



### Description

The BSC0504NSI 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

$V_{DS} = 30V$   $I_D = 120A$

$R_{DS(ON)} < 2.6m\Omega$   $V_{GS} = 10V$

### Application

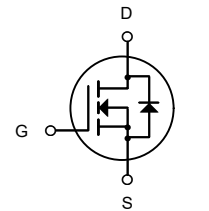
Battery protection

Load switch

Uninterruptible power supply



DFN5X6-8L



N-Channel MOSFET

### Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
BSC0504NSI	DFN5X6-8L	HXY MOSFET	5000

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	120	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	57	A
$I_{DM}$	Pulsed Drain Current	360	A
EAS	Single Pulse Avalanche Energy	125	mJ
$P_D$	Total Power Dissipation <sup>4</sup>	115	W
$T_{STG}$	Storage Temperature Range	-55 to 175	°C
$T_J$	Operating Junction Temperature Range	-55 to 175	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>2</sup>	1.3	°C/W



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	---	---	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V	---	---	1	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0A	---	---	±100	nA
<b>On Characteristics<sup>3</sup></b>						
V <sub>GS(th)</sub>	Gate-Source Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μ A	1	1.6	2.5	V
R <sub>DS(ON)</sub>	Drain-Source On Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	2.6	3.3	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	3.8	5	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	2218	---	pF
C <sub>oss</sub>	Output Capacitance		---	480	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	340	---	
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time <sup>3,4</sup>	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, R <sub>G</sub> =3.3Ω V <sub>GS</sub> =10V	---	12.6	---	ns
t <sub>r</sub>	Rise Time <sup>3,4</sup>		---	19.5	---	ns
t <sub>d(off)</sub>	Turn-Off Delay Time <sup>3,4</sup>		---	42.8	---	ns
t <sub>f</sub>	Fall Time <sup>3,4</sup>		---	13.2	---	ns
Q <sub>g</sub>	Total Gate Charge <sup>3,4</sup>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A	---	24	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3,4</sup>		---	4.2	---	nC
Q <sub>gd</sub>	Gate-Drain "Miller" Charge <sup>3,4</sup>		---	13	---	nC
<b>Drain-Source Diode Characteristics</b>						
V <sub>SD</sub>	Source-Drain Diode Forward Voltage <sup>3</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1	V
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	120	A
I <sub>SM</sub>	Pulsed Source Current		---	---	360	A
T <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =30V, I <sub>S</sub> =1A, di/dt=100A/μs	---	258	---	NS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	324	---	NC

**Notes:**

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=50A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



