



General Description

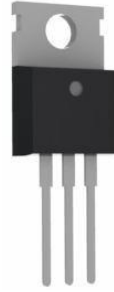
The 6080A is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged EAS capability and ultra low $R_{DS(ON)}$ is suitable for PWM, load switching especially for E-Bike controller applications.

Features

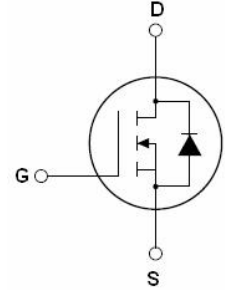
- $V_{DS}=60V$; $I_D=80A$;
 $R_{DS(ON)}<8.0m\Omega @ V_{GS}=10V$
- Special Designed for E-Bike Controller Application
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

Application

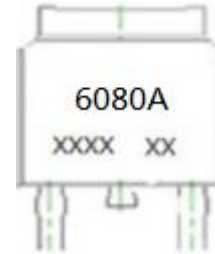
- 48V E-Bike Controller Applications
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



TO-220(DPAK)
Top View



Schematic Diagram



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
6080A	6080A	TO-220	-	-	-

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	60	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	V
$I_{D(DC)}$	Drain Current (DC) at $T_c=25^\circ C$	80	A
$I_{D(DC)}$	Drain Current (DC) at $T_c=100^\circ C$	56	A
$I_{DM(pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	240	A
P_D	Maximum Power Dissipation($T_c=25^\circ C$)	60	W
	Derating Factor	2.5	W/°C
E_{AS}	Single Pulse Avalanche Energy (Note 2)	310	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: $T_J=25^\circ C, V_{DD}=33V, V_G=10V$



Table 2. Thermal Characteristic

Symbol	Parameter	Value	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	---	1.5	$^{\circ}C/W$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V,$	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.7	2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note2</small>	$V_{GS}=10V, I_D=40A$	-	6.6	8	m Ω
		$V_{GS}=4.5V, I_D=30A$	-	9.0	11	
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=20A$	10	-	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V,$ $f=1.0MHz$	-	1980	-	pF
C_{oss}	Output Capacitance		-	470	-	pF
C_{rss}	Reverse Transfer Capacitance		-	14	-	pF
Q_g	Total Gate Charge	$V_{DS}=30V, I_D=20A,$ $V_{GS}=10V$	-	31	-	nC
Q_{gs}	Gate-Source Charge		-	6	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=30V, I_D=20A,$ $R_L=1\Omega, R_{GEN}=3\Omega,$ $V_{GS}=10V$	-	10	-	ns
t_r	Turn-on Rise Time		-	5	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	30	-	ns
t_f	Turn-off Fall Time		-	8	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	80	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	320	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=20A$	-	0.8	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$T_J=25^{\circ}C,$ $I_F=20A, di/dt=100A/\mu s$	-	17	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	58	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

