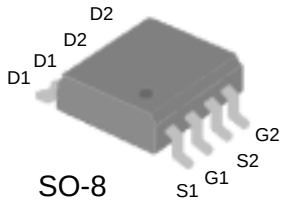
N- and P-channel Enhancement-mode Power MOSFETs

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



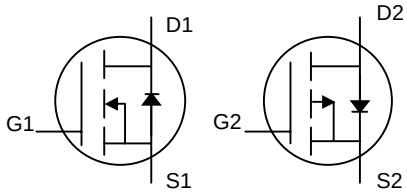
SO-8

N-CH	BV_{DSS}	20V
	$R_{DS(ON)}$	30mΩ
	I_D	6A
P-CH	BV_{DSS}	-20V
	$R_{DS(ON)}$	50mΩ
	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°C	Continuous Drain Current[3]	+6	-5	A
I_D @ T_A=70°C	Continuous Drain Current[3]	+4.8	-4	A
I_{DM}	Pulsed Drain Current[1,2]	+20	-20	A
P_D @ T_A=25°C	Total Power Dissipation	2.0		W
	Linear Derating Factor	0.016		W/°C
T_{STG}	Storage Temperature Range	-55 to 150		°C
T_J	Operating Junction Temperature Range	-55 to 150		°C

THERMAL DATA

Symbol	Parameter		Value	Unit
Rthj-amb	Thermal Resistance Junction-ambient	Max.	62.5	°C/W

N-channel ELECTRICAL CHARACTERISTICS @ T_j = 25° C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.037	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=6A	-	-	30	mΩ
		V_{GS}=2.5V, I_D=5.2A	-	-	45	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	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°C)	V_{DS}=20V, V_{GS}=0V	-	-	1	uA
	Drain-Source Leakage Current (T_j=70°C)	V_{DS}=16V, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±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=6Ω, V_{GS}=4.5V	-	-	60	ns
t_f	Fall Time	R_D=10Ω	-	-	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=1.0MHz	-	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°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 ≤300us , duty cycle ≤2%.

3.Surface mounted on FR4 board, t≤10sec.

P-channel ELECTRICAL CHARACTERISTICS @ T_j = 25° C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	-20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=-1mA	-	-0.037	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-2.2A	-	-	50	mΩ
		V_{GS}=-2.5V, I_D=-1.8A	-	-	80	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-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_j=25°C)	V_{DS}=-20V, V_{GS}=0V	-	-	-1	uA
	Drain-Source Leakage Current (T_j=70°C)	V_{DS}=-16V, V_{GS}=0V	-	-	-25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ± 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=6Ω ,V_{GS}=-4.5V	-	-	50	ns
t_f	Fall Time	R_D=4.5Ω	-	-	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=1.0MHz	-	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°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 ≤300us , duty cycle ≤2%.

3.Surface mounted on FR4 board, t≤10sec.

