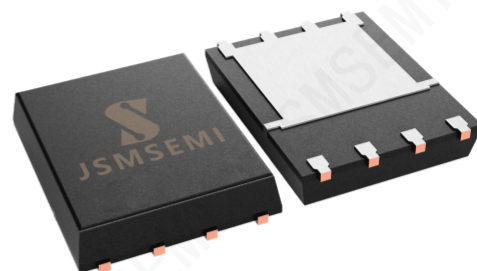


Product Summary

- V_{DS} 60V
- I_D 102A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<3.9m\Omega$
- 100% EAS Tested
- 100% ∇V_{DS} Tested

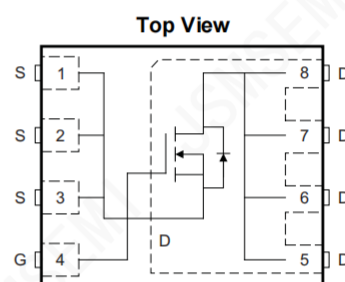


General Description

- 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
- Motor drivers



■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	60	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_C=25^\circ\text{C}$	I_D	102	A
	$T_C=100^\circ\text{C}$		60	
Pulsed Drain Current ^A		I_{DM}	408	A
Avalanche energy ^B		EAS	625	mJ
Total Power Dissipation ^C	$T_C=25^\circ\text{C}$	P_D	87	W
	$T_C=100^\circ\text{C}$		40	
Junction and Storage Temperature Range		T_J, T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient ^D	Steady-State	$R_{\theta JA}$		50	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$		1.5	

Ordering Information

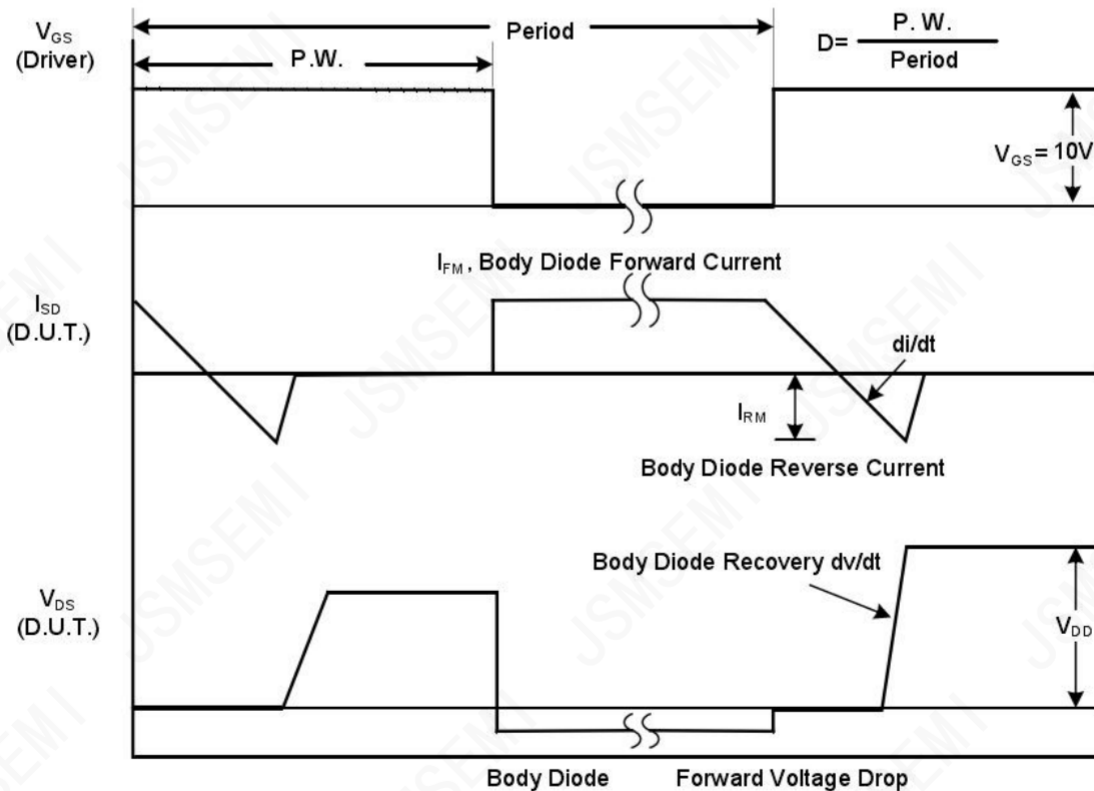
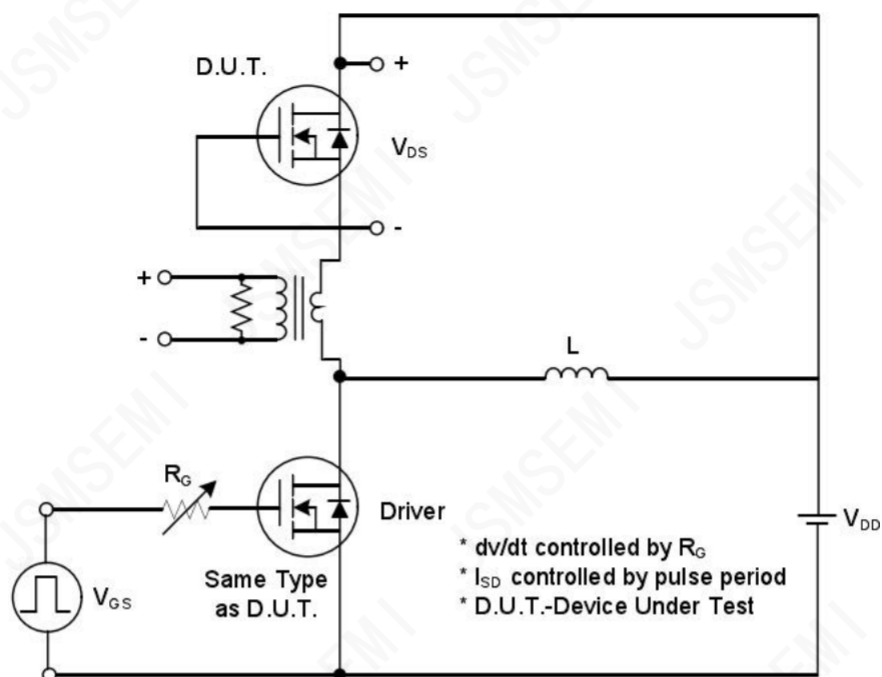
Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
BSC039N06NSATMA1-JSM	DFN5060-8L	030N06QGL	-55 to 150°C	1	T&R, 5000	RoHS

