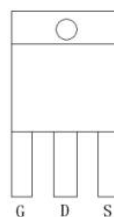
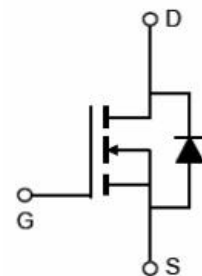


**Main Product Characteristics:**

$V_{DSS}$	30V
$R_{DS(on)}$	1.95m $\Omega$ (typ.)
$I_D$	180A


**TO-220**

**Pin Assignments**

**Schematic Diagram**
**Features and Benefits:**

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature


**Description:**

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

**Absolute Max Rating:**

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	180	A
$I_{DM}$	Pulsed Drain Current②	720	
$P_D @ TC = 25^\circ C$	Power Dissipation③	24	W
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy @ $L=0.5mH$	324	mJ
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$

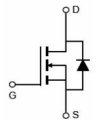
## Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case <sup>③</sup>	—	1.15	°C/W

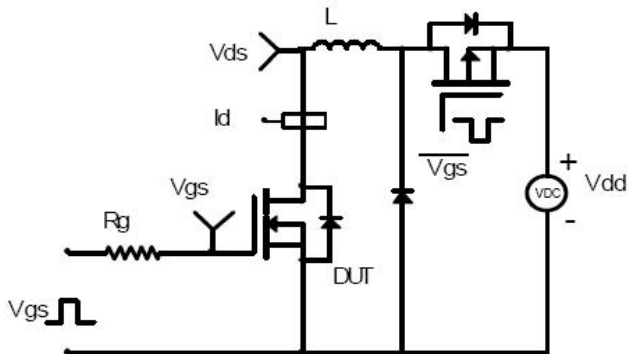
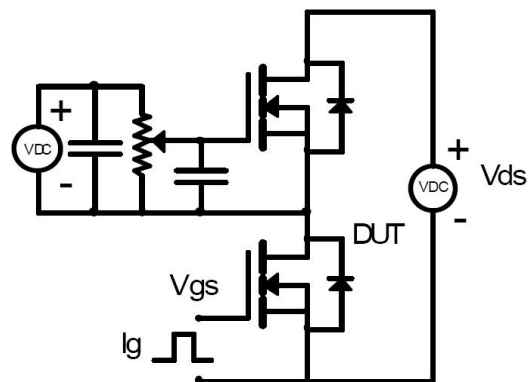
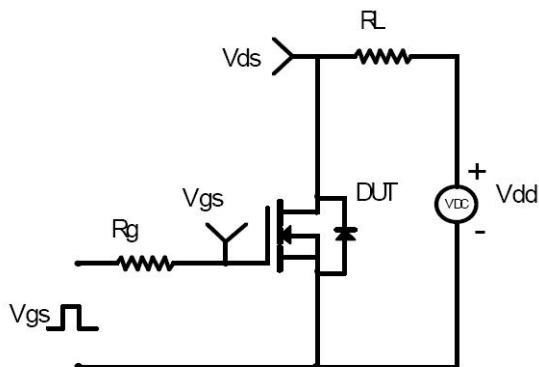
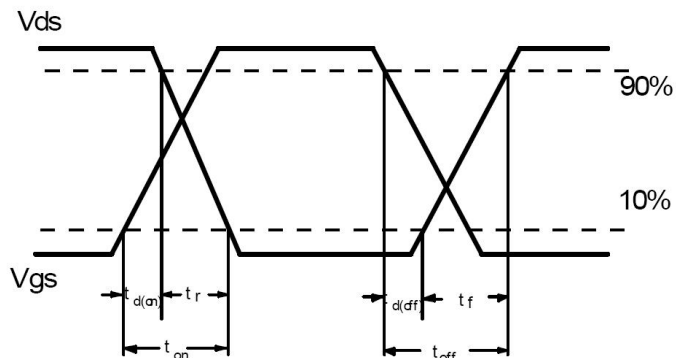
## Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	1.95	2.4	m $\Omega$	$V_{GS}=10V, I_D=30A$
		—	3.5	5		$V_{GS}=4.5V, I_D=20A$
$V_{GS(th)}$	Gate threshold voltage	1	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	$\mu A$	$V_{DS} = 30V, V_{GS} = 0V$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
$Q_g$	Total gate charge	—	72	—	nC	$I_D = 30A,$ $V_{DS}=15V,$ $V_{GS} = 10V$
$Q_{gs}$	Gate-to-Source charge	—	11	—		
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	15	—		
$t_{d(on)}$	Turn-on delay time	—	10.2	—	ns	$V_{GS}=10V, V_{DS}=15V,$ $R_{GEN}=3\Omega$ $I_D = 30A$
$t_r$	Rise time	—	6.4	—		
$t_{d(off)}$	Turn-Off delay time	—	75	—		
$t_f$	Fall time	—	16	—		
$C_{iss}$	Input capacitance	—	4932	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1MHz$
$C_{oss}$	Output capacitance	—	685	—		
$C_{riss}$	Reverse transfer capacitance	—	566	—		

