

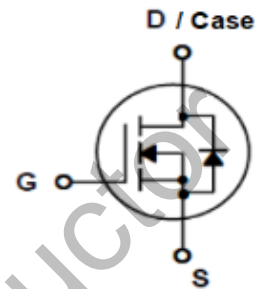
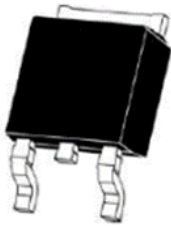
Features

- Extremely Low RDS(on):
Typ. $R_{DS(on)} = 3.2 \text{ m}\Omega @ V_{GS}=10 \text{ V}, I_d=30 \text{ A}$
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation

General Description

The BSC100N03A uses advanced trench technology to provide excellent RDS(ON), low gate charge. This device is suitable for use in Load Switch, PWM Application, Power Management and general purpose applications. .

TO-252-2L Package



Maximum Ratings ($T_j=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	30	V
I_D	Drain Current - Continuous ($TC= 25^\circ\text{C}$)	90	A
	Drain Current - Continuous ($TC= 100^\circ\text{C}$)	57*	A
I_{DM}	Drain Current - Pulsed (Note 1)	360*	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	90	mJ
P_D	Power Dissipation ($TC = 25^\circ\text{C}$)	100	W
	- Derate above 25°C	0.9	W/ $^\circ\text{C}$
T_j, T_{stg}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.85	$^\circ\text{C}/\text{W}$

Electrical Characteristics TC = 25°C unless otherwise noted

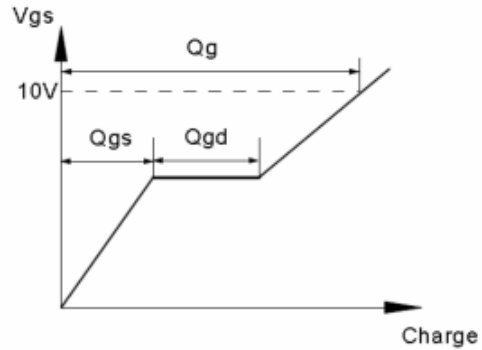
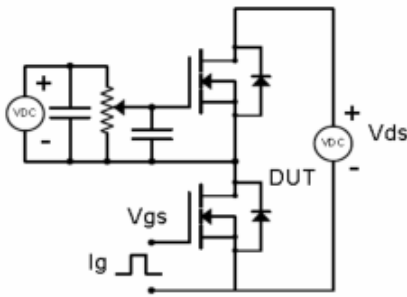
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 29.5\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	1.5	2.2	V
$R_{DS(on)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		3.2	5.0	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 24\text{ A}$		4.9	7.5	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 24\text{ A}$ (Note 3)	20			S
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $F = 1.0\text{ MHz}$		2135		pF
C_{oss}	Output capacitance			309		pF
C_{riss}	Reverse transfer capacitance			262		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DD} = 15\text{ V}, I_D = 60\text{ A},$ $V_{GS} = 4.5\text{ V}, R_G = 1.8\ \Omega$ (Note 3, 4)		11		ns
t_r	Rising Time			160		ns
$t_{d(off)}$	Turn Off Delay Time			12		ns
t_f	Fall Time			80		ns
Q_g	Total Gate Charge			39		nC
Q_{gs}	Gate-Source Charge			5		nC
Q_{gd}	Gate-Drain Charge		9		nC	
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				90	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				360	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 24\text{ A}$			1.2	V
T_{rr}	Reverse recovery time	$I_F = 60\text{ A},$ $di_F/dt = 100\text{ A/us}$		12		ns
Q_{rr}	Reverse recovery charge			2.5		nC

Notes:

