

# GTM CORPORATION

ISSUED DATE :2006/02/16  
REVISED DATE :

## GT3585

### N AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

N-CH BV <sub>DSS</sub>	20V
R <sub>DS(ON)</sub>	75mΩ
I <sub>D</sub>	3.5A
P-CH BV <sub>DSS</sub>	-20V
R <sub>DS(ON)</sub>	160mΩ
I <sub>D</sub>	-2.5A

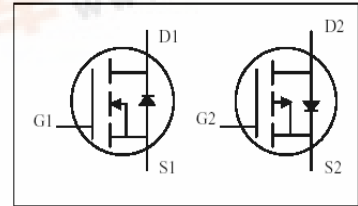
### Description

The GT3585 provide the designer with best combination of fast switching, low on-resistance and cost-effectiveness.

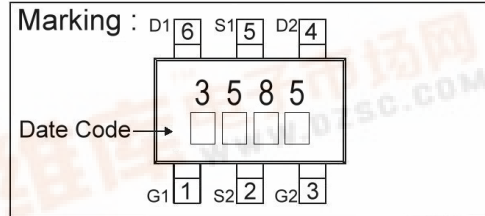
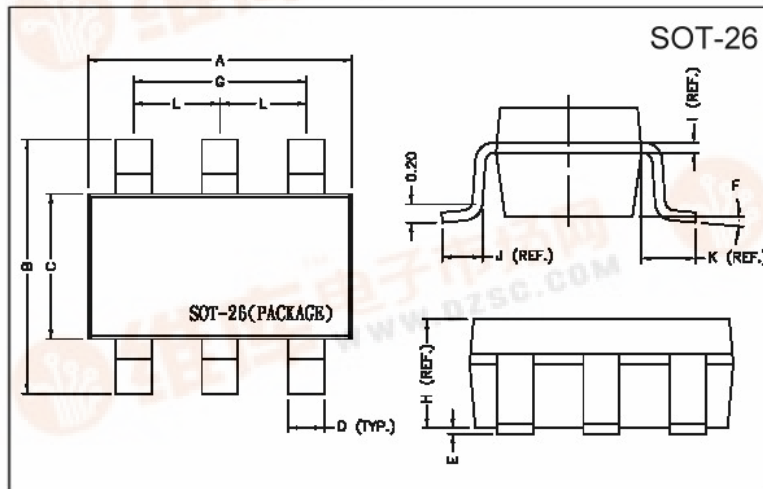
The SOT-26 package is universally used for all commercial-industrial surface mount applications.

### Features

- \*Low Gate Change
- \*Low On-resistance
- \*RoHS Compliant



### Package Dimensions



REF.	Millimeter		REF.	Dimensions
	Min.	Max.		Millimeter
A	2.70	3.10	G	1.90 REF.
B	2.60	3.00	H	1.20 REF.
C	1.40	1.80	I	0.12 REF.
D	0.30	0.55	J	0.37 REF.
E	0	0.10	K	0.60 REF.
F	0°	10°	L	0.95 REF.

### Absolute Maximum Ratings

Parameter	Symbol	Ratings		Unit
		N-channel	P-channel	
Drain-Source Voltage	V <sub>DS</sub>	20	-20	V
Gate-Source Voltage	V <sub>GS</sub>	± 12	± 12	V
Continuous Drain Current <sup>3</sup>	I <sub>D</sub> @TA=25°C	3.5	-2.5	A
Continuous Drain Current <sup>3</sup>	I <sub>D</sub> @TA=70°C	2.8	-1.97	A
Pulsed Drain Current <sup>1</sup>	I <sub>DM</sub>	10	-10	A
Total Power Dissipation	P <sub>D</sub> @TA=25°C	1.14		W
Linear Derating Factor		0.01		W/°C
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55 ~ +150		°C

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient <sup>3</sup> Max.	R <sub>thj-a</sub>	110	°C/W

