

500V N-Channel Enhancement Mode MOSFET

Description

The AP20N50F/P/T 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

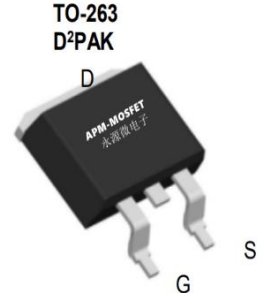
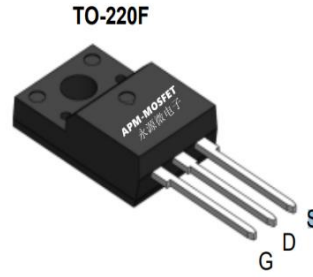
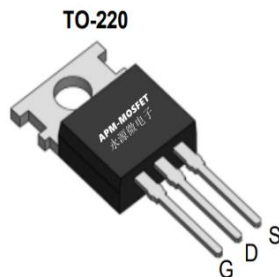
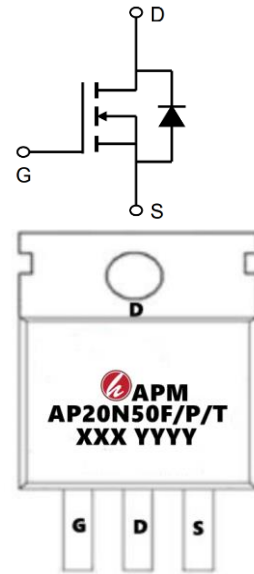
$V_{DS} = 500V$ $I_D = 20A$

$R_{DS(ON)} < 300m\Omega$ @ $V_{GS}=10V$ (Type: 260m Ω)

Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP20N50F	TO-220F-3L	AP20N50F XXX YYYY	1000
AP20N50P	TO-220-3L	AP20N50P XXX YYYY	1000
AP20N50T	TO-263-3L	AP20N50T XXX YYYY	800

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS} = 0V$)	500	V
I_D	Continuous Drain Current	20	A
I_{DM}	Pulsed Drain Current (note1)	65	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note2)	405	mJ
I_{AR}	Avalanche Current (note1)	16	A
E_{AR}	Repetitive Avalanche Energy (note1)	5	mJ
P_D	Power Dissipation ($T_c = 25^{\circ}C$)	29.8	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	$-55 \sim +150$	$^{\circ}C$
R_{thJC}	Thermal Resistance, Junction-to-Case	3.92	$^{\circ}C/W$
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	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	500			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA, Referenced to 25°C		0.51		V/°C
IDSS	Zero Gate Voltage Drain Current	V _{DS} = 500 V, V _{GS} = 0 V			1	μA
		V _{DS} = 400 V, T _C = 125°C			10	μA
IGSSF	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V			100	nA
IGSSR	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			-100	nA
VGS(TH)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250 uA	2.0	3.0	5.0	V
RDS(On)	Drain-Source On-state Resistance	V _{GS} =10 V, I _D =8 A, T _J = 25°C		260	300	mΩ
gFS	Forward Transconductance	V _{DS} = 40 V, I _D = 8 A (Note 4)		16		S
Ciss	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0 MHz		1670		pF
Coss	Output Capacitance			247		pF
Crss	Reverse Transfer Capacitance			6.8		pF
td(on)	Turn On Delay Time	V _{DD} =250V, I _D =16A, R _G = 25 Ω		27		ns
t _r	Rising Time			45		ns
td(off)	Turn Off Delay Time			61		ns
t _f	Fall Time			38		ns
Q _g	Total Gate Charge	V _{DS} = 250 V, I _D = 16A, V _{GS} = 10 V		31		nC
Q _{gs}	Gate-Source Charge			13		nC
Q _{gd}	Gate-Drain Charge			9		nC
ISM	Maximum Pulsed Drain-Source Diode Forward Current				64	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 16 A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 16 A, dI _F / dt = 100 A/μs Note 4)		342		ns
Q _{rr}	Reverse Recovery Charge			4.0		μC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2、The EAS data shows Max. rating . L=4.1Mh IAS=16A, VDD=50V, RG=25Ω, Starting T_J = 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.