N-channel

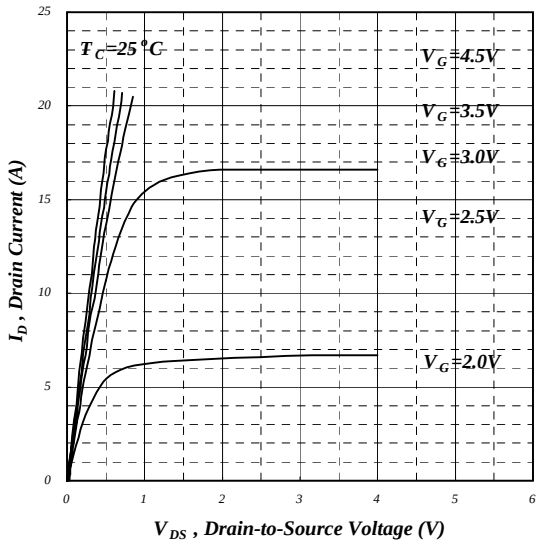


Fig 1. Typical Output Characteristics

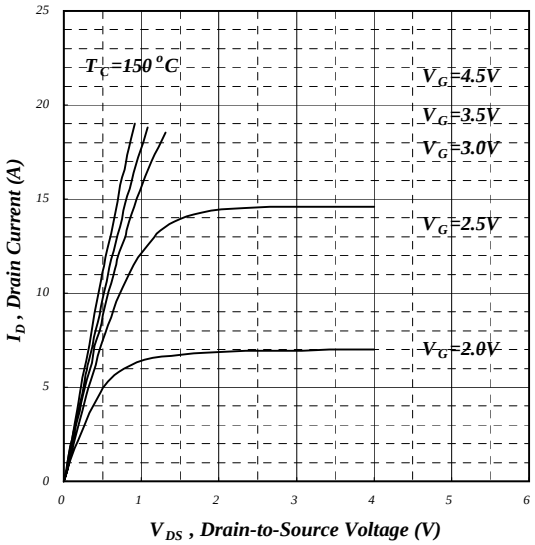


Fig 2. Typical Output Characteristics

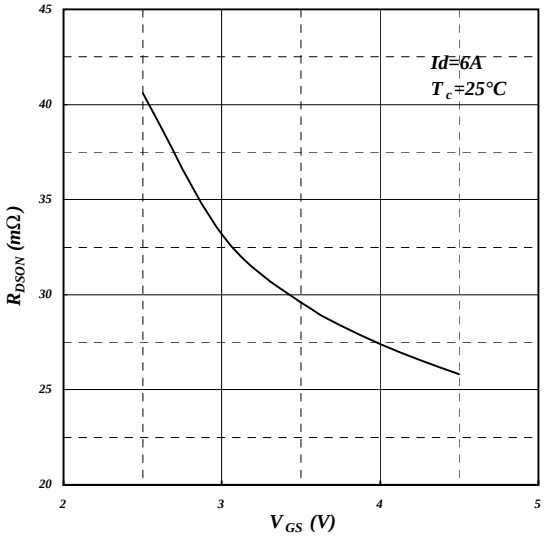


Fig 3. On-Resistance vs. Gate Voltage

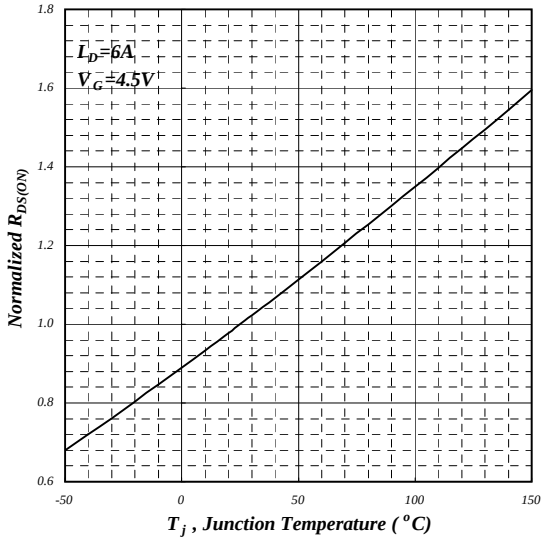


Fig 4. Normalized On-Resistance vs. Junction Temperature

N-channel

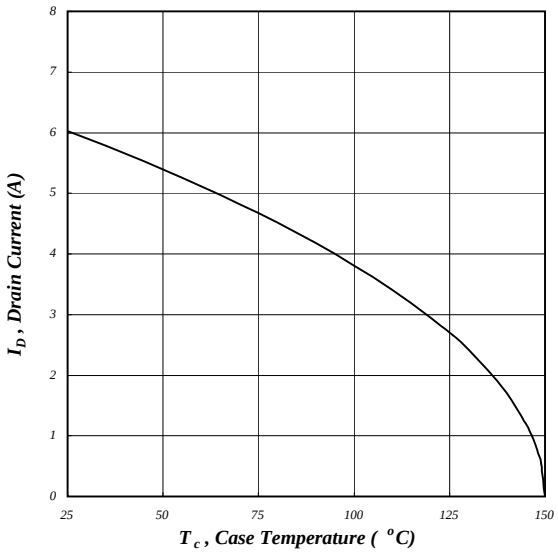


