



### General Description

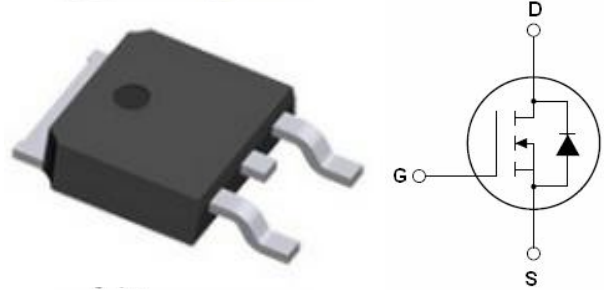
The 6080K is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged EAS capability and ultra low  $R_{DS(ON)}$  is suitable for PWM, load switching especially for E-Bike controller applications.

### Features

- $V_{DS}=60V$ ;  $I_D=80A$ ;
- $R_{DS(ON)}<8.2m\Omega @ V_{GS}=10V$
- Special Designed for E-Bike Controller Application
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

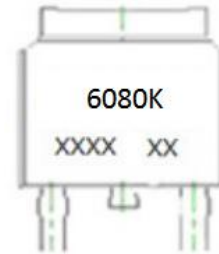
### Application

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



TO-252(DPAK)  
Top View

Schematic Diagram



Marking and pin Assignment

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
6080K	6080K	TO-252	-	-	-

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 ( $V_{DS}=0V$ )	$\pm 20$	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. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



**Table 2. Thermal Characteristic**

Symbol	Parameter	Value	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	---	2.2	$^{\circ}C/W$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	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	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	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>	$V_{GS}=10V, I_D=40A$	-	6.9	8.2	m $\Omega$
		$V_{GS}=4.5V, I_D=30A$	-	9.3	11	
$g_{FS}$	Forward Transconductance	$V_{DS}=5V, I_D=20A$	10	-	-	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	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
<b>Switching Characteristics</b>						
$t_{d(on)}$	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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	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