### Typical Characteristics

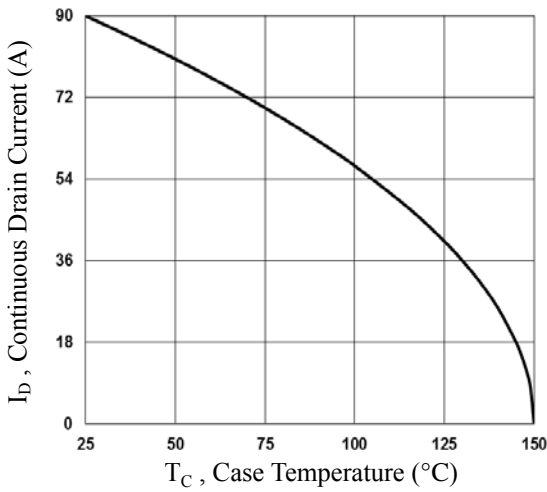


Fig.1 Continuous Drain Current vs.  $T_C$

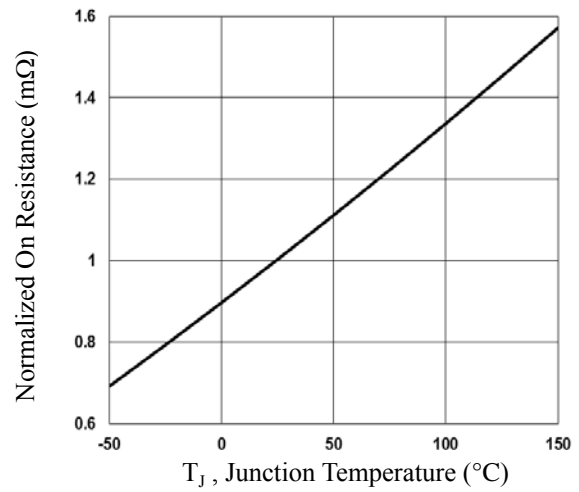


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

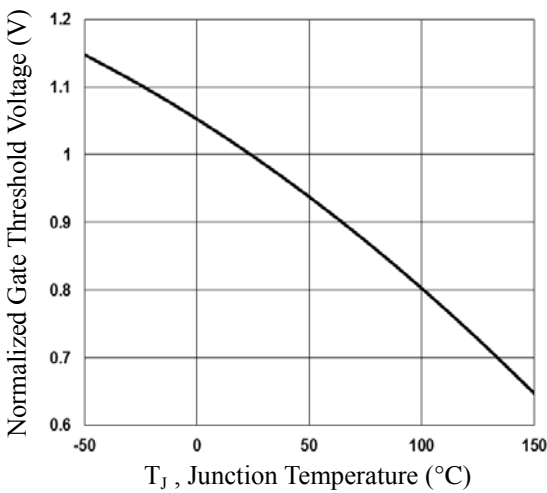


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

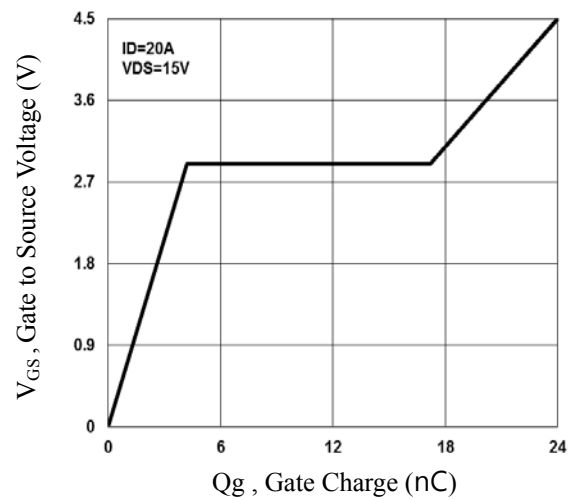


Fig.4 Gate Charge Waveform

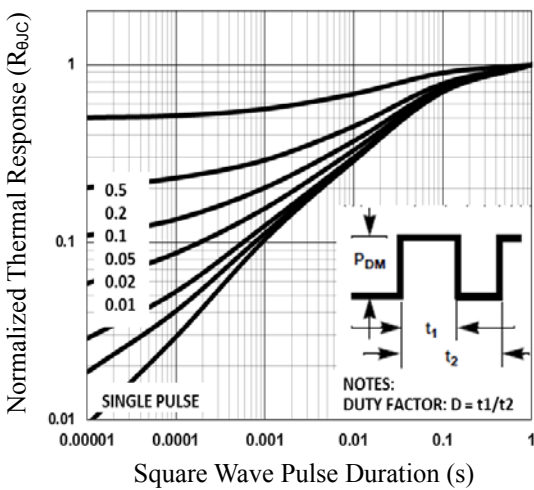


Fig.5 Normalized Transient Impedance

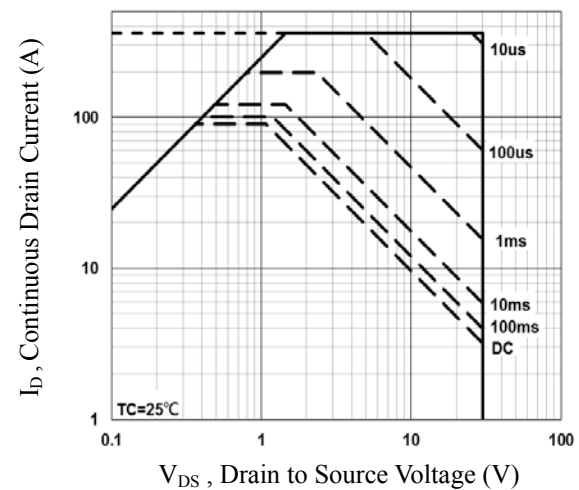


Fig.6 Maximum Safe Operation Area

