

Silicon N-Channel Power MOSFET

Description

The MPF13N50 uses advanced technology and design to provide excellent $R_{DS(ON)}$. It can be used in a wide variety of applications.

General Features

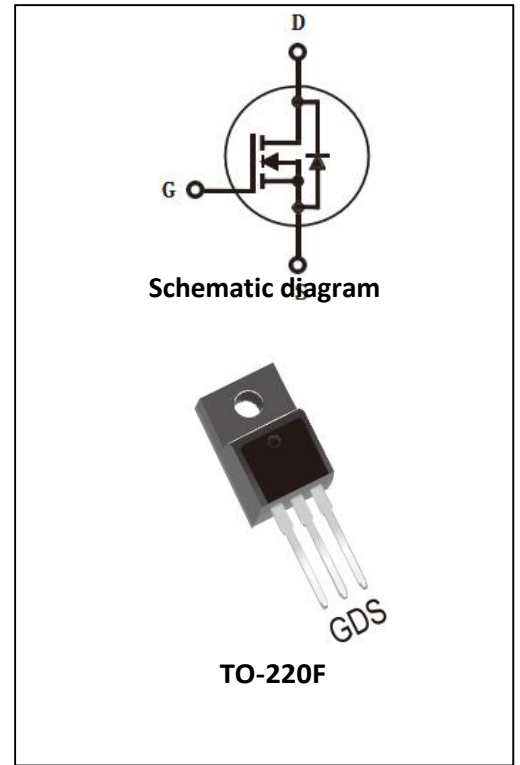
- ① $V_{DS}=500V, I_D=13A$
- ② Low ON Resistance
- ③ Low Reverse transfer capacitances
- ④ 100% Single Pulse avalanche energy Test

Application

- ① Power switching application
- ② Adapter and charger

Electrical Characteristics

@ $T_a=25^{\circ}C$ (unless otherwise specified)



Package Marking And Ordering Information

Ordering Codes	Package	Product Code	Packing
MPF13N50	TO-220F	MPF13N50	Tube

Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Breakdown Voltage	500	V
I_D	Drain Current (continuous) at $T_c=25^{\circ}C$	13	A
I_{DM}	Drain Current (pulsed)	52	A
V_{GS}	Gate to Source Voltage	+/-30	V
P_{tot}	Total Dissipation at $T_c=25^{\circ}C$	60	W
T_j	Max. Operating Junction Temperature	175	$^{\circ}C$
EAS	Single Pulse Avalanche Energy	1000	mJ

Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V _{DS}	Drain-source Voltage	V _{GS} =0V, I _D =250μA	500			V
R _{DS(on)}	Static Drain-to-Source on-Resistance	V _{GS} =10V, I _D =6.5A		0.50	0.55	Ω
V _{GS(th)}	Gated Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V
I _{DSS}	Drain to Source leakage Current	V _{DS} =500V, V _{GS} =0V			1.0	μA
I _{GSS(F)}	Gated to Source Forward Leakage	V _{GS} = +30V			100	nA
I _{GSS(R)}	Gated to Source Reverse Leakage	V _{GS} = -30V			-100	nA
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1.0MHZ		2315		pF
C _{oss}	Output Capacitance			190		pF
C _{rss}	Reverse Transfer Capacitance			11		pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t _{d(on)}	Turn-on Delay Time	V _{DD} =250V, I _D =13A, R _G =10Ω		28		nS
t _r	Turn-on Rise Time			21		nS
t _{d(off)}	Turn-off Delay Time			62		nS
t _f	Turn-off Fall Time			32		nS
Q _g	Total Gate Charge	V _{DS} =400V		40		nC
Q _{gs}	Gate-Source Charge	I _D =13A		9.2		nC
Q _{gd}	Gate-Drain Charge	V _{GS} =10V		14		nC

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I _{SD}	S-D Current(Body Diode)				13	A
I _{SDM}	Pulsed S-D Current(Body Diode)				52	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{DS} =13A			1.5	V
t _{rr}	Reverse Recovery Time	T _J =25°C, I _F =13A di/dt=100A/us			555	nS
Q _{rr}	Reverse Recovery Charge				4550	μC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle <= 2%						

