

IntelliMAX™ Advanced Load Switches



Fairchild's Offering

Fairchild's IntelliMAX™ family of advanced load management switches reduces board space, part count and complexity in power management designs for the latest generation of battery-powered devices. This unique combination of protection, control, and fault monitoring features allows for a simple, space-saving solution in critical time-to-market product applications without sacrificing design performance.

Overview Features & Benefits

- Product families address a wide operating voltage range (1.2V–20.0V)
- Soft-start control reduces in-rush current
- Integrated fixed and adjustable current-limit value
- Under-voltage lockout for system protection
- Thermal shutdown to reduce excessive heating or system damage
- Fast current limit response time
- Optional flag for fault conditions, fault blanking and auto re-start to optimize fault condition management
- Low shutdown current to conserve critical battery life
- Options for reverse current blocking capability

Applications

- Portable devices such as mobile phones, PDAs, digital cameras, MP3 players, portable bar code readers
- Inventory management terminals and portable enterprise equipment
- Portable gaming, keyboards, and keypads
- GPS systems and wireless data systems
- Set-top boxes, DVD players and consumer electronics
- Low-voltage industrial, telecom, and medical equipment
- All systems that require power load switching
- USB On-The-Go

IntelliMAX Family Overview

Part Number Series	Load Switch Special Feature
FPF1003-FPF1006	Slew Rate Control
FPF2000-FPF2007	Over Current Protection
FPF2100-FPF2107	Over Current Protection
FPF2108-FPF2195	Over Current Protection with Reverse Current Blocking
FPF2140-FPF2148	Over Current Protection
FPF2163-FPF2165	Over Current Protection
FPF2180-FPF2187	Over Current Protection
FPF2500-FPF2506	Over Current Protection

Slew Rate Controlled Load Switch

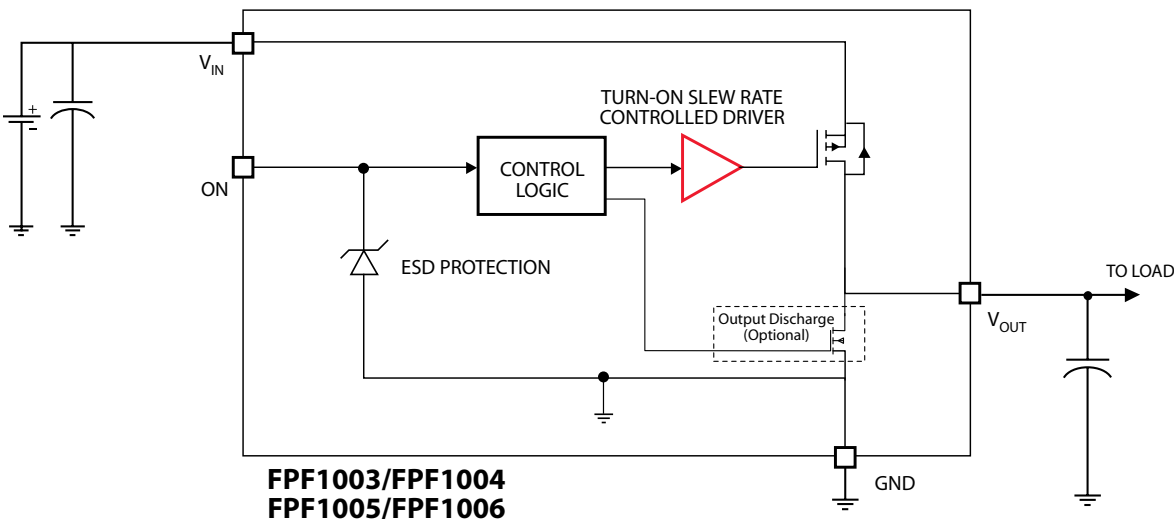
This family of slew rate controlled switches features industry leading WLCSP (Wafer Level Chip Scale Packaging) and MLP (Molded Leadless Package) integration that includes slew-rate control, ESD protection as well as load discharge capability and low-voltage operation (1.2V). This family of products is designed to enhance thermal and electrical performance in portable applications.