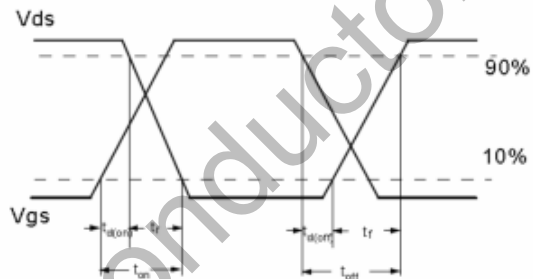
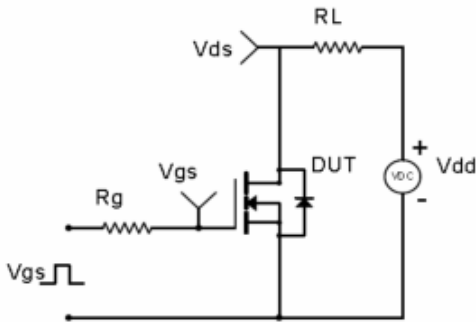
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.5 mH, $V_{DD} = 15\text{ V}, V_{GS} = 10\text{ V}, R_G = 25\ \Omega$, Starting $T_j = 25^\circ\text{C}$
3. $I_{SD} \leq 40\text{ A}, di/dt = 100\text{ A/us}, V_{DD} \leq BV_{DSS}$, Starting $T_j = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Test Circuit & Waveform

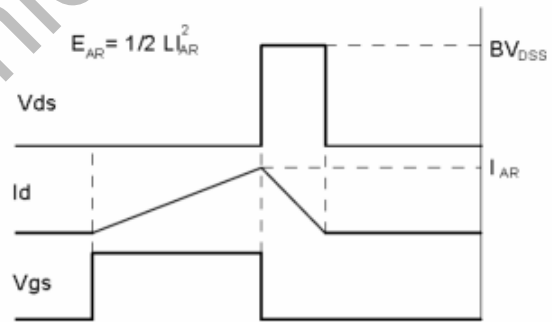
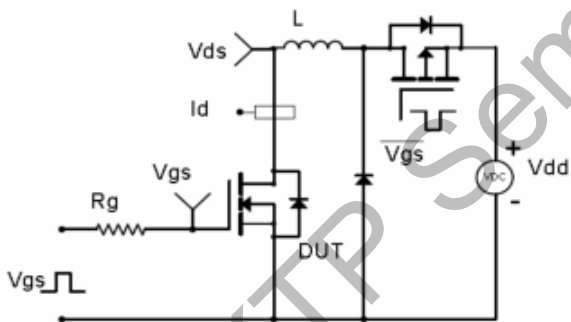
Gate Charge Test Circuit & Waveform



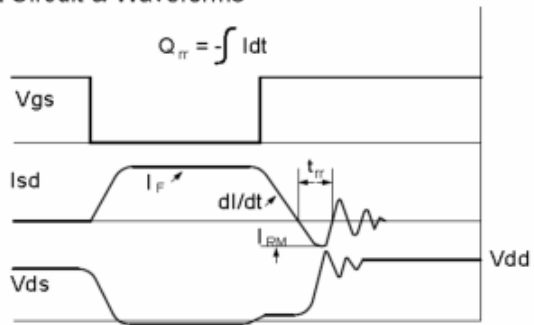
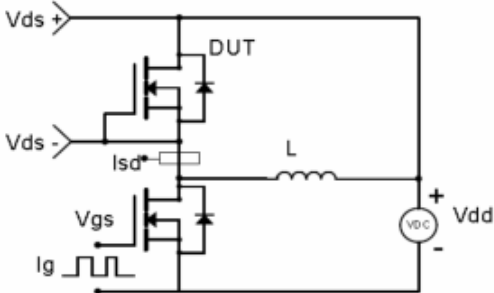
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Fig.1 Power Dissipation Derating Curve

