

60V N-Channel Enhancement Mode MOSFET

Description

The AP30N06DF 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

$V_{DS} = 60V$ $I_D = 30A$

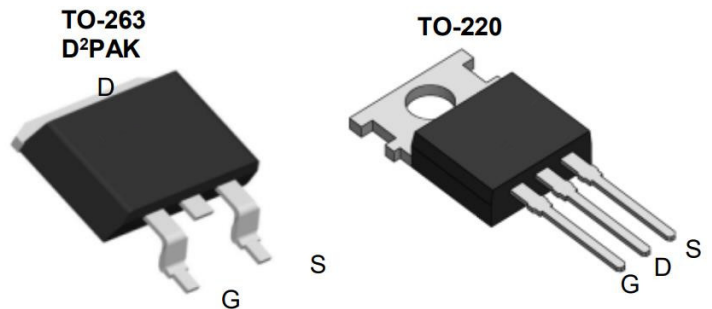
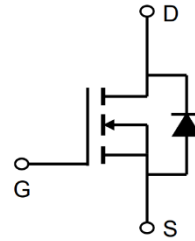
$R_{DS(ON)} < 36m\Omega$ @ $V_{GS}=10V$ (Type: **28mΩ**)

Application

LED lamp

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP30N06P	TO-220-3L	AP30N06P XXX YYYY	1000
AP30N06T	TO-263-3L	AP30N06T XXX YYYY	800

Absolute Maximum Ratings@ $T_j=25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	16	A
IDM	Pulsed Drain Current	74	A
IAS	Avalanche Current	13	A
EAS	Single Pulsed Avalanche Energy	22	mJ
$P_D @ T_c = 25^\circ C$	Power Dissipation	31.3	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	4	$^\circ C/W$



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Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	60	65	---	V
ΔBVDSS/ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.044	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =15A	---	28	36	mΩ
		V _{GS} =4.5V, I _D =7A	---	38	45	mΩ
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	-4.8	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =48V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =48V, V _{GS} =0V, T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =5V, I _D =15A	---	25.3	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.5	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =48V, V _{GS} =10V, I _D =15A	---	19	---	nC
Q _{gs}	Gate-Source Charge		---	2.5	---	
Q _{gd}	Gate-Drain Charge		---	5	---	
Td(on)	Turn-On Delay Time	V _{DD} =30V, V _{GS} =10V, R _G =3.3Ω, I _D =15A	---	2.8	---	ns
T _r	Rise Time		---	16.6	---	
Td(off)	Turn-Off Delay Time		---	21.2	---	
T _f	Fall Time		---	5.6	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	1027	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	46	---	
I _s	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	20	A
ISM	Pulsed Source Current ^{2,6}		---	---	40	A
VSD	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =15A, dI/dt=100A/μs, T _J =25°C	---	12.2	---	nS
Q _{rr}	Reverse Recovery Charge		---	7.3	---	nC

Note :

- 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. The EAS data shows Max. rating.
- 3、The test cond ≅ 300us duty cycle ≅ 2%, duty cycle ition is T_J=25°C, V_{DD}=48V, V_G=10V, R_G=25Ω, L=0.1mH, I_{AS}=13A
- 4、The power dissipation is limited by 175°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.

