



40H12(文件编号: S&CIC1711)

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



Table 2. Thermal Characteristic

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

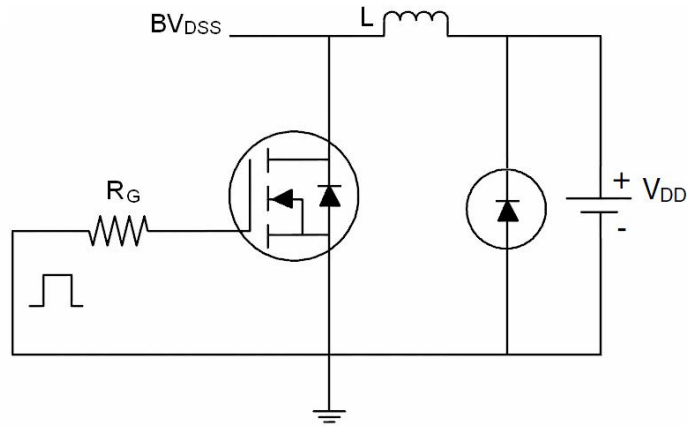
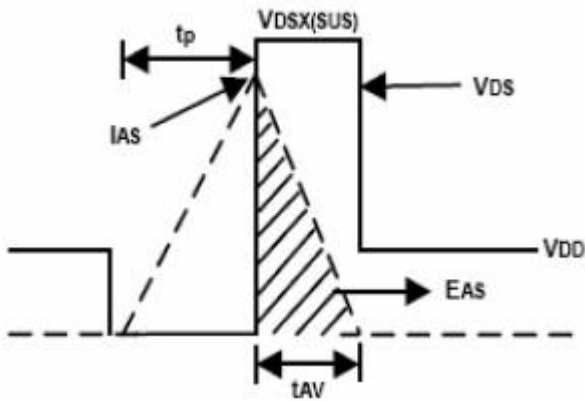
Table 3. Electrical Characteristics (TA=25 $^{\circ}C$ unless otherwise noted)

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		nC
t_{on}	Forward Turn-on Time	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

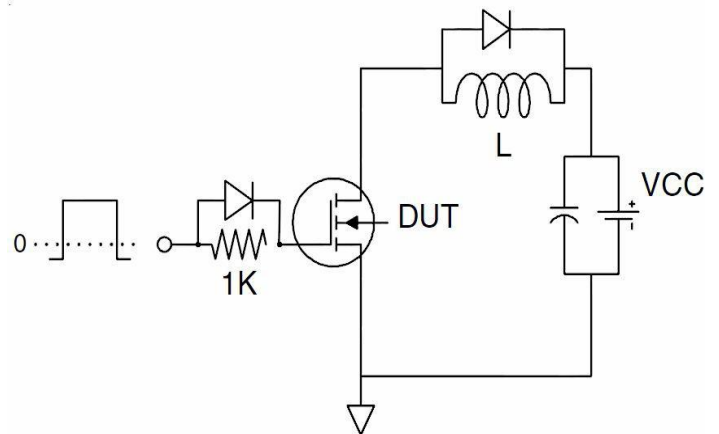
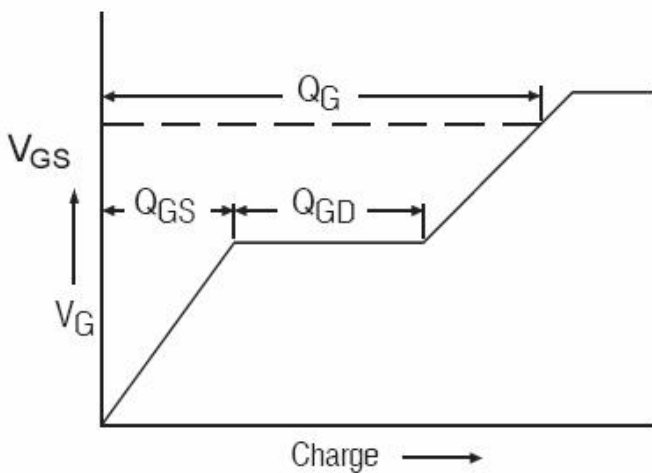
Notes 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_J=25^{\circ}C$

