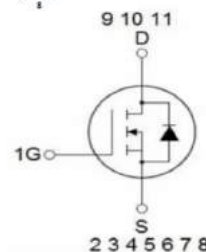
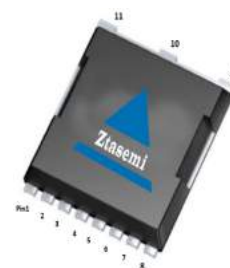


## Features

- N-Channel
- Low  $R_{DS(ON)}$
- RoHS compliant
- Halogen-free
- 100% EAS Tested

$V_{DS}$	60	V
$R_{DS(on),TYP@ V_{GS}=10V}$	0.85	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	1.2	m $\Omega$
$I_D$	220	A

**TOLL**


Part ID	Package Type	Marking	Packing
ZTG009N06L	TOLL	ZTG009N06L	2000pcs/Reel

## Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (<math>T_c=25^\circ\text{C}</math> Unless Otherwise Noted)</b>				
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	60	V	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	$T_c = 25^\circ\text{C}$ 600	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous (Note 1)	$T_c = 25^\circ\text{C}$	220	A
		$T_c = 100^\circ\text{C}$	140	A
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ\text{C}$	113	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient (Note 4)		45	$^\circ\text{C/W}$
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 3)		506	mJ

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	2.0	3.0	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =50A	--	0.85	1.1	mΩ
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A	--	1.2	1.6	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	--	8396	--	pF
C <sub>oss</sub>	Output Capacitance		--	1840	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	218	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	1.6	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =30V, I <sub>D</sub> =50A, V <sub>GS</sub> =10V	--	165	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	36	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	68	--	nC
<b>Switching Characteristics</b>						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =30V, R <sub>L</sub> =0.5Ω, R <sub>G</sub> =6.5Ω, V <sub>GS</sub> =10V	--	29	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	68	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	210	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	168	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
I <sub>SD</sub>	Source-Drain Current (Body Diode)		--	--	220	A
V <sub>SD</sub>	Forward on voltage	I <sub>S</sub> =50A, V <sub>GS</sub> =0V	--	0.79	--	V
T <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>D</sub> =50A, di/dt=100A/μs	--	69	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	150	--	nC
I <sub>RRM</sub>	Peak Reverse Recovery Current				3.5	

**Notes:**

1. The max drain current rating is silicon limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V<sub>DD</sub> = 30 V, I<sub>AS</sub> = 45 A, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25 °C
4. Mount on minimum PCB layout

