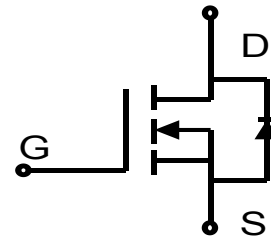




Description

These N-Channel enhancement mode power field effect transistors are using shielded gate trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.



N-Channel MOSFET

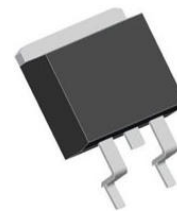
Features

- ◆ 100V, 180A, $R_{DS(on),max}=4.0m\Omega@V_{GS} = 10V$
- ◆ Improved dv/dt capability
- ◆ Fast switching
- ◆ 100% EAS Guaranteed
- ◆ Green device available

Applications

- ◆ Motor Drives
- ◆ UPS
- ◆ DC-DC Converter

Pin Configuration



TO-263

Product Summary

V_{DSS}	100V
$R_{DS(on),max}@ V_{GS}=10V$	4.0mΩ
I_D	180A

Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	100	V
Continuous drain current ($T_C = 25^\circ C$,Silicon limit)	I_D	186	A
($T_C = 25^\circ C$, Package limit)		180	A
($T_C = 100^\circ C$,Silicon limit)		118	A
Pulsed drain current ¹⁾	I_{DM}	720	A
Gate-Source voltage	V_{GSS}	± 20	V
Avalanche energy ²⁾	E_{AS}	702	mJ
Power Dissipation	P_D	278	W
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.45	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient ³⁾	$R_{\theta JA}$	50	$^\circ C/W$

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
WLP040R10	TO-263	WLP040R10	800



Electrical Characteristics

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=250\mu\text{A}$	100	---	---	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.2	---	3.8	V
Drain-source leakage current	I_{DSS}	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_J = 25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_J = 150^\circ\text{C}$	---	---	10	mA
Gate leakage current, Forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=50\text{ A},$ $T_J = 25^\circ\text{C}$	---	3.3	4.0	$\text{m}\Omega$
		$T_J = 150^\circ\text{C}$	---	6.6	---	
Forward transconductance	g_{fs}	$V_{DS} = 5\text{ V}, I_D=50\text{ A}$	---	94	---	S
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V},$ $f = 250\text{kHz}$	---	7116	---	pF
Output capacitance	C_{oss}		---	1067	---	
Reverse transfer capacitance	C_{rss}		---	24	---	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, V_{GS}=10\text{V}, I_D = 50\text{ A}$	---	75	---	ns
Rise time	t_r		---	176	---	
Turn-off delay time	$t_{d(off)}$		---	110	---	
Fall time	t_f		---	66.7	---	
Gate resistance	R_g	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	---	2.4	---	Ω
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DS}=80\text{V}, I_D = 50\text{A},$ $V_{GS}= 10\text{ V}$	---	28	---	nC
Gate to drain charge	Q_{gd}		---	33	---	
Gate charge total	Q_g		---	115	---	
Gate plateau voltage	$V_{plateau}$		---	5	---	V
Output Charge	Q_{oss}	$V_{DS}=80\text{ V}, V_{GS}= 0\text{V}$	---	160	---	nC
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I_S		---	---	180	A
Pulsed Source Current	I_{SM}		---	---	720	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{V}, I_S=50\text{A}, T_J=25^\circ\text{C}$	---	---	1.1	V
Reverse Recovery Time	t_{rr}	$I_S=50\text{A}, di/dt=100\text{A}/\mu\text{s}, T_J=25^\circ\text{C}$	---	51	---	ns
Reverse Recovery Charge	Q_{rr}		---	56.8	---	nC

Notes:

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2: $V_{DD}=90\text{V}, V_{GS}=10\text{V}, L=0.5\text{mH}, I_{AS}=53\text{A},$ Starting $T_J=25^\circ\text{C}.$
- 3: The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.



Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

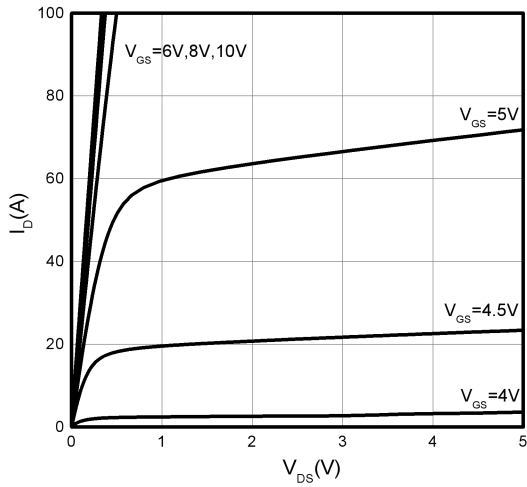


Figure 2. Transfer Characteristics

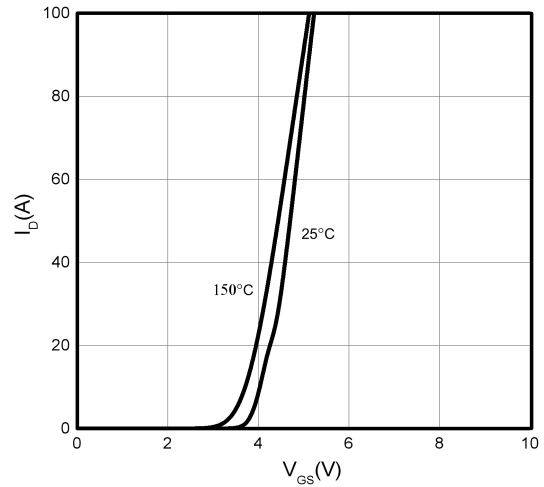


Figure 3. On-Resistance vs. Drain Current

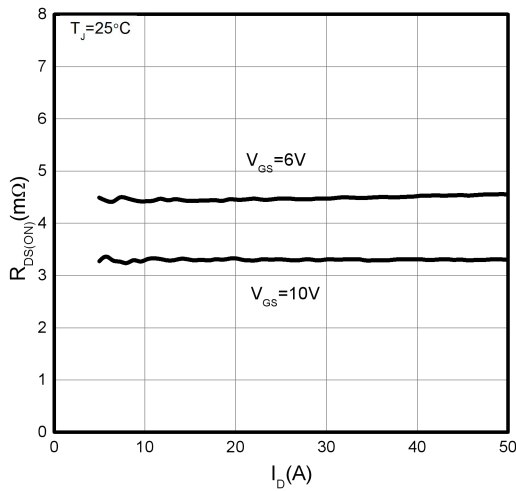


Figure 4. On-Resistance vs. Temperature

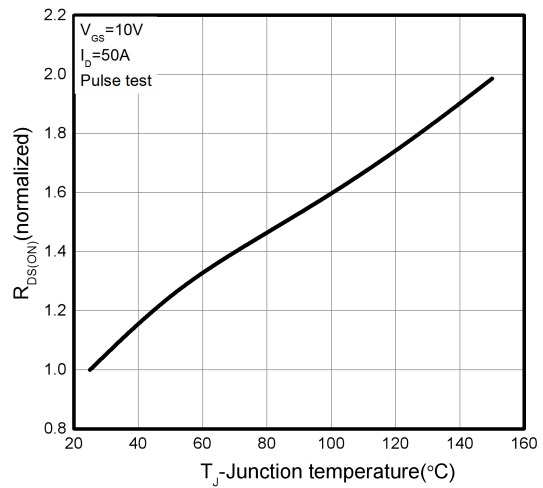


