

MS10N054TG

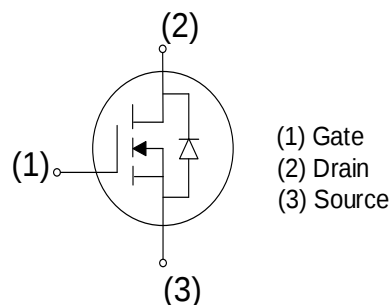
100V 5.4mohm N-channel SGT MOSFET

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance and superior UIS performance, especial for BMS application.

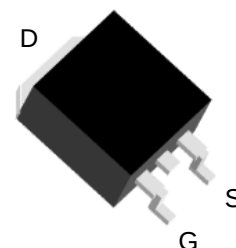
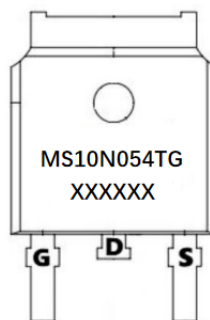
Applications:

- Battery Management System
- Motor Drivers
- DC-DC Converter



Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on)}$, max @ $V_{GS} = 10\text{ V}$	5.4	m Ω
I_D	120	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
MS10N054TG	TO-263-2L	MS10N054TG XXXXXX	Tape Reel	800PCS

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

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 1)	133	A
	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2)	120	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	84	A
I_{DM}	Drain Current - Pulsed ^(Note 3)	480	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 4)	225	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	192	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.65	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5)	55	$^\circ\text{C/W}$

Notes:

1. The max drain current rating is silicon limited
2. The max drain current rating is package limited
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. $L = 0.5\text{ mH}$, $V_{DD} = 50\text{ V}$, $I_{AS} = 30\text{ A}$, $R_G = 25\ \Omega$, Starting $T_J = 25\ ^\circ\text{C}$
5. Mount on minimum PCB layout

Electrical Characteristics (T_j = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	100			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100 V, V _{GS} = 0 V,			1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 20 V, V _{DS} = 0 V			±100	nA
V _{GS(TH)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2	3	4	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 20 A		4.5	5.4	mΩ
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0 V, F = 1 MHz		4666		pF
C _{OSS}	Output Capacitance			1038		pF
C _{RSS}	Reverse Transfer Capacitance			45		pF
R _G	Gate Resistance	F = 1 MHz		1.5		Ω
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 50 V , R _L = 2.5 Ω, V _{GS} = 10 V, R _G = 6.8 Ω		26.5		ns
T _R	Rise Time			32		ns
T _{D(OFF)}	Turn Off Delay Time			65		ns
T _F	Fall Time			32.5		ns
Q _G	Total Gate Charge	V _{DD} = 50 V , I _D = 20 A, V _{GS} = 10 V		67		nC
Q _{GS}	Gate-Source Charge			18		nC
Q _{GD}	Gate-Drain Charge			12		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current				120	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)				480	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 1 A		0.7		V
T _{RR}	Reverse recovery time	V _{DD} = 50 V, I _D = 15 A, di/dt = 100 A/μS		57		ns
Q _{RR}	Reverse recovery charge			106		nC
I _{RRM}	Peak Reverse Recovery Current			3		A