# Electrical Characteristics Diagrams

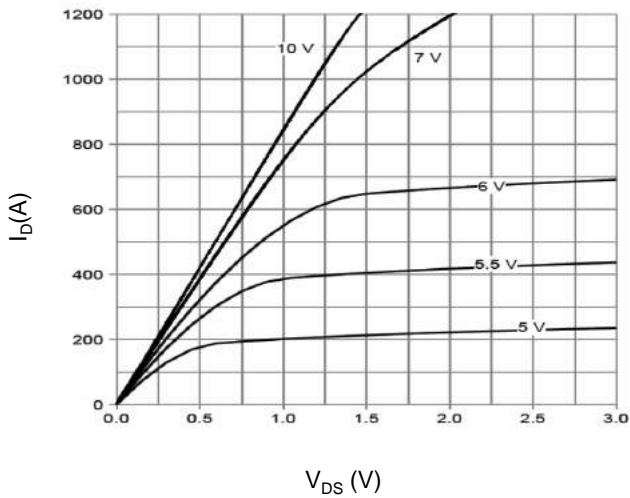


Figure 1: On-Region Characteristics

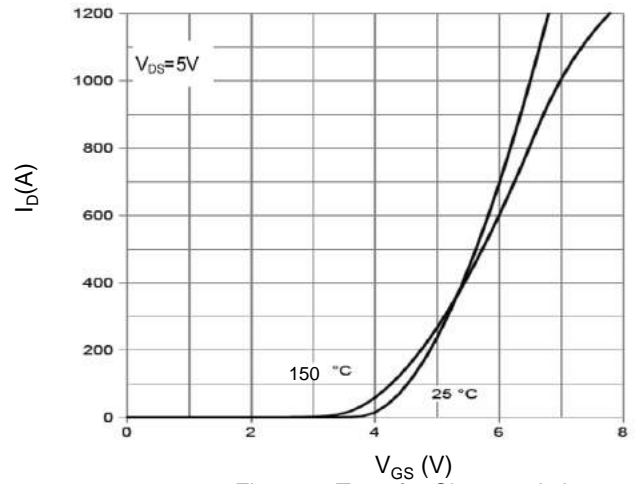


Figure 4: Transfer Characteristics

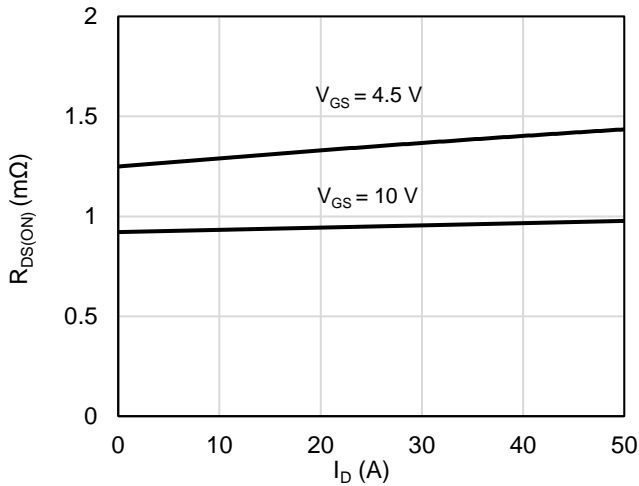


Figure 2: On-Resistance vs. Drain Current and Gate Voltage

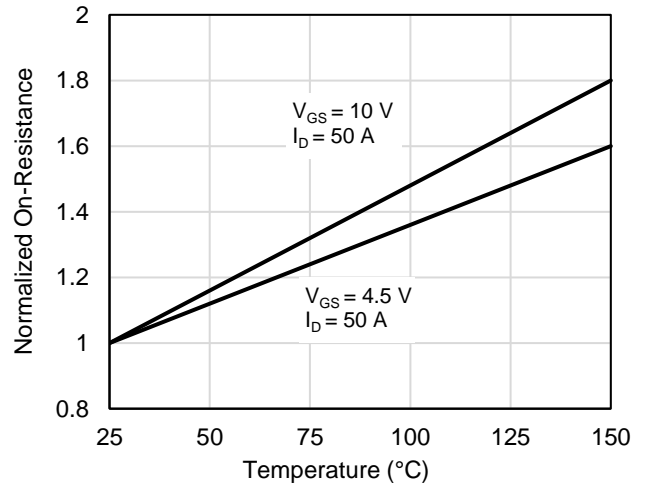


