

**GE9973****N-CHANNEL ENHANCEMENT MODE POWER MOSFET**

BVDSS	60V
RDS(ON)	80mΩ
ID	14A

**Description**

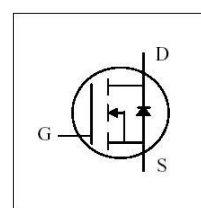
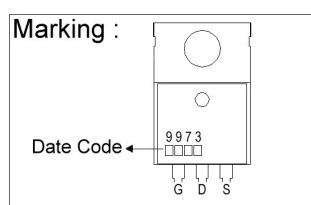
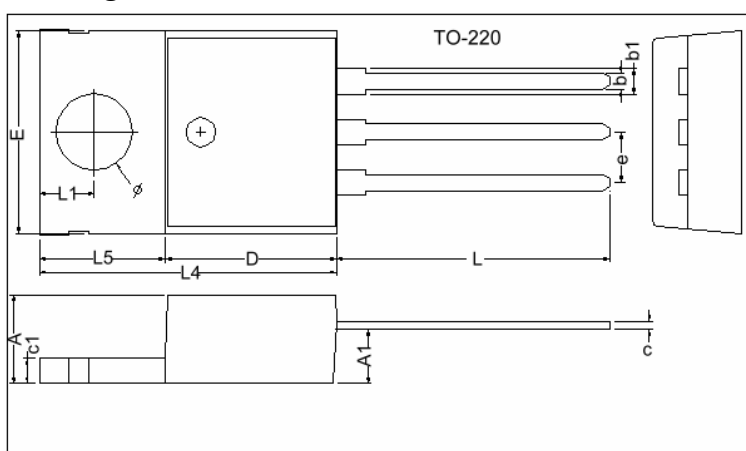
The GE9973 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is universally preferred for all commercial-industrial applications and suited for low voltage applications such as DC/DC converters.

**Features**

\*Simple Drive Requirement

\*Low Gate Charge

**Package Dimensions**

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.80	c1	1.25	1.45
b	0.76	1.00	b1	1.17	1.47
c	0.36	0.50	L	13.25	14.25
D	8.60	9.00	e	2.54 REF.	
E	9.80	10.4	L1	2.60	2.89
L4	14.7	15.3	Ø	3.71	3.96
L5	6.20	6.60	A1	2.60	2.80

**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, $V_{GS}@10V$	$I_D @ T_C=25^\circ C$	14	A
Continuous Drain Current, $V_{GS}@10V$	$I_D @ T_C=100^\circ C$	9	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	40	A
Total Power Dissipation	$P_D @ T_C=25^\circ C$	27	W
Linear Derating Factor		0.22	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-case Max.	$R_{thj-c}$	4.5	$^\circ C/W$
Thermal Resistance Junction-ambient Max.	$R_{thj-a}$	62	$^\circ C/W$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.05	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	-	3.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA
Forward Transconductance	g <sub>fs</sub>	-	8.6	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =9A
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±20V
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	1	uA	V <sub>DS</sub> =60V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =150°C)		-	-	25	uA	V <sub>DS</sub> =48V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	80	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =9A
		-	-	100		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	8	13	nC	I <sub>D</sub> =9A V <sub>DS</sub> =48V V <sub>GS</sub> =4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	3	-		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	-	4	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	7	-	ns	V <sub>DS</sub> =30V I <sub>D</sub> =9A V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω R <sub>D</sub> =3.3Ω
Rise Time	T <sub>r</sub>	-	15	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	16	-		
Fall Time	T <sub>f</sub>	-	3	-		
Input Capacitance	C <sub>iss</sub>	-	720	1150	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	77	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	45	-		

**Source-Drain Diode**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	1.2	V	I <sub>S</sub> =14A, V <sub>GS</sub> =0V
Reverse Recovery Time	T <sub>rr</sub>	-	28	-	ns	I <sub>S</sub> =9A, V <sub>GS</sub> =0V dI/dt=100A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	-	27	-	nC	

