

100V N-Channel Enhancement Mode MOSFET

Description

The AP140N10P/T uses advanced **APM-SGT₁₁** 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

$V_{DS} = 100V$ $I_D = 140A$

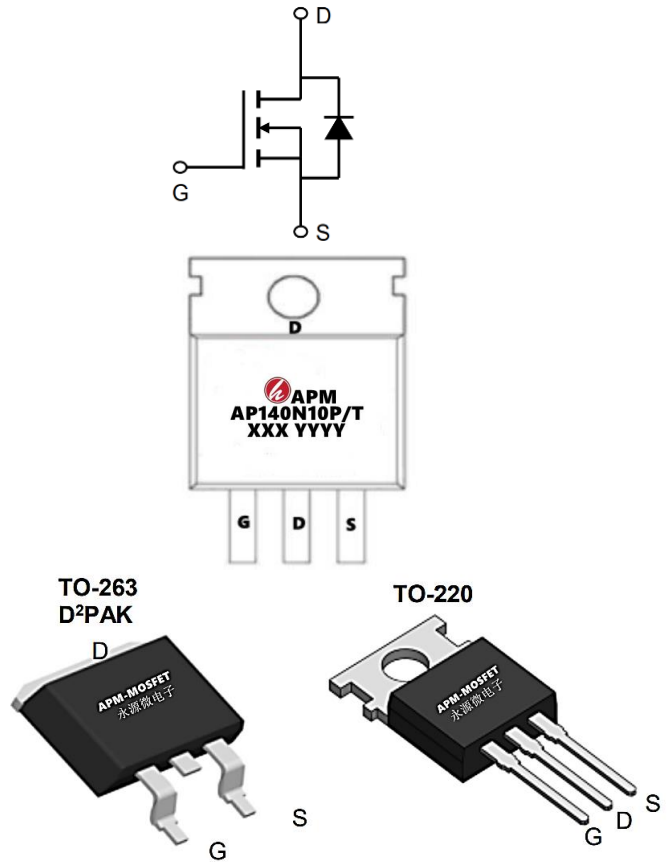
$R_{DS(ON)} < 5.5m\Omega$ @ $V_{GS}=10V$ (**Type: 4.6mΩ**)

Application

DC/DC Converter

LED Backlighting

Power Management Switches



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP140N10P	TO-220-3L	AP140N10P XXX YYYY	1000
AP140N10T	TO-263-3L	AP140N10T XXX YYYY	800

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	140	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	85	A
IDM	Pulsed Drain Current	417	A
EAS	Single Pulse Avalanche Energy	245	mJ
IAS	Avalanche Current	42	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	167	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	0.88	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	62	$^\circ\text{C/W}$

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Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
VDSS	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	100	-	-	V
IGSS	Gate-body Leakage current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
IDSS	Zero Gate Voltage Drain Current T _J =25°C	V _{DS} = 100V, V _{GS} = 0V	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current T _J =100°C		-	-	100	
VGS(th)	Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	2.9	4.0	V
RDS(on)	Drain-Source on-Resistance ²	V _{GS} = 10V, I _D = 20A	-	4.6	5.5	mΩ
Ciss	Input Capacitance	V _{DS} = 50V, V _{GS} = 0V, f = 1MHz	-	2816	-	pF
Coss	Output Capacitance		-	614	-	
Crss	Reverse Transfer Capacitance		-	7.4	-	
R _g	Gate Resistance	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	2.4	-	Ω
Q _g	Total Gate Charge	V _{GS} = 10V, V _{DS} = 50V, I _D = 20A	-	42	-	nC
Q _{gs}	Gate-Source Charge		-	9.7	-	
Q _{gd}	Gate-Drain Charge		-	10.6	-	
td(on)	Turn-on Delay Time	V _{GS} = 10V, V _{DS} = 50V, R _G = 3Ω, I _D = 20A	-	13	-	ns
t _r	Rise Time		-	25	-	
td(off)	Turn-off Delay Time		-	43	-	
t _f	Fall Time		-	37	-	
VSD	Diode Forward Voltage ²	I _F = 20A, V _{GS} = 0V	-	-	1.2	V
IS	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	-	-	167	A
trr	Body Diode Reverse Recovery Time	I _F = 20A, dI/dt=100A/μs	-	60	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	61	-	nC

