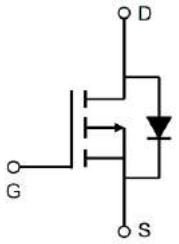
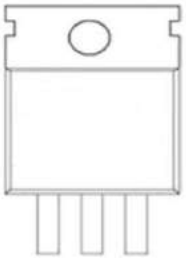
4P20

200V P-Channel Enhancement Mode MOSFET

Description

The 4P20 is silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.





General Features

VDS =-200V,ID =-4A

RDS(ON) <1.5Ω@ VGS=10V

Application

Power amplifier

motor drive

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	- 200	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current T_C = 25 °C	-4	A
	Continuous Drain Current T_C = 100 °C	- 2.3	A
I_{DM}	Pulsed Drain Current[a]	- 14	A
E_{AS}	Single Pulse Avalanche Energy[b]	310	mJ
I_{AR}	Repetitive Avalanche Current[a]	- 3.6	A
E_{AR}	Repetitive Avalanche Energy[a]	4.2	mJ
P_D	Maximum Power Dissipation T_C = 25 °C	42	W
	Maximum Power Dissipation (PCB Mount)[e] T_A = 25 °C	2.5	W
dV/dt	Peak Diode Recovery dV/dt[c]	- 5.0	V/ns
T_J, T_{stg}	Operating Junction and Storage Temperature Range	- 55 to + 150	°C
R_{thJA}	Maximum Junction-to-Ambient	110	°C/W
R_{thJA}	Maximum Junction-to-Ambient (PCB Mount)[a]	50	°C/W
R_{thJC}	Maximum Junction-to-Case (Drain)	3.0	°C/W

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Electrical Characteristics Diagrams

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = - 250 µA	- 200	-	-	V
$\Delta V_{DS}/T_J$	V_{DS} Temperature Coefficient	Reference to 25 °C, I_D = - 1 mA	-	- 0.22	-	V/°C
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = - 250 µA	- 2.0	-	- 4.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS} = - 10 V I_D = - 2.2 A[b]	-	-	1.5	Ω
I_{GSS}	Gate-Source Leakage	V_{GS} = ± 20 V	-	-	± 100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = - 200 V, V_{GS} = 0 V	-	-	- 100	µA
		V_{DS} = - 160 V, V_{GS} = 0 V, T_J = 125 °C	-	-	- 500	
g_{fs}	Forward Transconductance	V_{DS} = - 50 V, I_D = - 2.2 A	1.1	-	-	S
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = - 25 V, f = 1.0 MHz,	-	340	-	pF
C_{oss}	Output Capacitance		-	110	-	
C_{rss}	Reverse Transfer Capacitance		-	33	-	
Q_g	Total Gate Charge	I_D = - 3.9 A, V_{DS} = - 160 V V_{GS} = - 10 V	-	-	20	nC
Q_{gs}	Gate-Source Charge		-	-	3.3	
Q_{gd}	Gate-Drain Charge		-	-	11	
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = - 100 V, I_D = - 3.9 A, R_G = 18 Ω, R_D = 24 Ω, see fig. 10[b]	-	8.8	-	ns
t_r	Rise Time		-	27	-	
$t_{d(off)}$	Turn-Off Delay Time		-	7.3	-	
t_f	Fall Time		-	19	-	
I_S	Continuous Source-Drain Diode Current	MOSFET symbol showing the integral reversep - n junction diode	-	-	- 3.6	A
I_{SM}	Pulsed Diode Forward Current[a]		-	-	- 14	
V_{SD}	Body Diode Voltage	T_J = 25 °C, I_S = - 3.6 A, V_{GS} = 0 V[b]	-	-	- 6.3	V
t_{rr}	Body Diode Reverse Recovery Time	T_J = 25 °C, I_F = - 3.9 A, dI/dt = 100 A/µs[b]	-	150	300	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	0.97	2.0	µC
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width ≤ 300 µs; duty cycle ≤ 2

