
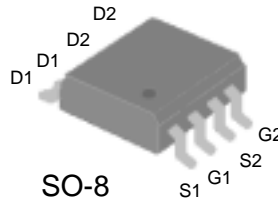


N- and P-channel Enhancement-mode Power MOSFETs

- Simple drive requirement
- Lower gate charge
- Fast switching characteristics
-  **Pb-free; RoHS compliant.**

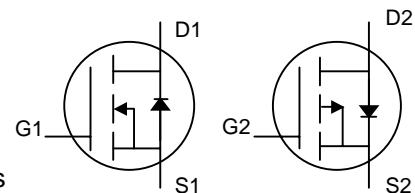


N-CH	BV_{DSS}	20V
	$R_{DS(ON)}$	30m Ω
	I_D	6A
P-CH	BV_{DSS}	-20V
	$R_{DS(ON)}$	50m Ω
	I_D	-5A

DESCRIPTION

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

The SSM2030GM is in an SO-8 package, which is widely preferred for commercial and industrial surface mount applications. This device is suitable for low voltage applications requiring complementary N and P MOSFETs.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 8	± 8	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current ³	+6	-5	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current ³	+4.8	-4	A
I_{DM}	Pulsed Drain Current ^{1,2}	+20	-20	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation	2.0		W
	Linear Derating Factor	0.016		W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150		$^\circ C$

THERMAL DATA

Symbol	Parameter	Value	Unit
Rthj-amb	Thermal Resistance Junction-ambient	Max. 62.5	$^\circ C/W$

N-channel 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	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	-	0.037	-	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=6A$	-	-	30	m Ω
		$V_{GS}=2.5V, I_D=5.2A$	-	-	45	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	-	1.2	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=6A$	-	18.5	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=70^\circ\text{C}$)	$V_{DS}=16V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 8V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=6A$	-	9	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=10V$	-	1.8	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	4.2	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=10V$	-	-	29	ns
t_r	Rise Time	$I_D=1A$	-	-	65	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=6\Omega, V_{GS}=4.5V$	-	-	60	ns
t_f	Fall Time	$R_D=10\Omega$	-	-	50	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) ¹		-	-	20	A
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=1.7A, V_{GS}=0V$	-	0.75	1.2	V

Notes:

- 1.Pulse width limited by max. junction temperature.
- 2.Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 3.Surface mounted on FR4 board, $t \leq 10\text{sec}$.

P-channel 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	$V_{GS}=0V, I_D=250\mu A$	-20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	-	-0.037	-	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-2.2A$	-	-	50	m Ω
		$V_{GS}=-2.5V, I_D=-1.8A$	-	-	80	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-	-1	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-2.2A$	-	2.5	-	S
I_{DSS}	Drain-Source Leakage Current ($T=25^\circ\text{C}$)	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
		Drain-Source Leakage Current ($T=70^\circ\text{C}$)	$V_{DS}=-16V, V_{GS}=0V$	-	-	-25
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 8V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=-2.2A$	-	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 ²	$V_{DS}=-10V$	-	-	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) ¹		-	-	-20	A
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=-1.8A, V_{GS}=0V$	-	-0.75	-1.2	V

Notes:

1. Pulse width limited by max. junction temperature.
2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Surface mounted on FR4 board, $t \leq 10\text{sec}$.

