



## Description

The AP10N012P use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable.



TO-220

## General Features

$V_{DS} = 100V$   $I_D = 70A$

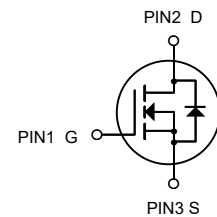
$R_{DS(ON)} < 10.5m\Omega @ V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
AP10N012P	TO-220	HXY MOSFET	50

## Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current $T_C=25^\circ C$	70	A
$I_{DM}$	Puled Drain Current	280	A
EAS	Single Pulse Avalanche Energy	110	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation	100	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	64	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Ambient	1.25	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.098	---	V/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	8.5	10.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	---	9.5	15	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	---	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4.57	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	0.48	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =50V, V <sub>GS</sub> =50V, I <sub>D</sub> =10A	---	31.3	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.49	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	7.63	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =4Ω, I <sub>D</sub> =10A	---	16	---	ns
T <sub>r</sub>	Rise Time		---	10	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	40	---	
T <sub>f</sub>	Fall Time		---	6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	---	1368	---	pF
C <sub>oss</sub>	Output Capacitance		---	451	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	12.9	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	70	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	280	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> =25°C	---	103	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	187	---	nC

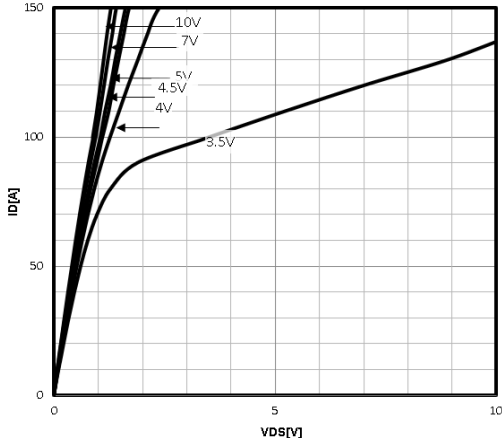
**Note :**

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=11A
- 4.The power dissipation is limited by 150°C junction temperature
- 5 .The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

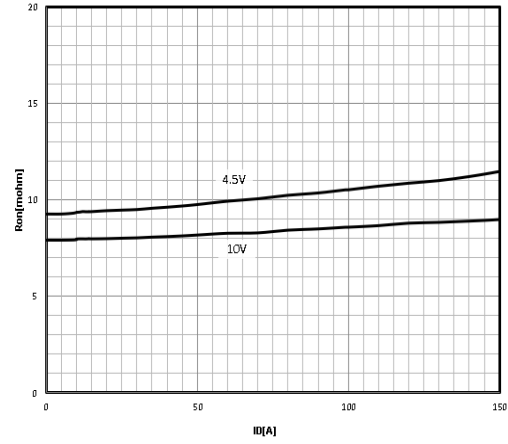


### Typical Characteristics

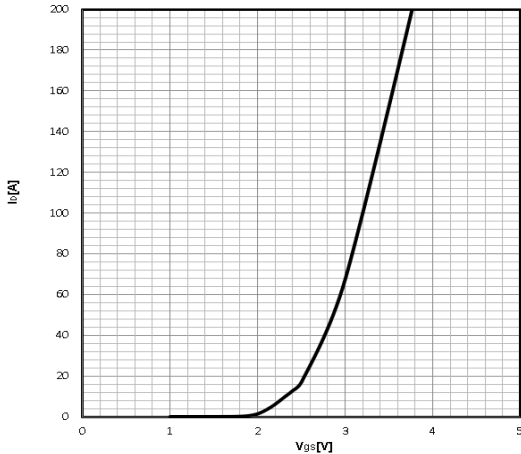
**Typ. output characteristics**  
 $I_D = f(V_{DS})$



