

Description

JMP N-channel Enhancement Mode Power MOSFET

Features

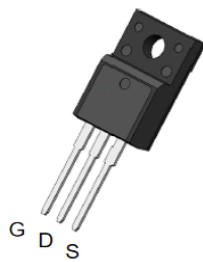
- 500V, 13A
 $R_{DS(ON)} < 0.62\Omega @ V_{GS} = 10V$
- Fast Switching
- Improved dv/dt Capability

Applications

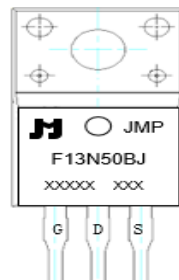
- Load Switch
- PWM Application
- Power Management



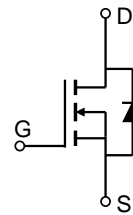
100% UIS TESTED!
100% ΔVds TESTED!



TO-220FP-3L Top View



Marking and Pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Outline	Package	TUBE (pcs)	Inner Box (pcs)	Per Carton (pcs)
JMPF13N50BJ	JMPF13N50BJ	TUBE	TO-220FP-3L	50	1000	5000

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DS}	Drain-to-Source Voltage	500	V
V_{GS}	Gate-to-Source Voltage	± 30	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	13
		$T_C = 100^\circ\text{C}$	8
I_{DM}	Pulsed Drain Current ⁽¹⁾	52	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	414	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	30
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.2	
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150	°C



Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	I _D = 250μA, V _{GS} = 0V	500	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 500V, V _{GS} = 0V	-	-	1.0	μA
I _{GSS}	Gate-Body Leakage Current	V _{DS} = 0V, V _{GS} = ±30V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 10V, I _D = 6.5A	-	0.48	0.62	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 25V, f = 1MHz	-	1645	-	pF
C _{oss}	Output Capacitance		-	157	-	pF
C _{rss}	Reverse Transfer Capacitance		-	18	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 250V, I _D = 13A	-	33	-	nC
Q _{gs}	Gate Source Charge		-	9.7	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	11	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 253.5V I _D = 13A, R _{GEN} = 24Ω	-	26	-	ns
t _r	Turn-On Rise Time		-	40	-	ns
t _{d(off)}	Turn-Off DelayTime		-	92	-	ns
t _f	Turn-Off Fall Time		-	42	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	13	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	52	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = 13A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F = 13A, di/dt = 100A/us	-	386	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	4.2	-	μC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting T_J=25C, V_{DD}=50V, V_G=10V, R_G=25ohm, L=10mH, I_{AS}=9A
 3. R_{θJA} is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB
 4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

