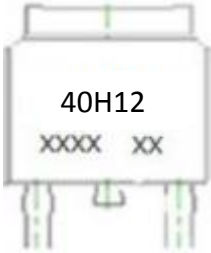
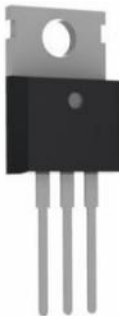
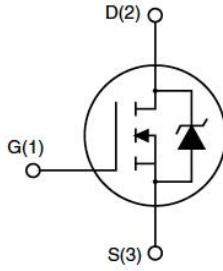


40H12

N-Channel Trench Power MOSFET

<p>Features</p> <p>VDS=40V; ID=170A@ VGS=10V; RDS(ON)<3.6mΩ @ VGS=10V Ultra Low On-Resistance High UIS and UIS 100% Test</p> <p>Application</p> <p>Hard Switched and High Frequency Circuits Uninterruptible Power Supply</p>	<p>General Description</p> <p>The 40H12 is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged EAScapability and ultra low RDS(ON) is suitable for PWM, load switching .</p>
<p>Package</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div data-bbox="183 779 395 1030">  <p>Marking and pin assignment</p> </div> <div data-bbox="702 750 821 1064">  <p>TO-220top view</p> </div> <div data-bbox="1045 761 1268 1030">  <p>Schematic diagram</p> </div> </div>	

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
40H12	40H12	TO-220	-	-	-

Table 1. Absolute Maximum Ratings (TA=25°C)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage (V _{GS} =0V)	40	V
V _{GS}	Gate-Source Voltage (V _{DS} =0V)	±20	V
I _{D(DC)}	Drain Current (DC) at Tc=25°C	170	A
I _{D(DC)}	Drain Current (DC) at Tc=100°C	119	A
I _{DM (pluse)}	Drain Current-Continuous@ Current-Pulsed (Note 1)	680	A
dv/dt	Peak Diode Recovery Voltage	1.83	V/ns
P _D	Maximum Power Dissipation(Tc=25°C)	231	W
	Derating Factor	1.54	W/°C
E _{AS}	Single Pulse Avalanche Energy (Note 2)	1800	mJ
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 To 175	°C

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

2.EAS condition:T_J=25°C,I_{AS}=85A,V_G=10V, R_G=25 Ω

40H12

N-Channel Trench Power MOSFET

Table 2. Thermal Characteristic

Symbol	Parameter	Value	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	---	0.65	$^{\circ}C/W$