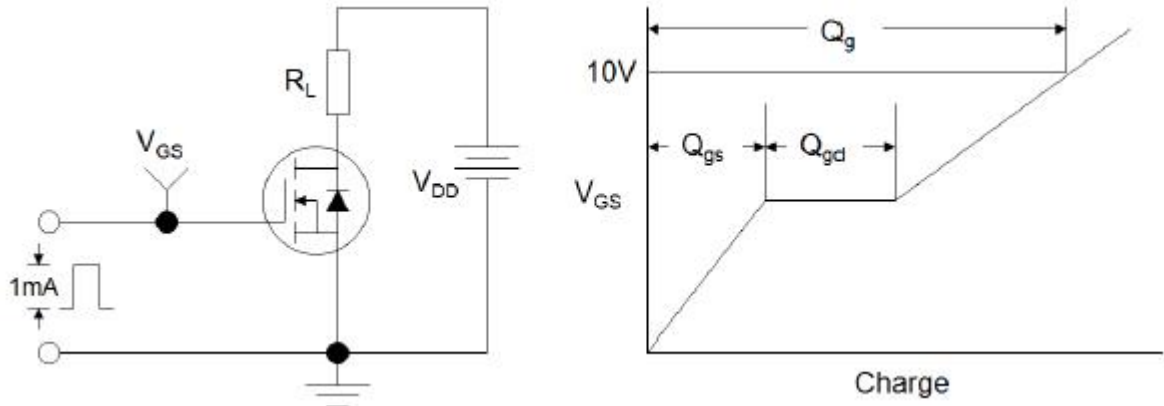


Figure 1: Gate Charge Test Circuit & Waveform

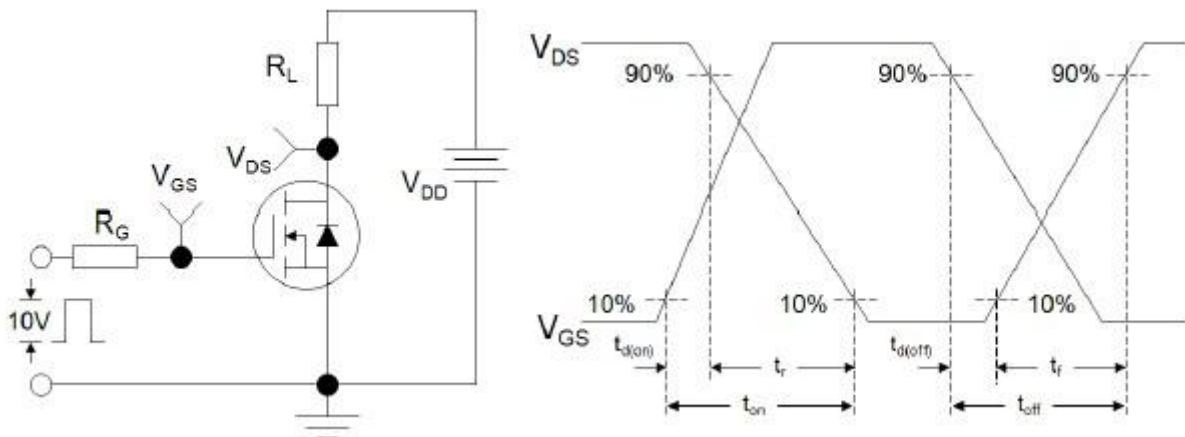


Figure 2: Resistive