JJMICROELECTRONICS

40V, 306A, 0.8mΩ N-channel Power SGT MOSFET

JMSH04011GL4LQ

Features

- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested
- 100% ΔVds Tested
- Halogen-free; RoHS-compliant
- AEC-Q101 Qualified

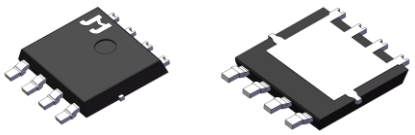
Applications

- Load Switch
- PWM Application
- General Automotive Application

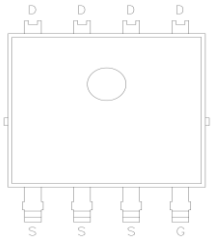
Product Summary

Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th)_Typ}$	2.8	V
I_D(@V_{GS}=10V)	306	A
$R_{DS(ON)_Typ}$(@V_{GS}=10V)	0.8	mΩ

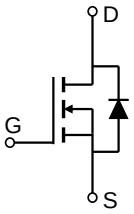
RoHS



LFPAK5X6-8L



Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH04011GL4LQ-13	SH040114LQ	1	Tape&Reel	LFPAK5X6-8L	5000	50000

Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-Source Voltage		40	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25°C	306	A
		T_C = 100°C	217	
I_{DM}	Pulsed Drain Current (1)		Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy (2)		618	mJ
P_D	Power Dissipation	T_C = 25°C	176	W
		T_C = 100°C	88	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(3)	42	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.85	

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Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	2.8	4.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS} = 10V, I_D = 20A	-	0.8	1.1	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	2.1	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz	-	5696	7700	pF
C_{oss}	Output Capacitance		-	1540	2100	pF
C_{rss}	Reverse Transfer Capacitance		-	94	150	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 20A	-	87	-	nC
Q_{gs}	Gate Source Charge		-	26	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	16	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 20V I_D= 20A, R_{GEN} = 3Ω	-	19	-	ns
t_r	Turn-On Rise Time		-	36	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	60	-	ns
t_f	Turn-Off Fall Time		-	23	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	306	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	1224	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = 20A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 20A, di/dt = 100A/us	25	50	75	ns
Qrr	Body Diode Reverse Recovery Charge		-	60	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=20V, V_{GS}=10V, R_G=25ohm, L=3mH, I_{AS}=20.3A, V_{DD}=0V during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

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Typical Performance Characteristics

