

### Features

- Split Gate Trench Mosfet Technology
- Excellent Stability and Uniformity
- 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

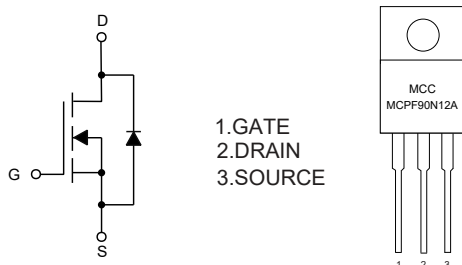
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62.5°C/W Junction to Ambient(Notes 2)
- Thermal Resistance: 1.6°C/W Junction to Case

Parameter	Symbol	Rating	Unit	
Drain -Source Voltage	$V_{DS}$	120	V	
Gate -Source Voltage	$V_{GS}$	±20	V	
Drain Current-Continuous	$I_D$	$T_C=25^\circ C$	90	A
		$T_C=100^\circ C$	56	
Drain Current-Pulse(Notes 3)	$I_{DM}$	360	A	
Power Dissipation(Notes 4)	$P_D$	78	W	
Single Pulsed Avalanche Energy(Notes 5)	$E_{AS}$	441	mJ	

**Note:**

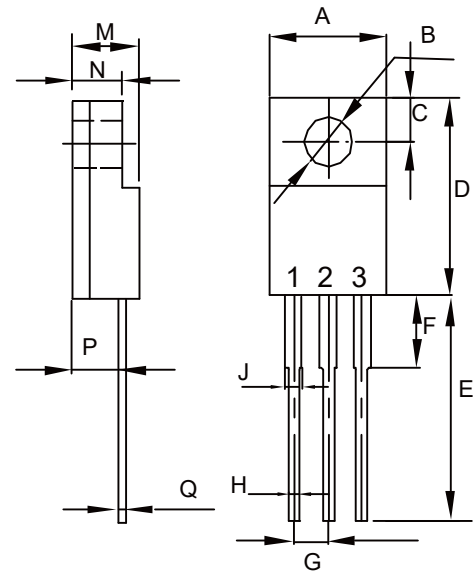
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of RθJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. P<sub>D</sub> is based on max. junction temperature, using junction-Case thermal resistance.
5. T<sub>J</sub>=25 C, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, V<sub>GS</sub>=10V, L=2mH.

### Internal Structure and Marking Code



# N-CHANNEL MOSFET

## TO-220F



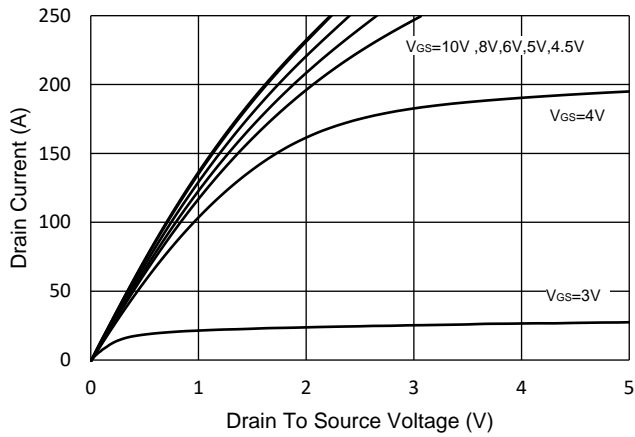
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.381	0.406	9.70	10.30	
B	0.118	0.138	3.00	3.50	Φ
C	0.124	0.139	3.15	3.55	
D	0.610	0.634	15.50	16.10	
E	0.496	0.535	12.60	13.60	
F	0.134	0.150	3.40	3.80	
G	0.092	0.108	2.34	2.74	
H	0.027	0.035	0.70	0.90	
J	0.044	0.056	1.12	1.42	
M	0.173	0.193	4.40	4.90	
N	0.098	0.114	2.50	2.90	
P	0.085	0.100	2.15	2.55	
Q	0.016	0.024	0.40	0.60	

