

## Lonten N-channel 100V, 360A, 1.55mΩ Power MOSFET

### Description

These N-Channel enhancement mode power field effect transistors are using **shielded gate trench DMOS** technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### Features

- 100V, 360A,  $R_{DS(on).max}=1.55m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green device available

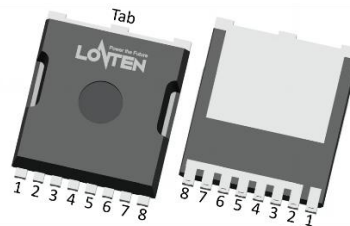
### Applications

- Motor Drives
- UPS
- DC-DC Converter
- Telecom
- Battery management

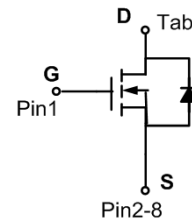
### Product Summary

$V_{DSS}$	100V
$R_{DS(on).typ}@V_{GS}=10V$	1.2mΩ
$I_D$	360A

### Pin Configuration



### TOLL



N-Channel MOSFET



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	100	V
Continuous drain current <sup>1)</sup> ( $T_C = 25^\circ\text{C}$ , Silicon limit)	$I_D$	416	A
( $T_C = 25^\circ\text{C}$ , Package limit)		360	A
( $T_C = 100^\circ\text{C}$ , Silicon limit)		263	A
Pulsed drain current <sup>2)</sup>	$I_{DM}$	1440	A
Gate-Source voltage	$V_{GSS}$	$\pm 20$	V
Avalanche energy <sup>3)</sup>	$E_{AS}$	2056	mJ
Power Dissipation	$P_D$	481	W
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.26	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient <sup>4)</sup>	$R_{\theta JA}$	58.18	$^\circ\text{C/W}$
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	$T_{sld}$	260	$^\circ\text{C}$

**Package Marking and Ordering Information**

Device	Device Package	Marking	Units/Reel
LSGT10R015	TOLL	LSGT10R015	2000

**Electrical Characteristics**
 $T_J = 25^{\circ}\text{C}$  unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	---	4.5	V
Drain-source leakage current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
		$V_{DS}=100V, V_{GS}=0V, T_J=150^{\circ}\text{C}$	---	---	10	mA
Gate leakage current, Forward	$I_{GSSF}$	$V_{GS}=20V, V_{DS}=0V$	---	---	100	nA
Gate leakage current, Reverse	$I_{GSSR}$	$V_{GS}=-20V, V_{DS}=0V$	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A, T_J=25^{\circ}\text{C}$	---	1.2	1.55	m $\Omega$
		$T_J=150^{\circ}\text{C}$	---	2.1	---	
Forward transconductance	$g_{fs}$	$V_{DS}=5V, I_D=50A$	---	150.9	---	S
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V, f=100kHz$	---	21761	---	pF
Output capacitance	$C_{oss}$		---	4016	---	
Reverse transfer capacitance	$C_{rss}$		---	63	---	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=50V, V_{GS}=10V, I_D=50A, R_g=10\Omega$	---	224	---	ns
Rise time	$t_r$		---	179	---	
Turn-off delay time	$t_{d(off)}$		---	270	---	
Fall time	$t_f$		---	98	---	
Gate resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	---	1.5	---	$\Omega$
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DS}=50V, I_D=50A, V_{GS}=10V$	---	100	---	nC
Gate to drain charge	$Q_{gd}$		---	55	---	
Gate charge total	$Q_g$		---	293	---	
Gate plateau voltage	$V_{plateau}$		---	4.9	---	V
Output Charge	$Q_{oss}$	$V_{DS}=50V, V_{GS}=0V$	---	338	---	nC
<b>Drain-Source diode characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$		---	---	360	A
Pulsed Source Current	$I_{SM}$		---	---	1440	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=50A, T_J=25^{\circ}\text{C}$	---	---	1.1	V
Reverse Recovery Time	$t_{rr}$	$I_S=50A, di/dt=200A/\mu s, T_J=25^{\circ}\text{C}$	---	79	---	ns
Reverse Recovery Charge	$Q_{rr}$		---	361	---	nC

**Notes:**

- Limited by maximum junction temperature and duty cycle.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- $V_{DD}=50V, V_{GS}=10V, L=0.5mH, I_{AS}=90.7A$ , Starting  $T_J=25^{\circ}\text{C}$ .
- The value of  $R_{thJA}$  is measured by placing the device in a still air box which is one cubic foot.

## Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

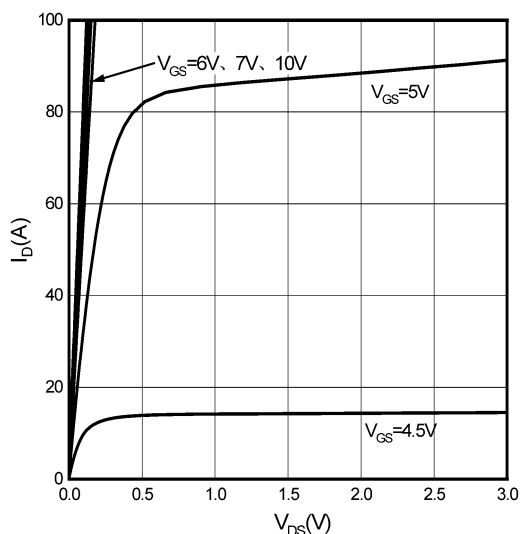


Figure 2. Transfer Characteristics

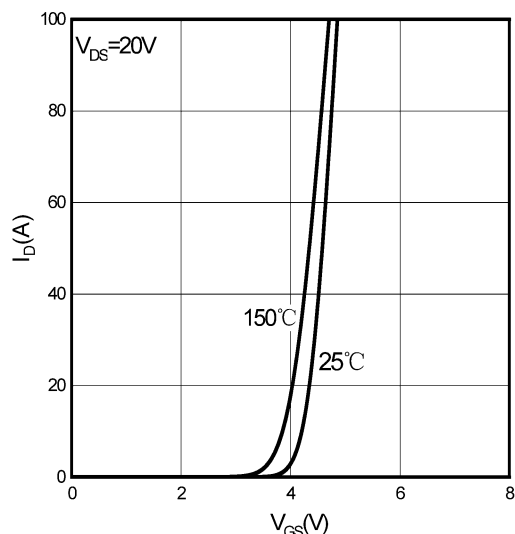


Figure 3. On-Resistance vs. Drain Current

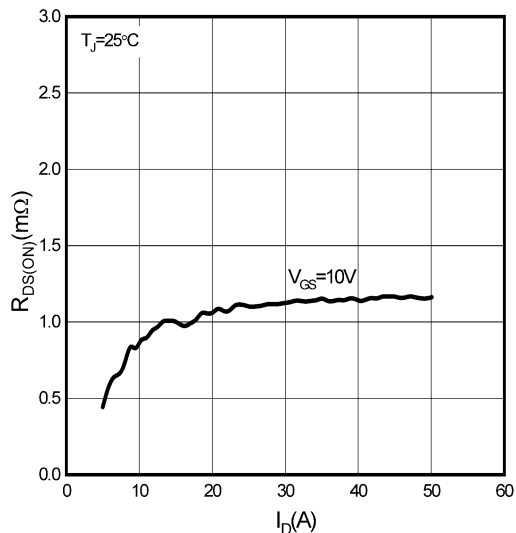


Figure 4. On-Resistance vs. Temperature

