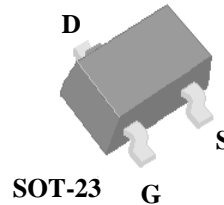




- ▼ Simple Drive Requirement
- ▼ Small Package Outline
- ▼ Surface Mount Device
- ▼ RoHS Compliant

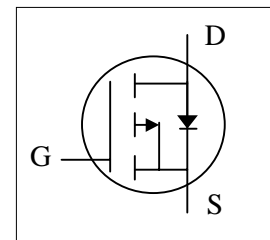


$BV_{DSS}$	-60V
$R_{DS(ON)}$	250m $\Omega$
$I_D$	- 1.8A

## Description

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The SOT-23 package is widely preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	- 60	V
$V_{GS}$	Gate-Source Voltage	+20	V
$I_D@T_A=25^\circ C$	Continuous Drain Current <sup>3</sup>	- 1.8	A
$I_D@T_A=70^\circ C$	Continuous Drain Current <sup>3</sup>	- 1.4	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-10	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	1.38	W
	Linear Derating Factor	0.01	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	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	90	$^\circ C/W$



# AP2311GN-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> =-250uA	-60	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	-	-0.04	-	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-1.8A	-	200	250	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1.4A	-	240	300	mΩ
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> =-1A	-	2	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V	-	-	-10	uA
	Drain-Source Leakage Current (T <sub>j</sub> =70°C)	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V	-	-	-25	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	I <sub>D</sub> =-1A	-	6	10	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-48V	-	1	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =-4.5V	-	3	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =-30V	-	8	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =-1A	-	5	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =-10V	-	22	-	ns
t <sub>f</sub>	Fall Time	R <sub>D</sub> =30Ω	-	3	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	510	810	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =-25V	-	50	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	40	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	6.4	9.6	Ω

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =-1.2A, V <sub>GS</sub> =0V	-	-	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time <sup>2</sup>	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V,	-	30	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	38	-	nC

### Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse width ≤300us, duty cycle ≤2%.
3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec; 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.

