

Features

- Very Low FOM $R_{DS(on)} \times Q_g$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

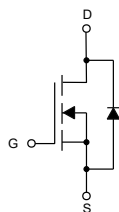
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 80°C/W Junction to Ambient
- Thermal Resistance: 4°C/W Junction to Case

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
Pulsed Drain Current ^(Note 1)	I_{DM}	33	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	211	mJ
Avalanche Current ^(Note 1)	I_{AR}	1.6	A
Repetitive Avalanche Energy ^(Note 1)	E_{AR}	0.32	mJ
Total Power Dissipation	$T_C=25^\circ\text{C}$	P_D	31.3 W

Note: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

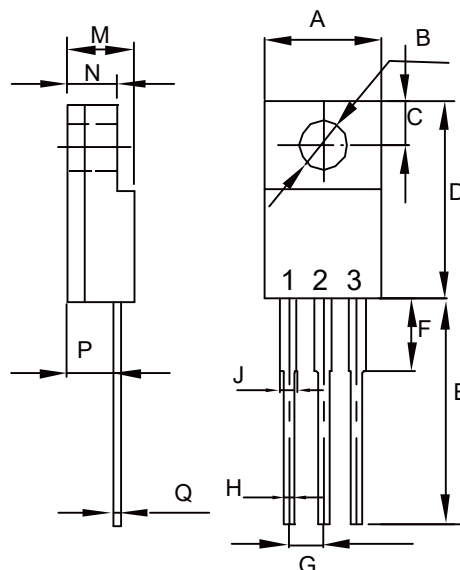
2. $I_{AS}=1.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

Internal Structure



N-CHANNEL Super-Junction Power MOSFET

TO-220F



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	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 @ 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}	$V_{DS}=650V, V_{GS}=0V$			1	μA	
		$V_{DS}=650V, V_{GS}=0V, T_J=150^\circ C$			100		
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4	V	
Drain-Source On-Resistance ^(Note 3)	$R_{DS(on)}$	$V_{GS}=10V, I_D=5.5A$		0.34	0.38	Ω	
Forward tranconductance ^(Note 3)	g_{FS}	$V_{DS}=10V, I_D=5.5A$		7.8		S	
Dynamic Characteristics^(Note 4)							
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$		901		μF	
Output Capacitance	C_{oss}			50			
Reverse Transfer Capacitance	C_{rss}			5.5			
Total Gate Charge	Q_g	$V_{DD}=520V, V_{GS}=10V, I_D=11A$		21		nC	
Gate-Source Charge	Q_{gs}			4.5			
Gate-Drain Charge	Q_{gd}			7			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=11A, R_G=25\Omega$		41		ns	
Turn-On Rise Time	t_r			20			
Turn-Off Delay Time	$t_{d(off)}$			123			
Turn-Off Fall Time	t_f			6.4			
Drain-Source Body Diode Characteristics							
Continuous Body Diode Current	I_S	$T_C=25^\circ C$			9.2	A	
Pulsed Diode Forward Current	I_{SM}				29		
Body Diode Voltage	V_{SD}	$I_{SD}=11A, V_{GS}=0V$		0.9	1.2	V	
Reverse Recovery Time	t_{rr}	$V_R=520V, I_F=I_S, di_F/dt=100A/\mu s$		280		ns	
Reverse Recovery Charge	Q_{rr}				2.8		μC
Peak Reverse Recovery Current	I_{rrm}				17		A

Note 3. Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1\%$.

