

# GSMDC3906X

## 30V N-Channel MOSFETs

### Product Description

These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for high efficiency fast switching applications.

### Features

- 30V, 80A,  $R_{DS(ON)}=5.5m\Omega@V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS guaranteed
- Green Device Available
- DFN5X6-8L package design

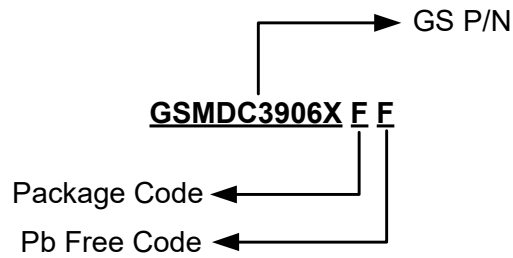
### Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

### Packages & Pin Assignments

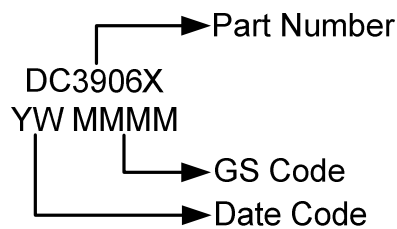
GSMDC3906XFF (DFN5X6-8L)	
<p style="text-align: center;">Bottom View</p>	
Pin	Description
1	Source
2	Source
3	Source
4	Gate
5	Drain
6	Drain
7	Drain
8	Drain

## Ordering Information



Part Number	Package	Quantity
GSMDC3906XFF	DFN5X6-8L	3000 PCS

## Marking Information



## Absolute Maximum Ratings

$T_C=25^\circ\text{C}$  Unless otherwise noted

Symbol	Parameter	Typical	Unit
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	80
		$T_C=100^\circ\text{C}$	51
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	320	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	88	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	42	A
$P_D$	Power Dissipation ( $T_C=25^\circ\text{C}$ )	74	W
	Power Dissipation (Derate above $25^\circ\text{C}$ )	0.59	W/ $^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.7	$^\circ\text{C}/\text{W}$

## Electrical Characteristics

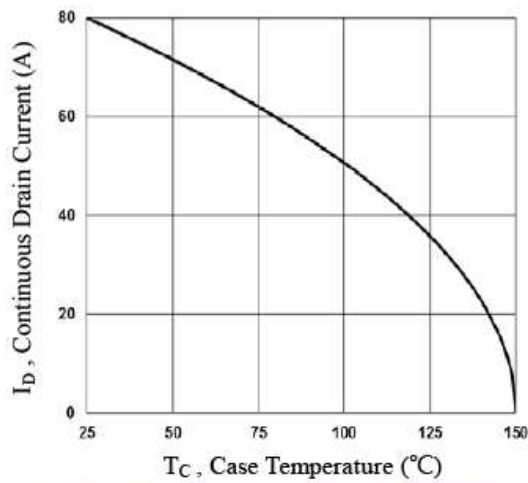
T<sub>J</sub>=25°C Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30			V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA		0.04		V/°C
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1.0	1.6	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient			-4		mV/°C
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			10	
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current			80	A
I <sub>SM</sub>	Pulsed Source Current				320	
R <sub>DS(on)</sub>	Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		4.6	5.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		6.5	8.5	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =10A		18		S
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A			1	V
EAS	Single Pulse Avalanche Energy	V <sub>DD</sub> =25V, L=0.1mH, IAS=20A	20			mJ
<b>Dynamic</b>						
Q <sub>g</sub>	Total Gate Charge <sup>3,4</sup>	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		11.1		nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3,4</sup>			1.85		
Q <sub>gd</sub>	Gate-Drain Charge <sup>3,4</sup>			6.8		
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz		1160		pF
C <sub>oss</sub>	Output Capacitance			200		
C <sub>rss</sub>	Reverse Transfer Capacitance			180		
t <sub>d(on)</sub>	Turn-On Time <sup>3,4</sup>	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω		7.5		ns
t <sub>r</sub>				14.5		
t <sub>d(off)</sub>	Turn-Off Time <sup>3,4</sup>			35.2		
t <sub>f</sub>				9.6		
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz		2.5		Ω

