Lonten N-channel 600V, 45A, 0.069Ω 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 =75.1nC)
- 100% UIS tested
- RoHS compliant

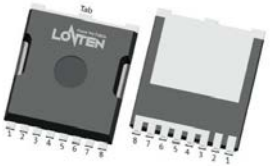
Applications

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

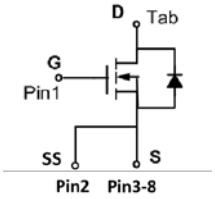
Product Summary

V_{DS}	600V
$R_{DS(on),\ max}$	0.069Ω
I_{DM}	135A
$Q_{g,typ}$	75.1nC

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	45	A
(T_C = 100°C)		28	A
Pulsed drain current [1]	I_{DM}	135	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	1009	mJ
Power Dissipation	P_D	338	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	45	A
Diode pulse current	$I_{S,pulse}$	135	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.37	°C/W
Thermal Resistance, Junction-to-Ambient, minimal footprint [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
LSTK60R069GF	TOLL-Kelvin	LSTK60R069GF	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}=0V, I_D=250uA	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.9mA	3	3.83	5	V
Drain cut-off current	I_{DSS}	V_{DS}=600V, 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=59A T_j = 25°C T_j = 150°C	- - -	 61.86 149.7	 69 -	mΩ
Gate resistance	R_G	f=1 MHz, open drain	-	1.32	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} =100V, V_{GS}=0V, f=250kHz	-	3291	-	pF
Output capacitance	C_{oss}		-	129	-	
Reverse transfer capacitance	C_{rss}		-	3.75	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} =400V, I_D=23A R_G = 10Ω, V_{GS}=10V	-	71.1	-	ns
Rise time	t_r		-	9.8	-	
Turn-off delay time	$t_{d(off)}$		-	92.1	-	
Fall time	t_f		-	5.4	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480V, I_D=23A, V_{GS}=0 to 10 V	-	18	-	nC
Gate to drain charge	Q_{gd}		-	30.9	-	
Gate charge total	Q_g		-	75.1	-	
Gate plateau voltage	$V_{plateau}$		-	5.6	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=23A	-	-	1.1	V
Reverse recovery time	t_{rr}	V_R=400V, I_F=23A, dI_F/dt=100 A/μs	-	147.7	-	ns
Reverse recovery charge	Q_{rr}		-	1080.9	-	nC
Peak reverse recovery current	I_{rrm}		-	13.4	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.
2. I_{AS}=5.8A, L=60mH, V_{DD}=60V, Starting Tj= 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