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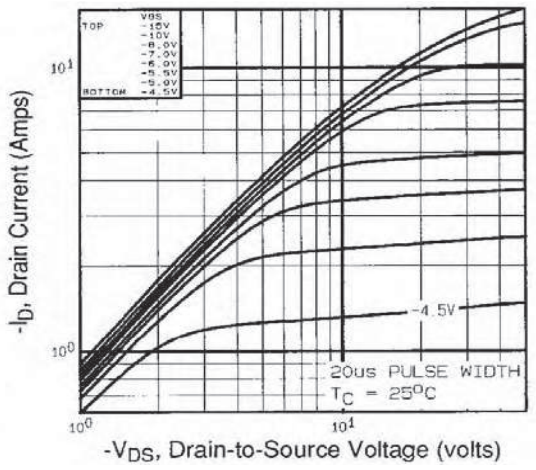


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

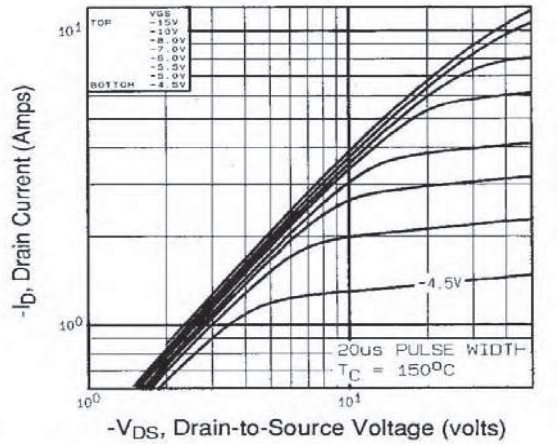


Fig. 2 - Typical Output Characteristics, T_C = 150 °C

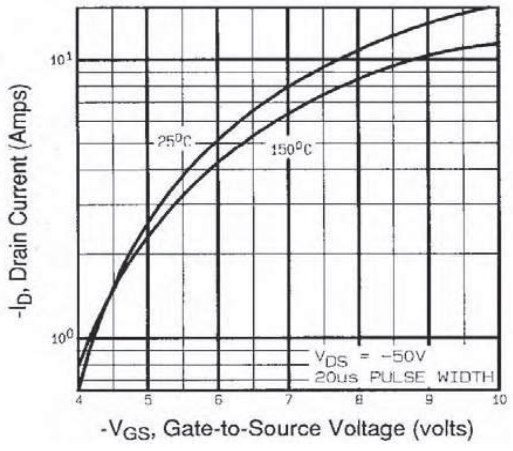


Fig. 3 - Typical Transfer Characteristics

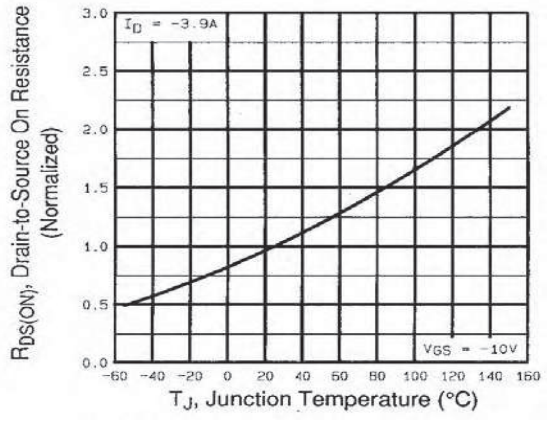


Fig. 4 - Normalized On-Resistance vs. Temperature

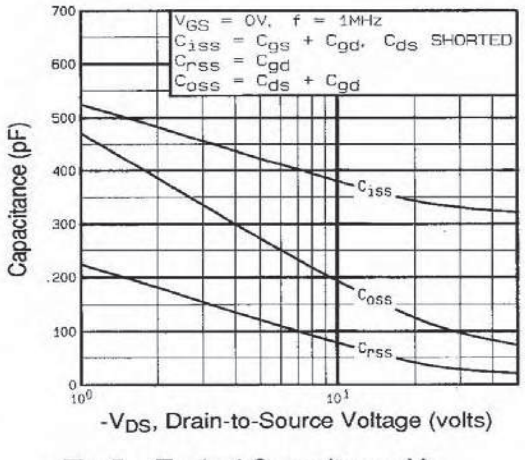


