

## GSC4412

### N-CHANNEL ENHANCEMENT MODE POWER MOSFET

BVDSS	25V
RDS(ON)	33mΩ
ID	7A

### Description

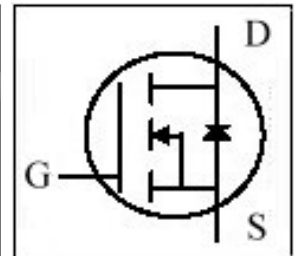
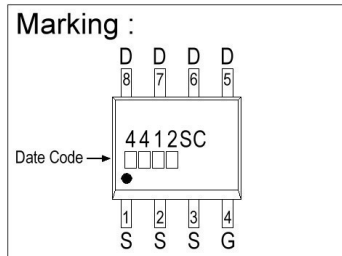
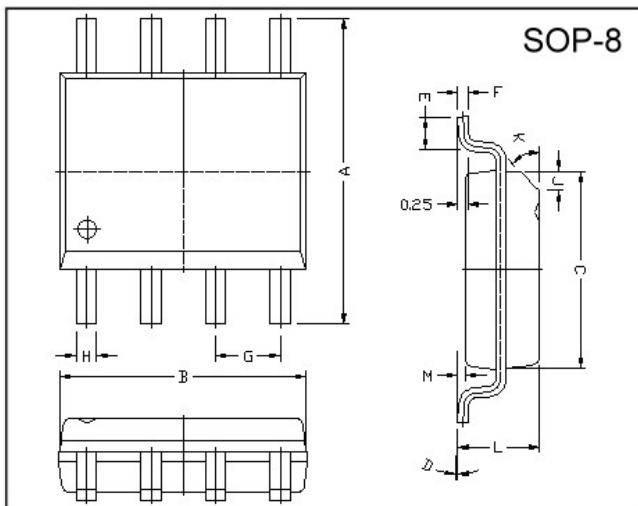
The GSC4412 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

### Features

- \*Simple Drive Requirement
- \*Low Gate Charge
- \*Fast Switching
- \*RoHS Compliant

### Package Dimensions



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.49
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.375 REF.	
E	0.40	0.90	K	45°	
F	0.19	0.25	G	1.27 TYP.	

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	25	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>3</sup>	$I_D @ TA=25^\circ C$	7	A
Continuous Drain Current <sup>3</sup>	$I_D @ TA=70^\circ C$	5.8	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	30	A
Total Power Dissipation	$P_D @ TA=25^\circ C$	2.5	W
Linear Derating Factor		0.02	W/°C
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	-55 ~ +150	°C

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient <sup>3</sup> Max.	$R_{thj-amb}$	50	°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>	25	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.03	-	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>	-	12	-	S	V <sub>DS</sub> =15V, I <sub>D</sub> =7A
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> =25V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =70°C)		-	-	25	uA	V <sub>DS</sub> =20V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	33	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =7A
		-	-	60		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.5A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	7	-	nC	I <sub>D</sub> =7A V <sub>DS</sub> =16V V <sub>GS</sub> =5V
Gate-Source Charge	Q <sub>gs</sub>	-	1.5	-		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	-	5	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	7	-	ns	V <sub>DS</sub> =16V I <sub>D</sub> =7A V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω R <sub>D</sub> =2.3Ω
Rise Time	T <sub>r</sub>	-	22	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	14.5	-		
Fall Time	T <sub>f</sub>	-	6	-		
Input Capacitance	C <sub>iss</sub>	-	218	-	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	155	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	63	-		