Fig 5. Maximum Drain Current vs. Case Temperature

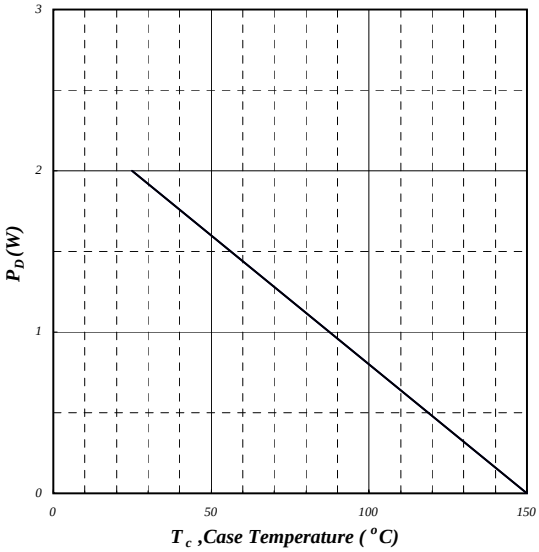


Fig 6. Typical Power Dissipation

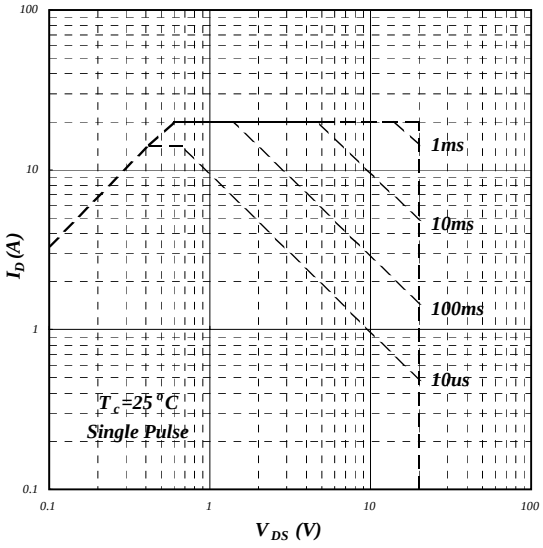


Fig 7. Maximum Safe Operating Area

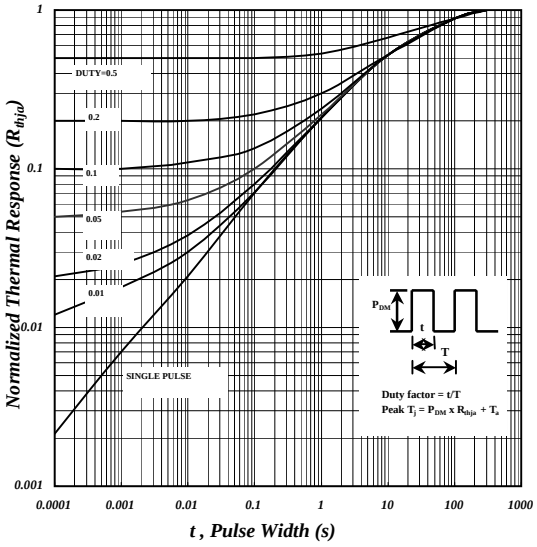


Fig 8. Effective Transient Thermal Impedance

N-channel

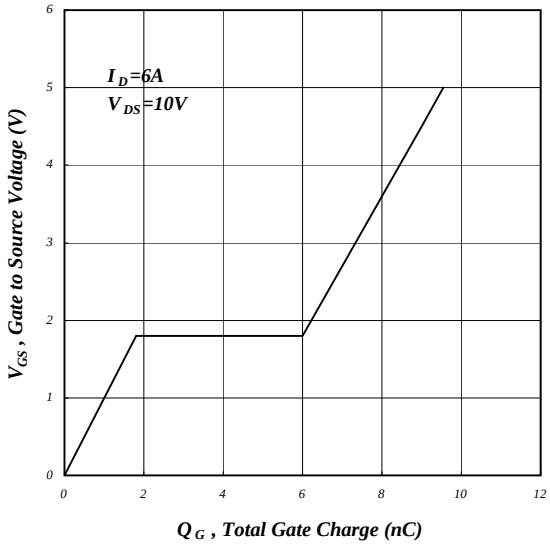


Fig 9. Gate Charge Characteristics