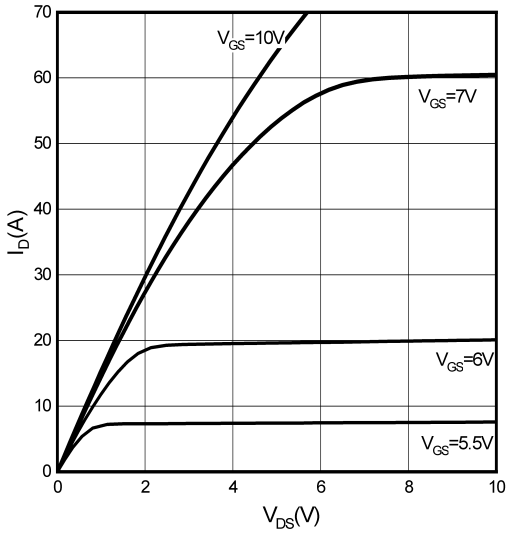


Figure 2. Transfer Characteristics

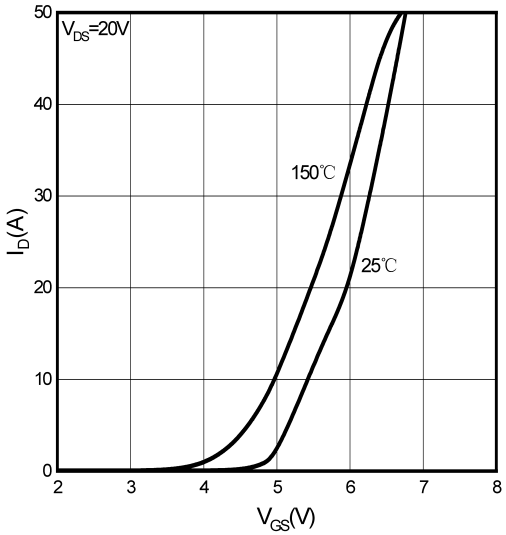


Figure 3. On-Resistance vs. Drain Current

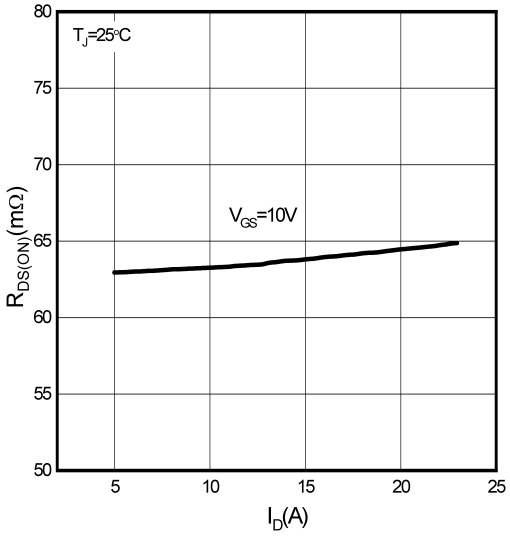


Figure 4.On-Resistance vs.Temperature

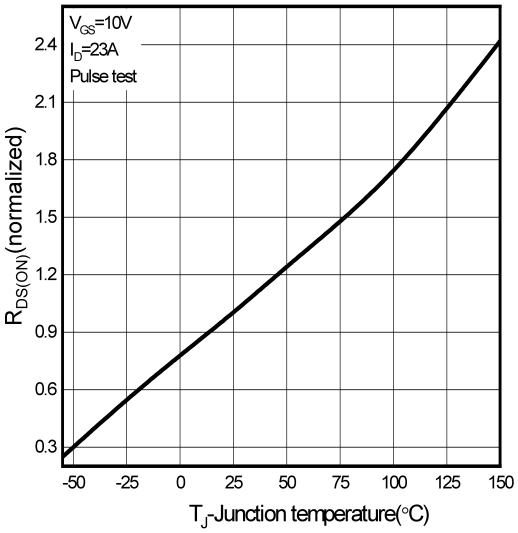


