

# GI9T15

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

BVDSS	20V
RDS(ON)	50mΩ
ID	12.5A

### Description

The GI9T15 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The through-hole version (TO-251) is available for low-profile applications and suited for low voltage applications such as DC/DC converters.

### Features

- \*Low Gate Charge
- \*Single Drive Requirement
- \*Capable of 2.5V gate drive

### 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	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current, $V_{GS}@4.5V$	$I_D @T_C=25^{\circ}C$	12.5	A
Continuous Drain Current, $V_{GS}@4.5V$	$I_D @T_C=100^{\circ}C$	8	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	60	A
Total Power Dissipation	$P_D @T_C=25^{\circ}C$	12.5	W
Linear Derating Factor		0.1	W/°C
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	-55 ~ +150	°C

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-case Max.	$R_{thj-c}$	10	°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	$BV_{DSS}$	20	-	-	V	$V_{GS}=0, I_D=250\mu A$
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.02	-	V/°C	Reference to 25°C, $I_D=1mA$
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Forward Transconductance	$g_{fs}$	-	10	-	S	$V_{DS}=5V, I_D=10A$
Gate-Source Leakage Current	$I_{GSS}$	-	-	±100	nA	$V_{GS}= \pm 12V$
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	$I_{DSS}$	-	-	1	uA	$V_{DS}=20V, V_{GS}=0$
Drain-Source Leakage Current(T <sub>j</sub> =150°C)		-	-	25	uA	$V_{DS}=16V, V_{GS}=0$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	-	50	mΩ	$V_{GS}=4.5V, I_D=6A$
		-	-	80		$V_{GS}=2.5V, I_D=5.2A$
Total Gate Charge <sup>2</sup>	$Q_g$	-	5	8	nC	$I_D=10A$ $V_{DS}=16V$ $V_{GS}=4.5V$
Gate-Source Charge	$Q_{gs}$	-	1	-		
Gate-Drain ("Miller") Charge	$Q_{gd}$	-	2	-		
Turn-on Delay Time <sup>2</sup>	$T_{d(on)}$	-	8	-	ns	$V_{DS}=10V$ $I_D=10A$ $V_{GS}=5V$ $R_G=3.3\Omega$ $R_D=1.0\Omega$
Rise Time	$T_r$	-	55	-		
Turn-off Delay Time	$T_{d(off)}$	-	10	-		
Fall Time	$T_f$	-	3	-		
Input Capacitance	$C_{iss}$	-	360	580	pF	$V_{GS}=0V$ $V_{DS}=20V$ $f=1.0MHz$
Output Capacitance	$C_{oss}$	-	70	-		
Reverse Transfer Capacitance	$C_{rss}$	-	50	-		
Gate Resistance	$R_g$	-	1.67	-	Ω	$f=1.0MHz$

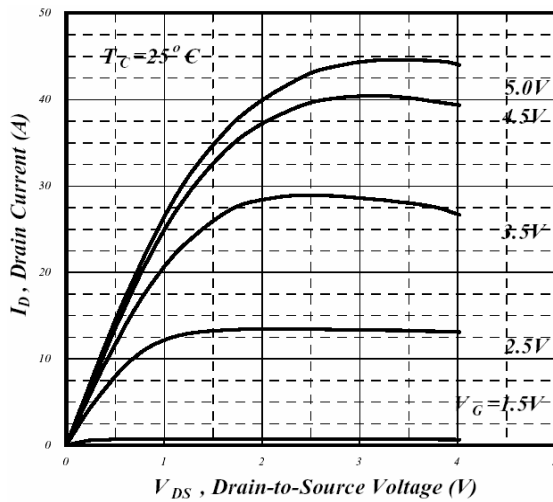
**Source-Drain Diode**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	$V_{SD}$	-	-	1.3	V	$I_S=10A, V_{GS}=0V$
Reverse Recovery Time <sup>2</sup>	$T_{rr}$	-	17	-	ns	$I_S=10A, V_{GS}=0V$ $di/dt=100A/\mu s$
Reverse Recovery Charge	$Q_{rr}$	-	9	-	nC	

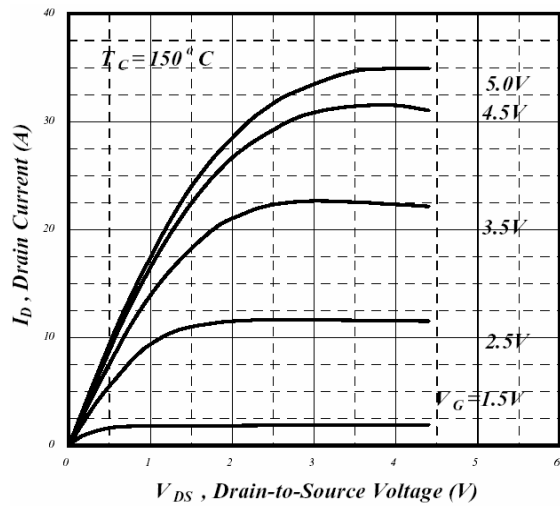
Notes: 1. Pulse width limited by safe operating area.