## Source-Drain Ratings and Characteristics

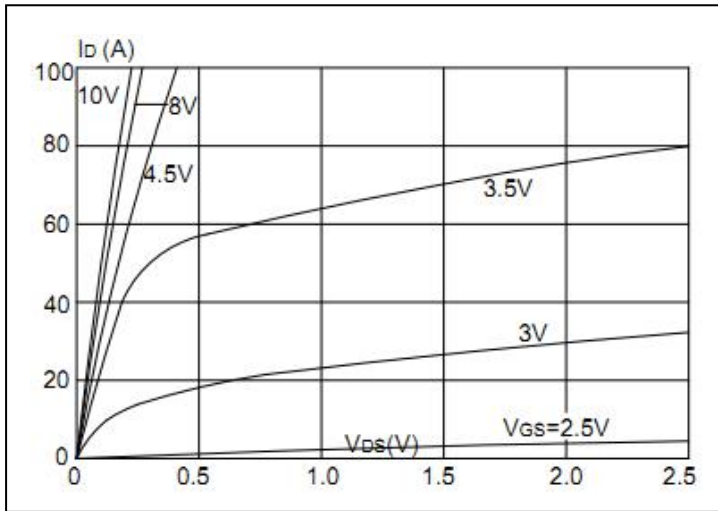
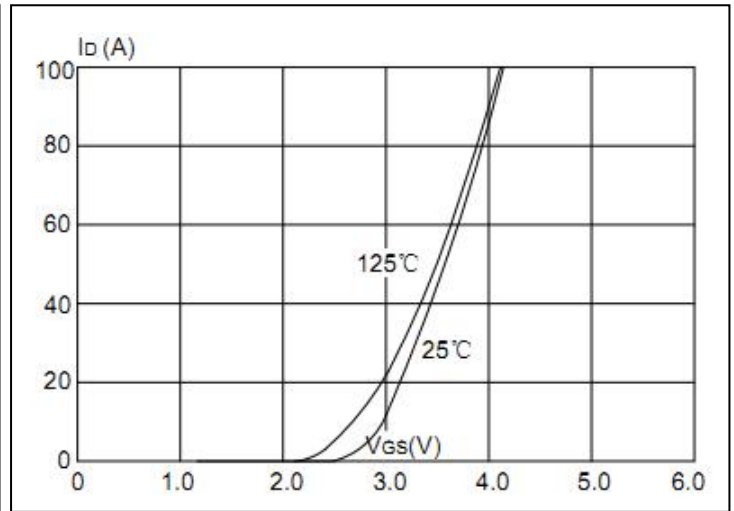
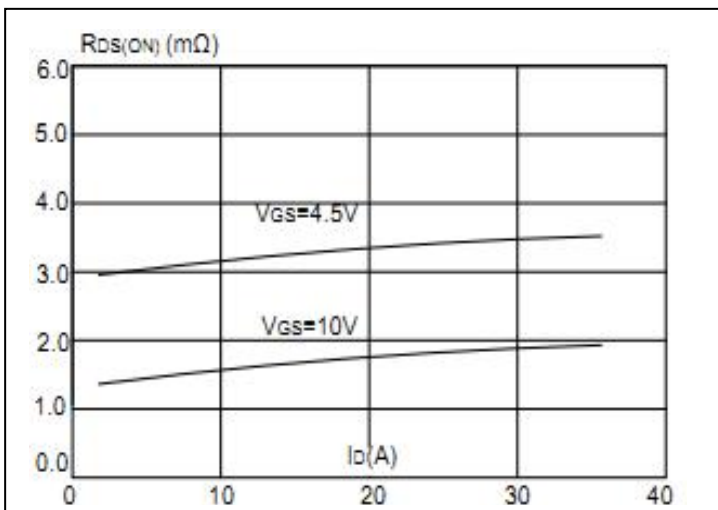
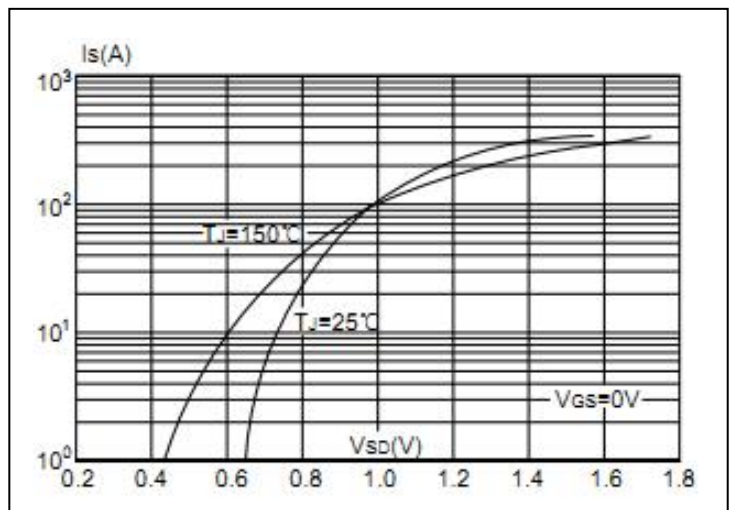
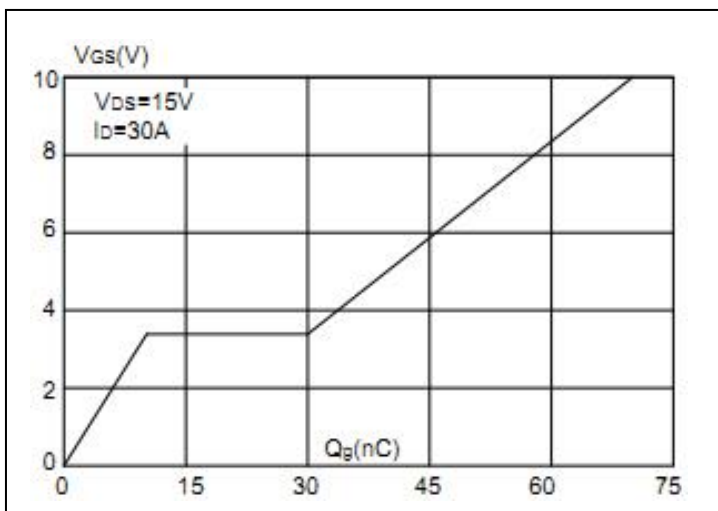
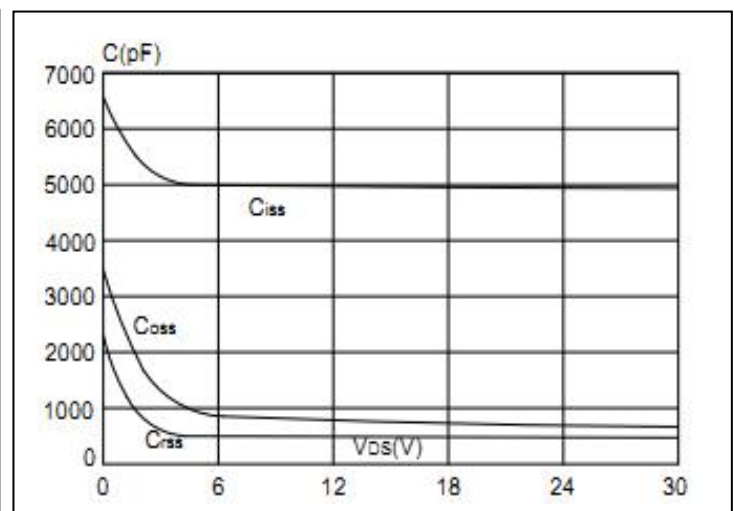
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	180	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	720	A	
$V_{SD}$	Diode Forward Voltage	—	—	1.2	V	$I_S=30A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	—	30	—	ns	$I_F=20A, di/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	—	15	—	nC	