**N-Channel 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>	20	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	0.02	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	-	1.2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA
Forward Transconductance	g <sub>fs</sub>	-	7	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =3A
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±12V
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	1	uA	V <sub>DS</sub> =20V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =70°C)		-	-	10	uA	V <sub>DS</sub> =16V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	75	mΩ	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.5A
		-	-	125		V <sub>GS</sub> =2.5V, I <sub>D</sub> =1.2A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	4	7	nC	I <sub>D</sub> =3A V <sub>DS</sub> =16V V <sub>GS</sub> =4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	0.7	-		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	-	2	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	6	-	ns	V <sub>DS</sub> =15V I <sub>D</sub> =1A V <sub>GS</sub> =5V R <sub>G</sub> =3.3Ω R <sub>D</sub> =15Ω
Rise Time	T <sub>r</sub>	-	8	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	10	-		
Fall Time	T <sub>f</sub>	-	3	-		
Input Capacitance	C <sub>iss</sub>	-	230	370	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =20V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	55	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	40	-		
Gate Resistance	R <sub>g</sub>	-	1.1	1.7	Ω	f=1.0MHz

**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> =1.2A, V <sub>GS</sub> =0V
Reverse Recovery Time	T <sub>rr</sub>	-	16	-	ns	I <sub>S</sub> =3A, V <sub>GS</sub> =0V di/dt=100A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	-	8	-	nC	

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, t ≤ 5sec; 180°C/W when mounted on Min. copper pad.

**P-Channel 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>	-20	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =-250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	-0.01	-	V/°C	Reference to 25°C, I <sub>D</sub> =-1mA
Gate Threshold Voltage	V <sub>GS(th)</sub>	-	-	-1.2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA
Forward Transconductance	g <sub>fs</sub>	-	4.0	-	S	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2A
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±12V
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	-1	uA	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =70°C)		-	-	-25	uA	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	120	mΩ	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2.8A
		-	-	160		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.5A
		-	-	300		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	5	8	nC	I <sub>D</sub> =-2A V <sub>DS</sub> =-16V V <sub>GS</sub> =-4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	1	-		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	-	2	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	6	-	ns	V <sub>DS</sub> =-10V I <sub>D</sub> =-1A V <sub>GS</sub> =-10V R <sub>G</sub> =3.3Ω R <sub>D</sub> =10Ω
Rise Time	T <sub>r</sub>	-	17	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	16	-		
Fall Time	T <sub>f</sub>	-	5	-		
Input Capacitance	C <sub>iss</sub>	-	270	430	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =-20V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	70	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	55	-		

**Source-Drain Diode**

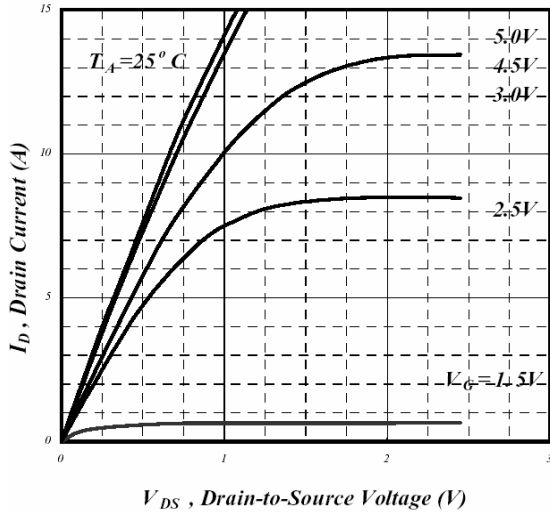
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	-1.2	V	I <sub>S</sub> =-1.2A, V <sub>GS</sub> =0V
Reverse Recovery Time <sup>2</sup>	T <sub>rr</sub>	-	20	-	ns	I <sub>S</sub> =-2A, V <sub>GS</sub> =0V
Reverse Recovery Charge	Q <sub>rr</sub>	-	15	-	nC	di/dt=100A/μs

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

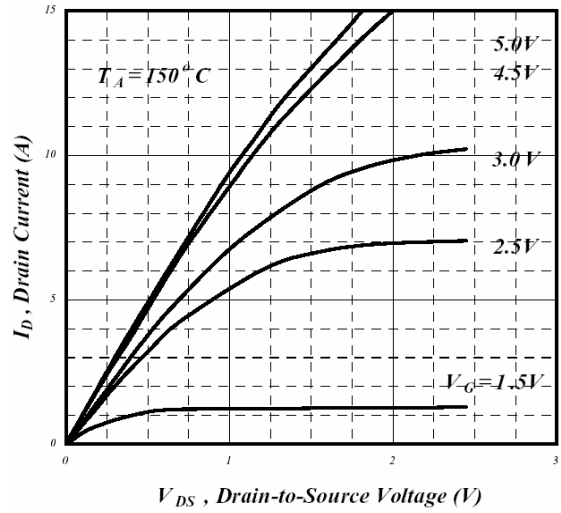
2. Pulse width ≤ 300us, duty cycle ≤ 2%.

