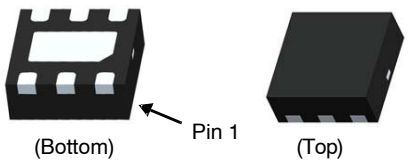
IntelliMAX™ Advanced Load Products

FPF1007 - FPF1009



WDFN6 2x2, 0.65P
CASE 511CY

General Description

The FPF1007/8/9 are low R_{DS} P−Channel MOSFET load switches offered in a selection of 10 μs, 80 μs, and 1 ms slew rate turn−on options for transient / in−rush current control. To support trends in mobile application requirements, the minimum operating input voltage has been reduced down to 1.2 V, the input current leakage has been minimized to extend battery life, and the ESD−protection has been designed to withstand a minimum of 8 kV (HBM) and 2 kV (CDM).

The switch is controlled by an active−high logic input (ON pin), allowing direct interface with a low−voltage control signal. An internal ON pin pull−down resistor protects against unintentional device turn−on in the initial state. An on−chip pull−down resistor on the output is enabled when the switch is turned−off and provides quick, robust discharge of the output load.

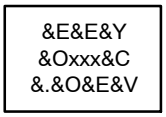
Features

- 1.2 to 5.5 V Input Voltage Range
- Typical R_{ON} = 30 mΩ at V_{IN} = 5.5 V
- Typical R_{ON} = 40 mΩ at V_{IN} = 3.3 V
- Fixed Three Different Turn−on Rise Time 10 μs / 80 μs / 1 ms
- Low < 10 μA at V_{IN} = 3.3 V Quiescent Current
- Internal ON Pin Pull Down
- Output Discharge Function
- ESD Protection above 8000 V HBM and 2000 V CDM
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- PDAs
- Cell Phones
- GPS Devices
- MP3 Players
- Digital Cameras
- Peripheral Ports
- Hot−Swap Supplies
- Notebook Computers

MARKING DIAGRAM



&E	= Designates Space
&Y	= Binary Calendar Year Coding Scheme
&O	= Plant Code identifier
xxx	= Device Specific Code
&C	= Single digit Die Run Code
&.	= Pin One Dot
&V	= Eight−Week Binary Datecoding Scheme

ORDERING INFORMATION

See detailed ordering and shipping information on page 10 of this data sheet.

Typical Application Circuit

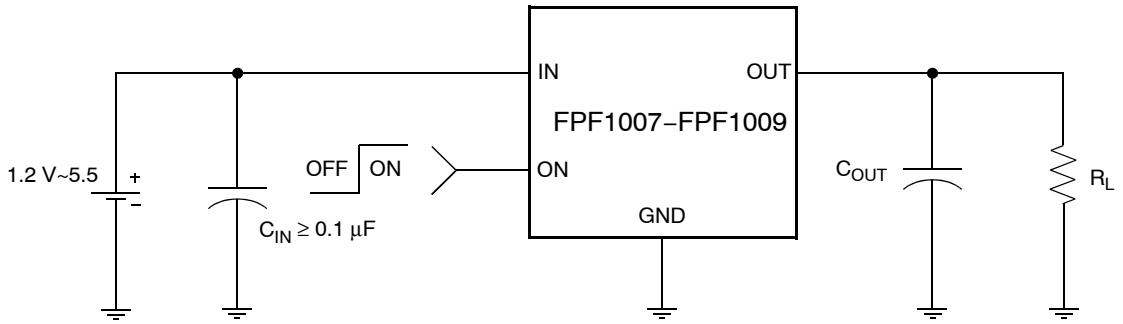


Figure 1. Typical Application Circuit

Functional Block Diagram

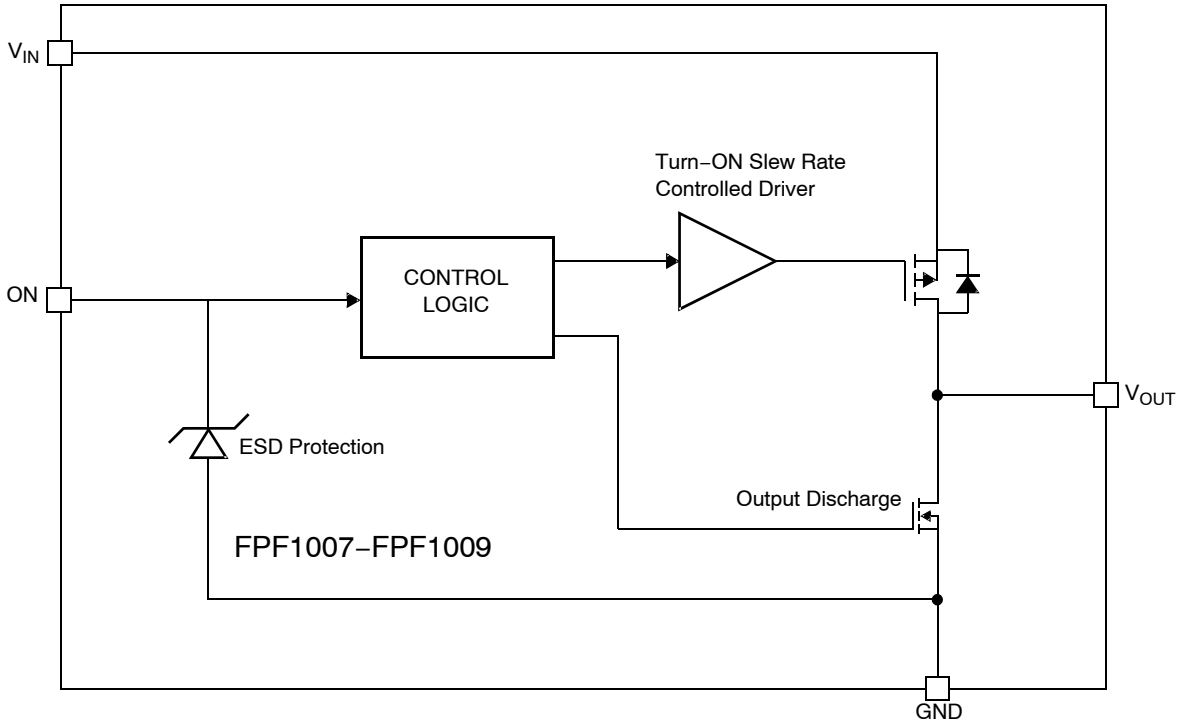
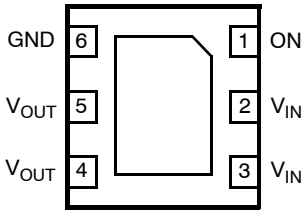