Notes:

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3、The EAS data shows Max. rating. The test condition is V_{DD}=50V, V_{GS}=10V, L=0.4mH, I_{AS}=42A
- 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

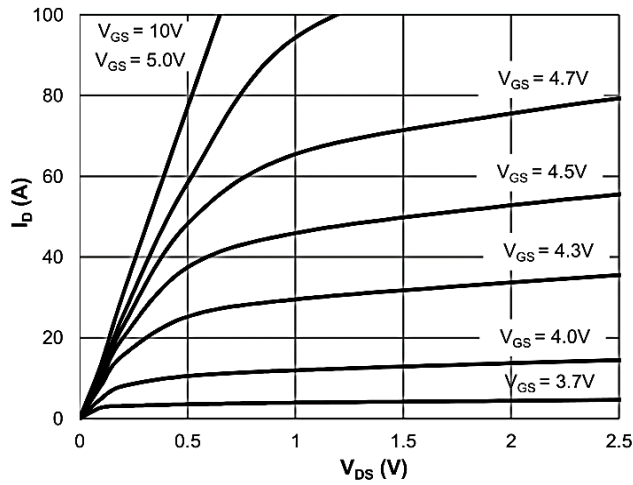


Figure 1: Saturation Characteristics

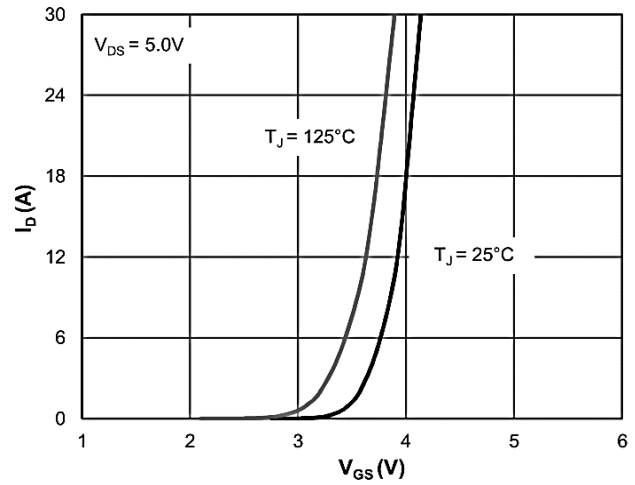


Figure 2: Transfer Characteristics

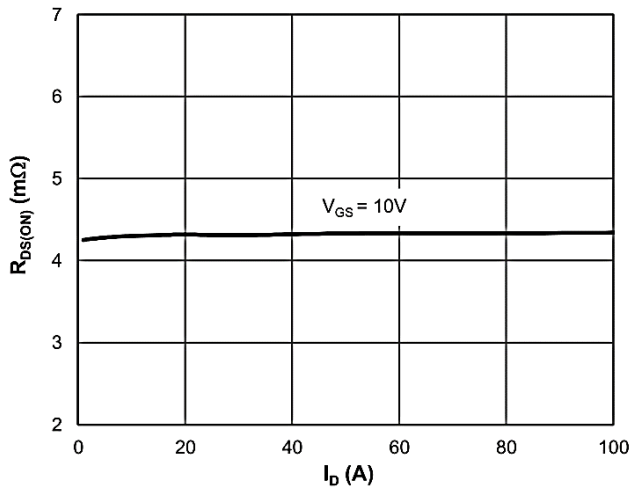