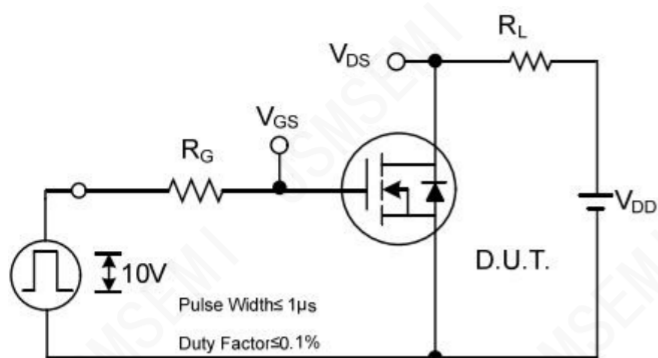
■ Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics ⁽⁶⁾						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60V, V _{GS} = 0V	-	-	1.0	μA
		T _J = 125°C	-	-	100	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
On Characteristics ⁽⁶⁾						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 250μA	2.0	3.0	4.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A	-	3.3	3.9	mΩ
Forward Transconductance	g _{fs}	V _{DS} = 5.0V, I _D = 20A	-	110	-	S
Diodes Forward Voltage	V _{SD}	I _S = 2.0A, V _{GS} = 0V	-	0.7	1.2	V
Dynamic Characteristics ⁽⁷⁾						
Input Capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V, f = 300KHz	-	5790	-	pF
Output Capacitance	C _{oss}		-	1750	-	pF
Reverse Transfer Capacitance	C _{rss}		-	60	-	pF
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	1.5	-	Ω
Switching Characteristics ⁽⁷⁾						
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 30V I _D = 20A, R _{GEN} = 5.0Ω	-	6.5	-	ns
Rise Time	t _r		-	8	-	ns
Turn-Off DelayTime	t _{d(off)}		-	38	-	ns
Fall Time	t _f		-	13	-	ns
Gate Charge Characteristics ⁽⁷⁾						
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} = 30V, I _D = 20A V _{GS} = 10V	-	85	-	nC
Total Gate Charge (V _{GS} = 6.0V)	Q _g		-	97	-	nC
Gate-Source Charge	Q _{gs}		-	25	-	nC
Gate-Drain Charge	Q _{gd}		-	15	-	nC
Gate Plateau Voltage	V _{plateau}		-	3.0	-	V
Drain-Source Diode Characteristics ⁽⁷⁾						
Body Diode Reverse Recovery Time	t _{rr}	I _F = 1A, dI/dt = 100A/μs,	-	39	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}	T _J = 25°C	-	45	-	nC
Diode Forward Current	I _S	T _C = 25°C	-	-	102	A

