

## Features

- Very Low FOM  $R_{DS(on)} \times Q_g$
- Epoxy Meets UL 94 V-0 Flammability Rating
- 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: 75°C/W Junction to Ambient
- Thermal Resistance: 4.0°C/W Junction to Case

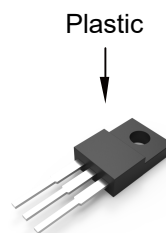
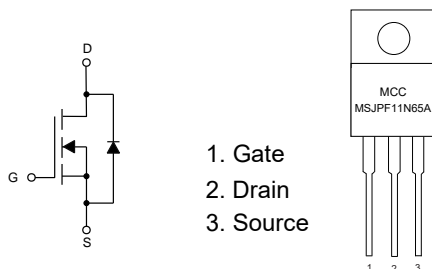
Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	650	V	
Gate-Source Voltage	$V_{GS}$	±30	V	
Continuous Drain Current	$I_D$	11	A	
Pulsed Drain Current (Note 2)	$I_{DM}$	45	A	
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	215	mJ	
Avalanche Current (Note 2)	$I_{AR}$	1.6	A	
Repetitive Avalanche Energy (Note 2)	$E_{AR}$	0.32	mJ	
Total Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	31.3	W

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. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

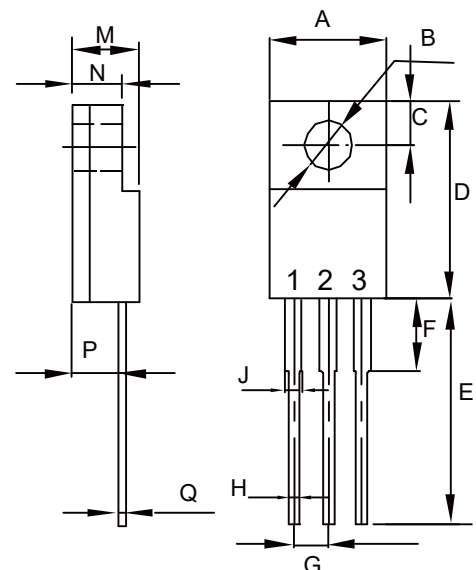
3.  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$  .

## Internal Structure and Marking Code



# N-CHANNEL Super-Junction Power MOSFET

## TO-220F



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.392	0.421	9.96	10.70	
B	0.138		3.50		φ
C	0.106		2.70		TYP.
D	0.567	0.642	14.40	16.30	
E	0.520		13.20		TYP.
F	---	0.177	---	4.50	
G	0.100		2.54		TYP.
H	0.020	0.035	0.50	0.90	
J	0.043	0.053	1.10	1.35	
M	0.169	0.201	4.30	5.10	
N	---	0.140	---	3.56	
P	0.083	0.126	2.10	3.20	
Q	0.020	0.032	0.50	0.80	

**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	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=650V, V_{GS}=0V, T_J=150^\circ C$			100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
Drain-Source On-Resistance <sup>(Note 4)</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=3.2A$		0.34	0.38	$\Omega$
Forward transconductance <sup>(Note 4)</sup>	$g_{FS}$	$V_{DS}=10V, I_D=3.2A$		7.8		S
<b>Dynamic Characteristics<sup>(Note 5)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		763		$\mu F$
Output Capacitance	$C_{oss}$			896		
Reverse Transfer Capacitance	$C_{rss}$			39		
Total Gate Charge	$Q_g$	$V_{DD}=520V, V_{GS}=10V, I_D=11A$		21		nC
Gate-Source Charge	$Q_{gs}$			5.3		
Gate-Drain Charge	$Q_{gd}$			7.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=325V, I_D=11A, R_G=25\Omega$		19		ns
Turn-On Rise Time	$t_r$			38		
Turn-Off Delay Time	$t_{d(off)}$			108		
Turn-Off Fall Time	$t_f$			36		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C=25^\circ C$			11	A
Pulsed Diode Forward Current	$I_{SM}$				33	
Body Diode Voltage	$V_{SD}$	$I_{SD}=11A, V_{GS}=0V$			1.4	V
Reverse Recovery Time	$t_{rr}$	$V_R=520V, I_F=I_S, di_F/dt=100A/\mu s$		324		ns
Reverse Recovery Charge	$Q_{rr}$				3.8	$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$				23	A

