Lonten N-channel 600V, 36A, 89mΩ LonFET™ Power MOSFET

Description

LonFET™ Power MOSFET is fabricated using **advanced super junction** technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. Q_g = 55.8nC)
- 100% UIS tested
- RoHS compliant

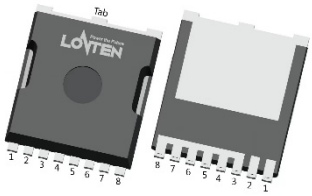
Applications

- Power factor correction (PFC).
- Switched mode power supplies (SMPS).
- Uninterruptible power supply (UPS).

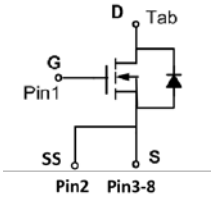
Product Summary

V_{DS} @ $T_{j,max}$	650V
$R_{DS(on),max}$	89mΩ
I_{DM}	108A
$Q_{g,typ}$	55.8nC

Pin Configuration



TOLL-Kelvin



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	600	V
Continuous drain current (T_C = 25°C)	I_D	36	A
(T_C = 100°C)		23	A
Pulsed drain current [1]	I_{DM}	108	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	720	mJ
Power Dissipation	P_D	272	W
MOSFET dv/dt Ruggedness, V_{DS}≤480V	dv/dt	80	V/ns
Reverse Diode dv/dt, V_{DS}≤480V, I_{SD}≤I_D	dv/dt	50	V/ns
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	36	A
Diode pulse current	$I_{S,pulse}$	108	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.46	°C/W
Thermal Resistance, Junction-to-Ambient, minimal footprin [3]	$R_{\theta JA}$	62	°C/W
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
LSTK60R089GF	TOLL-Kelvin	LSTK60R089GF	2000

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=0.25 mA	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.70mA	3.0	3.78	5.0	V
Drain cut-off current	I_{DSS}	V_{DS}=600 V, V_{GS}=0 V,T_j = 25°C	-	-	10	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=14 A	-			mΩ
		T_j = 25°C	-	77.2	89	
		T_j = 150°C	-	183.6	-	
Gate resistance	R_G	f=1 MHz, open drain	-	5.68	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V, f = 250kHz	-	2553	-	pF
Output capacitance	C_{oss}		-	100	-	
Reverse transfer capacitance	C_{rss}		-	1.28	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 400V, I_D =14A, R_G = 10Ω, V_{GS}=10V	-	78.4	-	ns
Rise time	t_r		-	12.8	-	
Turn-off delay time	$t_{d(off)}$		-	95.9	-	
Fall time	t_f		-	5.8	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480V, I_D=14A, V_{GS}=0 to 10 V	-	15	-	nC
Gate to drain charge	Q_{gd}		-	22.3	-	
Gate charge total	Q_g		-	55.8	-	
Gate plateau voltage	$V_{plateau}$		-	6.2	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=40A	-	-	1.1	V
Reverse recovery time	t_{rr}	V_R=400 V, I_F=14A, dI_F/dt=100 A/μs	-	134.3	-	ns
Reverse recovery charge	Q_{rr}		-	913.7	-	nC
Peak reverse recovery current	I_{rrm}		-	12.54	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.

