



## FEATURES

- I Fast switching
- I 100% avalanche tested
- I Improved dv/dt capability

## APPLICATIONS

- I Switch Mode Power Supply (SMPS)
- I Uninterruptible Power Supply (UPS)
- I Power Factor Correction (PFC)



### Device Marking and Package Information

Device	Package	Marking
MPF7N65	TO-220F	MPF7N65
MPF7N65	TO-220	MPF7N65
MPF7N65	TO-251	MPF7N65
MPF7N65	TO-252	MPF7N65

## 650V N-Channel MOSFET

Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ , unless otherwise noted		Value				Unit
Parameter	Symbol	TO-220F	TO-220	TO-251	TO-252	
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DS}$	650				V
Continuous Drain Current	$I_D$	7				A
Pulsed Drain Current (note1)	$I_{DM}$	28				A
Gate-Source Voltage	$V_{GS}$	$\pm 30$				V
Single Pulse Avalanche Energy (note2)	EAS	165				mJ
Avalanche Current (note1)	$I_{AS}$	5.76				A
Repetitive Avalanche Energy (note1)	EAR	100				mJ
Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	63	97			W
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	$-55 \sim +150$				$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Value				Unit
		TO-220F	TO-220	TO-251	TO-252	
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.98	1.29			rXrVV
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	60			



Specifications $T_j = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	V (BR)DSS	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 650V, V_{GS} = 0V, T_j = 25^\circ\text{C}$	-	-	1	$\mu A$
Gate-Source Leakage	I <sub>GSS</sub>	$V_{GS} = \pm 30V$	..	—	$\pm 100$	nA
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	4.0	V
Drain-Source On-Resistance (Note3)	$r_{DS(on)}$	$V_{GS} = 10V, I_D = 3.5A$	-	1.1	1.35	$\Omega$
<b>Dynamic</b>						
Input Capacitance	C <sub>iss</sub>	$V_{GS} = 0V, V_{DS} = 25V, f = 1.0\text{MHz}$	—	891	-	pF
Output Capacitance	C <sub>oss</sub>		-	87	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	10	-	
Total Gate Charge	Q <sub>g</sub>	$V_{DD} = 520V, I_D = 7A, V_{GS} = 10V$	-	32	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	4.6	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	14	-	
Turn-on Delay Time	t <sub>d(on)</sub>	$V_{DD} = 325V, I_D = 7A, R_G = 25\Omega$	-	39	-	ns
Turn-on Rise Time	t <sub>r</sub>		—	23	-	
Turn-off Delay Time	t <sub>d(off)</sub>		-	137	-	
Turn-off Fall Time	t <sub>f</sub>		-	60	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	I <sub>S</sub>	$T_c = 25^\circ\text{C}$	—	—	7.0	A
Pulsed Diode Forward Current	I <sub>SM</sub>		-	-	28	
Body Diode Voltage	V <sub>S(D)</sub>	$T_j = 25^\circ\text{C}, I_{SD} = 3.5A, V_{GS} = 0V$	-	-	1.4	V
Reverse Recovery Time	t <sub>rr</sub>	$V_{GS} = 0V, I_S = 7A, di_f/dt = 100A/\mu s$	-	575	..	ns
Reverse Recovery Charge	Q <sub>rr</sub>		—	1.9	-	$\mu c$

#### Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L=10\text{mH}, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_j=25^\circ\text{C}$
3. Pulse Test: Pulse width < 300ps, Duty Cycle 与 1%



