FAIRCHILD SEMICONDUCTOR®

January 2008

FPF1007-FPF1009
IntelliMAX™ Advanced Load Products

Features

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

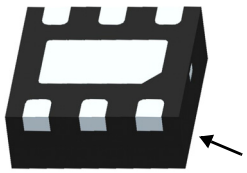
Applications

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

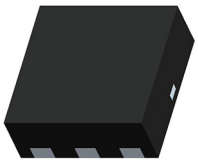
General Description

The FPF1007/8/9 are low RDS P-Channel MOSFET load switches offered in a selection of 10µs, 80µs, and 1ms 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 1.2V, the input current leakage has been minimized to extend battery life, and the ESD-protection has been designed to withstand a minimum of 8KV (HBM) and 2KV(CDM).

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



BOTTOM

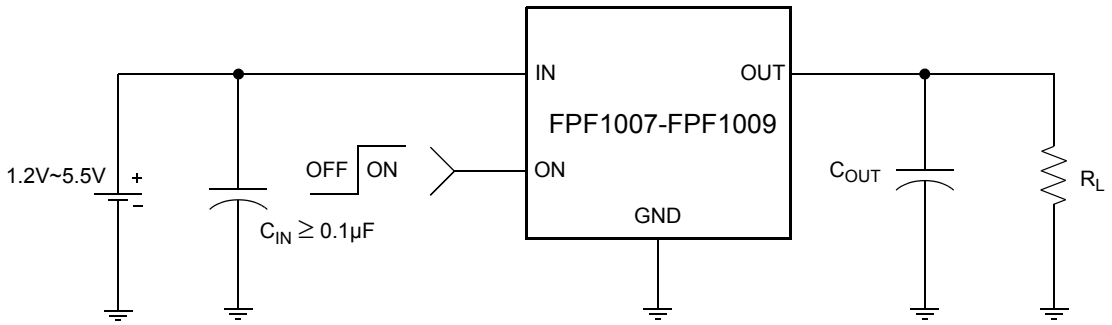


TOP

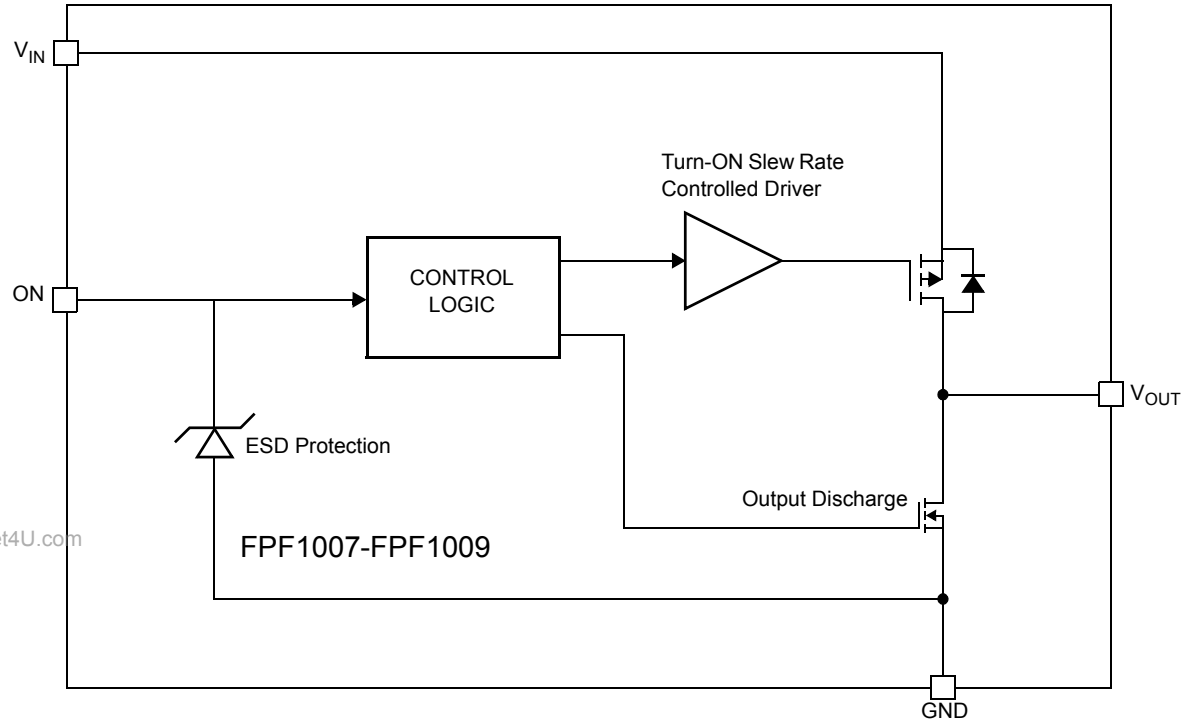
Ordering Information

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

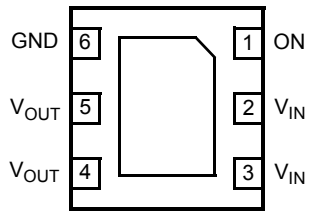
Typical Application Circuit



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

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
V_{IN}, V_{OUT}, ON to GND		-0.3	6	V
Maximum Continuous Switch Current			1.5	A
Power Dissipation @ 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		V