Electrical Characteristics Diagrams

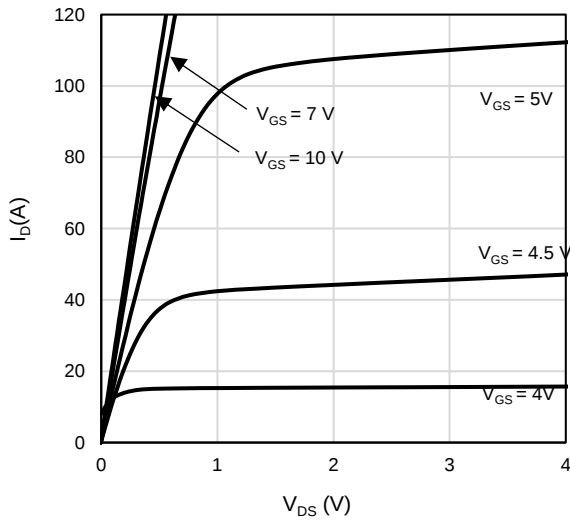


Figure 1: On-Region Characteristics

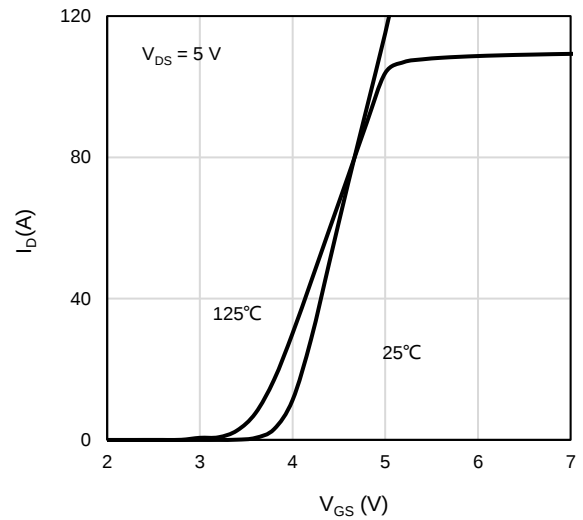


Figure 2: Transfer Characteristics

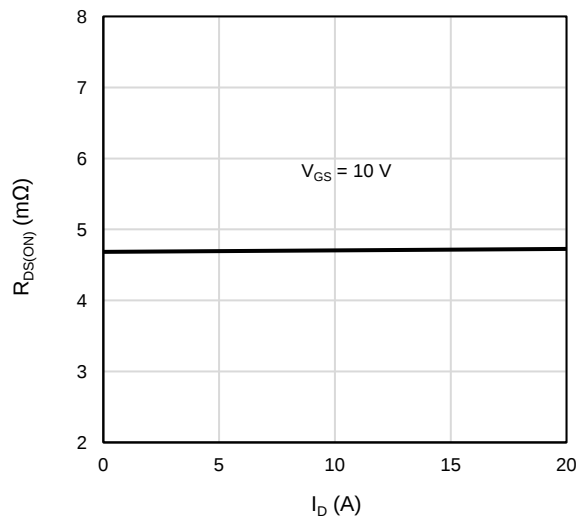


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

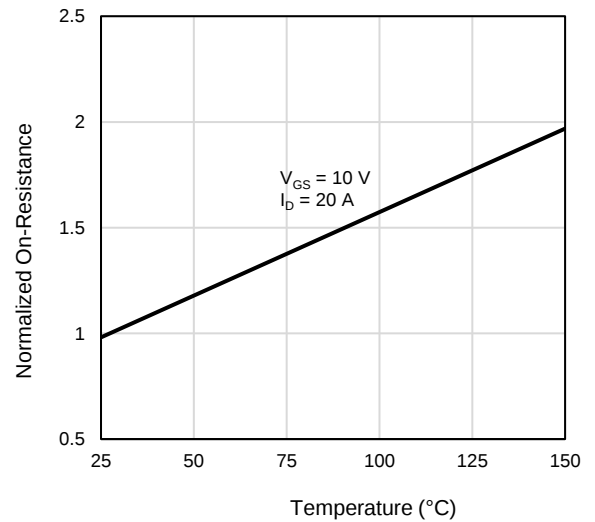