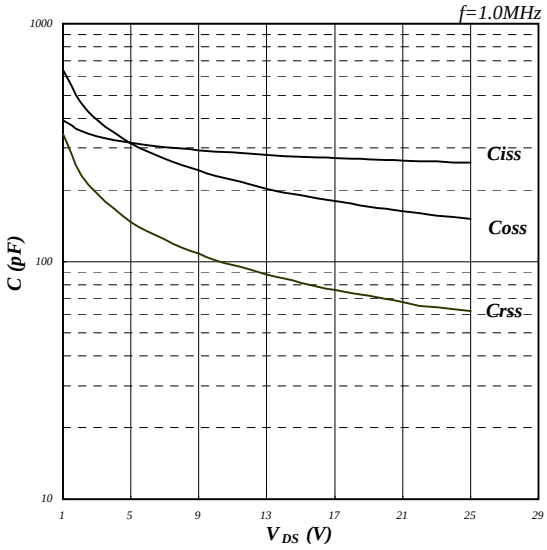


Fig 10. Typical Capacitance Characteristics

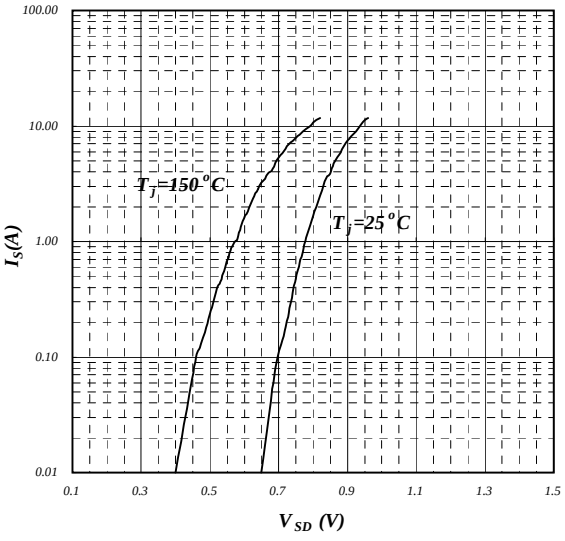


Fig 11. Forward Characteristic of Reverse Diode

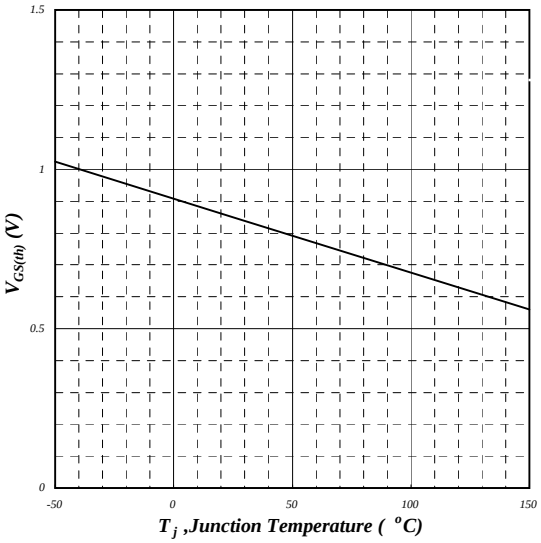


Fig 12. Gate Threshold Voltage vs. Junction Temperature

N-channel

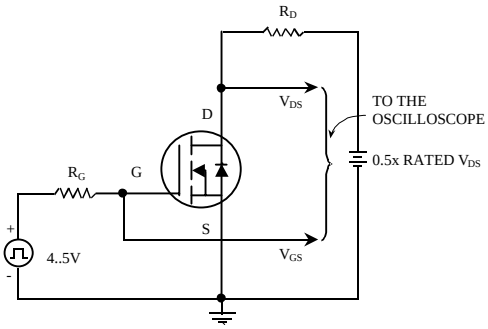


Fig 13. Switching Time Circuit

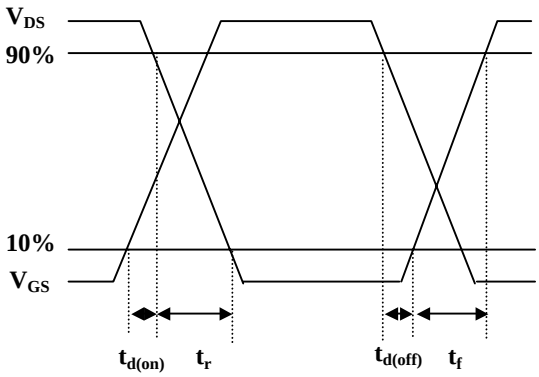


