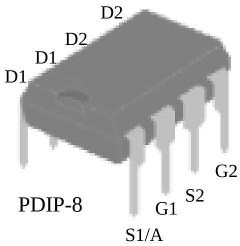
AP4501SSD

Advanced Power Electronics Corp.

N with Schottky AND P-CHANNEL
ENHANCEMENT MODE POWER MOSFET

- ▼ **Simple Drive Requirement**
- ▼ **Low On-resistance**
- ▼ **Fast Switching**

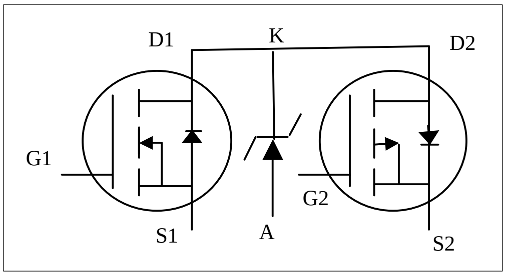


N-CH	BV_{DSS}	30V
	$R_{DS(ON)}$	36mΩ
	I_D	5.3A
P-CH	BV_{DSS}	-30V
	$R_{DS(ON)}$	60mΩ
	I_D	-4.2A

Description

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

AP4501SSD included N , P channel enhancement mode power MOSFET and Shottky diode.



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current[3]	5.3	-4.2	A
I_D@T_A=70℃	Continuous Drain Current[3]	4.3	-3.5	A
I_{DM}	Pulsed Drain Current[1]	40	-30	A
P_D@T_A=25℃	Total Power Dissipation	2		W
	Linear Derating Factor	0.016		W/℃
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 125		℃

Thermal Data

Symbol	Parameter		Value	Unit
Rthj-amb	Thermal Resistance Junction-ambient[3]	Max.	62.5	℃/W

N-CH Electrical Characteristics@T_j=25^{o}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
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25℃, I_D=1mA	-	0.031	-	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=5.3A	-	-	36	mΩ
		V_{GS}=4.5V, I_D=4A	-	-	55	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=5.3A	-	10	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25^{o}C)[4]	V_{DS}=30V, V_{GS}=0V	-	-	100	uA
	Drain-Source Leakage Current (T_j=70^{o}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=5.3A	-	8.2	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	2.3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	4.8	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	6	-	ns
t_r	Rise Time	I_D=1A	-	5.2	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=10V	-	18.8	-	ns
t_f	Fall Time	R_D=15Ω	-	4.4	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	645	-	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	150	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	95	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Source Current (Body Diode)[2]	V_D=V_G=0V , V_S=1.2V	-	-	1.7	A
V_{SD}	Forward On Voltage[2]	I_S=1.7A, V_{GS}=0V	-	-	1.2	V

Schottky Characteristics@Tj=25℃

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Forward Voltage Drop	I_F=1A	-	-	0.5	V
I_{rm}	Maximum Reverse Leakage Current	Vr=30V	-	-	100	uA

P-CH Electrical Characteristics@T_j=25^{o}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
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25℃, I_D=-1mA	-	-0.03	-	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V, I_D=-4.2A	-	-	60	mΩ
		V_{GS}=-4.5V, I_D=-3A	-	-	80	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=-4.2A	-	7.2	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25^{o}C)	V_{DS}=-30V, V_{GS}=0V	-	-	-1	uA
	Drain-Source Leakage Current (T_j=70^{o}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=-4.2A	-	9	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-15V	-	3.5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=-4.5V	-	2	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=-15V	-	12	-	ns
t_r	Rise Time	I_D=-1A	-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=6Ω,V_{GS}=-10V	-	45	-	ns
t_f	Fall Time	R_D=15Ω	-	27	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	760	-	pF
C_{oss}	Output Capacitance	V_{DS}=-25V	-	330	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	90	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Source Current (Body Diode)[2]	V_D=V_G=0V , V_S=-1.2V	-	-	-1.7	A
V_{SD}	Forward On Voltage[2]	I_S=-1.7A, V_{GS}=0V	-	-	-1.2	V

Notes:

1.Pulse width limited by Max. junction temperature.

