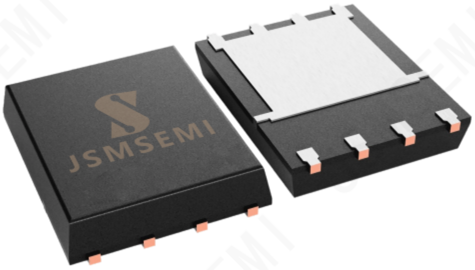
Product Summary

- V_{DS} 40V
- I_D 120A
- $R_{DS(ON)}$(at V_{GS}=10V) ＜2.2mΩ
- 100% EAS Tested
- 100% ∇V_{DS} Tested



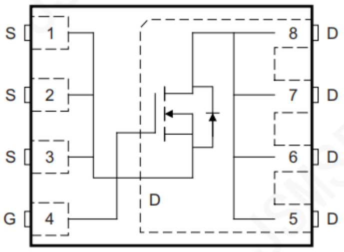
General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor

Top View



Absolute Maximum Ratings (T_A= 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
I_D [G]	Continuous Drain Current	Tc=25°C	120 [G]	A
		Tc=25°C	205 [I]	
		Tc=100°C	100 [G]	
I_{DM} [C]	Pulsed Drain Current		550	
I_{DSM}	Continuous Drain Current	T_A=25°C	40	A
		T_A=70°C	32	
P_D [B]	Power Dissipation	T_C=25°C	157	W
		T_C=100°C	62	
I_S [G]	Diode Continuous Forward Current		120	A
T_{STG}, T_j	Storage Temperature Range		-55 to 150	°C
P_{DSM}	Power Dissipation	T_A=25°C	6.2	W
		T_A=70°C	4	
I_{AS} [C]	Single pulsed avalanlce Current		47	A
E_{AS} [C]	Single pulsed avalanlce energy	L=0.3mH	331	mJ
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.8	°C/W
$R_{\theta JA}$ [AD]	Thermal Resistance-Junction to Ambient	t≤10S	20	
		Steady State	50	

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

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250µA, V_{GS}=0V		40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V				1	µA
			T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=250µA		1	1.7	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=50A			2.0	2.2	mΩ
			T_J =125°C		2.25	3	
		V_{GS}=4.5V, I_D=20A			2.2	3.5	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A			100		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V			0.7	1	V
I_S	Maximum Body-Diode Continuous Current [G]					120	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, f=1MHz			3200		pF
C_{oss}	Output Capacitance				1600		pF
C_{rss}	Reverse Transfer Capacitance				75		pF
R_g	Gate resistance	f=1MHz		1	2	3.1	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=20A			46		nC
Q_g(4.5V)	Total Gate Charge				23		nC
Q_{gs}	Gate Source Charge				6.2		nC
Q_{gd}	Gate Drain Charge				6.5		nC
Q_{oss}	Output Charge	V_{GS}=0V, V_{DS}=20V			28		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=20V, R_L=1Ω, R_{GEN}=3Ω			12.5		ns
t_r	Turn-On Rise Time				9.5		ns
$t_{D(off)}$	Turn-Off DelayTime				57.5		ns
t_f	Turn-Off Fall Time				10.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, di/dt=500A/µs			20		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, di/dt=500A/µs			60		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The Power dissipation P_{DSM} is based on R $_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Single pulse width limited by junction temperature $T_{J(MAX)}$=150° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.
G. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.
I. The maximum current rating is silicon limited

Ordering Information

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship,Quantity	Green
BSC027N04LSGATMA1-JSM	DFN5060-8L	022N04QGL/5	-55 to 150°C	1	T&R,5000	Rohs