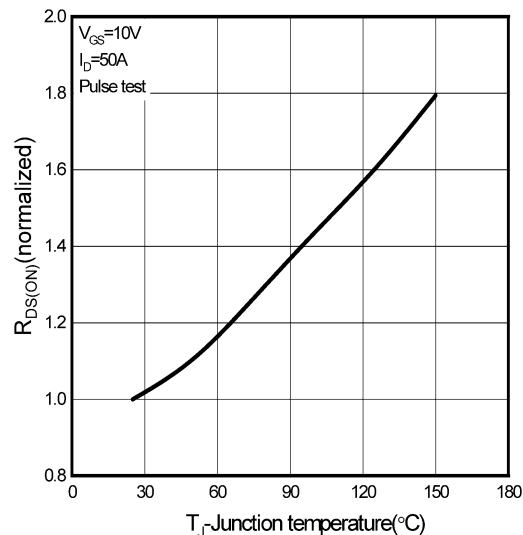


Figure 5. Breakdown Voltage vs. Temperature

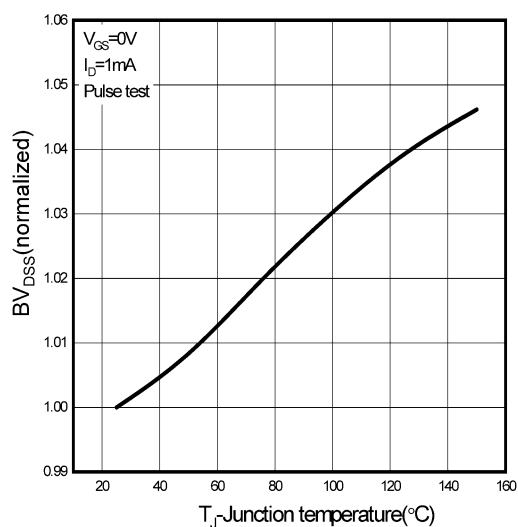


Figure 6. Threshold Voltage vs. Temperature

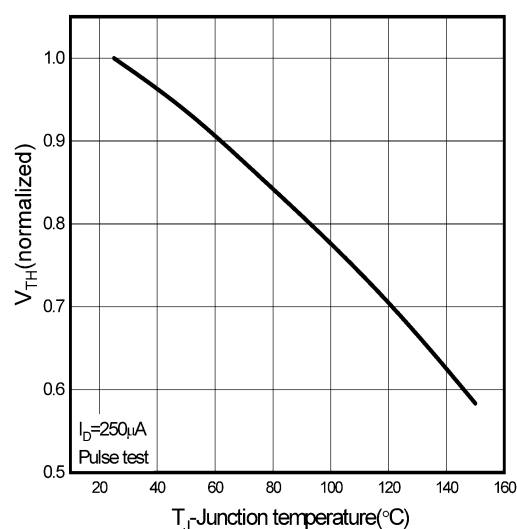


Figure 7.  $R_{DS(on)}$  vs. Gate Voltage

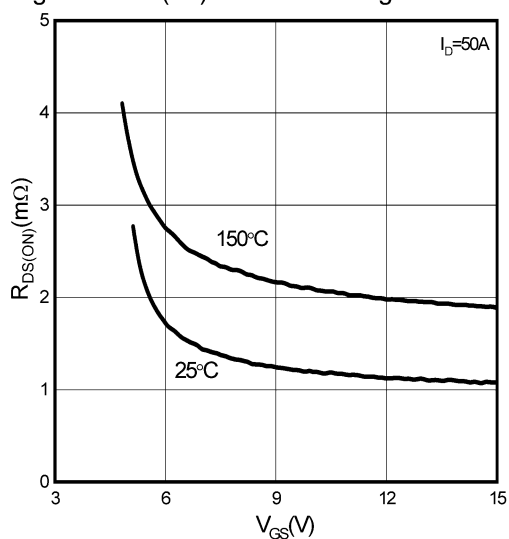