Figure 2. Functional Block Diagram

Pin Configuration



(Bottom View)

Figure 3. Pin Configuration

PIN DESCRIPTIONS

Name	Type	Description
4, 5	V_{OUT}	Switch Output: Output of the power switch
2, 3	V_{IN}	Supply Input: Input to the power switch and the supply voltage for the IC
6	GND	Ground
1	ON	ON/OFF Control Input

ABSOLUTE MAXIMUM RATINGS

Parameter		Min	Max	Unit
V_{IN}, V_{OUT}, ON to GND		−0.3	6.0	V
Maximum Continuous Switch Current			1.5	A
Power Dissipation at T_A = 25°C (Note 1)			1.2	W
Storage Junction Temperature		−65	150	°C
Operating Temperature Range		−40	85	°C
Thermal Resistance, Junction to Ambient			86	°C/W
Electrostatic Discharge Protection	HBM	8000		V
	CDM	2000		

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Package power dissipation on 1 square inch pad, 2 oz. copper board.

RECOMMENDED OPERATING RANGE

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	1.2	5.5	V
T_A	Ambient Operating Temperature	−40	85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS

V_{IN} = 1.2 to 5.5 V, T_A = −40 to +85°C unless otherwise noted. Typical values are at V_{IN} = 3.3 V and T_A = 25°C.

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
Basic Operation							
V_{IN}	Operating Voltage			1.2		5.5	V
I_Q	Quiescent Current	I_{OUT} = 0 mA, V_{ON} = Enabled	V_{IN} = 3.3 V		8		μA
			V_{IN} = 5.5 V			15	
$I_{Q(off)}$	Off Supply Current	V_{ON} = GND, V_{OUT} = OPEN				1	μA
$I_{SD(off)}$	Off Switch Current	V_{ON} = GND, V_{OUT} = GND			0.1	1.0	μA
R_{ON}	On−Resistance	V_{IN} = 5.5 V, I_{OUT} = 200 mA, T_A = 25°C			30	40	mΩ
		V_{IN} = 3.3 V, I_{OUT} = 200 mA, T_A = 25°C			40	55	
		V_{IN} = 1.5 V, I_{OUT} = 200 mA, T_A = 25°C			100	130	
		V_{IN} = 1.2 V, I_{OUT} = 200 mA, T_A = 25°C			175	250	
		V_{IN} = 3.3 V, I_{OUT} = 200 mA, T_A = −40°C to +85°C		20		65	
R_{PD}	Output Pull Down Resistance	V_{IN} = 3.3 V, V_{ON} = 0 V, T_A = 25°C			60		Ω
V_{IL}	ON Input Logic Low Voltage	V_{IN} = 1.2 V to 5.5 V				0.4	V
V_{IH}	ON Input Logic High Voltage	V_{IN} = 1.2 V to 5.5 V		1			V
	ON Input Leakage (On)	V_{ON} = V_{IN} = 5.5 V				10	μA
	ON Input Leakage (Off)	V_{ON} = GND				1	μA
Dynamic							
FPF1007							
t_{ON}	Turn On Time	V_{IN} = 3.3 V, R_L = 500 Ω, R_{L_CHIP} = 60 Ω, C_{OUT} = 0.1 μF, T_A = 25°C			12		μs
t_R	Rise Time				10		μs
t_{OFF}	Turn Off Time				40		μs
t_F	Fall Time				15		μs
FPF1008							
t_{ON}	Turn On Time	V_{IN} = 3.3 V, R_L = 500 Ω, R_{L_CHIP} = 60 Ω, C_{OUT} = 0.1 μF, T_A = 25°C			125		μs
t_R	Rise Time				80		μs
t_{OFF}	Turn Off Time				40		μs
t_F	Fall Time				15		μs
FPF1009							
t_{ON}	Turn On Time	V_{IN} = 3.3 V, R_L = 500 Ω, R_{L_CHIP} = 60 Ω, C_{OUT} = 0.1 μF, T_A = 25°C			2		ms
t_R	Rise Time				1		ms
t_{OFF}	Turn Off Time				40		μs
t_F	Fall Time				15		μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