**Source-Drain Diode**

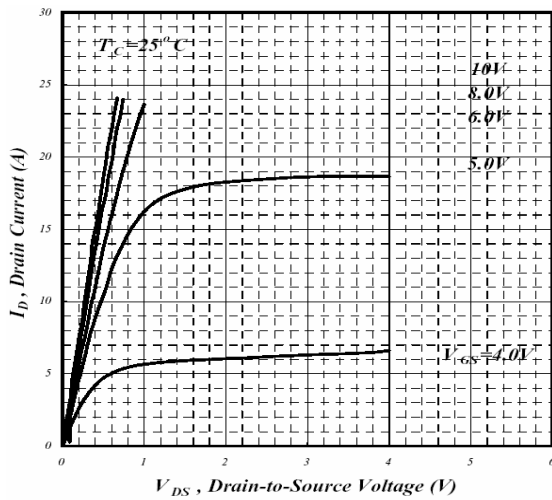
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	1.2	V	I <sub>S</sub> =2.3A, V <sub>GS</sub> =0V, T <sub>j</sub> =25°C
Continuous Source Current (Body Diode)	I <sub>S</sub>	-	-	2.08	A	V <sub>D</sub> =V <sub>G</sub> =0V, V <sub>S</sub> =1.2V

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

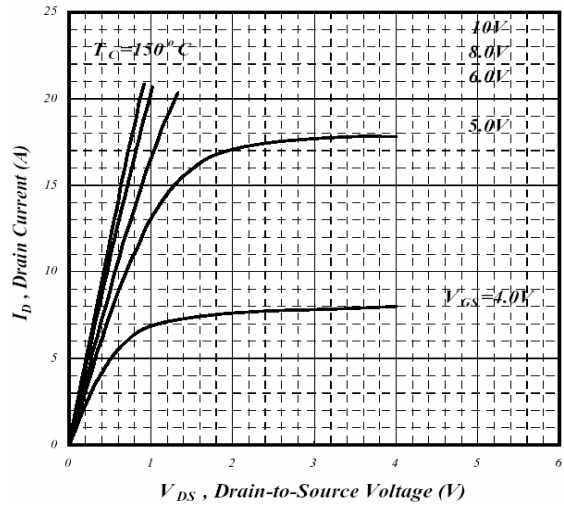
2. Pulse width ≤ 300us, duty cycle ≤ 2%.

3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board; 125°C/W when mounted on Min. copper pad.

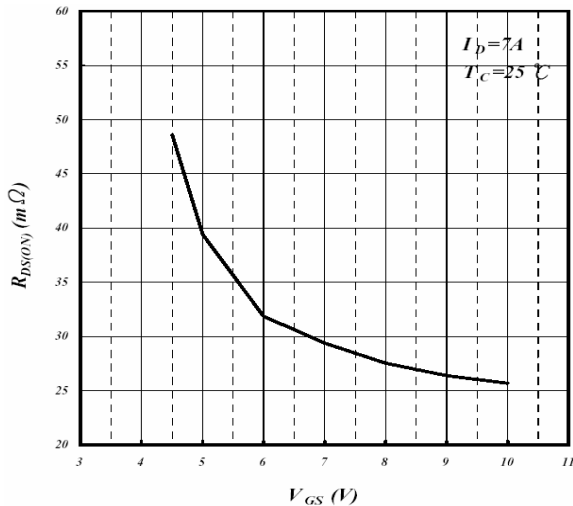
## Characteristics Curve



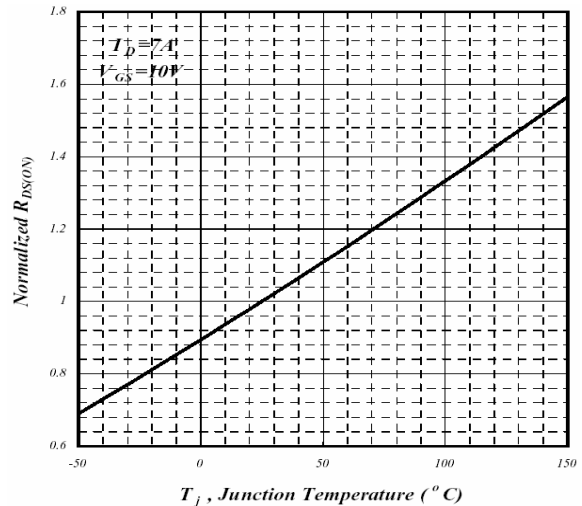
**Fig 1. Typical Output Characteristics**