Test Circuit

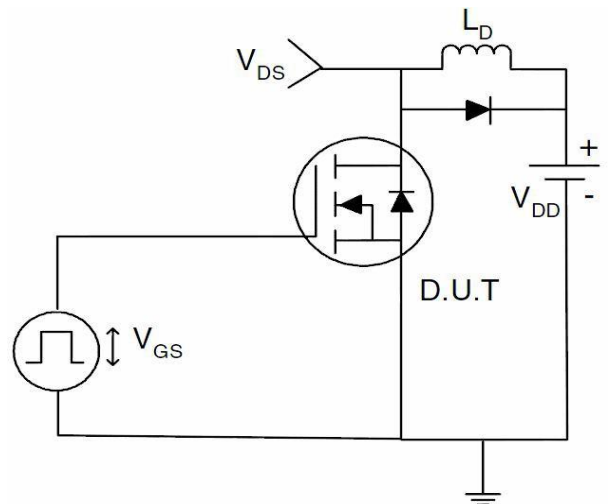
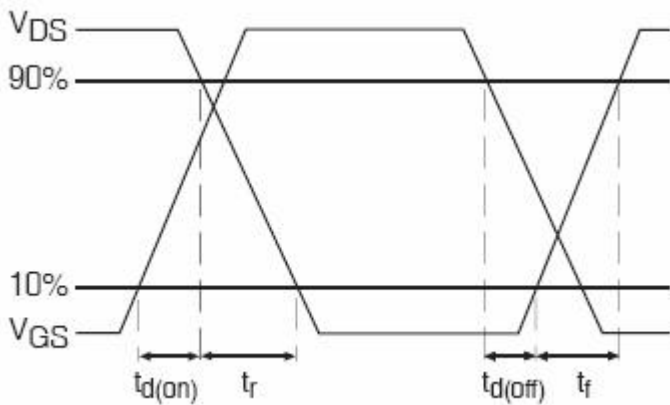
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

