GSMDC4959X

40V P-Channel MOSFETs

Product Description

These P-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

- -40V, -85A, $R_{DS(ON)}$=5.8mΩ@V_{GS}=-10V
- Improved dv/dt capability
- Fast switching
- 100% EAS guaranteed
- Green Device Available
- DFN5X6-8L package design

Applications

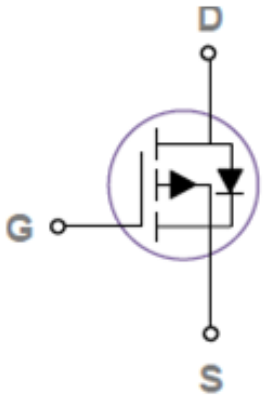
- Motor Drive
- Power Tools
- LED Lighting

Packages & Pin Assignments

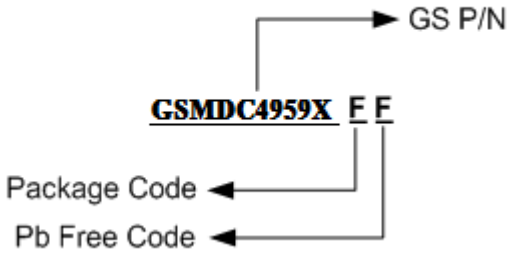
GSMDC4959XFF (DFN5X6-8L)

Bottom View

Pin	Description
1	Source
2	Source
3	Source
4	Gate
5	Drain
6	Drain
7	Drain
8	Drain

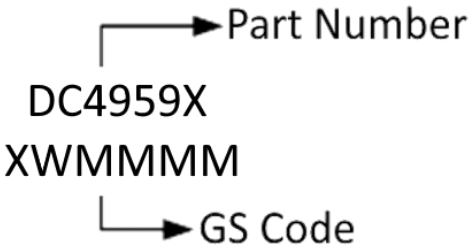


Ordering Information



Part Number	Package	Quantity
GSMDC4959XFF	DFN5X6-8L	3000 PCS

Marking Information



Absolute Maximum Ratings

T_C=25ºC Unless otherwise noted

Symbol	Parameter		Typical	Unit
V_{DS}	Drain-Source Voltage		-40	V
V_{GS}	Gate –Source Voltage		±20	V
I_D	Continuous Drain Current	T_C=25℃	-85	A
		T_C=100℃	-53.7	
I_{DM}	Pulsed Drain Current (Note 1)		-340	A
EAS	Single Pulse Avalanche Energy (Note 2)		245	mJ
IAS	Single Pulse Avalanche Current (Note 2)		-70	A
P_D	Power Dissipation (T_C=25℃)		135	W
	Power Dissipation (Derate above 25℃)		1.09	W/℃
T_J	Operating Junction Temperature Range		-55 to +150	℃
T_{STG}	Storage Temperature Range		-55 to +150	℃
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.92	℃/W

Note 1: Repetitive Rating: Pulsed width limited by maximum junction temperature.
Note 2: V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-70A, Starting T_J=25℃.

Electrical Characteristics

T_J=25℃ Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	-40			V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=1mA		-0.03		V/℃
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-1.2	-1.6	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient			5.38		mV/℃
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V			-1	uA
		V_{DS}=-32V, V_{GS}=0V, T_J=125℃			-10	
I_S	Continuous Source Current	V_G=V_D=0V, Force Current			-85	A
I_{SM}	Pulsed Source Current				-170	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=-10V, I_D=-25A		4.7	5.8	mΩ
		V_{GS}=-4.5V, I_D=-12A		6.4	8.5	
g_{FS}	Forward Transconductance	V_{DS}=-10V, I_D=-3A		15		S
V_{SD}	Diode Forward Voltage	V_{GS}=0V, I_S=-1A			-1	V
Dynamic						
Q_g	Total Gate Charge (Note 3,4)	V_{DS}=-32V, V_{GS}=-10V, I_D=-10A		106	160	nC
Q_{gs}	Gate-Source Charge (Note 3,4)			13.1	20	
Q_{gd}	Gate-Drain Charge (Note 3,4)			24.9	38	
C_{iss}	Input Capacitance	V_{DS}=-25V,V_{GS}=0V, f=1MHz		5720	8580	pF
C_{oss}	Output Capacitance			527	790	
C_{rss}	Reverse Transfer Capacitance			352	528	
$t_{d(on)}$	Turn-On Time (Note 3,4)	V_{DD}=-32V, I_D=-1A, V_{GS}=-10V, R_G=6Ω		41.6	82	ns
t_r				12.7	26	
$t_{d(off)}$	Turn-Off Time (Note 3,4)			308	600	
t_f				70	140	
R_g	Gate Resistance	V_{DS}=0V, V_{GS}=0V, f=1MHz		4.2	6.3	Ω

Note 3: The data tested by pulsed, pulse width≦300us, duty cycle≦2%.