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

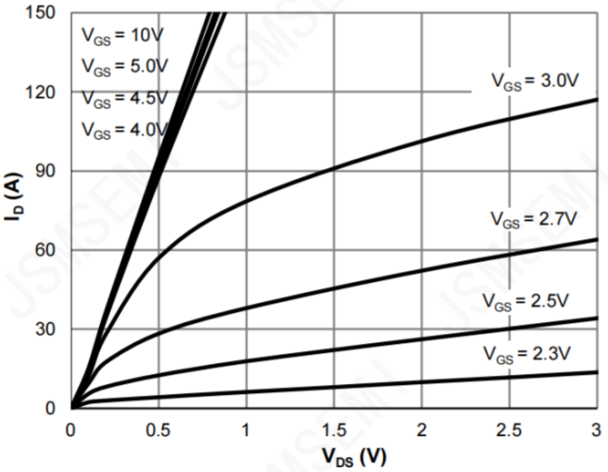


Figure 1: Saturation Characteristics

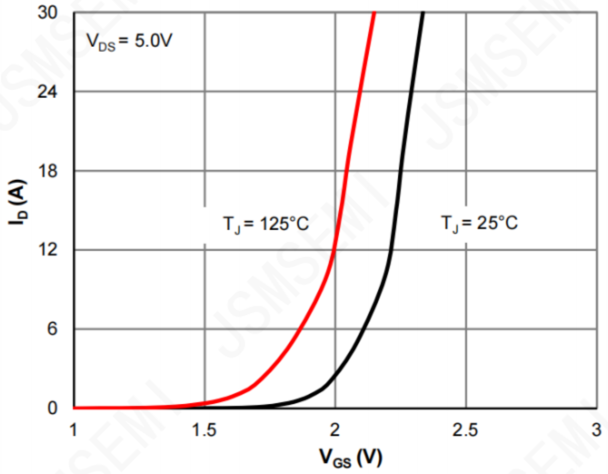


Figure 2: Transfer Characteristics

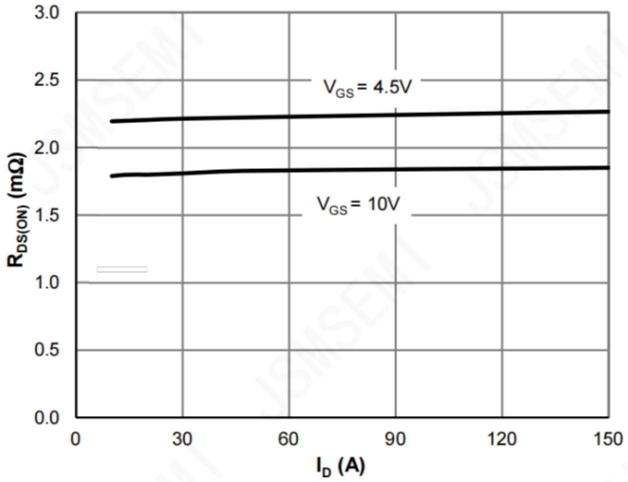


Figure 3: $R_{DS(ON)}$ vs. Drain Current

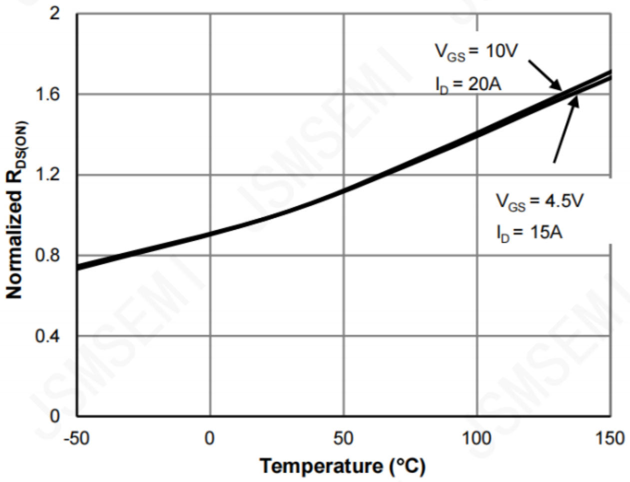


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

