Features

- Very Low FOM $R_{DS(on)}$ x 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)

N-CHANNEL Super-Junction Power MOSFET

Maximum Ratings

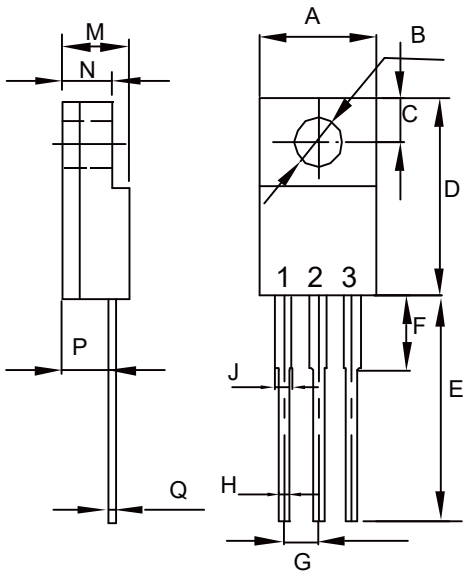
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62.5°C/W Junction to Ambient(Note2)
- Thermal Resistance: 3.2°C/W Junction to Case

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Volltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	20	A
	T_C=100°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:

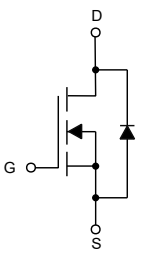
1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A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

TO-220F

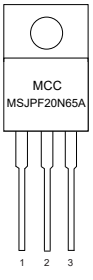


DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.381	0.406	9.70	10.30	
B	0.118	0.138	3.00	3.50	Φ
C	0.124	0.139	3.15	3.55	
D	0.610	0.634	15.50	16.10	
E	0.496	0.535	12.60	13.60	
F	0.134	0.150	3.40	3.80	
G	0.092	0.108	2.34	2.74	
H	0.027	0.035	0.70	0.90	
J	0.044	0.056	1.12	1.42	
M	0.173	0.193	4.40	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	

Internal Structure and Marking Code



1. Gate
2. Drain
3. Source



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=250μA	650			V
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS} =±30V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V, T_C=25°C			1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2	3.5	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=10A		167	190	mΩ
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/μs		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=25Ω, 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