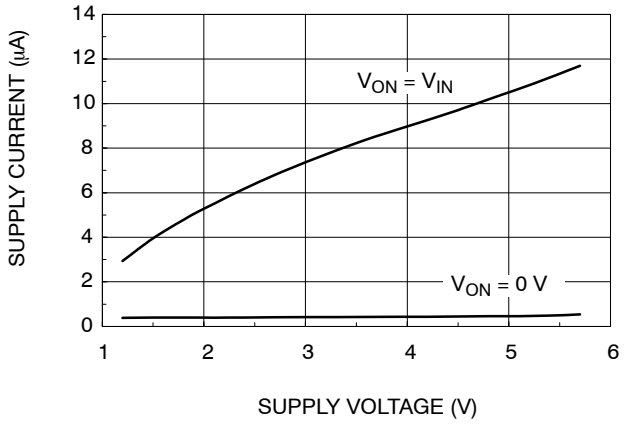


Figure 4. Quiescent Current vs. Input Voltage

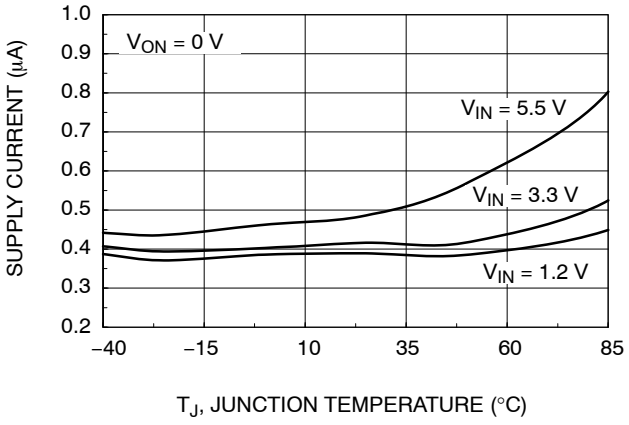


Figure 5. Quiescent Current vs. Temperature

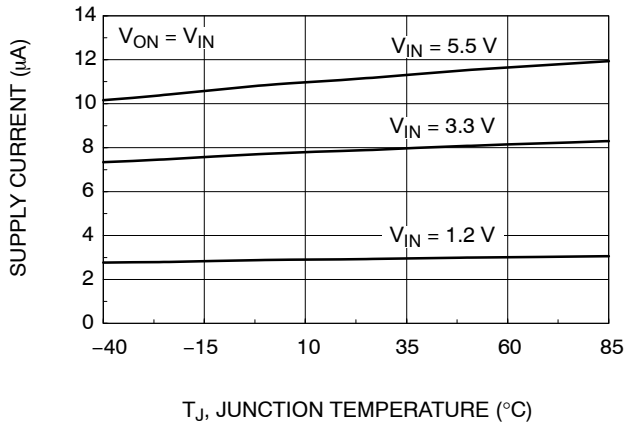


Figure 6. Quiescent Current vs. Temperature

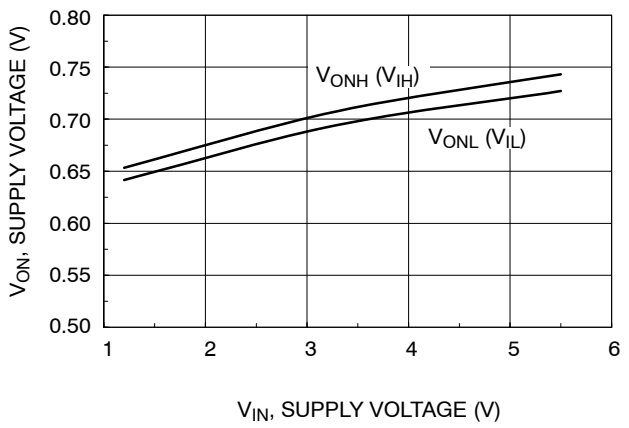


Figure 7. V_{ON} Voltage vs. Input Voltage

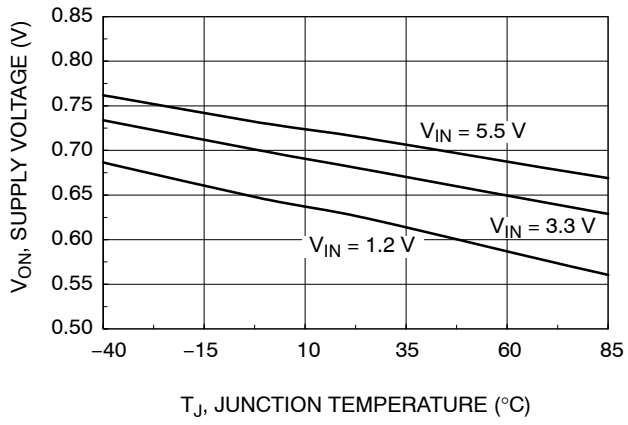


Figure 8. V_{ON} Low Voltage vs. Temperature

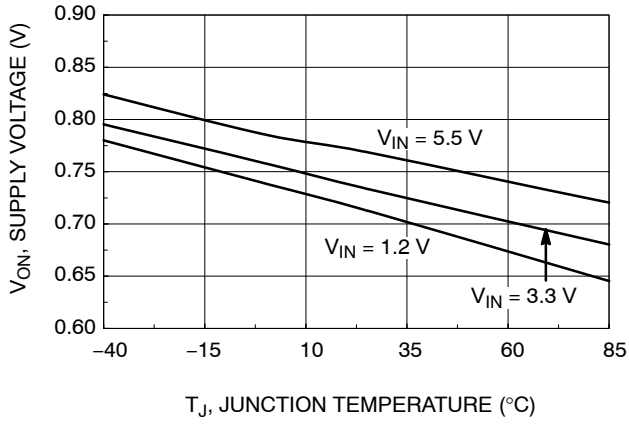


Figure 9. V_{ON} High Voltage vs. Temperature

TYPICAL CHARACTERISTICS (continued)

