

GP4501

N AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

N-CH BV_{DSS}	30V
$R_{DS(ON)}$	28m Ω
I_D	7A
P-CH BV_{DSS}	-30V
$R_{DS(ON)}$	50m Ω
I_D	-5.3A

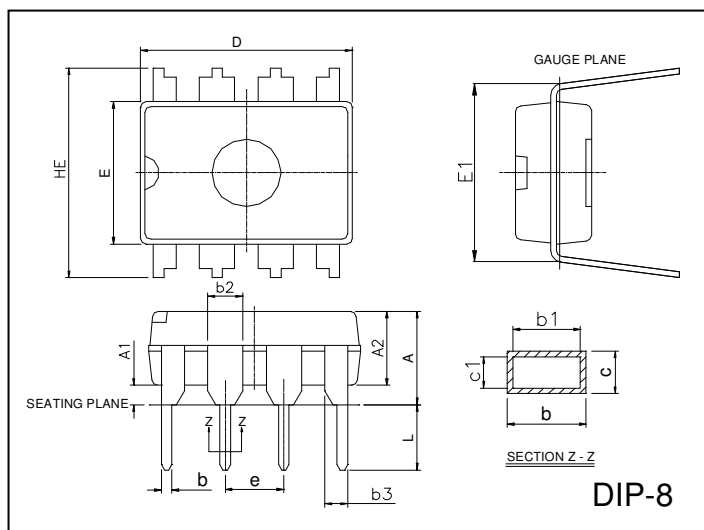
Description

The GP4501 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

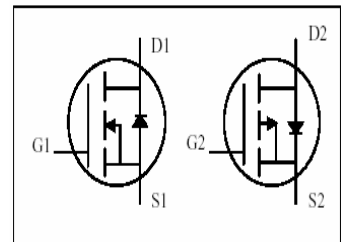
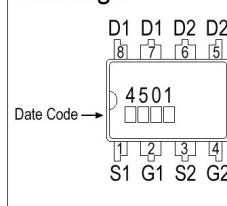
Features

- *Simple Drive Requirement
- *Lower On-resistance
- *Fast Switching

Package Dimensions



Marking :



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	0.5334	c1	0.203	0.279
A1	0.381	-	D	9.017	10.16
A2	2.921	4.953	E	6.096	7.112
b	0.356	0.559	E1	7.620	8.255
b1	0.356	0.508	e	2.540 BSC	
b2	1.143	1.778	HE	-	10.92
b3	0.762	1.143	L	2.921	3.810
c	0.203	0.356			

Absolute Maximum Ratings

Parameter	Symbol	Ratings		Unit
		N-channel	P-channel	
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 16	V
Continuous Drain Current ³	$I_D @ T_A = 25^\circ C$	7	-5.3	A
Continuous Drain Current ³	$I_D @ T_A = 70^\circ C$	5.8	-4.7	A
Pulsed Drain Current ¹	I_{DM}	20	-20	A
Total Power Dissipation	$P_D @ T_A = 25^\circ C$	2.0		W
Linear Derating Factor		0.016		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-ambient ³ Max.	R_{thj-a}	62.5	$^\circ C/W$

N-Channel Electrical Characteristics (T_j = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	30	-	-	V	V _{GS} =0, I _D =250uA
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)}	1.0	-	3.0	V	V _{DS} =V _{GS} , I _D =250uA
Forward Transconductance	g _{fs}	-	13	-	S	V _{DS} =10V, I _D =7A
Gate-Source Leakage Current	I _{GSS}	-	-	±100	nA	V _{GS} = ±20V
Drain-Source Leakage Current(T _j =25°C)	I _{DSS}	-	-	1	uA	V _{DS} =30V, V _{GS} =0
Drain-Source Leakage Current(T _j =70°C)		-	-	25	uA	V _{DS} =24V, V _{GS} =0
Static Drain-Source On-Resistance ²	R _{DS(ON)}	-	-	28	mΩ	V _{GS} =10V, I _D =7A
		-	-	42		V _{GS} =4.5V, I _D =5A
Total Gate Charge ²	Q _g	-	8.4	-	nC	I _D =7A V _{DS} =24V V _{GS} =4.5V
Gate-Source Charge	Q _{gs}	-	2.1	-		
Gate-Drain ("Miller") Charge	Q _{gd}	-	4.7	-		
Turn-on Delay Time ²	T _{d(on)}	-	6	-	ns	V _{DS} =15V I _D =1A V _{GS} =10V R _G =3.3Ω R _D =15Ω
Rise Time	T _r	-	5.2	-		
Turn-off Delay Time	T _{d(off)}	-	18.8	-		
Fall Time	T _f	-	4.4	-		
Input Capacitance	C _{iss}	-	645	-	pF	V _{GS} =0V V _{DS} =25V f=1.0MHz
Output Capacitance	C _{oss}	-	150	-		
Reverse Transfer Capacitance	C _{rss}	-	95	-		

Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage ²	V _{SD}	-	-	1.2	V	I _S =7A, V _{GS} =0V, T _j =25°C
Continuous Source Current (Body Diode)	I _S	-	-	1.67	A	V _D =V _G =0V, V _S =1.2V

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

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

3. Mounted on 1 in² copper pad of FR4 board; 90°C/W when mounted on Min. copper pad.

P-Channel Electrical Characteristics (T_j = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	-30	-	-	V	V _{GS} =0, I _D =-250uA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_j$	-	-0.028	-	V/°C	Reference to 25°C, I _D =-1mA
Gate Threshold Voltage	V _{GS(th)}	-1.0	-	-3.0	V	V _{DS} =V _{GS} , I _D =-250uA
Forward Transconductance	g _{fs}	-	8.5	-	S	V _{DS} =-10V, I _D =-5.3A
Gate-Source Leakage Current	I _{GSS}	-	-	±100	nA	V _{GS} = ±16V
Drain-Source Leakage Current(T _j =25°C)	I _{DSS}	-	-	-1	uA	V _{DS} =-30V, V _{GS} =0
Drain-Source Leakage Current(T _j =70°C)		-	-	-25	uA	V _{DS} =-24V, V _{GS} =0
Static Drain-Source On-Resistance ²	R _{DS(on)}	-	-	50	mΩ	V _{GS} =-10V, I _D =-5.3A
		-	-	90		V _{GS} =-4.5V, I _D =-4.2A
Total Gate Charge ²	Q _g	-	20	-	nC	I _D =-5.3A V _{DS} =-15V V _{GS} =-10V
Gate-Source Charge	Q _{gs}	-	3.5	-		
Gate-Drain ("Miller") Charge	Q _{gd}	-	2	-		
Turn-on Delay Time ²	T _{d(on)}	-	12	-	ns	V _{DS} =-15V I _D =-1A V _{GS} =-10V R _G =6Ω R _D =15Ω
Rise Time	T _r	-	20	-		
Turn-off Delay Time	T _{d(off)}	-	45	-		
Fall Time	T _f	-	27	-		
Input Capacitance	C _{iss}	-	790	-	pF	V _{GS} =0V V _{DS} =-15V f=1.0MHz
Output Capacitance	C _{oss}	-	440	-		
Reverse Transfer Capacitance	C _{rss}	-	120	-		

Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage ²	V _{SD}	-	-	-1.2	V	I _S =-2.6A, V _{GS} =0V, T _j =25°C
Continuous Source Current (Body Diode)	I _S	-	-	-1.67	A	V _D =V _G =0V, V _S =-1.2V

