

Features

- Very Low FOM $R_{DS(on)} \times Q_g$
- 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

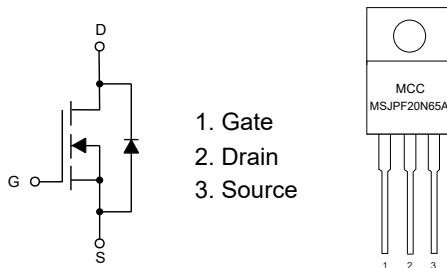
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62.5°C/W Junction to Ambient(Notes 2)
- Thermal Resistance: 3.2°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	20
		$T_C=100^\circ C$	13
Pulsed Drain Current (Note 3)	I_{DM}	80	A
Total Power Dissipation (Note 4)	P_D	39	W
Single Pulsed Avalanche Energy (Note 5)	E_{AS}	303	mJ

Note:

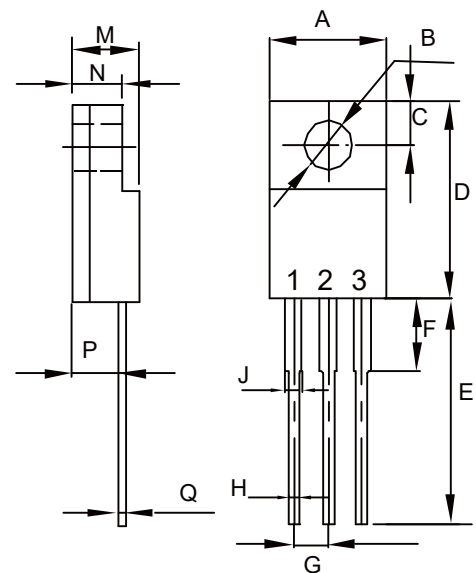
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$.
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. $T_J=25^\circ C$, $V_{DD}=50V$, $R_G=25\Omega$, $L=30mH$.

Internal Structure and Marking Code



**N-CHANNEL
Super-Junction
Power 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 Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	650			V
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 30V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V, T_C=25^\circ C$			1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.5	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		167	190	m Ω
Gate Resistance	R_g	$f = 1.0MHz, Open Drain$		2.2		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S				20	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$			1.2	V
Reverse Recovery Time	t_{rr}	$I_F=20A, di_F/dt=100A/\mu s$		365		ns
Reverse Recovery Charge	Q_{rr}			6067		nC
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$		1750		pF
Output Capacitance	C_{oss}			583		
Reverse Transfer Capacitance	C_{rss}			16		
Total Gate Charge	Q_g	$V_{DS}=560V, V_{GS}=10V, I_D=20A$		55		nC
Gate-Source Charge	Q_{gs}			9.6		
Gate-Drain Charge	Q_{gd}			25		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=350V, V_{GEN}=10V, R_G=25\Omega, I_{DS}=20A$		32		ns
Turn-On Rise Time	t_r			61		
Turn-Off Delay Time	$t_{d(off)}$			174		
Turn-Off Fall Time	t_f			55		