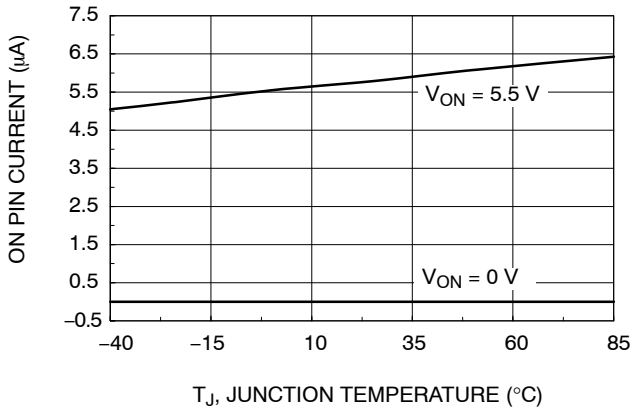


Figure 10. On Pin Current vs. Temperature

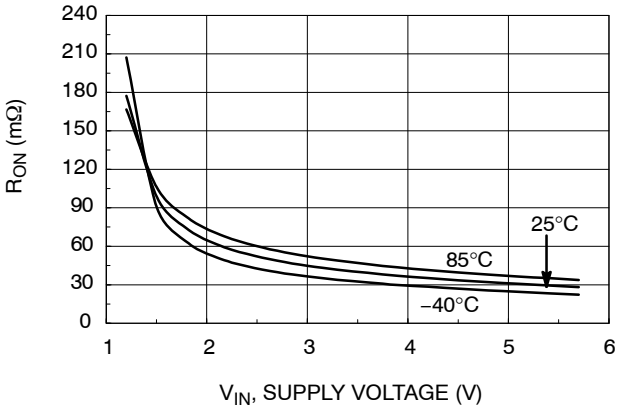


Figure 11. R_{ON} vs. V_{IN}

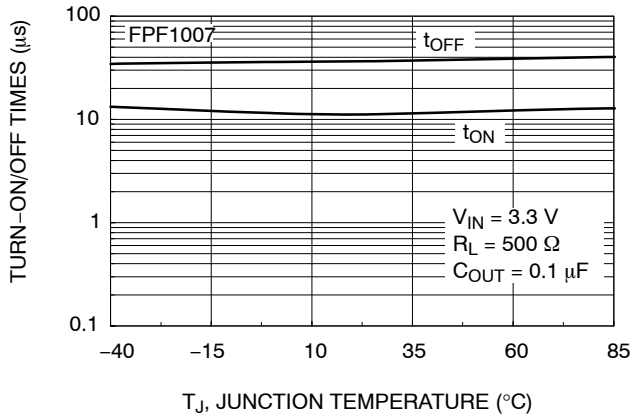


Figure 12. FPF1007 t_{ON} / t_{OFF} vs. Temperature

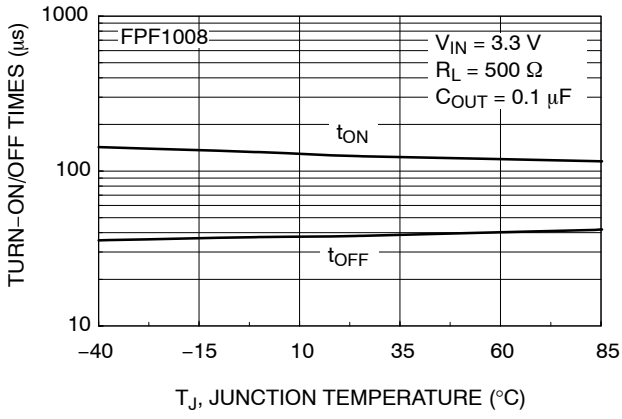


Figure 13. FPF1008 t_{ON} / t_{OFF} vs. Temperature

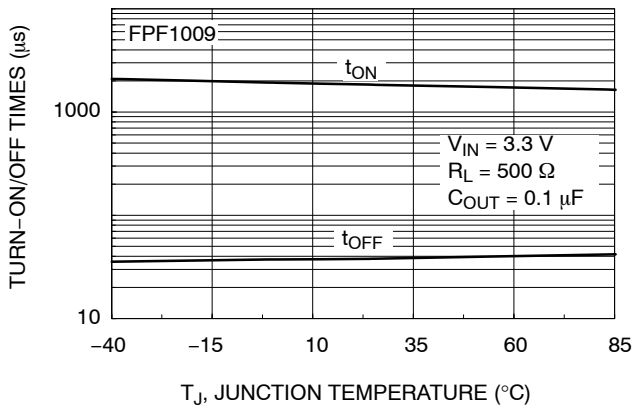


Figure 14. FPF1009 t_{ON} / t_{OFF} vs. Temperature

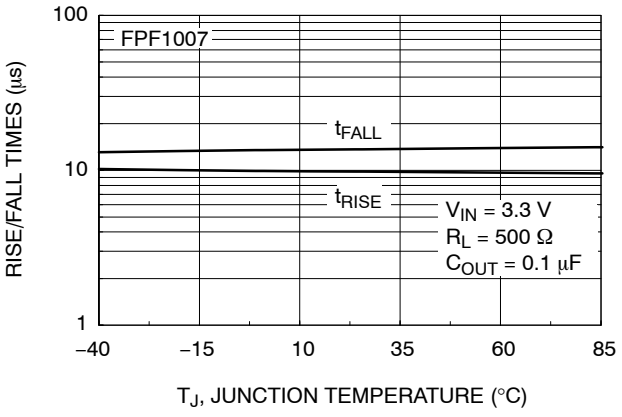


Figure 15. FPF1007 t_{RISE} / t_{FALL} vs. Temperature

