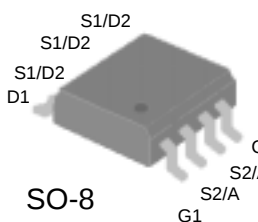


DUAL N-CHANNEL MOSFET WITH SCHOTTKY DIODE

Simple drive requirement
Suitable for DC-DC Converters
Fast switching performance

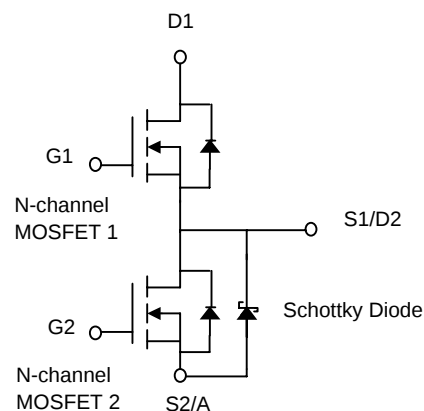


MOSFET-1 BV_{DS}	30V
$R_{DS(ON)}$	22m Ω
I_D	6.7A
MOSFET-2 BV_{DS}	30V
$R_{DS(ON)}$	13m Ω
I_D	11.5A

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
$I_D @ T_A=25^\circ\text{C}$	Continuous Drain Current ³	6.7	11.5	A
$I_D @ T_A=70^\circ\text{C}$	Continuous Drain Current ³	5.3	9.2	A
I_{DM}	Pulsed Drain Current ¹	30	40	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	1.4	2.4	W
	Linear Derating Factor	0.01	0.02	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		Units
		Typ.	Max.	
Rthj-a (MOSFET-1)	Thermal Resistance Junction-ambient ³	70	90	$^\circ\text{C/W}$
Rthj-a (MOSFET-2)	Thermal Resistance Junction-ambient ³	42	53	$^\circ\text{C/W}$
Rthj-a (Schottky)	Thermal Resistance Junction-ambient ³	52	60	$^\circ\text{C/W}$

MOSFET-1 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	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=1mA$	-	0.03	-	V/ $^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=6A$	-	-	22	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	-	30	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=6A$	-	10	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^{\circ}\text{C}$)	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=70^{\circ}\text{C}$)	$V_{DS}=24V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 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	$R_G=3.3\Omega, V_{GS}=10V$	-	22	-	ns
t_f	Fall Time	$R_D=15\Omega$	-	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	$dI/dt=100A/\mu s$	-	15	-	nC

MOSFET-2 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	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=1mA$	-	0.03	-	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=11A$	-	-	13	$m\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	-	18.5	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=11A$	-	15	-	S
I_{DSS}	Drain-Source Leakage Current ($T=25^{\circ}\text{C}$)	$V_{DS}=30V, V_{GS}=0V$	-	-	100	μA
	Drain-Source Leakage Current ($T=70^{\circ}\text{C}$)	$V_{DS}=24V, V_{GS}=0V$	-	-	1	mA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 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	$R_G=3.3\Omega, V_{GS}=10V$	-	31	-	ns
t_f	Fall Time	$R_D=15\Omega$	-	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	$dI/dt=100A/\mu s$	-	18	-	nC

Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10$ sec.