4. Guaranteed by Design, Not Subject to Production Testing.

Curve Characteristics

Fig. 1 - Typical Output Characteristics

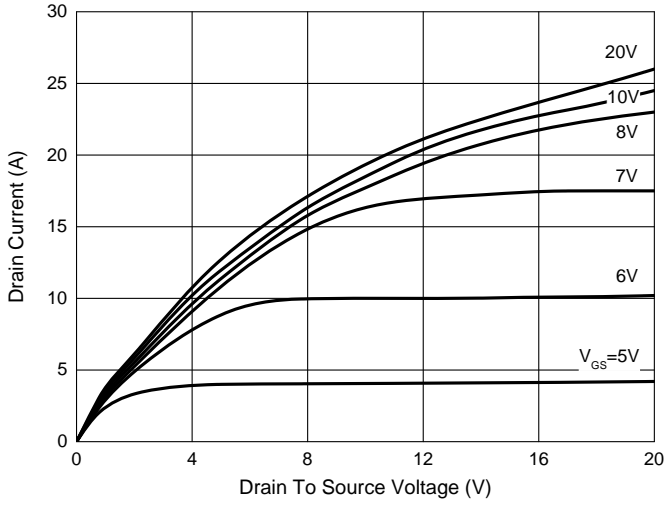


Fig. 2 - Transfer Characteristics

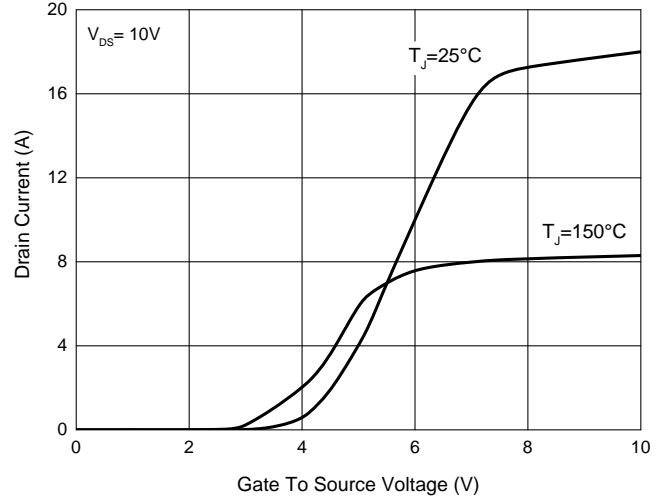


Fig. 3 - $R_{DS(ON)} - I_D$

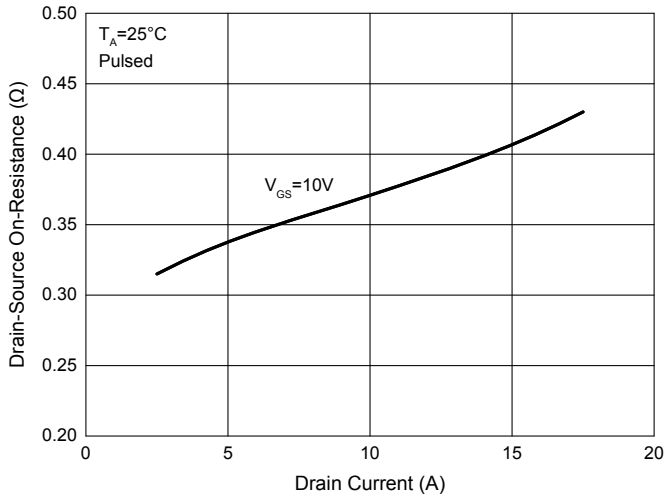


Fig. 4 - Capacitance Characteristics

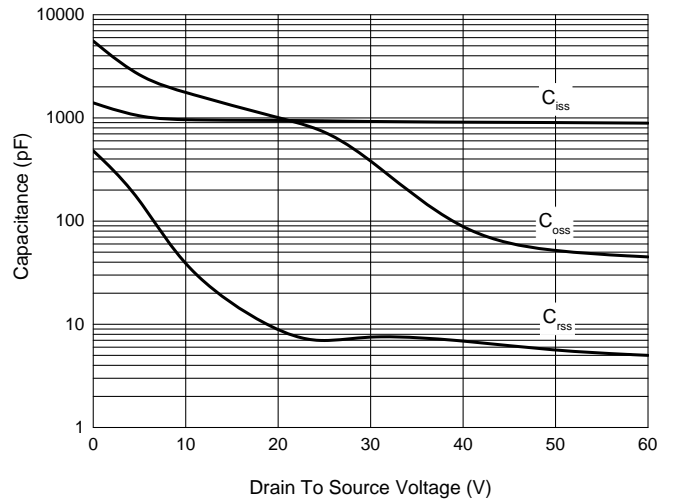


Fig. 5 - Total Gate Charge Characteristics

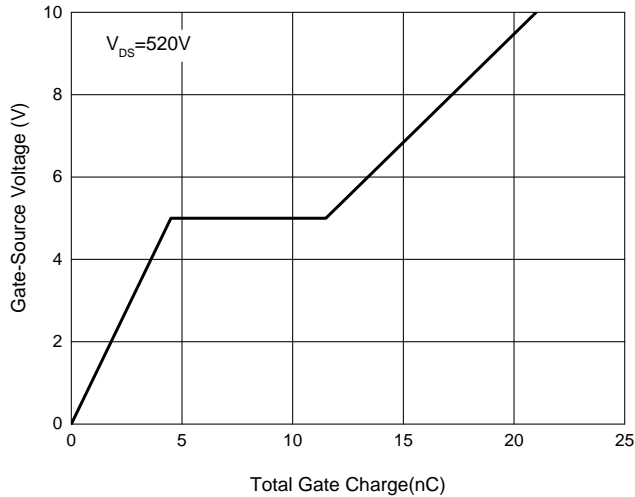
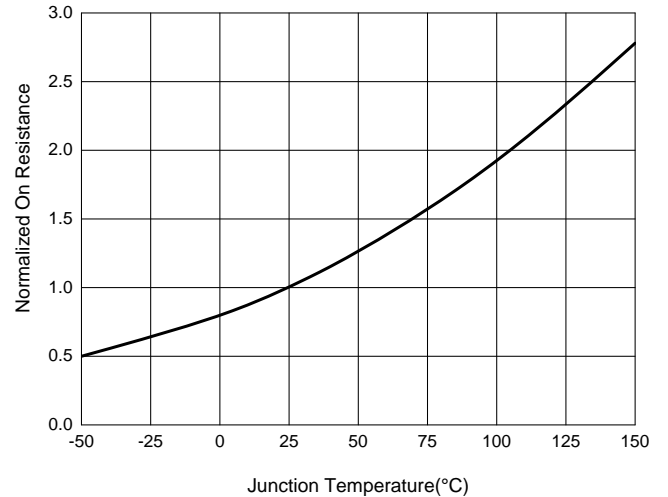


Fig. 6 - Normalized On Resistance Characteristics



Ordering Information

Device	Packing
Part Number-BP	Bulk: 1Kpcs/Box

Note : Adding "-HF" Suffix for Halogen Free, eg. Part Number-BP-HF

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