Advanced Power Electronics Corp.

P-CHANNEL ENHANCEMENT MODE
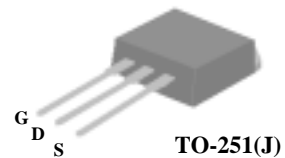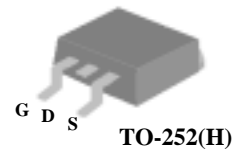
POWER MOSFET

▼ **Simple Drive Requirement**

▼ **2.5V Gate Drive Capability**

BV$_{DSS}$	-20V
R$_{DS(ON)}$	150mΩ
I$_D$	-10A

Description

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

This device is suited for low voltage and battery power applications.

G D S   **TO-252(H)**

G D S   **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$_A$=25℃	Continuous Drain Current, V$_{GS}$ @ 10V	-10	A
I$_D$@T$_A$=100℃	Continuous Drain Current, V$_{GS}$ @ 10V	-6.2	A
I$_{DM}$	Pulsed Drain Current[1]	-24	A
P$_D$@T$_A$=25℃	Total Power Dissipation	25	W
	Linear Derating Factor	0.01	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.	5.0	℃/W
Rthj-a	Thermal Resistance Junction-ambient	Max.	110	℃/W

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
$\triangle BV_{DSS}/\triangle T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25℃, I_D=-1mA	-	-0.1	-	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-2.8A	-	-	150	mΩ
		V_{GS}=-2.5V, I_D=-2.0A	-	-	250	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-0.5	-	-	V
g_{fs}	Forward Transconductance	V_{DS}=-5V, I_D=-2.8A	-	4.4	-	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=150°C)	V_{DS}=-16V, V_{GS}=0V	-	-	-25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=$\pm$12V	-	-	$\pm$100	nA
Q_g	Total Gate Charge[2]	I_D=-2.8A	-	6	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-6V	-	1.5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=-5V	-	0.6	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=-6V	-	25	-	ns
t_r	Rise Time	I_D=-1A	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=6Ω,V_{GS}=-5V	-	70	-	ns
t_f	Fall Time	R_D=6Ω	-	60	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	300	-	pF
C_{oss}	Output Capacitance	V_{DS}=-6V	-	180	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	60	-	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=-1.2V	-	-	-10	A
I_{SM}	Pulsed Source Current (Body Diode)[1]		-	-	-24	A
V_{SD}	Forward On Voltage[2]	T_j=25℃, I_S=-10A, V_{GS}=0V	-	-	-1.2	V

Notes:

1.Pulse width limited by safe operating area.
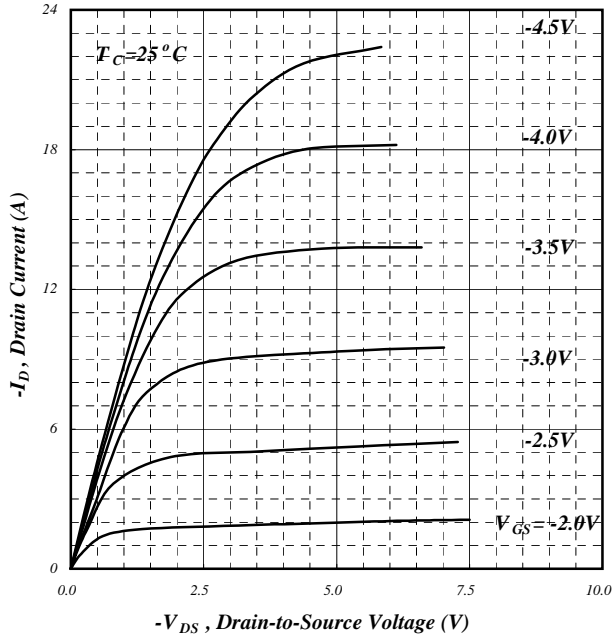
2.Pulse width $\leq$300us , duty cycle $\leq$2%.

