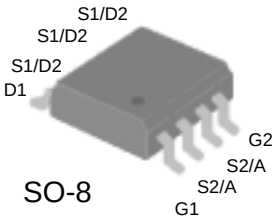
DUAL N-CHANNEL MOSFET WITH SCHOTTKY DIODE

Simple drive requirement

Suitable for DC-DC Converters

Fast switching performance



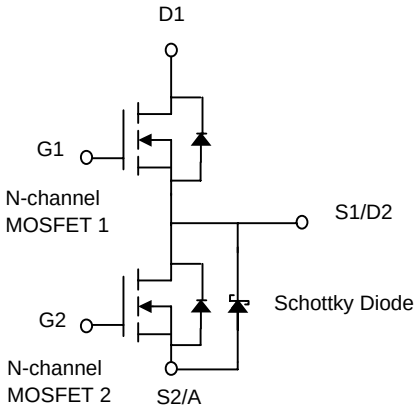
SO-8

MOSFET-1	BV_{DSS}	30V
	$R_{DS(ON)}$	22mΩ
	I_D	6.7A
MOSFET-2	BV_{DSS}	30V
	$R_{DS(ON)}$	13mΩ
	I_D	11.5A

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 SO-8 package is widely preferred for commercial and industrial surface mount applications and is well suited for low voltage applications such as DC/DC converters.



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		MOSFET-1	MOSFET-2	
V_{DS}	Drain-Source Voltage	30	30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D @ T_A=25°C	Continuous Drain Current[3]	6.7	11.5	A
I_D @ T_A=70°C	Continuous Drain Current[3]	5.3	9.2	A
I_{DM}	Pulsed Drain Current[1]	30	40	A
P_D @ T_A=25°C	Total Power Dissipation	1.4	2.4	W
	Linear Derating Factor	0.01	0.02	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		Units
		Typ.	Max.	
Rthj-a (MOSFET-1)	Thermal Resistance Junction-ambient[3]	70	90	°C/W
Rthj-a (MOSFET-2)	Thermal Resistance Junction-ambient[3]	42	53	°C/W
Rthj-a (Schottky)	Thermal Resistance Junction-ambient[3]	52	60	°C/W

MOSFET-1 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	30	-	-	V
$\Delta BV_{DSS}/\Delta Tj$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.03	-	V/ °C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=6A	-	-	22	mΩ
		V_{GS}=4.5V, I_D=5A	-	-	30	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=6A	-	10	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25°C)	V_{DS}=30V, V_{GS}=0V	-	-	1	uA
	Drain-Source Leakage Current (T_j=70°C)	V_{DS}=24V, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=6A	-	11	18	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	7	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	9	-	ns
t_r	Rise Time	I_D=1A	-	7	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω , V_{GS}=10V	-	22	-	ns
t_f	Fall Time	R_D=15Ω	-	7	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	780	1250	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	180	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	50	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.25	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=1.2A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[2]	I_S=6A, V_{GS}=0V	-	21	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/µs	-	15	-	nC

MOSFET-2 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	30	-	-	V
$\Delta BV_{DSS}/\Delta Tj$	Breakdown Voltage Temperature Coefficient	Reference to 25°C,I_D=1mA	-	0.03	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=11A	-	-	13	mΩ
		V_{GS}=4.5V, I_D=8A	-	-	18.5	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=11A	-	15	-	S
I_{DSS}	Drain-Source Leakage Current (Tj=25°C)	V_{DS}=30V, V_{GS}=0V	-	-	100	uA
	Drain-Source Leakage Current (Tj=70°C)	V_{DS}=24V, V_{GS}=0V	-	-	1	mA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=8A	-	20	30	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	12	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	12	-	ns
t_r	Rise Time	I_D=1A	-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω , V_{GS}=10V	-	31	-	ns
t_f	Fall Time	R_D=15Ω	-	12	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	1450	2320	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	320	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	230	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.5	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=1A, V_{GS}=0V	-	-	0.5	V
t_{rr}	Reverse Recovery Time[2]	I_S=8A, V_{GS}=0V	-	27	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	18	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

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

3.Surface mounted on 1 in^2 copper pad of FR4 board, t ≤10 sec.