Recommended Operating Range

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

Electrical Characteristics

V_{IN} = 1.2 to 5.5V, T_A = -40 to +85°C unless otherwise noted. Typical values are at V_{IN} = 3.3V 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} = 0mA, V_{IN} = 3.3V, V_{ON} = Enabled		8		µA
		I_{OUT} = 0mA, V_{IN} = 5.5V, 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	µA

Electrical Characteristics Cont.

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
On-Resistance	R_{ON}	V_{IN} = 5.5V, I_{OUT} = 200mA, T_A = 25°C		30	40	mΩ
		V_{IN} = 3.3V, I_{OUT} = 200mA, T_A = 25°C		40	55	
		V_{IN} = 1.5V, I_{OUT} = 200mA, T_A = 25°C		100	130	
		V_{IN} = 1.2V, I_{OUT} = 200mA, T_A = 25°C		175	250	
		V_{IN} = 3.3V, I_{OUT} = 200mA, T_A = -40°C to +85°C	20		65	
Output Pull Down Resistance	R_{PD}	V_{IN} = 3.3V, V_{ON} = 0V, T_A = 25°C		60		Ω
ON Input Logic Low Voltage	V_{IL}	V_{IN} = 1.2V to 5.5V			0.4	V
ON Input Logic High Voltage	V_{IH}	V_{IN} = 1.2V to 5.5V	1			V
ON Input Leakage (On)		V_{ON} = V_{IN} = 5.5V	-1		10	µA
ON Input Leakage (Off)		V_{ON} = GND	-1		1	µA
Dynamic						
FPF1007						
Turn On	t_{ON}	V_{IN} = 3.3V, R_L = 500Ω, R_{L_CHIP} = 60Ω, C_{OUT} = 0.1µF, 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} = 3.3V, R_L = 500Ω, R_{L_CHIP} = 60Ω, C_{OUT} = 0.1µF, 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} = 3.3V, R_L = 500Ω, R_{L_CHIP} = 60Ω, C_{OUT} = 0.1µF, T_A = 25°C		2		ms
Rise Time	t_R			1		ms
Turn Off	t_{OFF}			40		µs
Fall Time	t_F			15		µs

