

## TOLL Plastic-Encapsulate MOSFETS

### ● Features

- $V_{DS}=120V$
- $I_D=300A$
- $R_{DS(on)}@V_{GS}=10V < 2.5m\Omega$
- Low Gate Charge and  $R_{dson}$
- Fast Switching Speedze
- Advanced Split Gate Trench Technology

**Drain-source Voltage**

120 V

**Drain Current**

300 Ampere

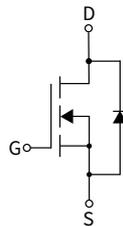
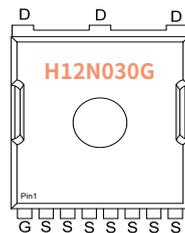
### ● Applications

- High Speed Power switching
- DC-DC Converter
- 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



### ● 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	120
Gate-source Voltage	$V_{GS}$	V	$\pm 20$
Drain Current	$I_D$	A	300
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	A	1200
Total Power Dissipation	$P_D$	W	320
Single pulse avalanche energy <sup>(2)</sup>	EAS	mJ	1056
Junction temperature	$T_J$	°C	-55 ~+150
Storage temperature	$T_{stg}$	°C	-55 ~+150
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	°C / W	0.39

## ● 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	120	—	—
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =120V, 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	2.5	3.3	4.5
Static Drain-Source On-Resistance <sup>(3)</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> =50A	mΩ	—	1.9	2.5

## ● Dynamic Parameters

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, f=1MHZ	pF	—	9563	—
Output Capacitance	C <sub>oss</sub>			—	1221	—
Reverse Transfer Capacitance	C <sub>rss</sub>			—	180	—

## ● 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> =60V, I <sub>D</sub> =75A, R <sub>GEN</sub> =1.6Ω	nS	—	20	—
Turn-on Rise Time	t <sub>r</sub>		nS	—	23	—
Turn-off Delay Time	t <sub>D(off)</sub>		nS	—	65	—
Turn-off fall Time	t <sub>f</sub>		nS	—	25	—
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =60V, I <sub>D</sub> =75A V <sub>GS</sub> =10V	nC	—	175	—
Gate-Source Charge	Q <sub>gs</sub>		nC	—	47.5	—
Gate-Drain Charge	Q <sub>gd</sub>		nC	—	48.5	—

## ● Driian-Source Diode Characteristics

PARAMETER	SYMBOL	Condition	UNIT	Min	Typ	Max
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =300A, V <sub>GS</sub> =0V	V	—	—	1.2
Maximum Body-Diode Continuous Current	I <sub>S</sub>	—	A	—	—	300
Reverse Recovery Time	T <sub>rr</sub>	I <sub>S</sub> =100A, di/dt=100A/us, T <sub>J</sub> =25°C	nS	—	112	—
Reverse Recovery Charge	Q <sub>rr</sub>		nC	—	289	—