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

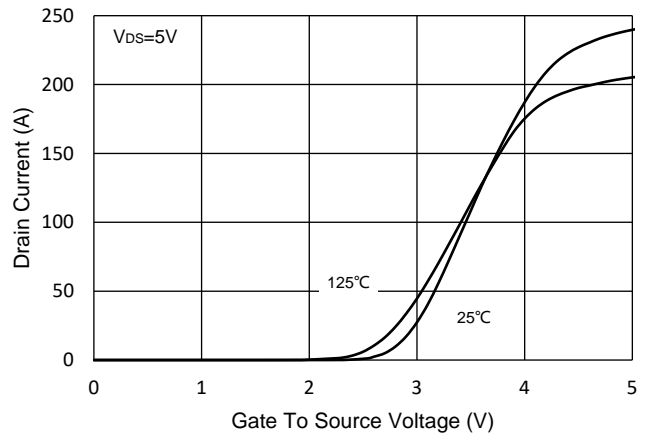
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	120			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=120V, V_{GS}=0V$			1	$\mu A$
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	2.0	3.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=45A$		7	9	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$		8.5	11	
Gate resistance	$R_G$	$V_{GS}=0V, f=1MHz$		0.8		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				90	A
Body Diode Voltage	$V_{SD}$	$I_{SD}=20A, V_{GS}=0V$			1.2	V
Reverse Recovery Charge	$Q_{rr}$	$I_F=20A, di/dt=100A/\mu s$		176		nC
Reverse Recovery Time	$t_{rr}$			85		ns
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=60V, V_{GS}=0V, f=1MHz$		4604		pF
Output Capacitance	$C_{oss}$			430		
Reverse Transfer Capacitance	$C_{rss}$			7.4		
Total Gate Charge	$Q_g$	$V_{DS}=60V, V_{GS}=10V, I_D=20A$		67.5		nC
Gate-Source Charge	$Q_{gs}$			13.5		
Gate-Drain Charge	$Q_{gd}$			10		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=60V, I_D=20A, V_{GS}=10V, R_G=2.2\Omega$		16		ns
Turn-On Rise Time	$t_r$			8.7		
Turn-Off Delay Time	$t_{d(off)}$			43		
Turn-Off Fall Time	$t_f$			11		

## Curve Characteristics

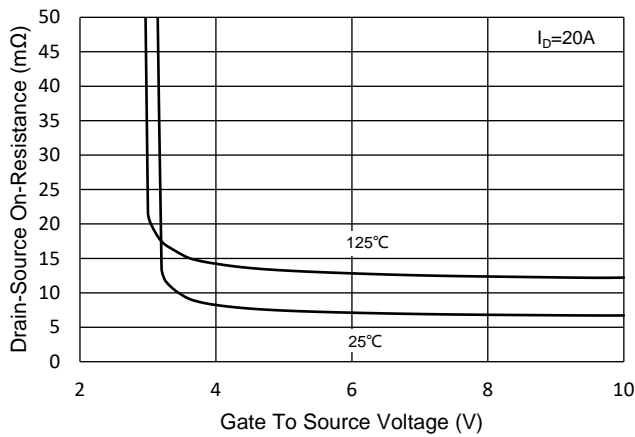
**Fig.1 - Typical Output Characteristics**



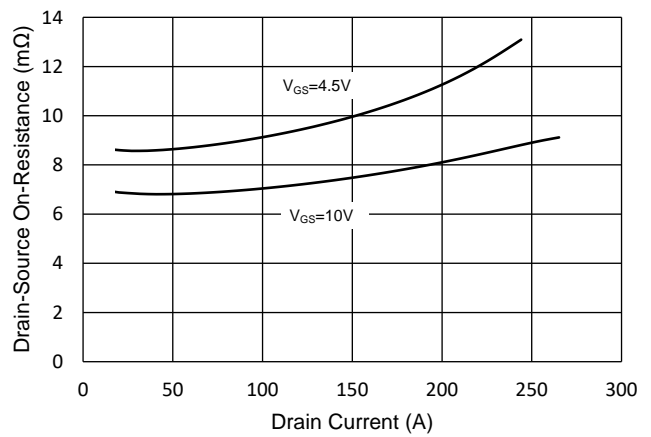
**Fig.2 - Transfer Characteristic**



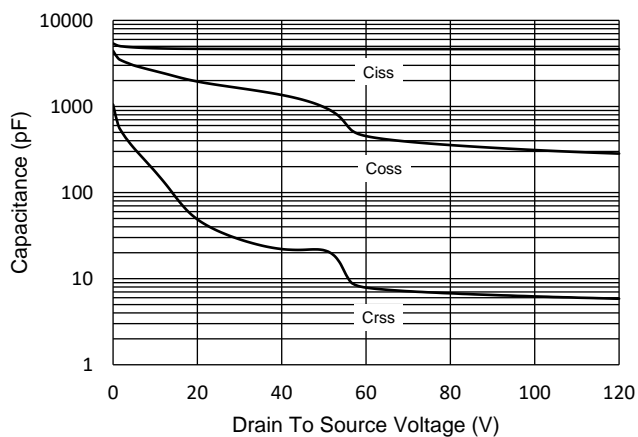
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



