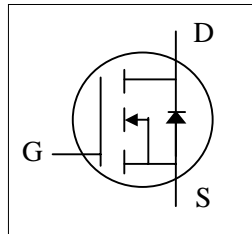




- ▼ 100% Avalanche Test
- ▼ Fast Switching Characteristic
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant & Halogen-Free

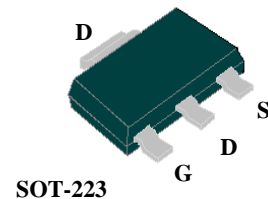


$BV_{DSS}$	400V
$R_{DS(ON)}$	5.5 $\Omega$
$I_D$	0.45A

## Description

AP02N40 uses rugged design with the best combination of fast switching and cost-effectiveness.

The SOT-223 package is designed for surface mount application, larger heatsink than SO-8 and SOT package.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	400	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	0.45	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	0.35	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	1.8	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.7	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	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>4</sup>	45	$^\circ C/W$



**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> =250uA	400	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>3</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.4A	-	-	5.5	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	-	4	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =0.4A	-	0.7	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V	-	-	25	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>3</sup>	I <sub>D</sub> =1A	-	6.4	10	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =320V	-	1.2	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =10V	-	3.2	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>3</sup>	V <sub>DD</sub> =200V	-	8	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =1A	-	9	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =50Ω	-	21	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	12	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	180	300	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V	-	22	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	5.6	-	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> =0.4A, V <sub>GS</sub> =0V	-	-	1.5	V
t <sub>rr</sub>	Reverse Recovery Time <sup>3</sup>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V,	-	150	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	680	-	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>=25 Ω
- 3.Pulse test
- 4.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec ; 120 °C/W when mounted on Min. copper pad.

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.

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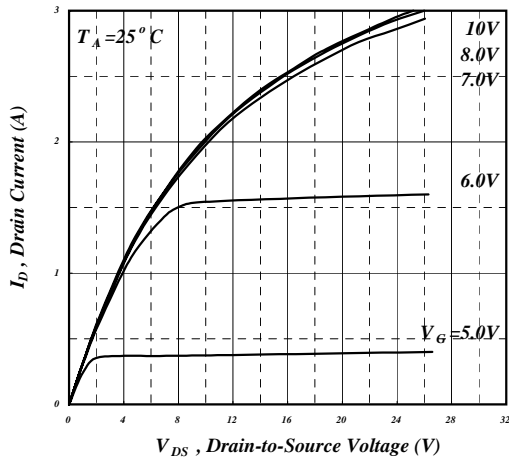