Figure 5.Breakdown Voltage vs.Temperature

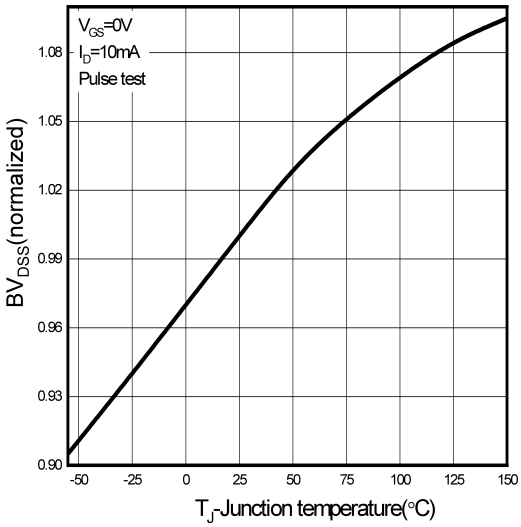


Figure 6.Threshold Voltage vs.Temperature

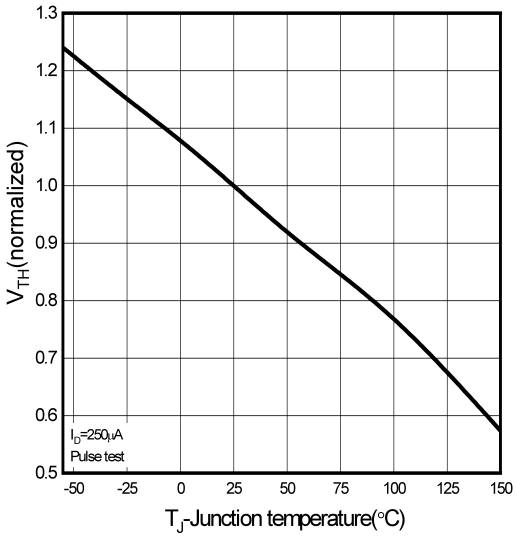


Figure 7.Body-Diode Characteristics

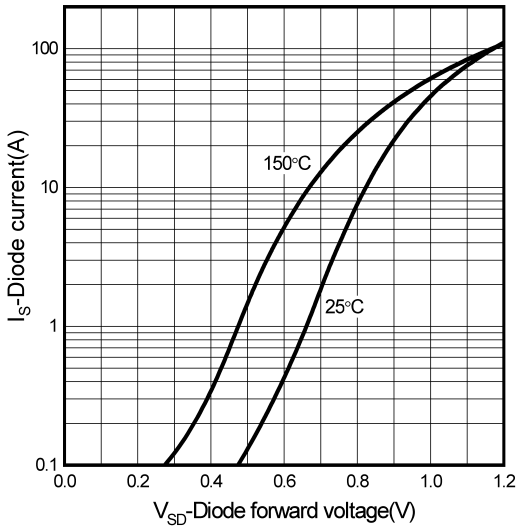