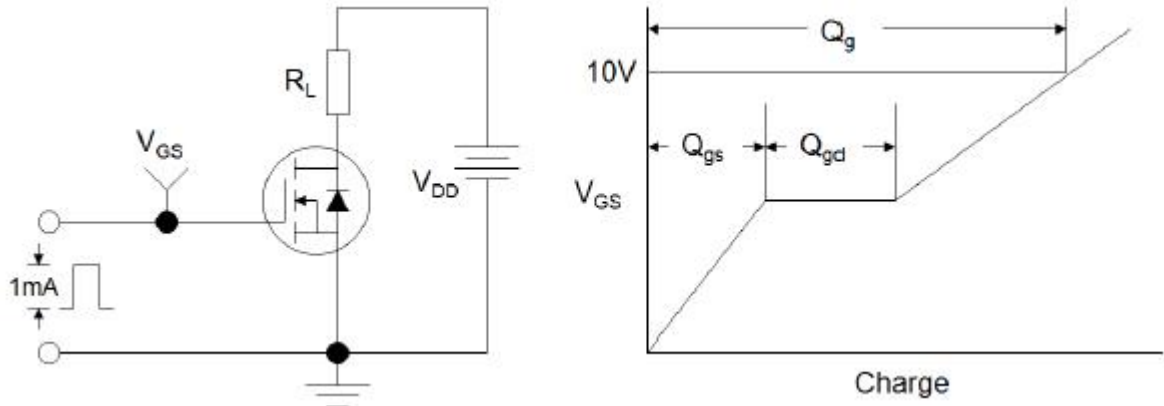


Figure 1: Gate Charge Test Circuit & Waveform

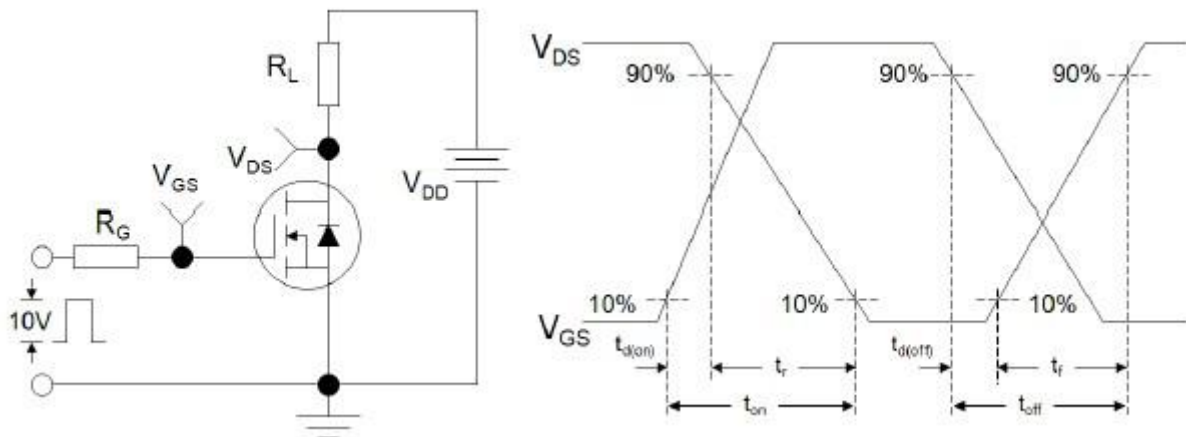


Figure 2: Resistive