

## 150V N-Channel Enhancement Mode MOSFET

### Description

The AP190N15P/T uses advanced **APM-SGT<sub>1</sub>** 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

$V_{DS} = 150V$   $I_D = 190A$

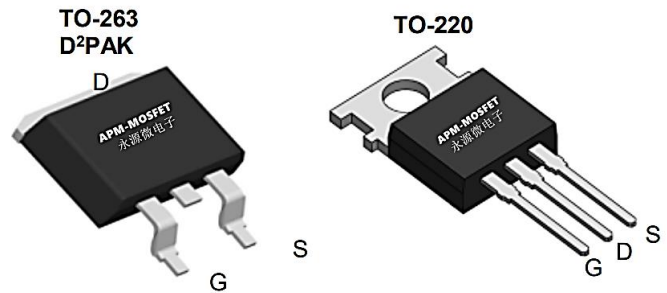
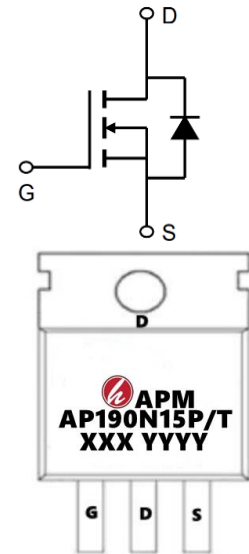
$R_{DS(ON)} < 7.5m\Omega$  @  $V_{GS}=10V$  (Type: **6.6mΩ**)

### Application

DC/DC Converter

LED Backlighting

Power Management Switches



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP190N15P	TO-220-3L	AP190N15P XXX YYYY	1000
AP190N15T	TO-263-3L	AP190N15T XXX YYYY	800

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$	190	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$	140	A
IDM	Pulsed Drain Current	550	A
EAS	Single Pulse Avalanche Energy	506	mJ
IAS	Avalanche Current	53.4	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	210	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	0.84	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	62	$^\circ\text{C/W}$



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### Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
VDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	150	-	-	V
IGSS	Gate-body Leakage current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
IDSS	Zero Gate Voltage Drain Current T <sub>J</sub> =25°C	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current T <sub>J</sub> =100°C		-	-	100	
VGS(th)	Gate-Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0	2.9	4.0	V
RDS(on)	Drain-Source on-Resistance <sup>2</sup>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A	-	6.6	7.5	mΩ
Ciss	Input Capacitance	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1MHz	-	5240	-	pF
Coss	Output Capacitance		-	412	-	
Crss	Reverse Transfer Capacitance		-	10	-	
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz	-	1.7	-	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V, I <sub>D</sub> = 20A	-	18	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	10	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	72	-	
td(on)	Turn-on Delay Time	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A	-	22	-	ns
t <sub>r</sub>	Rise Time		-	115	-	
td(off)	Turn-off Delay Time		-	44	-	
t <sub>f</sub>	Fall Time		-	105	-	
VSD	Diode Forward Voltage <sup>2</sup>	I <sub>F</sub> = 20A, V <sub>GS</sub> = 0V	-	-	1.2	V
IS	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	-	-	190	A
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> = 20A, di/dt=100A/μs	-	45	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	12	-	nC

#### Notes:

- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> 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<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=45A
- 4、 The power dissipation is limited by 150°C junction temperature
- 5、 The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

