



**Advanced Power
Electronics Corp.**

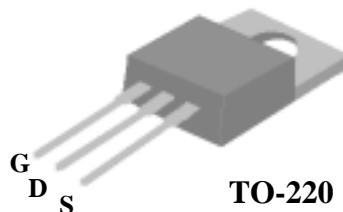
AP40N03GP

Pb Free Plating Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

- ▼ Low Gate Charge
- ▼ Simple Drive Requirement
- ▼ Fast Switching



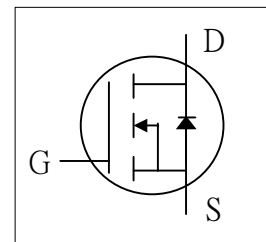
TO-220

BV_{DSS}	30V
$R_{DS(ON)}$	17m Ω
I_D	40A

Description

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

The TO-220 package is universally preferred for all commercial-industrial applications and suited for low voltage applications such as DC/DC converters and high efficiency switching circuits.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	40	A
$I_D @ T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	30	A
I_{DM}	Pulsed Drain Current ¹	169	A
$P_D @ T_C=25^\circ\text{C}$	Total Power Dissipation	50	W
	Linear Derating Factor	0.4	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Thermal Resistance Junction-case	Max. 2.5	$^\circ\text{C}/\text{W}$
Rthj-a	Thermal Resistance Junction-ambient	Max. 62	$^\circ\text{C}/\text{W}$



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Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	-	0.037	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	-	14	17	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=16A$	-	20	23	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	-	26	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=150^\circ\text{C}$)	$V_{DS}=24V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=20A$	-	17	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=24V$	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=5V$	-	10	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=15V$	-	7.2	-	ns
t_r	Rise Time	$I_D=20A$	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	22.5	-	ns
t_f	Fall Time	$R_D=0.75\Omega$	-	10	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	800	-	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	380	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	133	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.3V$	-	-	40	A
I_{SM}	Pulsed Source Current (Body Diode) ¹		-	-	169	A
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=40A, V_{GS}=0V$	-	-	1.3	V

Notes:

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



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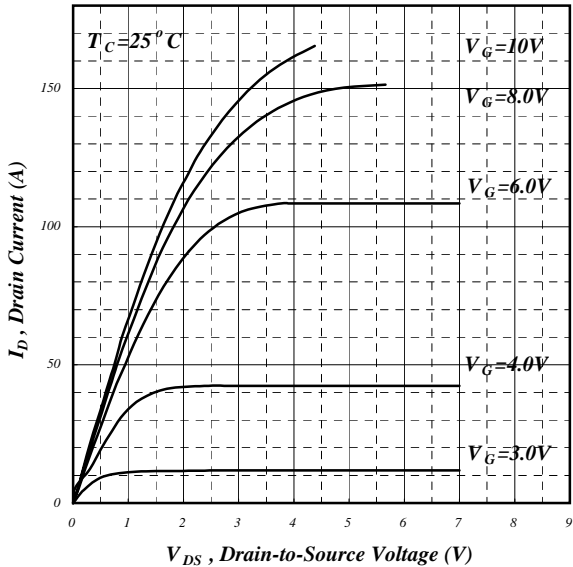


Fig 1. Typical Output Characteristics

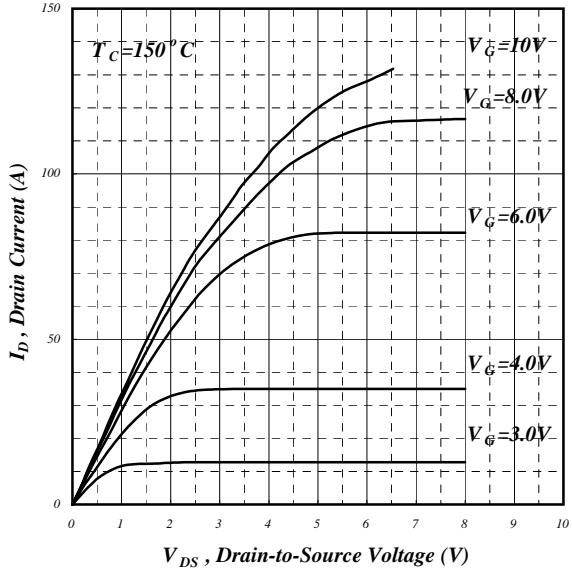


Fig 2. Typical Output Characteristics

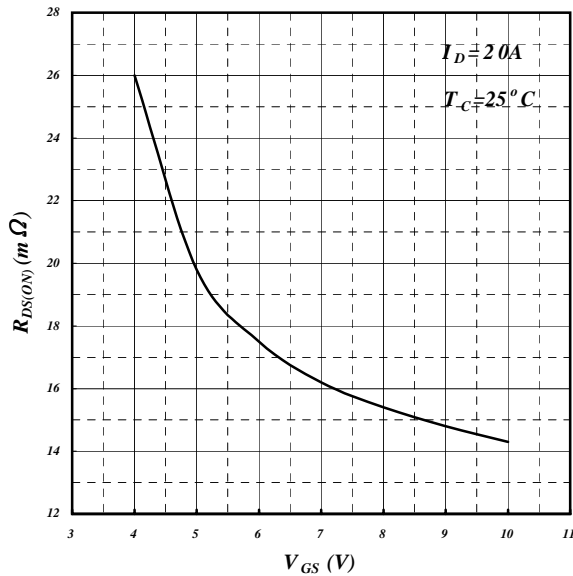


Fig 3. On-Resistance v.s. Gate Voltage

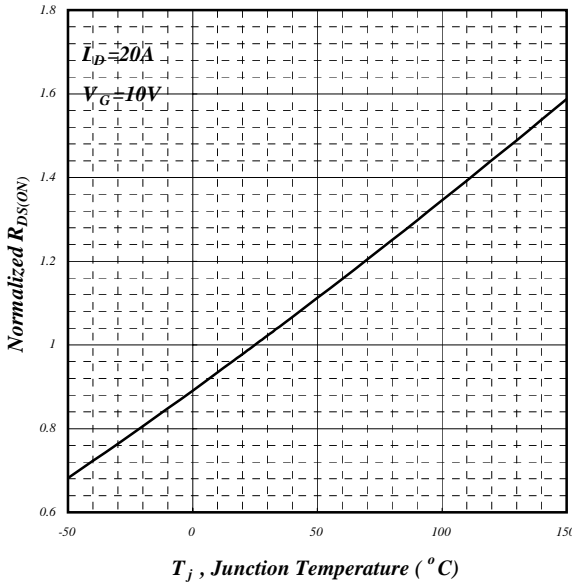


Fig 4. Normalized On-Resistance v.s. Junction Temperature



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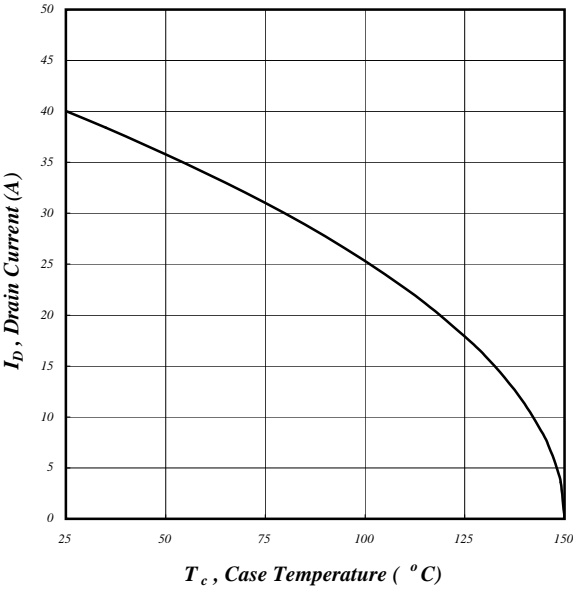


Fig 5. Maximum Drain Current v.s. Case Temperature

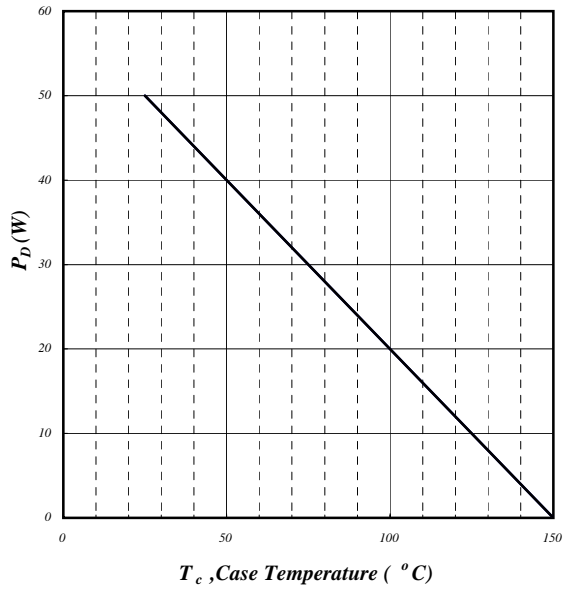


Fig 6. Typical Power Dissipation

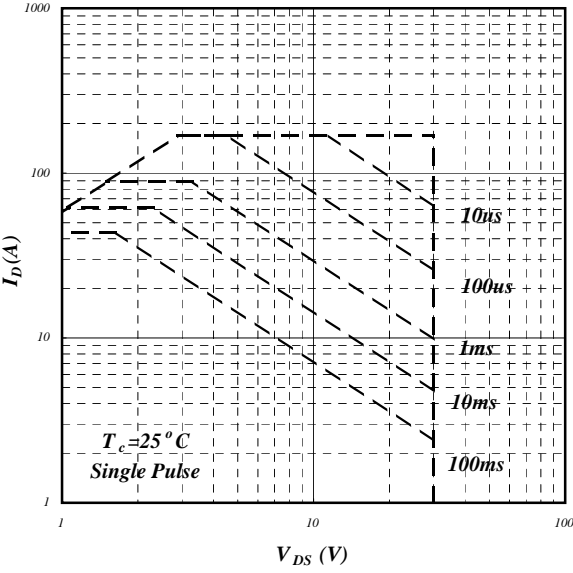


Fig 7. Maximum Safe Operating Area

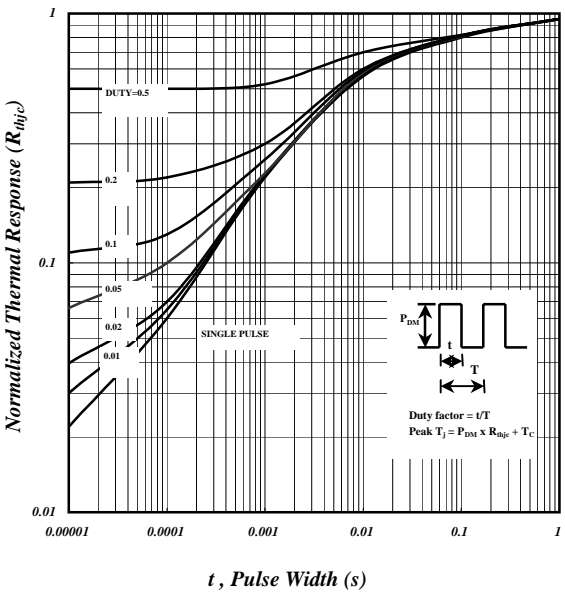


Fig 8. Effective Transient Thermal Impedance



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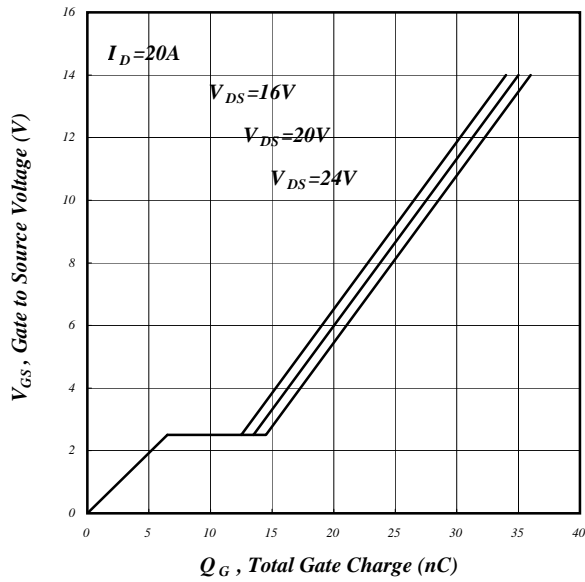


Fig 9. Gate Charge Characteristics

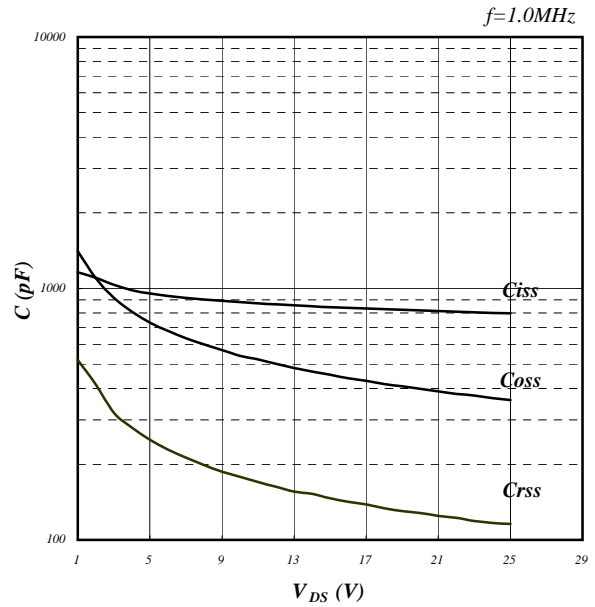


Fig 10. Typical Capacitance Characteristics

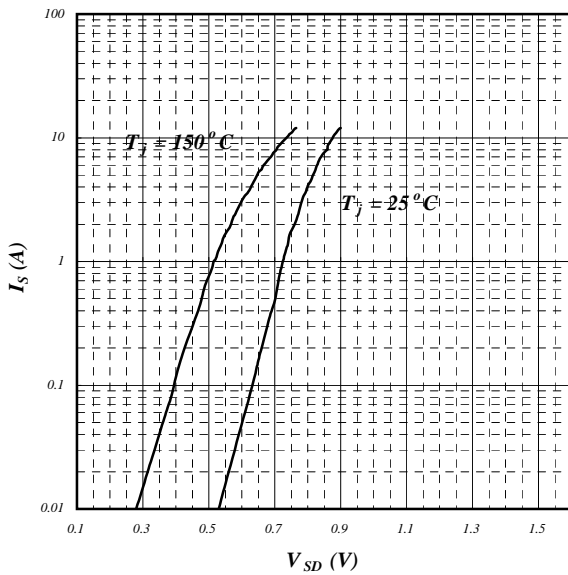


Fig 11. Forward Characteristic of Reverse Diode

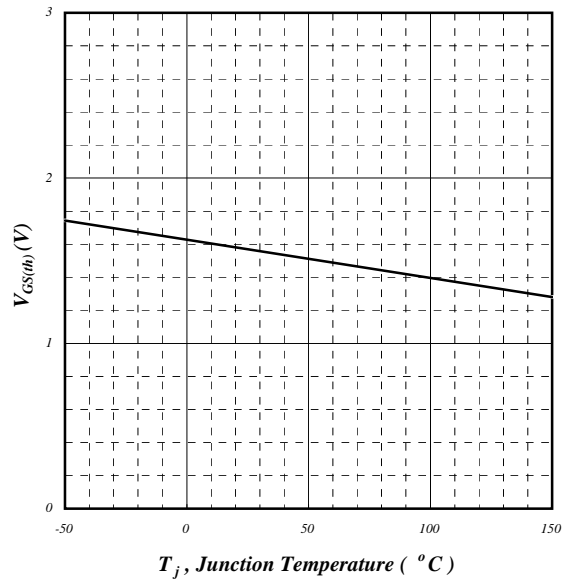


Fig 12. Gate Threshold Voltage v.s. Junction Temperature



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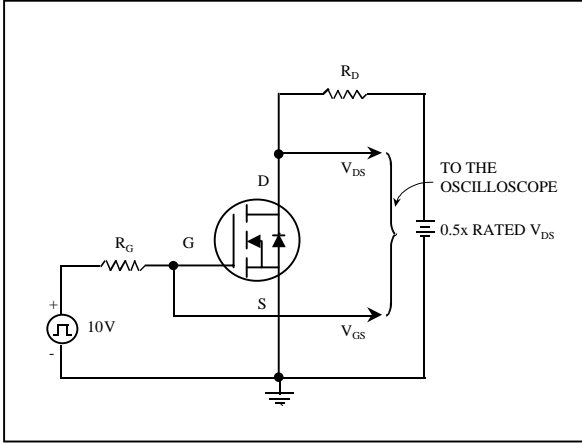


Fig 13. Switching Time Circuit

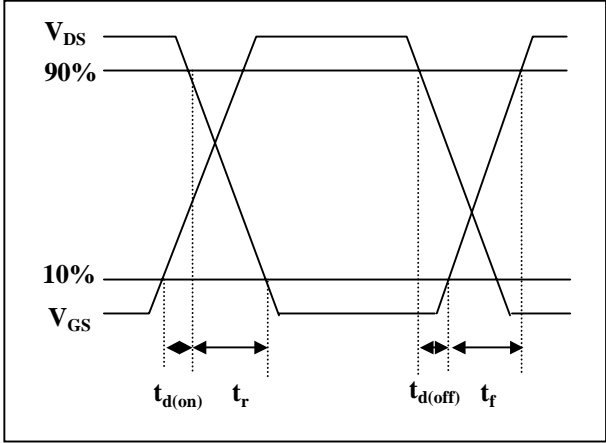


Fig 14. Switching Time Waveform

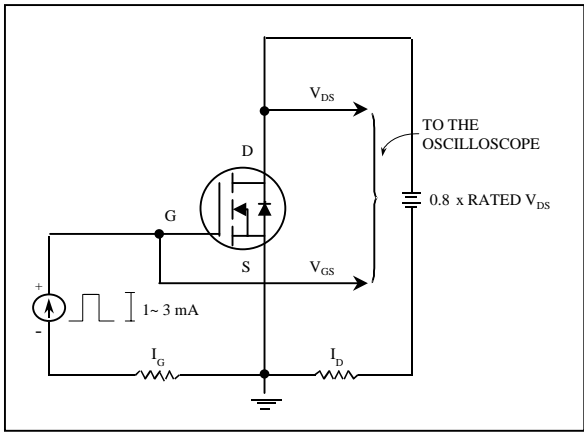


Fig 15. Gate Charge Circuit

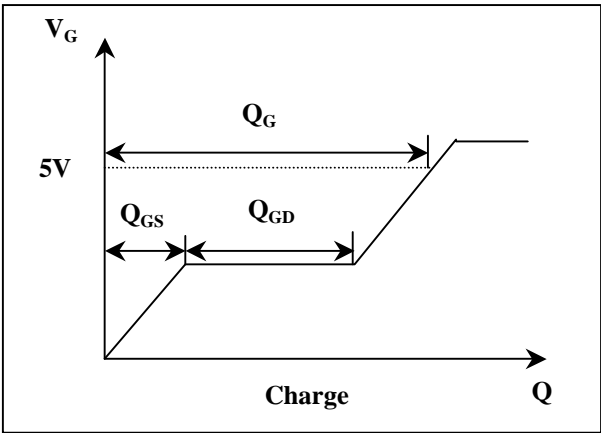


Fig 16. Gate Charge Waveform