3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤ 5sec; 180°C/W when mounted on Min. copper pad.

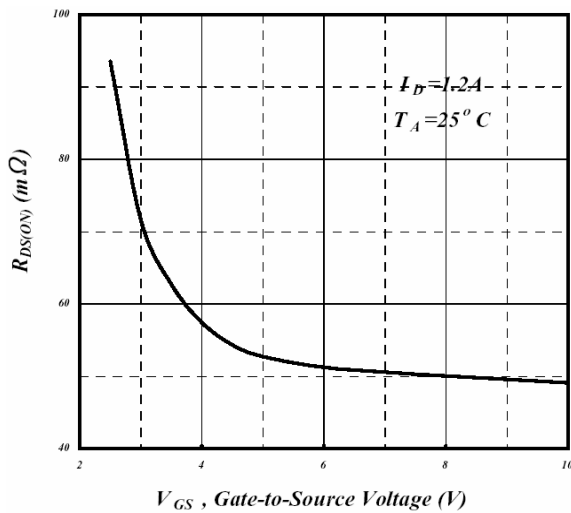
## Characteristics Curve N-Channel



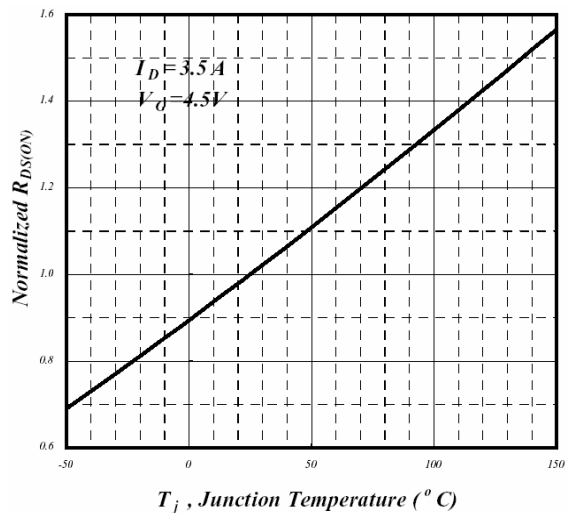
**Fig 1. Typical Output Characteristics**



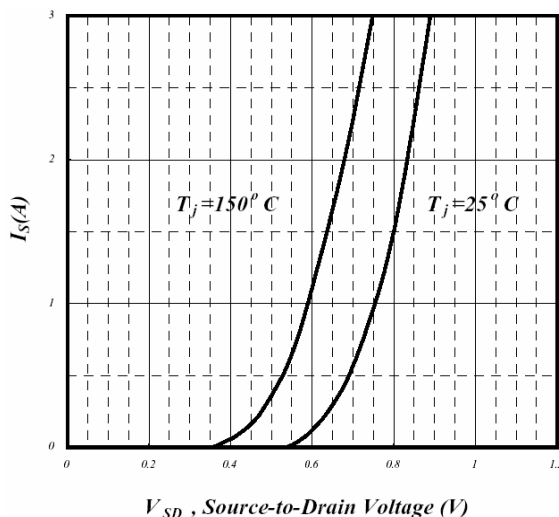
**Fig 2. Typical Output Characteristics**



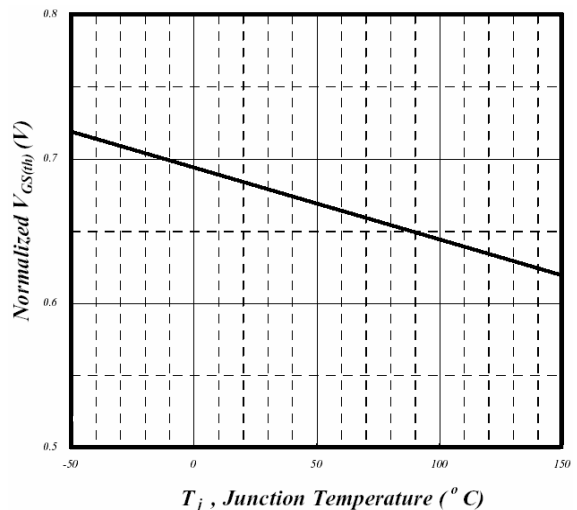
**Fig 3. On-Resistance v.s. Gate Voltage**