### Typical Characteristics

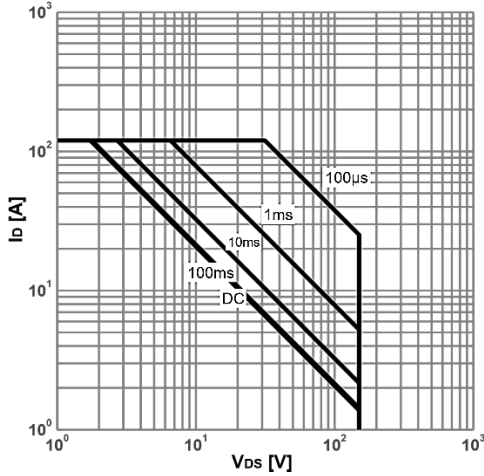


Figure 1. Power dissipation

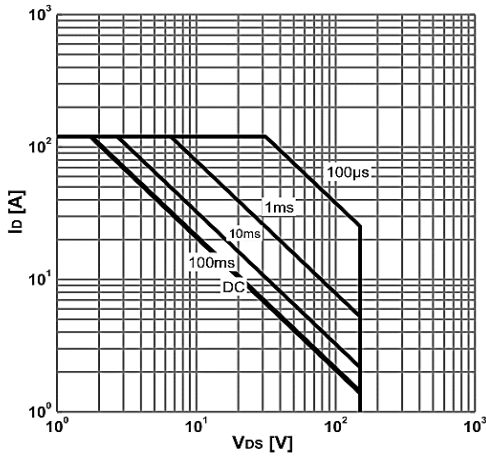


Figure 3. Safe operating area

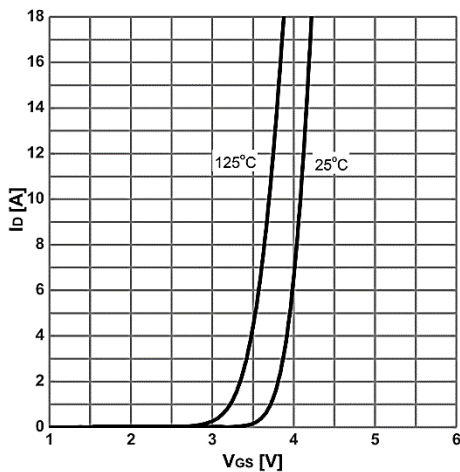


Figure 5. Typ. transfer characteristics

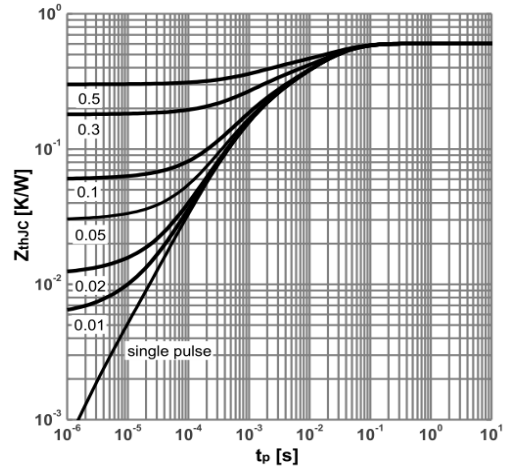


Figure 2. Max. transient thermal impedance

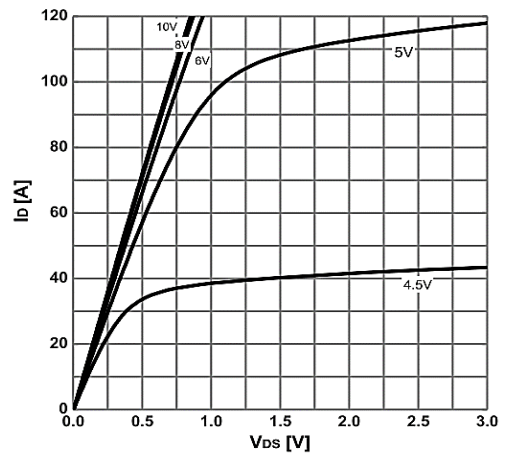


Figure 4. Typ. output characteristics

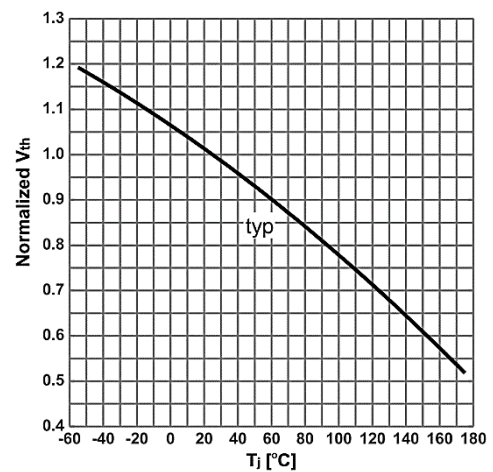


Figure 6. Gate threshold voltage vs. Junction Temperature

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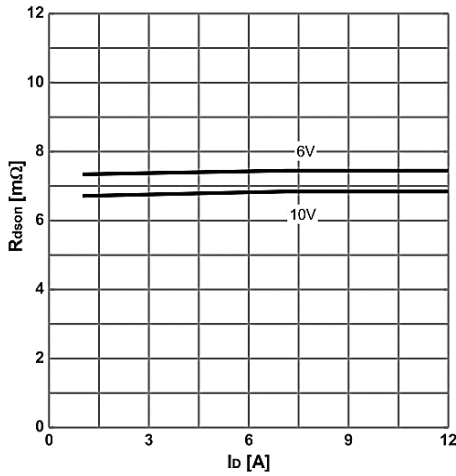


