



### Description

The BSC093N04LSG uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 40V$   $I_D = 60A$

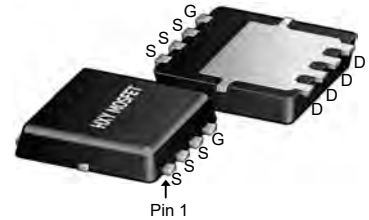
$R_{DS(ON)} < 8.5m\Omega @ V_{GS}=10V$

### Application

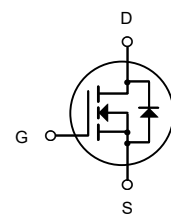
Battery protection

Load switch

Uninterruptible power supply



DFN5X6-8L



N-Channel MOSFET

### Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
BSC093N04LS	DFN5X6-8L	HXY MOSFET	5000

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	60	A
$I_D @ T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	35	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	105	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	48	mJ
$I_{AS}$	Avalanche Current	35	A
$P_D @ T_C=25^{\circ}C$	Total Power Dissipation <sup>4</sup>	39	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	62	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	3.2	$^{\circ}C/W$



**Electrical Characteristics (T =25 , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	40	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =10A	---	7	8.5	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =5A	---	10	15	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.7	3	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =32V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =32V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ± 20V , V <sub>DS</sub> =0V	---	---	± 100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V , I <sub>D</sub> =5A	---	27	---	S
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =20V , V <sub>GS</sub> =4.5V , I <sub>D</sub> =10A	---	20	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	5.8	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	9.5	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V , V <sub>GS</sub> =10V R <sub>G</sub> =3.3 Ω I <sub>D</sub> =1A	---	15.2	---	ns
T <sub>r</sub>	Rise Time		---	8.8	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	74	---	
T <sub>f</sub>	Fall Time		---	7	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	690	---	pF
C <sub>oss</sub>	Output Capacitance		---	193	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	38	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	70	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1	V

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=47A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