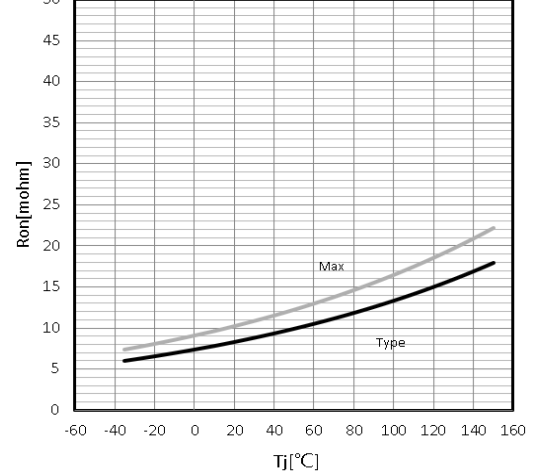
**Typ. drain-source on resistance**  
 $R_{DS(on)} = f(I_D)$



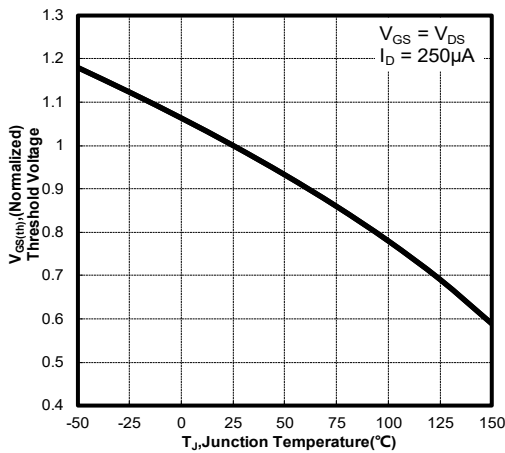
**Typ. transfer characteristics**  
 $I_D = f(V_{GS})$



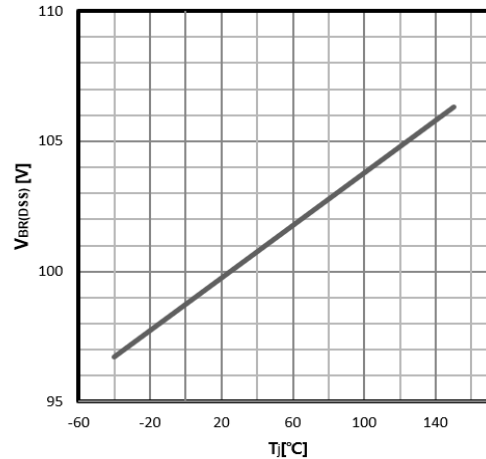
**Drain-source on-state resistance**  
 $R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$