Figure 7. On-state resistance vs. Drain current

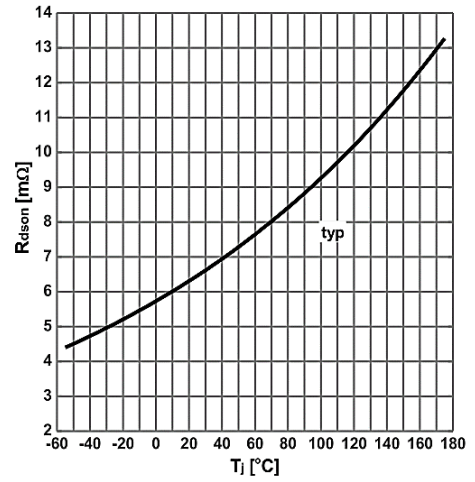


Figure 8. On-state resistance vs. Junction temperature

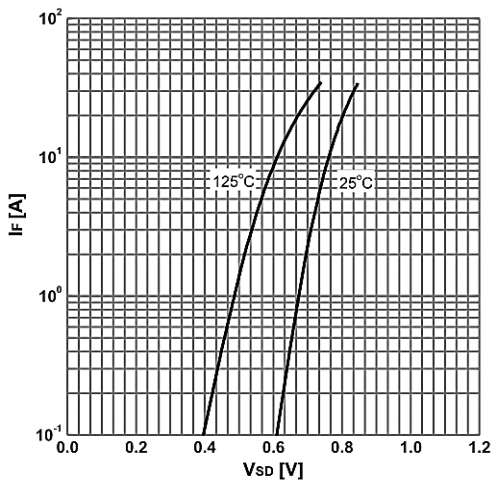


Figure 9. Forward characteristics of reverse diode

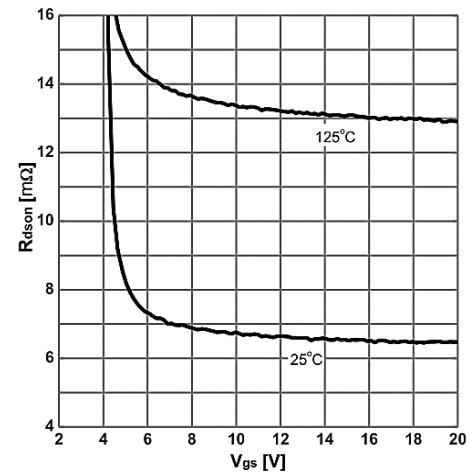


Figure 10. On-state resistance vs. Vgs characteristics

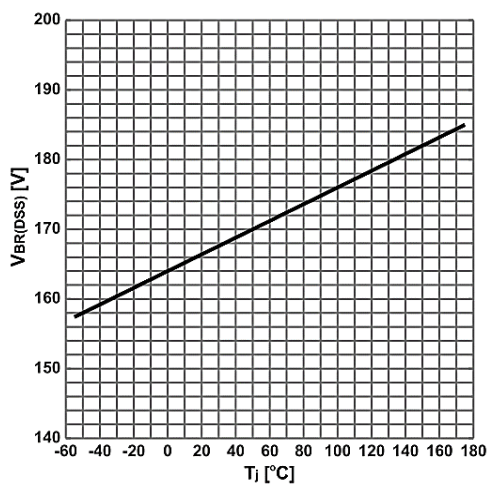


Figure 10: Breakdown Voltage Variation vs. Temperature

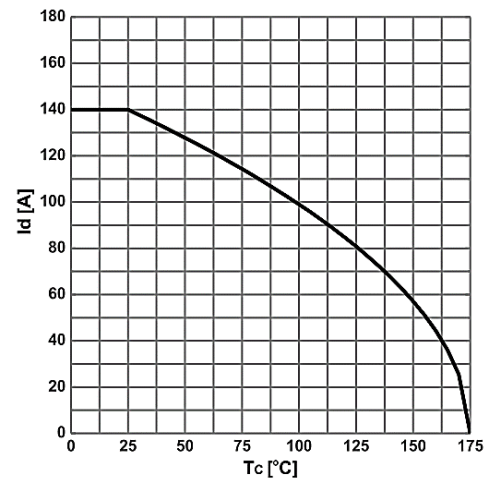