Figure 8. Body-Diode Characteristics

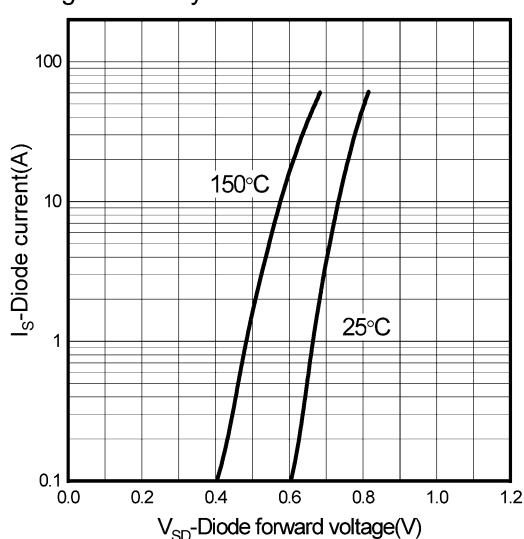


Figure 9. Capacitance Characteristics

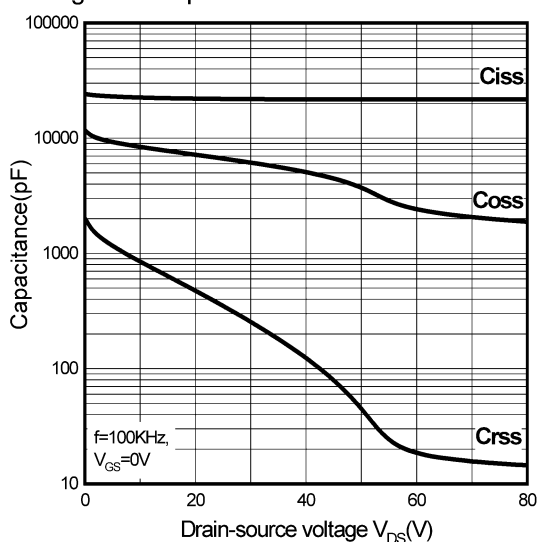


Figure 10. Gate Charge Characteristics

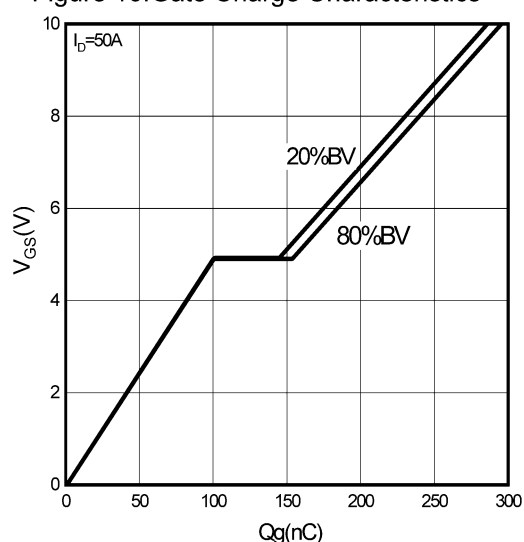


Figure 11. Drain Current Derating

