

100V N-Channel Enhancement Mode MOSFET

Description

The AP160N10P/T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V.

This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 100V$ $I_D = 160A$

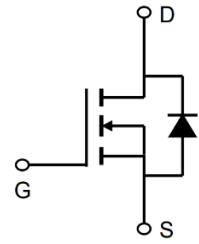
$R_{DS(ON)} < 4.2m\Omega$ $V_{GS} = 10V$ (Type: $3.7m\Omega$)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP160N10P	TO-220-3L	AP160N10P XXX YYYY	1000
AP160N10T	TO-263-3L	AP160N10T XXX YYYY	800

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

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	100	V
VGS	Gate-Source Voltage	±20	V
ID@TC=25°C	Continuous Drain Current, VGS @ 10V	160	A
ID@TC=100°C	Continuous Drain Current, VGS @ 10V	105	A
IDM	Pulsed Drain Current	600	A
EAS	Single Pulse Avalanche Energy	540	mJ
IAS	Avalanche Current	60	A
PD @TC=25°C	Power dissipation	225	W
TSTG	Storage Temperature Range	-55 to 150	°C
TJ	Operating Junction Temperature Range	-55 to 150	°C
RθJA	Thermal Resistance Junction-Ambient	0.55	°C/W
RθJC	Thermal Resistance Junction-Case	62	°C/W



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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V(BR)DSS	Drain-source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	100	110		V
VGS(th)	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\mu A, T_J=25^\circ\text{C}$	2.5	3.0	4.2	V
IDSS	Zero gate voltage drain current	$V_{DS}=100V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	μA
IDSS	Zero gate voltage drain current	$V_{DS}=100V, V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	5	μA
IGSS	Gate-source leakage current	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
RDS(on)	Drain-source on-state resistance	$V_{GS}=10V, I_D=80A, T_J=25^\circ\text{C}$	-	3.7	4.2	m Ω
gfs	Transconductance	$V_{DS}=5V, I_D=80A$	-	130	-	S
Ciss	Input Capacitance	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$	-	3950	-	pF
Coss	Output Capacitance		-	1200	-	pF
Crss	Reverse Transfer Capacitance		-	45	-	pF
Q _G	Gate Total Charge	$T_J=25^\circ\text{C}, V_{GS}=10V, V_{DS}=50V, I_D=80A$	-	78	-	nC
Q _{gs}	Gate-Source charge		-	32	-	nC
Q _{gd}	Gate-Drain charge		-	17	-	nC
td(on)	Turn-on delay time	$V_{GS}=10V, V_{DS}=50V, I_D=80A, R_G=5\Omega$	-	27	-	ns
t _r	Rise time		-	52	-	ns
td(off)	Turn-off delay time		-	58	-	ns
t _f	Fall time		-	23	-	ns
R _G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	-	0.77	-	Ω
VSD	Body Diode Forward Voltage	$V_{GS}=0V, I_{SD}=50A$	-	0.85	1.2	V
trr	Body Diode Reverse Recovery Time	$I_F=20A, dI/dt=500A/\mu s$	-	82	-	ns
Qrr	Body Diode Reverse Recovery Charge	$I_F=20A, dI/dt=500A/\mu s$	-	180	-	nC

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、 The EAS data shows Max. rating . The test condition is $V_{DD}=82V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=53.8A$
- 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

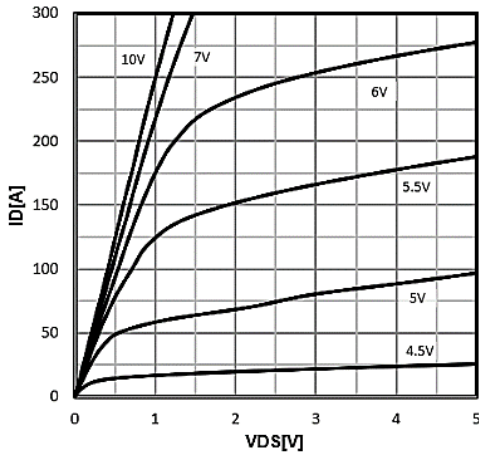


Figure 1. Type. Output Characteristics ($T_j=25\text{ }^\circ\text{C}$)

