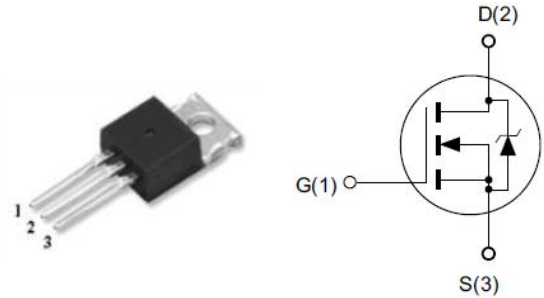


Features

- ◆ 110V, 173A, $R_{DS(on)}$ (Typ.) = 3.4m Ω @ $V_{GS} = 10V$
- ◆ Excellent $R_{DS(on)}$ and Low Gate Charge
- ◆ 100% E_{AS} Guaranteed
- ◆ Halogen-free; RoHS-compliant



Application

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management

Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	110	V
V_{GS}	Gate-Source Voltage	± 20	
I_D	Drain Current-Continuous	$T_C = 25^\circ\text{C}$	173
		$T_C = 100^\circ\text{C}$	108
I_{DM}	Drain Current-Pulsed ^b	691	A
P_D	Maximum Power Dissipation, $T_C = 25^\circ\text{C}$	312.5	W
E_{AS}	Single Pulsed Avalanche Energy ^c	855	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	70	

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu\text{A}$	110	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 110V, V_{GS} = 0V$	-	-	1.0	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA



MSA004C

N-Channel Enhancement Mode MOSFET

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 20A$	-	3.4	4.4	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$V_{DS} = V_{GS} = 0V,$ $f = 1.0MHz$	-	2.2	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 55V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	5718	-	pF
C_{oss}	Output Capacitance		-	815	-	
C_{rss}	Reverse Transfer Capacitance		-	27	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 55V,$ $V_{GS} = 10V,$ $I_D = 20A,$ $R_{GEN} = 6.2\Omega$	-	25	-	ns
t_r	Turn-On Rise Time		-	41	-	
$t_{d(off)}$	Turn-Off Delay Time		-	67	-	
t_f	Turn-Off Fall Time		-	42	-	
Q_g	Total Gate Charge	$V_{DS} = 55V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 20A$	-	86	-	nC
Q_{gs}	Gate-Source Charge		-	30	-	
Q_{gd}	Gate-Drain Charge		-	19	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_G = V_D = 0V,$ Force Current	-	-	173	A
I_{SM}	Maximum Pulsed Current		-	-	691	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 20A$	-	-	1.2	V
T_{rr}	Body Diode Reverse Recovery Time	$I_F = 20A,$ $di_F/dt = 100A/\mu s$	-	82	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 20A,$ $di_F/dt = 100A/\mu s$	-	223	-	nC

Notes:

- $T_J = +25\text{ }^\circ\text{C}$ to $+150\text{ }^\circ\text{C}$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $L = 0.5mH, V_{DD} = 25V, I_{AS} = 58.5A, R_G = 25\Omega$ Starting $T_J = 25\text{ }^\circ\text{C}$.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 0.5\%$.