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

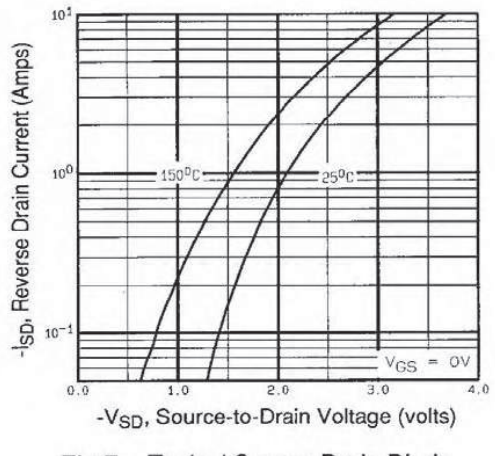


Fig. 7 - Typical Source-Drain Diode Forward Voltage

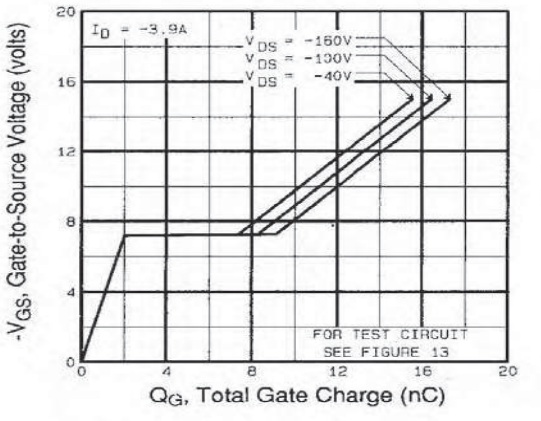


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

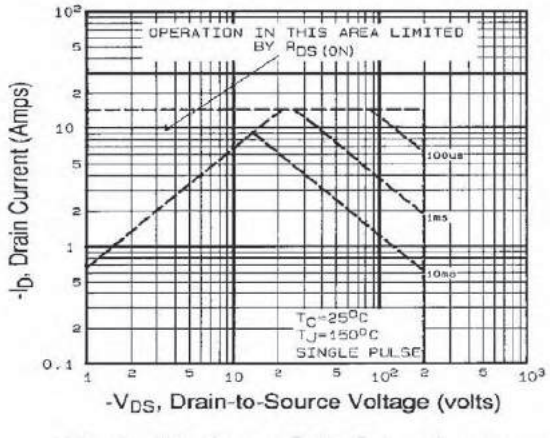


Fig. 8 - Maximum Safe Operating Area

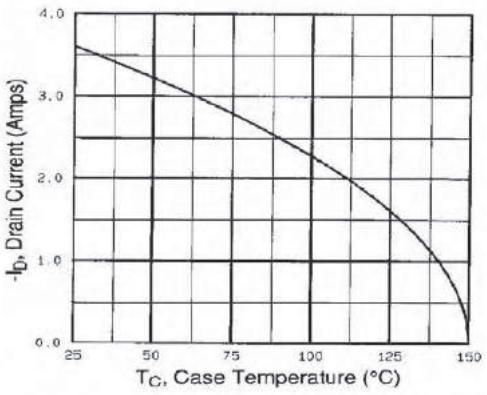


Fig 9. Maximum Drain Current Vs. Case Temperature

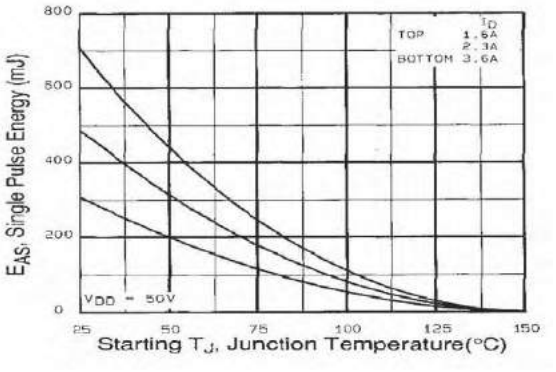


