

### Features

- High Density Cell Design for Ultra Low  $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current
- Good Stability and Uniformity with High  $E_{AS}$
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

### Maximum Ratings

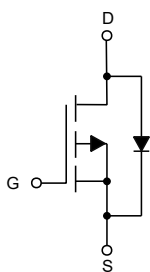
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 40°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 1.15°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	-60
		$T_C=100^\circ C$	-42.4
Pulsed Drain Current (Note 3)	$I_{DM}$	-240	A
Total Power Dissipation (Note 4)	$P_D$	130	W
Single Pulse Avalanche Energy (Note 5)	$E_{AS}$	722	mJ

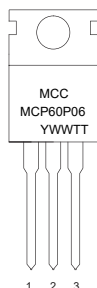
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $T_J=25^\circ C$ ,  $V_{DD}=-25V$ ,  $V_G=-10V$ ,  $L=2mH$ .

### Internal Structure and Marking Code



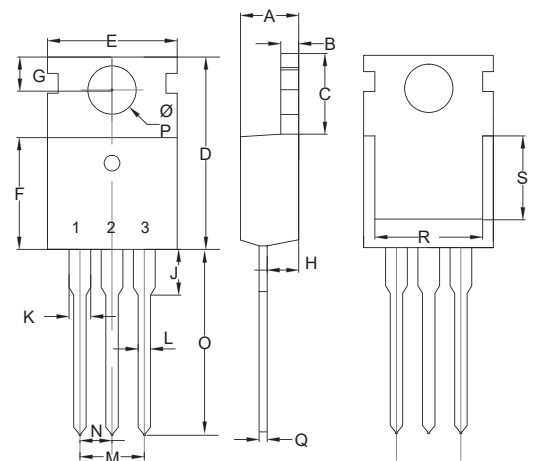
1. Gate
2. Drain
3. Source



YWWTT: 5 codes in total  
Y is the year  
WW is the cycle  
TT is the line type

## P-CHANNEL MOSFET

### TO-220AB(H)



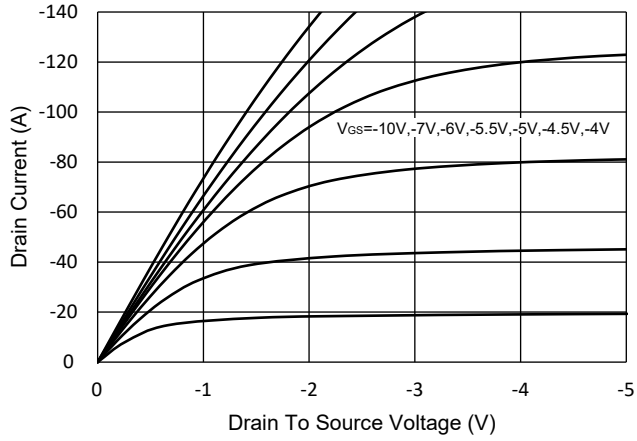
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.172	0.188	4.37	4.77	
B	0.049	0.057	1.25	1.45	
C	0.246	0.270	6.25	6.85	
D	0.594	0.634	15.10	16.10	
E	0.382	0.406	9.70	10.30	
F	0.346	0.370	8.80	9.40	
G	0.102	0.118	2.60	3.00	
H	0.087	0.102	2.20	2.60	
J	----	0.134	----	3.40	
K	0.046	0.058	1.17	1.47	
L	0.028	0.037	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)**