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

5. Guaranteed by Design, Not Subject to Production Testing.

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

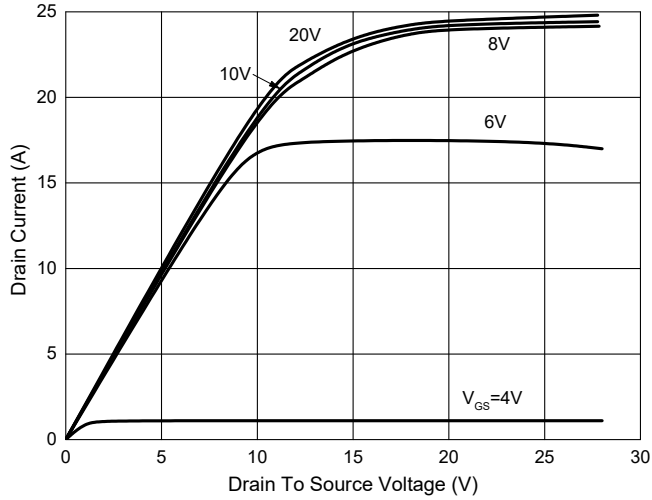


Fig. 2 - Transfer Characteristics

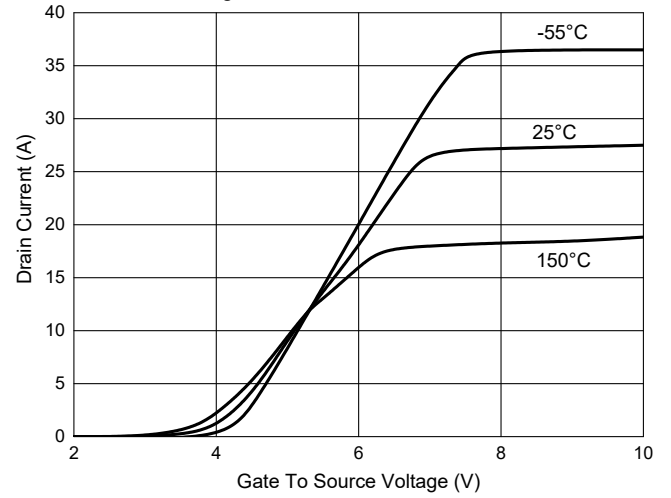


Fig. 3 -  $R_{DS(ON)} - I_D$

