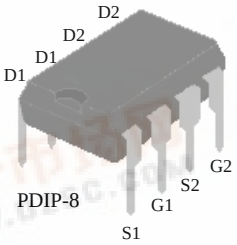
AP4513GD

Pb Free Plating Product

Advanced Power Electronics Corp.

N AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

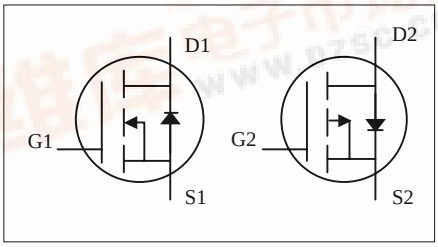
- ▼ Low Gate Charge
- ▼ Fast Switching Speed
- ▼ PDIP-8 Package
- ▼ RoHS Compliant



N-CH	BV_{DSS}	35V
	$R_{DS(ON)}$	36mΩ
	I_D	5.8A
P-CH	BV_{DSS}	-35V
	$R_{DS(ON)}$	68mΩ
	I_D	-4.3A

Description

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



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	35	-35	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current[3]	5.8	-4.3	A
I_D@T_A=70℃	Continuous Drain Current[3]	4.7	-3.4	A
I_{DM}	Pulsed Drain Current[1]	20	-20	A
P_D@T_A=25℃	Total Power Dissipation	2		W
	Linear Derating Factor	0.016		W/℃
E_{AS}	Single Pulse Avalanche Energy[4]	12.5	12.5	mJ
I_{AR}	Avalanche Current	5	-5	A
E_{AR}	Repetitive Avalanche Energy[1]	0.05	0.05	mJ
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

Thermal Data

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

N-CH 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	35	-	-	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=5A	-	-	36	mΩ
		V_{GS}=4.5V, I_D=3A	-	-	60	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=5A	-	7	-	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=5A	-	6	10	nC
Q_{gs}	Gate-Source Charge	V_{DS}=28V	-	2	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	3	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	8	-	ns
t_r	Rise Time	I_D=1A	-	7	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=10V	-	16	-	ns
t_f	Fall Time	R_D=15Ω	-	3	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	470	750	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	90	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	60	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=1.7A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time	I_S=5A, V_{GS}=0V	-	17	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	11	-	nC

P-CH 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	-35	-	-	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=-4A	-	-	68	mΩ
		V_{GS}=-4.5V, I_D=-2A	-	-	100	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=-4A	-	6	-	S
I_{DSS}	Drain-Source Leakage Current (Tj=25°C)	V_{DS}=-30V, V_{GS}=0V	-	-	-1	uA
	Drain-Source Leakage Current (Tj=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=-4A	-	6	10	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-28V	-	1	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=-4.5V	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=-15V	-	8	-	ns
t_r	Rise Time	I_D=-1A	-	7	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=-10V	-	20	-	ns
t_f	Fall Time	R_D=15Ω	-	4	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	410	660	pF
C_{oss}	Output Capacitance	V_{DS}=-25V	-	95	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	70	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=-1.7A, V_{GS}=0V	-	-	-1.2	V
t_{rr}	Reverse Recovery Time	I_S=-4A, V_{GS}=0V	-	21	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=-100A/μs	-	16	-	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 ≤10sec ; 90℃/W when mounted on min. copper pad.

