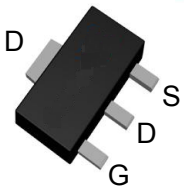
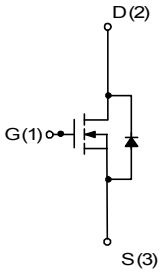
20V N-Channel Super Trench Power MOSFET

- 20V/30A
- $R_{DS(ON)}$=4.6mΩ (typ) @VGS=4.5V
  $R_{DS(ON)}$=5.8mΩ (typ) @VGS=2.5V
- 100% UIS & RG Tested
- Reliableand Rugged
- Lead Freeand Green Devices Available
  (RoHS Compliant)



Top View SOT-89



N-Channel MOSFET

Applications

- Power Management for Industrial DC/DC Converters

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Symbol	Parameter		Maximum	Units
V_{DS}	Drain-Source Voltage		20	V
V_{GS}	Gate-Source Voltage		±12	V
I_D	Continuous Drain Current	T_A=25℃	30	A
		T_A=70℃	24	
I_{DM}	Pulsed Drain Current [C]		140	
I_{AS}, I_{AR}	Avalanche Current [C]		57	A
E_{AS}, E_{AR}	Avalanche energy L=0.1mH [C]		162	mJ
P_D	Power Dissipation [B]	T_A=25℃	3.1	W
		T_A=70℃	2	
Junction and Storage Temperature Range			-55 to 150	℃

Thermal Characteristics					
Symbol	**Parameter**		**Typ**	**Max**	**Units**
$R_{\theta JA}$	Maximum Junction-to-Ambient [A]	t ≤ 10s	31	40	℃/W
	Maximum Junction-to-Ambient [A D]	Steady-State	59	75	℃/W
$R_{\theta JL}$	Maximum Junction-to-Lead	Steady-State	60	90	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	μA
		T_J=55℃			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±12V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA	0.5	1	1.6	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	140			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=20A		4.6	5.5	mΩ
		T_J=125℃		5.8	7	
		V_{GS}=2.5V, I_D=18A		5.5	7	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		105		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.6	1	V
I_S	Maximum Body-Diode Continuous Current				4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz	3080	3860	4630	pF
C_{oss}	Output Capacitance		520	740	960	pF
C_{rss}	Reverse Transfer Capacitance		350	580	810	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.6	1.4	2.1	Ω
SWITCHING PARAMETERS						
Q_g(4.5V)	Total Gate Charge	V_{GS}=10V, V_{DS}=10V, I_D=20A	28	36	43	nC
Q_{gs}	Gate Source Charge		7	9	11	nC
Q_{gd}	Gate Drain Charge		7	12	17	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=10V, R_L=0.5Ω, R_{GEN}=3Ω		7		ns
t_r	Turn-On Rise Time			8		ns
$t_{D(off)}$	Turn-Off DelayTime			70		ns
t_f	Turn-Off Fall Time			18		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=500A/μs	13	17	20	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=500A/μs	29	36	43	nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25℃. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150℃, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and duty cycles to keep initialT_J=25℃.Maximum avalanche current limited by tester capability.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150℃. The SOA curve provides a single pulse ratin g.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

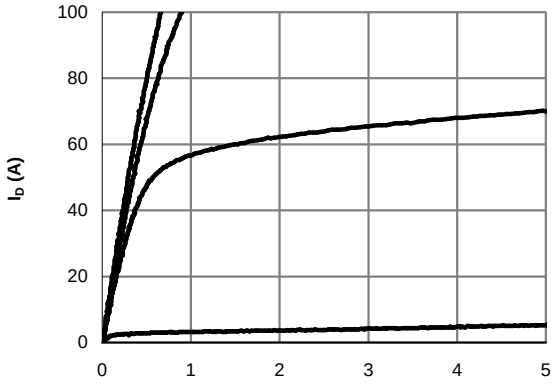


Fig 1: On-Region Characteristics (Note E)

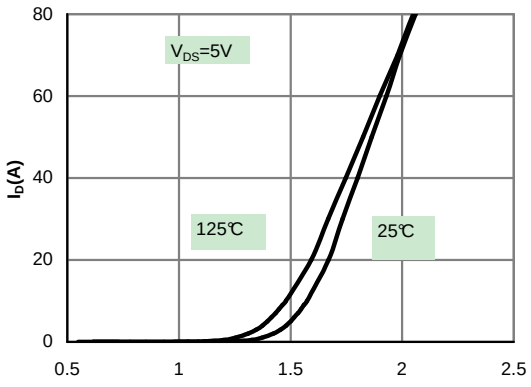


Figure 2: Transfer Characteristics (Note E)

