Preliminary

Advanced Power Electronics Corp.

DUAL N-CHANNEL ENHANCEMENT MODE POWER MOSFET

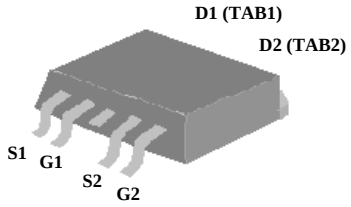
- ▼ **Simple Drive Requirement**
- ▼ **Fast Switching Performance**
- ▼ **Two Independent Device**
- ▼ **Halogen Free & RoHS Compliant Product**

CH-1	BV_{DSS}	30V
	$R_{DS(ON)}$	6.2mΩ
	I_D	72A
CH-2	BV_{DSS}	30V
	$R_{DS(ON)}$	10mΩ
	I_D	45A

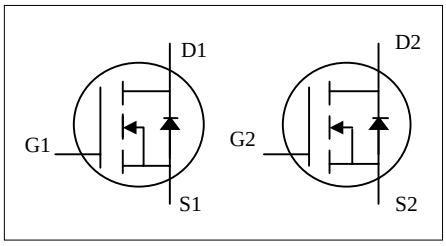
Description

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.

SDPAK™ used APEC innovated package and provides two independent device that is suitable and optimum for DC/DC power application.



SDPAK™



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		Channel-1	Channel-2	
V_{DS}	Drain-Source Voltage	30	30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D@T_C=25℃	Continuous Drain Current	72	45	A
I_D@T_A=25℃	Continuous Drain Current[3]	18	14.1	A
I_D@T_A=70℃	Continuous Drain Current[3]	14	11.2	A
I_{DM}	Pulsed Drain Current[1]	72	60	A
P_D@T_A=25℃	Total Power Dissipation	3		W
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c (CH-1)	Maximum Thermal Resistance, Junction-case	2.5	℃/W
Rthj-c (CH-2)	Maximum Thermal Resistance, Junction-case	4.0	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	42	℃/W

CH-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
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=18A	-	-	6.2	mΩ
		V_{GS}=4.5V, I_D=12A	-	-	12.5	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=18A	-	32	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V, V_{GS}=0V	-	-	10	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=18A	-	10	16	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	2.5		nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	5.5		nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	7	-	ns
t_r	Rise Time	I_D=18A	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=10V	-	18	-	ns
t_f	Fall Time	R_D=0.833Ω	-	5	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	945	1510	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	295	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	110	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.3	2	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=2.5A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[2]	I_S=10A, V_{GS}=0V,	-	30	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	27	-	nC

CH-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
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=12A	-	-	10	mΩ
		V_{GS}=4.5V, I_D=8A	-	-	22	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=12A	-	30	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V, V_{GS}=0V	-	-	10	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=12A	-	5.7	9.2	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	1.4	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	3.2	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	6	-	ns
t_r	Rise Time	I_D=12A	-	56	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=10V	-	14	-	ns
t_f	Fall Time	R_D=1.25Ω	-	3.5	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	505	810	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	180	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	70	-	pF
R_g	Gate Resistance	f=1.0MHz	-	2.6	4	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=2.5A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[2]	Is=10A, V_{GS}=0V,	-	24	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	18	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Rthja is determined with the device, mounted on 2oz FR4 board t ≦10s.