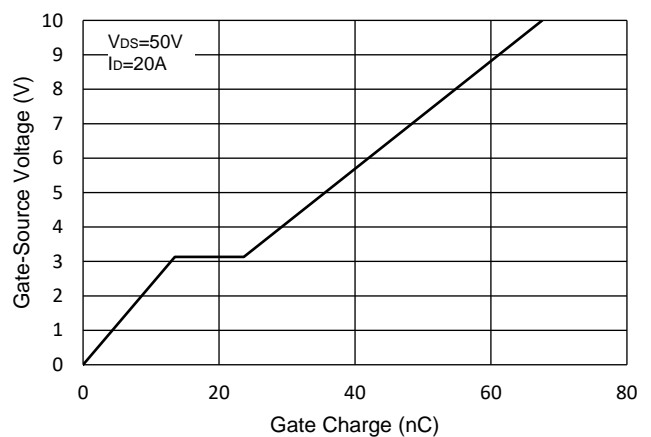
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

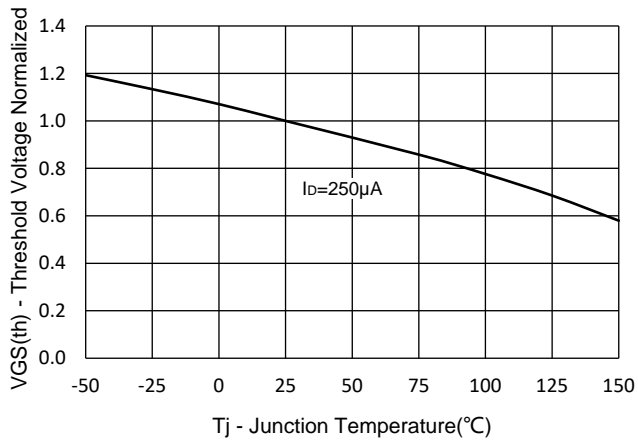


**Fig.6 - Gate Charge**

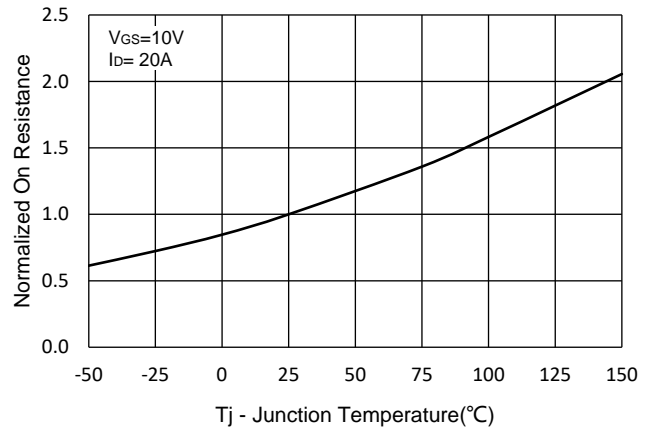


## Curve Characteristics

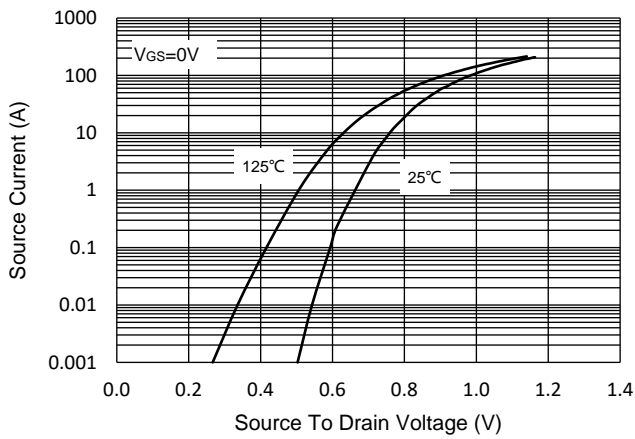
**Fig.7 - Normalized Threshold Voltage**



