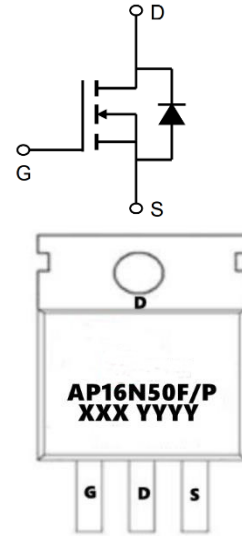


## 500V N-Channel Enhancement Mode MOSFET

### Description

The AP16N50F/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

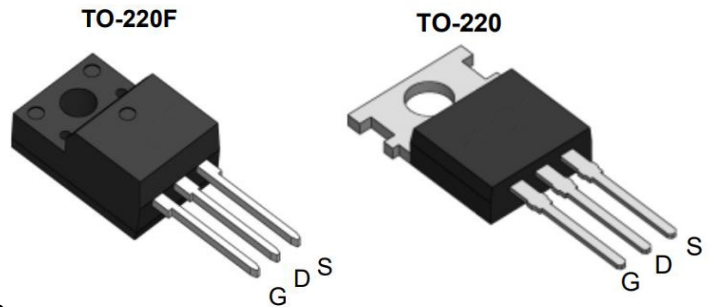
$V_{DS} = 500V$   $I_D = 16A$

$R_{DS(ON)} < 400m\Omega$  @  $V_{GS}=10V$  (Type: **320mΩ**)

### Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP16N50F	TO-220F-3L	AP16N50F XXX YYYY	1000
AP16N50P	TO-220-3L	AP16N50P XXX YYYY	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 ( $V_{GS} = 0V$ )	500		V
$I_D$	Continuous Drain Current	16		A
$I_{DM}$	Pulsed Drain Current (note1)	58		A
$V_{GS}$	Gate-Source Voltage	$\pm 30$		V
$E_{AS}$	Single Pulse Avalanche Energy (note2)	452		mJ
$I_{AR}$	Avalanche Current (note1)	14		A
$E_{AR}$	Repetitive Avalanche Energy note1)	60		mJ
$P_D$	Power Dissipation ( $T_C = 25^{\circ}C$ )	32		W
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	-55~+150		$^{\circ}C$
$R_{thJC}$	Thermal Resistance, Junction-to-Case	4.12		$^{\circ}C/W$
$R_{thJA}$	Thermal Resistance, Junction-to-Ambient	62.5		$^{\circ}C/W$



**500V N-Channel Enhancement Mode MOSFET**
**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	VGS = 0 V, ID = 250 μA	500	550		V
ΔBVDSS/ ΔTJ	Breakdown Voltage Temperature Coefficient	ID = 250 μA, Referenced to 25°C		0.52		V/°C
IDSS	Zero Gate Voltage Drain Current	VDS=500 V, VGS=0V			1	μA
		VDS=400 V, TC=125°C			10	μA
IGSSF	Gate-Body Leakage Current, Forward	VGS= 30V, VDS=0 V			100	nA
IGSSR	Gate-Body Leakage Current, Reverse	VGS=-30 V, VDS=0V			-100	nA
VGS(TH)	Gate Threshold voltage	VDS=VGS, ID=250 uA	2.0	3.0	4.0	V
RDS(On)	Drain-Source on-state resistance	VGS=10V, ID = 6.5A, T <sub>J</sub> = 25°C		320	400	mΩ
gFS	Forward Transconductance	VDS = 40 V, ID=6.5A (Note 4)		12.8		S
Ciss	Input capacitance	VDS=25V, VGS=0V, f=1.0MHz		1651		pF
Coss	Output capacitance			188		pF
Crss	Reverse transfer capacitance			7		pF
td(on)	Turn On Delay Time	VDD= 250 V, ID =16 A, RG = 25 Ω (Note 4, 5)		31		ns
tr	Rising Time			43		ns
td(off)	Turn Off Delay Time			106		ns
tf	Fall Time			46		ns
Qg	Total Gate Charge		VDS = 400 V, ID = 13 A, VGS = 10 V (Note 4, 5)		23.5	
Qgs	Gate-Source Charge			6.9		nC
Qgd	Gate-Drain Charge			7.4		nC
ISM	Maximum Pulsed Drain-Source Diode Forward Current				52	A
VSD	Diode Forward Voltage	VGS= 0 V, IS = 13 A			1.2	V
trr	Reverse Recovery Time	VGS = 0 V, IS = 13 A, dIF / dt = 100 A/μs Note 4)		340		ns
Qrr	Reverse Recovery Charge			2.8		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 . L=4.1Mh IAS=14A, VDD=50V, RG=25Ω, Starting T<sub>J</sub> = 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

