

## P-Channel Trench MOSFET

### Description

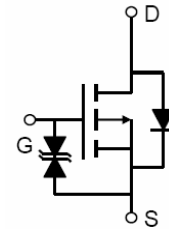
The G12P10TE uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

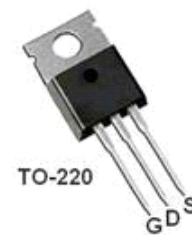
- $V_{DS}$  -100V
- $I_D$  (at  $V_{GS} = -10V$ ) -12A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) < 200 m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant
- ESD protection

### Application

- Power switch
- DC/DC converters



Schematic diagram



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

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

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

### Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta Jc}$	3.13	$^\circ\text{C}/\text{W}$

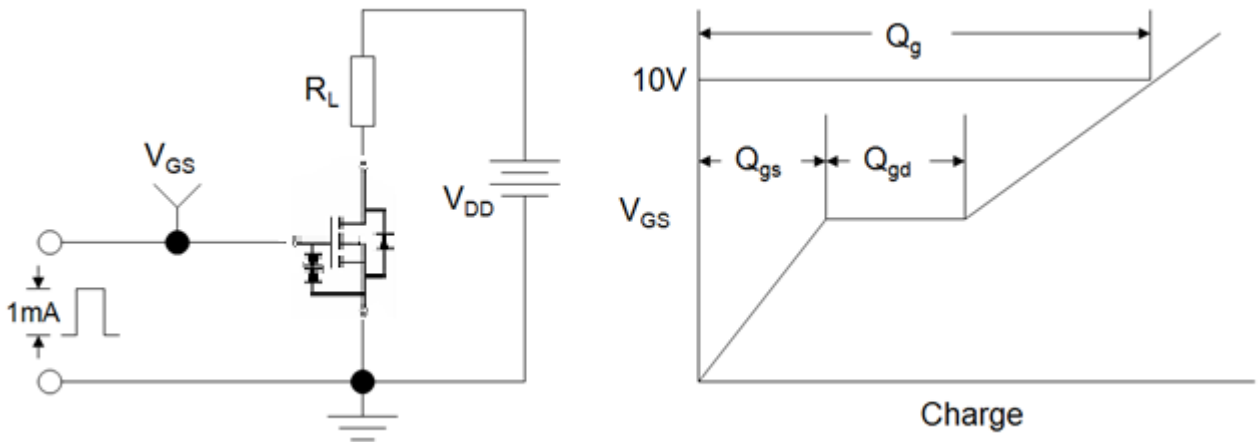
Electrical Characteristics ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-100	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-100V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.9	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-6A$	-	170	200	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-15V, I_D=-5A$	12	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=-25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	760	-	pF
Output Capacitance	$C_{oss}$		-	260	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	170	-	pF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-50V, I_D=-10A$ $V_{GS}=-10V, R_{GEN}=9.1\Omega$	-	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
<b>Drain-Source Diode Characteristics</b>						
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	$t_{rr}$	$T_J = 25^\circ\text{C}, I_F = -10A$	-	35	-	nS
Reverse Recovery Charge	$Q_{rr}$	$di/dt = 100A/\mu s$ (Note 3)	-	46	-	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