Figure 4: On-Resistance vs. Junction Temperature

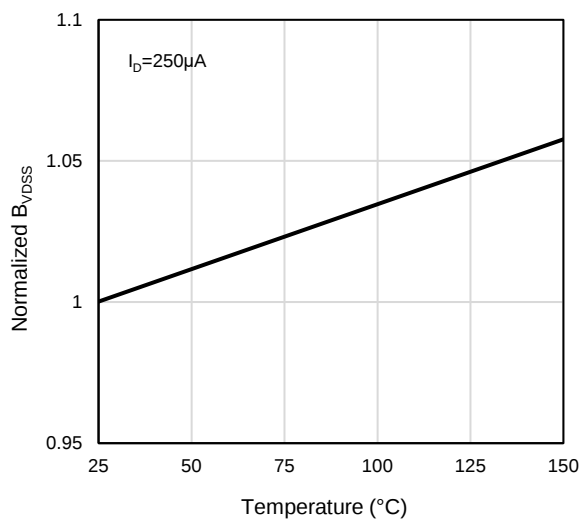


Figure 5: Breakdown Voltage vs. Junction Temperature

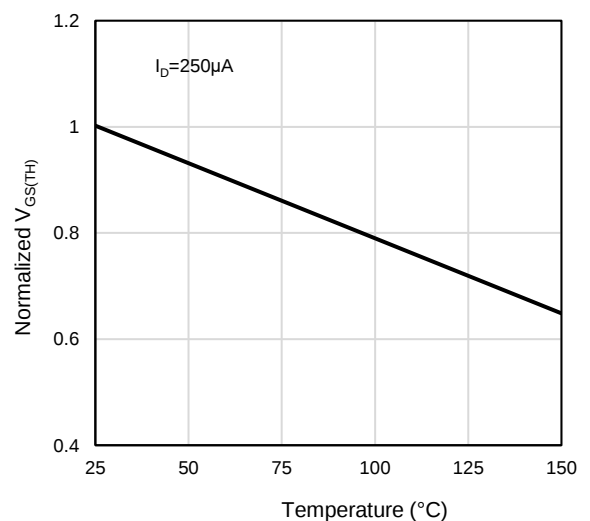


Figure 6: Threshold Voltage vs. Junction Temperature

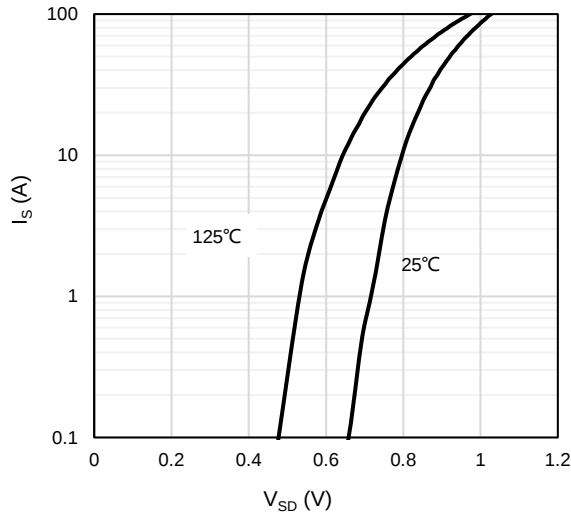


Figure 7: Body-Diode Characteristics

