

Features

- Low On-resistance and Low Conduction Loss
- Super Junction technology for High Voltage Application
- Soft Switching with Fast Reverse Recovery Diode
- Ultra Low Gate Charge Cause Lower Driving Requirement
- 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

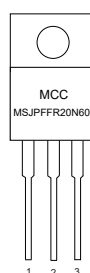
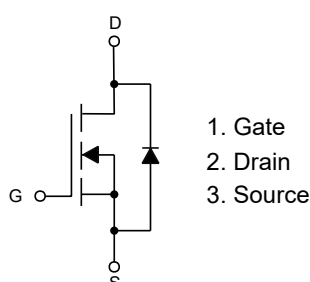
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance Junction to Ambient,Max^(Note 2): 60°C/W
- Thermal Resistance Junction to Case,Max : 2°C/W

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current ^(Note 3)	I_{DM}	49	A
Total Power Dissipation, $T_C=25^\circ\text{C}$	P_D	62.5	W
Single Avalanche Energy ^(Note 4)	E_{AS}	160	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. Device in a still air environment with $T_A=25^\circ\text{C}$.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. Starting $T_J=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $I_{AS}=4\text{A}$.

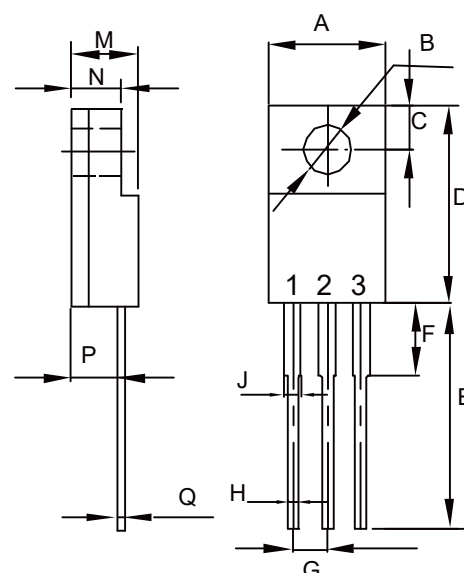
Internal Structure and Marking Code



Device Code: MSJPFFR20N60

N-CHANNEL Super-Junction Power MOSFET

TO-220F



DIMENSIONS					
DIM	INCHES		MM		NOTE
	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 ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =1mA	600			V
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±30V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =1.7mA	3	4.0	5	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =8.5A		170	204	mΩ
Gate Resistance	R _g	f=1MHz, open drain		1.3		Ω
Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =8.5A			1.2	V
Reverse Recovery Time	t _{rr}	V _R =300V, I _F =20A dI _F /dt=100A/μs		110		ns
Reverse Recovery Charge	Q _{rr}			550		nC
Peak Reverse Recovery Current	I _{rrm}			10		A
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =100V, V _{GS} =0V, f=1MHz		1240		pF
Output Capacitance	C _{oss}			60		
Output capacitance - energy related	C _{o(er)}	V _{DS} =0 to 400V, V _{GS} =0V		55		
Output capacitance - time related	C _{o(tr)}			338		
Total Gate Charge	Q _g	V _{DS} =300V, V _{GS} =10V, I _D =20A		30		nC
Gate-Source Charge	Q _{gs}			9		
Gate-Drain Charge	Q _{gd}			15		
Turn-On Delay Time	t _{d(on)}	V _{DD} =300V, V _{GS} =10V R _G =6Ω, I _D =20A		16		ns
Turn-On Rise Time	t _r			55		
Turn-Off Delay Time	t _{d(off)}			29		
Turn-Off Fall Time	t _f			16		

Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 1 - Typical Output Characteristics