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

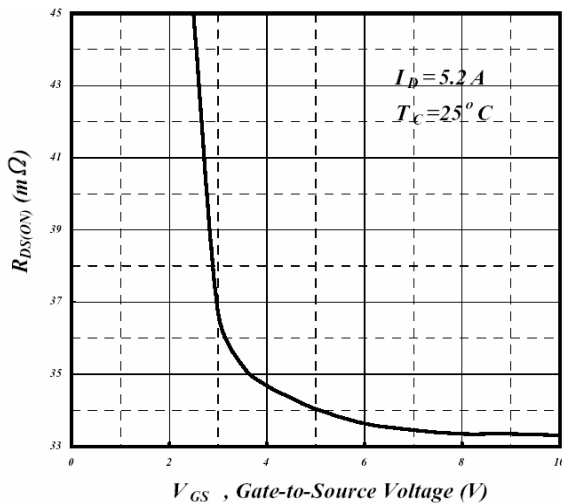
## Characteristics Curve



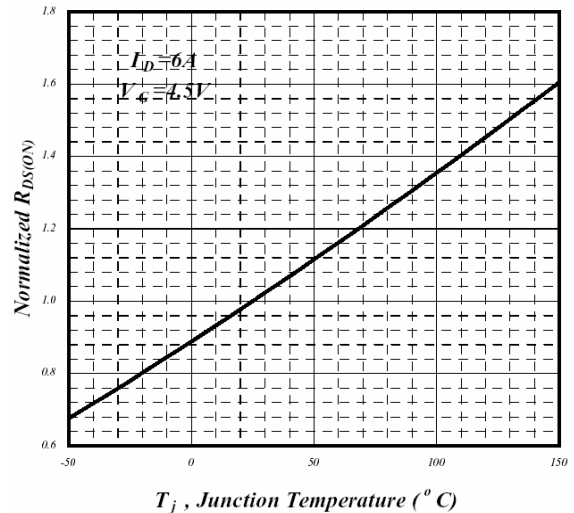
**Fig 1. Typical Output Characteristics**



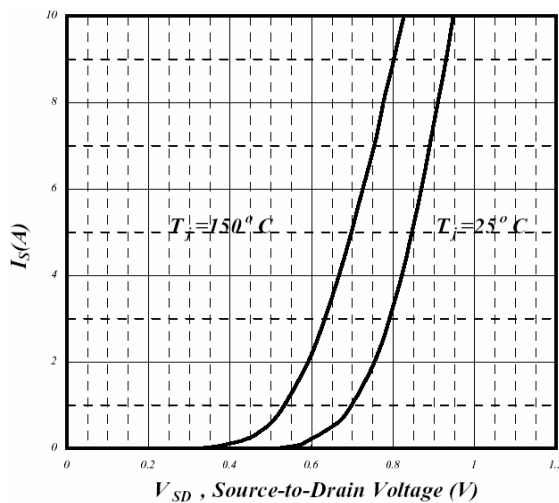
**Fig 2. Typical Output Characteristics**



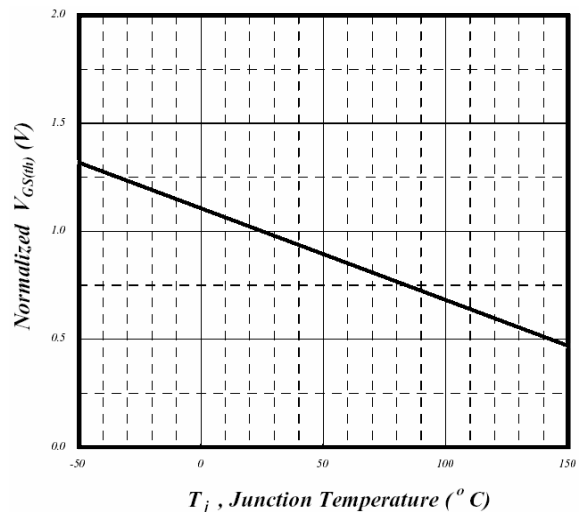
**Fig 3. On-Resistance v.s. Gate Voltage**



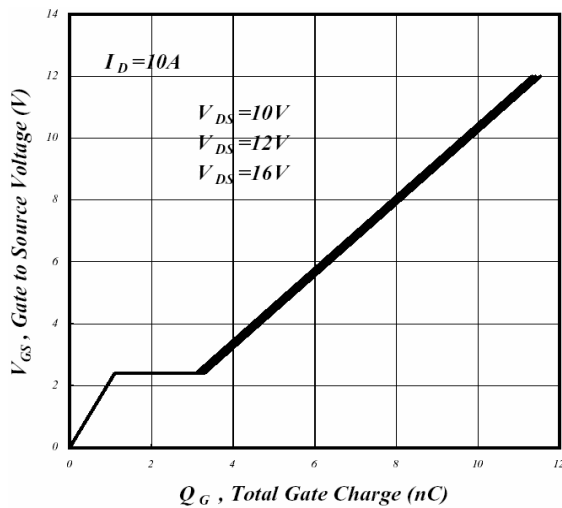
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