■ Characteristic Curve

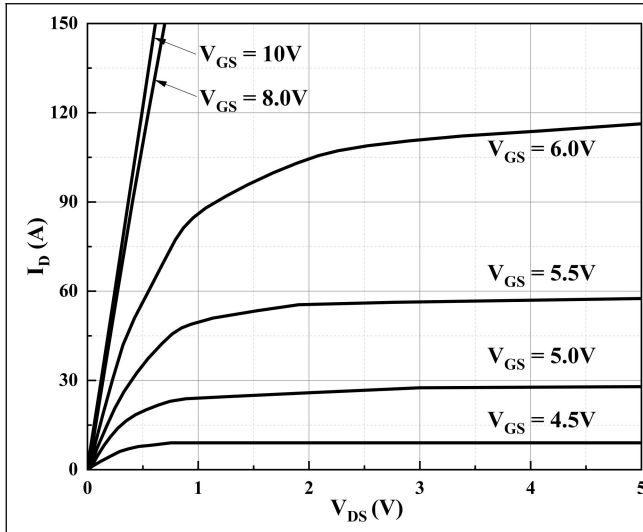


Figure 1. Typical Output Characteristics

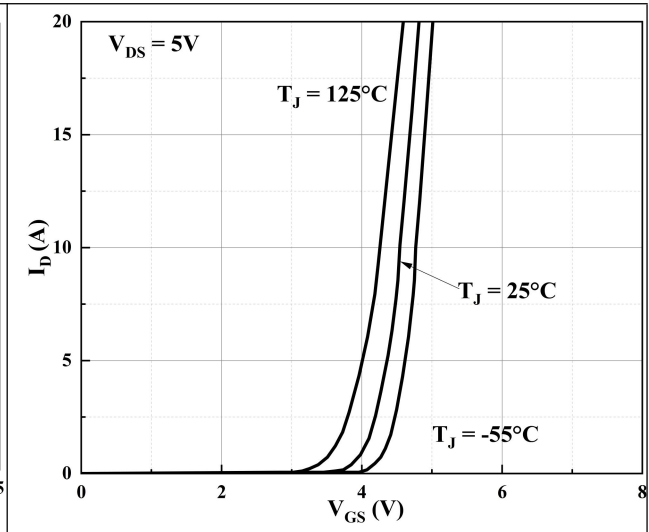


Figure 2. Typical Transfer Characteristics

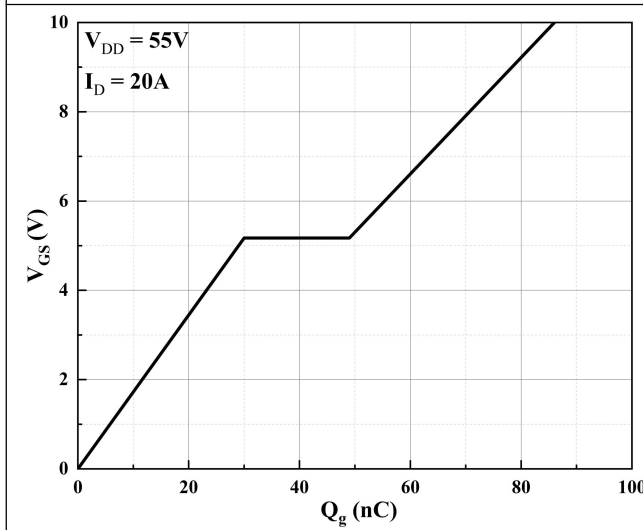


Figure 3. Typical Gate Charge

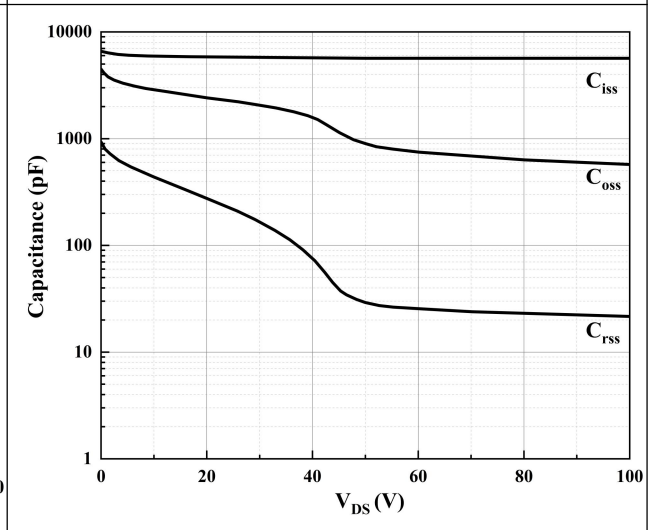


Figure 4. Typical Capacitance

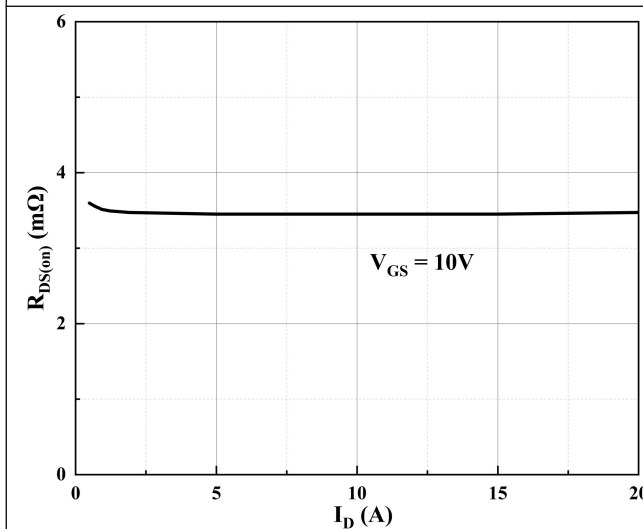