Figure 3: $R_{DS(ON)}$ vs. Drain Current

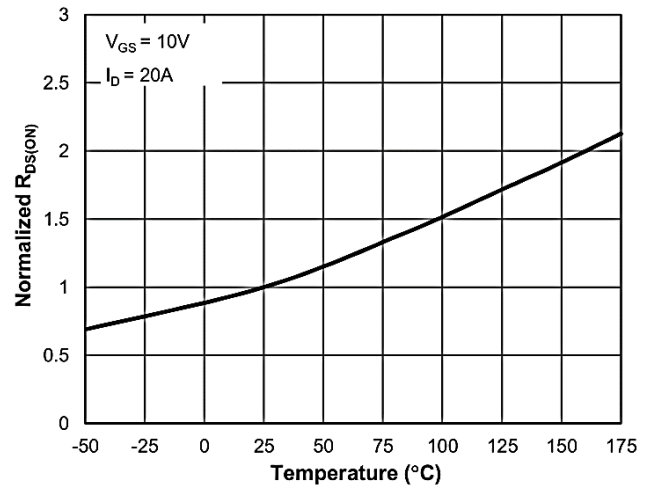


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

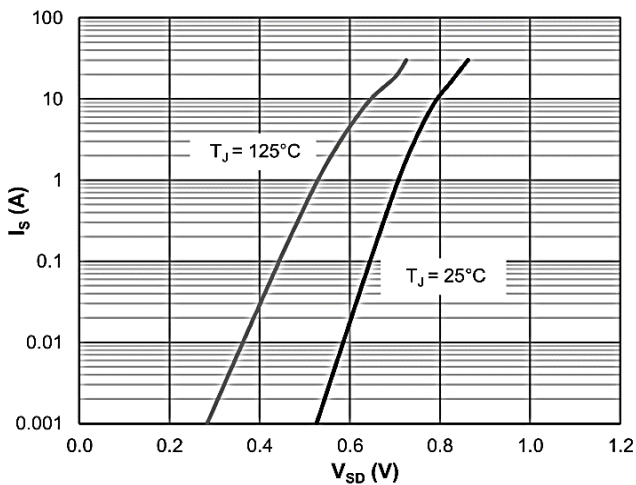


Figure 5: Body-Diode Characteristics

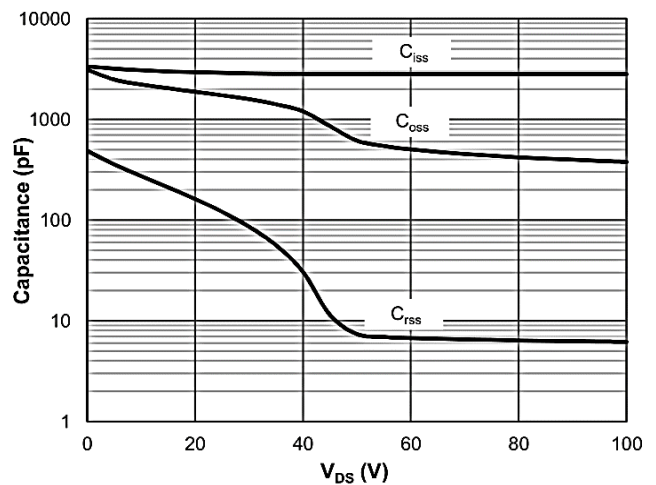


Figure 6: Capacitance Characteristics

100V N-Channel Enhancement Mode MOSFET

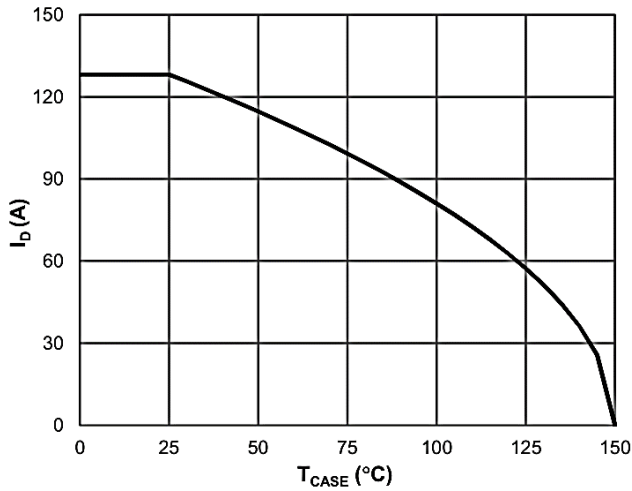