Schottky Specifications @ T_j=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Forward Voltage Drop	I_F=1.0A	-	0.47	0.5	V
I_{rm}	Maximum Reverse Leakage Current	V_r=30V	-	0.004	0.2	mA
	Maximum Reverse Leakage Current	V_r=30V,T_j=100°C	-	0.5	1	mA
C_T	Junction Capacitance	V_r=10V	-	66	-	pF

MOSFET-1

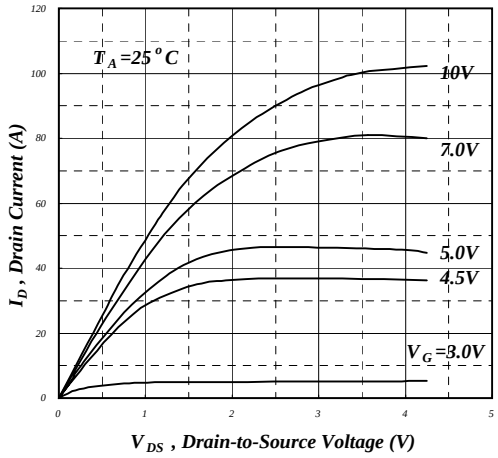


Fig 1. Typical Output Characteristics

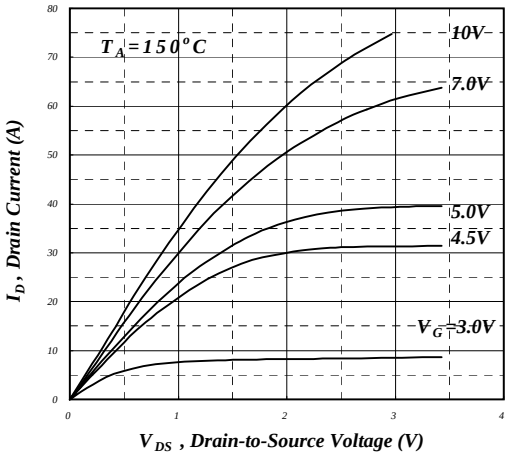