2. I_{AS} = 4.9A, L=60mH, V_{DD} = 60V, Starting T_j= 25°C.

3: 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

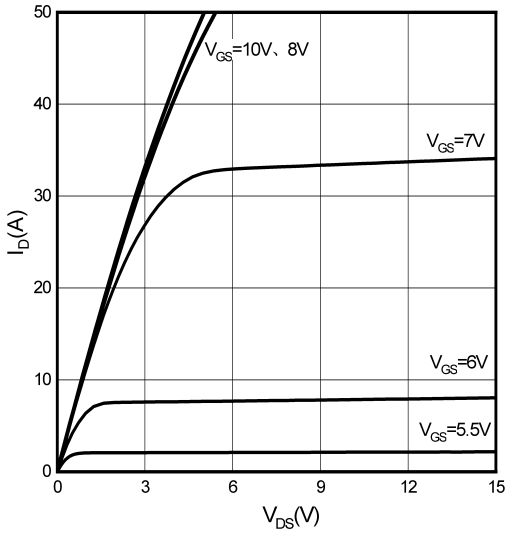


Figure 2. Transfer Characteristics

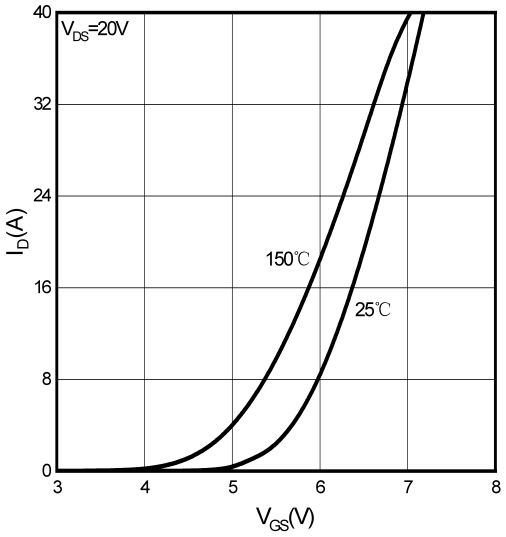


Figure 3. On-Resistance vs. Drain Current