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

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

3. Mounted on 1 in² copper pad of FR4 board; 90°C/W when mounted on Min. copper pad.

Characteristics Curve N-Channel

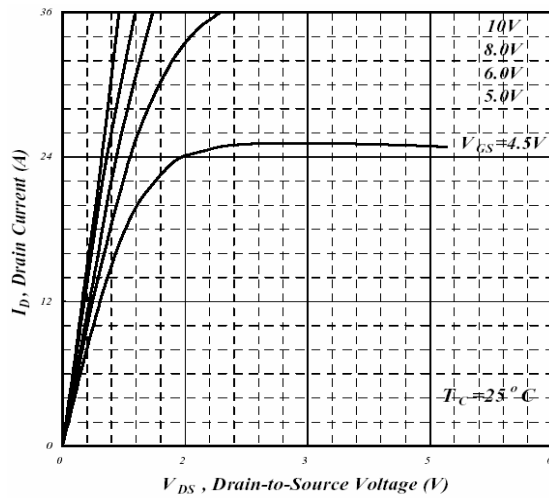


Fig 1. Typical Output Characteristics

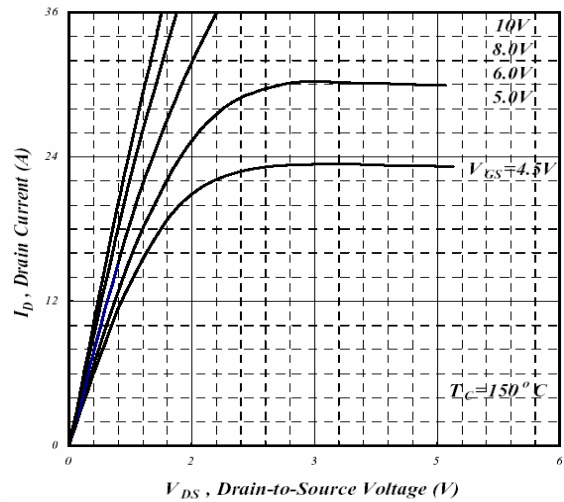


Fig 2. Typical Output Characteristics

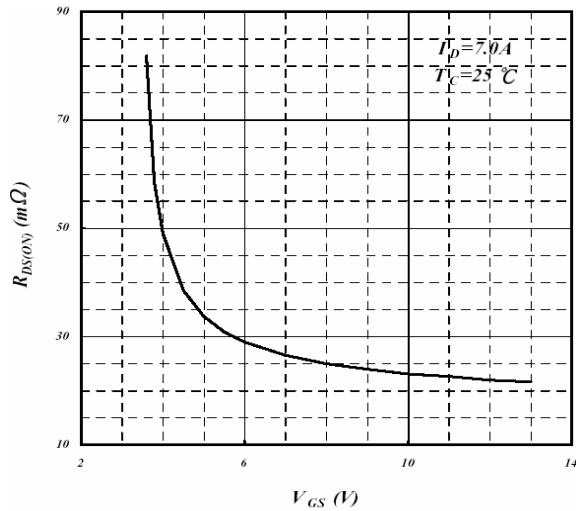


Fig 3. On-Resistance v.s. Gate Voltage

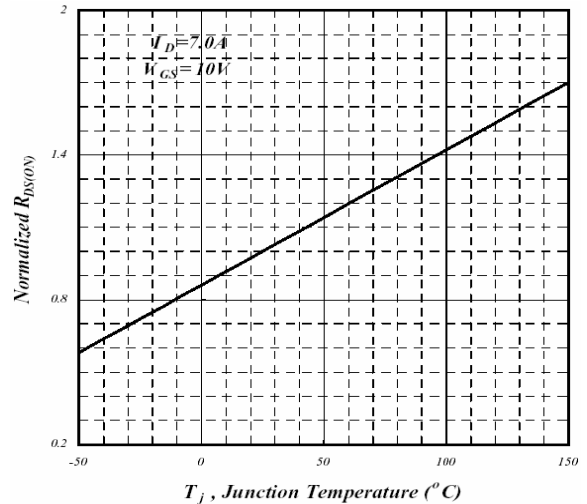
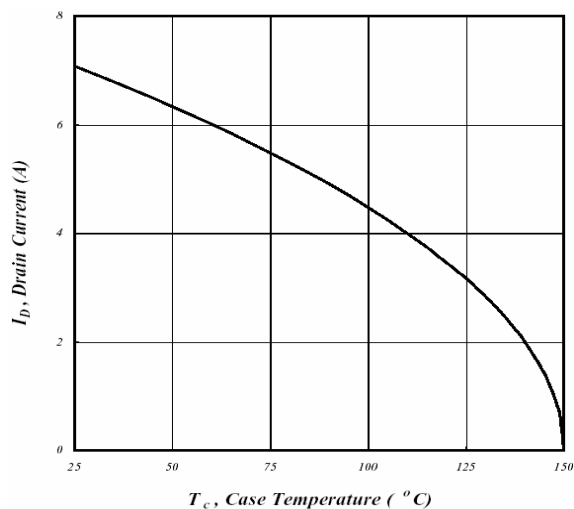
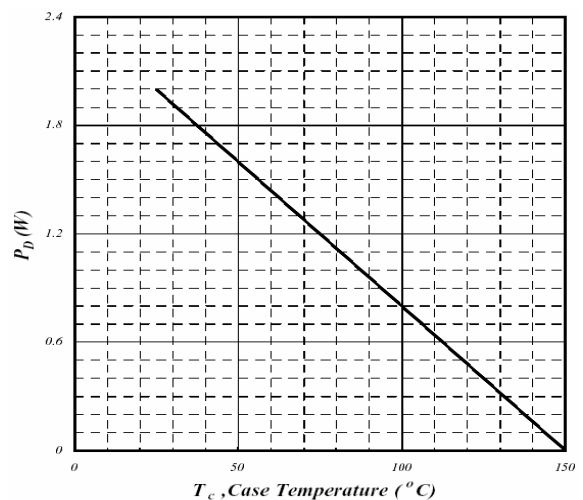
Fig 4. Normalized On-Resistance
v.s. Junction TemperatureFig 5. Maximum Drain Current
v.s. Case Temperature

