N-Channel Trench Power MOSFET

General Description

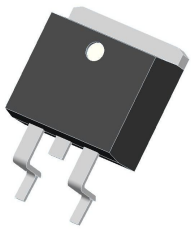
The CSJ60N62/CSJ60N62A is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged E_{AS} capability and ultra low $R_{DS(ON)}$ is suitable for PWM, load switching.

Features

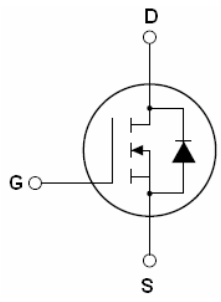
- V_{DS}=60V； I_D=80A@ V_{GS}=10V；
  $R_{DS(ON)}$<7.2mΩ @ V_{GS}=10V
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

Application

- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



To-263 Top View



Schematic Diagram

V_{DS} = 60 V

I_D = 80 A

$R_{DS(ON)}$ = 6.2 mΩ

Package Marking and Ordering Information

Device	Device Marking	Device Package	Package Typ	Quantity
CSJ60N62	CSJ60N62	TO-263	Tape&Reel	800pcs
CSJ60N62A	CSJ60N62	TO-263	Tube	50pcs

Table 1. Absolute Maximum Ratings (TA=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V）	60	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±25	V
$I_{D\ (DC)}$	Drain Current (DC) at Tc=25℃	80	A
$I_{D\ (DC)}$	Drain Current (DC) at Tc=100℃	56	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed **(Note 1)**	320	A
dv/dt	Peak Diode Recovery Voltage	9.5	V/ns
P_D	Maximum Power Dissipation(Tc=25℃)	100	W
	Derating Factor	0.67	W/℃
E_{AS}	Single Pulse Avalanche Energy **(Note 2)**	410	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	℃

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.E_{AS} condition:T_J=25℃,V_{DD}=33V,V_G=10V,I_D=40.5A

Table 2. Thermal Characteristic

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

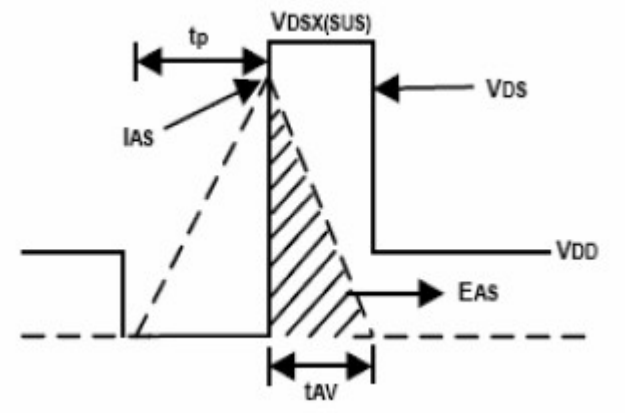
Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

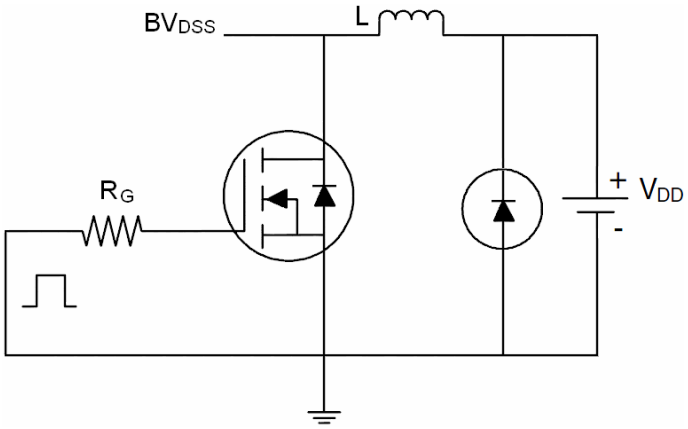
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	60			V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=60V,V_{GS}=0V			1	μA
I_{DSS}	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=60V,V_{GS}=0V			10	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±25V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2		4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=40A		6.2	7.2	mΩ
Dynamic Characteristics						
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=15A	18			S
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1.0MHz		3290		pF
C_{oss}	Output Capacitance			335		pF
C_{rss}	Reverse Transfer Capacitance			245		pF
Q_g	Total Gate Charge	V_{DS}=50V,I_D=40A, V_{GS}=10V		90		nC
Q_{gs}	Gate-Source Charge			18		nC
Q_{gd}	Gate-Drain Charge			42		nC
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V,I_D=2A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω		21		nS
t_r	Turn-on Rise Time			31		nS
$t_{d(off)}$	Turn-Off Delay Time			63		nS
t_f	Turn-Off Fall Time			29		nS
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)			80		A
I_{SDM}	Pulsed Source-Drain Current(Body Diode)			320		A
V_{SD}	Forward On Voltage**(Note 1)**	T_J=25℃,I_{SD}=40A,V_{GS}=0V		0.89	0.99	V
t_{rr}	Reverse Recovery Time**(Note 1)**	T_J=25℃,I_F=75A di/dt=100A/μs		26		nS
Q_{rr}	Reverse Recovery Charge**(Note 1)**			35		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 ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting T_J=25℃