Figure 1: Power De-rating

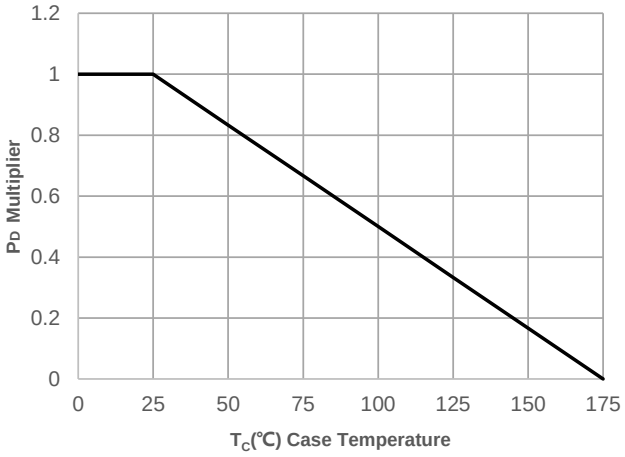


Figure 2: Current De-rating

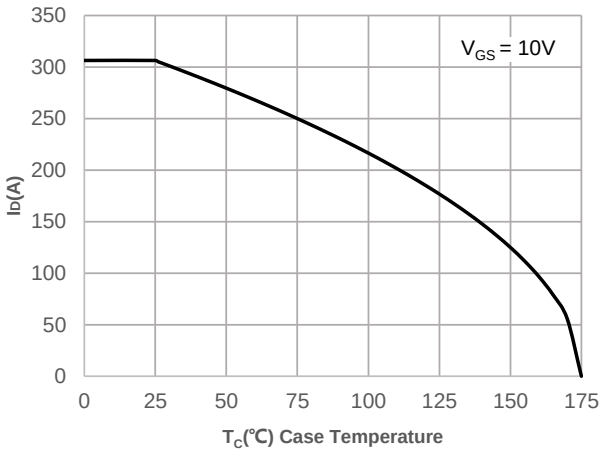


Figure 3: Normalized Maximum Transient Thermal Impedance

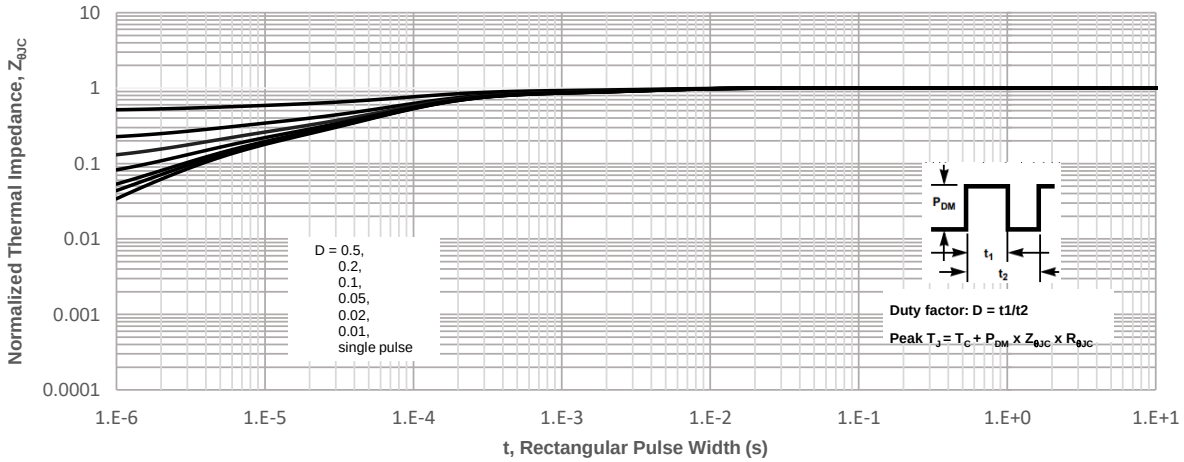
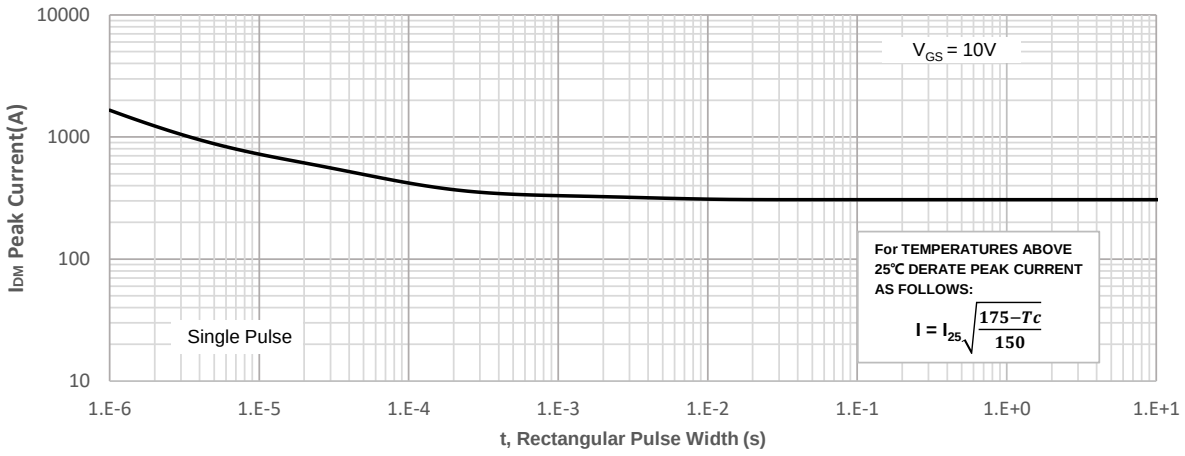