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

Typical Characteristics

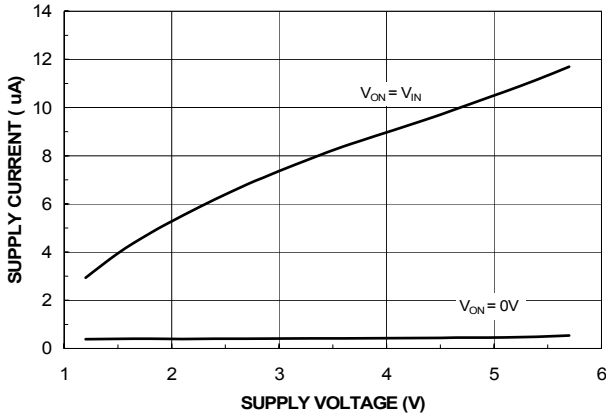


Figure 1. Quiescent Current vs. Input Voltage

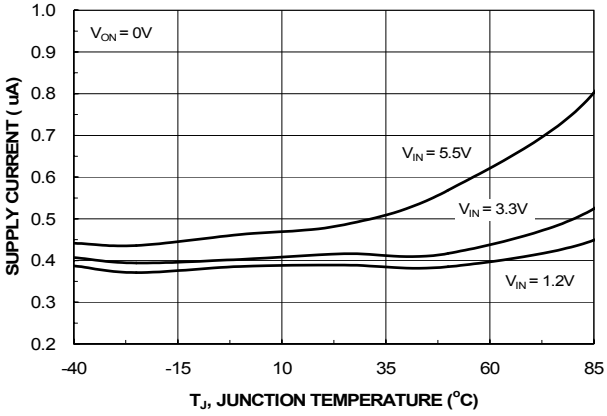


Figure 2. Quiescent Current vs. Temperature

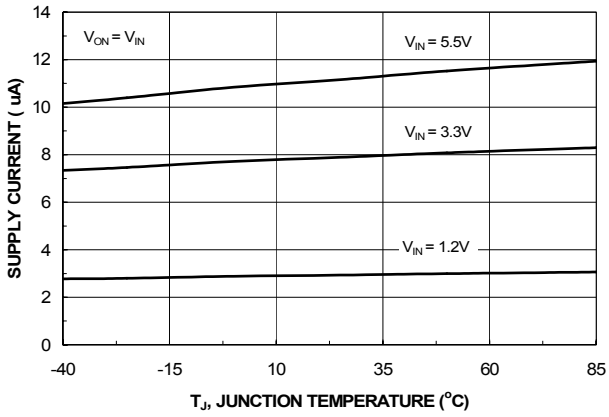


Figure 3. Quiescent Current vs. Temperature

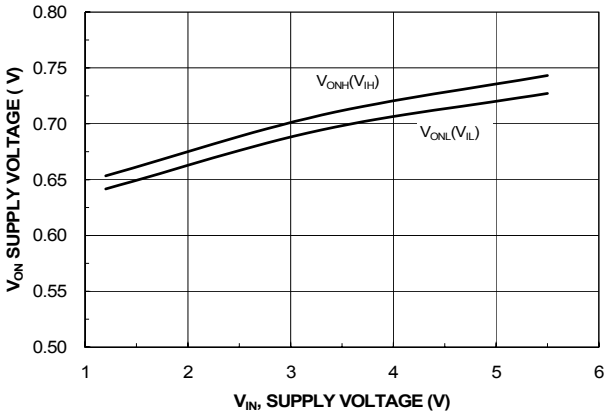


Figure 4. V_{ON} Voltage vs. Input Voltage

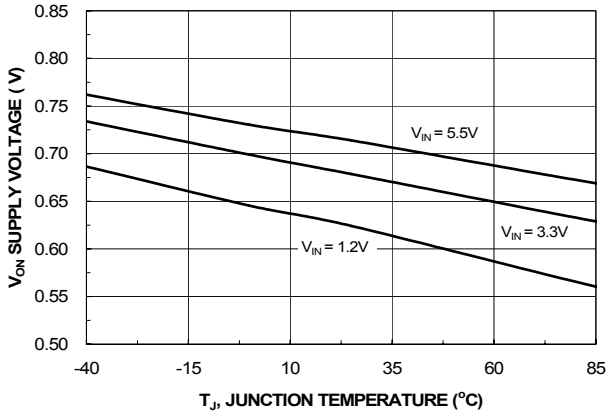


Figure 5. V_{ON} Low Voltage vs. Temperature

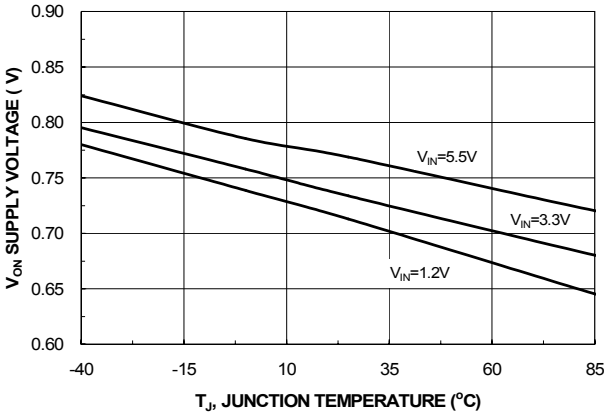


