

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

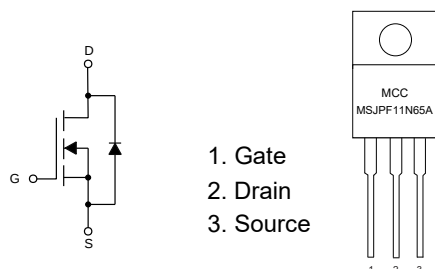
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 75°C/W Junction to Ambient (Note2)
- Thermal Resistance: 4.0°C/W Junction to Case

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
		7	
Pulsed Drain Current (Note3)	I_{DM}	44	A
Total Power Dissipation (Note4)	P_D	31.3	W
Single Pulse Avalanche Energy (Note5)	E_{AS}	142	mJ

Note:

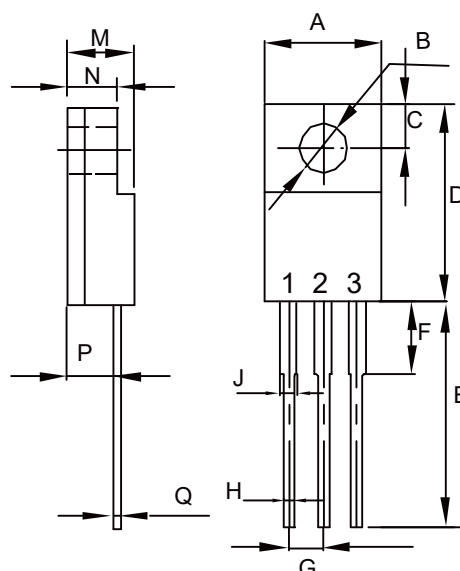
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$.
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. $T_J = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $V_{GS} = 10\text{V}$, $R_G = 25\Omega$, $L = 79\text{mH}$.

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 =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			1	μA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3.4	4	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =3.2A		0.33	0.38	Ω
Gate Resistance	R _g	f=1MHz, Open drain		22		Ω
Diode Characteristics						
Continuous Body Diode Current	I _S				11	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =11A			1.4	V
Reverse Recovery Time	t _{rr}	I _S =11A, dI _F /dt=550A/μs		175		ns
Reverse Recovery Charge	Q _{rr}			4.4		μC
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1MHz		774		pF
Output Capacitance	C _{oss}			890		
Reverse Transfer Capacitance	C _{rss}			26		
Total Gate Charge	Q _g	V _{DS} =520V, V _{GS} =10V, I _D =11A		20		nC
Gate-Source Charge	Q _{gs}			3		
Gate-Drain Charge	Q _{gd}			10		
Turn-On Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =325V, I _D =11A, R _G =2.2Ω		45		ns
Turn-On Rise Time	t _r			14		
Turn-Off Delay Time	t _{d(off)}			71		
Turn-Off Fall Time	t _f			20		