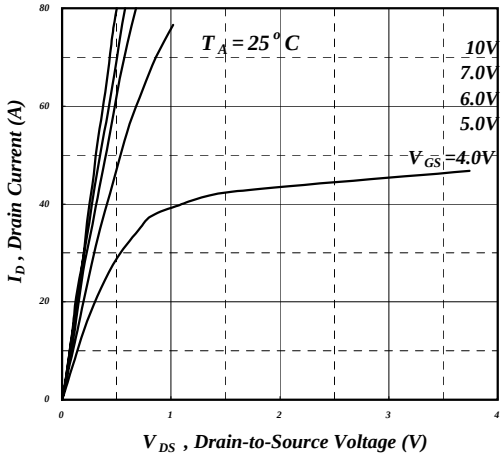


Fig 1. Typical Output Characteristics

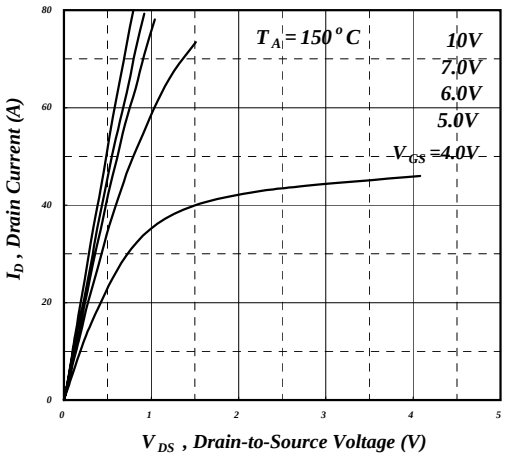


Fig 2. Typical Output Characteristics

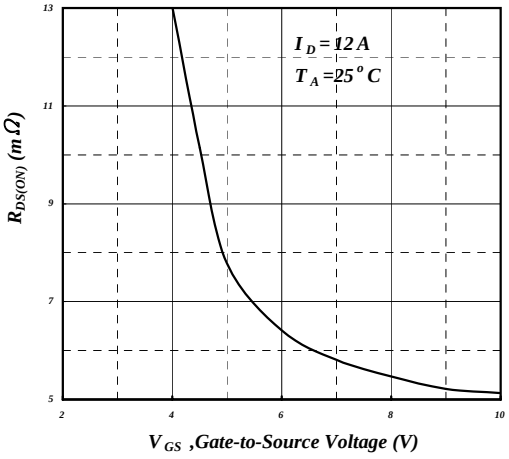


Fig 3. On-Resistance v.s. Gate Voltage

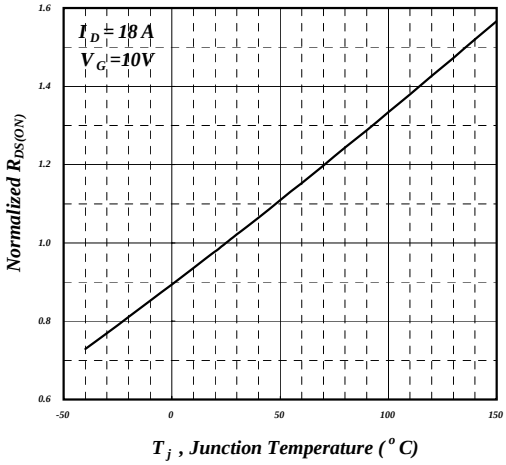


Fig 4. Normalized On-Resistance v.s. Junction Temperature

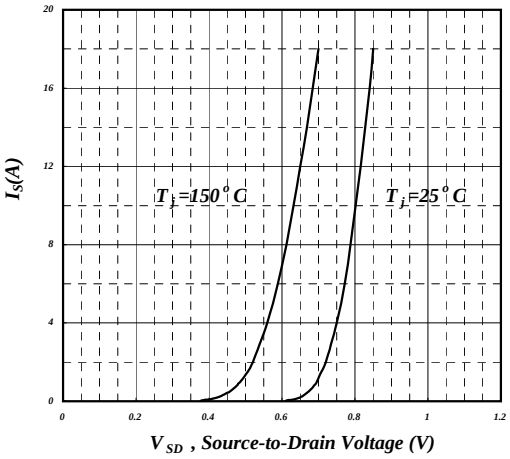


Fig 5. Forward Characteristic of Reverse Diode

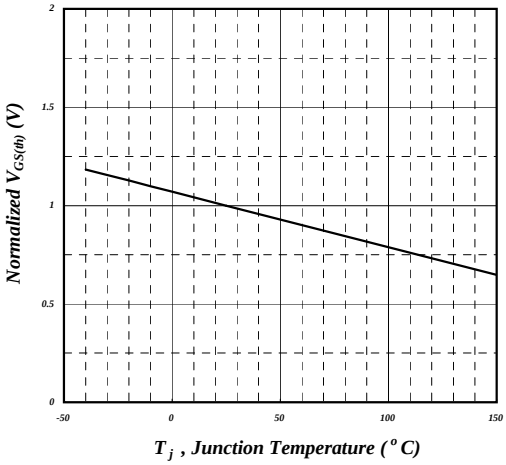


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