Figure 4: Peak Current Capacity



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Typical Performance Characteristics

Figure 5: Output Characteristics

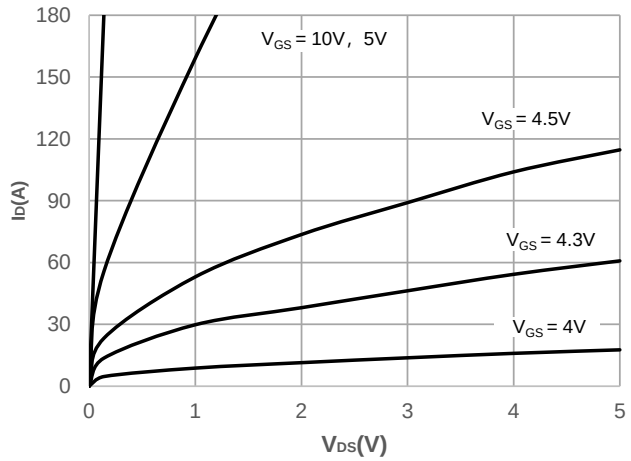


Figure 6: Typical Transfer Characteristics

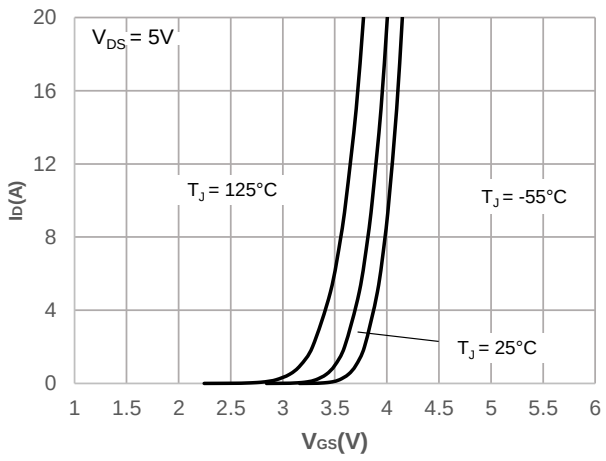


Figure 7: On-resistance vs. Drain Current

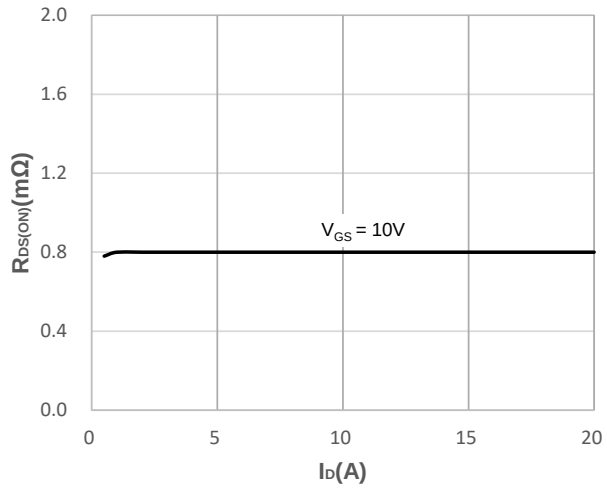