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Typical Characteristics

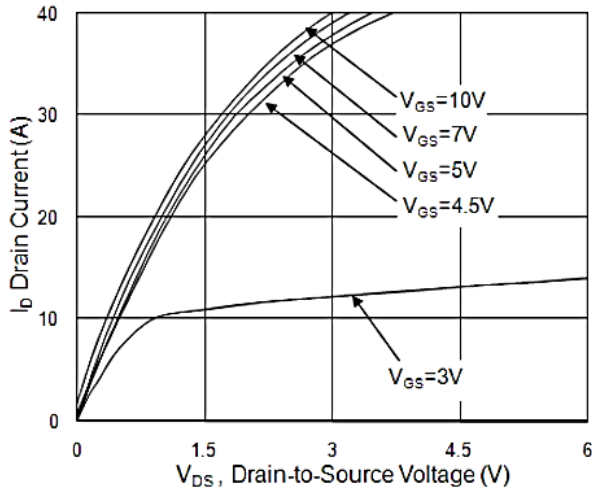


Fig.1 Typical Output Characteristics

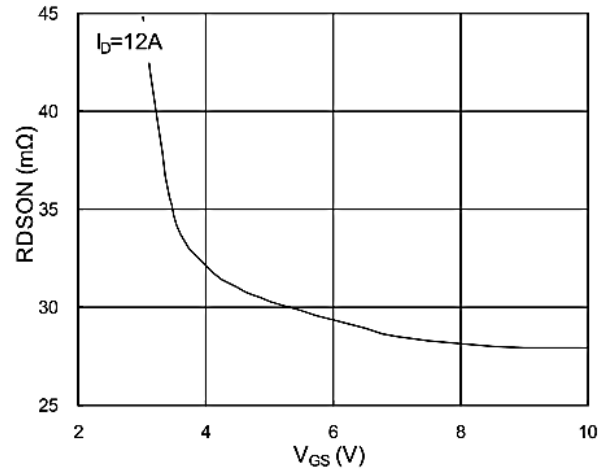


Fig.2 On-Resistance vs. Gate-Source

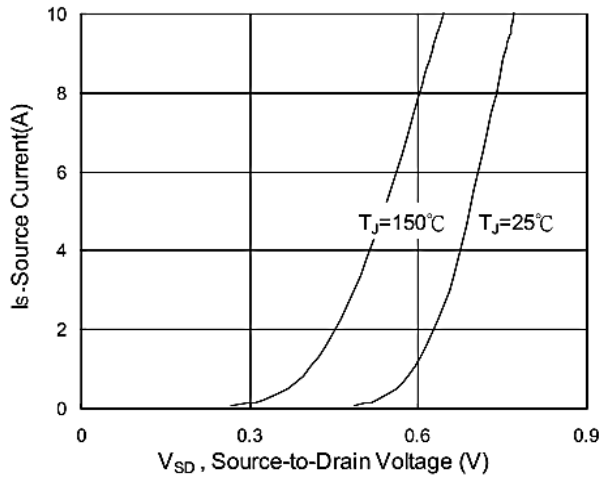


Fig.3 Forward Characteristics Of Reverse

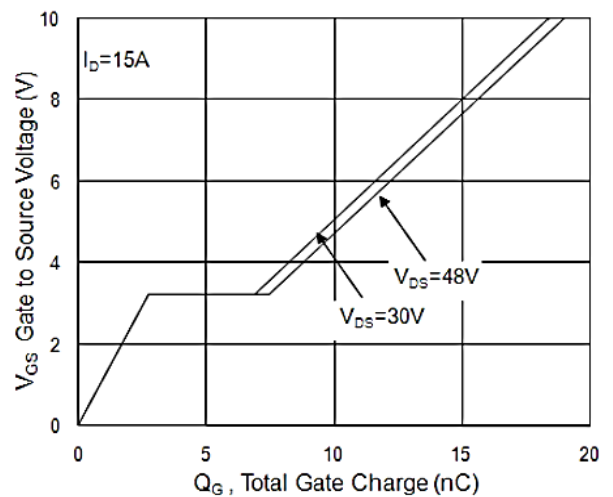


Fig.4 Gate-Charge Characteristics

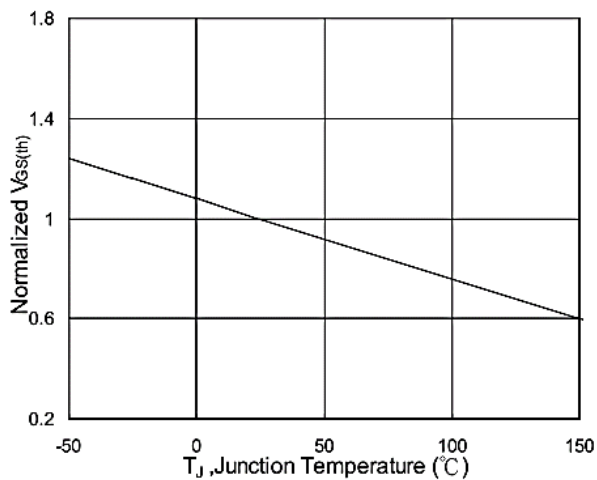


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

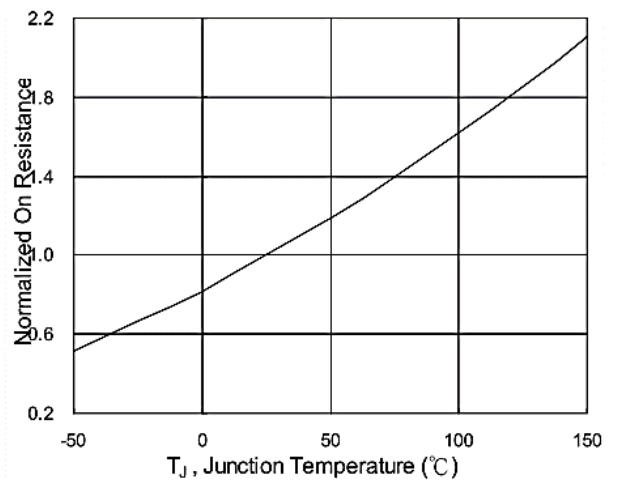


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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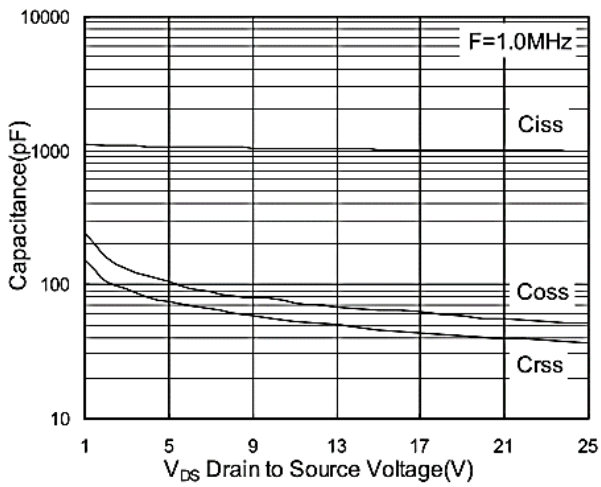


