

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Applications

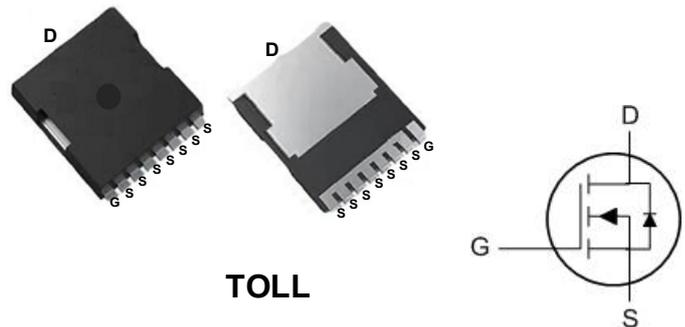
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
40V	1.1mΩ	300A

TOLL Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	300	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	200	A
I_{DM}	Pulsed Drain Current ²	690	A
EAS	Single Pulse Avalanche Energy ³	500	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	220	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	35	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	1	$^\circ C/W$

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	40	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	---	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =1A	---	1.1	1.38	mΩ
		V _{GS} =4.5V, I _D =1A	---	1.55	1.7	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.55	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	---	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =40V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =40V, V _{GS} =0V, T _J =150°C	---	100	---	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =20V, I _D =35A	---	205	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	3.1	---	Ω
Q _g	Total Gate Charge	V _{DS} =32V, V _{GS} =10V, I _D =40A	---	85	---	nC
Q _{gs}	Gate-Source Charge		---	20.2	---	
Q _{gd}	Gate-Drain Charge		---	13	---	
T _{d(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =20V, R _G =2Ω, I _D =40A	---	12.6	---	ns
T _r	Rise Time		---	46.5	---	
T _{d(off)}	Turn-Off Delay Time		---	86.7	---	
T _f	Fall Time		---	103	---	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	5631	---	pF
C _{oss}	Output Capacitance		---	2525	---	
C _{rss}	Reverse Transfer Capacitance		---	39.6	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	300	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =25A, T _J =25°C	0.7	0.9	1.1	V
t _{rr}	Reverse Recovery Time	I _F =40A, di/dt=100A/μs,	---	75.9	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	86.9	---	nC

Note :

1 The data is tested by surface mounted on a 4 inch² FR-4 board with 2OZ copper.

2 The data is tested by pulsed pulse width < 300us duty cycle < 2%

3 The EAS data shows Max. rating. The test condition is V_{RMS}>0, V_{DD}=32V, V_{GS}=10V, L=0.5mH

4 The power dissipation is limited by 150 °C junction temperature

5 The data is theoretically the same as I_{DM} and I_{DMA} in real applications. It should be limited by total power dissipation.