Figure 5: On-Resistance vs. Junction Temperature

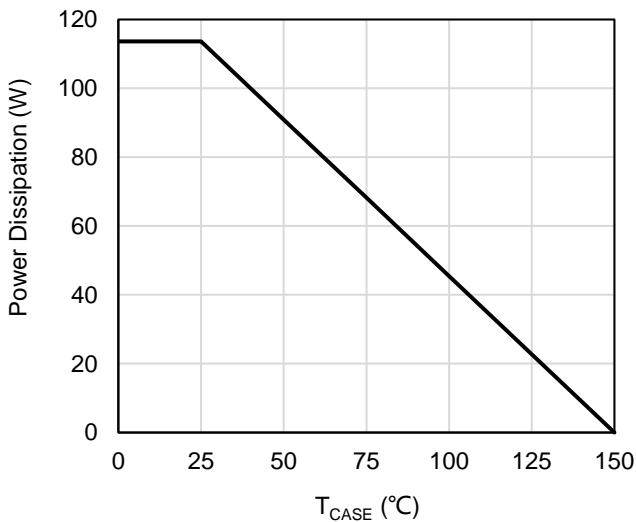


Figure 3: Power De-rating

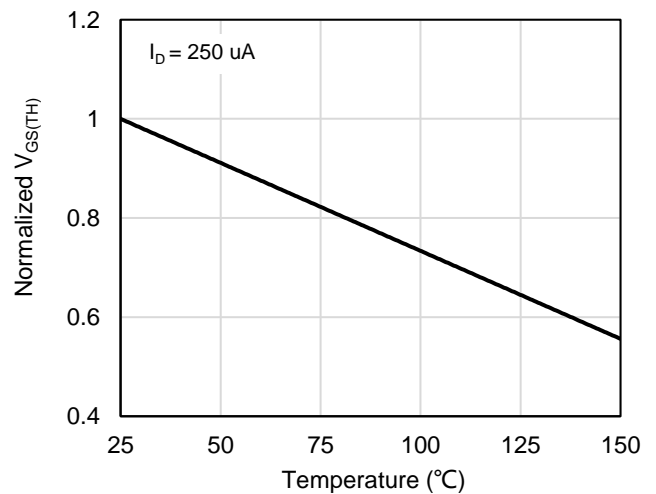


Figure 6: Threshold Voltage vs. Junction Temperature

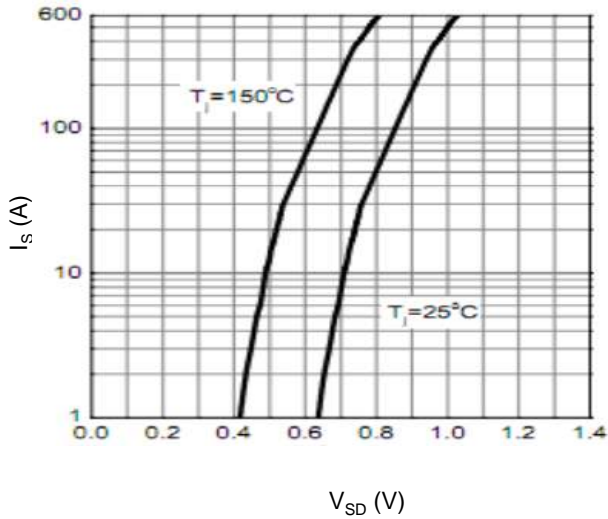


Figure 7: Body-Diode Characteristics

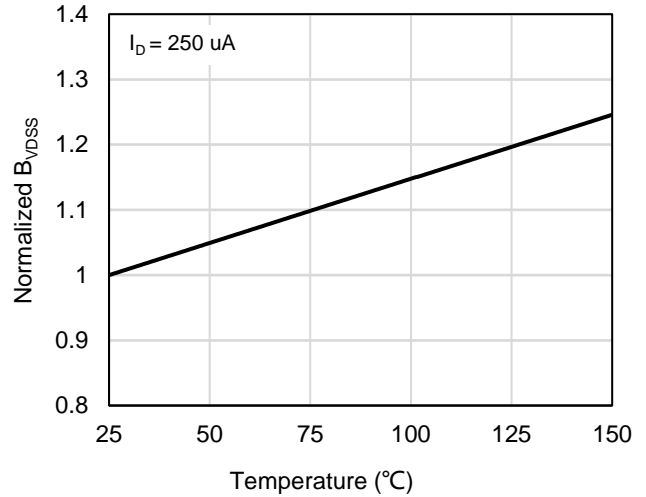