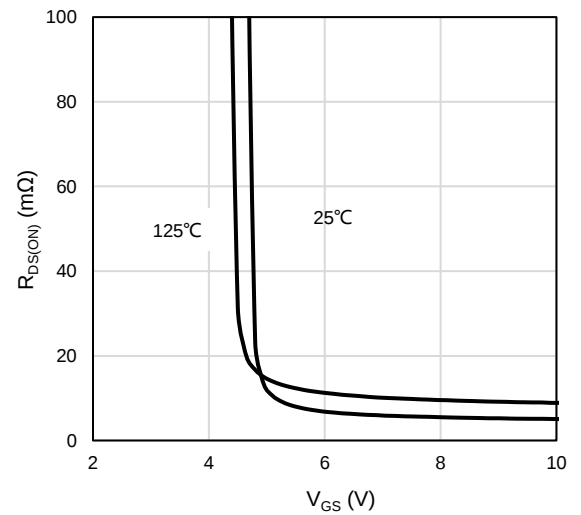


Figure 8: On-Resistance vs. Gate-Source Voltage

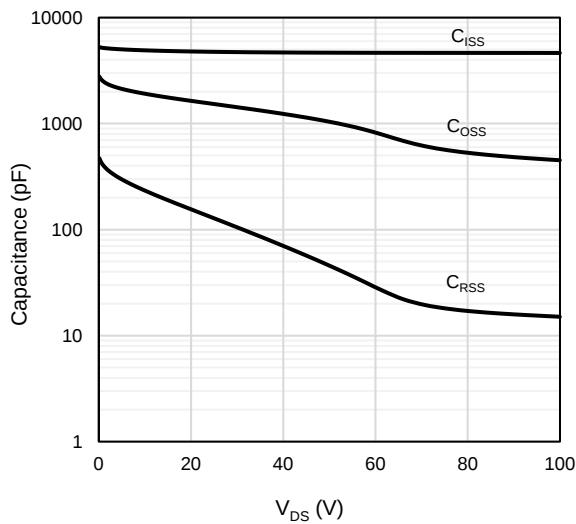


Figure 9: Capacitance Characteristics

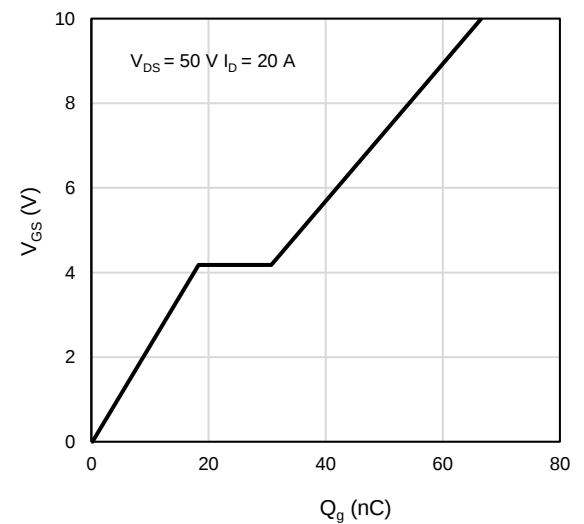


Figure 10: Gate-Charge Characteristics

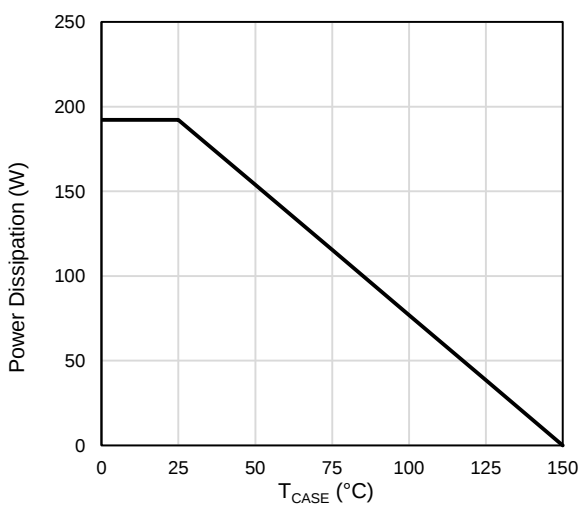


Figure 11: Power De-rating