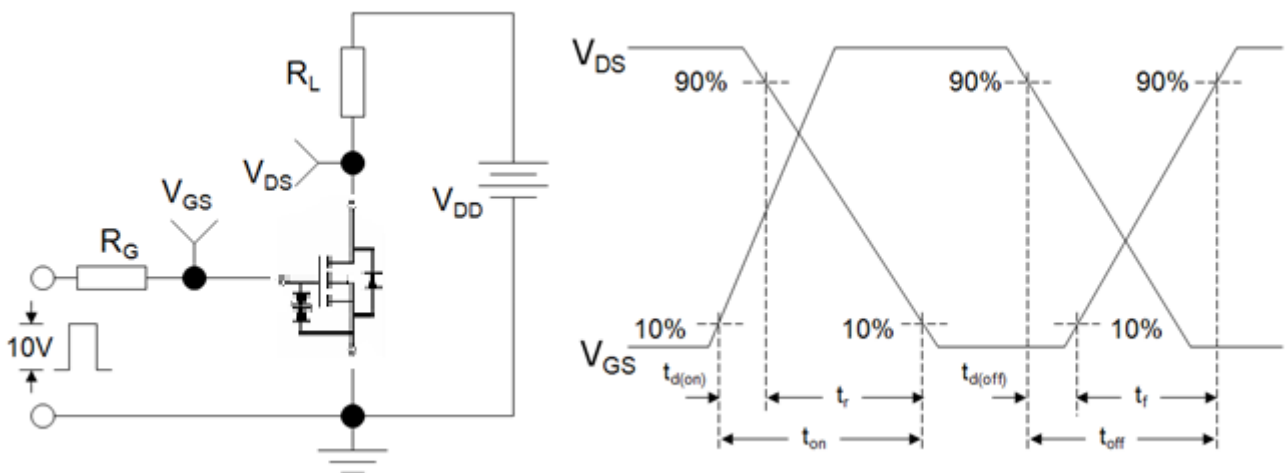
**Notes:**

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:  $T_J=25^\circ\text{C}, V_{DD}=-50V, V_G=-10V, L=0.5\text{mH}, R_g=25\Omega$

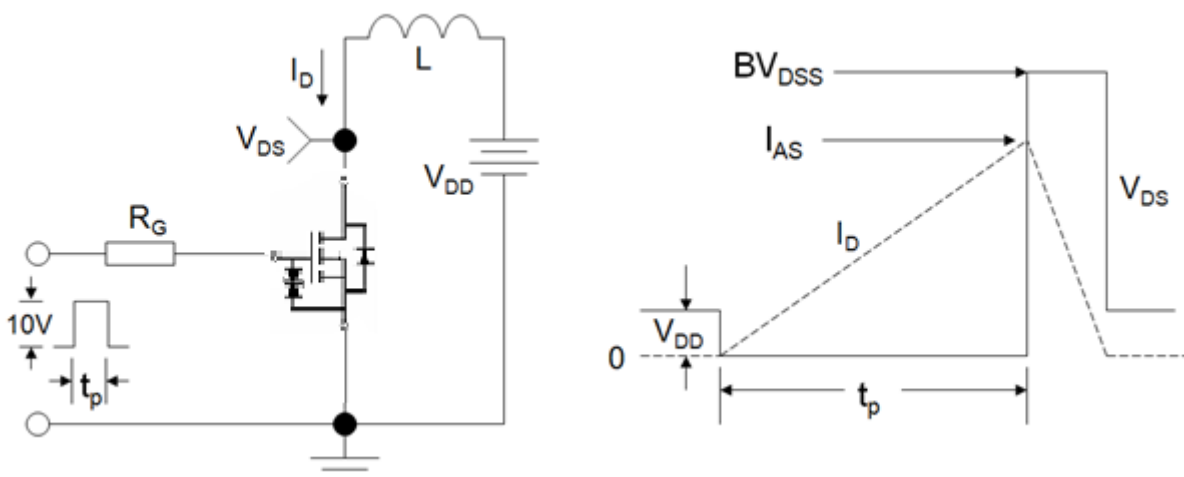
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