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Typical Characteristics

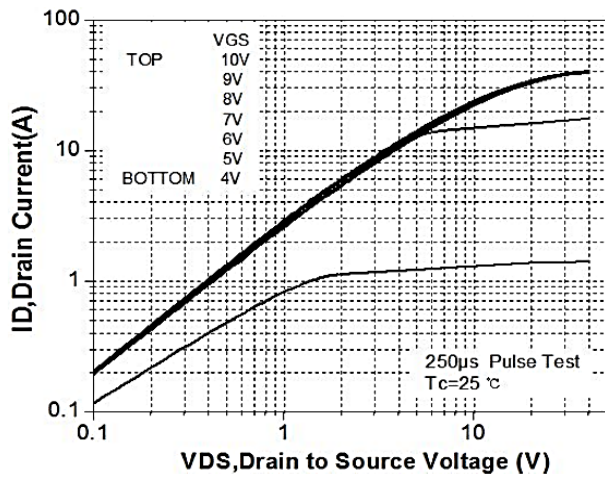


Figure 1. On-Region Characteristics

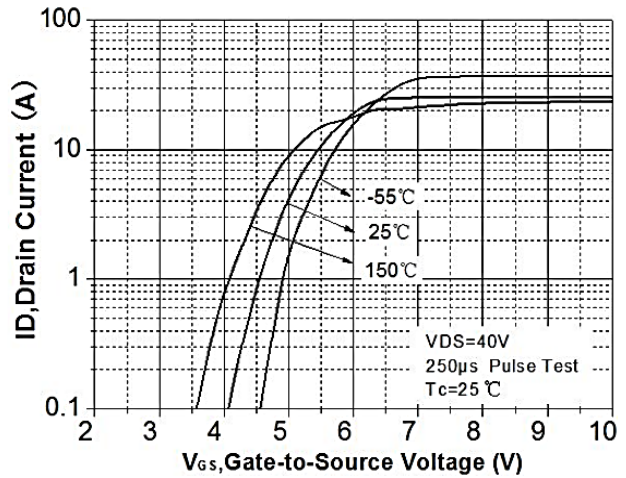


Figure 2. Transfer Characteristics

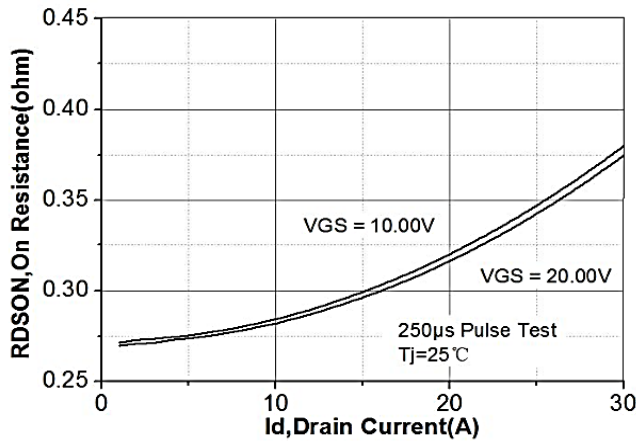


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

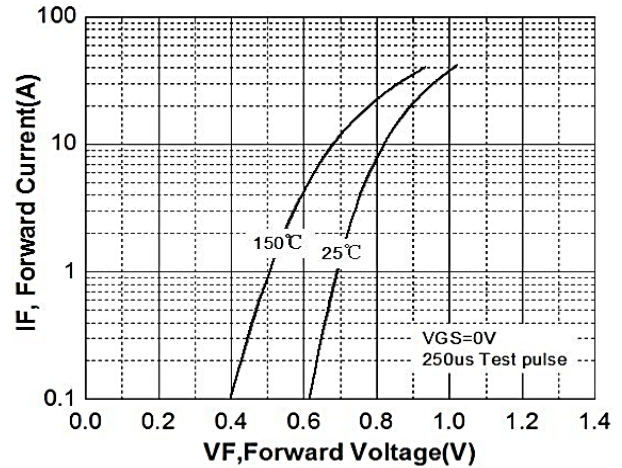