Fig 6. Type Power Dissipation

N-Channel

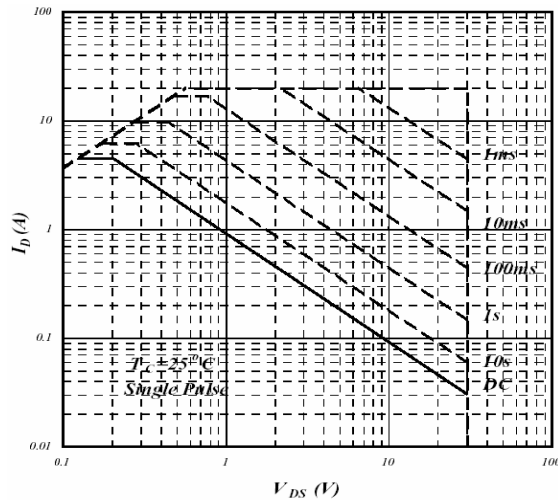


Fig 7. Maximum Safe Operating Area

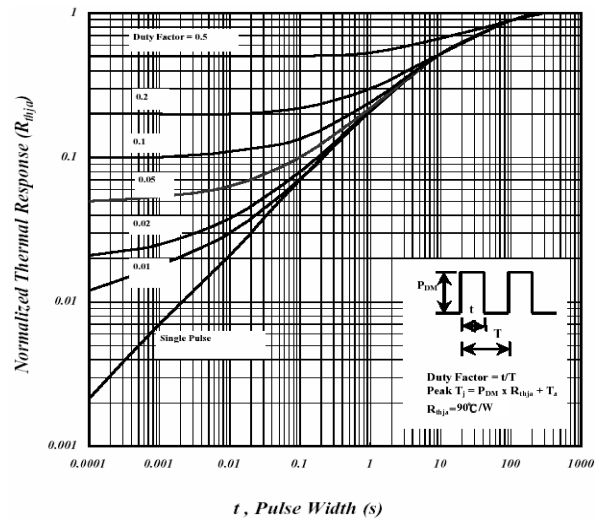


Fig 8. Effective Transient Thermal Impedance

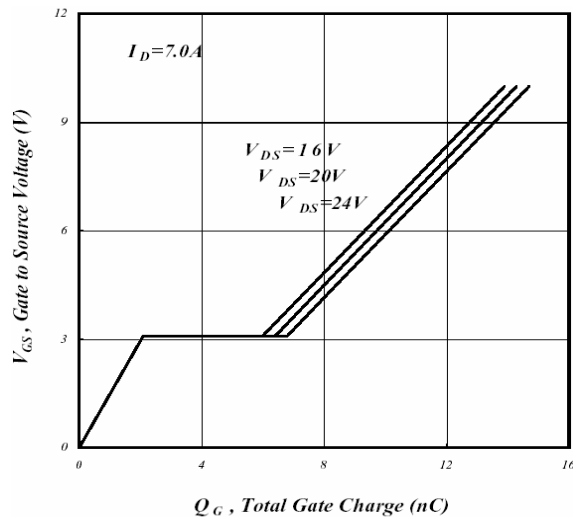


Fig 9. Gate Charge Characteristics

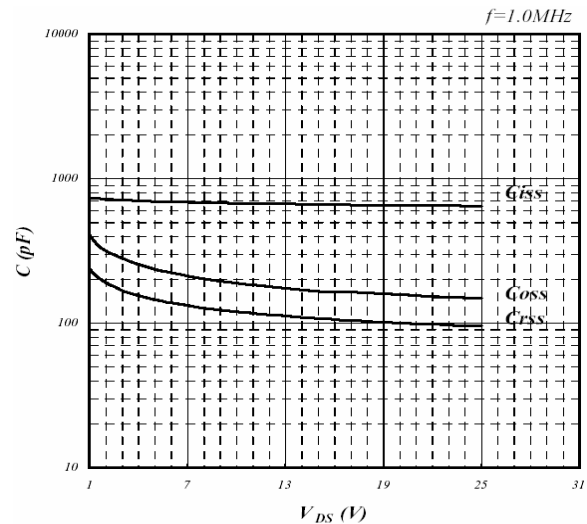


Fig 10. Typical Capacitance Characteristics

