

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

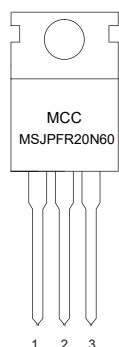
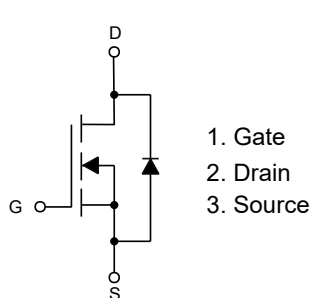
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance Junction to Ambient,Max^(Note 2): 60°C/W
- Thermal Resistance Junction to Case,Max : 0.9°C/W

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V _{DS}	600	V
Gate-Source Voltage		V _{GS}	±30	V
Continuous Drain Current	T _C =25°C	I _D	17.9	A
	T _C =100°C		11.3	
Pulsed Drain Current ^(Note 3)		I _{DM}	71.6	A
Total Power Dissipation, T _C =25°C		P _D	138	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 <100ppm 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 $T_J=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $I_{AS}=4\text{A}$.

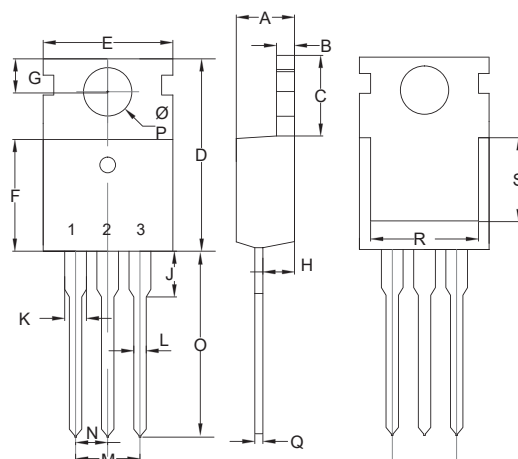
Internal Structure and Marking Code



Device Code: MSJPFR20N60

N-CHANNEL Super-Junction Power MOSFET

TO-220AB(H)



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.169	0.185	4.30	4.70	
B	0.049	0.055	1.25	1.40	
C	0.244	0.268	6.20	6.80	
D	0.598	0.638	15.20	16.20	
E	0.382	0.398	9.70	10.10	
F	0.354	0.370	9.00	9.40	
G	0.102	0.118	2.60	3.00	
H	0.087	0.102	2.20	2.60	
J	0.110	0.126	2.80	3.20	
K	0.048	0.055	1.22	1.40	
L	0.028	0.037	0.70	0.95	
M	0.188	0.212	4.78	5.38	
N	0.094	0.106	2.39	2.69	
O	0.496	0.535	12.60	13.60	
P	0.138	0.150	3.50	3.80	Φ
Q	0.016	0.024	0.40	0.60	
R	0.276	-----	7.00	-----	
S	0.217	-----	5.50	-----	