Curve Characteristics

Fig. 1 Typical Output Characteristics

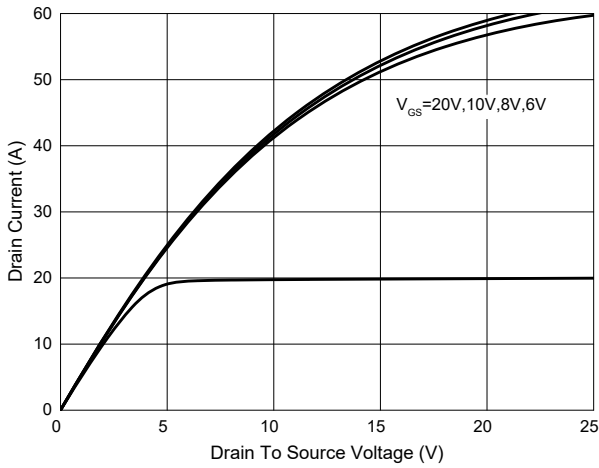


Fig. 2 - Transfer Characteristics

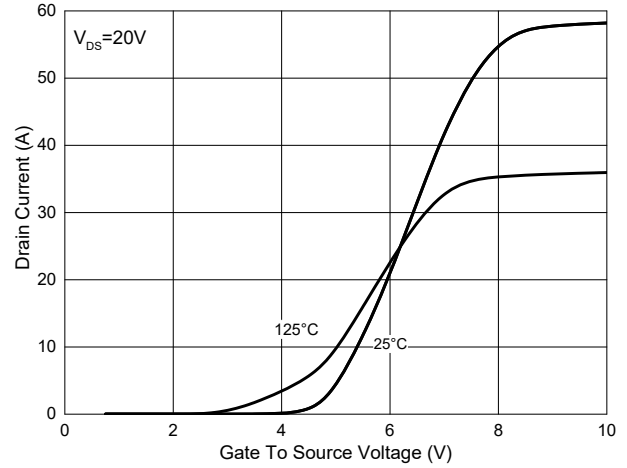


Fig.3 Rds(on)-Vgs

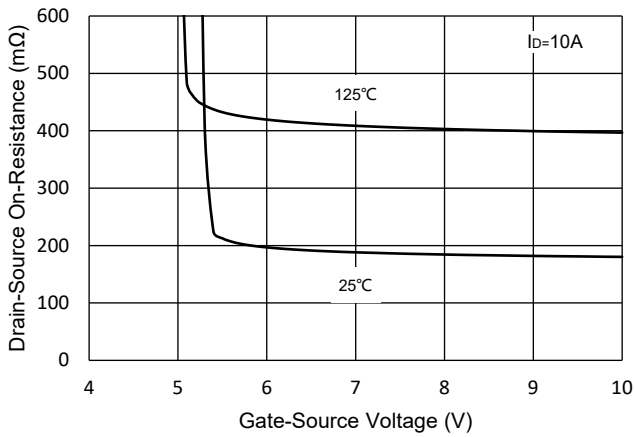


Fig.4 Rds(on)-Id

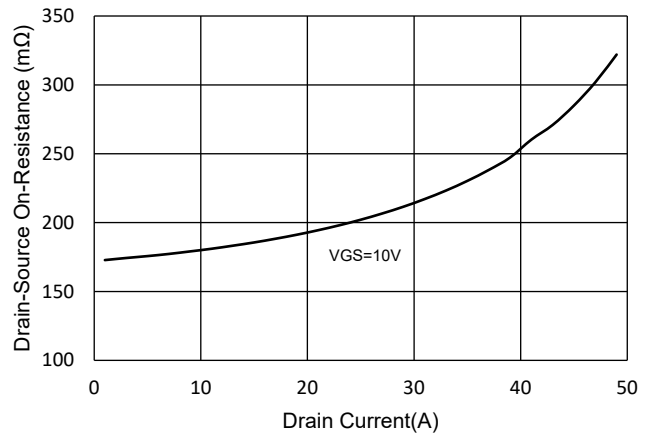


Fig.5 Capacitance Characteristics

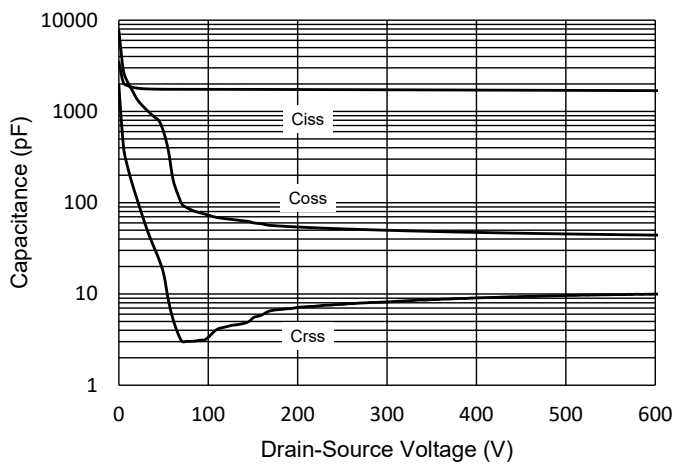
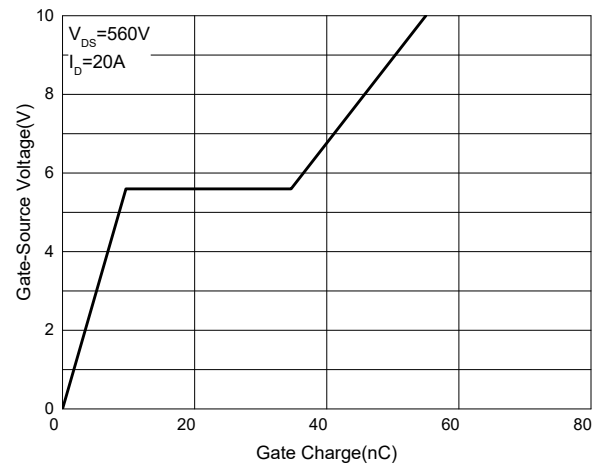