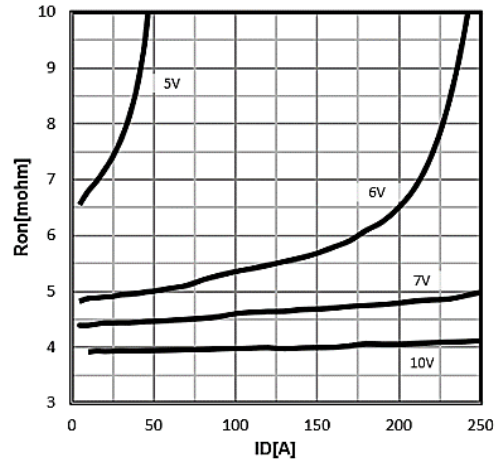


Figure 2. Type. drain-source on resistance

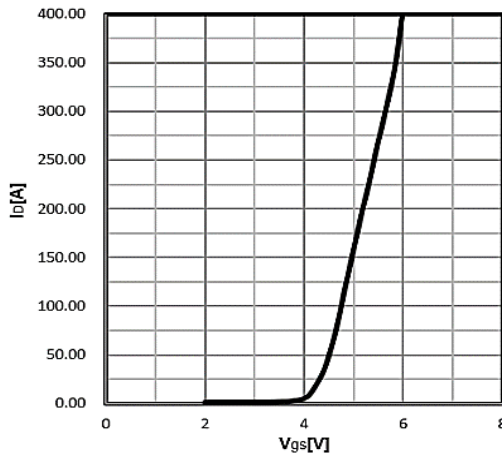


Figure 3. Type. transfer characteristics

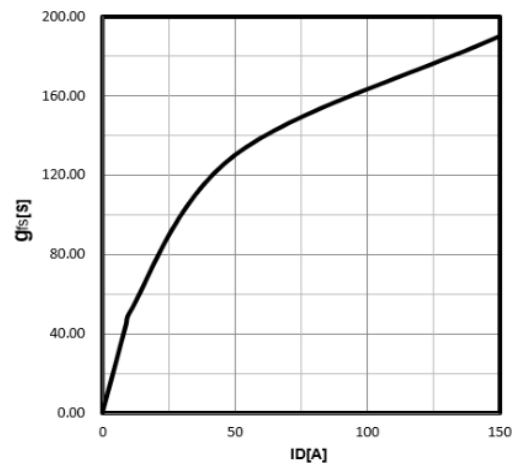


Figure 4. Type. forward transconductance

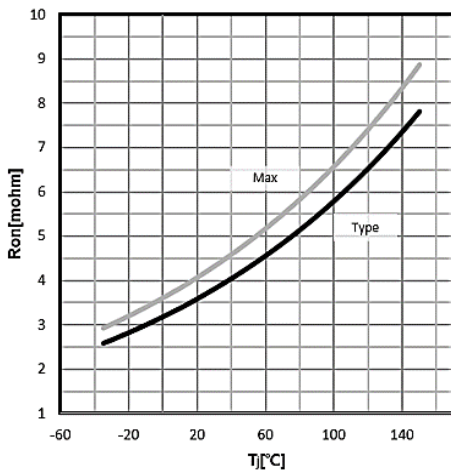


Figure 5. Drain-source on-state resistance $R_{DS(on)} = f(T_j)$; $I_D = 80\text{A}$; $V_{GS} = 10\text{V}$