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

2. Pulse width ≤ 300us, duty cycle ≤ 2%.

## Characteristics Curve

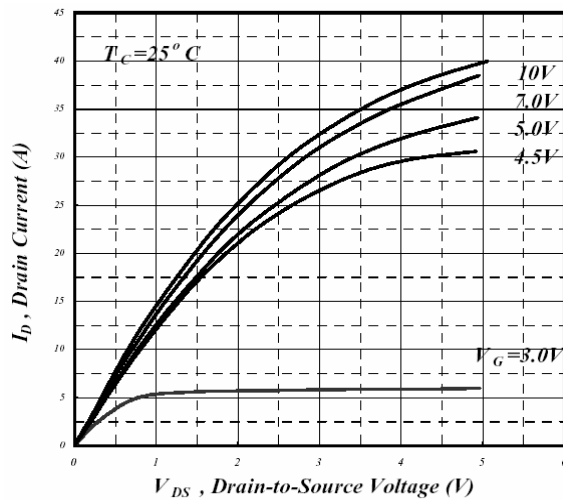


Fig 1. Typical Output Characteristics

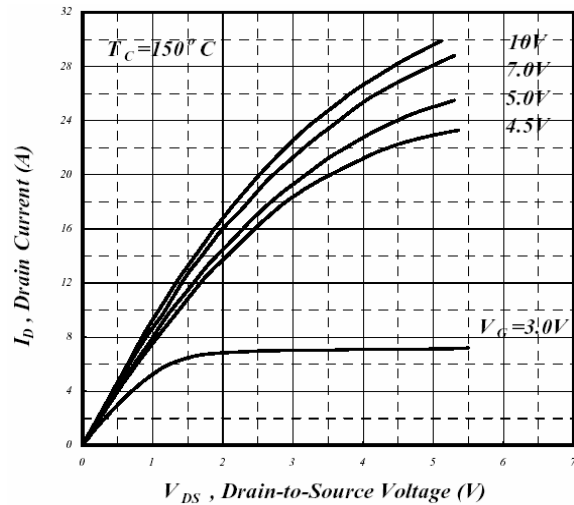


Fig 2. Typical Output Characteristics

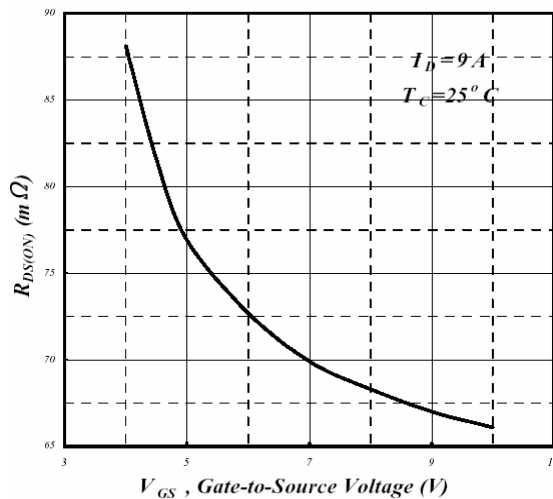