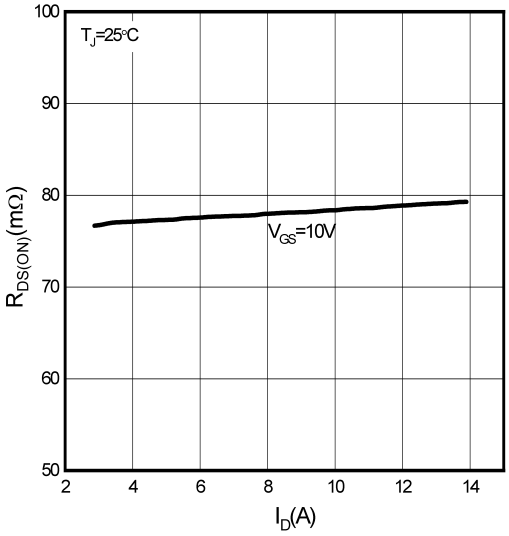


Figure 4.On-Resistance vs.Temperature

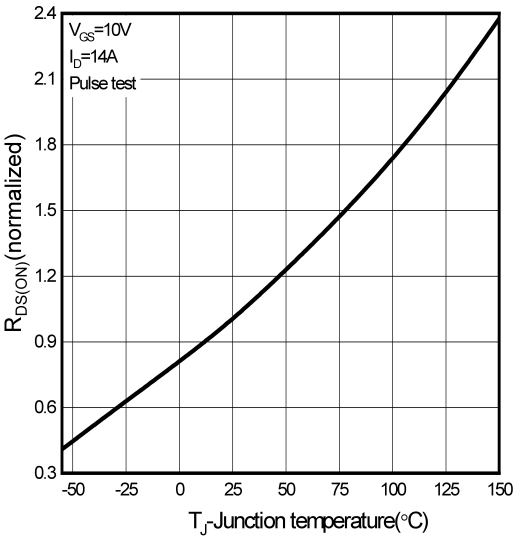


Figure 5.Breakdown Voltage vs.Temperature

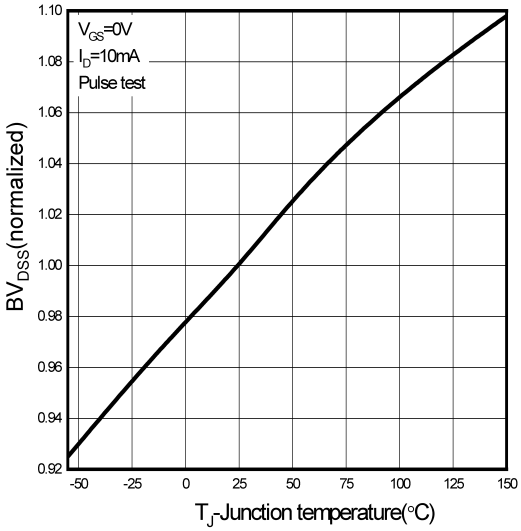


Figure 6.Threshold Voltage vs.Temperature

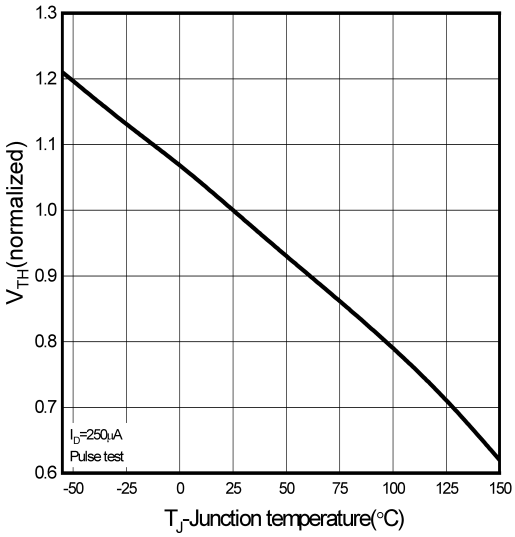