Switching Test Circuit & Waveforms

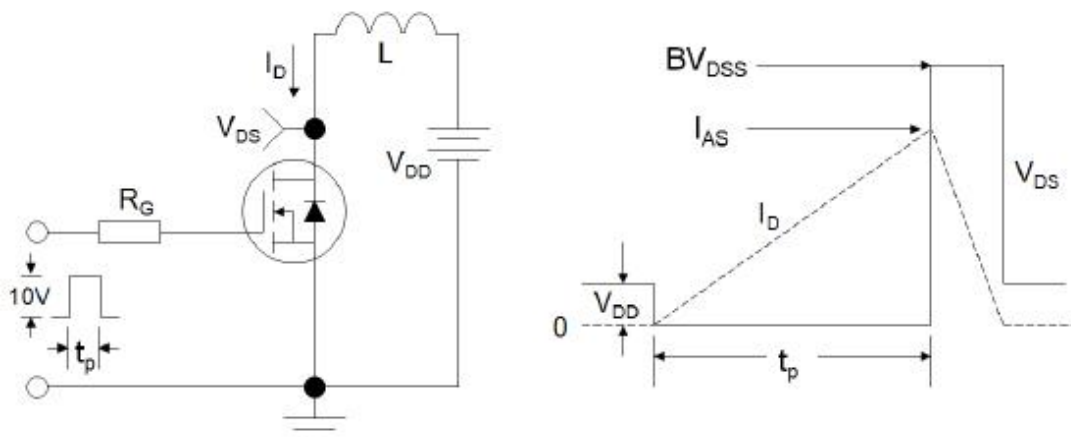
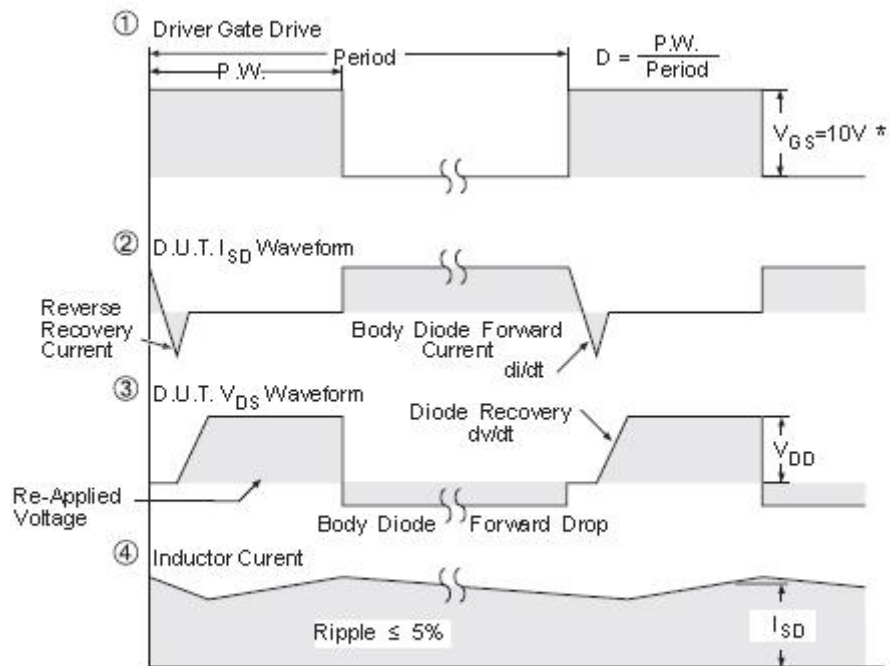
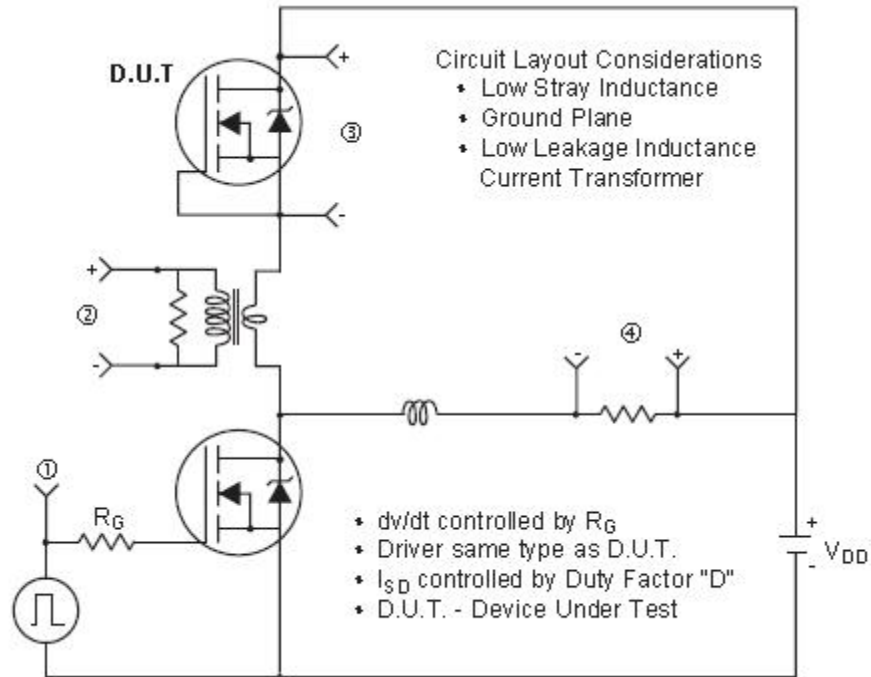


