



**Advanced Power
Electronics Corp.**

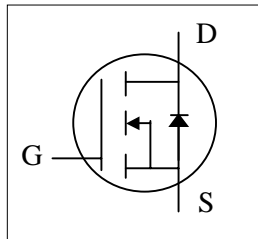
AP4416GH/J

Pb Free Plating Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

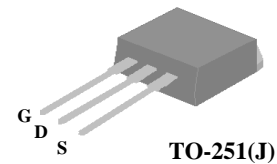
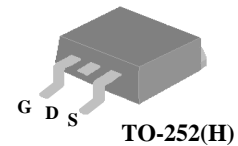
- ▼ Lower Gate Charge
- ▼ Simple Drive Requirement
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant



BV_{DSS}	35V
$R_{DS(ON)}$	45m Ω
I_D	20A

Description

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (AP4416GJ) is available for low-profile applications.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	35	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current	20	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current	12	A
I_{DM}	Pulsed Drain Current ¹	50	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	26	W
	Linear Derating Factor	0.21	W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Thermal Resistance Junction-case	Max. 4.8	$^\circ C/W$
Rthj-a	Thermal Resistance Junction-ambient	Max. 110	$^\circ C/W$



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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	$V_{GS}=0V, I_D=250\mu A$	35	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1\text{mA}$	-	0.03	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=12A$	-	-	45	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	-	65	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=11A$	-	10	-	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	$I_D=12A$	-	6	10	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=30V$	-	2	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	3.5	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=15V$	-	6	-	ns
t_r	Rise Time	$I_D=12A$	-	36	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	11	-	ns
t_f	Fall Time	$R_D=1.25\Omega$	-	2	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	460	740	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	80	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	60	-	pF
R_g	Gate Resistance	$f=1.0\text{MHz}$	-	1.1	1.6	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=12A, V_{GS}=0V$	-	-	1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=12A, V_{GS}=0V,$	-	17	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	10	-	nC

Notes:

1. Pulse width limited by safe operating area.

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

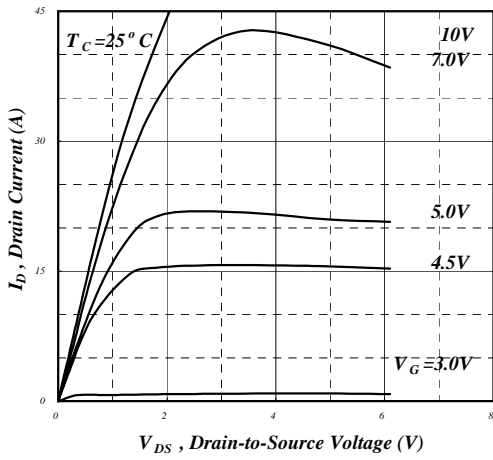


Fig 1. Typical Output Characteristics

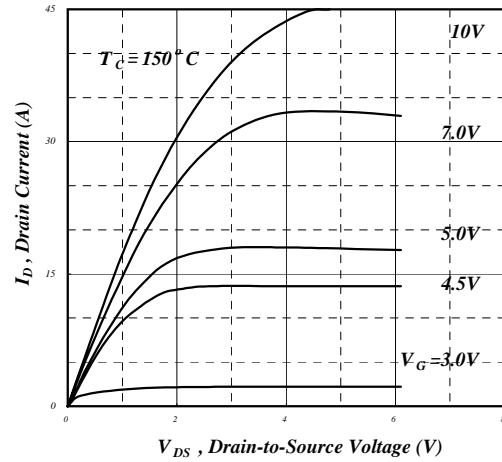


Fig 2. Typical Output Characteristics

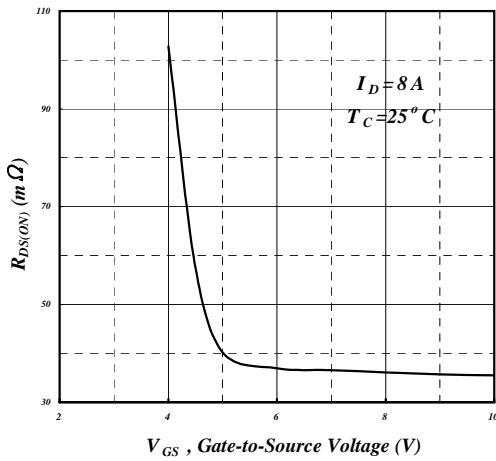


Fig 3. On-Resistance v.s. Gate Voltage

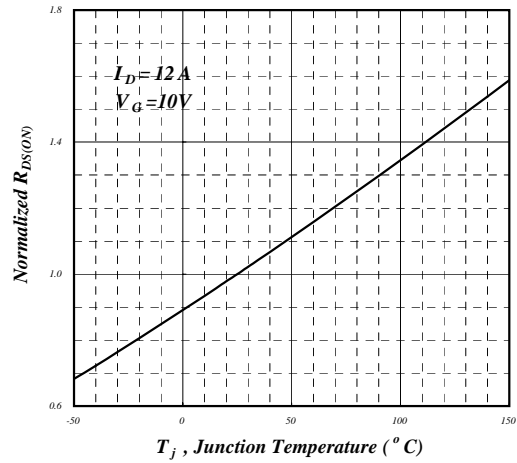


Fig 4. Normalized On-Resistance v.s. Junction Temperature

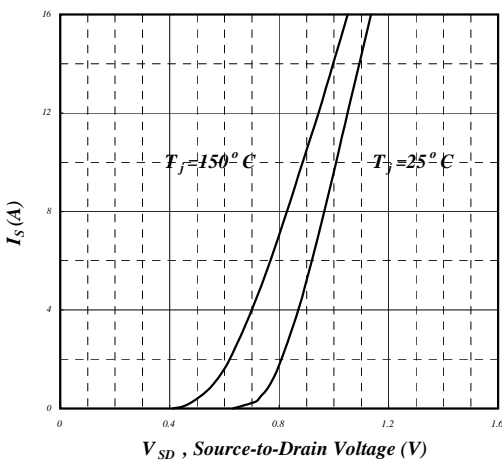


Fig 5. Forward Characteristic of Reverse Diode

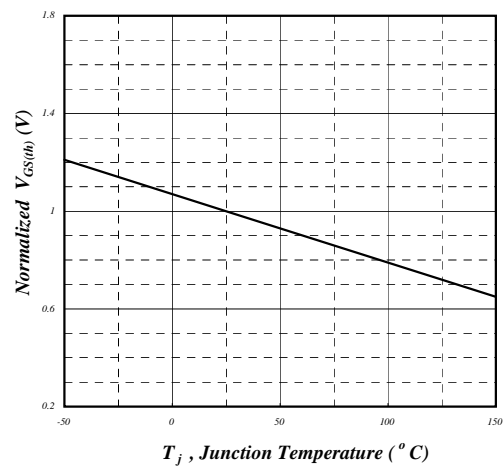


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



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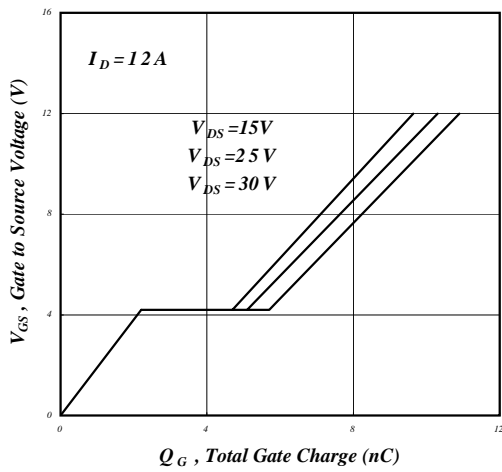


Fig 7. Gate Charge Characteristics

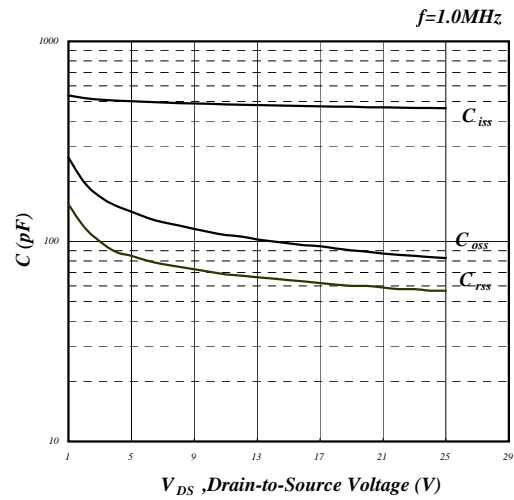


Fig 8. Typical Capacitance Characteristics

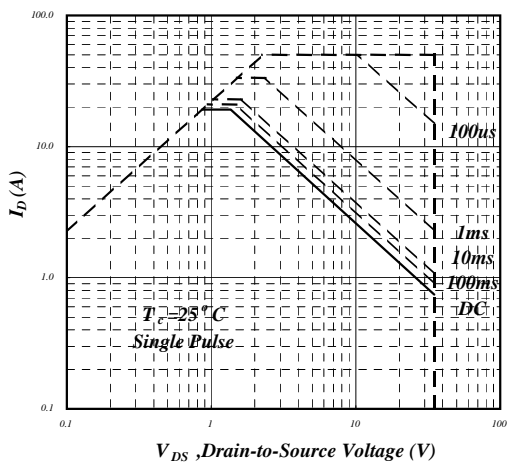


Fig 9. Maximum Safe Operating Area

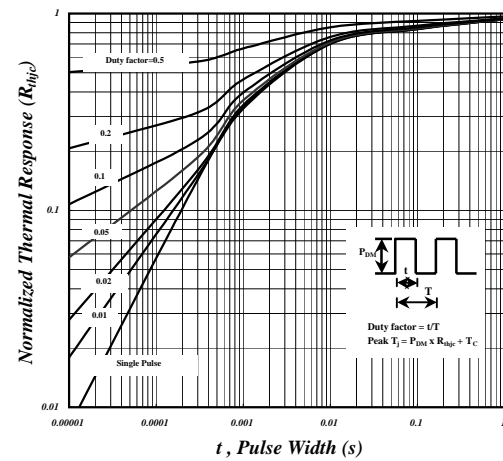


Fig 10. Effective Transient Thermal Impedance

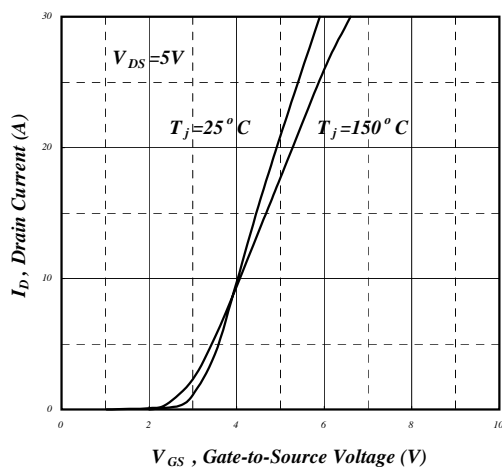


Fig 11. Transfer Characteristics

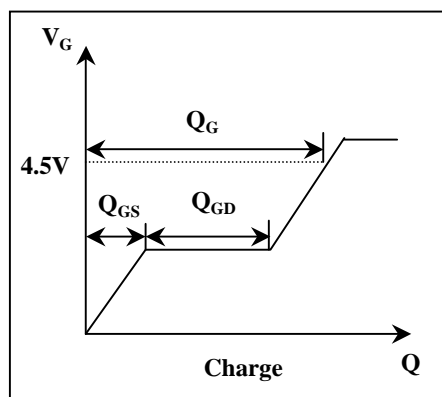


Fig 12. Gate Charge Waveform