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

3.Mounted on 1 in^2 copper pad of FR4 board ; 90℃/W when mounted on Min. copper pad.

4.I_{DSS} is the leakage current measurement combined with Schottky diode.

AP4501SSD

N-Channel

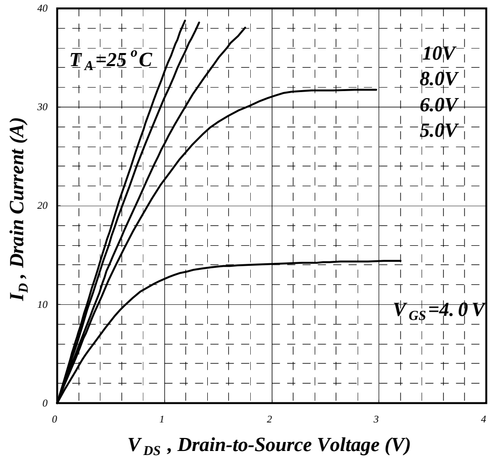


Fig 1. Typical Output Characteristics

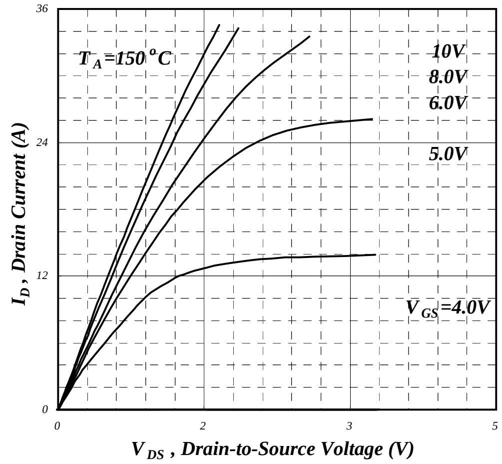


Fig 2. Typical Output Characteristics

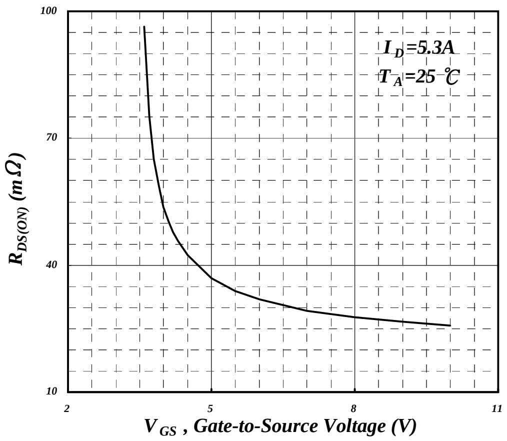


Fig 3. On-Resistance v.s. Gate Voltage

