

# GSMDP4904

## 40V 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

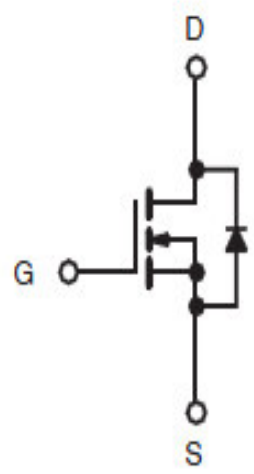
- 40V, 100A,  $R_{DS(ON)}=5.5m\Omega@V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- TO-220 package design

### Applications

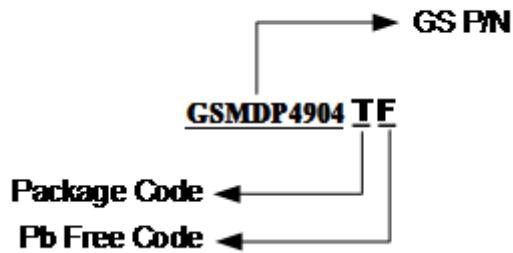
- Notebook
- Load Switch
- LED applications
- Hand-Held Device

### Packages & Pin Assignments

GSMDP4904TF (TO-220)	
 <p>Top View</p>	
<b>Pin</b>	<b>Description</b>
1	Gate
2	Drain
3	Source

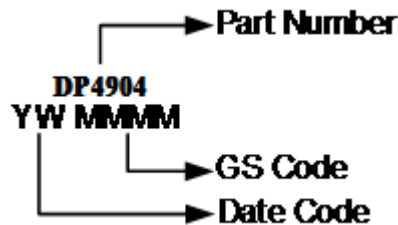


## Ordering Information



Part Number	Package	Quantity Tube
GSMDP4904TF	TO-220	50 PCS

## Marking Information



## Absolute Maximum Ratings

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^{\circ}\text{C}$	100
		$T_C=100^{\circ}\text{C}$	63
$I_{DM}$	Pulsed Drain Current (Note 1)	400	A
EAS	Single Pulse Avalanche Energy (Note 2)	115	mJ
IAS	Single Pulse Avalanche Current (Note 2)	48	A
$P_D$	Power Dissipation ( $T_C=25^{\circ}\text{C}$ )	121	W
	Power Dissipation (Derate above $25^{\circ}\text{C}$ )	0.97	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	1.03	$^{\circ}\text{C}/\text{W}$

Note 1: Repetitive Rating: Pulsed width limited by maximum junction temperature.

Note 2:  $V_{DD}=25\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=0.1\text{mH}$ ,  $I_{AS}=48\text{A}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$ .

## Electrical Characteristics

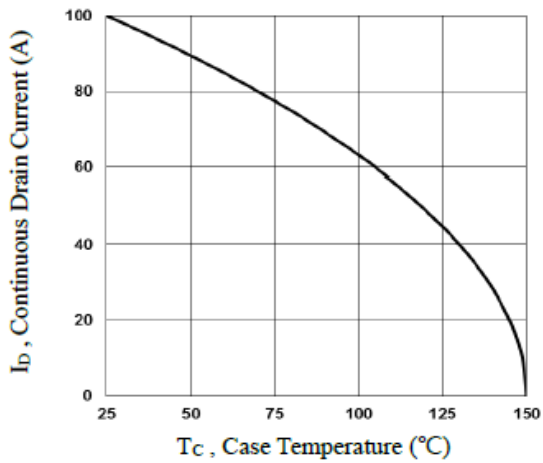
$T_J=25^{\circ}\text{C}$  Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40			V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ C$ , $I_D=1mA$		0.03		$V/^\circ C$
$V_{GS(th)}$	Gate Threshold Voltage		1.2	1.6	2.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	$V_{DS}=V_{GS}, I_D=250\mu A$		-5		$mV/^\circ C$
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	uA
		$V_{DS}=32V, V_{GS}=0V$ , $T_J=85^\circ C$			10	
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current			100	A
$I_{SM}$	Pulsed Source Current (Note 3)				200	
$R_{DS(on)}$	Drain-Source On-Resistance (Note 3)	$V_{GS}=10V, I_D=20A$		4.2	5.5	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$		5.3	7	$m\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=10V, I_D=10A$		16		S
$V_{SD}$	Diode Forward Voltage (Note 3)	$V_{GS}=0V, I_S=1A$			1	V
<b>Dynamic</b>						
$Q_g$	Total Gate Charge (Note 3,4)	$V_{DS}=32V, V_{GS}=4.5V$ , $I_D=10A$		25	50	nC
$Q_{gs}$	Gate-Source Charge (Note 3,4)			6.4	13	
$Q_{gd}$	Gate-Drain Charge (Note 3,4)			12.1	24	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V$ , $f=1MHz$		2410	3600	pF
$C_{oss}$	Output Capacitance			232	400	
$C_{rss}$	Reverse Transfer Capacitance			152	230	
$t_{d(on)}$	Turn-On Time (Note 3,4)	$V_{DD}=20V, I_D=1A$ , $V_{GS}=10V, R_G=3.3\Omega$		14.2	28	ns
$t_r$				18.3	36	
$t_{d(off)}$	Turn-Off Time (Note 3,4)			38.8	76	
$t_f$				13.9	28	
$R_g$	Gate Resistance		$V_{DS}=0V, V_{GS}=0V$ , $f=1MHz$		1.6	

