



## Description

The SI7860DP-T1-GE3 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

$V_{DS} = 30V$   $I_D = 50A$

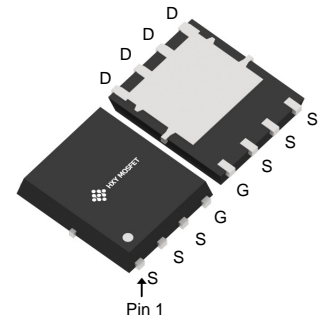
$R_{DS(ON)} < 8.5m\Omega$   $V_{GS}=10V$

## Application

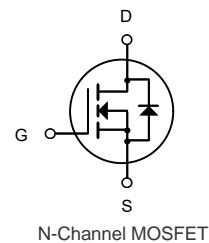
Battery protection

Load switch

Uninterruptible power supply



DFN5X6-8L



N-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SI7860DP-T1-GE3	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	60	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	38	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	200	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	36	mJ
$I_{AS}$	Avalanche Current	50	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	31	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>3</sup>	27	°C/W



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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
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> =24V	---	---	1	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0A	---	---	±100	nA
V <sub>GS(th)</sub>	GATE-Source Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	1.2	1.5	2.5	V
R <sub>DS(ON)</sub>	Drain-Source On Resistance <sup>4</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	6.5	8.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	---	11	14	
G <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =30A	---	38	---	S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	1317	1844	pF
C <sub>oss</sub>	Output Capacitance		---	163	228	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	131	183	
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, V <sub>GS</sub> =15V, R <sub>G</sub> =3.3Ω	---	4.6	9.2	ns
t <sub>r</sub>	Rise Time		---	12.2	22	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		---	26.6	53	ns
t <sub>f</sub>	Fall Time		---	8	16	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =15A	---	17.6	21	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.35	5.9	nC
Q <sub>gd</sub>	Gate-Drain "Miller" Charge		---	5.9	7.1	nC
V <sub>SD</sub>	Source-Drain Diode Forward Voltage	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	---	---	58	A
I <sub>SM</sub>	Pulsed Source Current		---	---	115	A
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =30A , dI/dt=100A/μs T <sub>J</sub> =25°C	---	9.2	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	2	---	nC

**Notes:**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E<sub>AS</sub> condition: Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, R<sub>G</sub>=25ohm, L=0.5mH, I<sub>AS</sub>=14A
3. R<sub>θJA</sub> is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.