N-channel

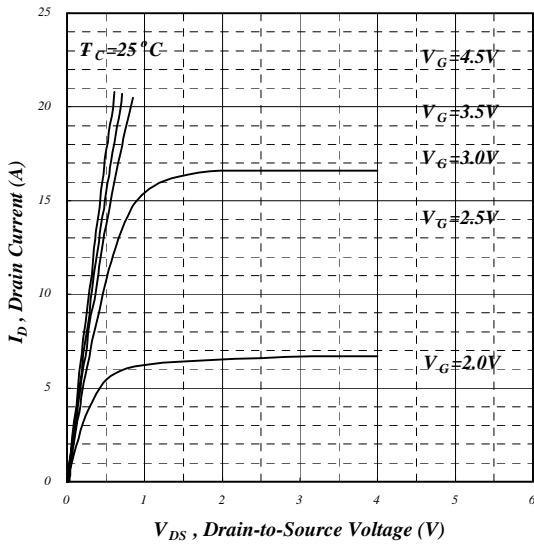


Fig 1. Typical Output Characteristics

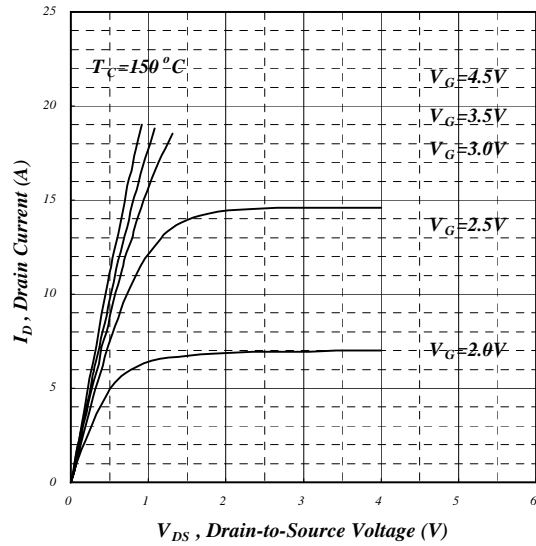


Fig 2. Typical Output Characteristics

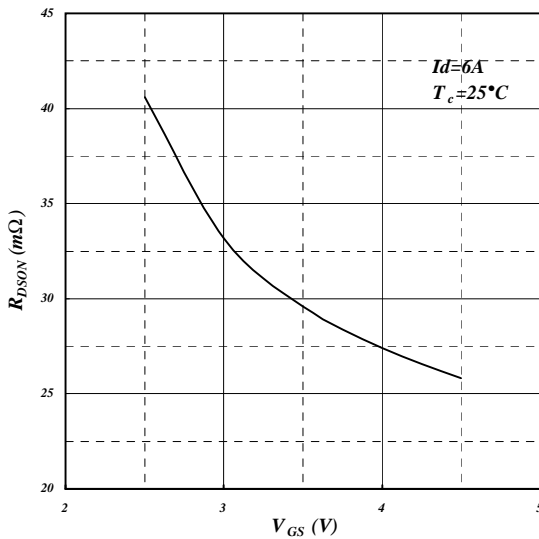


Fig 3. On-Resistance vs. Gate Voltage

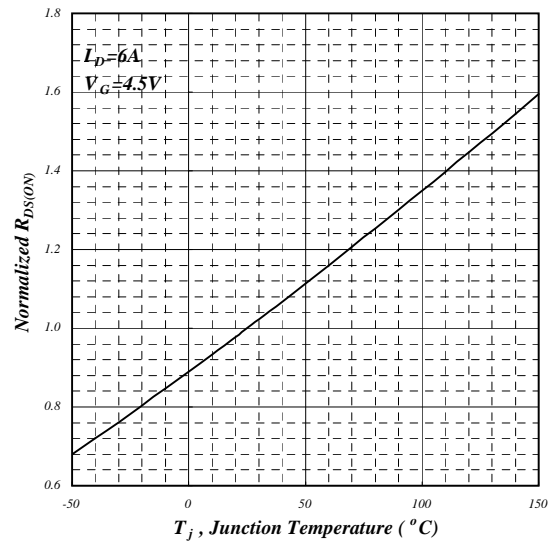


Fig 4. Normalized On-Resistance vs. Junction Temperature

N-channel

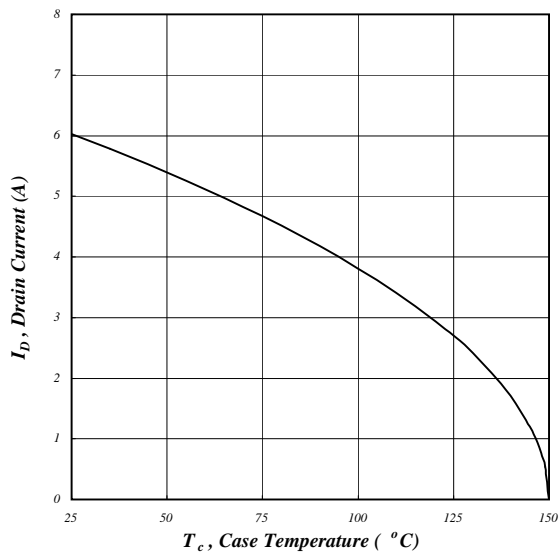