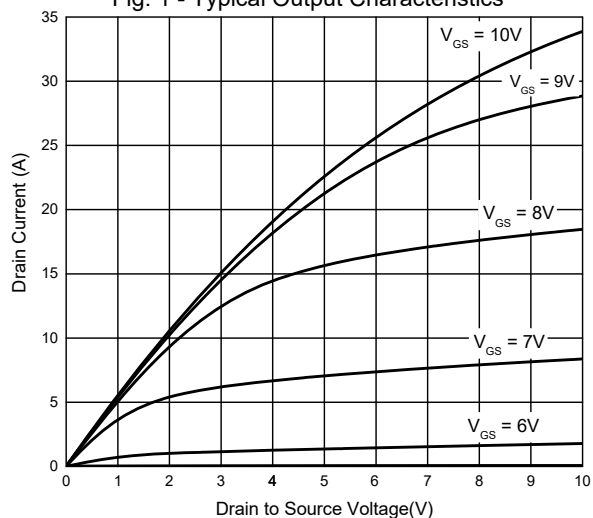


Fig. 2 - Typical Transfer Characteristics

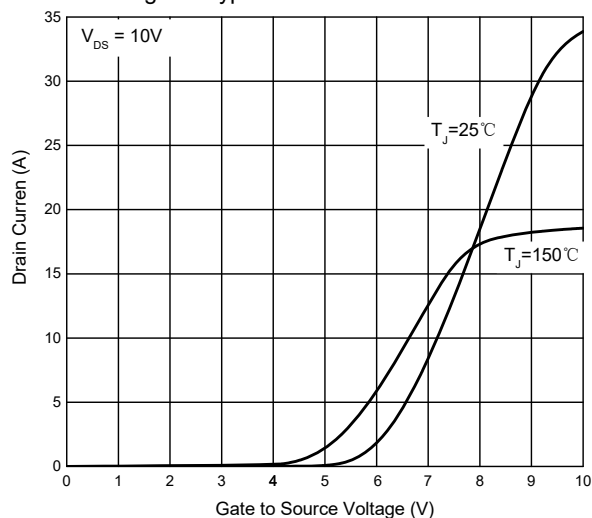


Fig. 3 - On-Resistance vs Gate Bias

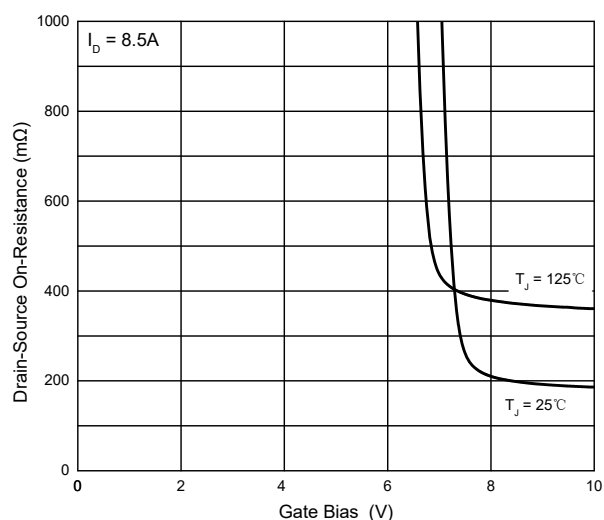


Fig. 4 - On-Resistance vs Drain Current

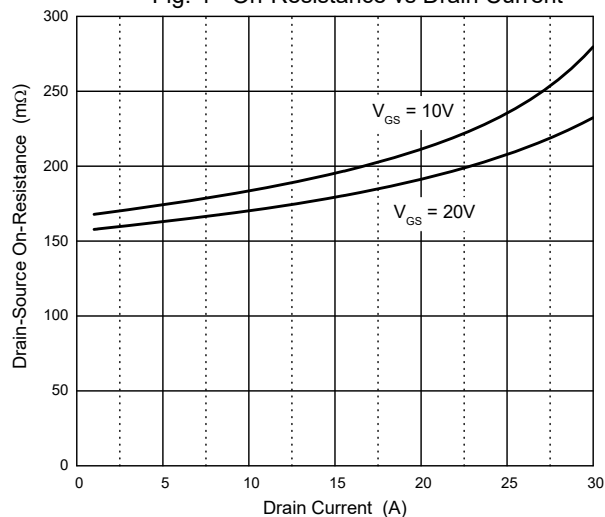


