FH3404TL4

N-Channel Trench Power MOSFET

Description

The FH3404TL4 uses advanced trench technologyand design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

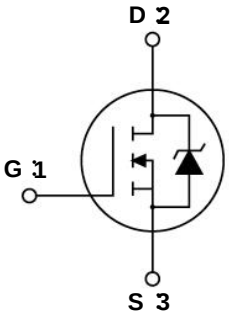
Application

- Load Switch
- PWM Application
- Battery Management

Features

Parameter	Typ.	Unit
V_{DS}	40	V
I_D (@ V_{GS} = 10V)	140	A
$R_{DS(ON)}$ (@ V_{GS} = 10V) (Typ)	2.4	mΩ
$R_{DS(ON)}$ (@ V_{GS} = 4.5V) (Typ)	3.1	mΩ

- Advanced Trench Technology
- Provide Excellent RDS(ON) and Low Gate Charge

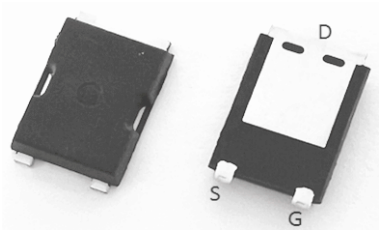


Schematic diagram

Top view

Marking and pin assignment

TOLL-4L



Top view Bottom View

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25℃	140	A
		T_C = 100℃	91	A
I_{DM}	Pulsed Drain Current note1		420	A
E_{AS}	Single Pulsed Avalanche Energy note2		463	mJ
P_D	Power Dissipation	T_C = 25℃	63	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		2	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250μA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =32V, V_{GS} = 0V,	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} =0V,V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	1	1.6	2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	V_{GS} =10V, I_D =20A	-	2.4	2.9	mΩ
		V_{GS} =4.5V, I_D =20A	-	3.1	3.7	
g_{FS}	Forward Transconductance	V_{DS} =5V, I_D =20A	-	15	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} =20V, V_{GS} =0V, f = 1.0MHz	-	4806	-	pF
C_{oss}	Output Capacitance		-	415	-	pF
C_{rss}	Reverse Transfer Capacitance		-	384	-	pF
R_g	Gate resistance	-	-	2.4	-	Ω
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS} =20V, I_D =20A, V_{GS} =10V	-	100	-	nC
Q_{gs}	Gate-Source Charge		-	10	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	26	-	nC
$V_{plateau}$	Gate plateau voltage		-	2.6	-	V
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=20V, V_{GS} =10V RL=0.5Ω,R_{GEN}=3Ω,	-	20	-	ns
t_r	Turn-on Rise Time		-	108	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	95	-	ns
t_f	Turn-off Fall Time		-	111	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	140	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	420	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S=10A	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25℃,VDD=30V,VG=10V, RG=25Ω， L=0.5mH