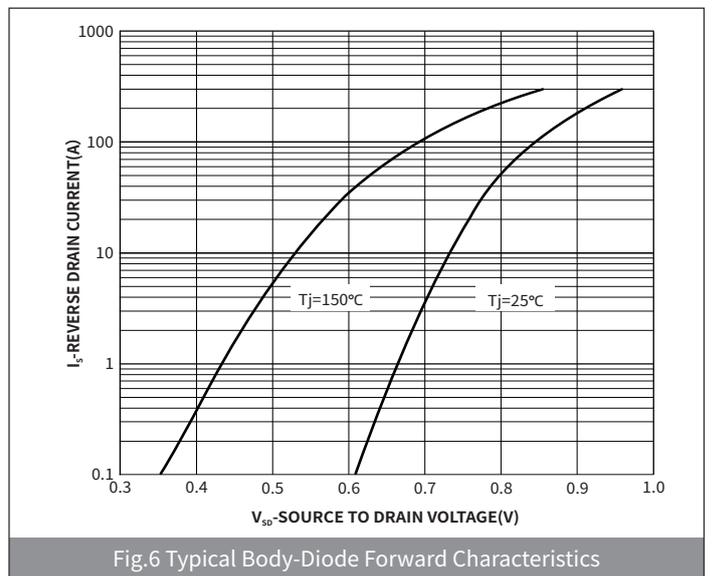
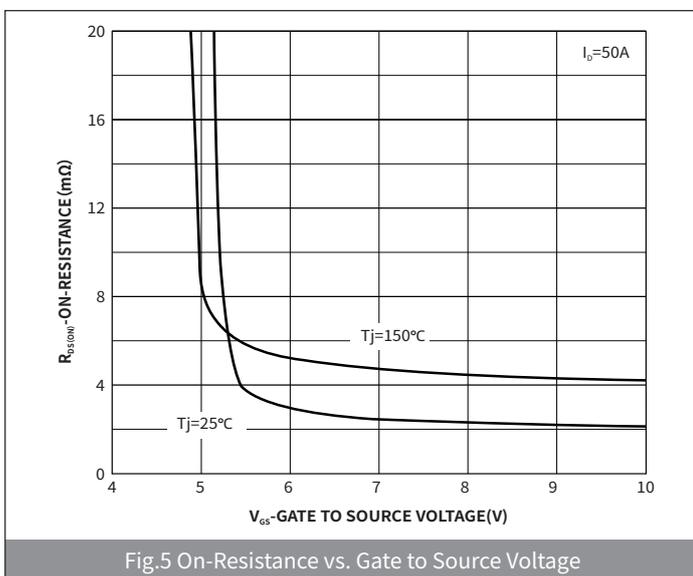
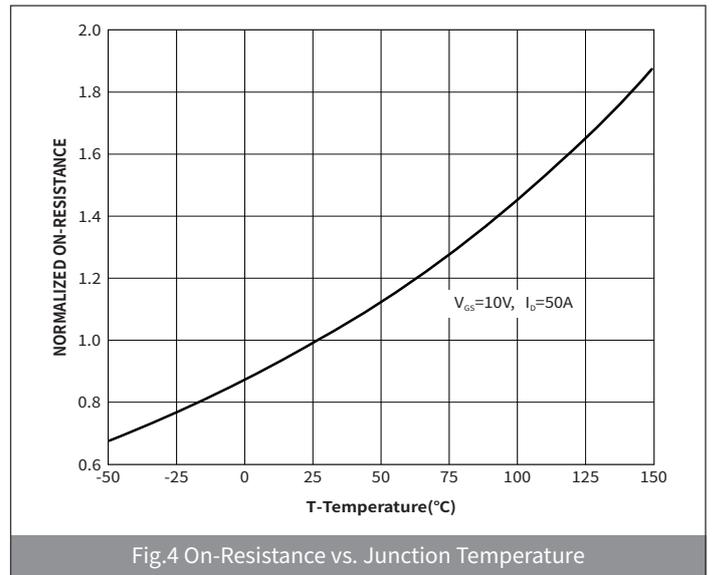