Symbol	Parameter	Typ	Units
R _{θJC}	Junction-to-case	2.0	°C/W

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

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

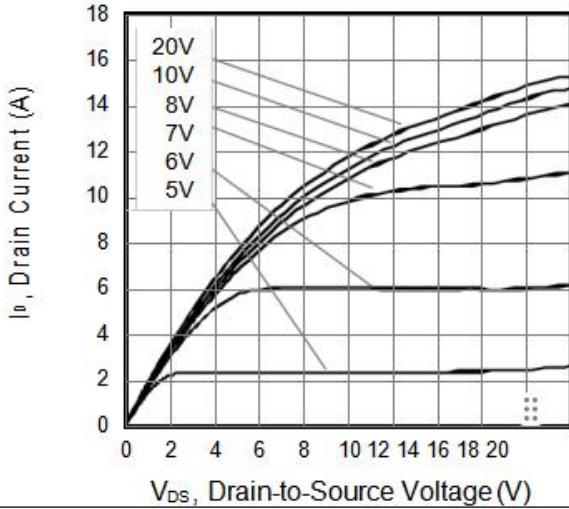


Figure 2. Body Diode Forward Voltage

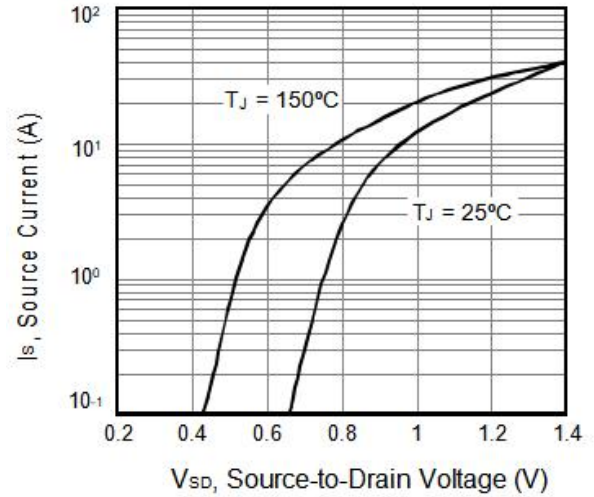