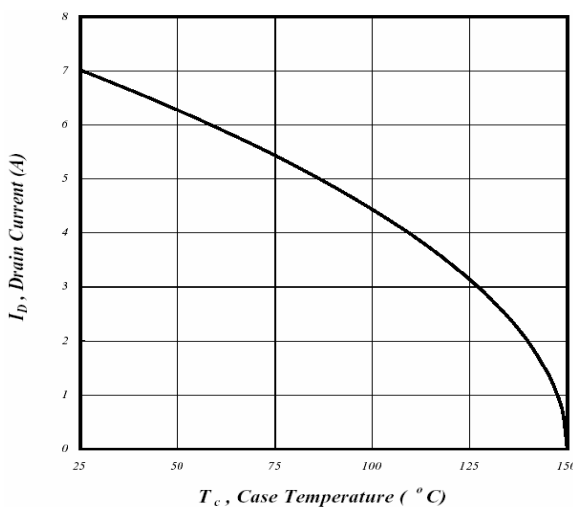
**Fig 2. Typical Output Characteristics**



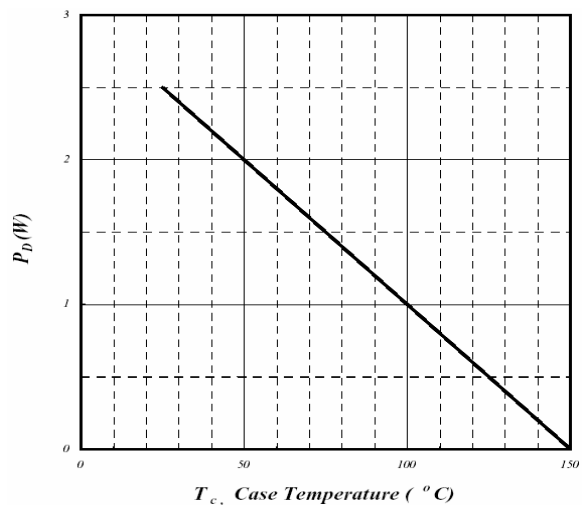
**Fig 3. On-Resistance v.s. Gate Voltage**



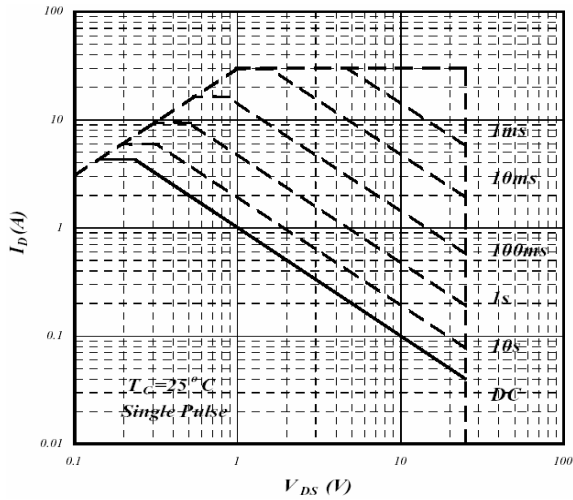
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



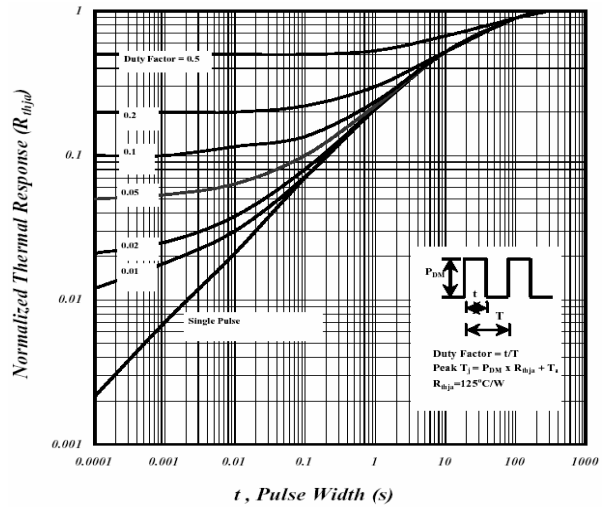
**Fig 5. Maximum Drain Current v.s. Case Temperature**