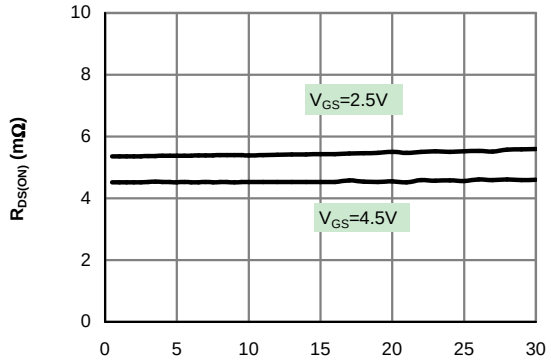


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

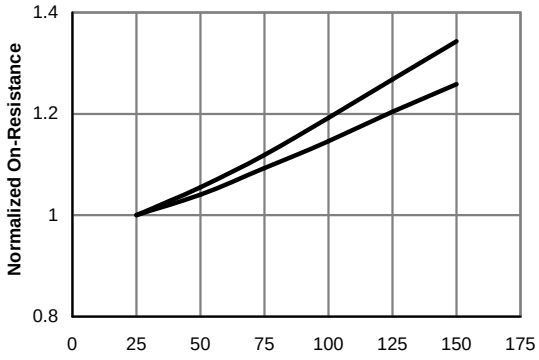


Figure 4: On-Resistance vs. Junction Temperature (Note E)

