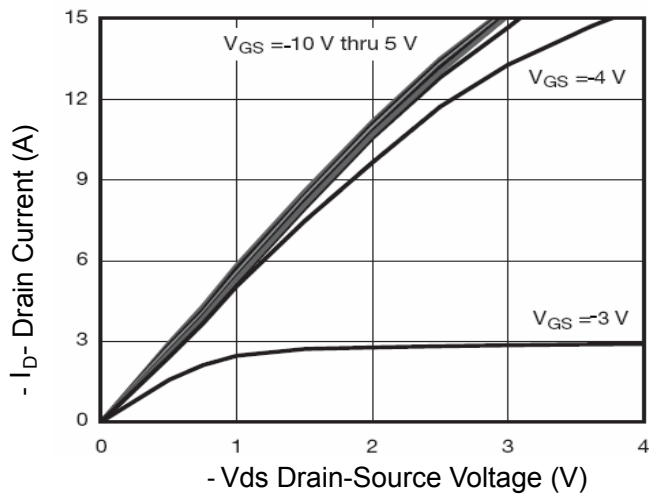


Figure 1 Output Characteristics

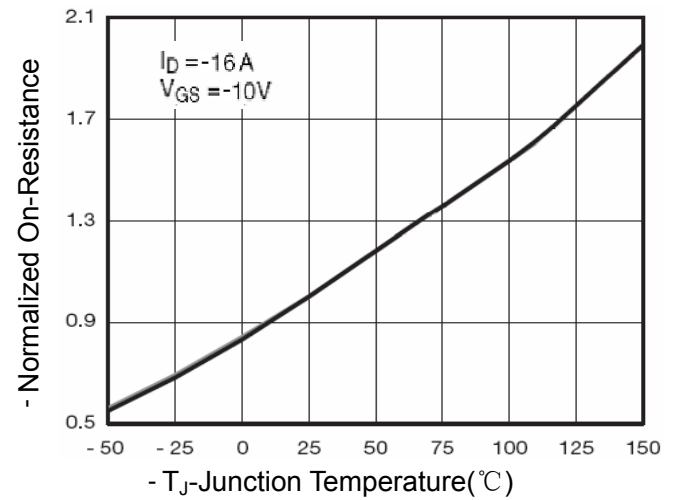


Figure 4 Rdson-Junction Temperature

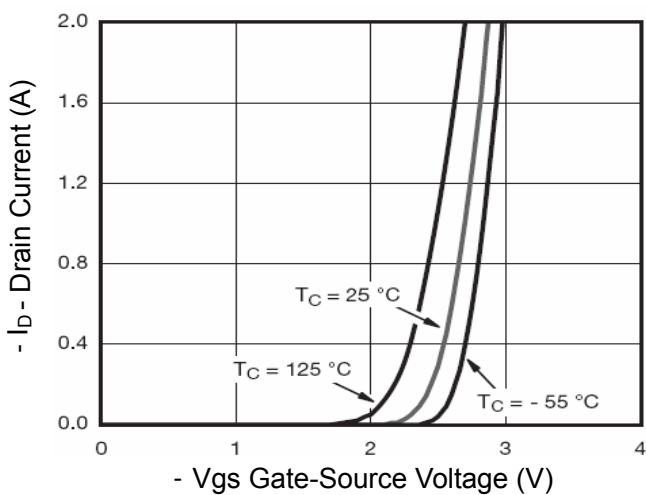


Figure 2 Transfer Characteristics

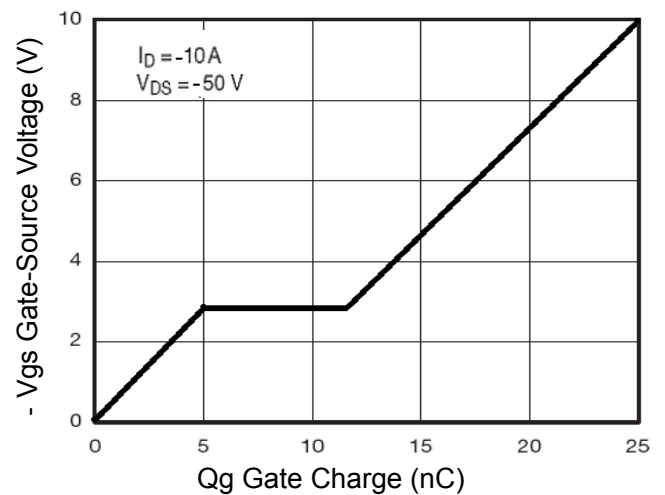


Figure 5 Gate Charge