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms



* $V_{GS} = 5V$ for Logic Level Devices

Figure 4: Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

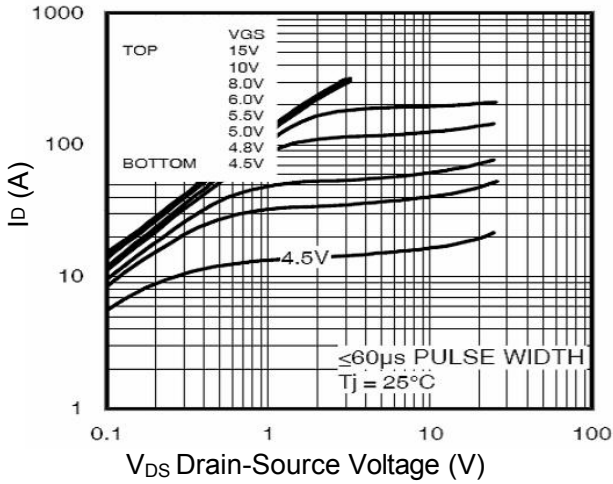


Figure2. Transfer Characteristics

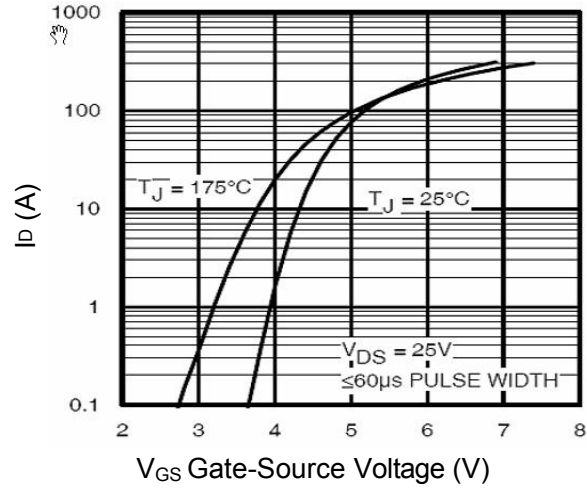


Figure3. BV_{DSS} vs Junction Temperature

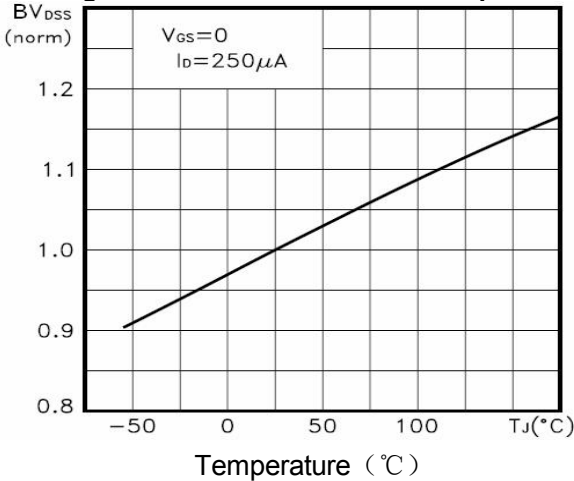


