

**Features**

- Optimized Body Diode Reverse Recovery Performance
- Low On-resistance and Low Conduction Losses
- Ultra Low Gate Charge Cause Lower Driving Requirement
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

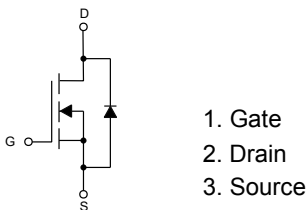
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 0.83°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	±30	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	20
		$T_C=100^\circ C$	12
Pulsed Drain Current (Note 2)	$I_{DM}$	60	A
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	484	mJ
Repetitive Avalanche Energy	$E_{AR}$	0.7	mJ
Avalanche Current	$I_{AR}$	3.5	A
Total Power Dissipation	$P_D$	151	W

Note:

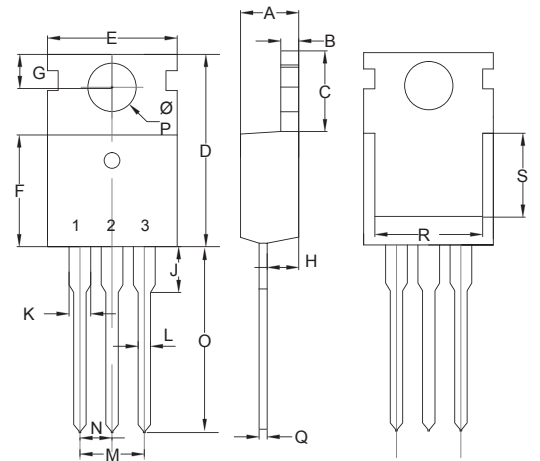
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <100ppm antimony compounds.
2. Repetitive Rating; Pulse Width Limited by Maximum Junction Temperature.
3.  $I_{AS}=3.5A$ ,  $V_{DD}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$ .

**Internal Structure**



**N-CHANNEL  
Super-Junction  
Power MOSFET**

**TO-220AB(H)**



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.172	0.188	4.37	4.77	
B	0.049	0.057	1.25	1.45	
C	0.246	0.270	6.25	6.85	
D	0.594	0.634	15.10	16.10	
E	0.382	0.406	9.70	10.30	
F	0.346	0.370	8.80	9.40	
G	0.102	0.118	2.60	3.00	
H	0.087	0.102	2.20	2.60	
J	-----	0.134	-----	3.40	
K	0.046	0.058	1.17	1.47	
L	0.028	0.037	0.70	0.95	
M	0.200		5.08		TYP.
N	0.100		2.54		TYP.
O	0.502	0.543	12.75	13.80	
P	0.134	0.150	3.40	3.80	Φ
Q	0.016	0.026	0.40	0.65	
R	0.276	-----	7.00	-----	
S	0.217	-----	5.50	-----	

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>Static Characteristics</b>							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	650			V	
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$			$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V, T_C=25^\circ C$			1	$\mu A$	
		$V_{DS}=650V, V_{GS}=0V, T_C=125^\circ C$			100		
Gate-Threshold Voltage <sup>(Note 4)</sup>	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V	
Drain-Source On-Resistance <sup>(Note 4)</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		150	170	m $\Omega$	
Gate Resistance <sup>(Note 4)</sup>	$R_G$	f = 1.0MHz Open Drain		12		$\Omega$	
<b>Dynamic Characteristics <sup>(Note 5)</sup></b>							
Input Capacitance	$C_{iss}$	$V_{DS}=100V, V_{GS}=0V, f=1MHz$		1724		$\mu F$	
Output Capacitance	$C_{oss}$			61			
Reverse Transfer Capacitance	$C_{rss}$			6			
Total Gate Charge	$Q_g$	$V_{DS}=520V, V_{GS}=10V, I_D=20A$		39		nC	
Gate-Source Charge	$Q_{gs}$			8			
Gate-Drain Charge	$Q_{gd}$			15			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=20A$ $V_{GS}=10V, R_{GEN}=25\Omega$		15		ns	
Turn-On Rise Time	$t_r$			59			
Turn-Off Delay Time	$t_{d(off)}$			121			
Turn-Off Fall Time	$t_f$			44			
<b>Drain-Source Diode Characteristics</b>							
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$			1.2	V	
Continuous Body Diode Current	$I_S$				20	A	
Reverse Recovery Time	$t_{rr}$	$V_R=400V, I_F=I_S,$ $di_F/dt = 100A/\mu s$		423		ns	
Reverse Recovery Charge	$Q_{rr}$				5.3		$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$				25		A