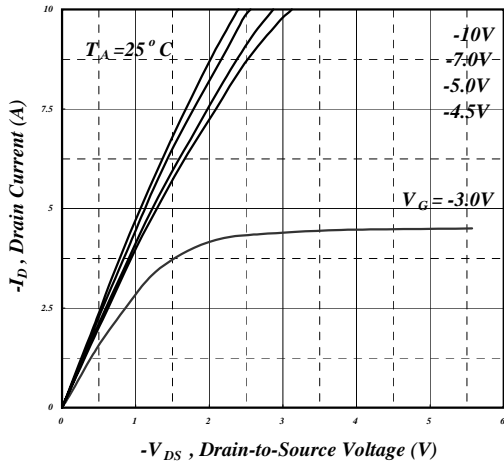


Fig 1. Typical Output Characteristics

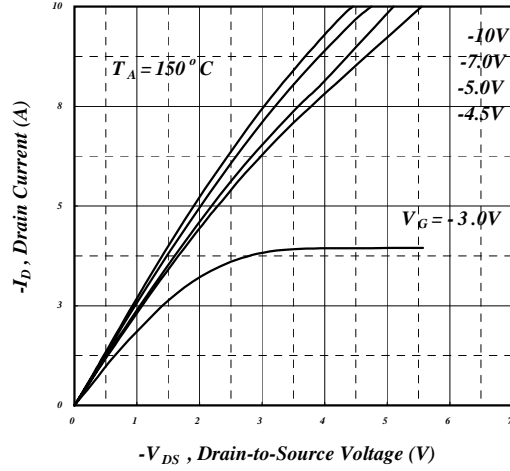


Fig 2. Typical Output Characteristics

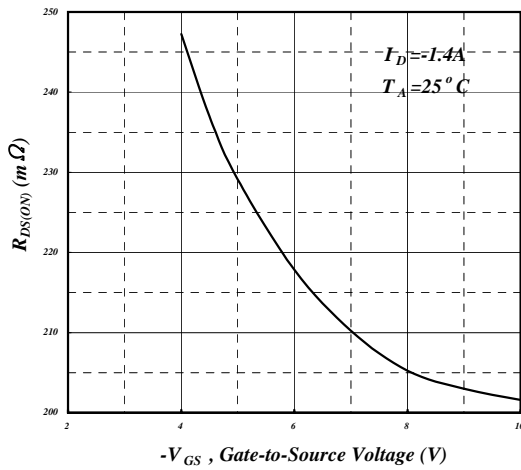


Fig 3. On-Resistance v.s. Gate Voltage

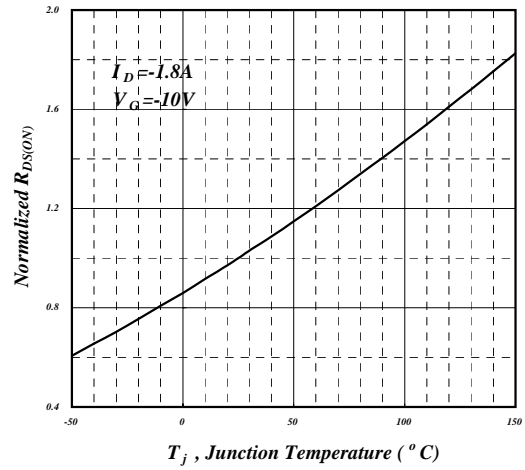


Fig 4. Normalized On-Resistance v.s. Junction Temperature

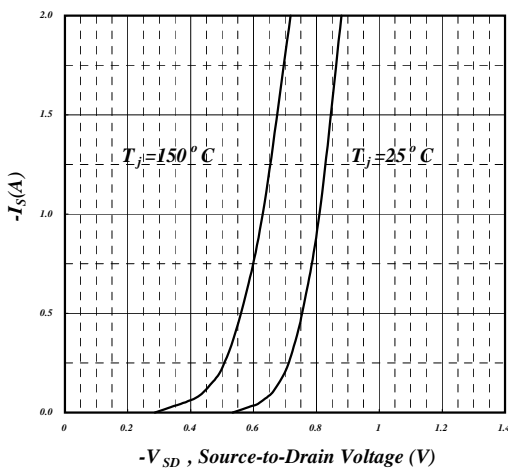


Fig 5. Forward Characteristic of

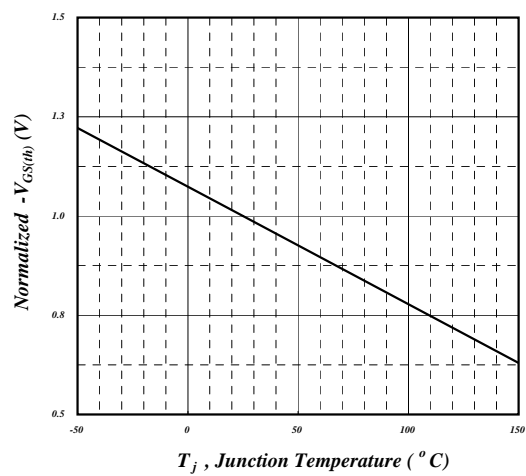
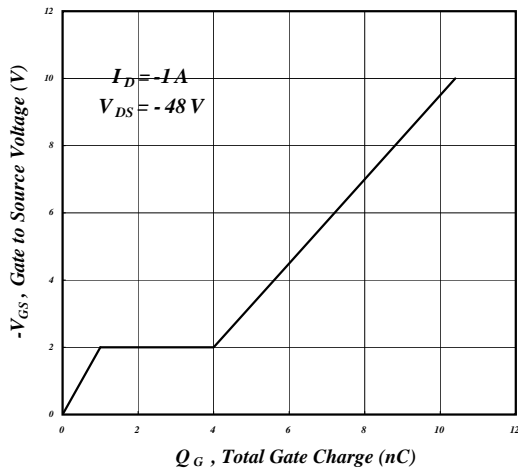
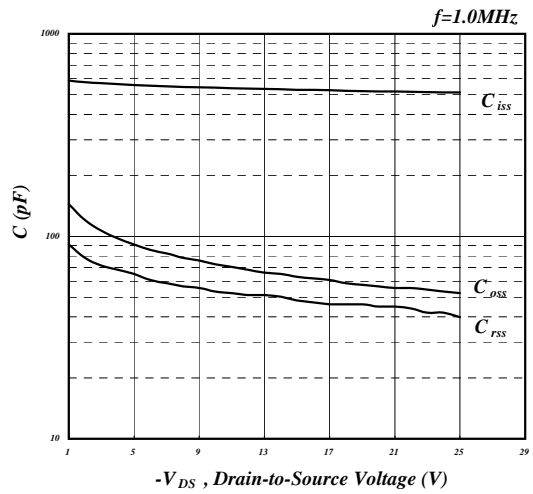


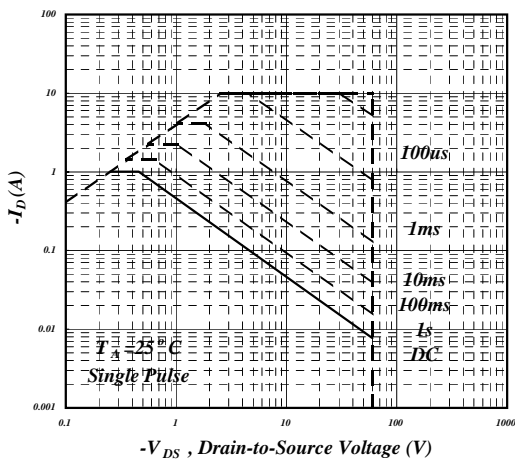
Fig 6. Gate Threshold Voltage v.s.