Figure4. ID vs Junction Temperature

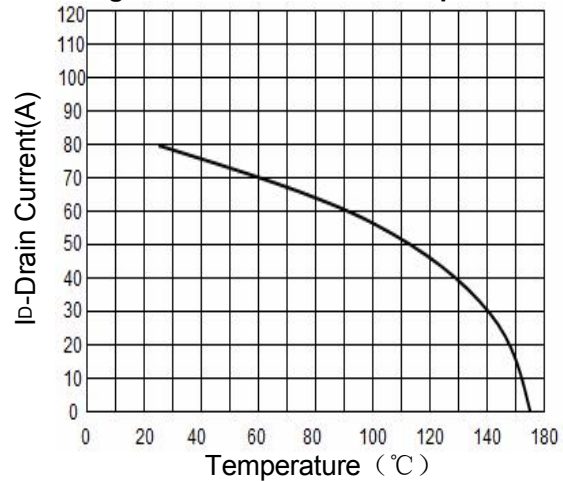


Figure7. BV_{DSS} vs Junction Temperature

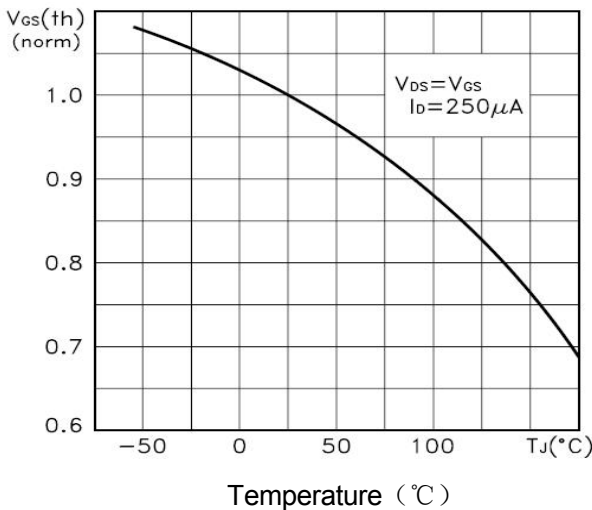


Figure8. V_{GS(th)} vs Junction Temperature

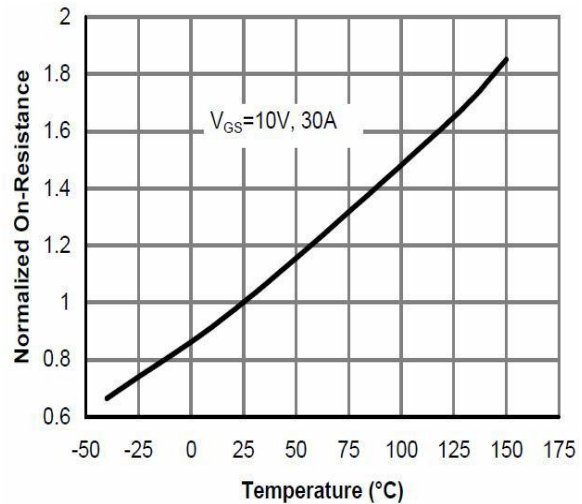




Figure7. Gate Charge

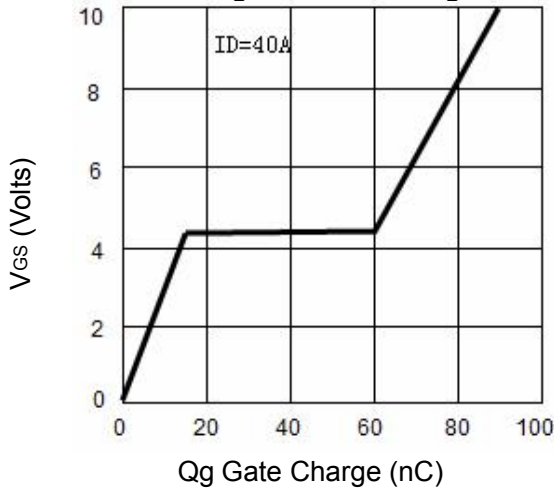


Figure8. Capacitance vs Vds

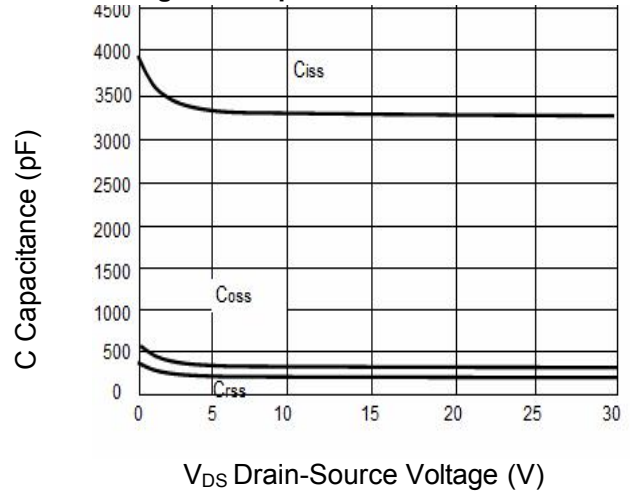