Fig. 5 - Capacitance Characteristic

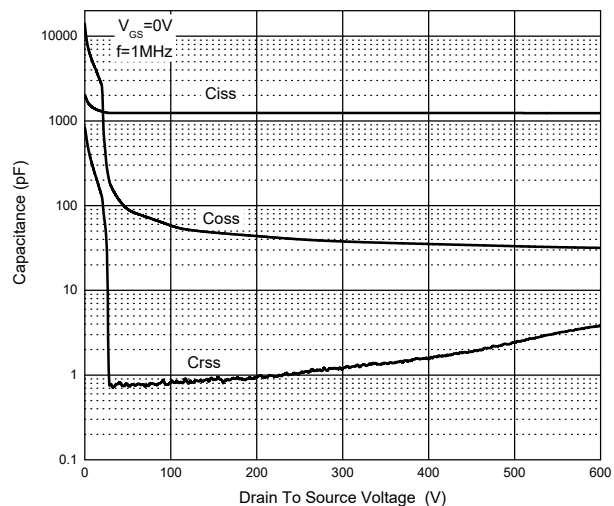
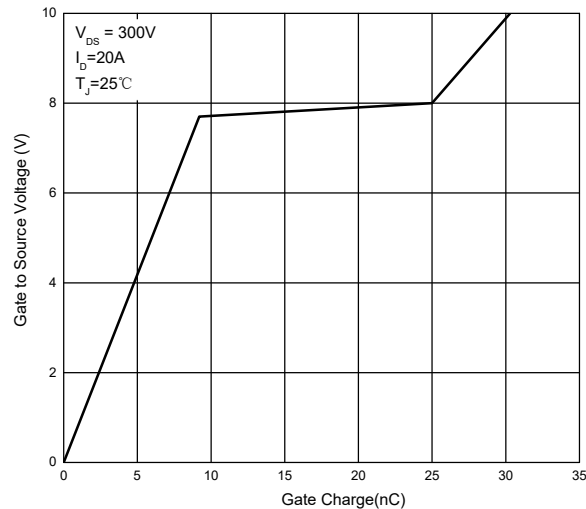


Fig. 6 - Typical Gate Charge



Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 7- Gate-Threshold Voltage vs Junction Temperature