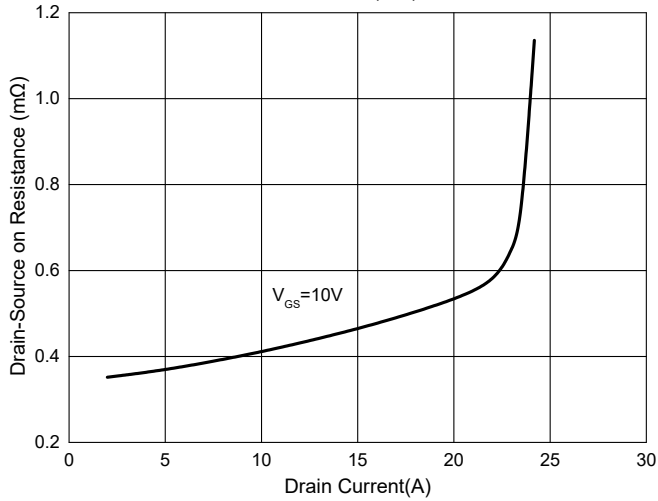


Fig. 4 - Normalized On Resistance Characteristics

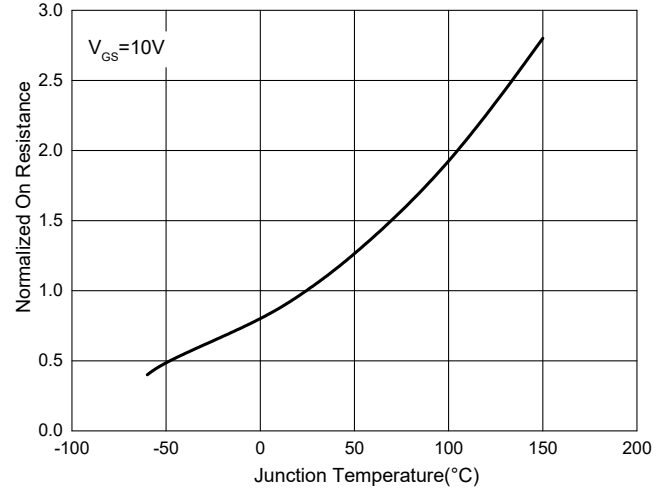


Fig. 5 - Gate Charge

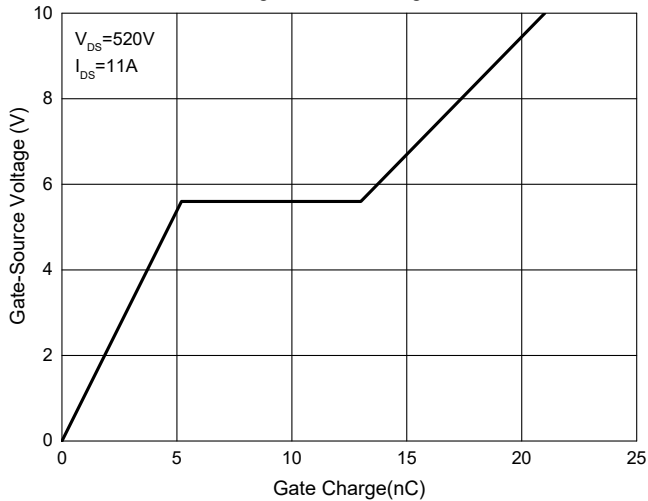


Fig. 6 - Capacitance Characteristics

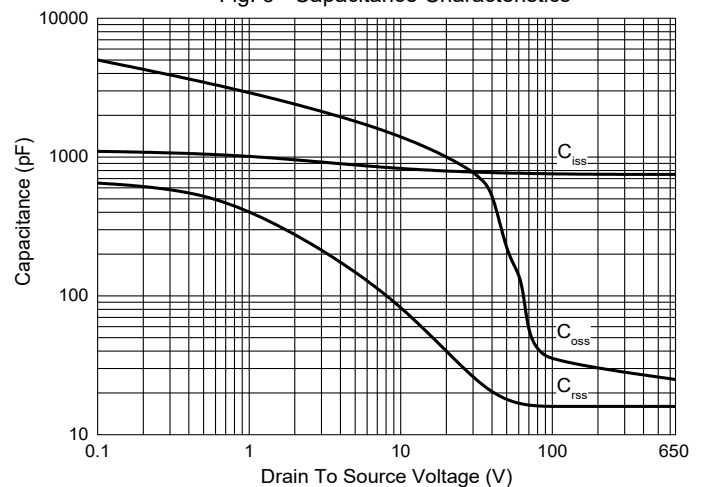


Fig. 7 - Normalized Drain-Source Breakdown Voltage

