N-Ch 40V Fast Switching MOSFETs

Features

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

Product Summary

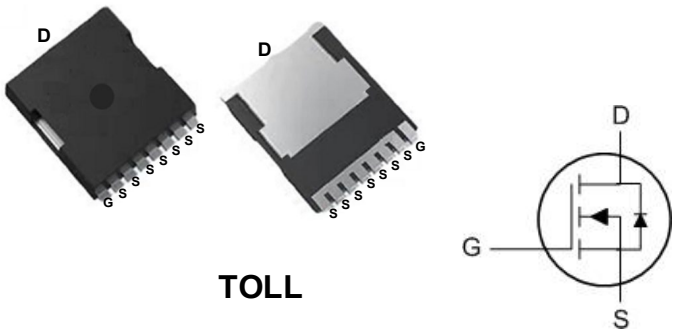
Green

BVDSS	RDSON	ID
40V	1.1mΩ	300A

Applications

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

TOLL Pin Configuration



TOLL

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℃	Continuous Drain Current, V_{GS} @ 10V[1,6]	300	A
I_D@T_C=100℃	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℃	Total Power Dissipation[4]	220	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

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

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	---	---	V/℃
$R_{DS(ON)}$	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
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=40V, V_{GS}=0V , T_J=150℃	---	100	---	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	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	VGS=10V, VDS=20V, RG=2Ω, ID=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℃	0.7	0.9	1.1	V
t_{rr}	Reverse Recovery Time	IF=40A , di/dt=100A/μs , T_J=25℃	---	75.9	---	nS
Q_{rr}	Reverse Recovery Charge		---	86.9	---	nC

Note :
1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
3.The EAS data shows Max. rating . The test condition is TJ = 25℃,VDD=32V,VGS=10V,L=0.5mH
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Performance Characteristics