### Typical Characteristics

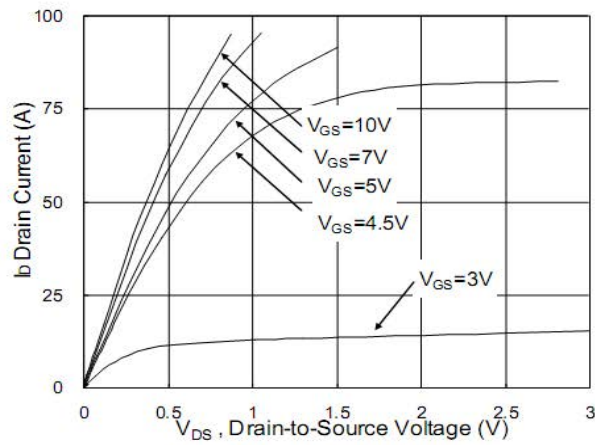


Fig.1 Typical Output Characteristics

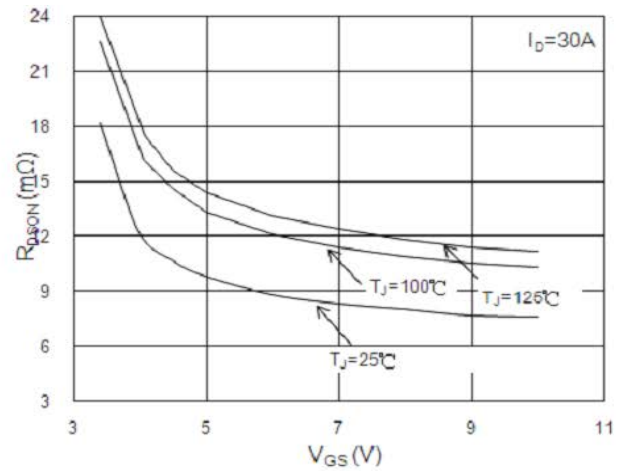


Fig.2 On-Resistance vs. Gate-Source

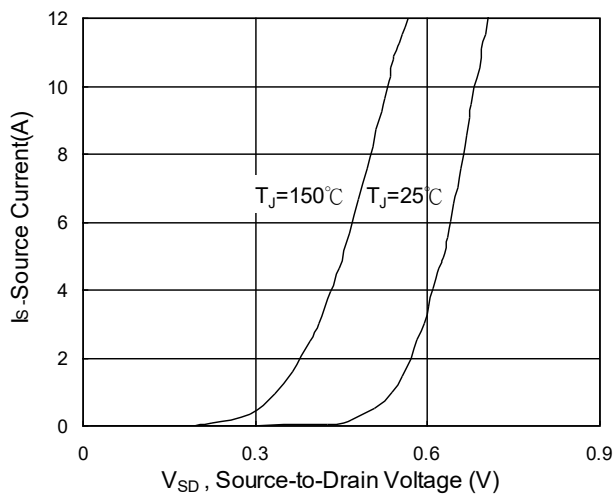


Fig.3 Forward Characteristics of reverse

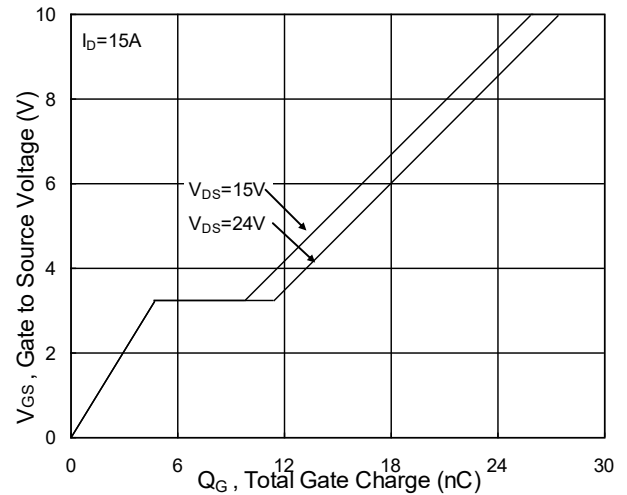


