

# GI9960

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

BVDSS	40V
RDS(ON)	16mΩ
ID	42A

### Description

The GI9960 provides 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
- \*Fast Switching

### Package Dimensions

**TO-251**

**Marking :**

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	0.50	0.70
B	5.20	5.50	H	2.20	2.40
C	6.80	7.20	J	0.45	0.55
D	7.20	7.80	K	0.45	0.60
E	2.30 REF.		L	0.90	1.50
F	0.60	0.90	M	5.40	5.80

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current, $V_{GS}@10V$	$I_D @T_C=25^{\circ}C$	42	A
Continuous Drain Current, $V_{GS}@10V$	$I_D @T_C=100^{\circ}C$	26	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	195	A
Total Power Dissipation	$P_D @T_C=25^{\circ}C$	45	W
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	-55 ~ +150	°C
Linear Derating Factor		0.36	W/°C

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-case	Max. $R_{thj-c}$	2.8	°C/W
Thermal Resistance Junction-ambient	Max. $R_{thj-a}$	110	°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>	40	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.032	-	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>	-	30	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =20A
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> =40V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =150°C)		-	-	25	uA	V <sub>DS</sub> =32V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	-	16	mΩ	I <sub>D</sub> =20A, V <sub>GS</sub> =10V
		-	-	25		I <sub>D</sub> =18A, V <sub>GS</sub> =4.5V
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	18	-	nC	I <sub>D</sub> =20A V <sub>DS</sub> =20V V <sub>GS</sub> =4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	6	-		
Gate-Drain ("Miller") Change	Q <sub>gd</sub>	-	12	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	9	-	ns	V <sub>DS</sub> =20V I <sub>D</sub> =20A V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω R <sub>D</sub> =1Ω
Rise Time	T <sub>r</sub>	-	110	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	23	-		
Fall Time	T <sub>f</sub>	-	10	-		
Input Capacitance	C <sub>iss</sub>	-	1500	-	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	250	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	180	-		

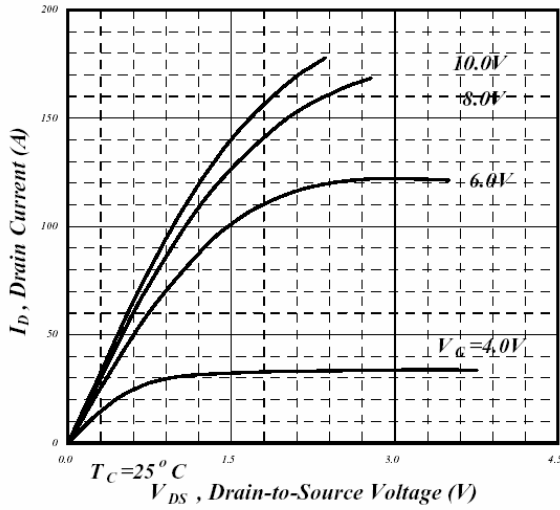
**Source-Drain Diode**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	1.3	V	I <sub>S</sub> =45A, V <sub>GS</sub> =0V
Reverse Recovery Time	T <sub>rr</sub>	-	22	-	ns	I <sub>S</sub> =20A, V <sub>GS</sub> =0V di/dt=100A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	-	27.4	-	nC	

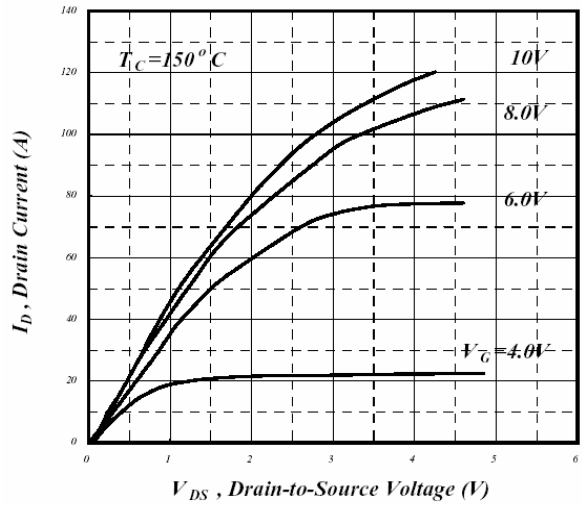
Notes: 1. Pulse width limited by safe operating area.