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

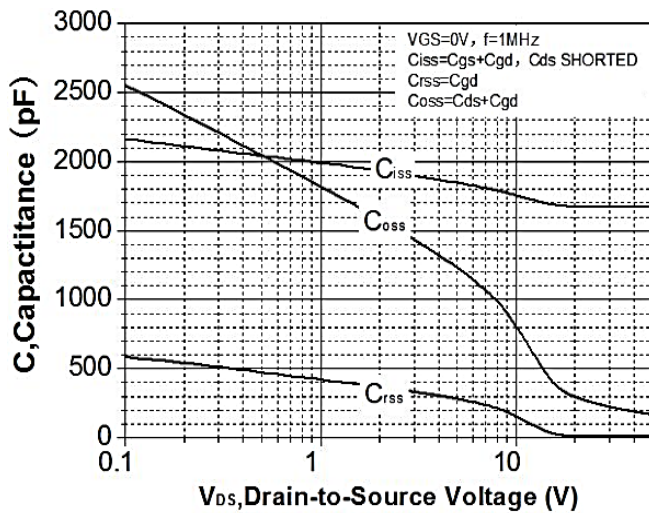


Figure 5. Capacitance Characteristics

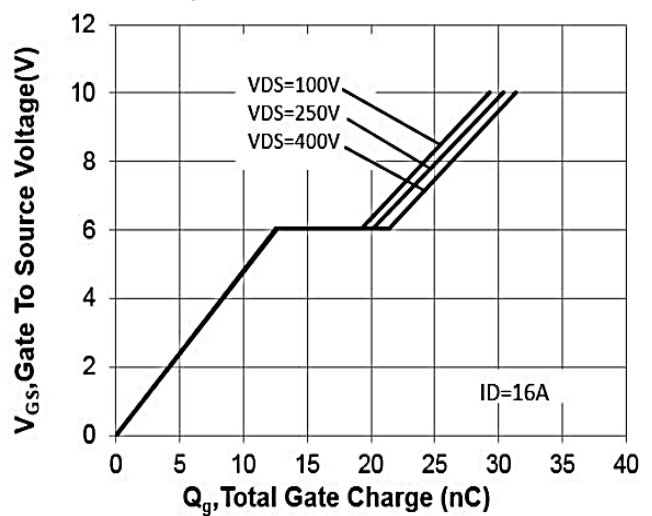
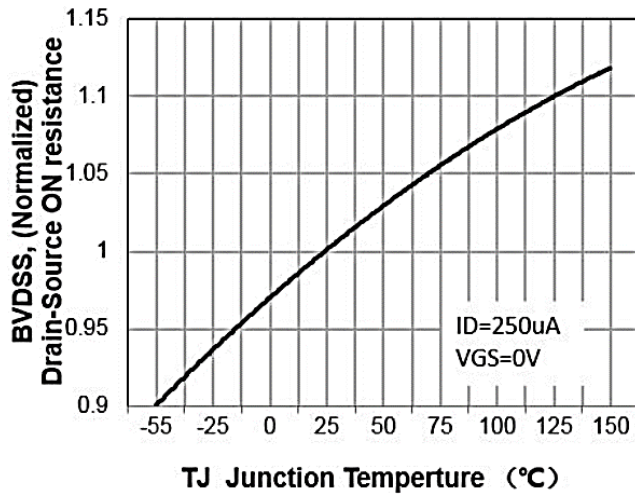
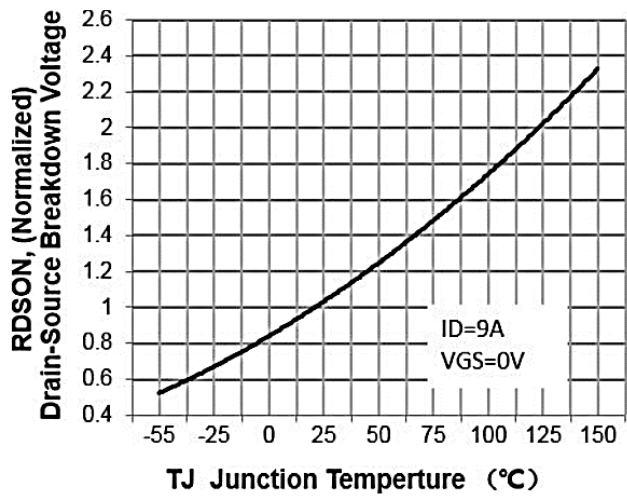
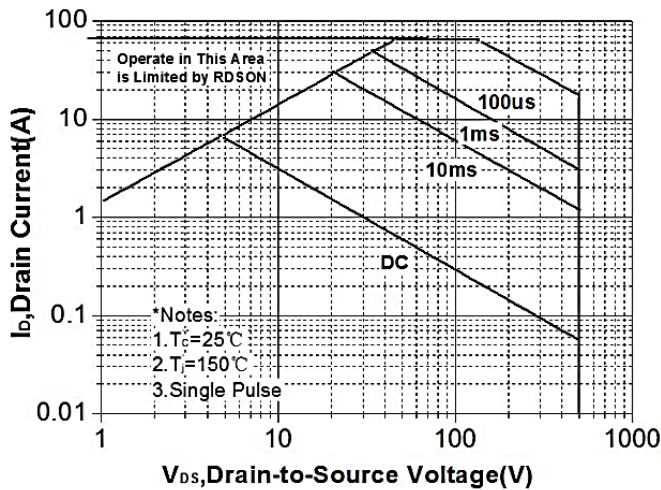
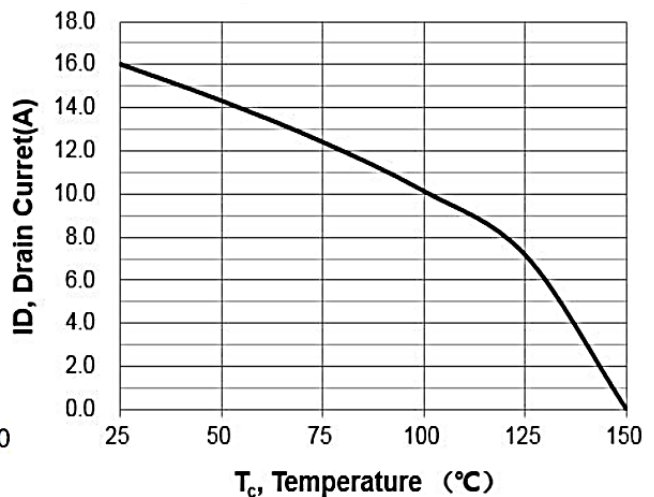
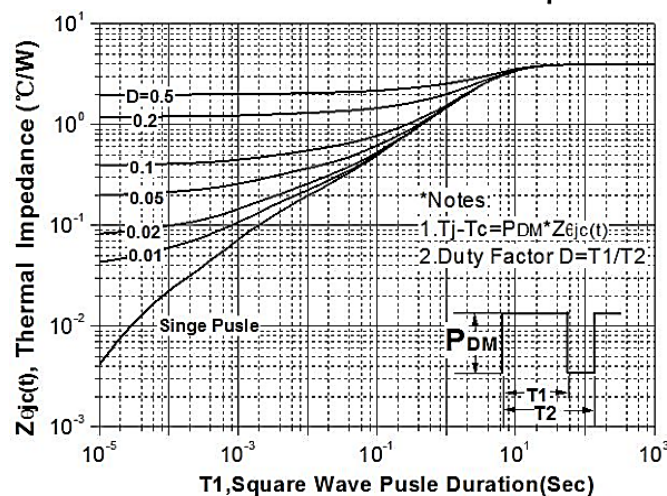