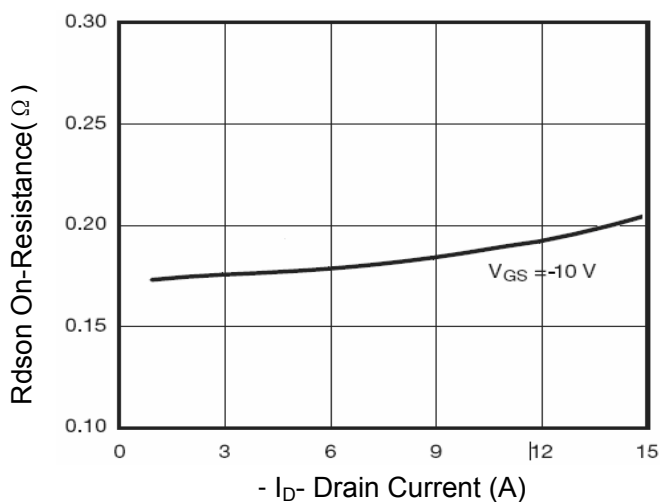


Figure 3 Rdson- Drain Current

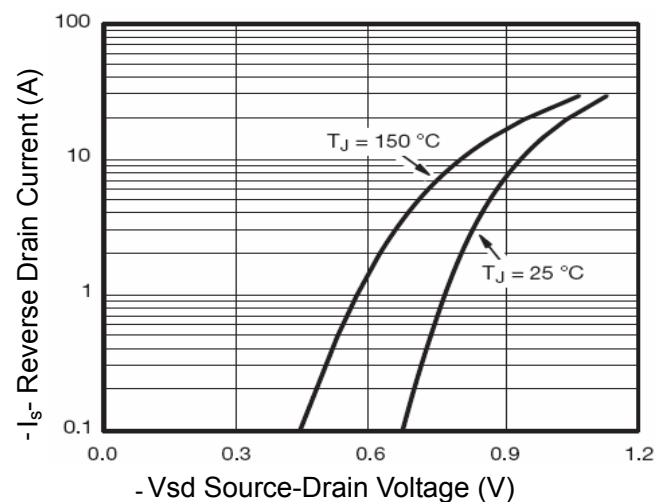


Figure 6 Source- Drain Diode Forward

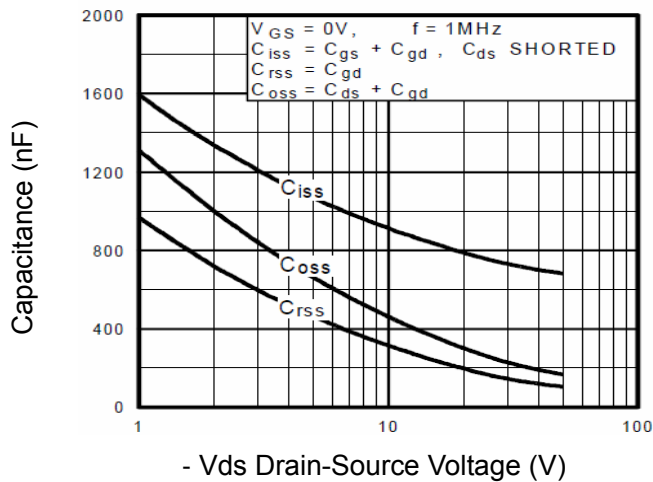


Figure 7 Capacitance vs Vds

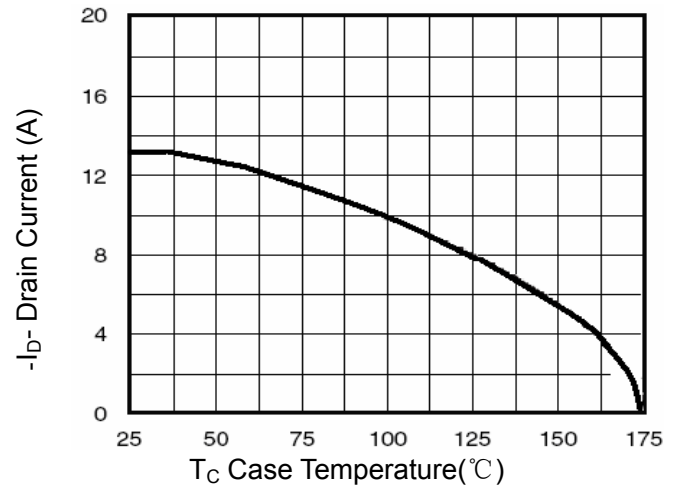