TYPICAL CHARACTERISTICS (continued)

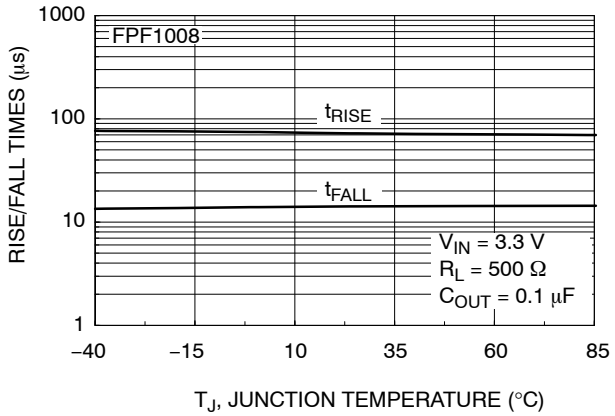


Figure 16. FPF1008 t_{RISE} / t_{FALL} vs. Temperature

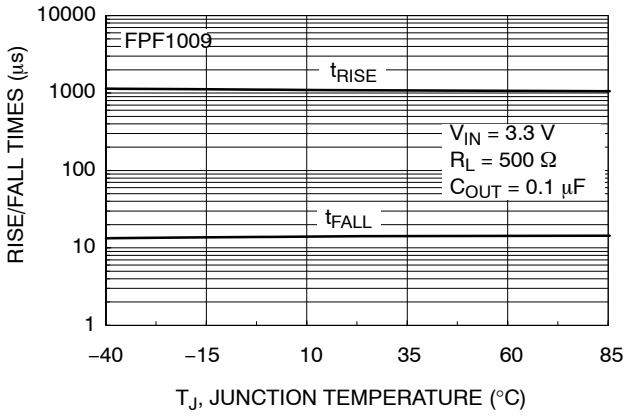


Figure 17. FPF1009 t_{RISE} / t_{FALL} vs. Temperature

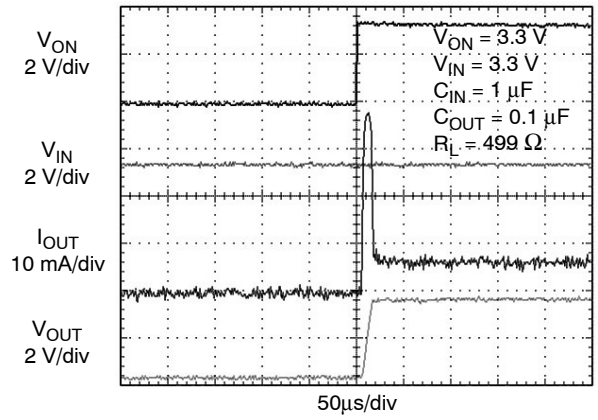


Figure 18. FPF1007 Turn−On Response

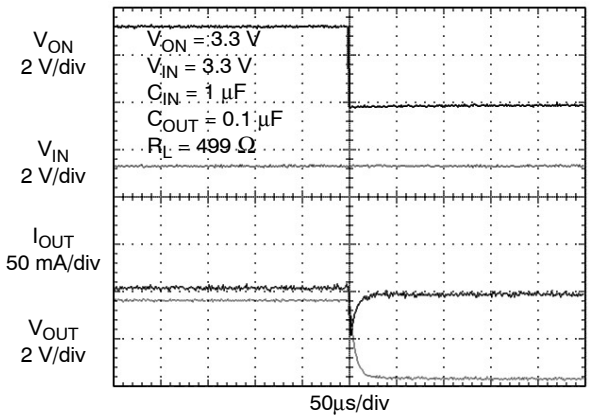


Figure 19. FPF1007 Turn−Off Response

Load current discharged through on−chip output discharge resistor

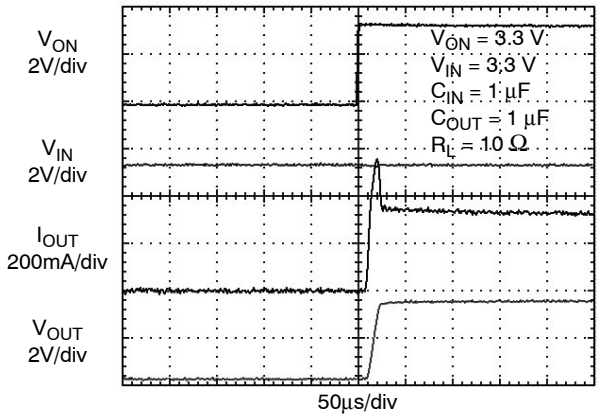


Figure 20. FPF1007 Turn−On Response (C_{OUT} = 1 μF)

