

500V N-Channel Enhancement Mode MOSFET

Description

The AP10N50F/P/T-B 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

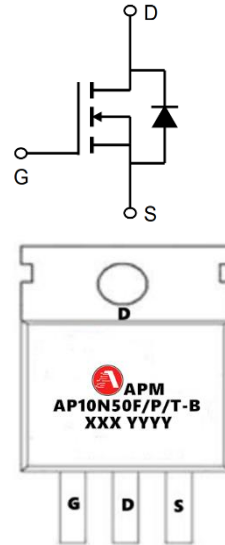
$V_{DS} = 500V$ $I_D = 10A$

$R_{DS(ON)} < 750m\Omega$ @ $V_{GS}=10V$ (Type: 680m Ω)

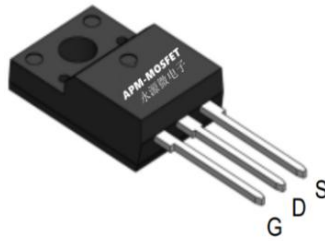
Application

Uninterruptible Power Supply(UPS)

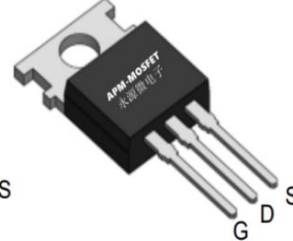
Power Factor Correction (PFC)



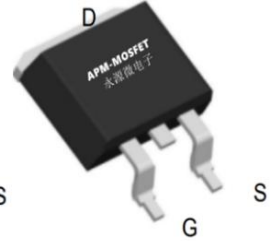
TO220F-3L



TO220-3L



TO263-3L



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP10N50F-B	TO220F-3L	AP10N50F-B XXXX YYYY	1000
AP10N50P-B	TO220-3L	AP10N50P-B XXXX YYYY	1000
AP10N50T-B	TO263-3L	AP10N50T-B XXXX YYYY	800

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS} = 0V$)	500	V
$I_D@T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	10	A
$I_D@T_c=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	6.5	A
I_{DM}	Pulsed Drain Current (note1)	36	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note2)	347	mJ
I_{AR}	Avalanche Current (note1)	9	A
E_{AR}	Repetitive Avalanche Energy note1)	22	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	178	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55~+150	$^\circ C$
R_{thJC}	Thermal Resistance, Junction-to-Case	0.7	$^\circ C/W$
R_{thJA}	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ C/W$

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Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	550	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=500V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.5	4.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance	$V_{GS}=10V, I_D=4.5A$	-	680	750	m Ω
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$	-	1100	-	pF
C_{oss}	Output Capacitance		-	106	-	pF
C_{rss}	Reverse Transfer Capacitance		-	32	-	pF
Q_g	Total Gate Charge	$V_{DD}=400V, I_D=9A, V_{GS}=10V$	-	19.5	-	nC
Q_{gs}	Gate-Source Charge		-	4.6	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	7.1	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=250V, I_D=9A, R_G=25\Omega$	-	24	-	ns
t_r	Turn-on Rise Time		-	44	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	55	-	ns
t_f	Turn-off Fall Time		-	35	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	9	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	36	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_{SD}=9A$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=9A, di/dt=100A/\mu s$	-	332	-	ns
Q_{rr}	Reverse Recovery Charge		-	3.5	-	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 . $I_{AS}=6A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
- 3、The test condition is Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