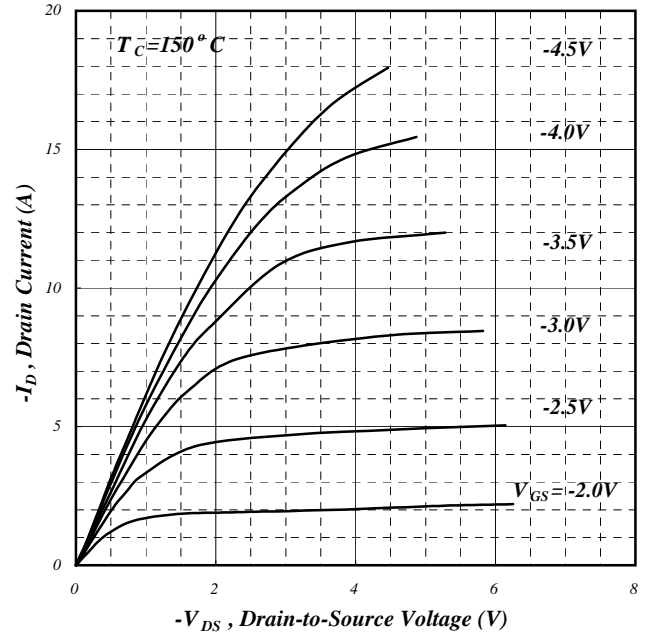Fig 1. Typical Output Characteristics
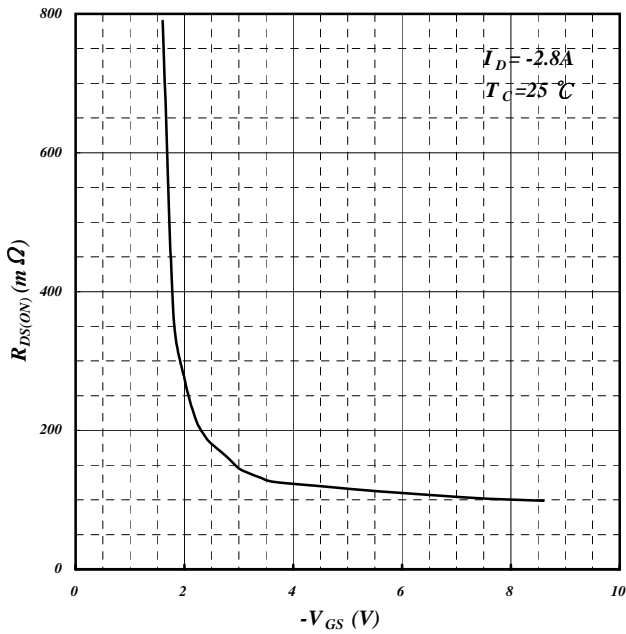
Fig 2. Typical Output Characteristics
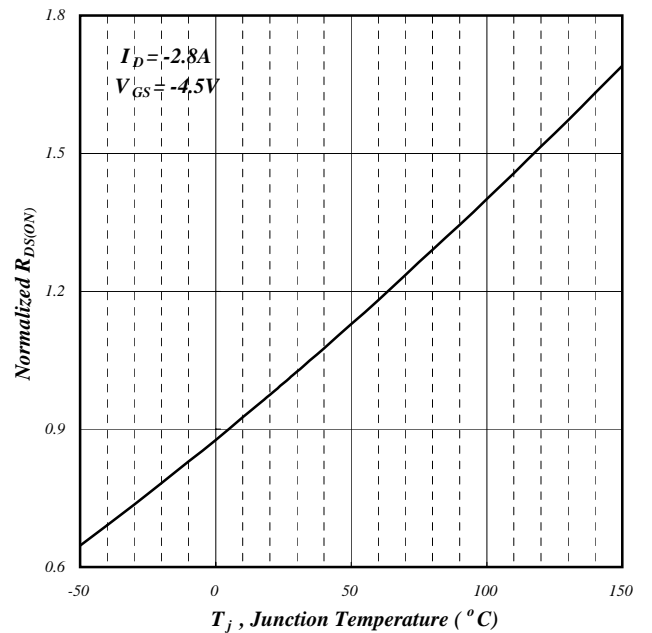
Fig 3. On-Resistance v.s. Gate Voltage