Figure 6. V_{ON} High Voltage vs. Temperature

Typical Characteristics

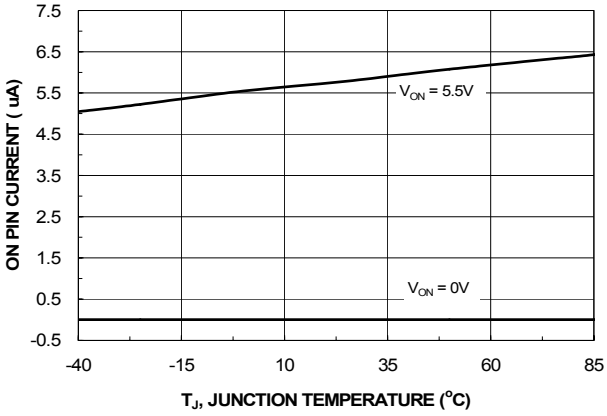


Figure 7. On Pin Current vs. Temperature

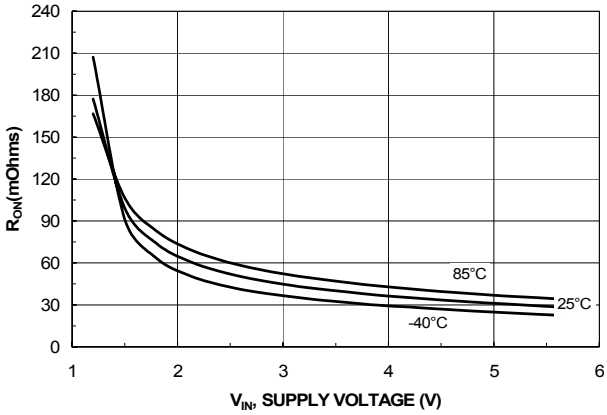


Figure 8. R_{ON} vs. V_{IN}

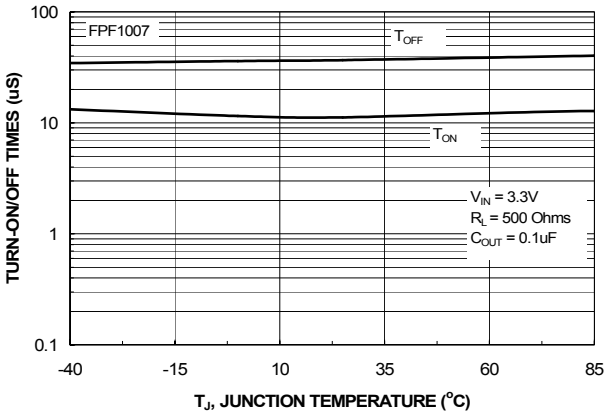


Figure 9. FPF1007 T_{ON} / T_{OFF} vs. Temperature

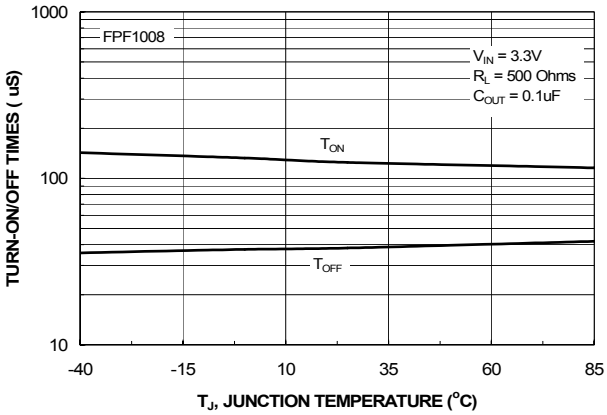


Figure 10. FPF1008 T_{ON} / T_{OFF} vs. Temperature

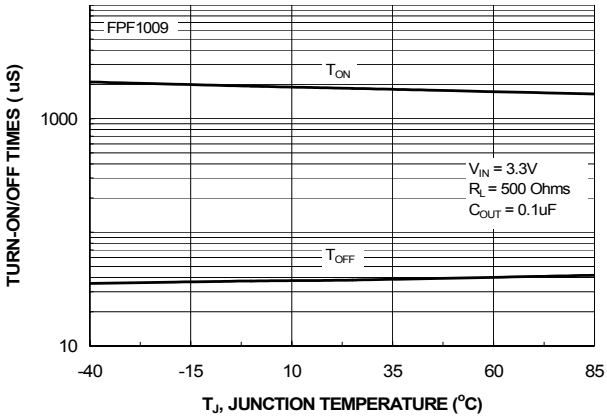


Figure 11. FPF1009 T_{ON} / T_{OFF} vs. Temperature

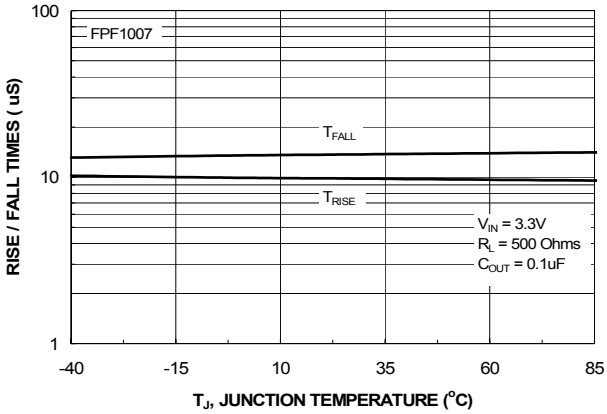


Figure 12. FPF1007 T_{RISE} / T_{FALL} vs. Temperature