Fig 14. Switching Time Waveform

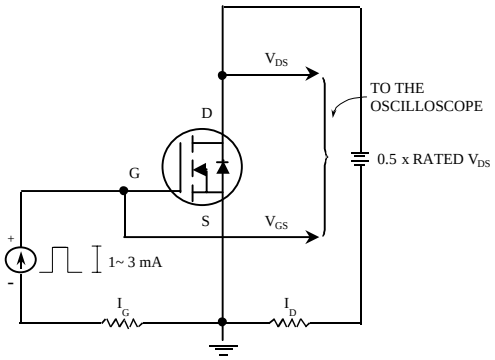


Fig 15. Gate Charge Circuit

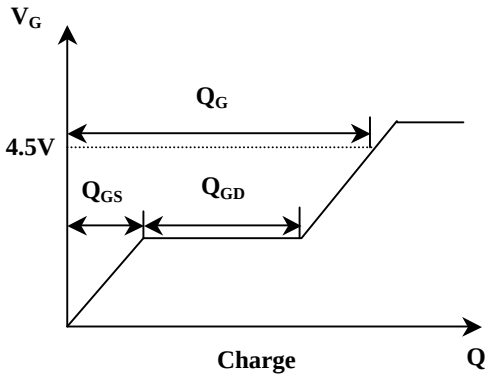


Fig 16. Gate Charge Waveform

P-channel

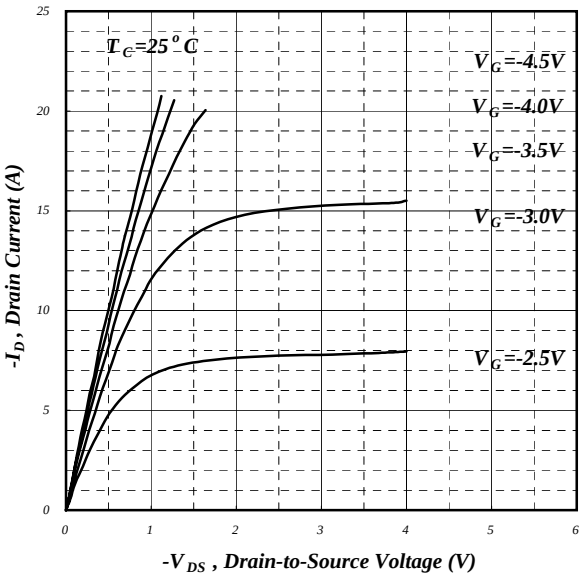


Fig 1. Typical Output Characteristics

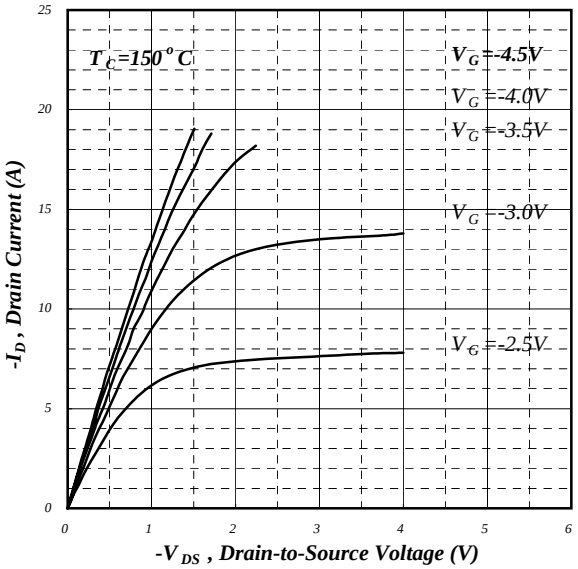


Fig 2. Typical Output Characteristics

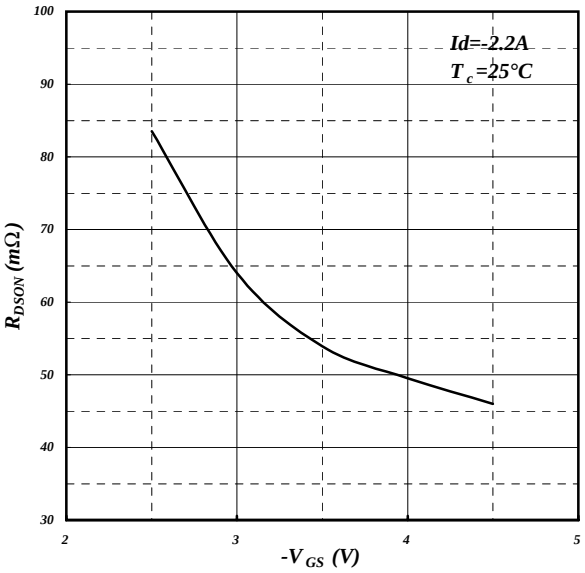