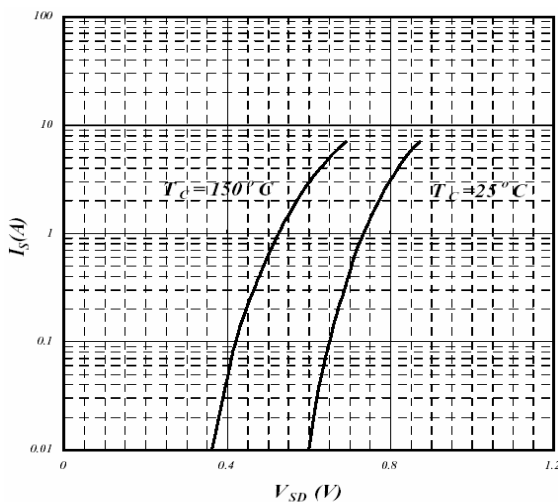


Fig 11. Forward Characteristics of Reverse Diode

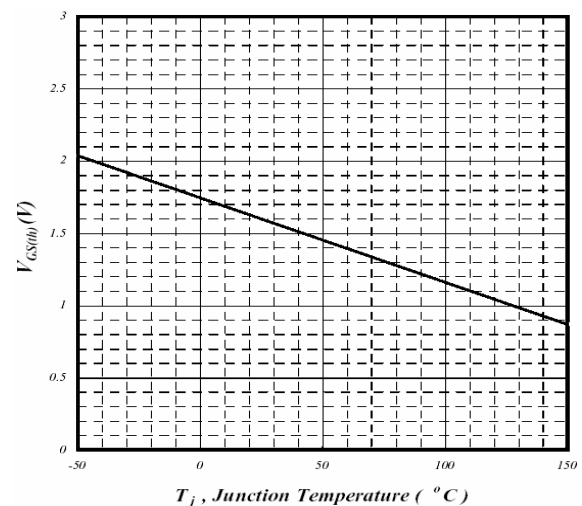


Fig 12. Gate Threshold Voltage v.s. Junction Temperature

N-Channel

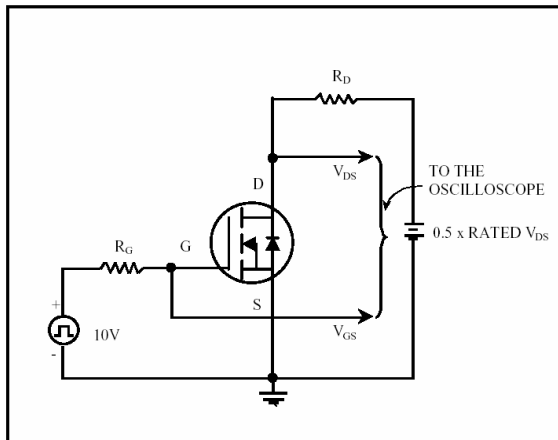


Fig 13. Switching Time Circuit

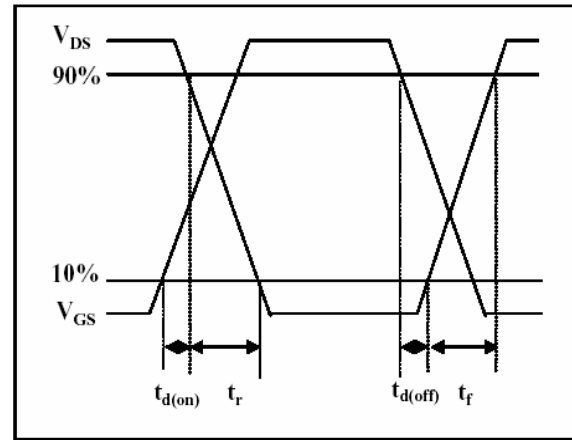


Fig 14. Switching Time Waveform