Figure 8: Body Diode Characteristics

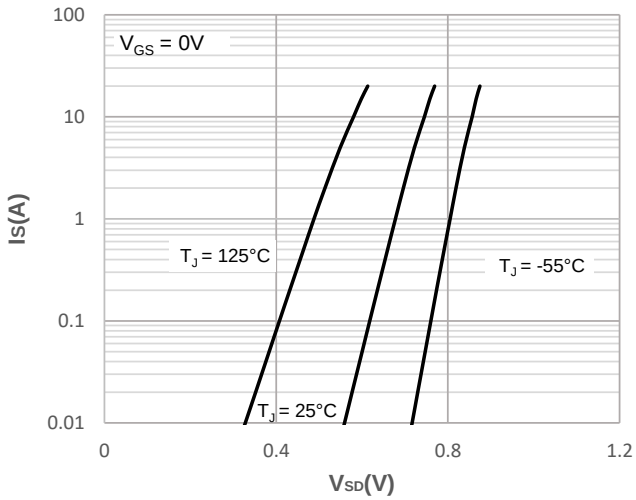


Figure 9: Gate Charge Characteristics

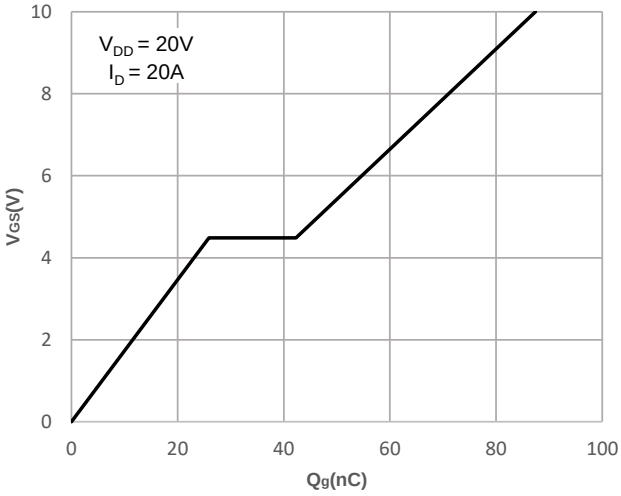
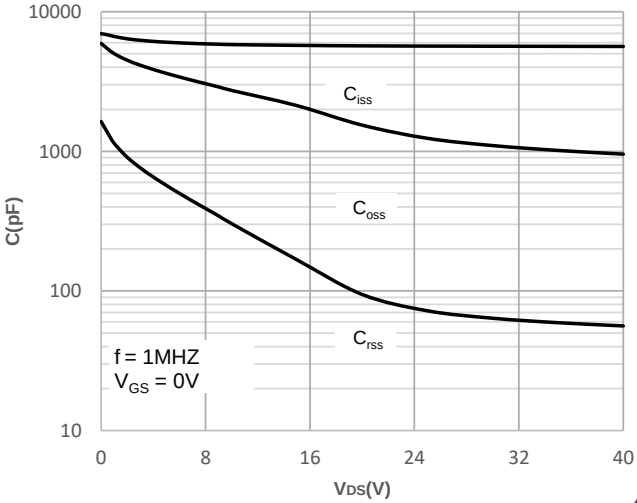


Figure 10: Capacitance Characteristics



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Typical Performance Characteristics