Fig.7 Capacitance

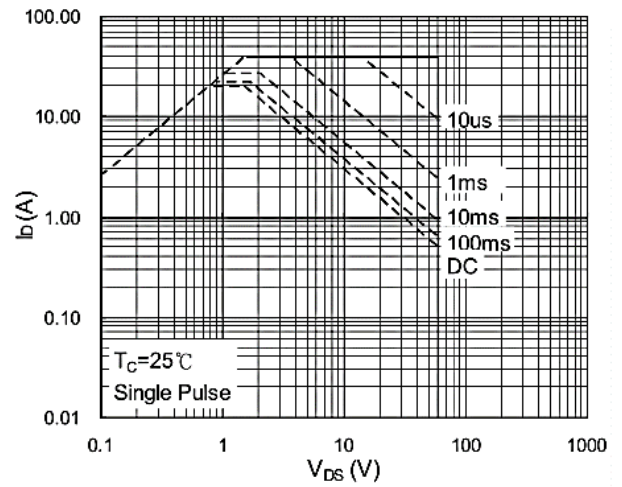


Fig.8 Safe Operating Area

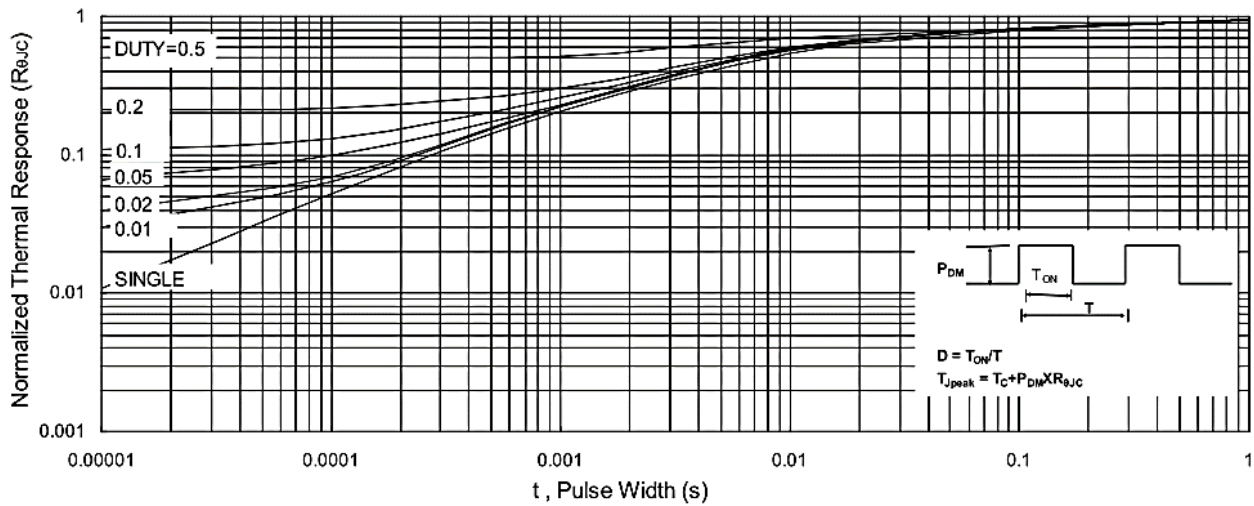


Fig.9 Normalized Maximum Transient Thermal Impedance

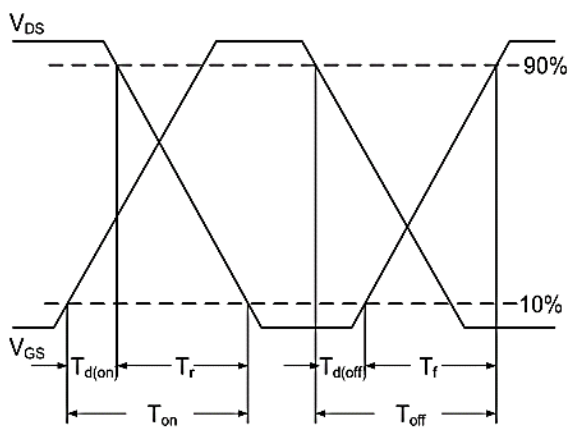


Fig.10 Switching Time Waveform

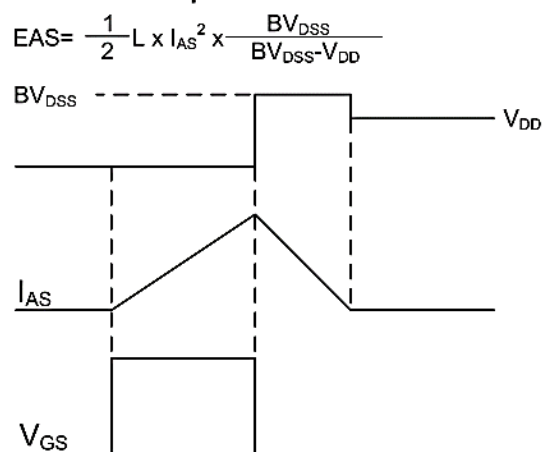
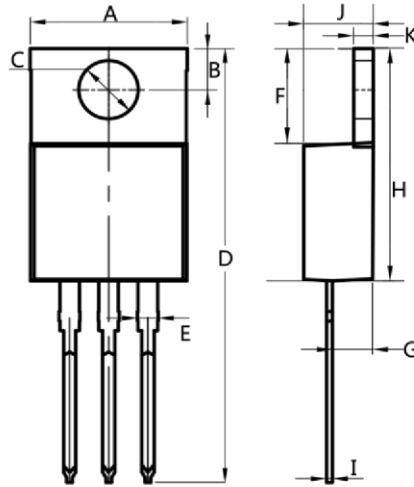