Fig 1. Typical Output Characteristics

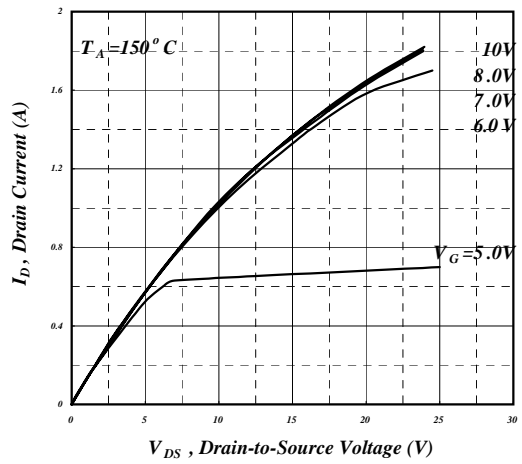


Fig 2. Typical Output Characteristics

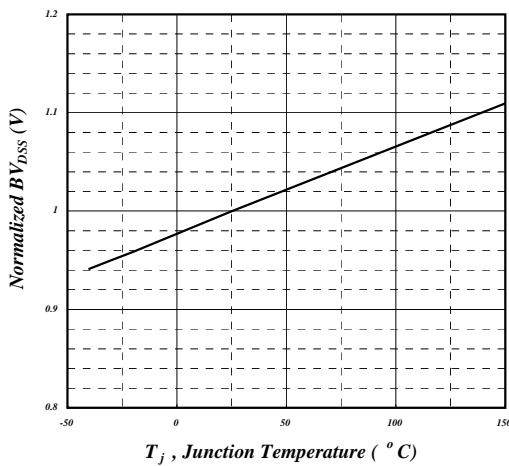


Fig 3. Normalized  $BV_{DS(ON)}$  v.s. Junction Temperature

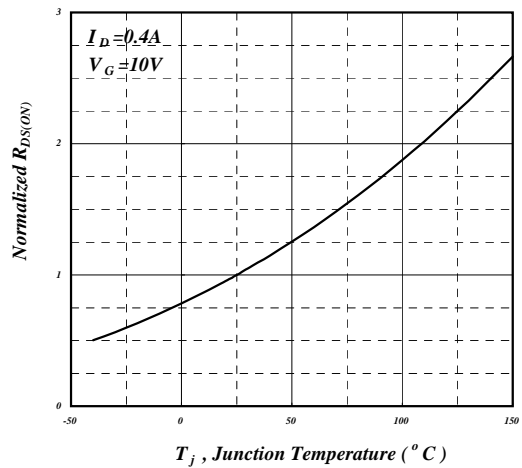


Fig 4. Normalized On-Resistance v.s. Junction Temperature

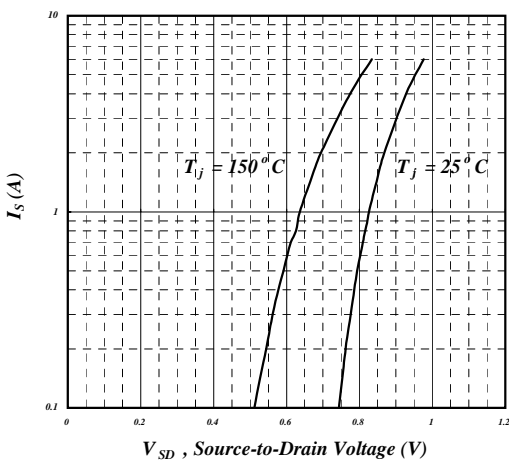


Fig 5. Forward Characteristic of Reverse Diode

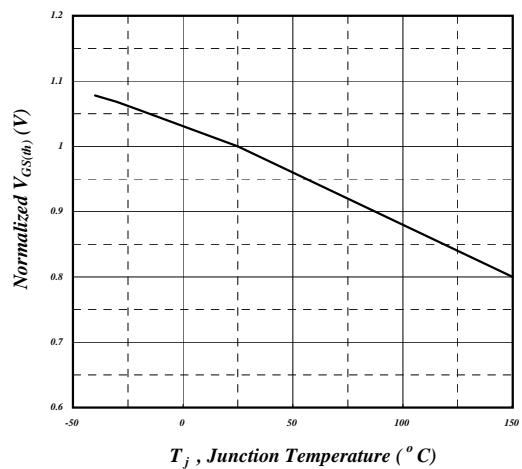


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