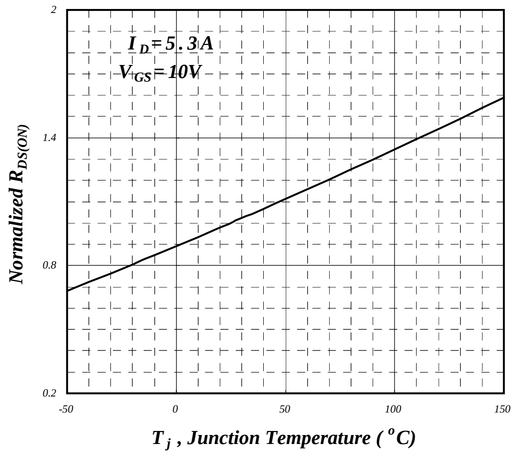


Fig 4. Normalized On-Resistance v.s. Junction Temperature

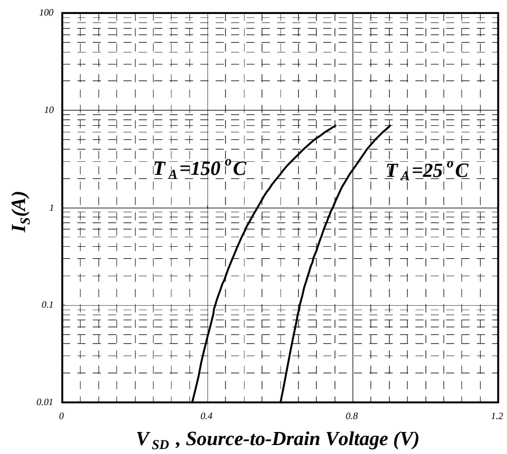


Fig 5. Forward Characteristic of Reverse Diode

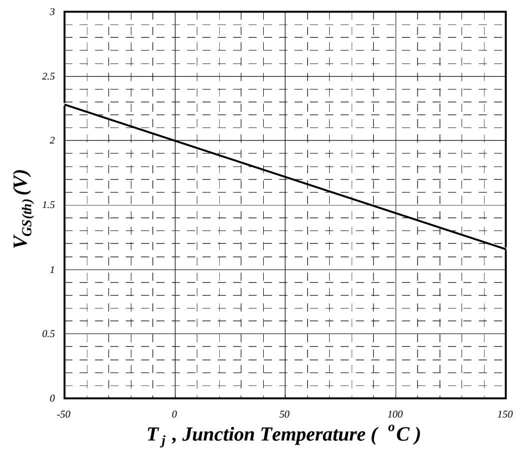


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

N-Channel

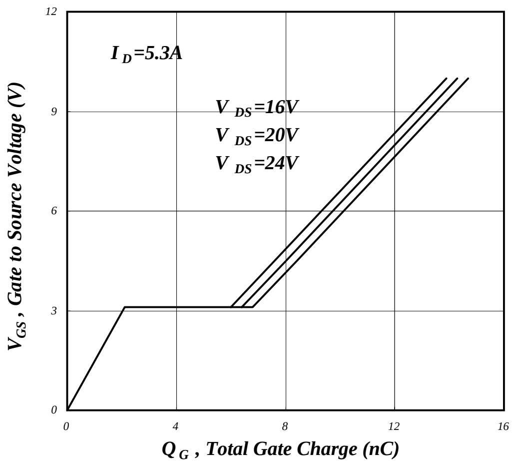


Fig 7. Gate Charge Characteristics

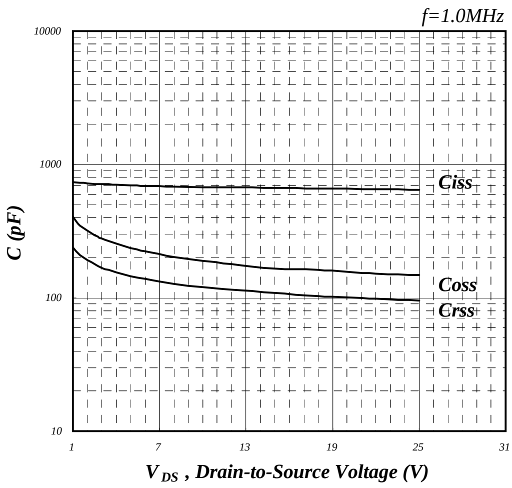


Fig 8. Typical Capacitance Characteristics

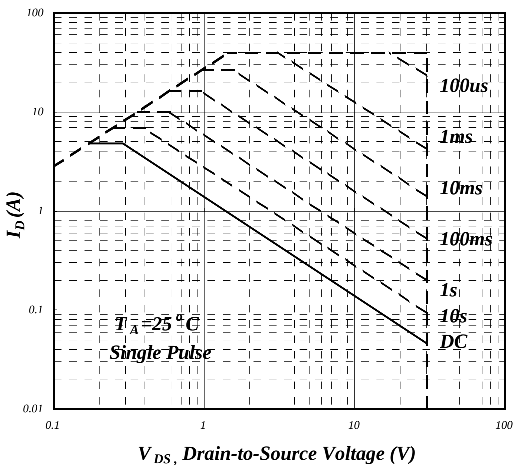