Figure 10: Breakdown Voltage vs. Junction Temperature

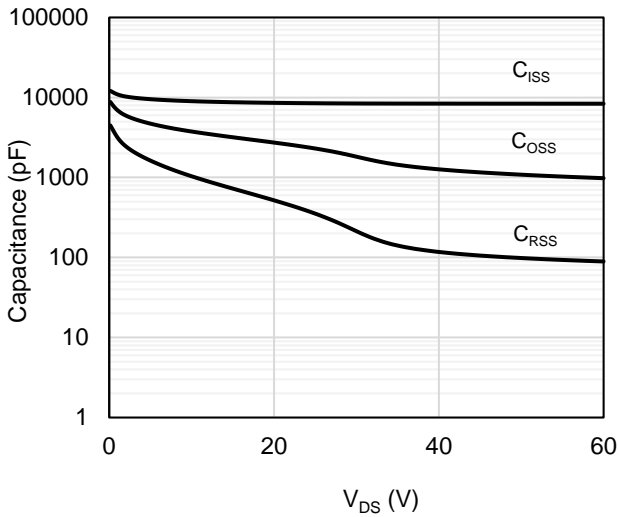


Figure 8: Capacitance Characteristics

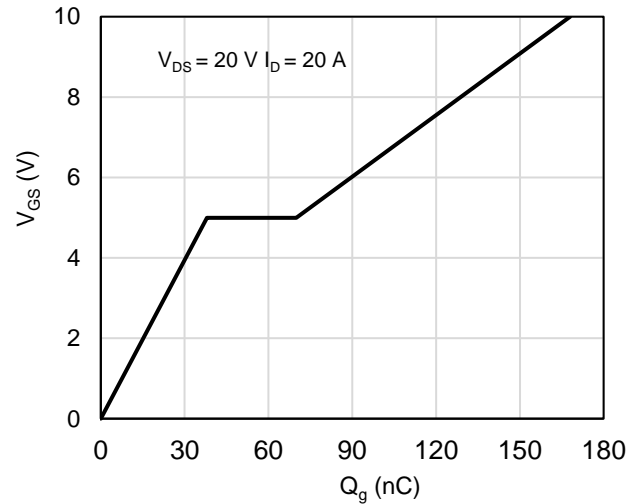


Figure 11: Gate-Charge Characteristics

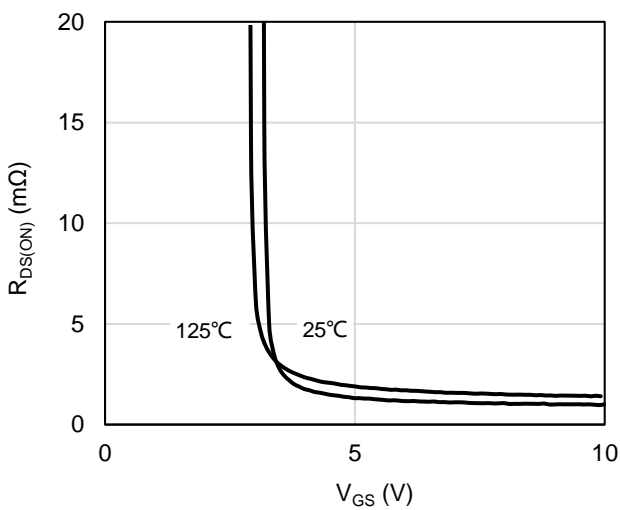


Figure 9: On-Resistance vs. Gate-Source Voltage