Figure 7.Body-Diode Characteristics

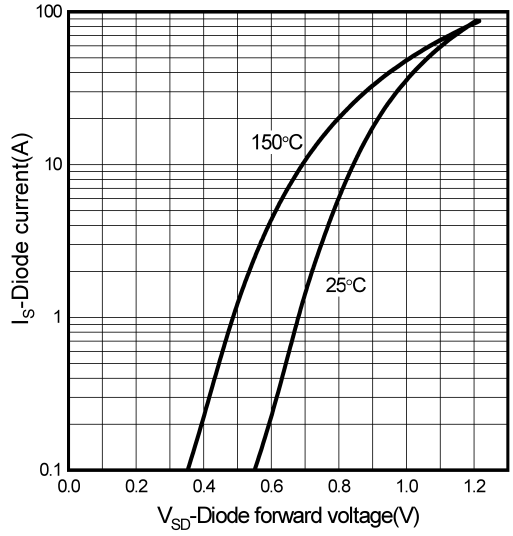


Figure 8.Capacitance Characteristics

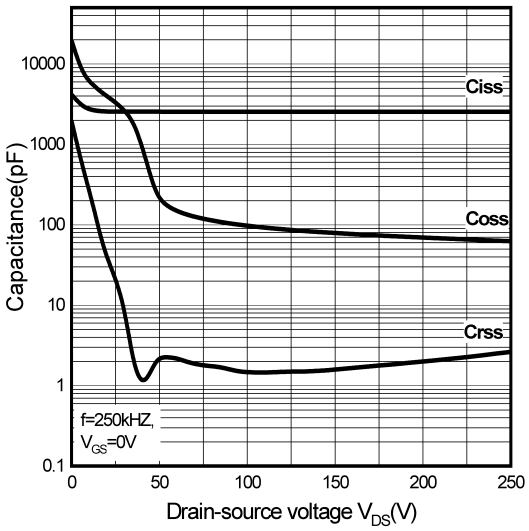


Figure 9.Gate Charge Characteristics

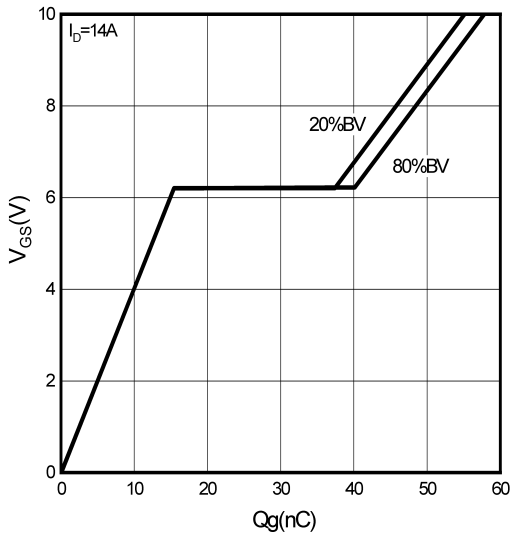


Figure 10.Drain Current Derating

