

# GSMDD6901

## 60V 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.

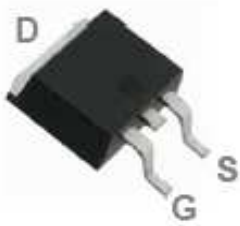
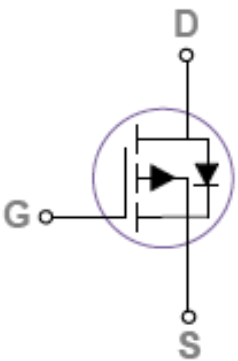
### Features

- -60V, -70A,  $R_{DS(ON)}=9.2m\Omega@V_{GS}=-10V$
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

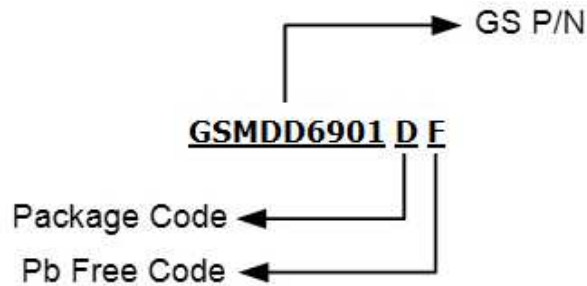
### Applications

- POL Applications
- Load Switch
- LED Applications

### Packages & Pin Assignments

GSMDD6901DF (TO-252-2L)	
 <p>Top View</p>	
<b>Description</b>	
Gate	
Drain	
Source	

## Ordering Information



Part Number	Package	Quantity Reel
GSMDD6901DF	TO-252-2L	2500 PCS

## Absolute Maximum Ratings

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

Symbol	Parameter	Rating	Unit
V <sub>DS</sub>	Drain-Source Voltage	-60	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> =25°C)	-70	A
	Drain Current - Continuous (T <sub>C</sub> =100°C)	-44.3	A
I <sub>DM</sub>	Drain Current - Pulsed (Note 1)	-280	A
E <sub>AS</sub>	Single Pulse Avalanche Energy (Note 2)	320	mJ
I <sub>AS</sub>	Single Pulse Avalanche Current (Note 2)	80	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	1.33	W
	Power Dissipation - Derate above 25°C	1.06	W/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
R <sub>θJC</sub>	Thermal Resistance Junction to Case	0.94	°C/W
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	62	°C/W

Note1. Repetitive Rating : Pulsed width limited by maximum junction temperature.

Note2. V<sub>DD</sub>=50V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=80A.,R<sub>G</sub>=25 ,Starting T<sub>J</sub>=25°C.

## Electrical Characteristics

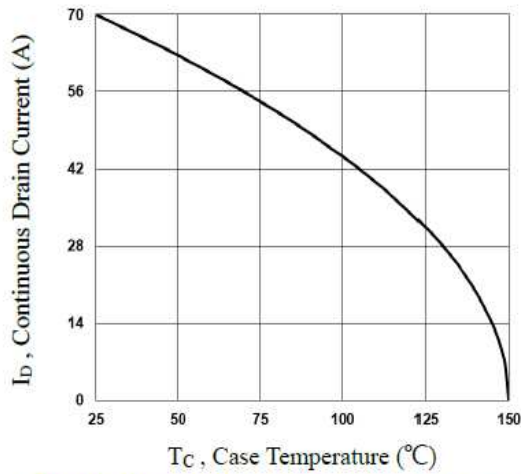
T<sub>J</sub>=25°C Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.036	---	V/°C
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.2	-1.6	-2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-6.3	---	mV/°C
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-48V, 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	---	---	-70	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-140	
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	7.6	9.2	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	---	9.2	12	mΩ
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-3A	---	18	---	S
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1	V
<b>Dynamic</b>						
Q <sub>g</sub>	Total Gate Charge (Note 3,4)	V <sub>DS</sub> =-48V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-5A	---	141	210	nC
Q <sub>gs</sub>	Gate-Source Charge (Note 3,4)		---	17	25.5	
Q <sub>gd</sub>	Gate-Drain Charge (Note 3,4)		---	28.6	43	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, F=1MHz	---	8620	12930	pF
C <sub>oss</sub>	Output Capacitance		---	486	730	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	288	430	
t <sub>d(on)</sub>	Turn-On Delay Time (Note 3,4)	V <sub>DD</sub> =-48V, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =-1A	---	70	140	nS
t <sub>r</sub>	Rise Time (Note 3,4)		---	205	410	
t <sub>d(off)</sub>	Turn-Off Delay Time (Note 3,4)		---	402	804	
t <sub>f</sub>	Fall Time (Note 3,4)		---	197	394	

