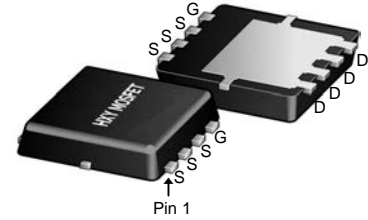




General Description

The BSC039N06NS use advanced SGT MOSFET technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable to use in



DFN5X6-8L

General Features

$V_{DS} = 60V$ $I_D = 125A$

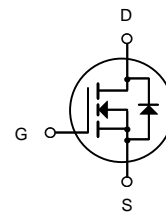
$R_{DS(ON)} < 2.9m\Omega @ V_{GS} = 10V$

Applications

Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
BSC039N06NS	DFN5X6-8L	039N06NS XXXX	5000

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	125	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	101	A
I_{DM}	Pulsed Drain Current ²	641	A
EAS	Single Pulse Avalanche Energy ³	189	mJ
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	113	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JC}$	Thermal Resistance from Junction-to-Ambient ³	1.11	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	39.4	$^\circ C/W$



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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V,$	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=10V, I_D=20A$	-	2.4	2.9	m Ω
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V,$ $f=1.0MHz$	-	4610	6915	pF
C_{oss}	Output Capacitance		-	2188	3282	pF
C_{rss}	Reverse Transfer Capacitance		-	66	132	pF
Q_g	Total Gate Charge	$V_{DS}=30V, I_D=40A,$ $V_{GS}=10V$	-	74.37	111.56	nC
Q_{gs}	Gate-Source Charge		-	17.26	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	9.44	18.88	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=30V, I_D=40A,$ $R_G=2.7\Omega, V_{GS}=10V$	-	14.13	-	ns
t_r	Turn-on Rise Time		-	63.73	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	46.8	-	ns
t_f	Turn-off Fall Time		-	105.07	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	125	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	641	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=40A$	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$T_J=25^\circ\text{C},$ $I_F=40A, di/dt=100A/\mu s$	-	52.78	105.56	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	56.31	112.62	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=12A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