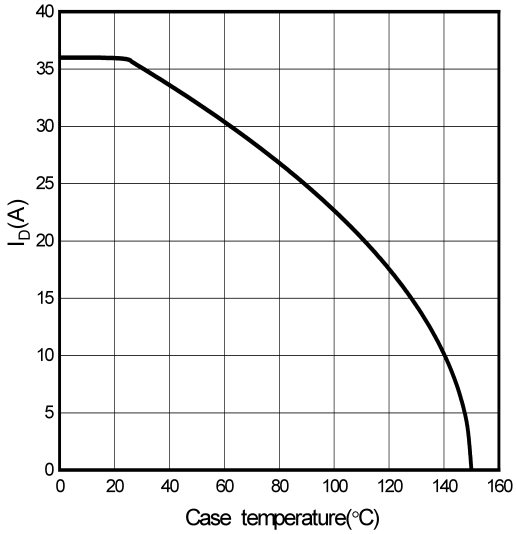


Figure 11.Power Dissipation vs.Temperature

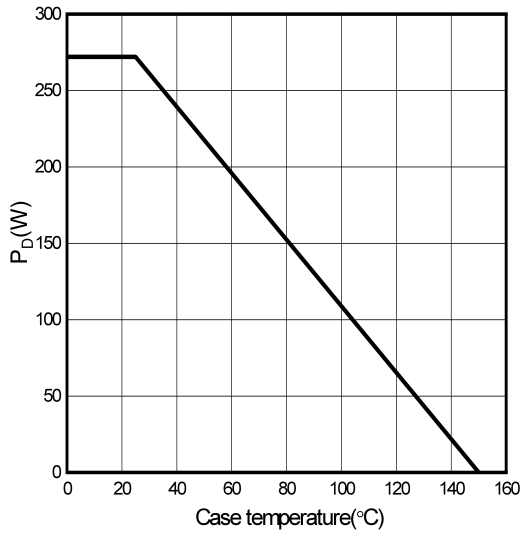


Figure 12. Safe Operating Area

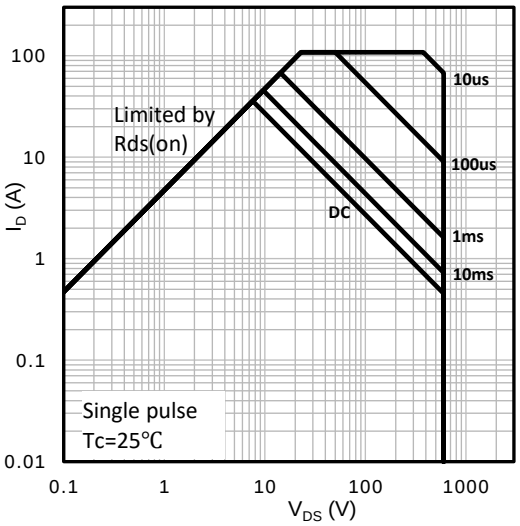
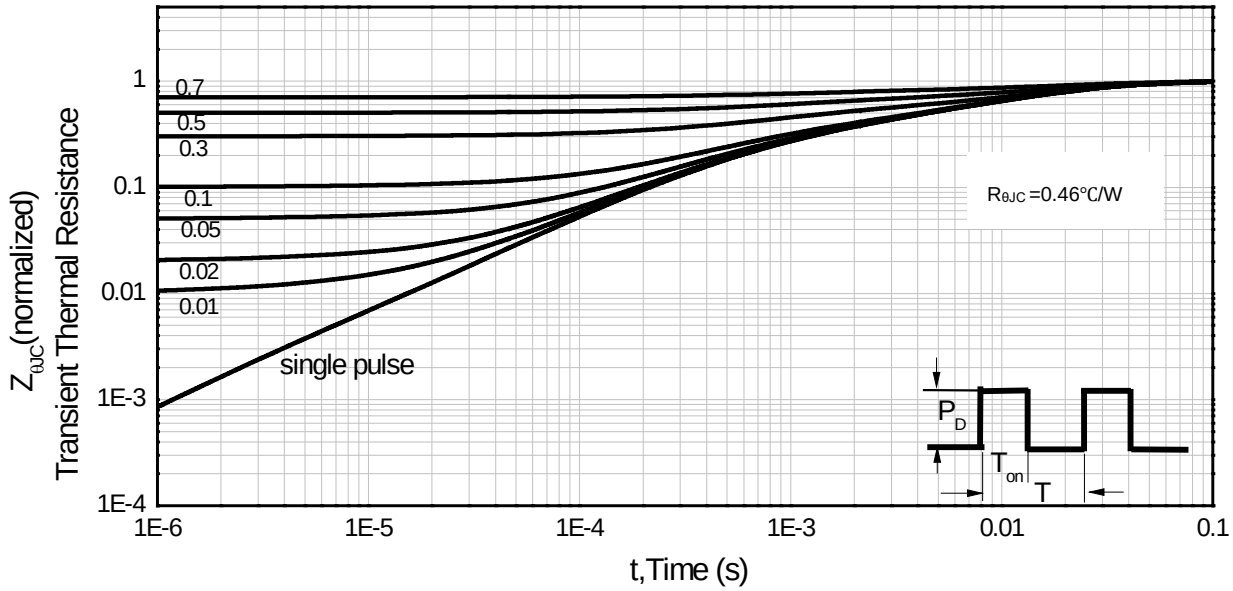
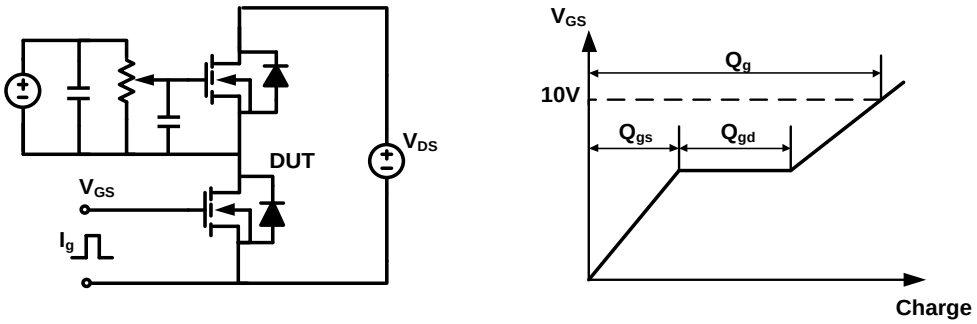