Figure 5. Breakdown Voltage vs. Temperature

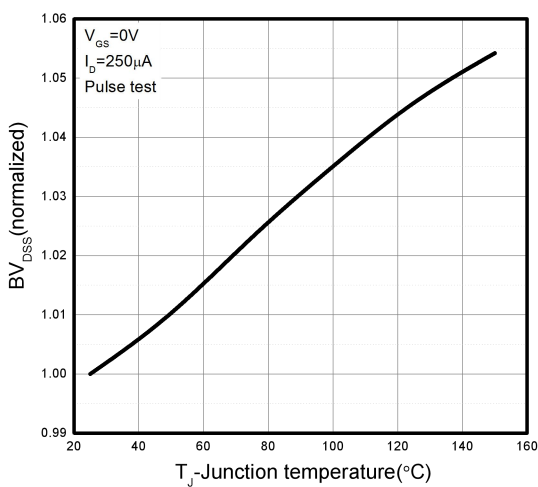


Figure 6. Threshold Voltage vs. Temperature

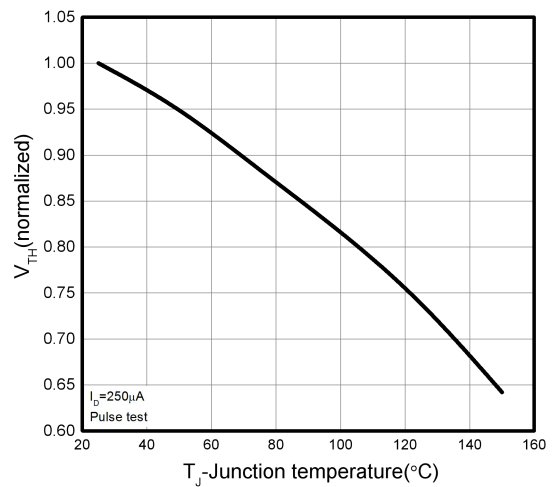




Figure 7. $R_{DS(on)}$ vs. Gate Voltage

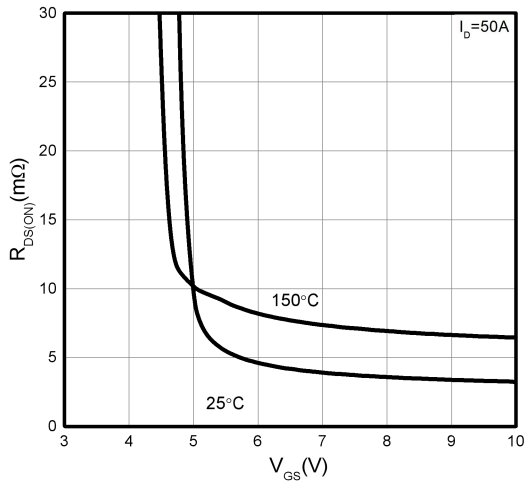


Figure 8. Body-Diode Characteristics

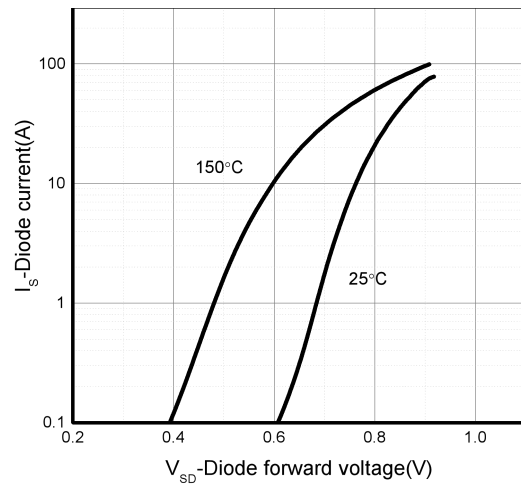


