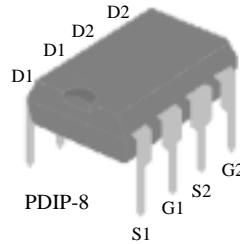


## N AND P-CHANNEL ENHANCEMENT-MODE POWER MOSFETS

**Simple drive requirement**

**Low on-resistance**

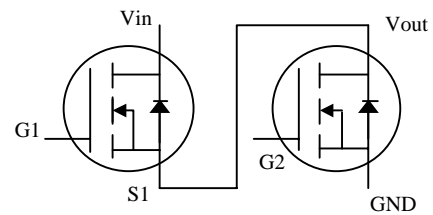
**Fast switching**



N-ch	$BV_{DSS}$	20V
	$R_{DS(ON)}$	60m $\Omega$
	$I_D$	2.6A
P-ch	$BV_{DSS}$	-20V
	$R_{DS(ON)}$	80m $\Omega$
	$I_D$	-2.3A

### Description

Power MOSFETs from Silicon Standard provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.



### Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
$V_{DS}$	Drain-Source Voltage	20	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	$\pm 12$	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current	2.6	-2.3	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current	2.1	-1.8	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	15	-10	A
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation	0.625		W
	Linear Derating Factor	0.005		W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150		$^\circ\text{C}$

### Thermal Data

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max. 200	$^\circ\text{C}/\text{W}$

**N-ch Electrical Characteristics @  $T_j=25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	25	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	-	0.037	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=2.6A$	-	-	60	$\text{m}\Omega$
		$V_{GS}=2.5V, I_D=1.8A$	-	-	90	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	-	1.2	V
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=2.6A$	-	3.6	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu A$
	Drain-Source Leakage Current ( $T_j=70^\circ\text{C}$ )	$V_{DS}=16V, V_{GS}=0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=2.6A$	-	9	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=10V$	-	1	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=10V$	-	6.5	-	ns
$t_r$	Rise Time	$I_D=1A$	-	14	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=6\Omega, V_{GS}=4.5V$	-	20	-	ns
$t_f$	Fall Time	$R_D=10\Omega$	-	15	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	300	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=8V$	-	255	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	115	-	pF

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.2V$	-	-	1.7	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	15	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=1.7A, V_{GS}=0V$	-	-	1.2	V

**Notes:**

1. Pulse width limited by safe operating area.
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

**P-ch Electrical Characteristics @  $T_j=25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	-25	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	-	-0.037	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-2.2A$	-	-	80	$m\Omega$
		$V_{GS}=-2.5V, I_D=-1.8A$	-	-	135	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-	-1	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_D=-2.2A$	-	2.7	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T=25^\circ\text{C}$ )	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	$\mu A$
	Drain-Source Leakage Current ( $T=70^\circ\text{C}$ )	$V_{DS}=-16V, V_{GS}=0V$	-	-	-25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=-2.2A$	-	11.5	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=-6V$	-	3.2	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	1.5	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=-10V$	-	10	-	ns
$t_r$	Rise Time	$I_D=-2.2A$	-	25	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=6\Omega, V_{GS}=-4.5V$	-	50	-	ns
$t_f$	Fall Time	$R_D=4.5\Omega$	-	30	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	940	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=-15V$	-	440	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	130	-	pF

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=-1.2V$	-	-	-1.8	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	-10	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=-1.8A, V_{GS}=0V$	-	-	-1.2	V