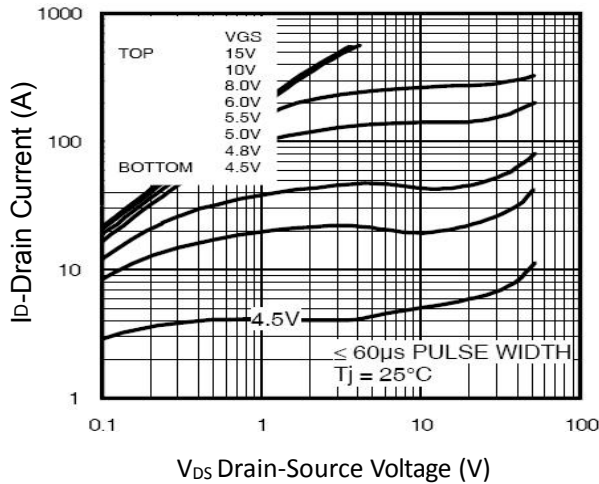


Figure2. Transfer Characteristics

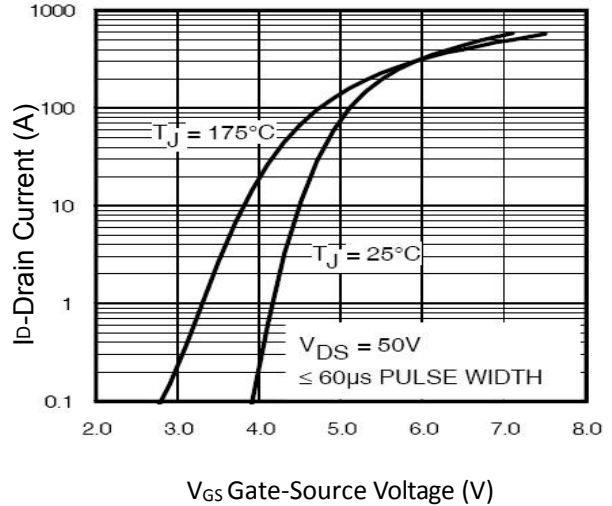


Figure3. VGS(th) vs Junction Temperature

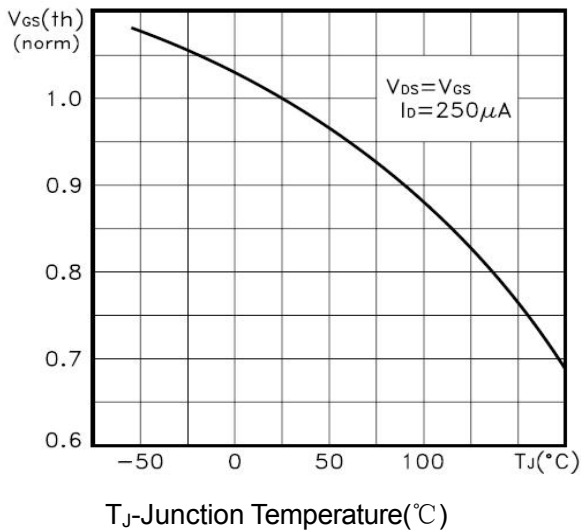


Figure4. BVDS vs Junction Temperature

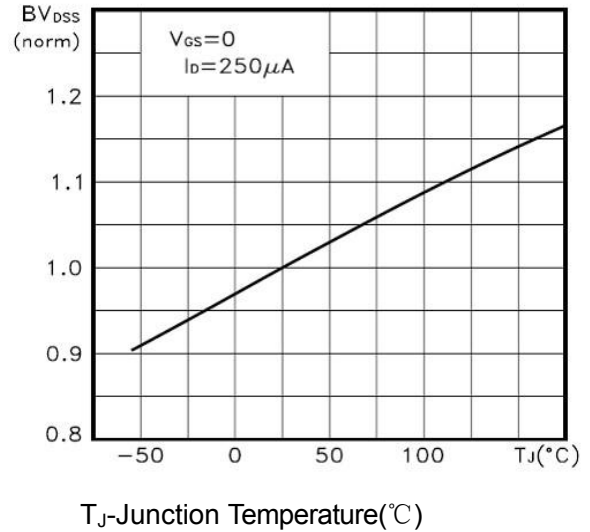


Figure5. ID vs Junction Temperature