Fig 3. On-Resistance v.s. Gate Voltage

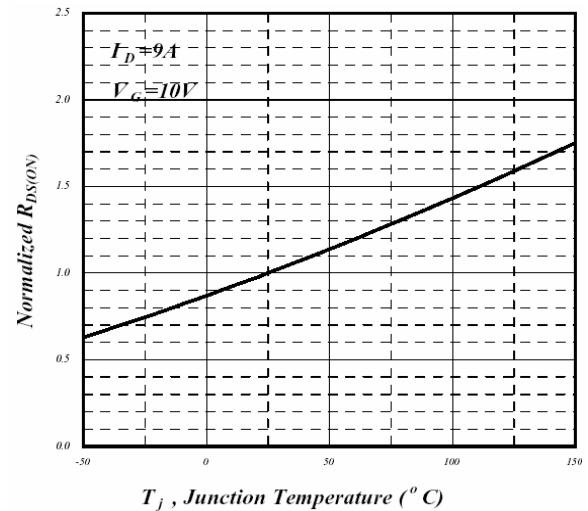


Fig 4. Normalized On-Resistance v.s. Junction Temperature

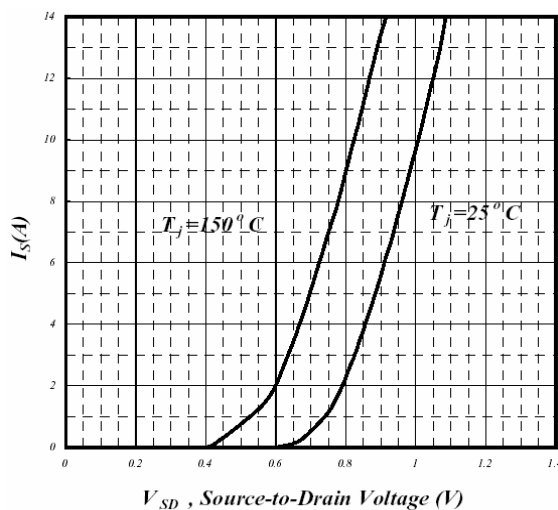


Fig 5. Forward Characteristics of Reverse Diode

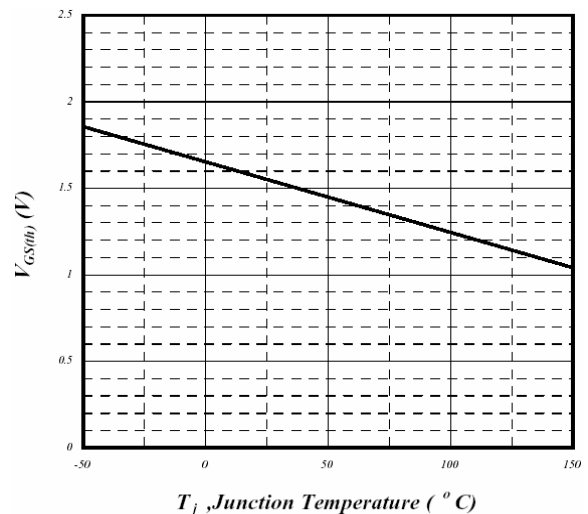
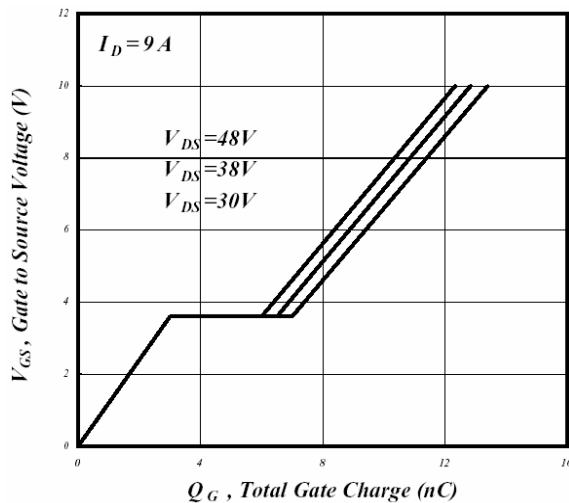
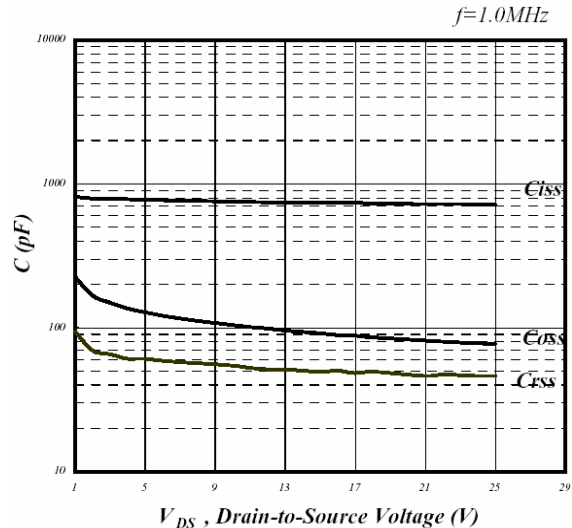


