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FAIRCHILD

October 2012

FPF1007-FPF1009
IntelliMAX™ Advanced Load Products

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
- RoHS Compliant

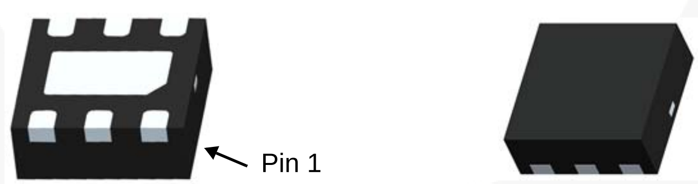
Applications

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

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.

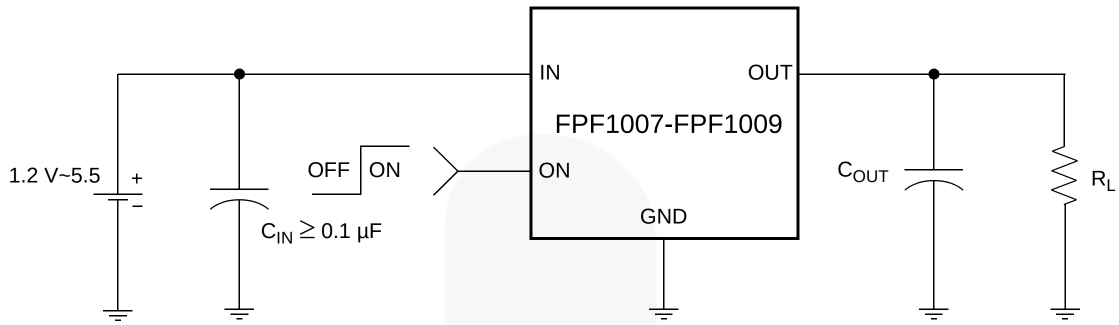


BOTTOM TOP

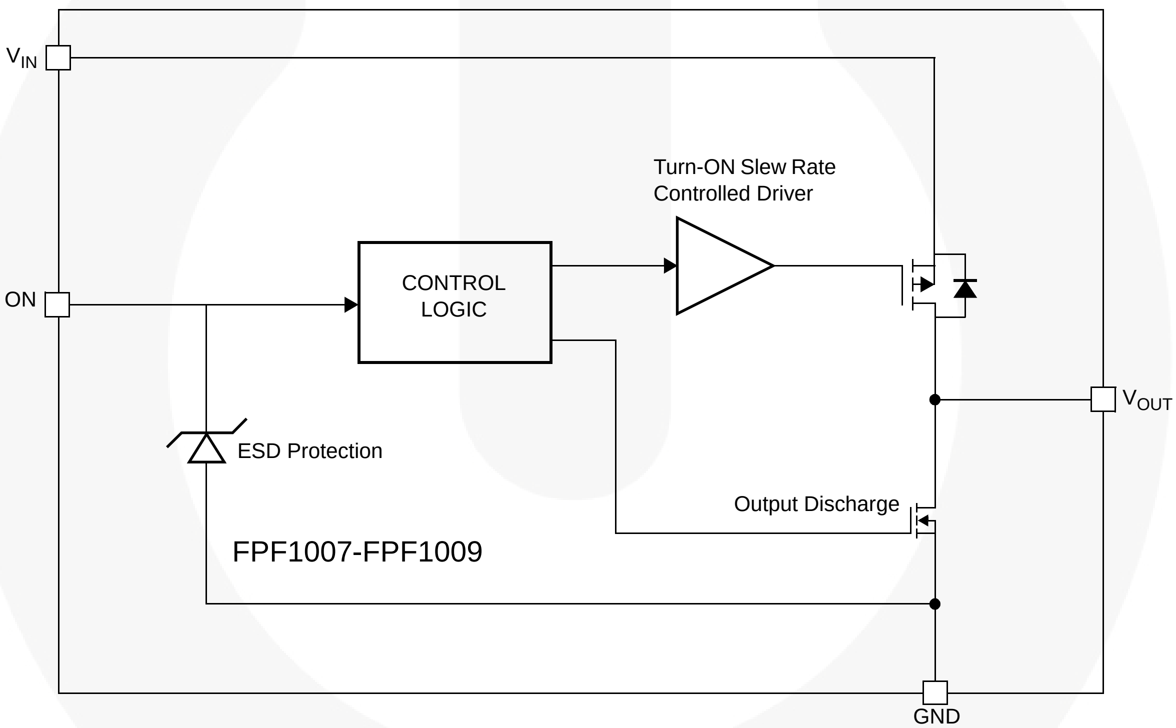
Ordering Information

Part	Switch R_{ON} at 5.5 V [Typ.]	Rise Time [Typ.]	Output Discharge [Typ.]	ON Pin Activity
FPF1007	30 mΩ, PMOS	10 µs	60 Ω	Active HIGH
FPF1008	30 mΩ, PMOS	80 µs	60 Ω	Active HIGH
FPF1009	30 mΩ, PMOS	1 ms	60 Ω	Active HIGH