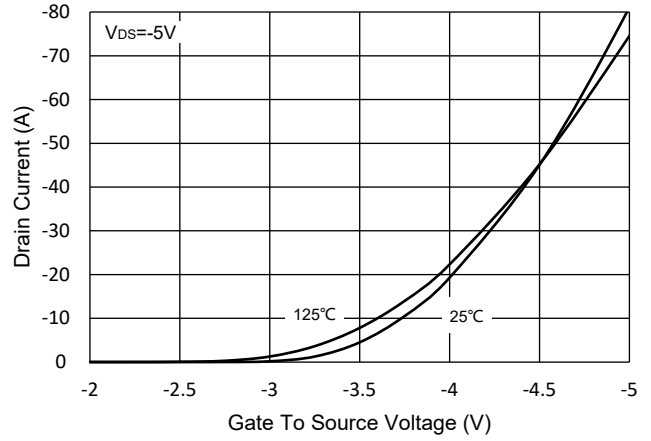
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-60V, V_{GS}=0V$			-1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-2	-2.6	-3.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-20A$		13	18	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-20A$		25		S
Gate Resistance	$R_g$	f=1Mhz, Drain open		2.3		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				-60	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-20A$			-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=-20A, di/dt=100A/\mu s$		34		ns
Reverse Recovery Charge	$Q_{rr}$			48		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-25V, V_{GS}=0V, f=1MHz$		6504		pF
Output Capacitance	$C_{oss}$			360		
Reverse Transfer Capacitance	$C_{rss}$			313		
Total Gate Charge	$Q_g$	$V_{DS}=-30V, V_{GS}=-10V, I_D=-20A$		113		nC
Gate-Source Charge	$Q_{gs}$			22.5		
Gate-Drain Charge	$Q_{gd}$			26		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-30V, V_{GS}=-10V$ $R_G=3\Omega, I_D=-30A$		20		ns
Turn-On Rise Time	$t_r$			40		
Turn-Off Delay Time	$t_{d(off)}$			110		
Turn-Off Fall Time	$t_f$			43		

**Curve Characteristics**

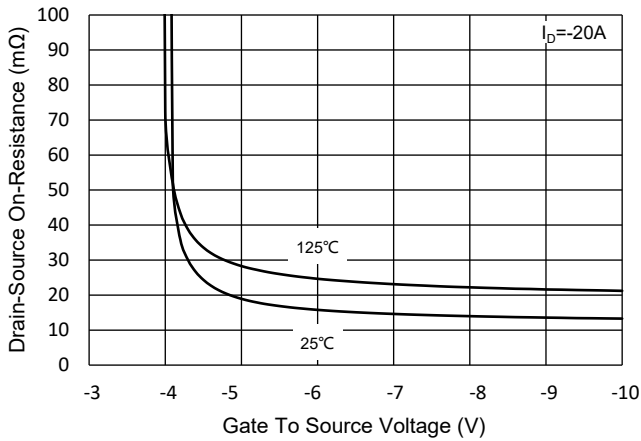
**Fig. 1 - Typical Output Characteristics**



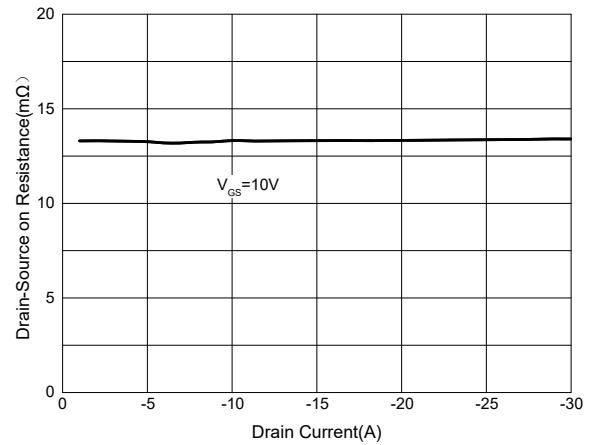
**Fig.2 - Transfer Characteristic**



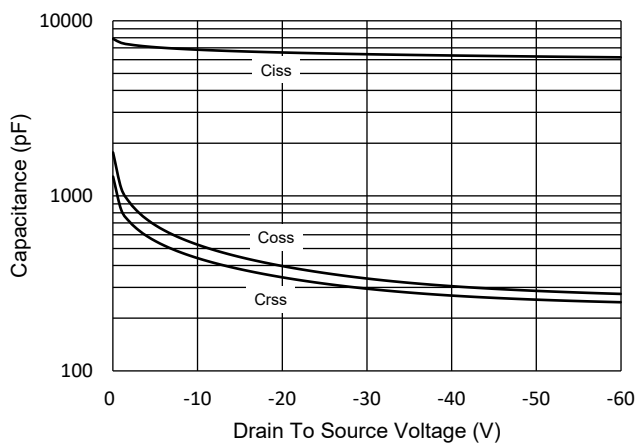
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