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

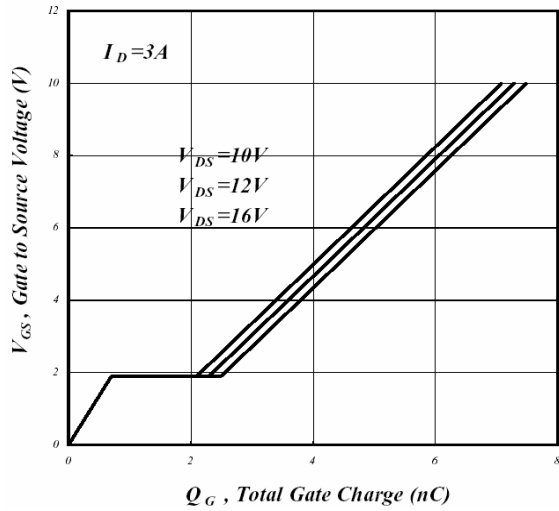


**Fig 5. Forward Characteristics of Reverse Diode**

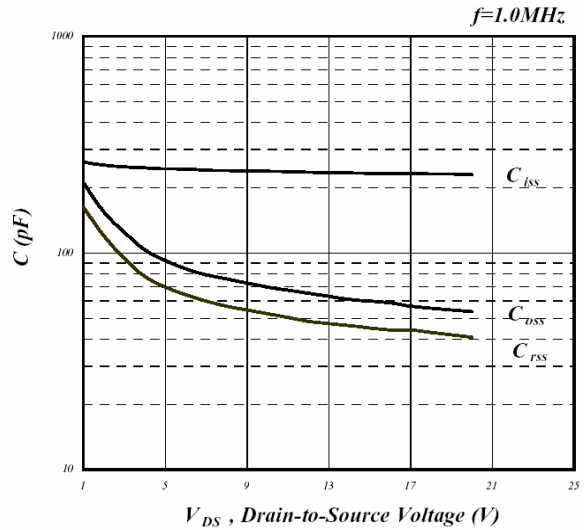


**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

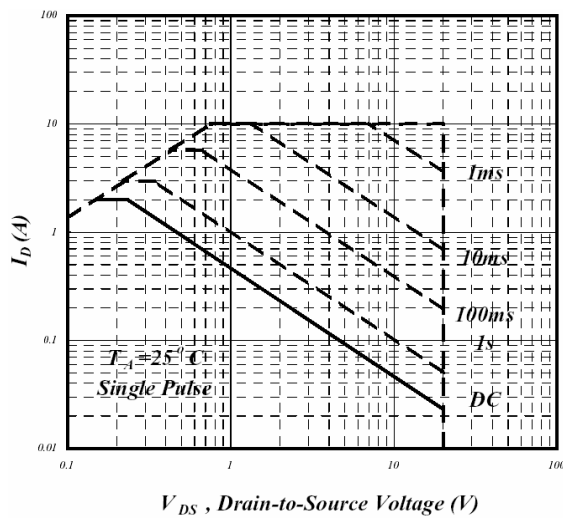
## N-Channel



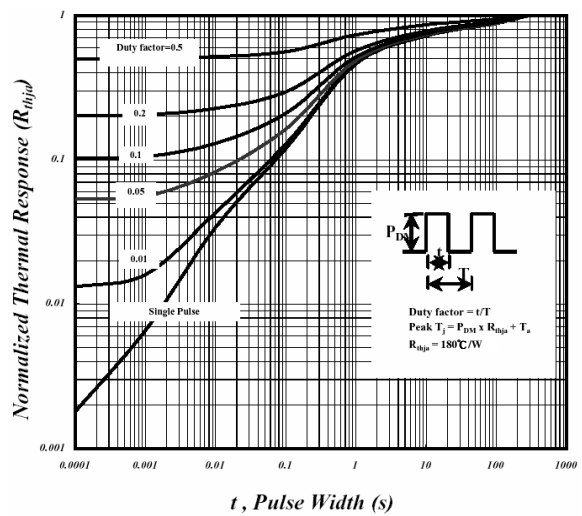
**Fig 7. Gate Charge Characteristics**



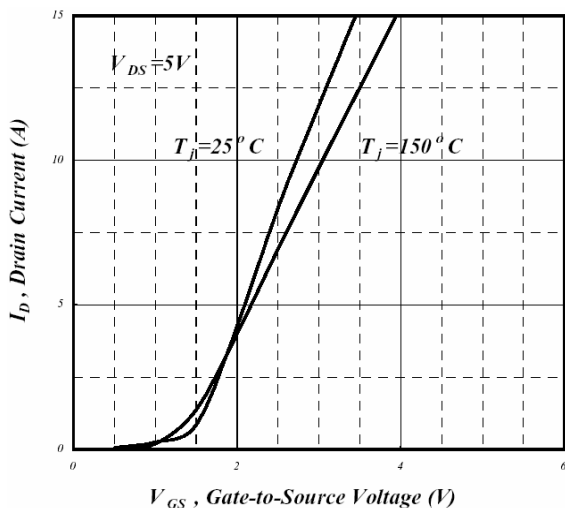
**Fig 8. Typical Capacitance Characteristics**



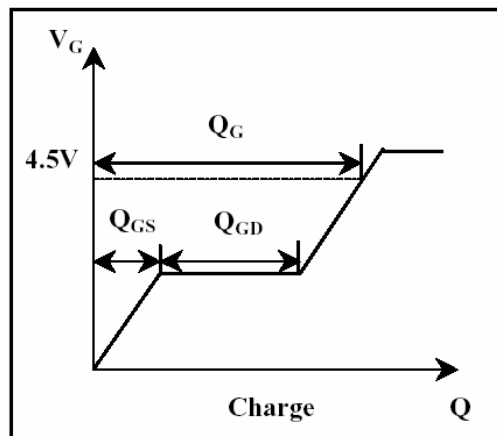
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**