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

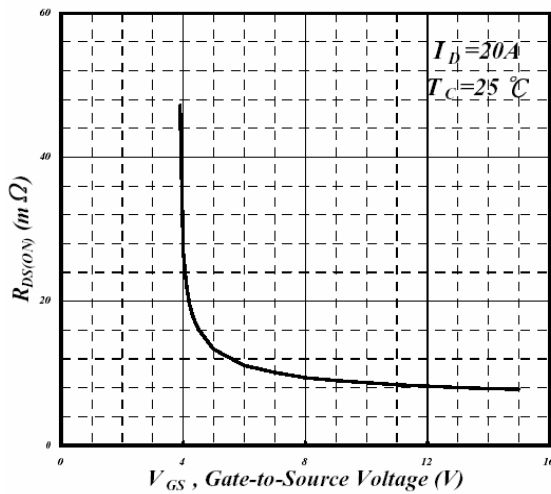
**Characteristics Curve**



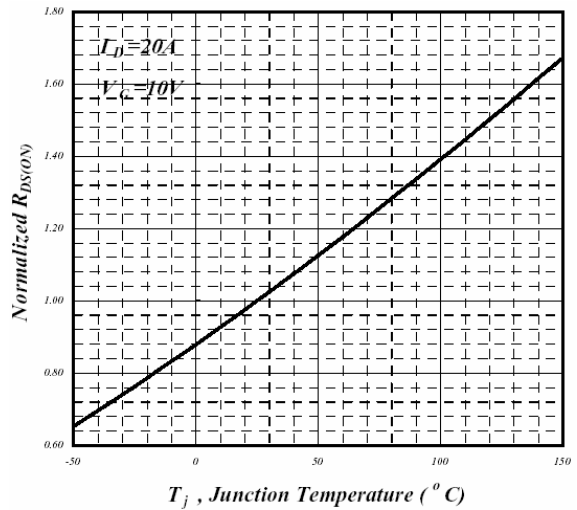
**Fig 1. Typical Output Characteristics**



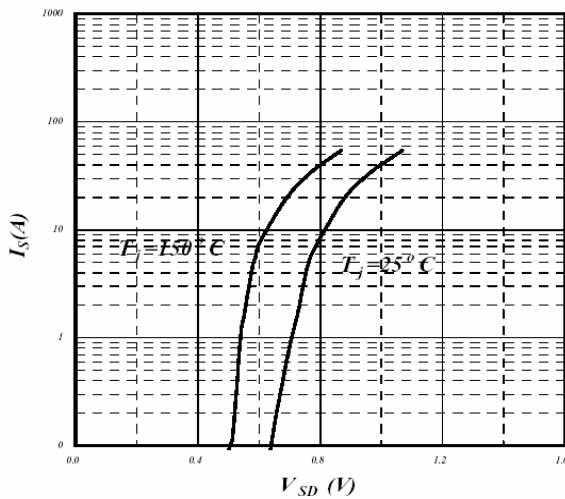
**Fig 2. Typical Output Characteristics**



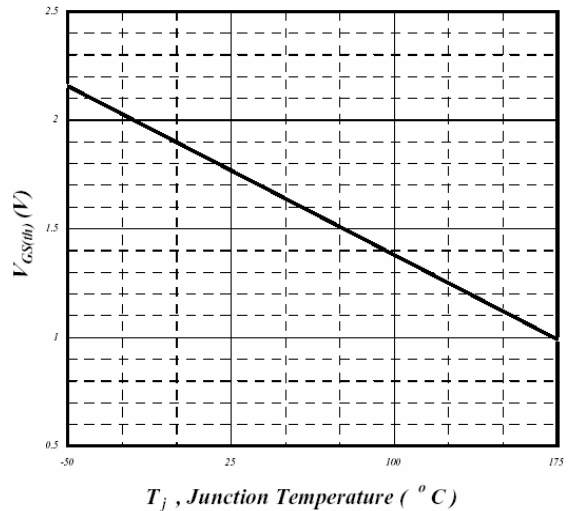
**Fig 3. On-Resistance v.s. Gate Voltage**



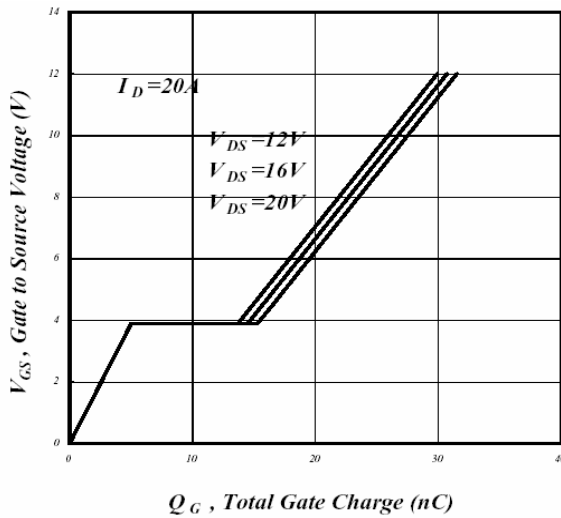
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