Figure 3. Drain Current vs. Temperature

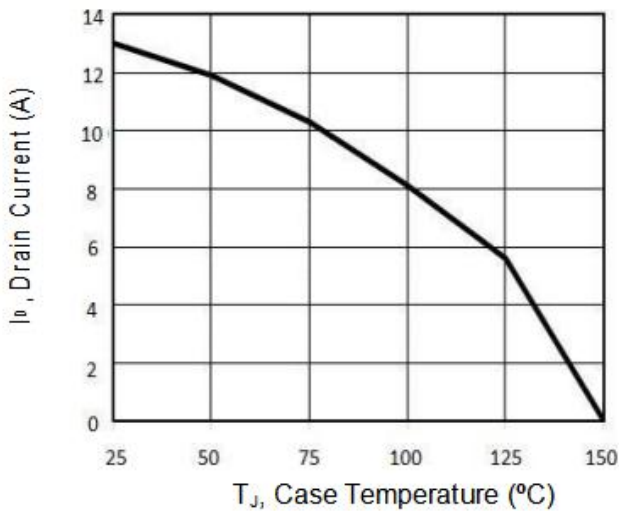


Figure 4. BVDS Variation vs. Temperature

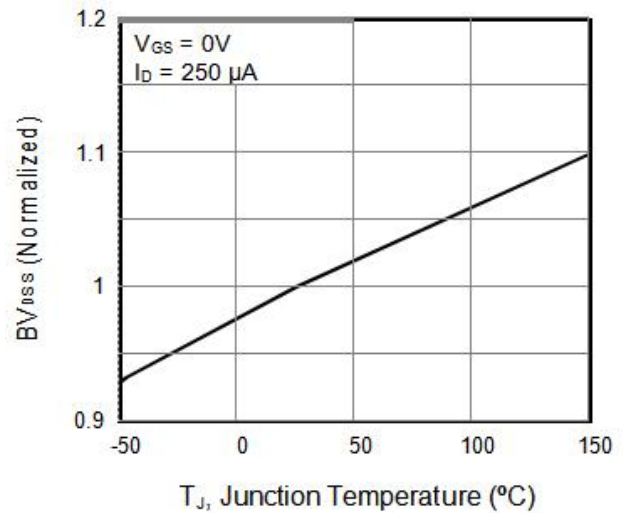


Figure 5. Transfer Characteristics

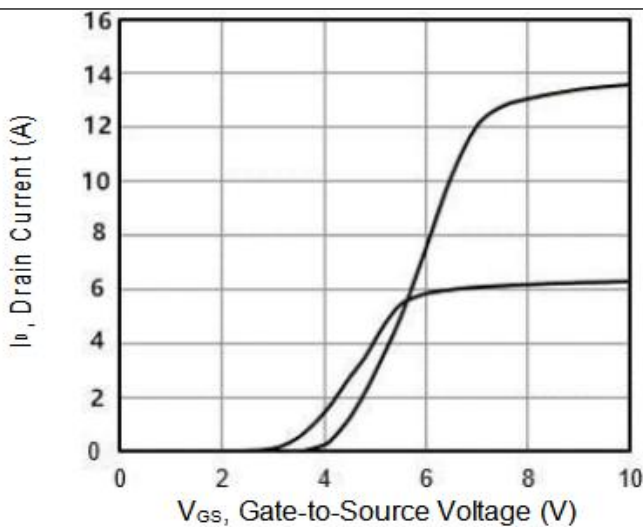
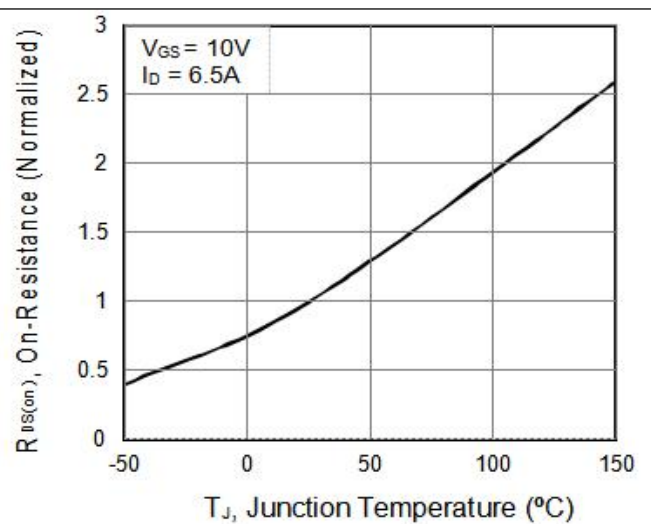


