

## TOLL Plastic-Encapsulate MOSFETS

### Features

- $V_{DS}=100V$
- $I_D=370A$
- $R_{DS(on)}@V_{GS}=10V < 1.3m\Omega$
- Low Gate Charge and  $R_{dson}$
- Fast Switching Speedze
- Advanced Split Gate Trench Technology

**Drain-source Voltage**

100 V

**Drain Current**

370 Ampere

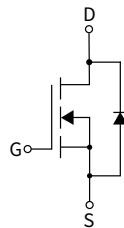
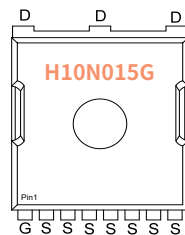
### Applications

- PWM Application
- Hard switched and high frequency circuits
- Power management

### Mechanical Data

- Case: TOLL  
Molding compound meets UL 94V-0 flammability rating, RoHS-compliant,halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750,Method 2026

### Function Diagram



TOLL



### Ordering Information

PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TOLL	R3	0.753	2000	4000	28000	13"

### Maximum Ratings (Ta=25°C Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	VALUE
Drain-source Voltage	$V_{DS}$	V	100
Gate-source Voltage	$V_{GS}$	V	$\pm 20$
Drain Current	$I_D$	A	370
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	A	1480
Total Power Dissipation	$P_D$	W	410
Single pulse avalanche energy <sup>(2)</sup>	EAS	mJ	1128
Junction temperature	$T_J$	°C	-55 ~+150
Storage temperature	$T_{stg}$	°C	-55 ~+150
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	°C / W	0.3

## ● Static Parameter Characteristics (T<sub>j</sub>=25°C Unless otherwise specified)

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	V	100	—	—
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	μA	—	—	1.0
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	nA	—	—	±100
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	V	2	3	4
Static Drain-Source On-Resistance <sup>(3)</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> =125A	mΩ	—	1.1	1.3

## ● Dynamic Parameters

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHZ	pF	—	12765	—
Output Capacitance	C <sub>oss</sub>			—	4600	—
Reverse Transfer Capacitance	C <sub>rss</sub>			—	1766	—

## ● Switching Parameters

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =125A, R <sub>GEN</sub> =1.6Ω	nS	—	28	—
Turn-on Rise Time	t <sub>r</sub>		nS	—	18	—
Turn-off Delay Time	t <sub>D(off)</sub>		nS	—	68	—
Turn-off fall Time	t <sub>f</sub>		nS	—	50	—
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =125A V <sub>GS</sub> =10V	nC	—	166	—
Gate-Source Charge	Q <sub>gs</sub>		nC	—	52	—
Gate-Drain Charge	Q <sub>gd</sub>		nC	—	33	—

## ● Drian-Source Diode Characteristics

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =370A, V <sub>GS</sub> =0V	V	—	—	1.2
Maximum Body-Diode Continuous Current	I <sub>S</sub>	—	A	—	—	370
Reverse Recovery Time	T <sub>rr</sub>	I <sub>S</sub> =370A, di/dt=100A/us, T <sub>J</sub> =25°C	nS	—	90	—
Reverse Recovery Charge	Q <sub>rr</sub>		nC	—	220	—