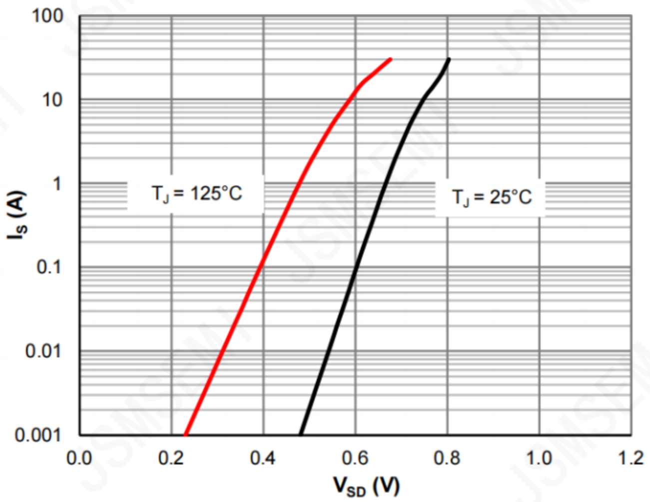


Figure 5: Body-Diode Characteristics

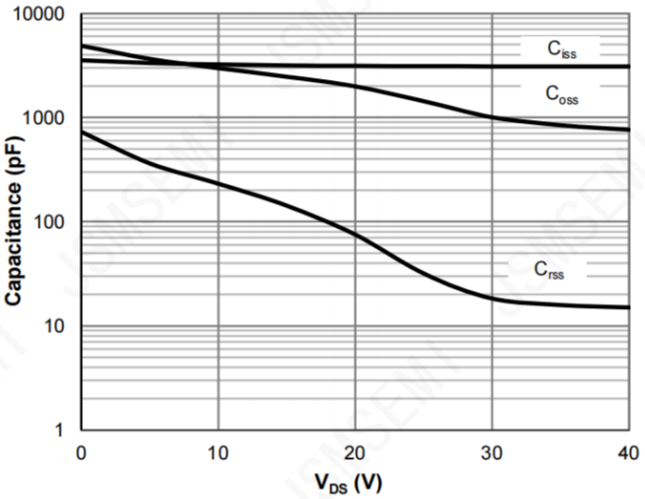


Figure 6: Capacitance Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

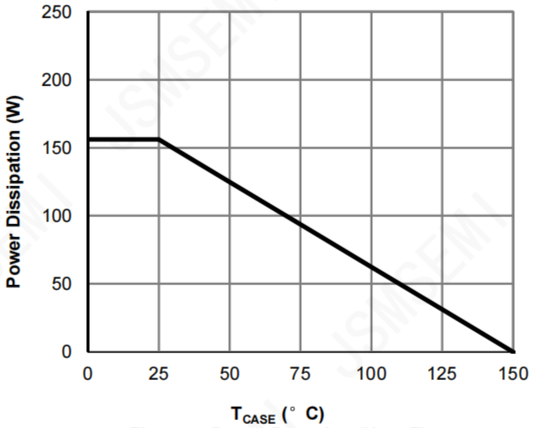


Figure 7: Power De-rating (Note F)

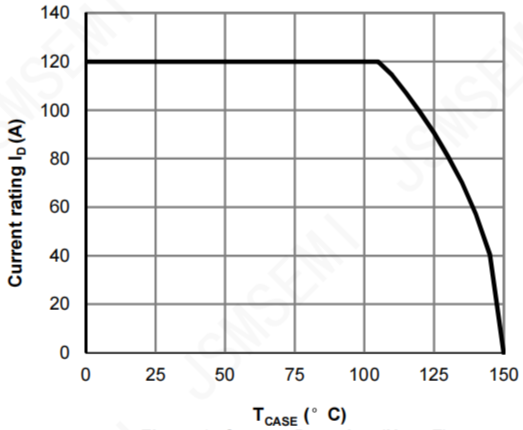


Figure 8: Current De-rating (Note F)