Fig. 10 - Maximum Avalanche Energy vs. Drain Current

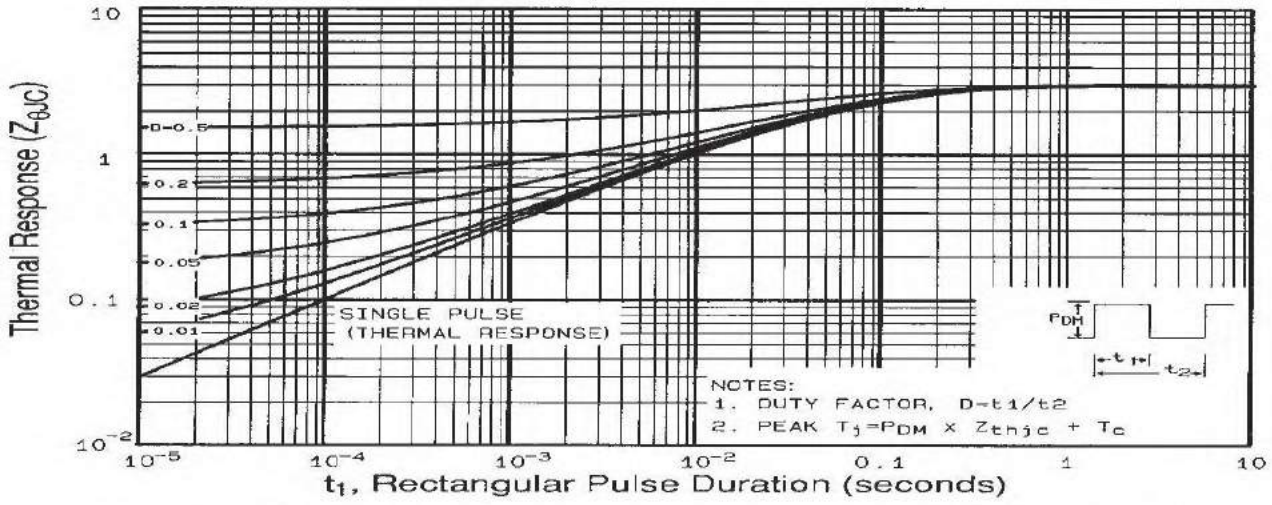
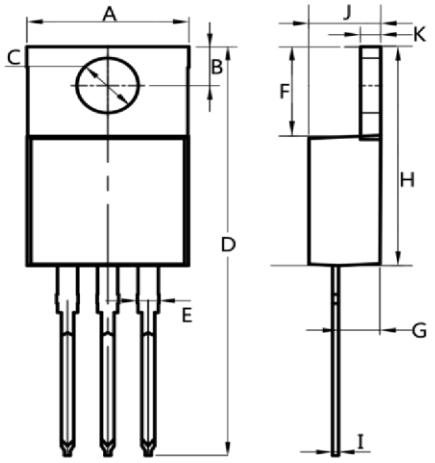


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

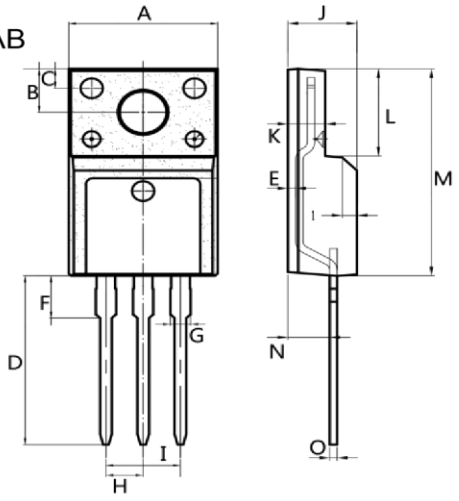
200V P-Channel Enhancement Mode MOSFET

TO-220AB



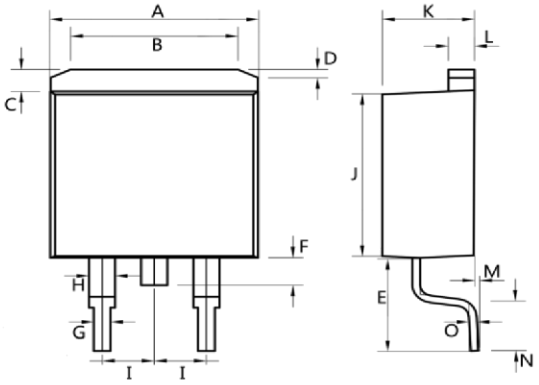
Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4
All Dimensions in millimeter		

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		