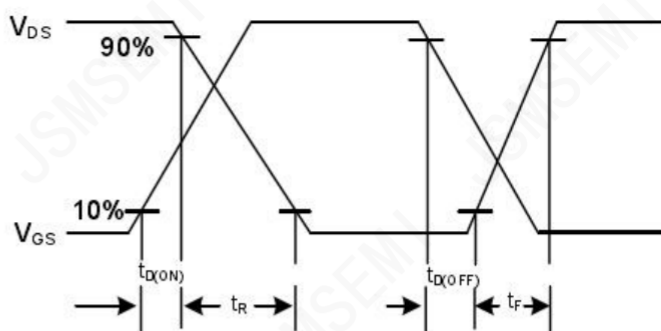
Notes:

1. This current is chip limited, which is calculated based on R_{thjc} .
2. This current is calculated on single pulse with $10\mu s$ Single Pulse.
3. Defined by design, not subject to production test, E_{AS} condition: $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_{GS}=10V, L=1.0mH$.
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed drain pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

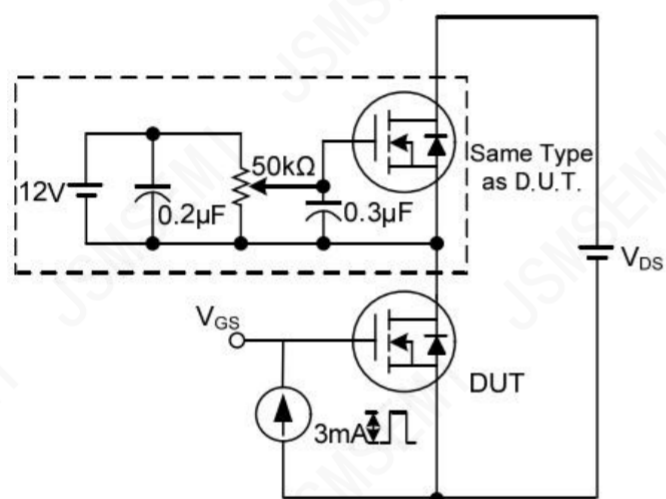




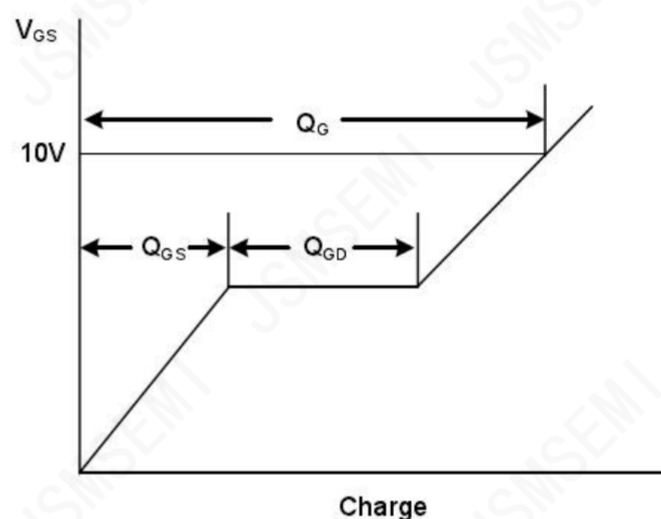
Switching Test Circuit



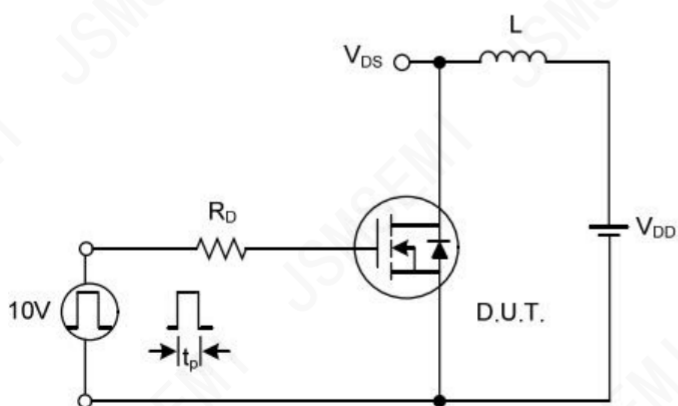
Switching Waveforms



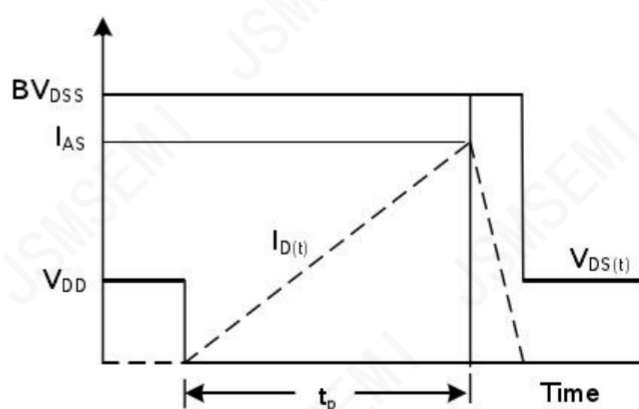
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Typical Electrical and Thermal Characteristics Diagrams