Fig 1: Output Characteristics

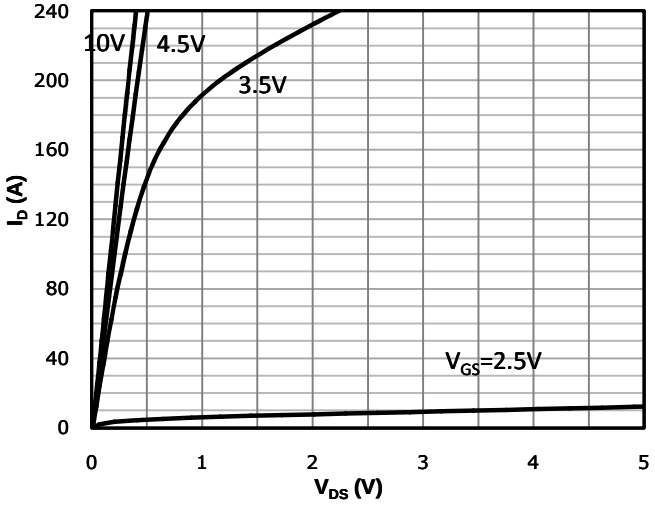


Fig 2: Transfer Characteristics

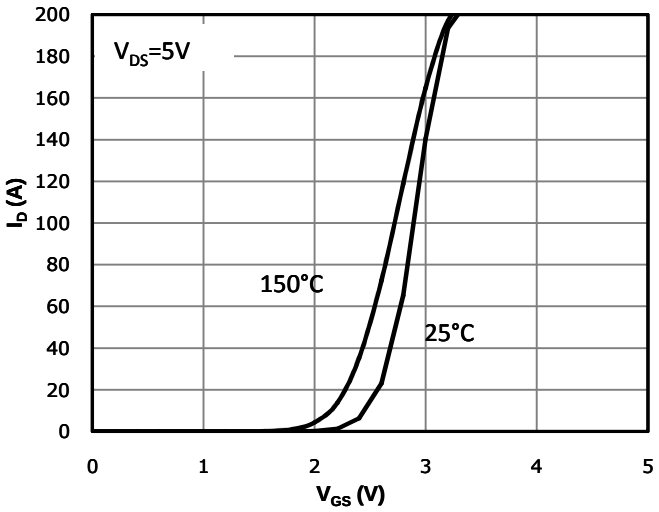


Fig 3: Rds(on) vs Drain Current and Gate Voltage

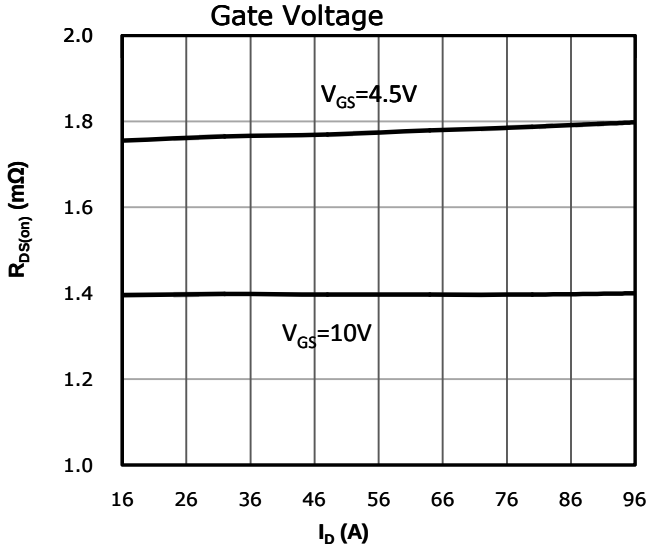