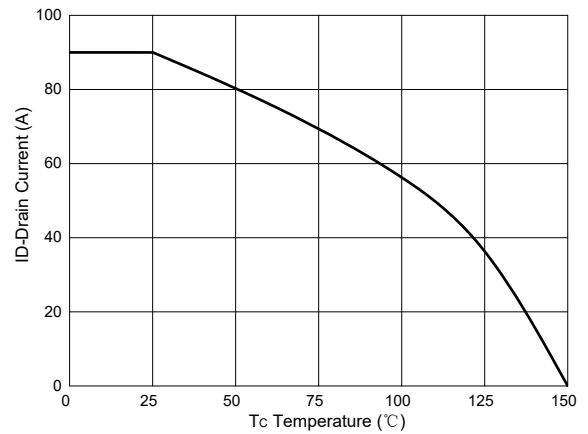
**Fig.8 - Normalized On Resistance Characteristics**



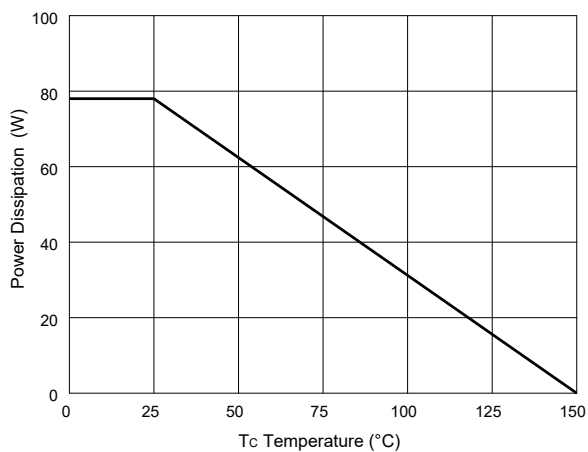
**Fig.9 - Is - VSD**



**Fig.10 - Drain Current**

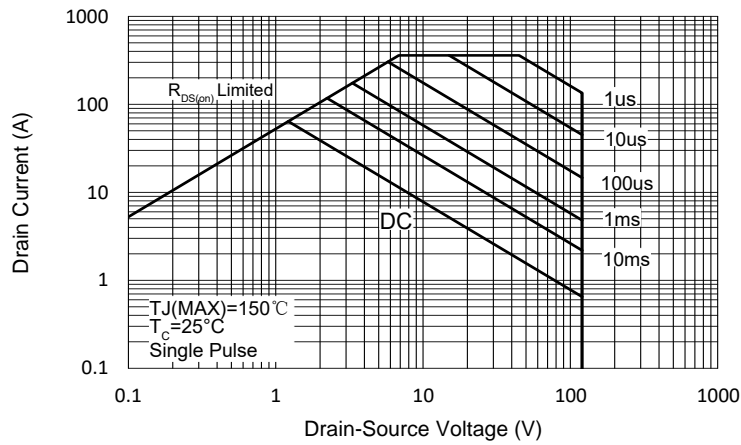


**Fig.11 - PD Dissipation**

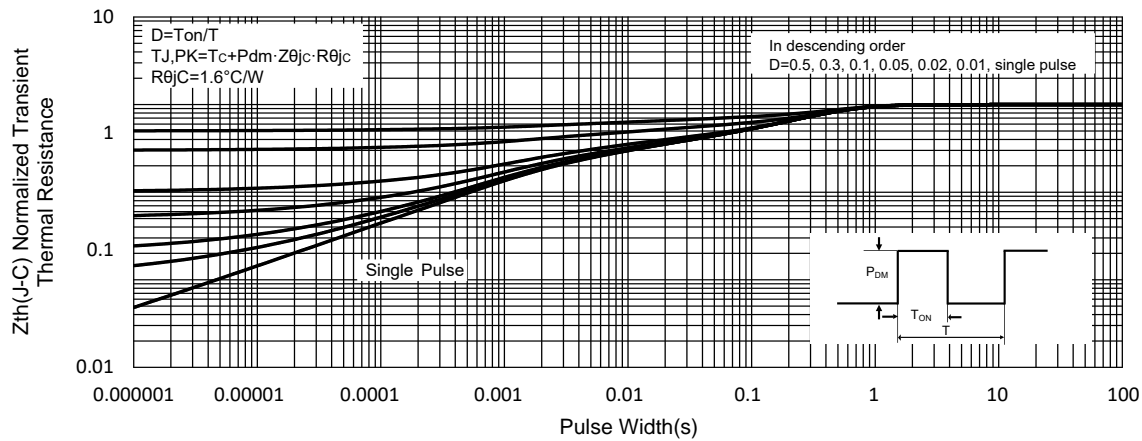


## Curve Characteristics

**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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