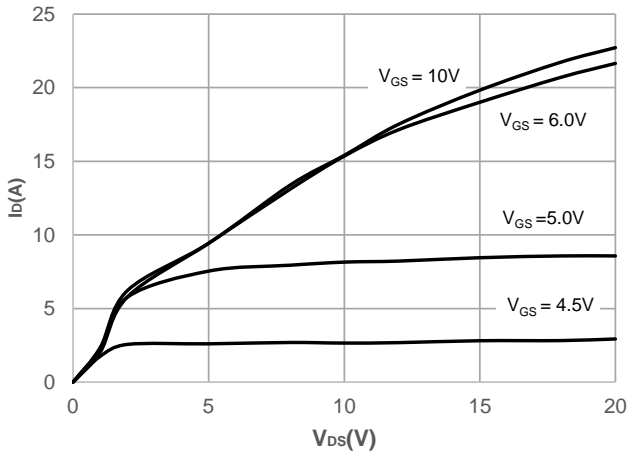


Figure 2: Typical Transfer Characteristics

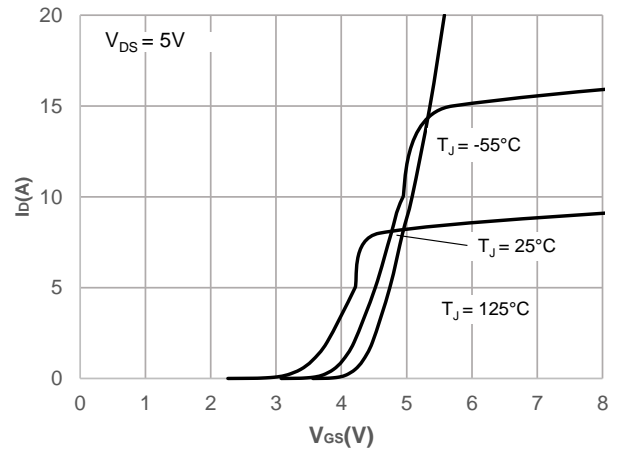


Figure 3: On-resistance vs. Drain Current

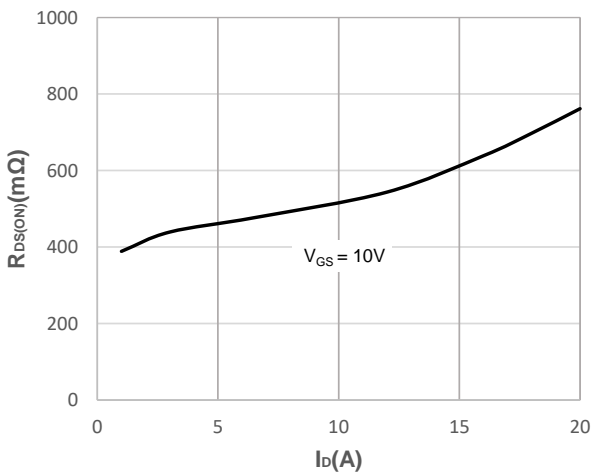