4.Starting T_j=25°C , V_{DD}=25V , L=1mH , R_G=25Ω

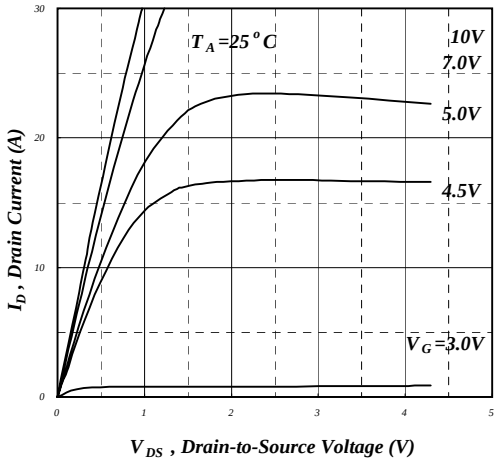


Fig 1. Typical Output Characteristics

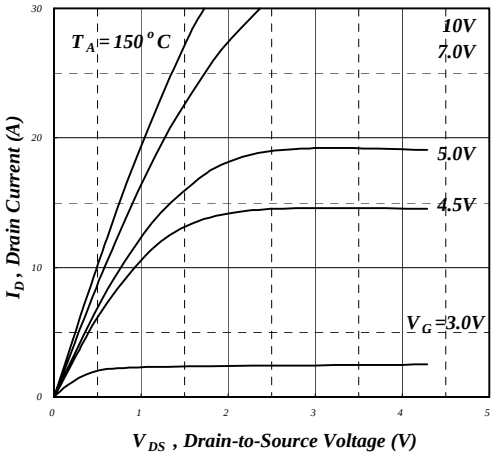


Fig 2. Typical Output Characteristics

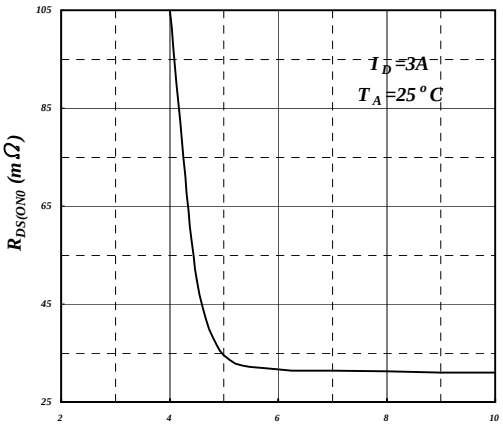


Fig 3. On-Resistance v.s. Gate Voltage

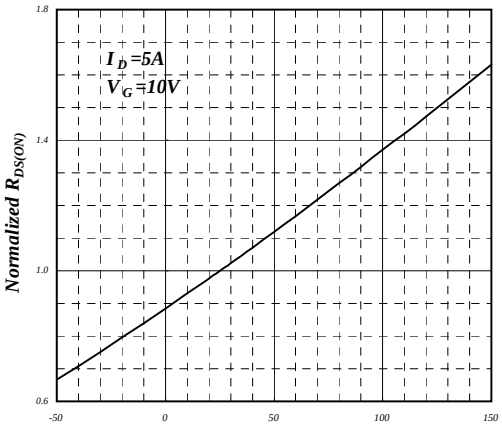


Fig 4. Normalized On-Resistance v.s. Junction Temperature

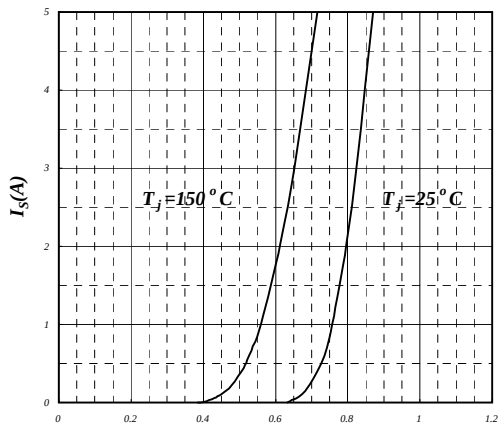


Fig 5. Forward Characteristic of Reverse Diode

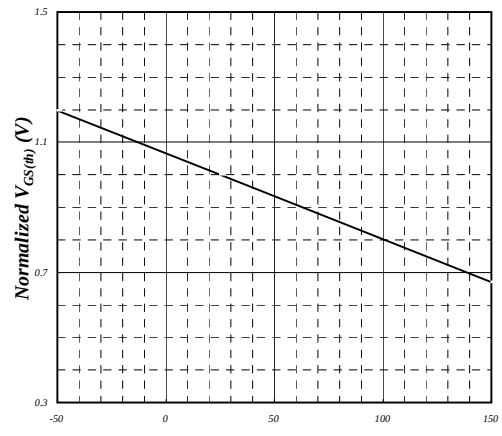