Curve Characteristics

Fig. 1 - Typical Output Characteristics

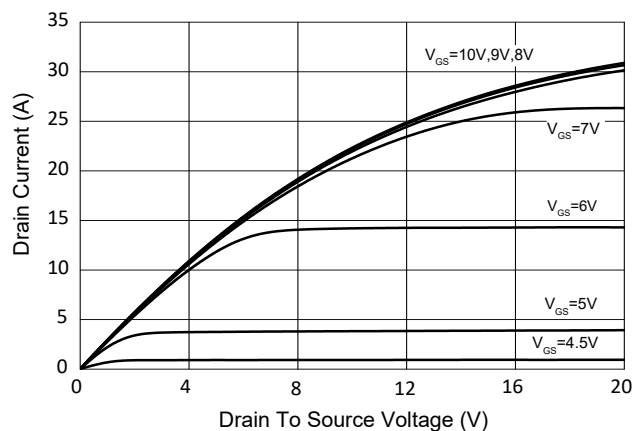


Fig.2 - Transfer Characteristic

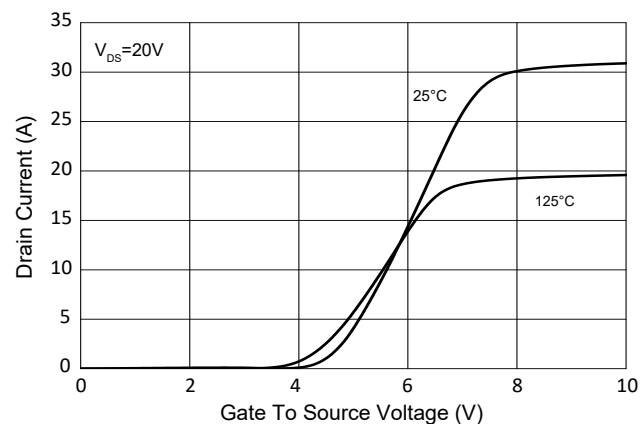


Fig.3 - $R_{DS(ON)}$ - V_{GS}

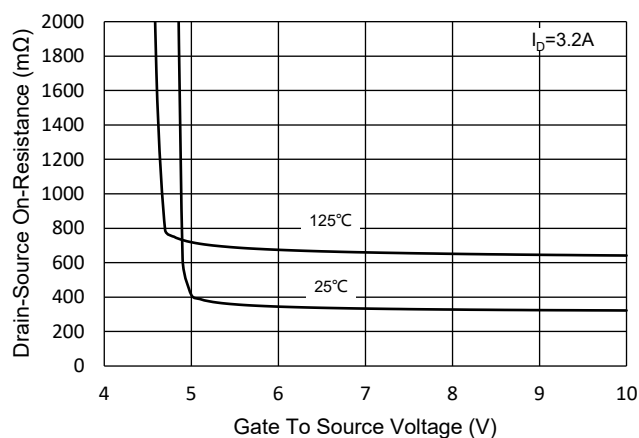


Fig.4 - $R_{DS(ON)}$ - I_D

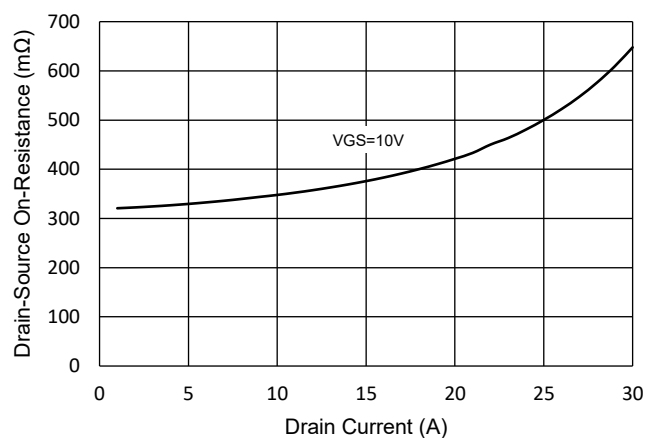


Fig.5 - Capacitance Characteristics

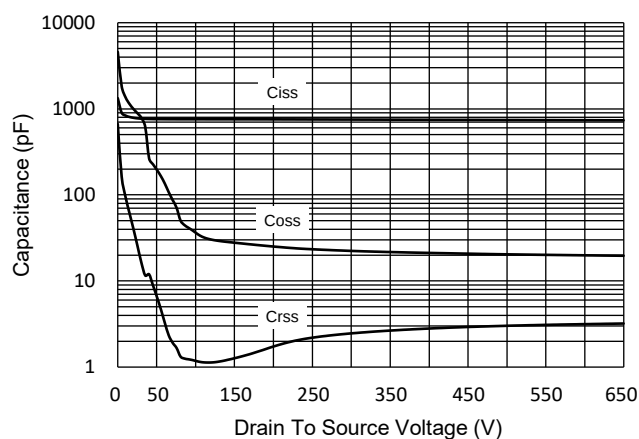
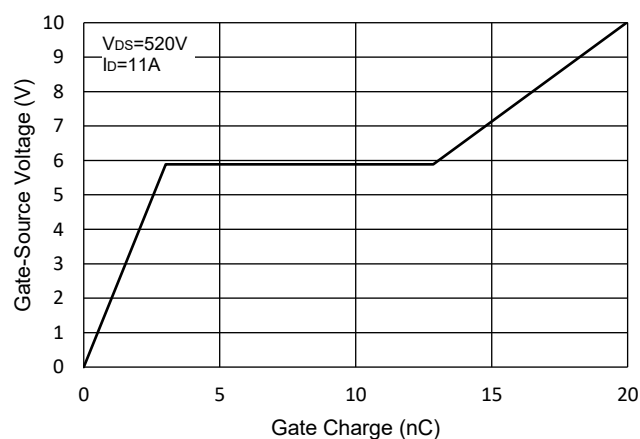