Typical Performance Characteristics

Fig 1: Output Characteristics

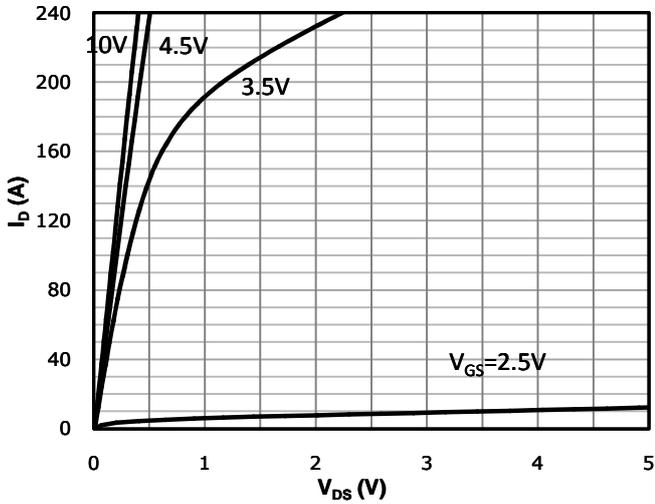


Fig 2: Transfer Characteristics

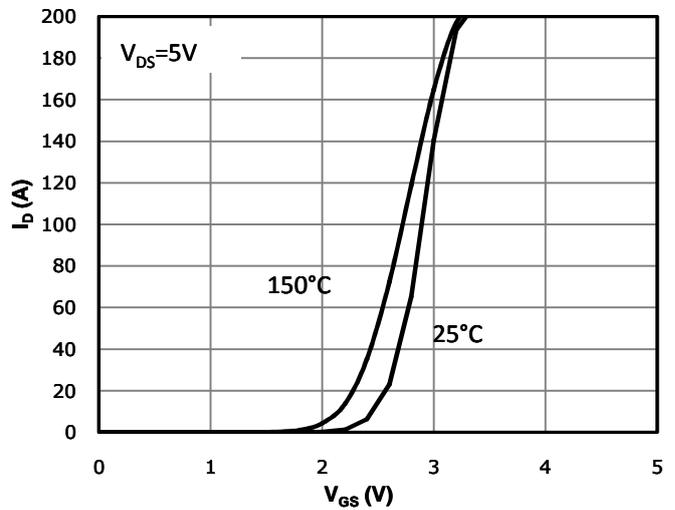


Fig 3: Rds(on) vs Drain Current and Gate Voltage