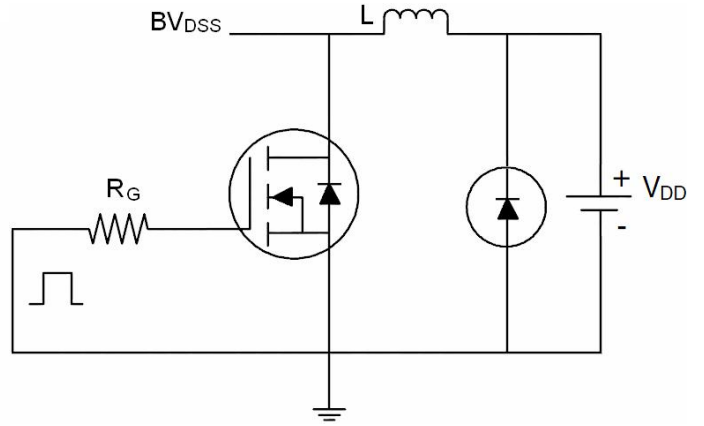
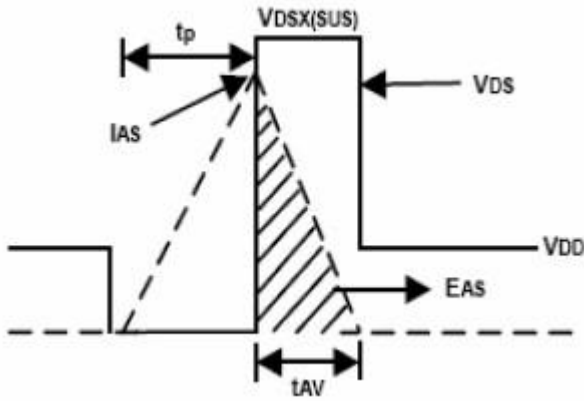
Table 3. Electrical Characteristics (TA=25 $^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40			V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25 $^{\circ}C$)	$V_{DS}=40V, V_{GS}=0V$			1	μA
I_{DSS}	Zero Gate Voltage Drain Current(Tc=125 $^{\circ}C$)	$V_{DS}=40V, V_{GS}=0V$			1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=40A$		3.0	3.6	m Ω
Dynamic Characteristics						
g_{FS}	Forward Transconductance	$V_{DS}=10V, I_D=40A$	40			S
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V$ $f=1.0MHz$		7585		PF
C_{oss}	Output Capacitance			967		PF
C_{rss}	Reverse Transfer Capacitance			625		PF
Q_g	Total Gate Charge	$V_{DS}=32V, I_D=75A$ $V_{GS}=10V$		144		nC
Q_{gs}	Gate-Source Charge			36		nC
Q_{gd}	Gate-Drain Charge			53		nC
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V, I_D=75A$ $V_{GS}=10V, R_G=3.0\Omega$		38		nS
t_r	Turn-on Rise Time			47		nS
$t_{d(off)}$	Turn-Off Delay Time			64		nS
t_f	Turn-Off Fall Time			26		nS
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)			170		A
I_{SDM}	Pulsed Source-Drain Current(Body Diode)			680		A
V_{SD}	Forward On Voltage(Note 1)	$T_J=25^{\circ}C, I_{SD}=40A, V_{GS}=0V$		0.82	0.99	V
t_{rr}	Reverse Recovery Time(Note 1)	$T_J=25^{\circ}C, I_F=40A$ $di/dt=100A/\mu s$		28		nS
Q_{rr}	Reverse Recovery Charge(Note 1)				22	
t_{on}	Forward Turn-on Time	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

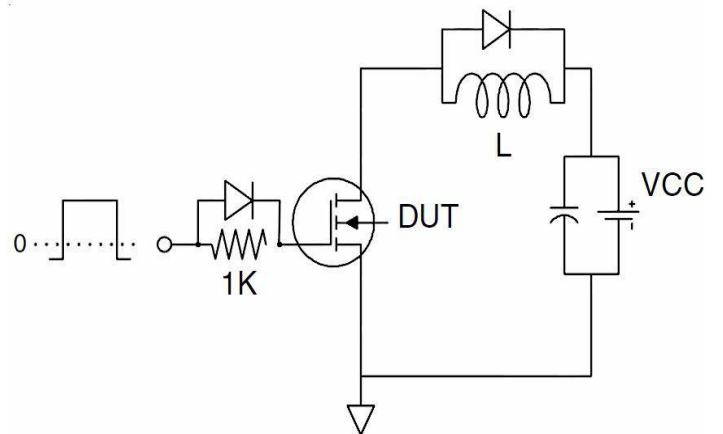
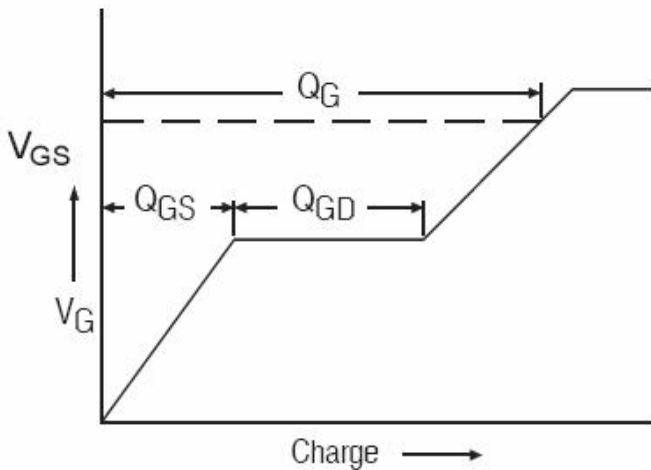
Notes 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_J=25^{\circ}C$