Fig 5. Maximum Drain Current vs. Case Temperature

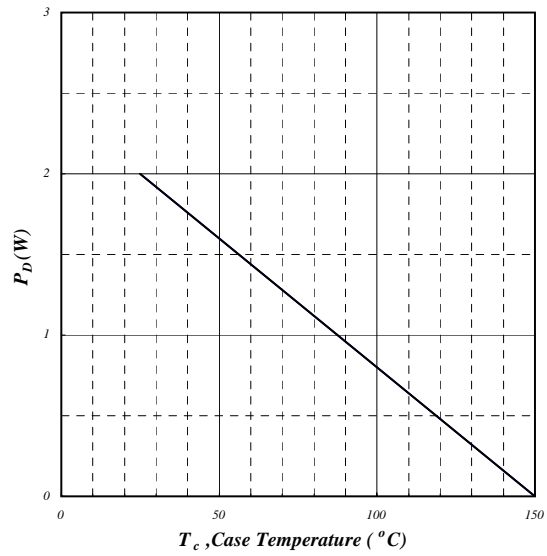


Fig 6. Typical Power Dissipation

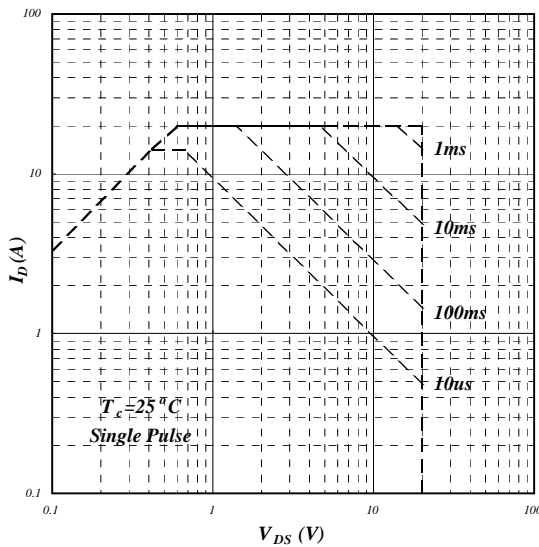


Fig 7. Maximum Safe Operating Area

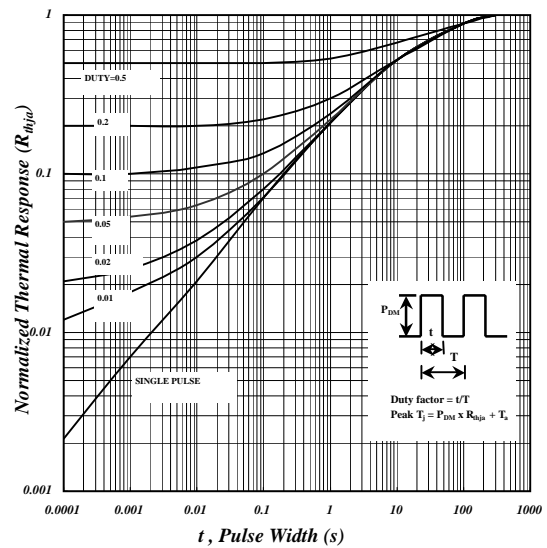


Fig 8. Effective Transient Thermal Impedance

N-channel

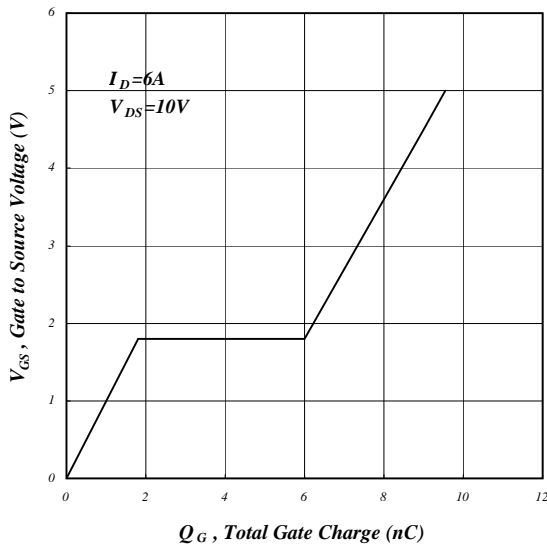


Fig 9. Gate Charge Characteristics