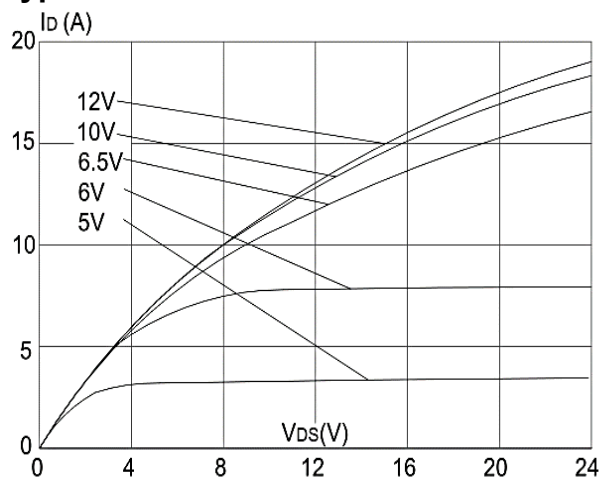


Figure1: Output Characteristics

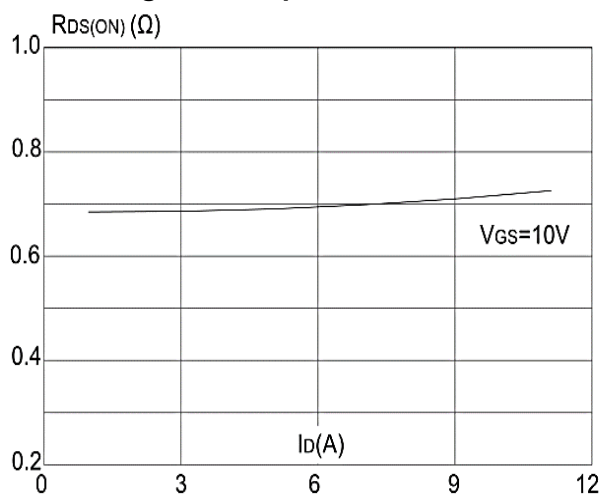


Figure 3: On-resistance vs. Drain Current

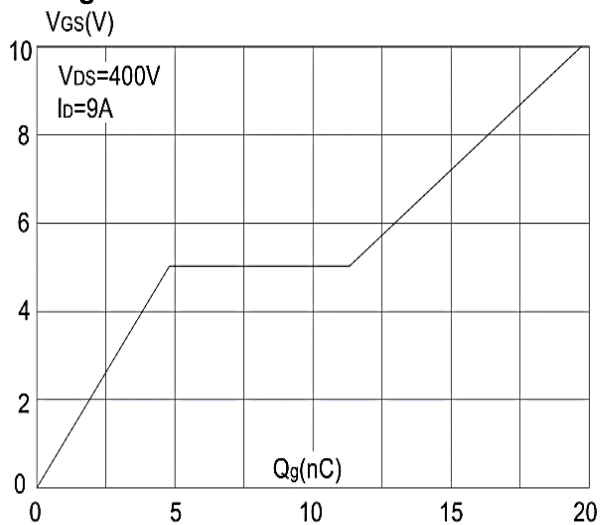


Figure 5: Gate Charge Characteristics

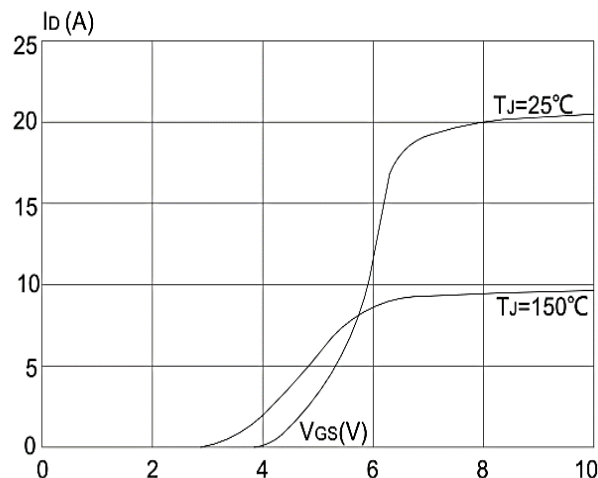