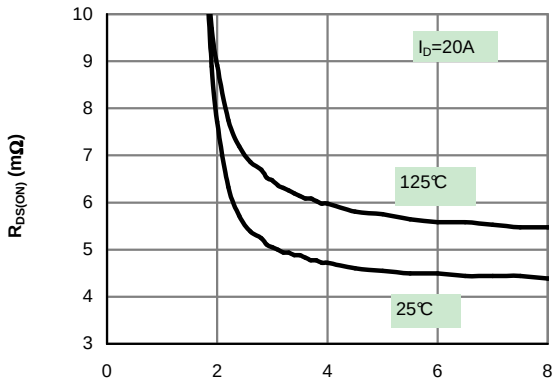


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

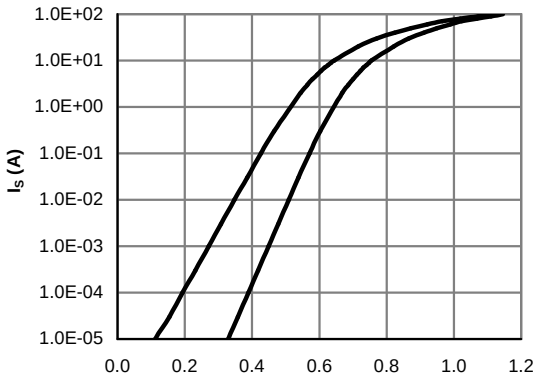


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

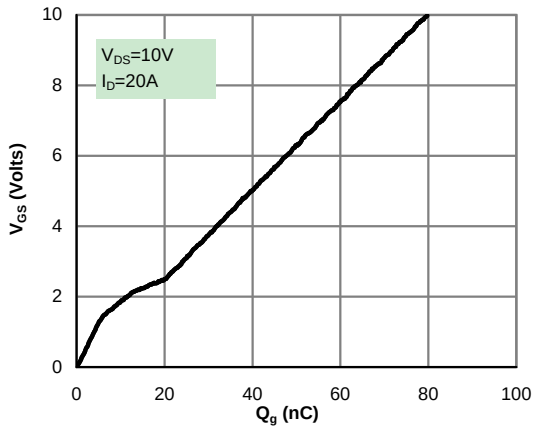


Figure 7: Gate-Charge Characteristics

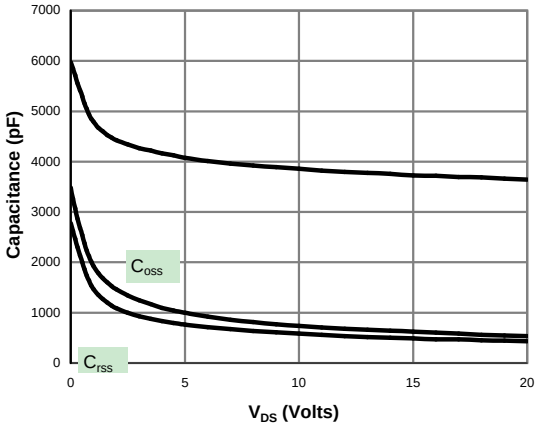


Figure 8: Capacitance Characteristics

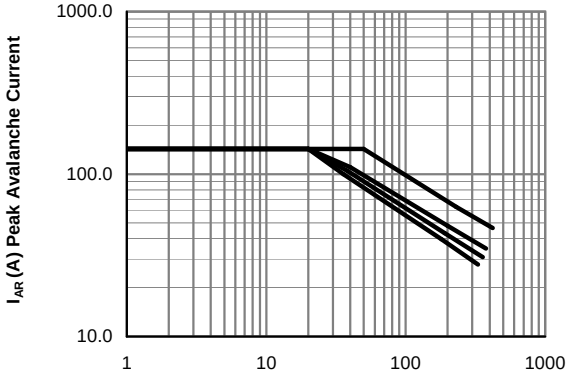
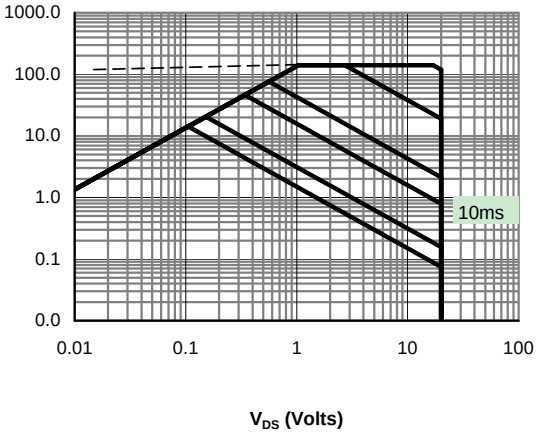


Figure 9: Single Pulse Avalanche capability (Note C)