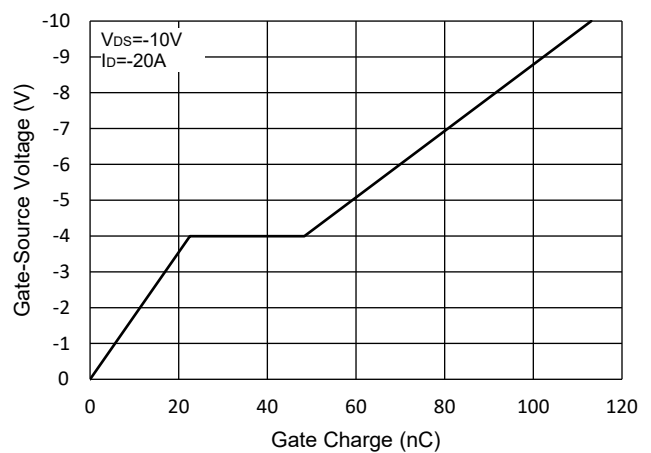
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

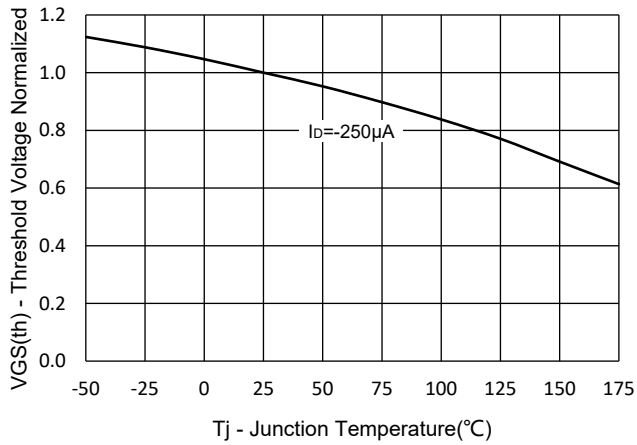


**Fig.6 - Gate Charge**

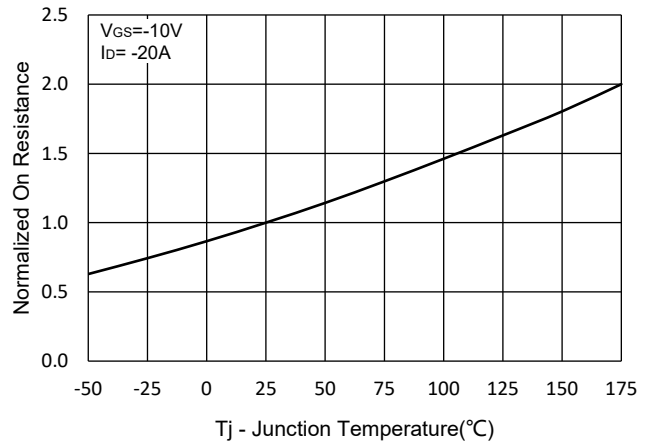


**Curve Characteristics**

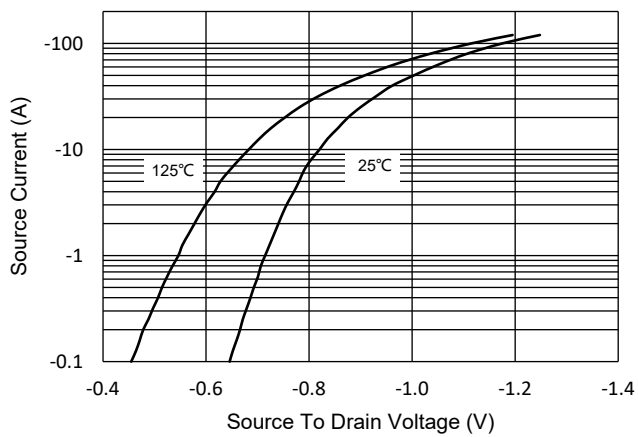
**Fig.7 - Normalized Threshold Voltage**



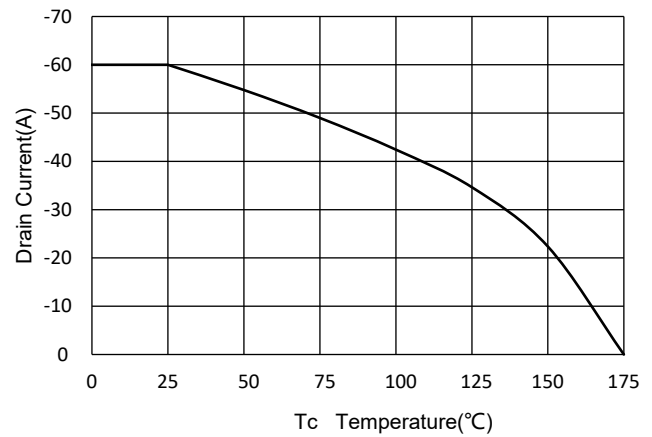
**Fig.8 - Normalized On Resistance Characteristics**