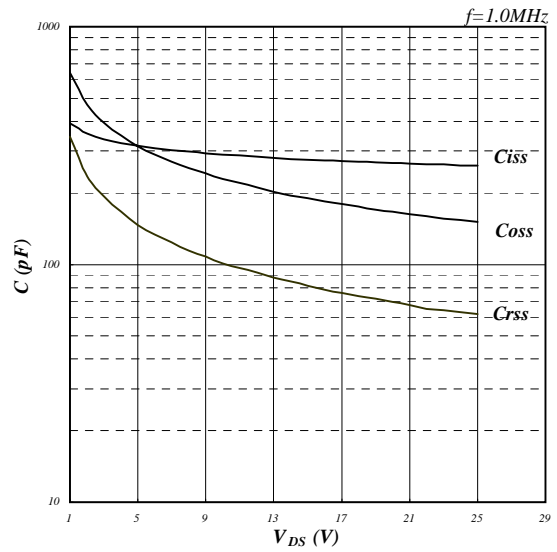


Fig 10. Typical Capacitance Characteristics

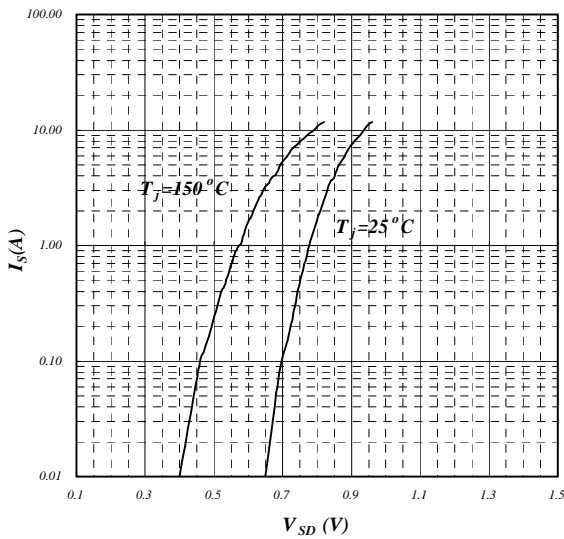


Fig 11. Forward Characteristic of Reverse Diode

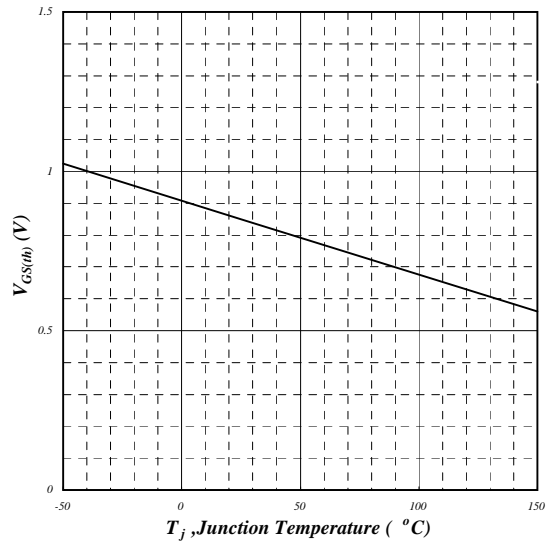


Fig 12. Gate Threshold Voltage vs. Junction Temperature

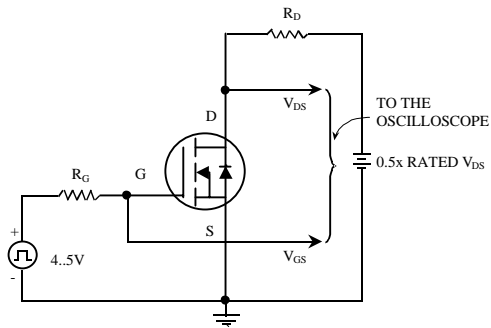
N-channel


Fig 13. Switching Time Circuit

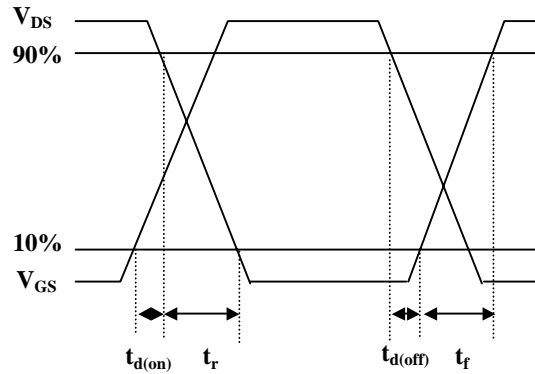