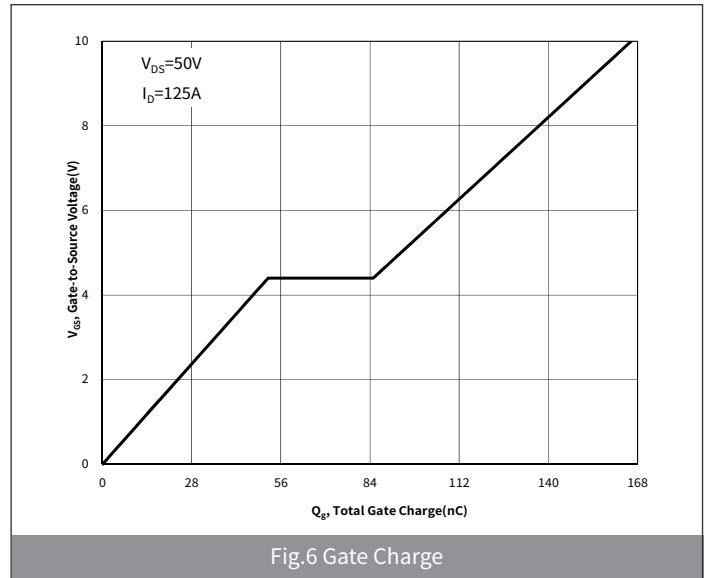
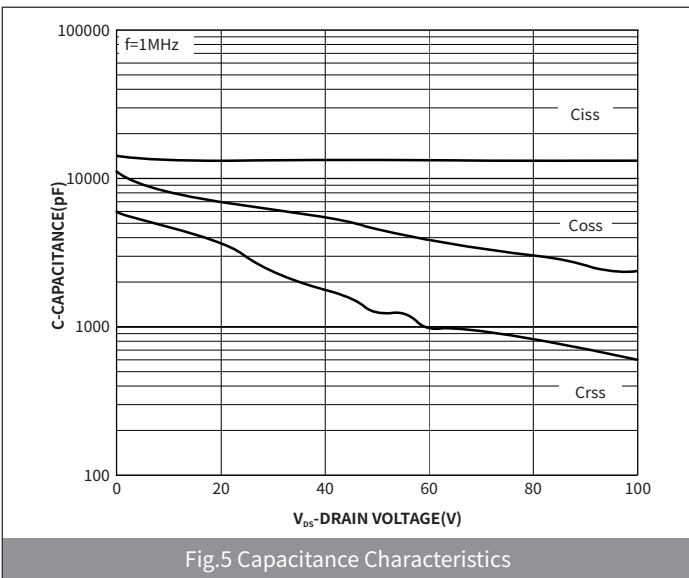
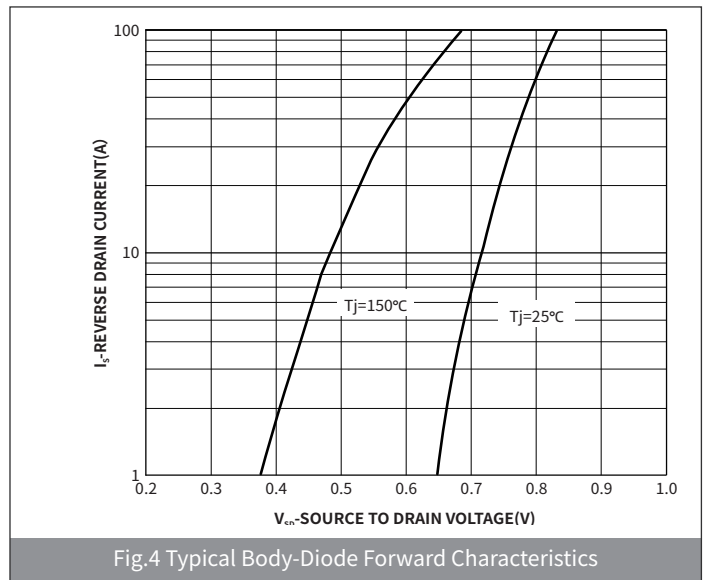