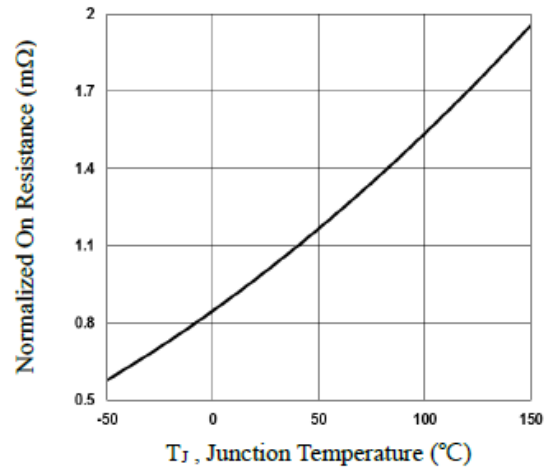
Note 3: The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

Note 4: Essentially independent of operating temperature.

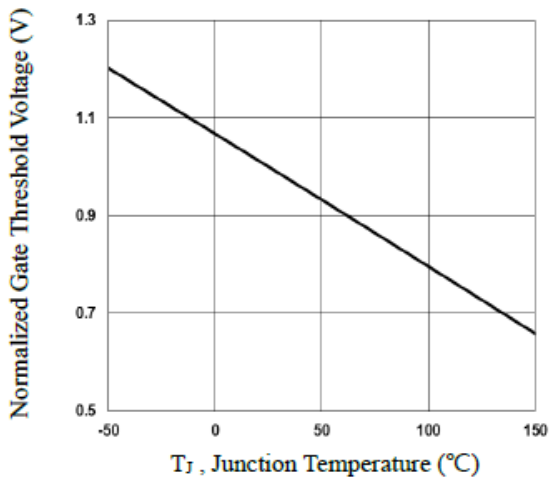
## Typical Performance Characteristics



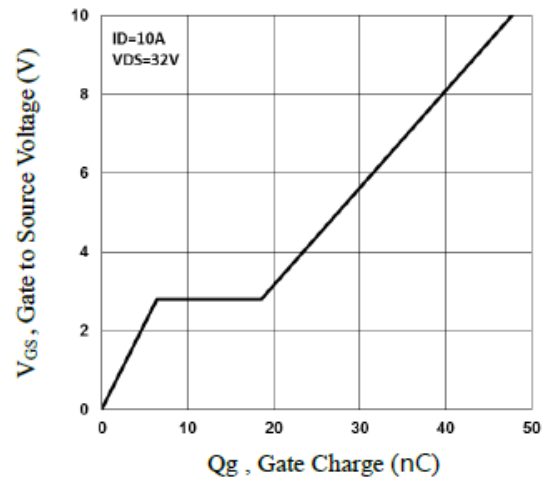
**Fig.1 Continuous Drain Current vs.  $T_c$**