Figure 9. Capacitance Characteristics

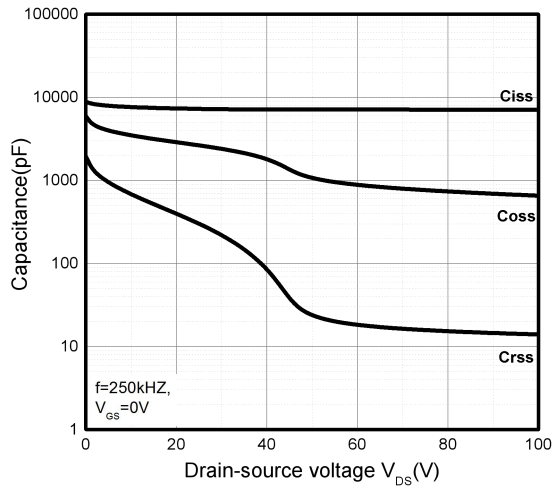


Figure 10. Gate Charge Characteristics

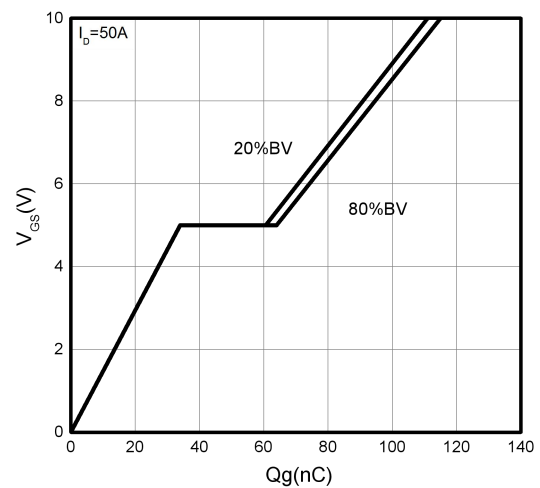


Figure 11. Drain Current Derating

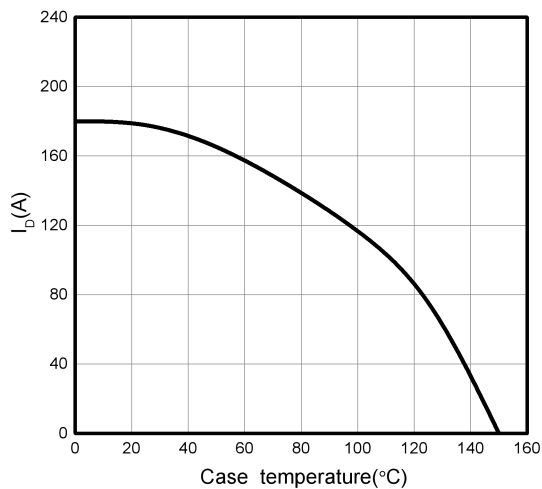


Figure 12. Power Dissipation vs. Temperature

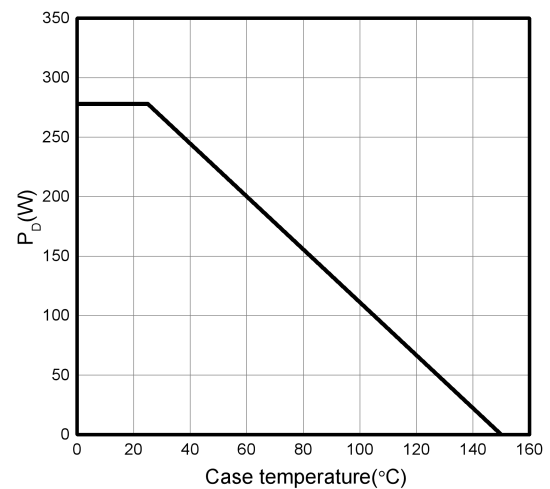