Fig 2. Typical Output Characteristics

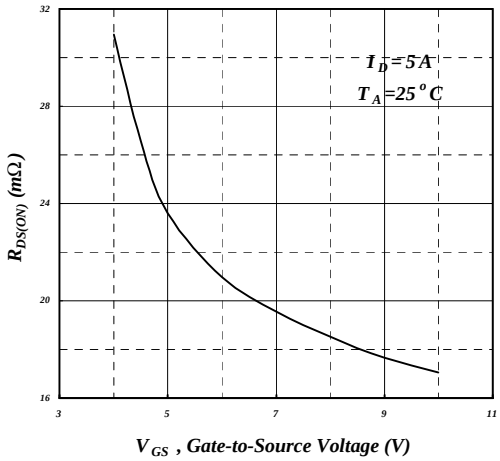


Fig 3. On-Resistance v.s. Gate Voltage

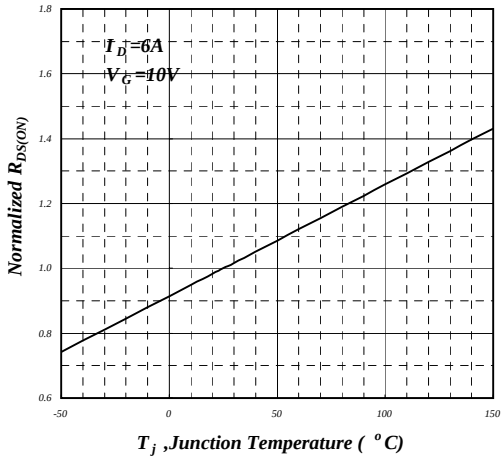


Fig 4. Normalized On-Resistance vs. Junction Temperature

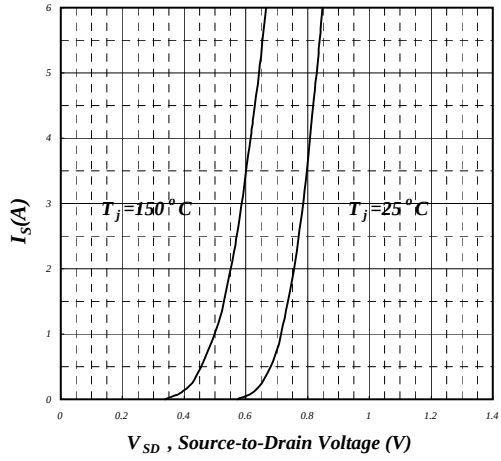


Fig 5. Forward Characteristic of Reverse Diode

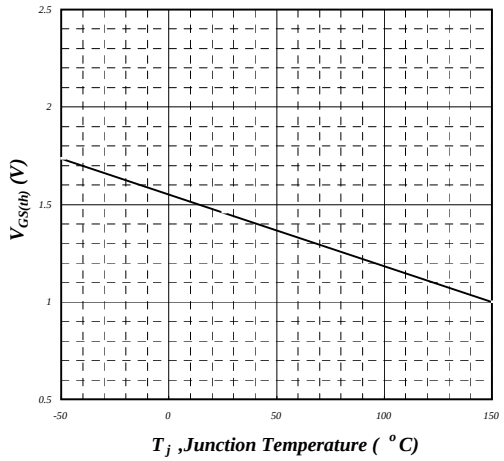


Fig 6. Gate Threshold Voltage vs. Junction Temperature

MOSFET-1

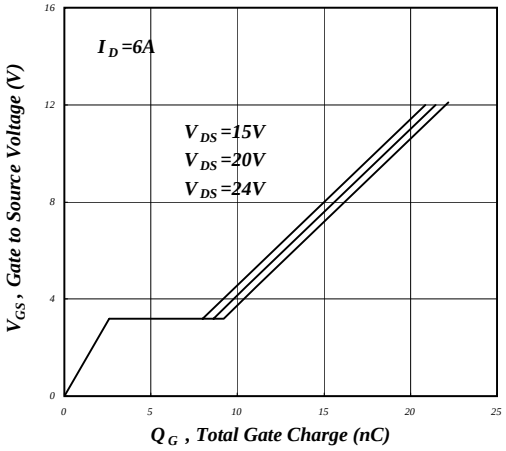