Fig 9. Maximum Safe Operating Area

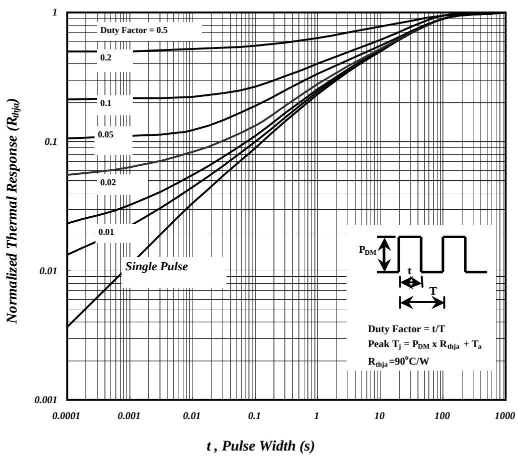


Fig 10. Effective Transient Thermal Impedance

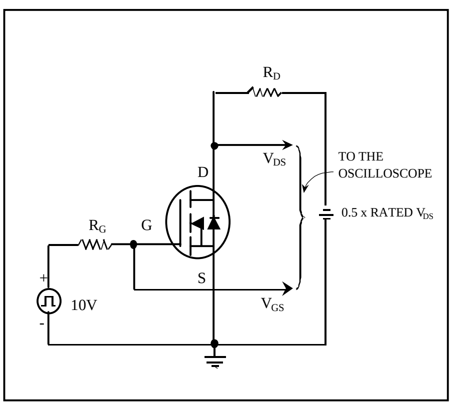


Fig 11. Switching Time Circuit

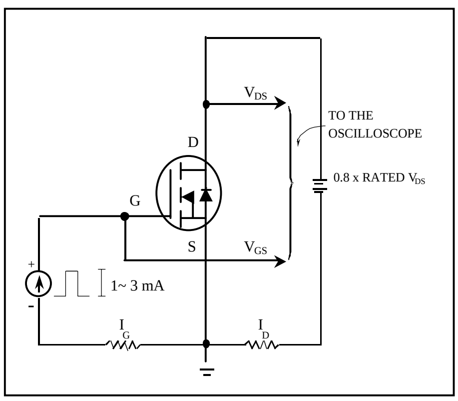


Fig 12. Gate Charge Circuit

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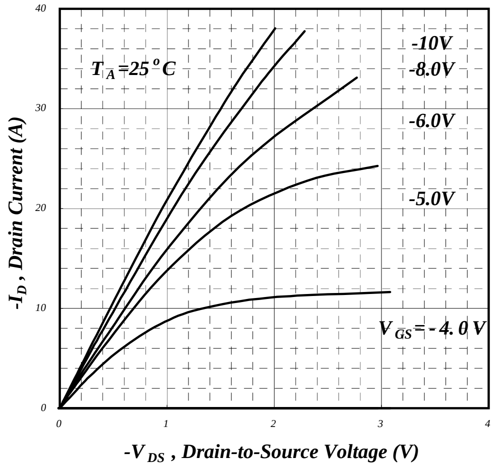
P-Channel



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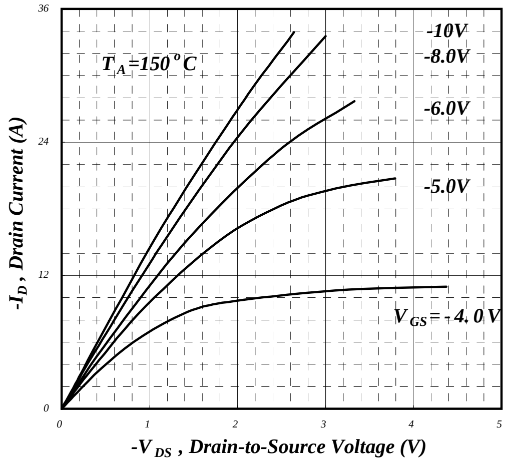
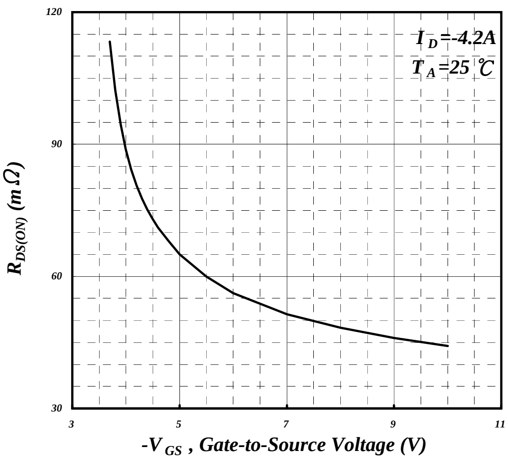