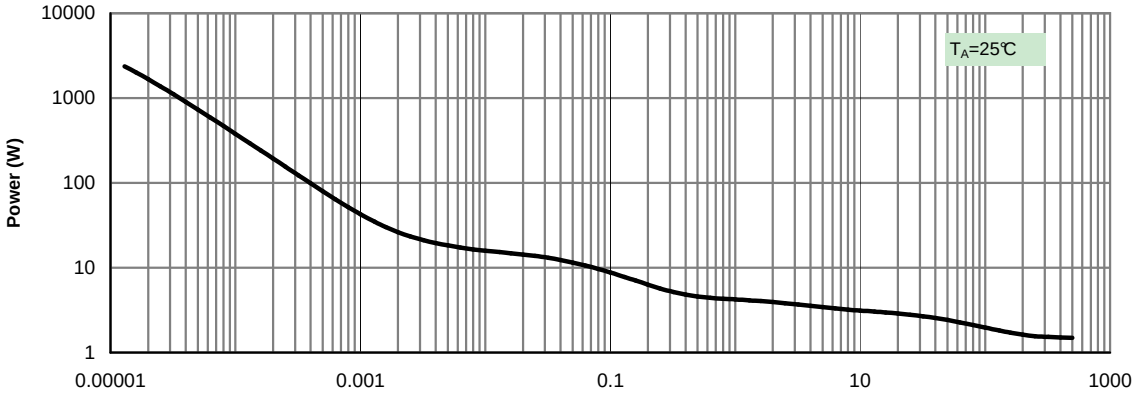


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

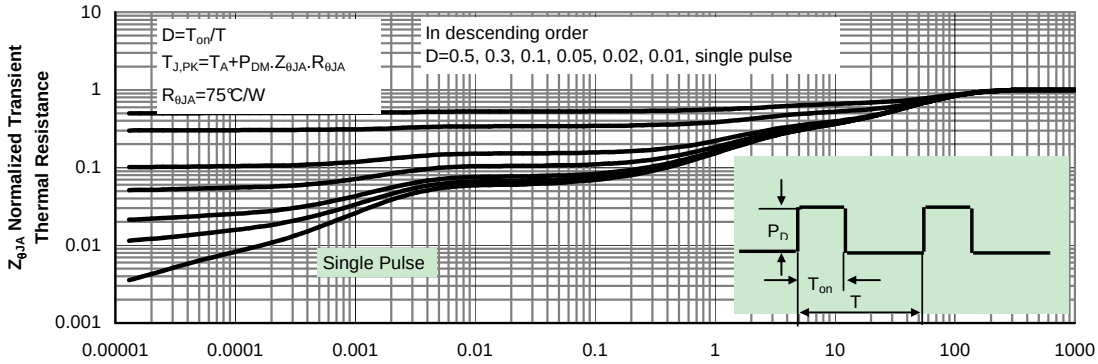
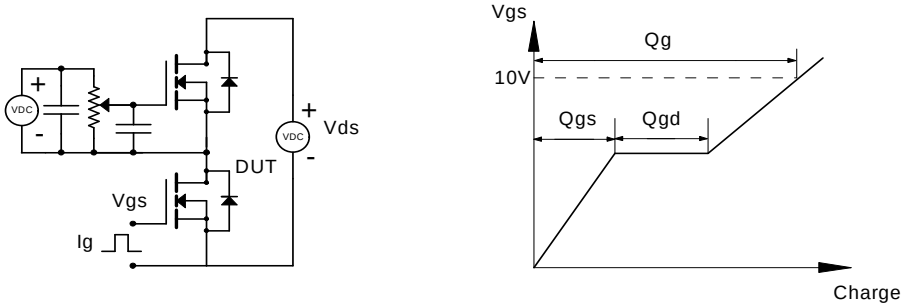
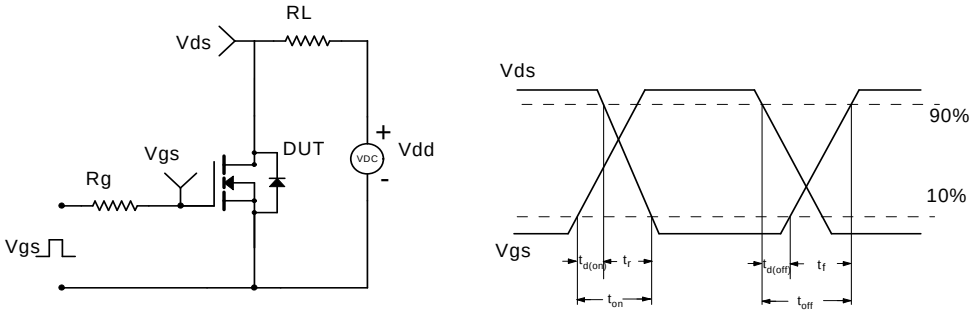


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

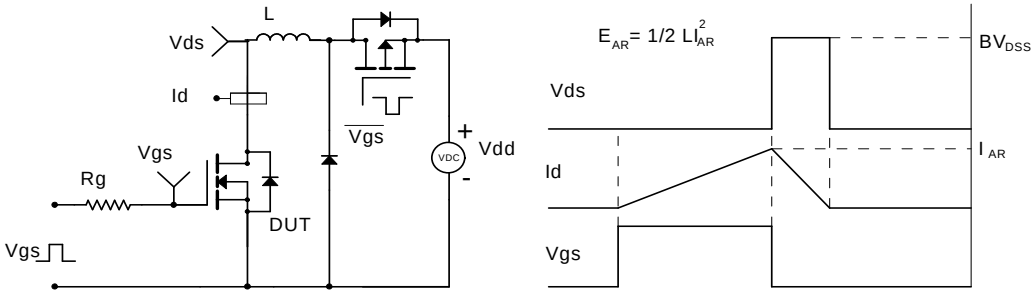
Gate Charge Test Circuit & Waveform



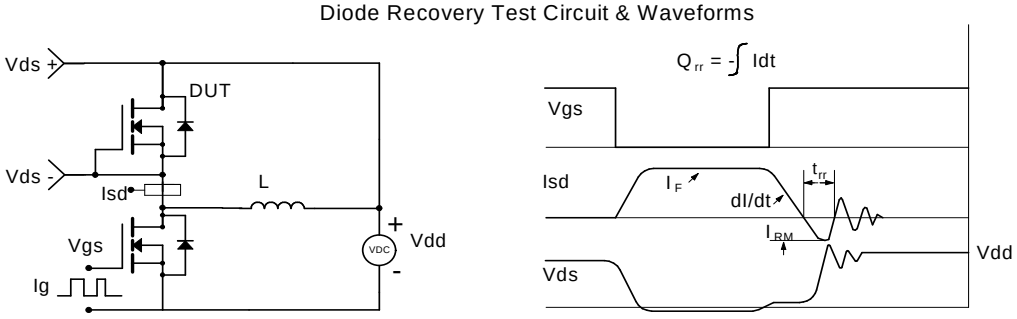
Resistive Switching Test Circuit & Waveforms