Fig 4: Rds(on) vs Gate Voltage

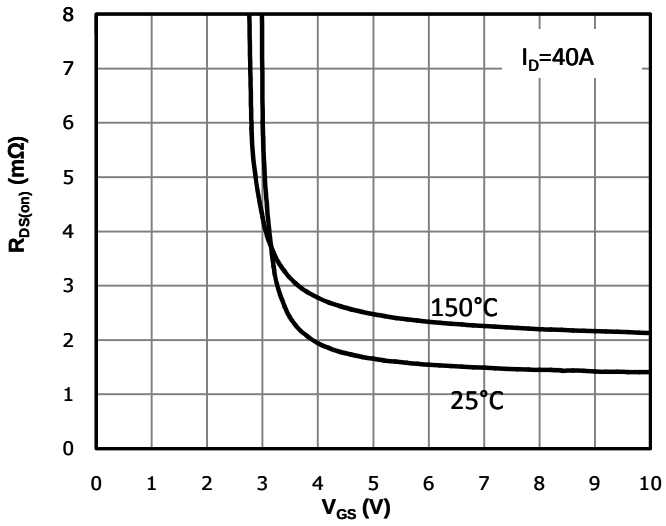


Fig 5: Rds(on) vs. Temperature

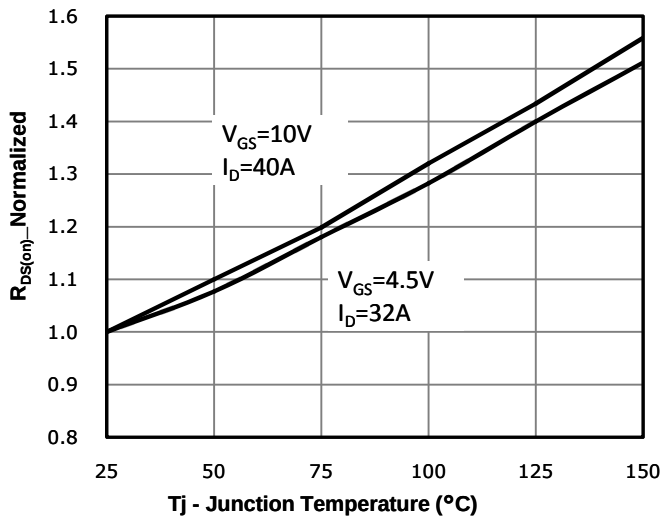


Fig 6: Capacitance Characteristics