Fig 7. Gate Charge Characteristics

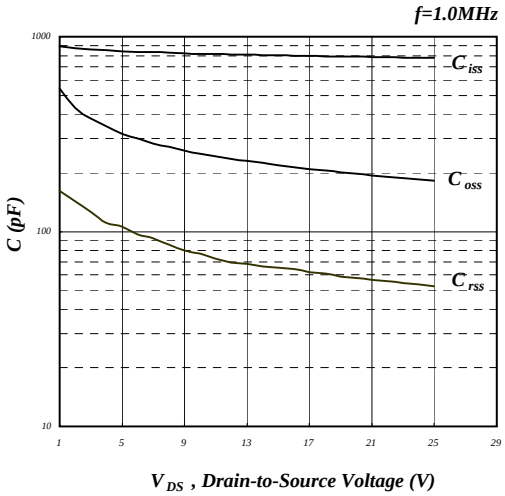


Fig 8. Typical Capacitance Characteristics

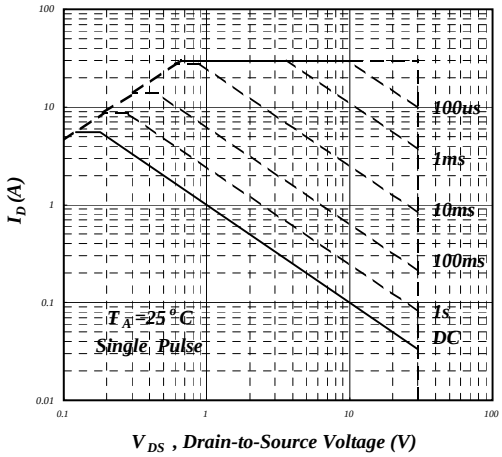


Fig 9. Maximum Safe Operating Area

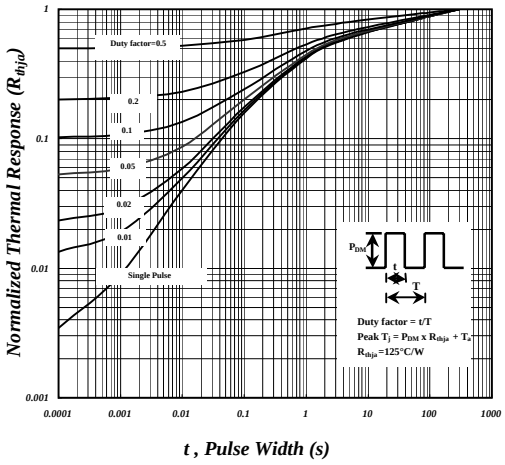


Fig 10. Effective Transient Thermal Impedance

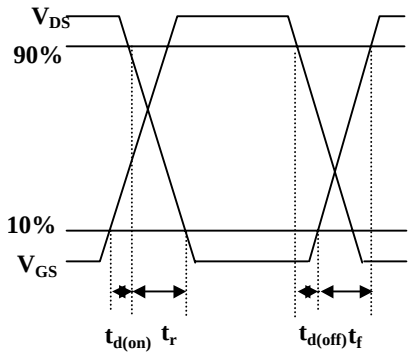


Fig 11. Switching Time Waveform

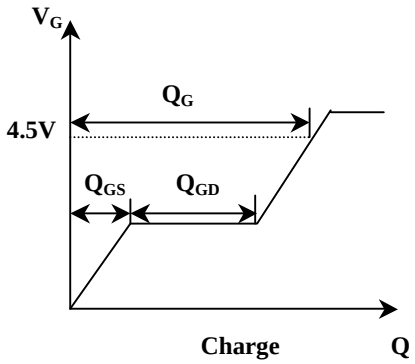