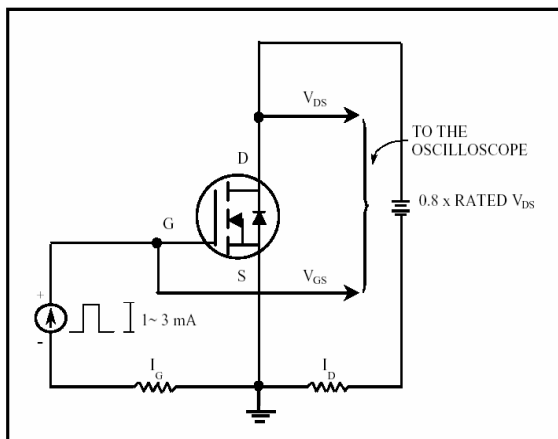


Fig 15. Gate Charge Circuit

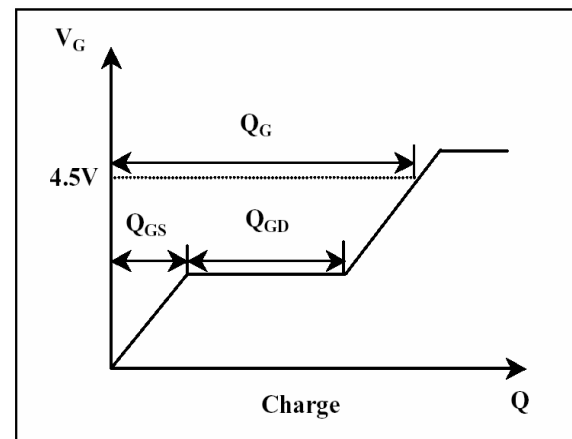
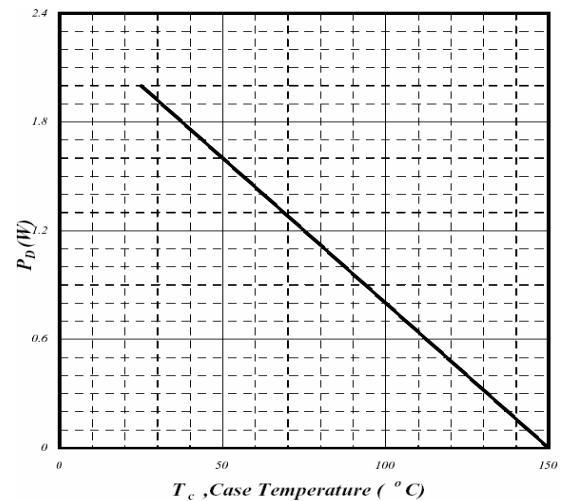
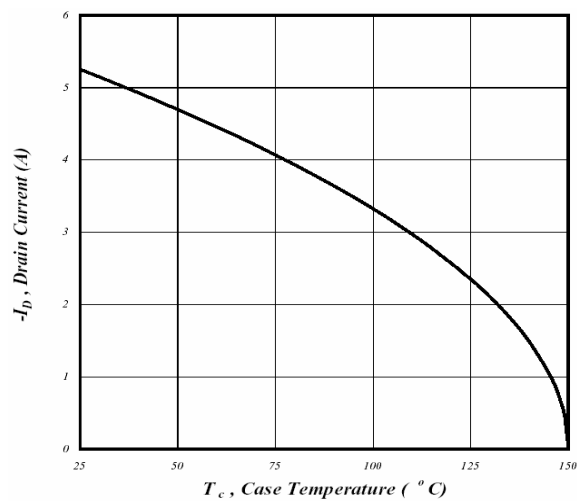
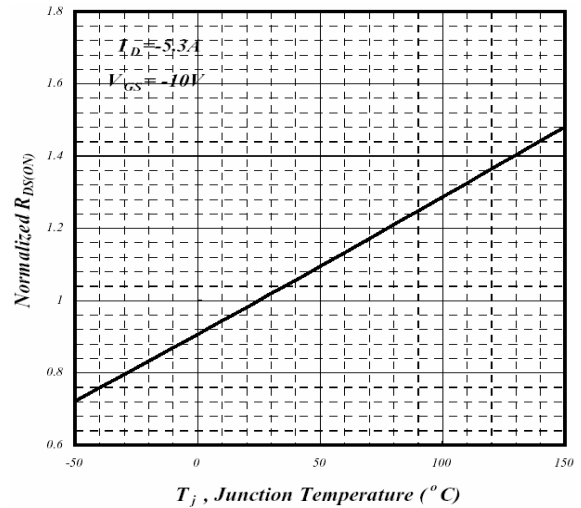
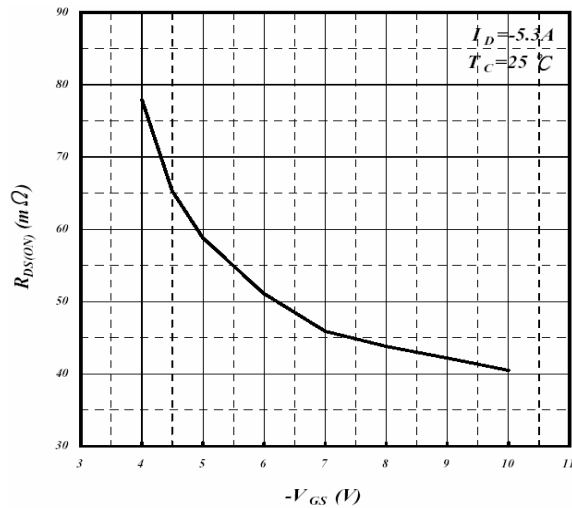
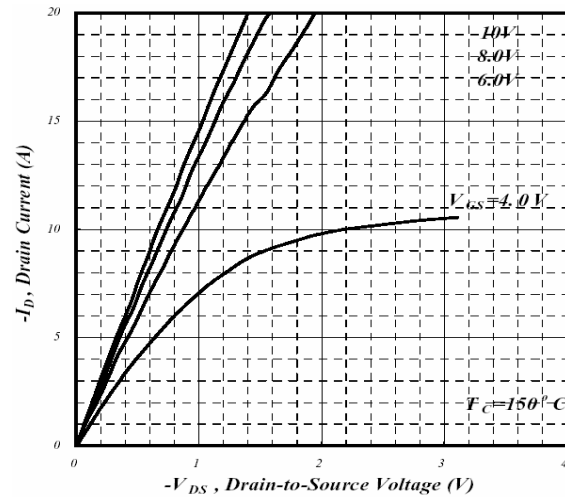
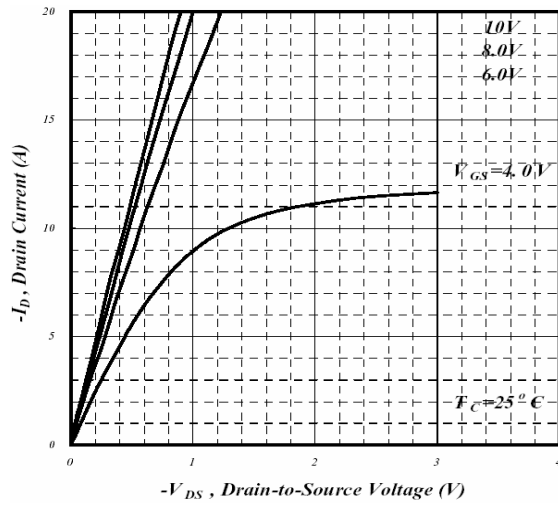