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

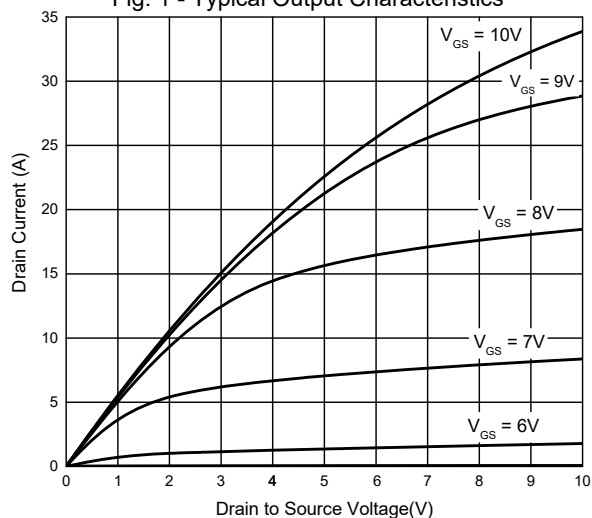


Fig. 2 - Typical Transfer Characteristics

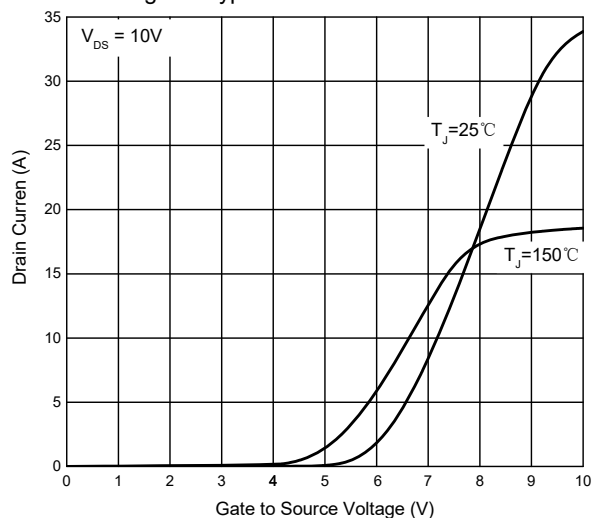


Fig. 3 - On-Resistance vs Gate Bias

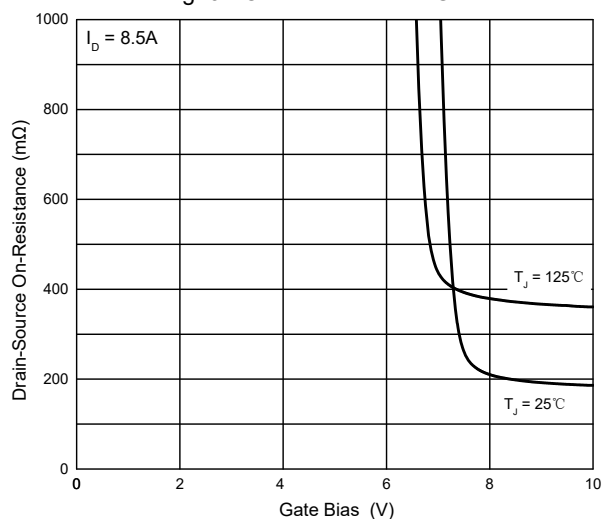


Fig. 4 - On-Resistance vs Drain Current

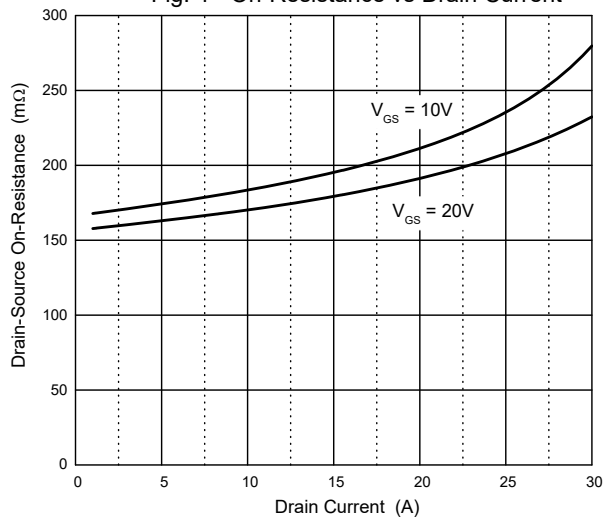


Fig. 5 - Capacitance Characteristic

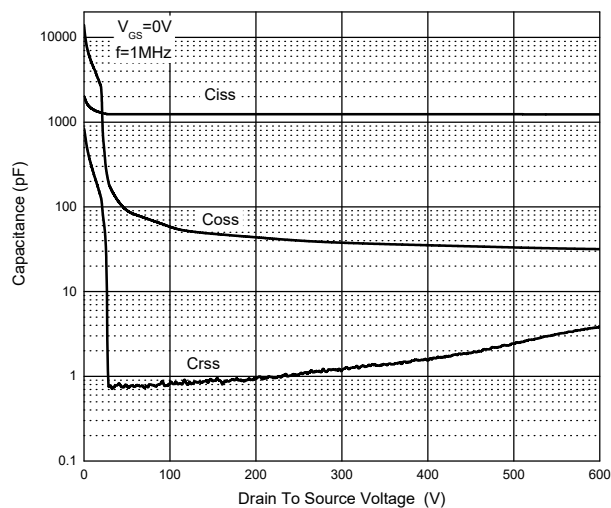
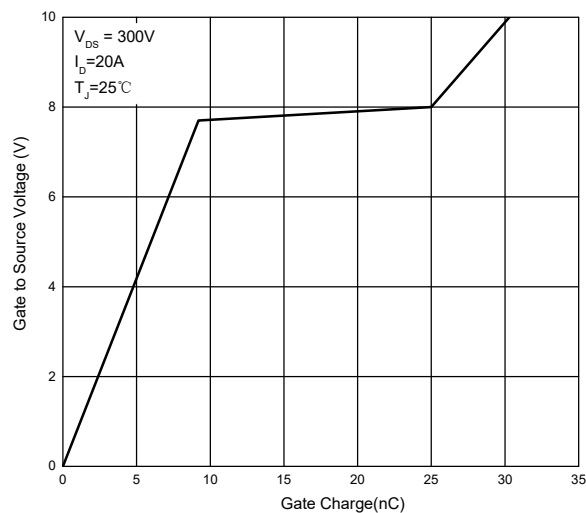


