

Description

The GT120N10 uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

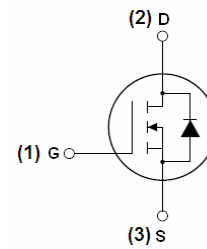
General Features

V_{DSS}	$R_{DS(ON)}$ @ 10V(Typ)	I_D
100V	3.7m Ω	120A

- Excellent gate charge x $R_{DS(on)}$ product
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- RoHS Compliant
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification



Schematic diagram



Marking and pin assignment



Ordering Information

Part Number	Marking	Case	Packaging
GT120N10	GT120N10	TO-220	50pcs/Tube

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous (Silicon Limited)	I_D	150	A
Drain Current-Continuous (Package Limited)	I_D	120	A
Drain Current-Continuous($T_C=100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	108	A
Pulsed Drain Current	I_{DM}	500	A
Maximum Power Dissipation	P_D	220	W
Derating factor		1.5	W/ $^\circ\text{C}$
Single pulse avalanche energy ^(Note 5)	E_{AS}	1156	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.7	$^{\circ}\text{C/W}$
--	-----------------	-----	----------------------

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

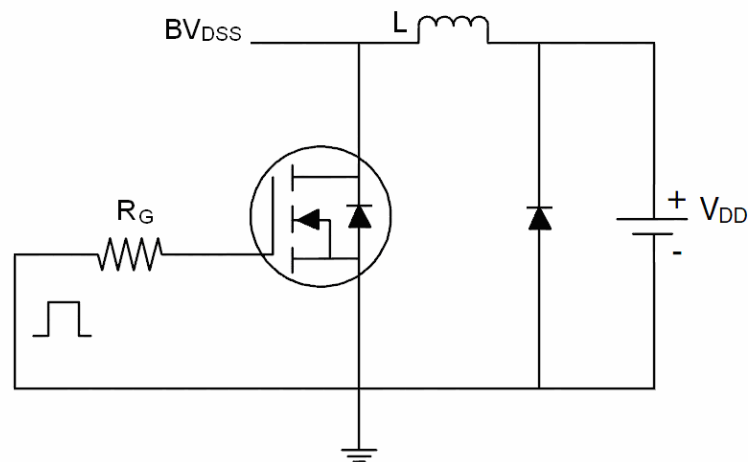
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	-	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=60A$	-	3.7	4.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=60A$	70	-	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	7500	-	PF
Output Capacitance	C_{oss}		-	755	-	PF
Reverse Transfer Capacitance	C_{rss}		-	45	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V, I_D=60A$ $V_{GS}=10V, R_G=4.7\Omega$	-	20	-	nS
Turn-on Rise Time	t_r		-	78	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	nS
Turn-Off Fall Time	t_f		-	16	-	nS
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=60A,$ $V_{GS}=10V$	-	100	-	nC
Gate-Source Charge	Q_{gs}		-	43.4	-	nC
Gate-Drain Charge	Q_{gd}		-	19.7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=135A$	-	-	1.2	V
Diode Forward Current ^(Note 2)	I_S		-	-	135	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}, I_F = I_S$ $di/dt = 100A/\mu s$ ^(Note 3)	-	65	-	nS
Reverse Recovery Charge	Q_{rr}		-	144	-	nC

Notes:

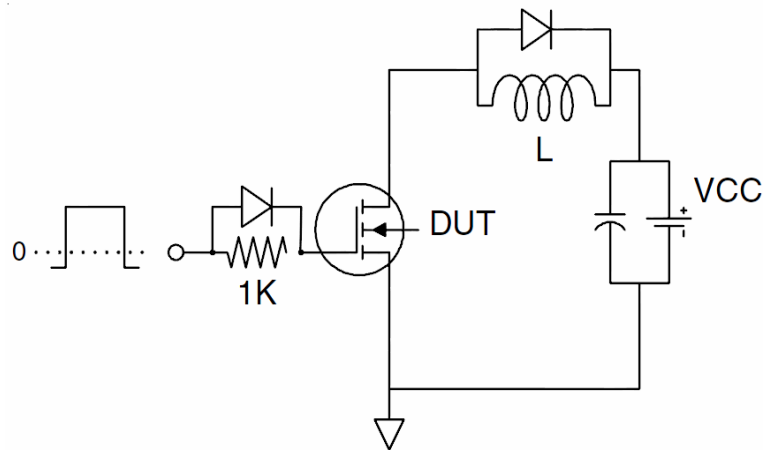
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V,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