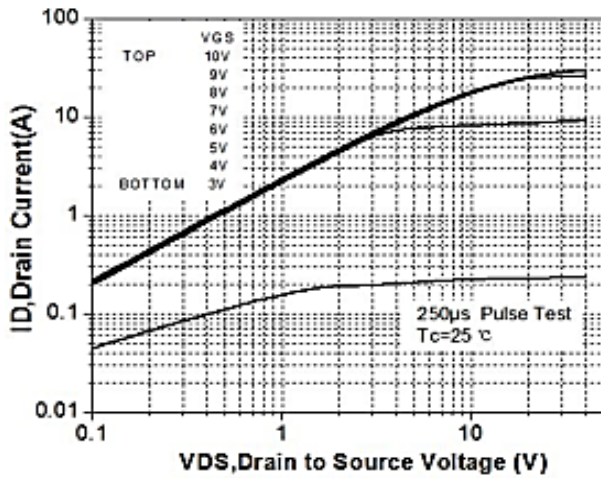


Figure 1. On-Region Characteristics

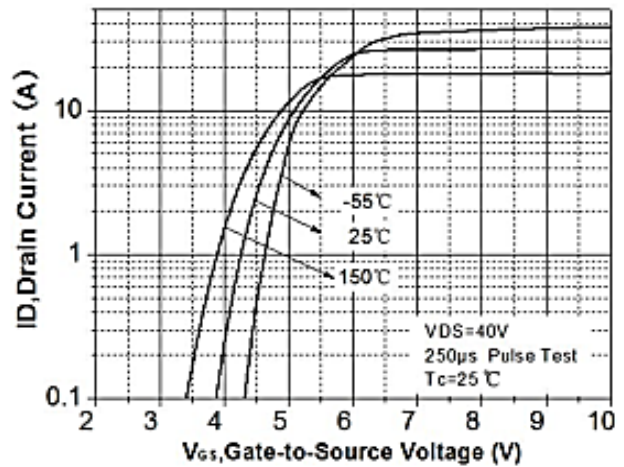


Figure 2. Transfer Characteristics

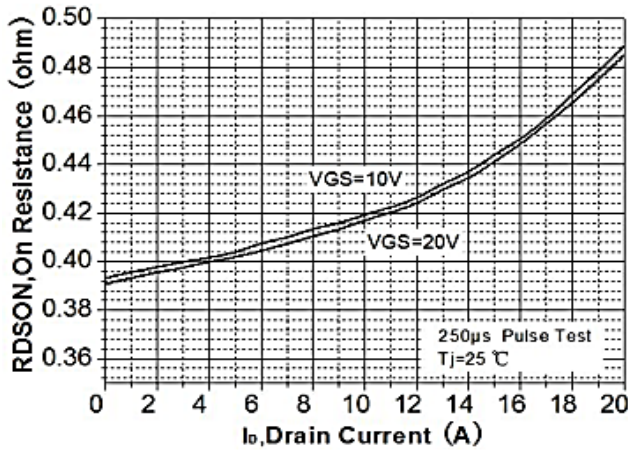


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

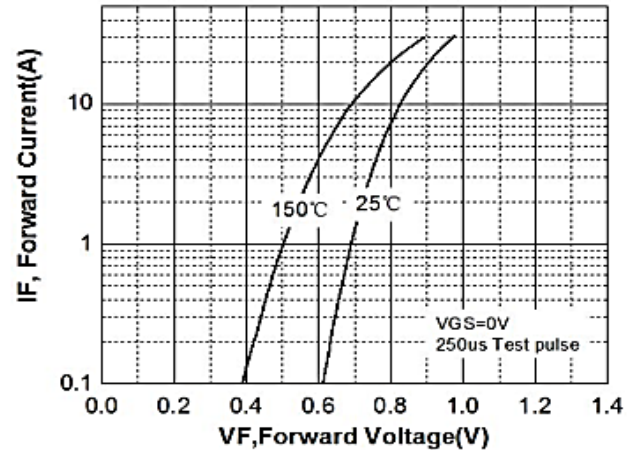


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