Figure 4: Body Diode Characteristics

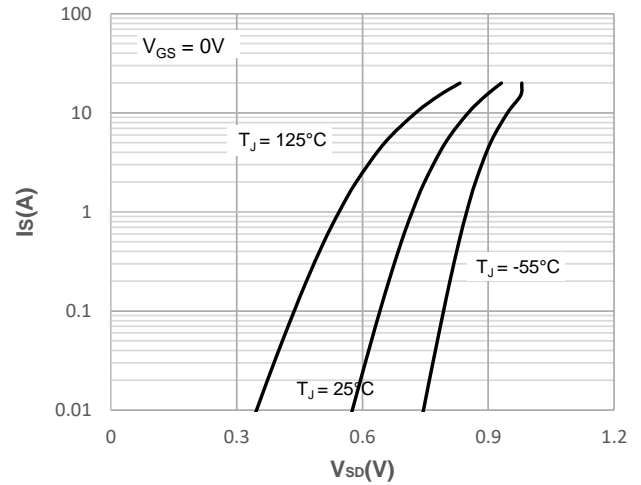


Figure 5: Gate Charge Characteristics

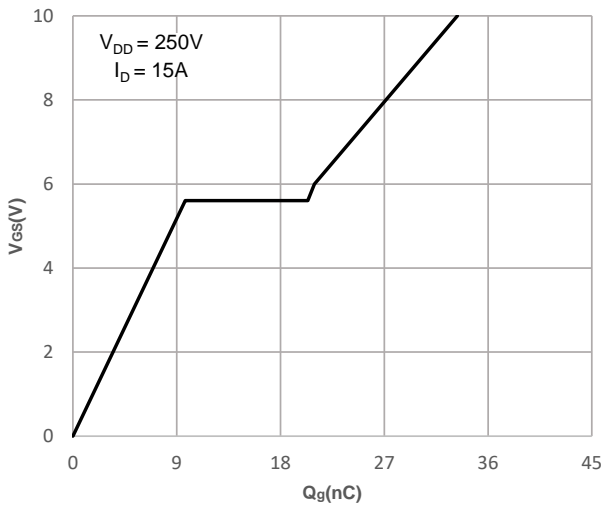
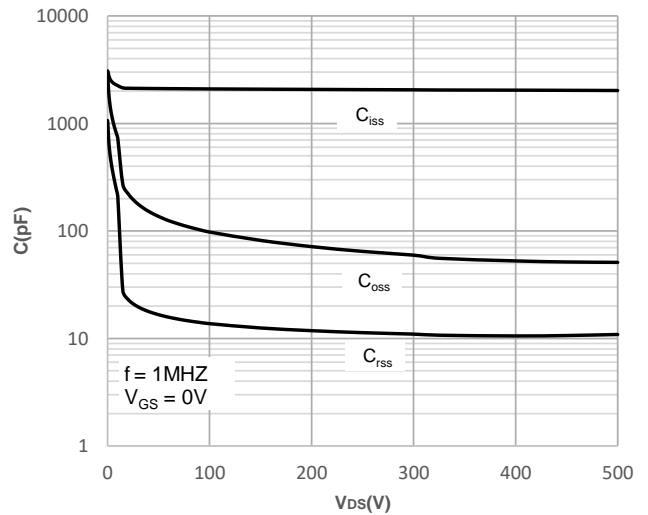