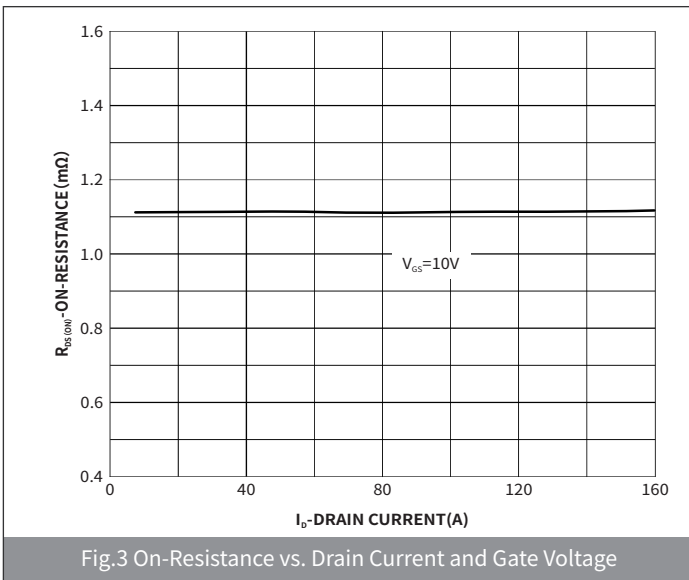
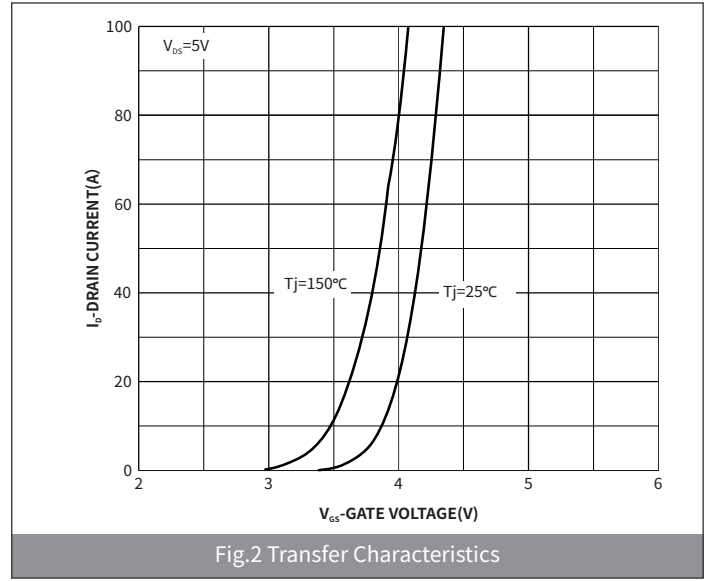
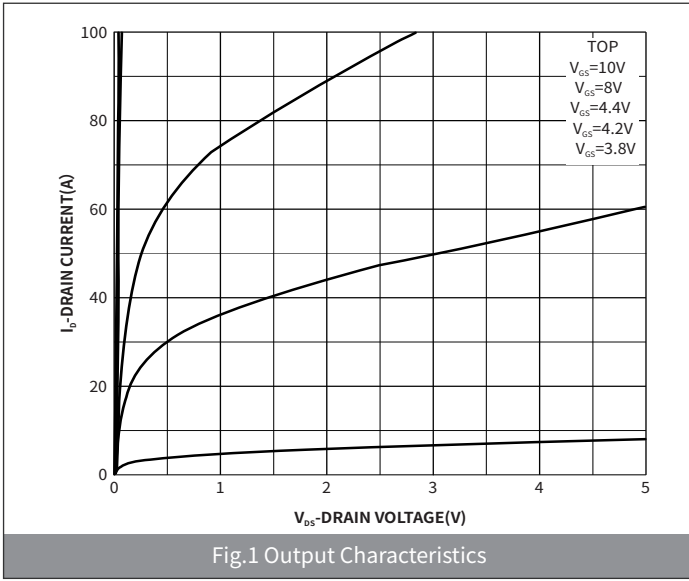
Note :