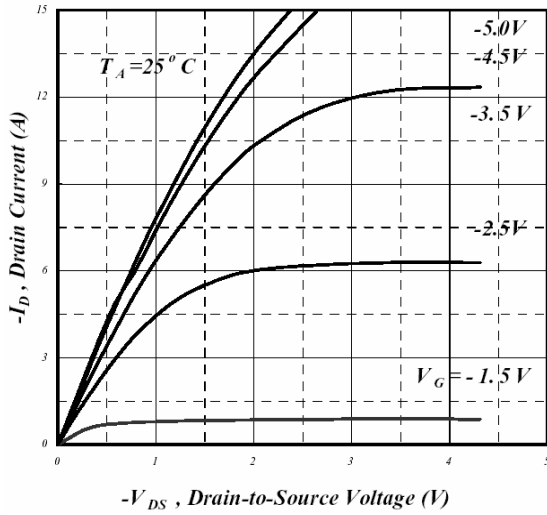


**Fig 11. Transfer Characteristics**

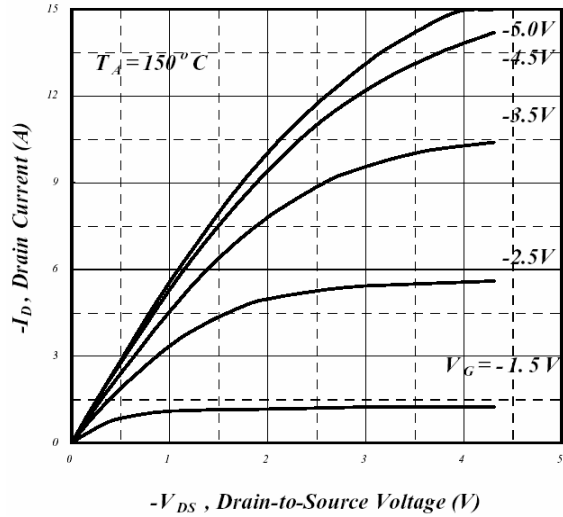


**Fig 12. Gate Charge Waveform**

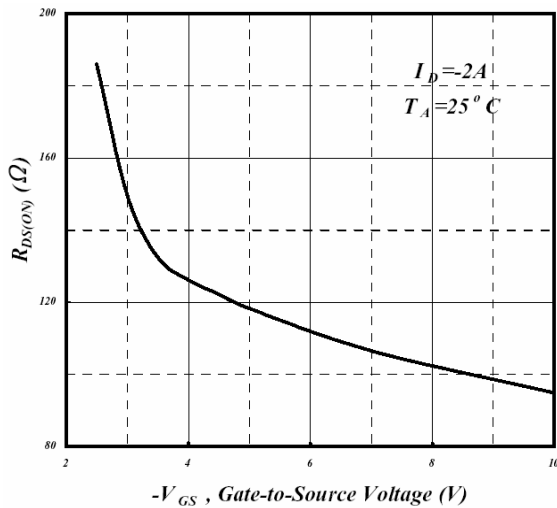
## P-Channel



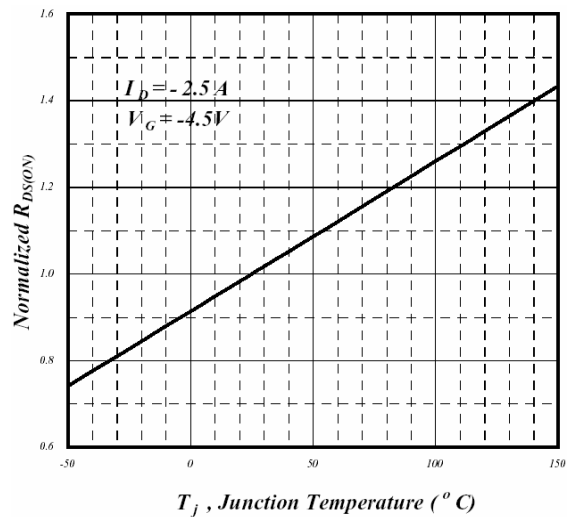