## Typical Characteristics

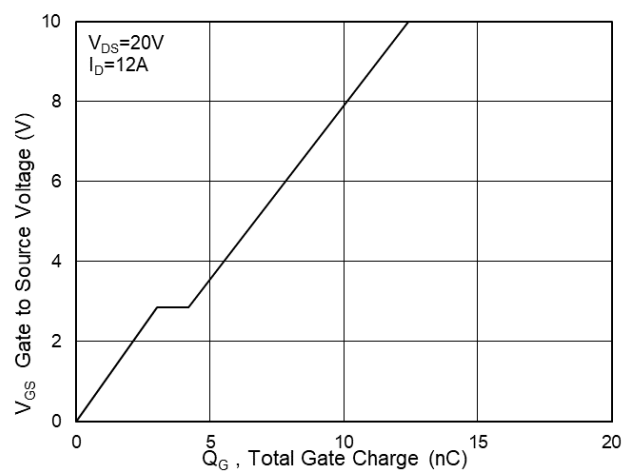
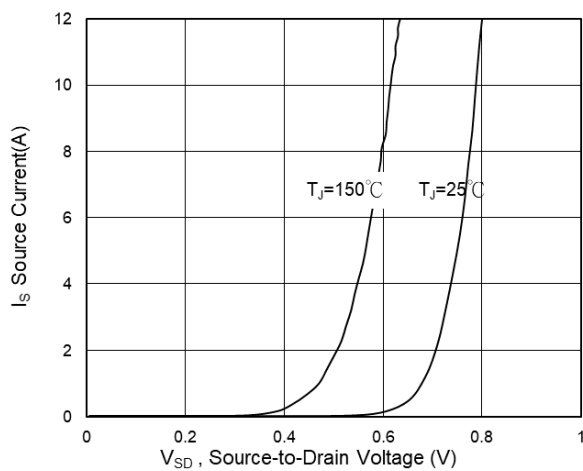
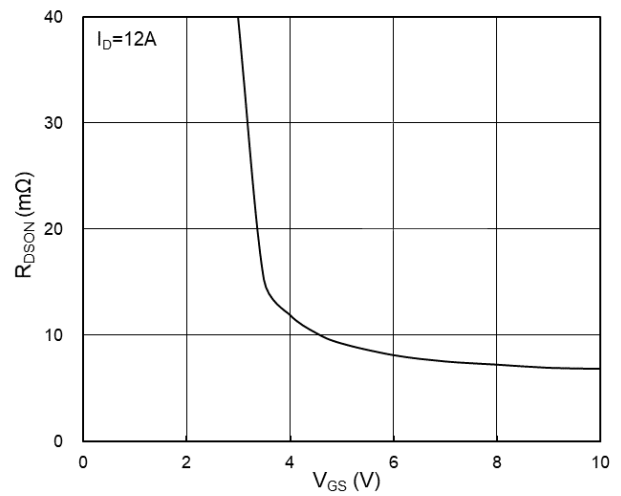
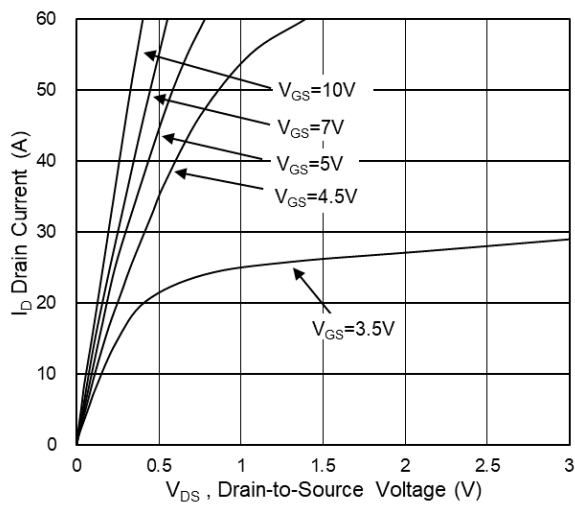
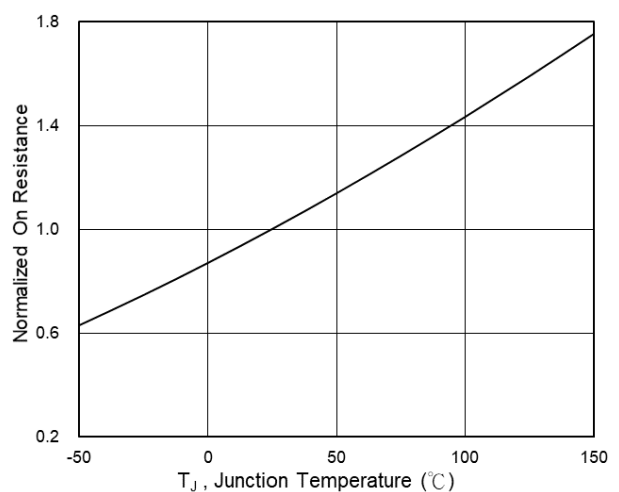
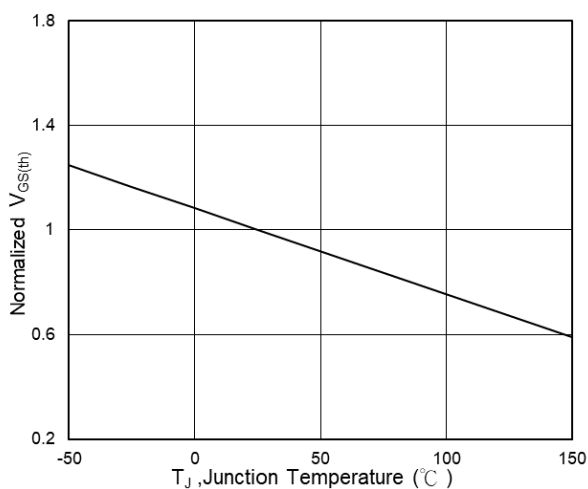
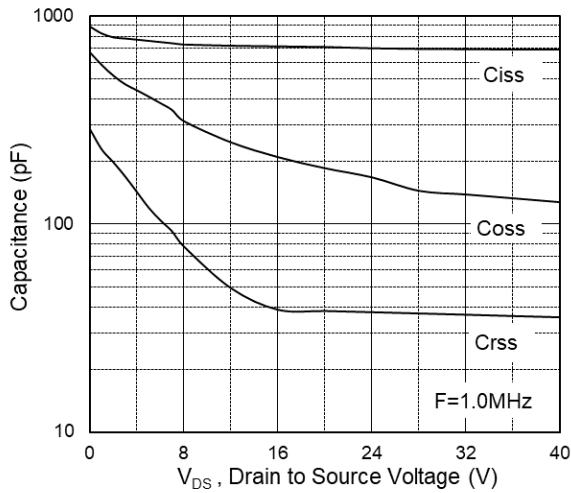