Test Circuit

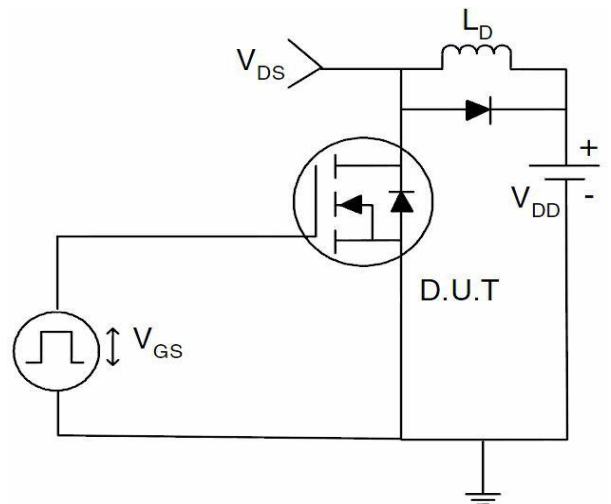
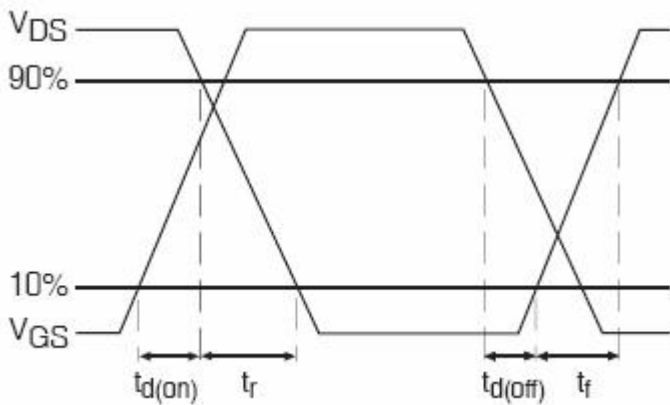
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:



40H12

N-Channel Trench Power MOSFET

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

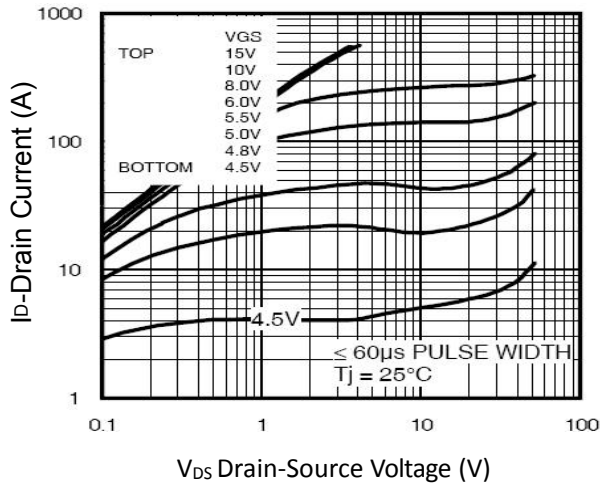


Figure2. Transfer Characteristics

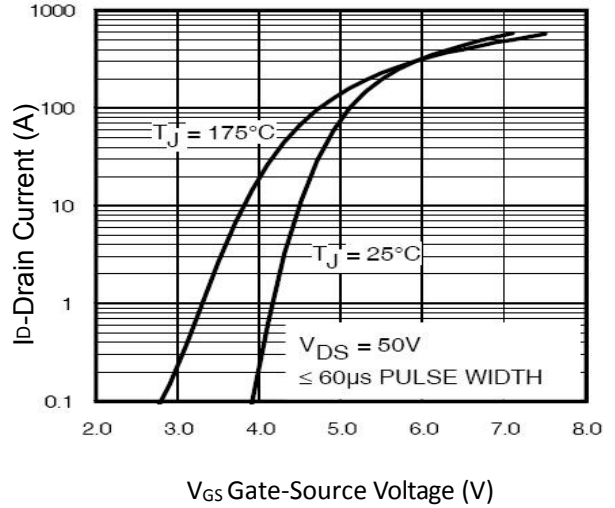


Figure3. VGS(th) vs Junction Temperature

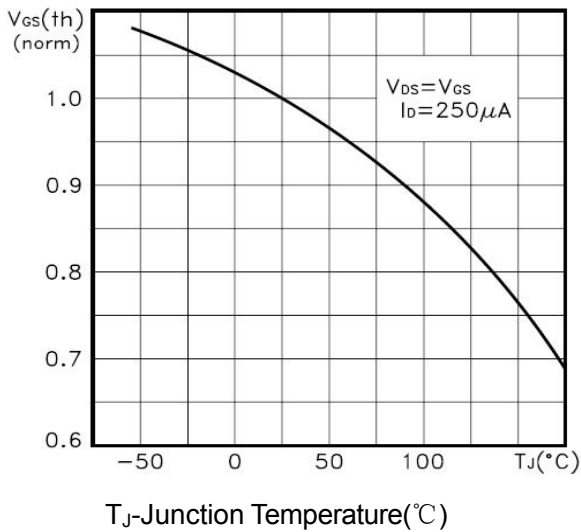


Figure4. BVDS vs Junction Temperature

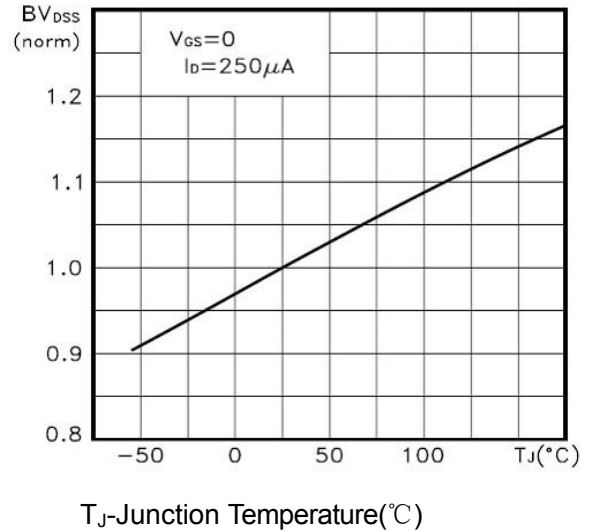


Figure5. ID vs Junction Temperature