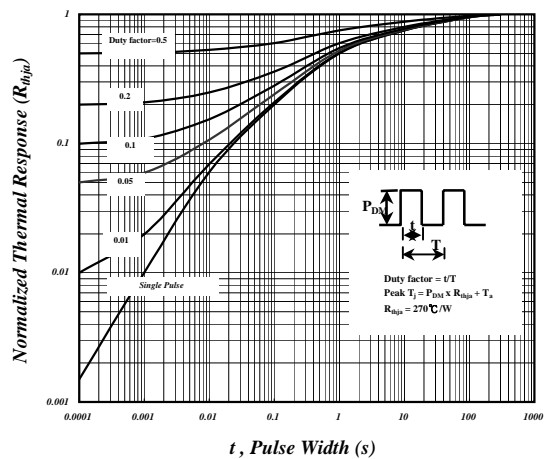
**Fig 7. Gate Charge Characteristics**



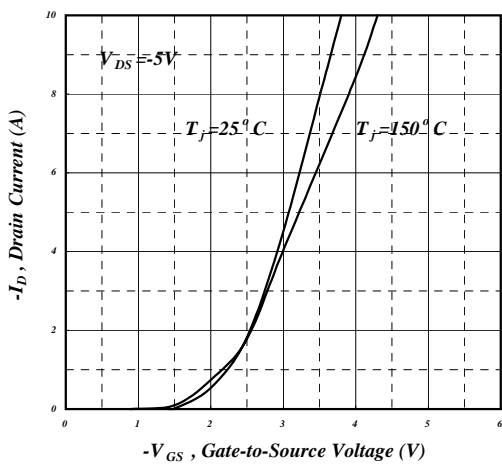
**Fig 8. Typical Capacitance Characteristics**



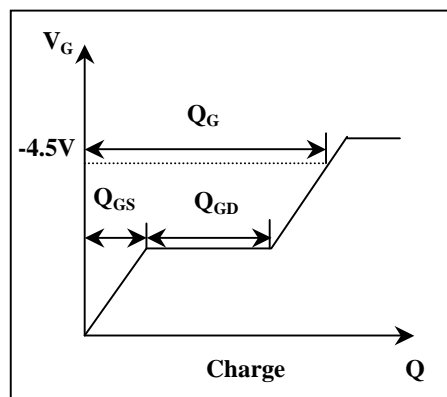
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



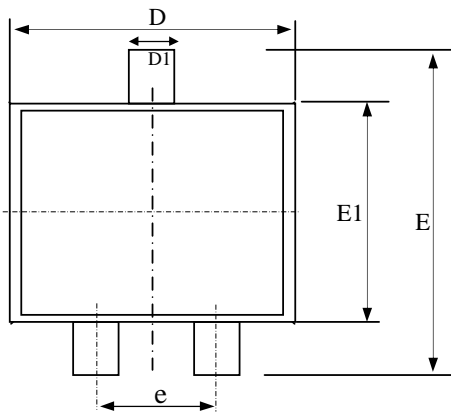
**Fig 11. Transfer Characteristics**



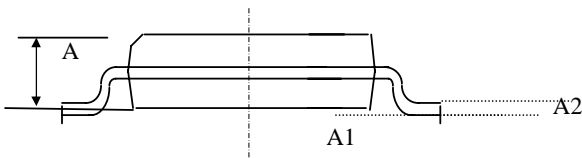
**Fig 12. Gate Charge Circuit**



**Package Outline : SOT-23**



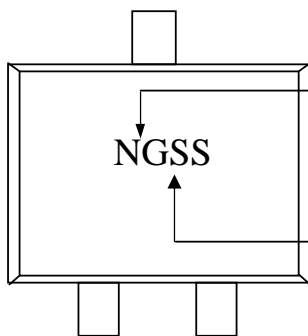
SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	1.00	1.15	1.30
A1	0.00	--	0.10
A2	0.10	0.15	0.25
D1	0.30	0.40	0.50
e	1.70	2.00	2.30
D	2.70	2.90	3.10
E	2.40	2.65	3.00
E1	1.40	1.50	1.60



- 1.All Dimension Are In Millimeters.
- 2.Dimension Does Not Include Mold Protrusions.

**Part Marking Information & Packing : SOT-23**

Laser Marking



Part Number : NG  
 If second letter has underline : HF & Rohs product  
 If second letter has not underline : Rohs product

Date Code :  
 SS:2004,2008,2012...  
SS:2003,2007,2011...  
SS:2002,2006,2010...  
SS:2001,2005,2009...  
 "A~Z" showed on 3rd position --> week 1 ~ week 26,  
 "A~Z" showed on 4th position --> week 27 ~ week 52.