(1) Repetitive Rating: Pulse width limited by maximum junction temperature.

(2) EAS condition : T<sub>j</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, I<sub>AS</sub>=67.2A, R<sub>g</sub>=25Ω.

(3) Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



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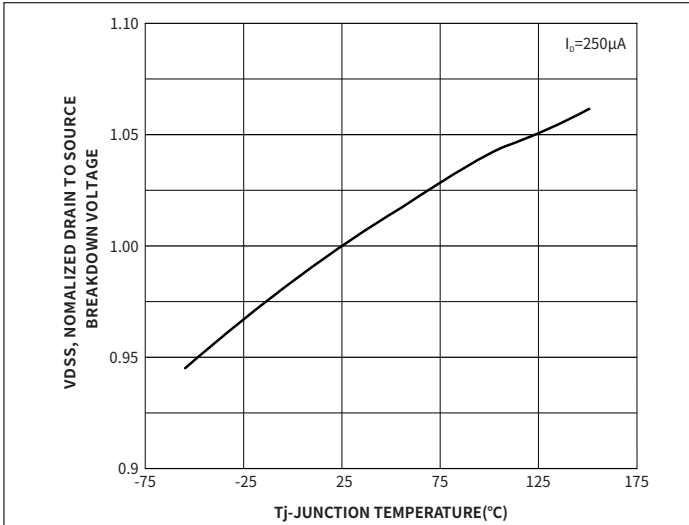