Figure 11: Normalized Breakdown Voltage vs. Junction Temperature

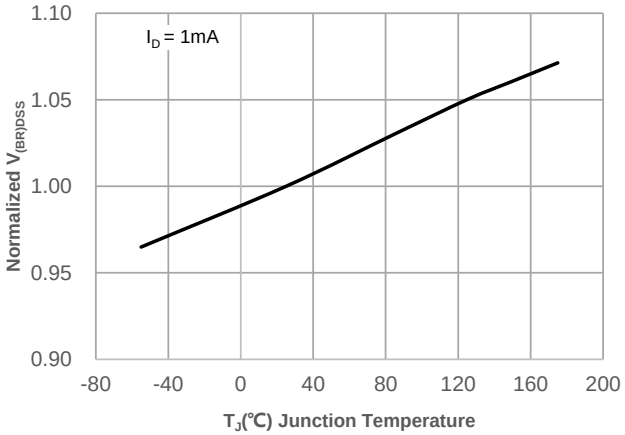


Figure 12: Normalized on Resistance vs. Junction Temperature

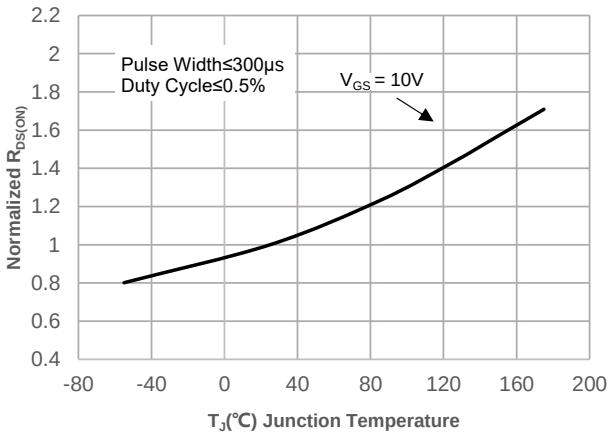


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

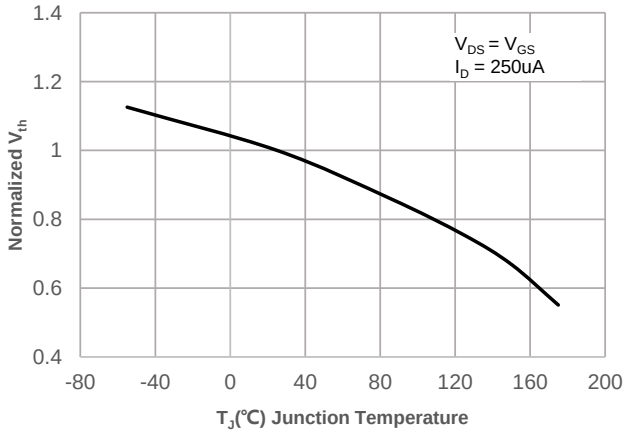


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

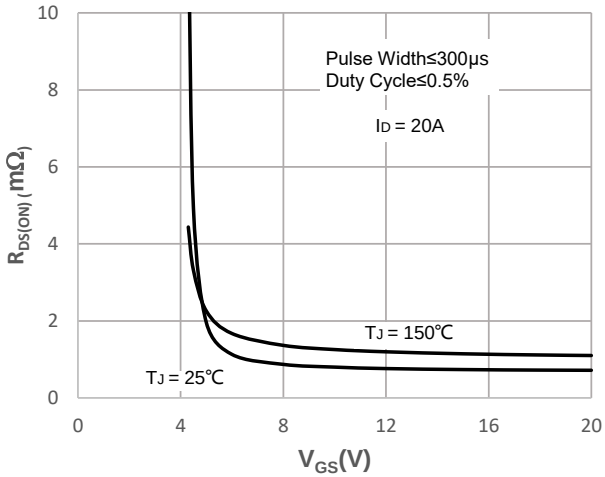
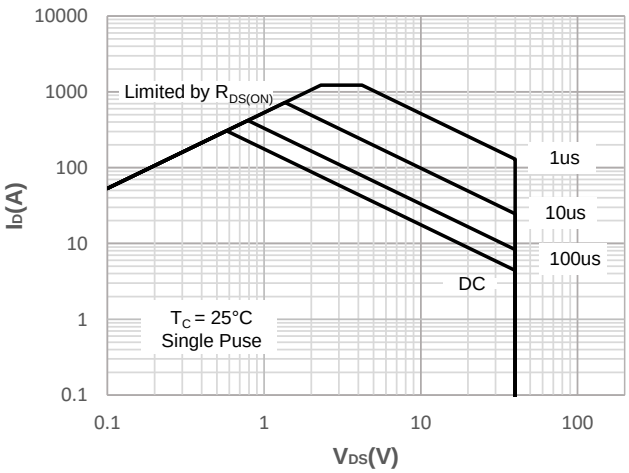