Switching Test Circuit & Waveforms

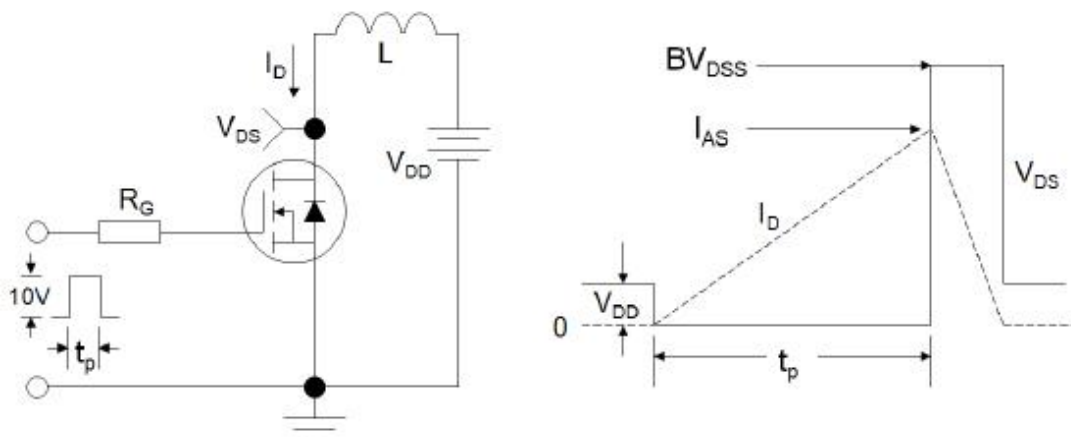
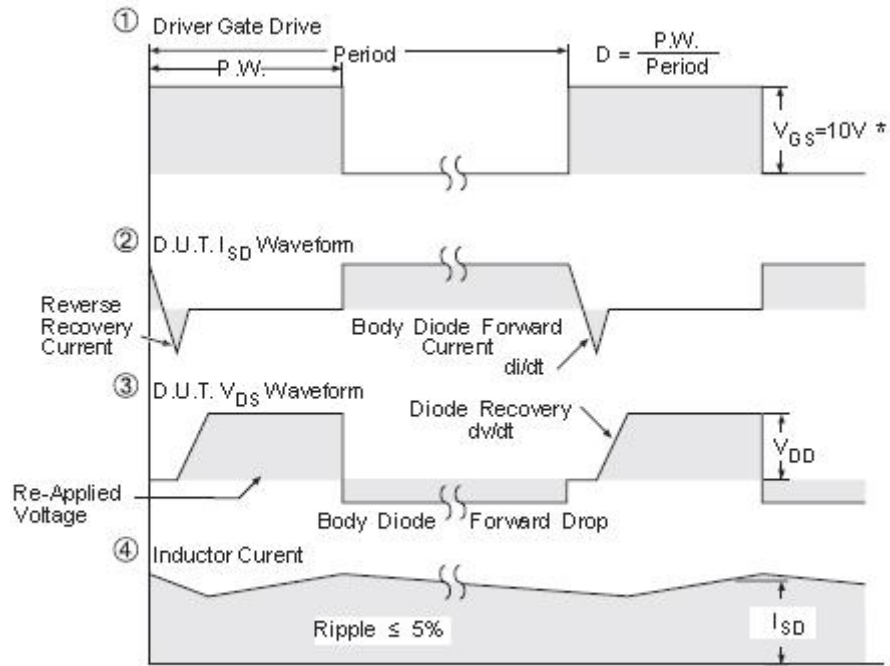
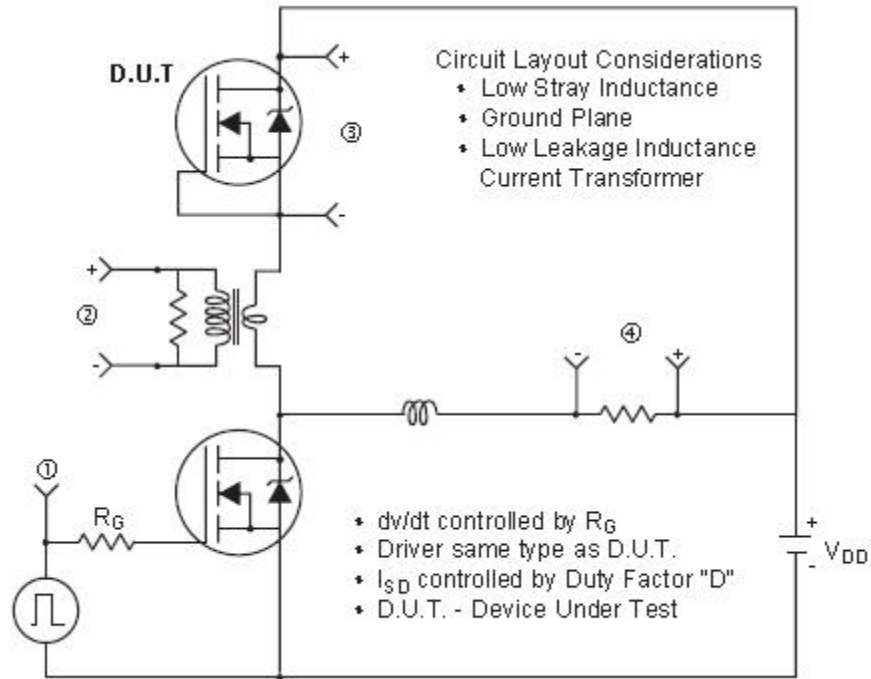