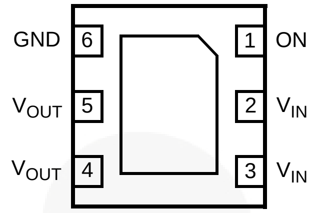
Typical Application Circuit



Functional Block Diagram



Pin Configuration



MicroFET 2x2 6L
BOTTOM VIEW

Pin Description

Pin	Name	Function
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

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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(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		V

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

Recommended Operating Range

Parameter	Min.	Max.	Unit
V_{IN}	1.2	5.5	V
Ambient Operating Temperature, T_A	-40	+85	°C

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Electrical Characteristics

V_{IN} = 1.2 V 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.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Basic Operation						
Operating Voltage	V_{IN}		1.2		5.5	V
Quiescent Current	I_Q	I_{OUT} = 0 mA, V_{IN} = 3.3 V, V_{ON} = Enabled		8		µA
		I_{OUT} = 0 mA, V_{IN} = 5.5 V, V_{ON} = Enabled			15	
Off Supply Current	I_Q(off)	V_{ON} = GND, V_{OUT} = OPEN			1	µA
Off Switch Current	I_{SD}(off)	V_{ON} = GND, V_{OUT} = GND		0.1	1.0	µA
On-Resistance	R_{ON}	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	
Output Pull Down Resistance	R_{PD}	V_{IN} = 3.3 V, V_{ON} = 0 V, T_A = 25°C		60		Ω
ON Input Logic Low Voltage	V_{IL}	V_{IN} = 1.2 V to 5.5 V			0.4	V
ON Input Logic High Voltage	V_{IH}	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						
Turn On	t_{ON}	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
Rise Time	t_R			10		µs
Turn Off	t_{OFF}			40		µs
Fall Time	t_F			15		µs
FPF1008						
Turn On	t_{ON}	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
Rise Time	t_R			80		µs
Turn Off	t_{OFF}			40		µs
Fall Time	t_F			15		µs
FPF1009						
Turn On	t_{ON}	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
Rise Time	t_R			1		ms
Turn Off	t_{OFF}			40		µs
Fall Time	t_F			15		µs