**Notes:**

1. Pulse width limited by safe operating area.
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

N-Channel

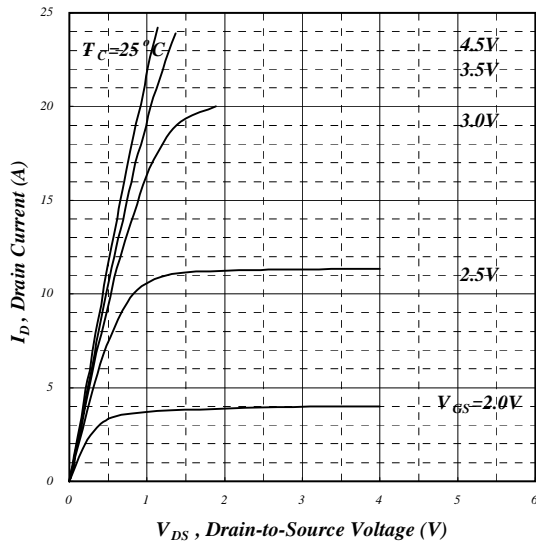


Fig 1. Typical Output Characteristics

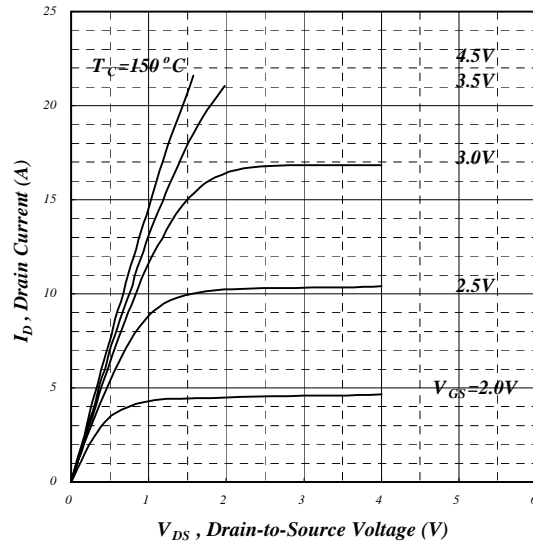


Fig 2. Typical Output Characteristics

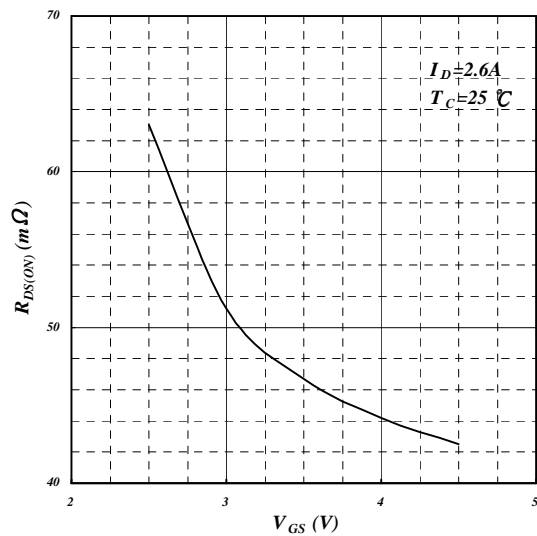


Fig 3. On-Resistance v.s. Gate Voltage

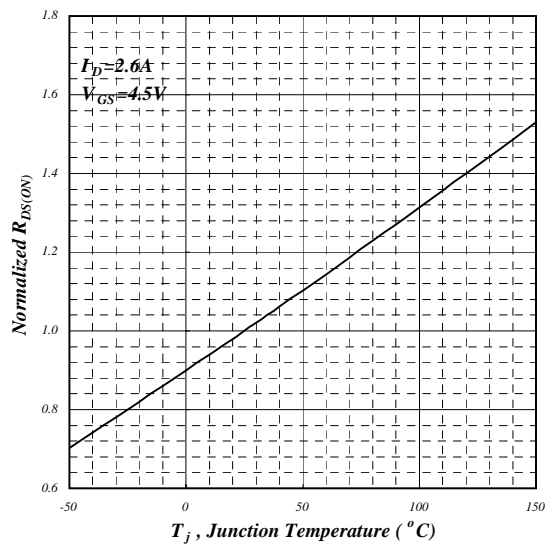
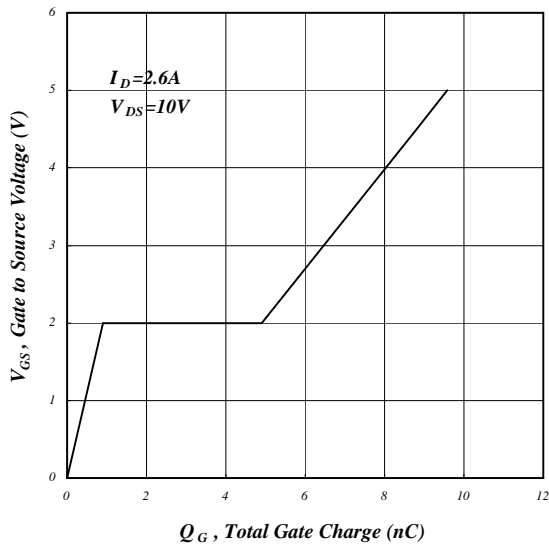
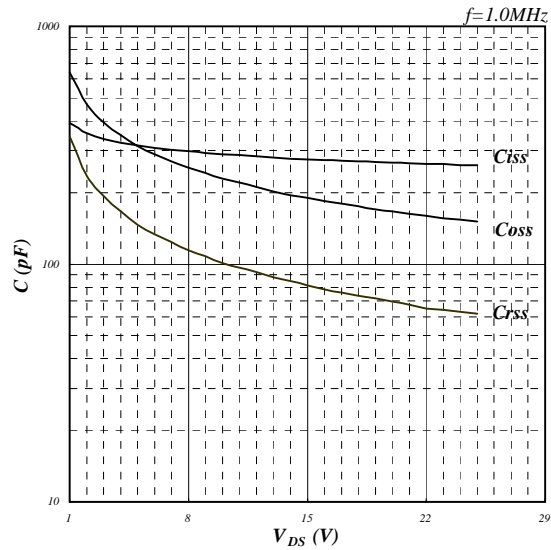


