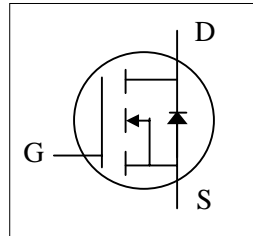




- ▼ Simple Drive Requirement
- ▼ Low On-resistance
- ▼ Fast Switching Characteristics
- ▼ RoHS Compliant

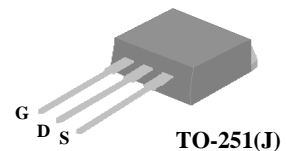
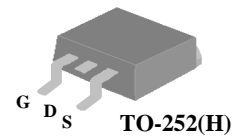


BV_{DSS}	200V
$R_{DS(ON)}$	380m Ω
I_D	8.6A

Description

AP09N20 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The TO-252 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for high current application due to the low connection resistance. The through-hole version (AP09N20J) are available for low-profile applications.



Absolute Maximum Ratings @ $T_J=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, $V_{GS} @ 10\text{V}$	8.6	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, $V_{GS} @ 10\text{V}$	5.5	A
I_{DM}	Pulsed Drain Current ¹	36	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	69	W
	Linear Derating Factor	0.55	W/ $^\circ\text{C}$
E_{AS}	Single Pulse Avalanche Energy ²	40	mJ
I_{AR}	Avalanche Current	8.6	A
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	Maximum Thermal Resistance, Junction-case	1.8	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount) ⁴	62.5	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient	110	$^\circ\text{C}/\text{W}$



AP09N20H/J-HF

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 =1mA	200	-	-	V
ΔBV _{DSS} /ΔT _j	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I _D =1mA	-	0.24	-	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =5A	-	-	380	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2	-	4	V
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =5A	-	3.7	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =200V, V _{GS} =0V	-	-	10	μA
	Drain-Source Leakage Current (T _j =125°C)	V _{DS} =160V, V _{GS} =0V	-	-	100	μA
I _{GSS}	Gate-Source Leakage	V _{GS} = ±30V, V _{DS} =0V	-	-	±100	nA
Q _g	Total Gate Charge ³	I _D =8.6A	-	23	37	nC
Q _{gs}	Gate-Source Charge	V _{DS} =160V	-	4	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =10V	-	13	-	nC
t _{d(on)}	Turn-on Delay Time ³	V _{DD} =100V	-	12	-	ns
t _r	Rise Time	I _D =8.6A	-	25	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =10Ω	-	36	-	ns
t _f	Fall Time	V _{GS} =10V	-	16	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	500	800	pF
C _{oss}	Output Capacitance	V _{DS} =25V	-	90	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	40	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ³	I _S =8.6A, V _{GS} =0V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _S =8.6A, V _{GS} =0V,	-	225	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	-	2260	-	nC

Notes:

1. Pulse width limited by safe operating area.
2. Starting T_j=25°C, V_{DD}=50V, L=1mH, R_G=25Ω, I_{AS}=8.6A.
3. Pulse width ≤300us, duty cycle ≤2%.
4. Surface mounted on 1 in² copper pad of FR4 board

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

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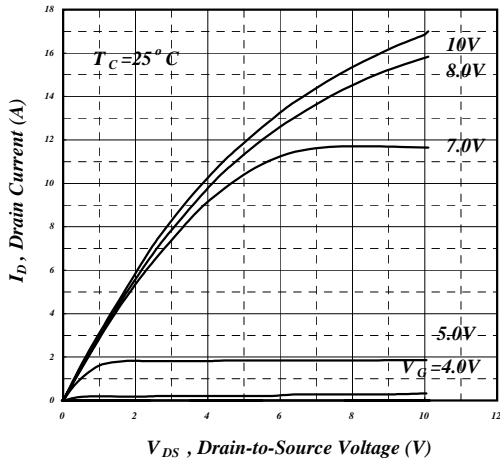


Fig 1. Typical Output Characteristics

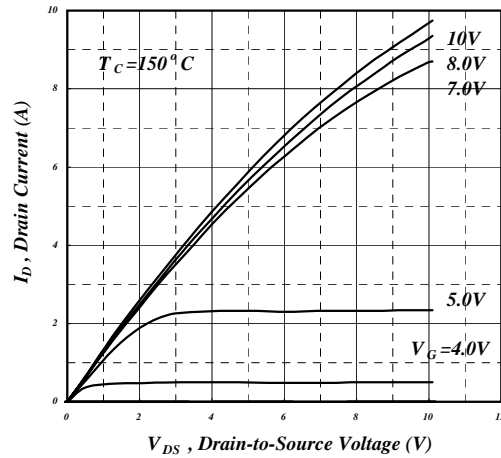


Fig 2. Typical Output Characteristics

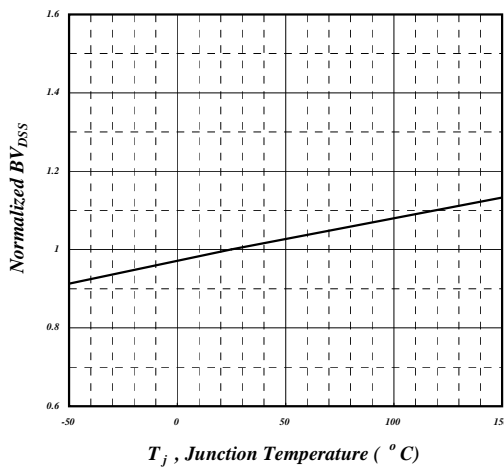


Fig 3. Normalized BV_{DSS} v.s. Junction Temperature

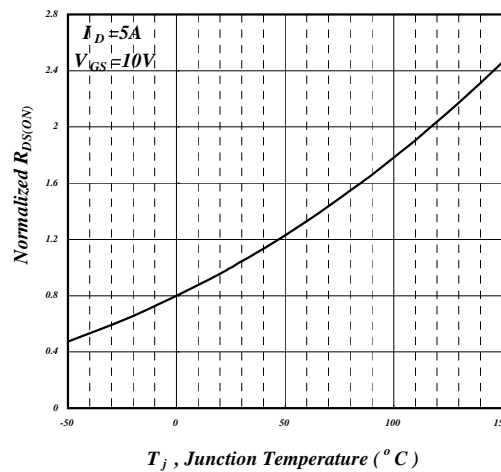


Fig 4. Normalized On-Resistance v.s. Junction Temperature

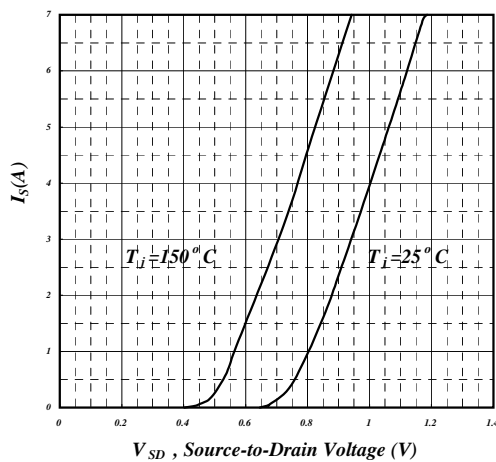


Fig 5. Forward Characteristic of Reverse Diode

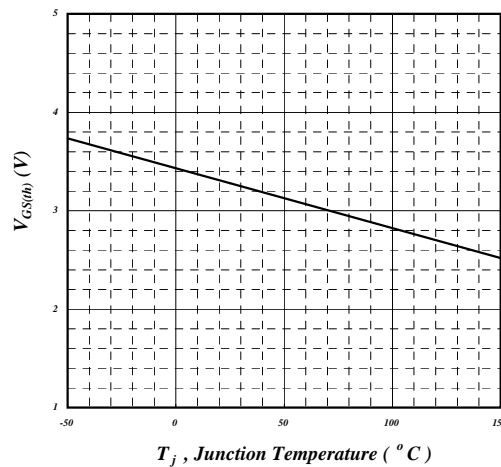


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

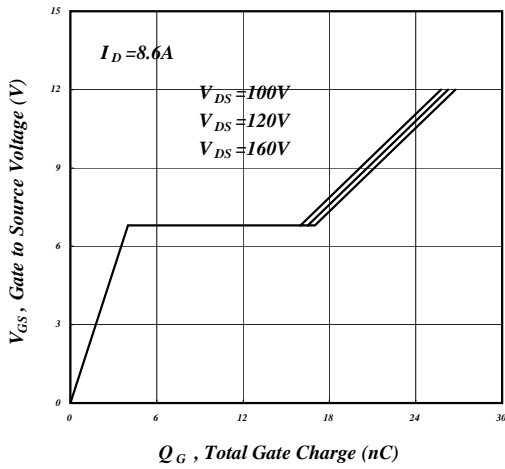


Fig 7. Gate Charge Characteristics

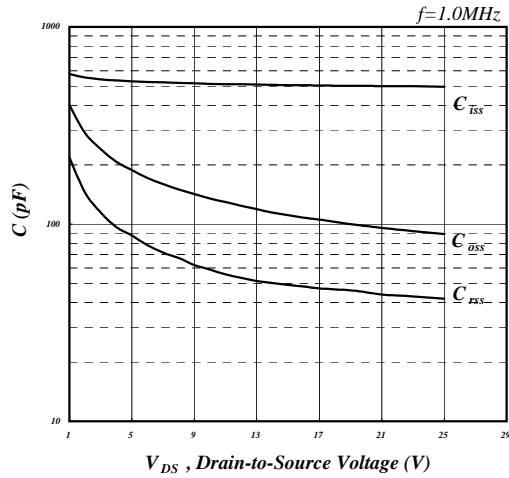


Fig 8. Typical Capacitance Characteristics

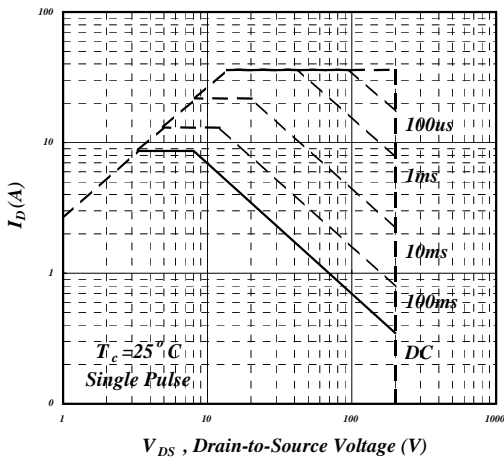


Fig 9. Maximum Safe Operating Area

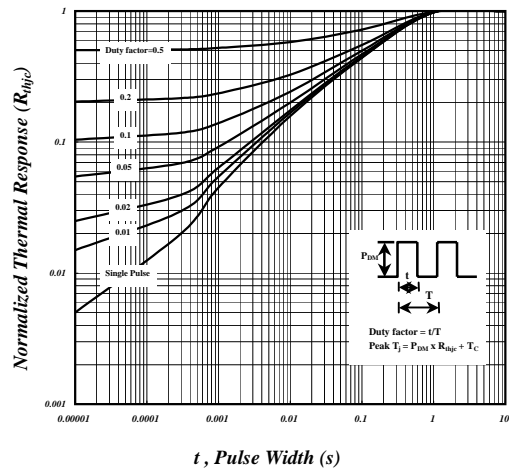


Fig 10. Effective Transient Thermal Impedance

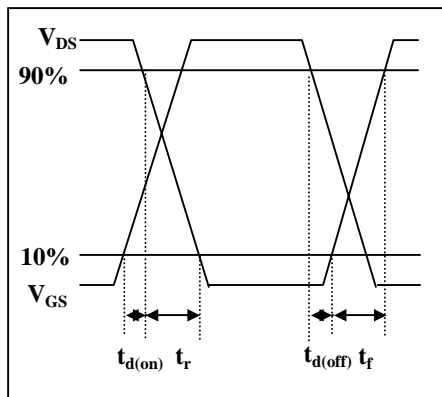


Fig 11. Switching Time Waveform

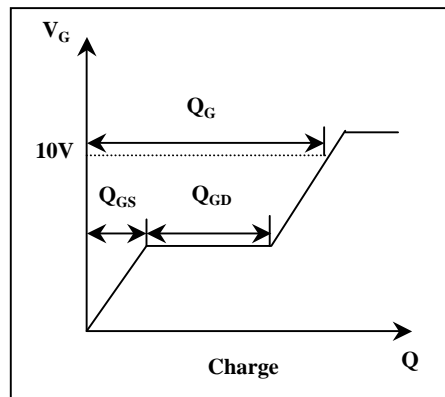
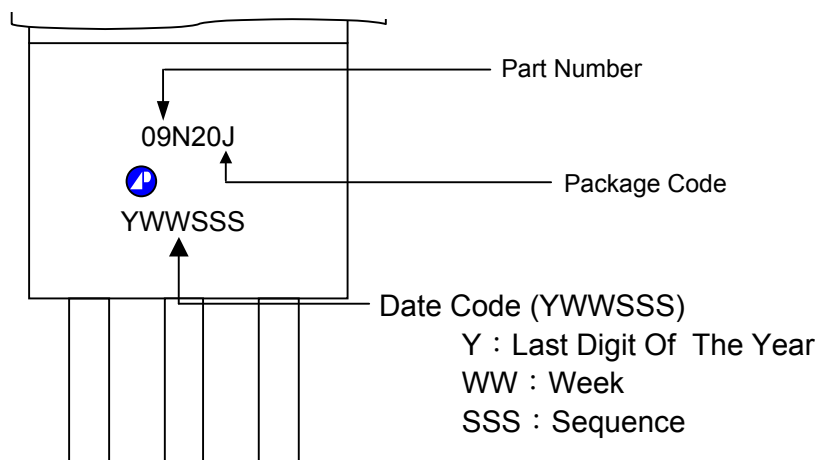


Fig 12. Gate Charge Waveform

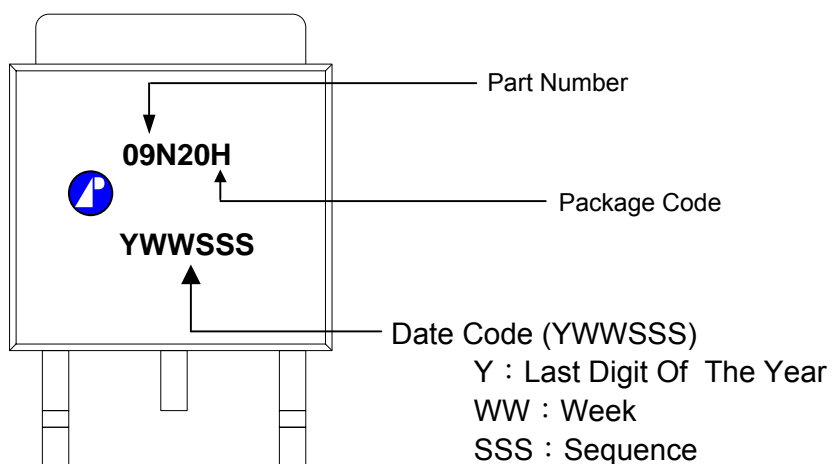


MARKING INFORMATION

TO-251

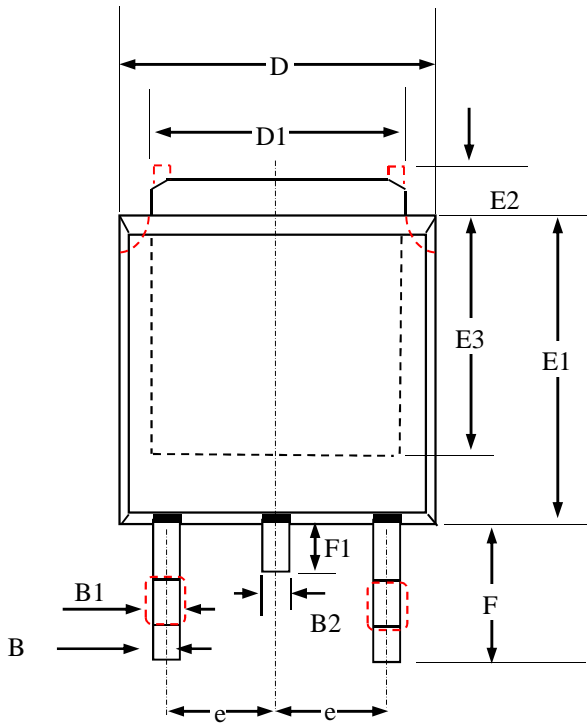


TO-252

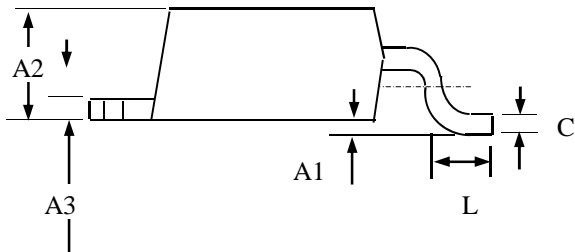




Package Outline : TO-252



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	2.18	2.30	2.40
A3	0.40	0.50	0.65
B	0.40	0.70	1.00
B1	0.50	0.85	1.20
D	6.00	6.50	6.80
D1	4.80	5.35	5.90
E3	4.00 (ref.)		
F	2.00	2.63	3.05
F1	0.50	0.85	1.20
E1	5.00	5.70	6.30
E2	0.50	1.10	1.80
e	2.3 (ref)		
C	0.35	0.525	0.70
A1	0.00	—	0.25
B2	—	—	1.25
L	0.90	1.34	1.78



1. All Dimensions Are in Millimeters.
2. Dimension Does Not Include Mold Protrusions.
3. Thermal PAD, Body and Pin contour is for reference, it may has little difference by option.



TO-252 FOOTPRINT :

