

650V N-Channel Enhancement Mode MOSFET

Description

The AP12N65F/P is silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

General Features

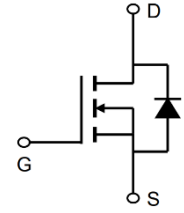
$V_{DS} = 650V$ $I_D = 12A$

$R_{DS(ON)} < 0.72\Omega$ @ $V_{GS}=10V$ (Type: 0.6Ω)

Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP12N65F	TO-220F-3L	AP12N65F XXX YYYY	1000
AP12N65P	TO-220-3L	AP12N65P XXX YYY	1000

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

Symbol	Parameter	Value	Unit
		TO-220F TO-220	
V_{DS}	Drain-Source Voltage ($V_{GS} = 0V$)	650	V
I_D	Continuous Drain Current	12	A
I_{DM}	Pulsed Drain Current (note1)	44	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note2)	304	mJ
I_{AR}	Avalanche Current (note1)	7.7	A
E_{AR}	Repetitive Avalanche Energy (note1)	65	mJ
P_D	Power Dissipation ($T_C = 25^{\circ}C$)	32.1	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	$-55 \sim +150$	$^{\circ}C$
R_{thJC}	Thermal Resistance, Junction-to-Case	1.92	$^{\circ}C/W$
R_{thJA}	Thermal Resistance, Junction-to-Ambient	62.5	$^{\circ}C/W$

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Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	650	685	--	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} = 650V, V _{GS} = 0V, T _J = 25°C	--	--	1	μA
IGSS	Gate-Source Leakage	V _{GS} = ±30V	--	--	±100	nA
VGS(th)	Gate-Source Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	3.5	4.0	V
RDS(on)	Drain-Source On-Resistance (Note3)	V _{GS} = 10V, I _D = 5.5A	--	0.6	0.72	Ω
Ciss	Input Capacitance	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	1528	--	pF
Coss	Output Capacitance		--	147	--	
Crss	Reverse Transfer Capacitance		--	16	--	
Qg	Total Gate Charge	V _{DD} = 520V, I _D = 11A, V _{GS} = 10V	--	46	--	nC
Qgs	Gate-Source Charge		--	7	--	
Qgd	Gate-Drain Charge		--	23	--	
td(on)	Turn-on Delay Time	V _{DD} = 325V, I _D = 11A, R _G = 25Ω	--	43	--	ns
t _r	Turn-on Rise Time		--	29	--	
td(off)	Turn-off Delay Time		--	196	--	
t _f	Turn-off Fall Time		--	51	--	
IS	Continuous Body Diode Current	T _C = 25 °C	--	--	11	A
ISM	Pulsed Diode Forward Current		--	--	44	A
VSD	Body Diode Voltage	T _J = 25°C, I _{SD} = 5.5A, V _{GS} = 0V	--	--	1.4	V
trr	Reverse Recovery Time	V _{GS} = 0V, I _S = 11A, di _F /dt = 100A/μs	--	482	--	ns
Qrr	Reverse Recovery Charge		--	2.85	--	μC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The EAS data shows Max. rating . IAS = 11A, VDD = 50V, RG = 25 Ω, Starting TJ = 25 °C
- 3、The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

