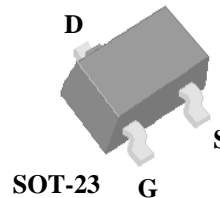
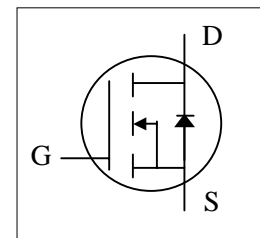




- ▼ Capable of 2.5V Gate Drive
- ▼ Small Package Outline
- ▼ Surface Mount Package
- ▼ RoHS Compliant



$BV_{DSS}$	20V
$R_{DS(ON)}$	85m $\Omega$
$I_D$	3.2A



## Description

AP2302 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 special design SOT-23 package with good thermal performance is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for voltage conversion or switch applications.

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D @ T_A=25^\circ\text{C}$	Drain Current <sup>3</sup> , $V_{GS}$ @ 4.5V	3.2	A
$I_D @ T_A=70^\circ\text{C}$	Drain Current <sup>3</sup> , $V_{GS}$ @ 4.5V	2.6	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	10	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	1.38	W
	Linear Derating Factor	0.01	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-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	90	$^\circ\text{C}/\text{W}$



**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	20	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	-	0.1	-	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.6A	-	-	85	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.1A	-	-	115	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.5	-	1.2	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =3.6A	-	6	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1	uA
	Drain-Source Leakage Current (T <sub>j</sub> =70°C)	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	10	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	I <sub>D</sub> =3.6A	-	4.4	-	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =10V	-	0.6	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =4.5V	-	1.9	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =10V	-	5.2	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =3.6A	-	37	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =6Ω	-	15	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =5V	-	5.7	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	145	-	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =10V	-	100	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	50	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	5.3	-	Ω

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Continuous Source Current ( Body Diode )	V <sub>D</sub> =V <sub>G</sub> =0V , V <sub>S</sub> =1.2V	-	-	1	A
I <sub>SM</sub>	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	10	A
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =1.6A, V <sub>GS</sub> =0V	-	-	1.2	V

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤ 10s ; 270°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.

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.

APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

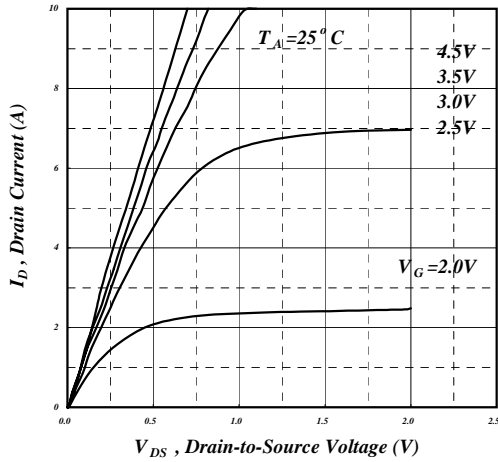


Fig 1. Typical Output Characteristics

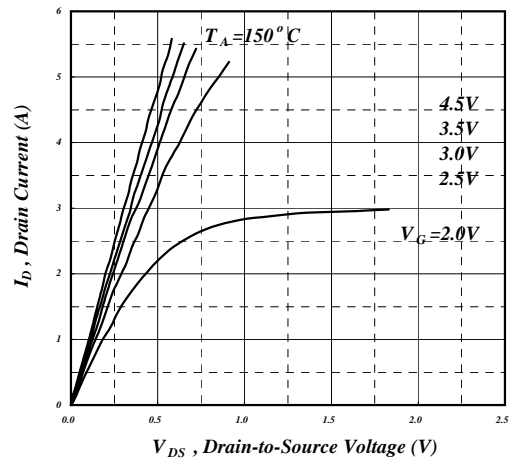


Fig 2. Typical Output Characteristics

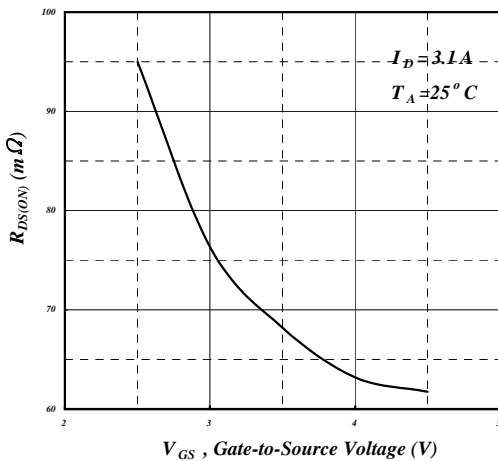


Fig 3. On-Resistance v.s. Gate Voltage

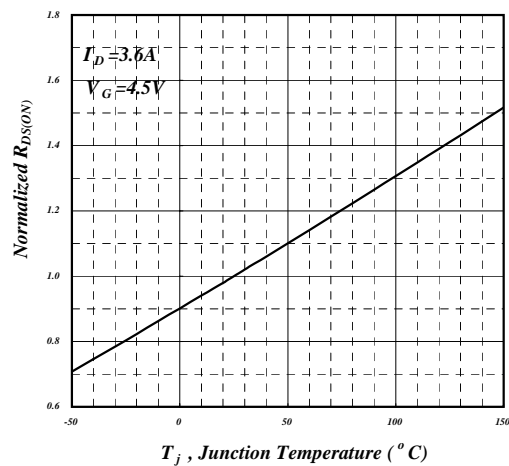


Fig 4. Normalized On-Resistance

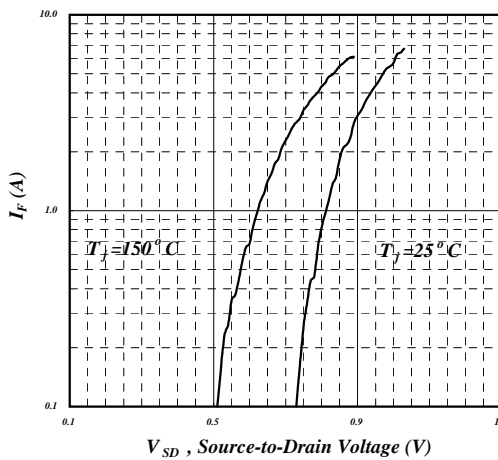


Fig 5. Forward Characteristic of Reverse Diode

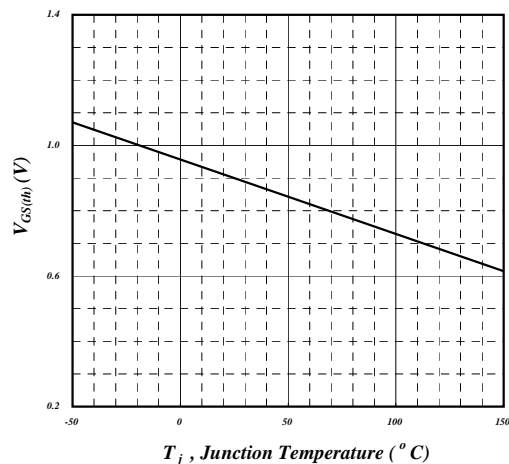


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

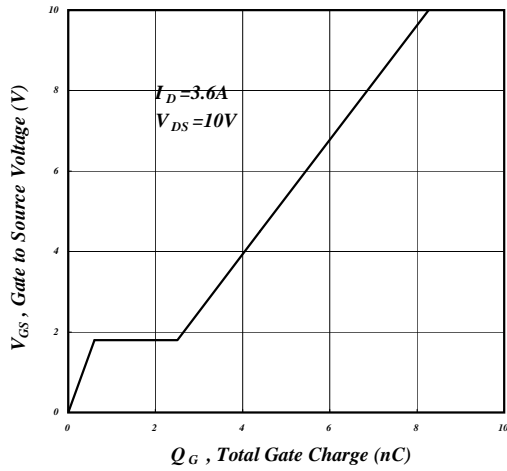