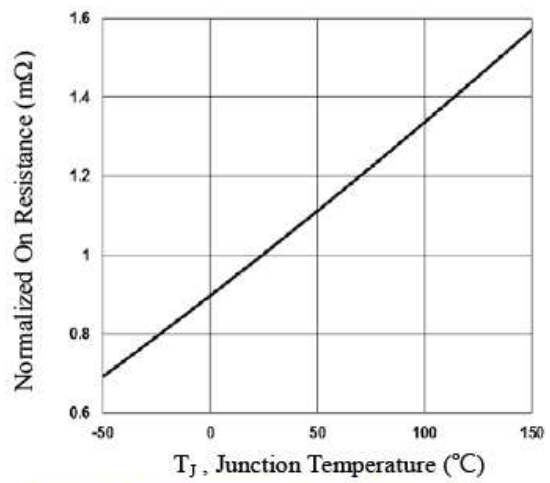
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, IAS=42A., 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.

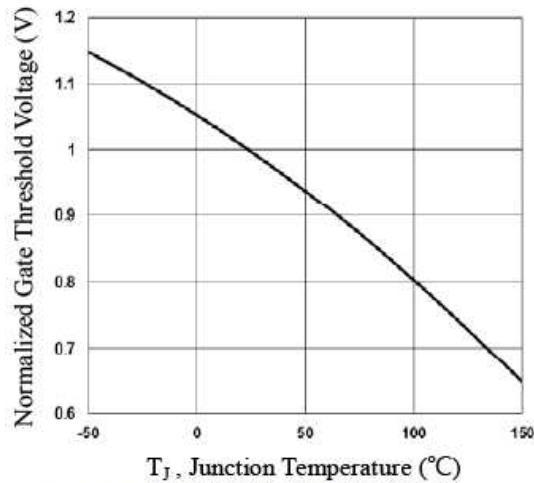
## Typical Performance Characteristics



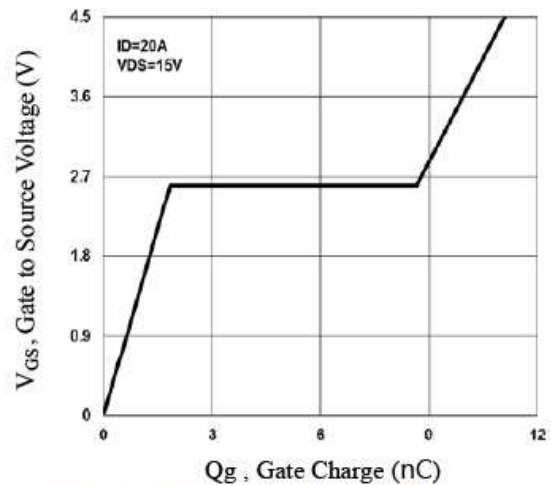
**Fig.1 Continuous Drain Current vs.  $T_C$**



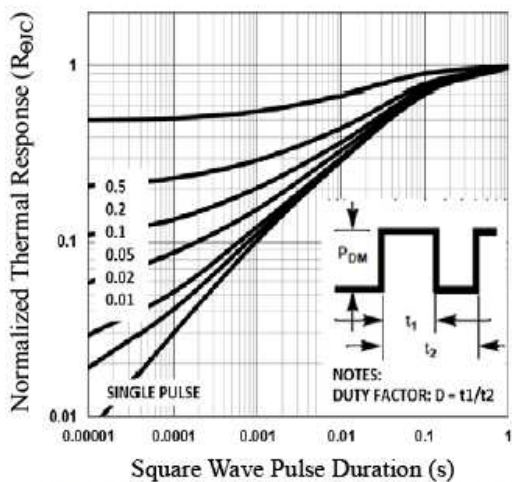
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



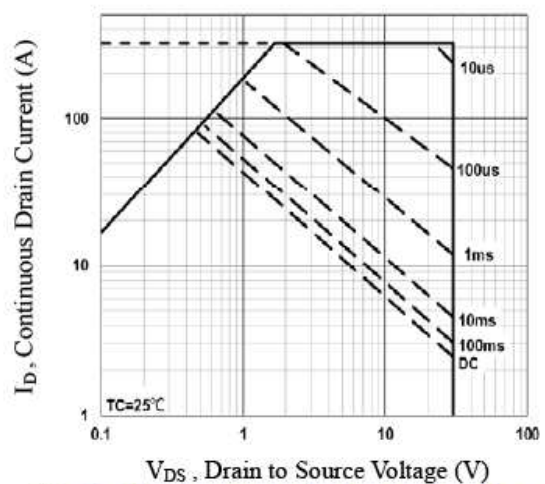
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**