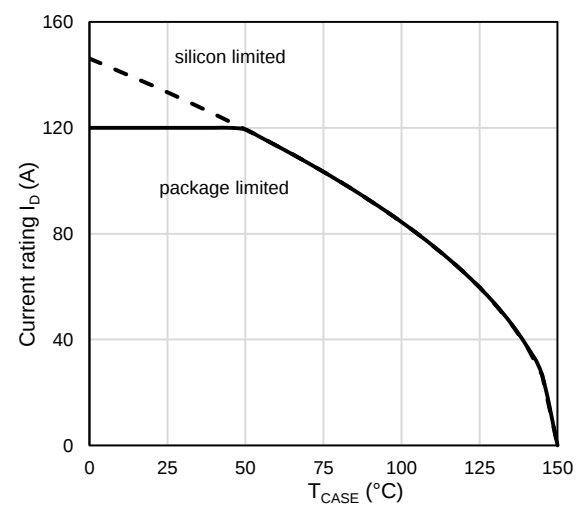


Figure 12: Current De-rating

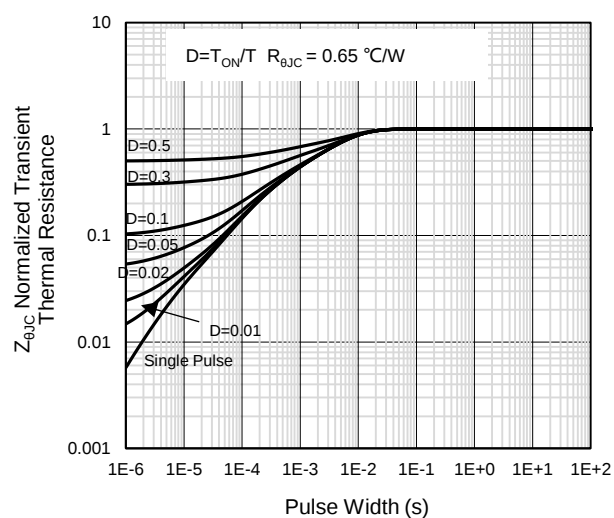


Figure 13: Normalized Maximum Transient Thermal Impedance

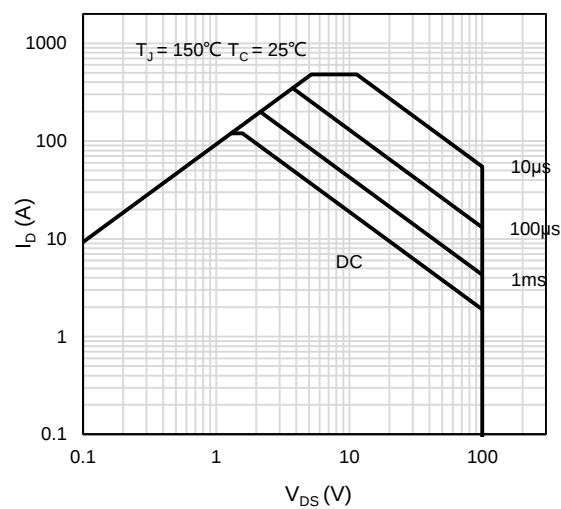
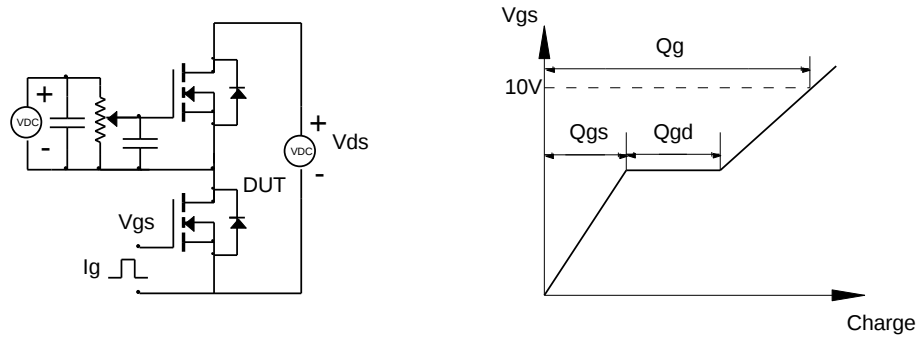


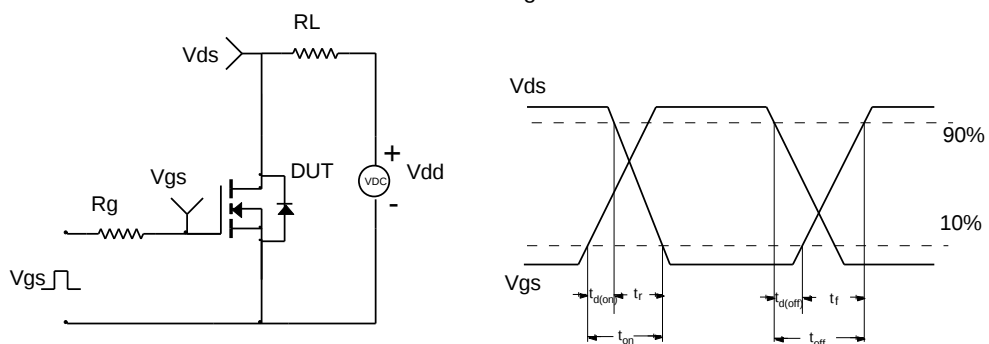
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

