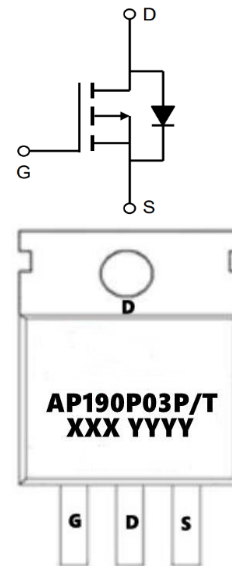
AP190P03P/T

-30V P-Channel Enhancement Mode MOSFET

Description

The AP190P03P/T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = -30V I_D =-190A

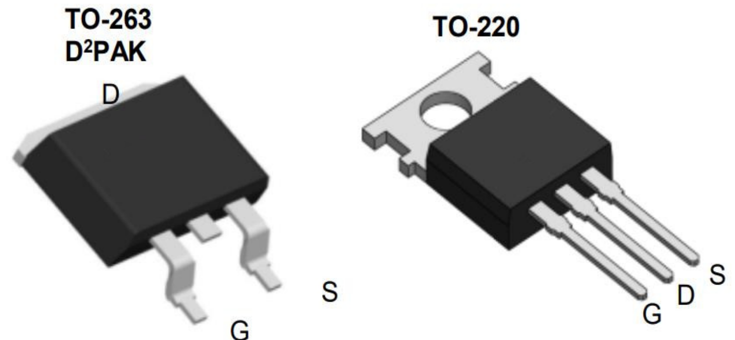
$R_{DS(ON)}$ <3.2mΩ @ V_{GS}=-10V （Type：2.5mΩ）

Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP190P03P	TO-220-3L	AP190P03P XXX YYYY	1000
AP190P03T	TO-263-3L	AP190P03T XXX YYYY	800

Absolute Maximum Ratings (TC=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-30	V
VGS	Gate-Source Voltage	±20	V
ID@TC=25℃	Continuous Drain Current, VGS @ -10V1	-190	A
ID@TC=100℃	Continuous Drain Current, VGS @ -10V1	-125	A
IDM	Pulsed Drain Current2	-700	A
EAS	Single Pulse Avalanche Energy3	876	mJ
IAS	Avalanche Current	-70	A
PD@TC=25℃	Total Power Dissipation4	150	W
TSTG	Storage Temperature Range	-55 to 150	℃
TJ	Operating Junction Temperature Range	-55 to 150	℃
RθJA	Thermal Resistance Junction-Ambient 1	62.5	℃/W
RθJC	Thermal Resistance Junction-Case1	1.06	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-30	-35		V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V			-1	μA
IGSS	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V			±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=-250μA	-1	-1.7	-2.5	V
RDS(ON)	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-20A		2.5	3.2	mΩ
		V_{GS}=-4.5V, I_D=-20A		4.0	5.2	mΩ
gFS	Forward Transconductance	V_{DS}=-5V, I_D=-20A		65		S
Ciss	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, f=1.0MHz		7000		pF
Coss	Output Capacitance			820		pF
Crss	Reverse Transfer Capacitance			540		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		2.2		Ω
td(on)	Turn-on Delay Time	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		14		nS
t_r	Turn-on Rise Time			13		nS
td(off)	Turn-Off Delay Time			65		nS
t_f	Turn-Off Fall Time			37		nS
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-20A		130		nC
Qgs	Gate-Source Charge			12		nC
Qgd	Gate-Drain Charge			31		nC
ISD	Source-Drain Current (Body Diode)				-150	A
VSD	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=-20A			-1.3	V
trr	Reverse Recovery Time	I_F=-20A, di/dt=100A/μs		30		ns
Q_{rr}	Reverse Recovery Charge	I_F=-20A, di/dt=100A/μs		40		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 ≦ 300us , duty cycle ≦ 2%

3、 The EAS data shows Max. rating . The test condition is TJ =25℃, VDD=-15V, VG=-10V, RG=25Ω, L=0.5mH, IAS=-30A