Figure 1: Output Characteristics

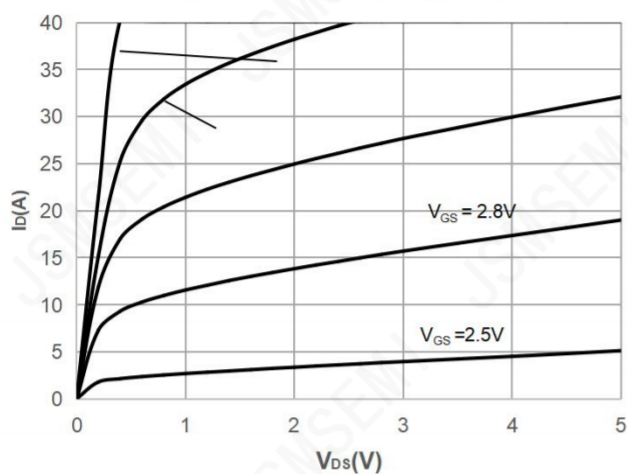


Figure 2: Typical Transfer Characteristics

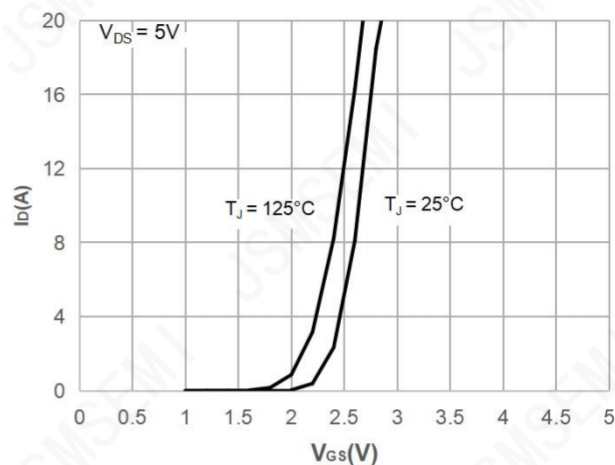


Figure 3: On-resistance vs. Drain Current

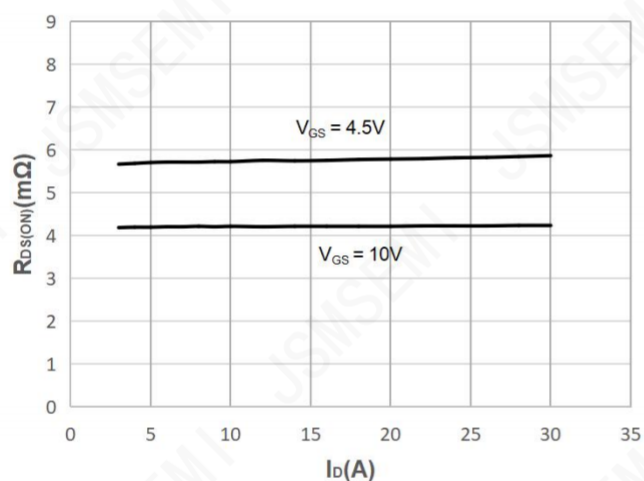


Figure 4: Body Diode Characteristics

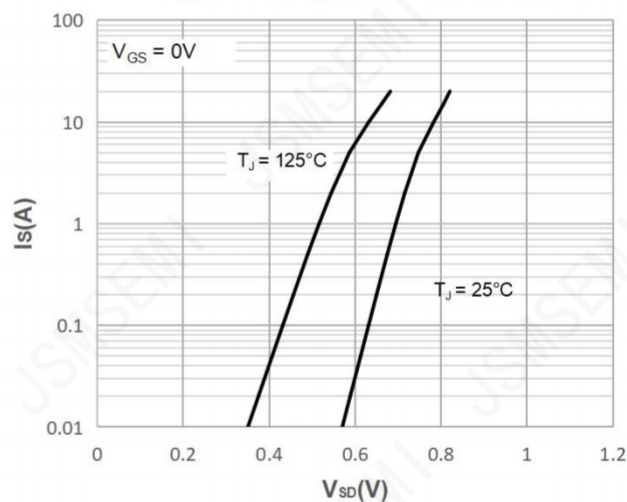