## Test Circuits and Waveforms

**EAS Test Circuit:**

**Gate Charge Test Circuit:**

**Switching Time Test Circuit:**

**Switching Waveforms:**


### Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

**Typical Electrical and Thermal Characteristics**

**Figure 1. Typical Output Characteristics**

**Figure 2. Transfer Characteristics**

**Figure 3. On-resistance vs. Drain Current**

**Figure 4. Body Diode Characteristics**

**Figure 5. Gate Charge**

**Figure 6. Capacitance**

Typical Electrical and Thermal Characteristics

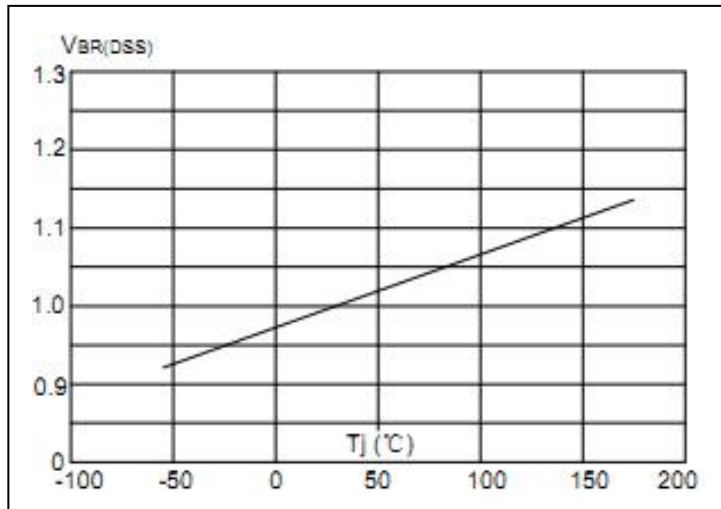


Figure7.Drain-to-Source Breakdown Voltage vs. Temperature

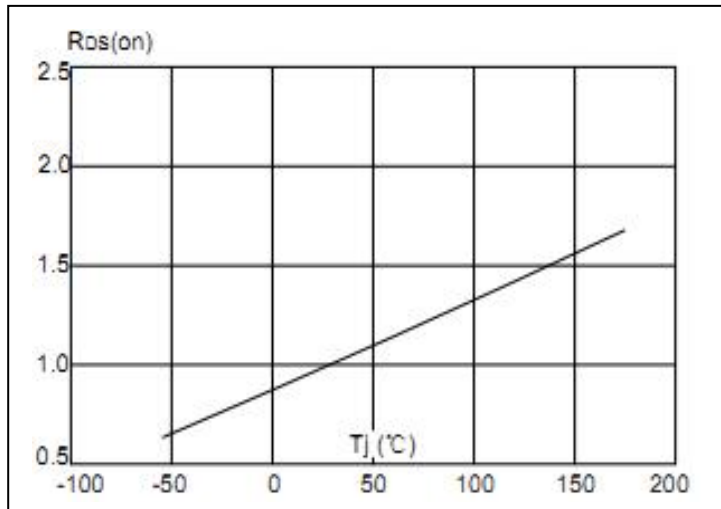


Figure8.Normalized On-Resistance vs. Junction Temperature

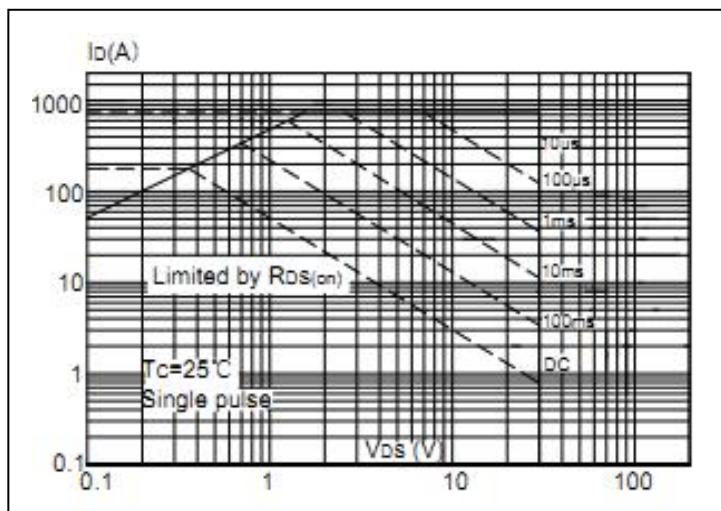


Figure9.Safe Operating Area

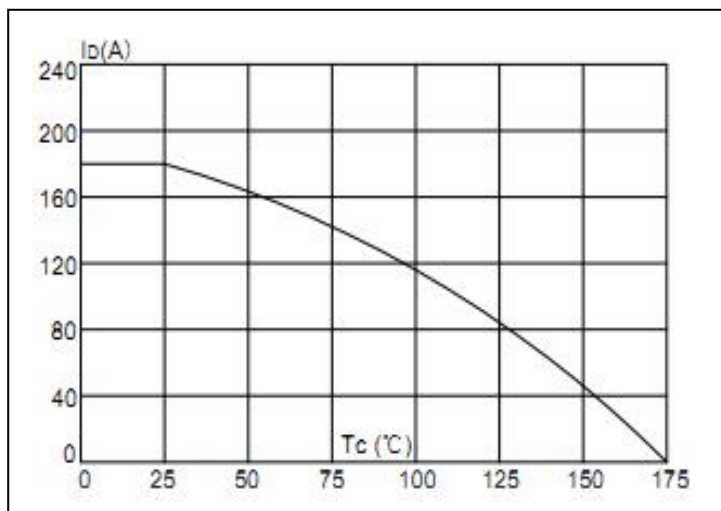


Figure10.Drain Current vs. Case Temperature