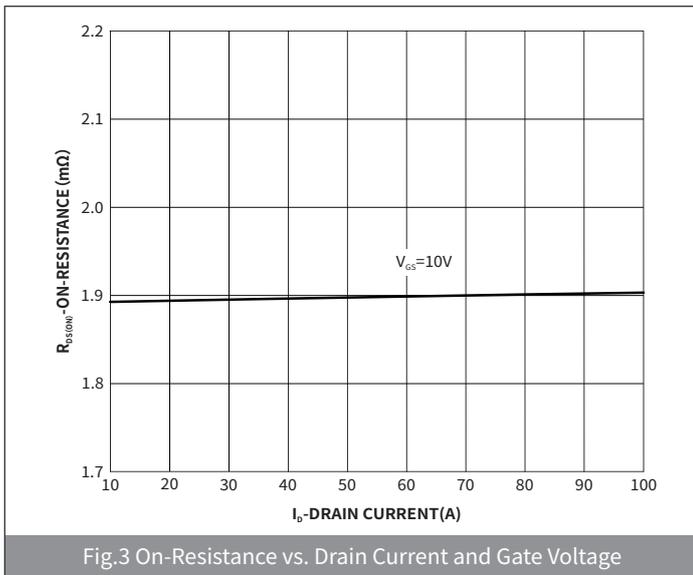
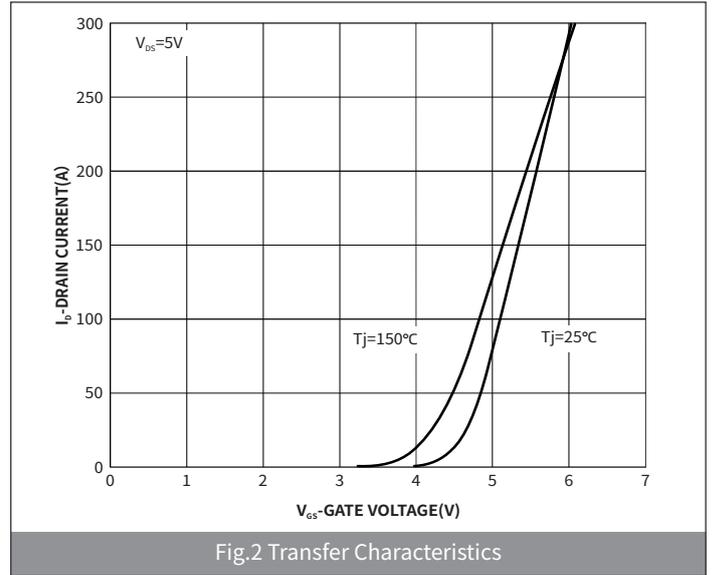
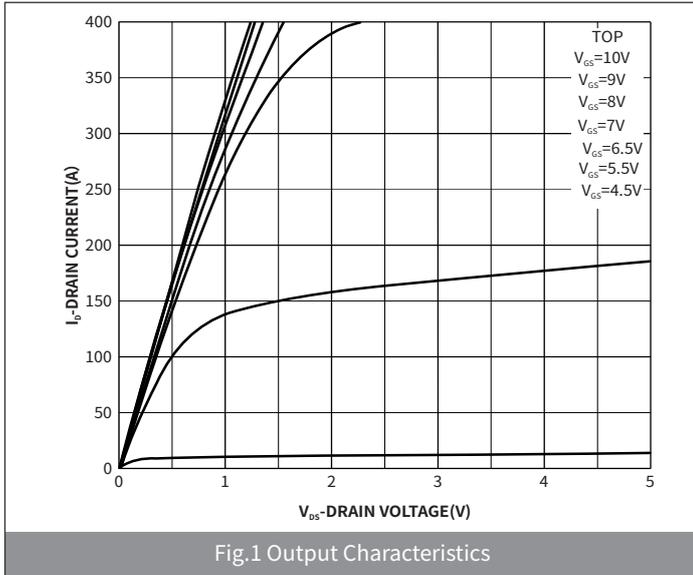
Note :