Fig. 6 - Typical Gate Charge



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

Fig. 7 - Gate-Threshold Voltage vs Junction Temperature

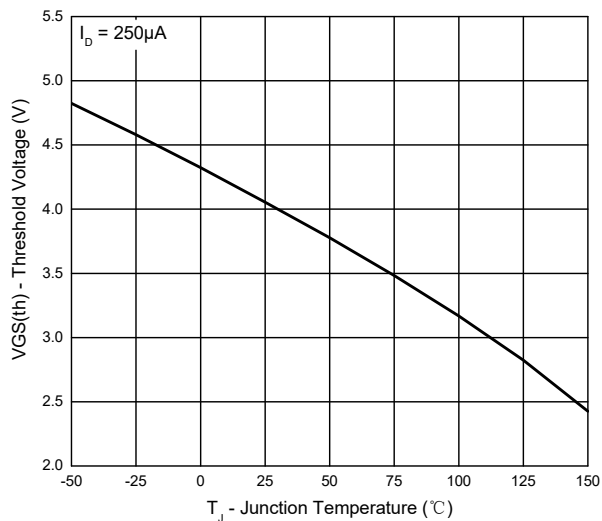


Fig. 8 - Normalized On-Resistance

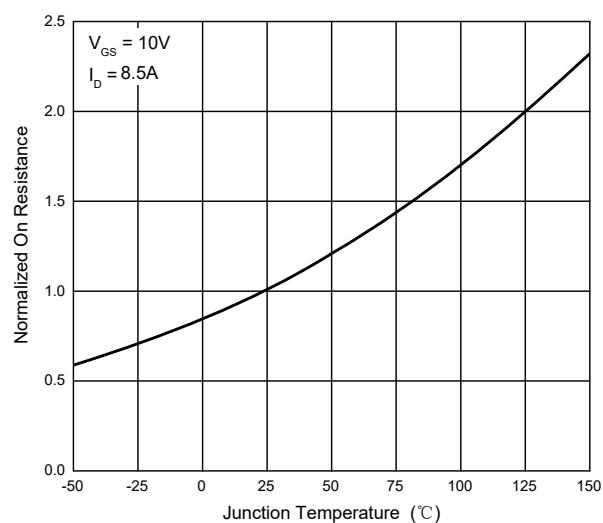


Fig. 9 - Forward Characteristics

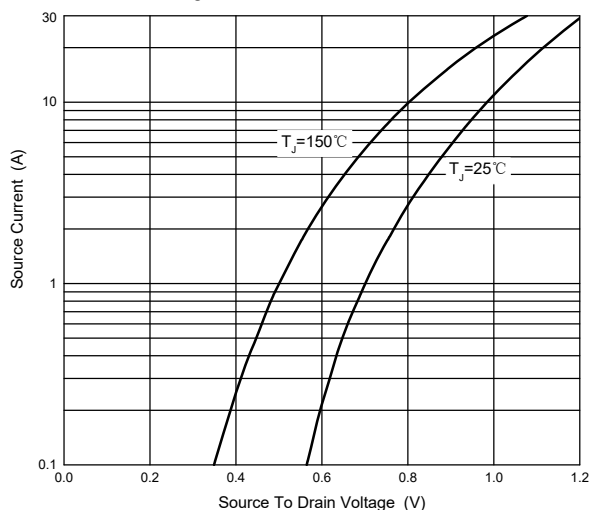