Figure 2: Typical Transfer Characteristics

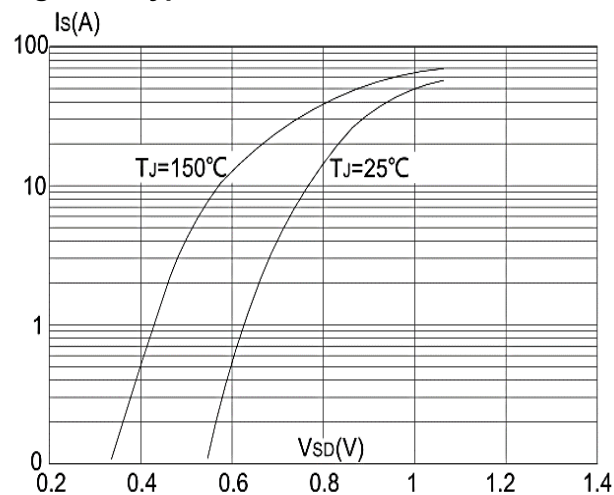


Figure 4: Body Diode Characteristics

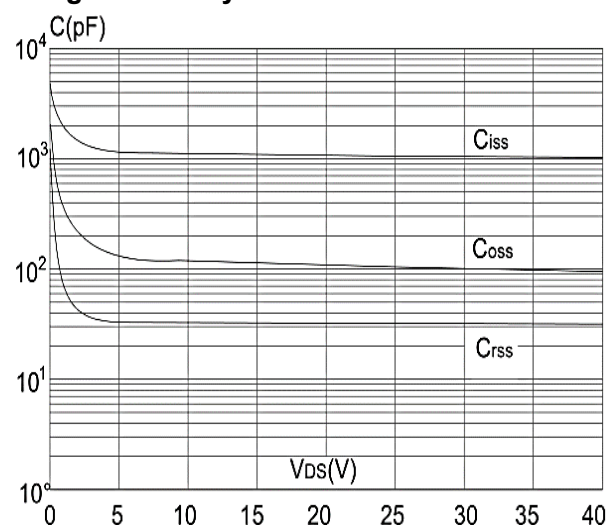


Figure 6: Capacitance Characteristics

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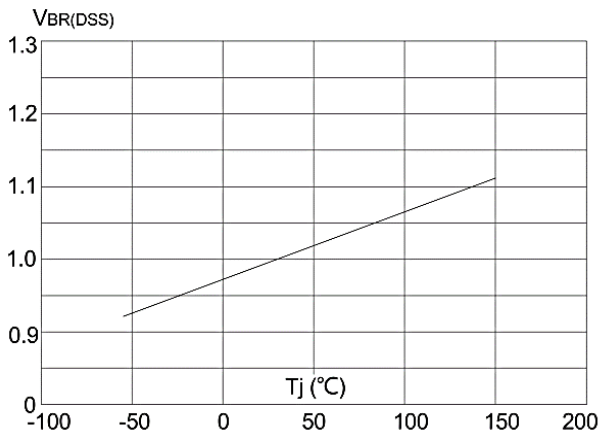