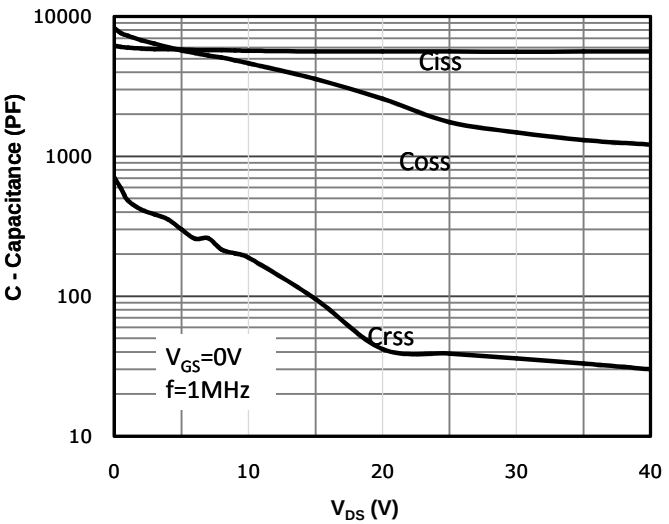


Fig 7: Gate Charge Characteristics

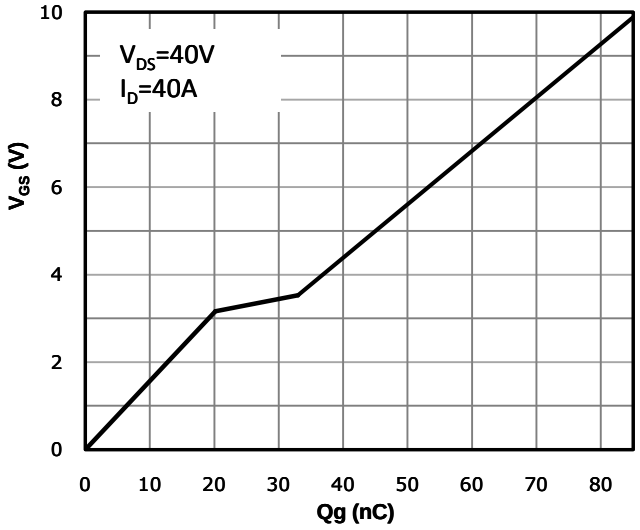


Fig 8: Body-diode Forward Characteristics

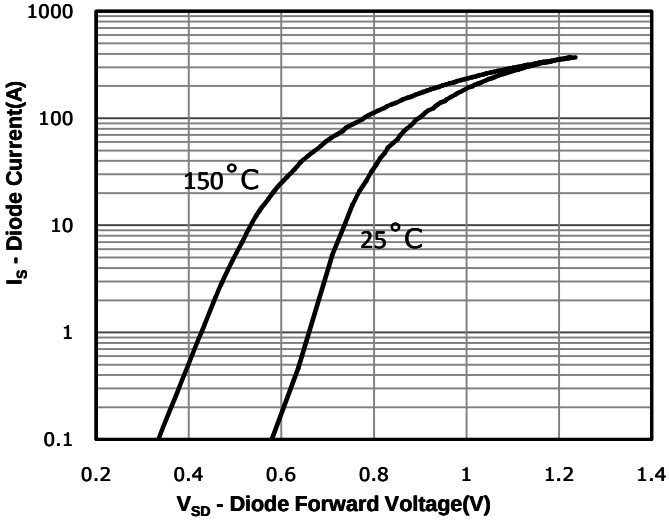


Fig 9: Power Dissipation