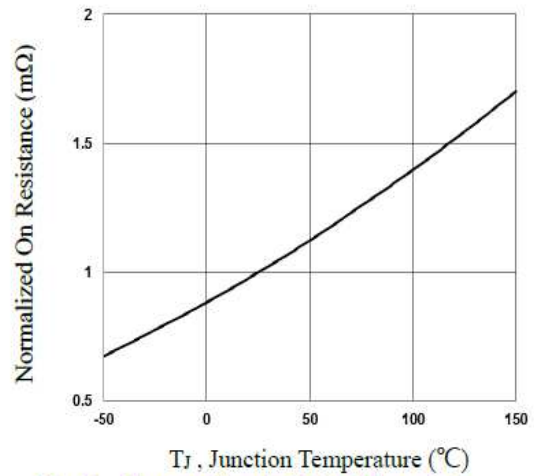
Note3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.

Note4. Essentially independent of operating temperature.

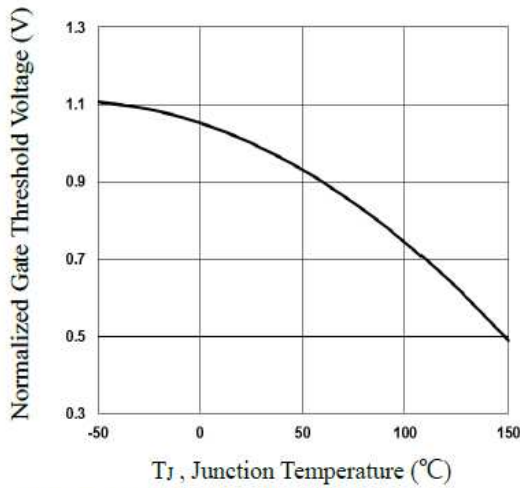
## Typical Performance Characteristics



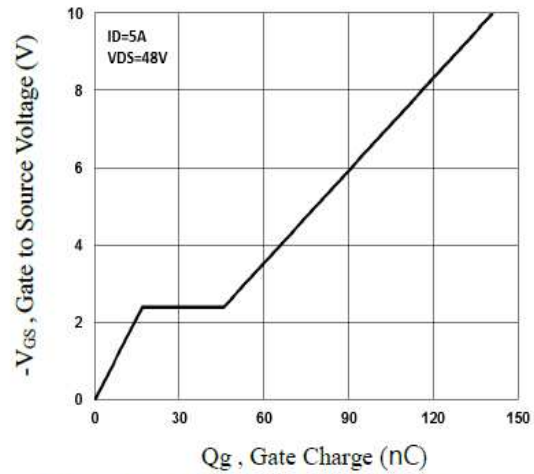
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



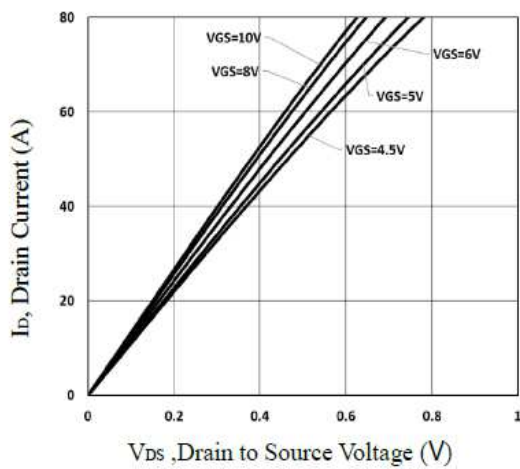
**Fig.2 Normalized R<sub>DS(on)</sub> vs. T<sub>j</sub>**