Figure 6. Gate Charge Characteristics

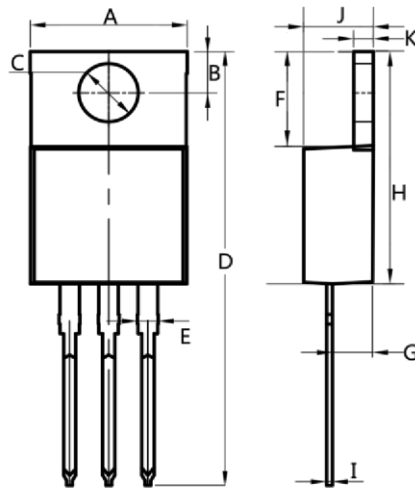
**500V N-Channel Enhancement Mode MOSFET****Figure 7. Breakdown Voltage Variation vs Temperature****Figure 8. On-Resistance Variation vs Temperature****Figure 9. Maximum Safe Operating Area****Figure 10. Maximum Drain Current vs Case Temperature****Figure 11. Transient Thermal Response Curve**

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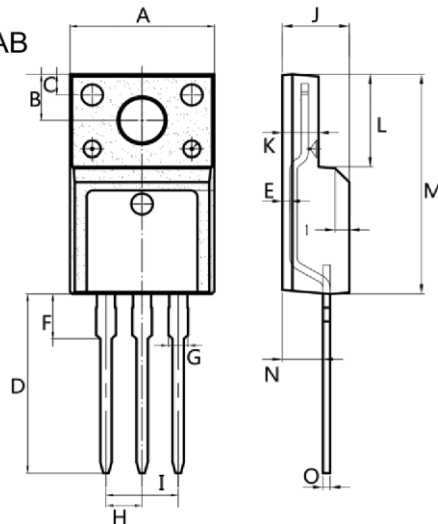
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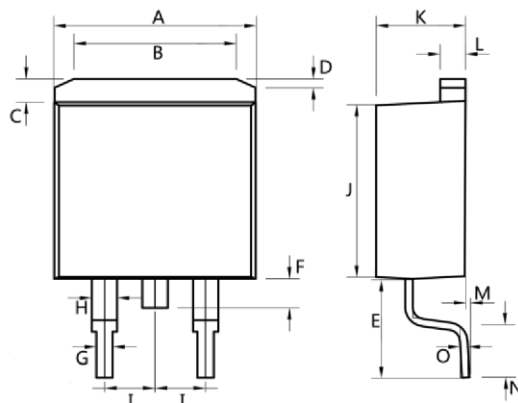
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TO-220AB

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		

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

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Edition	Date	Change
Rve1.0	2020/1/31	Initial release

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