Fig 4. Normalized On-Resistance v.s. Junction Temperature

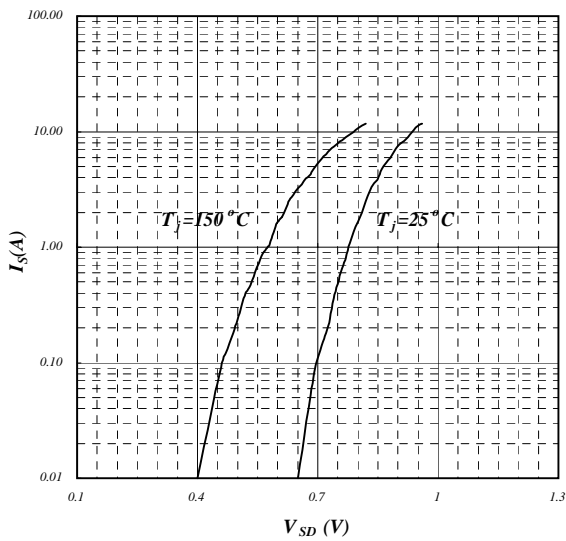
## N-Channel



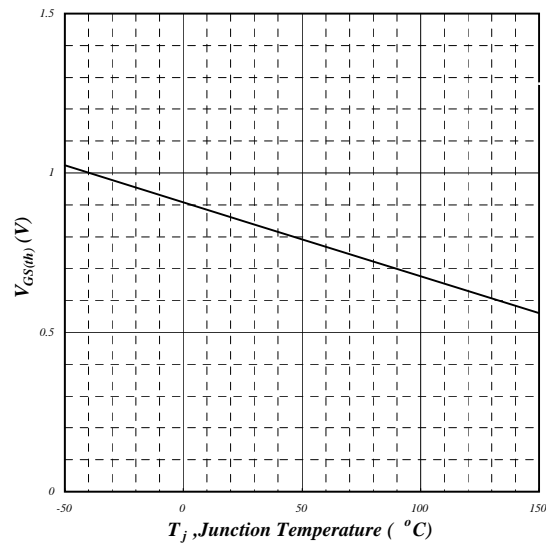
**Fig 9. Gate Charge Characteristics**



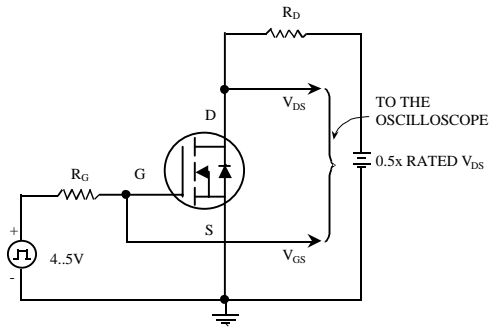
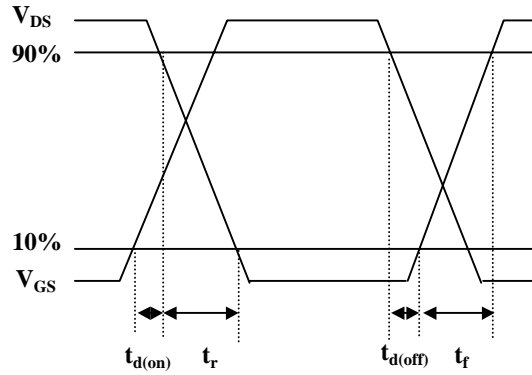
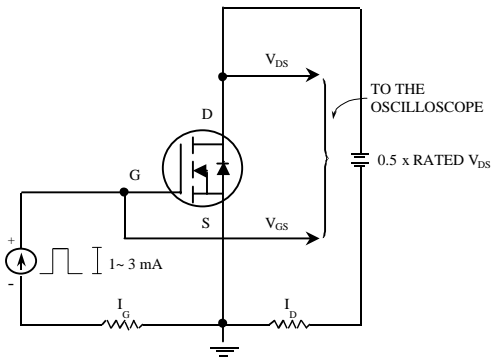
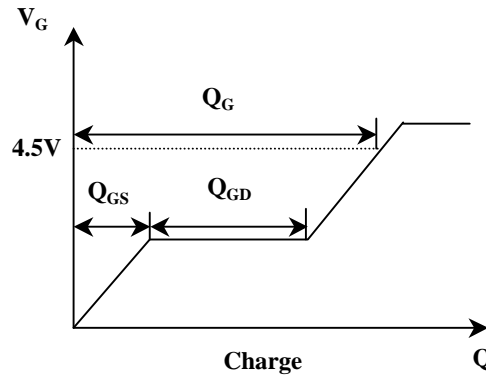
**Fig 10. Typical Capacitance Characteristics**