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: On-Region Characteristics

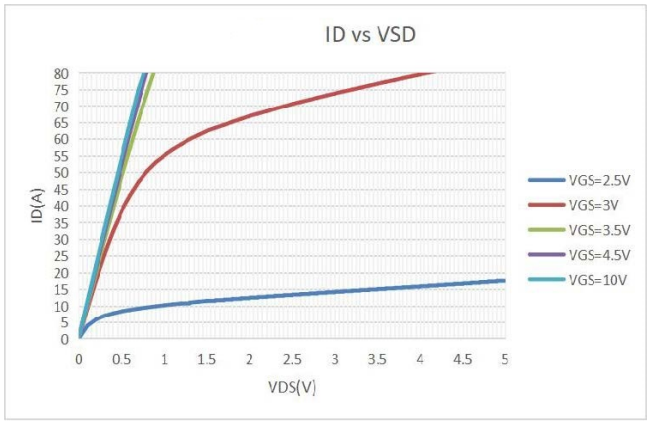


Figure 2: Transfer Characteristics

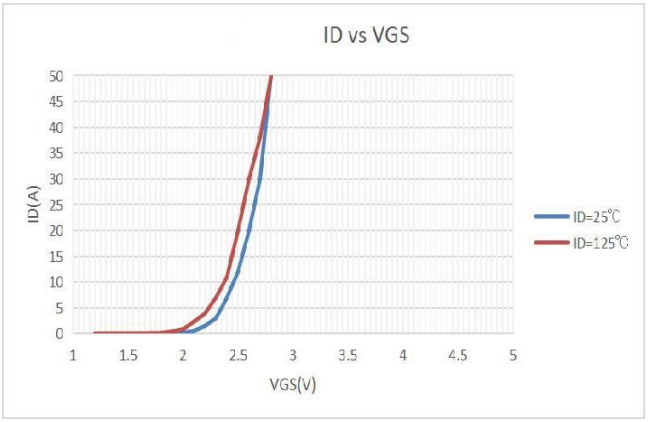


Figure 3: On-resistance vs. Drain Current and Gate Voltage

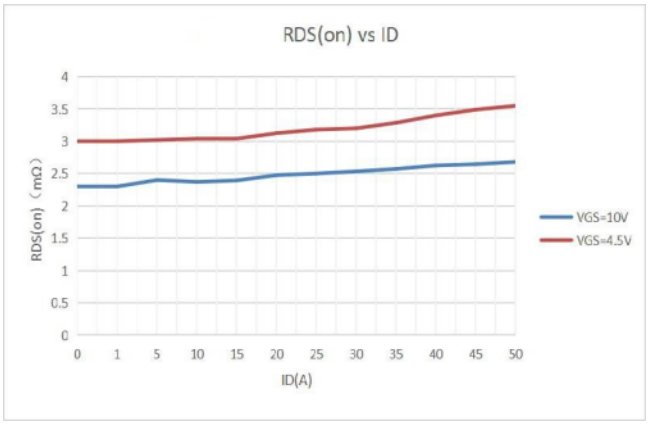


Figure 4: On-Resistance vs. Gate-Source Voltage

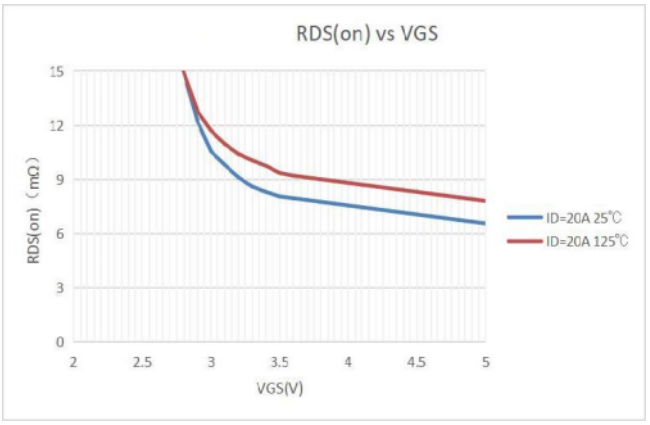


Figure 5: On-Resistance vs. Junction Temperature

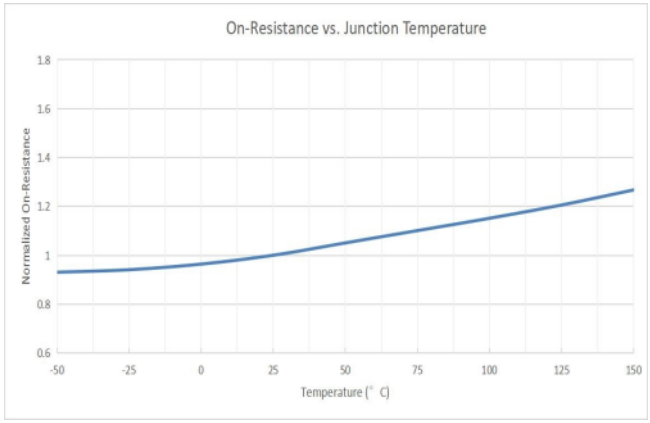
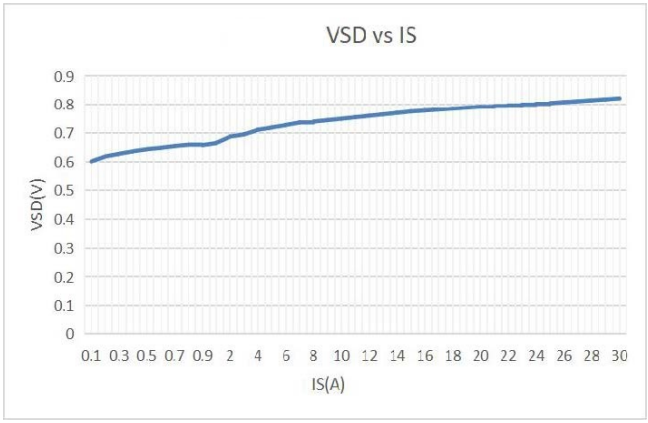