Fig 16. Gate Charge Waveform

P-Channel



P-Channel

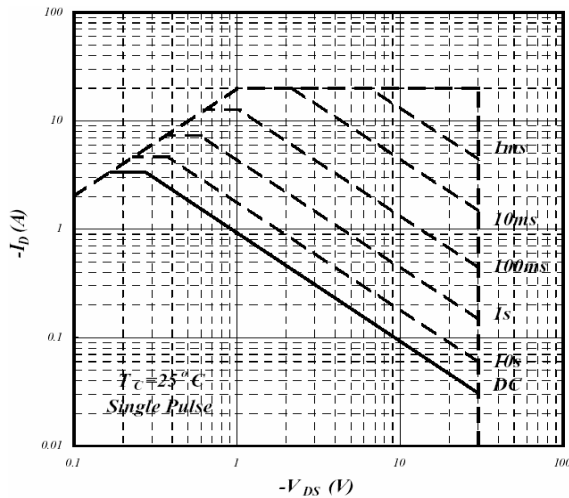


Fig 7. Maximum Safe Operating Area

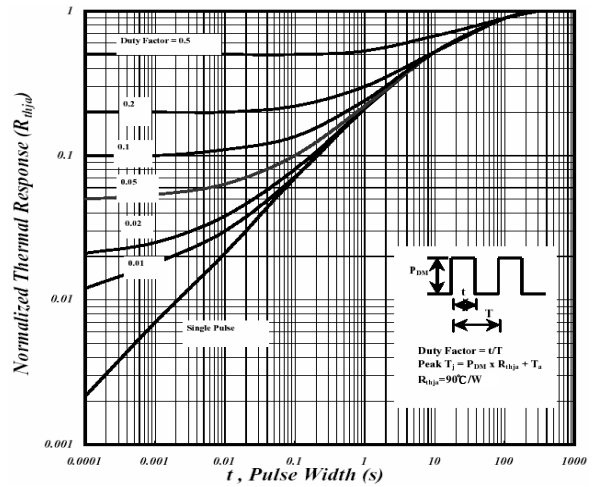


Fig 8. Effective Transient Thermal Impedance

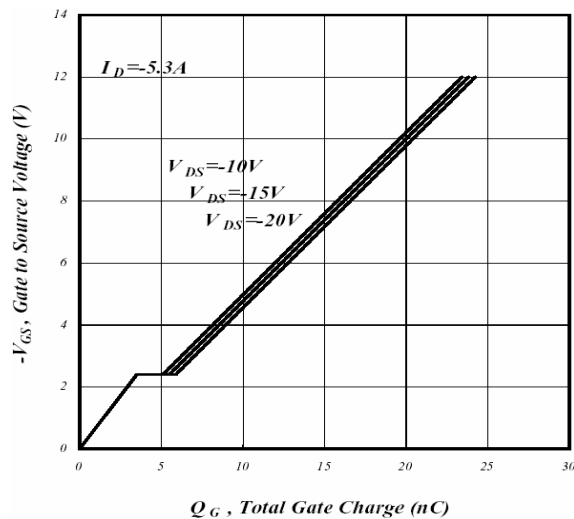


Fig 9. Gate Charge Characteristics

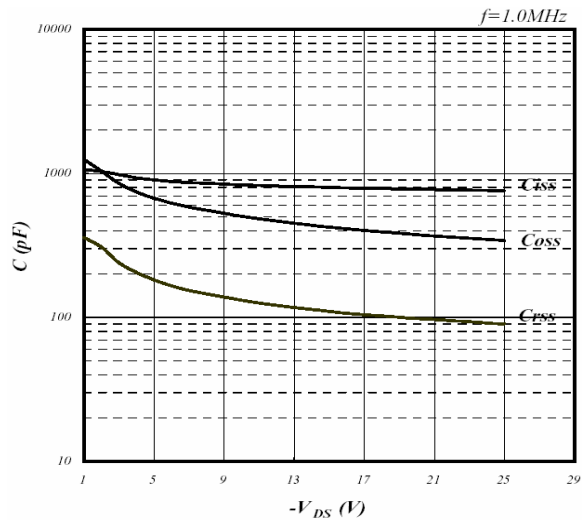


Fig 10. Typical Capacitance Characteristics

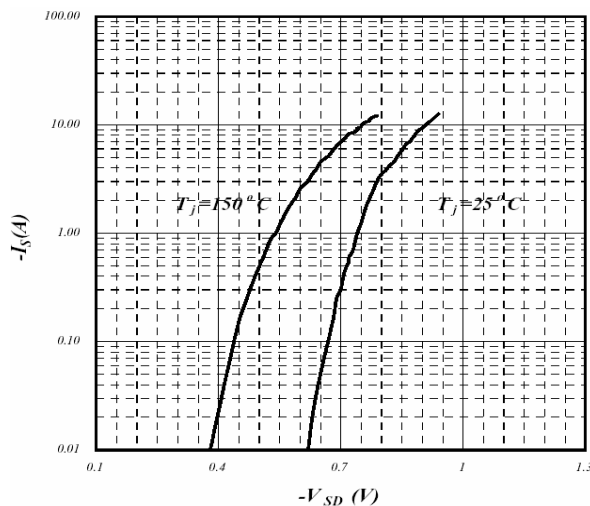


Fig 11. Forward Characteristics of Reverse Diode