Fig. 6 - Gate Charge



Curve Characteristics

Fig.7 Normalized Threshold Voltage

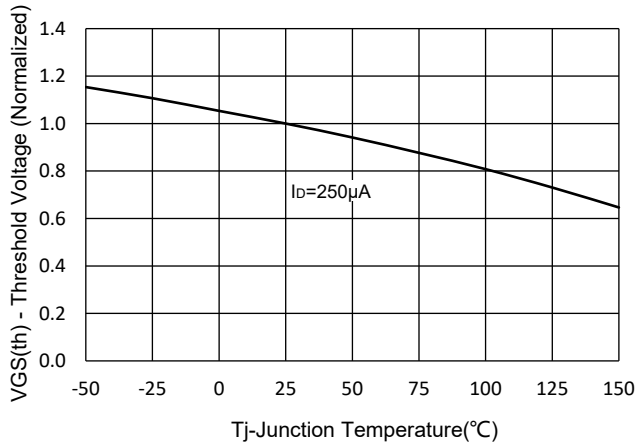


Fig.8 Normalized On Resistance Characteristics

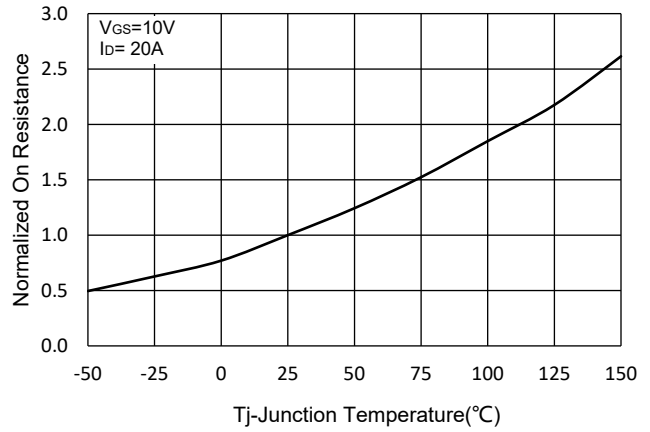


Fig.9 IS-VSD

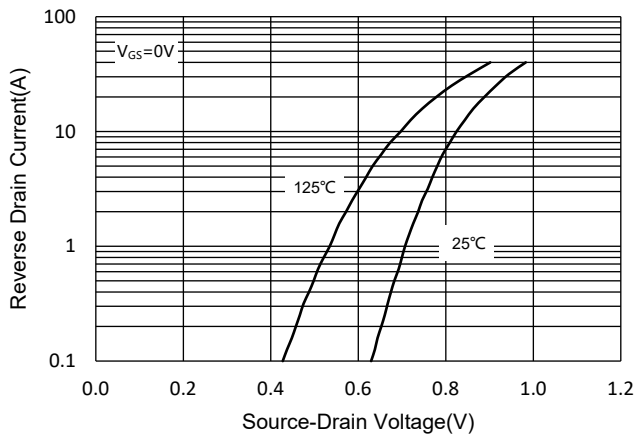


Fig. 10 - Drain Current

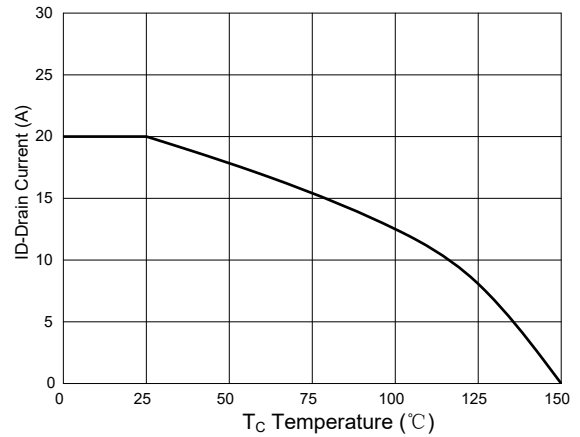
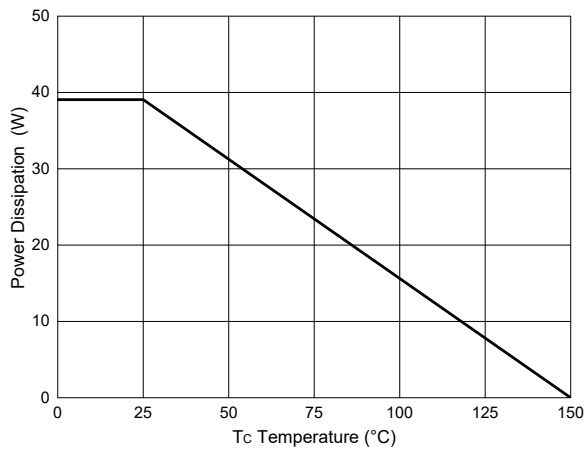