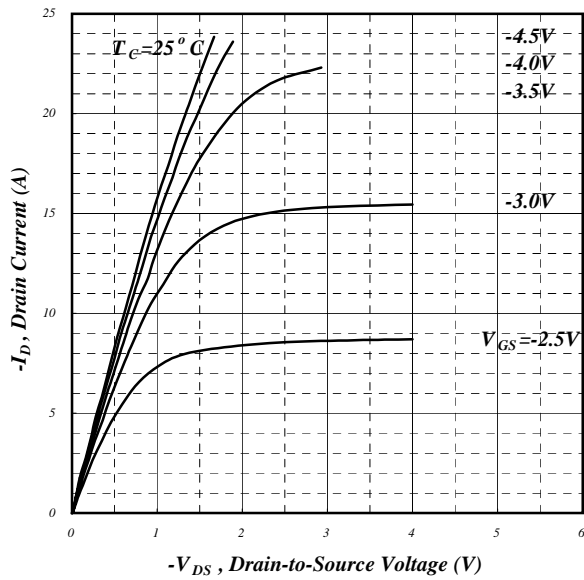
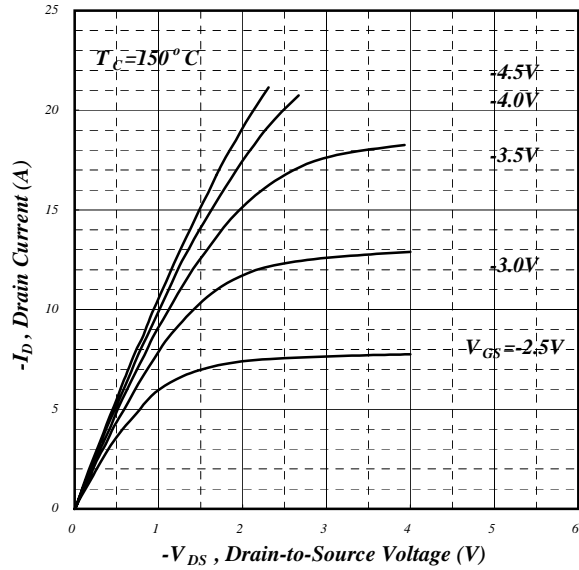
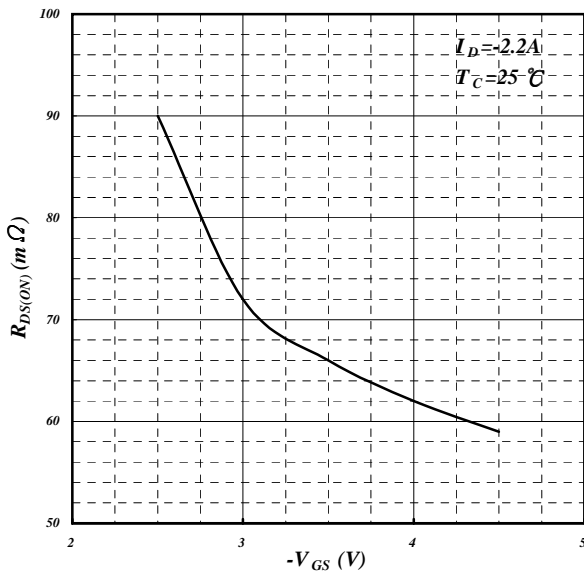
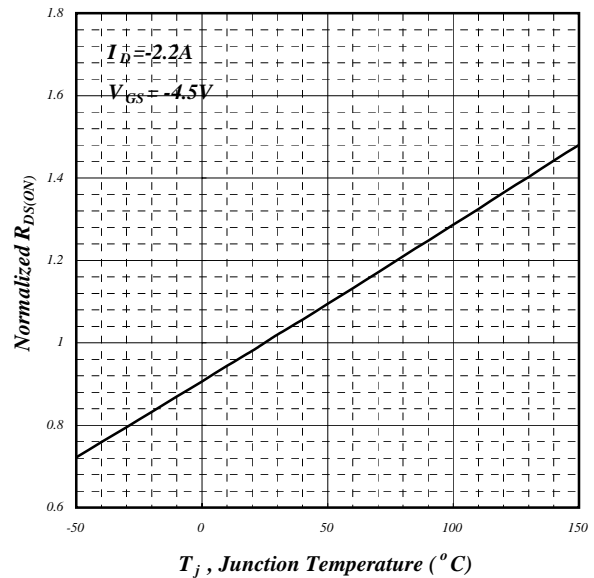