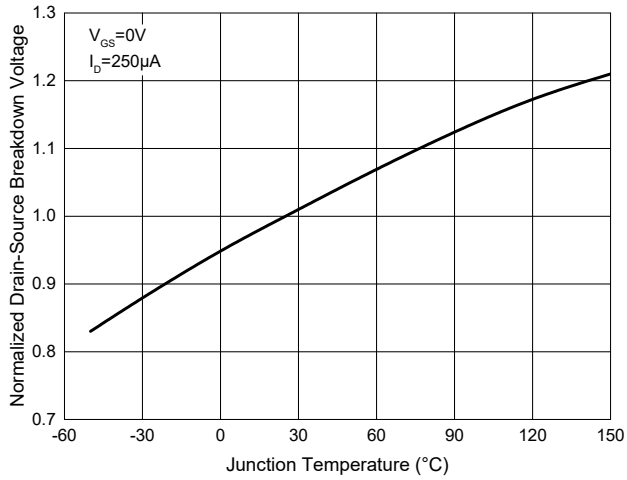


Fig. 8 - Safe Operation Area

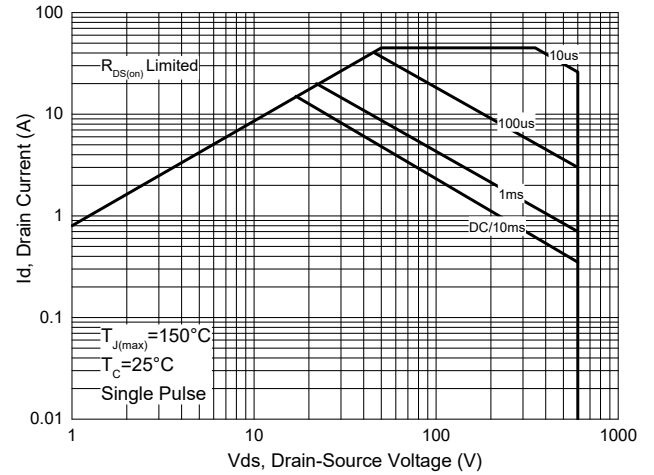
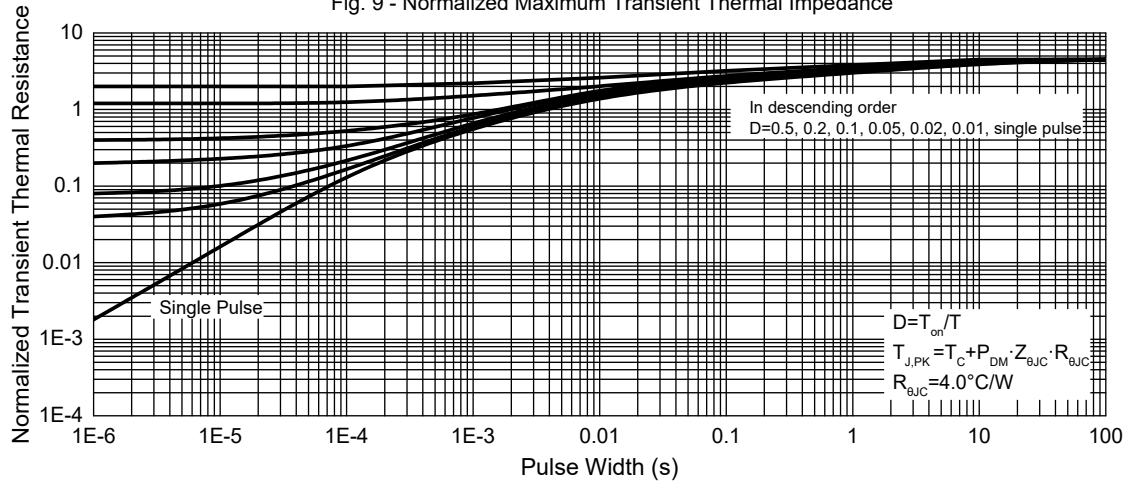


Fig. 9 - Normalized Maximum Transient Thermal Impedance



## Ordering Information

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

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