Fig 12. Gate Charge Waveform

MOSFET-2

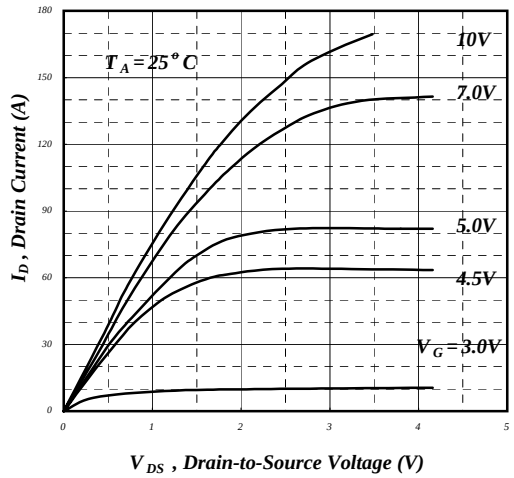


Fig 1. Typical Output Characteristics

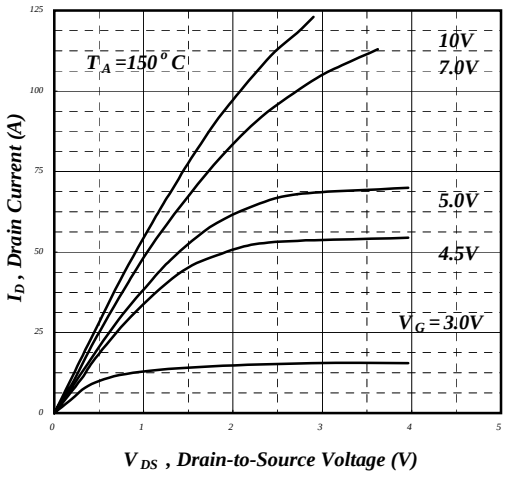


Fig 2. Typical Output Characteristics

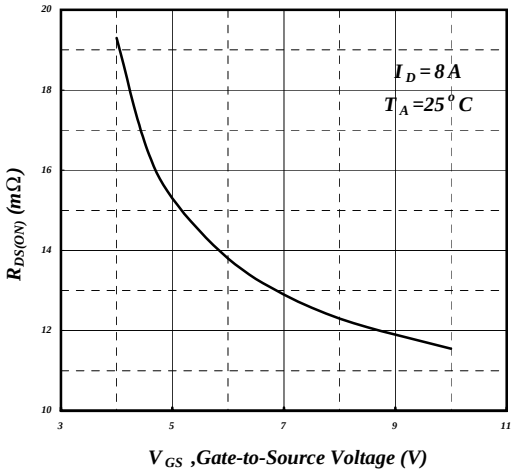


Fig 3. On-Resistance vs. Gate Voltage

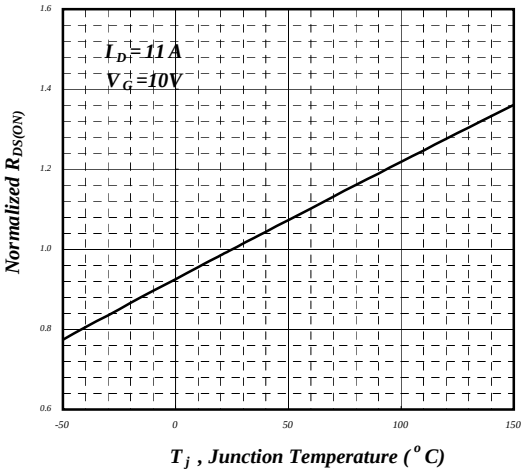


Fig 4. Normalized On-Resistance vs. Junction Temperature

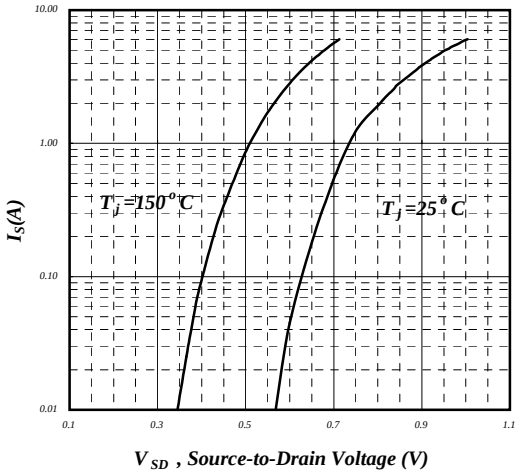