**Fig 1. Typical Output Characteristics**



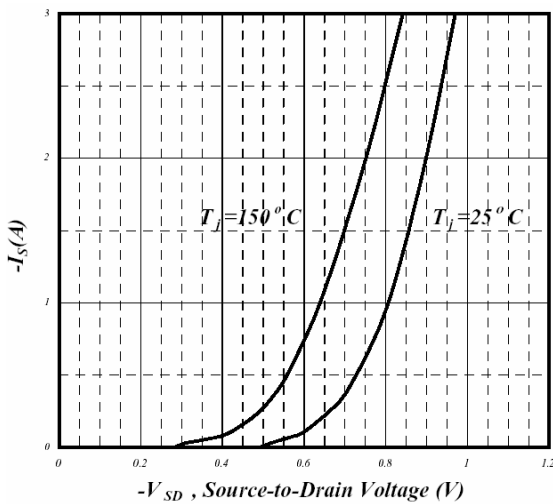
**Fig 2. Typical Output Characteristics**



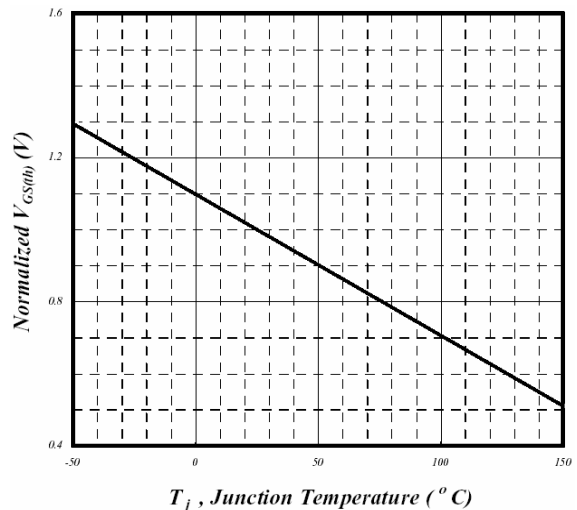
**Fig 3. On-Resistance v.s. Gate Voltage**