Typical Characteristics

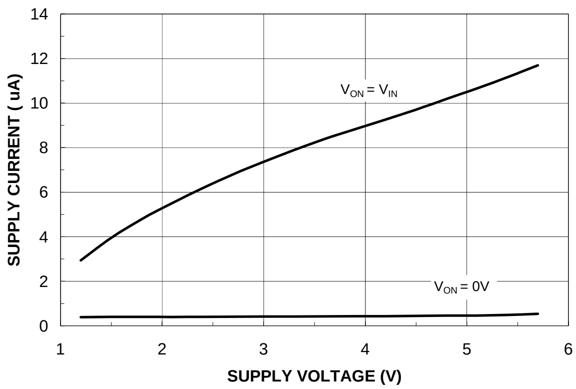

Figure 1. Quiescent Current vs. Input Voltage

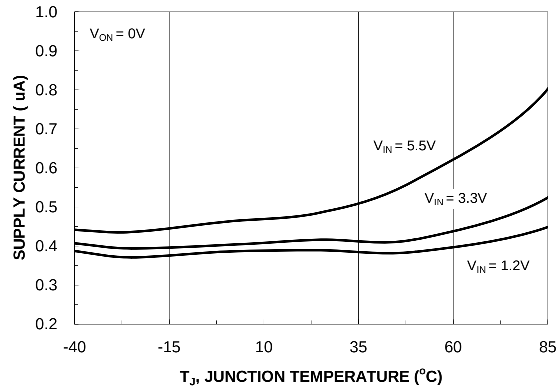

Figure 2. Quiescent Current vs. Temperature

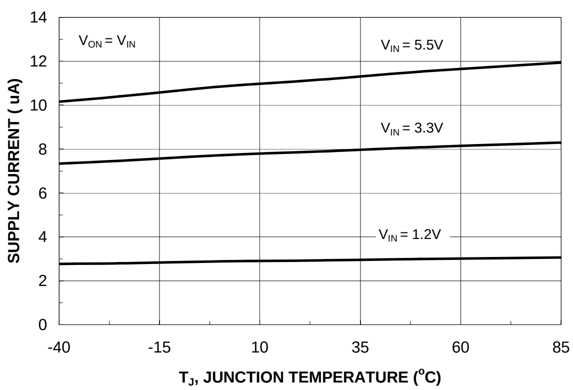

Figure 3. Quiescent Current vs. Temperature

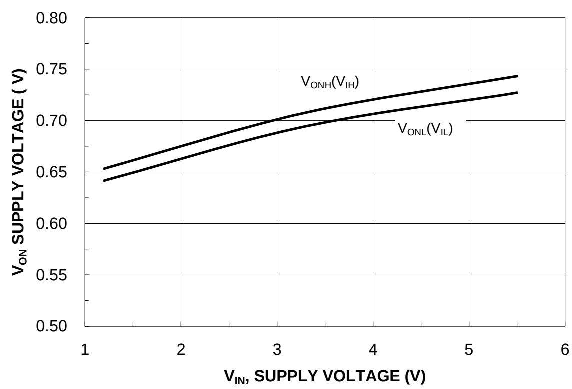

Figure 4. V_{ON} Voltage vs. Input Voltage

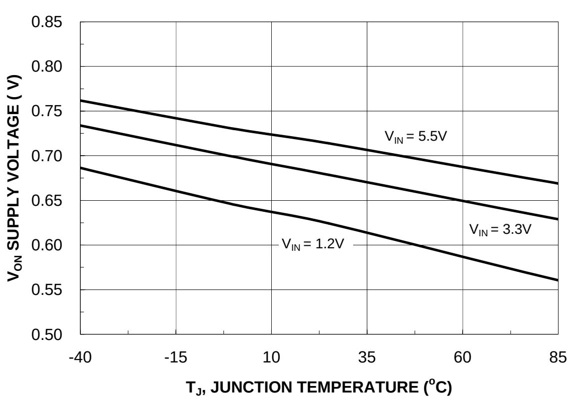

Figure 5. V_{ON} Low Voltage vs. Temperature

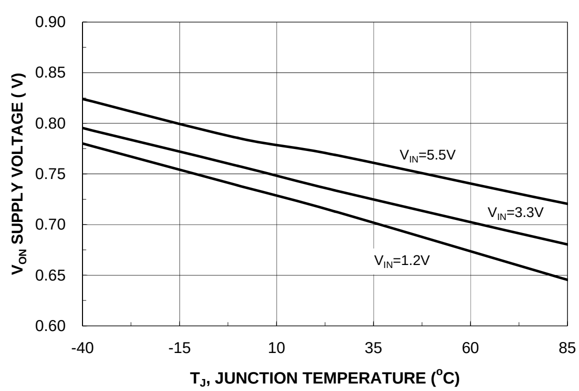

Figure 6. V_{ON} High Voltage vs. Temperature

Typical Characteristics