Note 4: Essentially independent of operating temperature.

Typical Performance Characteristics

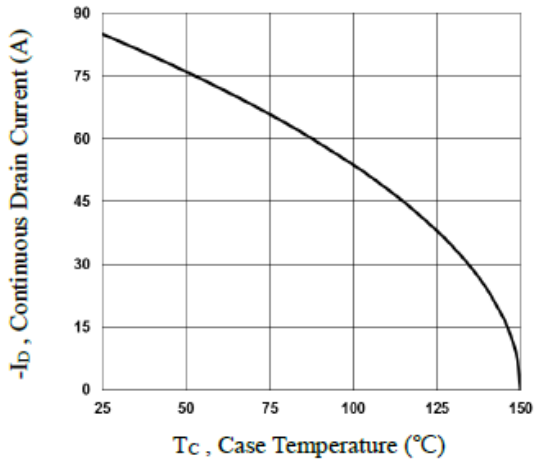


Fig.1 Continuous Drain Current vs. T_C

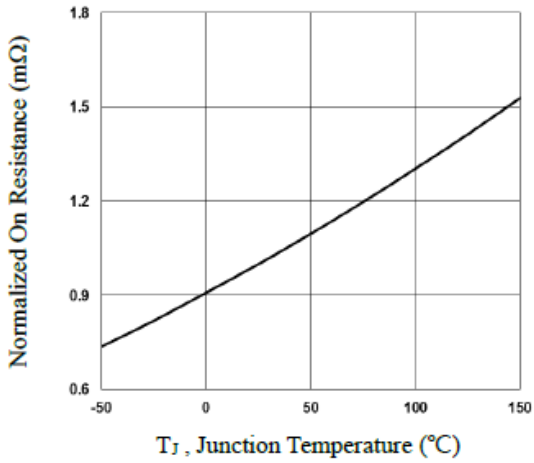


Fig.2 Normalized RDSON vs. T_J

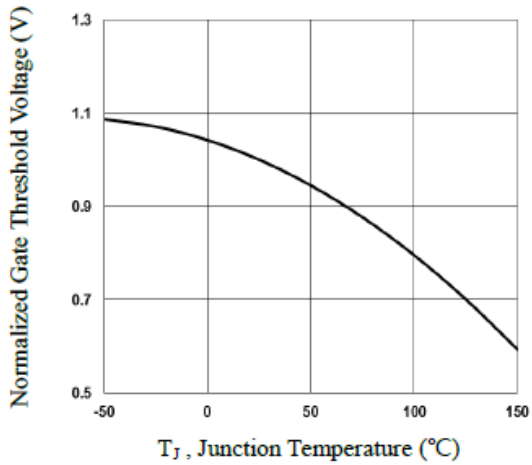


Fig.3 Normalized V_{th} vs. T_J

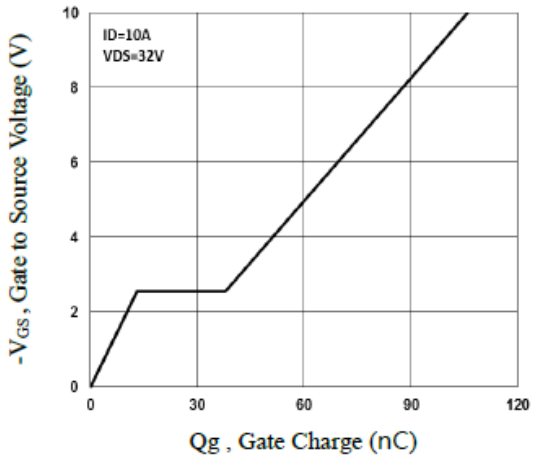


Fig.4 Gate Charge Waveform

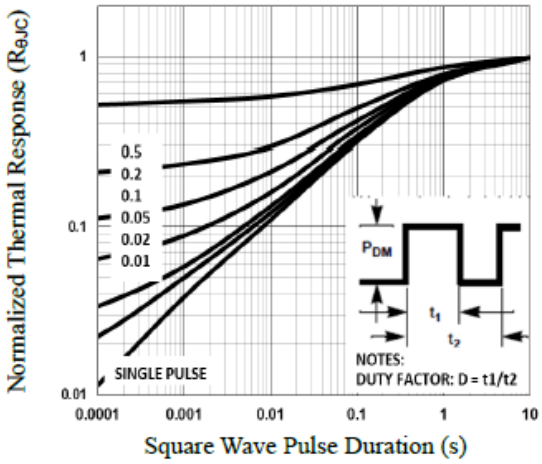


Fig.5 Normalized Transient Impedance

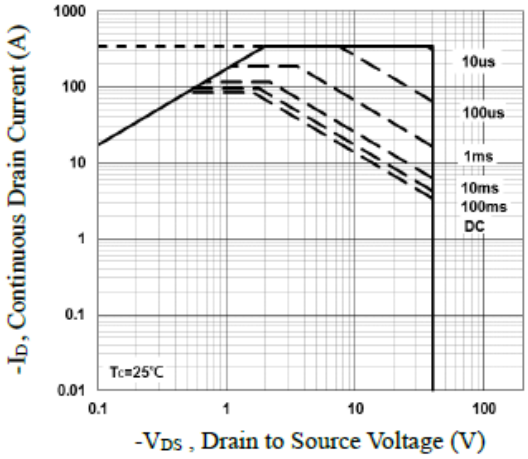


Fig.6 Maximum Safe Operation Area

Typical Performance Characteristics

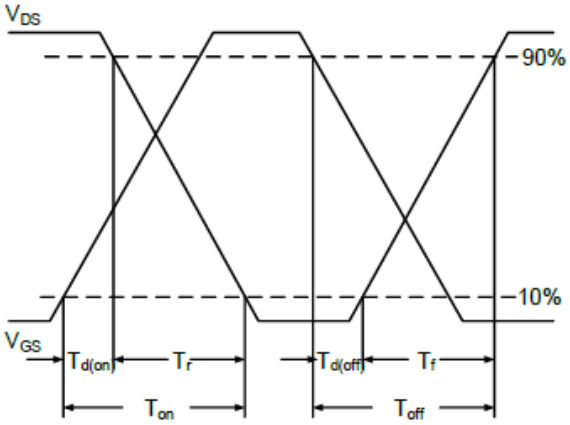