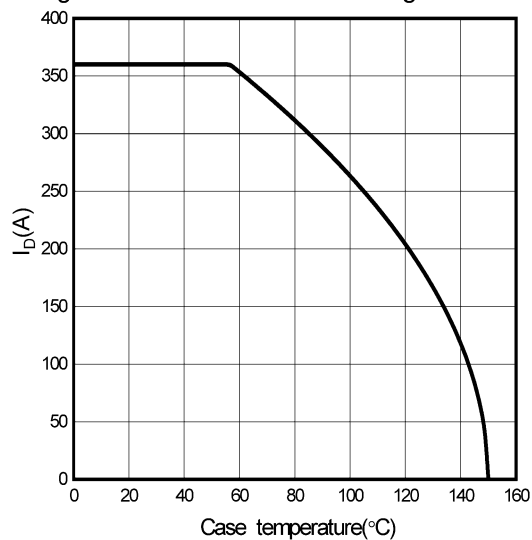


Figure 12. Power Dissipation vs. Temperature

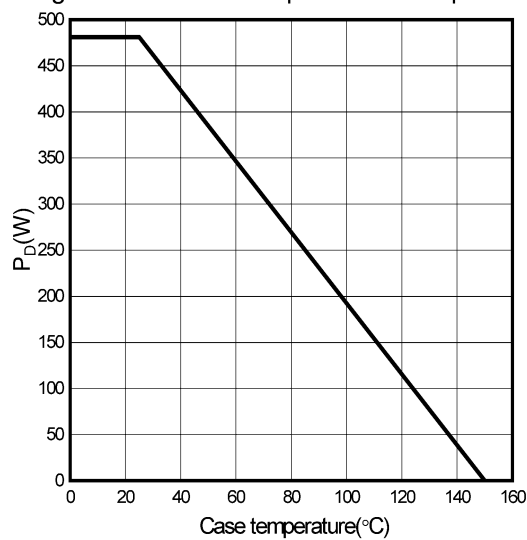


Figure 13. Safe Operating Area

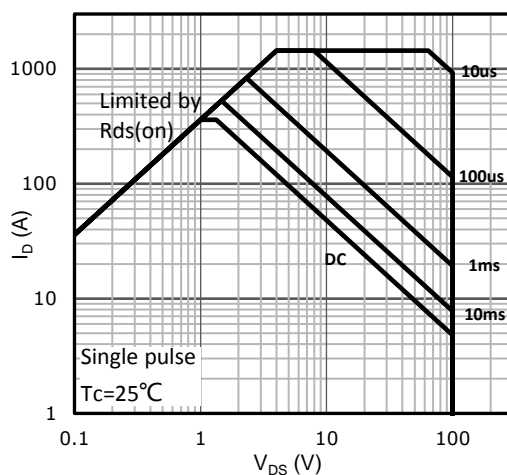
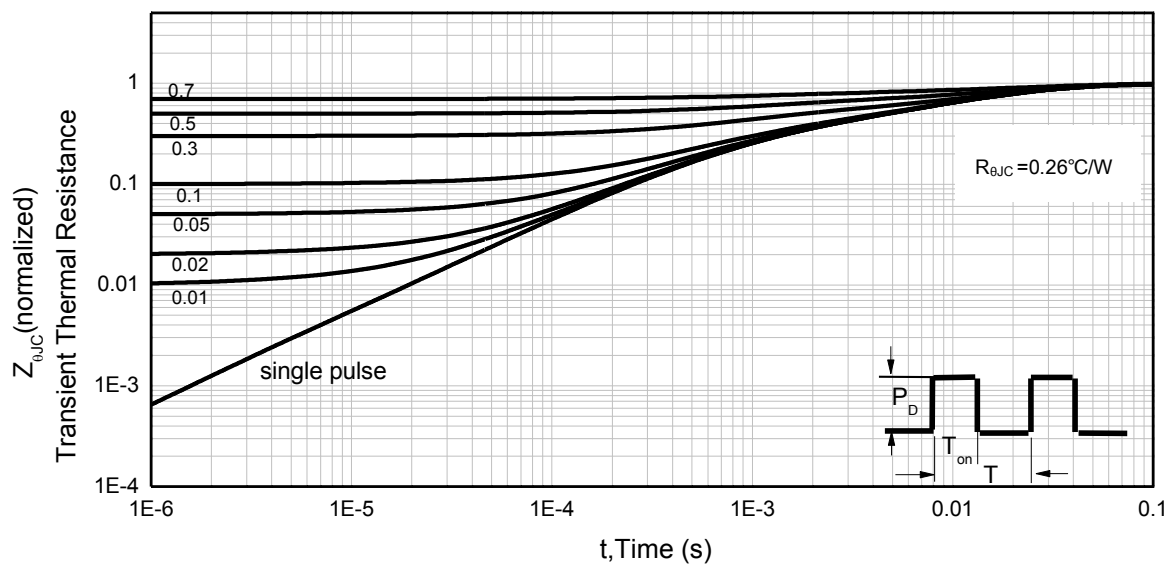
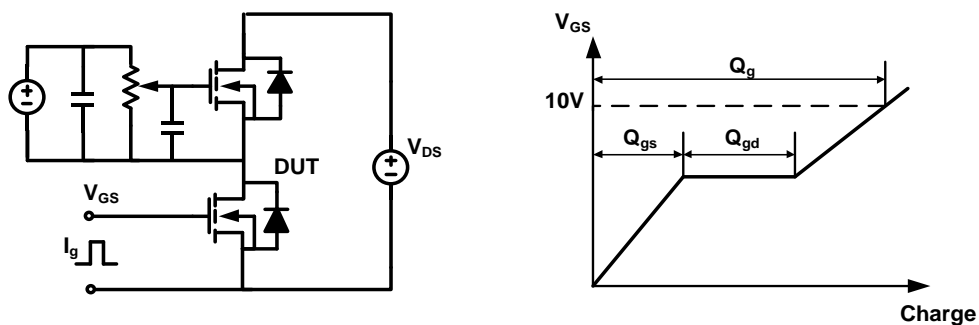