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

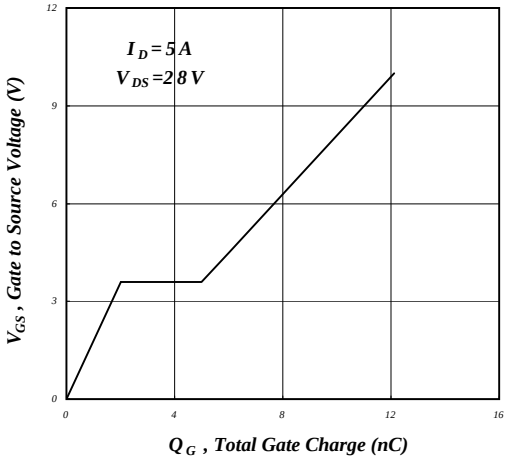


Fig 7. Gate Charge Characteristics

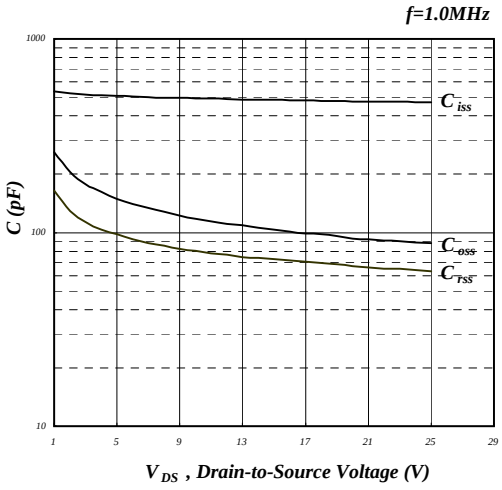


Fig 8. Typical Capacitance Characteristics

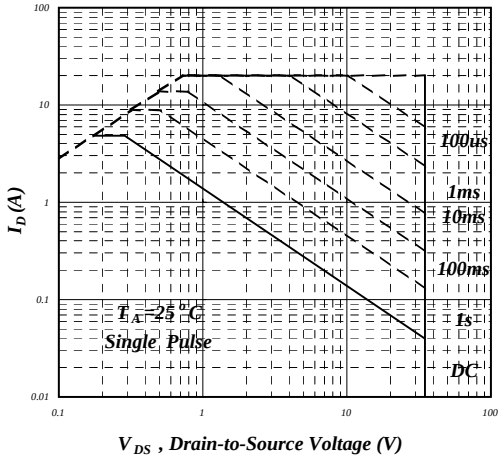


Fig 9. Maximum Safe Operating Area

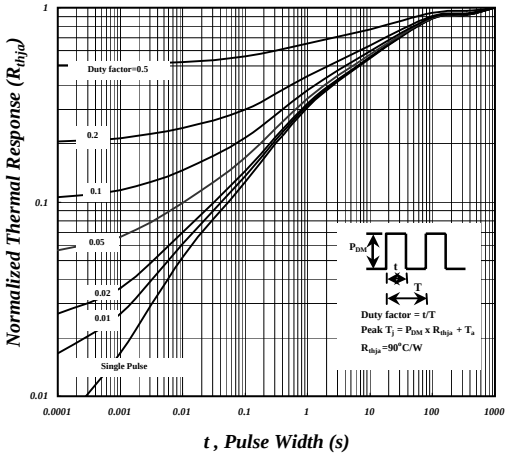


Fig 10. Effective Transient Thermal Impedance

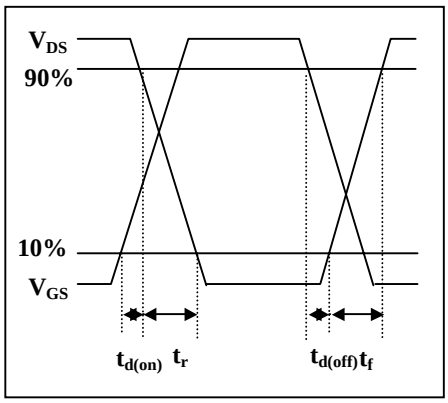


Fig 11. Switching Time Waveform

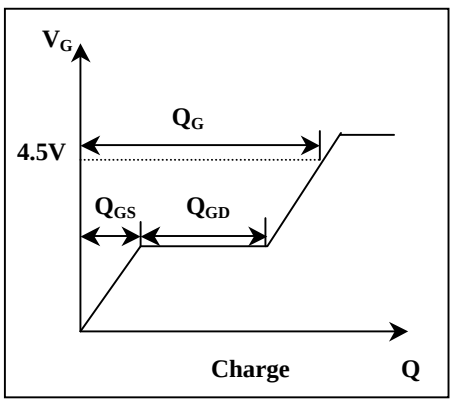
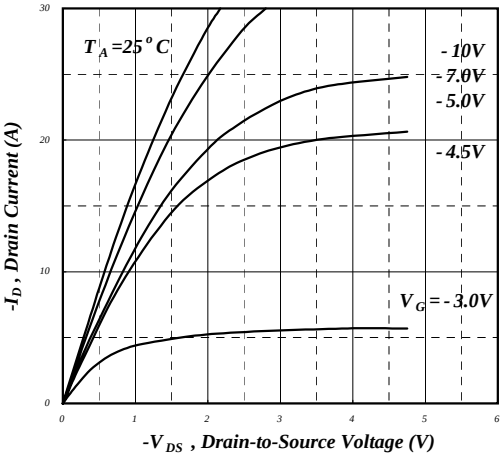