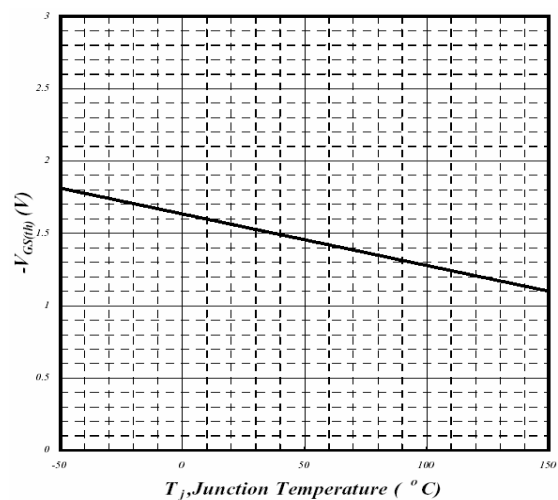


Fig 12. Gate Threshold Voltage v.s. Junction Temperature

P-Channel

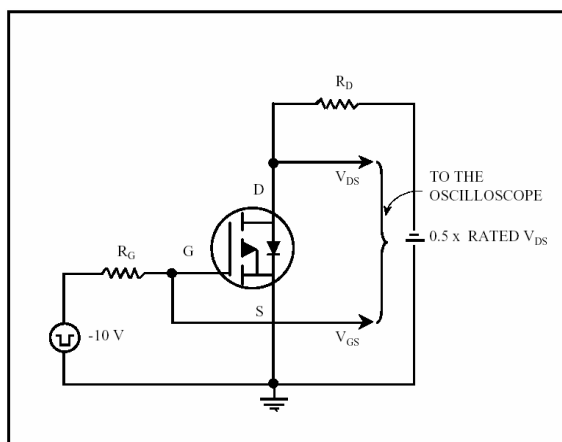


Fig 13. Switching Time Circuit

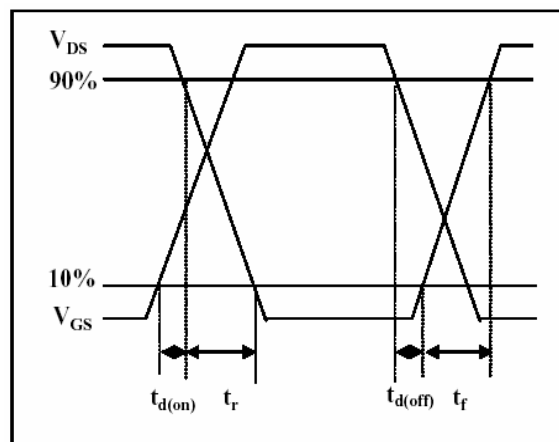


Fig 14. Switching Time Waveform

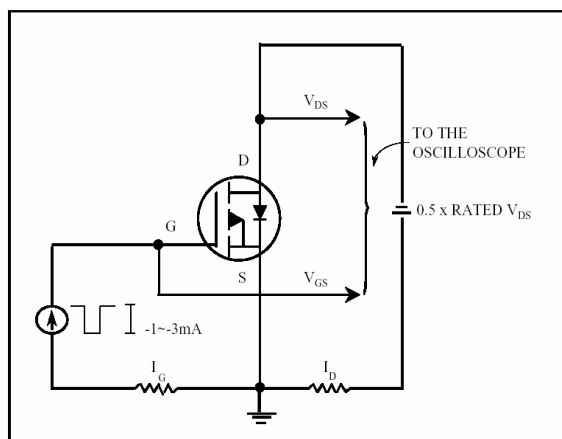


Fig 15. Gate Charge Circuit

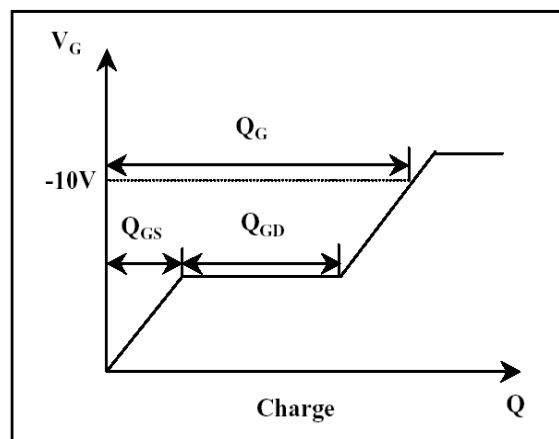


Fig 16. Gate Charge Waveform

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