Figure 14. Normalized Maximum Transient Thermal Impedance ( $R_{thJC}$ )

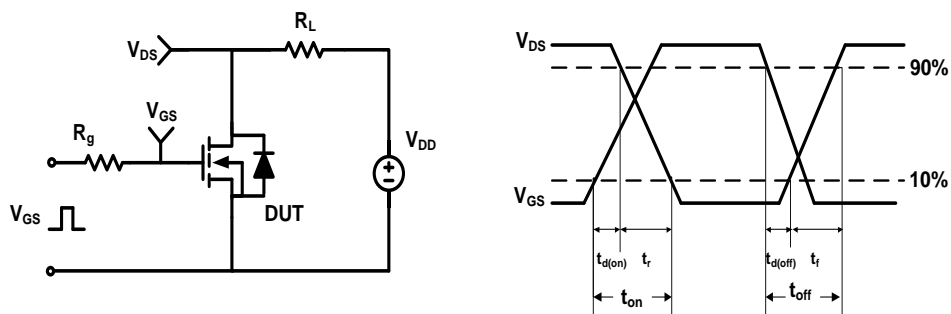


## Test Circuit & Waveforms

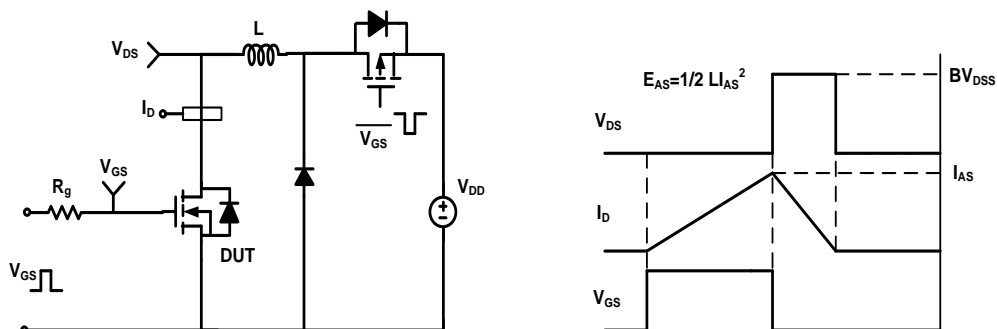
### Gate Charge Test Circuit & Waveform



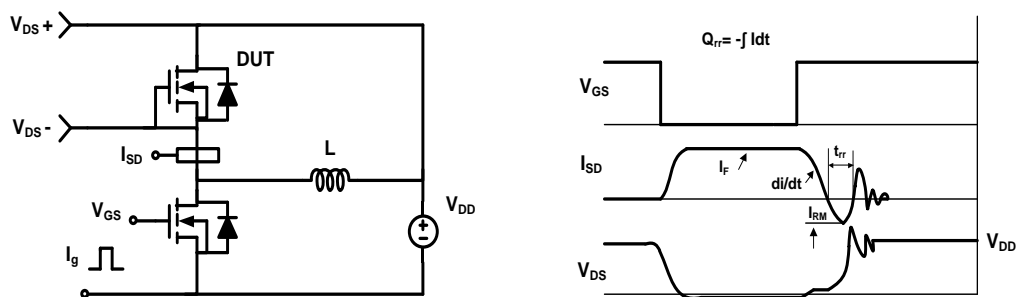
### Resistive Switching Test Circuit & Waveform