Typical Characteristics

Fig 1: Output Characteristics

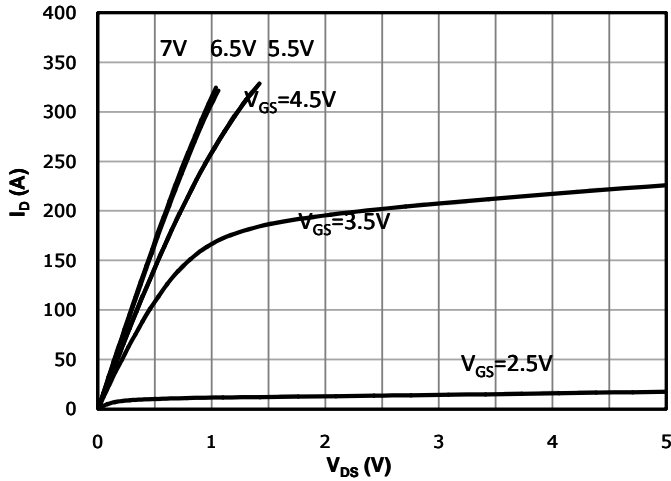


Fig 2: Transfer Characteristics

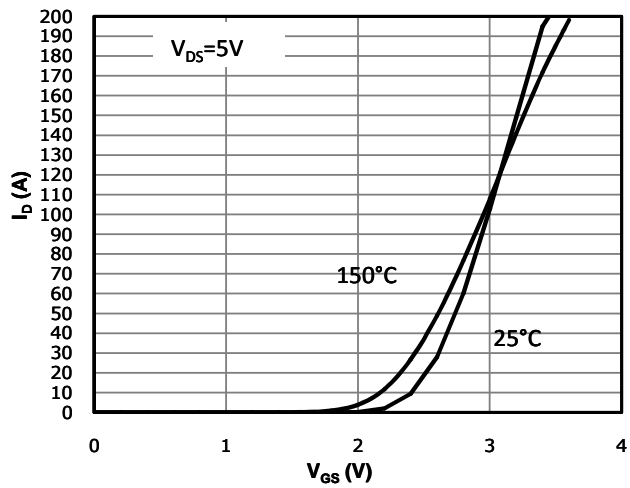


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

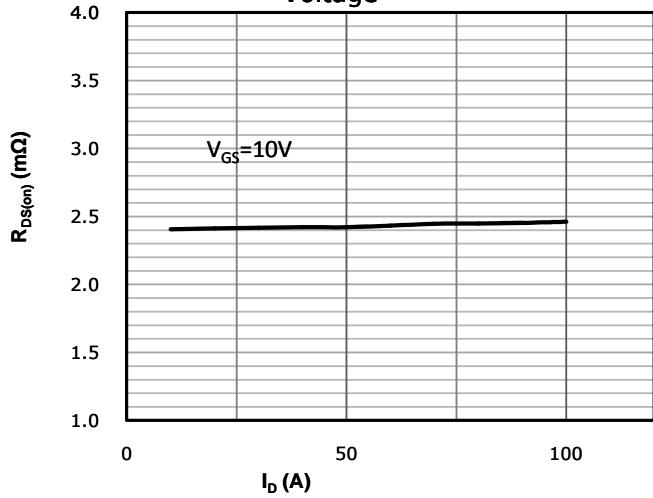


Fig 4: $R_{DS(on)}$ vs Gate Voltage