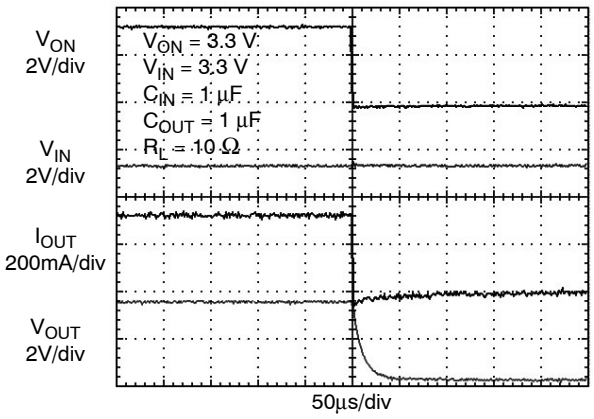


Figure 21. FPF1007 Turn−Off Response

TYPICAL CHARACTERISTICS (continued)

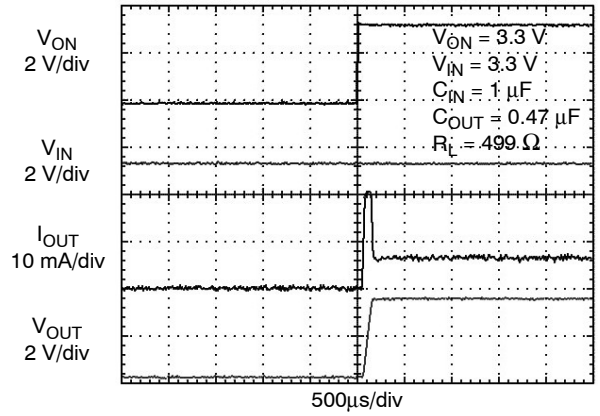


Figure 22. FPF1008 Turn−On Response

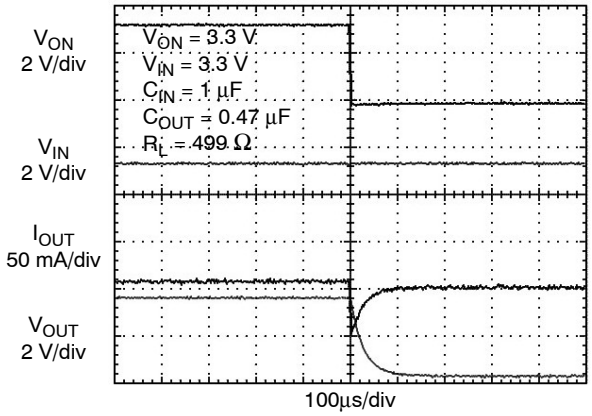


Figure 23. FPF1008 Turn−Off Response
Load current discharged through on−chip output discharge resistor

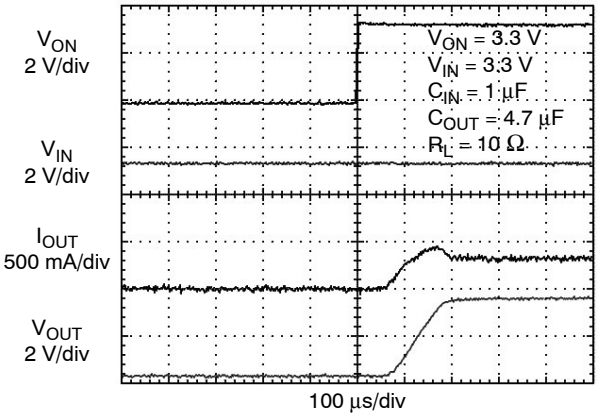


Figure 24. FPF1008 Turn−On Response (C_{OUT} = 4.7 μF)

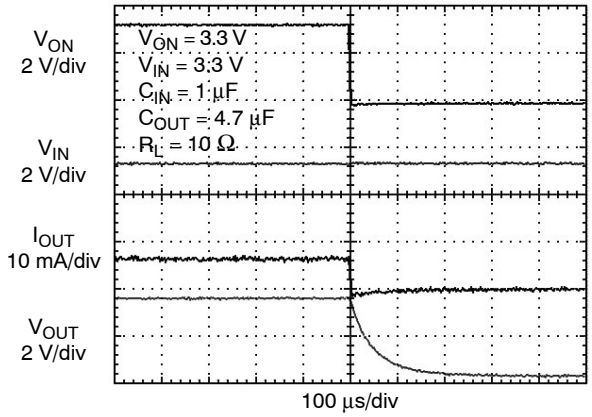


Figure 25. FPF1008 Turn−Off Response

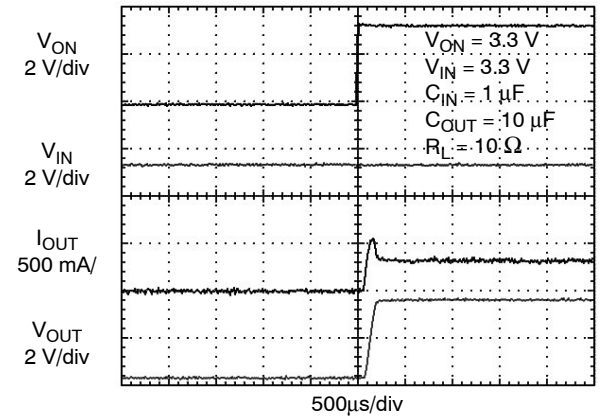


Figure 26. FPF1008 Turn−On Response (C_{OUT} = 10 μF)