Figure9. Source- Drain Diode Forward

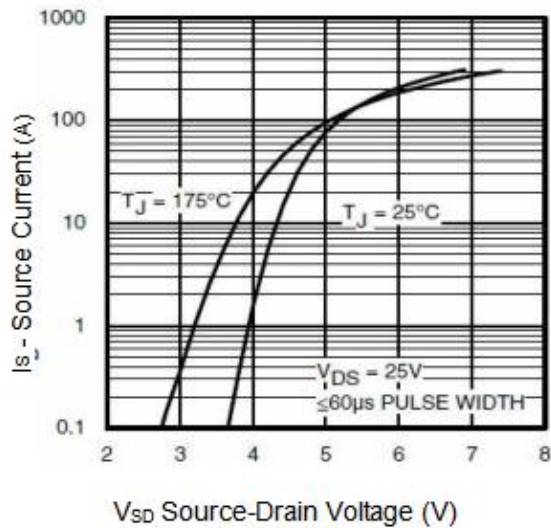


Figure10. Safe Operation Area

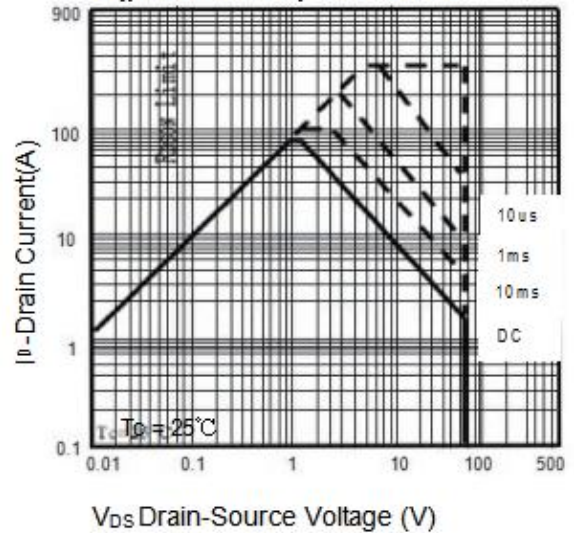
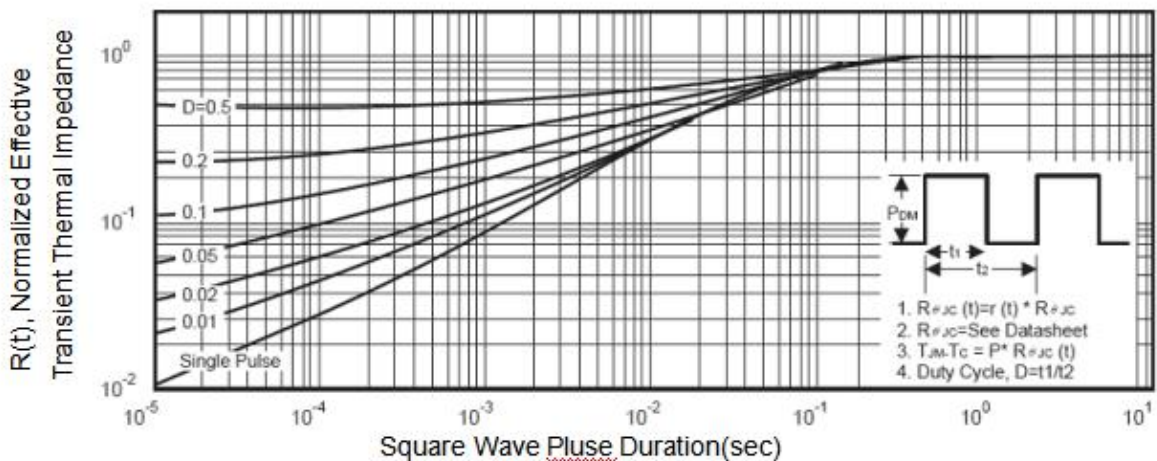
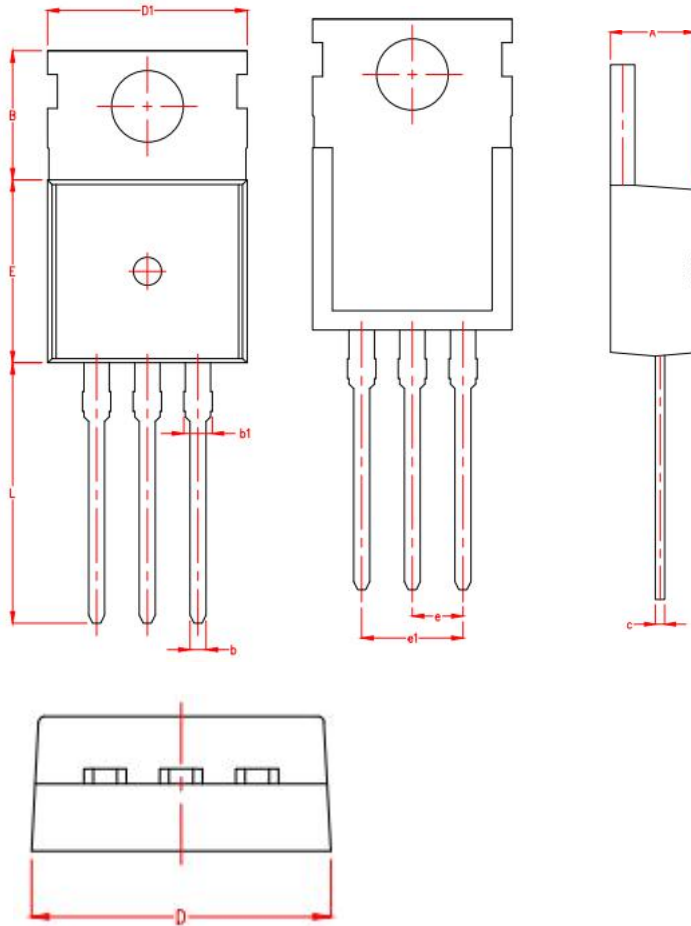


Figure11. Normalized Maximum Transient Thermal Impedance





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