Schottky Specifications @ $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

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

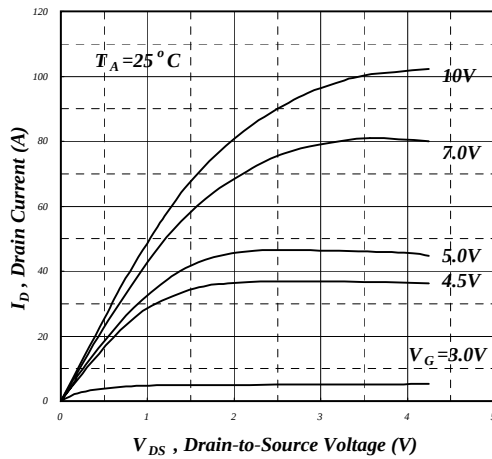
MOSFET-1


Fig 1. Typical Output Characteristics

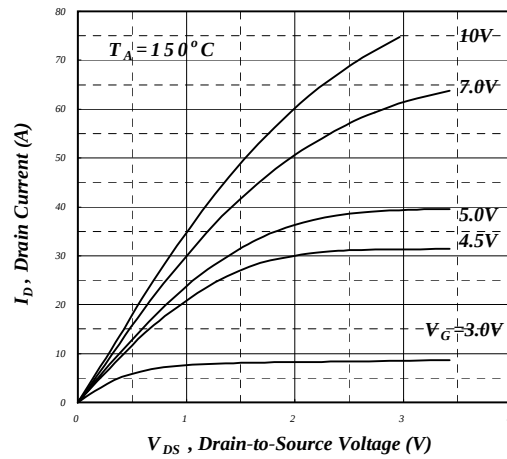


Fig 2. Typical Output Characteristics

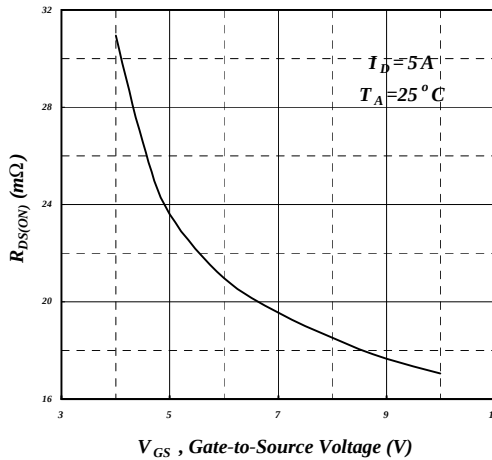


Fig 3. On-Resistance v.s. Gate Voltage

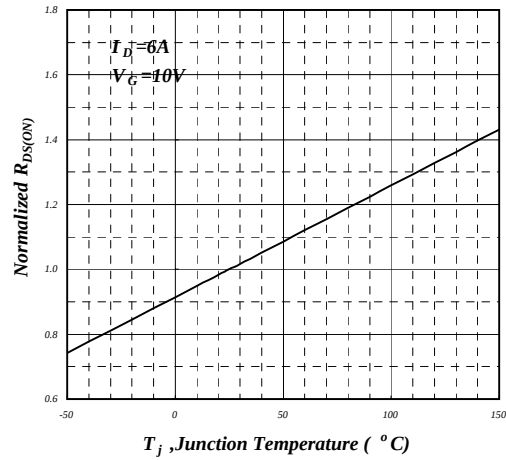


Fig 4. Normalized On-Resistance vs. Junction Temperature