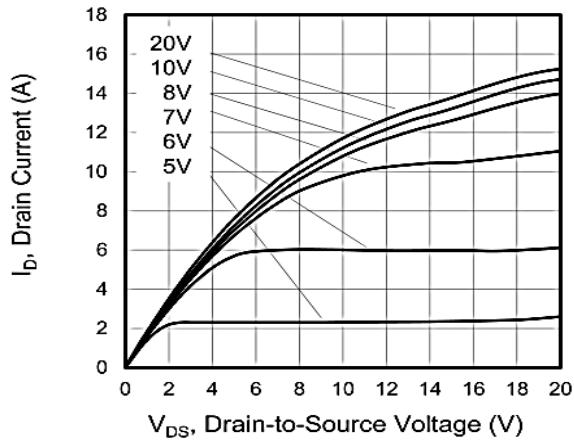


Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

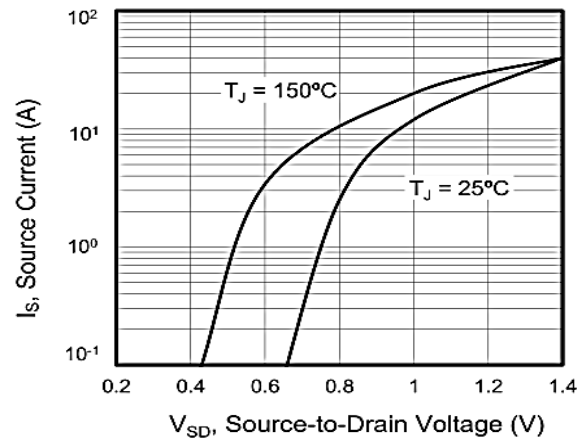


Figure 2. Body Diode Forward Voltage

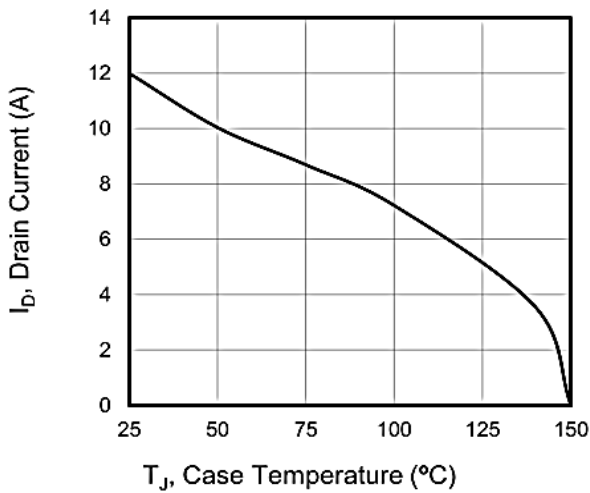


Figure 3. Drain Current vs. Temperature

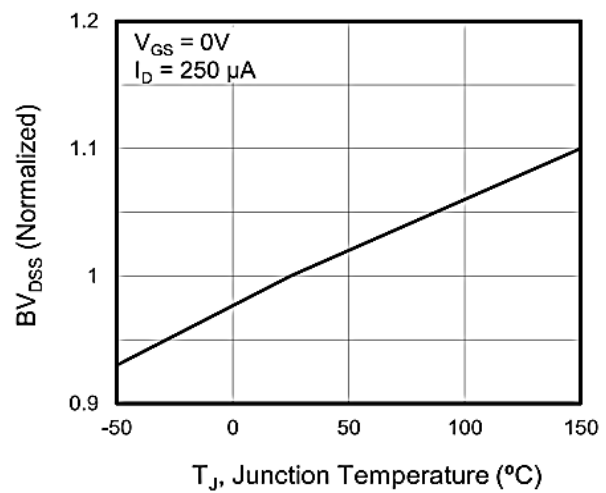