4、The power dissipation is limited by 150℃ 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

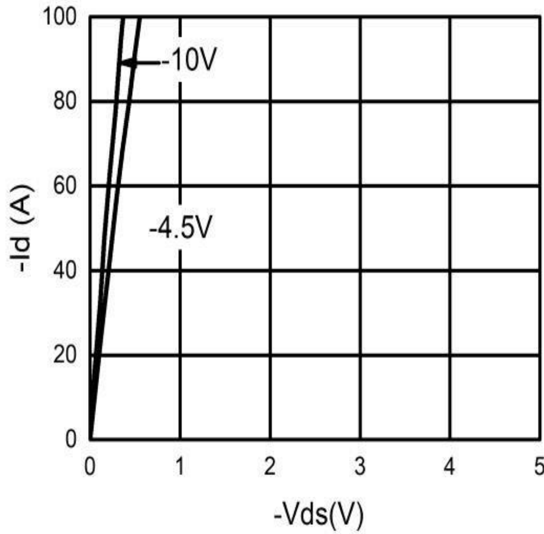


Figure 1. Output Characteristics

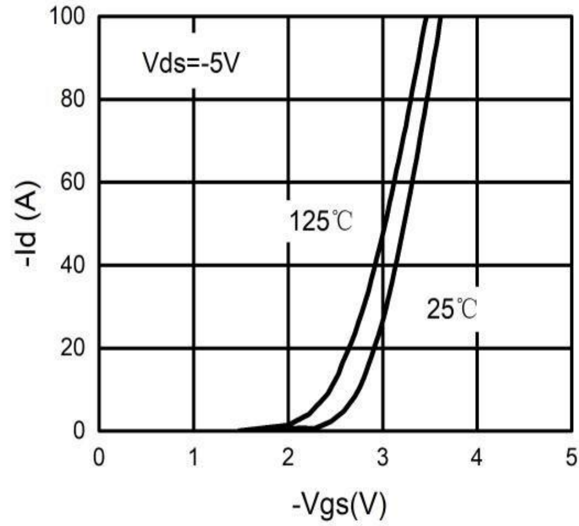


Figure 2. Transfer Characteristics

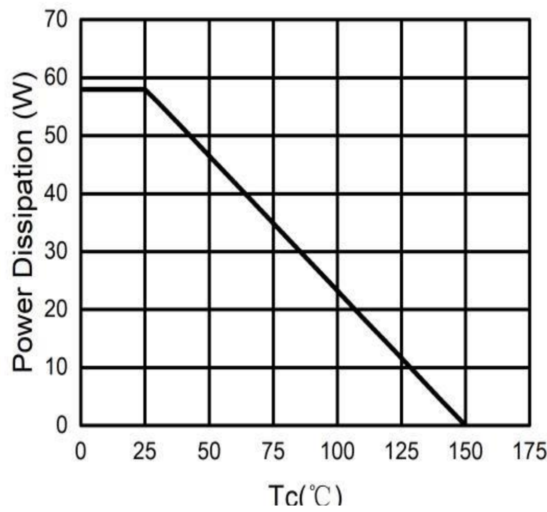


Figure 3. Power Dissipation

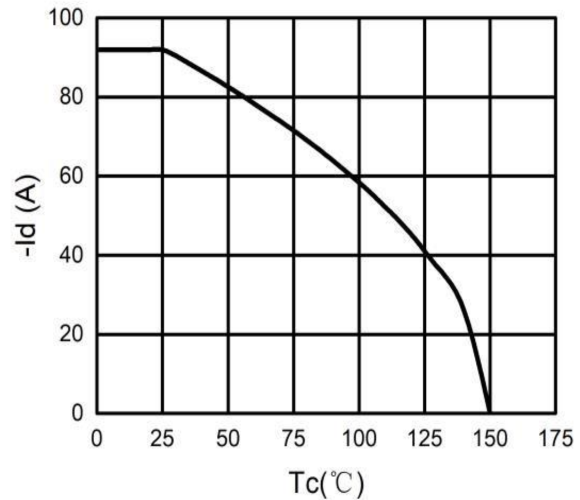


Figure 4. Drain Current

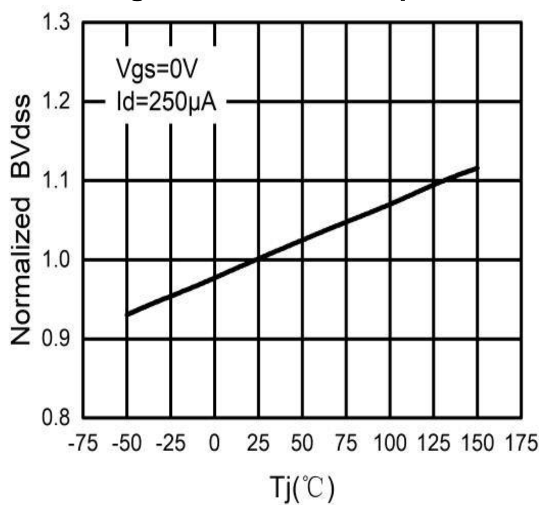


Figure 5. BV_{DSS} vs Junction Temperature