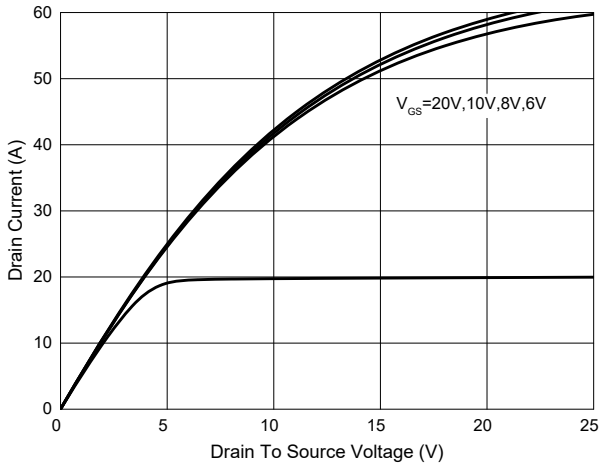


Fig. 2 - Transfer Characteristics

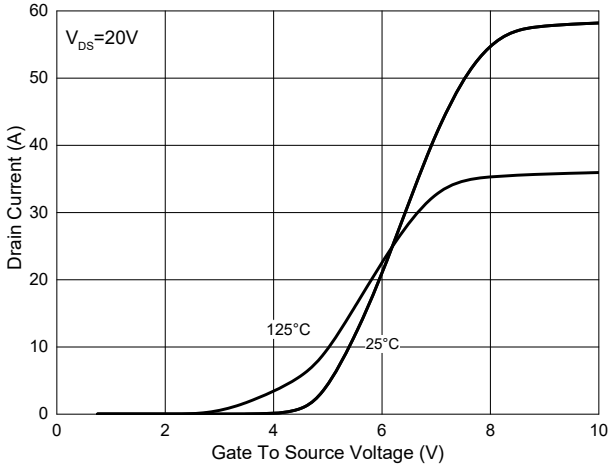


Fig.3 Rdson-Vgs

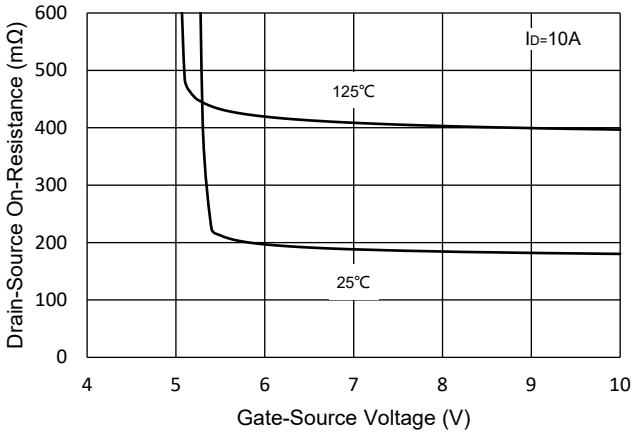


Fig.4 $R_{DS(ON)}$-ID

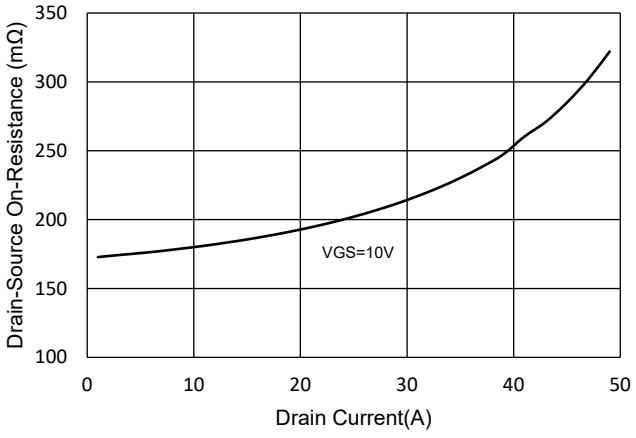


Fig.5 Capacitance Characteristics

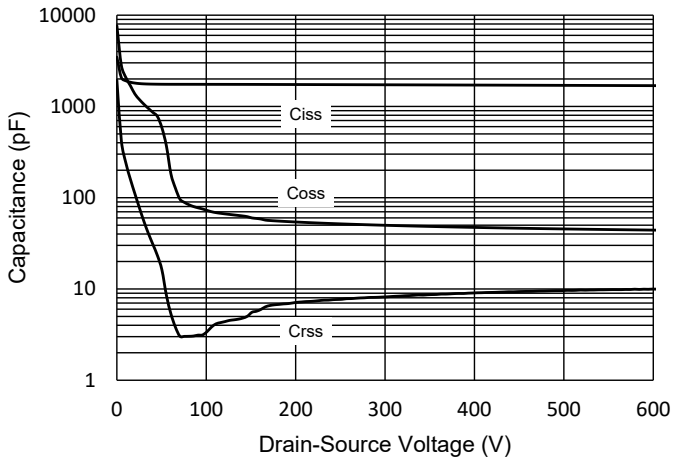
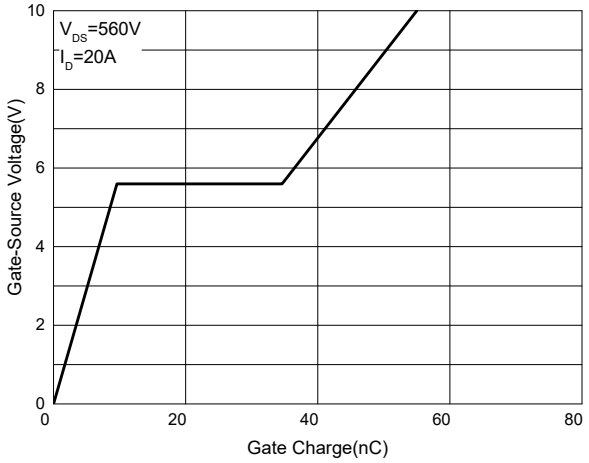