Fig 2. Typical Output Characteristics



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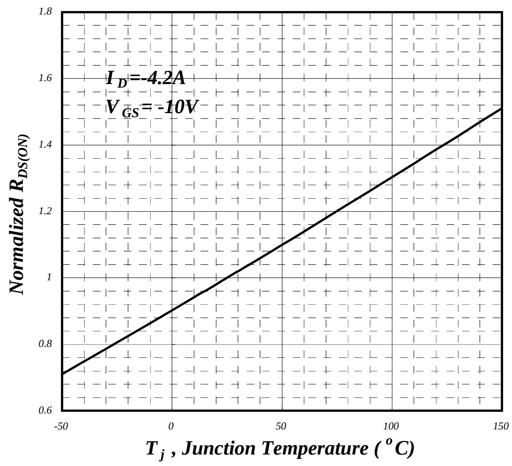


Fig 4. Normalized On-Resistance v.s. Junction Temperature

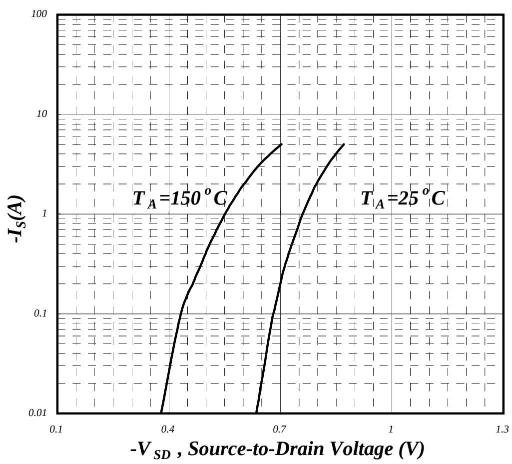


Fig 5. Forward Characteristic of Reverse Diode

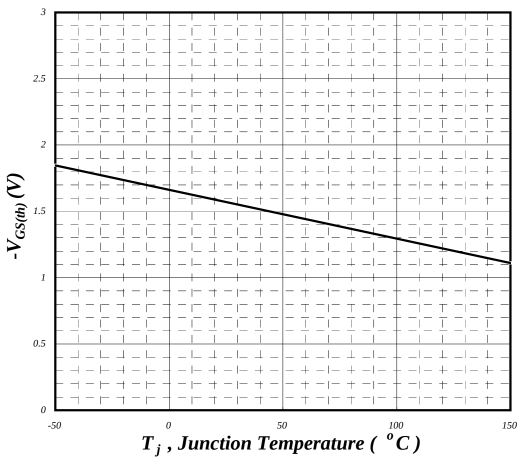


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

P-Channel

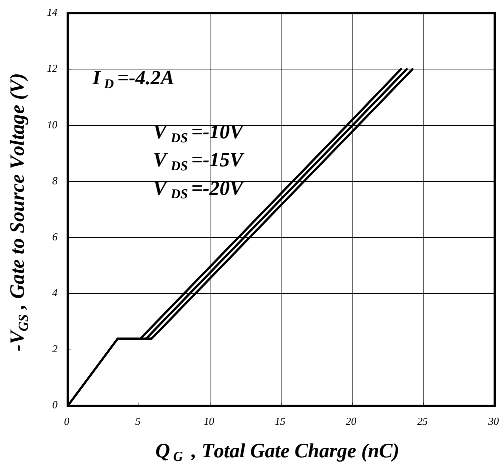


Fig 7. Gate Charge Characteristics

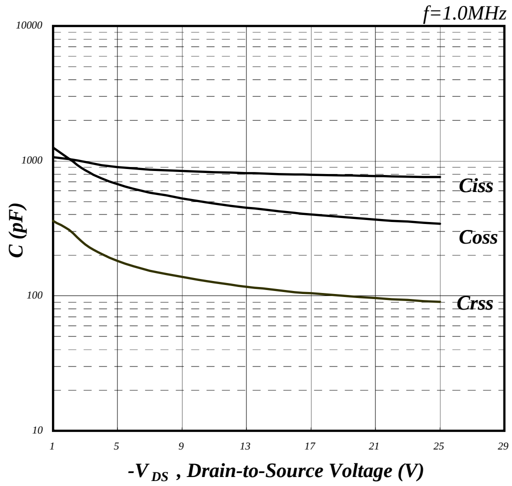
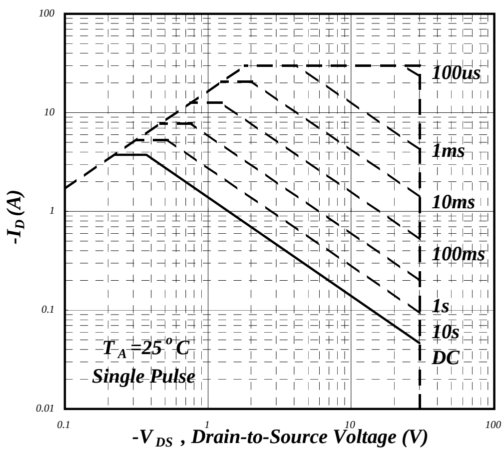


Fig 8. Typical Capacitance Characteristics



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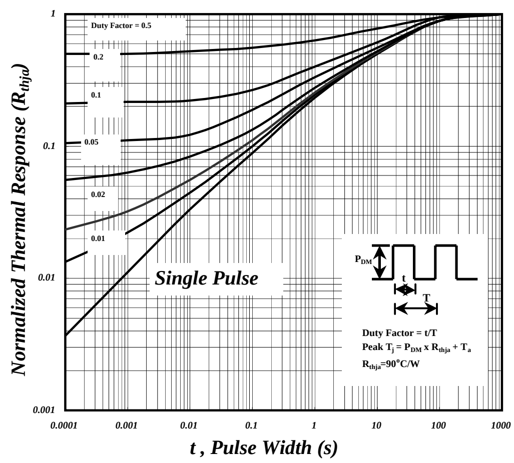

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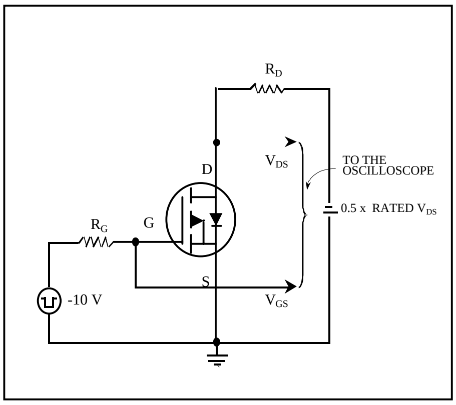

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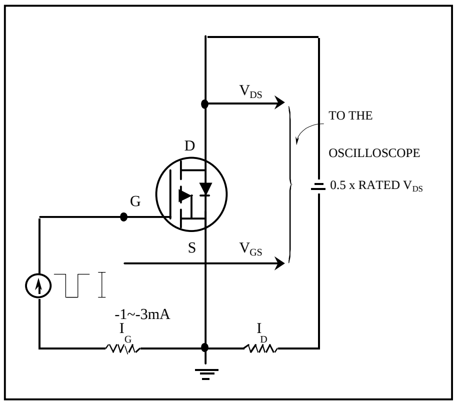

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