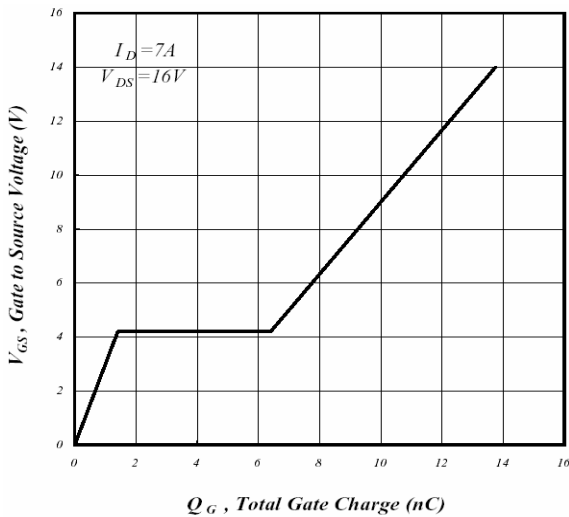
**Fig 6. Type Power Dissipation**



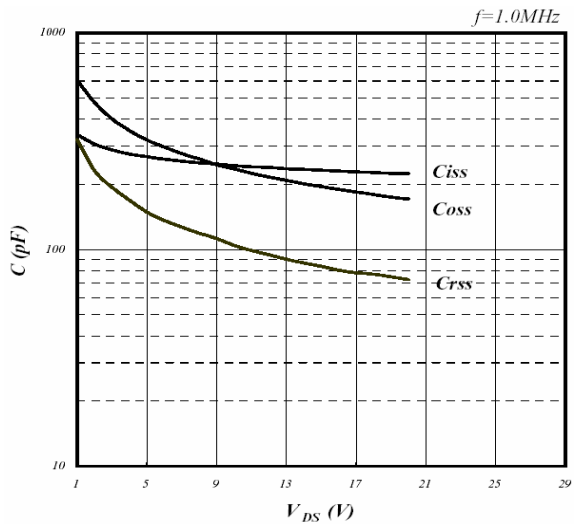
**Fig 7. Maximum Safe Operating Area**



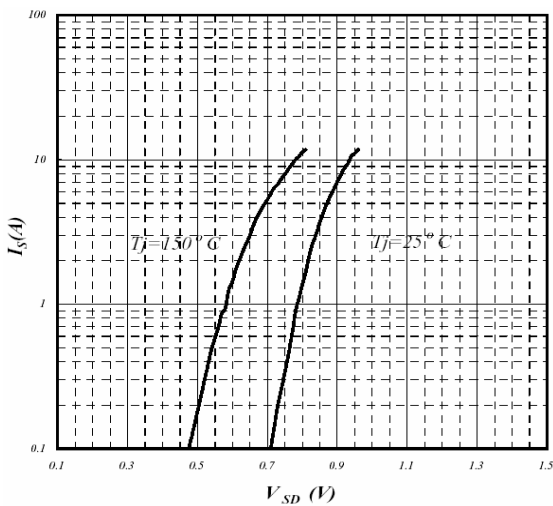
**Fig 8. Effective Transient Thermal Impedance**