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms



\*  $V_{GS} = 5V$  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

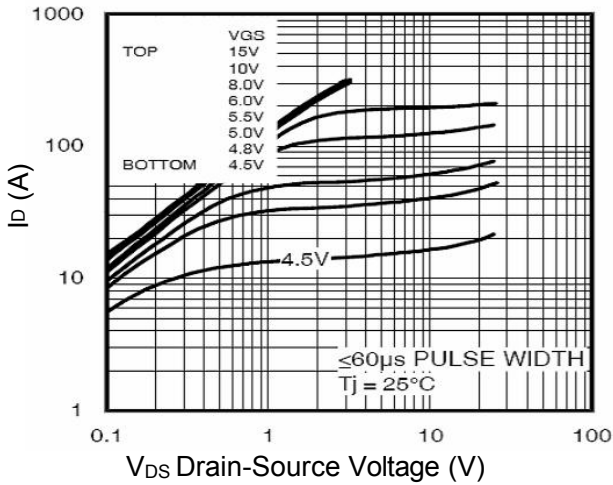


Figure2. Transfer Characteristics

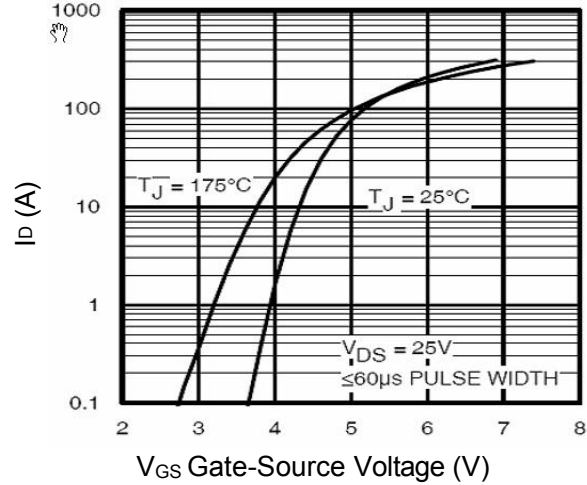


Figure3. BV<sub>DSS</sub> vs Junction Temperature

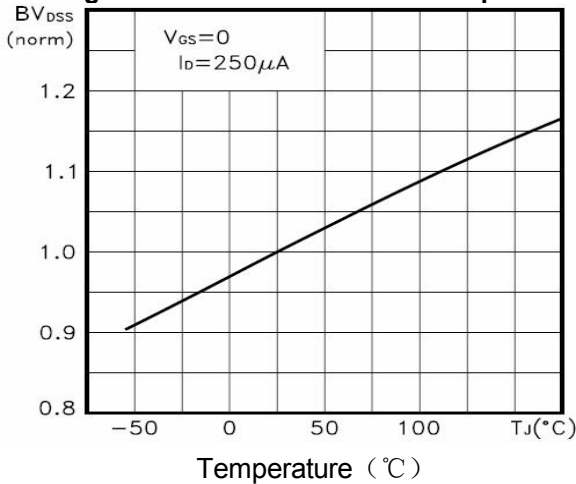


Figure4. ID vs Junction Temperature

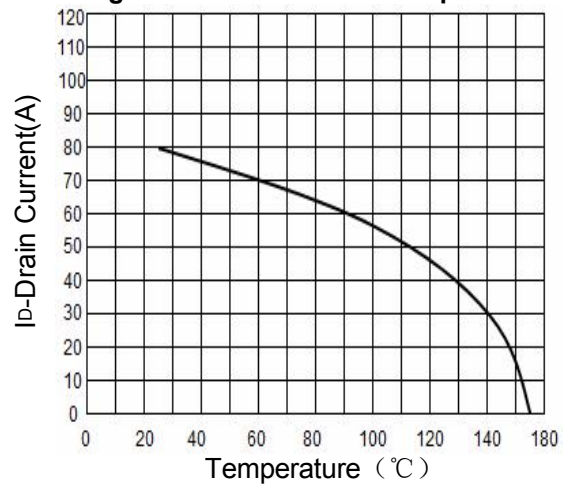


Figure7. BV<sub>DSS</sub> vs Junction Temperature

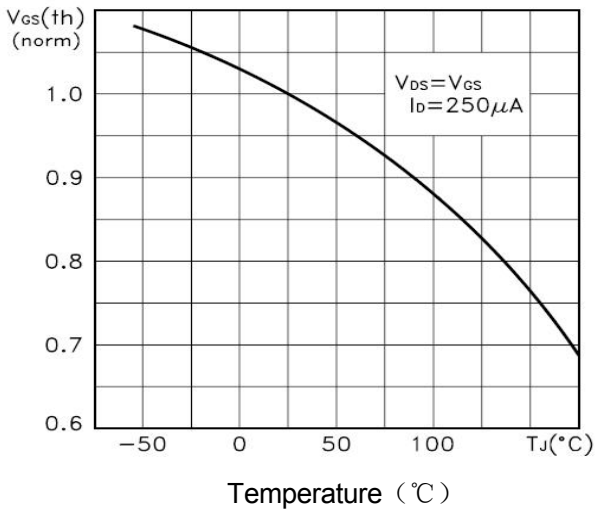
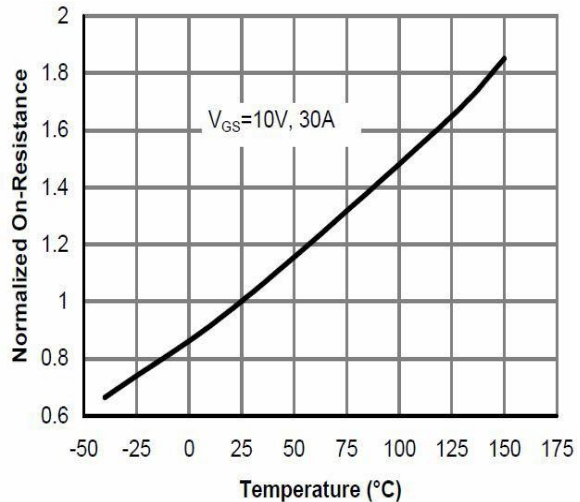
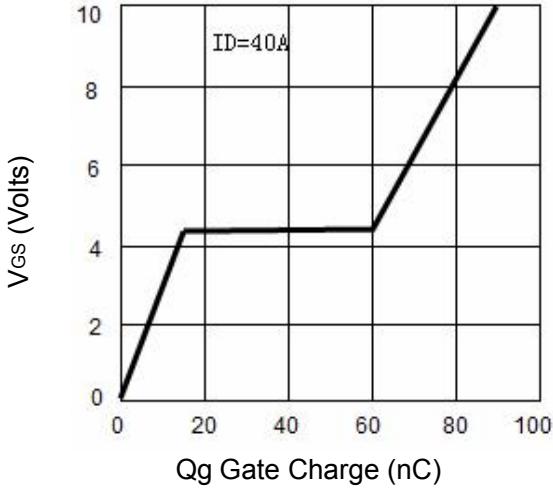