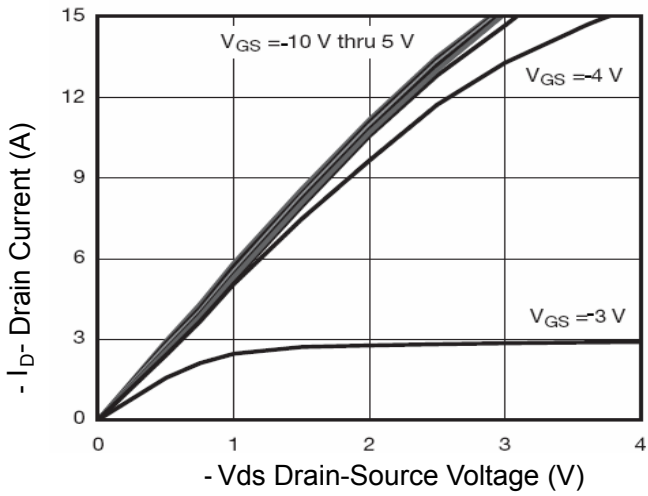


Figure 1 Output Characteristics

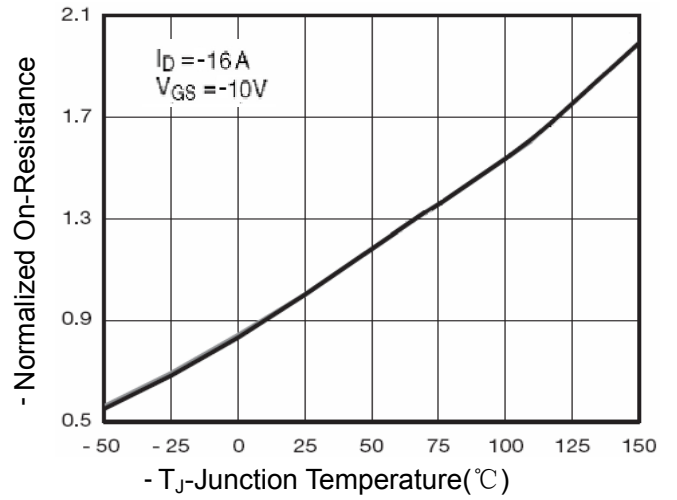


Figure 4 Rdson-Junction Temperature

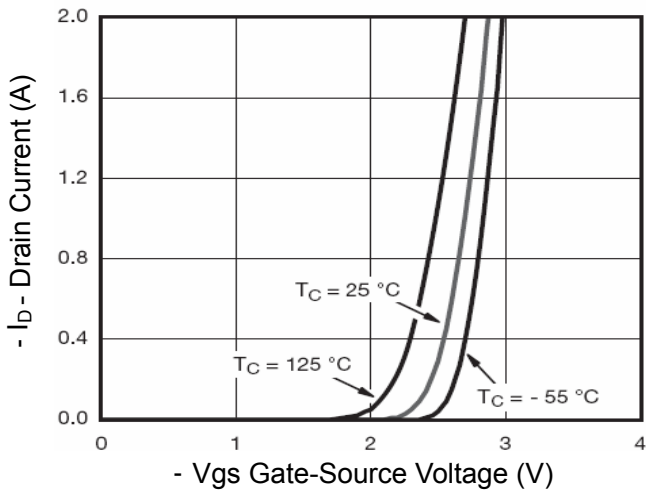


Figure 2 Transfer Characteristics