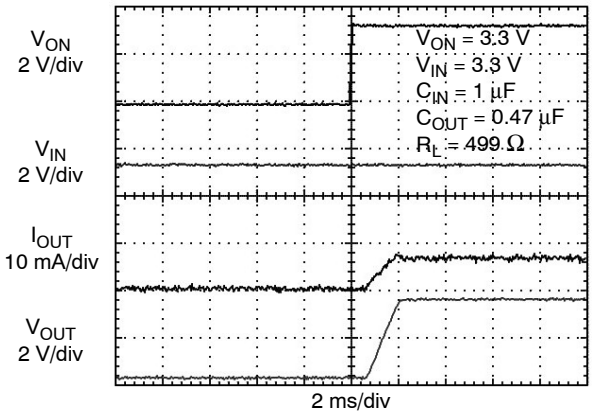


Figure 27. FPF1009 Turn−On Response

TYPICAL CHARACTERISTICS (continued)

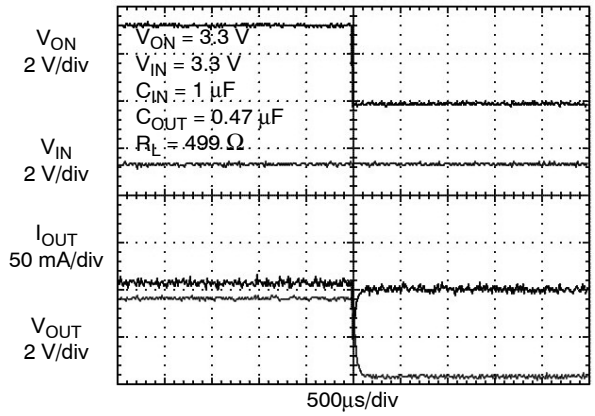


Figure 28. FPF1009 Turn−Off Response
Load current discharged through on−chip output discharge resistor

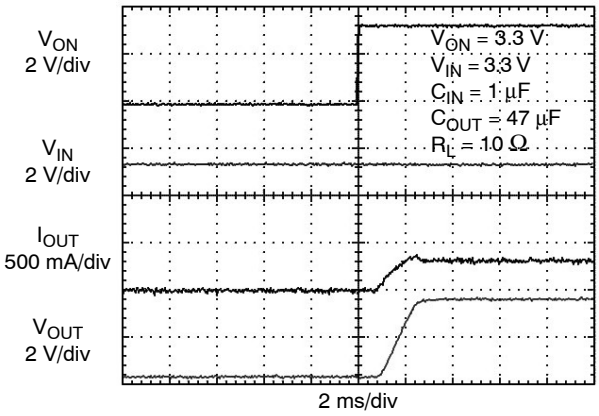


Figure 29. FPF1009 Turn−On Response (C_{OUT} = 47 μF)

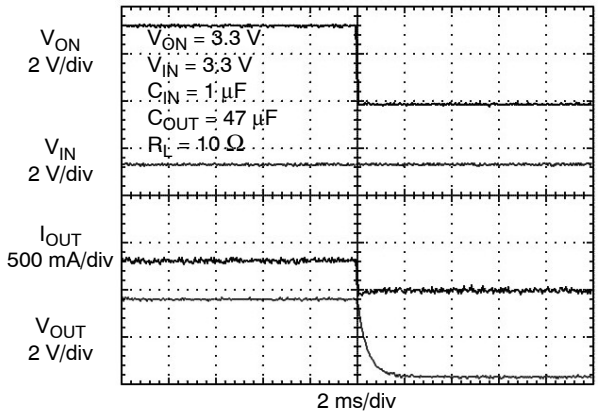


Figure 30. FPF1009 Turn−Off Response

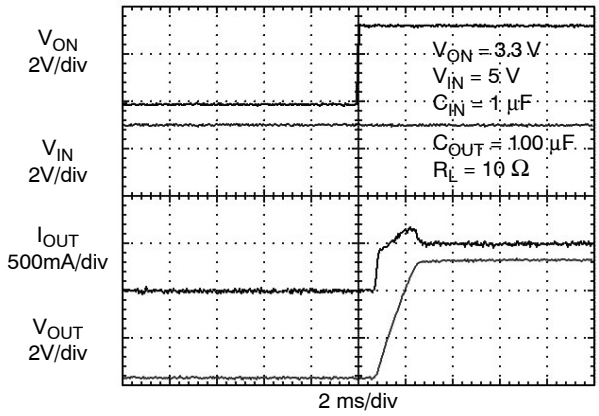
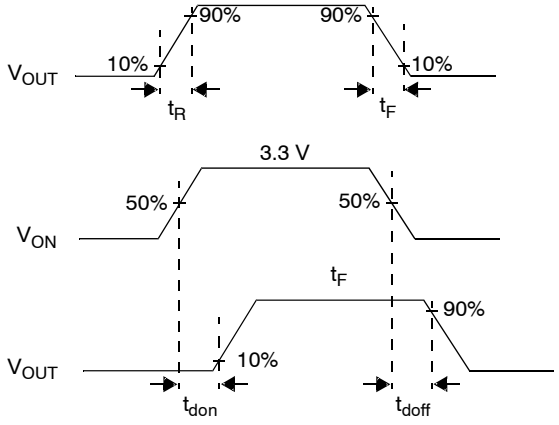