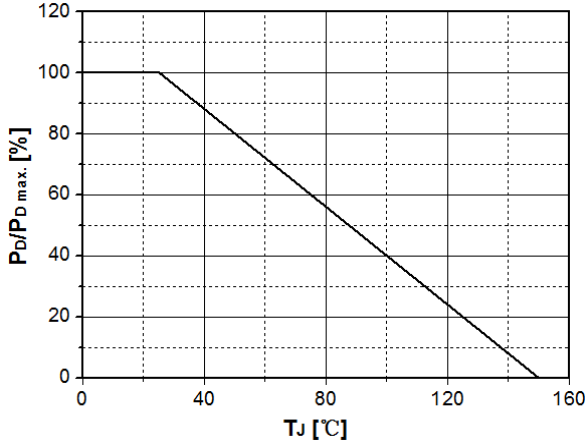


Fig.2 Capacitance Characteristics

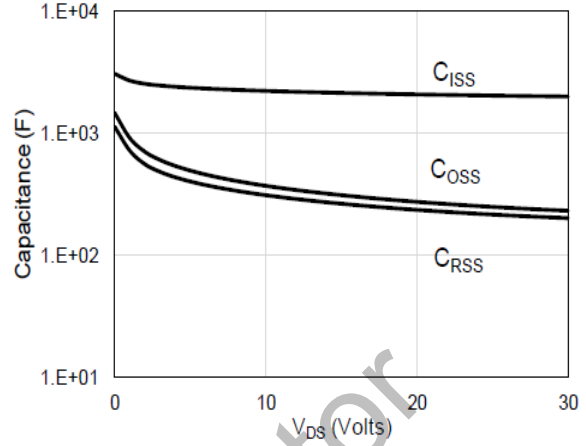


Fig.3 Typical Output Characteristics

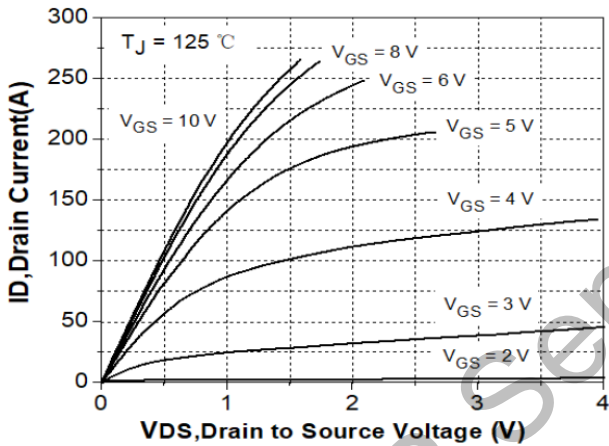


Fig. 4 Transconductance vs. Drain Current

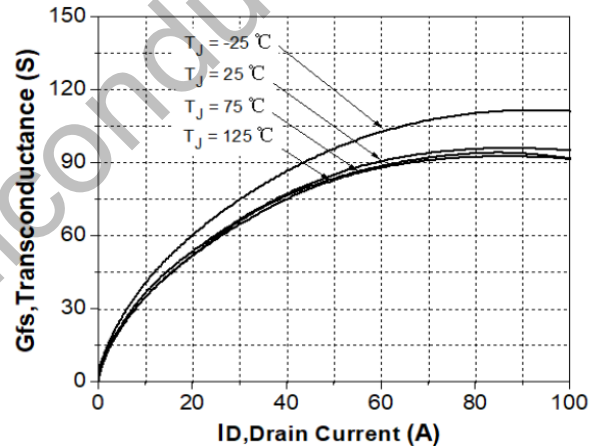


Fig.5 Typical Transfer Characteristics

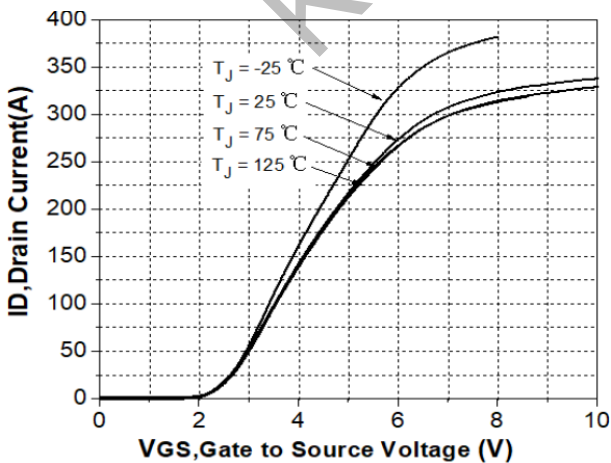
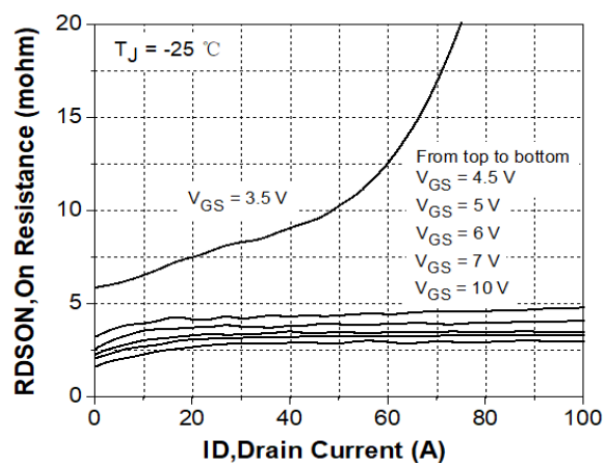