Fig. 6 - Gate Charge



Curve Characteristics

Fig.7 Normalized Threshold Voltage

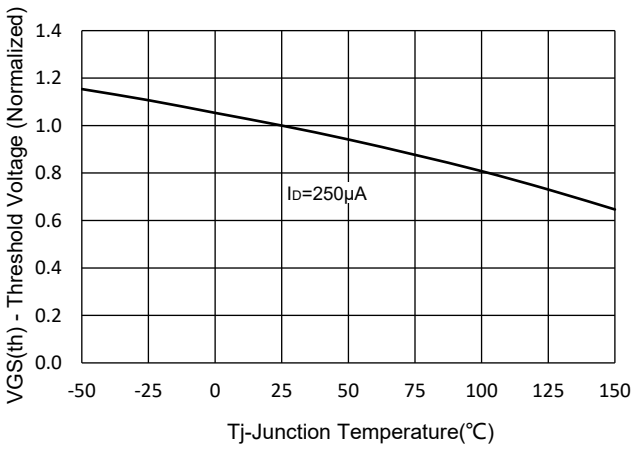


Fig.8 Normalized On Resistance Characteristics

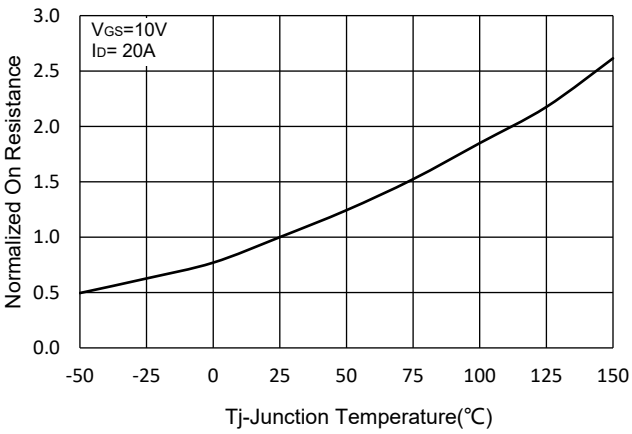


Fig.9 IS-VSD

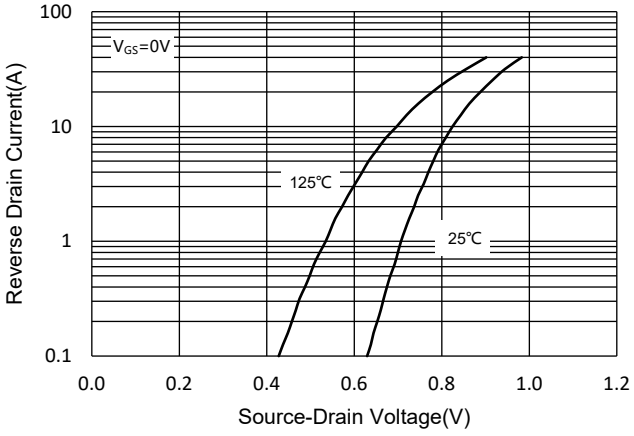


Fig. 10 - Drain Current

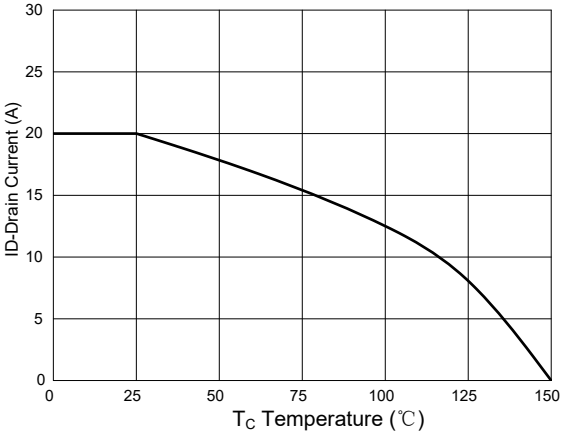
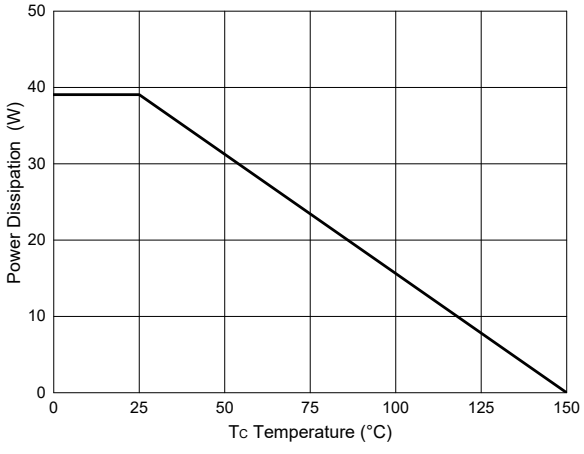