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

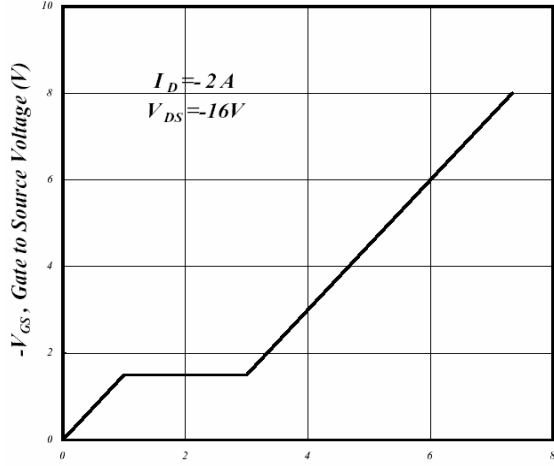


**Fig 5. Forward Characteristics of Reverse Diode**

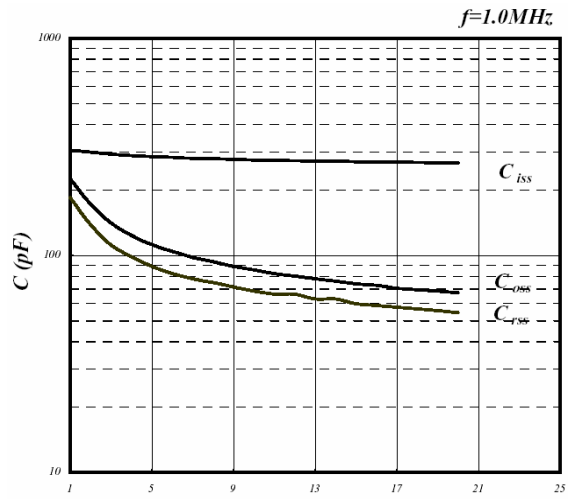


**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

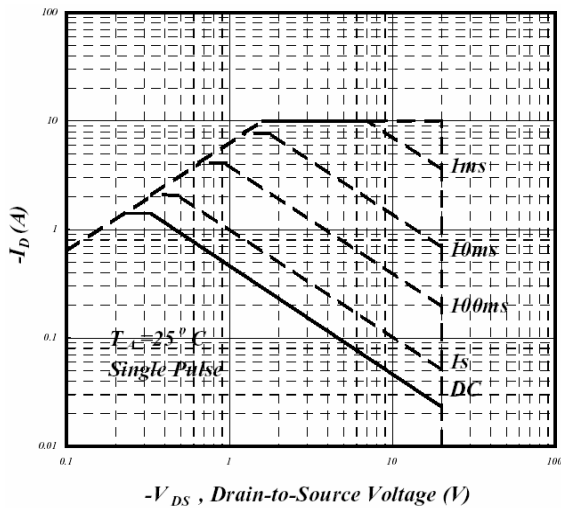
## P-Channel



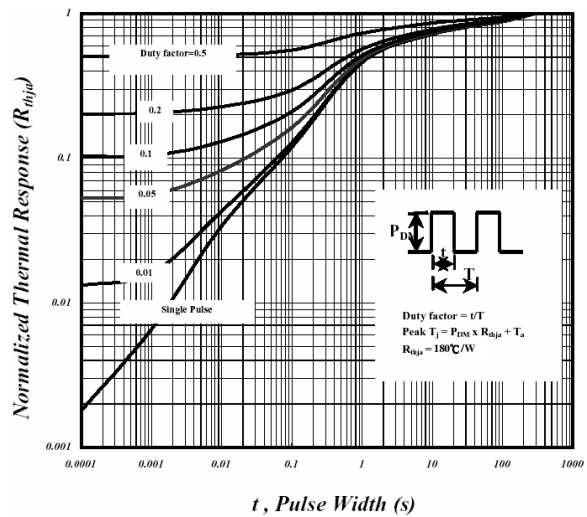
**Fig 7. Gate Charge Characteristics**



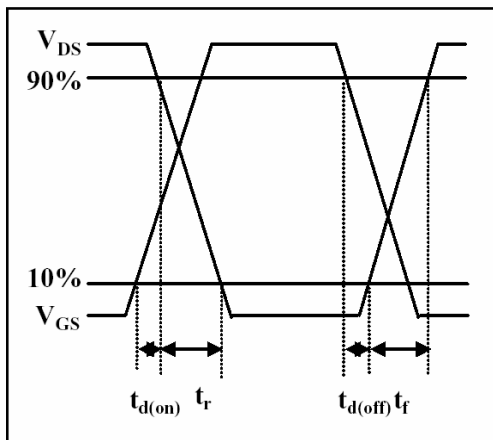
**Fig 8. Typical Capacitance Characteristics**



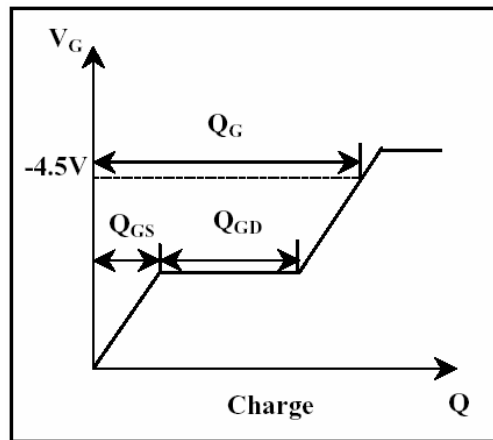
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

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