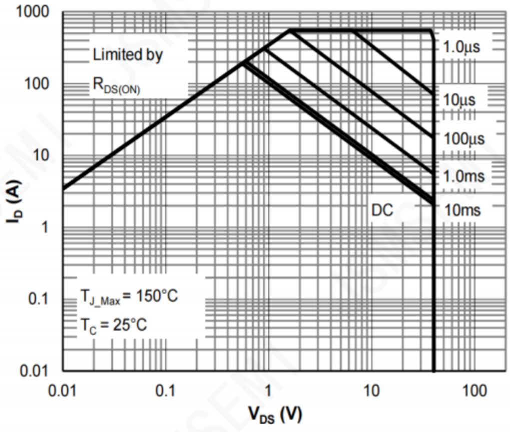


Figure 9: Maximum Safe Operating Area

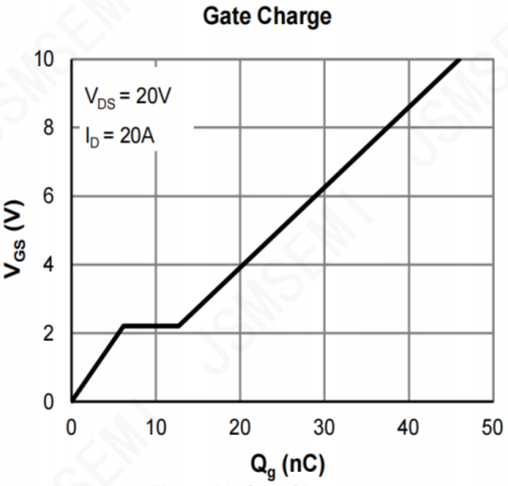


Figure 10: Gate Charge

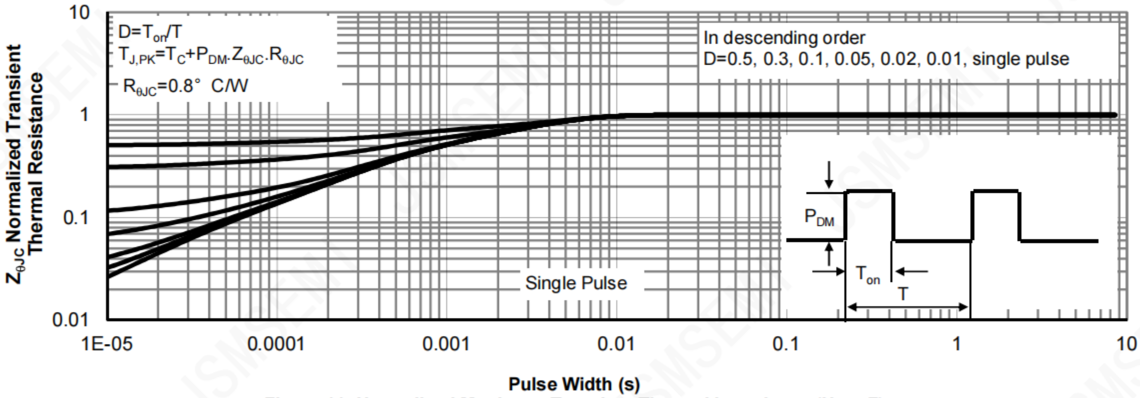


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Figure A: Gate Charge Test Circuit & Waveforms