Fig.11 Power Dissipation



Curve Characteristics

Fig. 12 - Safe Operation Area

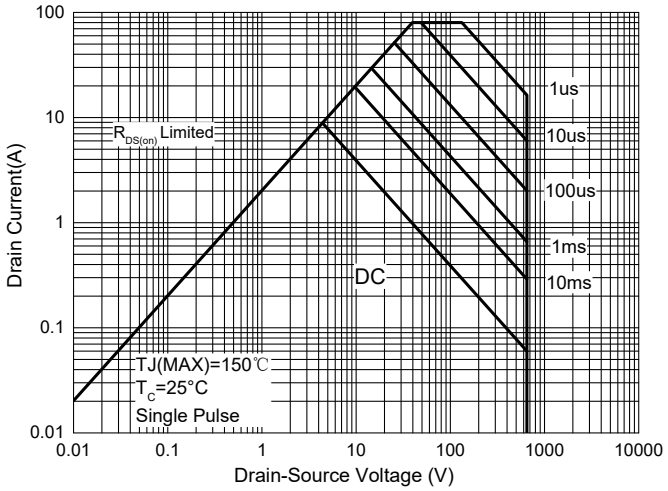
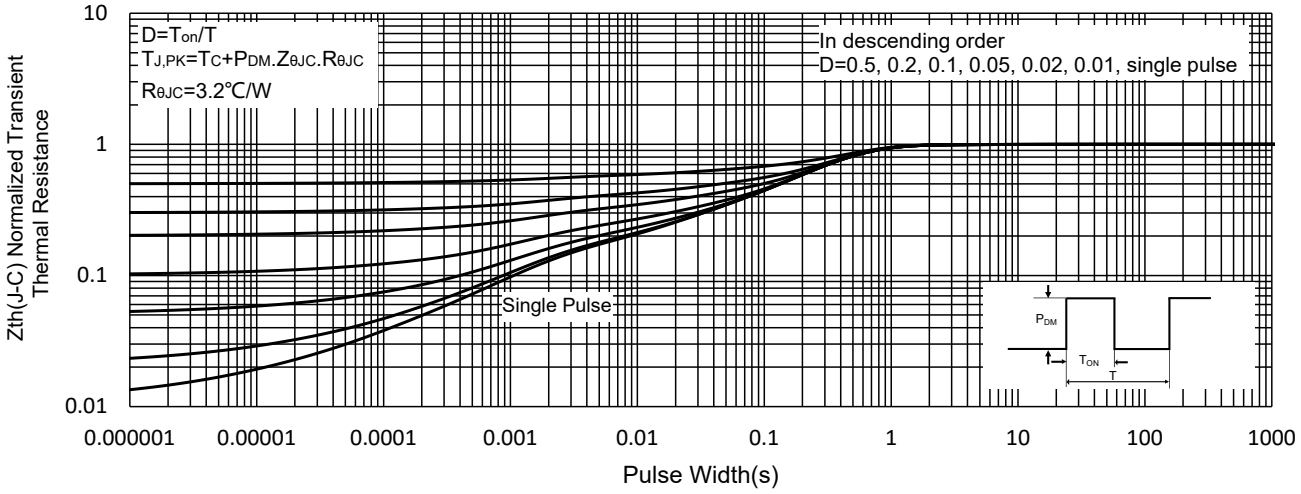


Fig.13 Normalized Transient Thermal Impedance



Ordering Information

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

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