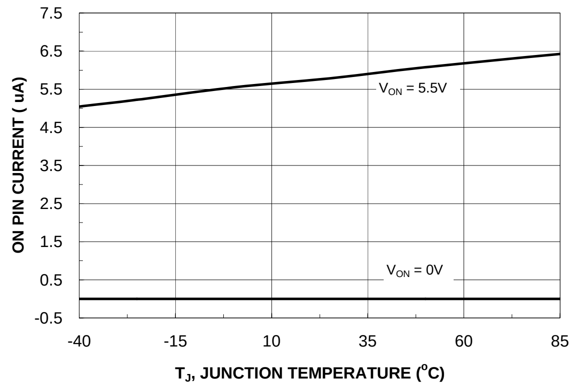

Figure 7. On Pin Current vs. Temperature

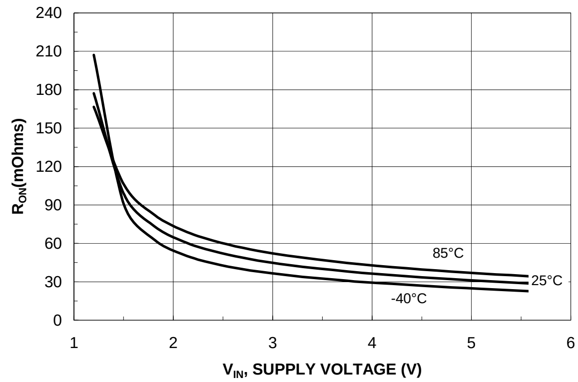

Figure 8. R_{ON} vs. V_{IN}

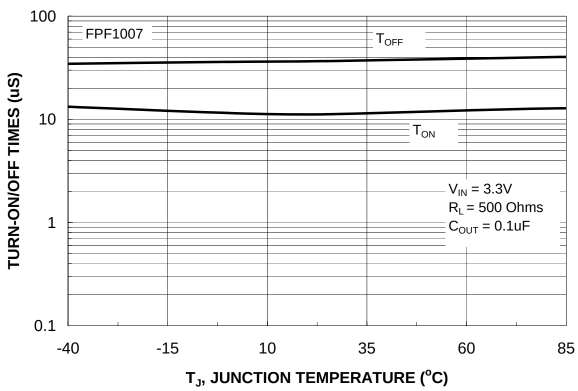

Figure 9. FPF1007 t_{ON} / t_{OFF} vs. Temperature

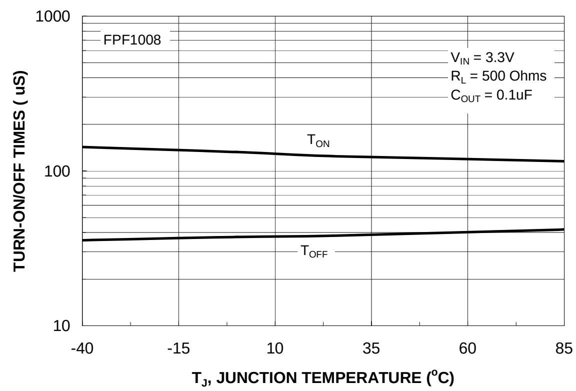

Figure 10. FPF1008 t_{ON} / t_{OFF} vs. Temperature

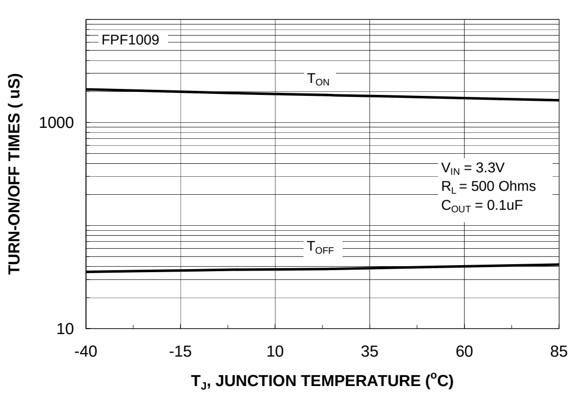

Figure 11. FPF1009 t_{ON} / t_{OFF} vs. Temperature

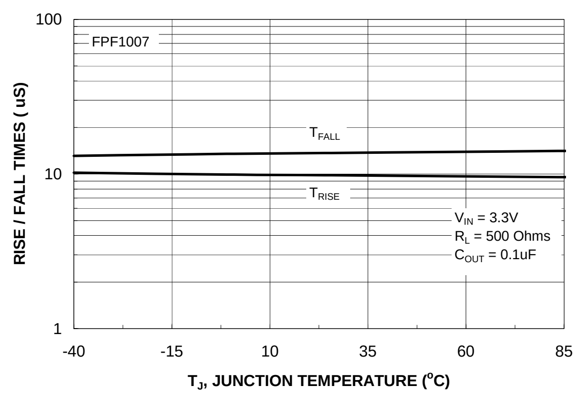

Figure 12. FPF1007 t_{RISE} / t_{FALL} vs. Temperature