Fig 5. Forward Characteristic of Reverse Diode

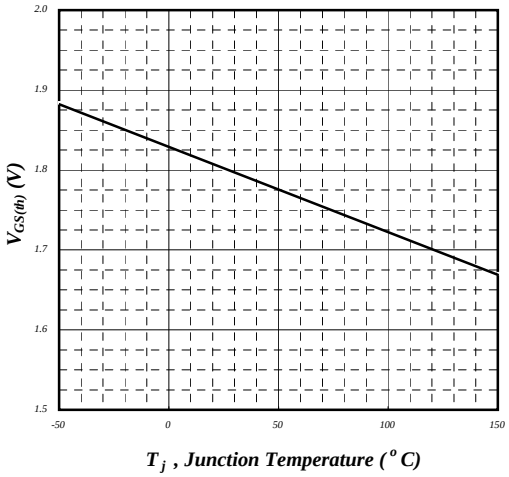


Fig 6. Gate Threshold Voltage vs. Junction Temperature

MOSFET-2

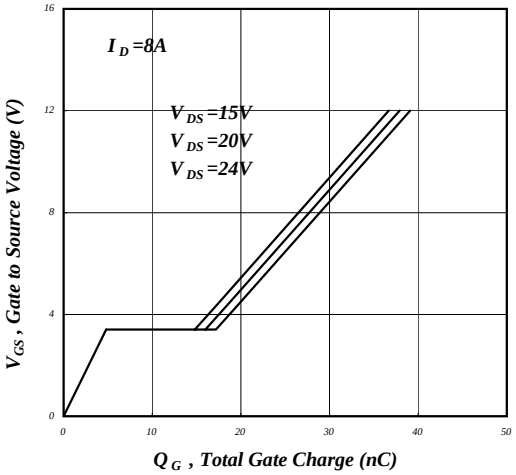


Fig 7. Gate Charge Characteristics

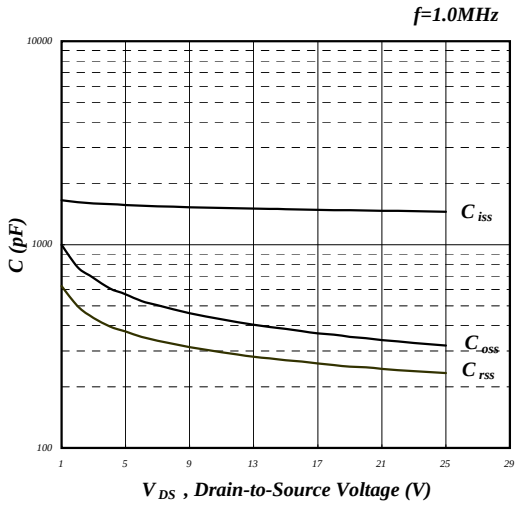


Fig 8. Typical Capacitance Characteristics

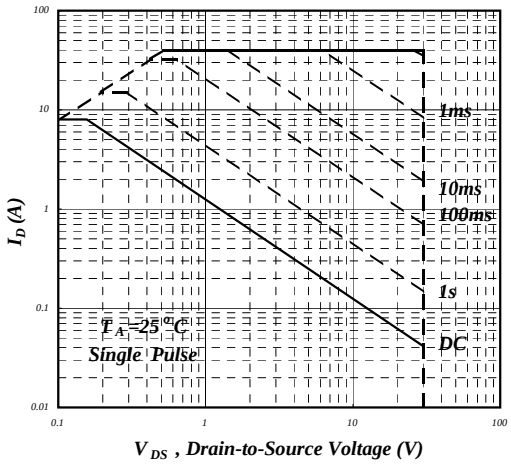


Fig 9. Maximum Safe Operating Area

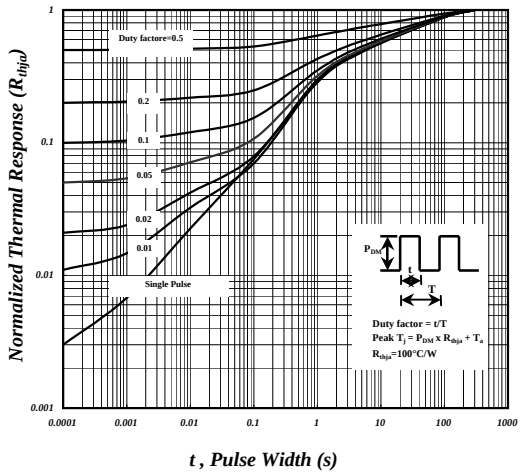