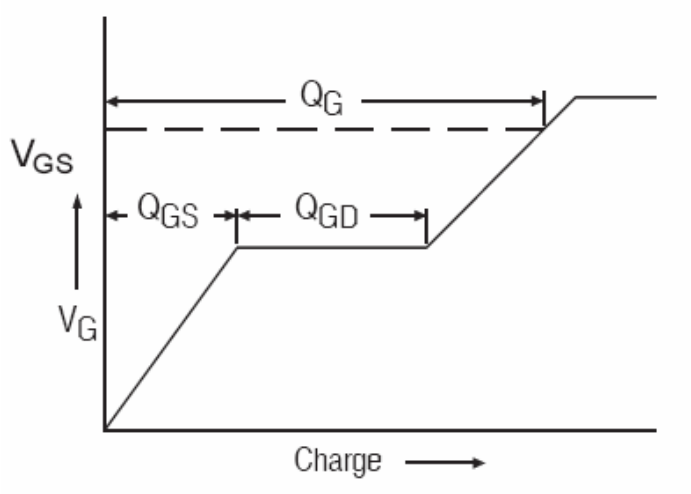
Test Circuit

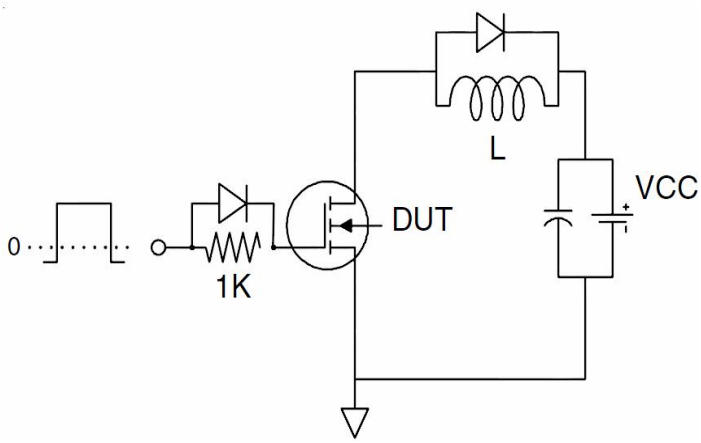
1）E_{AS} Test Circuits



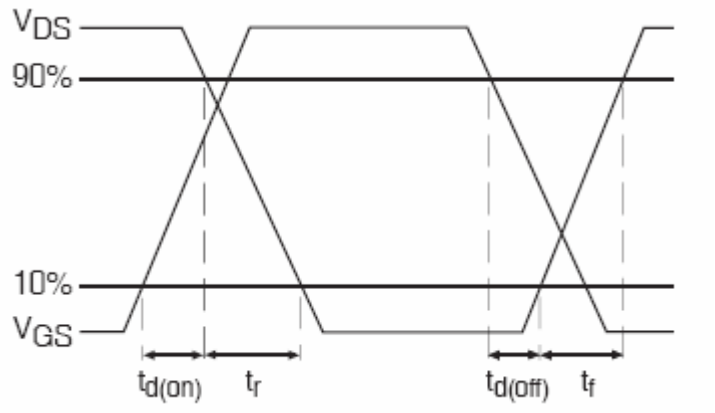


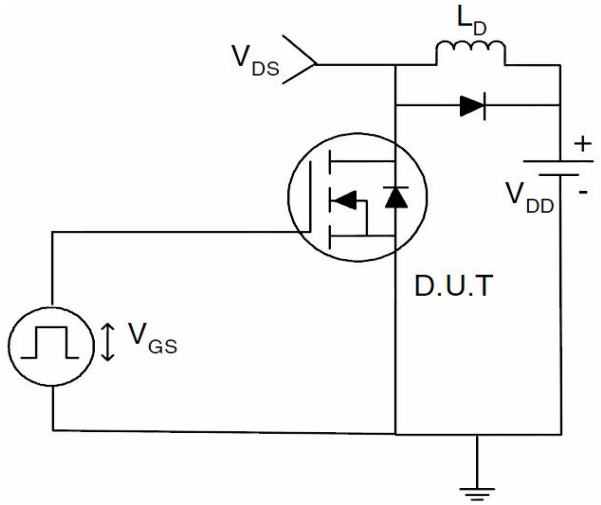
2）Gate Charge Test Circuit:





3）Switch Time Test Circuit：





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

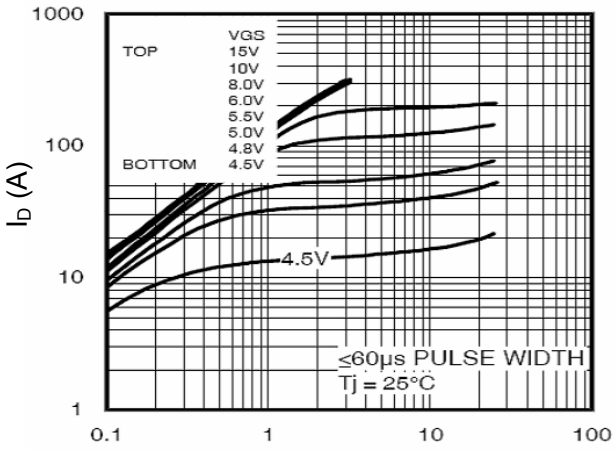


Figure2. Transfer Characteristics

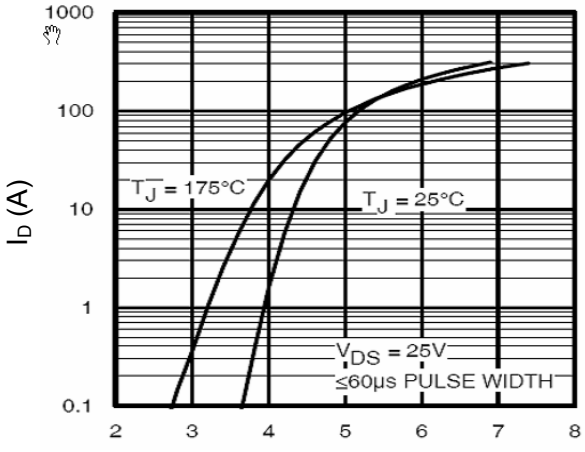


Figure3. BVDSS vs Junction Temperature

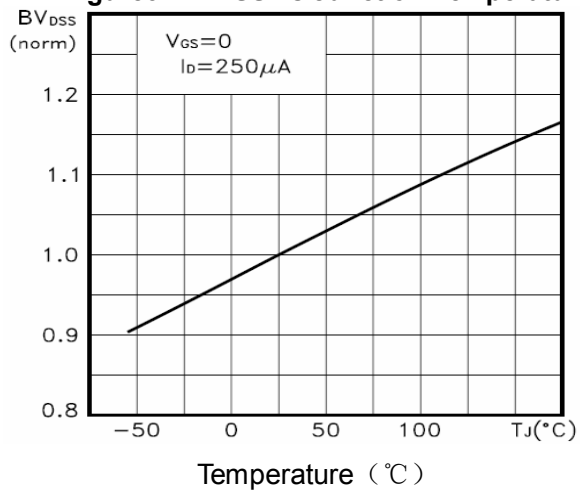


