



MPF13N50

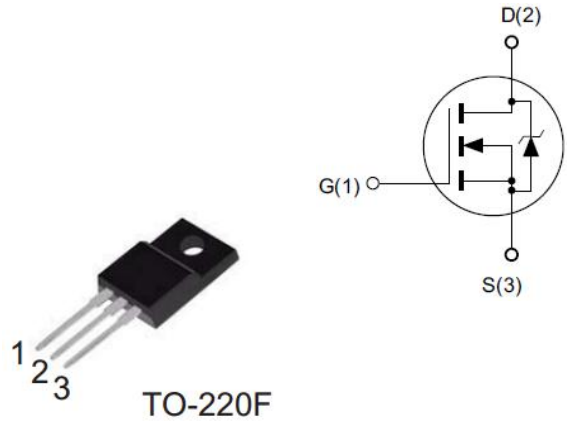
N-Channel Power MOSFET

Features

- ◆ 500V, 13A, $R_{DS(ON)}(Typ.) = 0.38\Omega @ V_{GS} = 10V$.
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Adaptor
- ◆ Standby Power
- ◆ Switching power supply
- ◆ PFC



Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Limit	Unit
		TO-220F	
V_{DS}	Drain-Source Voltage ^a	500	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_C = 25^\circ\text{C}$	13	A
	Drain Current-Continuous, $T_C = 100^\circ\text{C}$	8.2	A
I_{DM}	Drain Current-Pulsed ^b	52	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	48	W
EAS	Single Pulsed Avalanche Energy ^d	720	mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-Case Max.	2.58	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient Max	62.5	$^\circ\text{C/W}$

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA



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■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 6.5A$	-	0.38	0.45	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	1995	-	pF
C_{oss}	Output Capacitance		-	203	-	pF
C_{rss}	Reverse Transfer Capacitance		-	9	-	pF

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250V, I_D = 13A,$ $V_{GS} = 10V$	-	29	-	ns
t_r	Turn-On Rise Time		-	22	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	64	-	ns
t_f	Turn-Off Fall Time		-	33	-	ns
Q_g	Total Gate Charge	$V_{DS} = 400V, I_D = 13A,$ $V_{GS} = 10V$	-	40.2	-	nC
Q_{gs}	Gate-Source Charge		-	9	-	nC
Q_{gd}	Gate-Drain Charge		-	13.8	-	nC

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	13	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	52	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 13A$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$I_S = 13A, T_J = 25^\circ C$ $dI_F/dt = 100A/\mu s,$ $V_{GS} = 0V$	-	450	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.21	-	nC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 10mH, V_{DD} = 50V, I_{as} = 12A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$