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Typical Characteristics

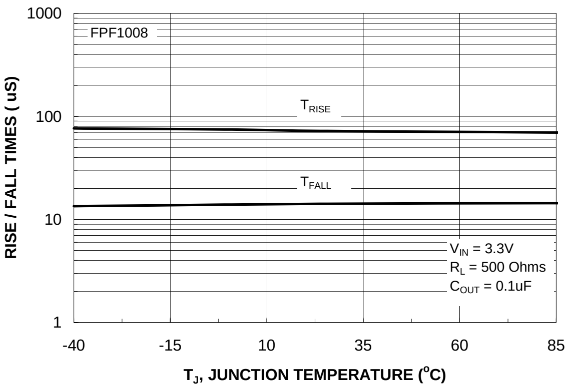


Figure 13. FPF1008 t_{RISE} / t_{FALL} vs. Temperature

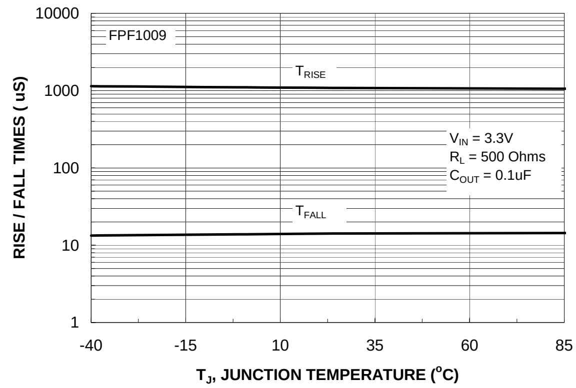


Figure 14. FPF1009 t_{RISE} / t_{FALL} vs. Temperature

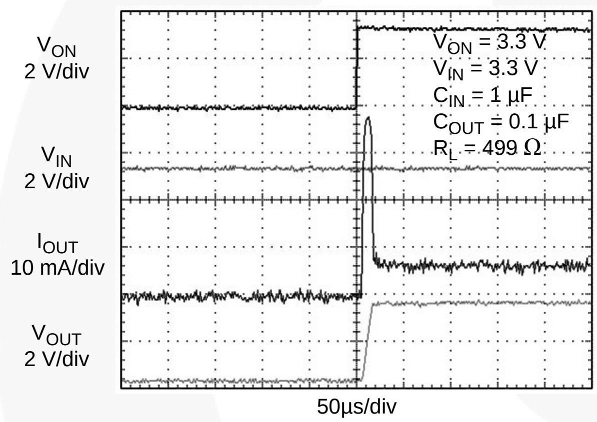


Figure 15. FPF1007 Turn-On Response

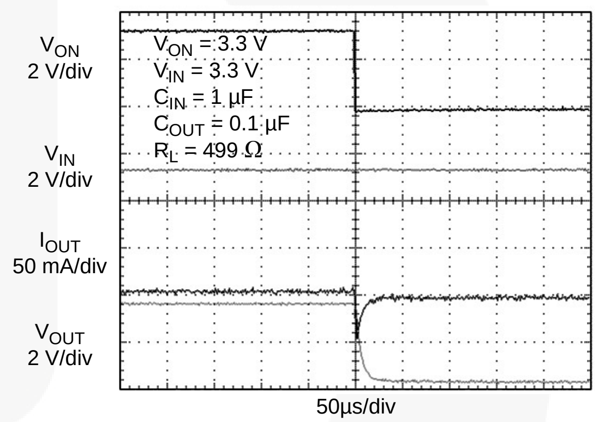


Figure 16. FPF1007 Turn-Off Response

Load current discharged through on-chip output discharge resistor

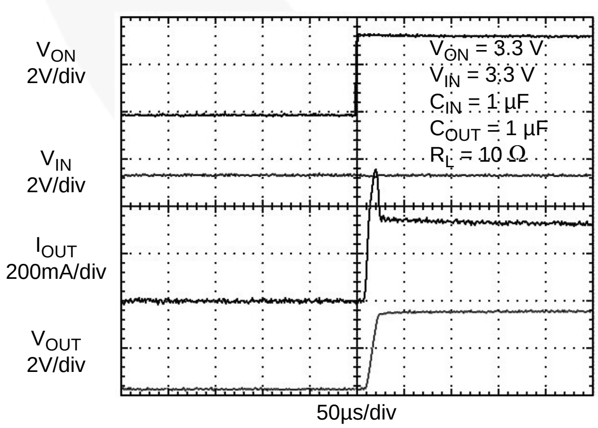


Figure 17. FPF1007 Turn-On Response (C_{OUT} = 1 µF)