Fig.4 Gate-Charge Characteristics

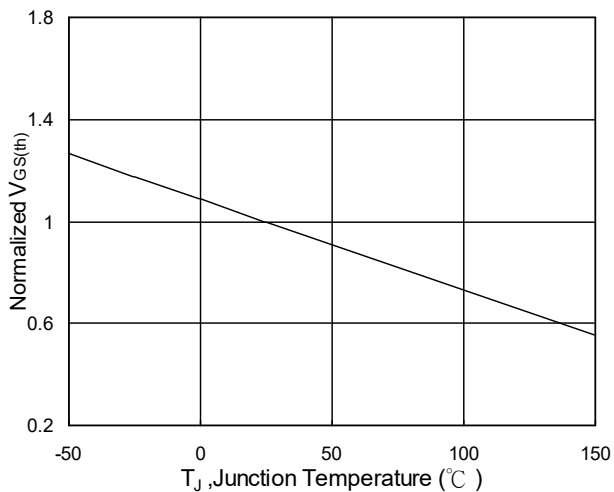


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

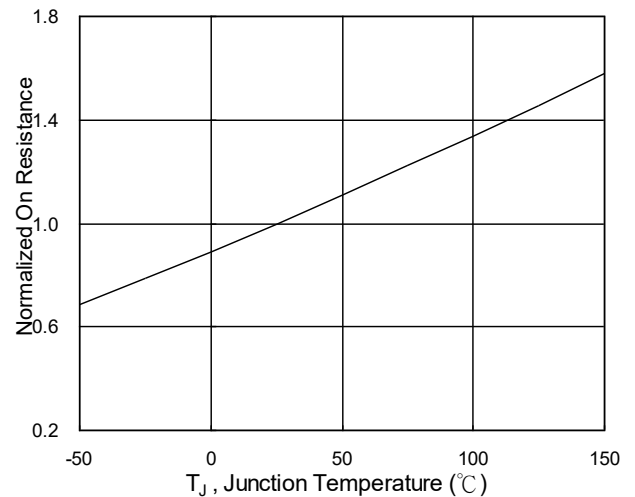


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

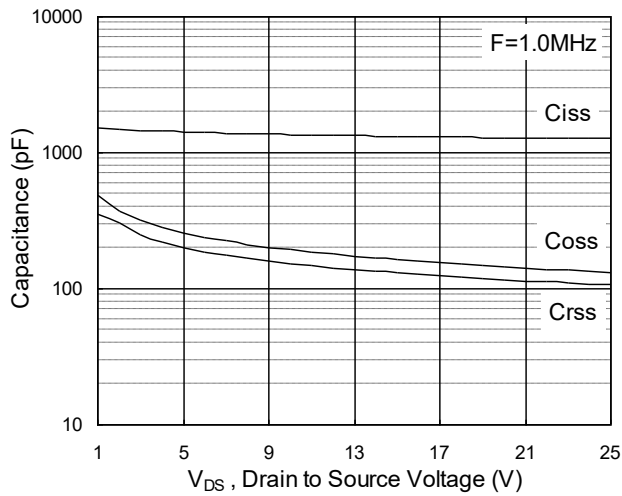


Fig.7 Capacitance

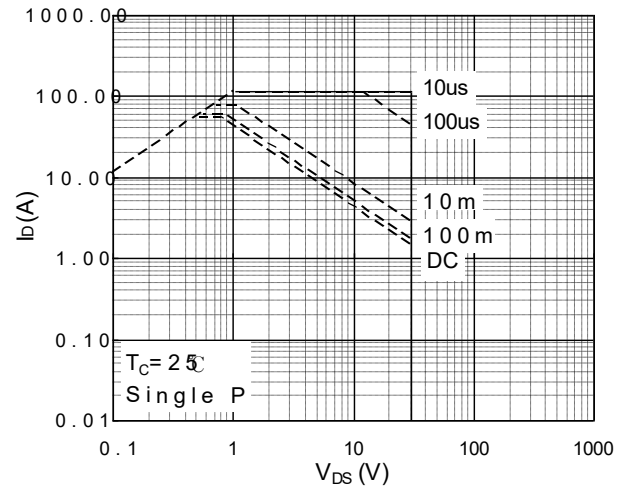