Figure 9 Drain Current vs Case Temperature

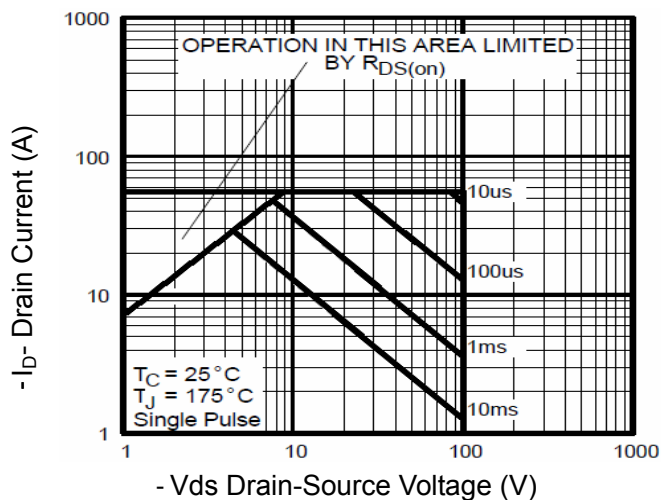


Figure 8 Safe Operation Area

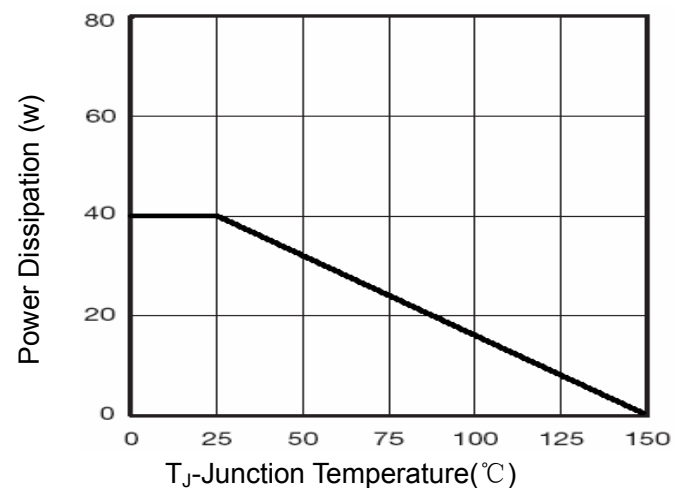


Figure 10 Power De-rating

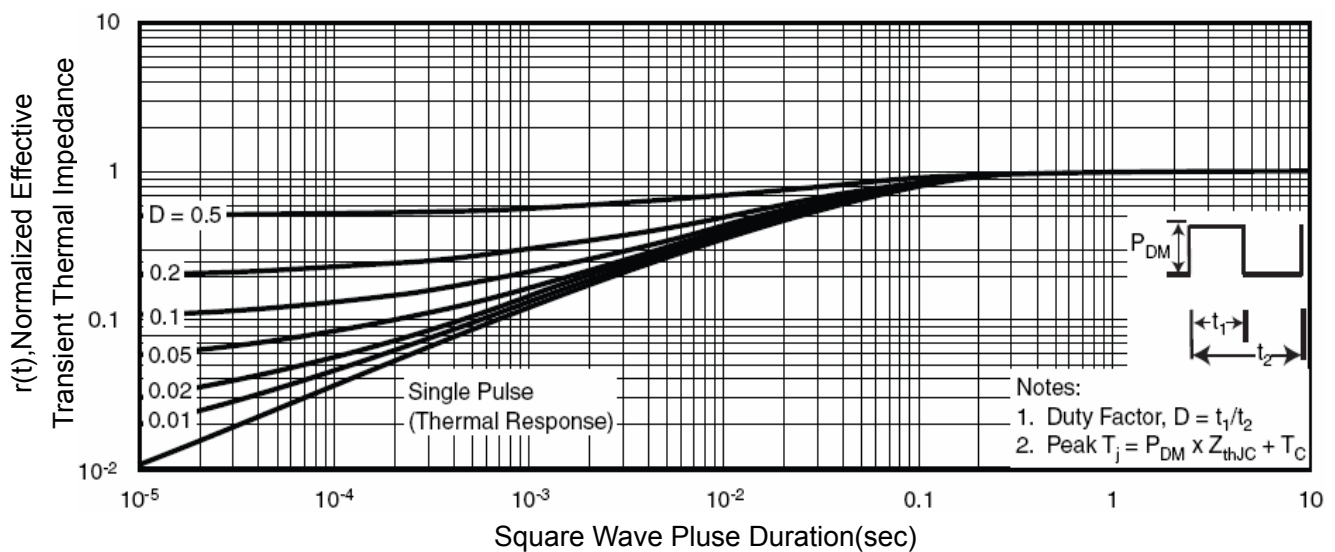
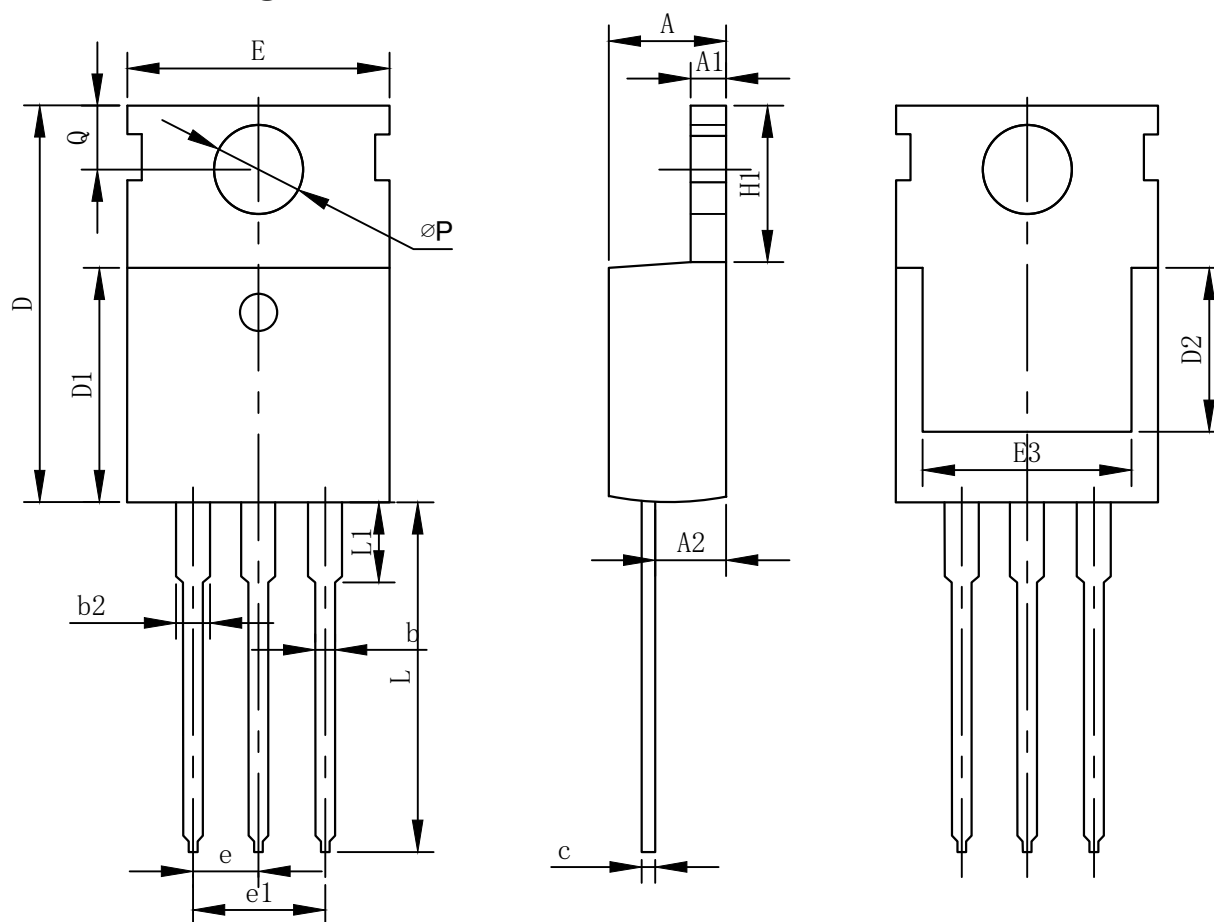


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220 Package information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.70	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	—	—
E	9.70	10.00	10.30
E3	7.00	—	—
e	2.54BSC		
e1	5.08BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	—	3.10	3.40
ϕP	3.40	3.60	3.80
Q	2.60	2.80	3.00