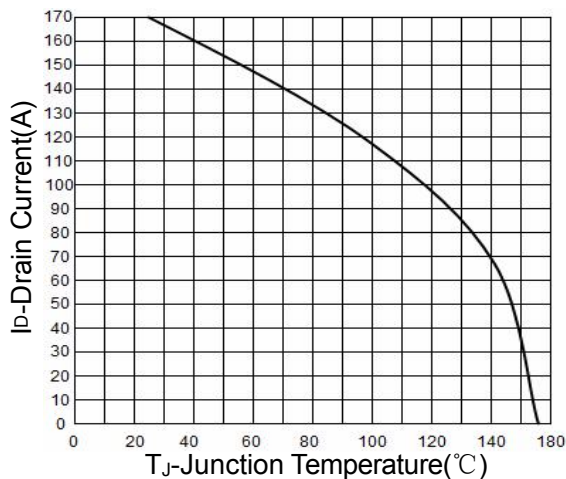


Figure6. RDS(ON)- Junction Temperature

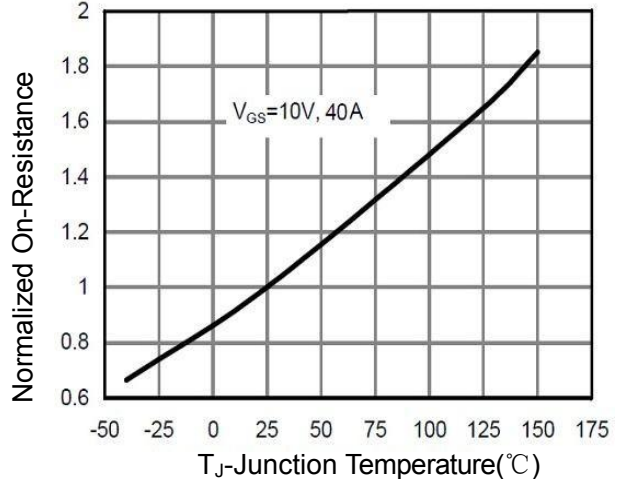


Figure7. Gate Charge

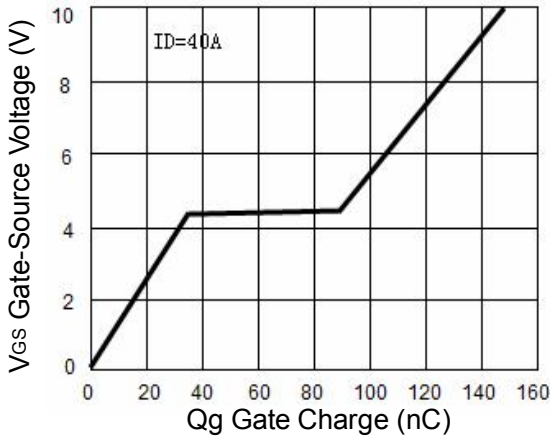


Figure8. Capacitance vs Vds

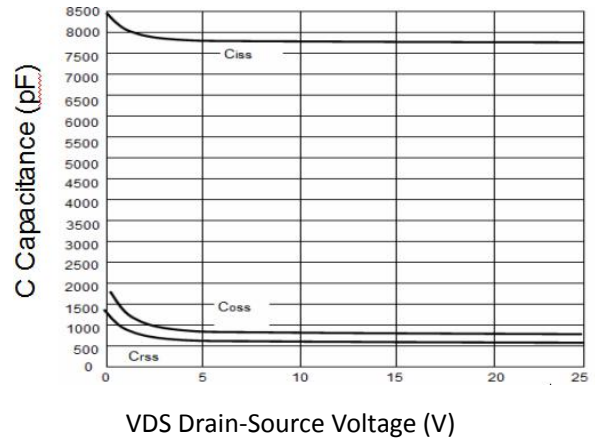


Figure9. Source- Drain Diode Forward

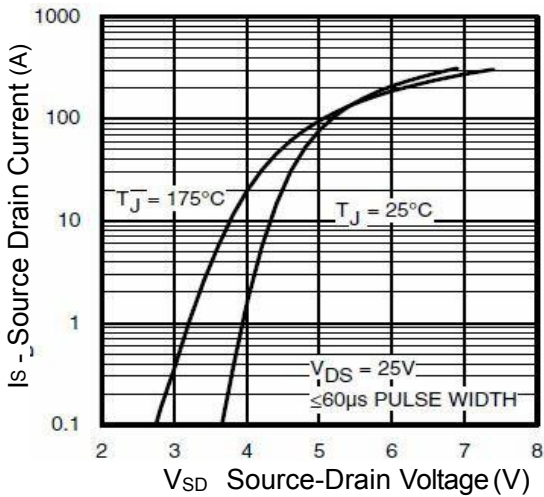


Figure10. Safe Operation Area

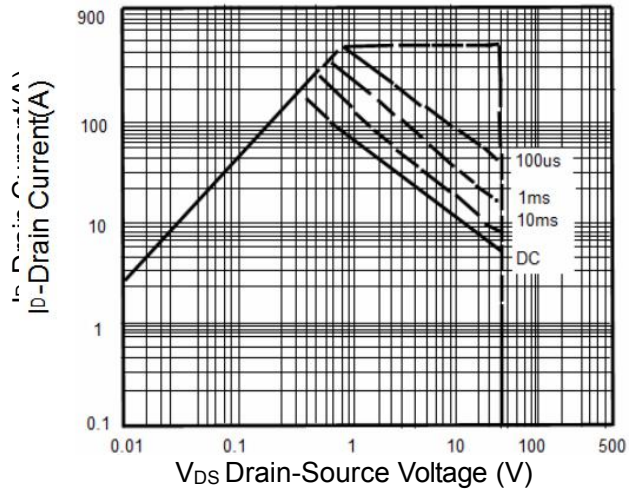