**Fig 11. Forward Characteristic of Reverse Diode**



**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**

**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**

P-Channel

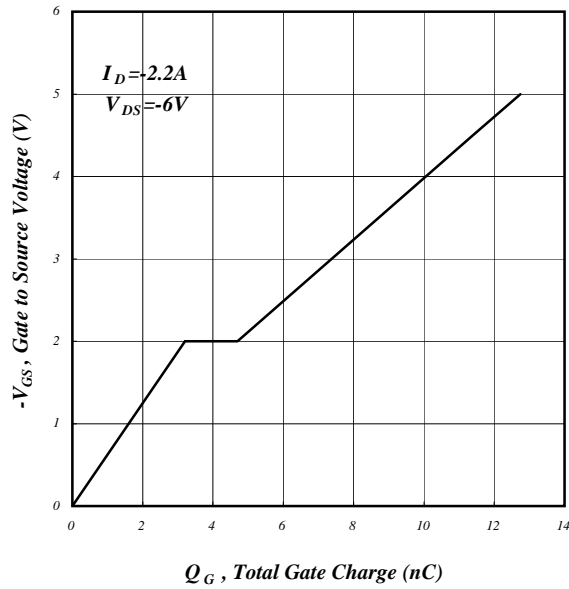


Fig 9. Gate Charge Characteristics

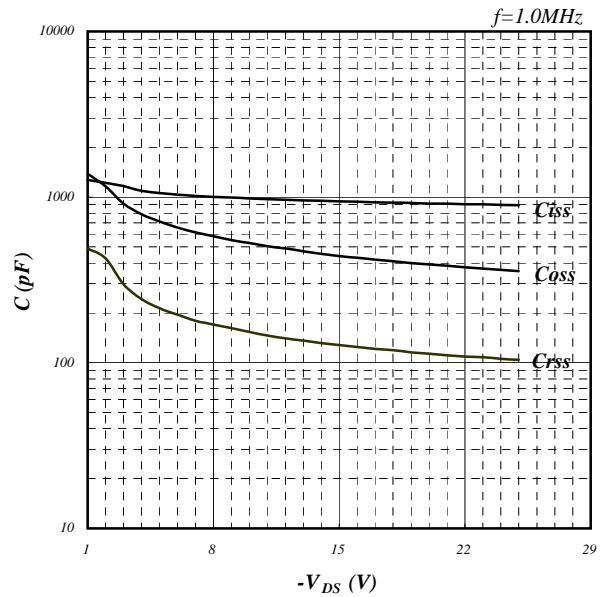


Fig 10. Typical Capacitance Characteristics

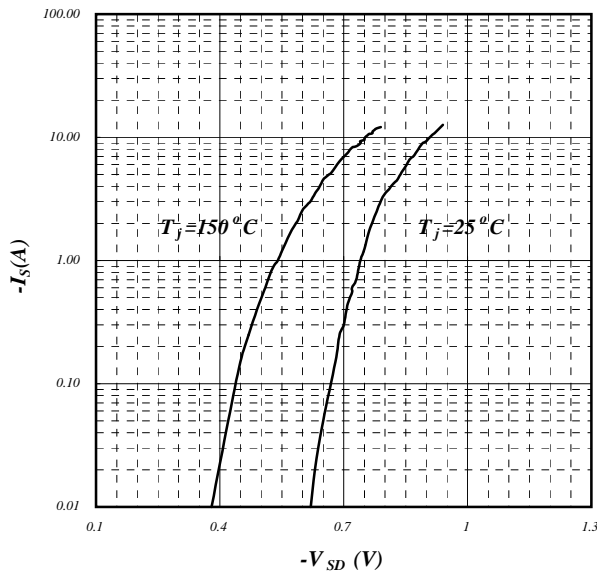