Fig.7 V(BR)DSS vs. Junction Temperature

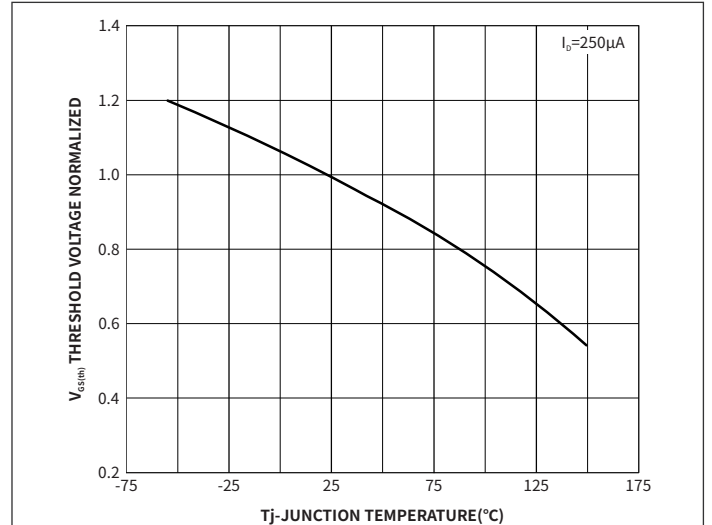


Fig.8 Gate Threshold Variation vs. Tj

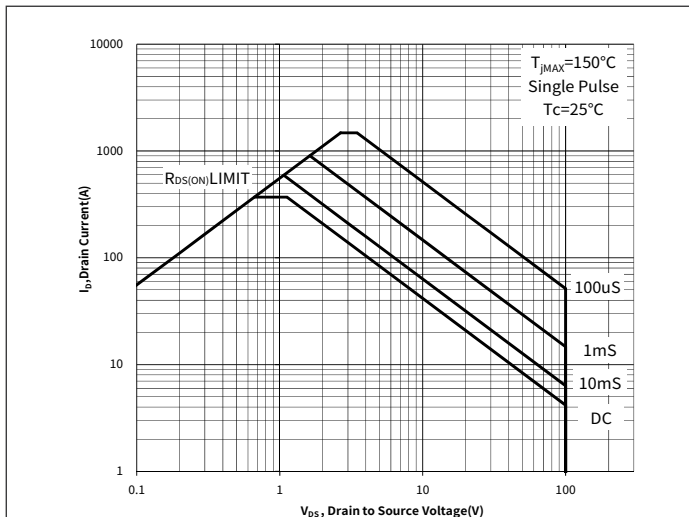


Fig.9 Safe Operation Area

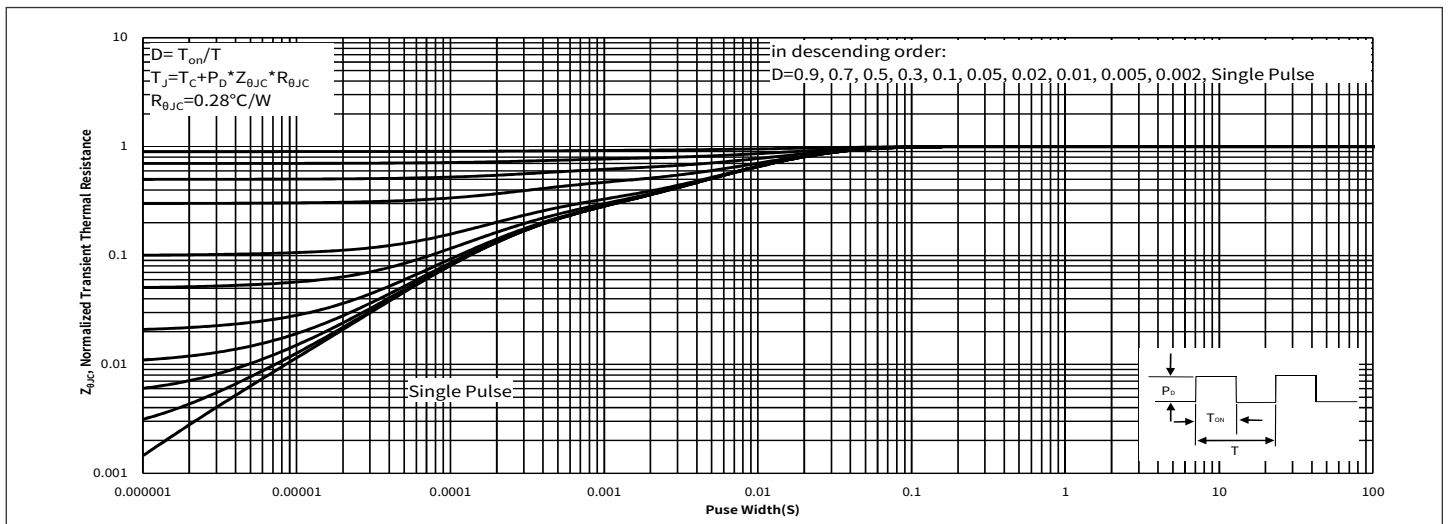
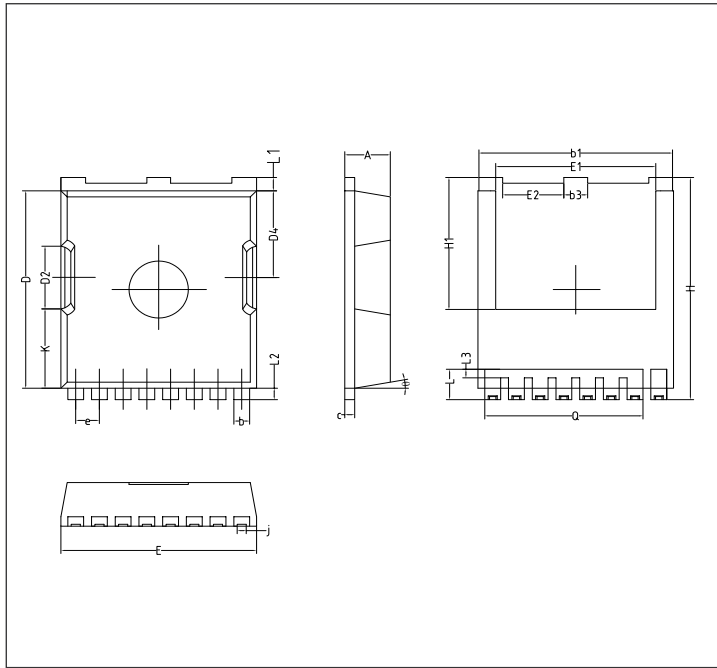