Fig.6 - Gate Charge



Curve Characteristics

Fig.7 - Normalized Threshold Voltage

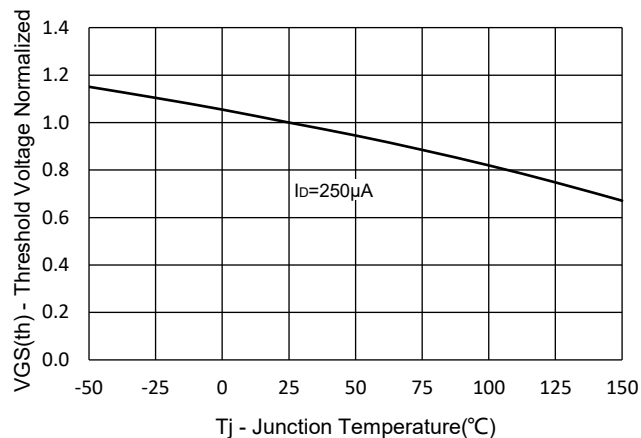


Fig.8 - Normalized On Resistance Characteristics

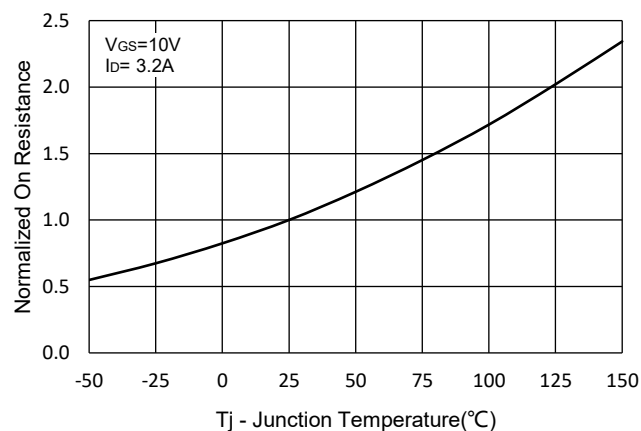


Fig.9 - $I_S - V_{SD}$

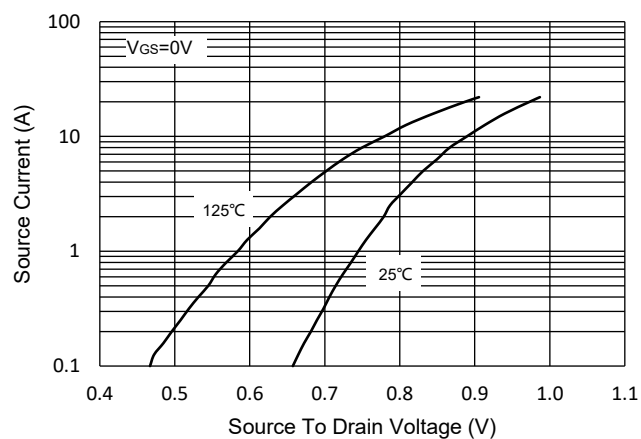


Fig.10 - Drain Current

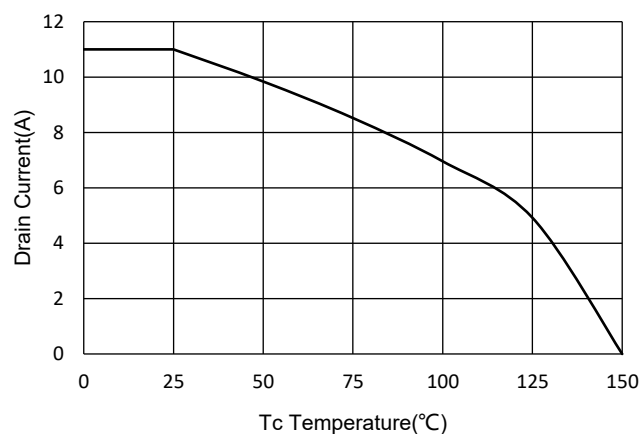
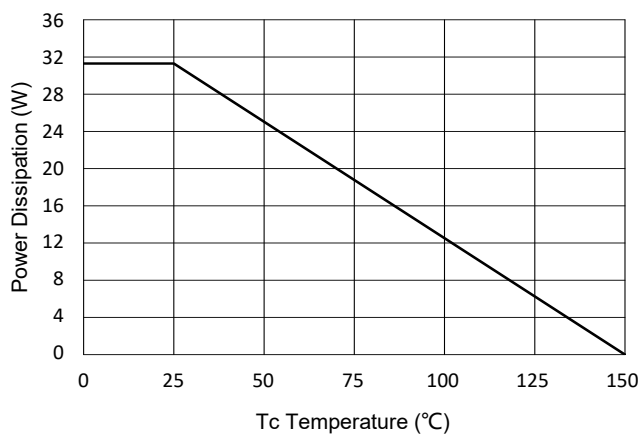


Fig.11 - PD Dissipation



Curve Characteristics

Fig.12 - Safe Operation Area

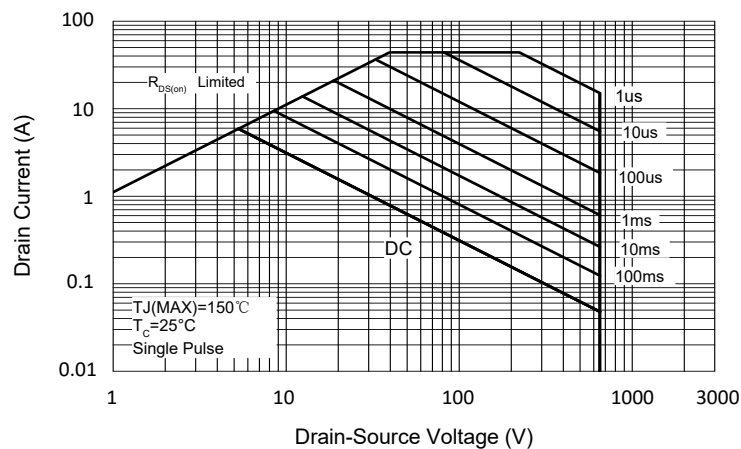
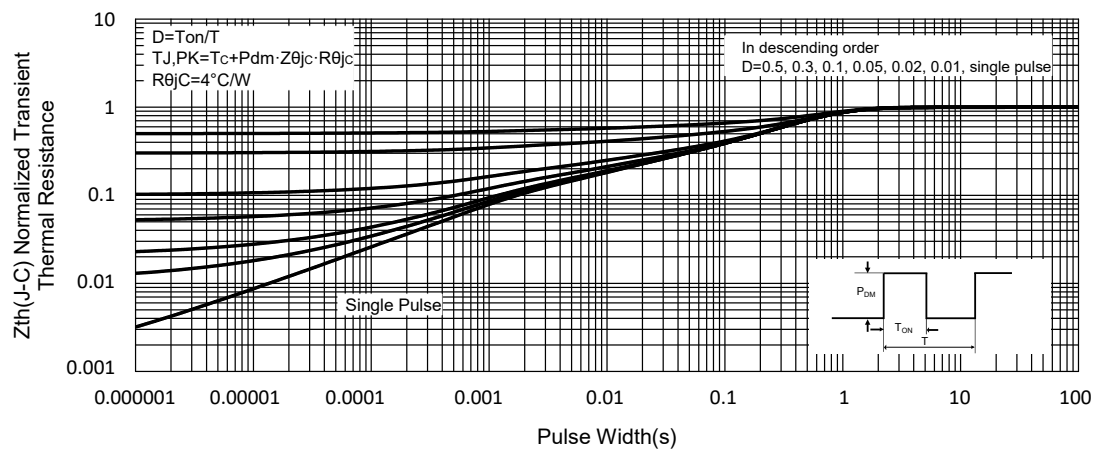


Fig.13 - Normalized Transient Thermal Impedance



Ordering Information

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

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