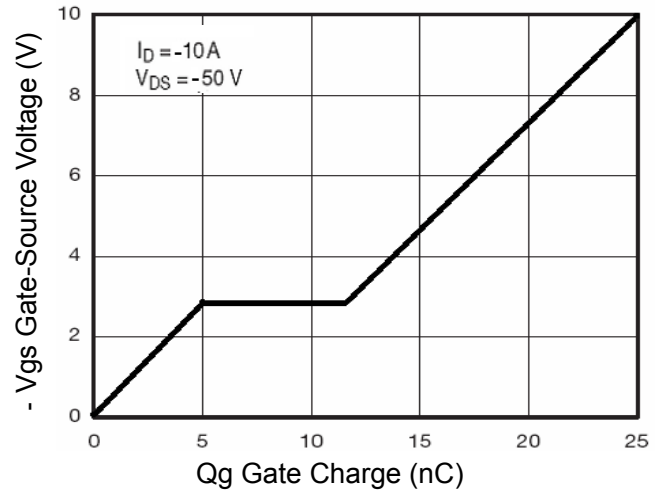


Figure 5 Gate Charge

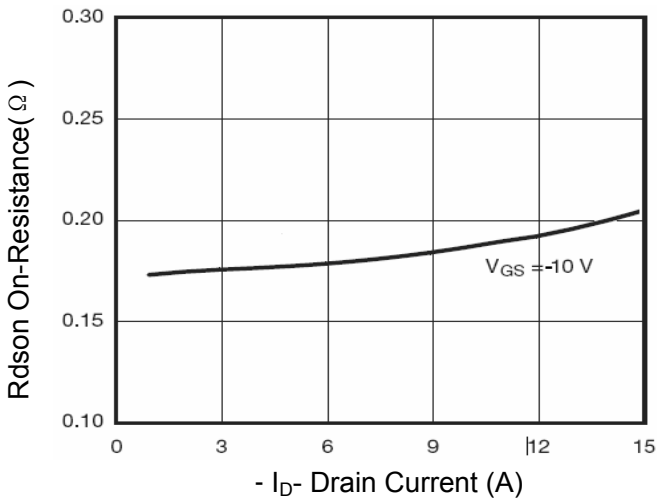


Figure 3 Rdson- Drain Current

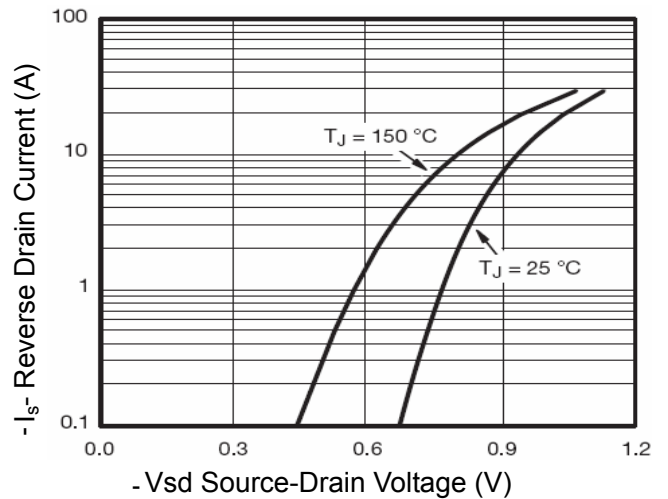


Figure 6 Source- Drain Diode Forward

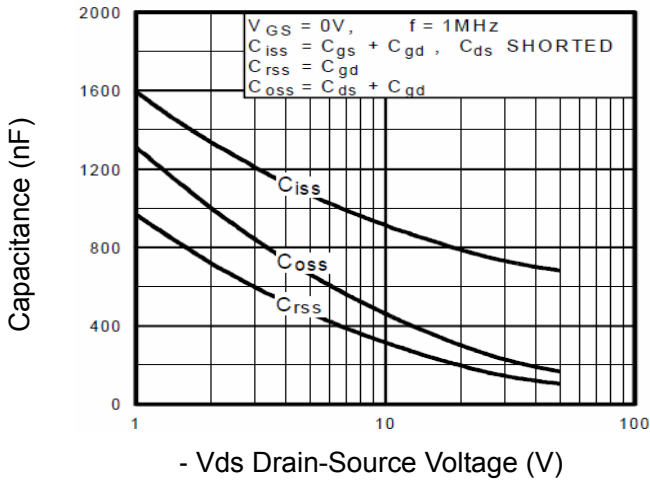