Fig. 6 State Resistance vs. Drain Current @ -25°C



30V N-channel Enhancement Mode Power MOSFET

Fig.7 State Resistance vs. Drain Current @25°C

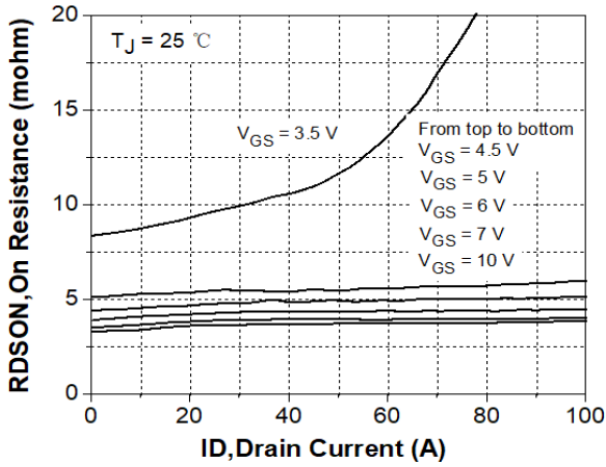


Fig. 8 State Resistance vs. Drain Current @75°C

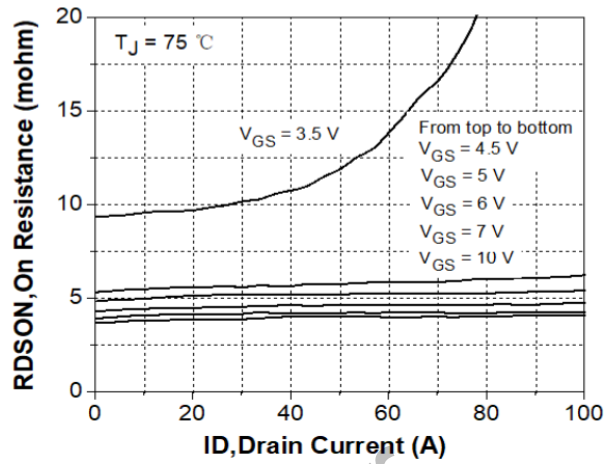