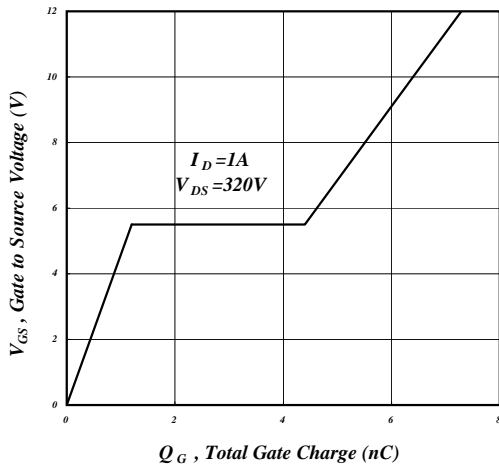


Fig 7. Gate Charge Characteristics

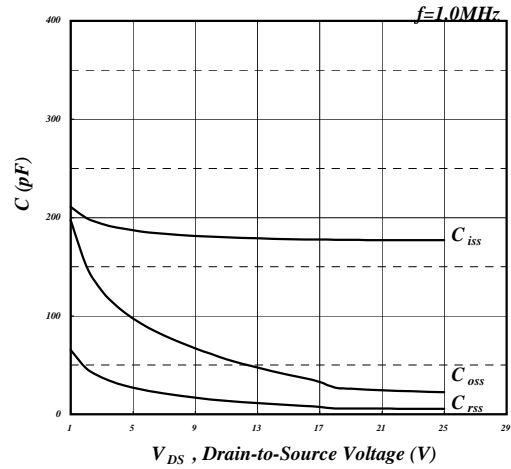


Fig 8. Typical Capacitance Characteristics

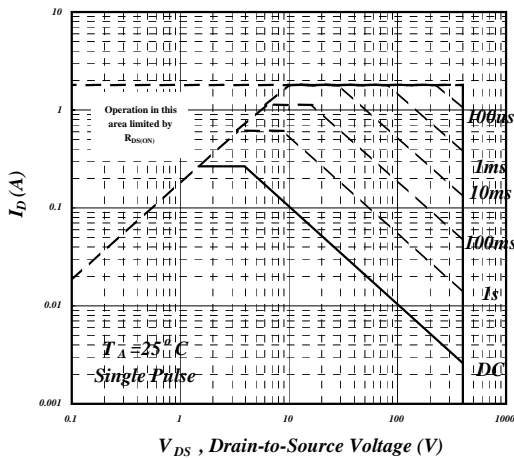


Fig 9. Maximum Safe Operating Area

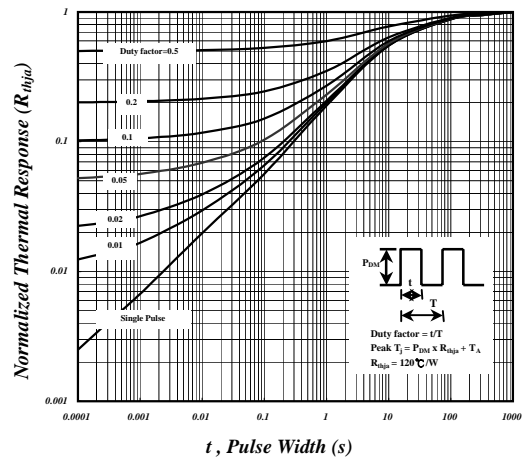


Fig 10. Effective Transient Thermal Impedance

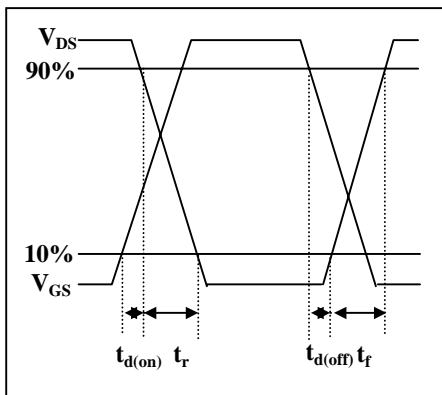


Fig 11. Switching Time Waveform

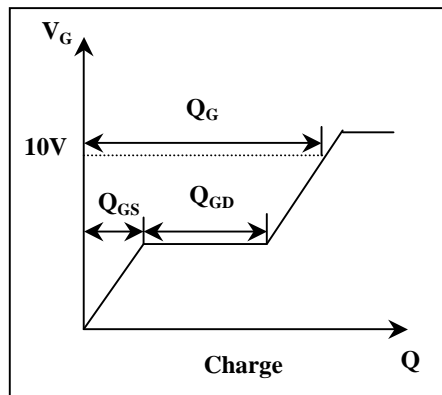


Fig 12. Gate Charge Waveform