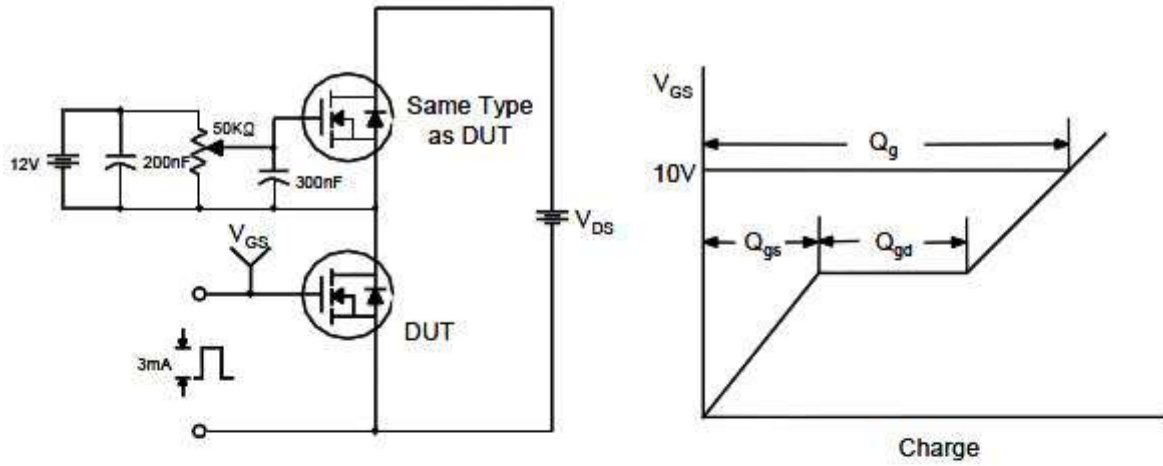
**Fig.5 Normalized Transient Impedance**



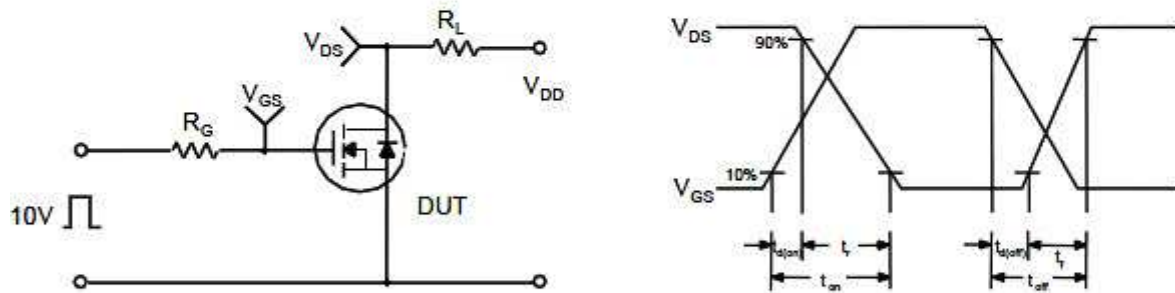
**Fig.6 Maximum Safe Operation Area**

## Typical Performance Characteristics (Continue)

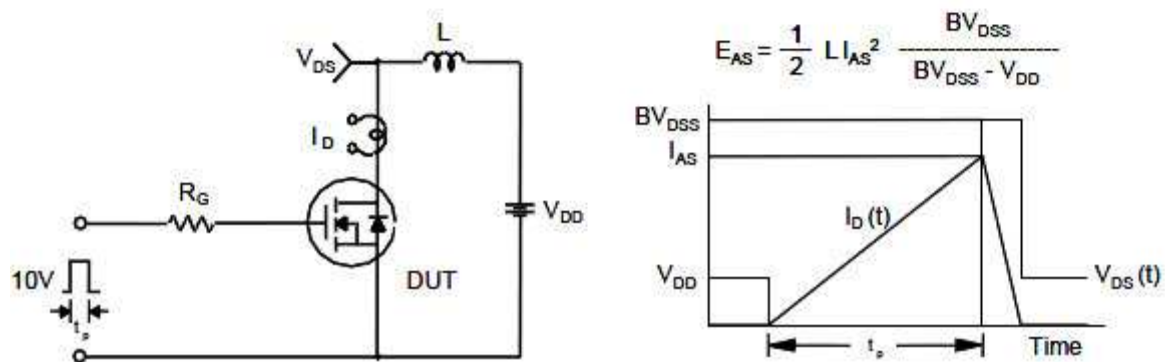
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