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

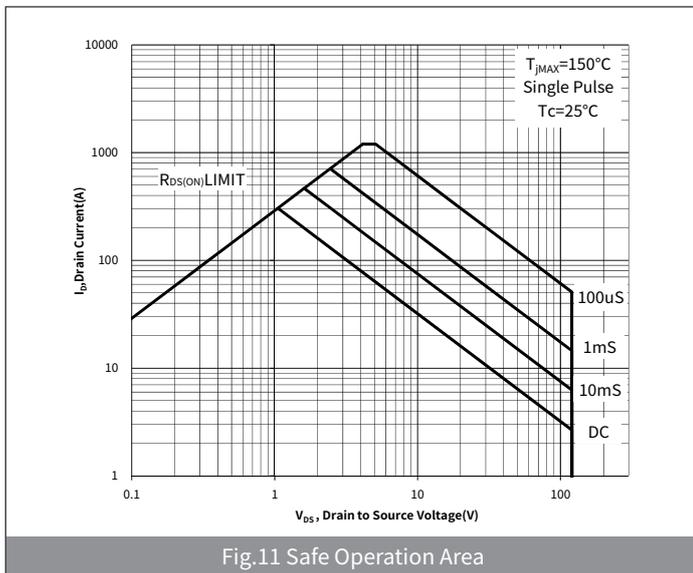
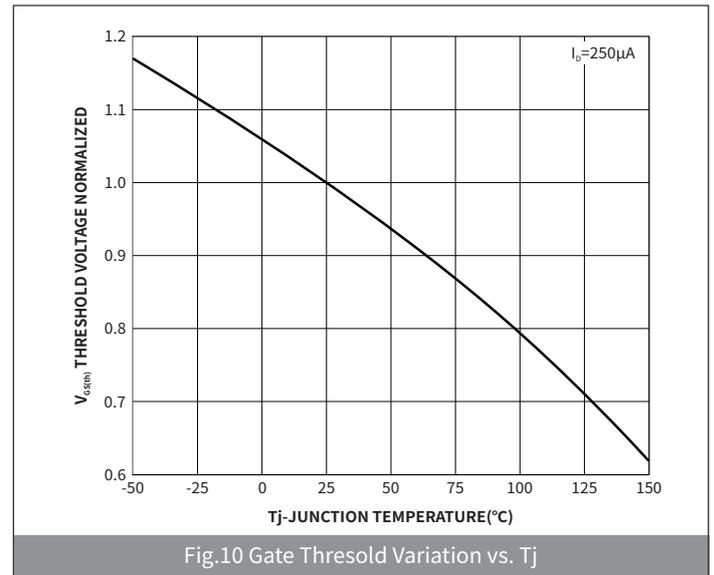
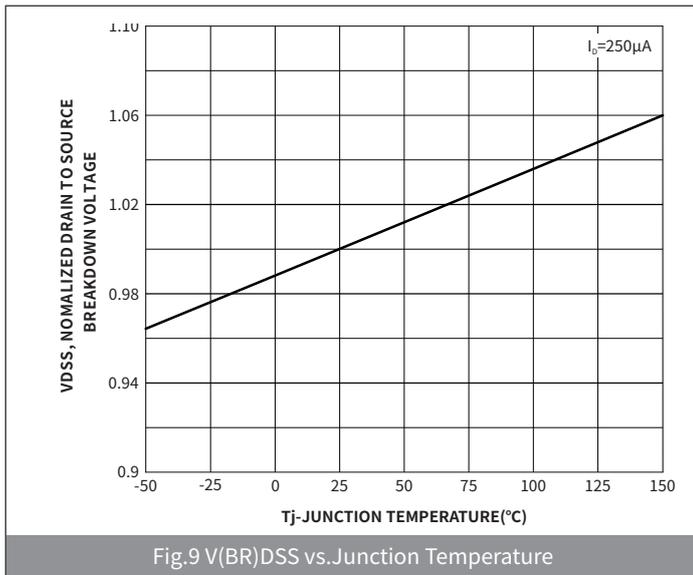
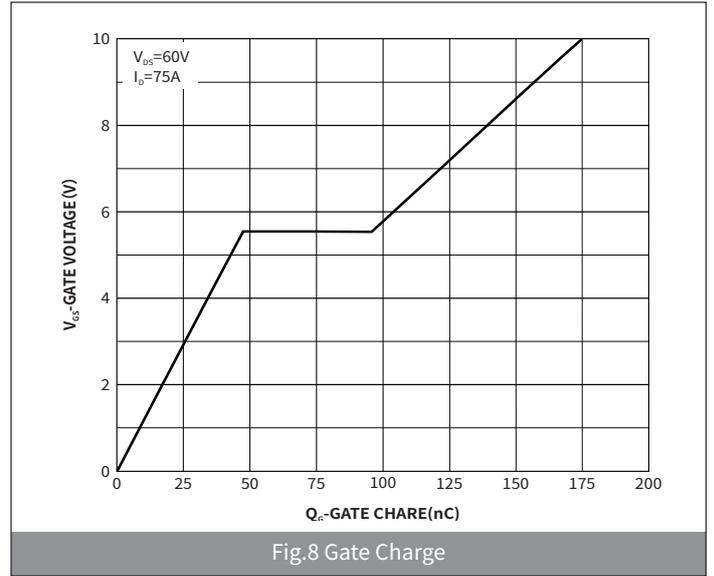
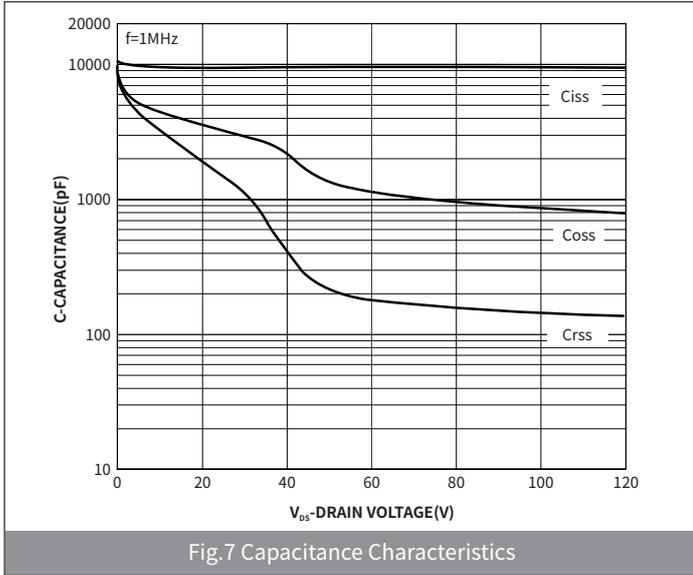
(2)EAS condition : T<sub>j</sub>=25°C ,V<sub>DD</sub>=50V,V<sub>G</sub>=10V,L=0.5mH,I<sub>AS</sub>=65A,R<sub>g</sub>=25Ω.