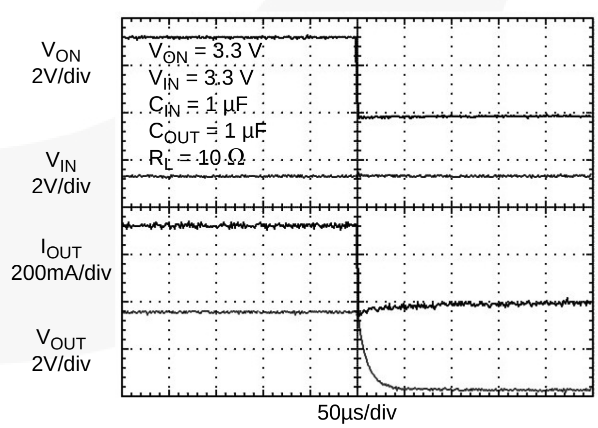


Figure 18. FPF1007 Turn-Off Response

Typical Characteristics

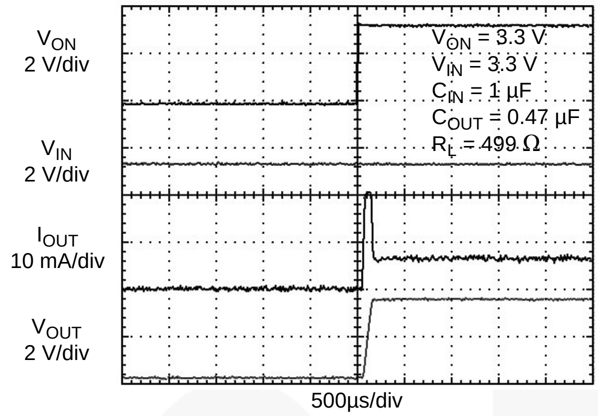


Figure 19. FPF1008 Turn-On Response

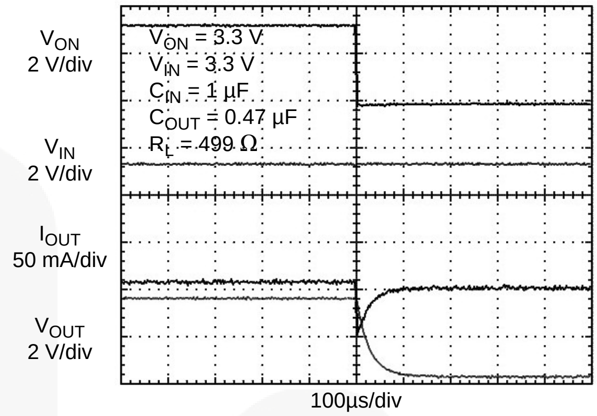


Figure 20. FPF1008 Turn-Off Response
Load current discharged through on-chip output discharge resistor

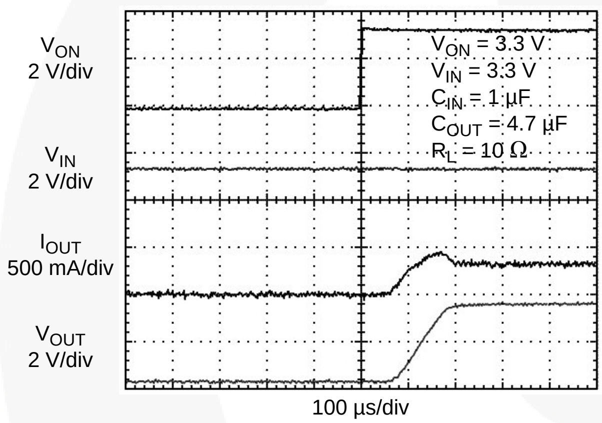


Figure 21. FPF1008 Turn-On Response (C_{OUT} = 4.7 µF)

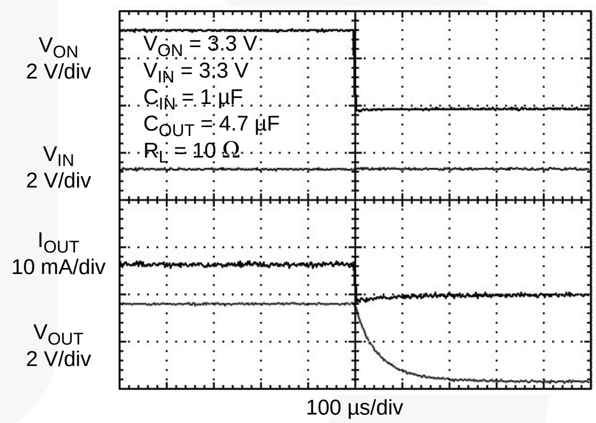


Figure 22. FPF1008 Turn-Off Response

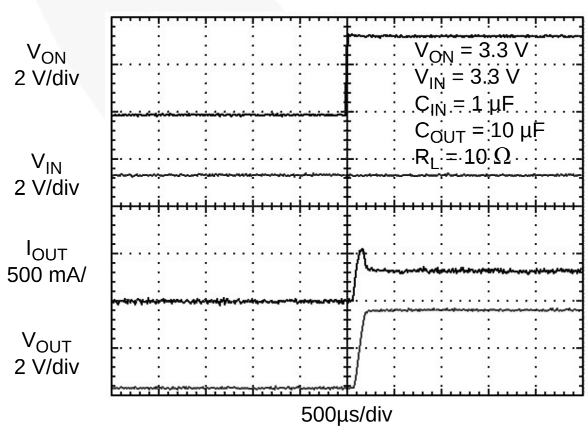


Figure 23. FPF1008 Turn-On Response (C_{OUT} = 10 µF)