Typical Characteristics

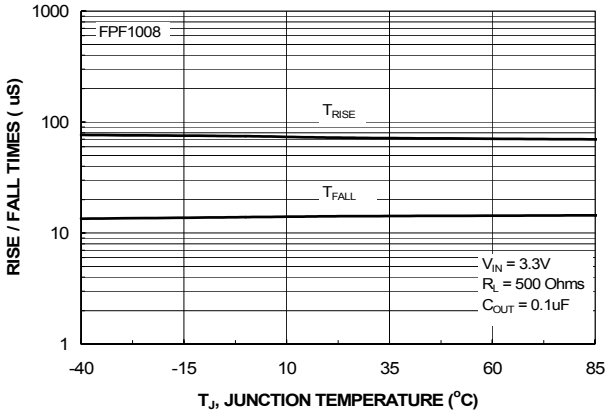


Figure 13. FPF1008 T_{RISE} / T_{FALL} vs. Temperature

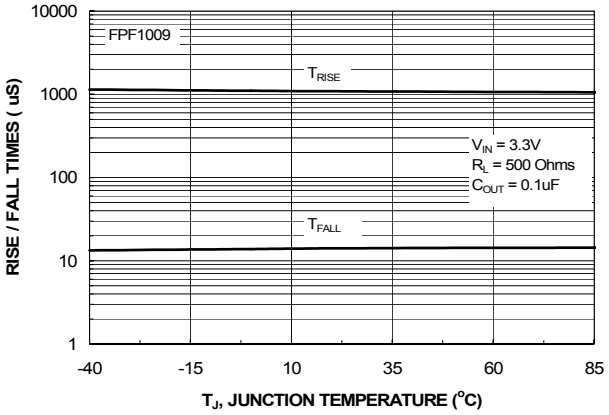


Figure 14. FPF1009 T_{RISE} / T_{FALL} vs. Temperature

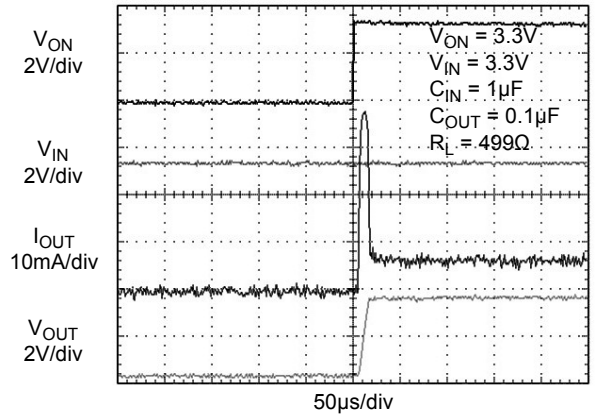


Figure 15. FPF1007 Turn ON Response

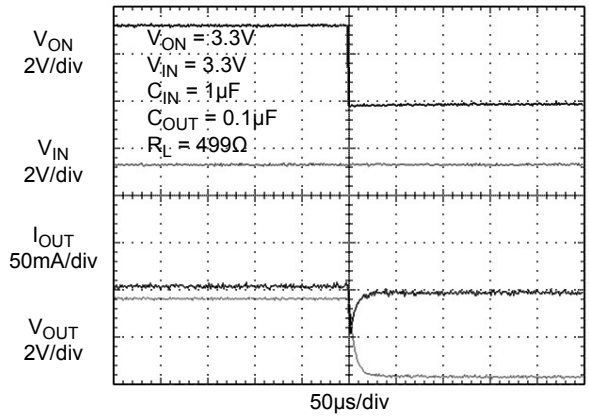


Figure 16. FPF1007 Turn OFF Response
Load current is discharged through On-chip output discharge resistor.

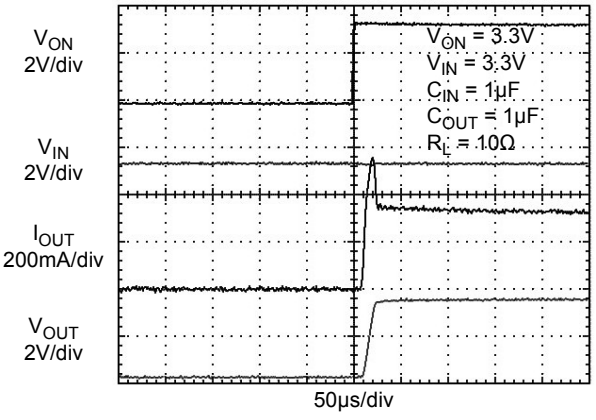


Figure 17. FPF1007 Turn ON Response (C_{OUT} = 1µF)