Channel-1

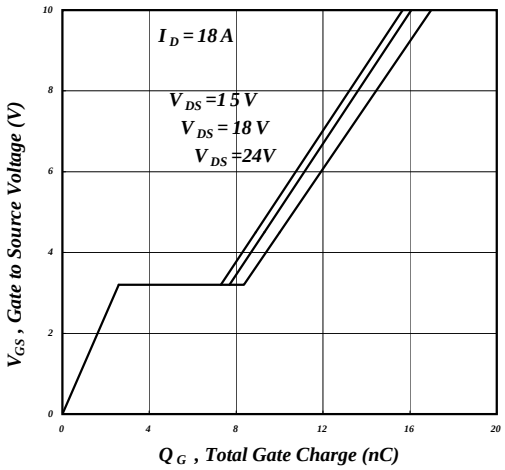


Fig 7. Gate Charge Characteristics

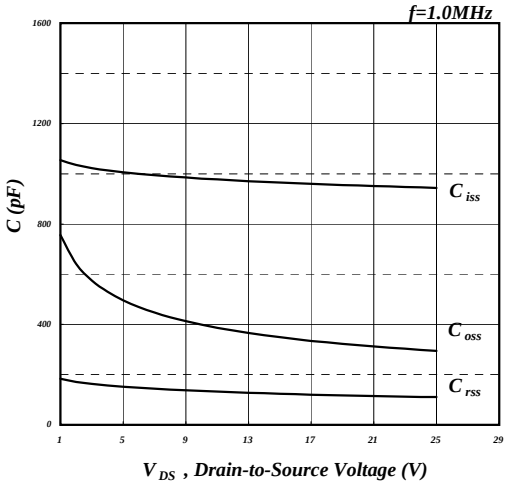


Fig 8. Typical Capacitance Characteristics

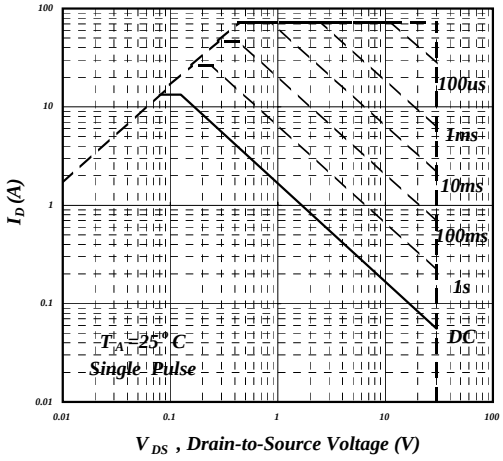


Fig 9. Maximum Safe Operating Area

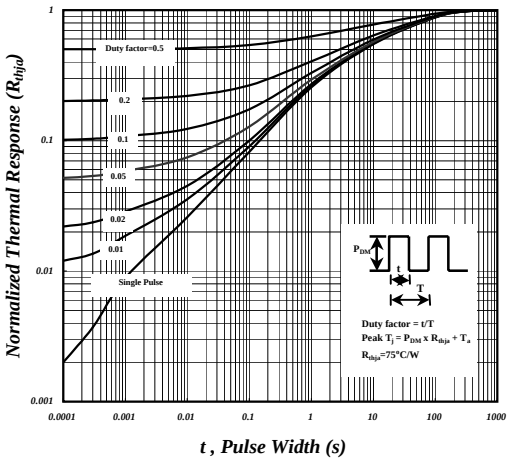


Fig 10. Effective Transient Thermal Impedance

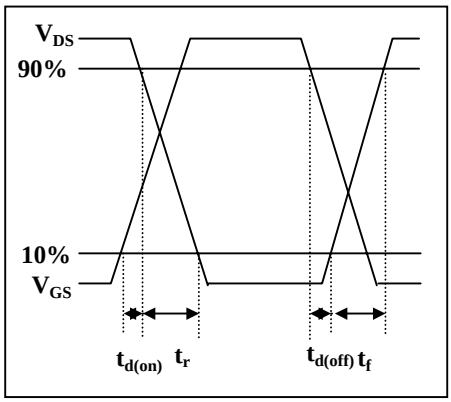


Fig 11. Switching Time Waveform

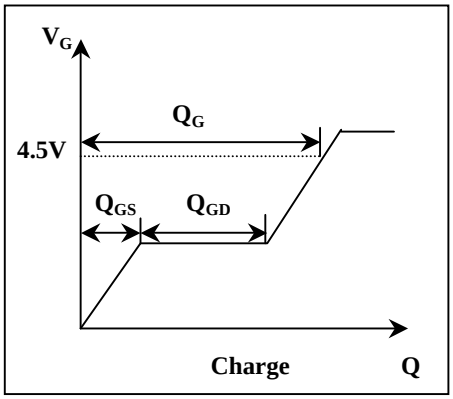
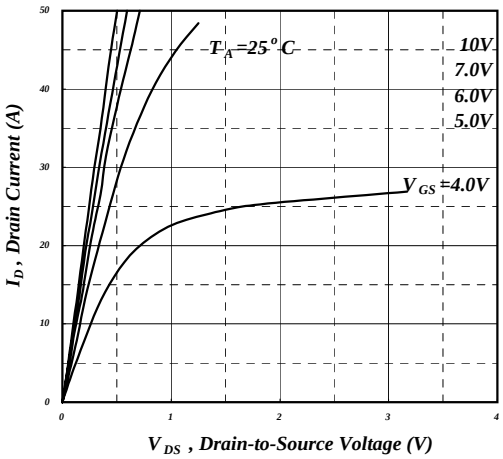