Figure 6. On-Resistance vs. Temperature



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

Figure 7. Capacitance

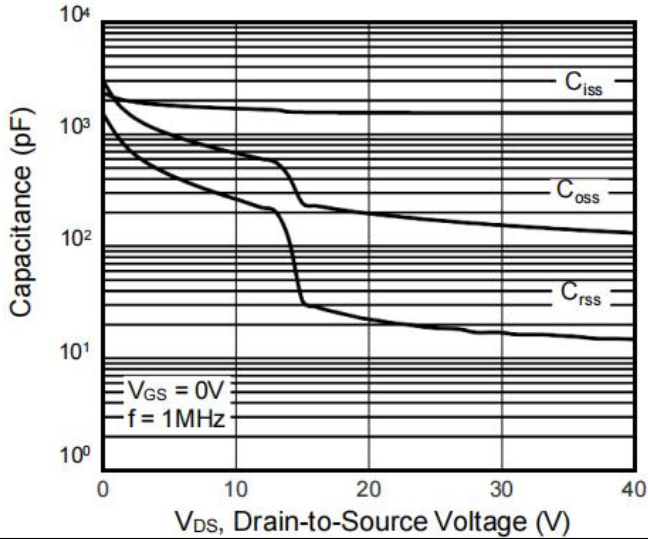


Figure 8. Gate Charge

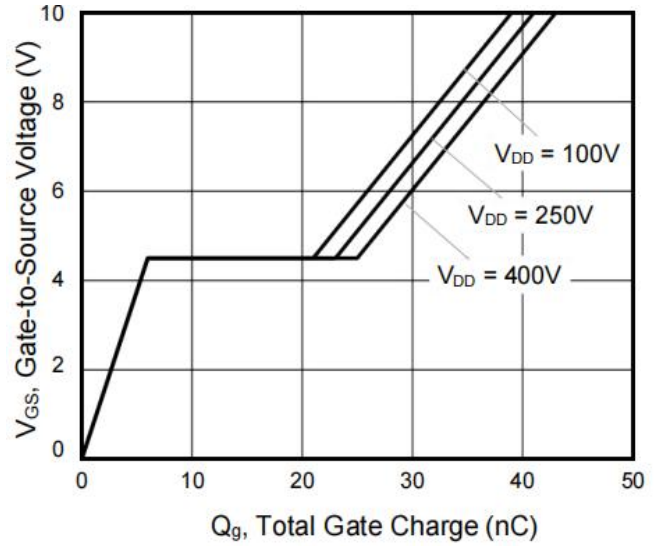


Figure 9. Transient Thermal Impedance (TO-220F)