Fig 11. Forward Characteristic of Reverse Diode

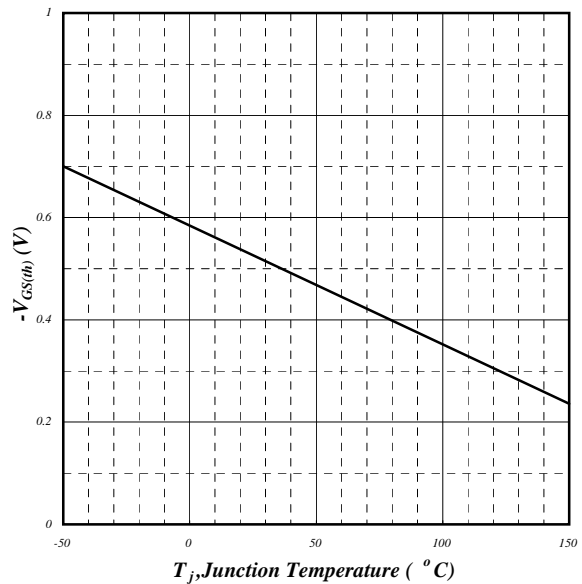
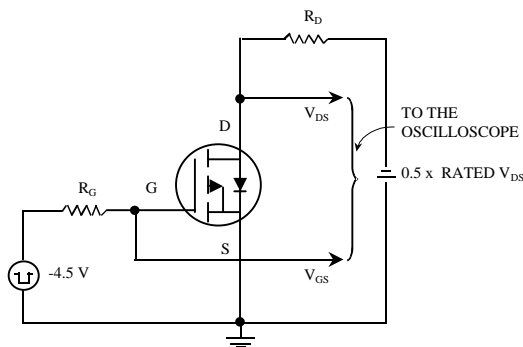
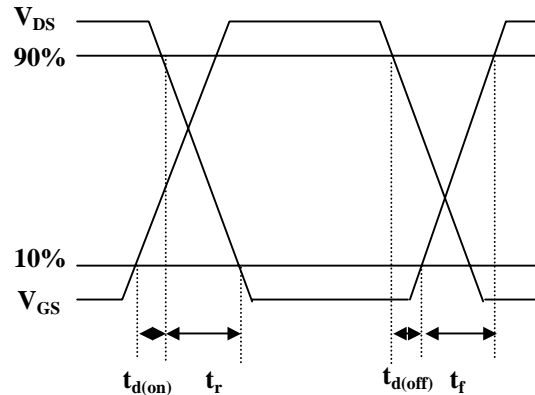
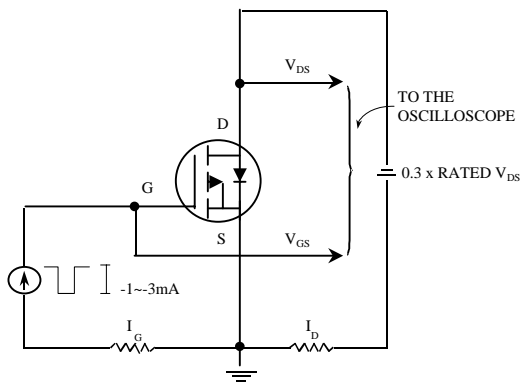
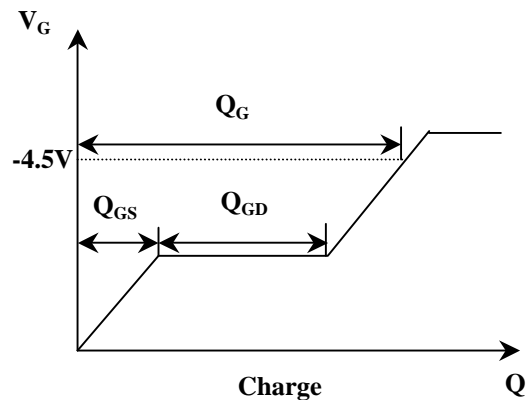


Fig 12. Gate Threshold Voltage v.s. Junction Temperature



**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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