Fig 12. Gate Charge Waveform

Channel-2



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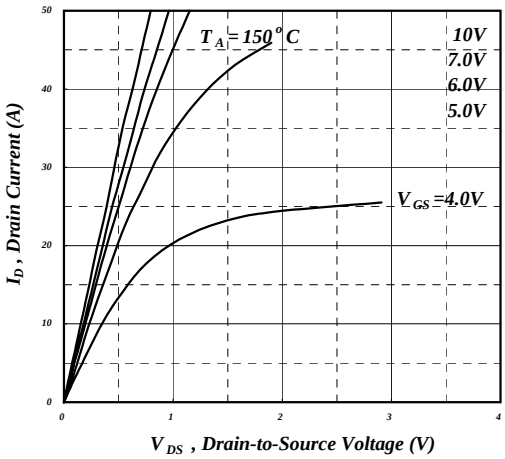
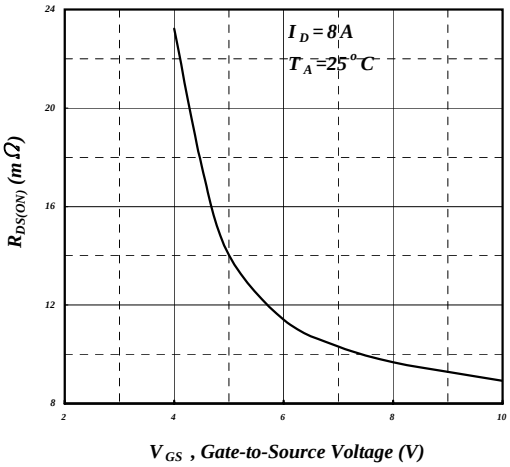


Fig 2. Typical Output Characteristics



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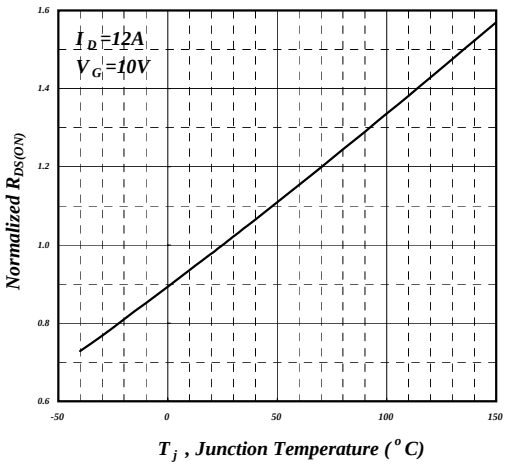
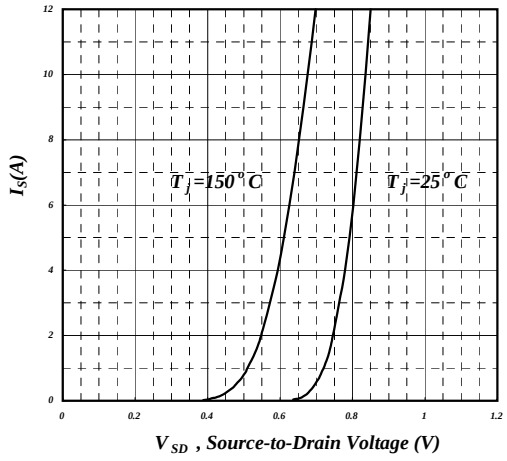


Fig 4. Normalized On-Resistance v.s. Junction Temperature



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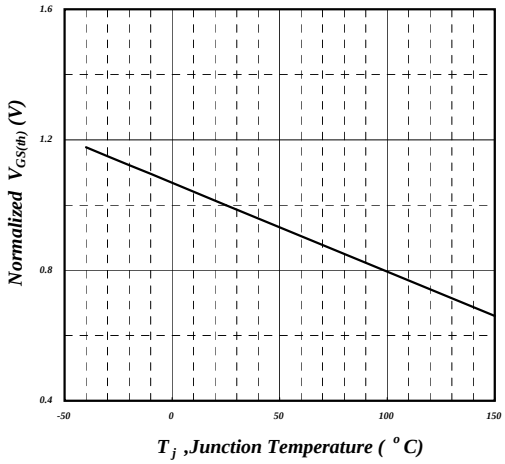
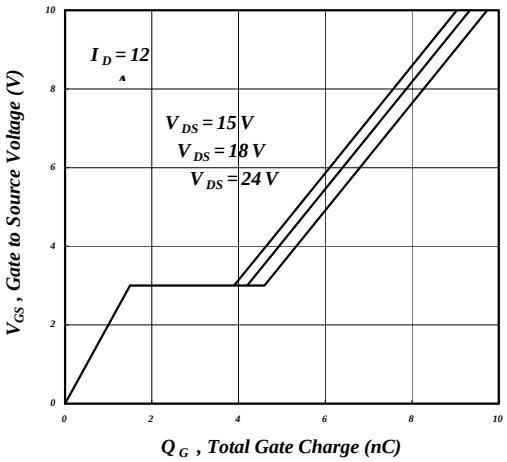