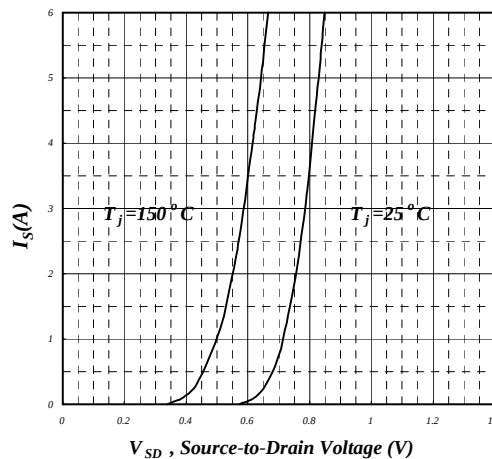


Fig 5. Forward Characteristic of Reverse Diode

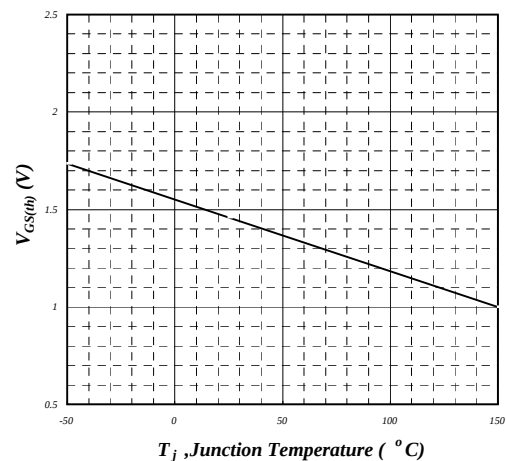


Fig 6. Gate Threshold Voltage vs. Junction Temperature

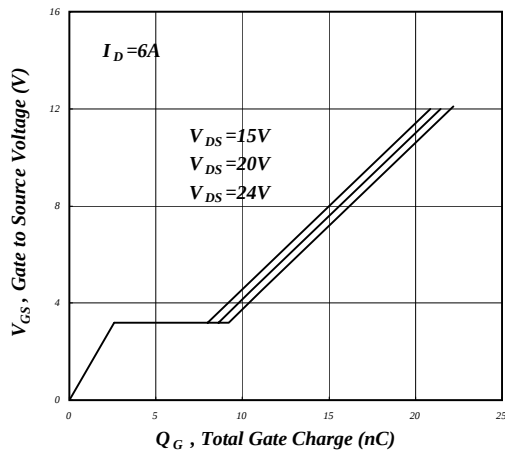
MOSFET-1


Fig 7. Gate Charge Characteristics

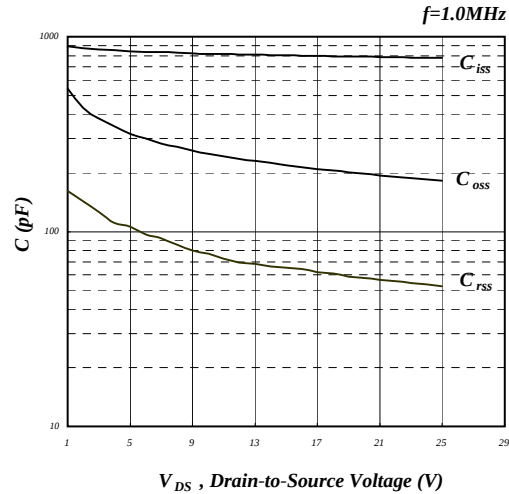


Fig 8. Typical Capacitance Characteristics

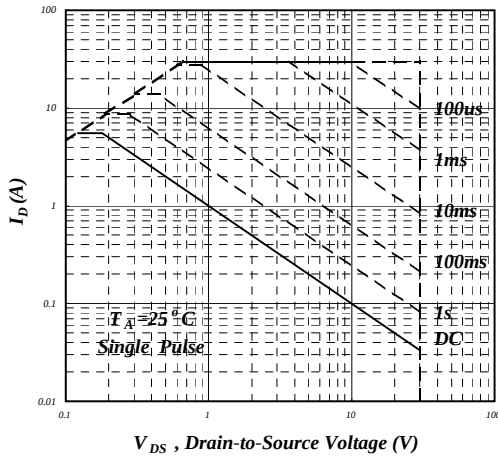


Fig 9. Maximum Safe Operating Area

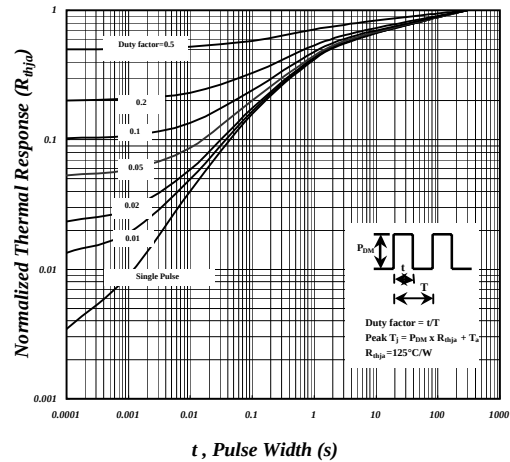


Fig 10. Effective Transient Thermal Impedance