Figure 6: Body-Diode Characteristics



Typical Performance Characteristics

Figure7: Capacitance Characteristics C(pF)

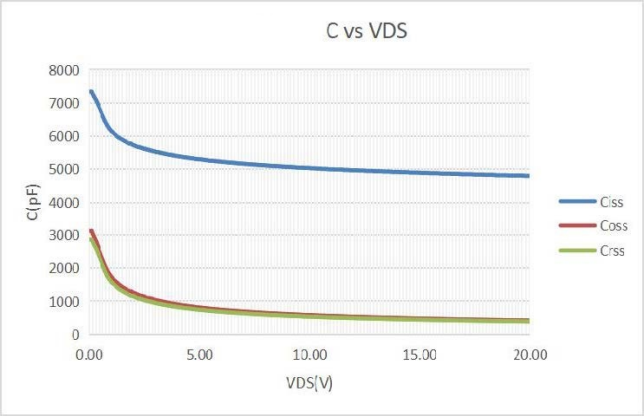


Figure 8: Gate-Charge Characteristics

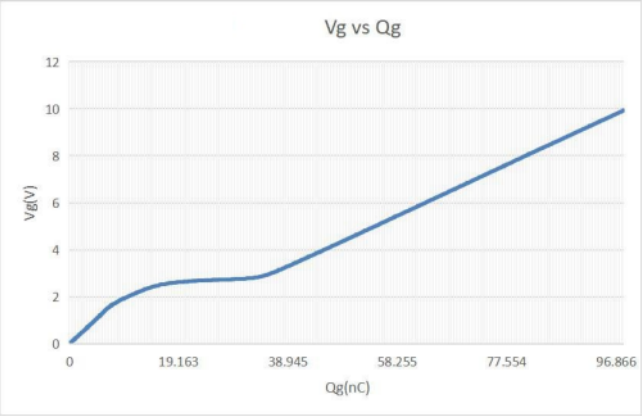


Figure9: Maximum Forward Biased Safe Operating Area

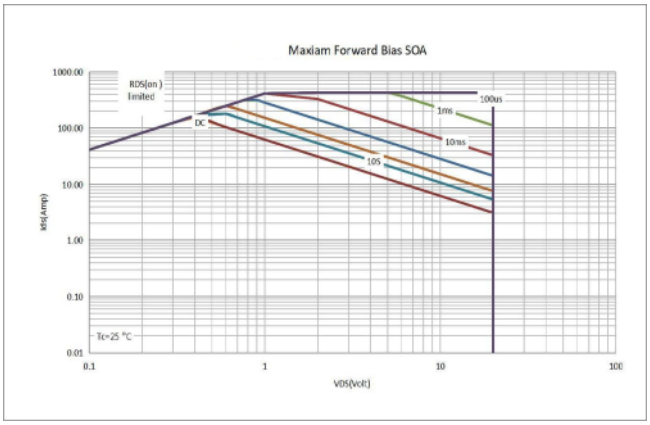
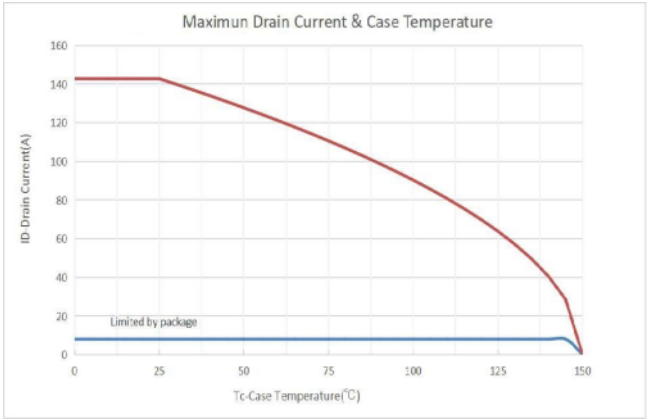