Test Circuit

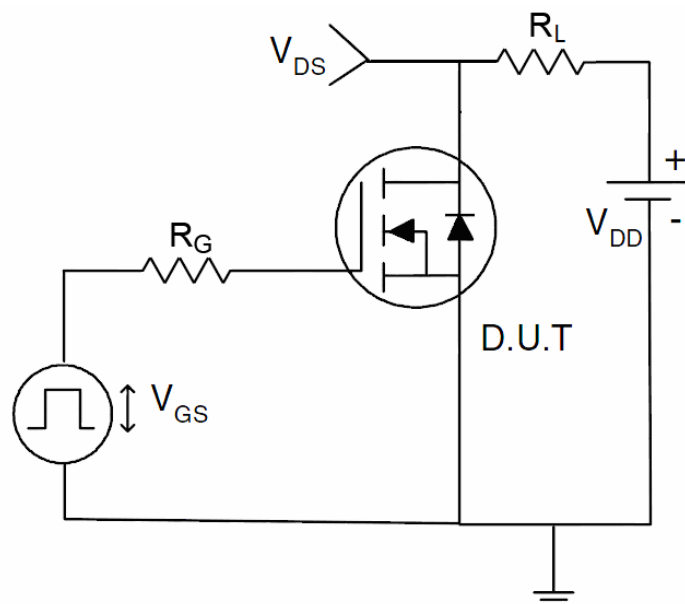
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