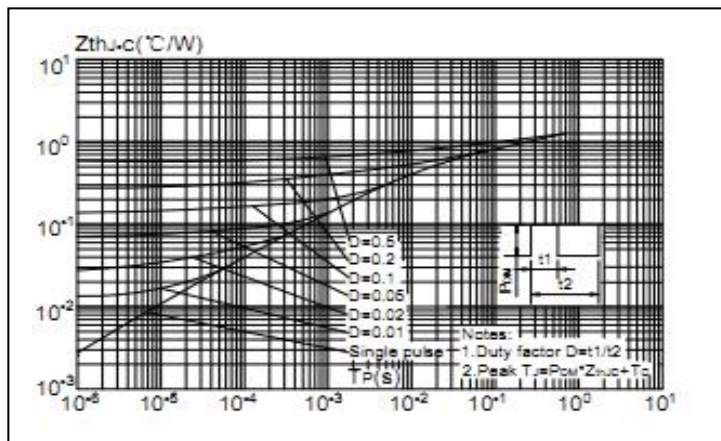
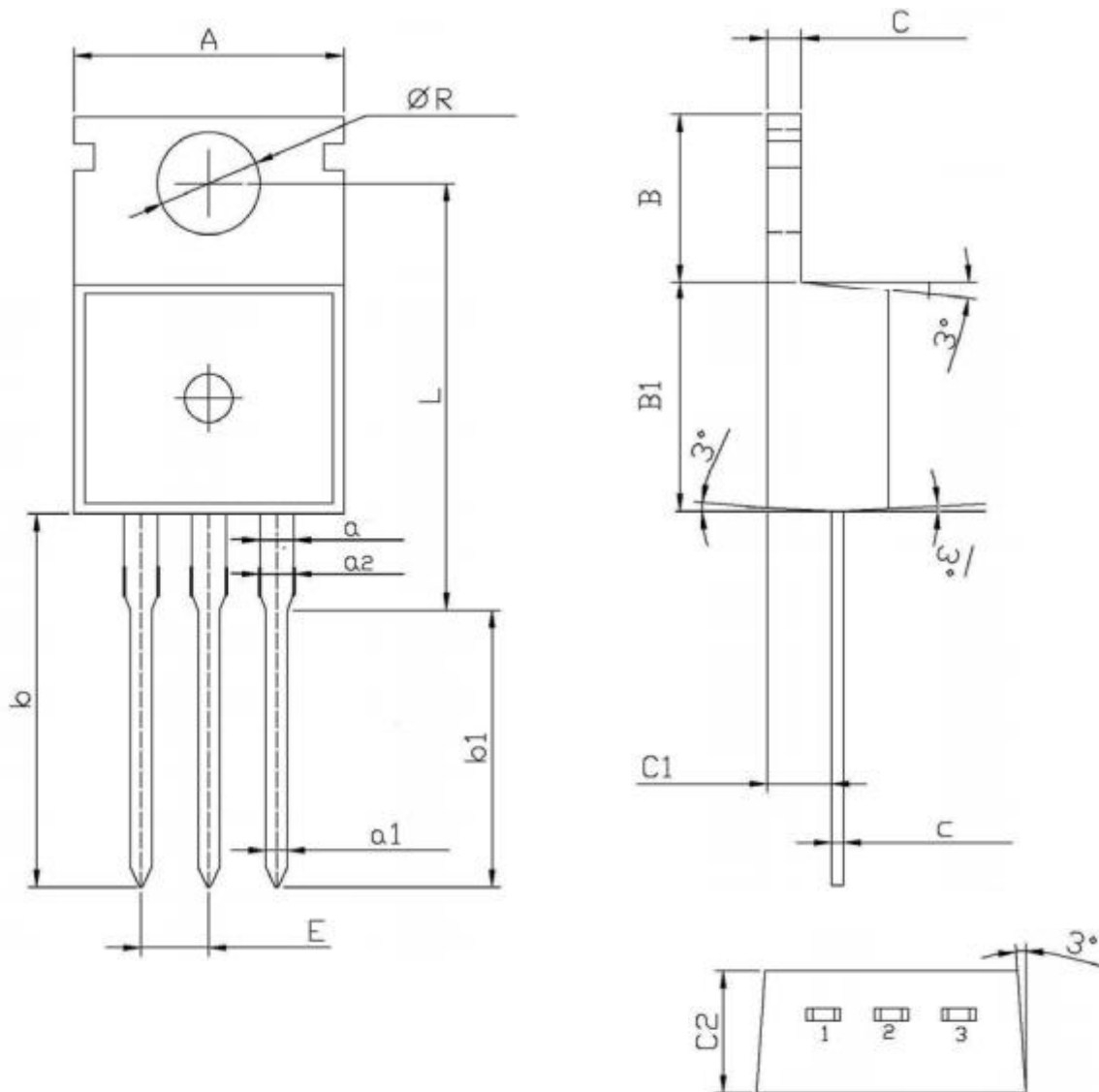


Figure11.Normalized Maximum Transient Thermal Impedance

**Mechanical Data:**

TO-220 Package Outline (Unit:mm)



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	9.8	10.2	C	1.2	1.4
R	3.56	3.64	B	6.3	6.7
L	15.7	16.1	B1	9.0	9.4
b	12.6	13.6	C1	2.2	2.6
b1	9.6	10.6	a1	0.7	0.9
a	1.22	1.32	c	0.4	0.6
E	2.34	2.74	C2	4.3	4.7
a2	1.25	1.45			

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