Figure4. ID vs Junction Temperature

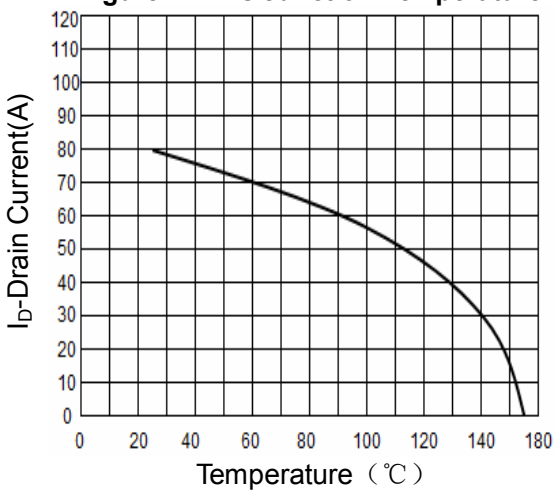


Figure7. $V_{GS(th)}$ vs Junction Temperature

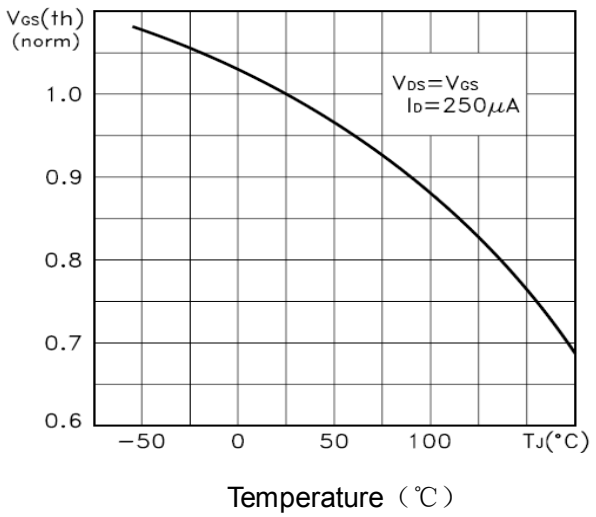


Figure8. Rdson vs Junction Temperature

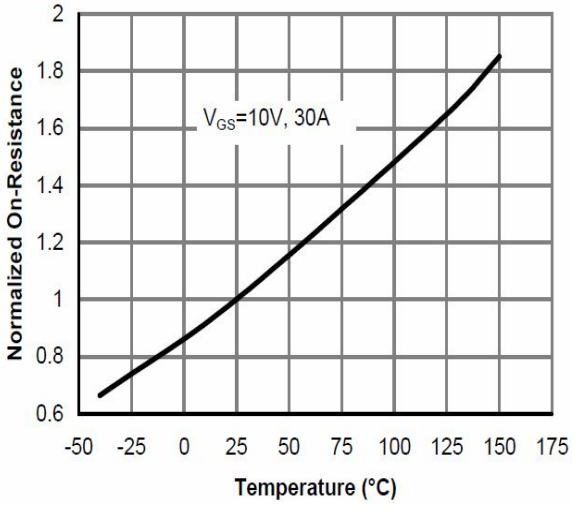


Figure7. Gate Charge