Fig.7 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS})^2 \times \frac{-BVDSS}{-BVDSS-(-VDD)}$$

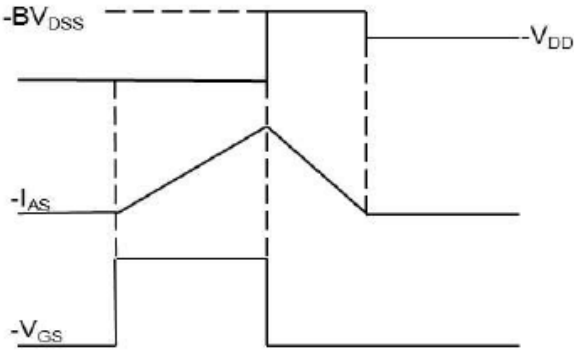
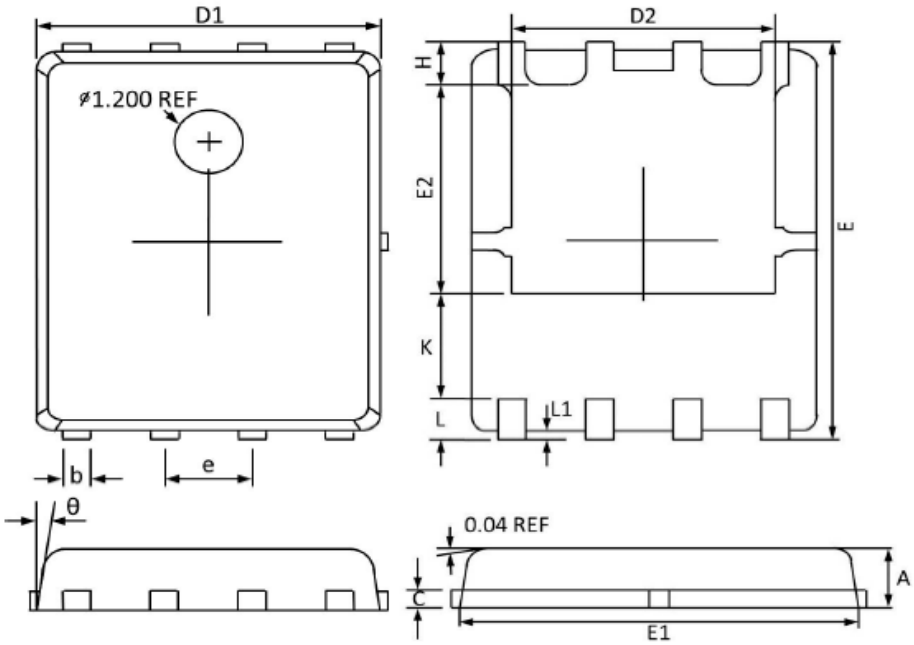


Fig.8 EAS Waveform

Package Dimension

DFN5X6-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
b	0.510	0.330	0.020	0.013
C	0.300	0.200	0.012	0.008
D1	5.100	4.800	0.201	0.189
D2	4.100	3.610	0.161	0.142
E	6.200	5.900	0.244	0.232
E1	5.900	5.700	0.232	0.224
E2	3.780	3.350	0.149	0.132
e	1.27BSC		0.05BSC	
H	0.700	0.410	0.028	0.016
K	1.500	1.100	0.059	0.043
L	0.710	0.510	0.028	0.020
L1	0.200	0.060	0.008	0.002
θ	12°	0°	12°	0°

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