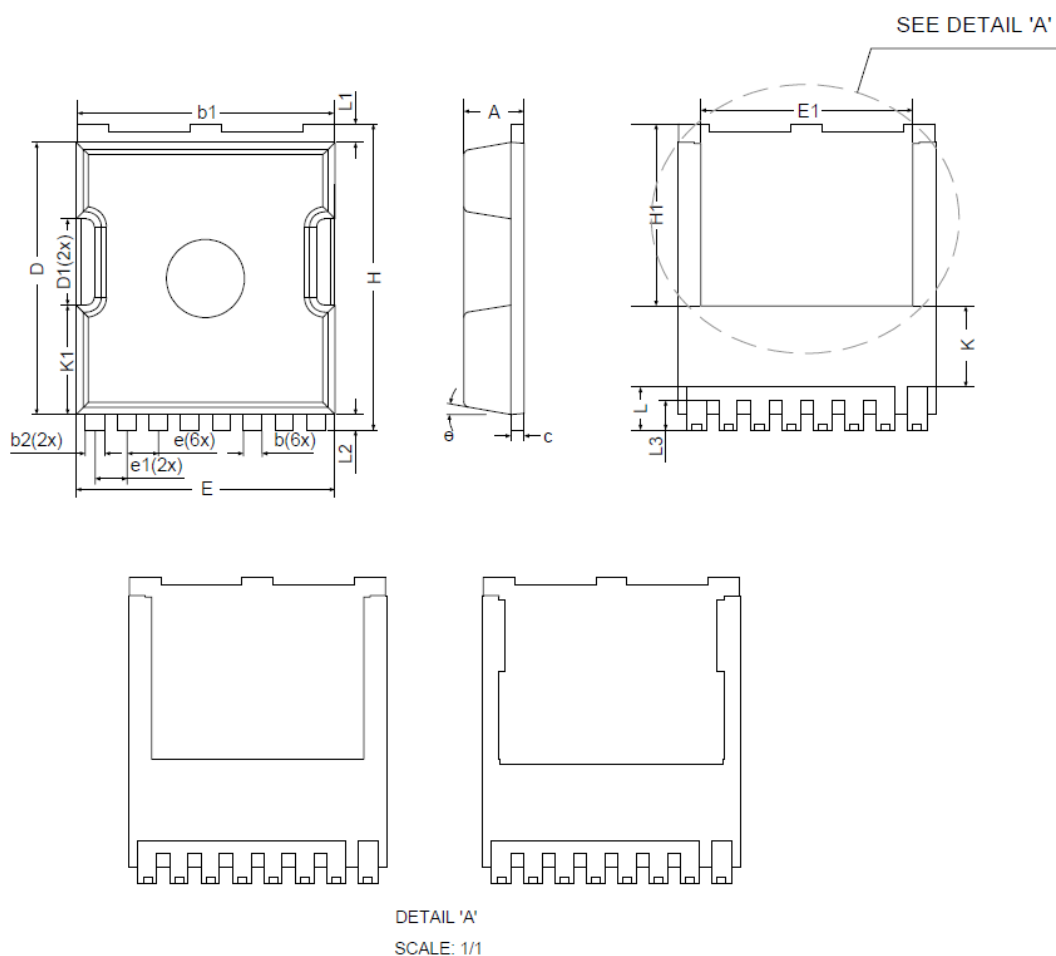
### Unclamped Inductive Switching (UIS) Test Circuit & Waveform



### Diode Recovery Test Circuit & Waveform



**Mechanical Dimensions for TOLL**



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.15	2.45	0.085	0.096
b	0.60	0.90	0.024	0.035
b1	9.65	9.95	0.380	0.392
b2	0.65	0.90	0.026	0.035
c	0.40	0.60	0.016	0.024
D	10.18	10.58	0.401	0.417
D1	3.15	3.45	0.124	0.136
E	9.70	10.10	0.382	0.398
E1	7.90	8.40	0.311	0.331
e	1.10	1.30	0.043	0.051
e1	1.10	1.30	0.043	0.051
H	11.48	11.88	0.452	0.468
H1	6.75	7.30	0.266	0.287
K	2.45	3.33	0.096	0.131
K1	4.03	4.33	0.159	0.170
L	1.50	2.10	0.059	0.083
L1	0.50	0.90	0.020	0.035
L2	0.45	0.75	0.018	0.030
L3	1.00	1.30	0.039	0.051
θ	10° REF		10° REF	

## Revision History

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LSGT10R015

**Revision 1.3**

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