Fig.8 Safe Operating Area

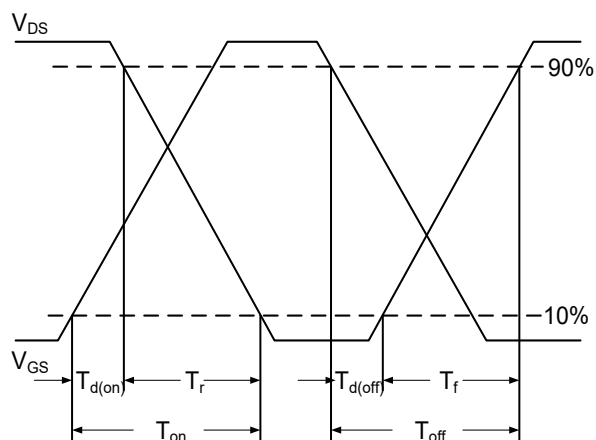
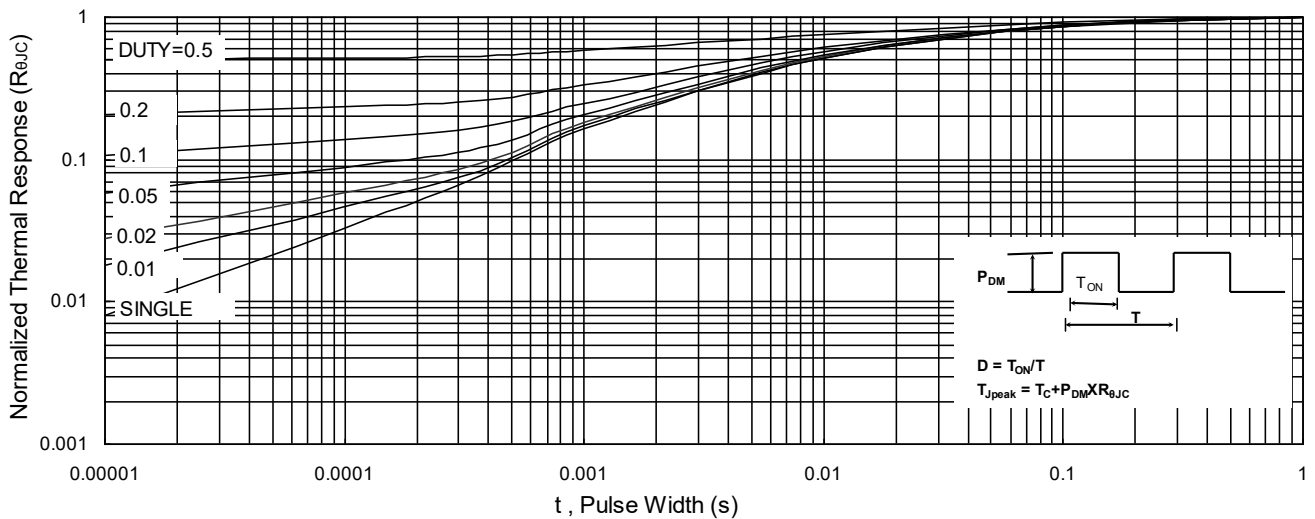
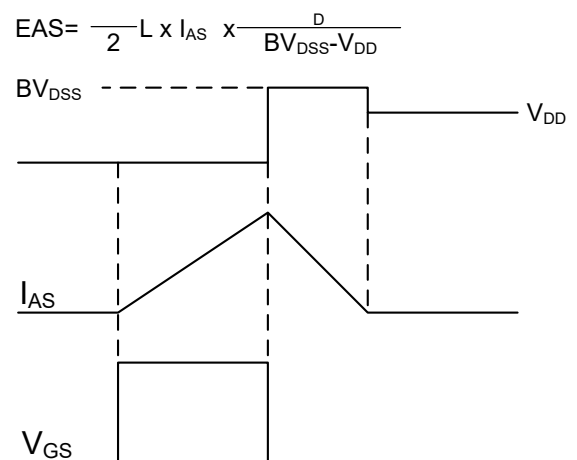
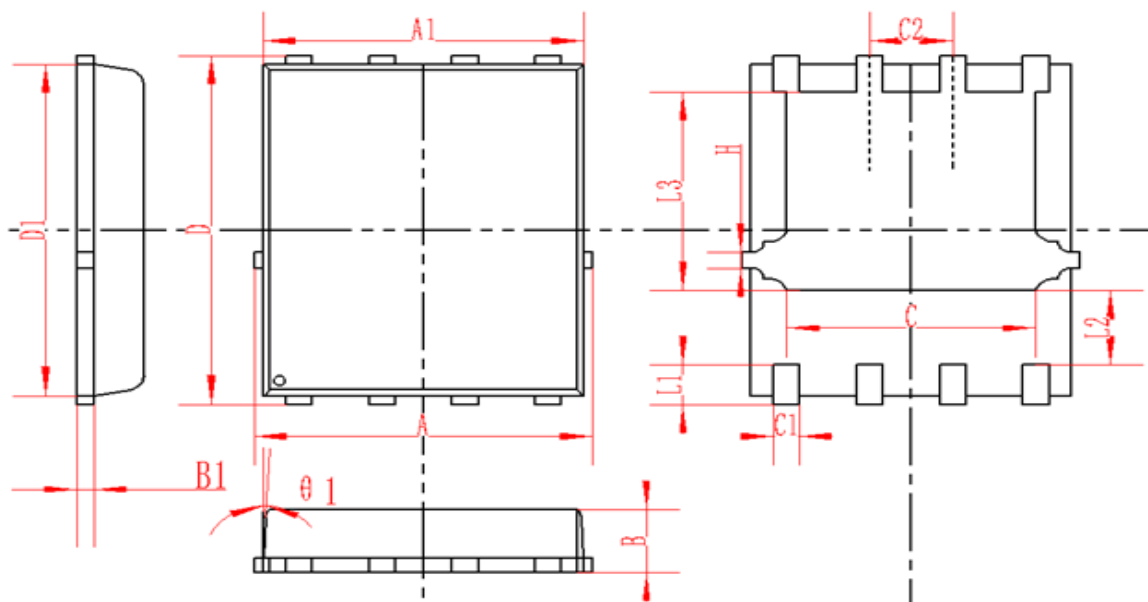


Fig.10 Switching Time Waveform





## 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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