Figure 5: Gate Charge Characteristics

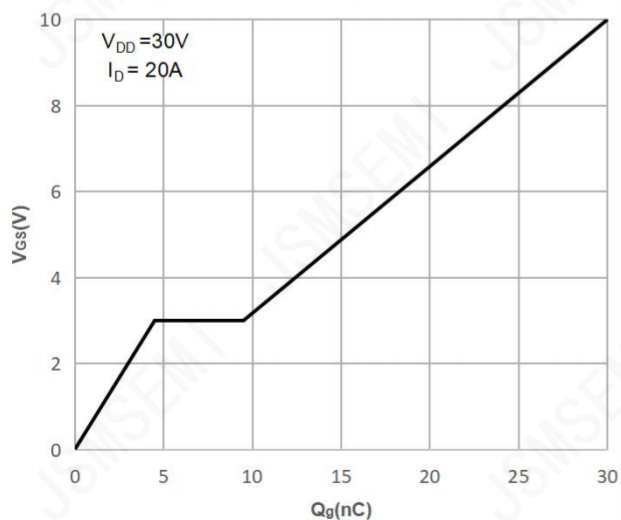


Figure 6: Capacitance Characteristics

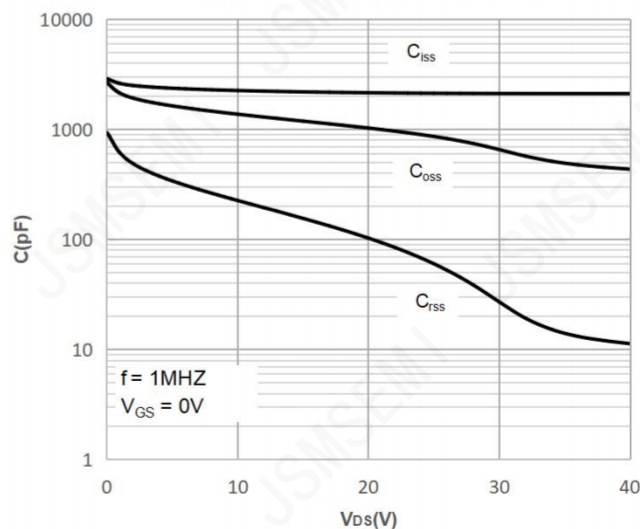
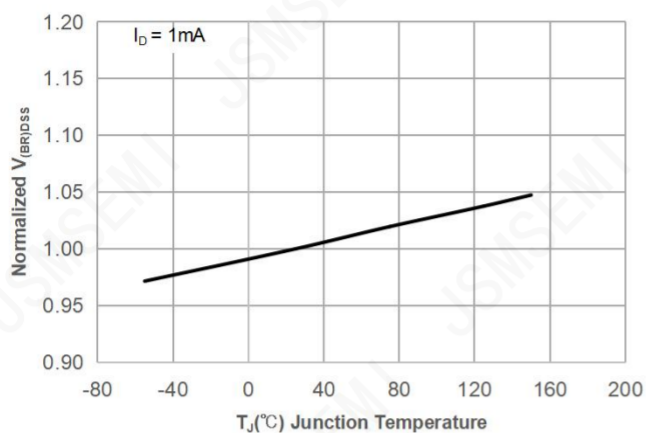
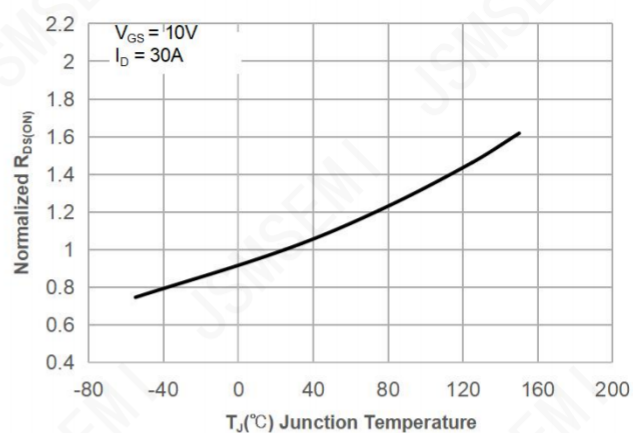
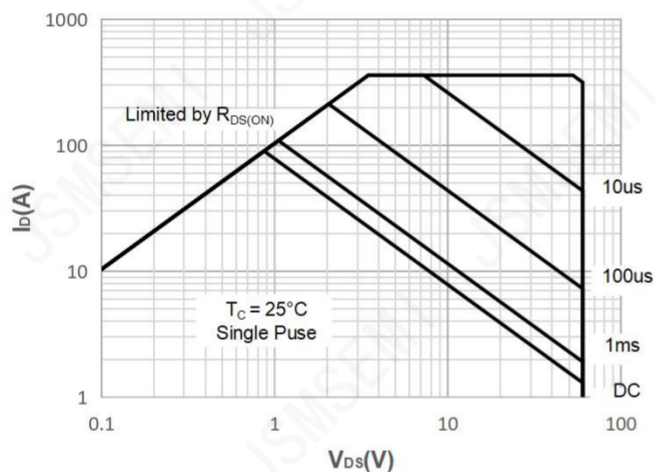
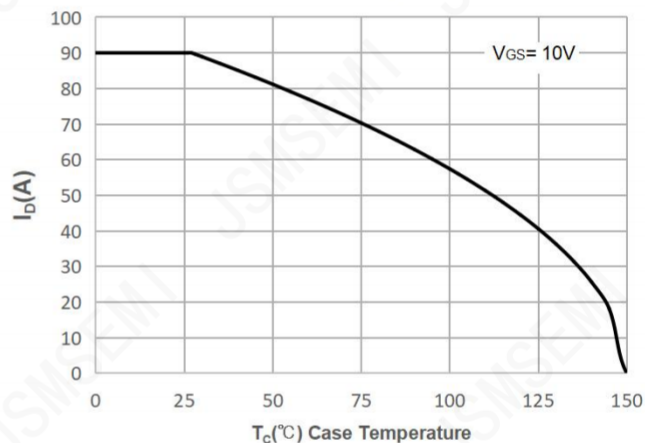