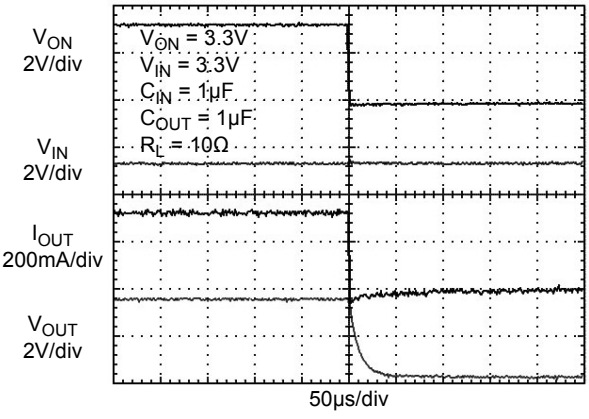


Figure 18. FPF1007 Turn OFF Response

Typical Characteristics

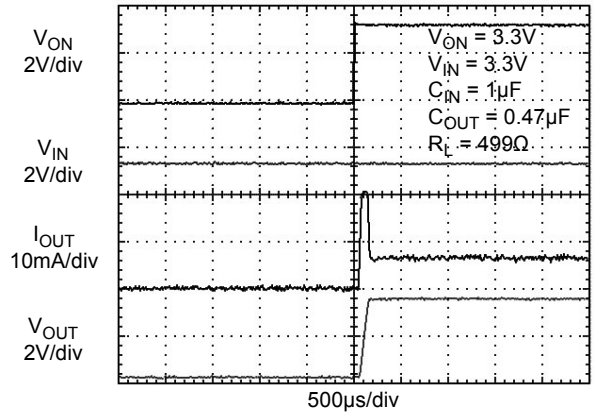


Figure 19. FPF1008 Turn ON Response

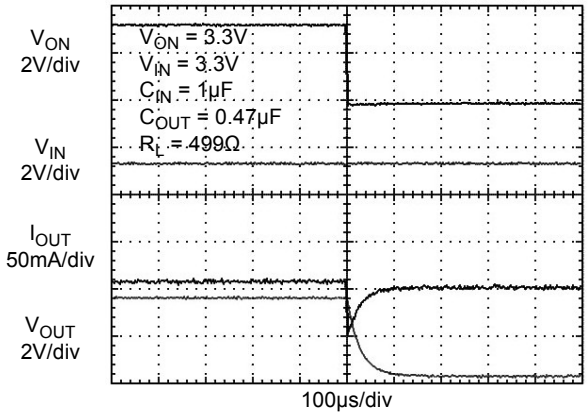


Figure 20. FPF1008 Turn OFF Response
Load current is discharged through On-chip output discharge resistor.

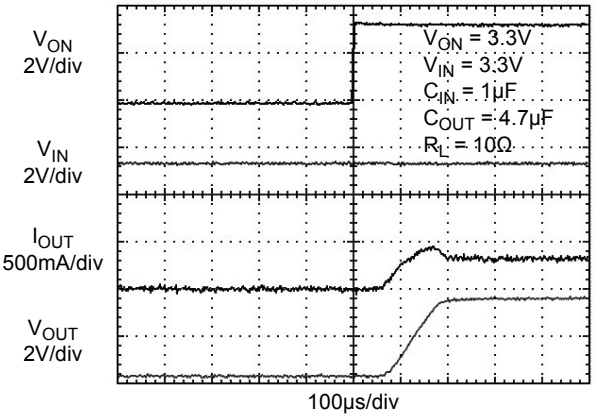


Figure 21. FPF1008 Turn ON Response (C_{OUT} = 4.7µF)

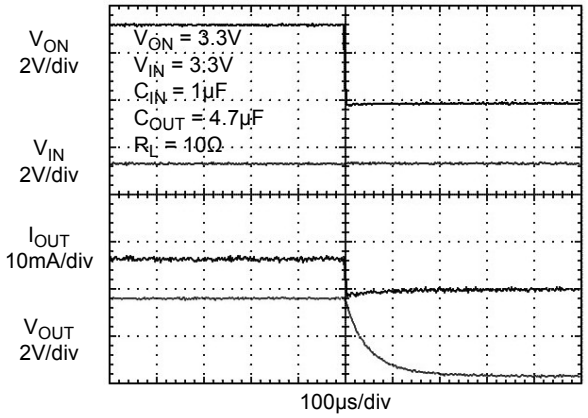


Figure 22. FPF1008 Turn OFF Response

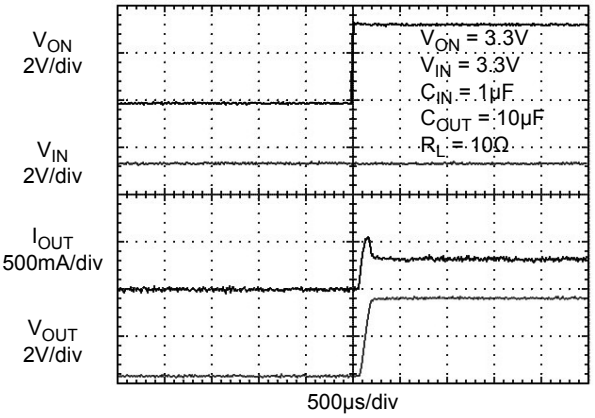


Figure 23. FPF1008 Turn ON Response (C_{OUT} = 10µF)