Figure 8.Capacitance Characteristics

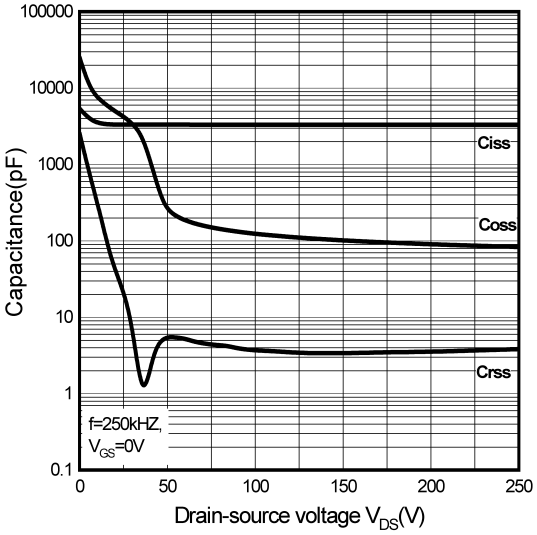


Figure 9.Gate Charge Characteristics

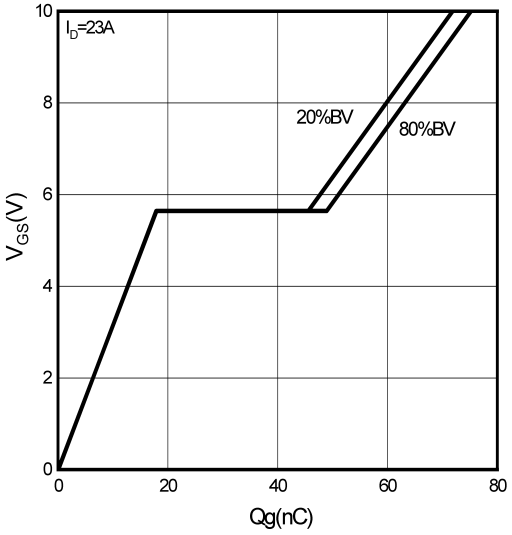


Figure 10.Drain Current Derating

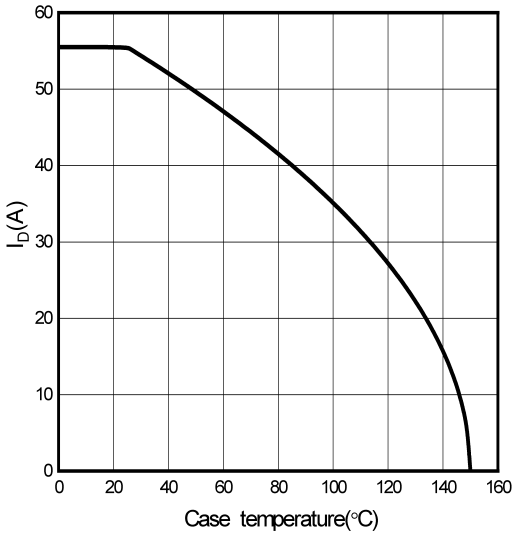


Figure 11.Power Dissipation vs.Temperature