Fig 14. Switching Time Waveform

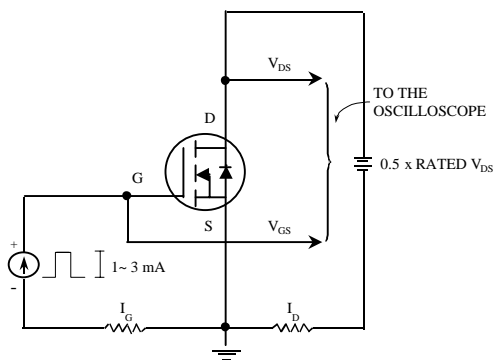


Fig 15. Gate Charge Circuit

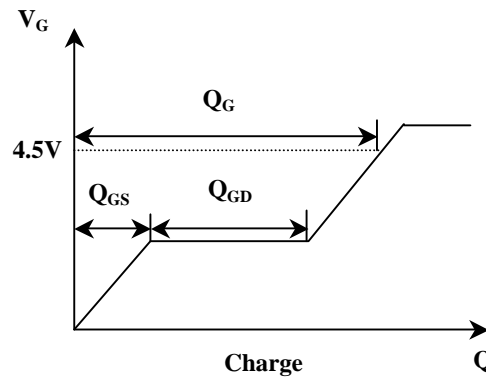


Fig 16. Gate Charge Waveform

P-channel

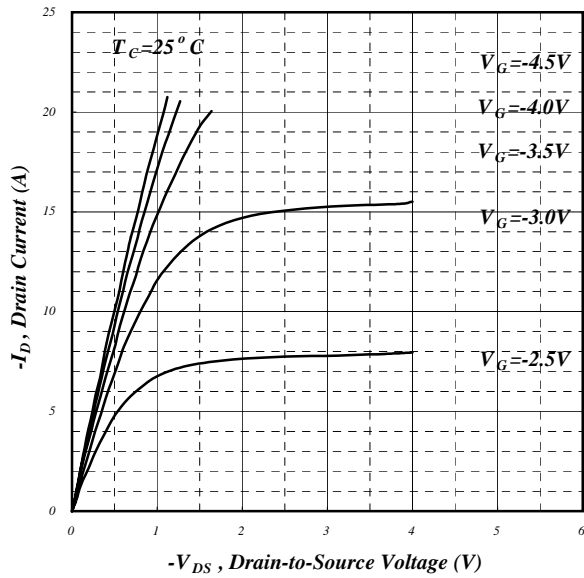


Fig 1. Typical Output Characteristics

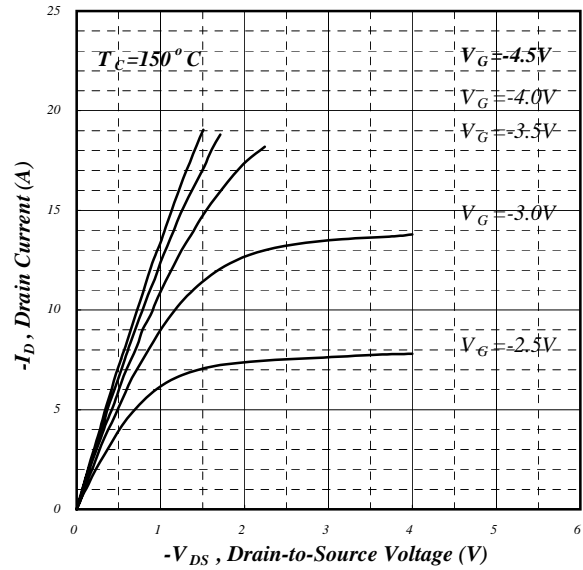


Fig 2. Typical Output Characteristics

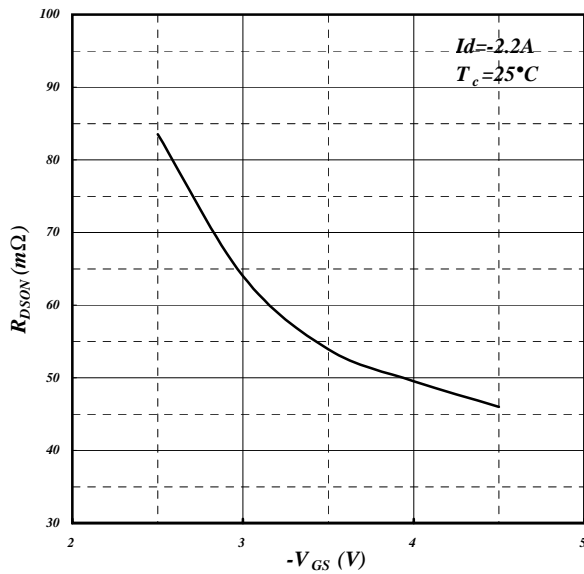