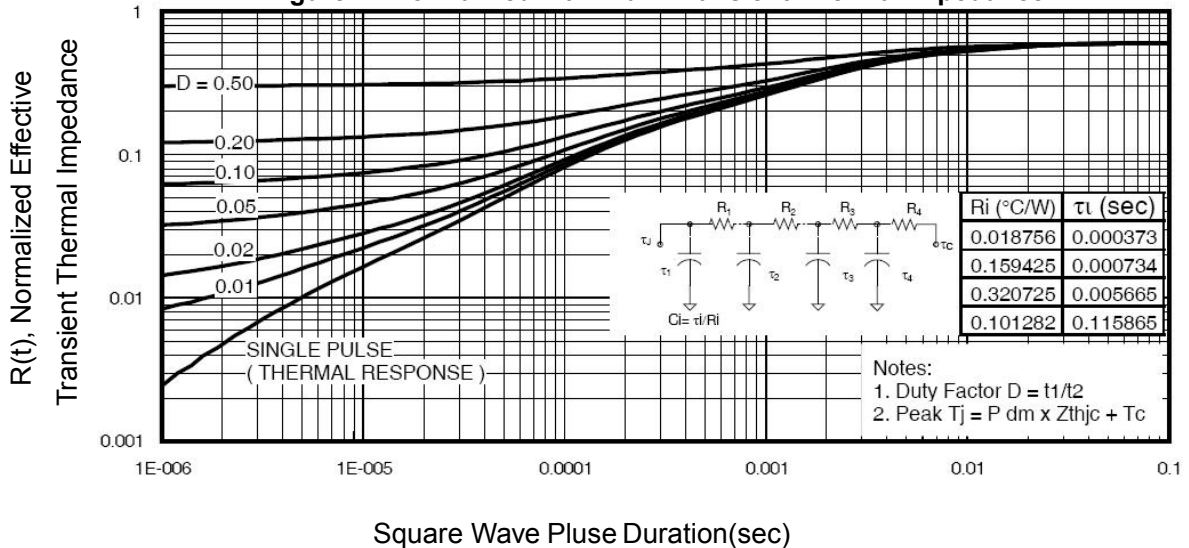
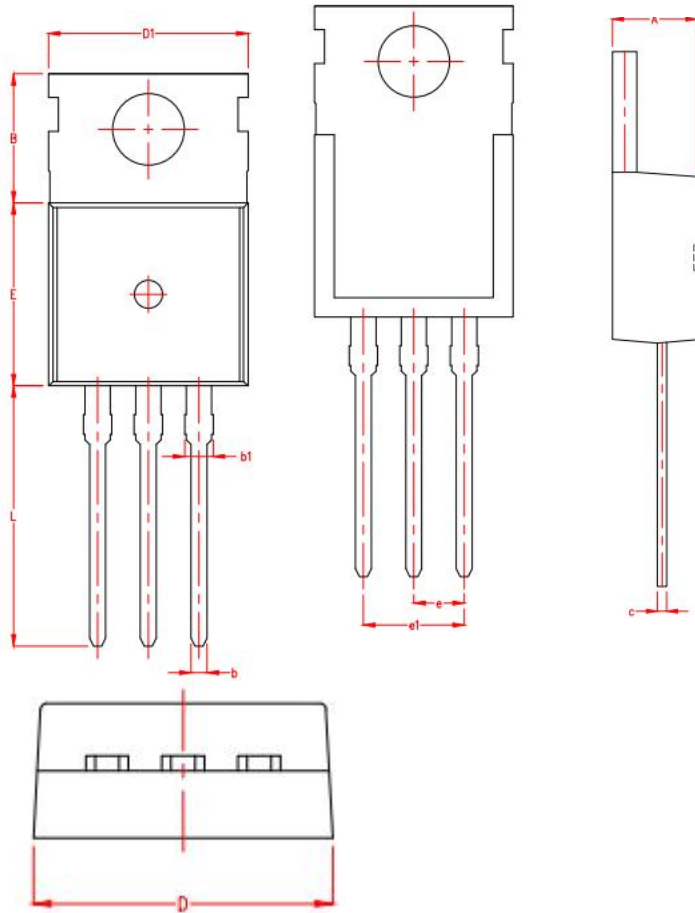


Figure11. Normalized Maximum Transient Thermal Impedance



TO-220 Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.45	4.50	4.55
B	6.40	6.50	6.60
b	0.80TYP.		
b1	1.24	1.27	1.30
c	0.48	0.50	0.52
D	9.95	10.00	10.05
D1	9.80	10.00	10.20
E	9.15	9.20	9.25
e	2.51	2.54	2.57
e1	5.05	5.08	5.11
L	12.95	13.10	13.25