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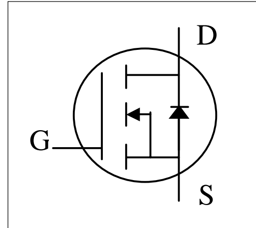
Advanced Power Electronics Corp.

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

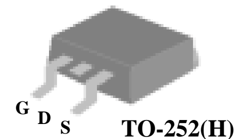
- ▼ **Low on-resistance**
- ▼ **Capable of 2.5V gate drive**
- ▼ **Low drive current**
- ▼ **Single Drive Requirement**



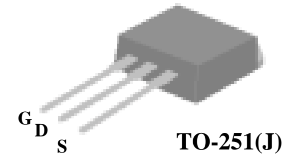
BV_{DSS}	20V
$R_{DS(ON)}$	50mΩ
I_D	20A

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.



TO-252(H)



TO-251(J)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 4.5V	20	A
I_D@T_C=125℃	Continuous Drain Current, V_{GS} @ 4.5V	16	A
I_{DM}	Pulsed Drain Current[1]	41	A
P_D@T_C=25℃	Total Power Dissipation	26	W
	Linear Derating Factor	0.2	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	Thermal Resistance Junction-case	Max.	4.8	℃/W
Rthj-a	Thermal Resistance Junction-ambient	Max.	110	℃/W

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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	20	-	-	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	V_{GS}=4.5V, I_D=6A	-	-	50	mΩ
		V_{GS}=2.5V, I_D=5.2A	-	-	80	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	0.5	-	1.2	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=6A	-	13	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25°C)	V_{DS}=20V, V_{GS}=0V	-	-	1	uA
	Drain-Source Leakage Current (T_j=125°C)	V_{DS}=16V ,V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ± 12V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=10A	-	7.5	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=20V	-	0.9	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=5V	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=10V	-	4.5	-	ns
t_r	Rise Time	I_D=10A	-	49.5	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=5V	-	12	-	ns
t_f	Fall Time	R_D=1Ω	-	6	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	195	-	pF
C_{oss}	Output Capacitance	V_{DS}=20V	-	126	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	50	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	V_D=V_G=0V , V_S=1.3V	-	-	20	A
I_{SM}	Pulsed Source Current (Body Diode)[1]		-	-	41	A
V_{SD}	Forward On Voltage[2]	T_j=25℃, I_S=20A, V_{GS}=0V	-	-	1.3	V

Notes:

1.Pulse width limited by safe operating area.

2.Pulse width $\leq$300us , duty cycle $\leq$2%.

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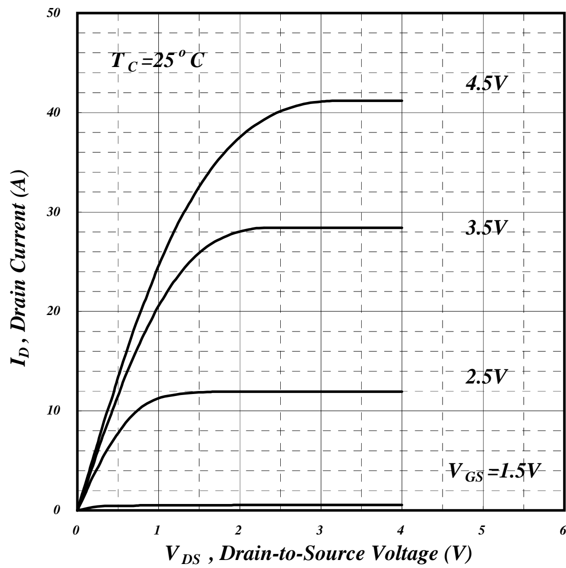