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

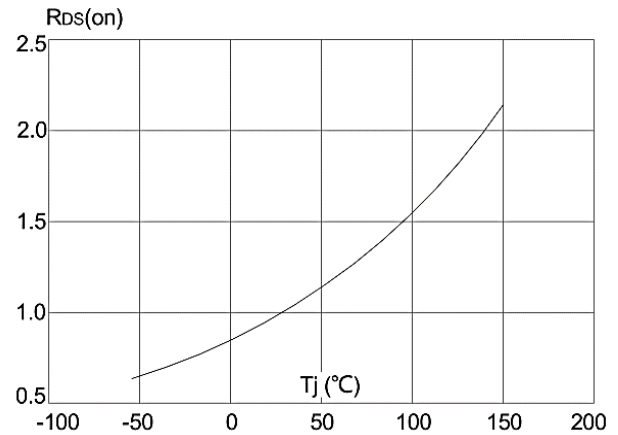


Figure 8: Normalized on Resistance vs. Junction Temperature

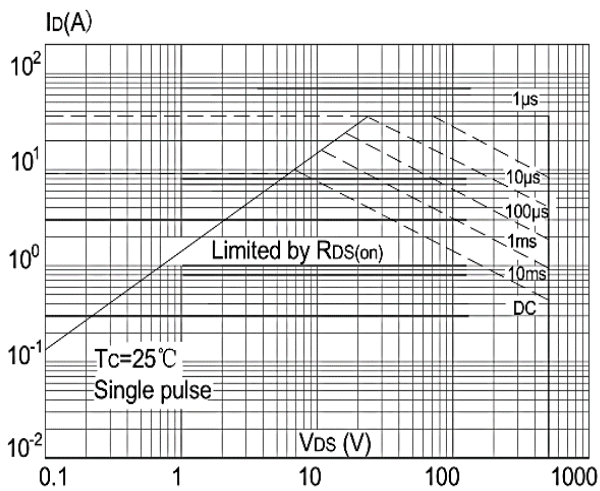


Figure 9: Maximum Safe Operating Area vs. Case Temperature

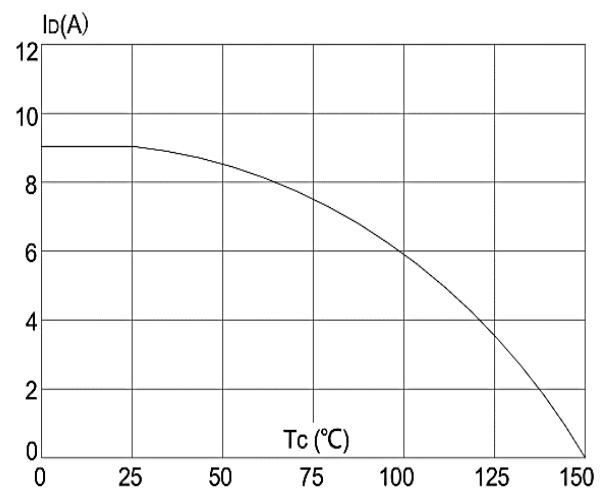


Figure 10: Maximum Continuous Drain Current

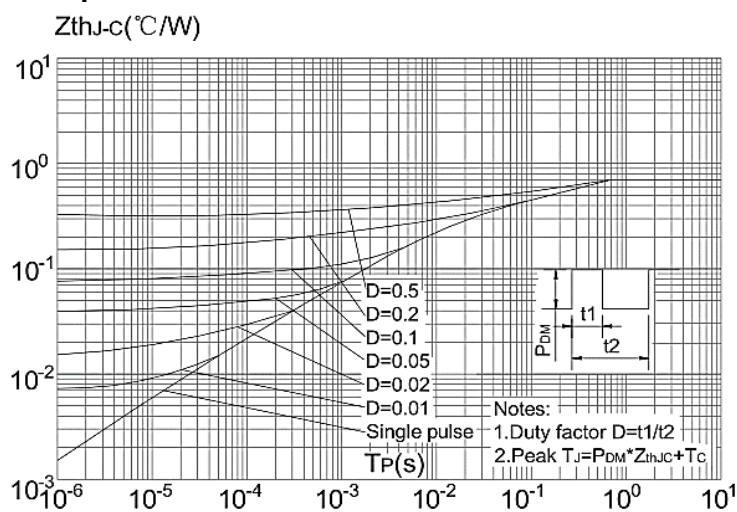
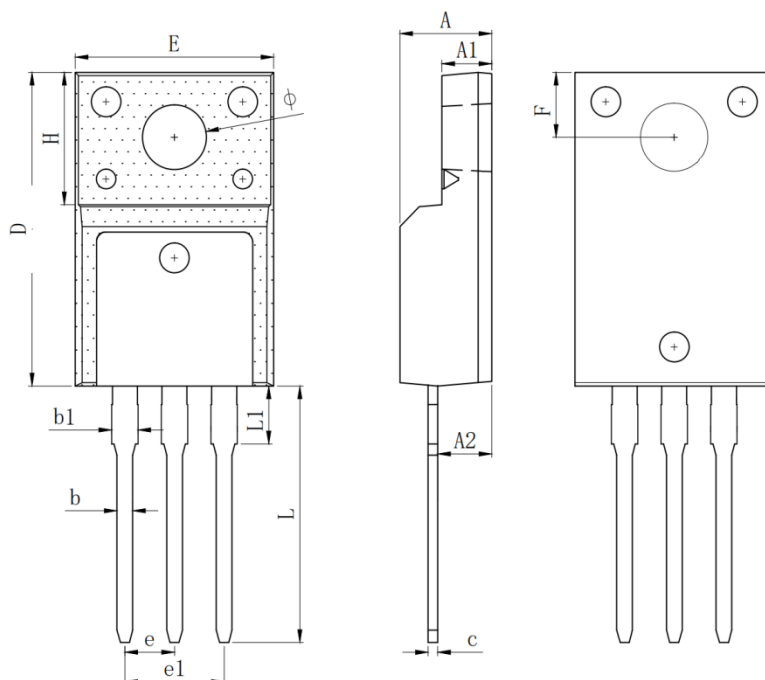