**Gate Threshold Voltage**  
 $V_{TH} = f(T_j); I_D = 250\mu A$

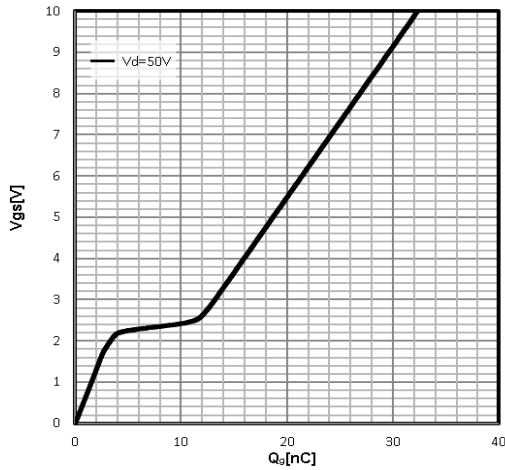


**Drain-source breakdown voltage**  
 $V_{BR(DSS)} = f(T_j); I_D = 250\mu A$

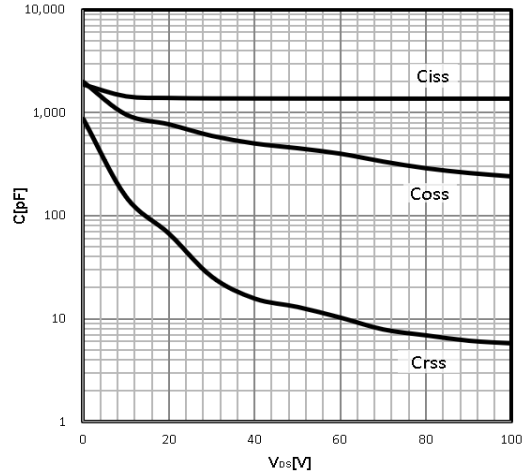




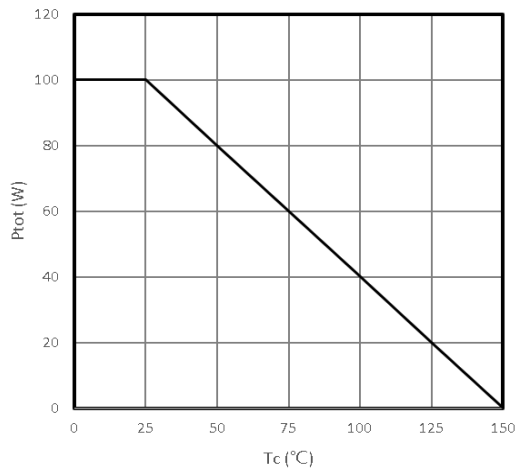
**Typ. gate charge**  
 $V_{GS}=f(Q_g); I_D=10A$



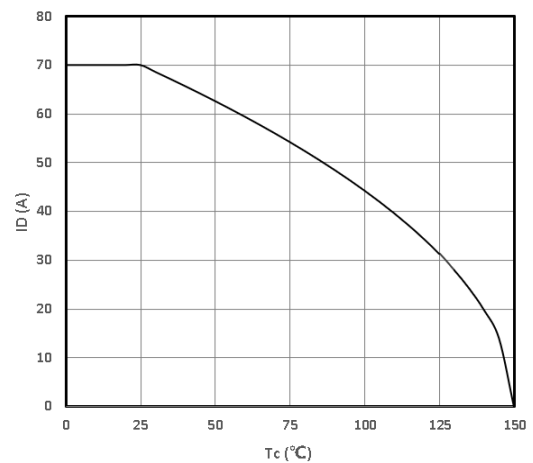
**Typ. capacitances**  
 $C=f(V_{DS}); V_{GS}=0V; f=1MHz$



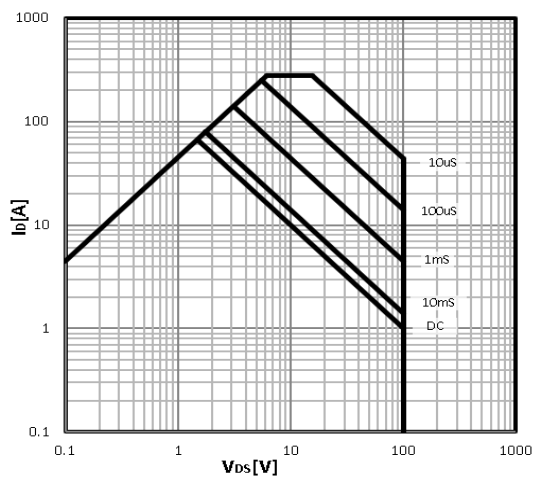
**Power Dissipation**  
 $P_{tot}=f(T_c)$



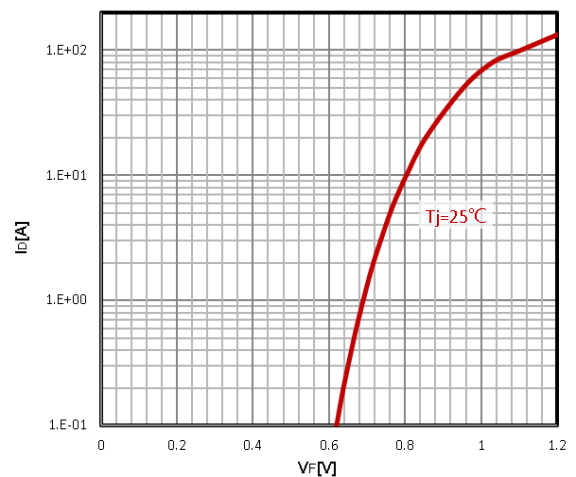
**Maximum Drain Current**  
 $I_D=f(T_c)$