Fig 12. Gate Charge Waveform



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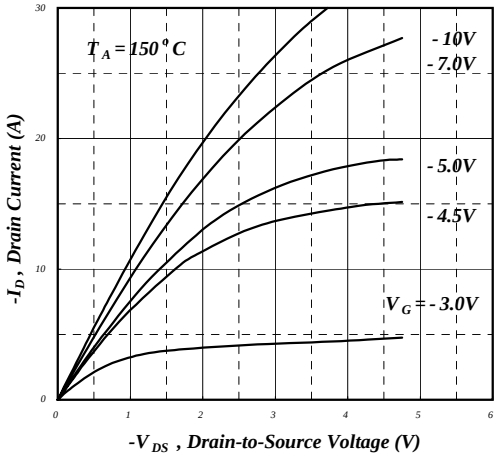


Fig 2. Typical Output Characteristics

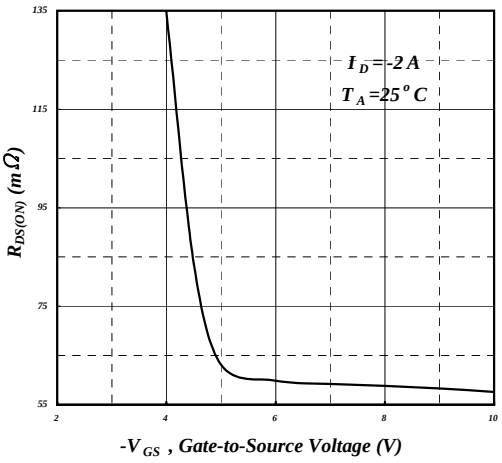


Fig 3. On-Resistance v.s. Gate Voltage

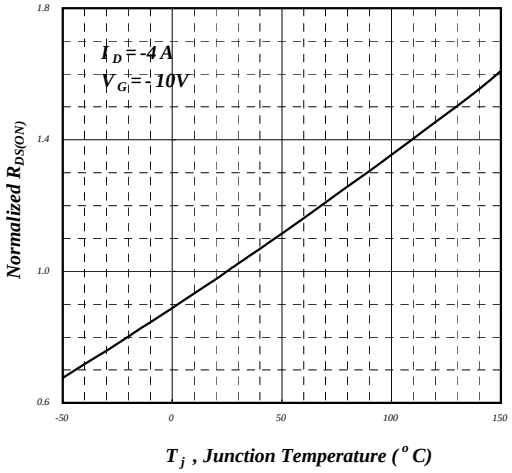
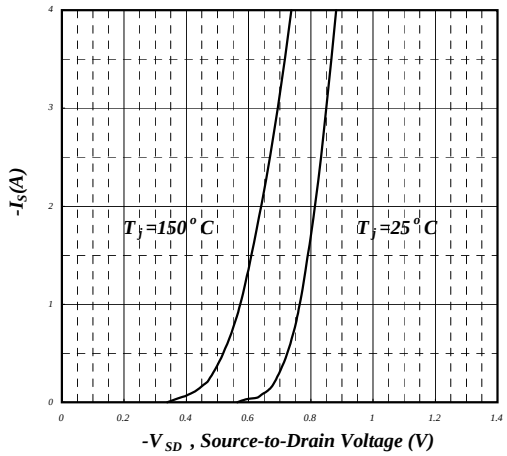


Fig 4. Normalized On-Resistance v.s. Junction Temperature



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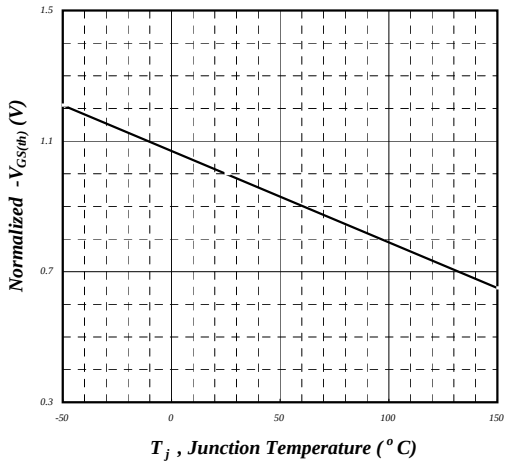
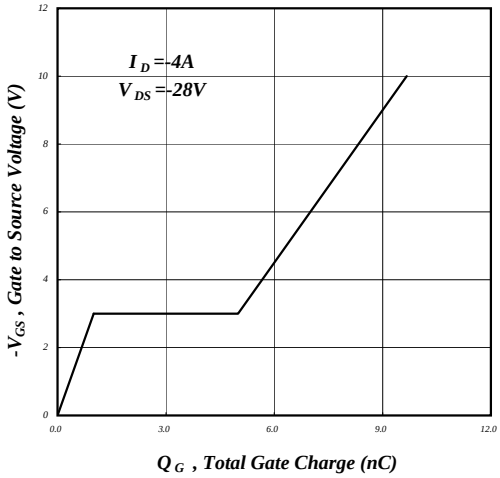


