

# GP9973

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

BVDSS	60V
RDS(ON)	80mΩ
ID	3.9A

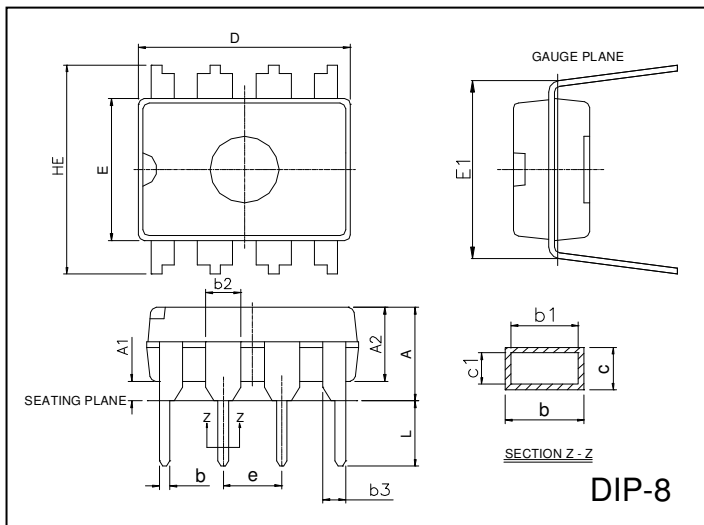
### Description

The GP9973 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

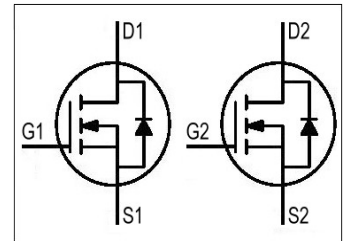
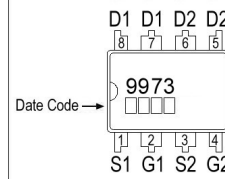
### Features

- \*Simple Drive Requirement
- \*Low Gate Charge

### Package Dimensions



#### Marking :



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	0.5334	c1	0.203	0.279
A1	0.381	-	D	9.017	10.16
A2	2.921	4.953	E	6.096	7.112
b	0.356	0.559	E1	7.620	8.255
b1	0.356	0.508	e	2.540 BSC	
b2	1.143	1.778	HE	-	10.92
b3	0.762	1.143	L	2.921	3.810
c	0.203	0.356			

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>3</sup> , $V_{GS}@10V$	$I_D @TA=25^\circ C$	3.9	A
Continuous Drain Current <sup>3</sup> , $V_{GS}@10V$	$I_D @TA=70^\circ C$	2.5	A
Pulsed Drain Current <sup>1,2</sup>	$I_{DM}$	20	A
Total Power Dissipation	$P_D @TA=25^\circ C$	2	W
Linear Derating Factor		0.016	W/ $^\circ C$
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	-55 ~ +150	$^\circ C$

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient <sup>3</sup> Max.	$R_{thj-amb}$	62.5	$^\circ C/W$

**Electrical Characteristics(T<sub>j</sub> = 25°C Unless otherwise specified)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	-	-	V	$V_{GS}=0, I_D=250\mu A$
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.06	-	V/°C	Reference to 25°C, $I_D=1mA$
Gate Threshold Voltage	$V_{GS(th)}$	1.0	-	3.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Forward Transconductance	$g_{fs}$	-	3.5	-	S	$V_{DS}=10V, I_D=3.9A$
Gate-Source Leakage Current	$I_{GSS}$	-	-	±100	nA	$V_{GS}= \pm 20V$
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	$I_{DSS}$	-	-	1	uA	$V_{DS}=60V, V_{GS}=0$
Drain-Source Leakage Current(T <sub>j</sub> =70°C)		-	-	25	uA	$V_{DS}=48V, V_{GS}=0$
Static Drain-Source On-Resistance <sup>2</sup>	$R_{DS(ON)}$	-	-	80	mΩ	$V_{GS}=10V, I_D=3.9A$
		-	-	100		$V_{GS}=4.5V, I_D=2.0A$
Total Gate Charge <sup>2</sup>	$Q_g$	-	8	13	nC	$I_D=3.9A$ $V_{DS}=48V$ $V_{GS}=4.5V$
Gate-Source Charge	$Q_{gs}$	-	2	-		
Gate-Drain ("Miller") Charge	$Q_{gd}$	-	4	-		
Turn-on Delay Time <sup>2</sup>	$T_{d(on)}$	-	8	-	ns	$V_{DS}=30V$ $I_D=1A$ $V_{GS}=10V$ $R_G=3.3\Omega$ $R_D=30\Omega$
Rise Time	$T_r$	-	4	-		
Turn-off Delay Time	$T_{d(off)}$	-	20	-		
Fall Time	$T_f$	-	6	-		
Input Capacitance	$C_{iss}$	-	700	1120	pF	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$
Output Capacitance	$C_{oss}$	-	80	-		
Reverse Transfer Capacitance	$C_{rss}$	-	50	-		