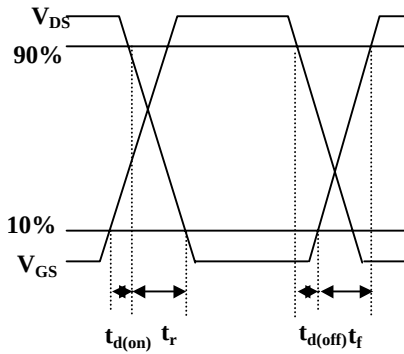


Fig 11. Switching Time Waveform

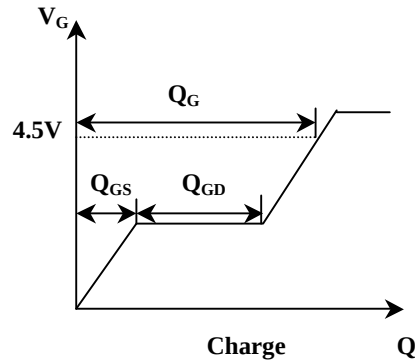


Fig 12. Gate Charge Waveform

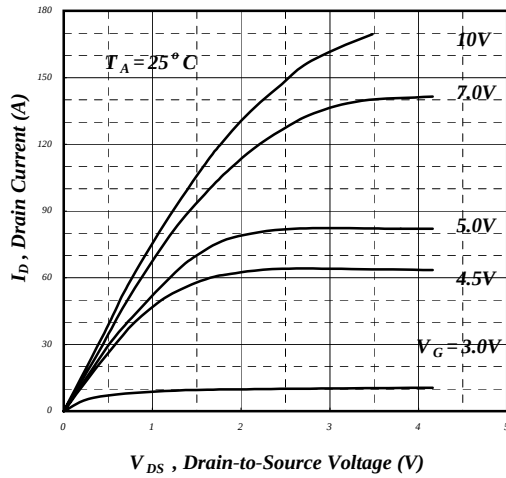
MOSFET-2


Fig 1. Typical Output Characteristics

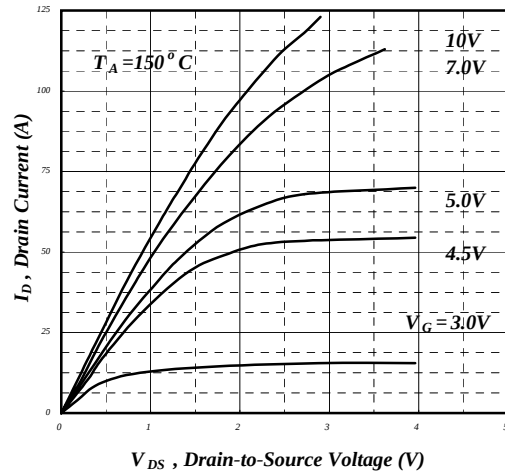


Fig 2. Typical Output Characteristics

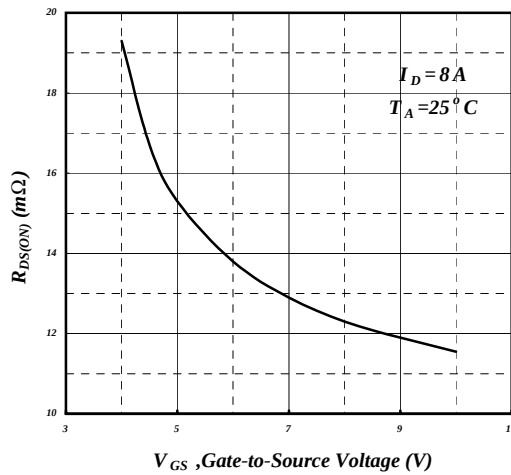


Fig 3. On-Resistance vs. Gate Voltage

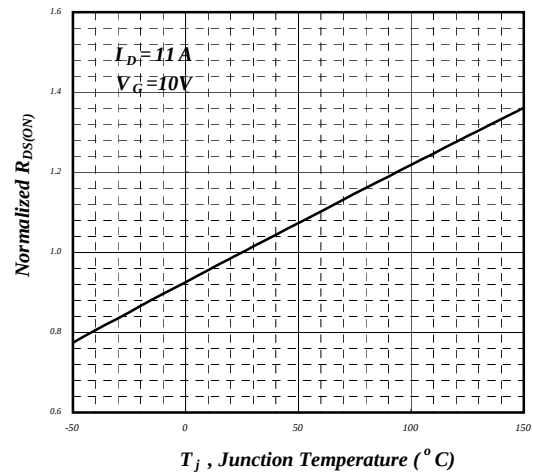


Fig 4. Normalized On-Resistance vs. Junction Temperature