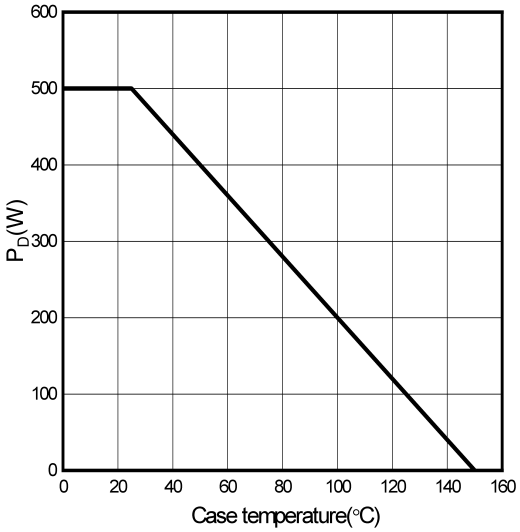


Figure 12. Safe Operating Area

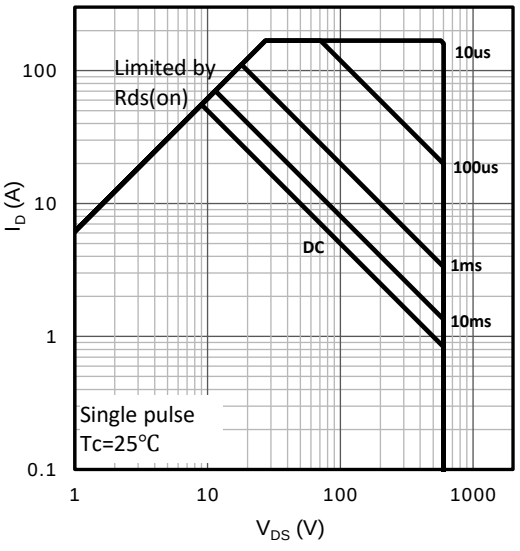
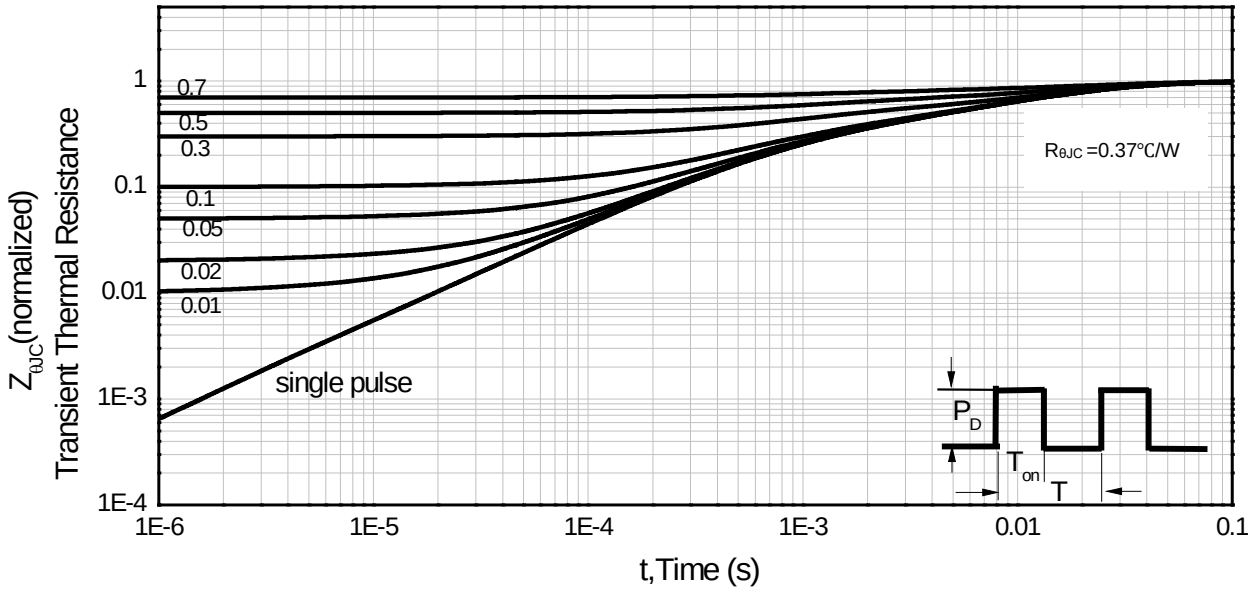
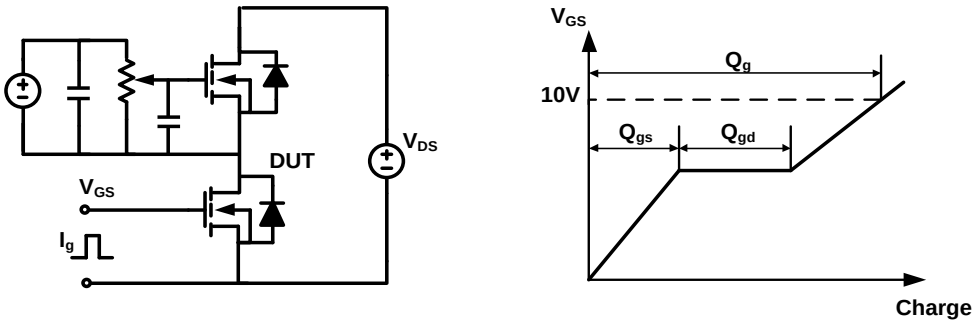


Figure 13. Normalized Maximum Transient Thermal Impedance (R_{thJC})