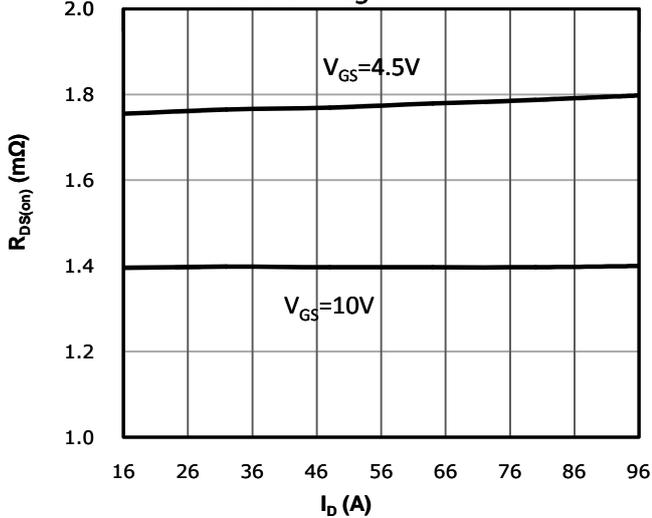


Fig 4: Rds(on) vs Gate Voltage

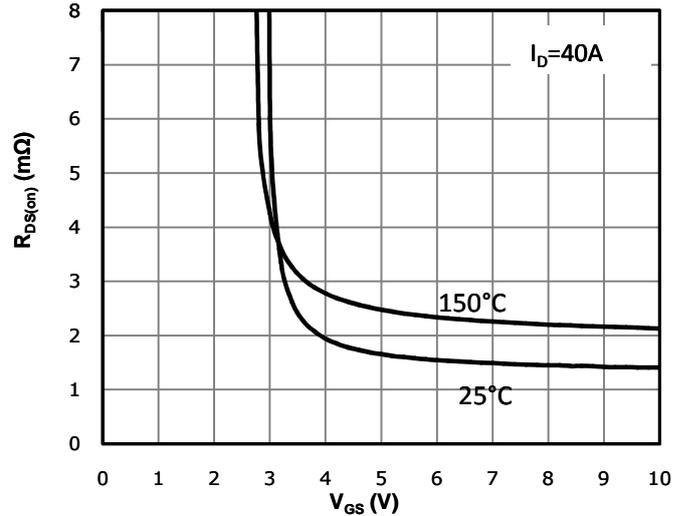


Fig 5: Rds(on) vs. Temperature

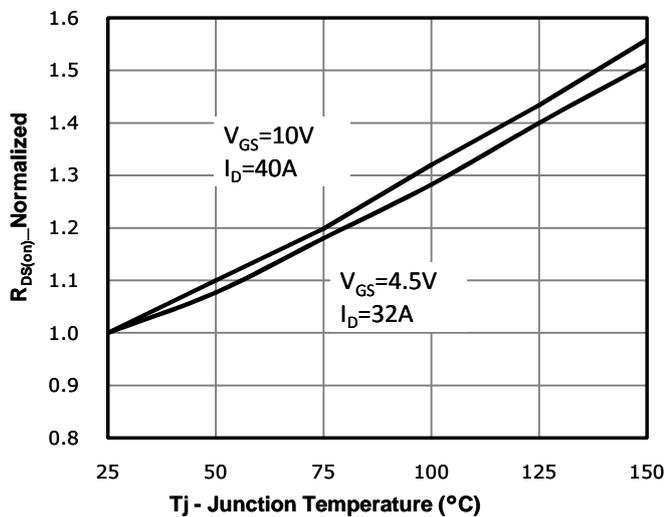


Fig 6: Capacitance Characteristics