Figure 15: Maximum Safe Operating Area



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Test Circuit

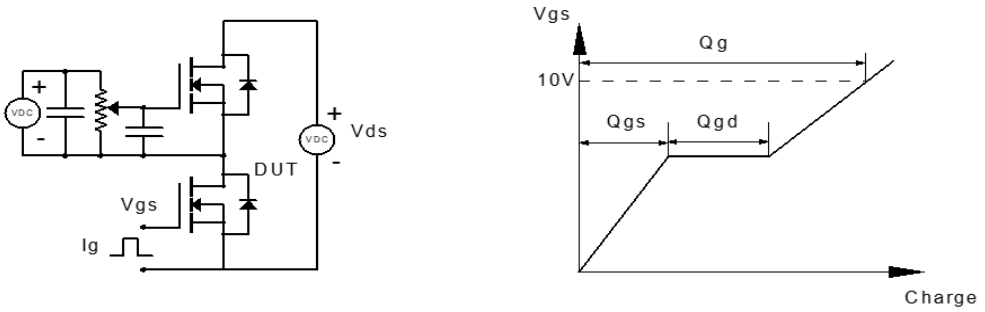


Figure 1: Gate Charge Test Circuit & Waveform

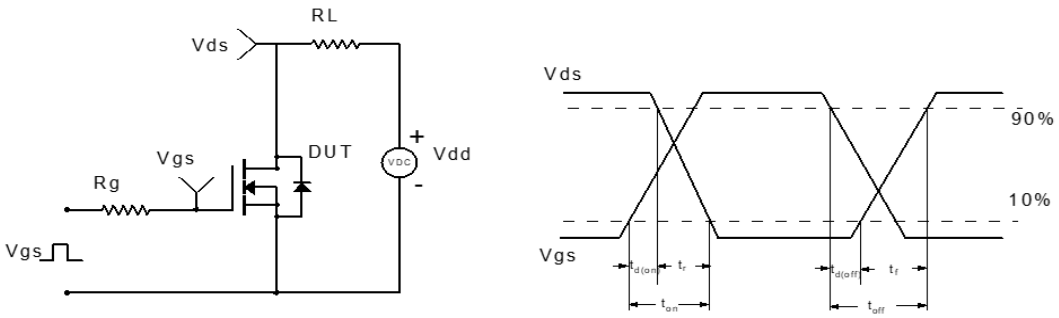


Figure 2: Resistive Switching Test Circuit & Waveform

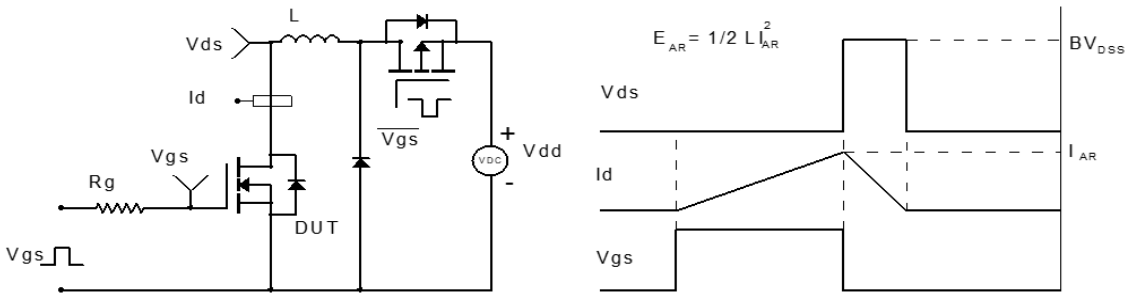


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

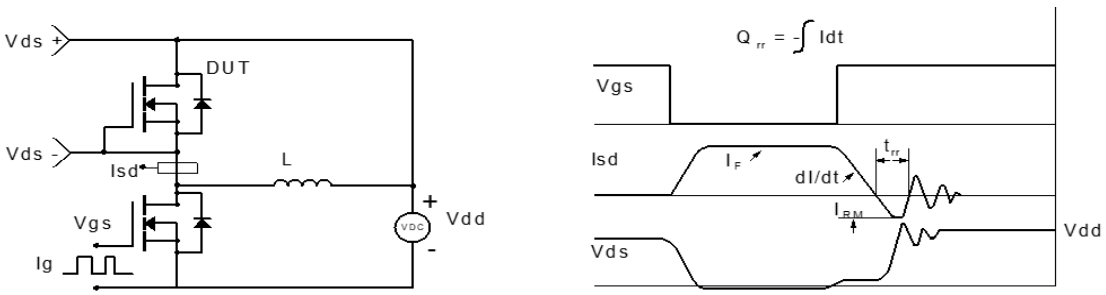
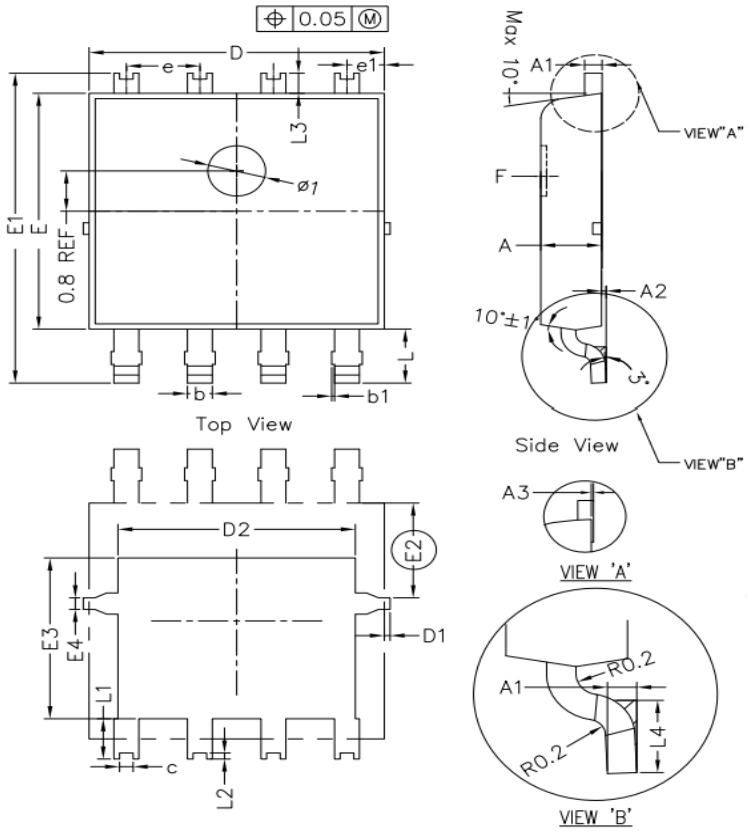


Figure 4: Diode Recovery Test Circuit & Waveform

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Package Mechanical Data(LFPAK5X6-8L)



SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
*A	0.950	1.050	1.200	0.037	0.041	0.047
*A1	0.228	0.278	0.328	0.009	0.011	0.013
A2	0.030	0.080	0.130	0.001	0.003	0.005
A3	--	--	0.050			0.002
*b	0.330	0.430	0.530	0.013	0.017	0.021
b1		0.05REF			0.002REF	
C		0.235REF			0.009REF	
*D	5.000	5.100	5.200	0.197	0.201	0.205
D1		0.125REF			0.005REF	
D2	4.000	4.100	4.200	0.157	0.161	0.165
*E1	6.000	6.150	6.300	0.236	0.242	0.248
*E	4.580	4.680	4.780	0.18	0.184	0.188
e1		0.645REF			0.025REF	
e		1.27REF			0.05REF	
E2		1.880REF			0.074REF	
E3	3.090	3.190	3.290	0.122	0.126	0.130
E4		0.230REF			0.009REF	
F	--	--	0.100	--	--	0.004
*L	0.970	1.070	1.170	0.038	0.042	0.046
L1	0.650	0.800	0.950	0.026	0.031	0.037
L2		0.125REF			0.005REF	
L3	0.300	0.400	0.500	0.012	0.016	0.020
L4	0.620	0.720	0.820	0.024	0.028	0.032

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