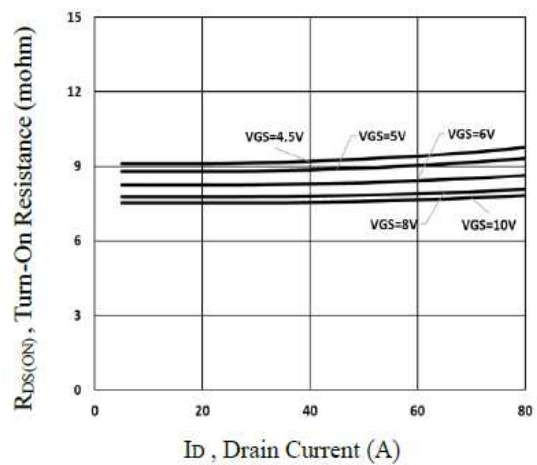
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



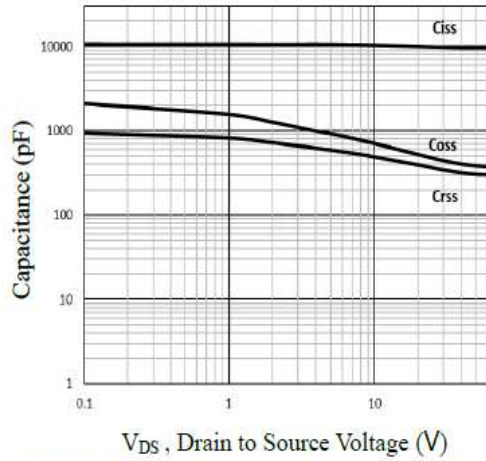
**Fig.4 Gate Charge Waveform**



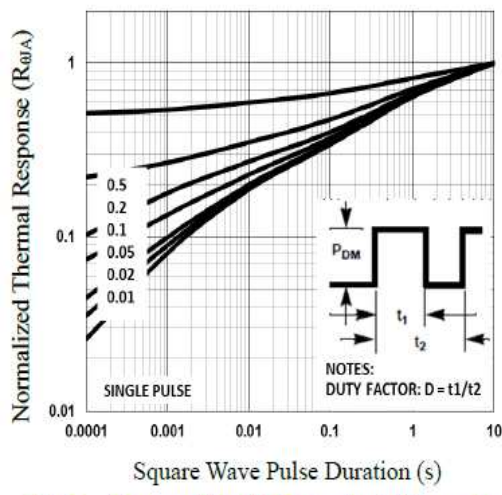
**Fig.5 Typical Output Characteristics**



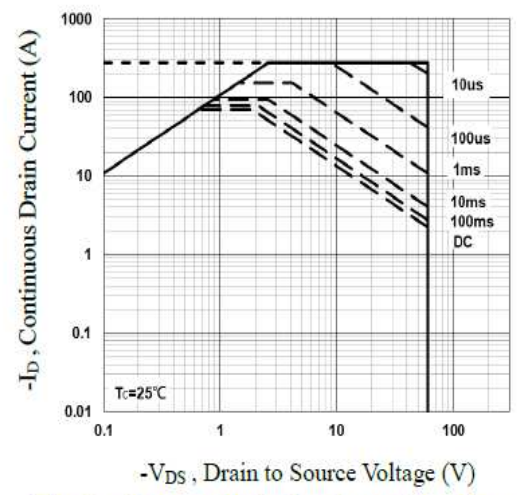
**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**