Figure 4. BV_{DSS} Variation vs. Temperature

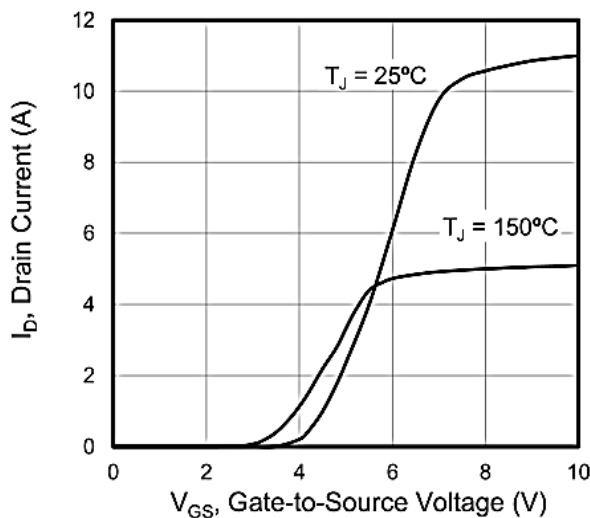


Figure 5. Transfer Characteristics

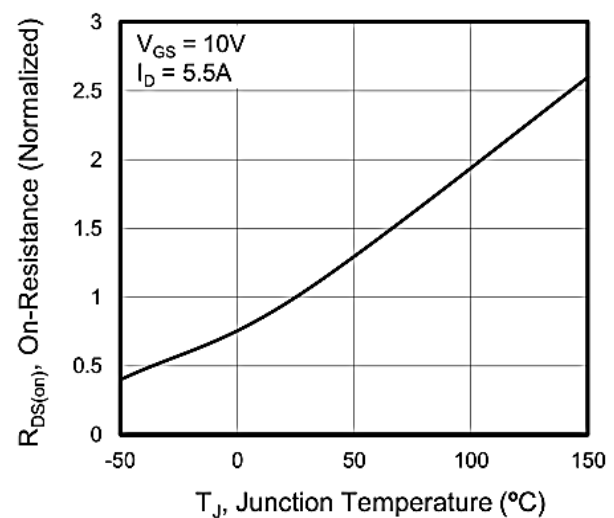


Figure 6. On-Resistance vs. Temperature

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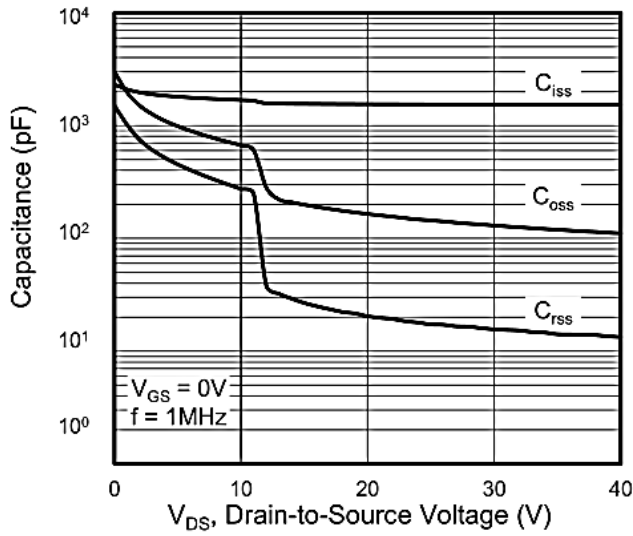
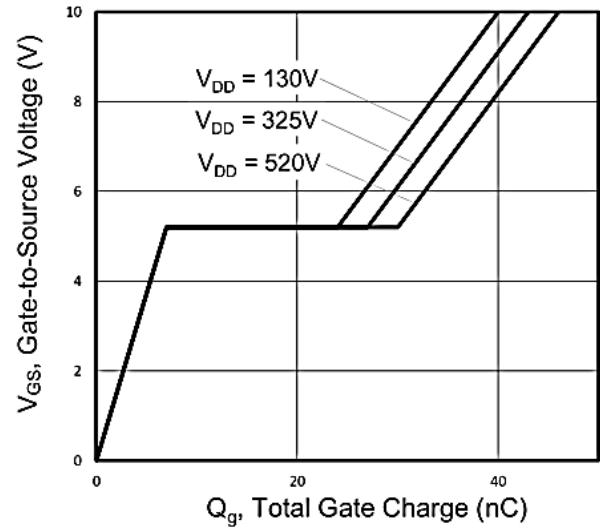