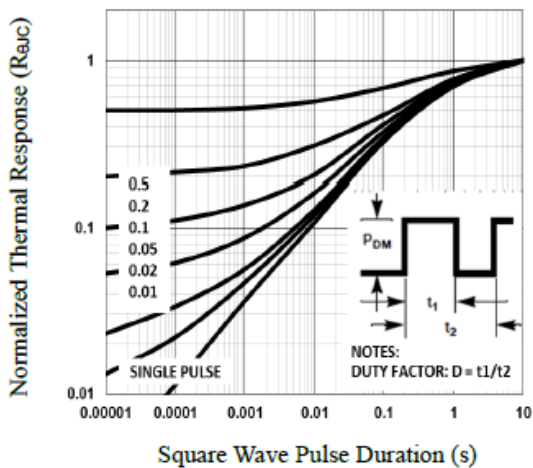
**Fig.2 Normalized RDSON vs.  $T_J$**



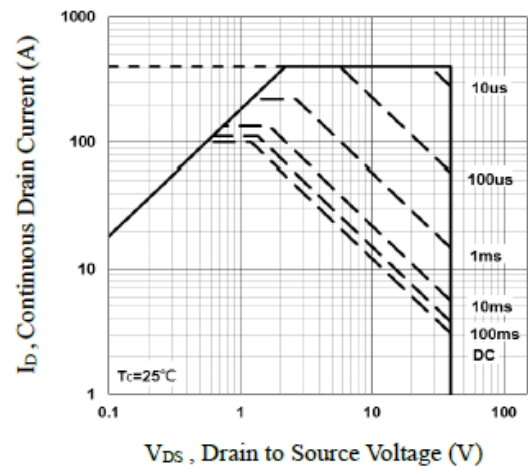
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**

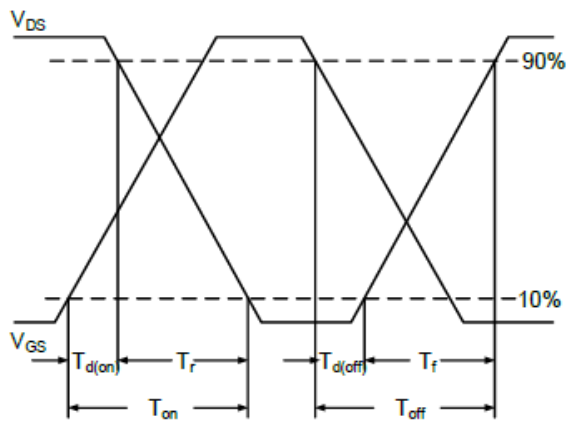


**Fig.5 Normalized Transient Impedance**

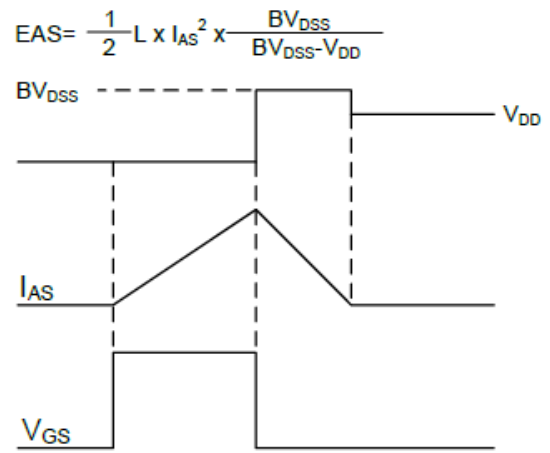


**Fig.6 Maximum Safe Operation Area**

## Typical Performance Characteristics (Continue)



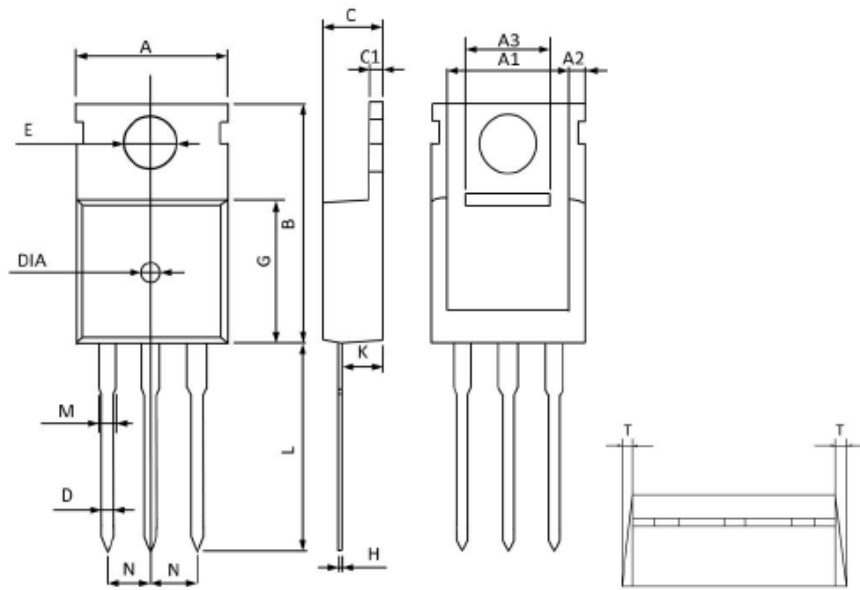
**Fig.7 Switching Time Waveform**



**Fig.8 EAS Waveform**

## Package Dimension

### TO-220










Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.



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