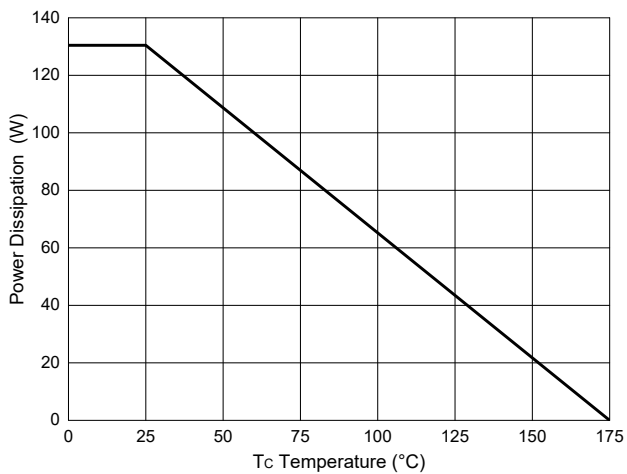
**Fig.9 - IS - VSD**



**Fig.10 - Drain Current**

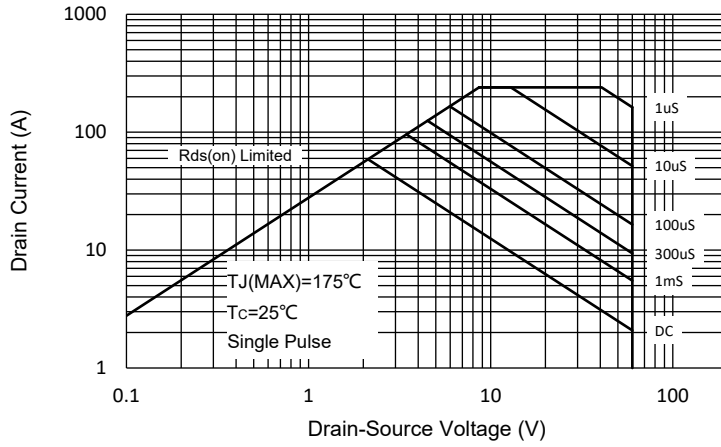


**Fig.11 - PD Dissipation**

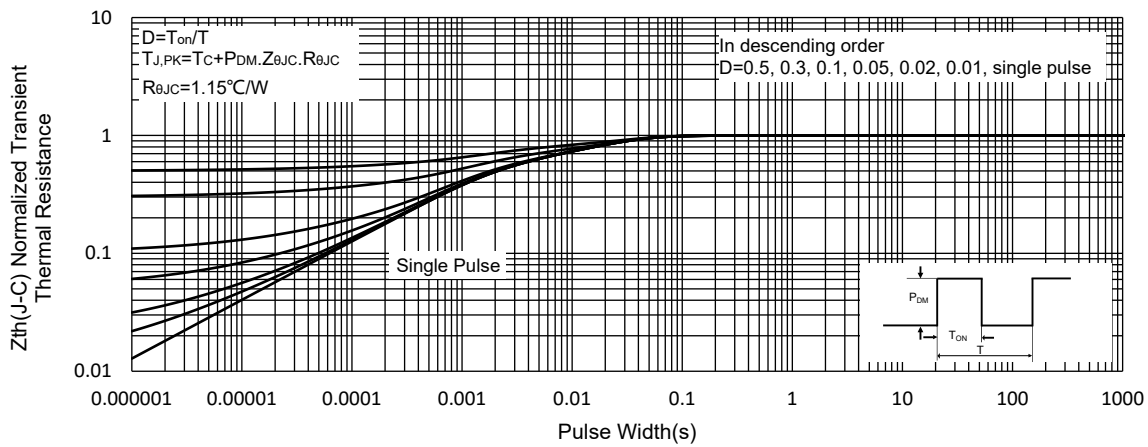


**Curve Characteristics**

**Fig.12 - Safe Operation Area**



**Fig.13 - Normalized Transient Thermal Impedance**



## Ordering Information

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

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