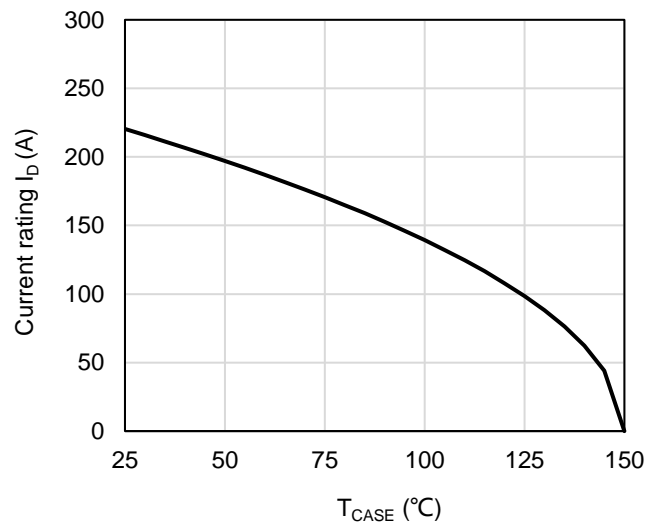


Figure 12: Current De-rating

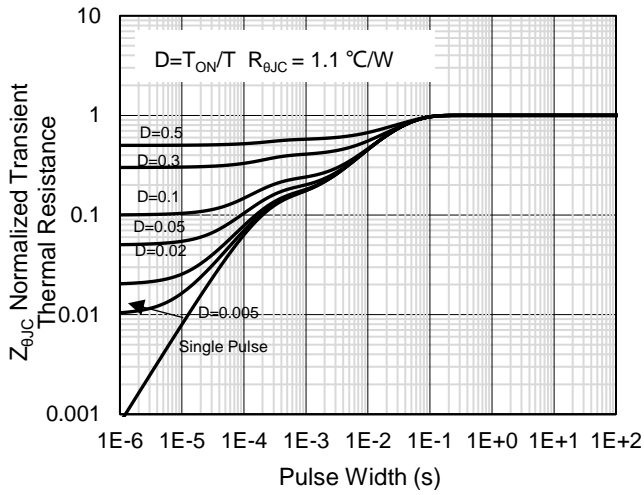


Figure 13: Normalized Maximum Transient Thermal Impedance

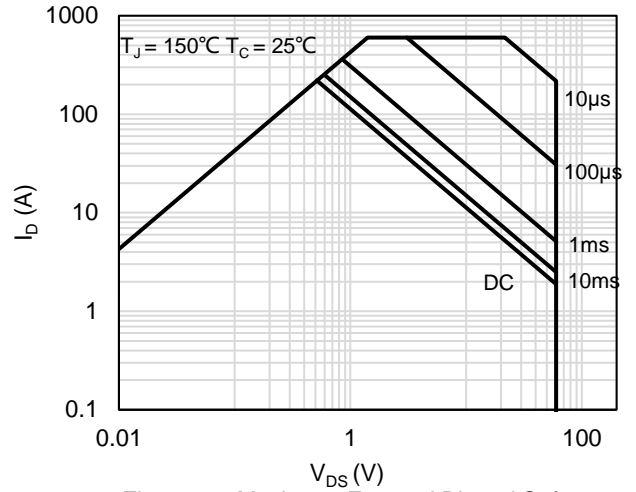
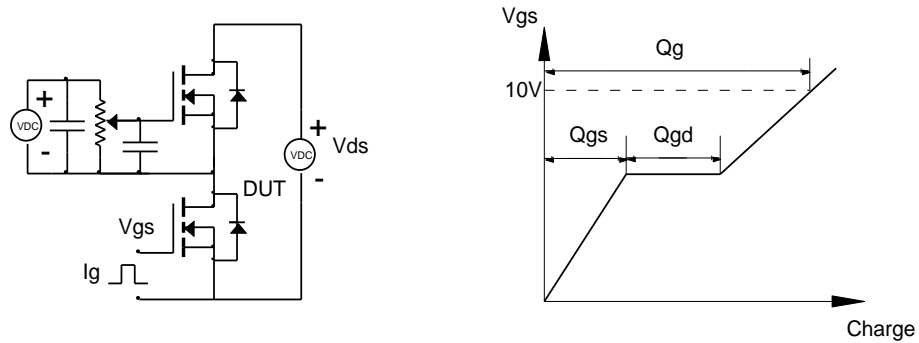


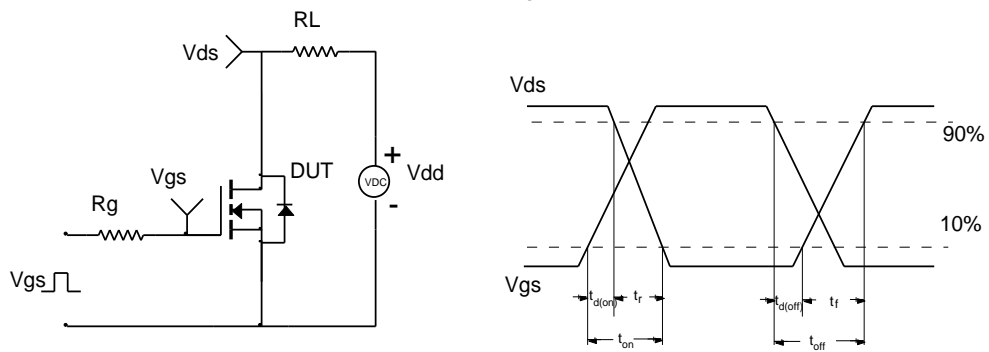
Figure 14: Maximum Forward Biased Safe Operating Area