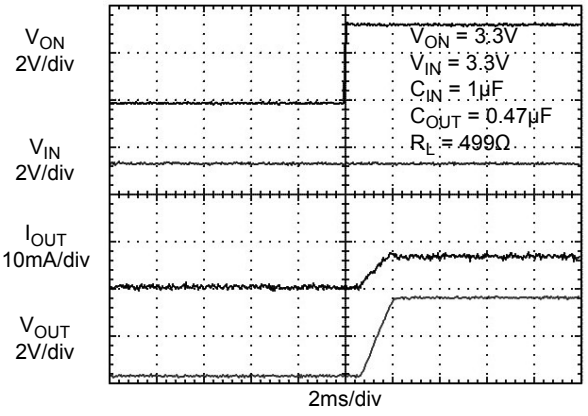


Figure 24. FPF1009 Turn ON Response

Typical Characteristics

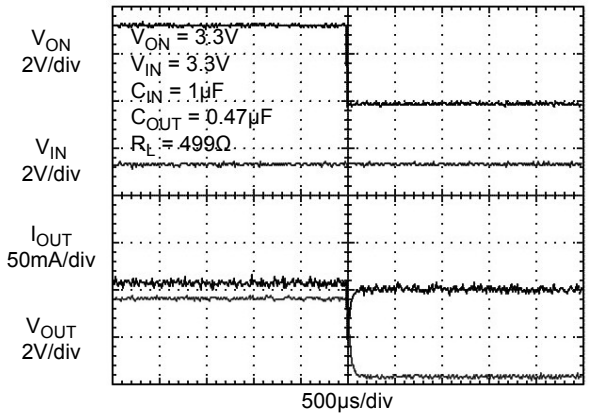


Figure 25. FPF1009 Turn OFF Response
Load current is discharged through On-chip output discharge resistor.

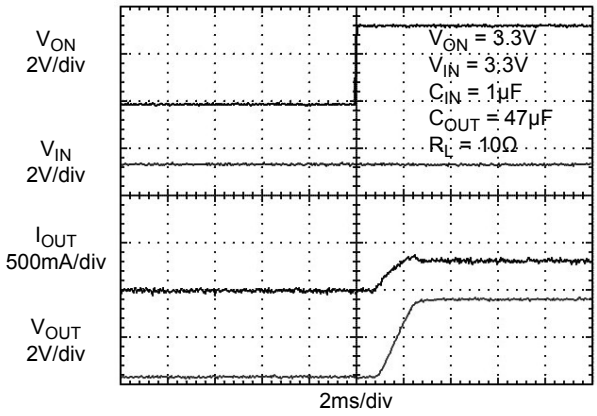


Figure 26. FPF1009 Turn ON Response (C_{OUT} = 47µF)