Fig 1. Typical Output Characteristics

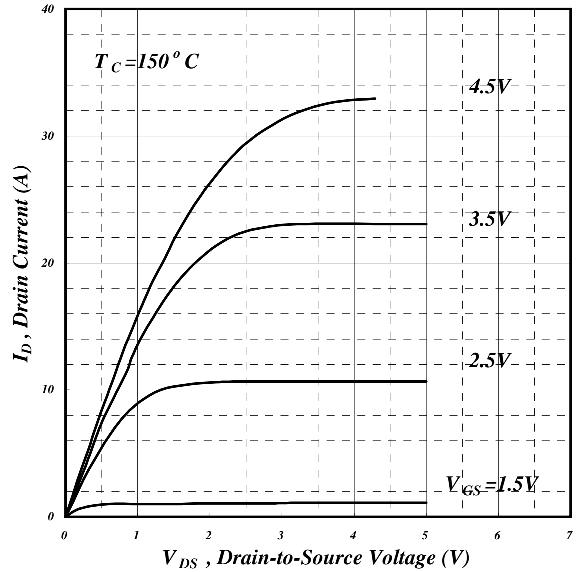

Fig 2. Typical Output Characteristics

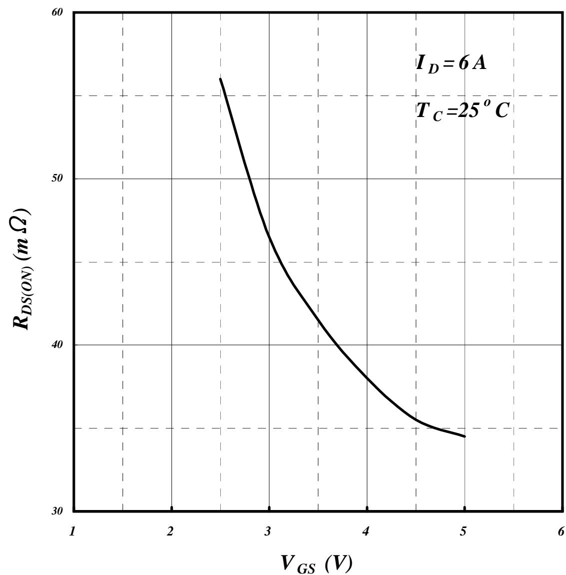

Fig 3. On-Resistance v.s. Gate Voltage

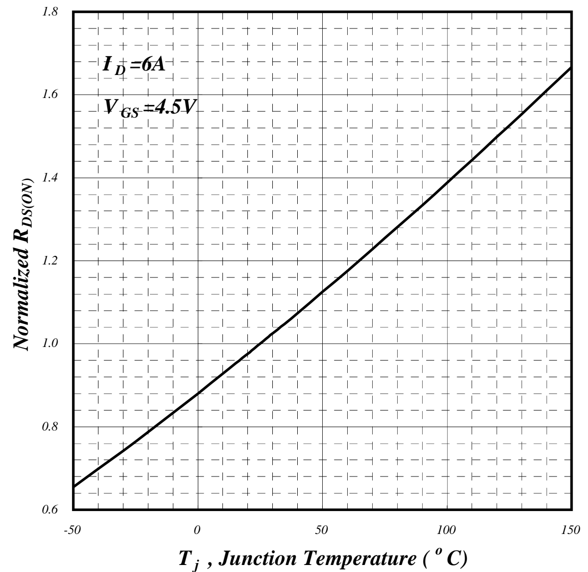

Fig 4. Normalized On-Resistance v.s. Junction Temperature

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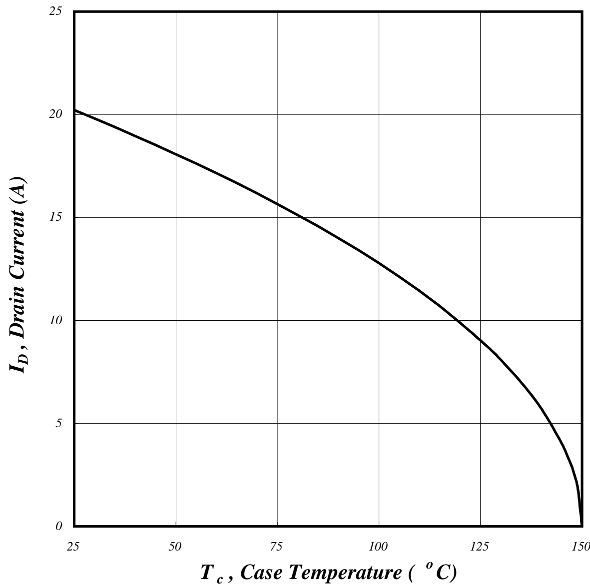