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

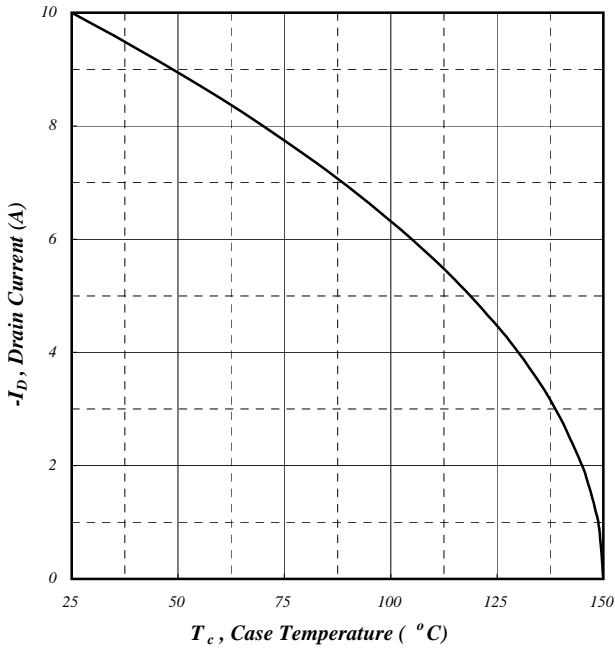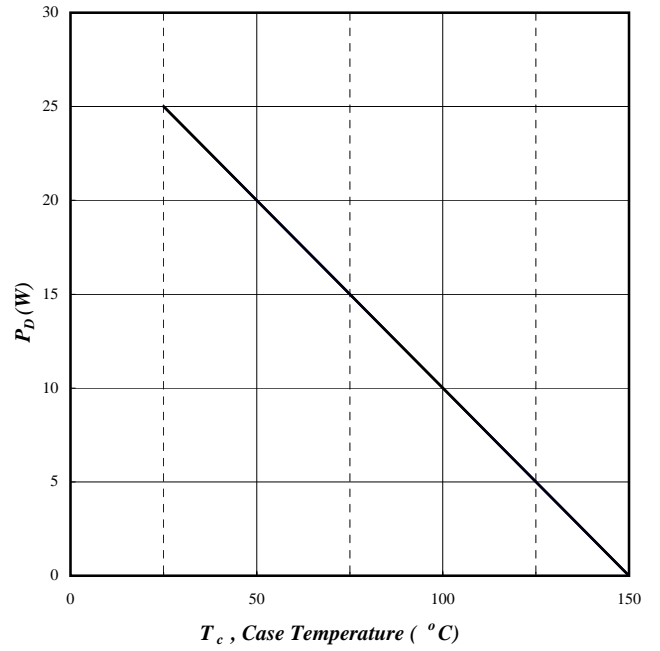**Fig 5. Maximum Drain Current v.s. Case Temperature**
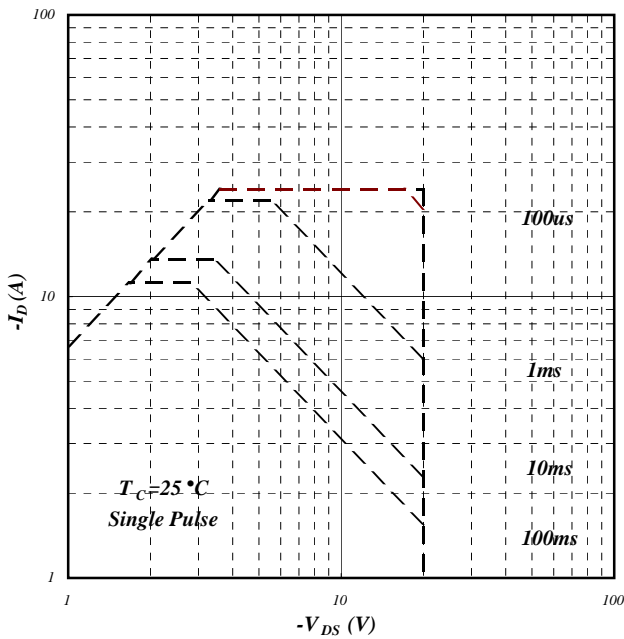

Fig 6. Typical Power Dissipation

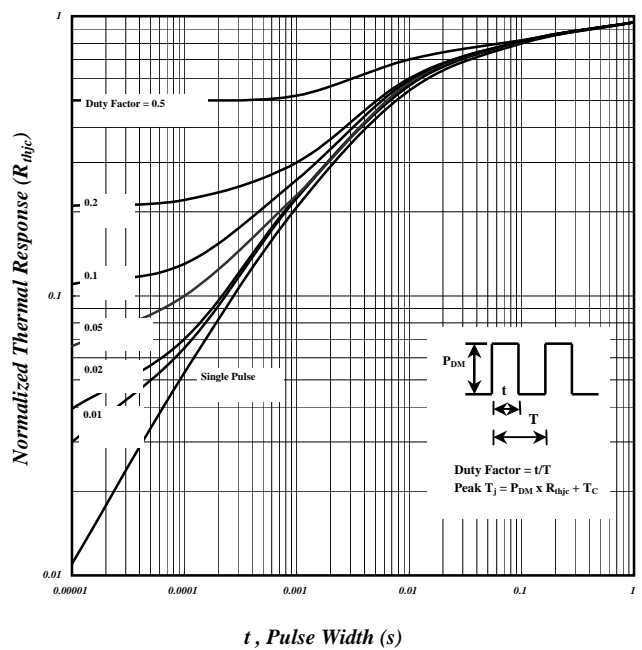

Fig 7. Maximum Safe Operating Area
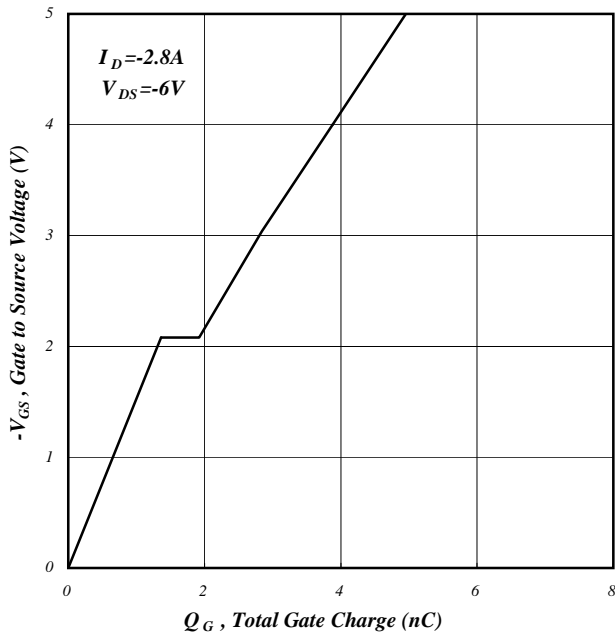

Fig 8. Effective Transient Thermal Impedance

Fig 9. Gate Charge Characteristics
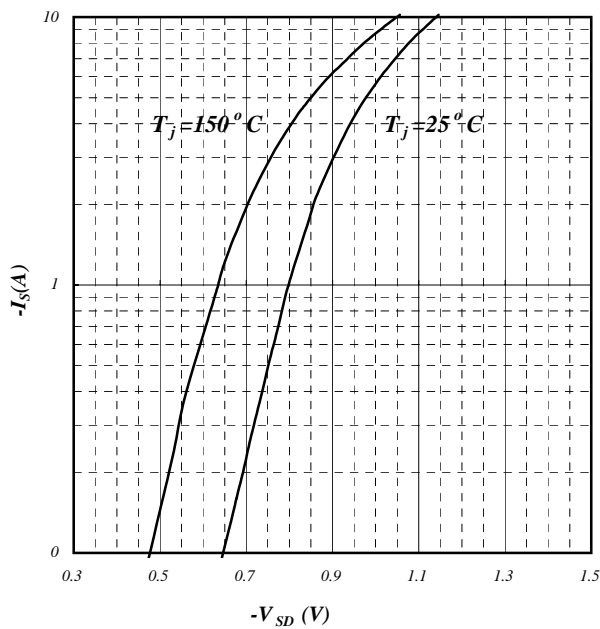

Fig 10. Typical Capacitance Characteristics

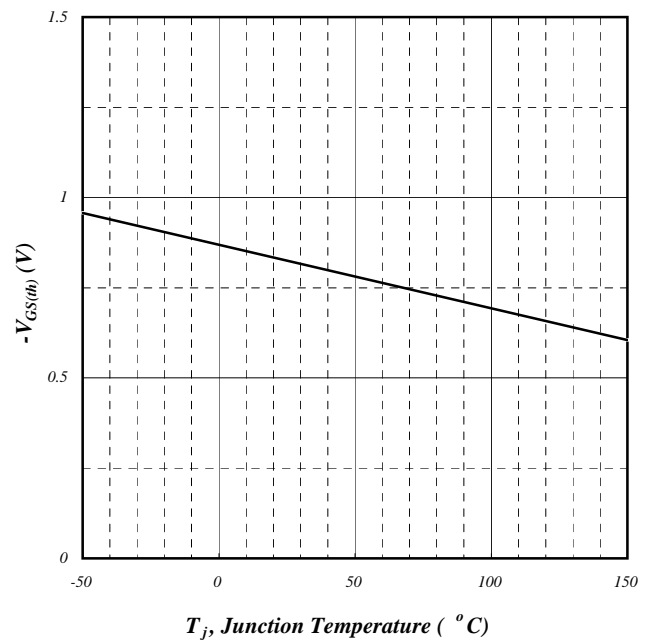**Fig 11. Forward Characteristic of Reverse Diode**

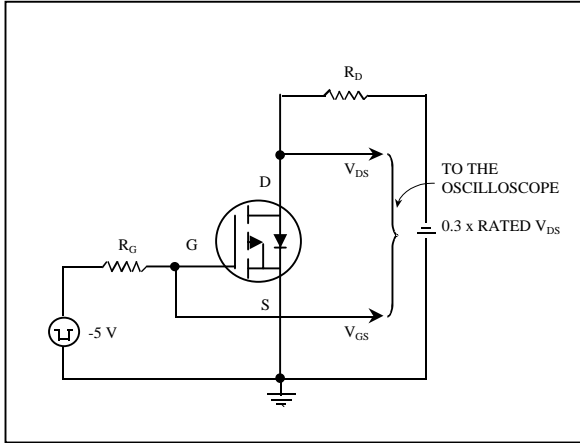**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**
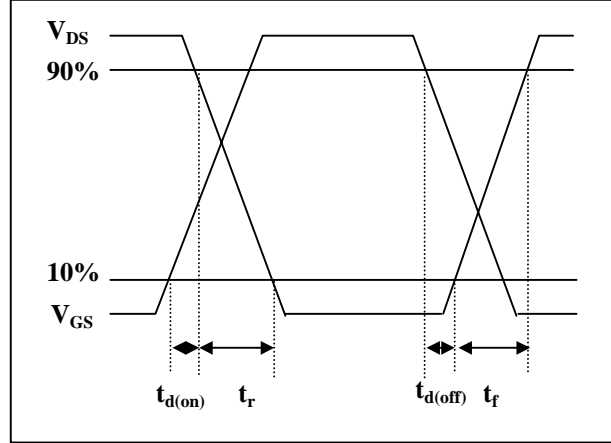
Fig 13. Switching Time Circuit
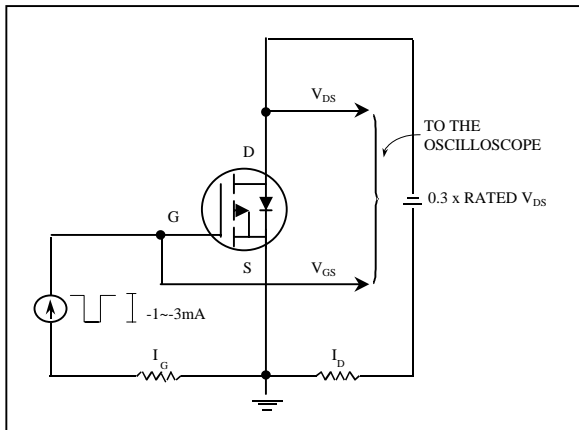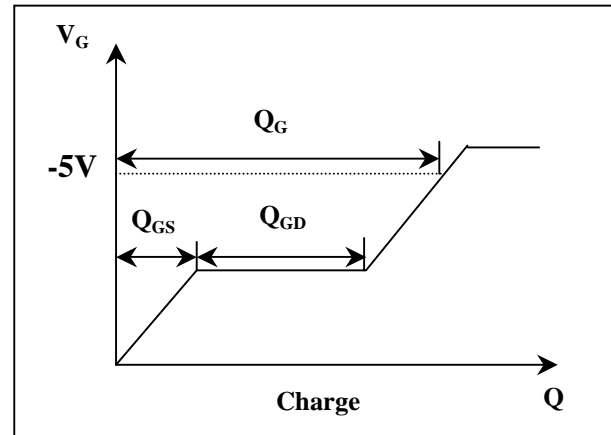

Fig 14. Switching Time Waveform

Fig 15. Gate Charge Circuit

Fig 16. Gate Charge Waveform