Figure 7: Current De-rating

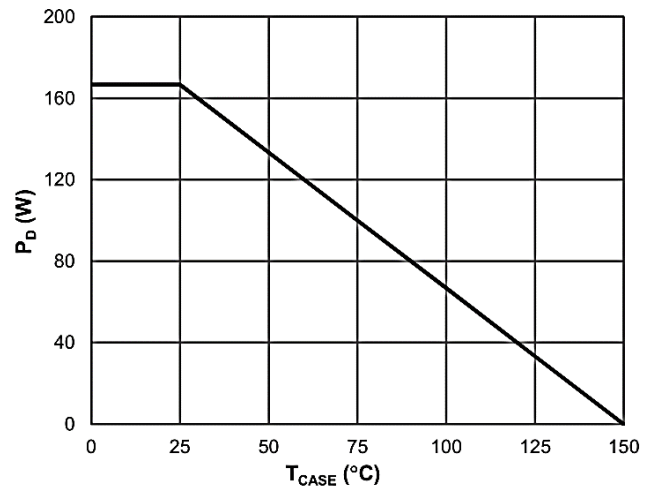


Figure 8: Power De-rating

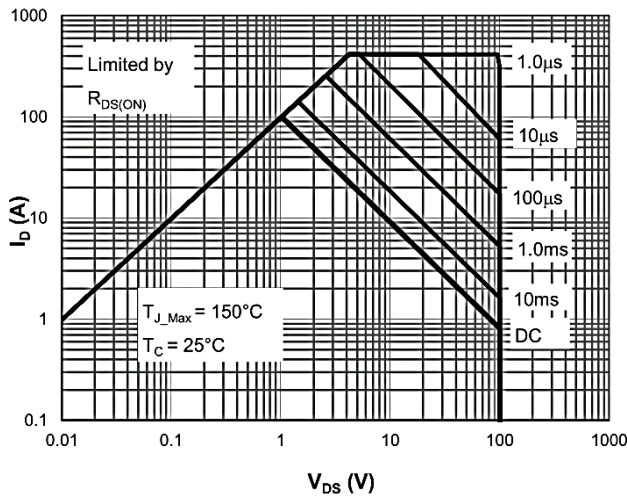


Figure 9: Maximum Safe Operating Area

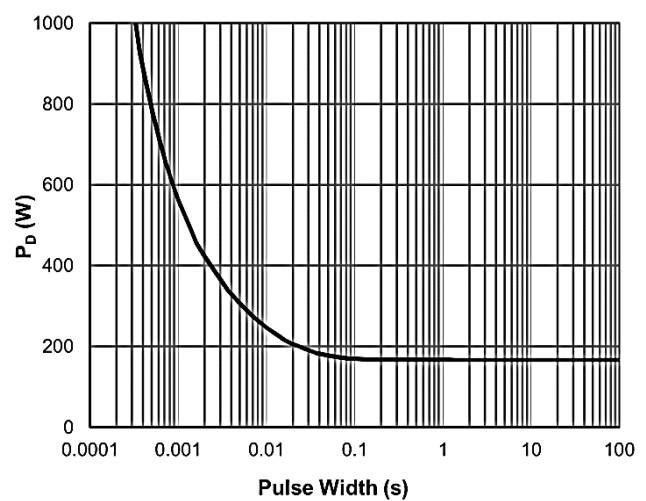


Figure 10: Single Pulse Power Rating, Junction-to-Case

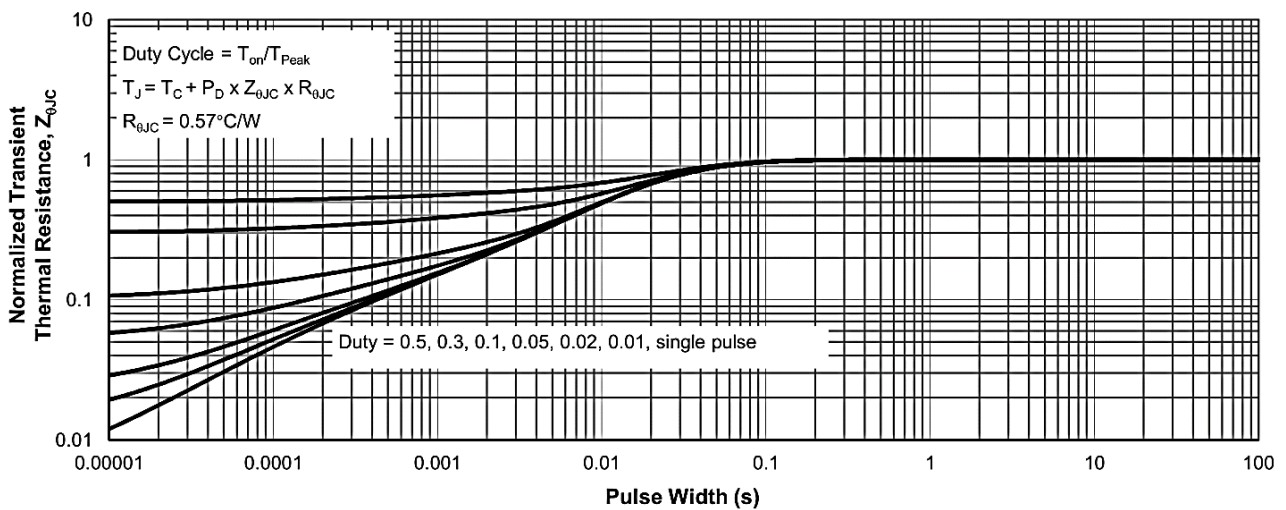
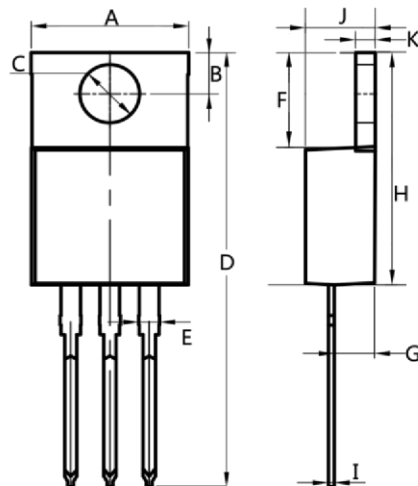


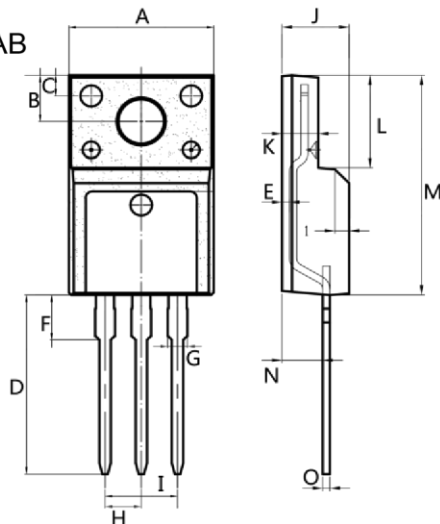
Figure 11: Normalized Maximum Transient Thermal Impedance

TO-220AB



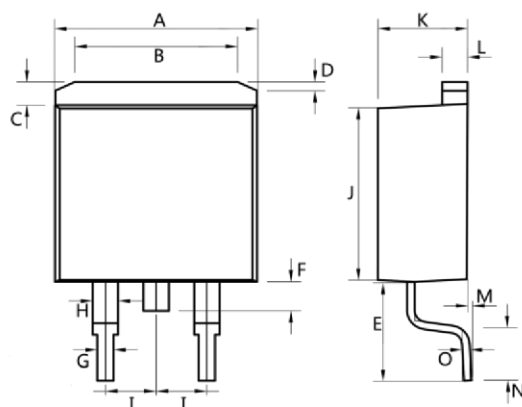
Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4
All Dimensions in millimeter		

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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Edition	Date	Change
REV1.0	2022/8/5	Initial release

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