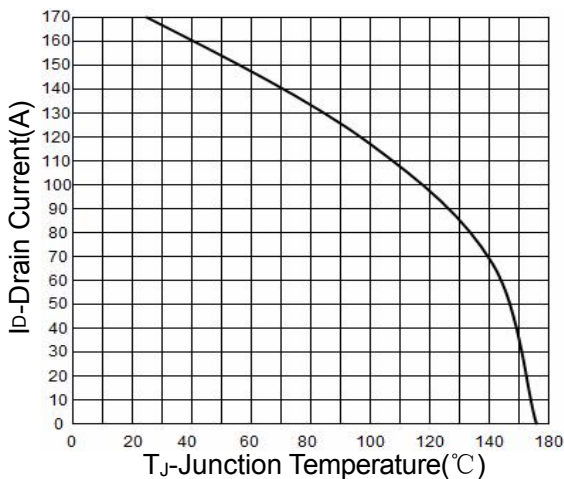


Figure6. RDS(ON)- Junction Temperature

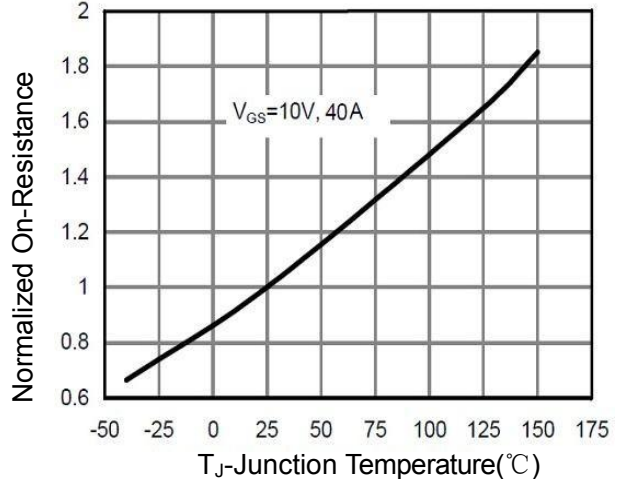




Figure7. Gate Charge

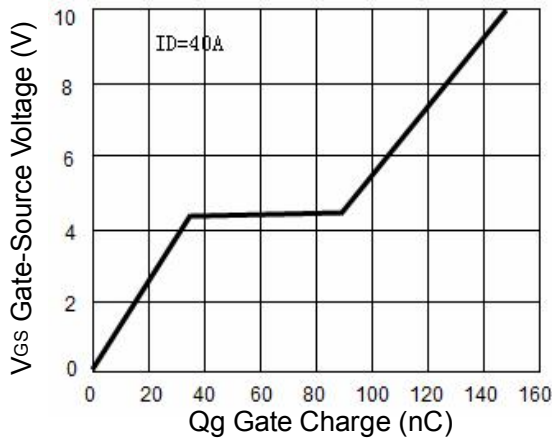


Figure8. Capacitance vs Vds

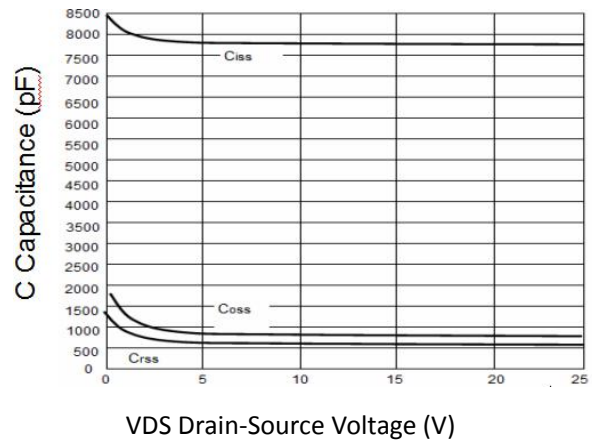


Figure9. Source- Drain Diode Forward