Fig.11 Unclamped Inductive Switching Waveform

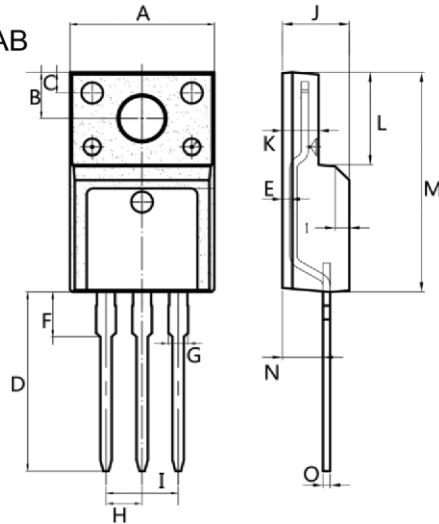
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TO-220AB



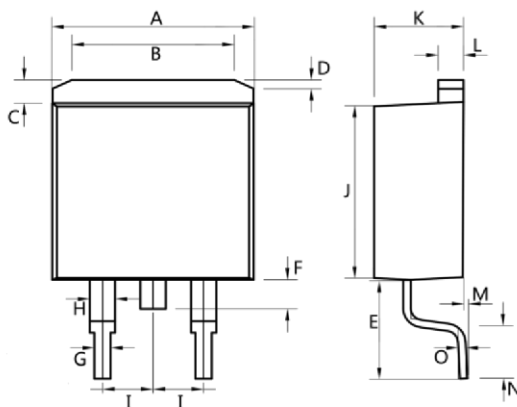
Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4
All Dimensions in millimeter		

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		