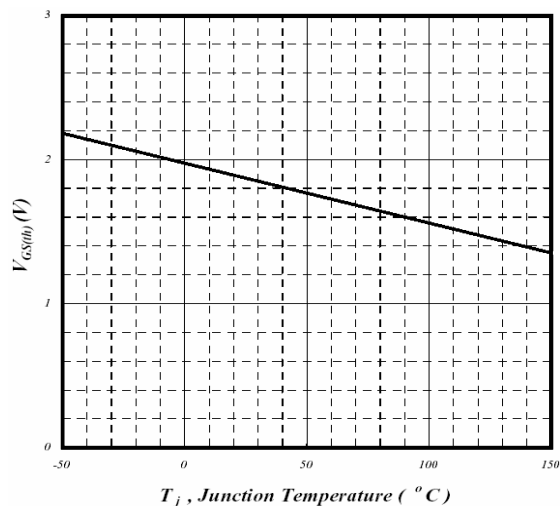
**Fig 9. Gate Charge Characteristics**



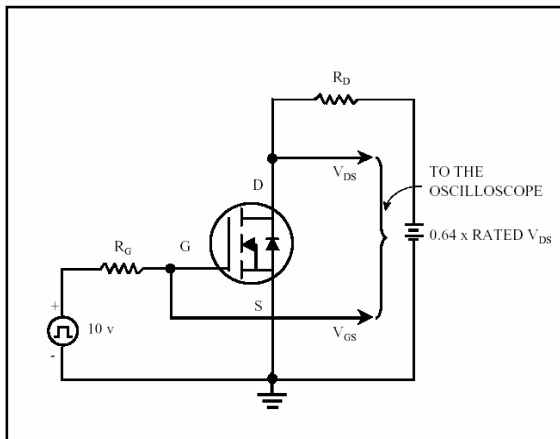
**Fig 10. Typical Capacitance Characteristics**



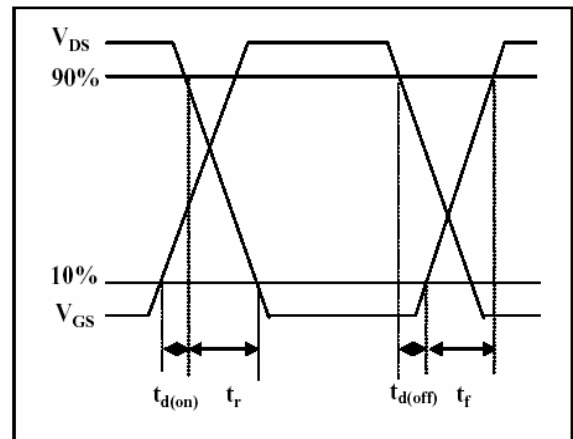
**Fig 11. Forward Characteristics of Reverse Diode**



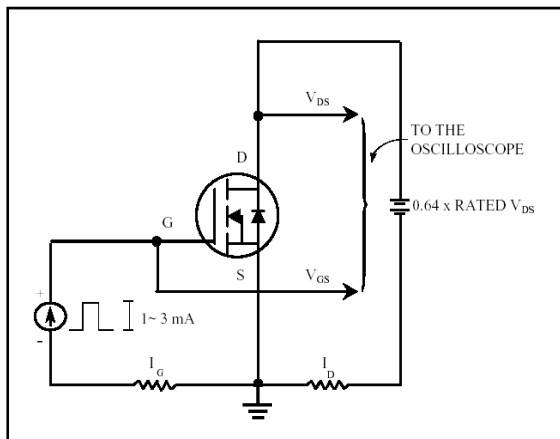
**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**



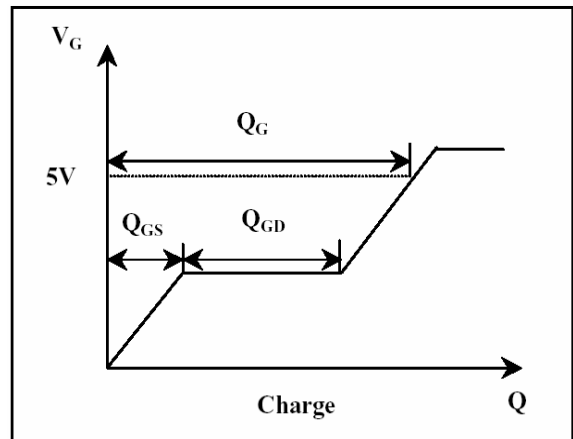
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

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