Fig.10 Normalized Maximum Transient Thermal Impedance

# HK10N015SG-B

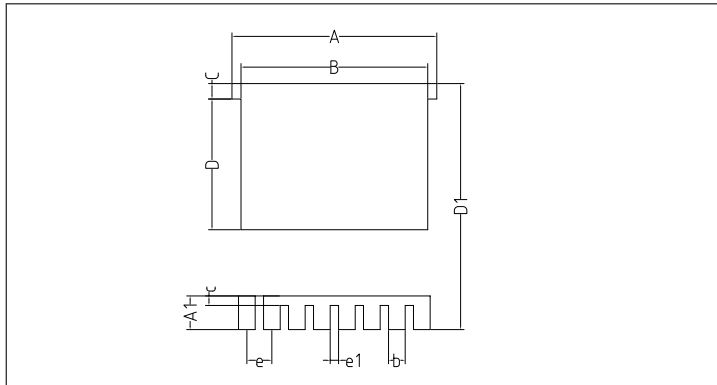
N-CHANNEL MOSFET

## Package Outline Dimensions (TOLL)



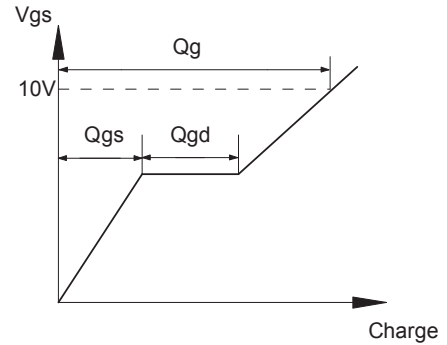
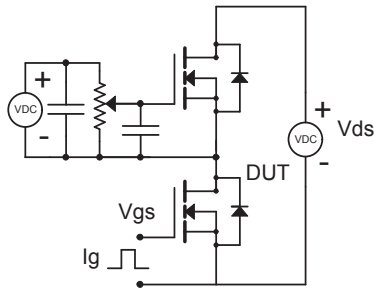
Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.4	0.087	0.094
b	0.65	0.90	0.026	0.035
b1	9.7	9.90	0.382	0.390
b3	1.15	1.35	0.045	0.053
c	0.40	0.60	0.016	0.024
D	10.28	10.48	0.405	0.413
D2	3.20	3.40	0.126	0.134
D4	4.45	4.65	0.175	0.183
E	9.80	10.00	0.386	0.394
E1	7.90	8.30	0.311	0.327
E2	2.8	3.20	0.110	0.126
e	1.2BSC		1.2BSC	
H	11.48	11.88	0.452	0.468
H1	6.95REF		6.95REF	
j	0.35REF		0.35REF	
K	3.0REF		3.0REF	
L	1.35	1.75	0.053	0.069
L1	0.50	0.90	0.020	0.035
L2	0.50	0.70	0.020	0.028
L3	0.25	0.65	0.010	0.026
Q	8.0REF		8.0REF	
θ	10° REF		10° REF	

## Suggested Pad Layout

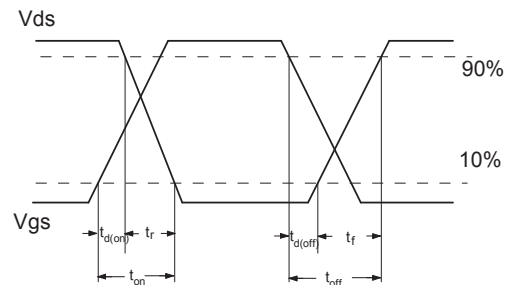
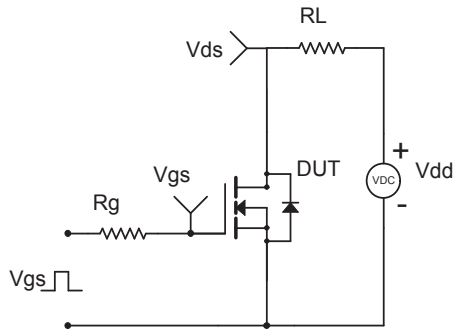


Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	9.95	10.2	0.392	0.402
A1	2.60	2.80	0.102	0.110
B	8.2	8.3	0.323	0.327
b	0.6	0.8	0.024	0.031
C	0.9	1.1	0.035	0.043
c	0.6	0.8	0.024	0.031
D	6.7	6.9	0.264	0.272
D1	13.1	13.3	0.516	0.524
e	1.0	1.2	0.039	0.047
e1	0.2	0.4	0.008	0.016

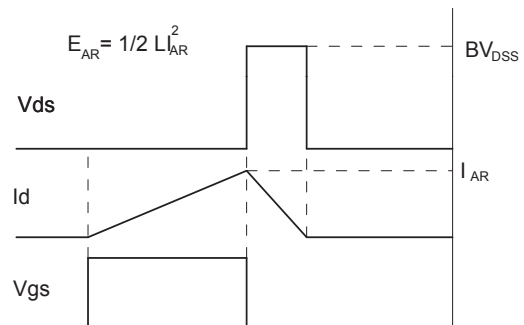
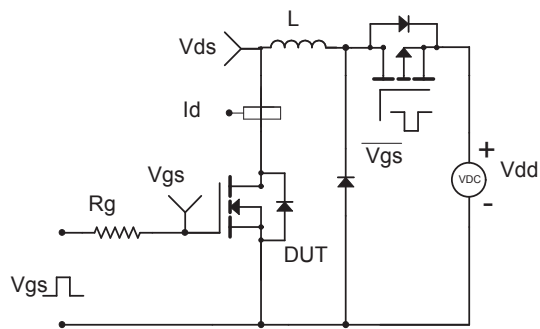
### 1. Gate Charge Test Circuit & Waveforms



### 2. Resistive Switching Test Circuit & Waveforms



### 3. Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



### 4. Diode Recovery Test Circuit & Waveforms