Fig 3. On-Resistance vs. Gate Voltage

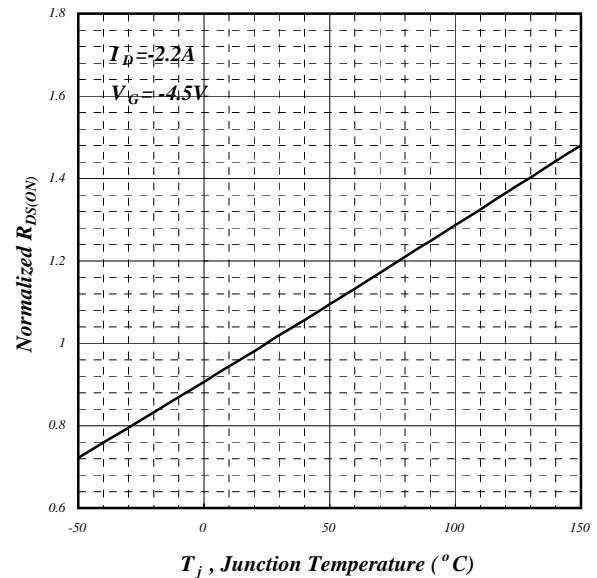


Fig 4. Normalized On-Resistance vs. Junction Temperature

P-channel

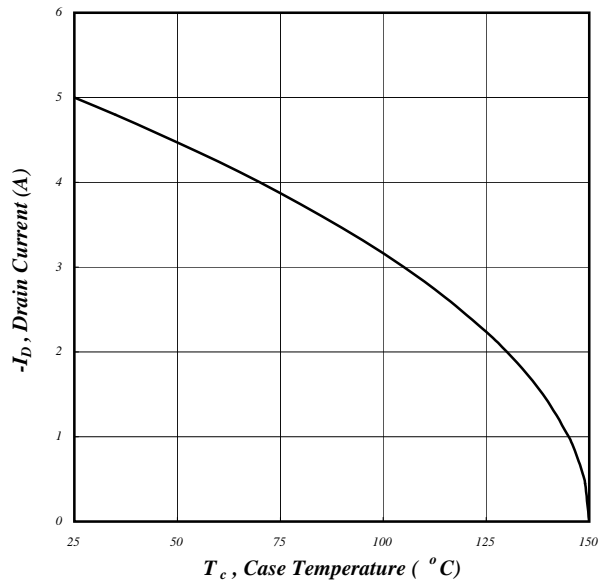


Fig 5. Maximum Drain Current vs. Case Temperature

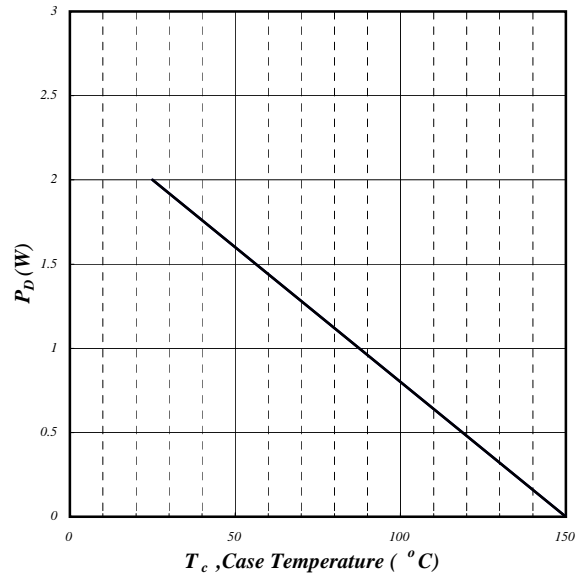


Fig 6. Typical Power Dissipation

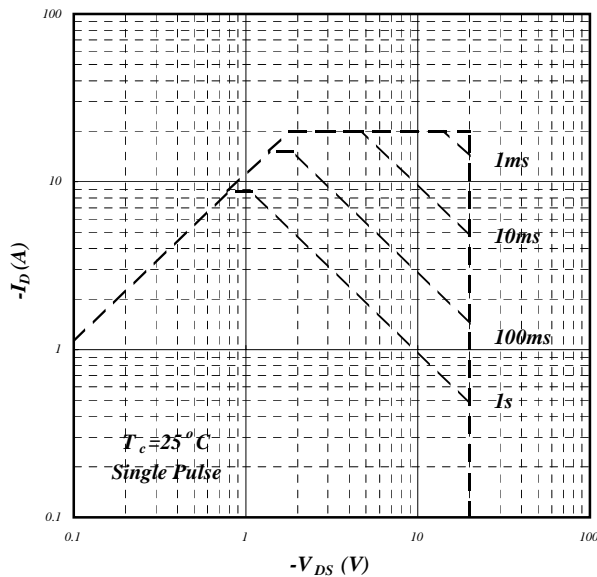


Fig 7. Maximum Safe Operating Area