Figure 7 Capacitance vs Vds

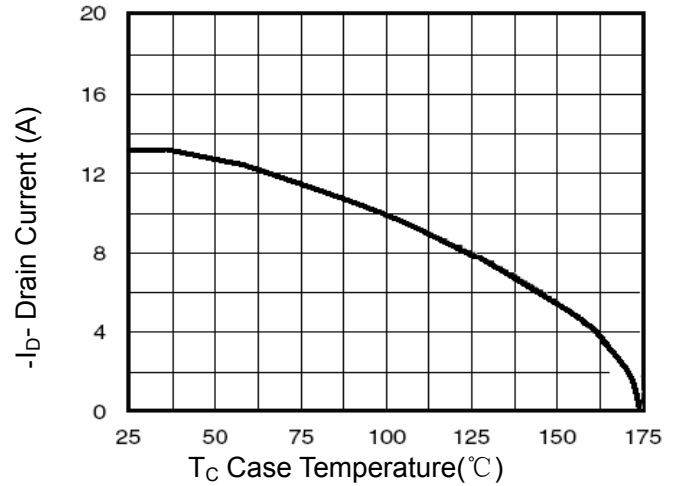


Figure 9 Drain Current vs Case Temperature

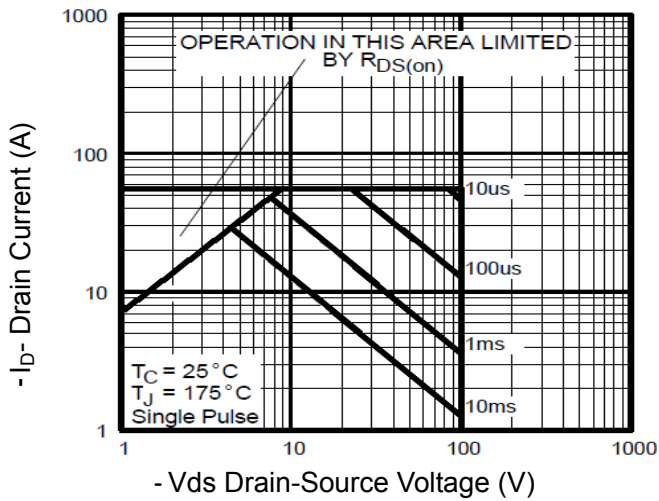


Figure 8 Safe Operation Area

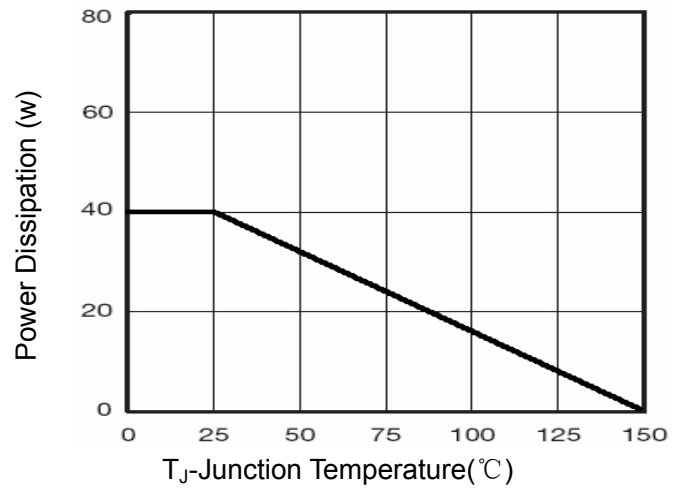