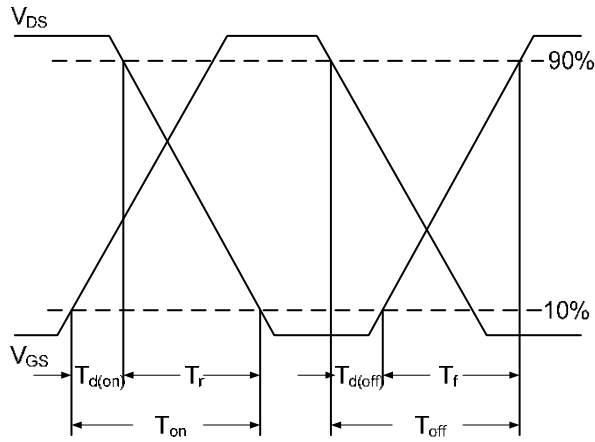


Fig.7 Switching Time Waveform

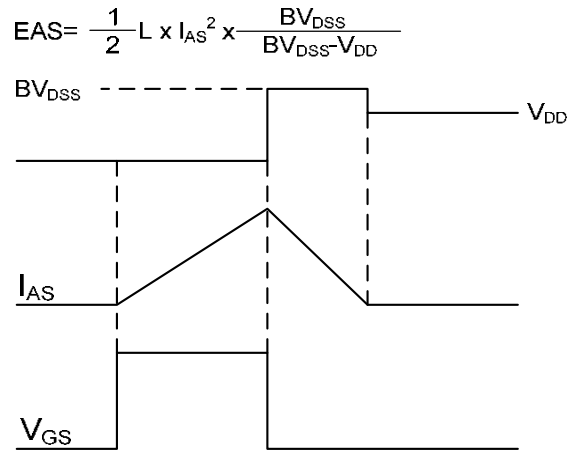
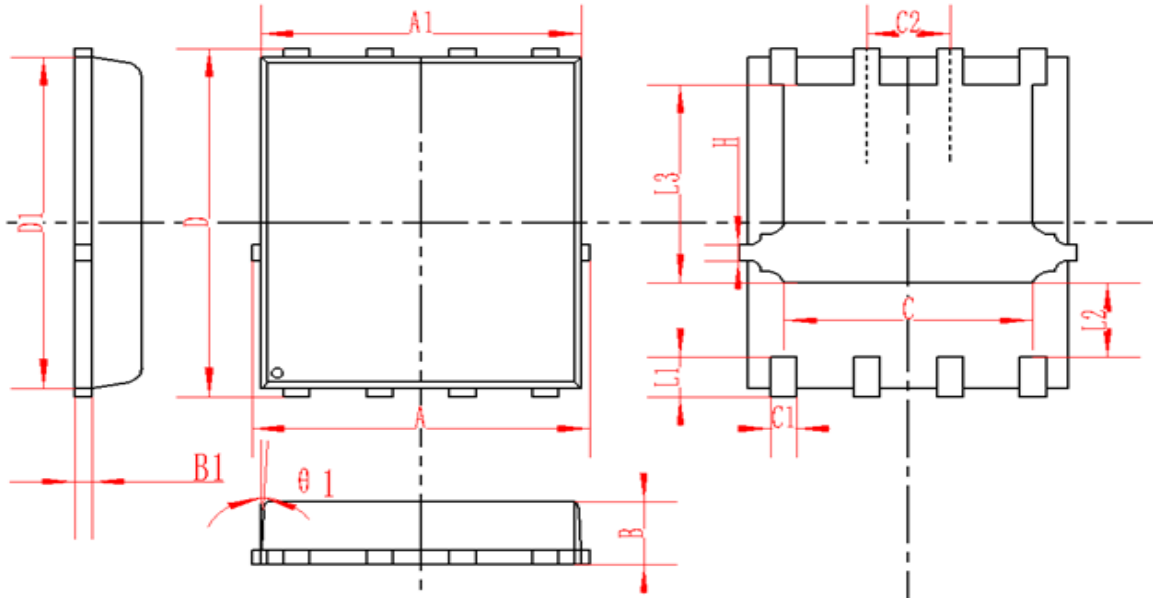


Fig.8 EAS Waveform



### DFN5X6-8L Package Information



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	5.3	5.5	5.7	0.208	0.216	0.224
A1	5.1	5.2	5.3	0.2	0.204	0.209
D	5.98	6	6.02	0.235	0.236	0.237
D1	5.85	6.05	6.25	0.23	0.238	0.246
B	0.85	0.95	1.05	0.033	0.037	0.041
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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