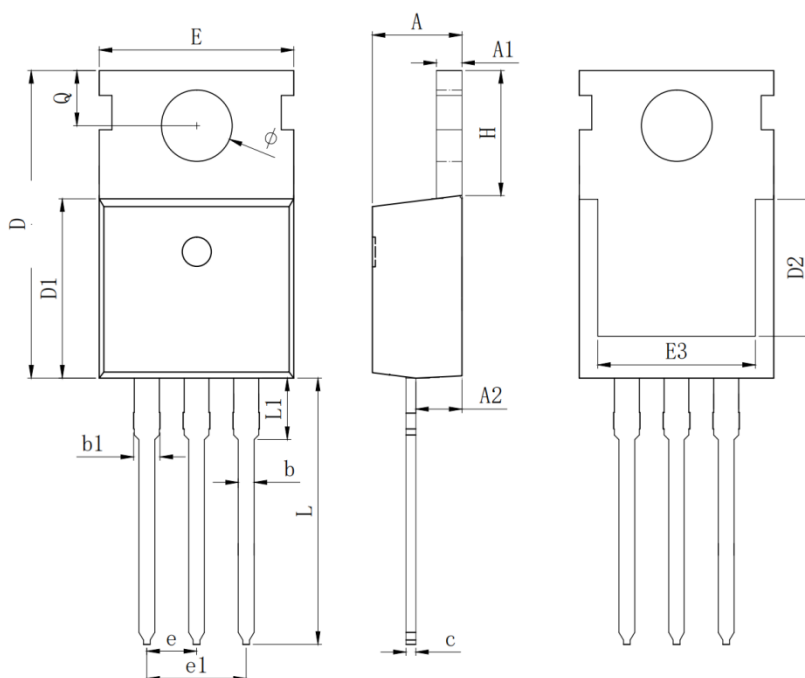
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-TO220F-3L



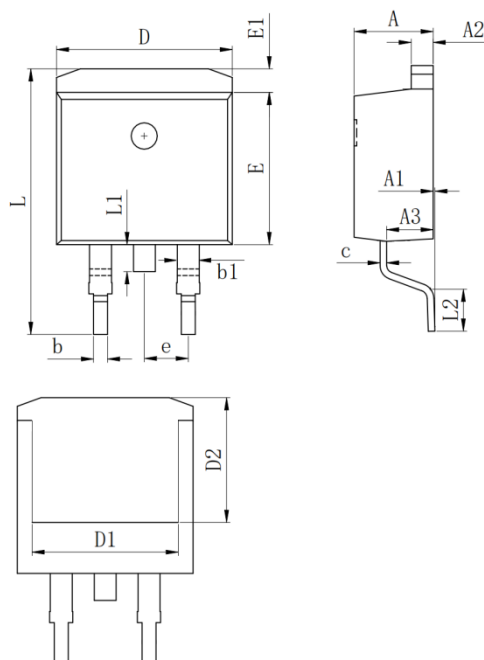
Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.50	4.70	5.00
A1	2.34	2.54	2.84
A2	2.40	2.90	3.40
b	0.70	0.80	0.95
b1	1.05	1.35	1.55
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H	6.70REF		
E	9.86	10.16	10.46
e	2.54BSC		
e1	5.08BSC		
L	12.65	12.98	13.30
L1	2.78	3.08	3.38
F	3.15	3.30	3.55
φ	3.00	3.30	3.65

Package Mechanical Data-TO220-3L



Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.25	4.50	4.70
A1	1.15	1.30	1.45
A2	2.15	2.35	2.55
b	0.65	0.80	0.95
b1	1.15	1.35	1.55
c	0.35	0.50	0.65
D	14.30	15.30	16.30
D1	8.80	9.10	9.40
D2	6.3REF		
E	9.70	10.00	10.30
E3	7.00	8.00	9.0
e	2.54BSC		
e1	5.08BSC		
L	12.70	13.50	13.90
L1	2.60	3.10	3.40
H	6.00	6.50	6.85
Q	2.60	2.80	3.00
φ	3.40	3.60	3.80

Package Mechanical Data-TO263-3L



Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.37	4.57	4.77
A1	0.00		0.25
A2	1.22	1.27	1.42
A3	2.49	2.69	2.89
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D	9.86	10.16	10.40
D1	8.4REF		
D2	7.073REF		
E	8.50	8.70	9.30
E1	0.87	1.17	1.47
e	2.54BSC		
L	14.70	15.10	15.50
L1	1.40	1.55	1.70
L2	2.00	2.30	2.60



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Edition	Date	Change
REV1.0	2025/6/31	Initial release

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