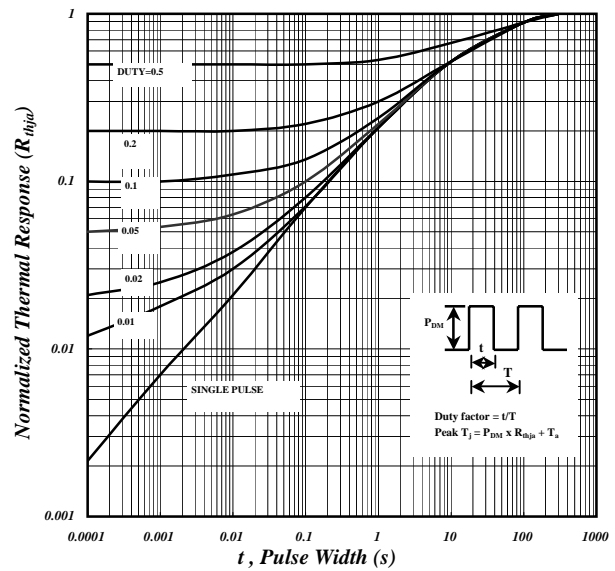


Fig 8. Effective Transient Thermal Impedance

P-channel

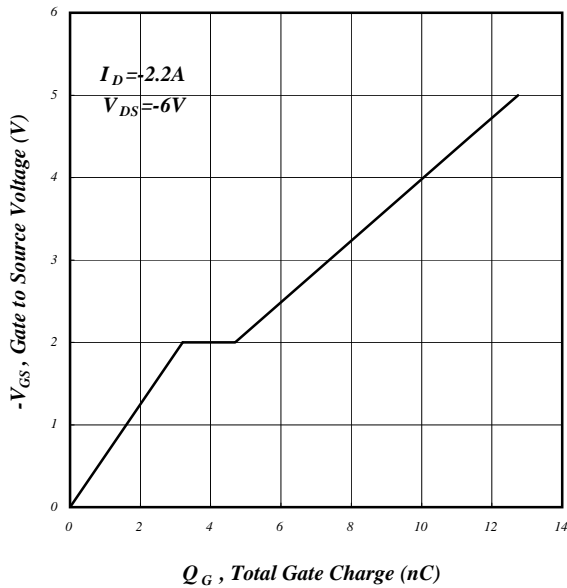


Fig 9. Gate Charge Characteristics

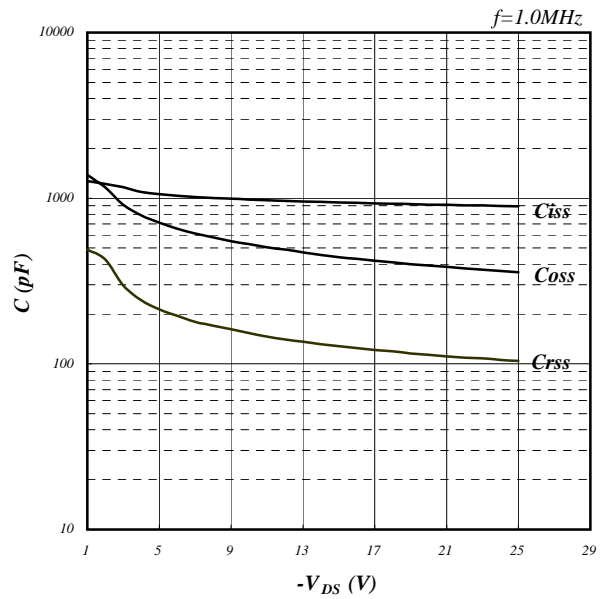


Fig 10. Typical Capacitance Characteristics

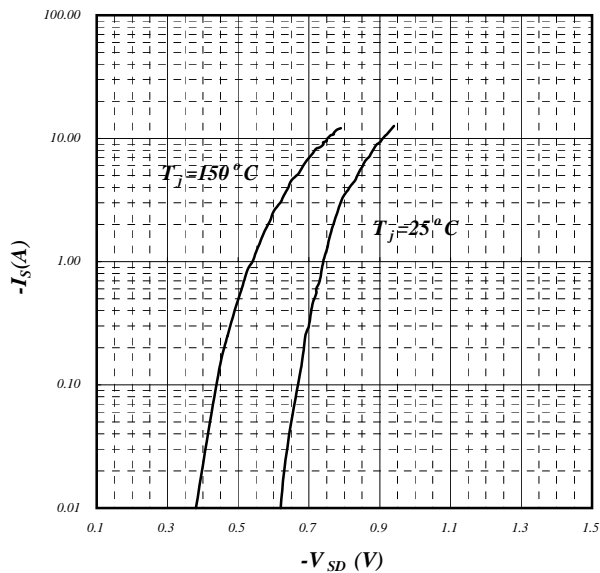


Fig 11. Forward Characteristic of Reverse Diode

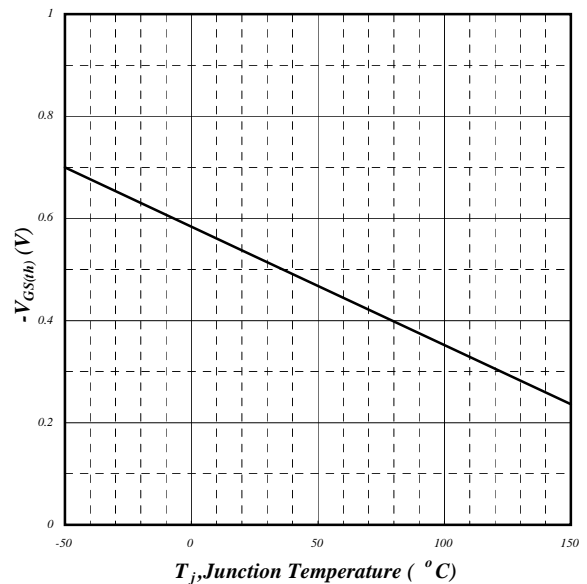