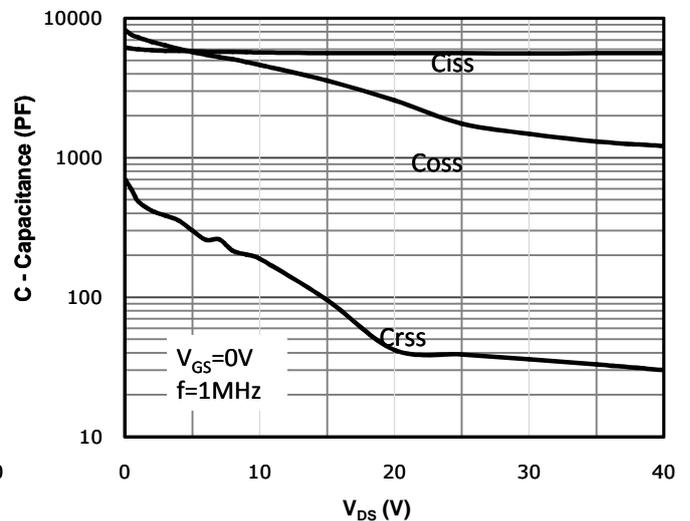


Fig 7: Gate Charge Characteristics

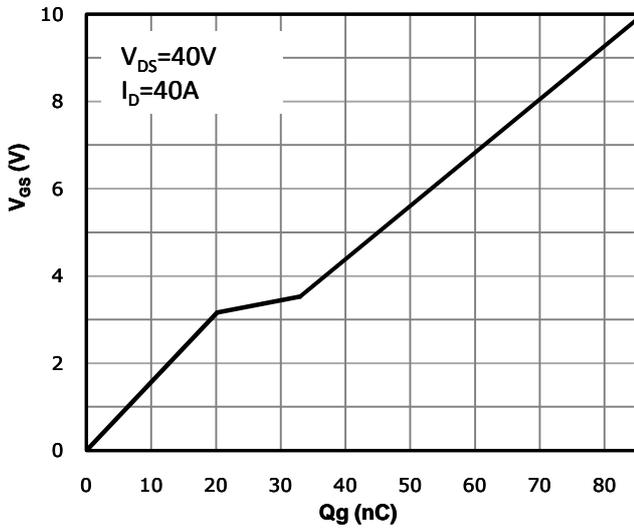


Fig 8: Body-diode Forward Characteristics

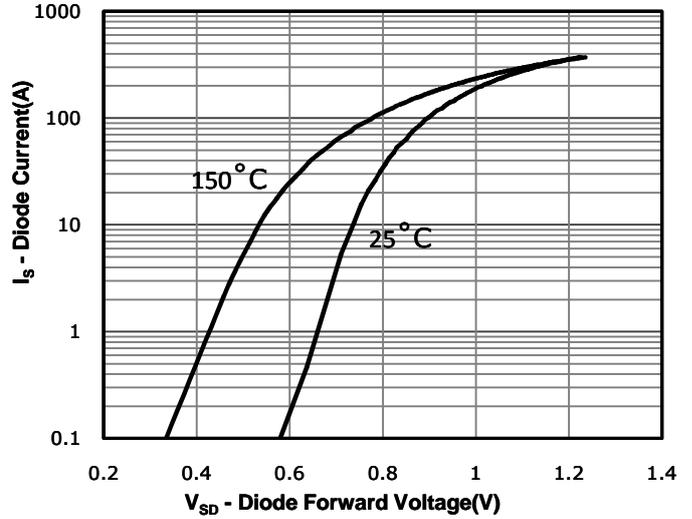


Fig 9: Power Dissipation