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

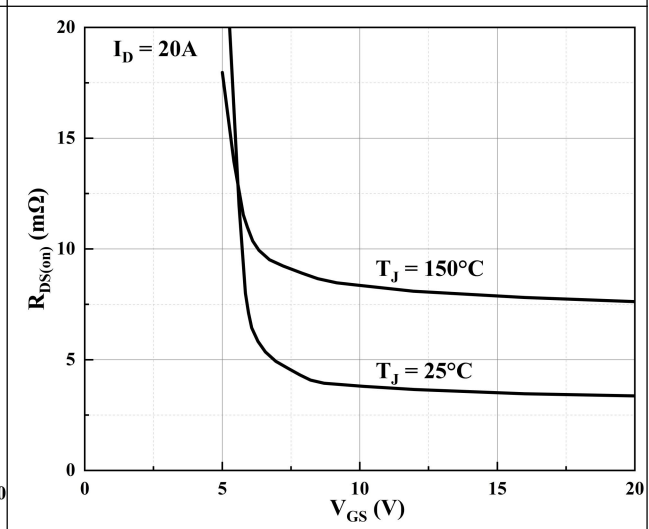


Figure 6. Static Drain-Source On-Resistance vs. Gate-Source Voltage

Characteristic Curve

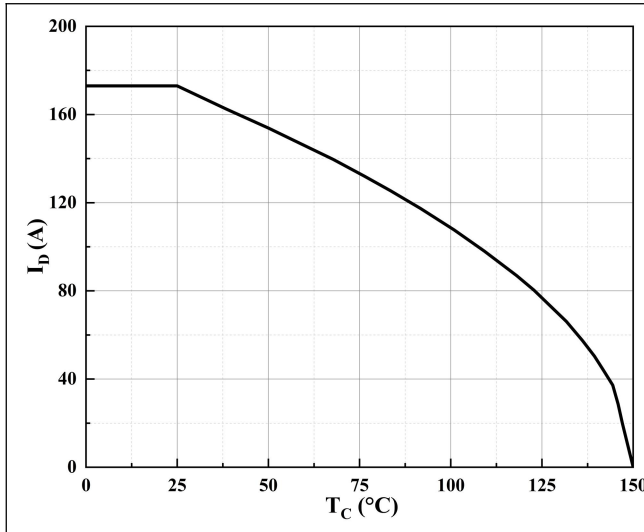


Figure 7. Maximum Continuous Drain Current vs. Case Temperature

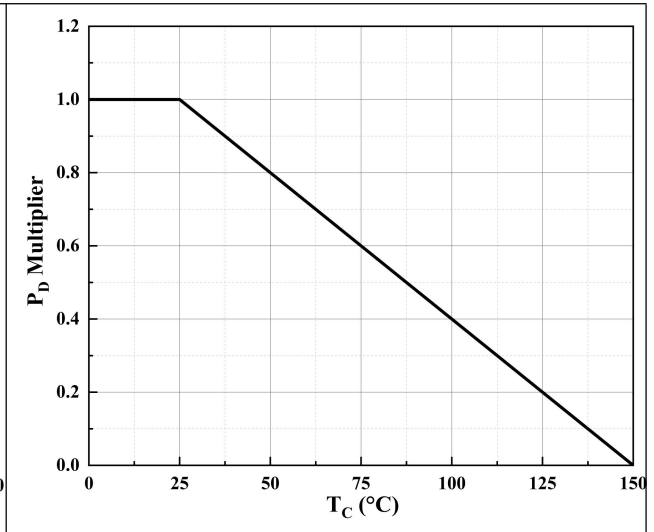