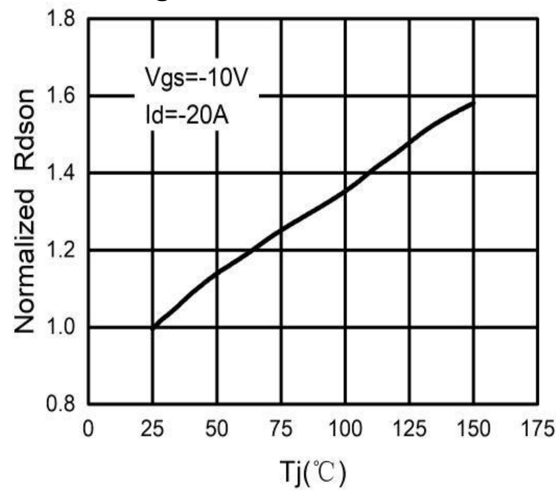


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

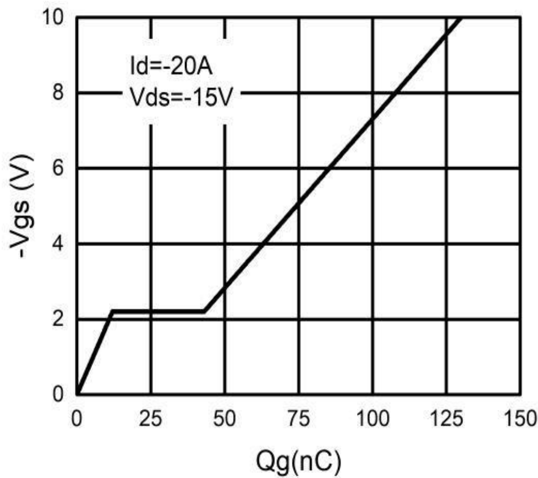


Figure 7. Gate Charge Waveforms

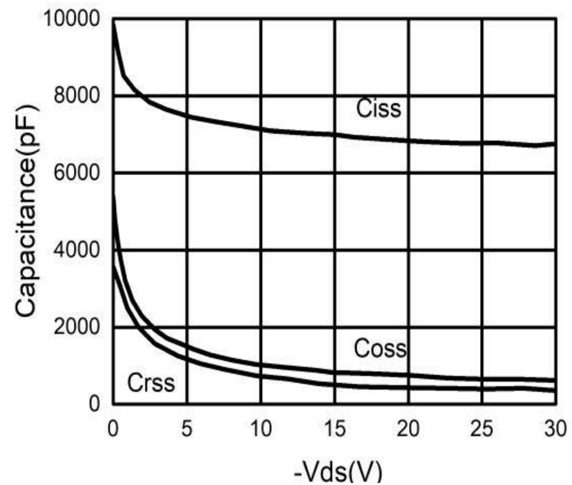


Figure 8. Capacitance

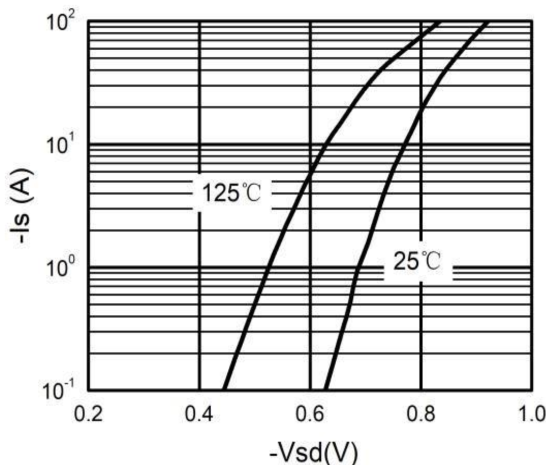


Figure 9. Body-Diode Characteristics

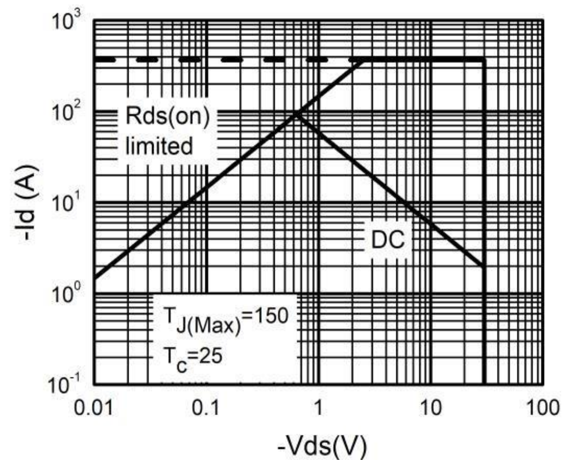


Figure 10. Maximum Safe Operating Area

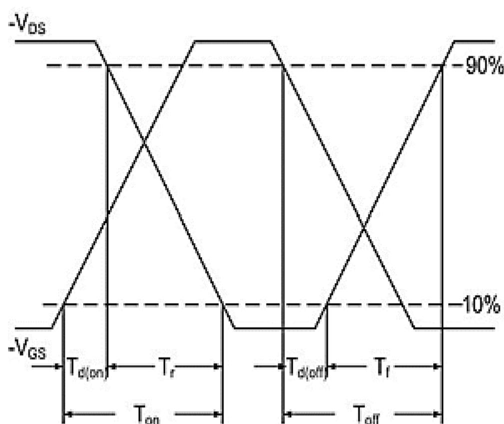


Figure.11 Switching Time Waveform