**Safe operating area**  
 $I_D=f(V_{DS})$



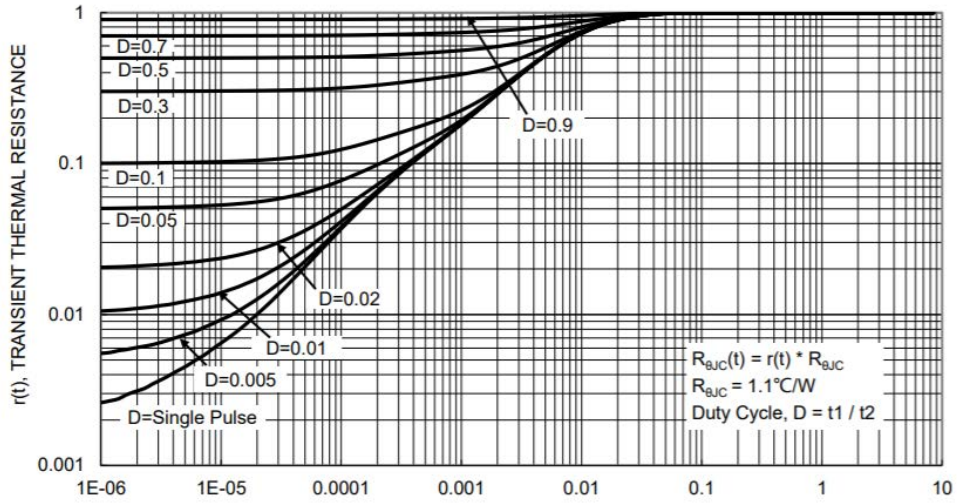
**Body Diode Forward Voltage Variation**  
 $I_F=f(V_{GS})$





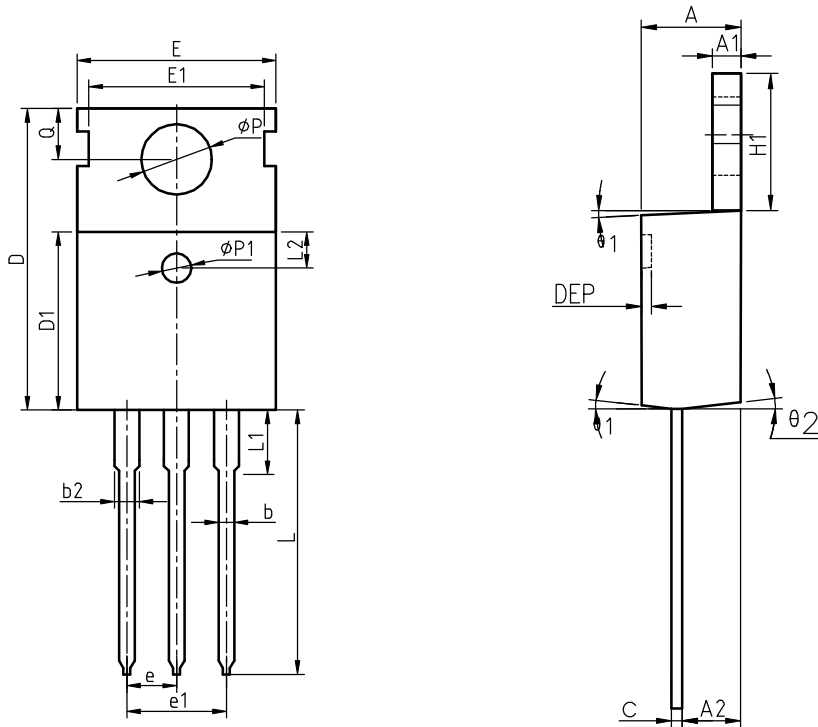
### Max. transient thermal impedance

$$Z_{thJC} = f(t_p)$$



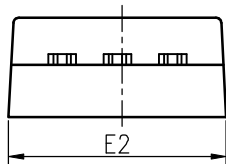


Package Information  
TO-220



COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.33	0.050	0.051	0.052
A2	2.35	2.40	2.50	0.093	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	-	8.70	-	-	0.343	-
E2	9.80	10.00	10.20	0.386	0.394	0.402
e		2.54	BSC		0.100	BSC
e1		5.08	BSC		0.200	BSC
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	-	3.10	3.30	-	0.122	0.130
L2		2.50	REF		0.098	REF
P	3.50	3.60	3.63	0.138	0.142	0.143
P1	3.50	3.60	3.63	0.138	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.113
theta 1	5°	7°	9°	5°	7°	9°
theta 2	1°	3°	5°	1°	3°	5°
theta 3	1°	3°	5°	1°	3°	5°





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