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

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

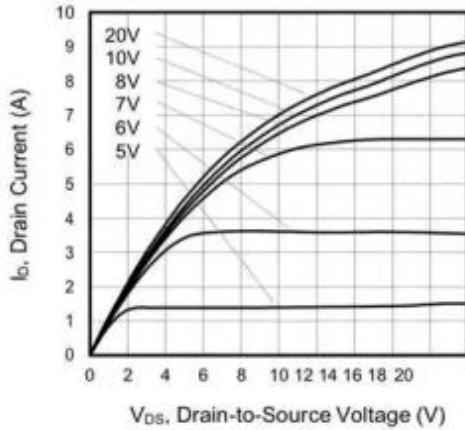


Figure 2. Body Diode Forward Voltage

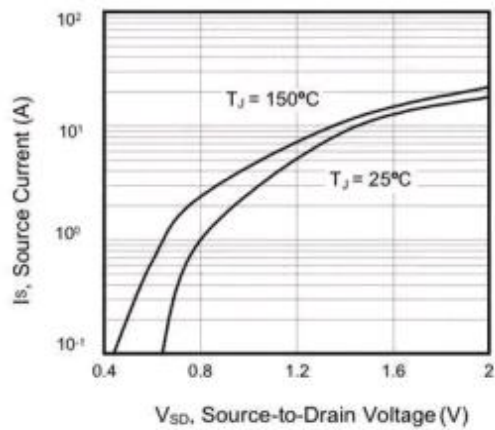


Figure 3. Drain Current vs. Temperature

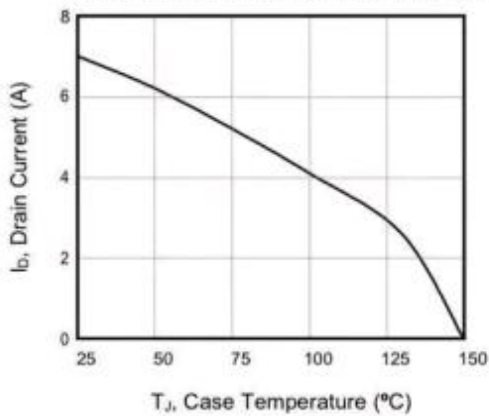


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

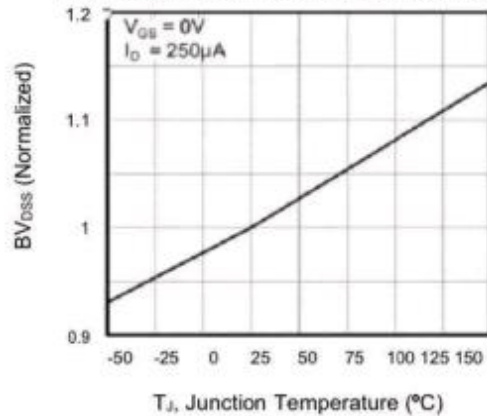


Figure 5. Transfer Characteristics

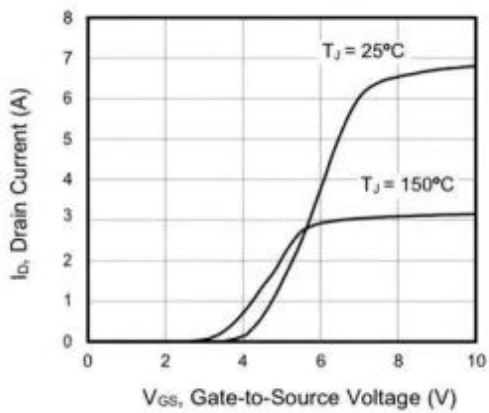
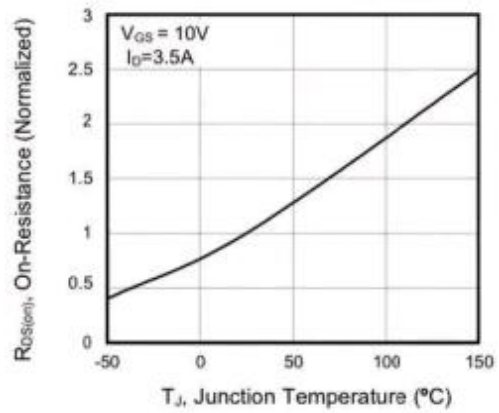