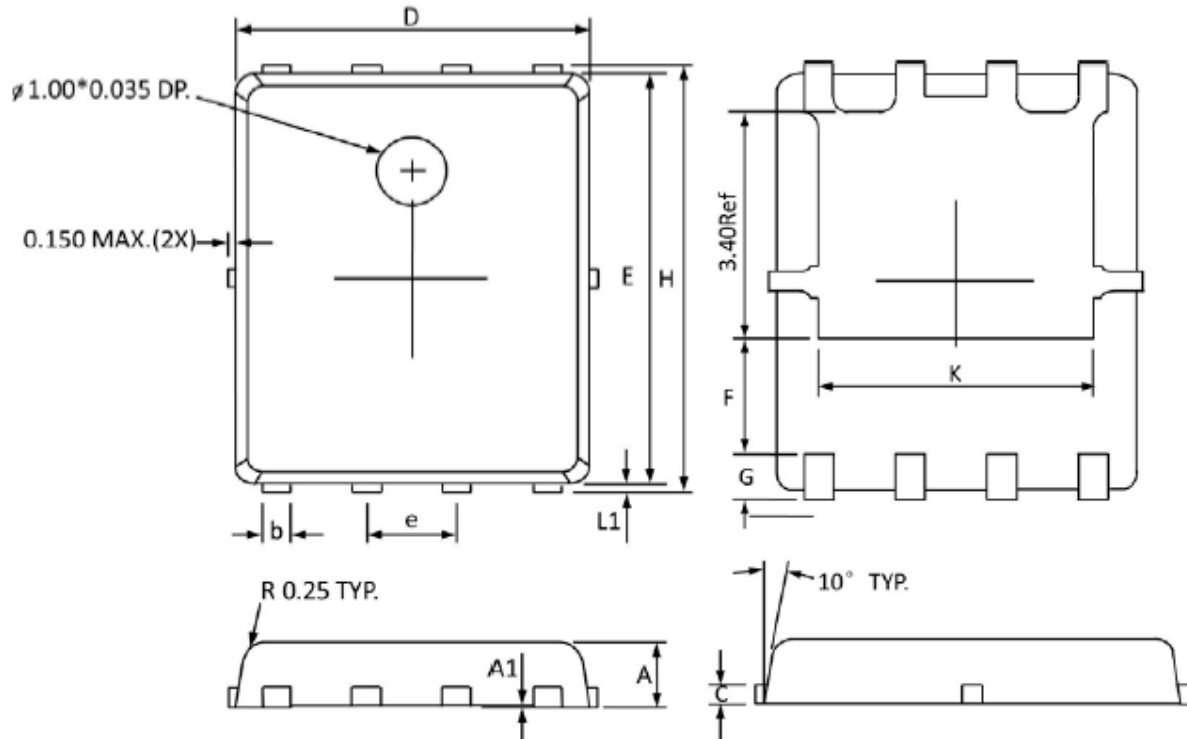


### Unclamped Inductive Switching Test Circuit & Waveforms



## Package Dimension

### DFN5X6-8L







### Dimensions



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	0.800	1.000	0.032	0.039
<b>A1</b>	0.000	0.005	0.000	0.000
<b>b</b>	0.350	0.490	0.014	0.019
<b>C</b>	0.254 (REF)		0.010 (REF)	
<b>D</b>	4.900	5.100	0.193	0.200
<b>E</b>	5.700	5.900	0.225	0.232
<b>e</b>	1.27 (BSC)		0.050 (BSC)	
<b>F</b>	1.400 (REF)		0.055 (REF)	
<b>G</b>	0.600 (REF)		0.024 (REF)	
<b>H</b>	5.950	6.200	0.235	0.244
<b>L1</b>	0.100	0.180	0.004	0.007
<b>K</b>	4.000 (REF)		0.157 (REF)	

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## CONTACT US

GS Headquarter	
	4F.,No.43-1,Lane11,Sec.6,Minquan E.Rd Neihu District Taipei City 114, Taiwan (R.O.C)
	886-2-2657-9980
	886-2-2657-3630
	sales_twn@gs-power.com

RD Division	
	824 Bolton Drive Milpitas. CA. 95035
	1-408-457-0587