Note:

4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$ .

5. Guaranteed by Design, not Subject to Production.

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

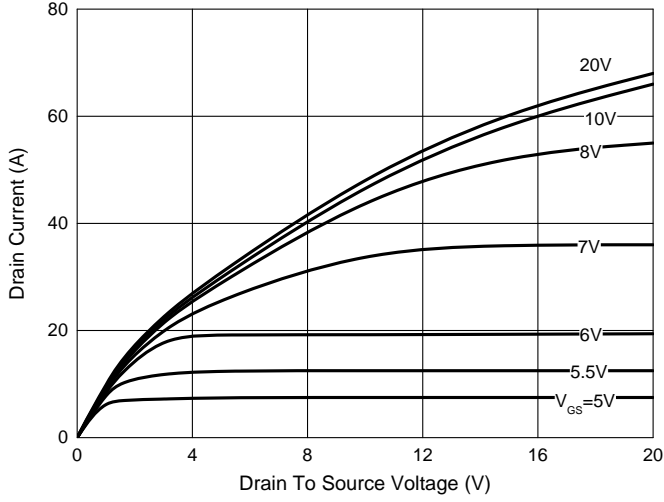


Fig. 2 - Transfer Characteristics

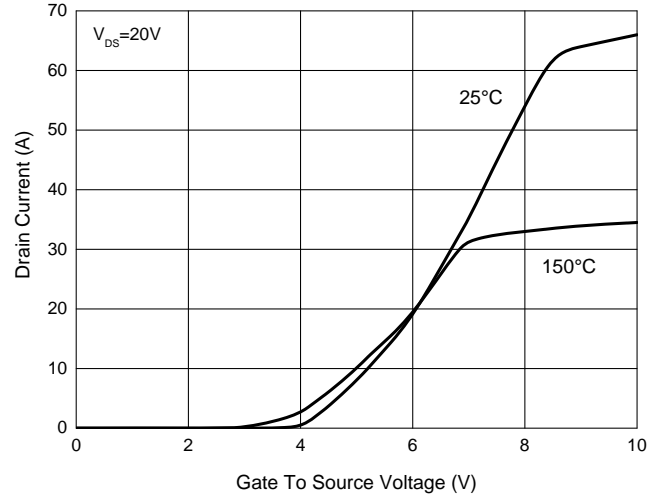


Fig. 3 -  $R_{DS(ON)} - I_D$

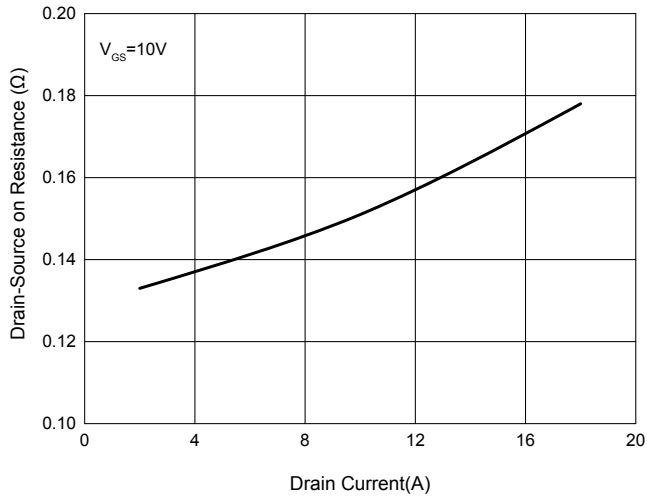


Fig. 4 - Capacitance Characteristics