Figure 8. Maximum Power Dissipation Multiplier vs. Case Temperature

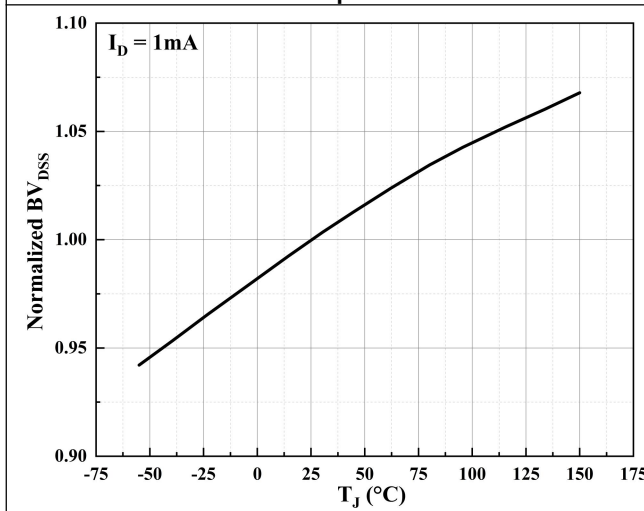


Figure 9. Normalized Breakdown Voltage vs. Junction Temperature

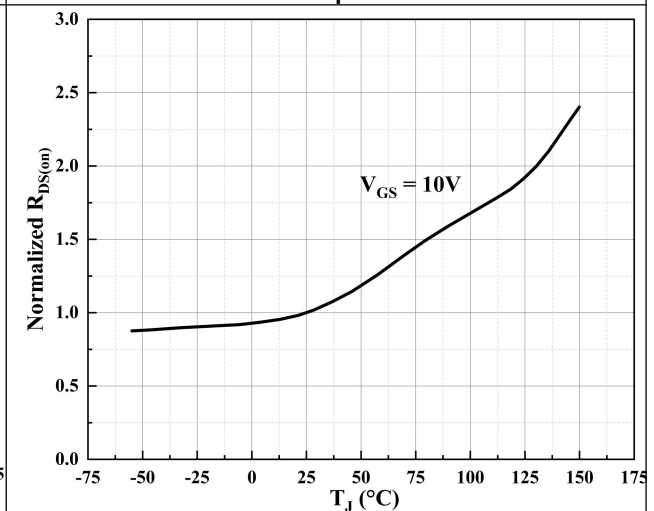


Figure 4. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

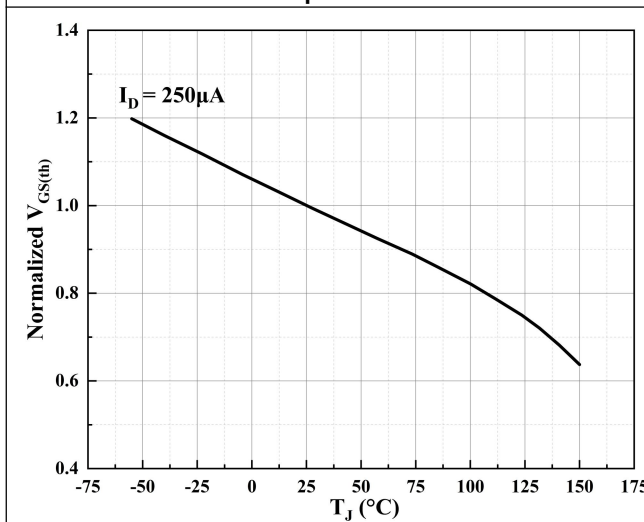


Figure 11. Normalized Threshold Voltage vs. Junction Temperature