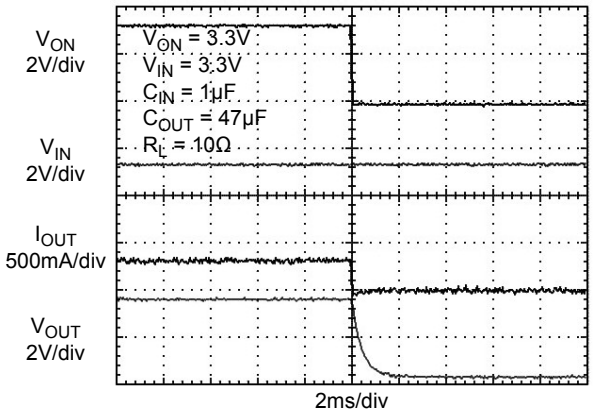


Figure 27. FPF1009 Turn OFF Response

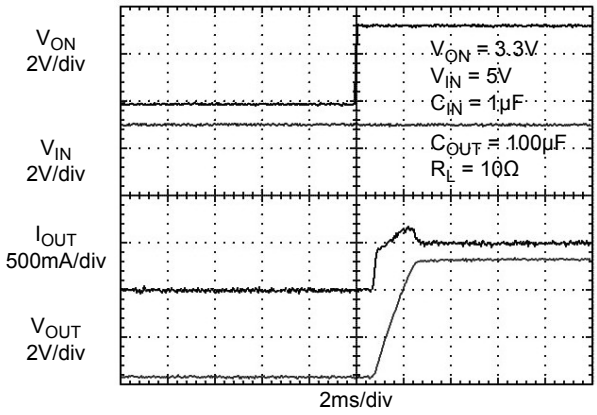
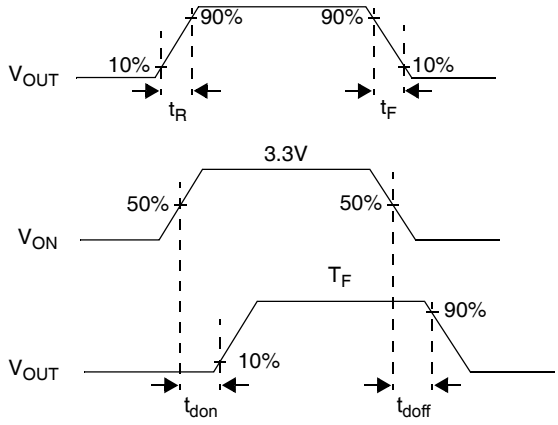


Figure 28. FPF1009 Turn ON Response
(C_{OUT} = 100µF, V_{IN} = 5V)

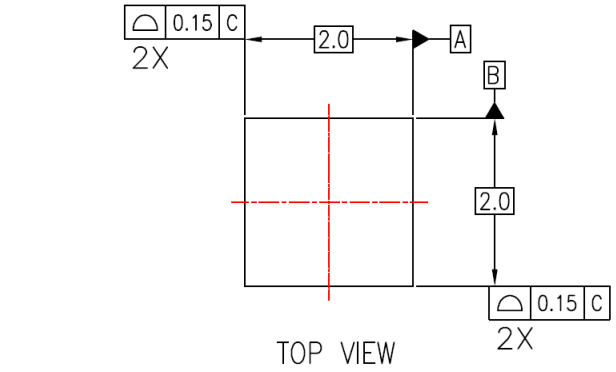
Timing Diagram

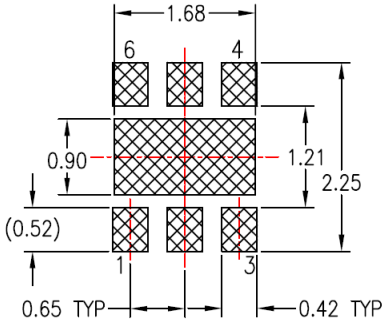


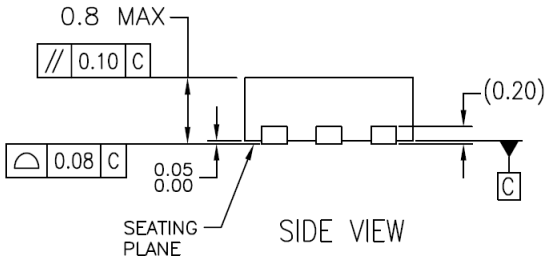
where:

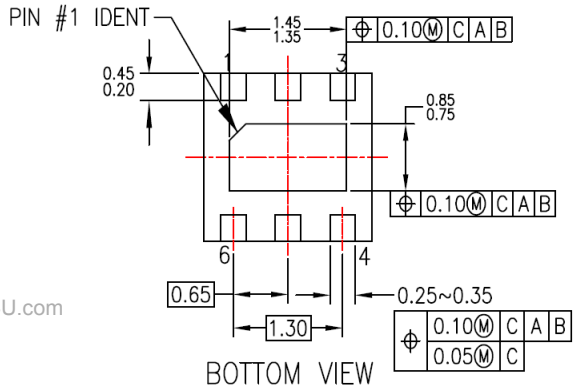
t_{ON} = Turn ON Time
t_{OFF} = Turn OFF Time
t_{don} = Turn ON Delay Time
t_{doff} = Turn OFF Delay Time
t_R = Rise Time
t_F = V_{OUT} Fall Time
t_{ON} = $t_R + t_{don}$
t_{OFF} = $t_F + t_{doff}$

Dimensional Outline and Pad Layout









NOTES:

A. NON–CONFORMS TO JEDEC REGISTRATION,
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP06KrevA

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FACT®
FAST®
FastvCore™
FlashWriter® *
FPS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
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MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MillerDrive™
Motion-SPM™
OPTOLOGIC®
OPTOPLANAR®
®
PDP-SPM™
Power220®
POWEREDGE®
Power-SPM™
PowerTrench®
Programmable Active Droop™
QFET®
QS™
QT Optoelectronics™
Quiet Series™
RapidConfigure™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS™
SyncFET™
SYSTEM GENERAL ®
The Power Franchise®
the power franchise
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
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