Fig 3. On-Resistance vs. Gate Voltage

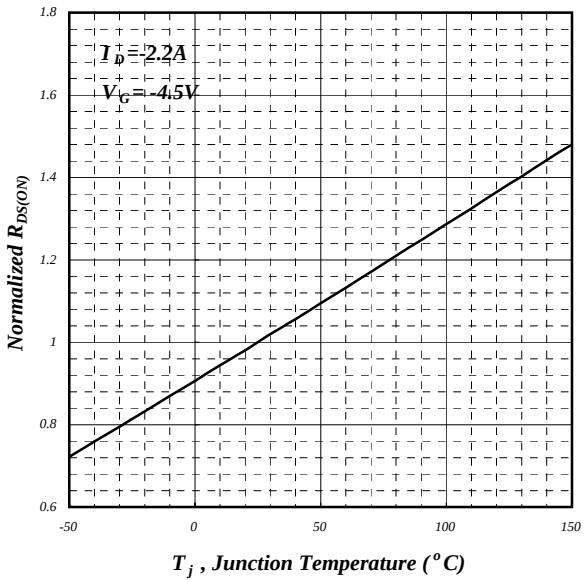


Fig 4. Normalized On-Resistance vs. Junction Temperature

P-channel

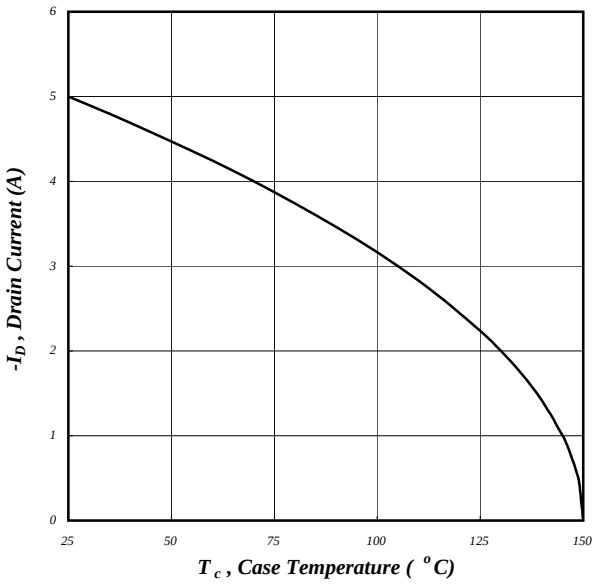


Fig 5. Maximum Drain Current vs. Case Temperature

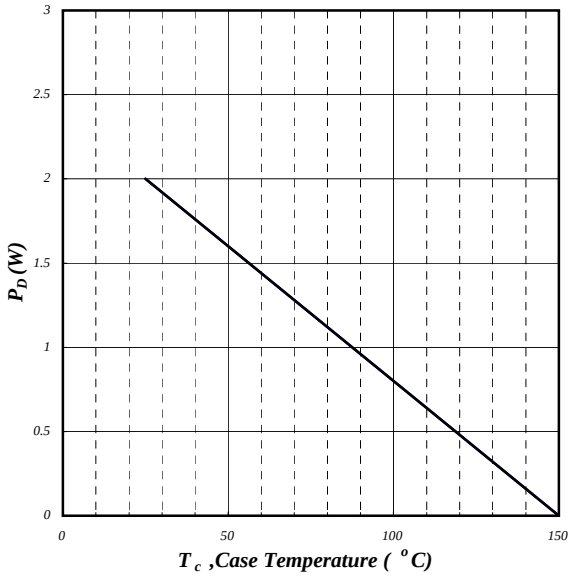


Fig 6. Typical Power Dissipation

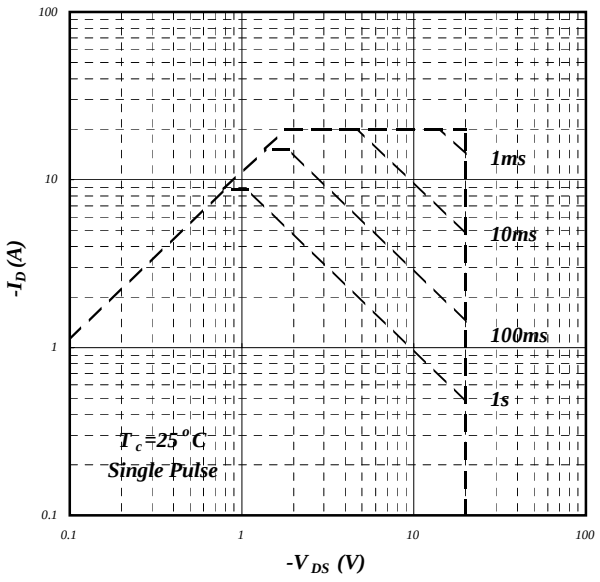