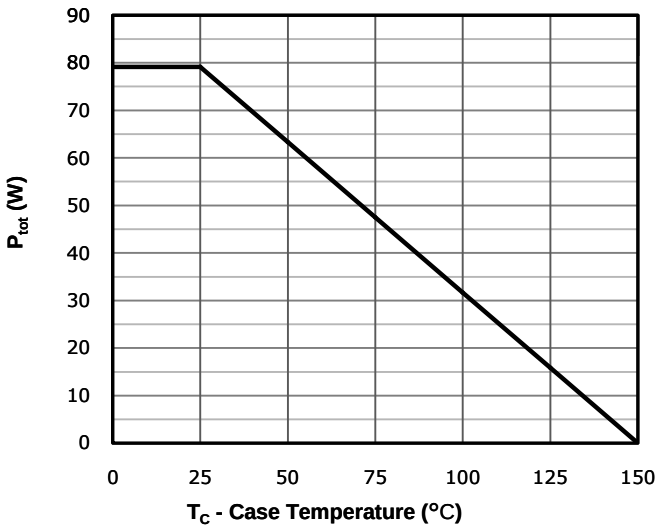


Fig 10: Drain Current Derating

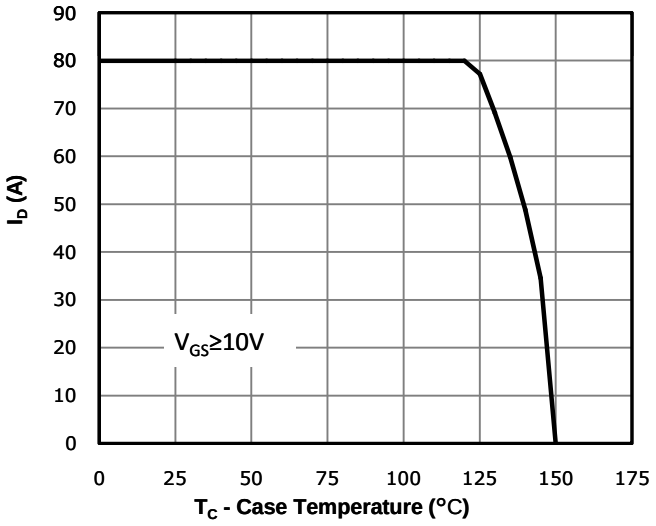


Fig 11: Safe Operating Area

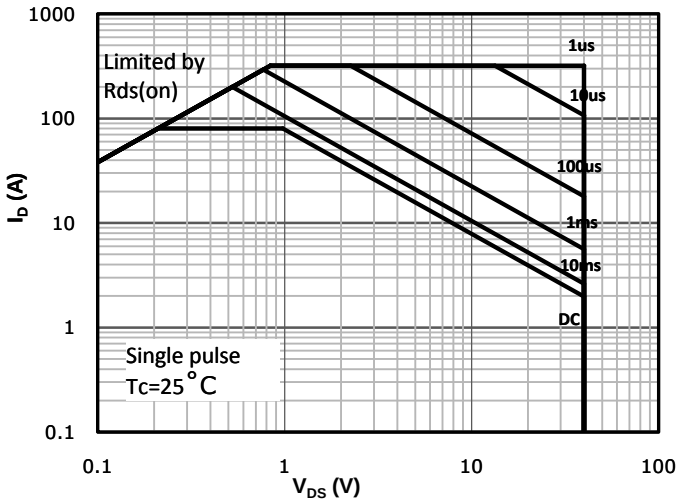
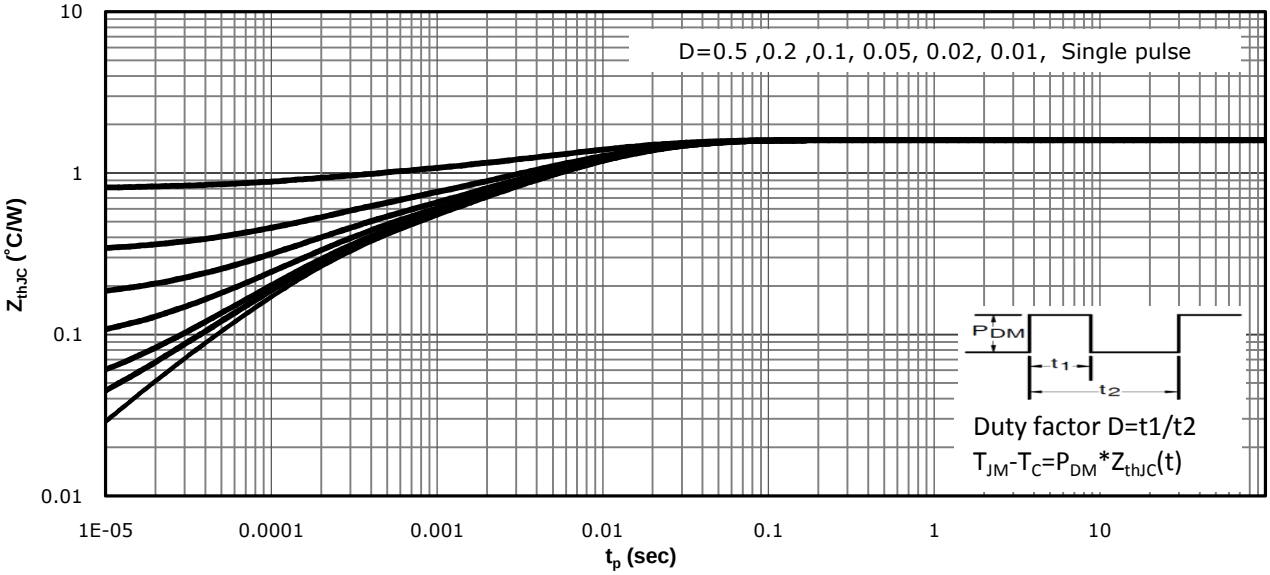