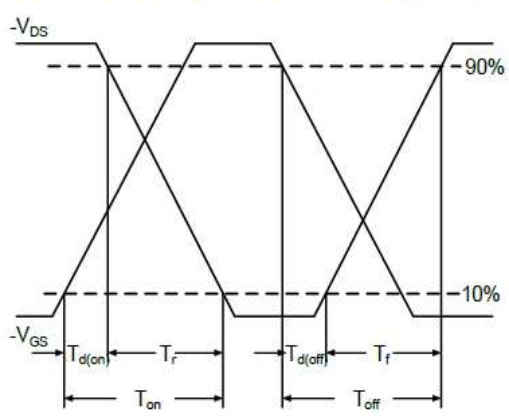
**Fig.7 Capacitance Characteristics**



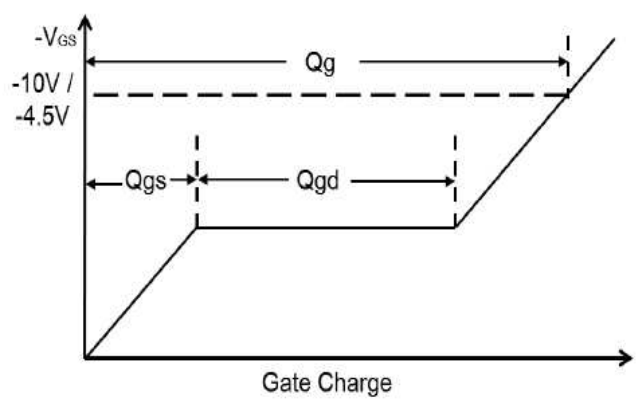
**Fig.8 Normalized Transient Impedance**



**Fig.9 Maximum Safe Operation Area**



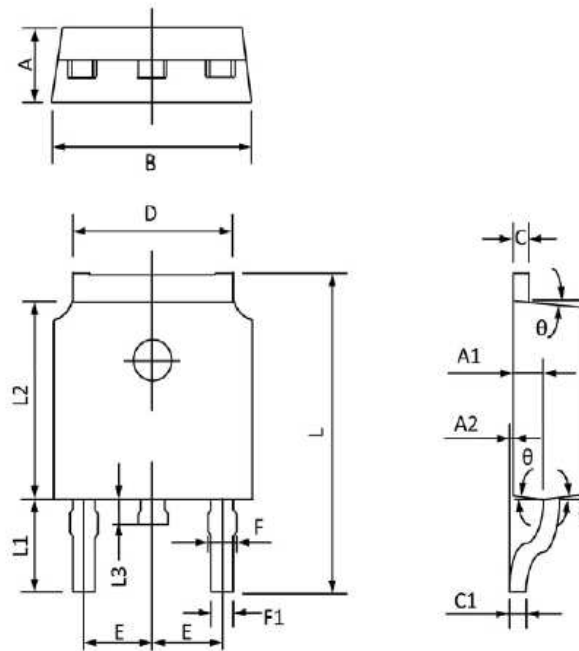
**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

## Package Dimension

### TO252 PACKAGE INFORMATION









Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	2.20	2.40	0.087	0.094
<b>A1</b>	0.91	1.11	0.036	0.044
<b>A2</b>	0.00	0.15	0.000	0.006
<b>B</b>	6.40	6.80	0.252	0.268
<b>C</b>	0.45	0.58	0.018	0.023
<b>C1</b>	0.46	0.58	0.018	0.023
<b>D</b>	5.10	5.50	0.201	0.217
<b>E</b>	2.186	2.386	0.086	0.094
<b>F</b>	0.60	0.94	0.024	0.037
<b>F1</b>	0.50	0.86	0.020	0.034
<b>L</b>	9.40	10.40	0.370	0.409
<b>L1</b>	2.40	3.00	0.094	0.118
<b>L2</b>	5.40	6.20	0.213	0.244
<b>L3</b>	0.60	1.20	0.024	0.047
<b>θ</b>	3°	9°	3°	9°

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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