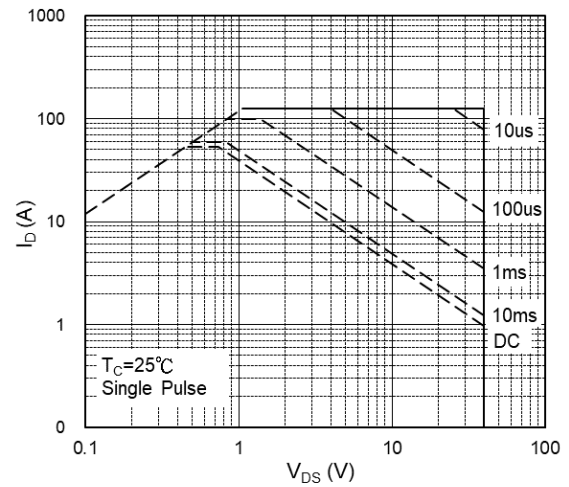
Fig.3 Source Drain Forward Characteristics

Fig.4 Gate-Charge Characteristics

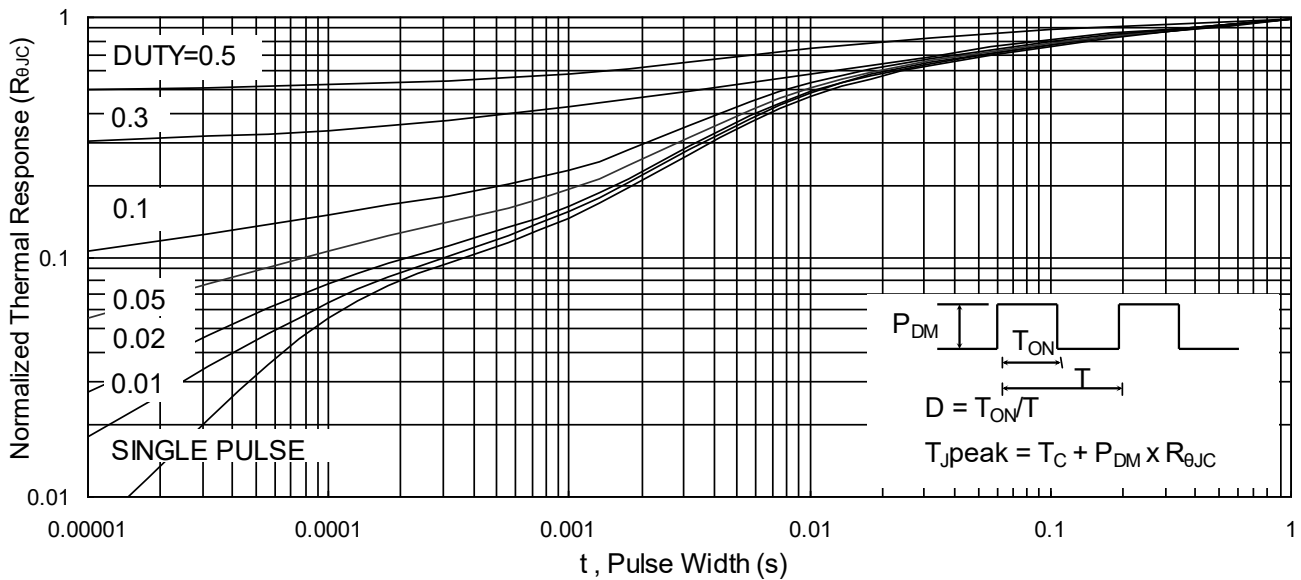




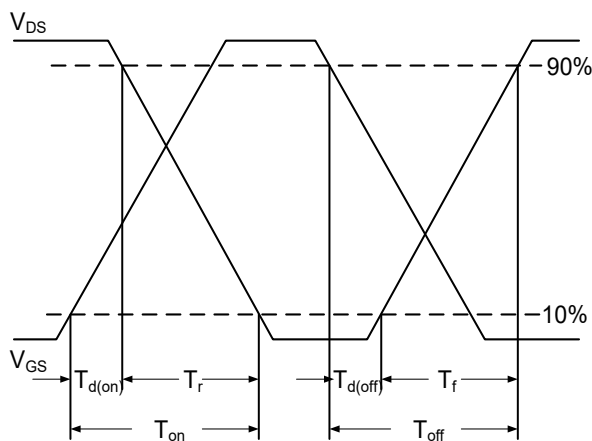
**Fig.7 Capacitance**



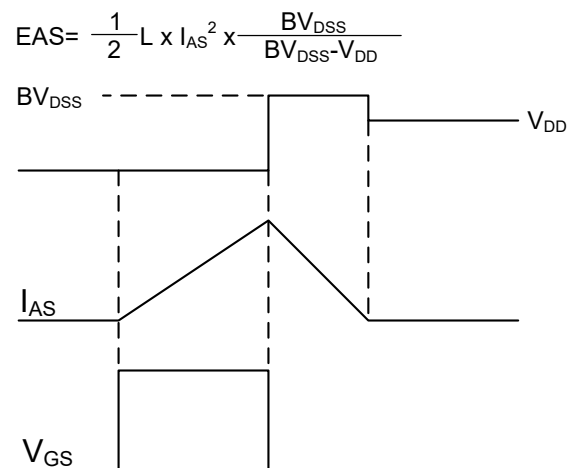