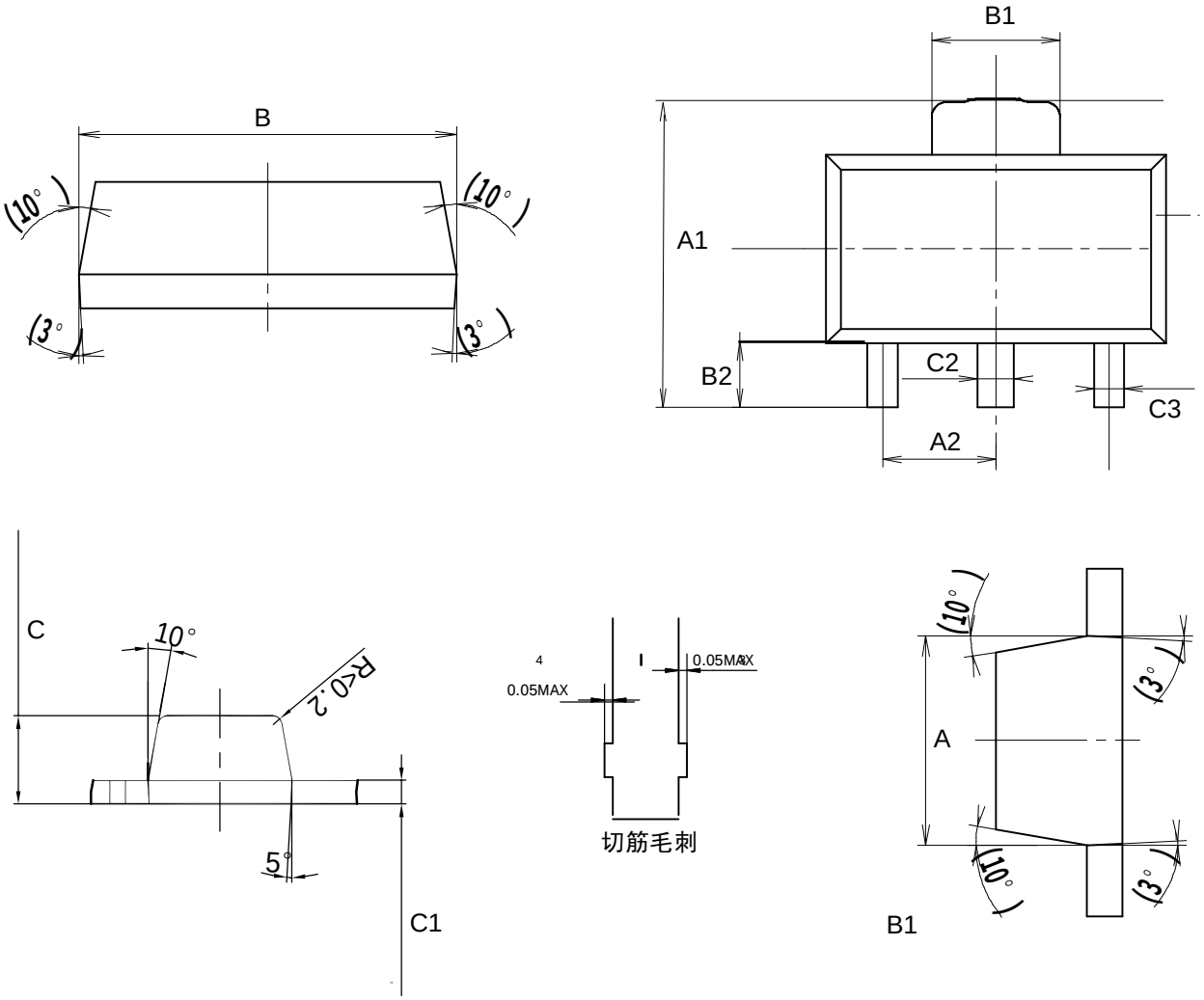
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

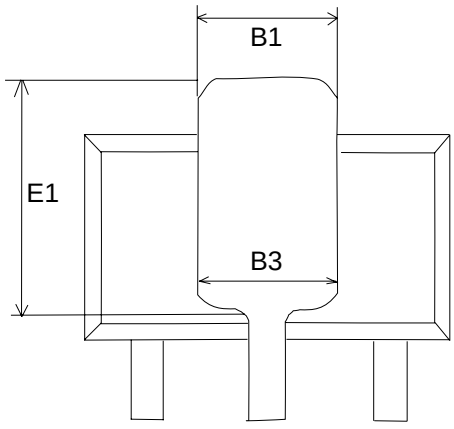


Diode Recovery Test Circuit & Waveforms



SOT89-3L





COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	2.35	2.45	2.55
A1	4.00	4.10	4.20
A2	1.45	1.50	1.55
B	4.40	4.50	4.60
B1		1.55 REF	
B2	1.00	1.10	1.20
B3		1.63 REF	
C	1.45	1.50	1.55
C1	0.39	0.40	0.41
C2	0.4	0.48	0.55
C3	0.35	0.4	0.45
E1	2.65	2.75	2.85