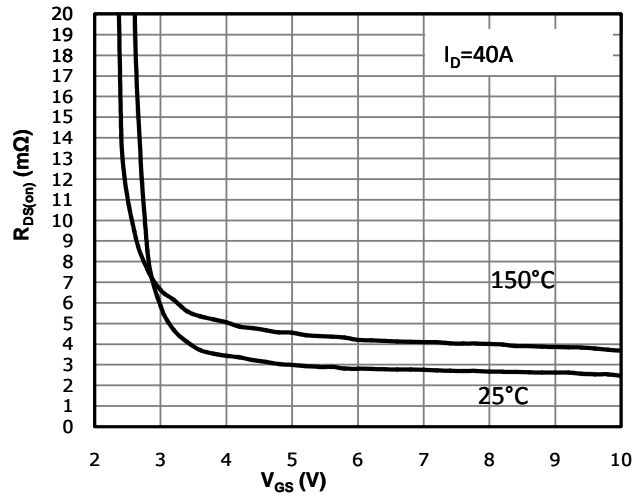


Fig 5: $R_{DS(on)}$ vs. Temperature

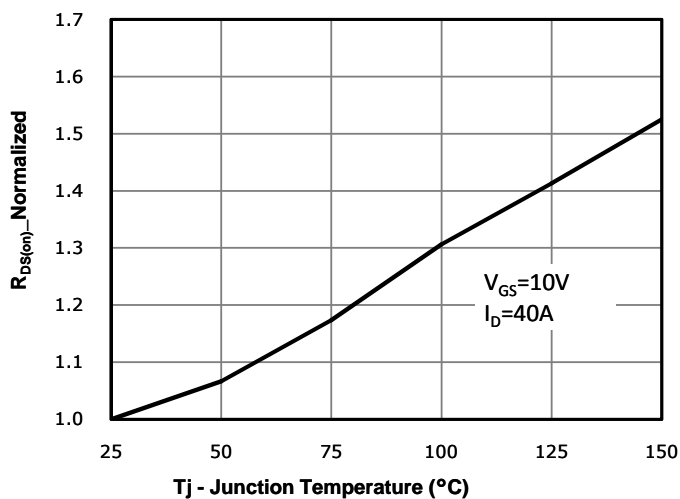


Fig 6: Capacitance Characteristics

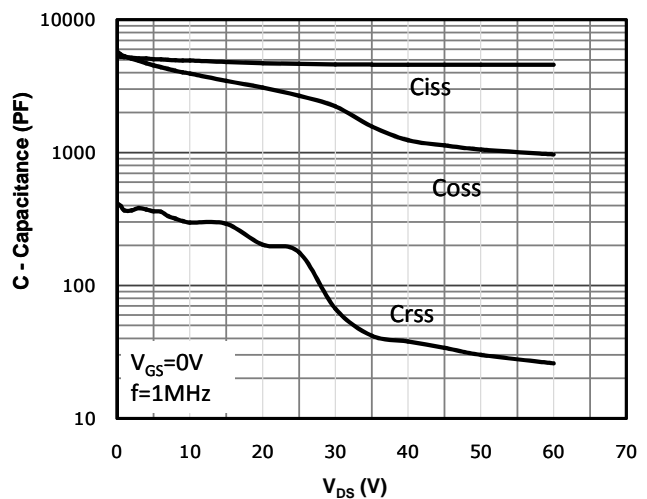




Fig 7: Gate Charge Characteristics

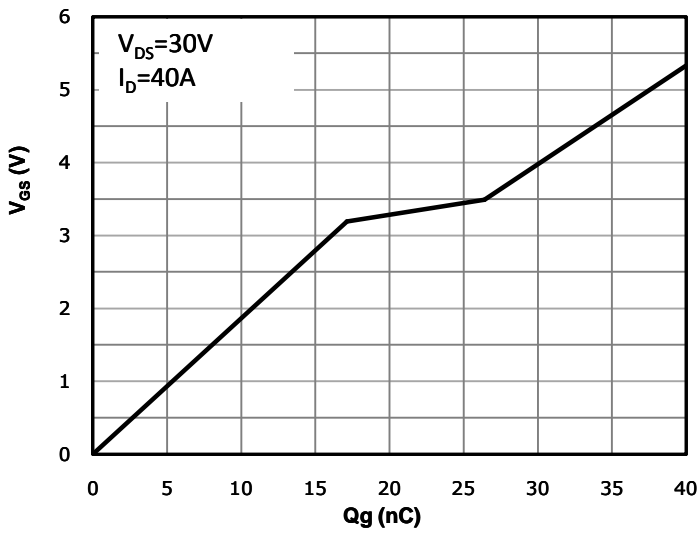


Fig 8: Body-diode Forward Characteristics