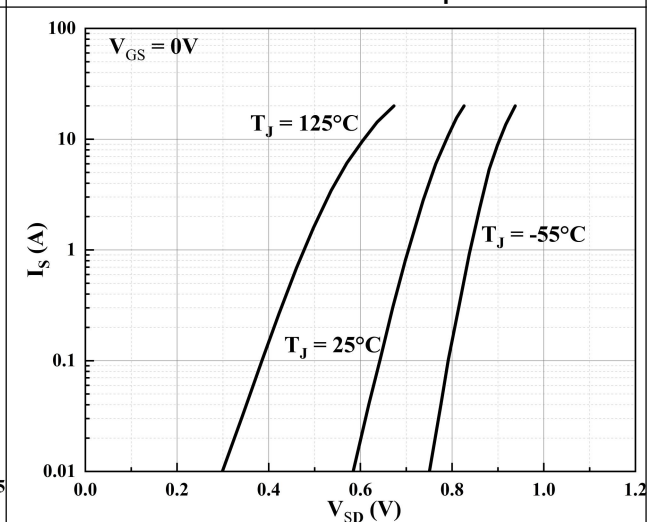


Figure 12. Body Diode Characteristics

■ Characteristic Curve

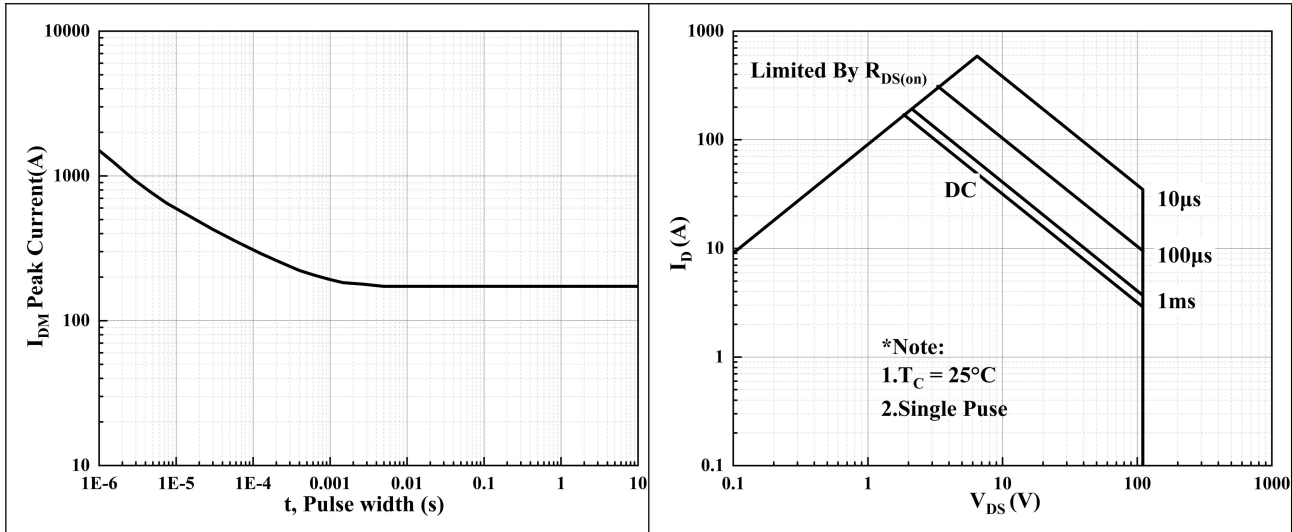


Figure 13. Peak Current Capacity

Figure 14. Maximum Safe Operating Area

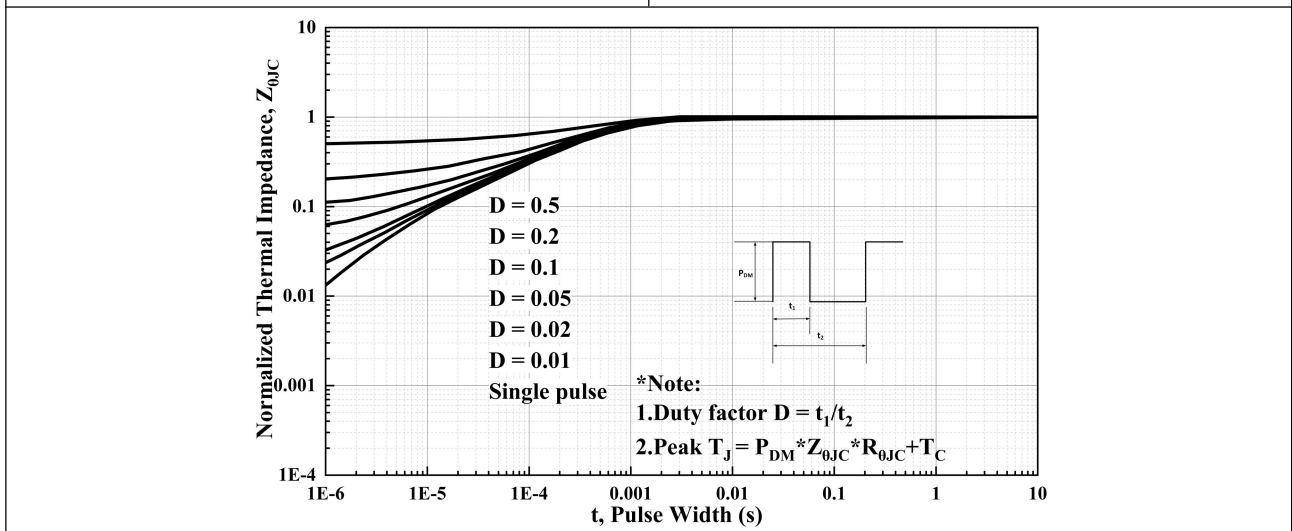
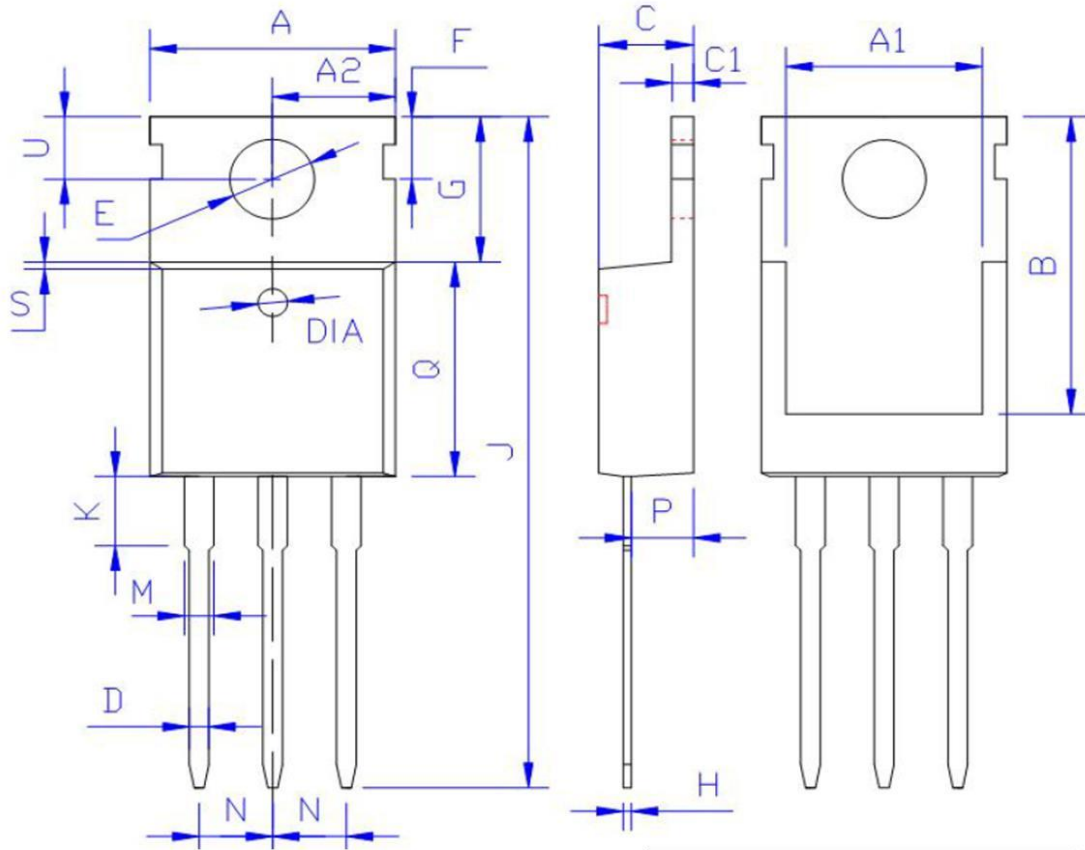


Figure 15. Normalized Maximum Transient Thermal Impedance

Package Information

TO-220



Dim.	Min.	Max.
A	9.80	10.20
A1	7.80	8.20
A2	4.80	5.20
B	13.00	13.40
C	4.35	4.65
C1	1.15	1.45
D	0.65	0.95
E	3.45	3.75
F	2.85	3.15
G	6.40	6.80
H	0.35	0.65
J	28.68	29.08
K	2.80	3.20
M	1.15	1.45
N	Typical 2.54	
P	2.20	2.60
Q	9.00	9.40
S	0.15	0.35
T	0.15	0.35
U	2.65	2.95
DIA	直径 1.5±0.1 深 MAX 0.5	
All Dimensions in millimeter		