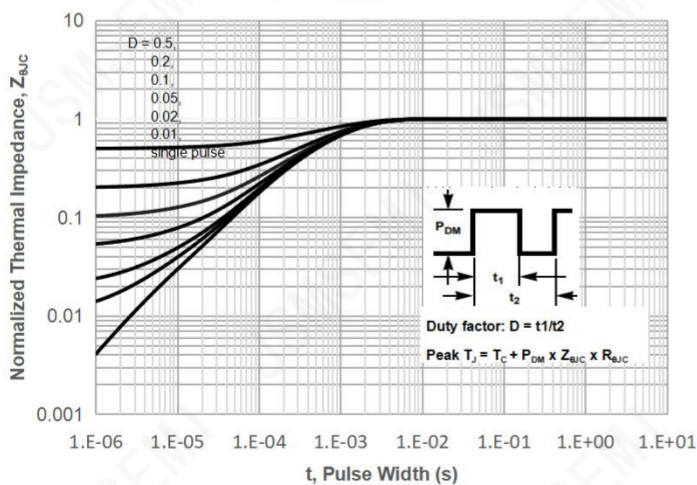
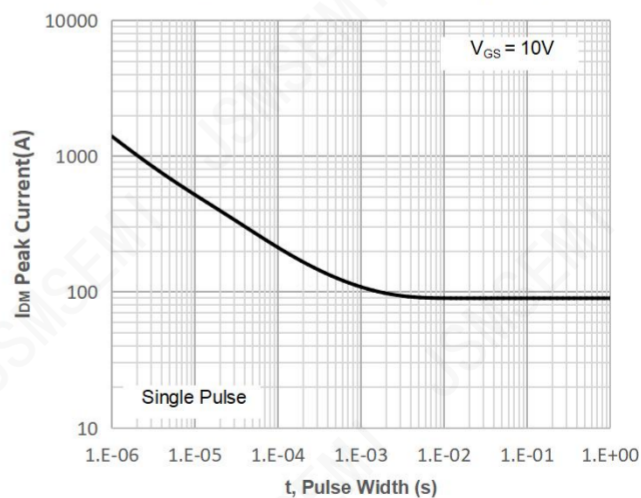
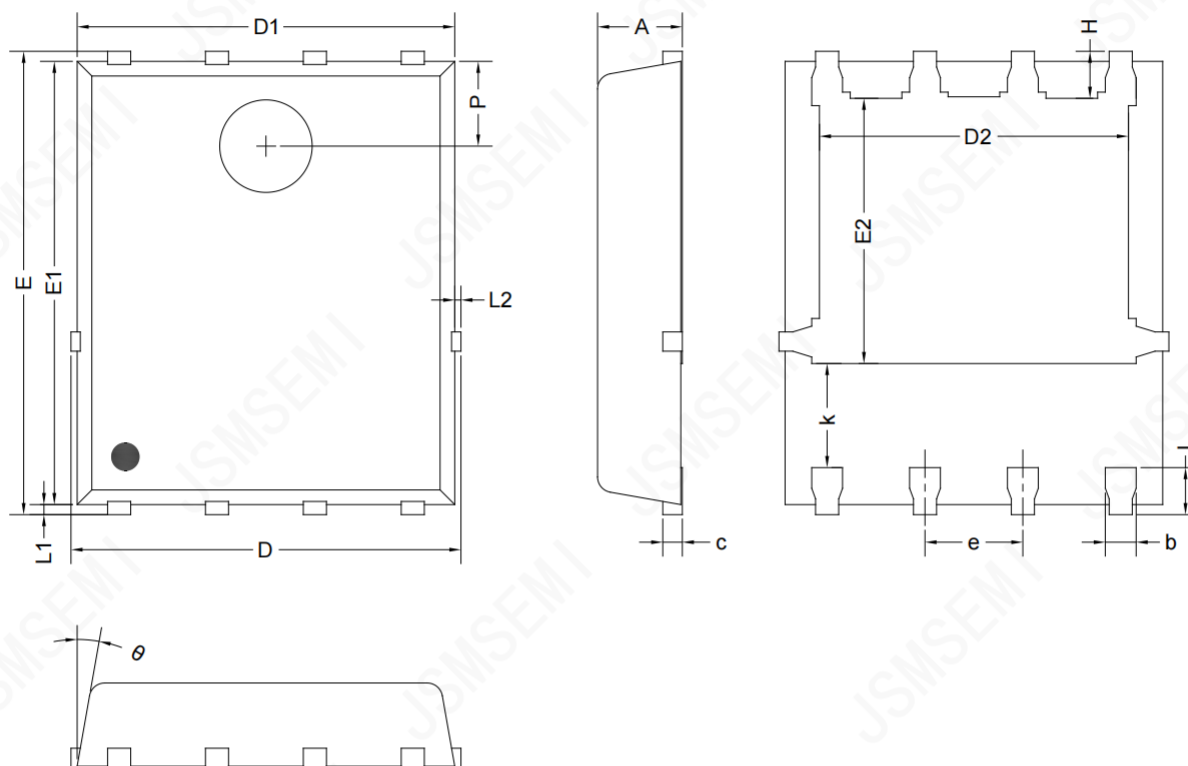


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

Figure 8: Normalized on Resistance vs. Junction Temperature

Figure 9: Maximum Safe Operating Area

Figure 10: Maximum Continuous Driant Current vs. Case Temperature

Figure 11: Normalized Maximum Transient Thermal Impedance

Figure 12: Peak Current Capacity


Package Information

DFN5060-8L



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.

Revision History

Rev.	Change	Date
V1.0	Initial version	4/27/2020

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