Figure 13: Safe Operating Area

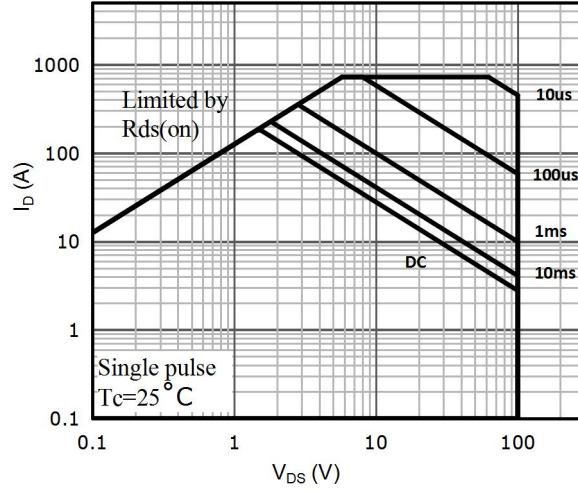
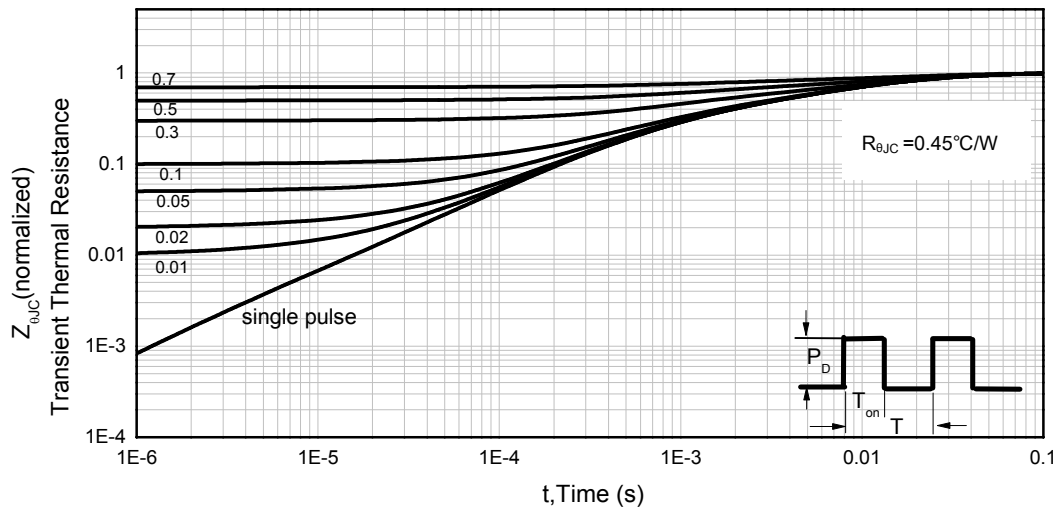


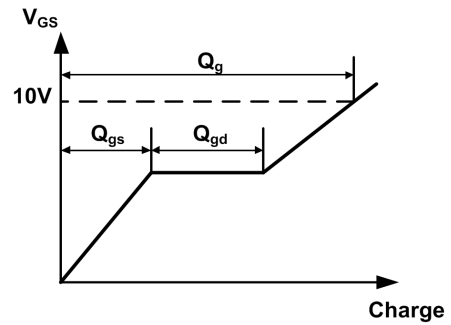
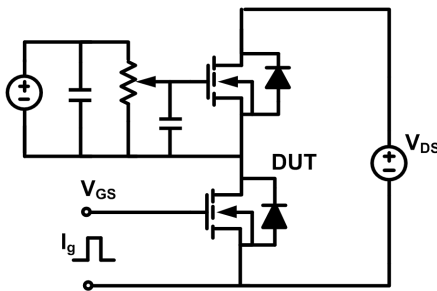
Figure 14. Normalized Maximum Transient Thermal Impedance (RthJC)



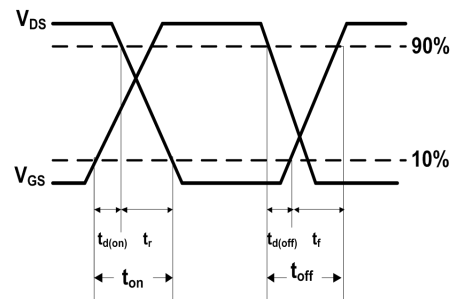
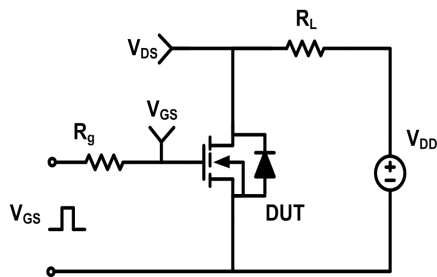