Figure8. V<sub>GS(th)</sub> vs Junction Temperature

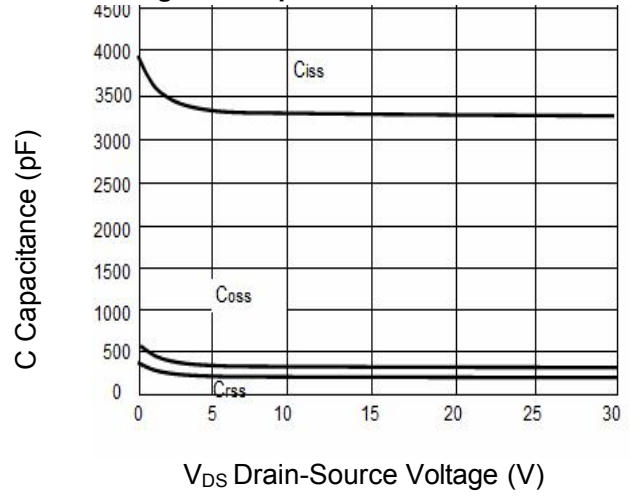




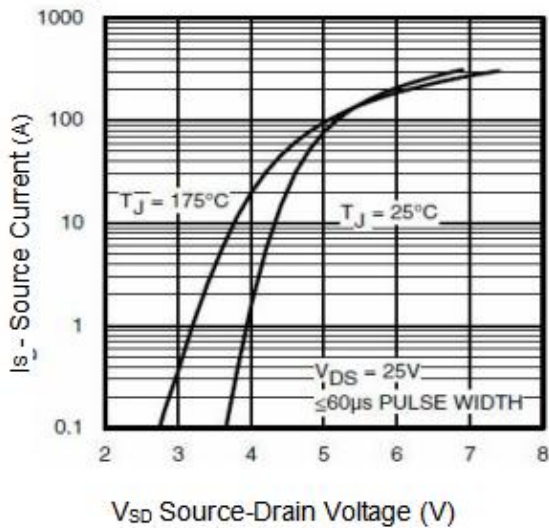
#### Figure7. Gate Charge



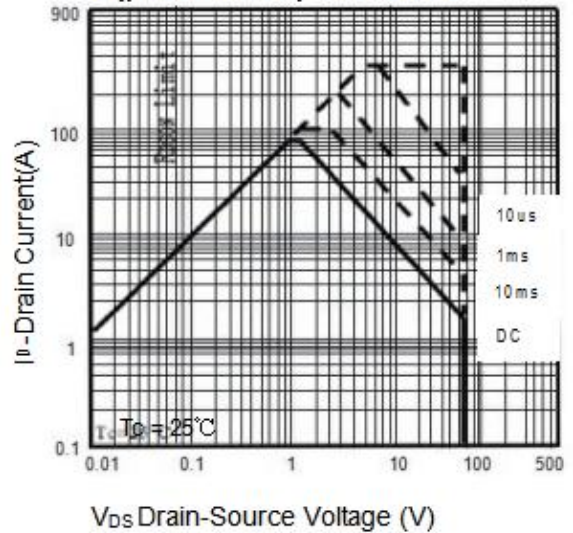
#### Figure8. Capacitance vs Vds



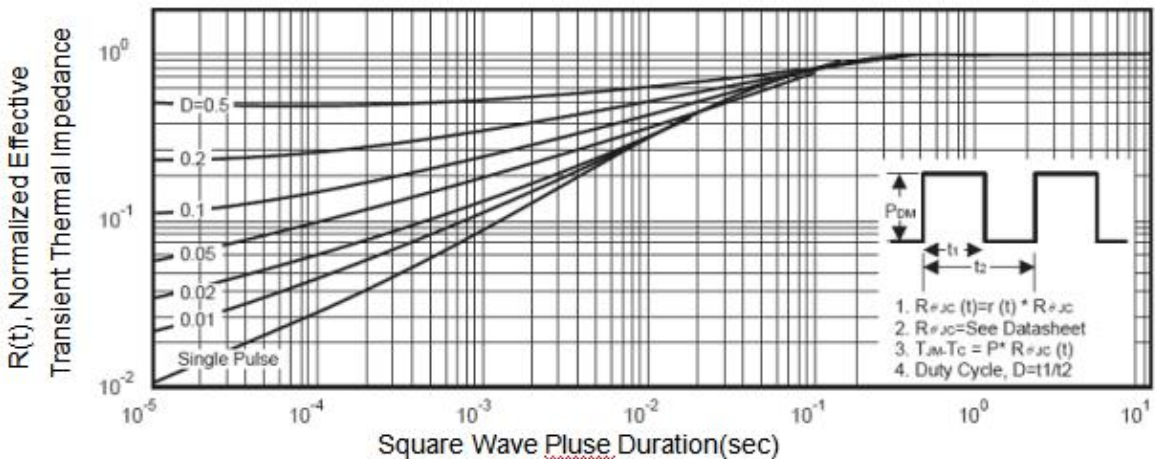
#### Figure9. Source- Drain Diode Forward



#### Figure10. Safe Operation Area

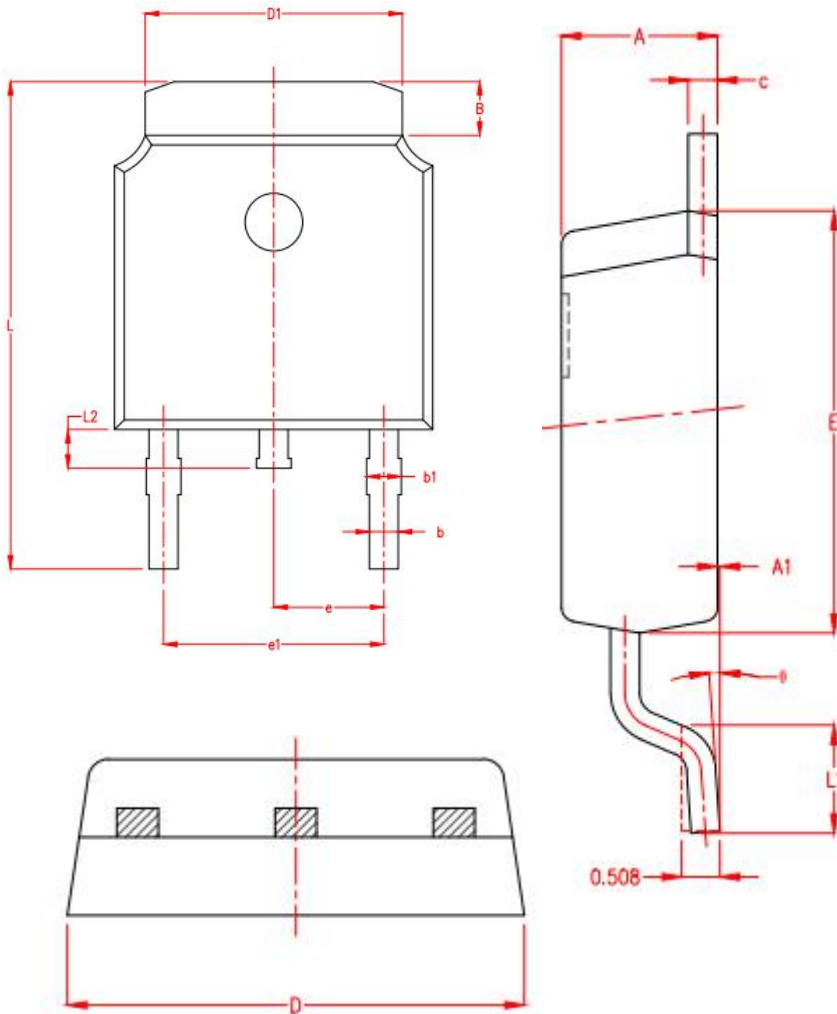


#### Figure11. Normalized Maximum Transient Thermal Impedance





### TO-252 Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.25	2.35
A1	0.00	0.06	0.12
B	0.96	1.11	1.26
b	0.59	0.69	0.79
b1	0.69	0.81	0.93
c	0.34	0.42	0.50
D	6.45	6.60	6.75
D1	5.23	5.33	5.43
E	5.95	6.10	6.25
e	2.286TYP.		
e1	4.47	4.57	4.67
L	9.90	10.10	10.30
L1	1.40	1.55	1.70
L2	0.60	0.80	1.00
θ	0°	4°	8°