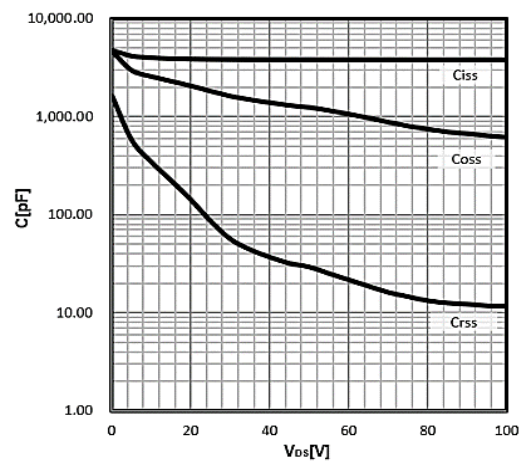


Figure 6. Body-Diode Characteristics $C = f(V_{DS})$; $V_{GS} = 0\text{V}$; $f = 1\text{MHz}$

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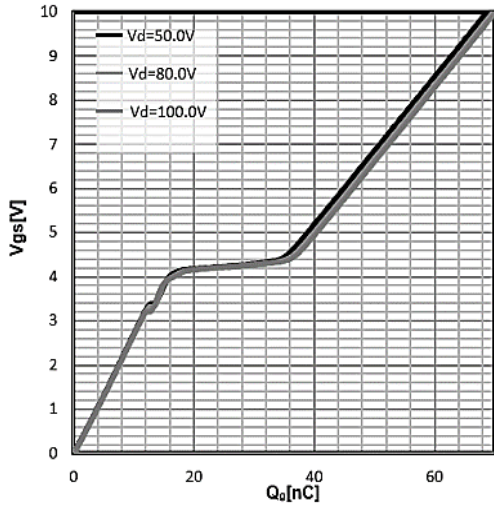