Figure 31. FPF1009 Turn−On Response (C_{OUT} = 100 μF, V_{IN} = 5 V)

Timing Diagram



where:
- t_{ON} = Turn−On Time
- t_{OFF} = Turn−Off Time
- t_{don} = Turn−On Delay Time
- t_{doff} = Turn−Off Delay Time
- t_R = Rise Time
- t_F = V_{OUT} Fall Time
- t_{ON} = $t_R + t_{don}$
- t_{OFF} = $t_F + t_{doff}$

Figure 32. Timing Diagram

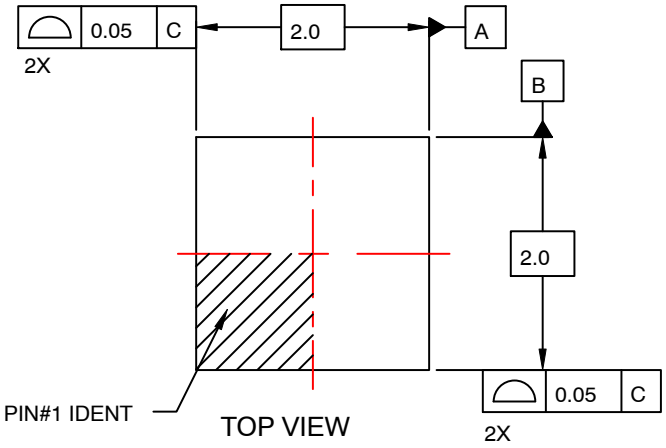
ORDERING INFORMATION

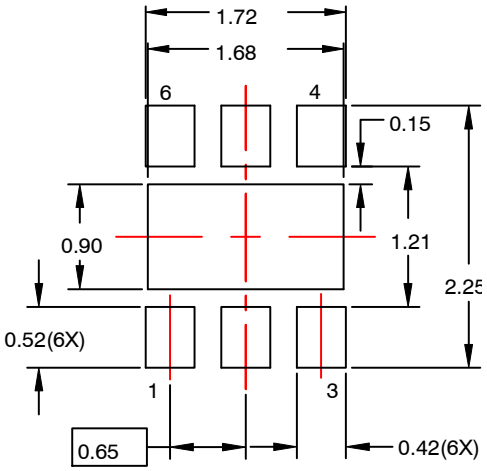
Part Number	Switch R_{ON} at 5.5 V (Typ.)	Rise Time (Typ.)	Output Discharge (Typ.)	ON Pin Activity	Top Mark	Shipping†
FPF1007	30 mΩ, PMOS	10 μs	60 Ω	Active HIGH	007	3000 / Tape & Reel
FPF1008	30 mΩ, PMOS	80 μs	60 Ω	Active HIGH	008	3000 / Tape & Reel
FPF1009	30 mΩ, PMOS	1 ms	60 Ω	Active HIGH	009	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D

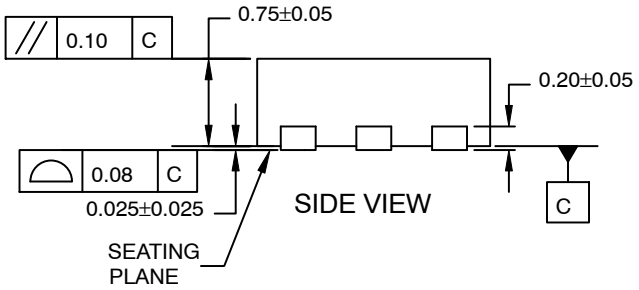
WDFN6 2x2, 0.65P
CASE 511CY
ISSUE O

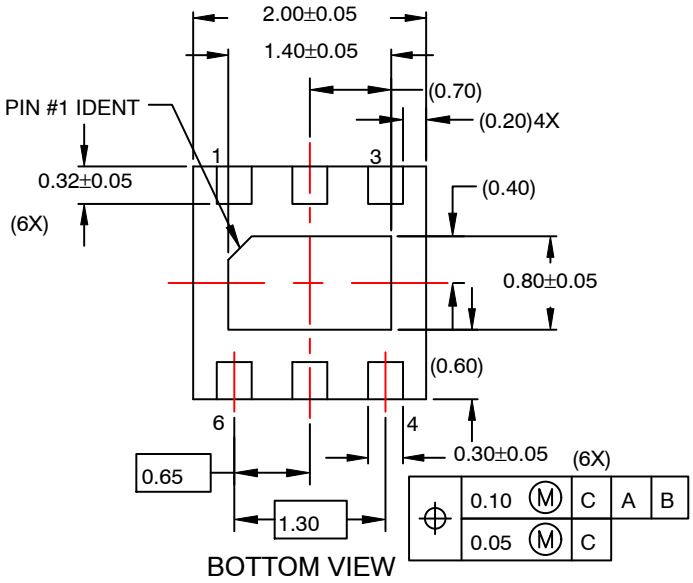
DATE 31 JUL 2016





RECOMMENDED
LAND PATTERN





NOTES:

A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC MO−229 REGISTRATION

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

DOCUMENT NUMBER:	**98AON13613G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**WDFN6 2X2, 0.65P**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales