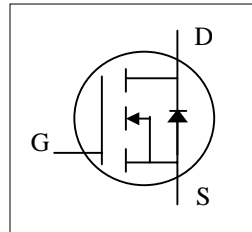




- ▼ Lower Gate Charge
- ▼ 100% Avalanche Rated
- ▼ Fast Switching Performance
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant & Halogen-Free

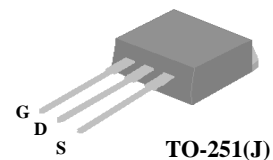
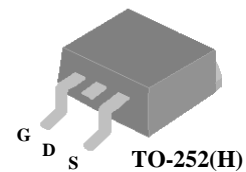


$BV_{DSS}$	400V
$R_{DS(ON)}$	16 $\Omega$
$I_D$	0.5A

## Description

AP01N40 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 and suited for AC/DC converters. The through-hole version (AP01N40J) is available for low-profile applications.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	400	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	0.5	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	0.4	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	2	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	17.4	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	2	W
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	0.5	mJ
$T_{STG}$	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	Maximum Thermal Resistance, Junction-case	7.2	$^\circ C/W$
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount) <sup>4</sup>	62.5	$^\circ C/W$
Rthj-a	Maximum Thermal Resistance, Junction-ambient	110	$^\circ C/W$



# AP01N40H/J-HF

## Electrical Characteristics @T<sub>j</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =1mA	400	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>3</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.2A	-	-	16	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1	-	3	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =0.5A	-	0.5	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V	-	-	100	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>3</sup>	I <sub>D</sub> =1A	-	2.9	4.6	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =320V	-	0.6	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =10V	-	0.6	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>3</sup>	V <sub>DD</sub> =200V	-	7.7	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =1A	-	12	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	23	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	73	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	76	125	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V	-	11	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	4	-	pF

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>3</sup>	I <sub>S</sub> =2A, V <sub>GS</sub> =0V	-	-	1.5	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =1A, V <sub>GS</sub> =0V	-	260	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	460	-	nC

### Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Starting T<sub>j</sub>=25°C , V<sub>DD</sub>=50V , L=1mH , R<sub>G</sub>=25Ω
- 3.Pulse test
- 4.Surface mounted on 1 in<sup>2</sup> 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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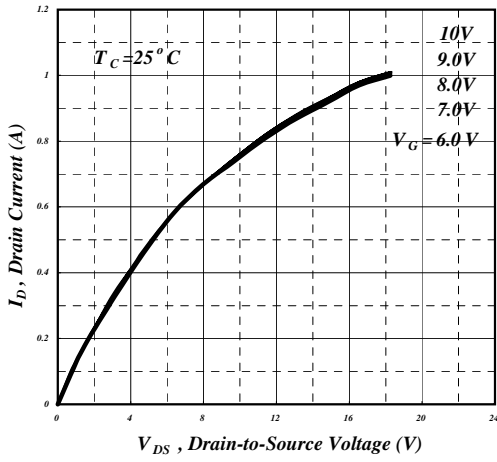


Fig 1. Typical Output Characteristics

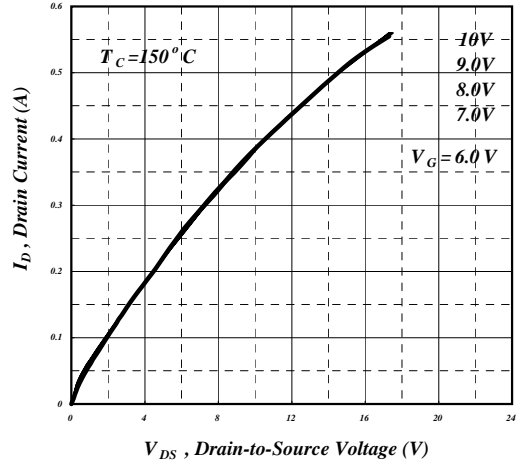


Fig 2. Typical Output Characteristics

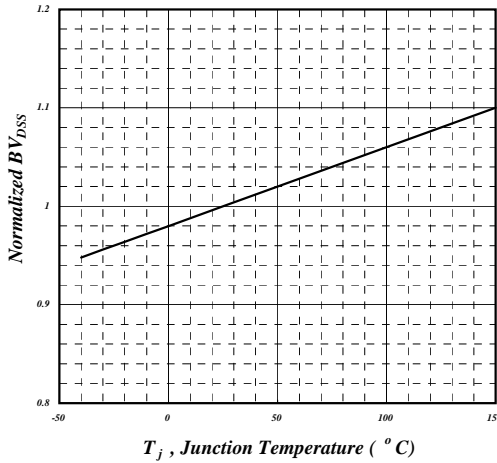


Fig 3. Normalized  $BV_{DSS}$  v.s. Junction Temperature

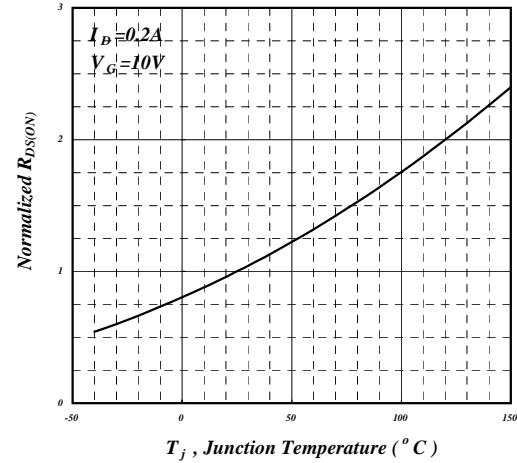


Fig 4. Normalized On-Resistance v.s. Junction Temperature

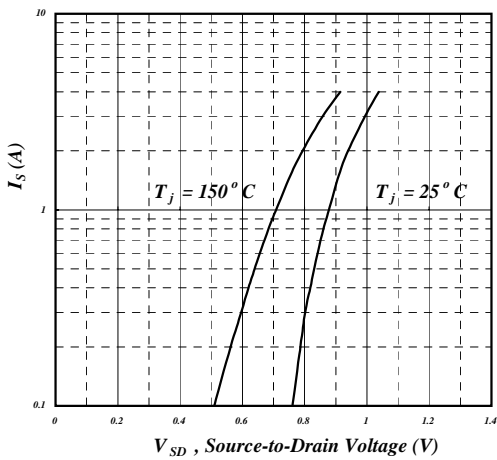


Fig 5. Forward Characteristic of Reverse Diode

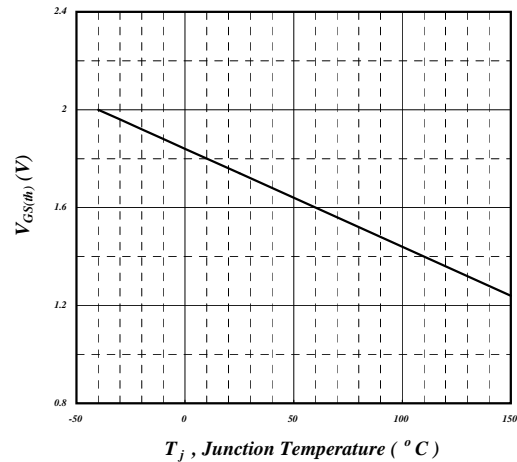


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

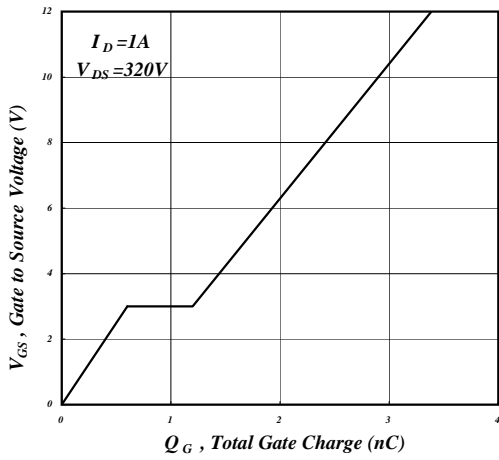


Fig 7. Gate Charge Characteristics

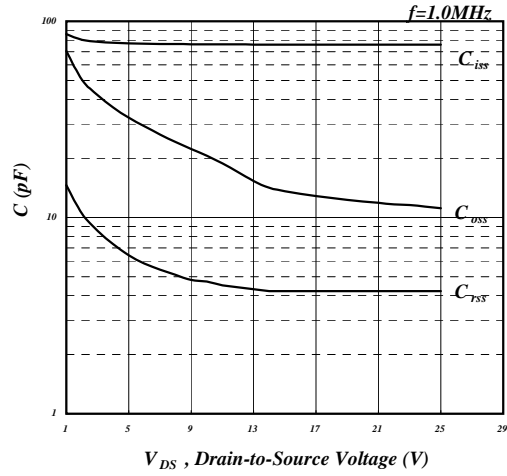


Fig 8. Typical Capacitance Characteristics

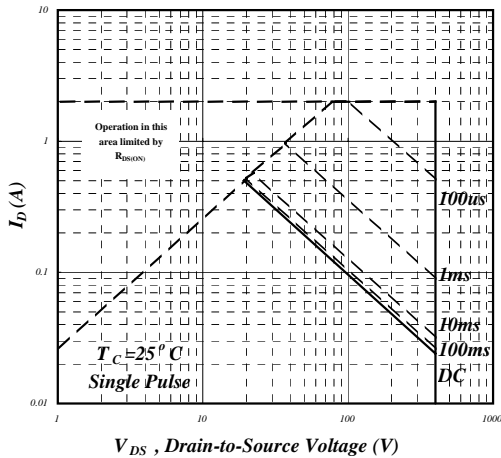


Fig 9. Maximum Safe Operating Area

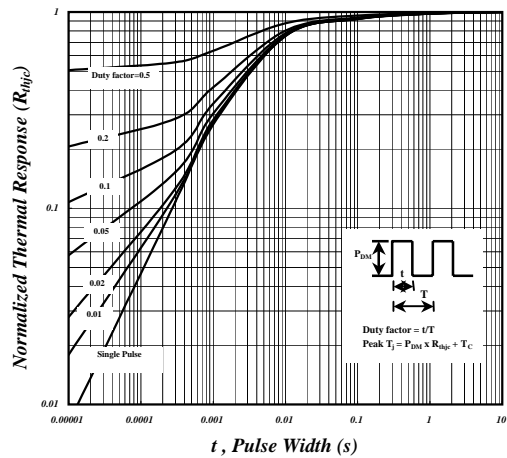


Fig 10. Effective Transient Thermal Impedance

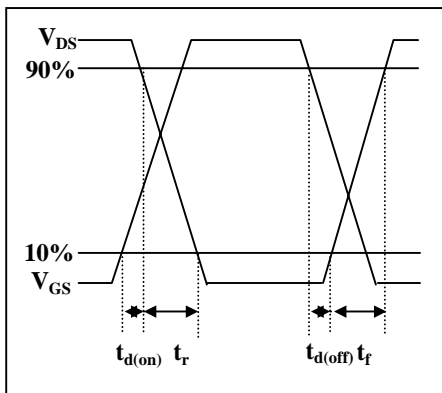


Fig 11. Switching Time Waveform

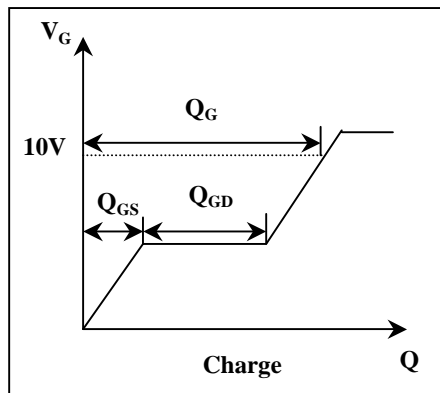


Fig 12. Gate Charge Waveform