Fig.9 State Resistance vs. Drain Current @125°C

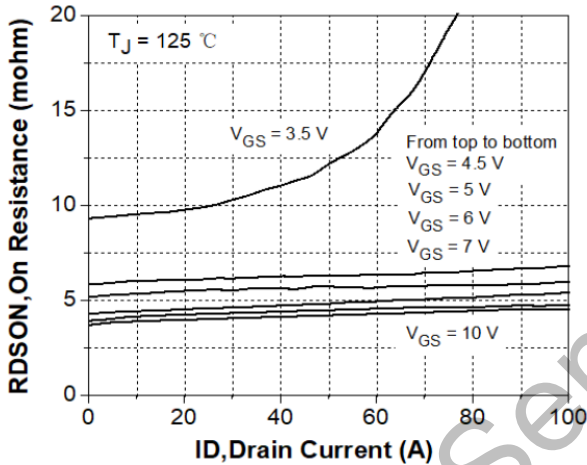


Fig.10 Gate Charge Characteristics

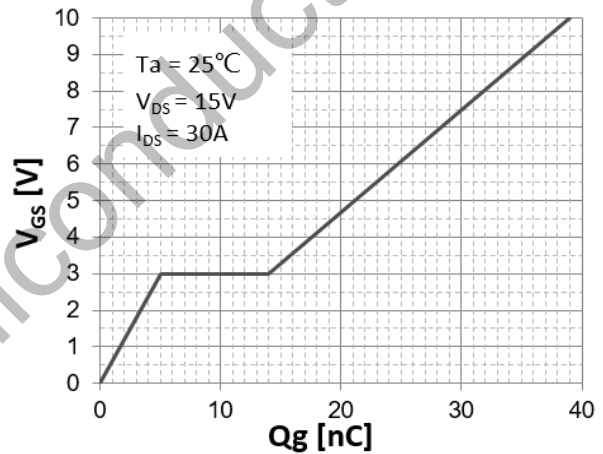


Fig.11 Breakdown Voltage vs. Junction Temperature

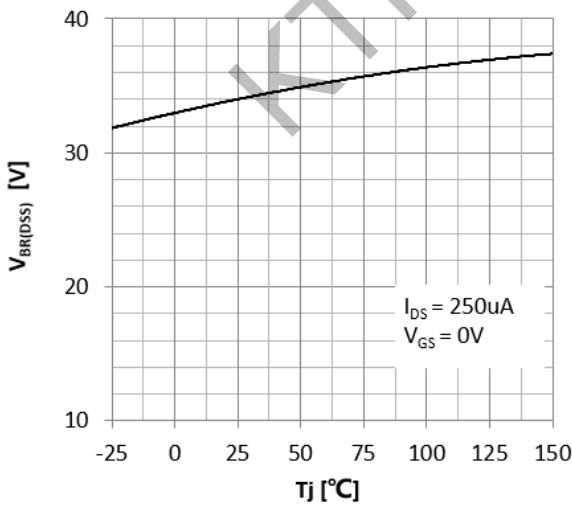
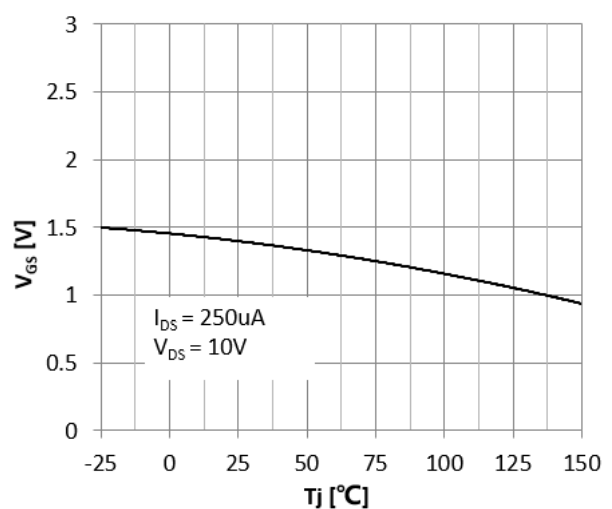