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

P-Channel



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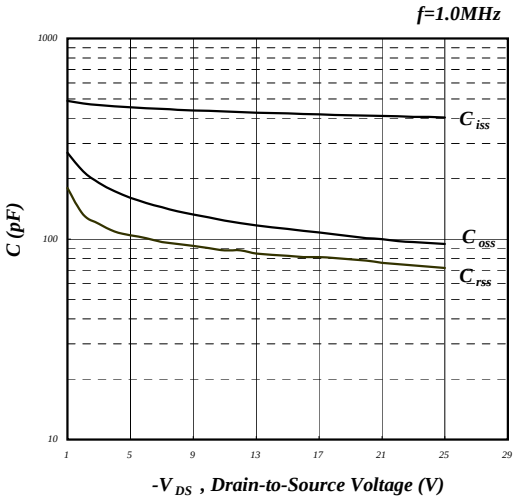

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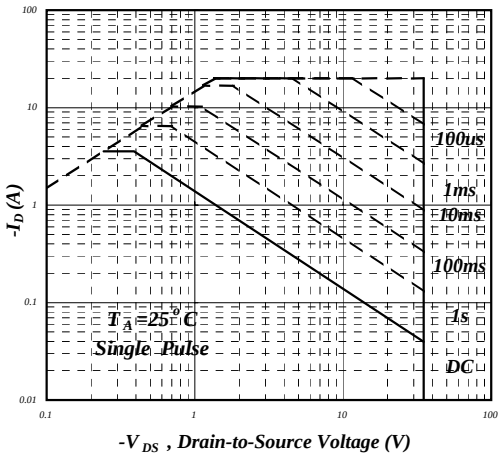

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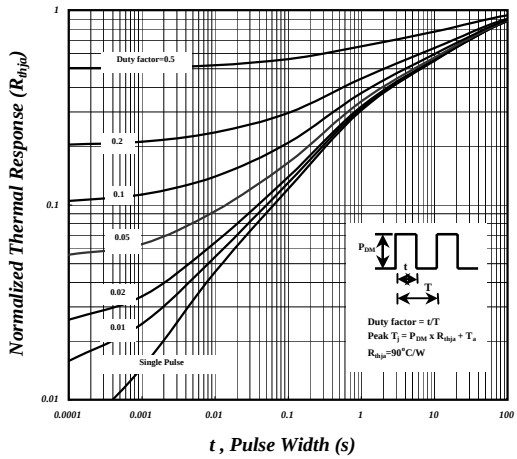

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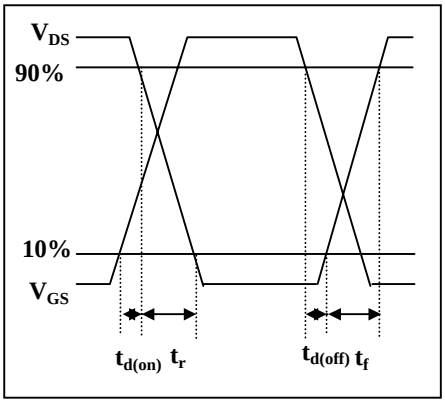

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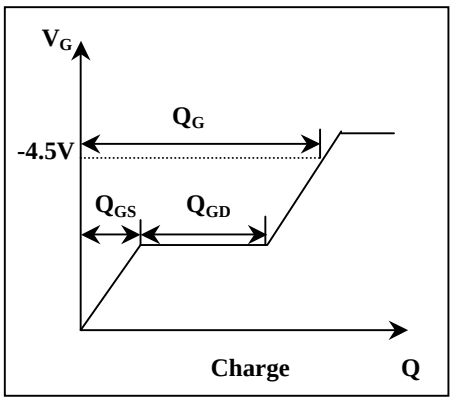

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