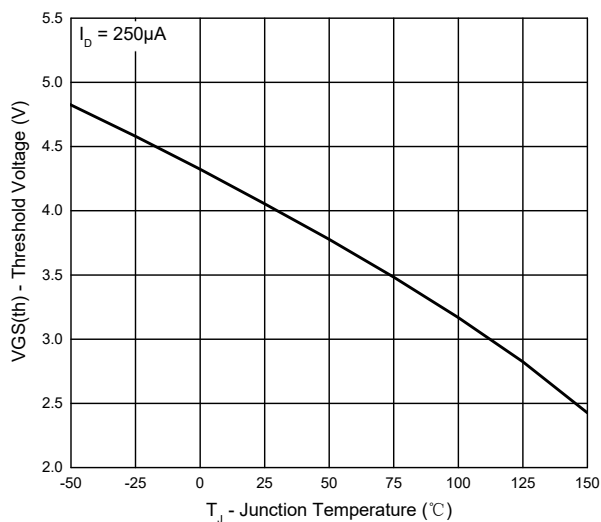


Fig. 8 - Normalized On-Resistance

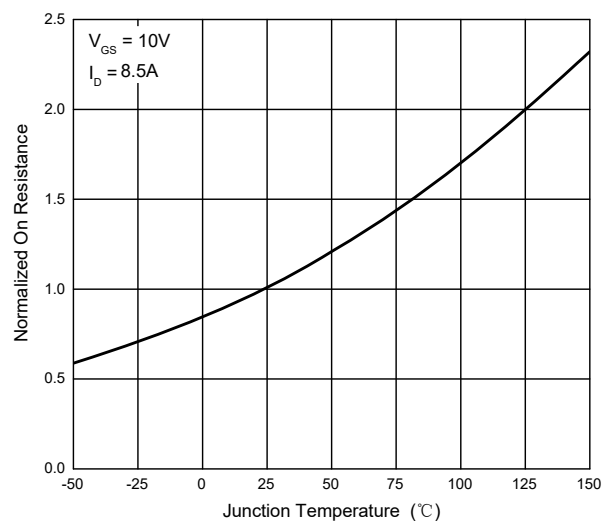


Fig. 9 - Forward Characteristics

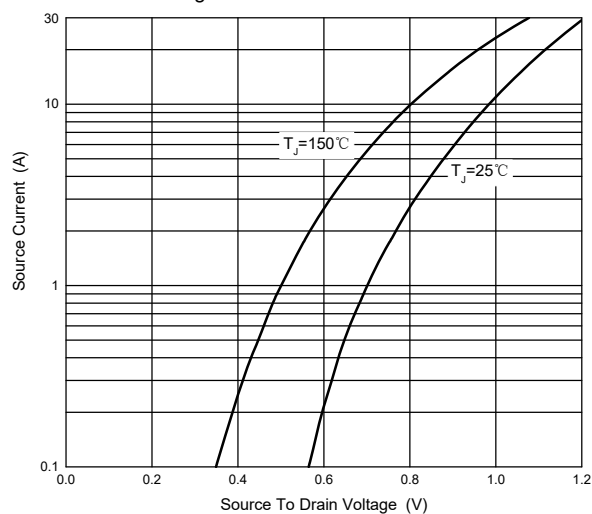


Fig. 10 - Drain Current

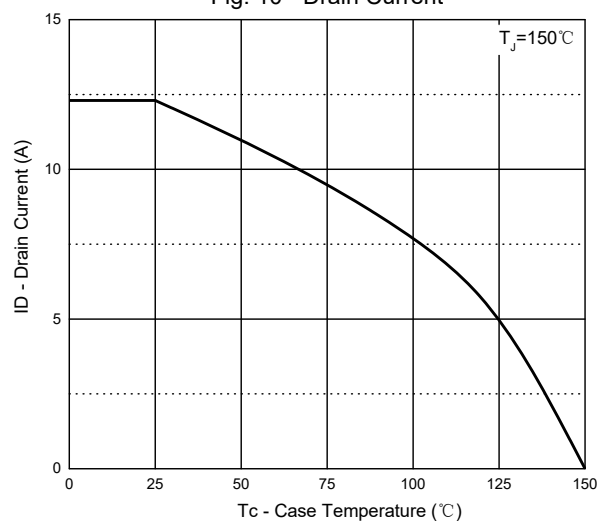


Fig. 11 - Power Dissipation

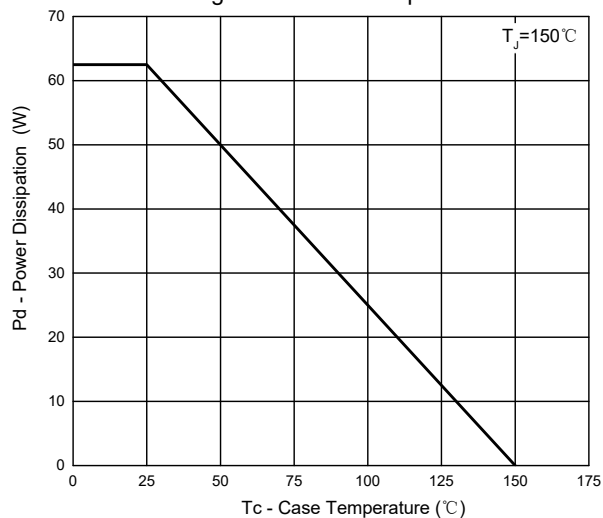
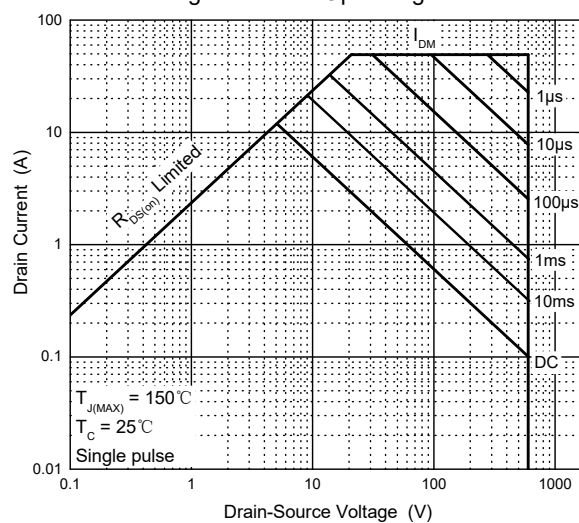
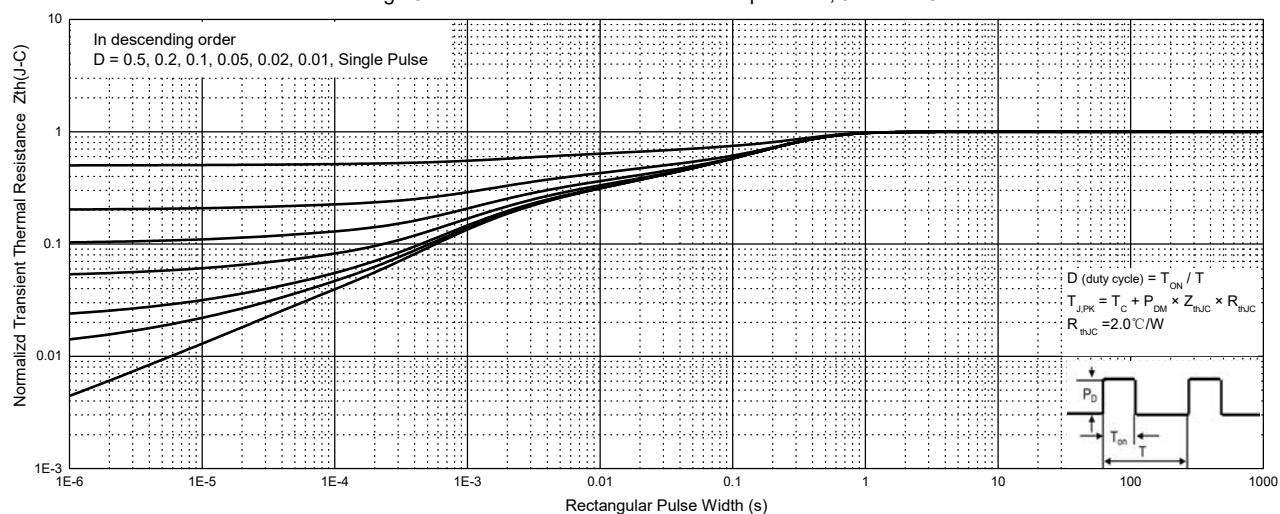


Fig. 12 - Safe Operating Area



Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig.13 - Normalized Transient Thermal Impedance, Junction-Case



Ordering Information

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

IMPORTANT NOTICE

Micro Commercial Components Corp. reserves the right to make changes without further notice to any product herein to make corrections, modifications, enhancements, improvements, or other changes. **Micro Commercial Components Corp.** does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products in such applications shall assume all risks of such use and will agree to hold **Micro Commercial Components Corp.** and all the companies whose products are represented on our website, harmless against all damages. **Micro Commercial Components Corp.** products are sold subject to the general terms and conditions of commercial sale, as published at <https://www.mccsemi.com/Home/TermsAndConditions>

LIFE SUPPORT

MCC's products are not authorized for use as critical components in life support devices or systems without the express written approval of Micro Commercial Components Corporation.

CUSTOMER AWARENESS

Counterfeiting of semiconductor parts is a growing problem in the industry. Micro Commercial Components (MCC) is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. MCC strongly encourages customers to purchase MCC parts either directly from MCC or from Authorized MCC Distributors who are listed by country on our web page cited below. Products customers bought either from MCC directly or from Authorized MCC Distributors are genuine parts, have full traceability, meet MCC's quality standards for handling and storage. **MCC will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources.** MCC is committed to combat this global problem and encourages our customers to do their parts in stopping this practice by buying directly or from authorized distributors.