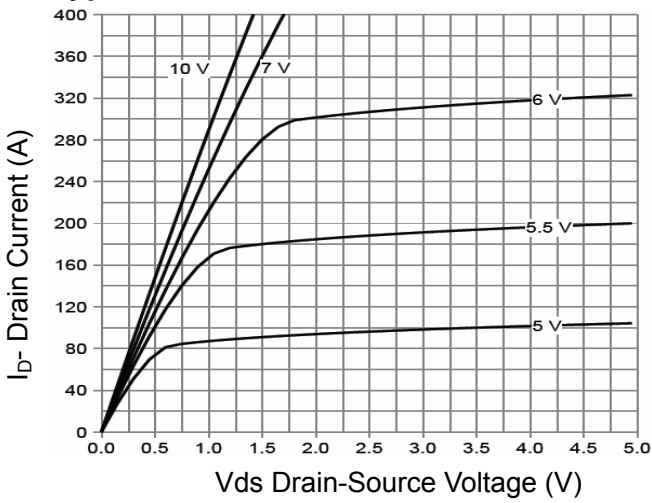


Figure 1 Output Characteristics

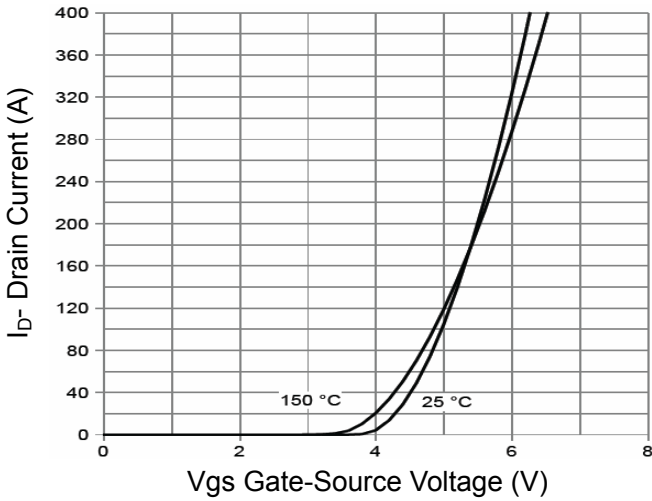


Figure 2 Transfer Characteristics

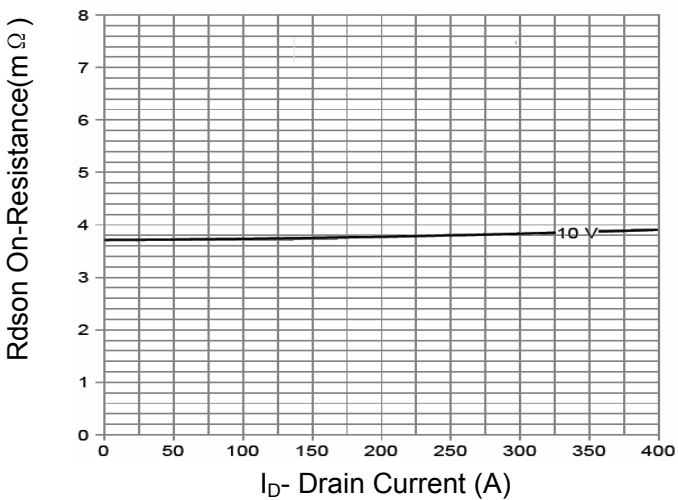


Figure 3 Rdson- Drain Current

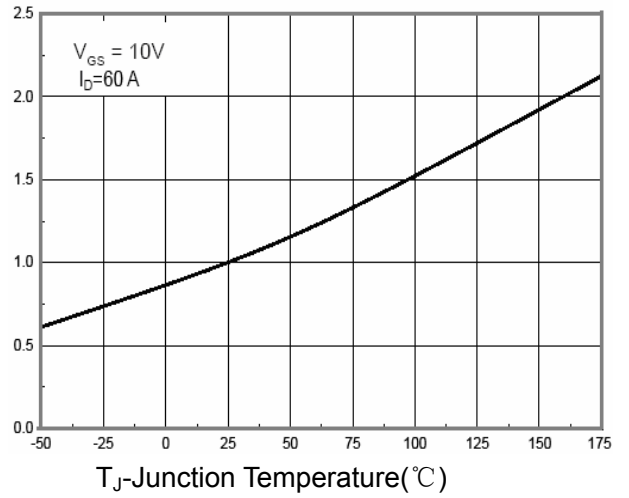


Figure 4 Rdson-Junction Temperature