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

Channel-2



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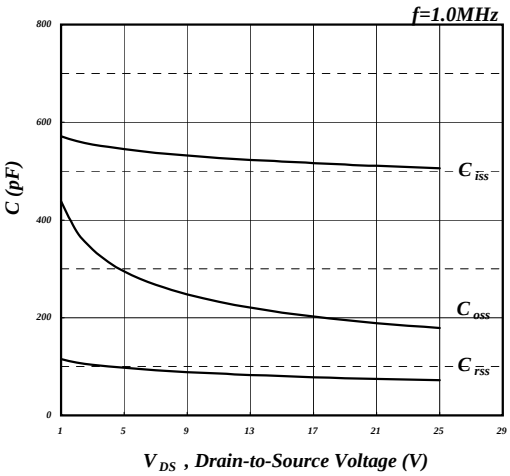

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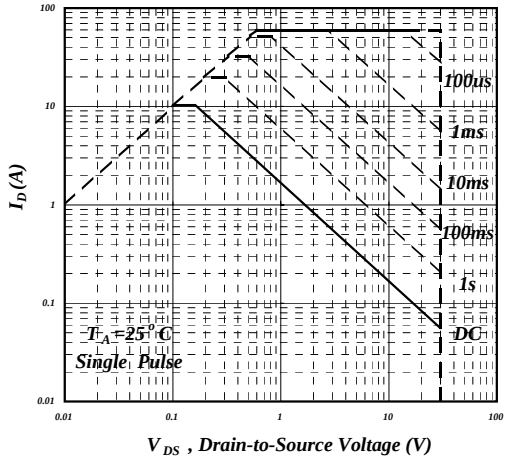

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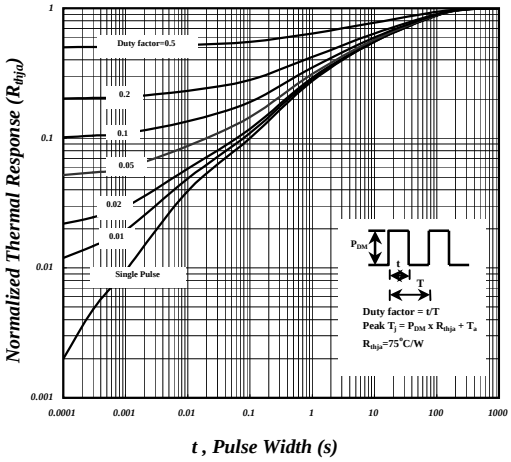

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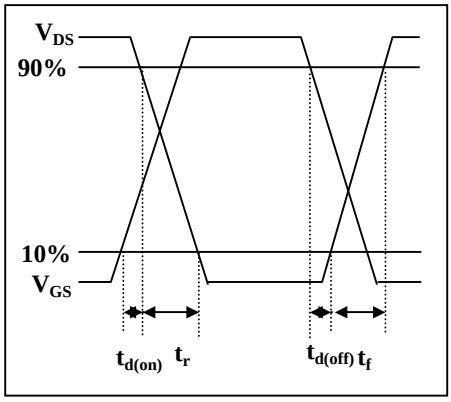

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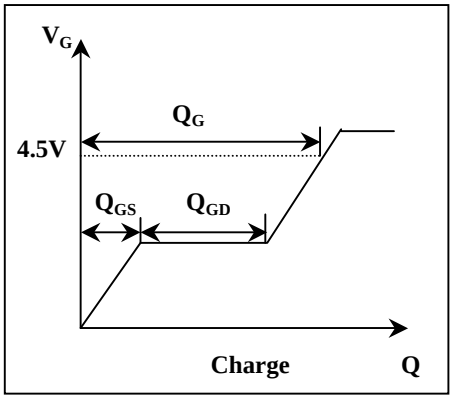

Fig 12. Gate Charge Waveform