Fig 5. Maximum Drain Current v.s. Case Temperature

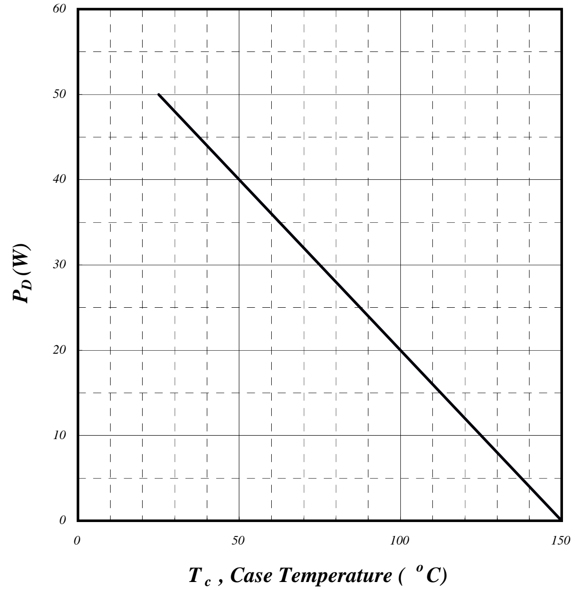

Fig 6. Typical Power Dissipation

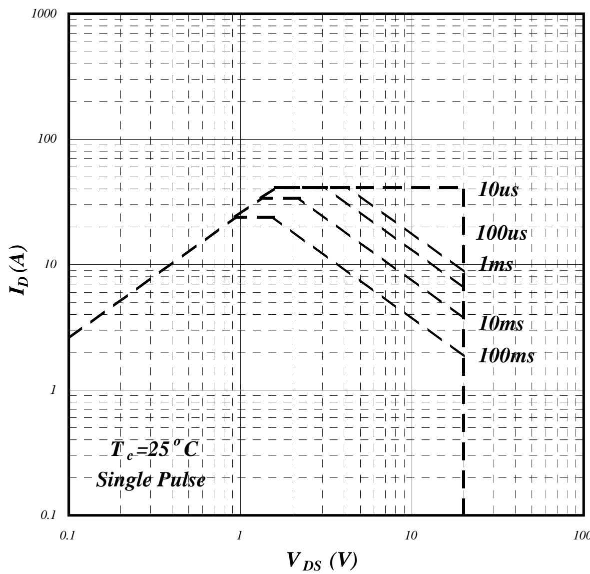

Fig 7. Maximum Safe Operating Area

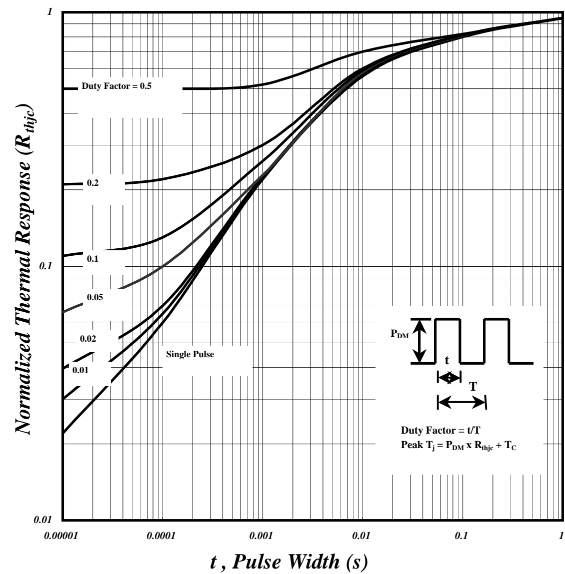

Fig 8. Effective Transient Thermal Impedance

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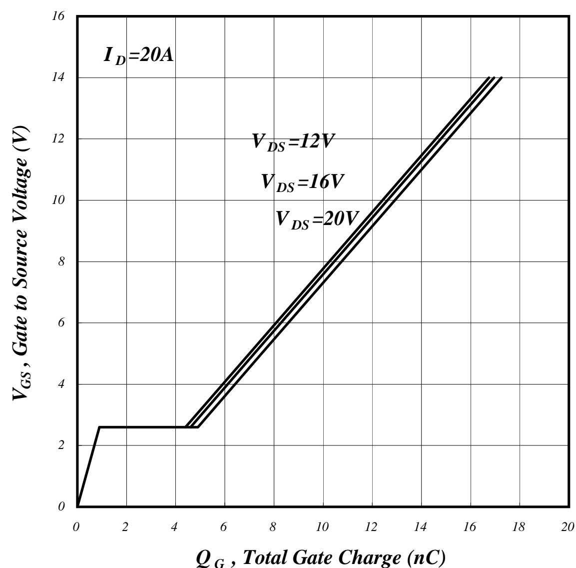