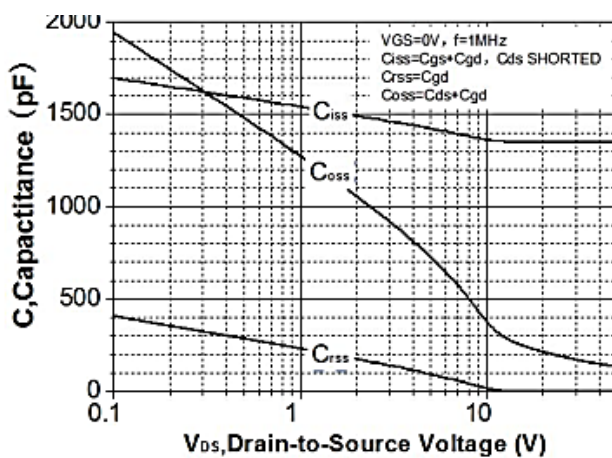


Figure 5. Capacitance Characteristics

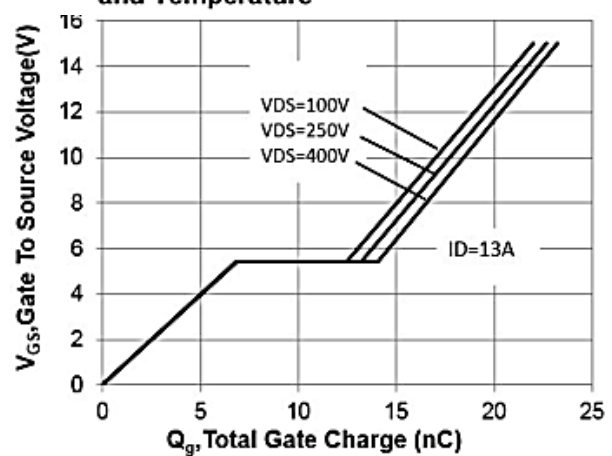
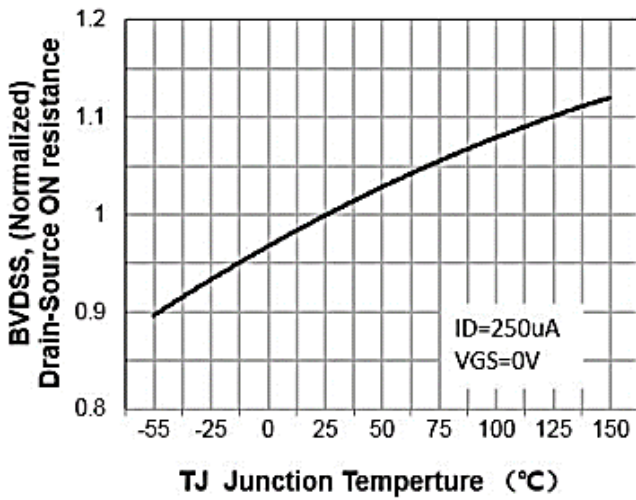
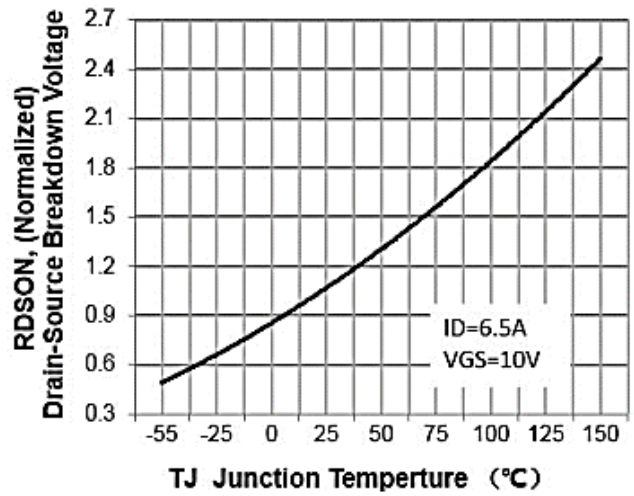


Figure 6. Gate Charge Characteristics

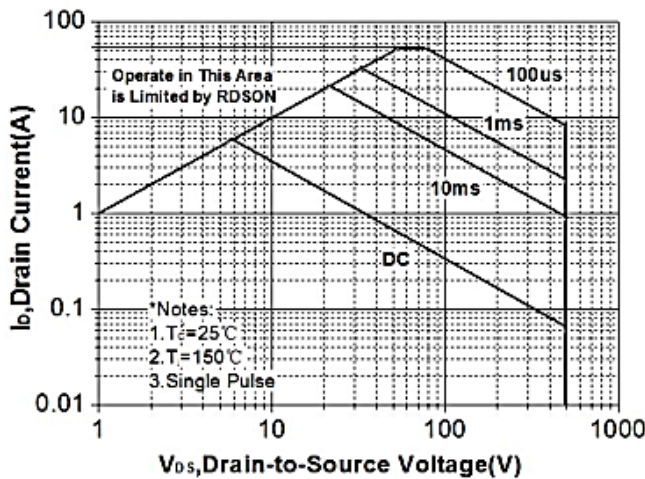
**500V N-Channel Enhancement Mode MOSFET**