Test Circuit & Waveforms

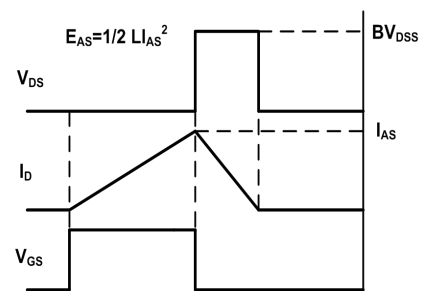
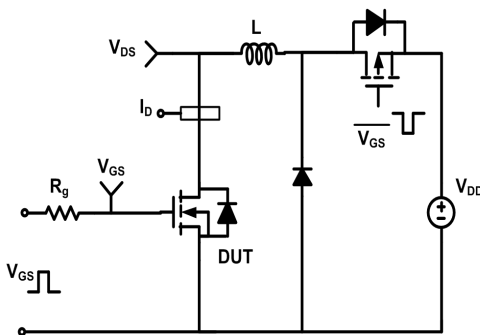
Gate Charge Test Circuit & Waveform



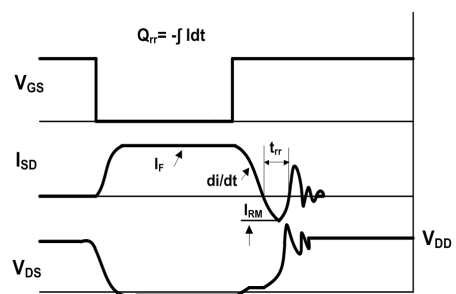
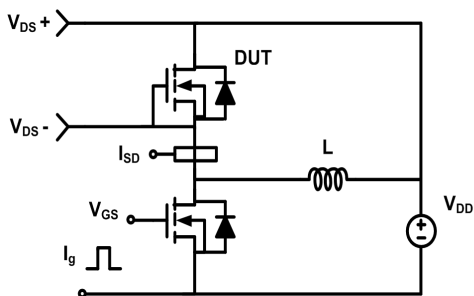
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform

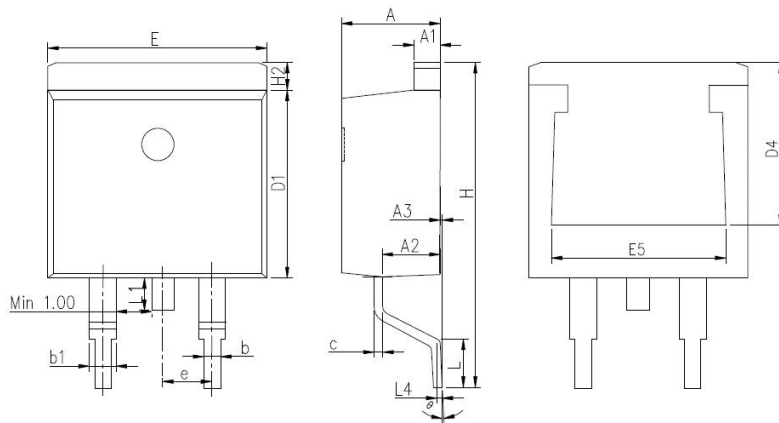


Diode Recovery Test Circuit & Waveform





Mechanical Dimensions for TO-263



DIMENSIONS IN MILLITMETERS		
SYMBOL	MIN	MAX
A	4.36	4.8
A1	1.19	1.42
A2	2.2	2.96
A3	0	0.25
b	0.7	0.96
b1	1.17	1.47
c	0.3	0.69
D1	8.5	9.5
D4	6.6	-
E	9.8	10.55
E5	7.06	8.7
e	2.54BSC	
H	14.7	15.7
H2	0.95	1.65
L	1.9	2.8
L1	-	1.78
L4	0.25BSC	
θ	0°	9°