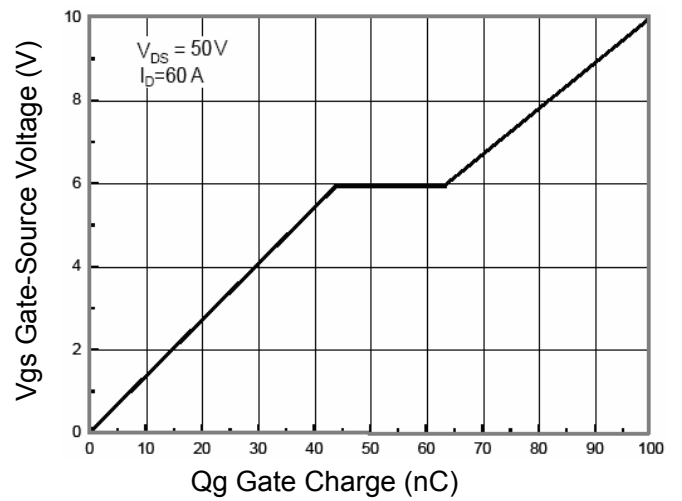


Figure 5 Gate Charge

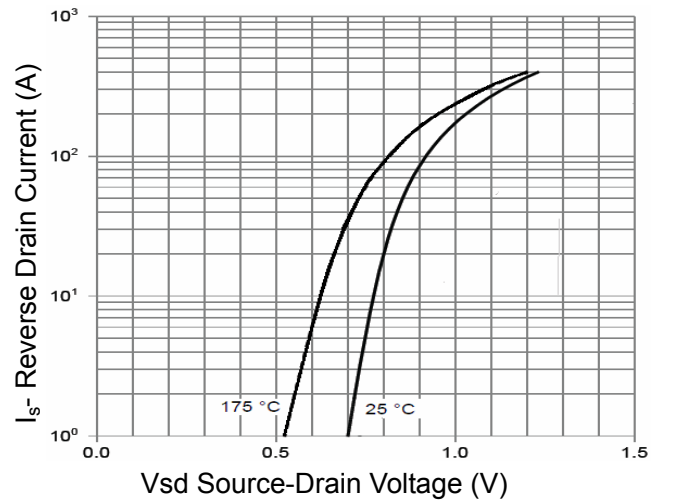


Figure 6 Source- Drain Diode Forward

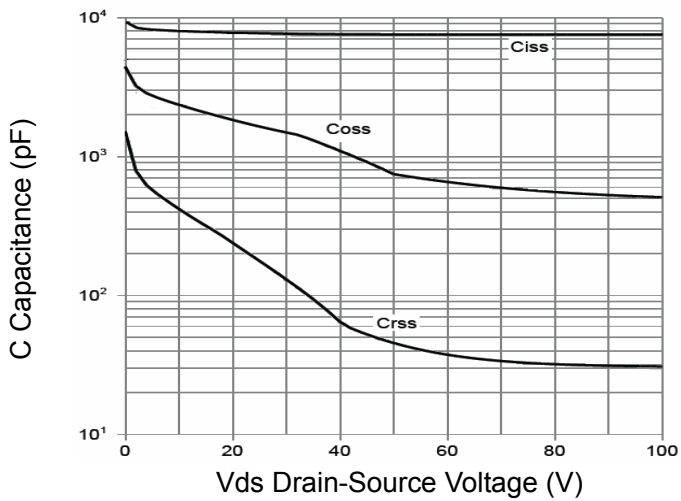


Figure 7 Capacitance vs Vds

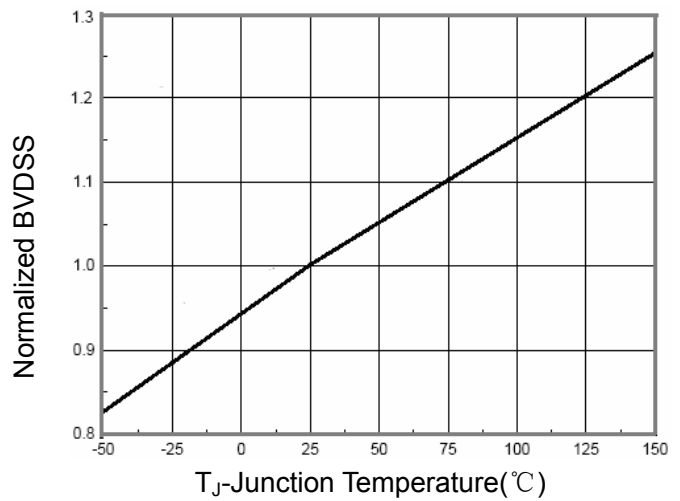


Figure 9 BV_{DSS} vs Junction Temperature

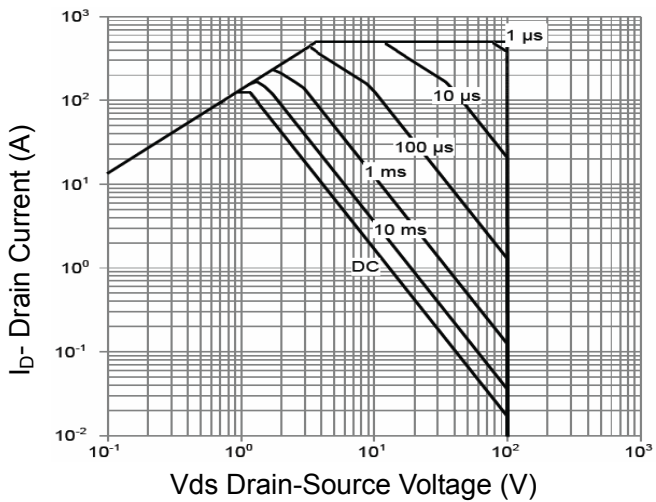