# Test Circuit and Waveform

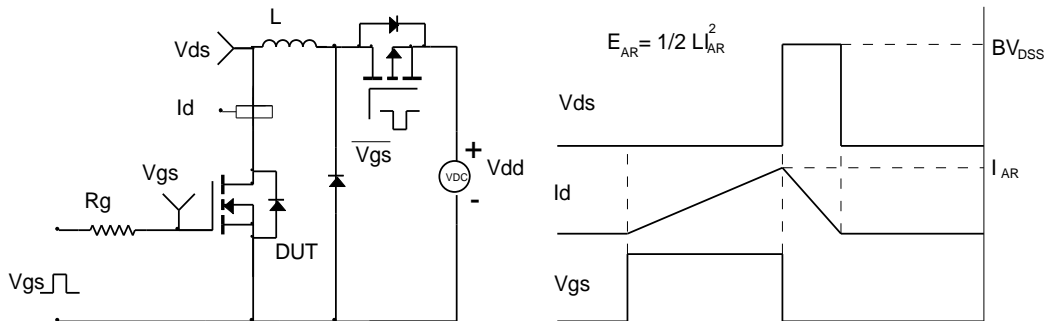
Gate Charge Test Circuit & Waveform



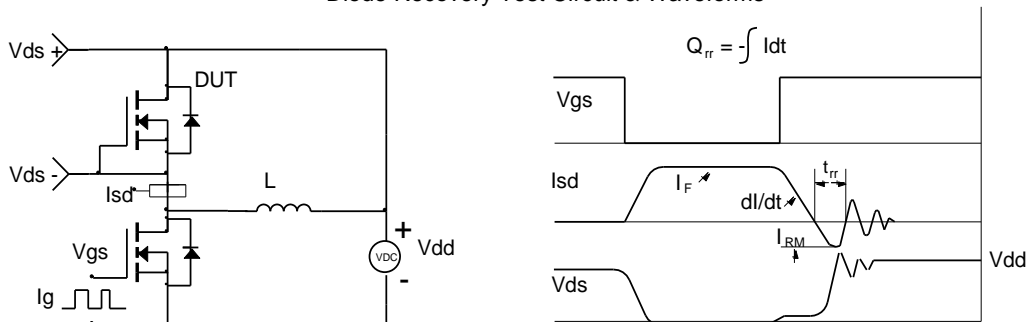
Resistive Switching Test Circuit & Waveforms



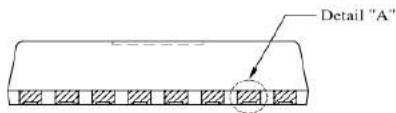
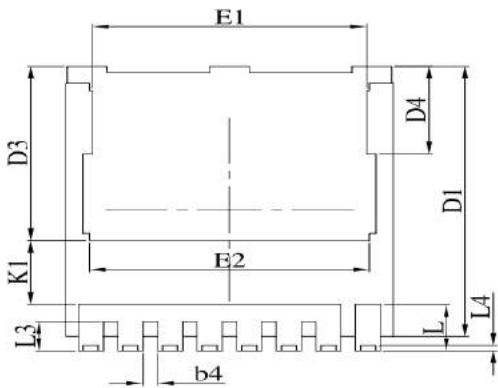
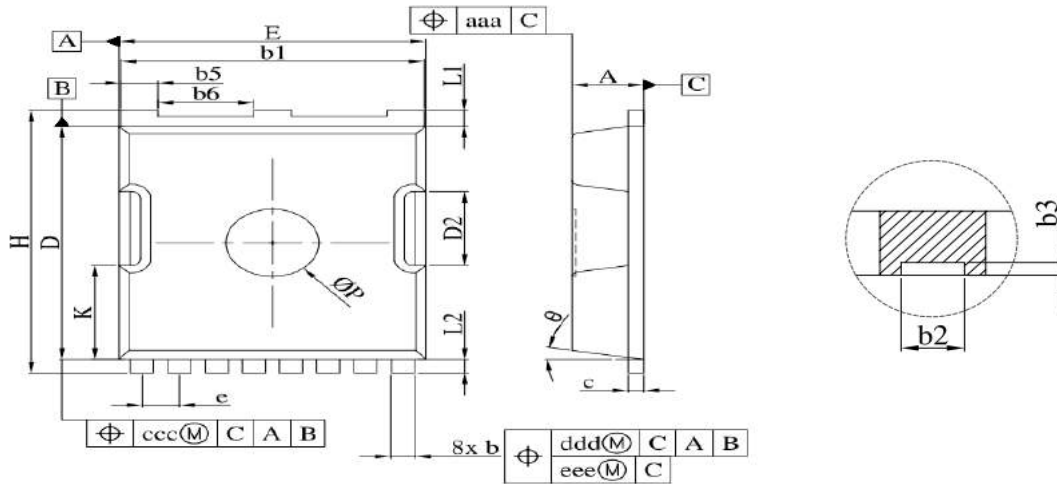
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## TOLL-8L Package Information



SYMBOL	COMMON		
	MILLIMETER		
	MIN.	NOMINAL	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.36	0.45	0.55
b3	0.05	0.100	0.35
b4	0.30	0.40	0.50
b5	1.10	1.20	1.30
b6	3.00	3.10	3.20
c	0.40	0.50	0.60
D	10.28	10.38	10.55
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	7.00	7.15	7.30
D4	3.44	3.59	3.74
e	1.10	1.20	1.30
E	9.80	9.90	10.00
E1	8.20	8.30	8.40
E2	8.35	8.50	8.65
H	11.50	11.68	11.85
K	4.08	4.18	4.28
K1	2.45	---	---
L	1.60	1.90	2.10
L1	0.50	0.70	0.90
L2	0.50	0.60	0.70
L3	1.00	1.20	1.30
L4	0.13	0.23	0.33
P	2.85	3.00	3.15
$\theta$	10° REF		
aaa	0.20		
ccc	0.20		
ddd	0.25		
eee	0.20		

## Customer Service

Sales and Service:

[zj@ztasemi.com](mailto:zj@ztasemi.com)