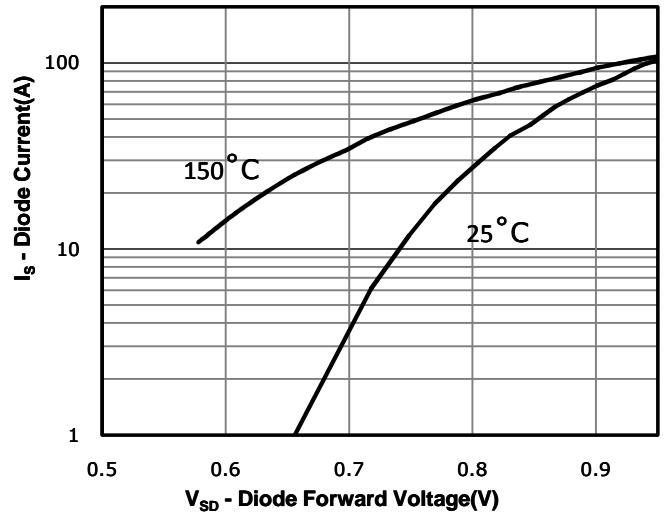


Fig 9: Power Dissipation

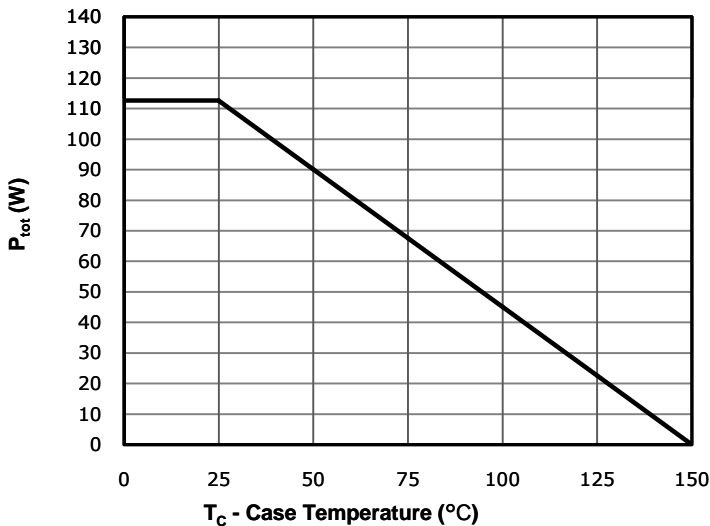


Fig 10: Drain Current Derating

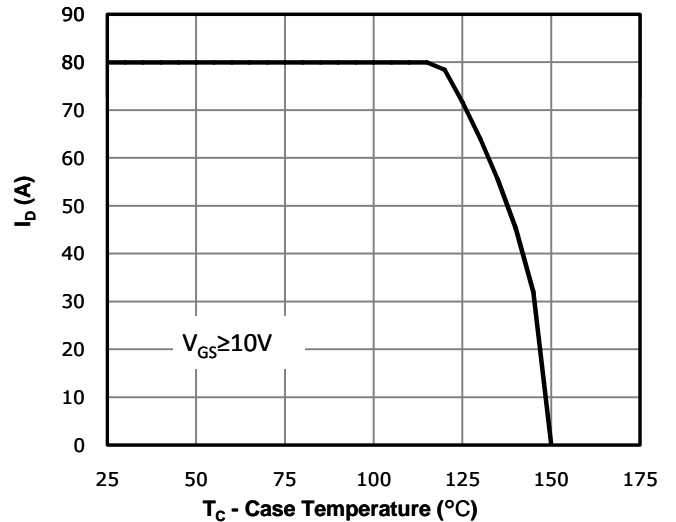


Fig 11: Safe Operating Area

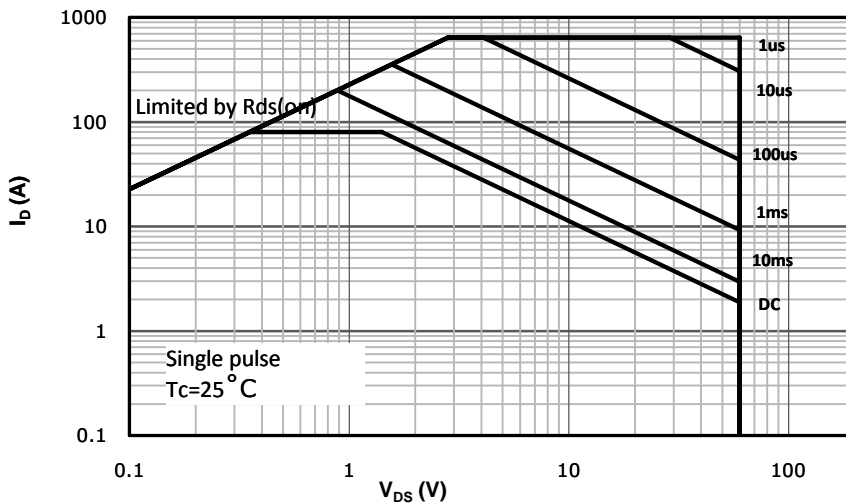
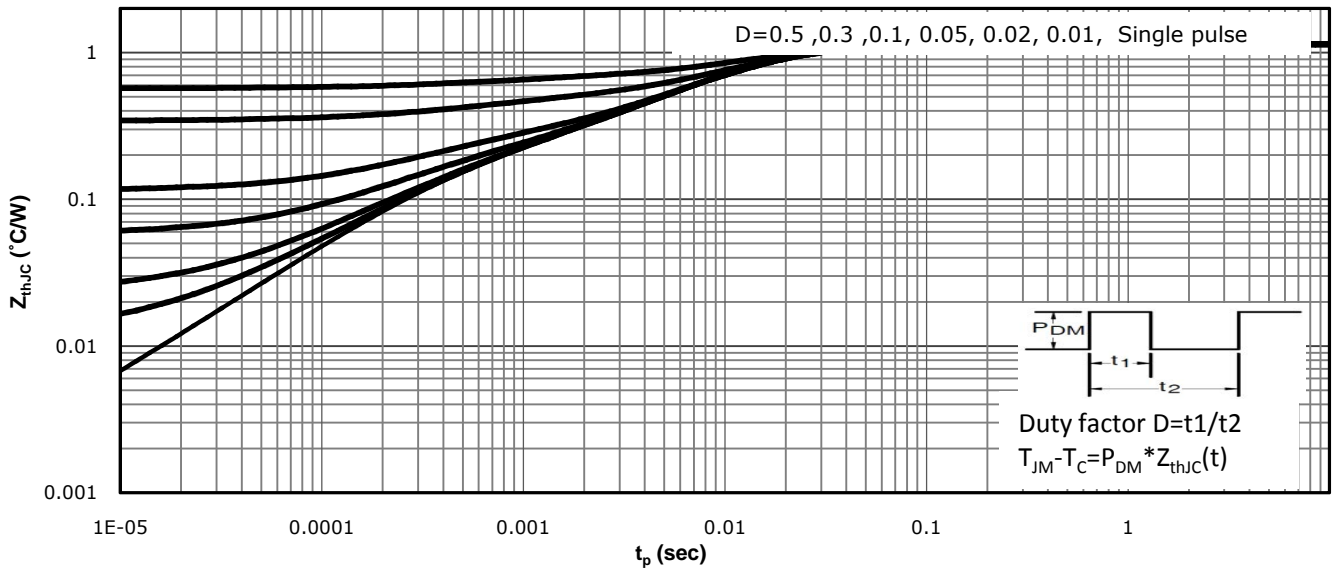