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

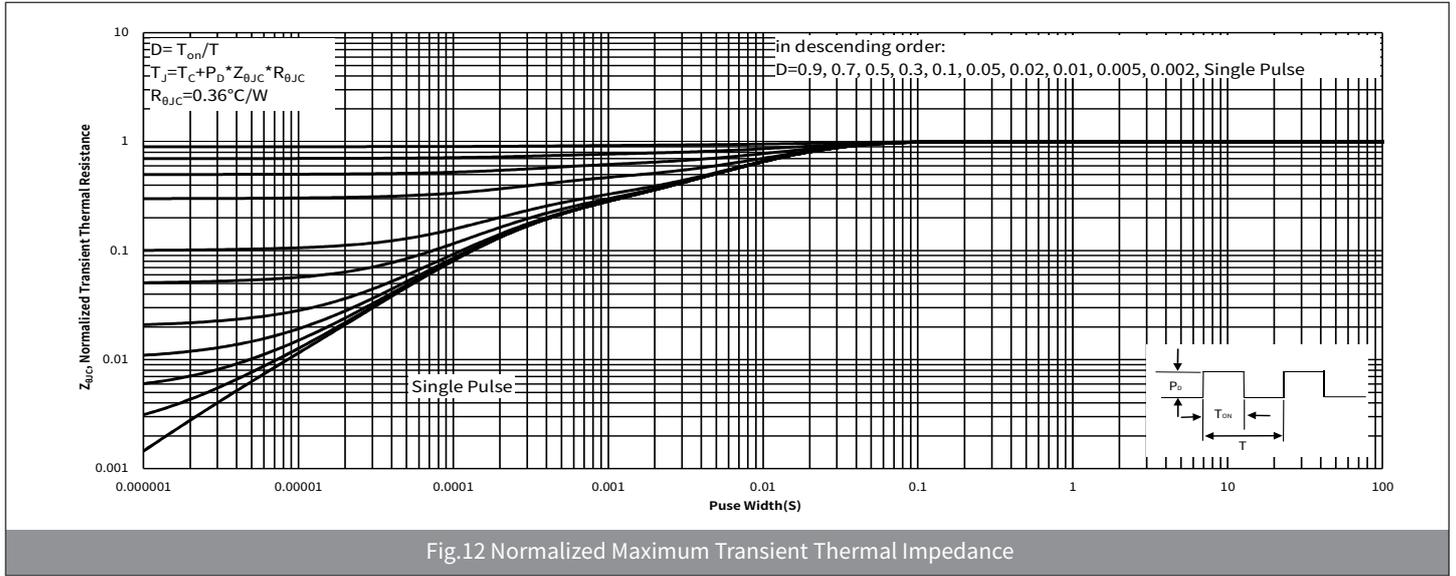
● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