Figure10: Current De-rating



Test Circuit

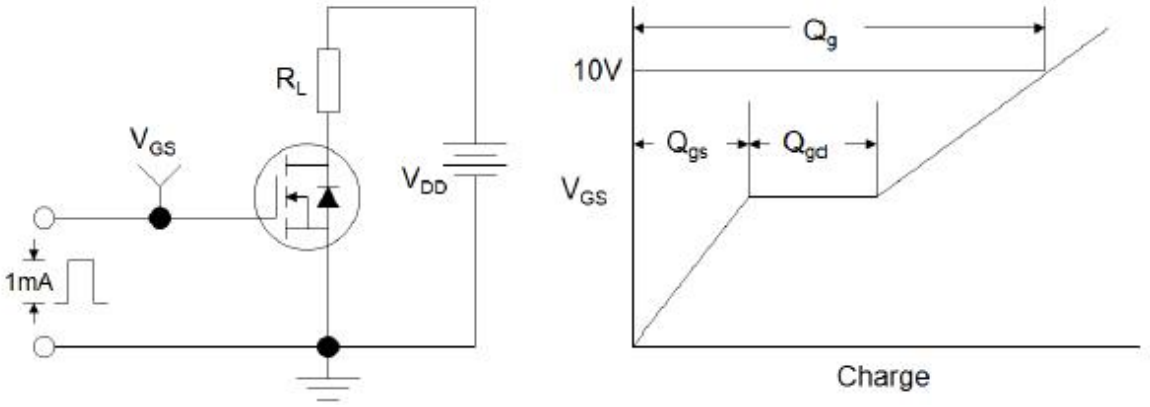


Figure1:Gate Charge Test Circuit & Waveform

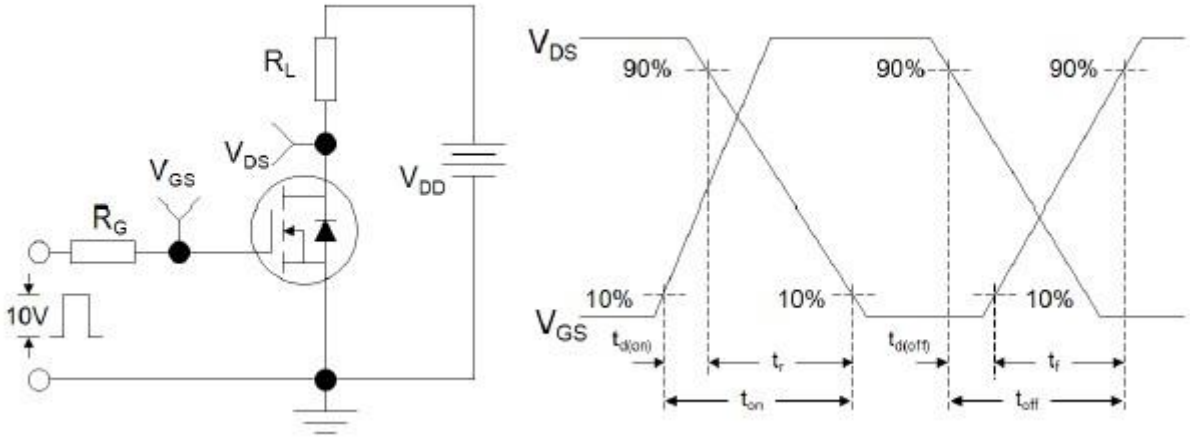


Figure 2: Resistive Switching Test Circuit & Waveforms

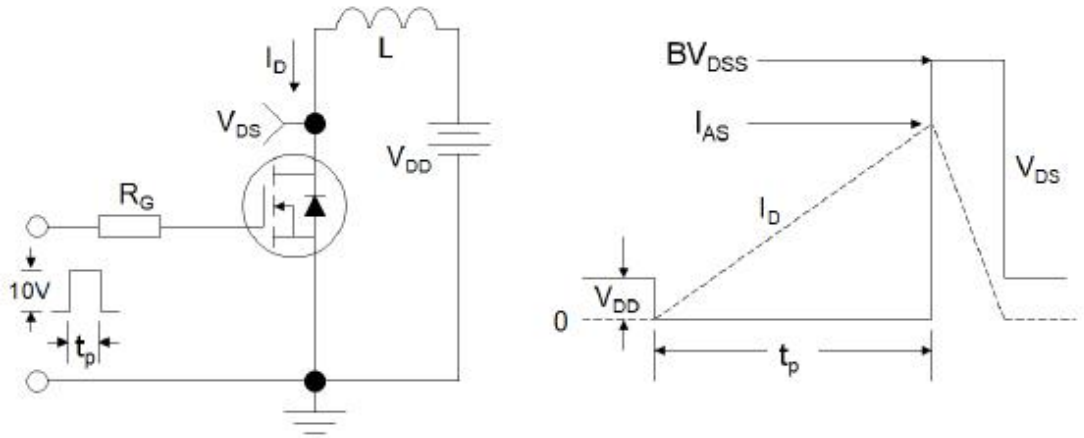