Fig 12: Max. Transient Thermal Impedance



■ Test circuits and waveforms

Figure A: Gate Charge Test Circuit & Waveforms

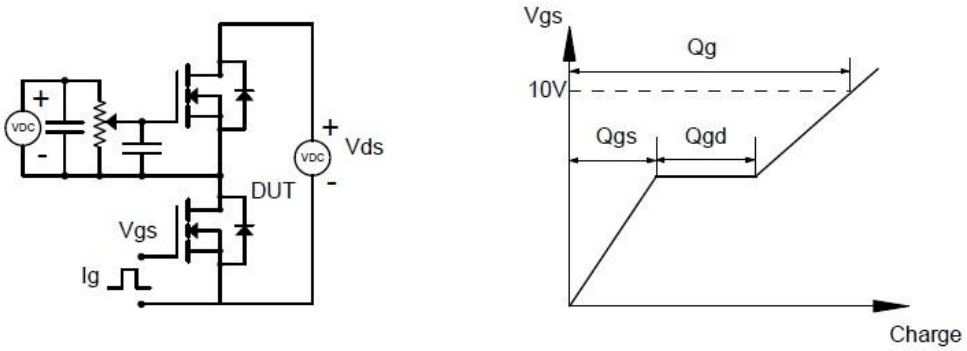


Figure B: Resistive Switching Test Circuit & Waveforms

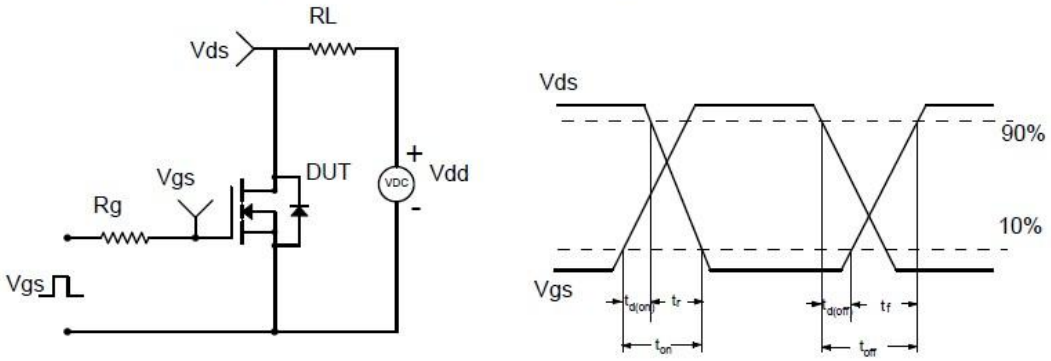


Figure C: Unclamped Inductive Switching (UIS) Test

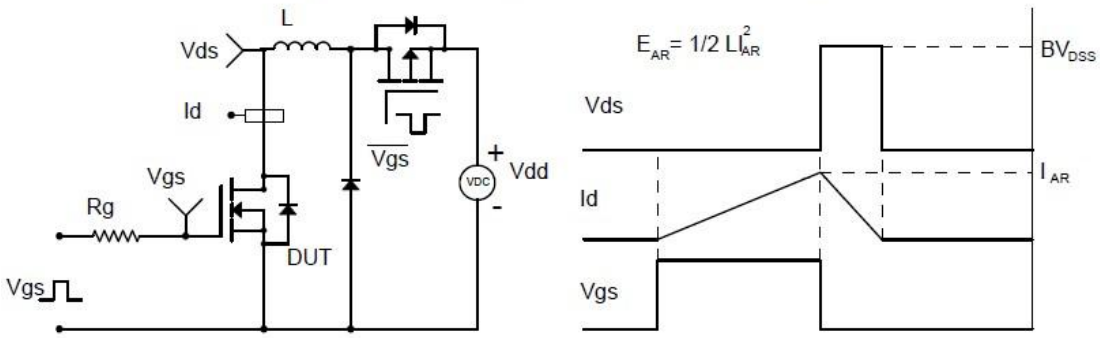
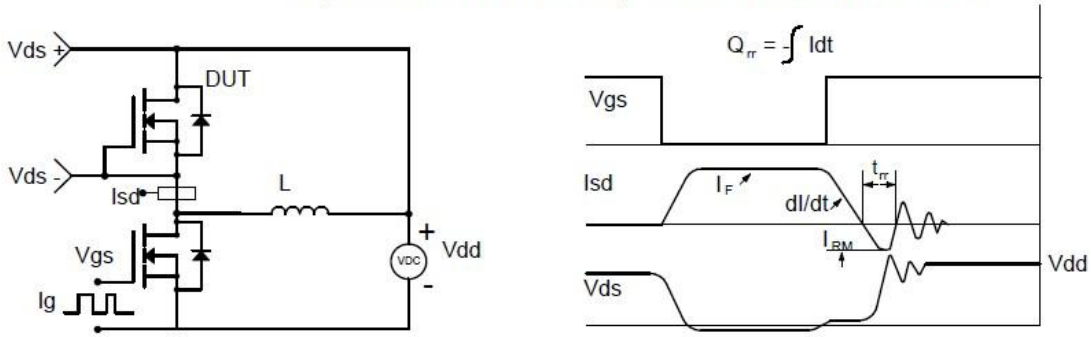
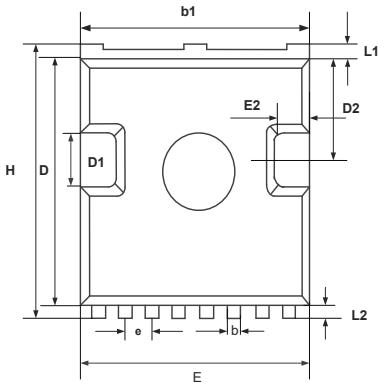


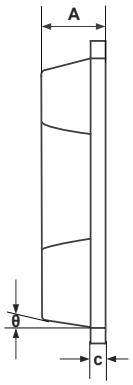
Figure D: Diode Recovery Test Circuit & Waveforms



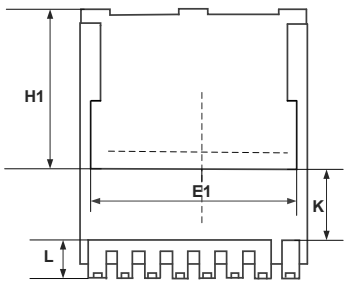
Mechanical Dimensions for TOLL-8L



TOP VIEW



SIDE VIEW



BOTTTOM VIEW

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.20	2.40
b	0.60	0.90
b1	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	