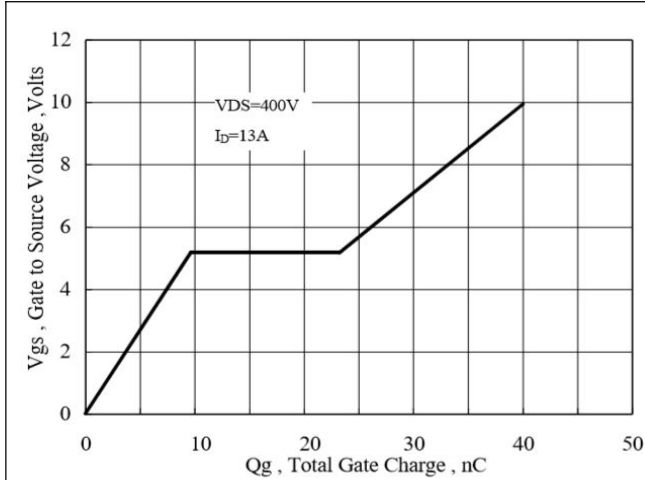


Figure 1. Gate Charge Characteristics

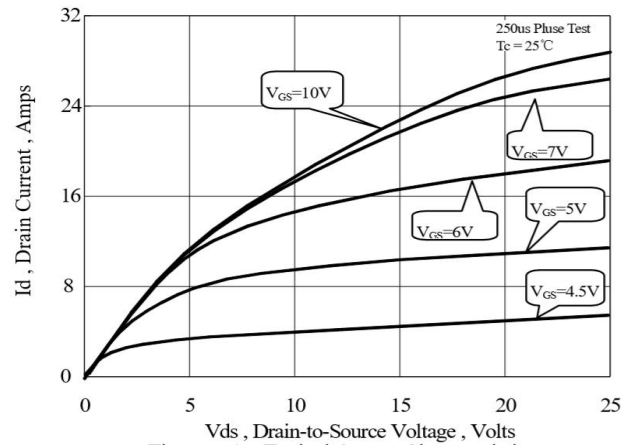


Figure 2. On-State Characteristics

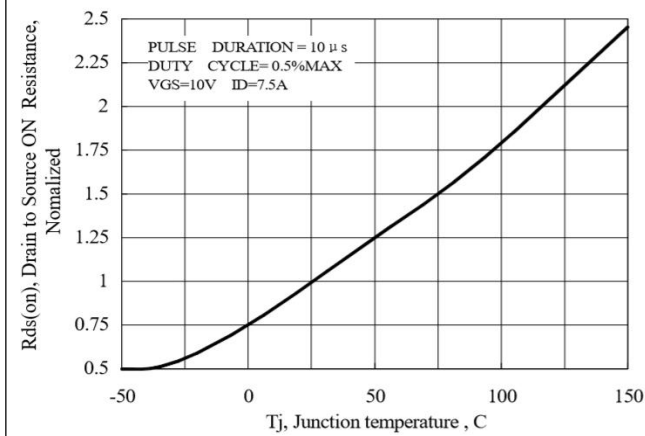


Figure 3. Normalized On-Resistance Variation with Temperature

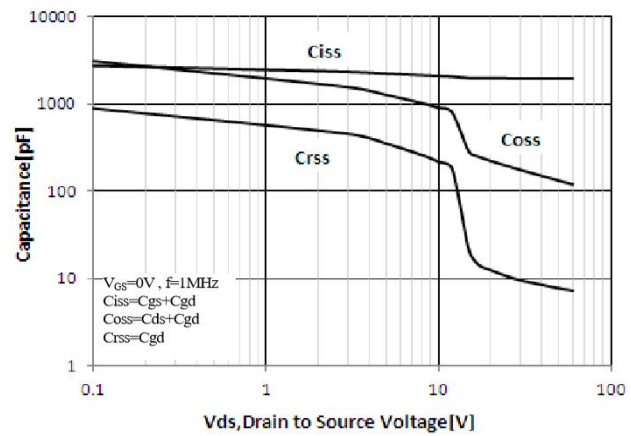


Figure 4. Typical Capacitance vs Drain to Source Voltage

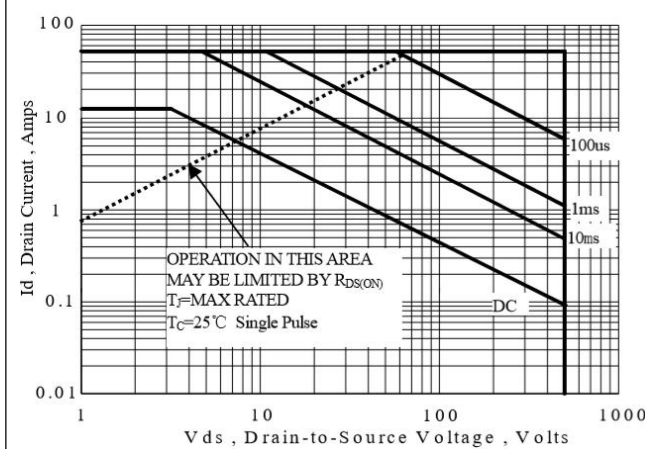


Figure 5. Maximum Forward Bias Safe Operating Area (TO-220F)

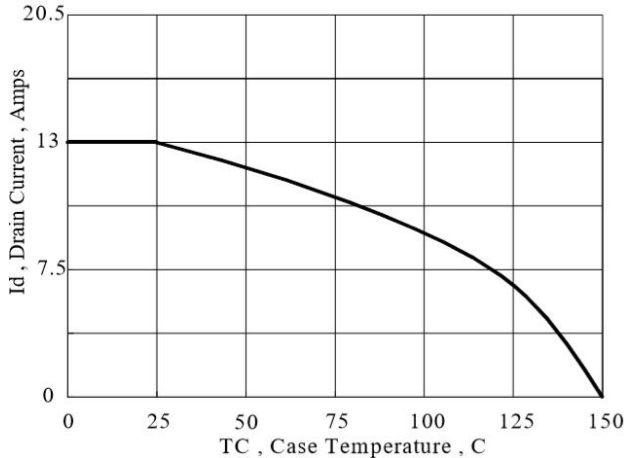


Figure 6. Maximum Continuous Drain Current vs Case Temperature

■ Package Information