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

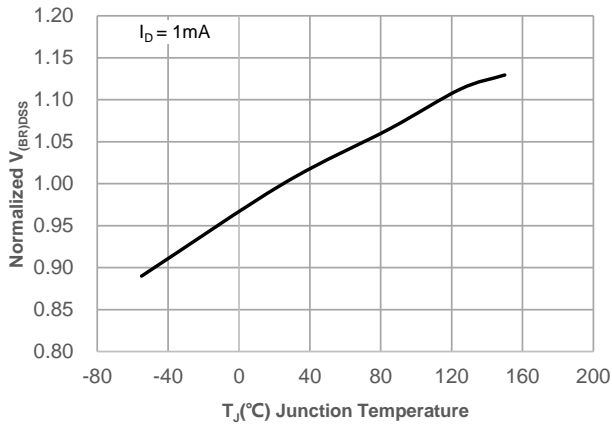


Figure 8: Normalized on Resistance vs. Junction Temperature

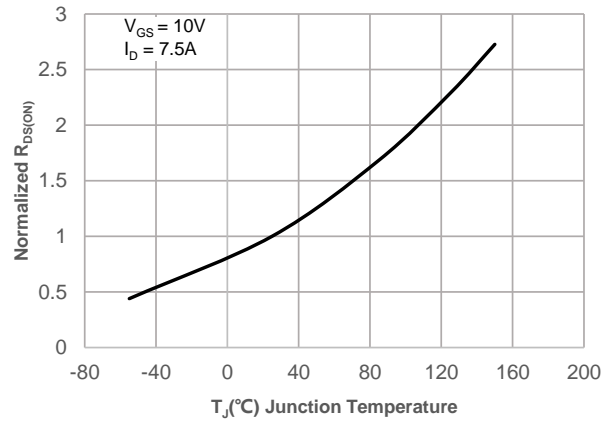


Figure 9: Maximum Safe Operating Area

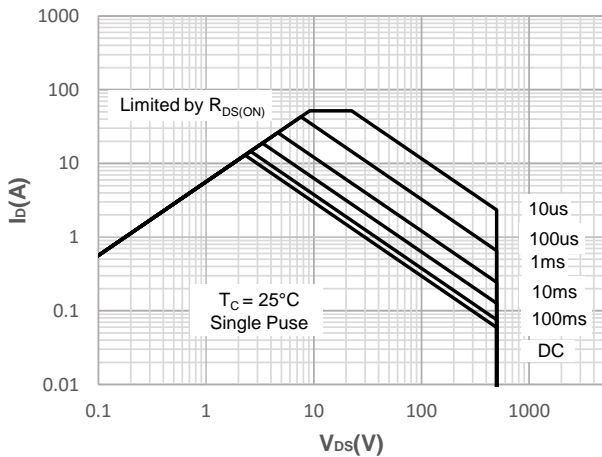


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

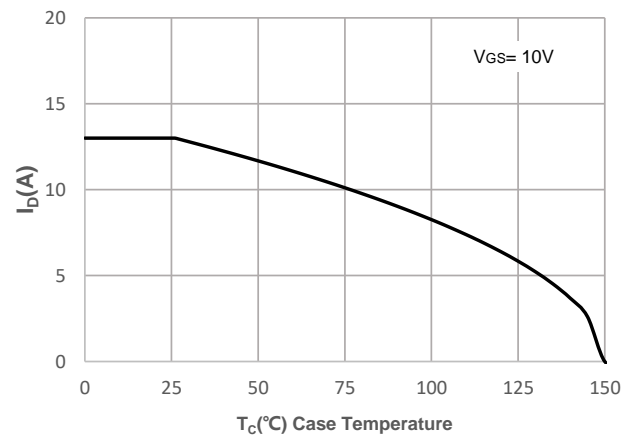


Figure 11: Normalized Maximum Transient Thermal Impedance

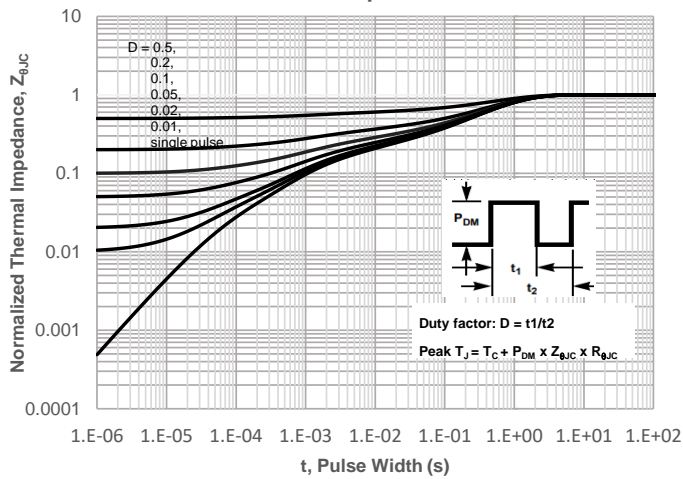
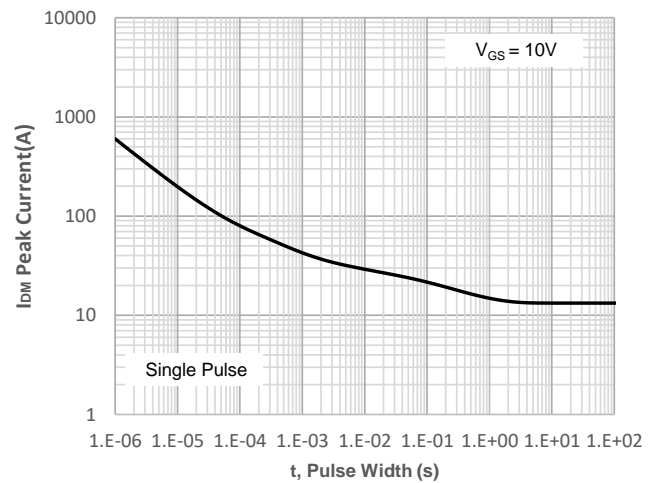