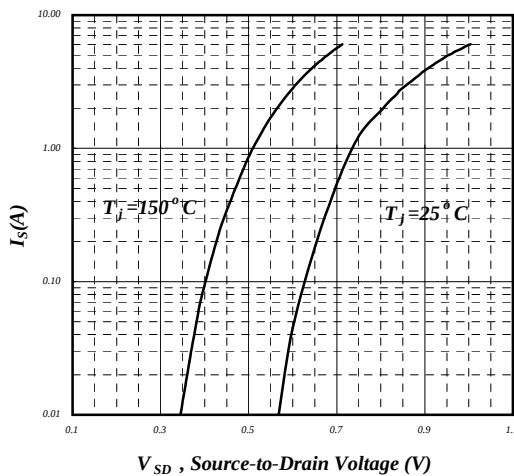


Fig 5. Forward Characteristic of Reverse Diode

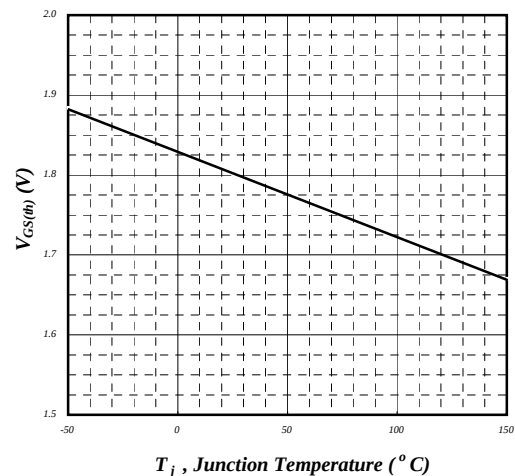


Fig 6. Gate Threshold Voltage vs. Junction Temperature

MOSFET-2

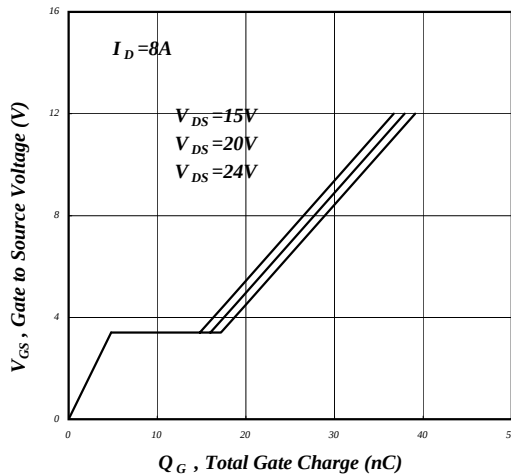


Fig 7. Gate Charge Characteristics

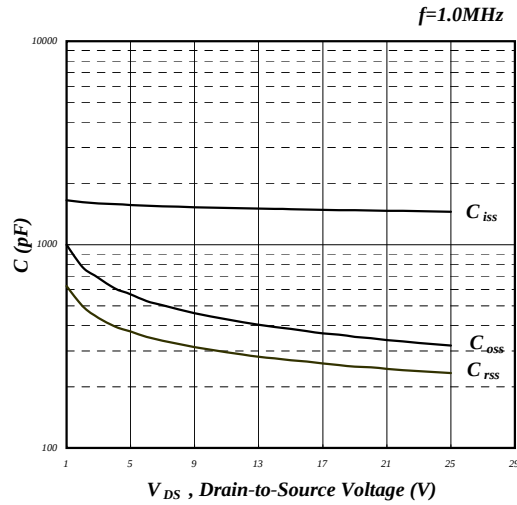


Fig 8. Typical Capacitance Characteristics

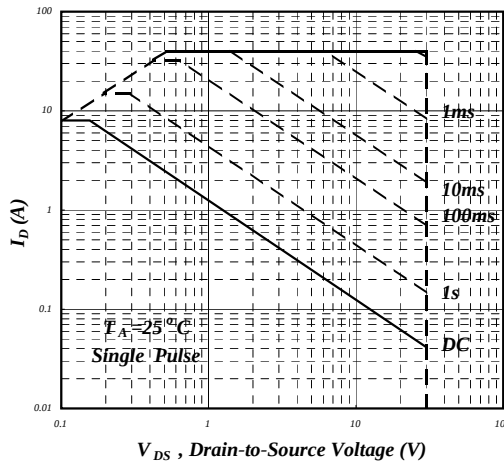


Fig 9. Maximum Safe Operating Area

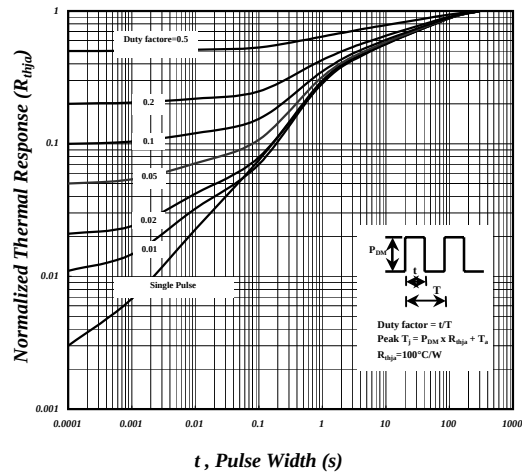


Fig 10. Effective Transient Thermal Impedance

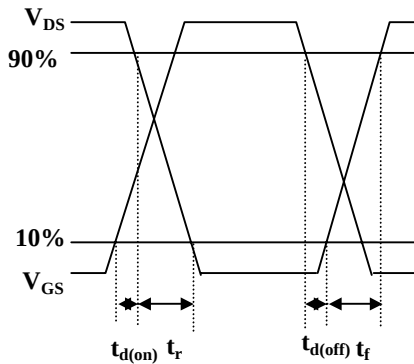


Fig 11. Switching Time Waveform

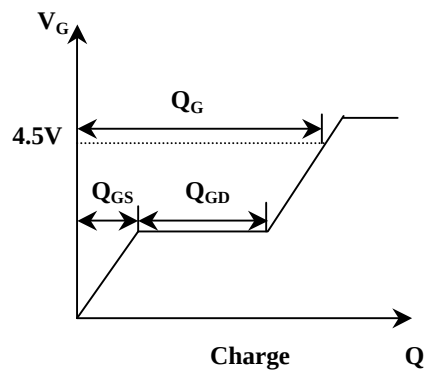


Fig 12. Gate Charge Waveform

Schottky

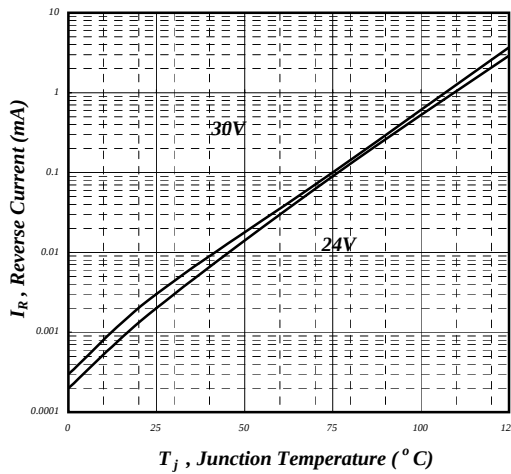


Fig 1. Reverse Current vs Junction Temperature

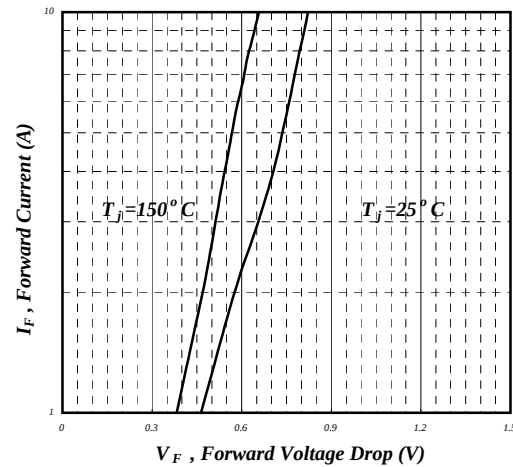


Fig 2. Typical Forward Characteristics

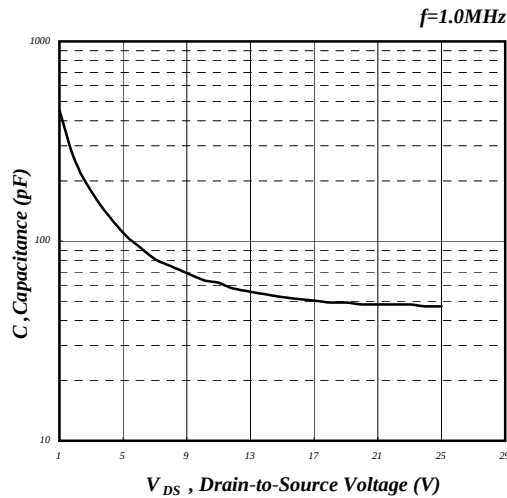


Fig 3. Typical Junction Capacitance

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