Figure 8 Safe Operation Area

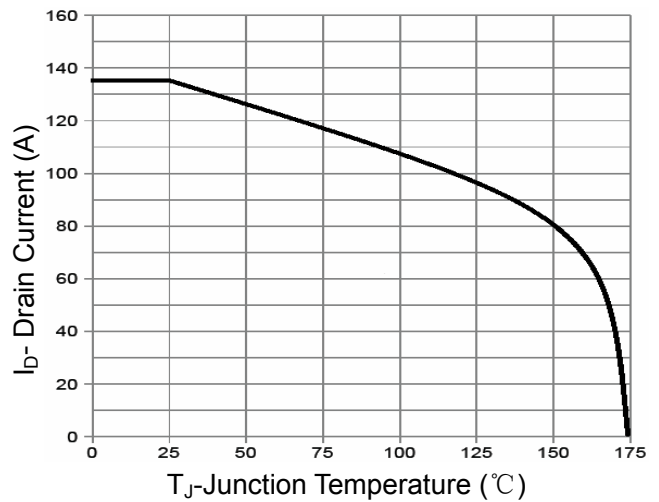


Figure 10 Current De-rating

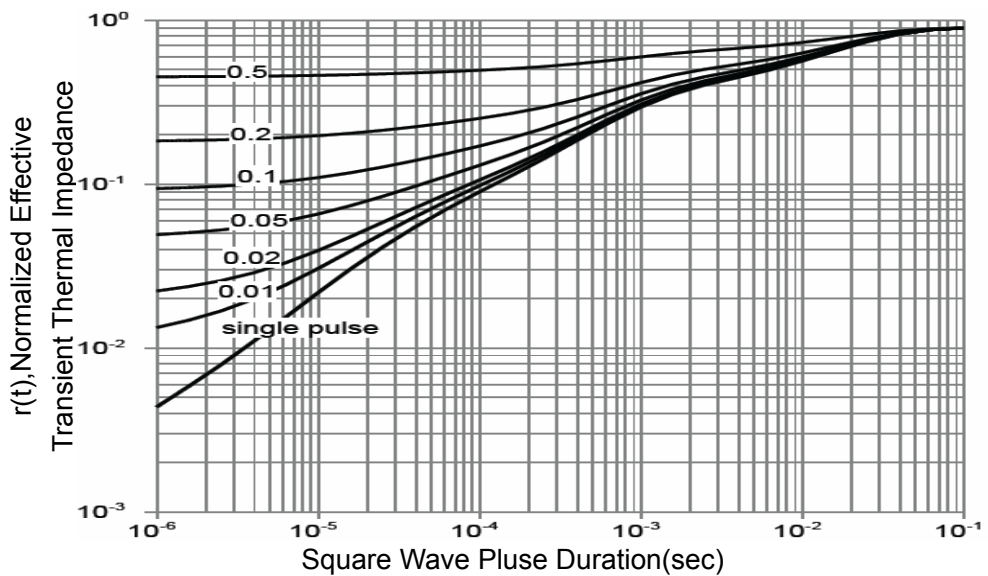
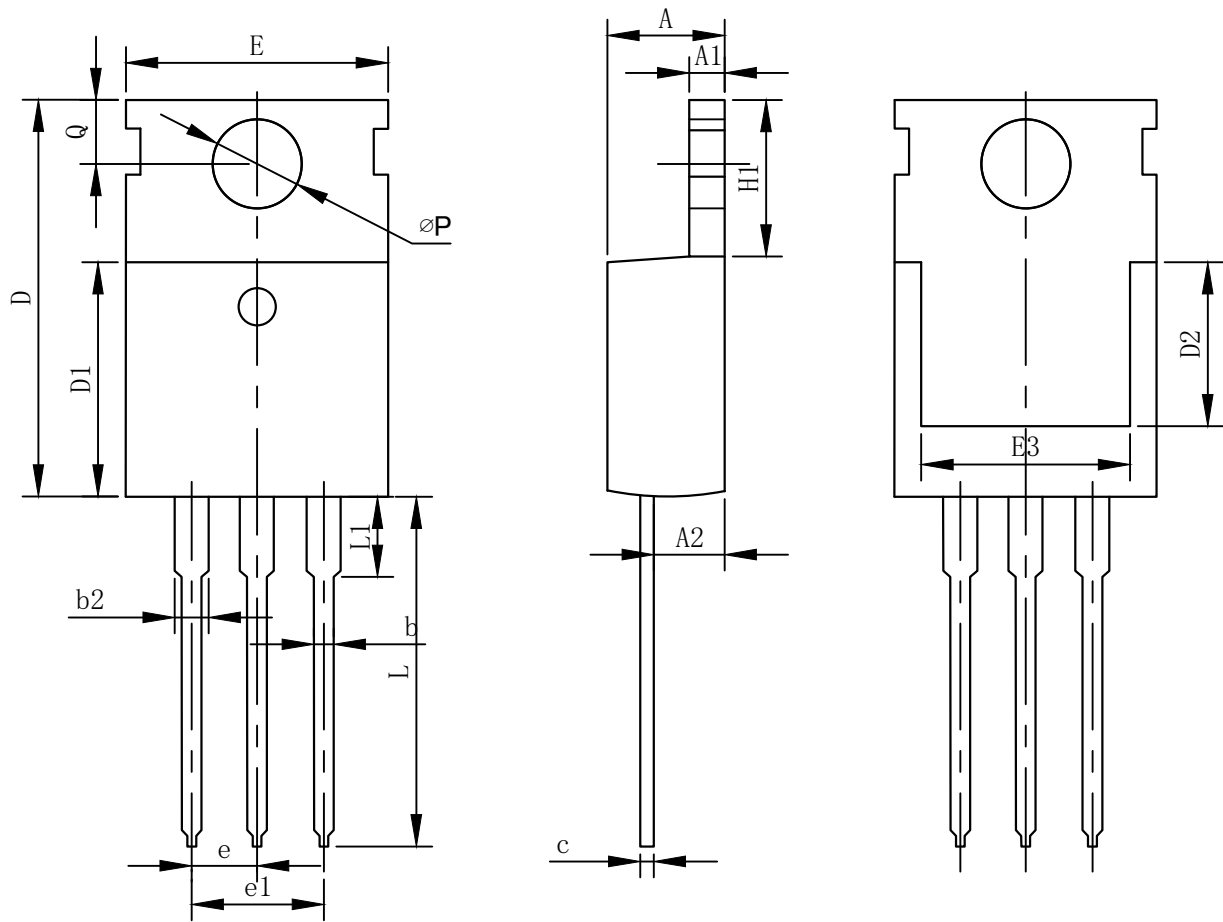


Figure 11 Normalized Maximum Transient Thermal Impedance

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