**Source-Drain Diode**

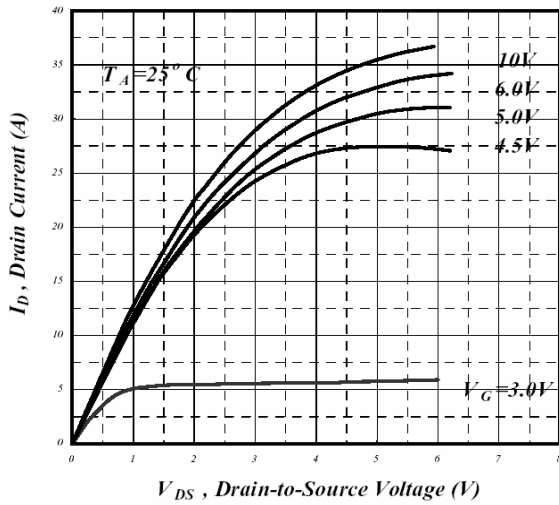
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	$V_{SD}$	-	-	1.2	V	$I_S=3.9A, V_{GS}=0V$
Reverse Recovery Time	$T_{rr}$	-	28	-	ns	$I_S=3.9A, V_{GS}=0V$ $di/dt=100A/\mu s$
Reverse Recovery Charge	$Q_{rr}$	-	25	-	nC	

Notes: 1. Pulse width limited by Max. junction temperature.

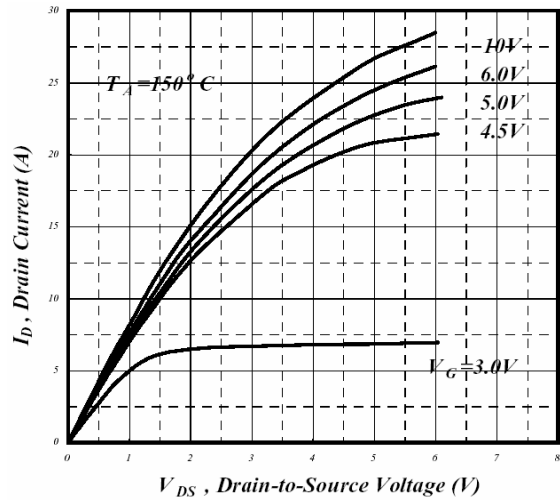
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

3. Mounted on 1 in<sup>2</sup> copper pad of FR4 board; 90°C/W when mounted on Min. copper pad.

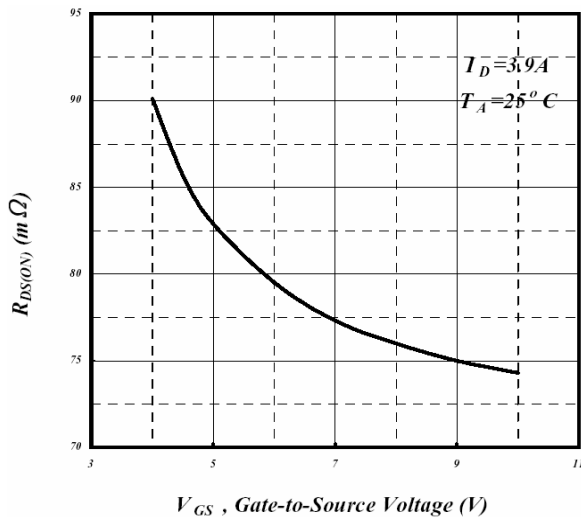
## Characteristics Curve



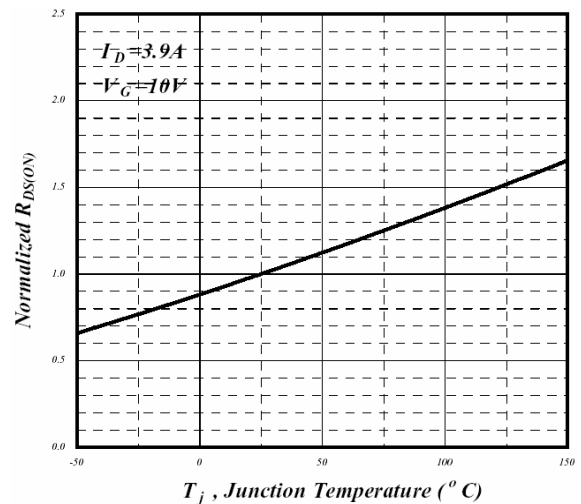
**Fig 1. Typical Output Characteristics**