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



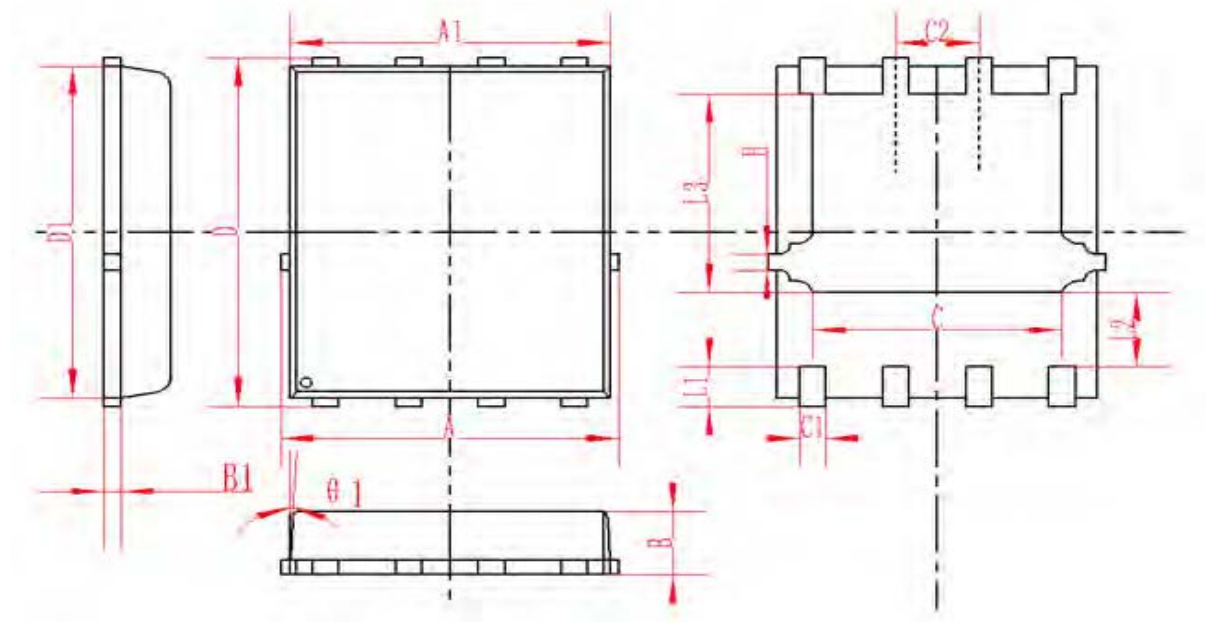
**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**



## 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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