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



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



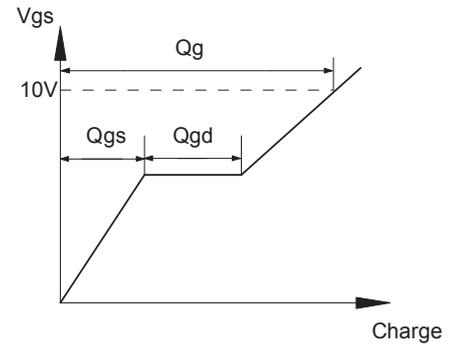
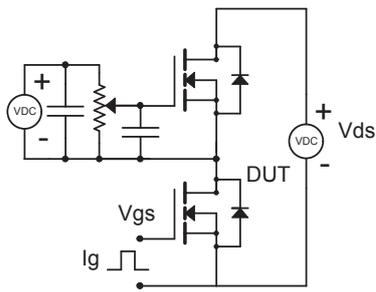
## ● Package Outline Dimensions (TOLL)

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	

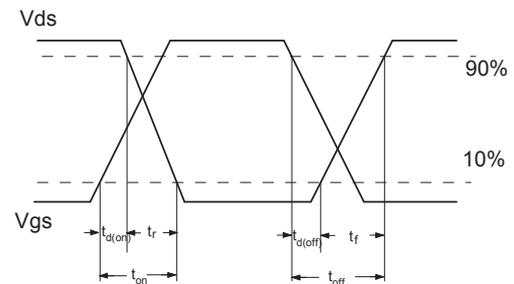
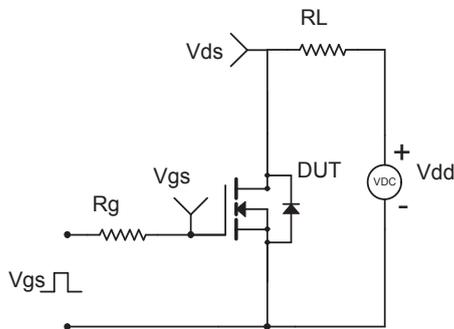
## ● Suggested Pad Layout

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

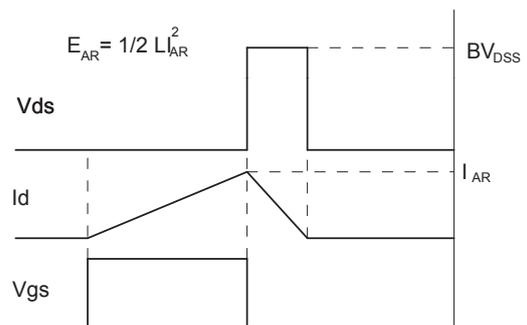
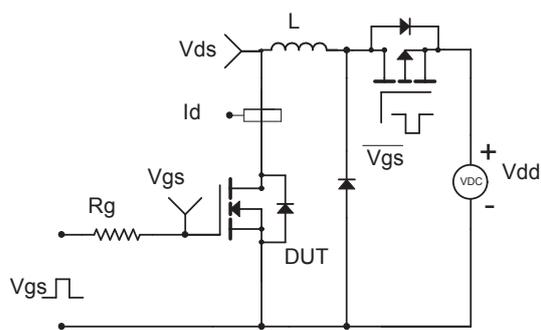
## 1. Gate Charge Test Circuit & Waveforms



## 2. Resistive Switching Test Circuit & Waveforms



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



## 4. Diode Recovery Test Circuit & Waveforms