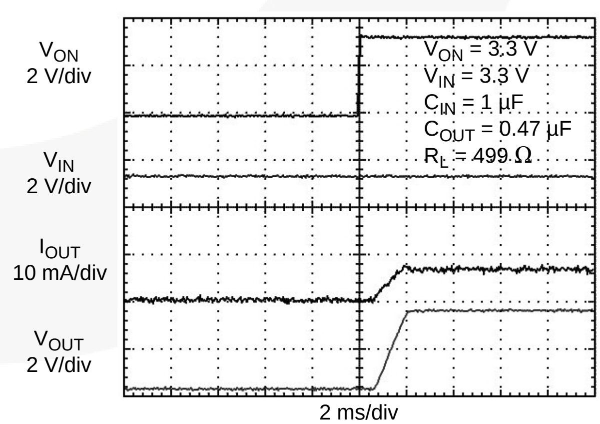


Figure 24. FPF1009 Turn-On Response

Typical Characteristics

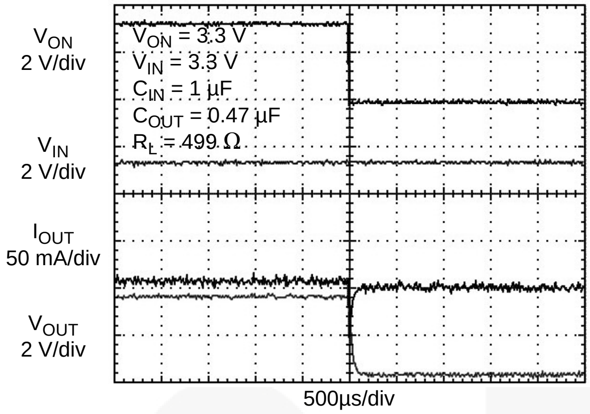


Figure 25. FPF1009 Turn-Off Response
Load current discharged through on-chip output discharge resistor

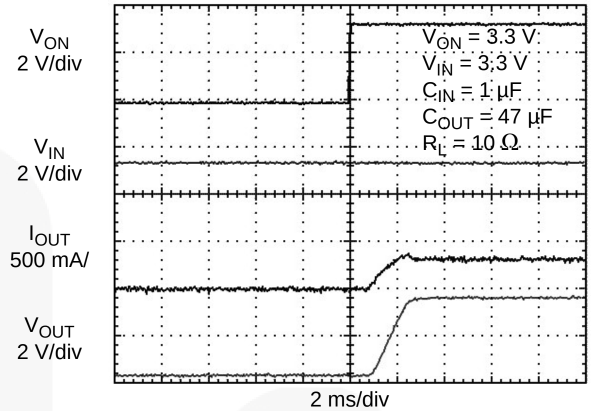


Figure 26. FPF1009 Turn-On Response (C_{OUT} = 47 µF)

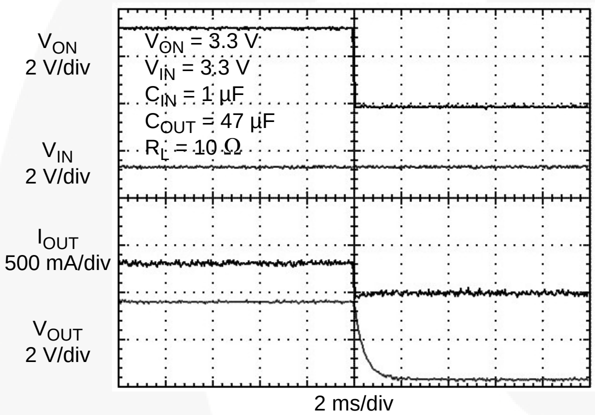


Figure 27. FPF1009 Turn-Off Response

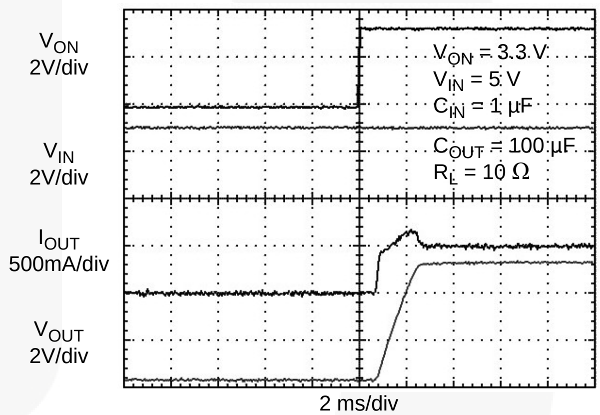
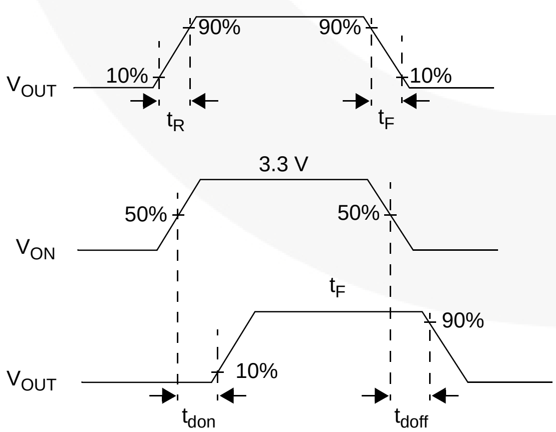