Fig 9. Gate Charge Characteristics

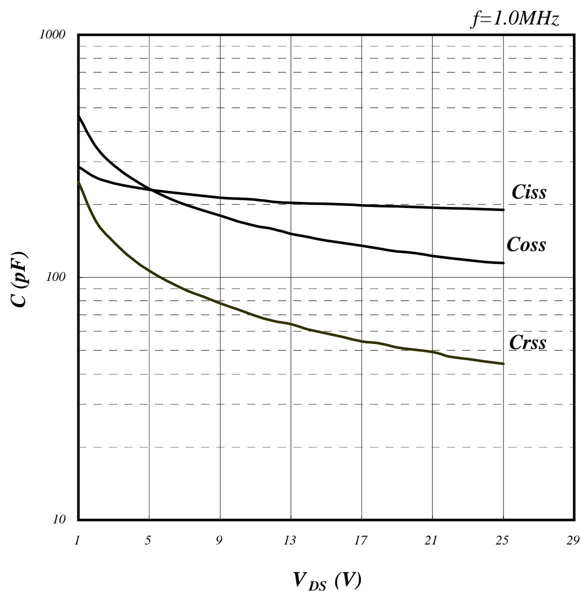

Fig 10. Typical Capacitance Characteristics

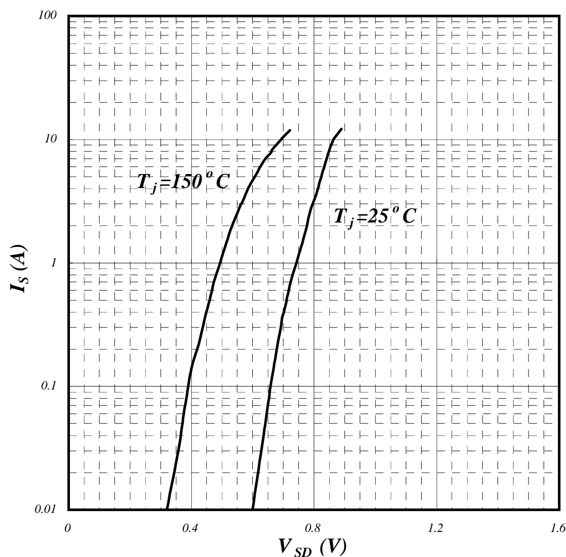

Fig 11. Forward Characteristic of Reverse Diode

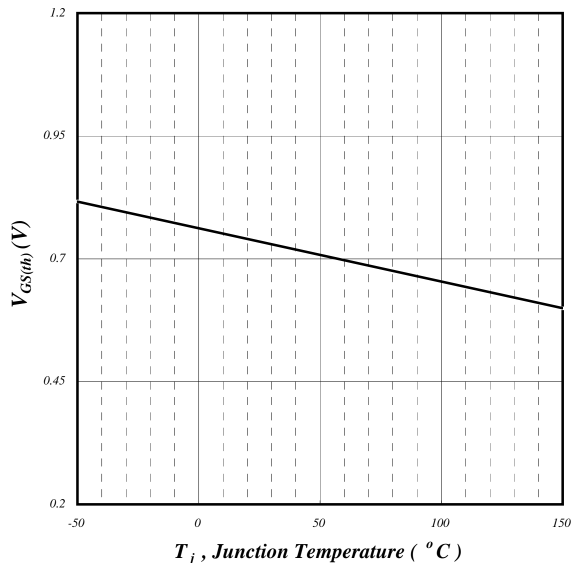

Fig 12. Gate Threshold Voltage v.s. Junction Temperature

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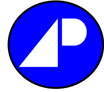