Fig. 12 Gate Threshold Voltage vs. Junction Temperature

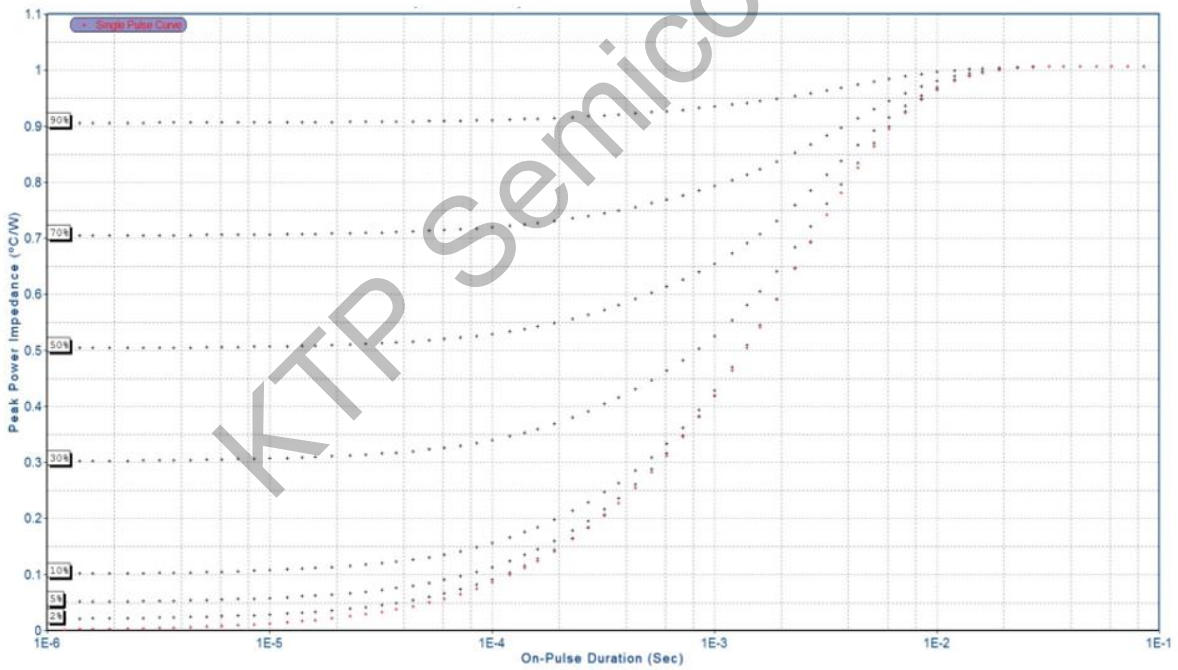


30V N-channel Enhancement Mode Power MOSFET

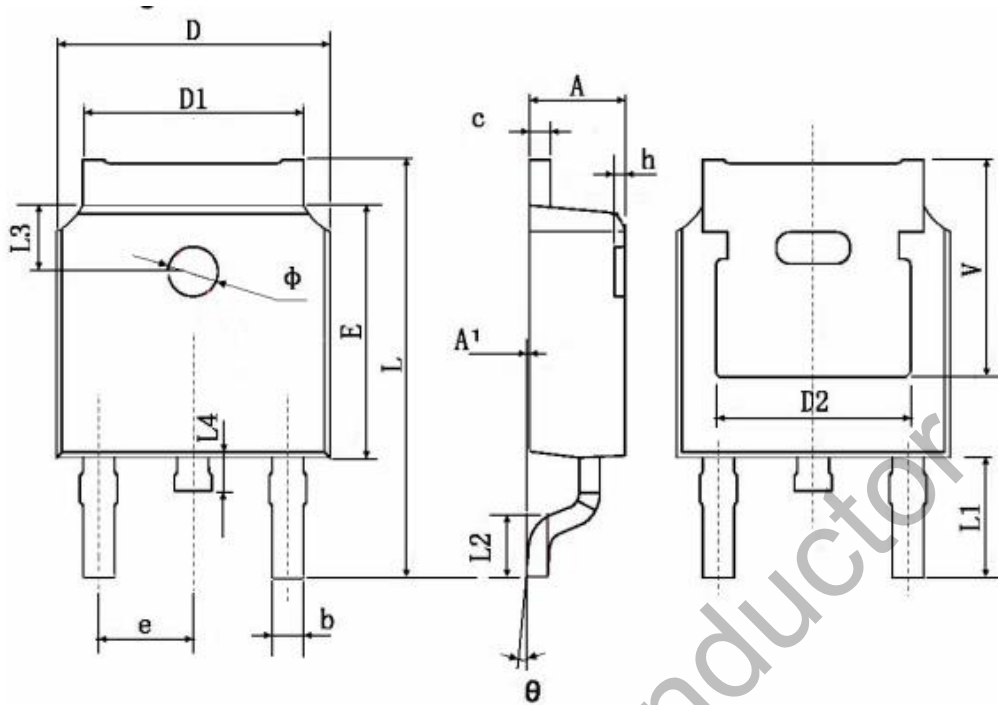
Fig.13 Safe Operating Area



Fig. 14 Transient Thermal Response Curve



Package Dimensions : TO-252-2L PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	