Figure 6. On-Resistance vs. Temperature





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

Figure 7. Capacitance

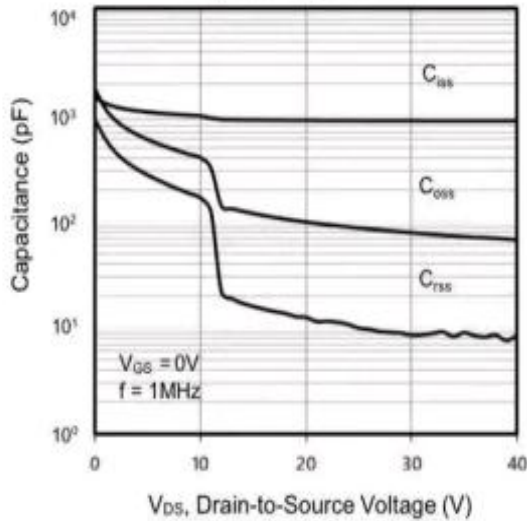


Figure 8. Gate Charge

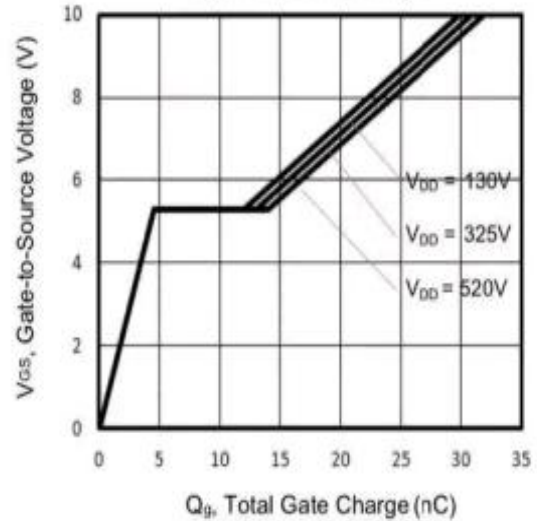


Figure 9. Transient Thermal Impedance  
TO-220, TO-251, TO-252

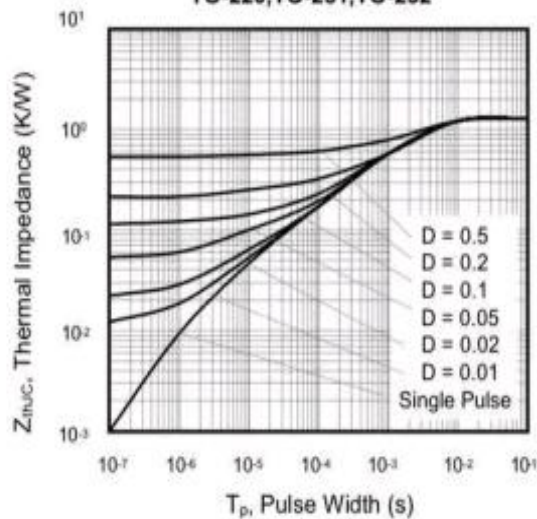


Figure 10. Transient Thermal Impedance  
TO-220F

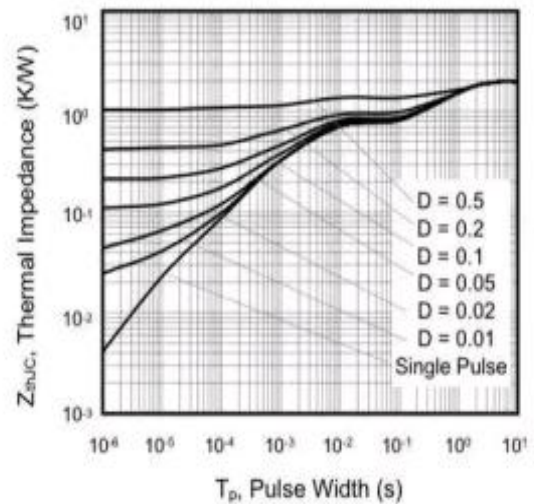




Figure A: Gate Charge Test Circuit and Waveform

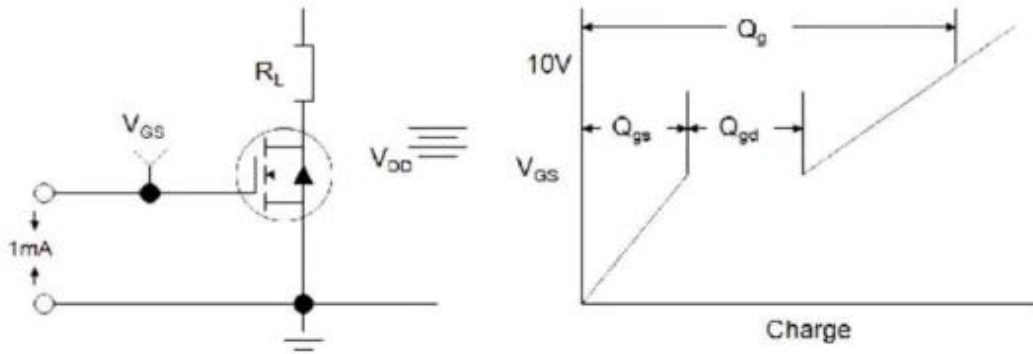


Figure B: Resistive Switching Test Circuit and Waveform

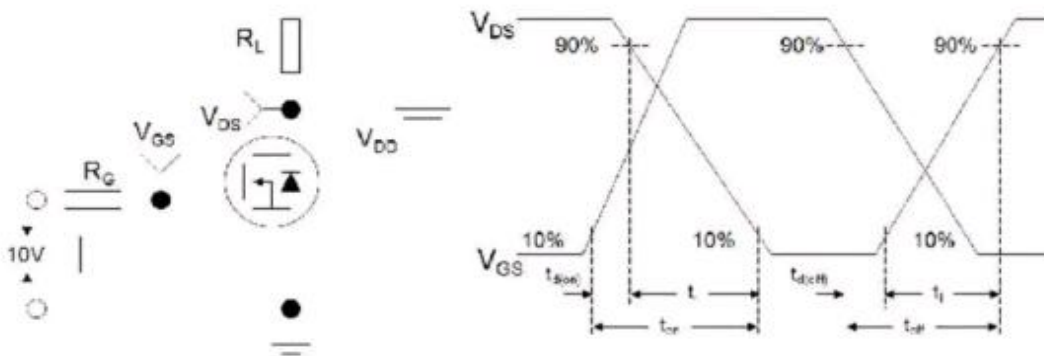


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