Fig. 10 - Drain Current

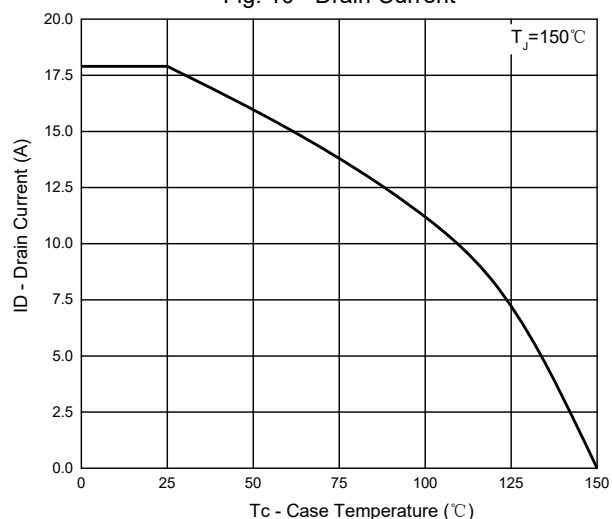


Fig. 11 - Power Dissipation

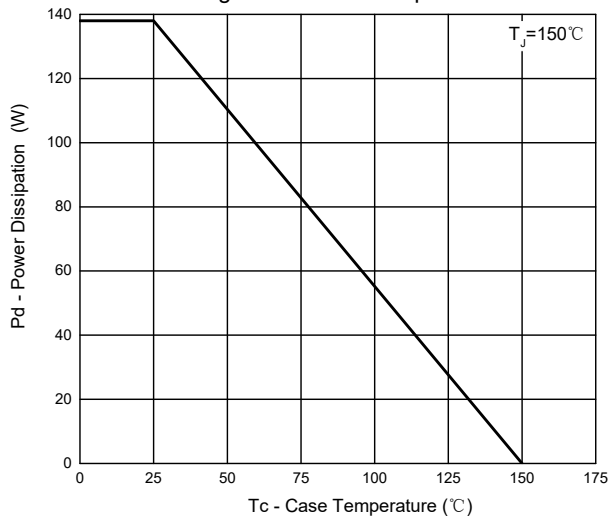
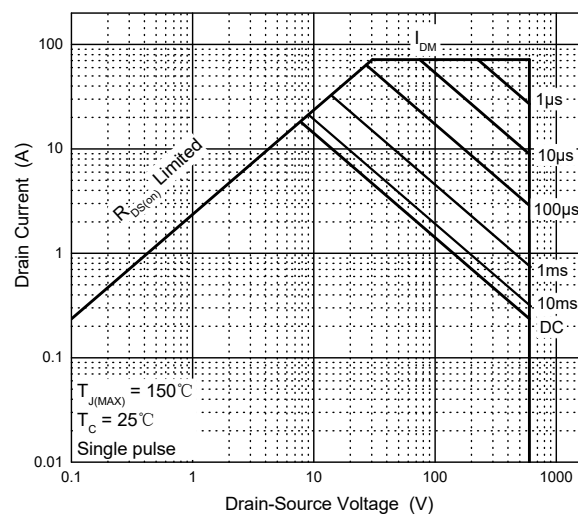
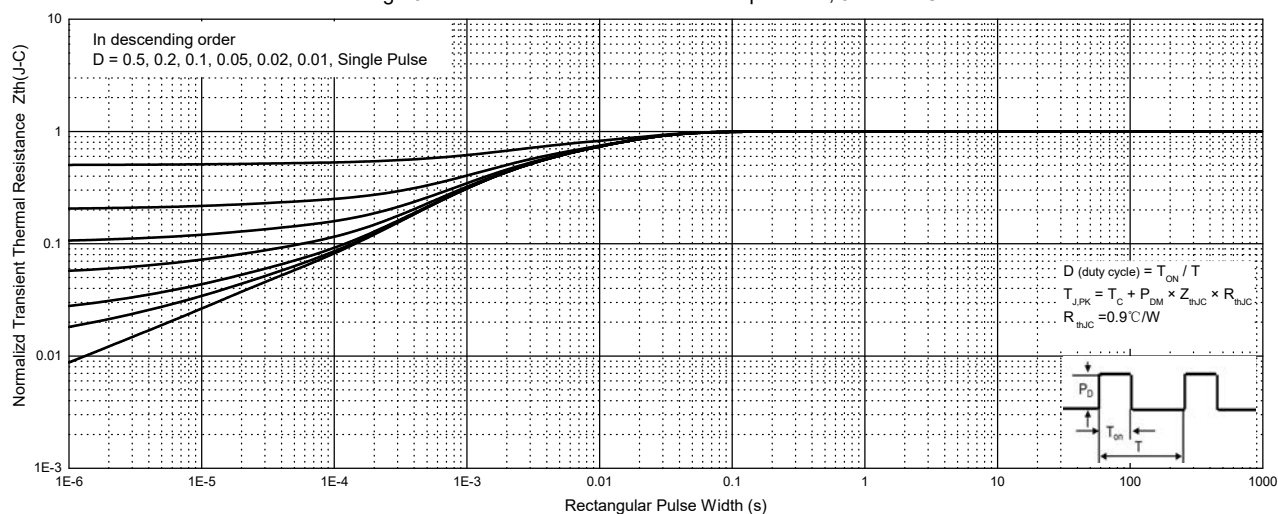


Fig. 12 - Safe Operating Area



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

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