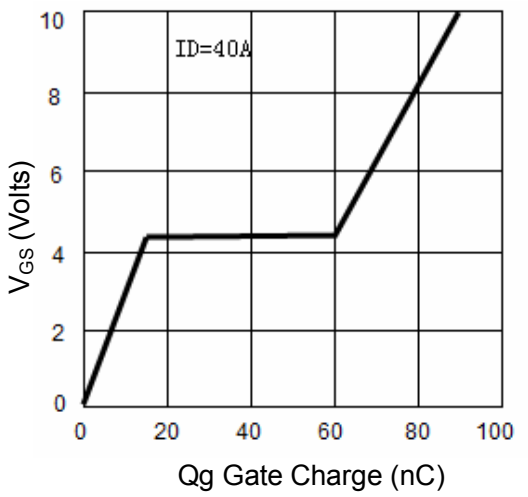


Figure8. Capacitance vs Vds

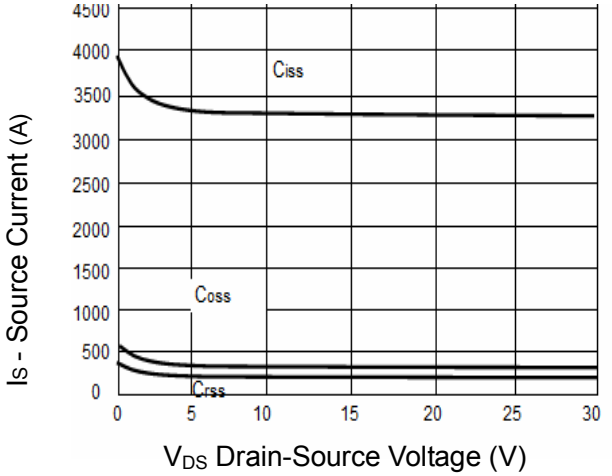


Figure9. Source- Drain Diode Forward

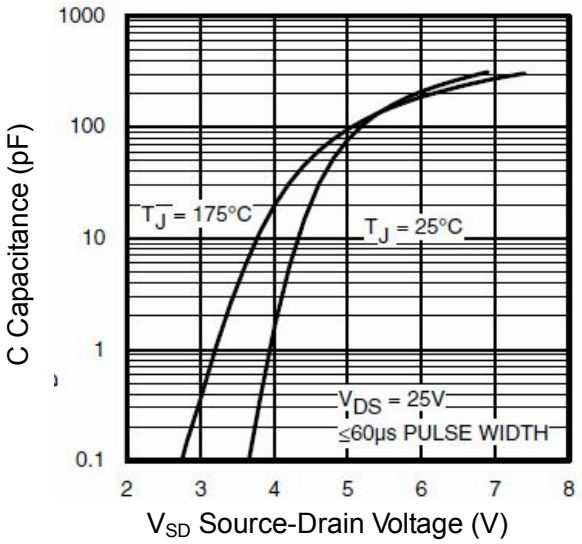


Figure10. Safe Operation Area

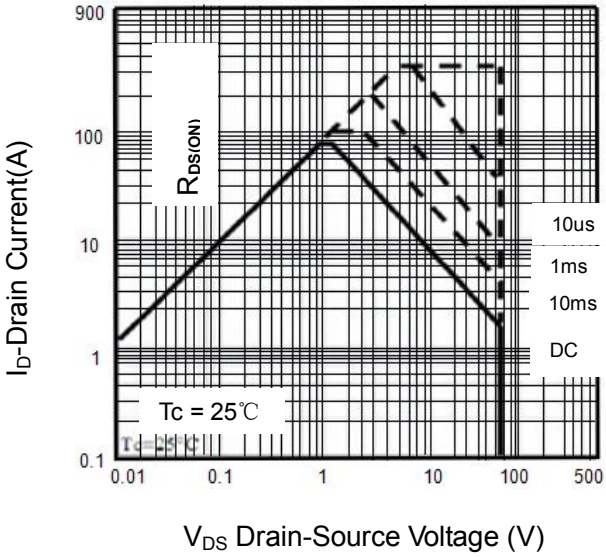