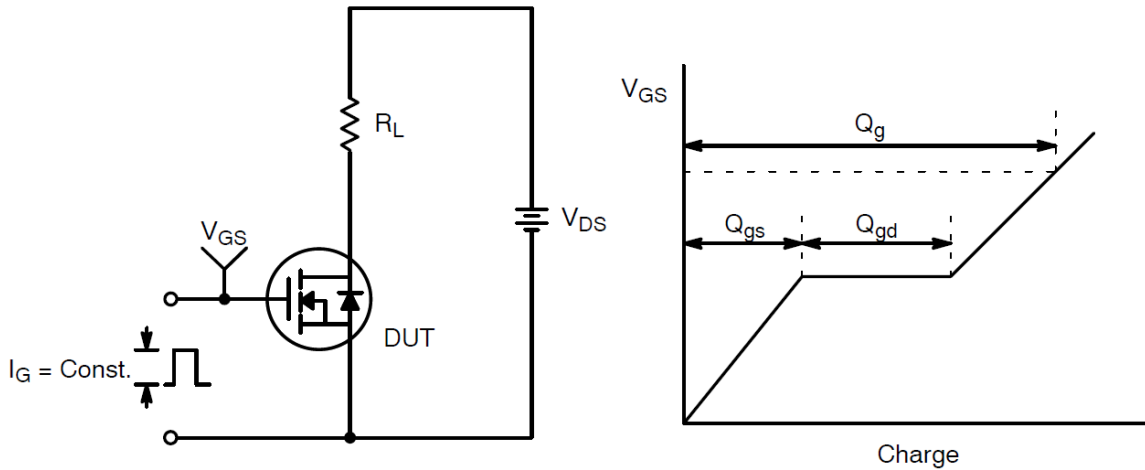


Fig 12: Max. Transient Thermal Impedance

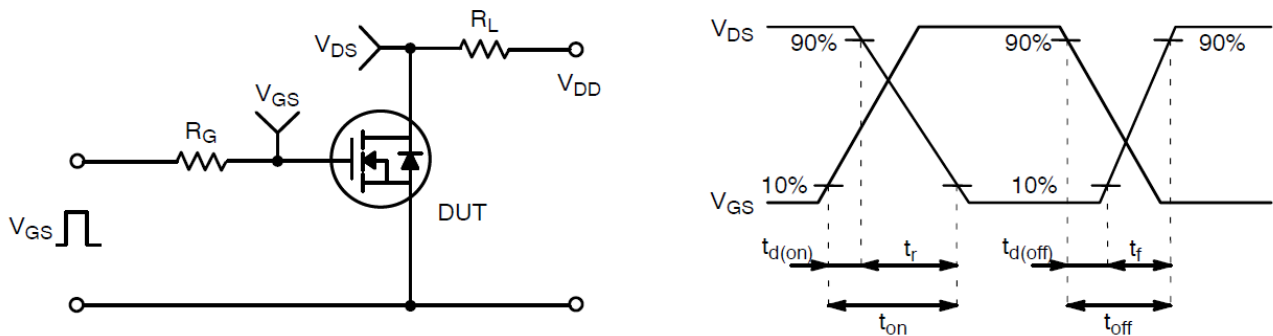




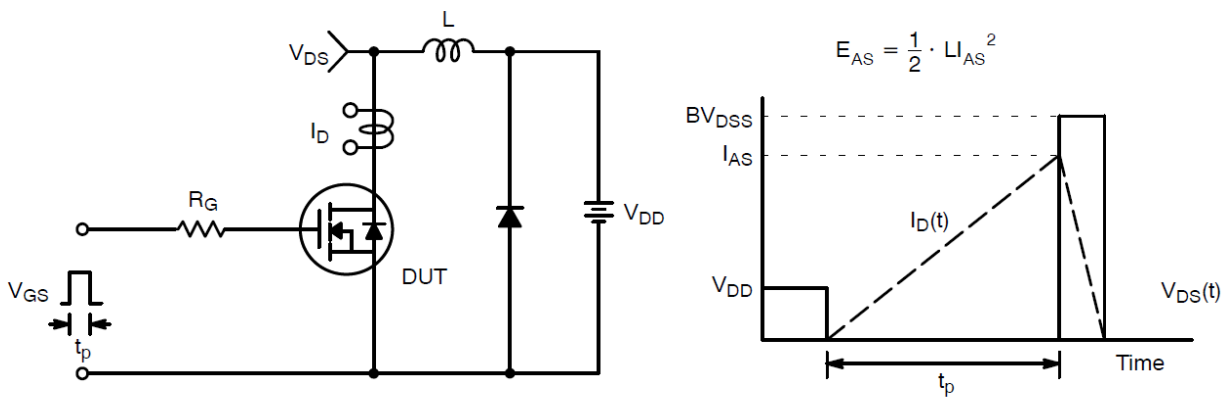
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform



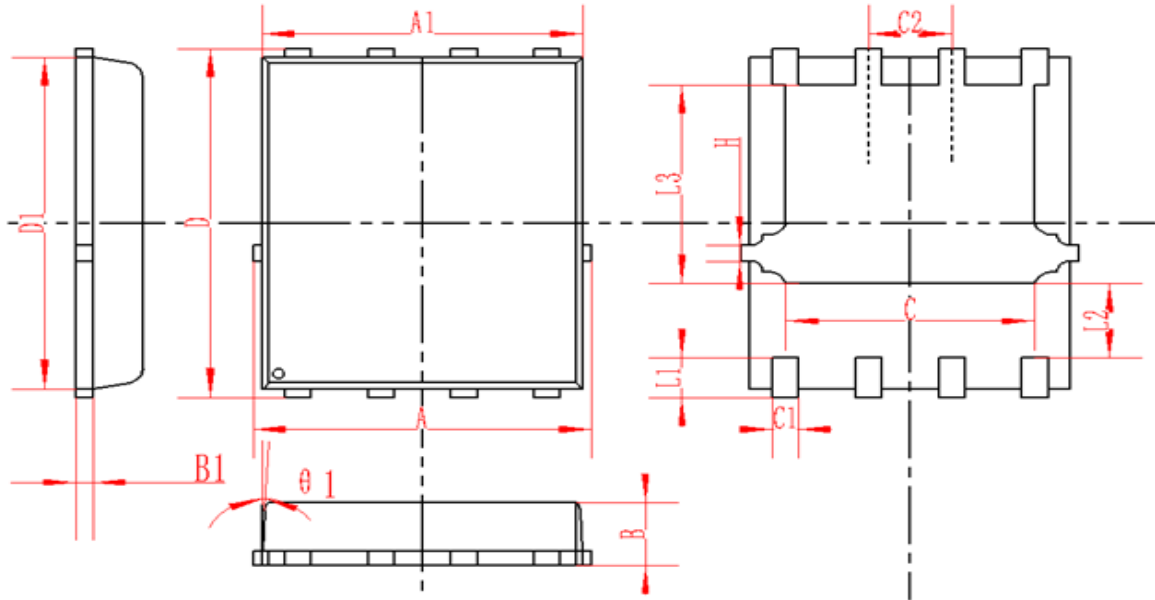
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



DFN5X6-8L Package Information



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.95	5	5.05	0.195	0.197	0.199
A1	4.82	4.9	4.98	0.190	0.193	0.196
D	5.98	6	6.02	0.235	0.236	0.237
D1	5.67	5.75	5.83	0.223	0.226	0.230
B	0.9	0.95	1	0.035	0.037	0.039
B1	0.254REF			0.010REF		
C	3.95	4	4.05	0.156	0.157	0.159
C1	0.35	0.4	0.45	0.014	0.016	0.018
C2	1.27TYP			0.5TYP		
θ1	8°	10°	12°	8°	10°	12°
L1	0.63	0.64	0.65	0.025	0.025	0.026
L2	1.2	1.3	1.4	0.047	0.051	0.055
L3	3.415	3.42	3.425	0.134	0.135	0.135
H	0.24	0.25	0.26	0.009	0.010	0.010



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