Fig 10. Effective Transient Thermal Impedance

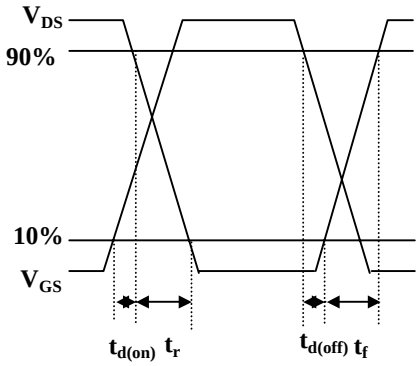


Fig 11. Switching Time Waveform

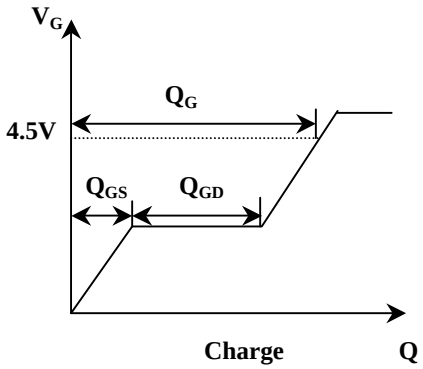


Fig 12. Gate Charge Waveform

Schottky

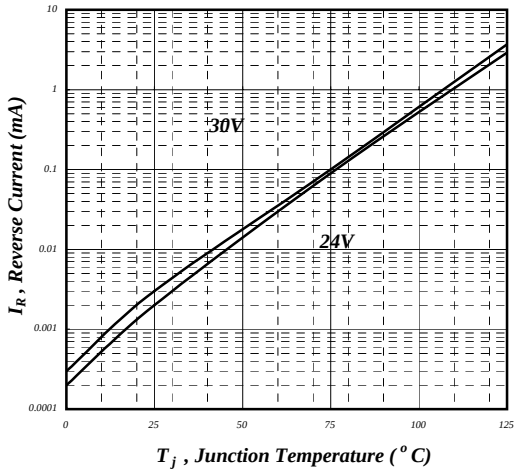


Fig 1. Reverse Current vs Junction Temperature

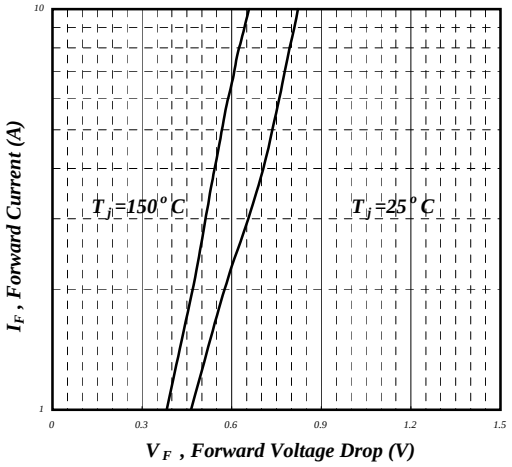


Fig 2. Typical Forward Characteristics

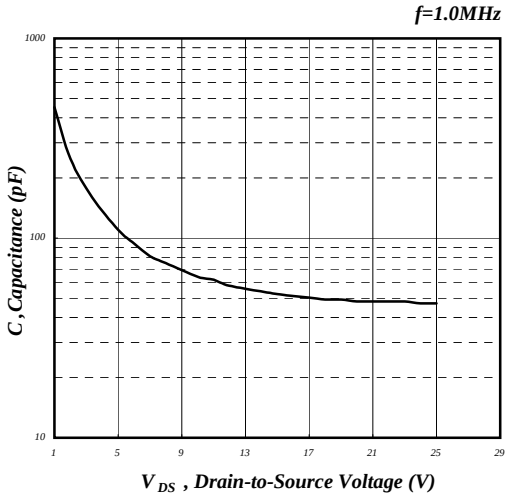


Fig 3. Typical Junction Capacitance