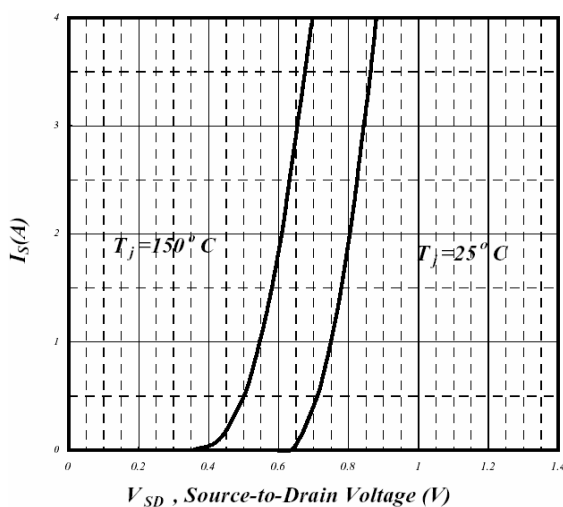
**Fig 2. Typical Output Characteristics**



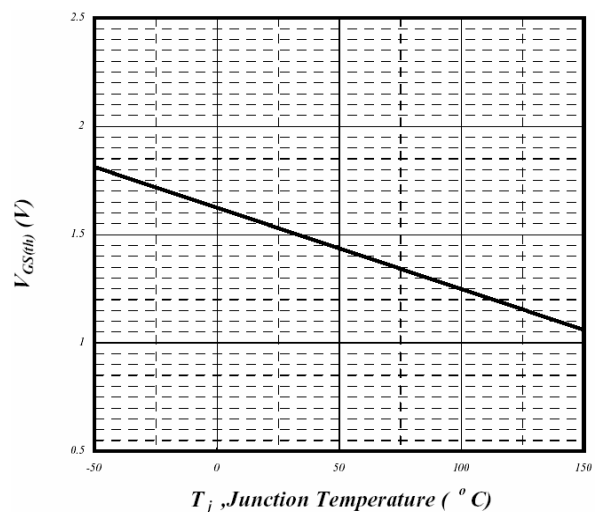
**Fig 3. On-Resistance v.s. Gate Voltage**



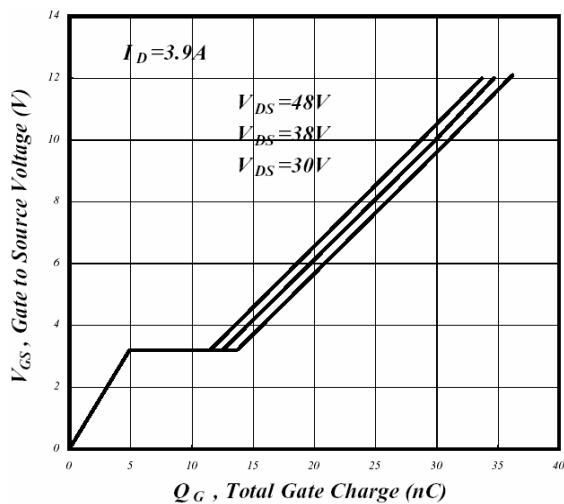
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



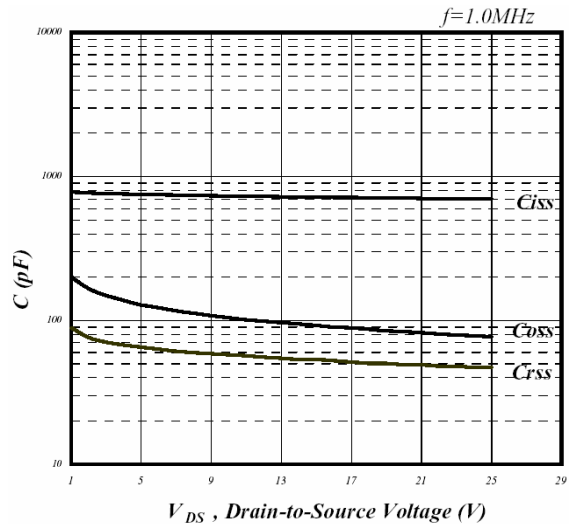
**Fig 5. Forward Characteristics of Reverse Diode**