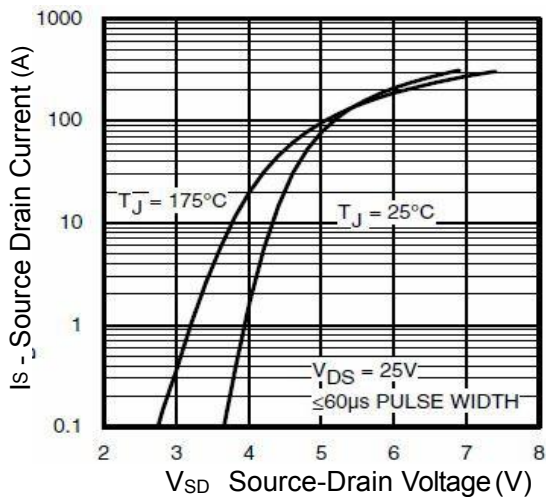


Figure10. Safe Operation Area

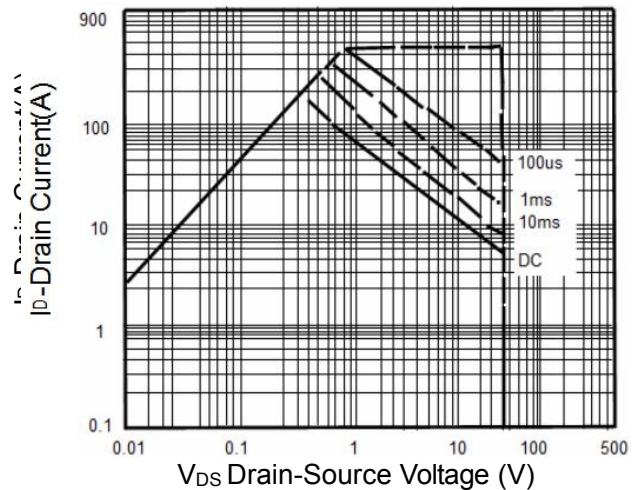
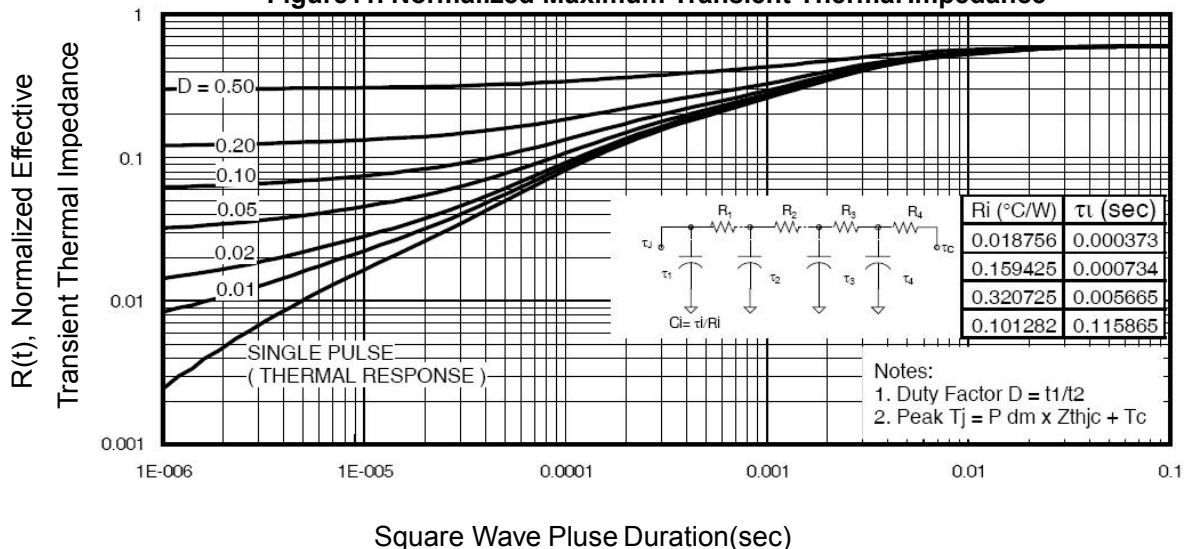
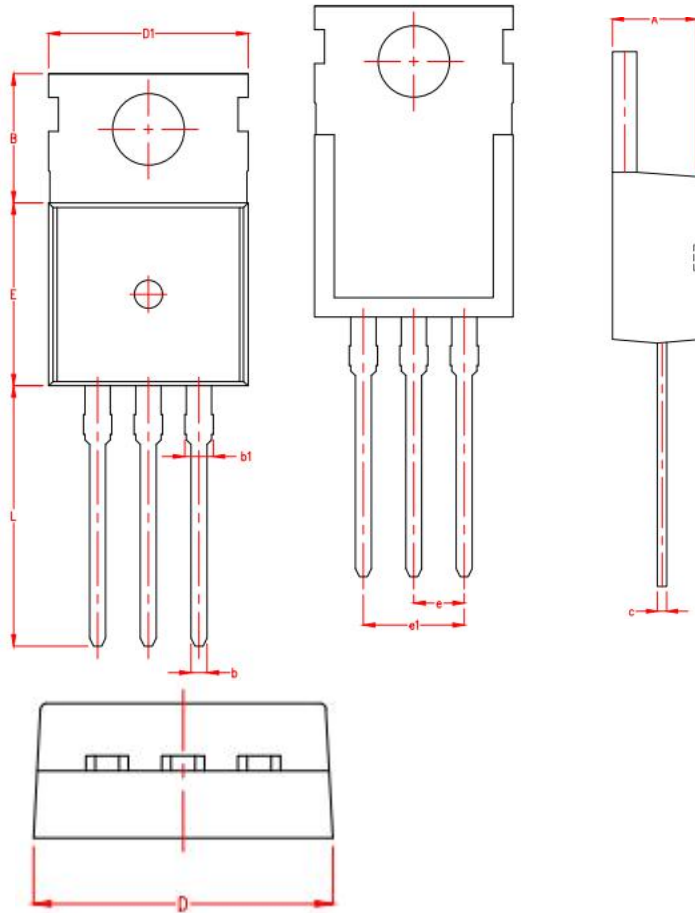


Figure11. Normalized Maximum Transient Thermal Impedance





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