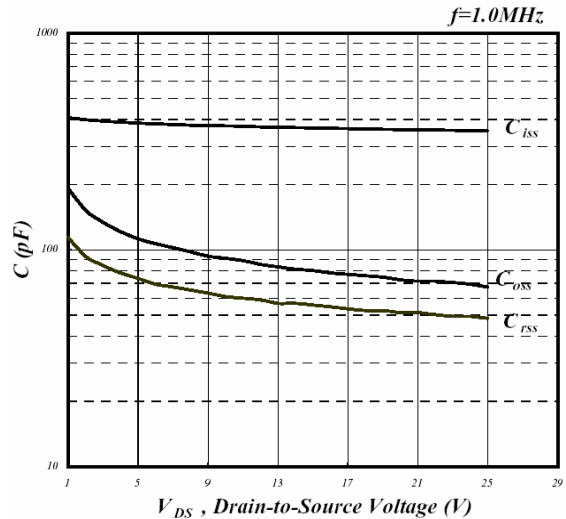
**Fig 5. Forward Characteristics of Reverse Diode**



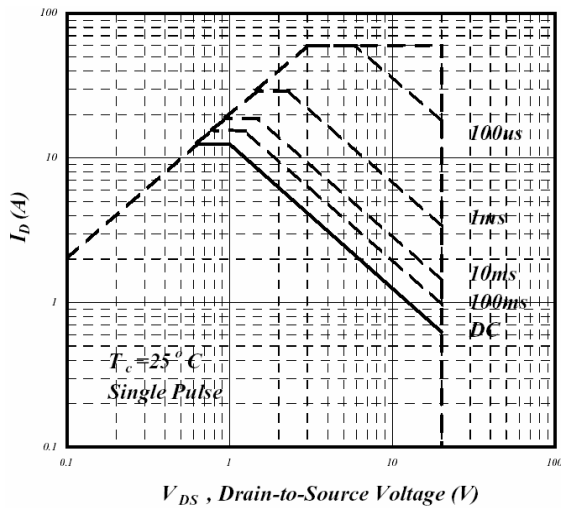
**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



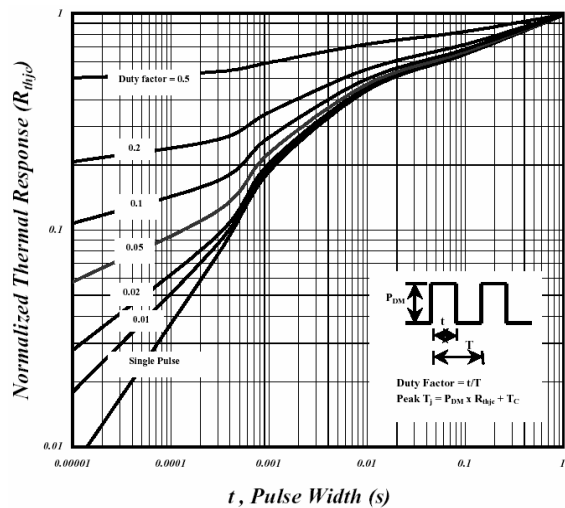
**Fig 7. Gate Charge Characteristics**



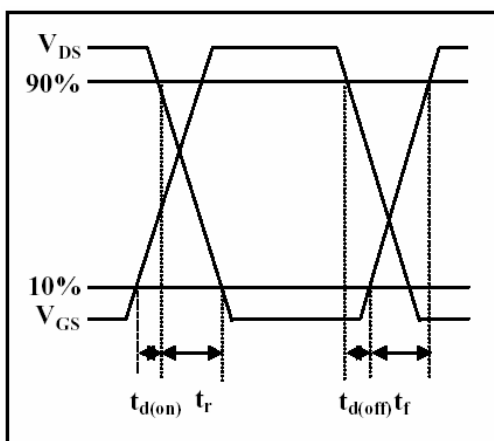
**Fig 8. Typical Capacitance Characteristics**



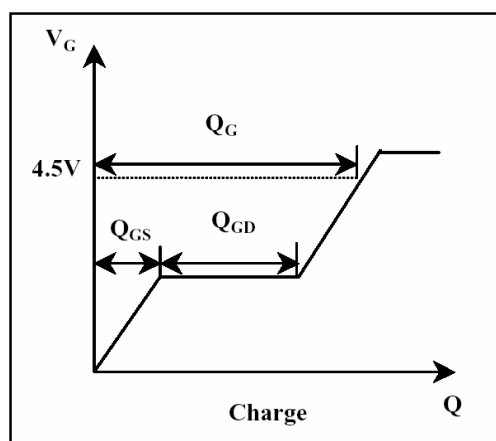
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

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