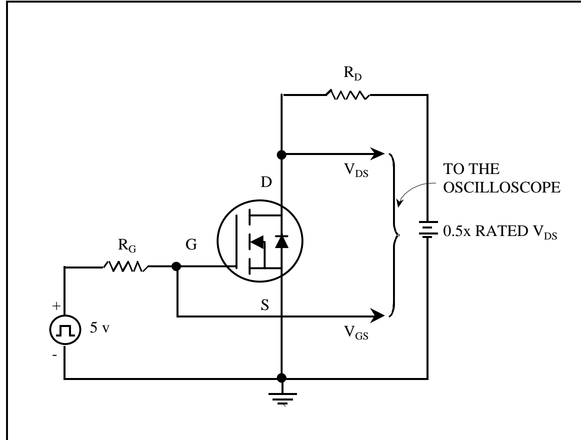




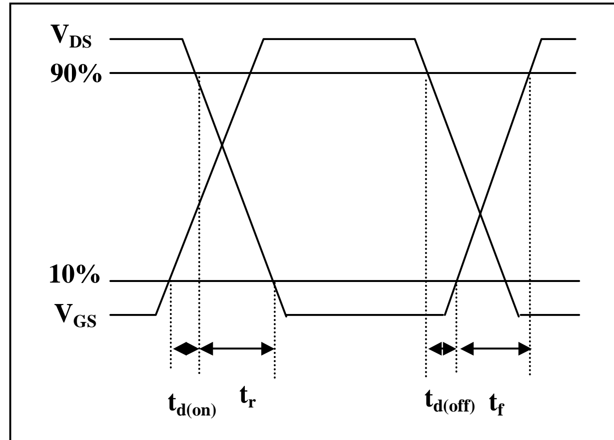
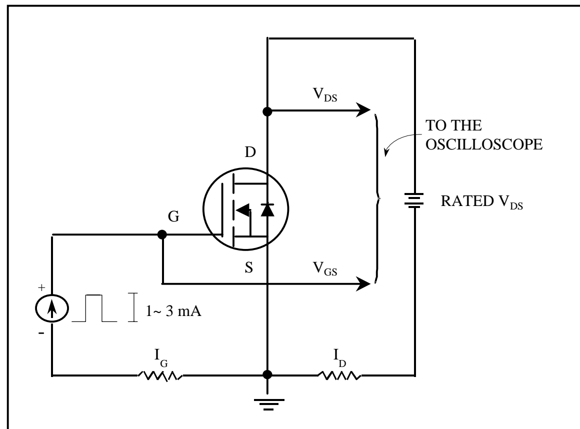


Fig 13. Switching Time Circuit

Fig 14. Switching Time Waveform



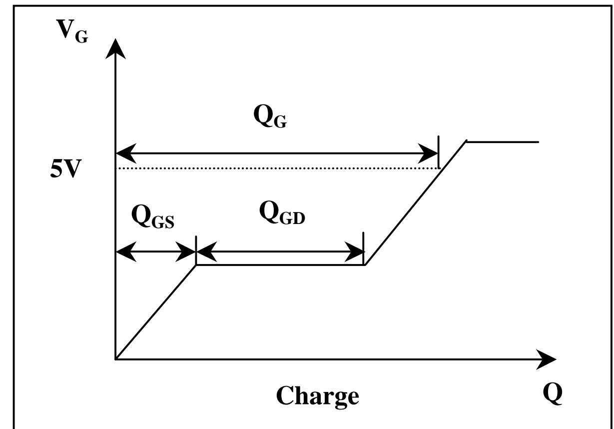


Fig 15. Gate Charge Circuit

Fig 16. Gate Charge Waveform

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