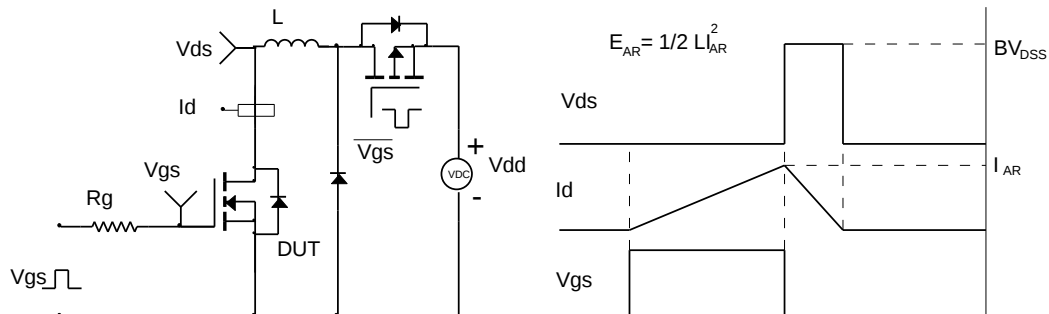
Gate Charge Test Circuit & Waveform



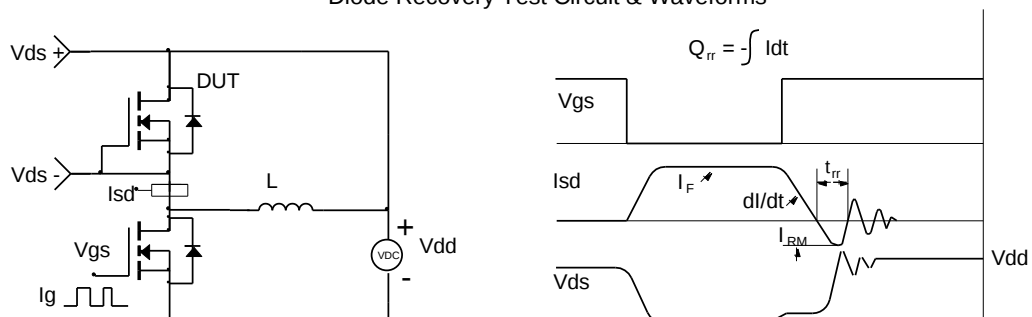
Resistive Switching Test Circuit & Waveforms



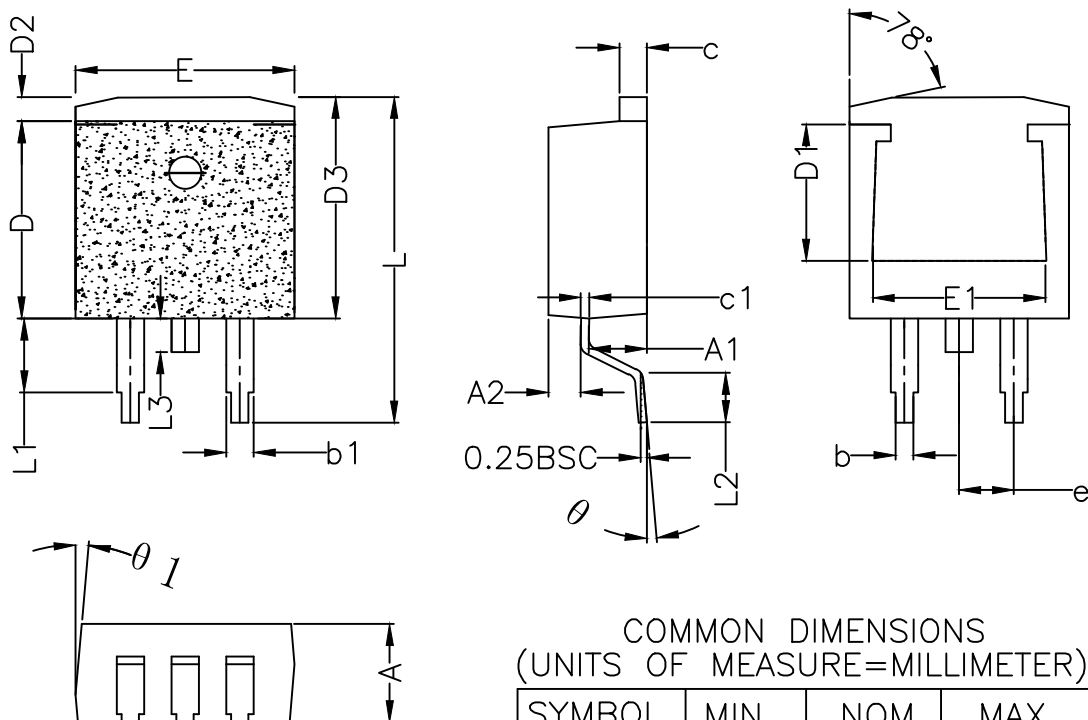
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines TO-263-2L



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	2.59	2.69	2.79
A2	1.40	1.50	1.60
b	0.71	0.81	0.91
b1	1.17	1.27	1.37
c	1.17	1.27	1.37
c1	0.30	0.38	0.45
D	9.00	9.15	9.30
D1	6.10	6.30	6.50
D2	0.90	1.10	1.30
D3	10.06	10.26	10.46
E	10.00	10.16	10.40
E1	7.92	8.02	8.12
L	14.90	15.10	15.40
L1	3.23	3.43	3.63
L2	2.20	2.30	2.40
L3	1.40	1.55	1.70
e	2.54BSC		
θ	0°	—	8°
θ 1	3°	5°	8°