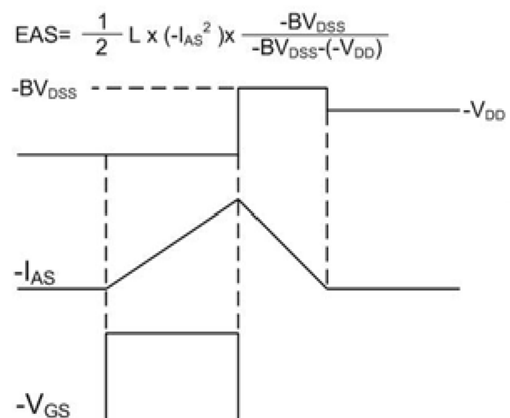
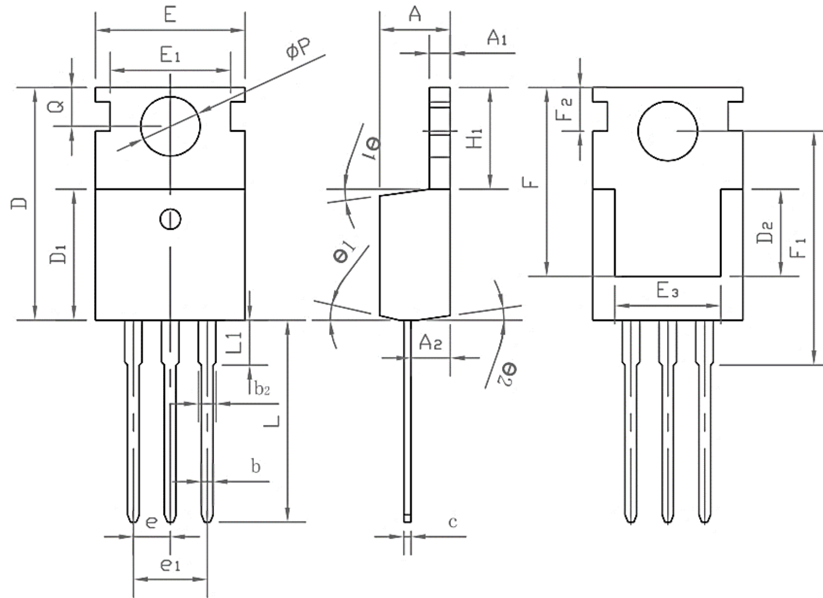


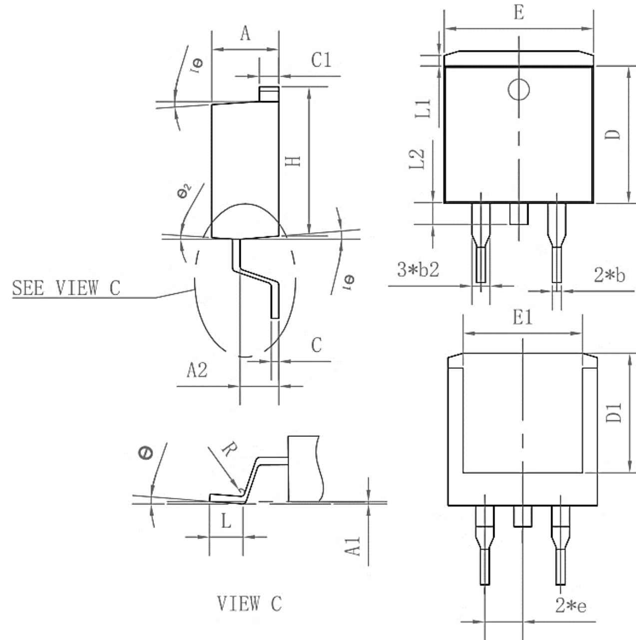
Figure.12 Unclamped Inductive Switching Waveform

Package Mechanical Data-TO-220-3L-SLK



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
D	0.40	0.50	0.65
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.63	10.00	10.35
E3	7.00	8.00	8.40
e		0.37	
e1		0.10	
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
Φp	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°
F	13.30	13.50	13.70
F1	15.50	15.90	16.30
F2	2.80	3.00	3.20

Package Mechanical Data-TO-263-3L-SLK



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.35	4.47	4.60
A1	0.09	0.10	0.11
A2	2.30	2.40	2.70
b	0.70	0.80	1.00
b2	1.25	1.36	1.50
C	0.45	0.50	0.65
C1	1.29	1.30	9.40
D	9.10	9.20	9.30
D1	7.90	8.00	8.10
E	9.85	10.00	10.20
E1	7.90	8.00	8.10
H	15.30	15.50	15.70
e	-	2.54	-
L	2.34	2.54	2.74
L1	1.00	1.10	1.20
L2	1.30	1.40	1.50
R	0.24	0.25	0.26
θ	0°	4°	8°
Θ1	4°	7°	10°
Θ2	0°	3°	6°