Figure 12: Peak Current Capacity



Test Circuit

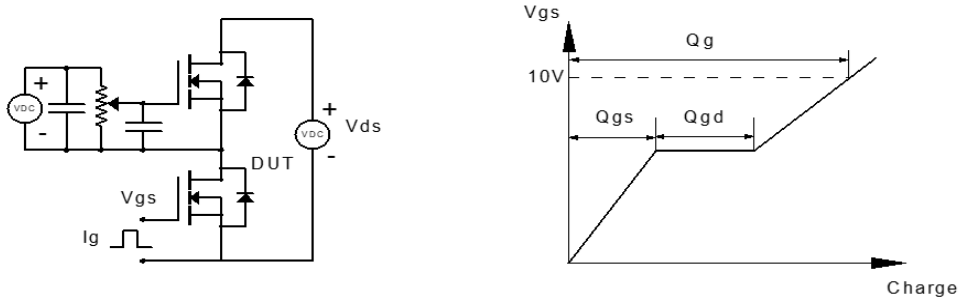


Figure 1: Gate Charge Test Circuit & Waveform

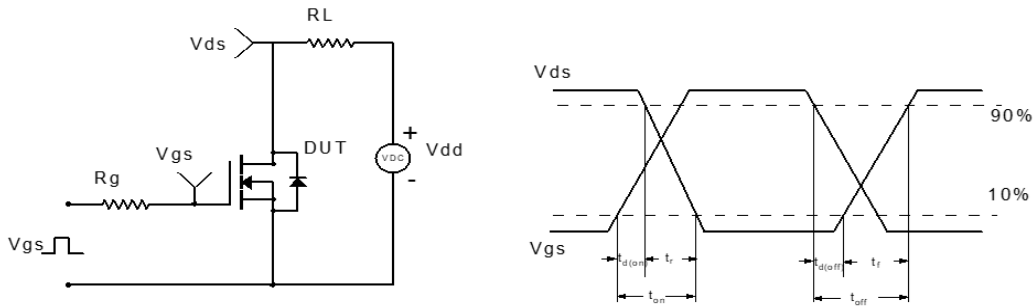


Figure 2: Resistive Switching Test Circuit & Waveform

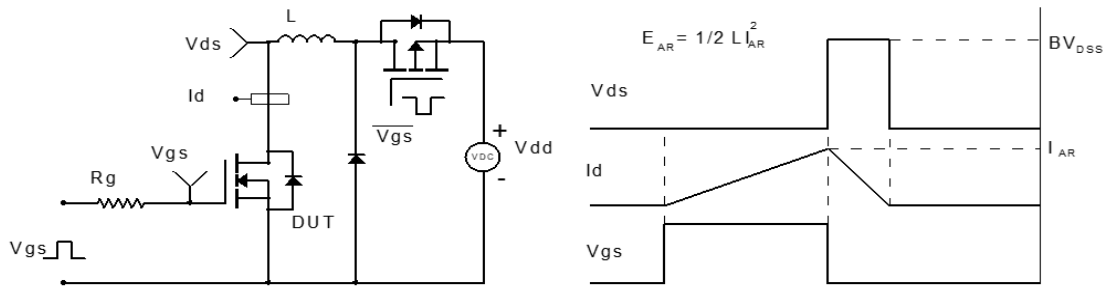


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

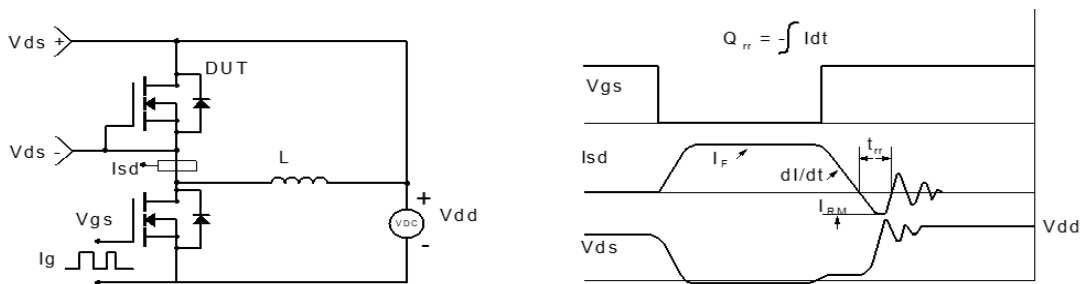
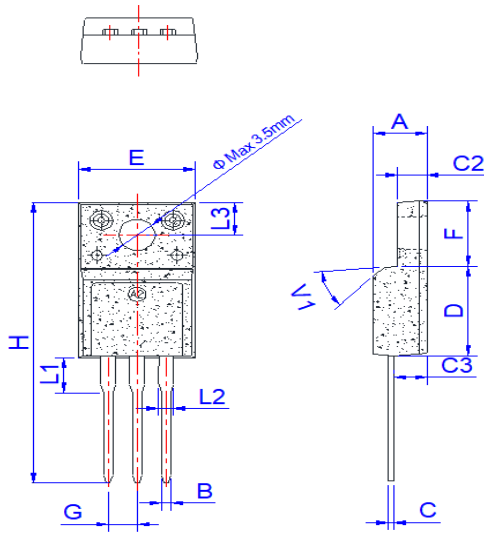


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(TO-220FP-3L)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	

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