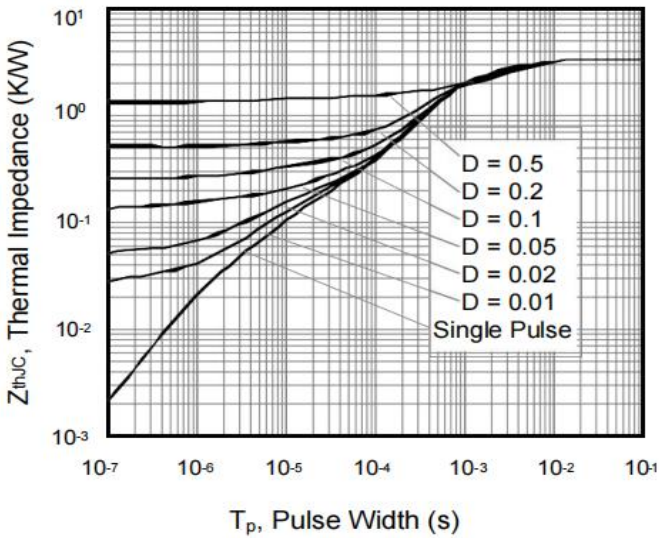
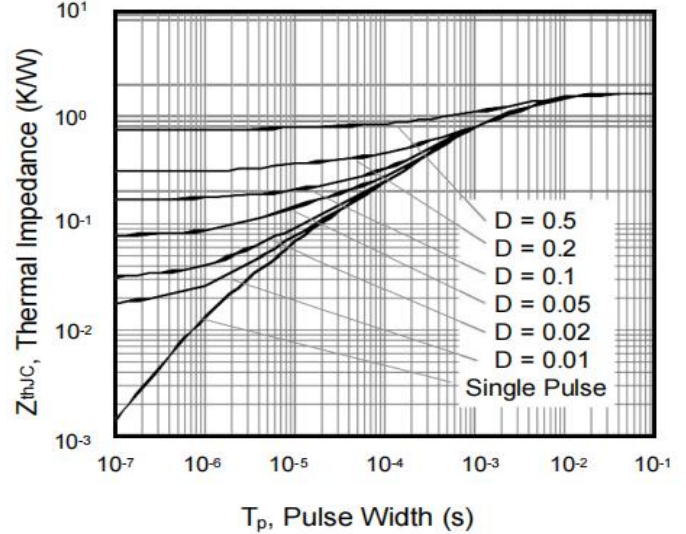
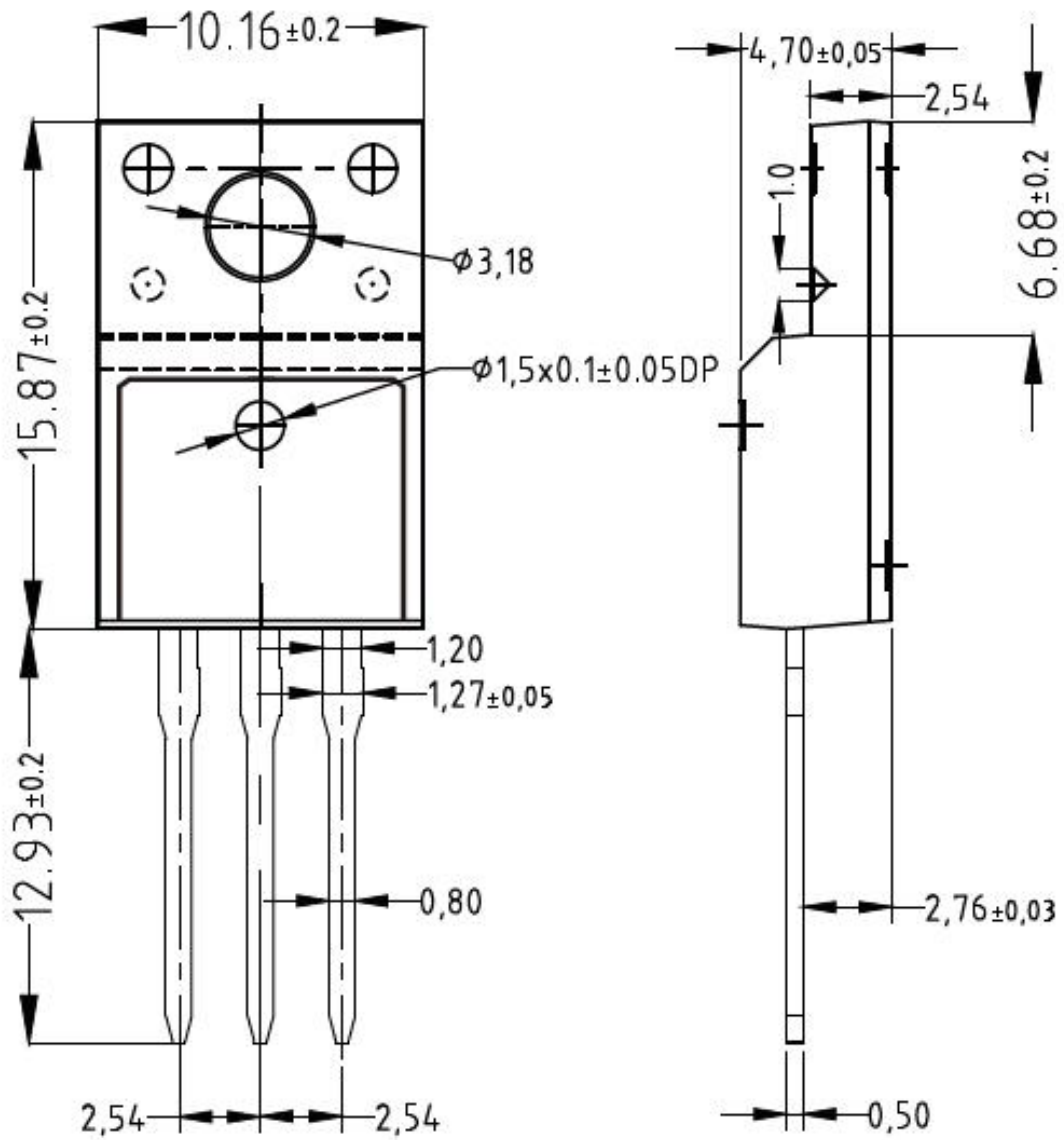


Figure 10. Transient Thermal Impedance (TO-220)



Package Information



TO-220 Package



NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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