Fig 7. Maximum Safe Operating Area

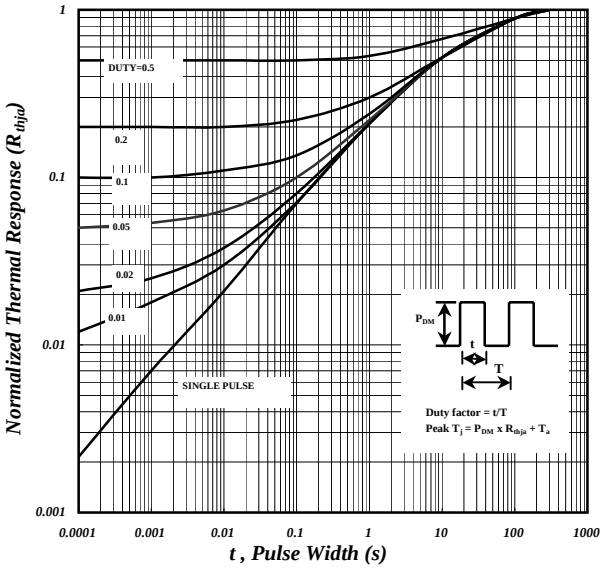


Fig 8. Effective Transient Thermal Impedance

P-channel

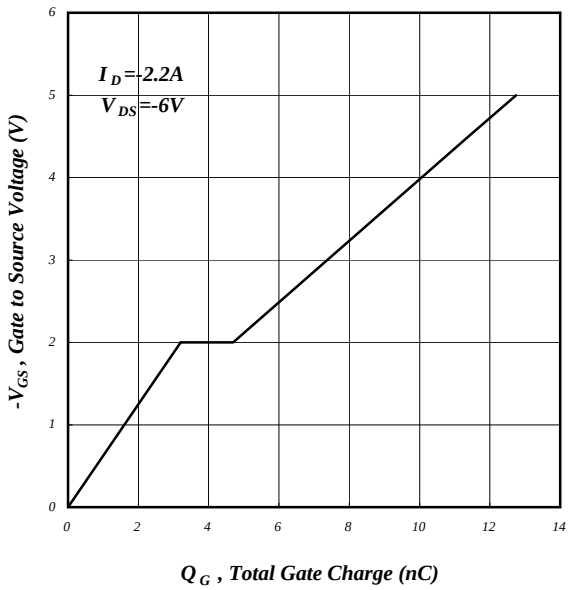


Fig 9. Gate Charge Characteristics

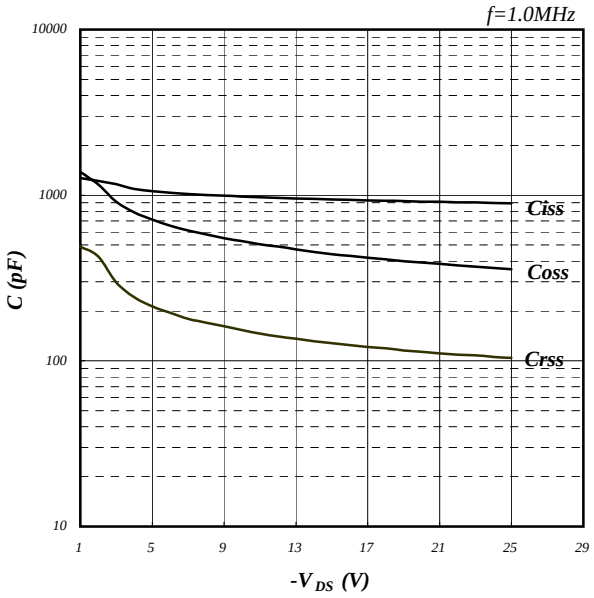


Fig 10. Typical Capacitance Characteristics

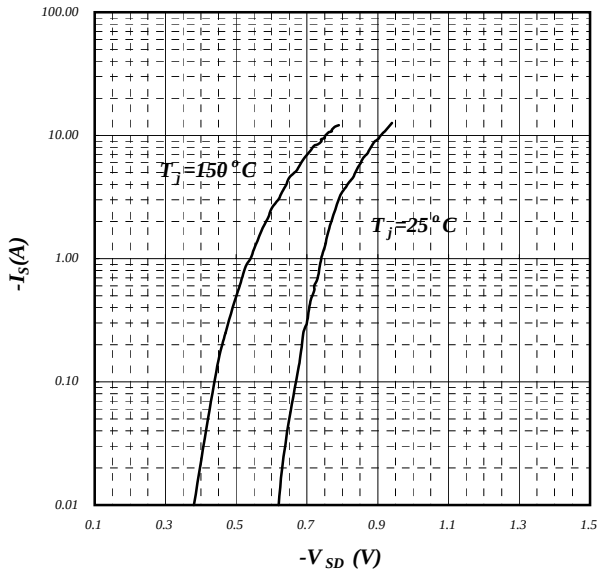


Fig 11. Forward Characteristic of Reverse Diode