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

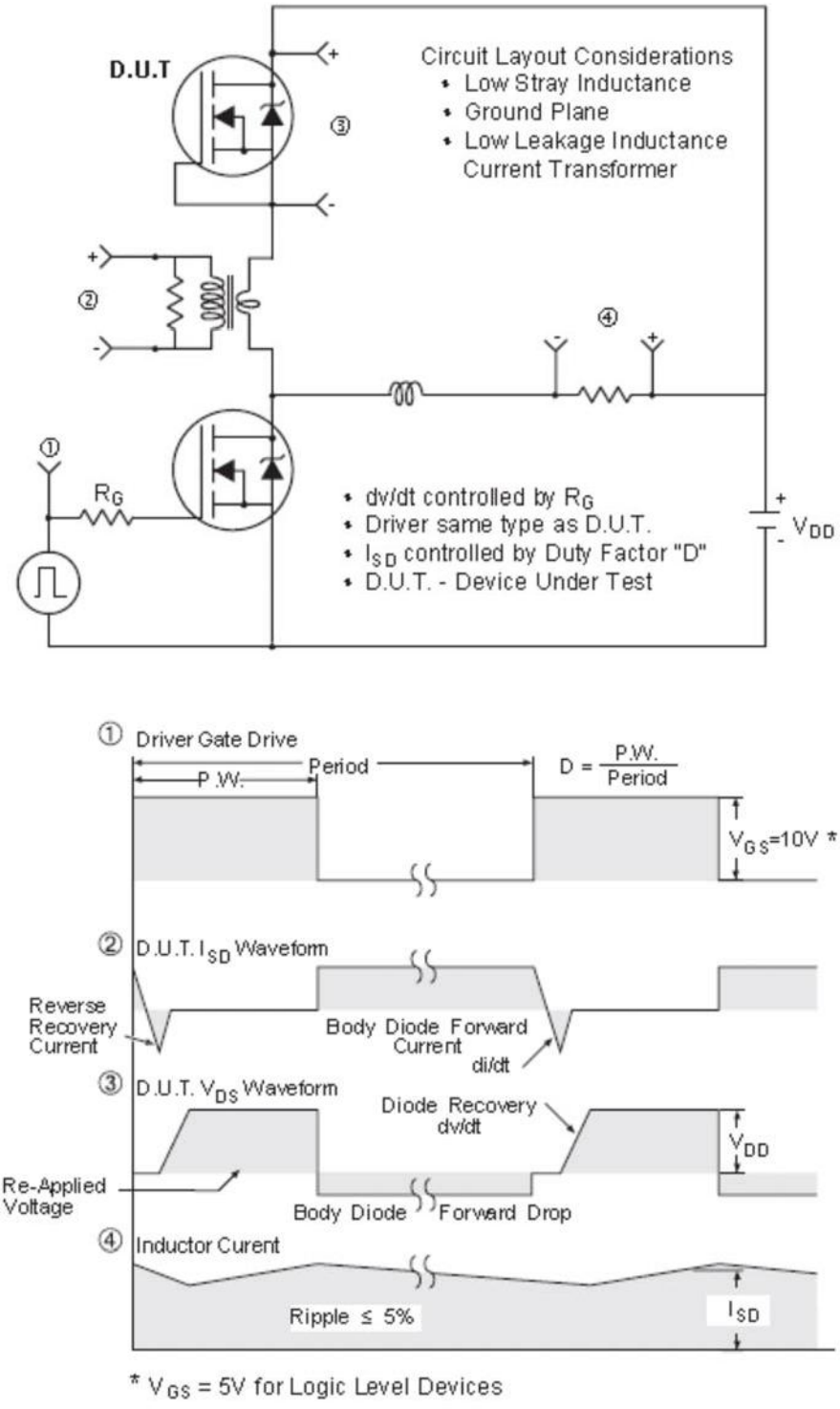
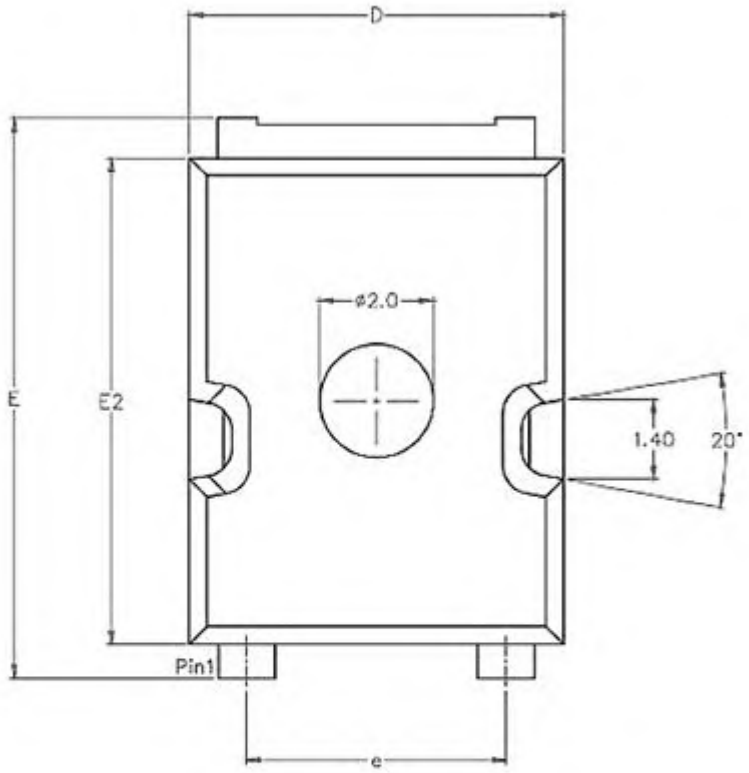
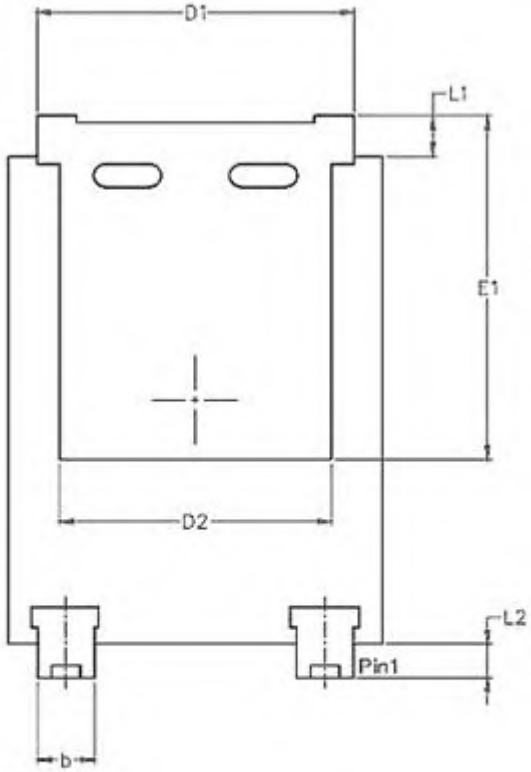
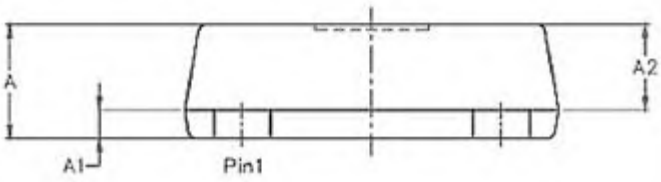


Figure 4:Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

Package Information:TOLL-4L







SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.95	2.00	2.05
A1	0.45	0.50	0.55
A2	1.45	1.50	1.55
b	0.95	1.00	1.05
D	6.55	6.60	6.65
E	9.85	9.90	9.95
D1	5.55	5.60	5.65
D2	4.75	4.80	4.85
E1	6.00	6.05	6.10
E2	8.55	8.60	8.65
e	4.54	4.57	4.60
L1	0.65	0.70	0.75
L2	0.55	0.60	0.65