Fig 12. Gate Threshold Voltage vs. Junction Temperature

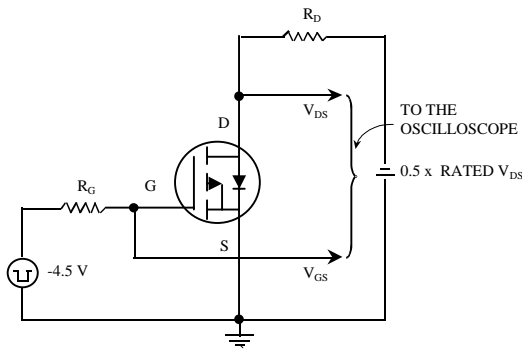
P-channel


Fig 13. Switching Time Circuit

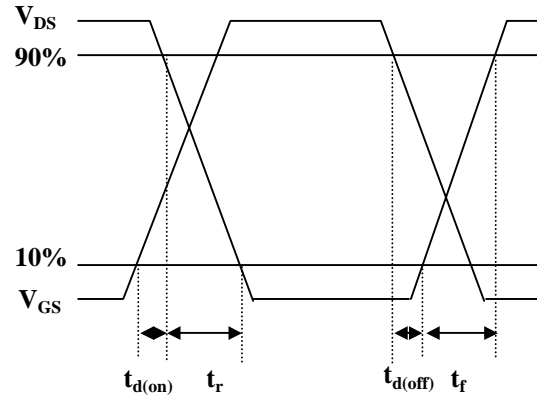


Fig 14. Switching Time Waveform

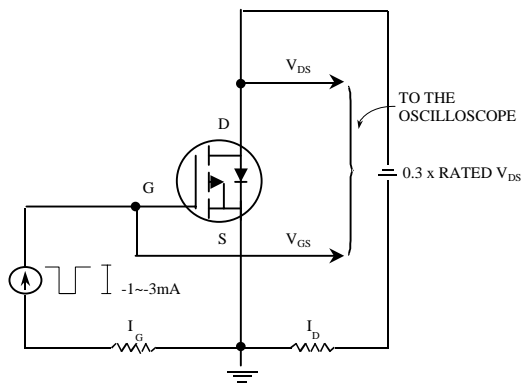


Fig 15. Gate Charge Circuit

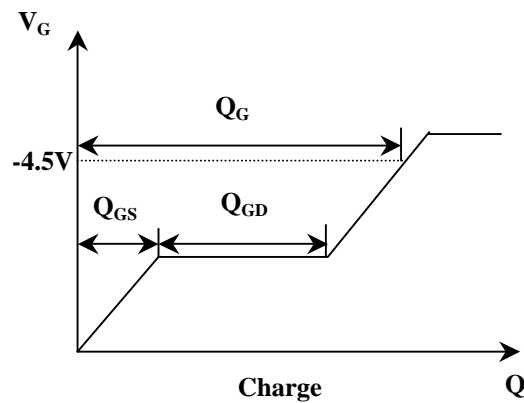


Fig 16. Gate Charge Waveform

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