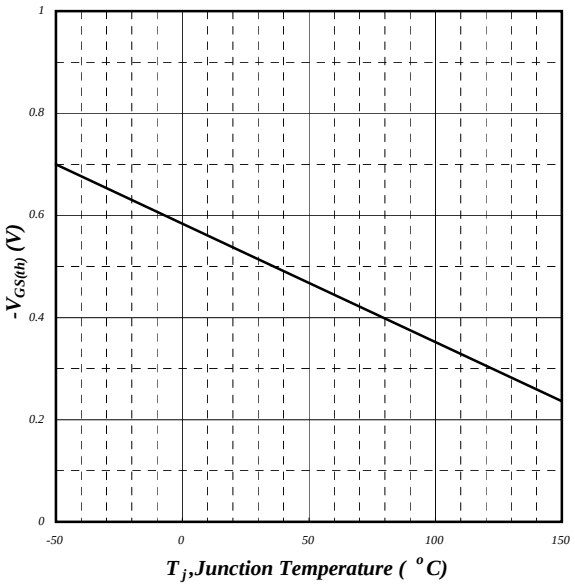


Fig 12. Gate Threshold Voltage vs. Junction Temperature

P-channel

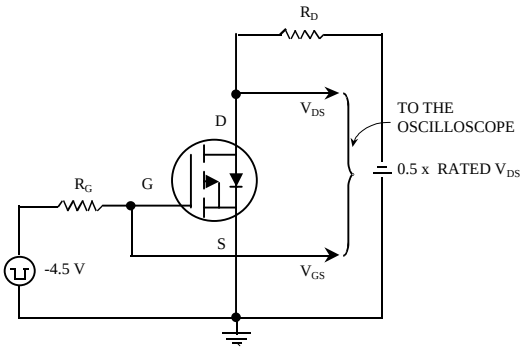


Fig 13. Switching Time Circuit

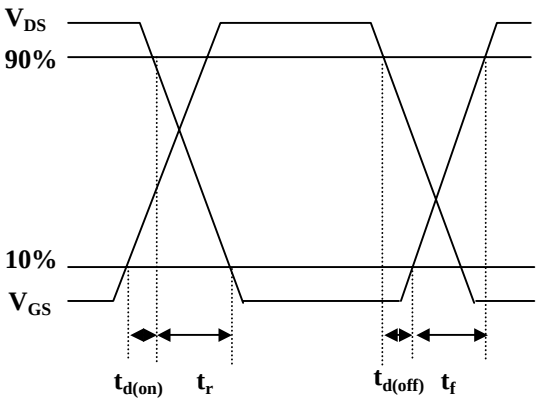


Fig 14. Switching Time Waveform

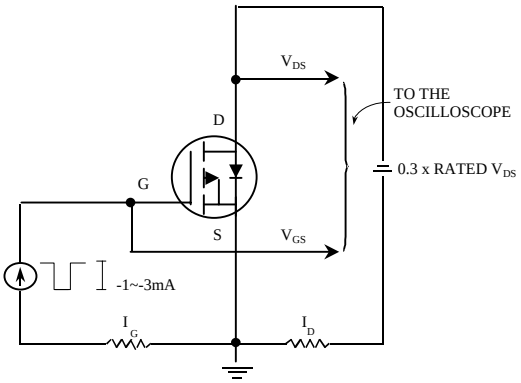


Fig 15. Gate Charge Circuit

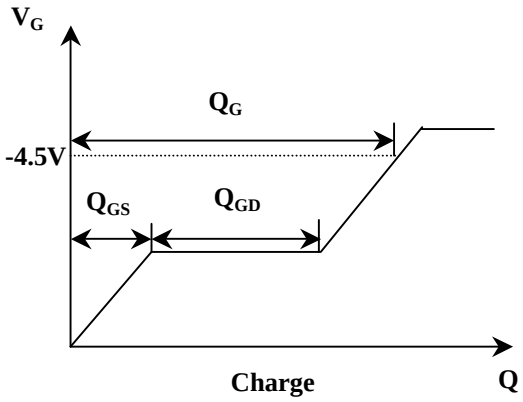


Fig 16. Gate Charge Waveform