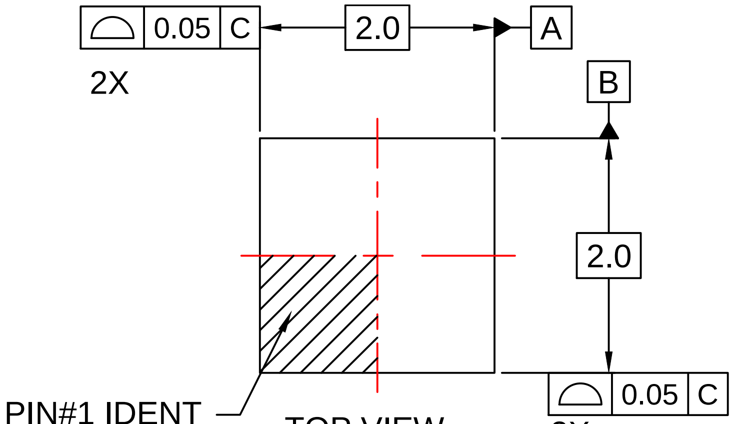
Figure 28. FPF1009 Turn-On Response
(C_{OUT} = 100 µF, V_{IN} = 5 V)

Timing Diagram

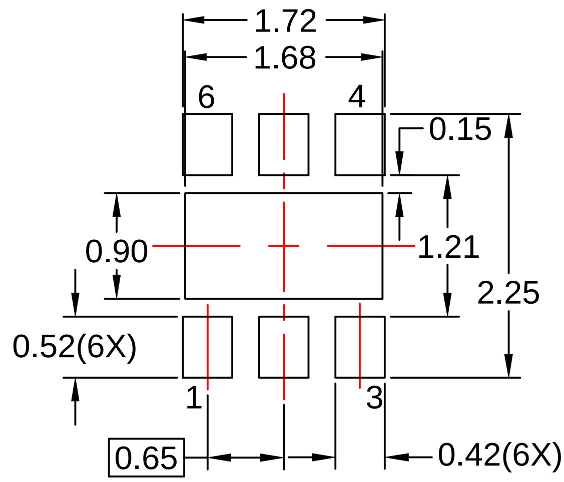


where:

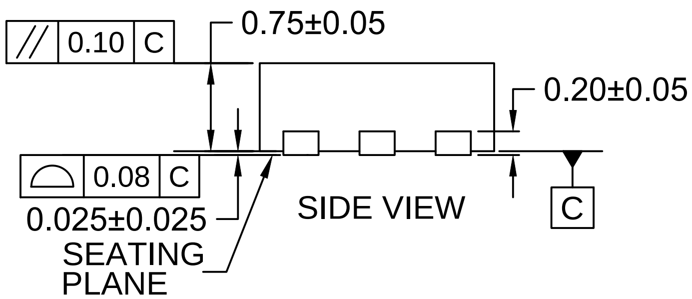
t_{ON}	=	Turn-On Time
t_{OFF}	=	Turn-Off Time
t_{don}	=	Turn-On Delay Time
t_{doff}	=	Turn-Off Delay Time
t_R	=	Rise Time
t_F	=	V_{OUT} Fall Time
t_{ON}	=	$t_R + t_{don}$
t_{OFF}	=	$t_F + t_{doff}$



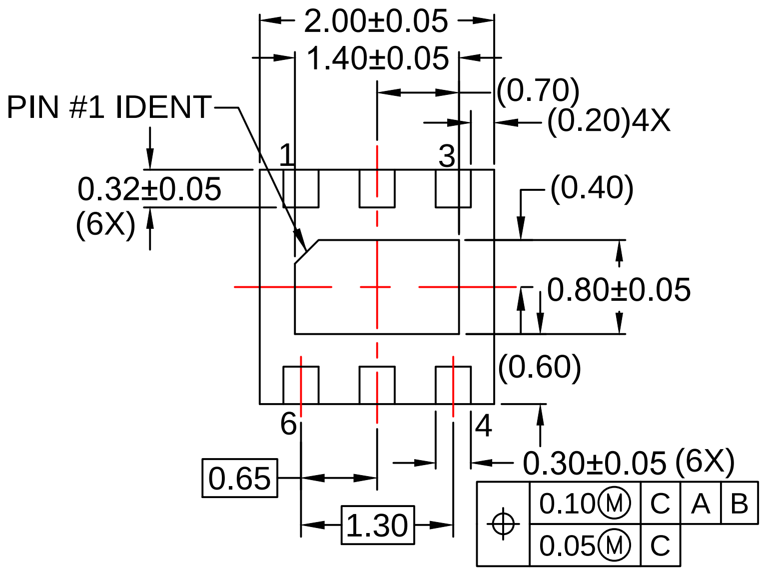
TOP VIEW



RECOMMENDED
LAND PATTERN



SIDE VIEW



BOTTOM VIEW

NOTES:

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

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

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