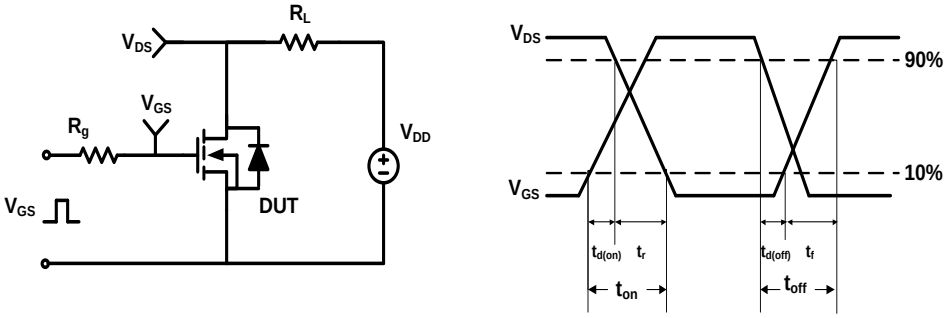


Test Circuit & Waveforms

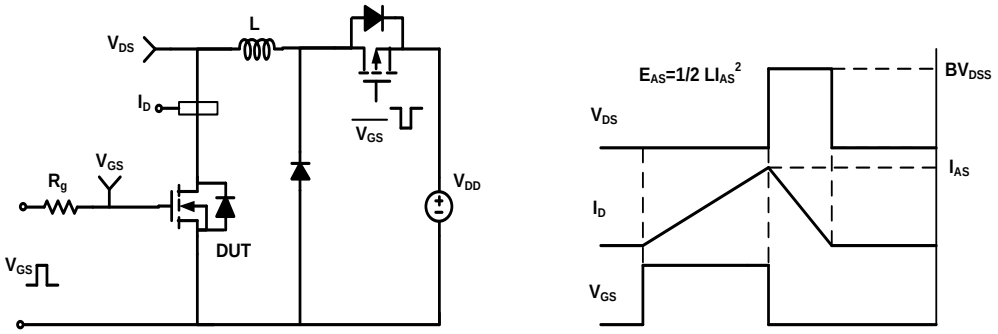
Gate Charge Test Circuit & Waveform



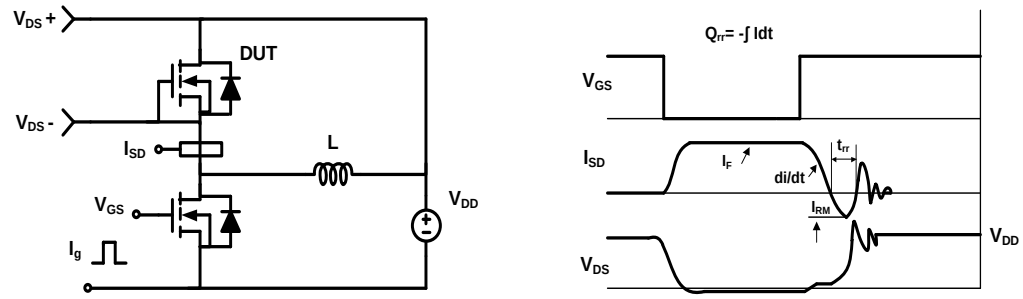
Resistive Switching Test Circuit & Waveform



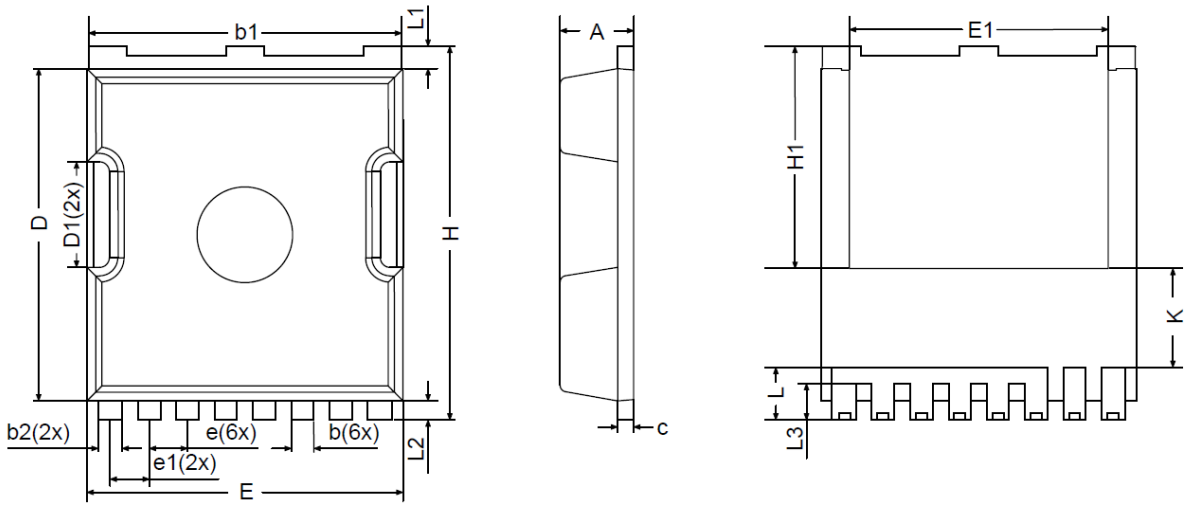
Unclamped Inductive Switching (UIS) Test Circuit & Waveform



Diode Recovery Test Circuit & Waveform



Mechanical Dimensions for TOLL-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

LSTK60R069GF
Revision 1.1

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