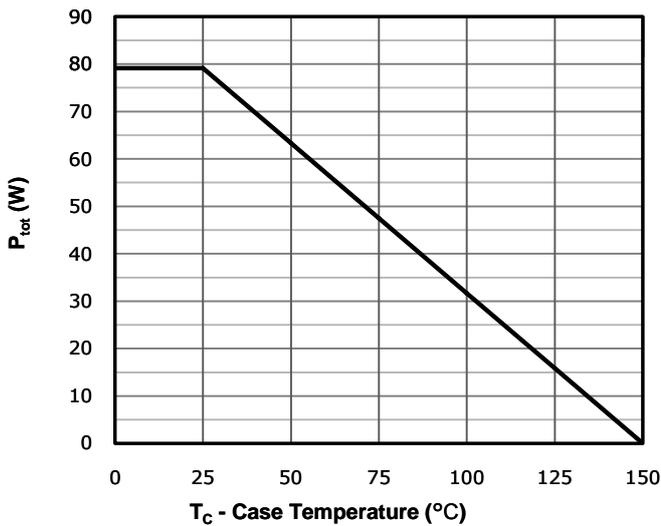


Fig 10: Drain Current Derating

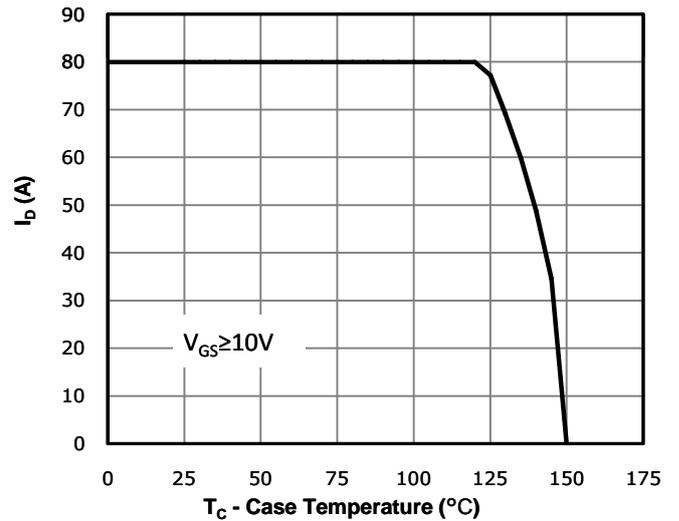


Fig 11: Safe Operating Area

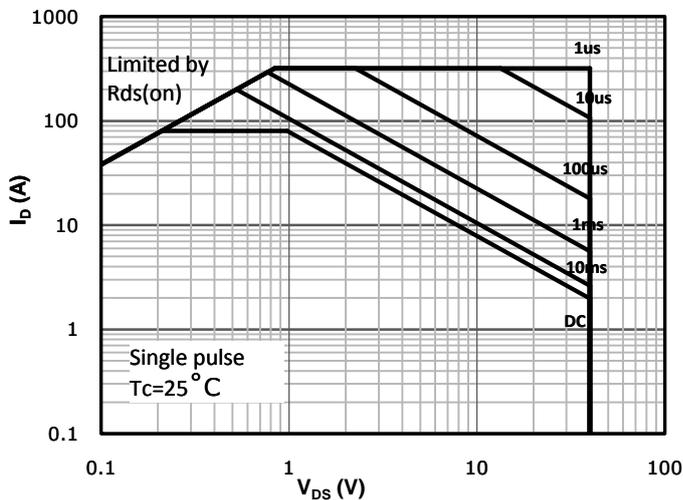
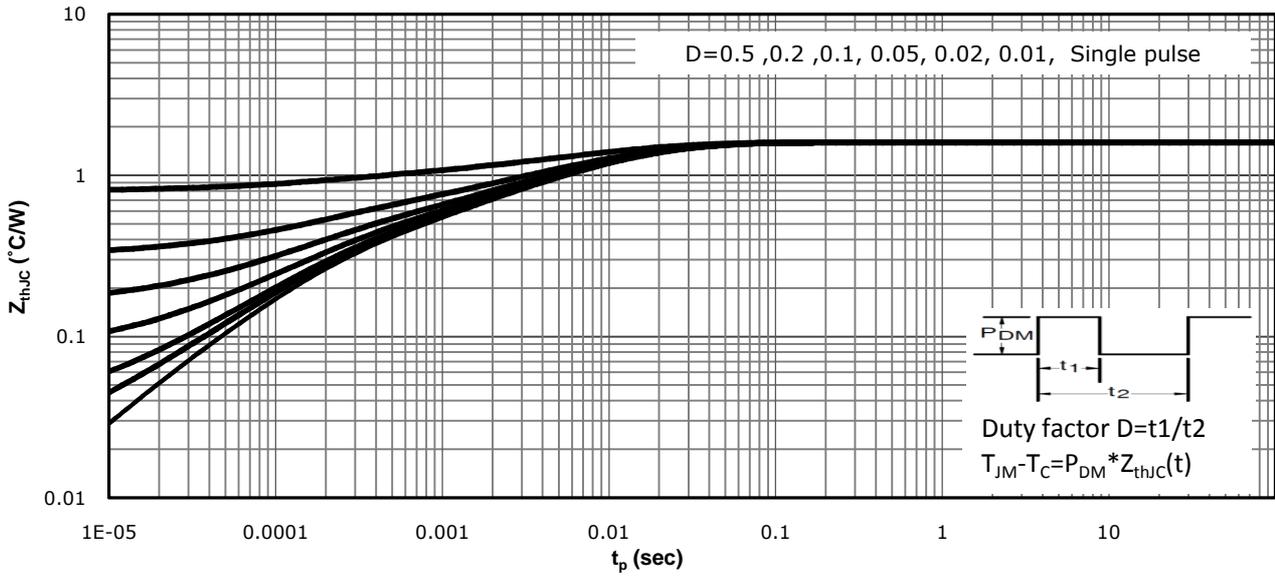