Figure 10 Power De-rating

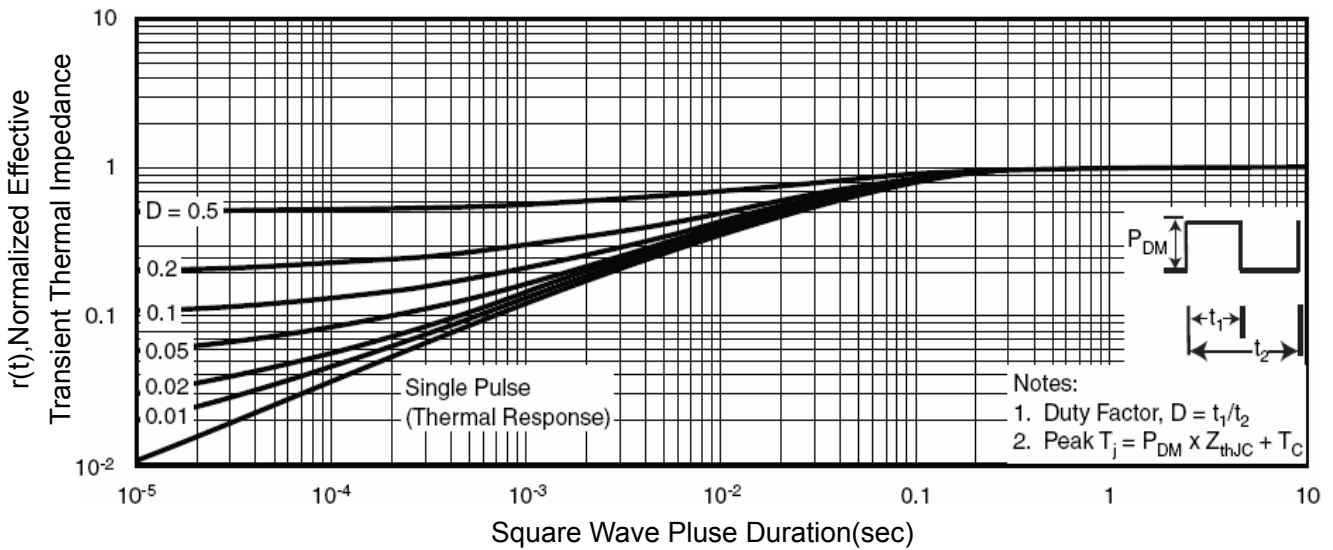
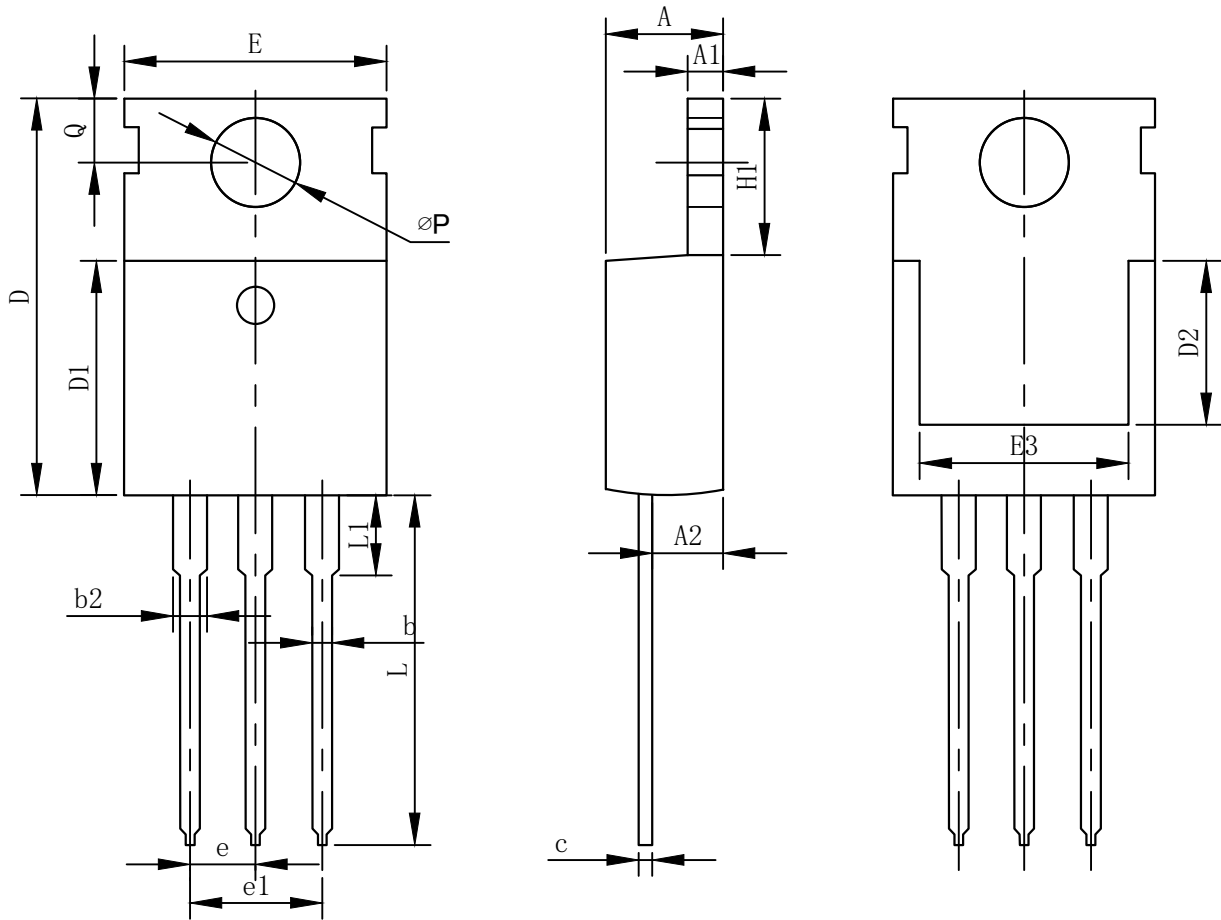


Figure 11 Normalized Maximum Transient Thermal Impedance

### 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
øP	3.40	3.60	3.80
Q	2.60	2.80	3.00