Figure 7. Capacitance Figure



8. Gate Charge

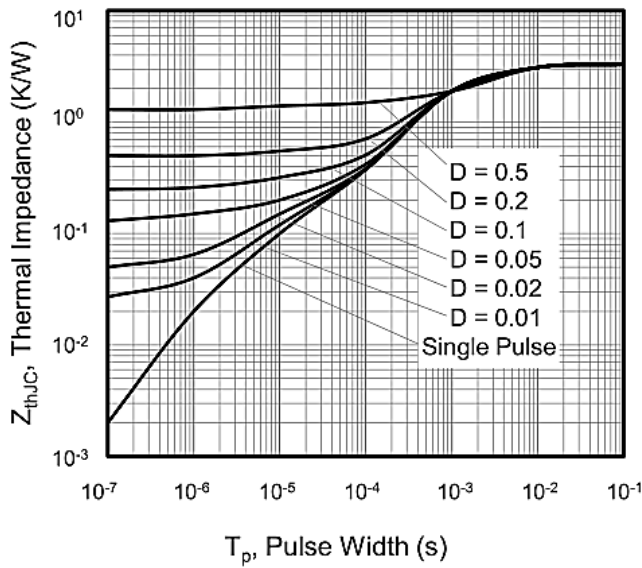


Figure 9. Transient Thermal Impedance

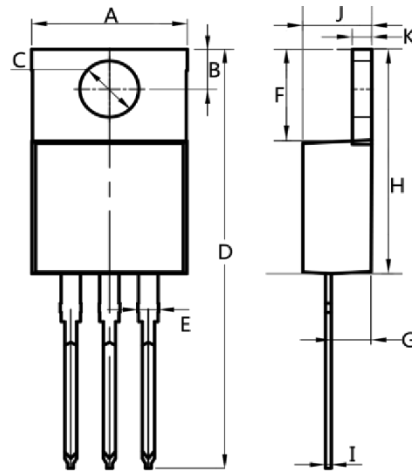
**APM**

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AP12N65F/P

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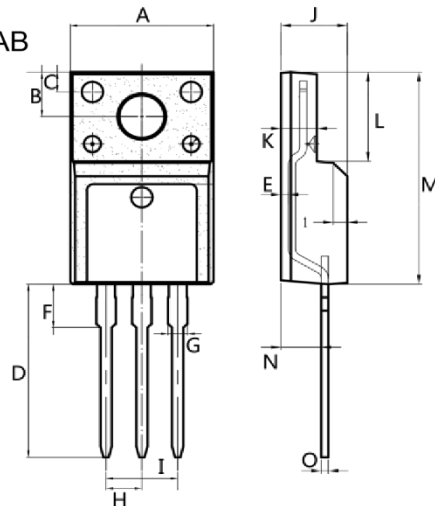
TO-220AB



Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4

All Dimensions in millimeter

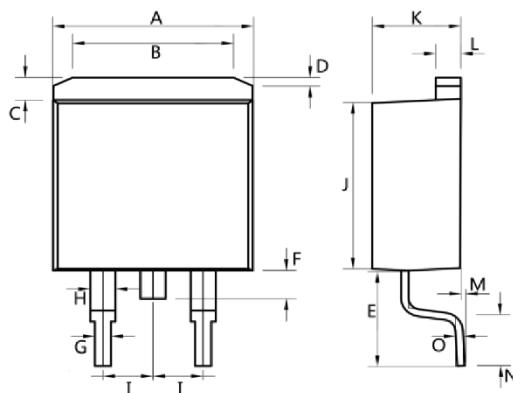
ITO-220AB



Dim.	Min.	Max.
A	9.9	10.3
B	2.9	3.5
C	1.15	1.45
D	12.75	13.25
E	0.55	0.75
F	3.1	3.5
G	1.25	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.55	4.75
K	2.4	2.7
L	6.35	6.75
M	15.0	16.0
N	2.75	3.15
O	0.45	0.60

All Dimensions in millimeter

TO-263



Dim.	Min.	Max.
A	10.0	10.5
B	7.25	7.75
C	1.3	1.5
D	0.55	0.75
E	5.0	6.0
F	1.4	1.6
G	0.75	0.95
H	1.15	1.35
I	Typ 2.54	
J	8.4	8.6
K	4.4	4.6
L	1.25	1.45
M	0.02	0.1
N	2.4	2.8
O	0.35	0.45

All Dimensions in millimeter

650V N-Channel Enhancement Mode MOSFET**Attention**

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Edition	Date	Change
Rve1.0	2018/1/31	Initial release
Rve1.1	2021/1/05	Reduce RDS(on)

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