Fig.11 Power Dissipation



Curve Characteristics

Fig. 12 - Safe Operation Area

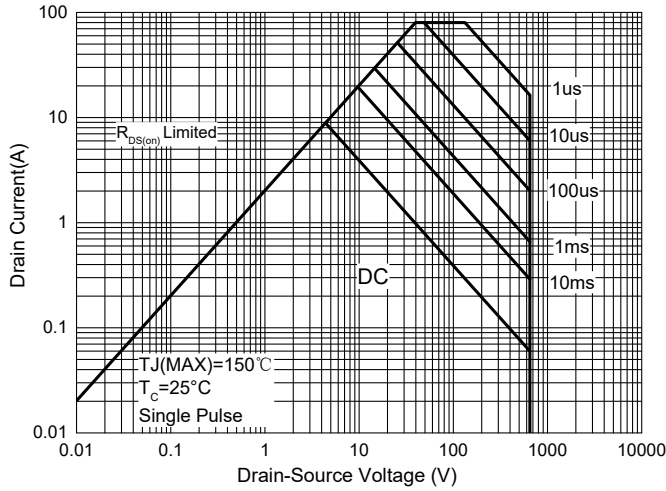
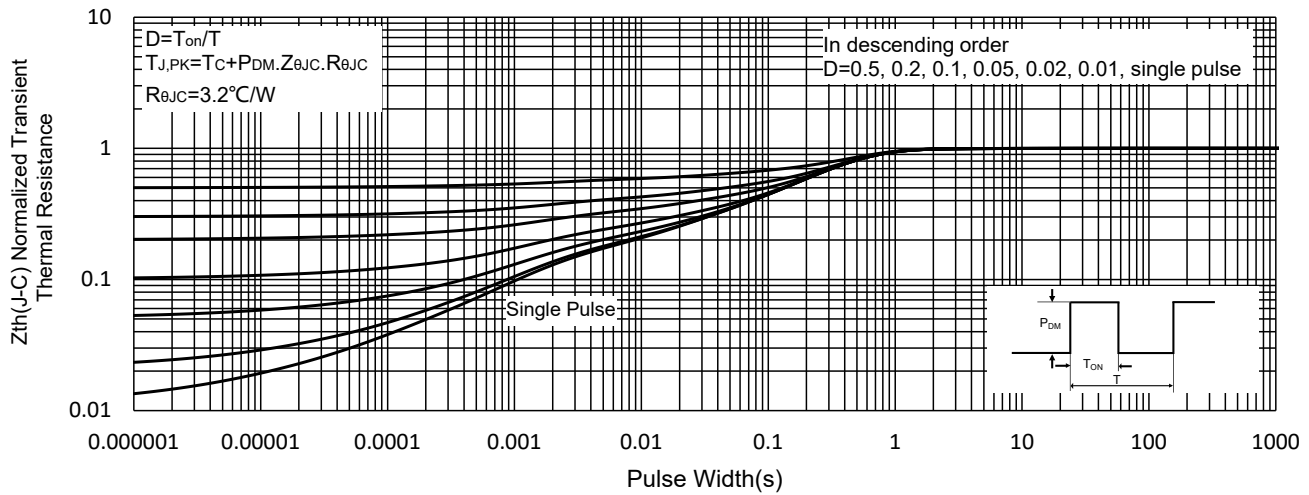


Fig.13 Normalized Transient Thermal Impedance



Ordering Information

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

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