Figure 13. Normalized Maximum Transient Thermal Impedance (RthJC)

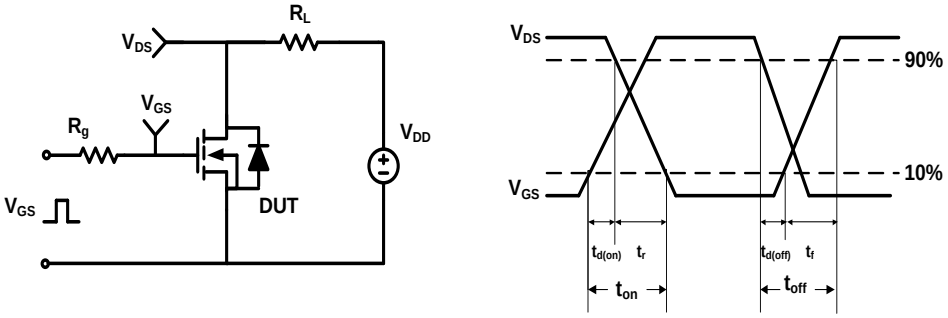


Test Circuit & Waveforms

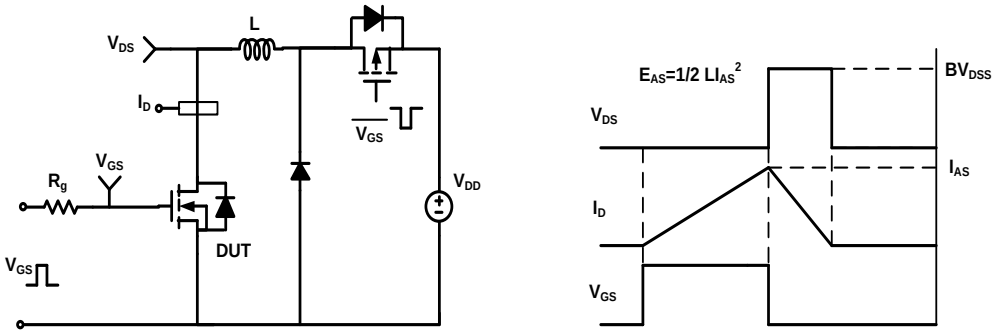
Gate Charge Test Circuit & Waveform



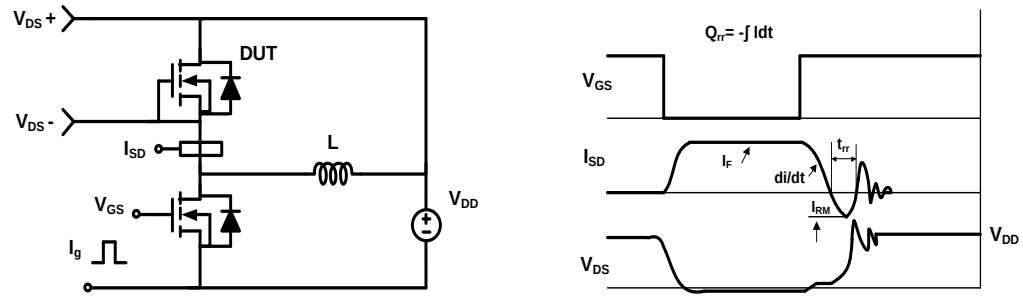
Resistive Switching Test Circuit & Waveform



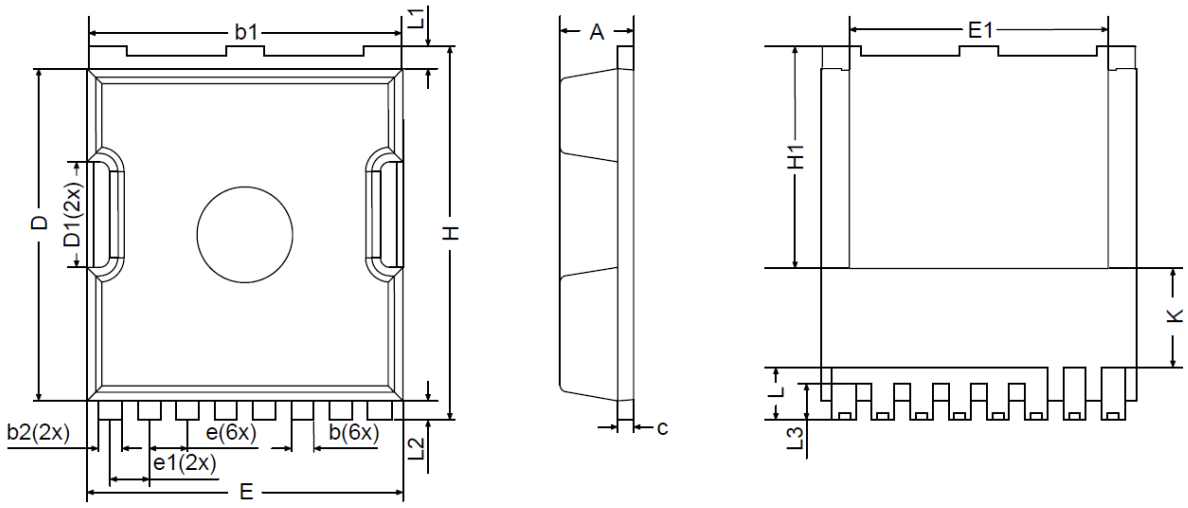
Unclamped Inductive Switching (UIS) Test Circuit & Waveform



Diode Recovery Test Circuit & Waveform



Mechanical Dimensions for TOLL-Kelvin



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.15	2.45	0.085	0.096
b	0.60	0.80	0.024	0.031
b1	9.65	9.95	0.380	0.392
b2	0.65	0.85	0.026	0.033
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	7.95	8.25	0.313	0.325
e	1.20 BSC		0.047 BSC	
e1	1.225 BSC		0.048 BSC	
H	11.48	11.88	0.452	0.468
H1	6.95 BSC		0.274 BSC	
K	2.73	3.13	0.107	0.123
L	1.55	2.00	0.061	0.079
L1	0.50	0.90	0.020	0.035
L2	0.48	0.72	0.019	0.028
L3	1.00	1.30	0.039	0.051

Version Information

LSTK60R089GF
Revision 1.1

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