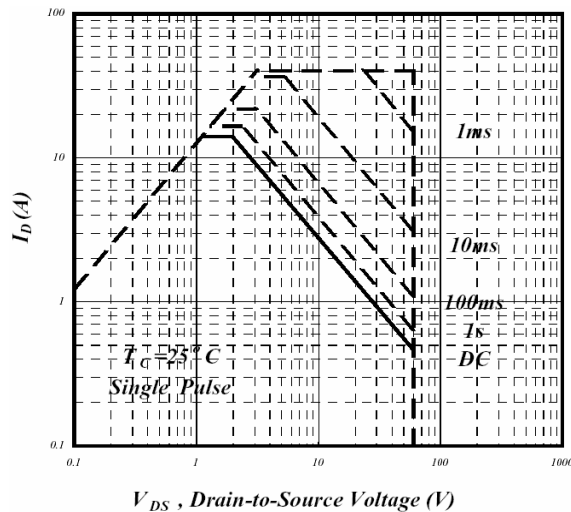
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



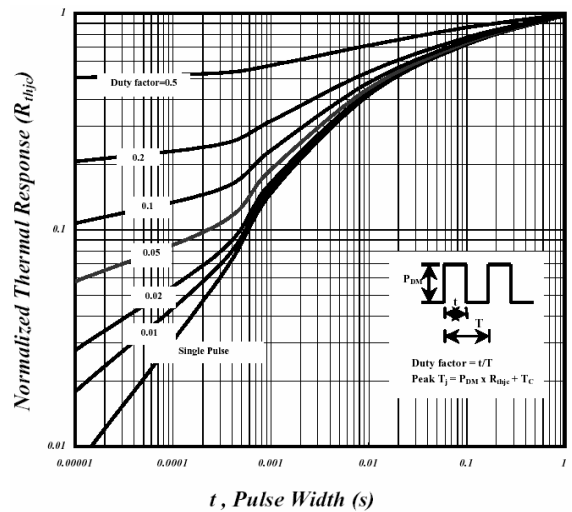
**Fig 7. Gate Charge Characteristics**



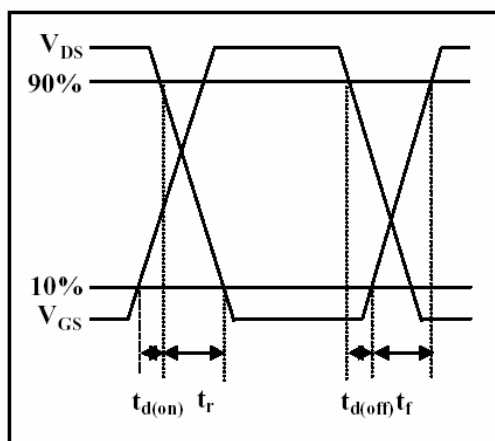
**Fig 8. Typical Capacitance Characteristics**



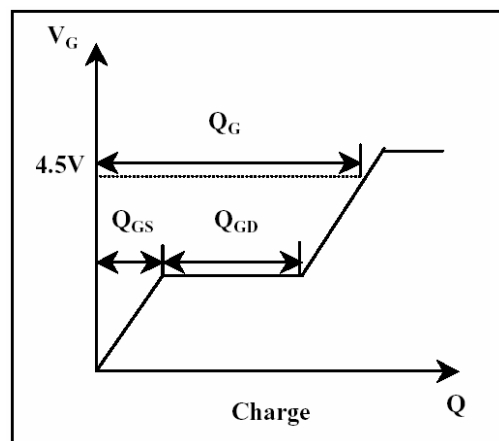
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

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