Fig 12: Max. Transient Thermal Impedance



■ Test circuits and waveforms

Figure A: Gate Charge Test Circuit & Waveforms

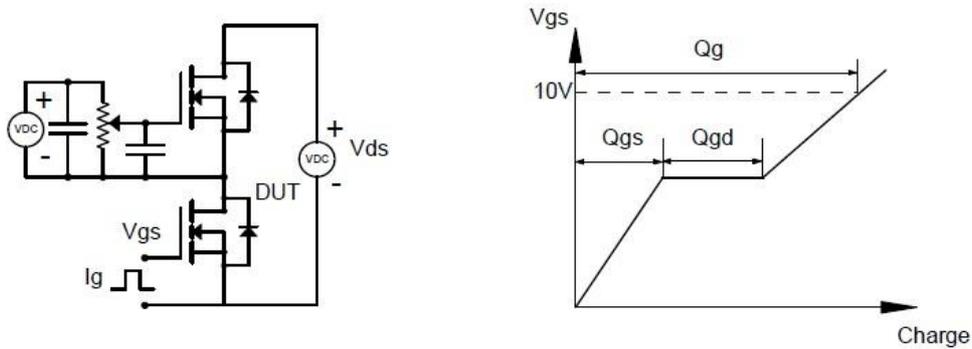


Figure B: Resistive Switching Test Circuit & Waveforms

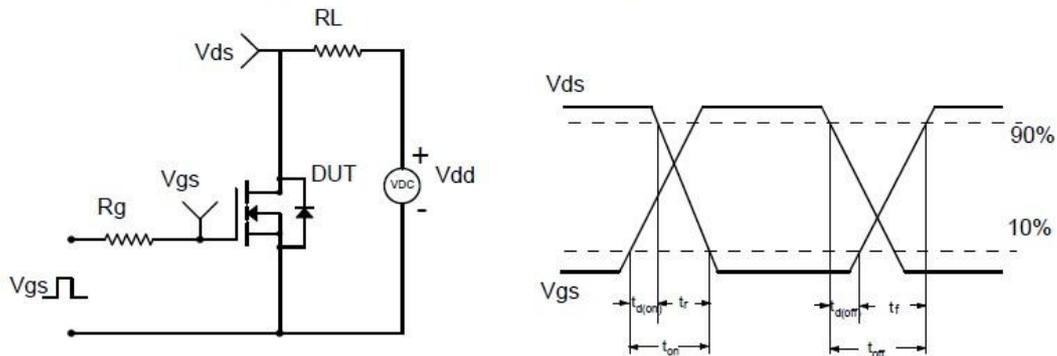


Figure C: Unclamped Inductive Switching (UIS) Test

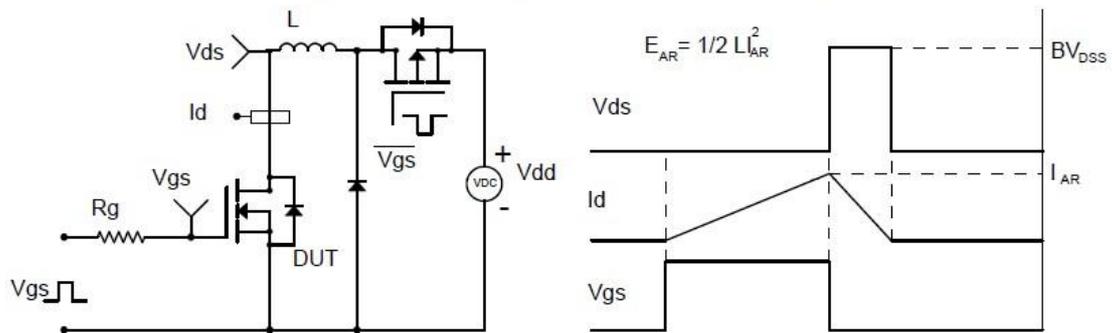
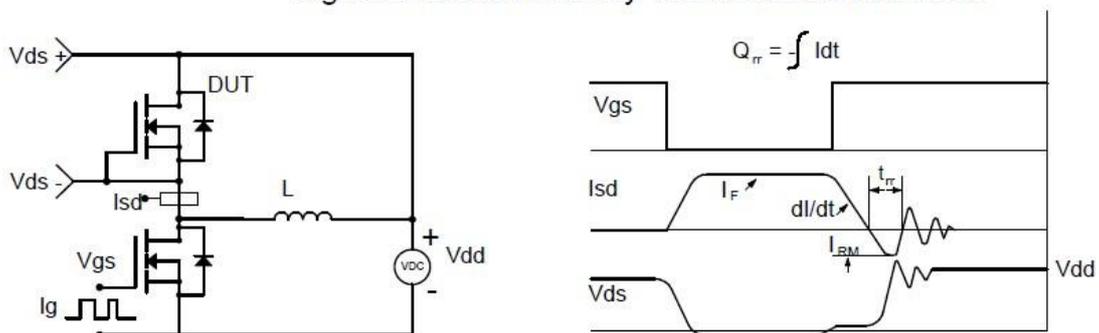
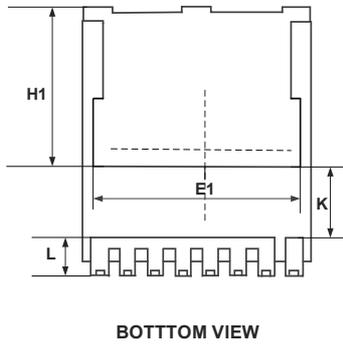
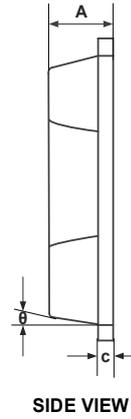
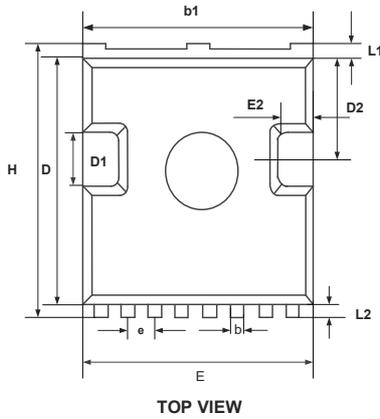


Figure D: Diode Recovery Test Circuit & Waveforms



Mechanical Dimensions for TOLL-8L



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.20	2.40
b	0.60	0.90
b_1	9.70	9.90
c	0.40	0.60
D	10.20	10.60
D1	3.10	3.50
D2	4.45	4.75
E	9.70	10.10
E1	7.80BSC	
E2	0.50	0.70
e	1.200 BSC	
H	11.45	11.90
H1	6.75 BSC	
K	3.10 REF	
L	1.70	2.10
L1	0.60	0.80
L2	0.50	0.70
θ	10° REF	