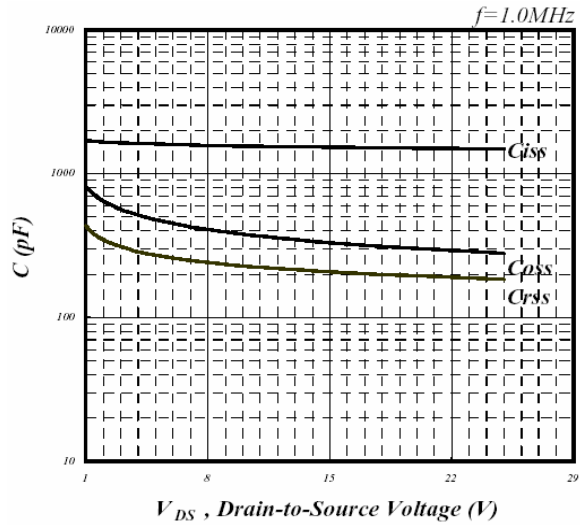
**Fig 5. Forward Characteristic of Reverse Diode**



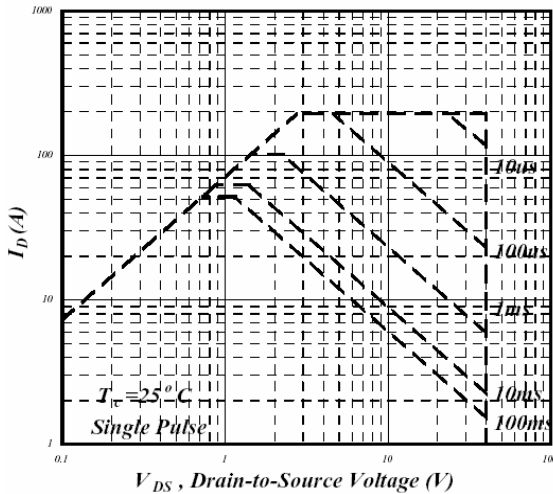
**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



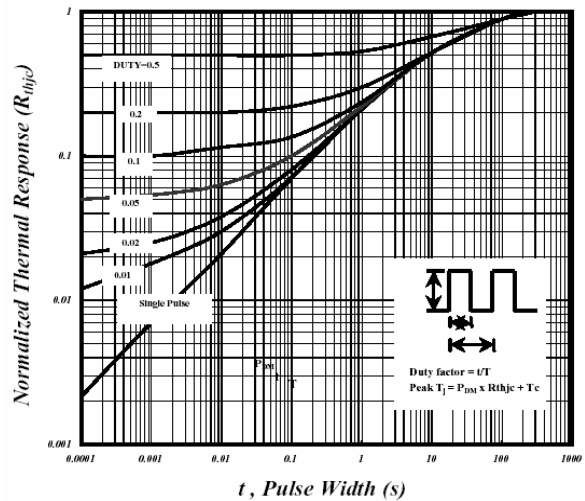
**Fig 7. Gate Charge Characteristics**



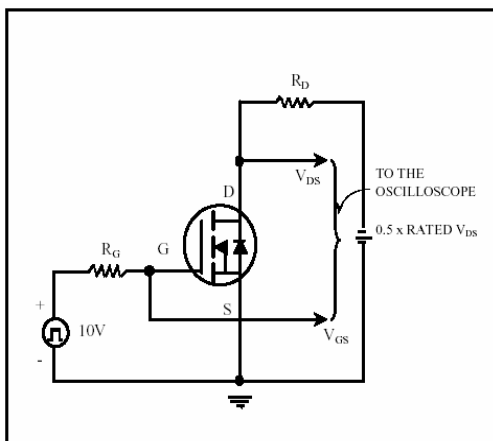
**Fig 8. Typical Capacitance Characteristics**



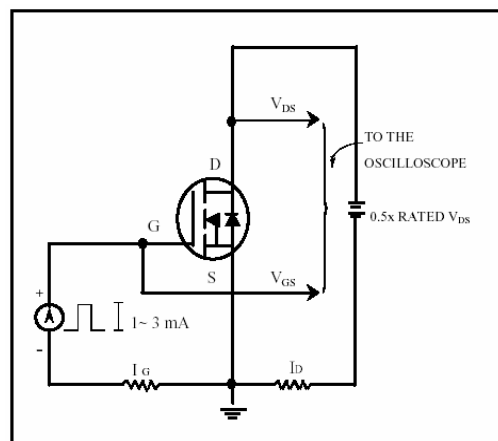
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Circuit**



**Fig 12. Gate Charge Circuit**

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