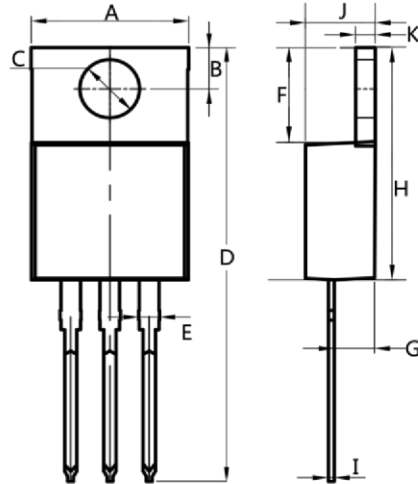


Figure 11: Maximum Drain Current

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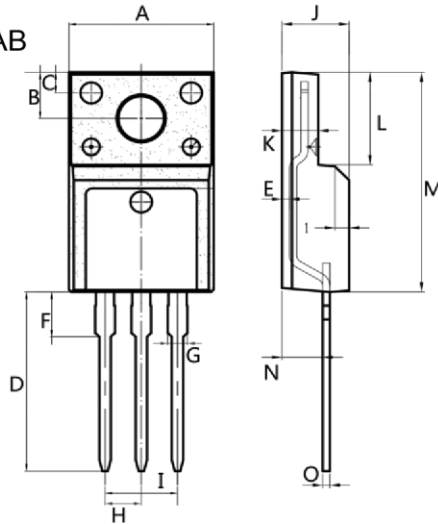
TO-220AB



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

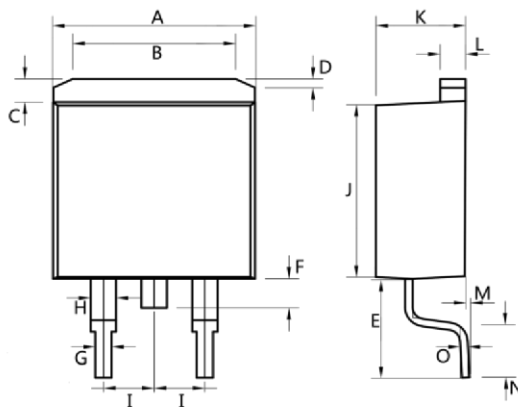
ITO-220AB



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

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Edition	Date	Change
Rve1.0	2021/8/5	Initial release

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