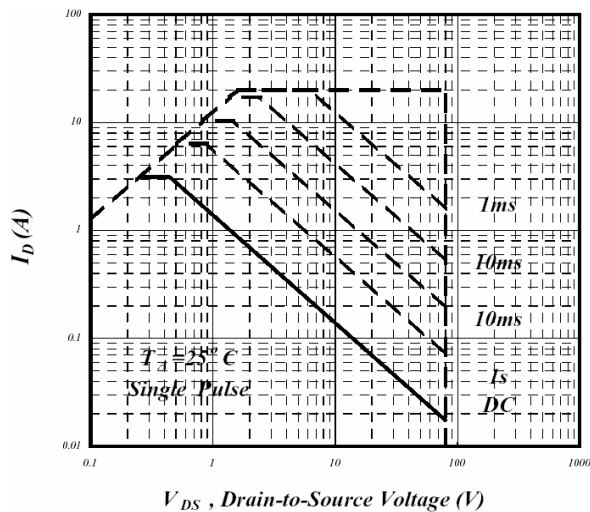
**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



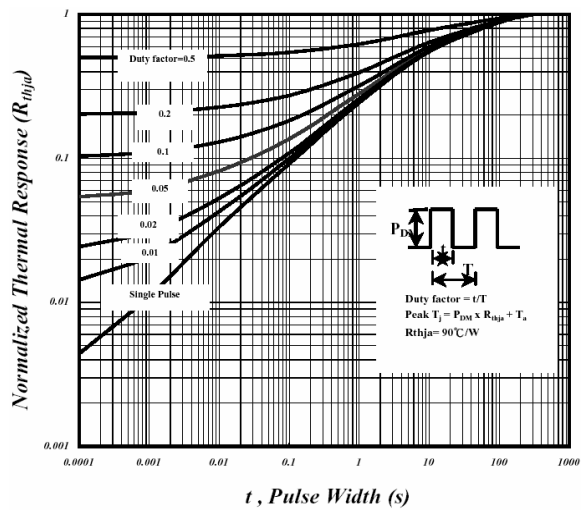
**Fig 7. Gate Charge Characteristics**



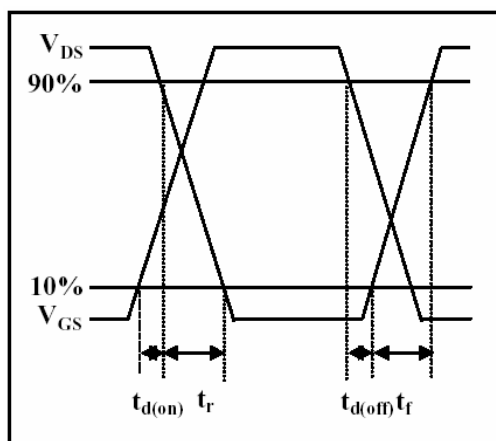
**Fig 8. Typical Capacitance Characteristics**



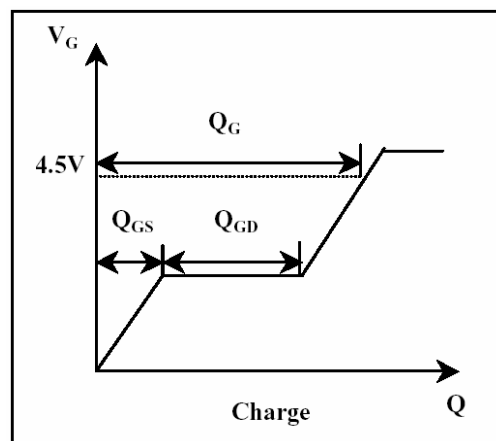
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

**Important Notice:**

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of GTM.
- GTM reserves the right to make changes to its products without notice.
- GTM semiconductor products are not warranted to be suitable for use in life-support Applications, or systems.
- GTM assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.

**Head Office And Factory:**

- Taiwan:** No. 17-1 Tatung Rd. Fu Kou Hsin-Chu Industrial Park, Hsin-Chu, Taiwan, R. O. C.
- TEL : 886-3-597-7061 FAX : 886-3-597-9220, 597-0785
- China:** (201203) No.255, Jang-Jiang Tsai-Lueng RD. , Pu-Dung-Hsin District, Shang-Hai City, China
- TEL : 86-21-5895-7671 ~ 4 FAX : 86-21-38950165