Fig 7. Gate Charge Characteristics

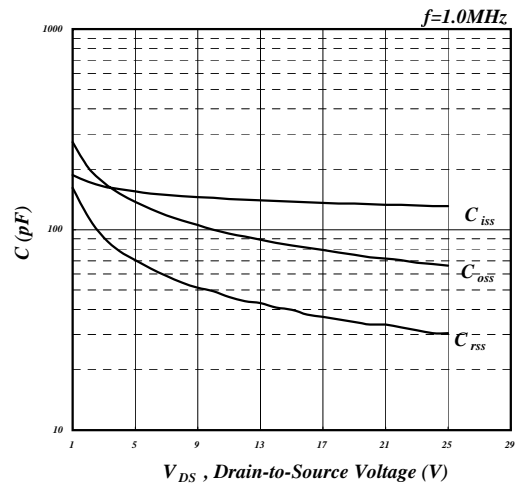


Fig 8. Typical Capacitance Characteristics

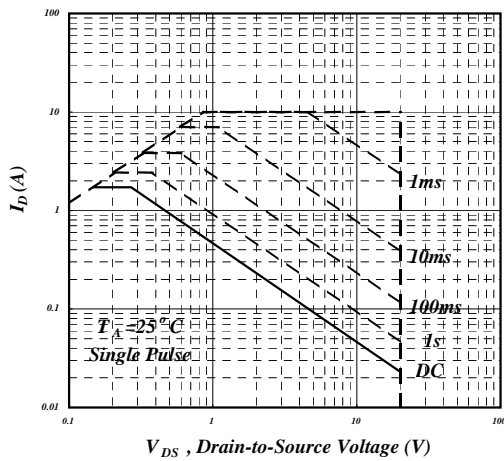


Fig 9. Maximum Safe Operating Area

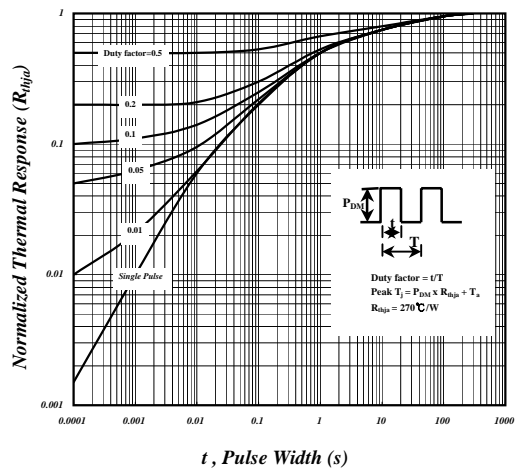


Fig 10. Effective Transient Thermal Impedance

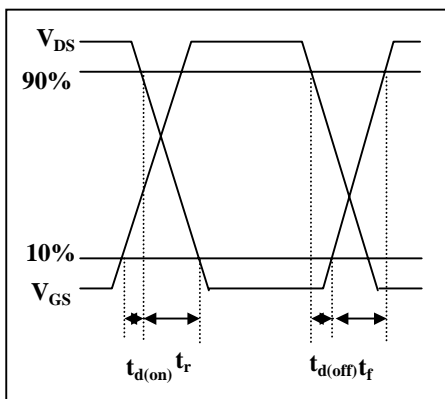


Fig 11. Switching Time Waveform

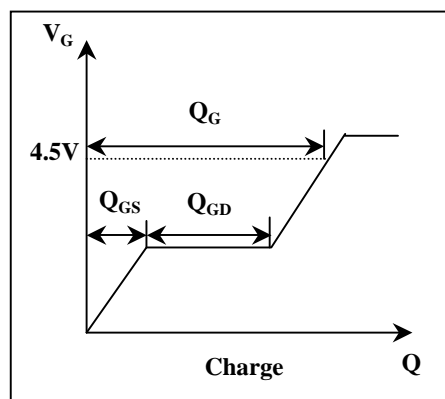
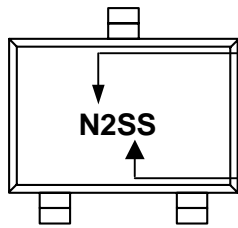


Fig 12. Gate Charge Waveform



---

**MARKING INFORMATION**



Part Number : N2

Date Code : SS

SS:2004,2008,2012,2016,2020...