Figure 7. Typ. gate charge
 $V_{GS} = f(Q_{gate}) ; I_D = 20A$

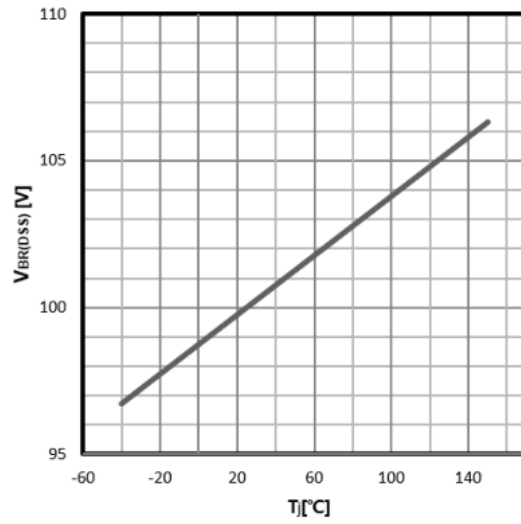


Figure 8. Drain Current Derating
 $V_{BR(DSS)} = f(T_j) ; I_D = 250\mu A$

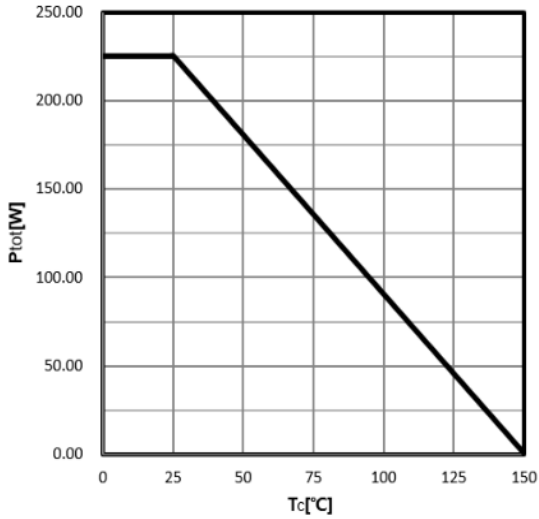


Figure 7. Power Dissipation

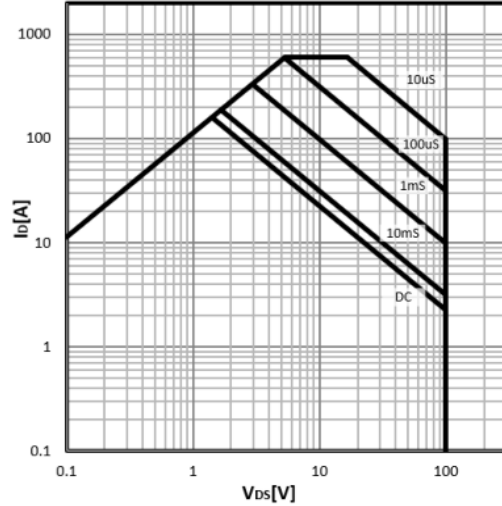


Figure 8. Safe operating area

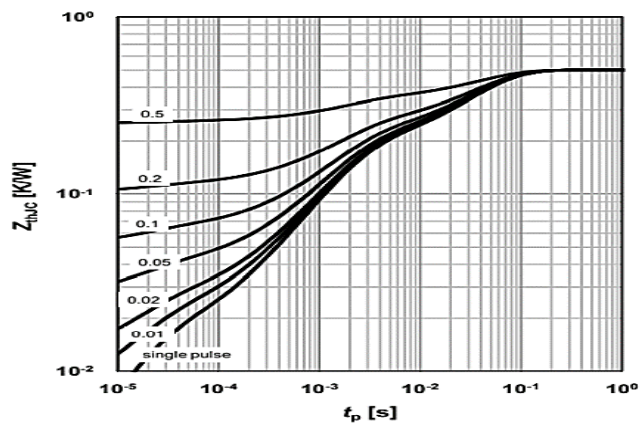
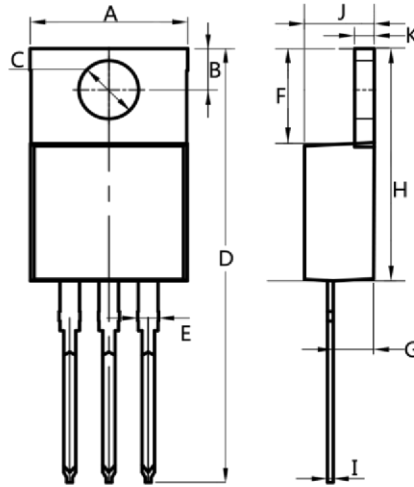


Figure 10. Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

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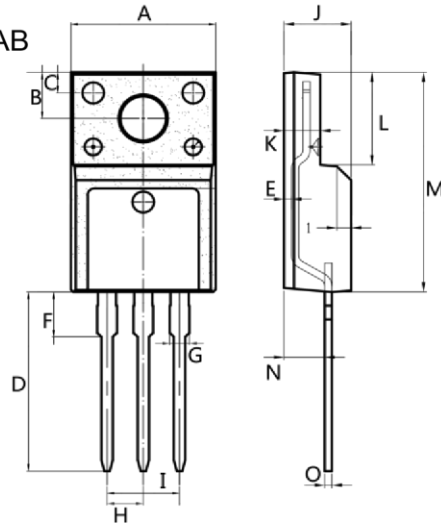
TO-220AB



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

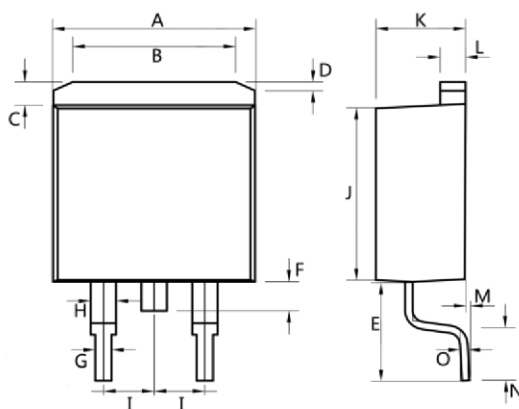
ITO-220AB



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

100V N-Channel Enhancement Mode MOSFET**Attention**

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