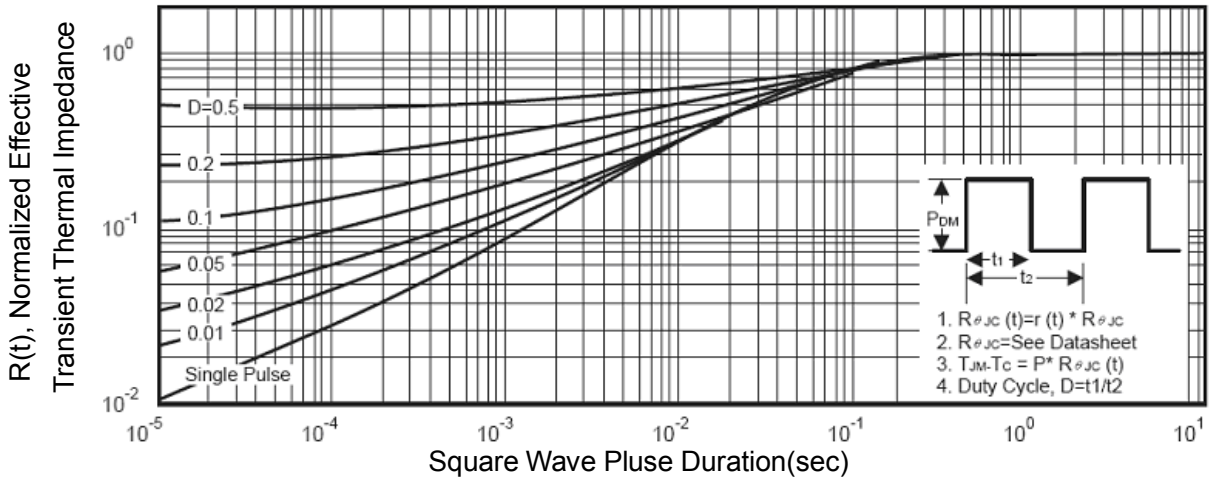
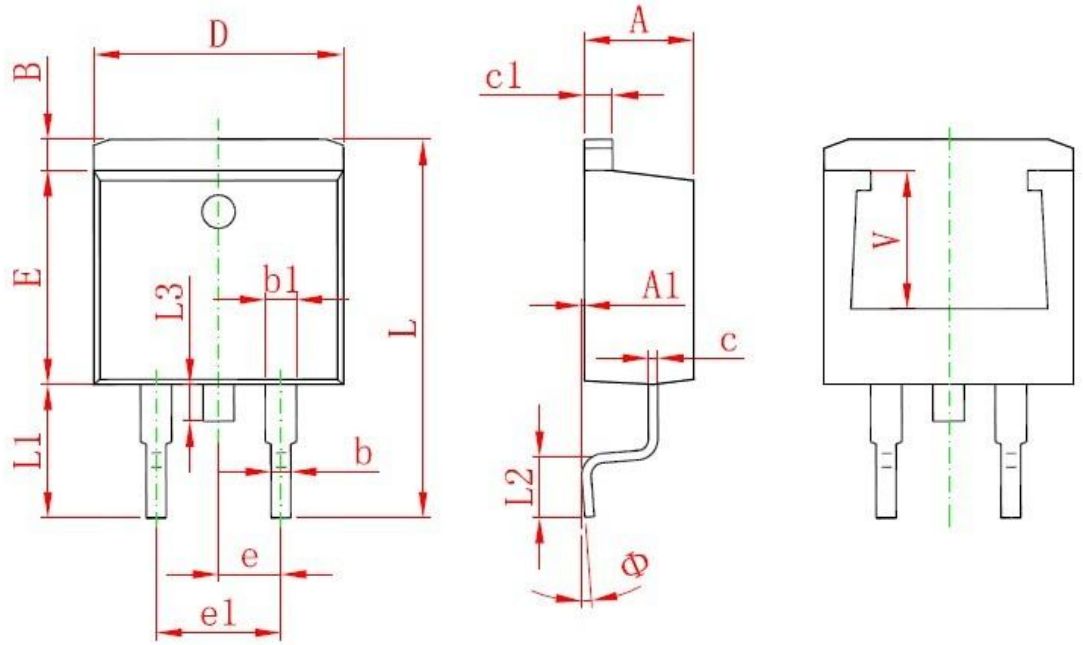


Figure11. Normalized Maximum Transient Thermal Impedance



TO-263 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Ma
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF.		0.220REF.	
Φ	0°	8°	0°	8°