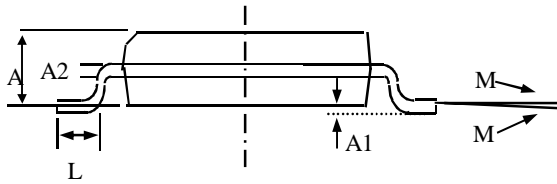
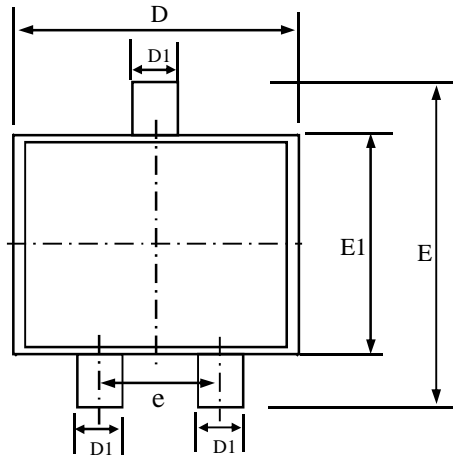
SS:2003,2007,2011,2015,2019...

SS:2002,2006,2010,2014,2018...

SS:2001,2005,2009,2013,2017...



### Package Outline : SOT-23

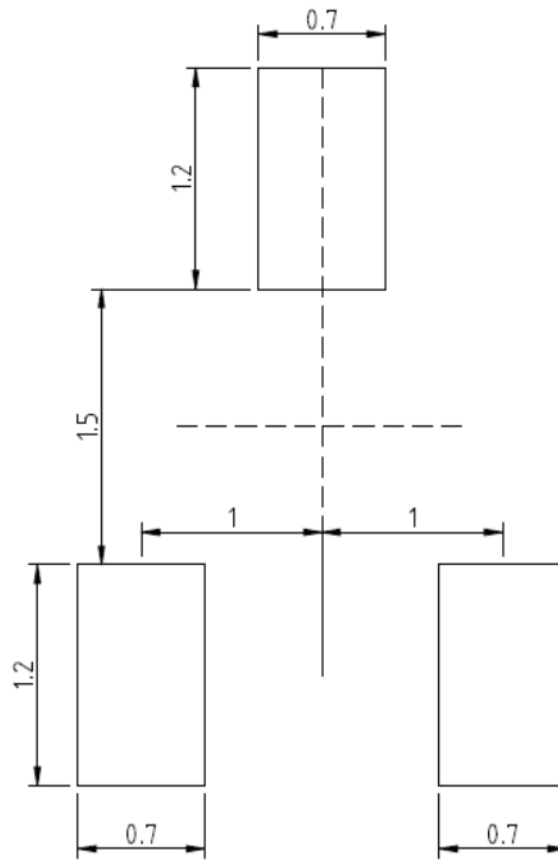


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	0.90	1.08	1.25
A1	0.00	0.08	0.15
A2	0.08	0.17	0.25
D1	0.30	0.40	0.50
e	1.70	2.00	2.30
D	2.70	2.90	3.10
E	2.40	2.70	3.00
E1	1.40	1.60	1.80
M	0°	5°	10°
L	0.30	0.45	0.60

1. All Dimension Are In Millimeters.
2. Dimension Does Not Include Mold Protrusions.
3. Does not Contain Dam Bar Dimension.



SOT-23 FOOTPRINT :



UNIT: mm