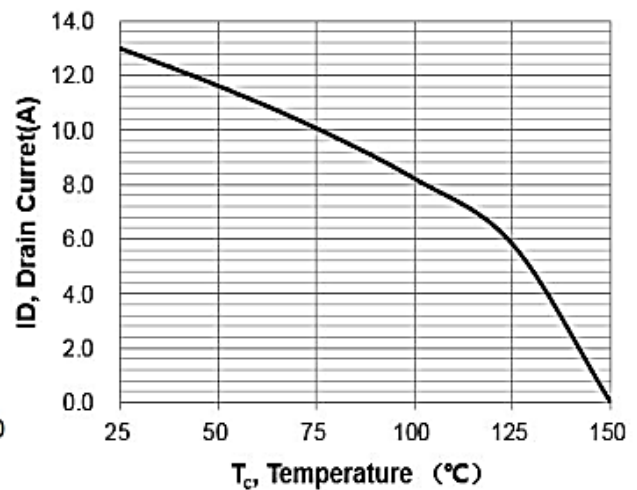
**Figure 7. Breakdown Voltage Variation vs Temperature**



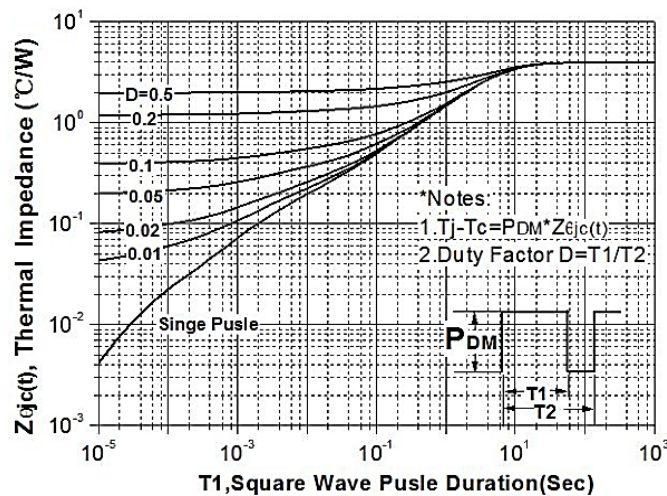
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9. Maximum Safe Operating Area**



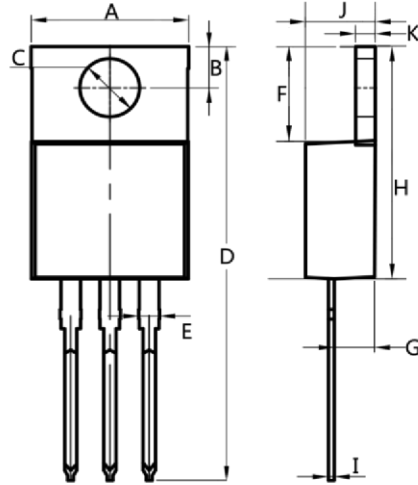
**Figure 10. Maximum Drain Current vs Case Temperature**



**Figure 11. Transient Thermal Response Curve**

**500V N-Channel Enhancement Mode MOSFET**

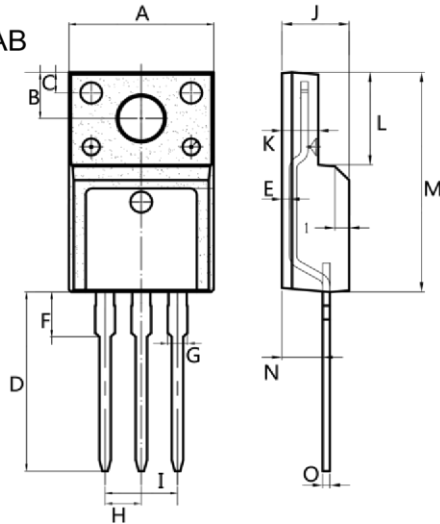
TO-220AB



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

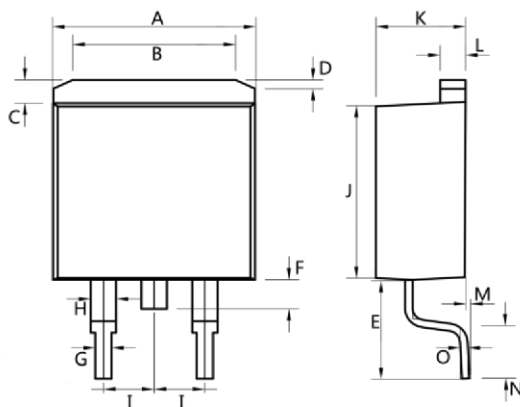
ITO-220AB



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