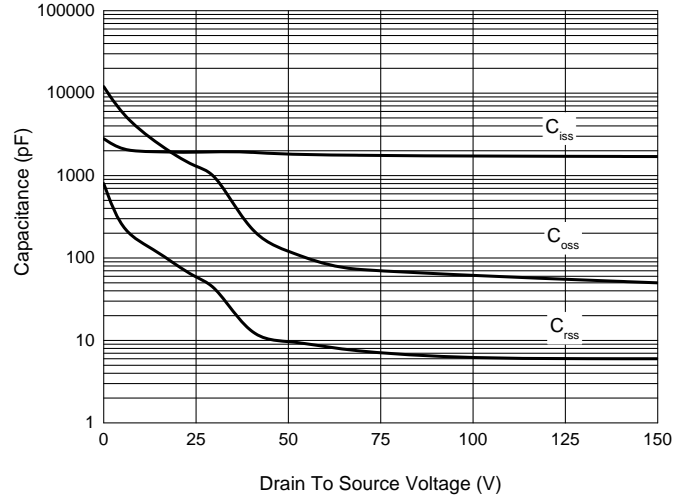


Fig. 5 - Total Gate Charge Characteristics

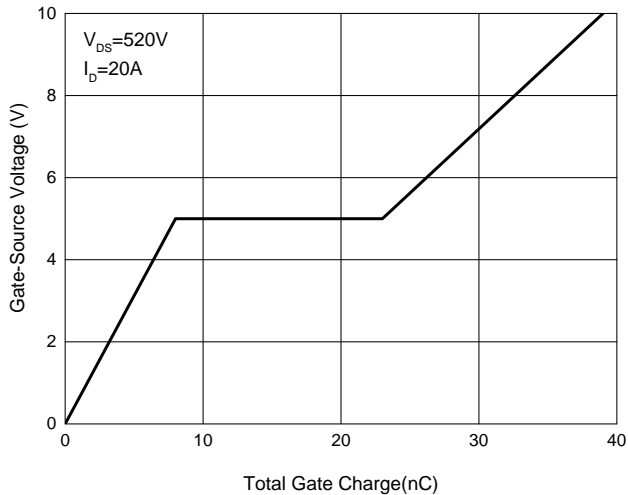
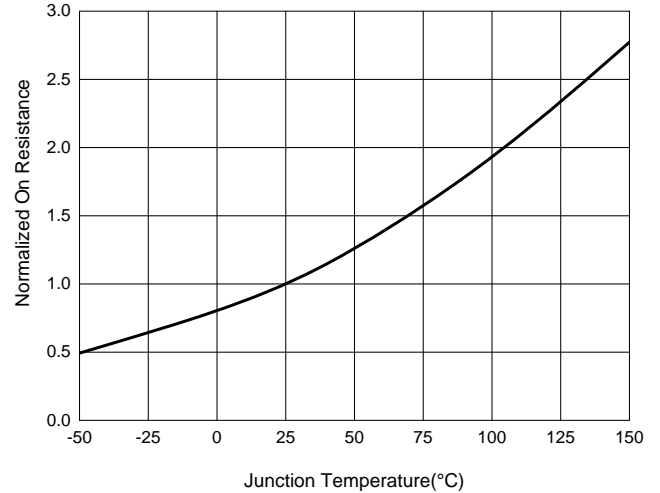


Fig. 6 - Normalized On Resistance Characteristics



## Ordering Information

Device	Packing
Part Number-BP	Bulk:50pcs/Tube, 1Kpcs/Box,5Kpcs/Carton

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