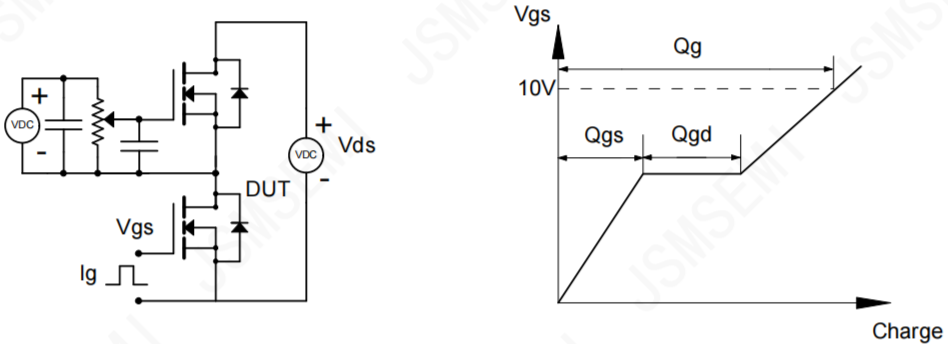


Figure B: Resistive Switching Test Circuit & Waveforms

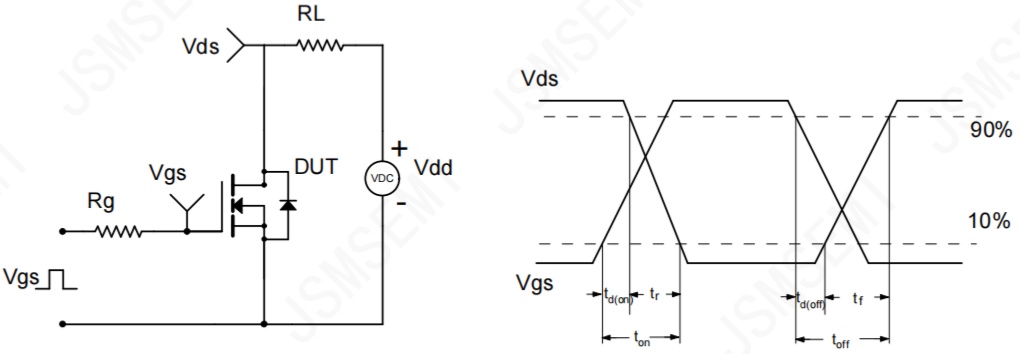


Figure C:nclamped Inductive Switching (UIS) Test Circuit & Waveforms

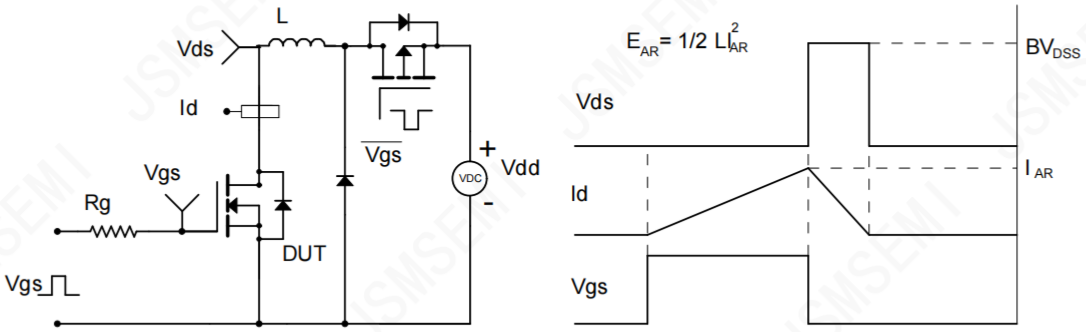
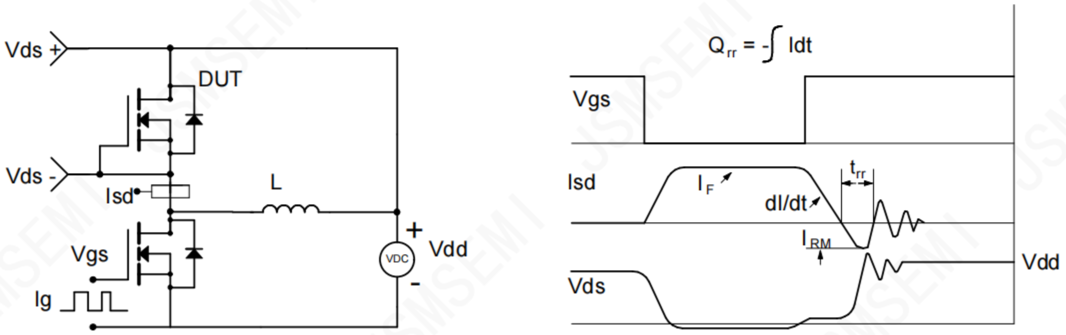
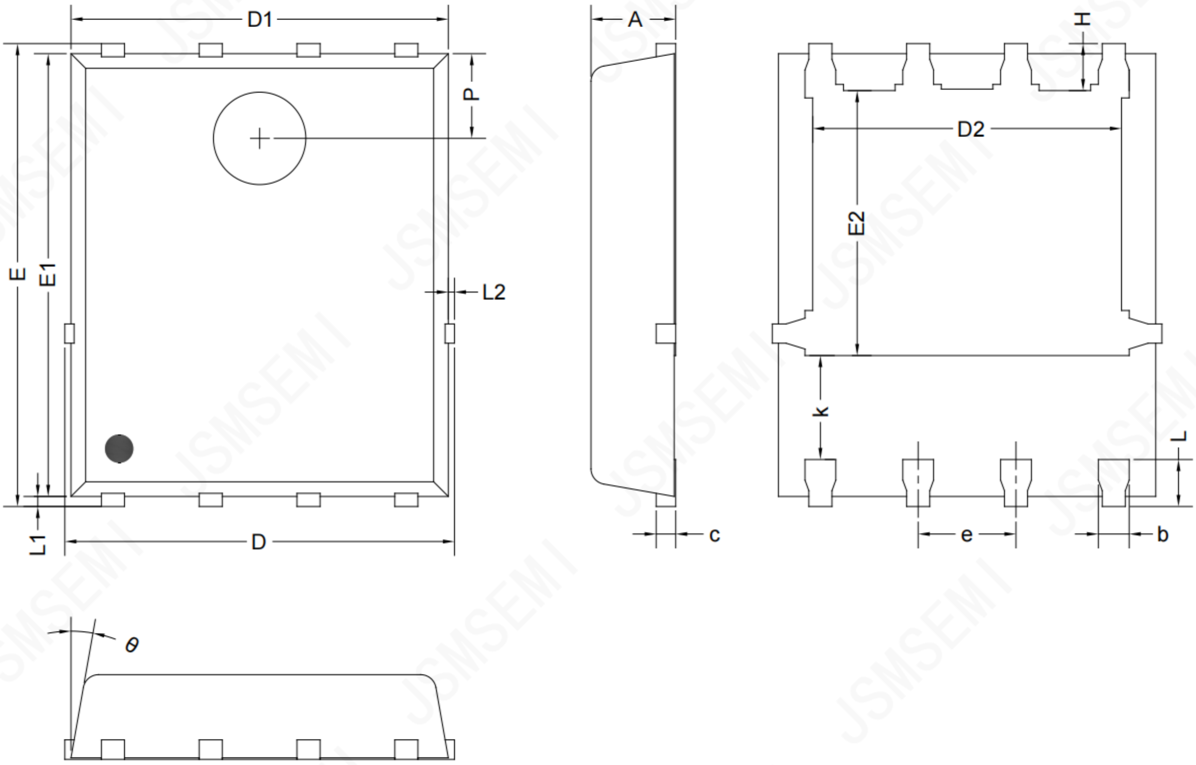


Figure D: Diode Recovery Test Circuit & Waveforms



Package Information

PDFN5060-8L



Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.000	1.100	1.200
b	0.350	0.400	0.450
c	0.210	0.250	0.340
D	4.800	-	5.100
D1	4.800	4.900	5.000
D2	3.910	4.010	4.110
E	5.900	6.000	6.100
E1	5.700	5.750	5.800
E2	3.340	3.440	3.540
e	1.270 BSC		
H	0.510	0.610	0.710
k	1.100	-	-
L	0.510	0.610	0.710
L1	0.060	0.130	0.200
L2	-	-	0.100
P	1.000	1.100	1.200
θ	8°	10°	12°

NOTE: This drawing is subject to change without notice.