Features

- 1.2V to 5.5V Input Voltage Range
- Typical $R_{DS(ON)} = 30m\Omega @ V_{IN} = 5.5V$
- Typical $R_{DS(ON)} = 35m\Omega @ V_{IN} = 3.3V$
- ESD Protected, above 2000V HBM
- Optional On-chip Load Resistor

Slew Rate Controlled Load Switches

Part Number	Package Type	V_{IN} Max (V)	R_{ON} Typ ($m\Omega$)	On-Pin State	Output Discharge Resistor
FPF1003	WLCSP	5.5	20	Active HI	No
FPF1004	WLCSP	5.5	20	Active HI	Yes
FPF1005	MLP 2x2 6L	5.5	50	Active HI	No
FPF1006	MLP 2x2 6L	5.5	60	Active HI	Yes



Current Protection Load Switch

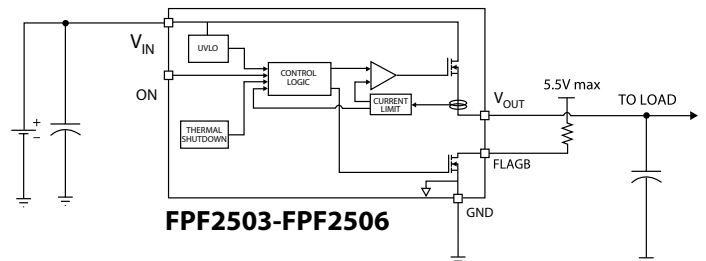
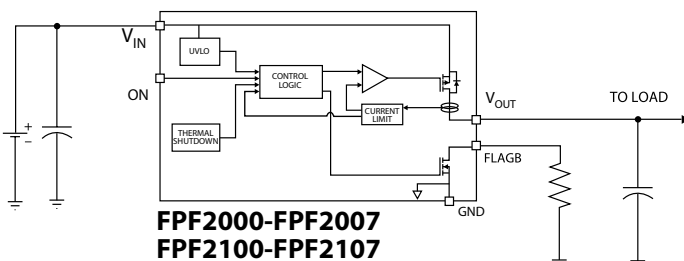
Current protection load switches contain thermal shutdown protection that shuts off the switch to prevent damage to the part when a continuous over-current condition causes excessive heating. When the switch current reaches the current limit, the family has options of shut down, auto reset or constant current to prohibit excessive current from causing damage. The FPF2000 through FPF2007 devices contain a 700mΩ current-limited P-channel MOSFET that can operate over an input voltage range of 1.8V–5.5V. The FPF2100 through FPF2107 devices contain a 125mΩ current-limited P-channel MOSFET that can operate over an input voltage range of 1.8V–5.5V. The FPF2500 through FPF2506 devices contain a 320mΩ current-limited N-channel MOSFET that can operate over an input voltage range of 4.5V–20V.

Features

- Controlled turn-on
- 50mA and 100mA current limit options
- Under-voltage lockout
- Thermal shutdown
- <1μA shutdown current
- Fast current limit response time
- 3μs to moderate over currents
- 20ns to hard shorts
- Fault blanking

Current Protection Load Switches

Part Number	Package Type	I Lim Min (mA)	V _{IN} Max (V)	R _{ON} Typ (mΩ)	On-Pin State	UVLO Min (V)	Behavior/Options	Flag Output Pin
FPF2000	SC70	50	5.5	700	Active HI	1.5	Auto Reset	Yes
FPF2001	SC70	50	5.5	700	Active LO	1.5	Auto Reset	Yes
FPF2002	SC70	50	5.5	700	Active HI	1.5	Shut Down	Yes
FPF2003	SC70	50	5.5	700	Active HI	1.5	Current Source	Yes
FPF2004	SC70	100	5.5	700	Active HI	1.5	Auto Reset	Yes
FPF2005	SC70	100	5.5	700	Active LO	1.5	Auto Reset	Yes
FPF2006	SC70	100	5.5	700	Active HI	1.5	Shut Down	Yes
FPF2007	SC70	100	5.5	700	Active HI	1.5	Current Source	Yes
FPF2100	SOT-23	200	5.5	125	Active HI	1.5	Auto Reset	Yes
FPF2101	SOT-23	200	5.5	125	Active LO	1.5	Auto Reset	Yes
FPF2102	SOT-23	200	5.5	125	Active HI	1.5	Shut Down	Yes
FPF2103	SOT-23	200	5.5	125	Active HI	1.5	Current Source	Yes
FPF2104	SOT-23	400	5.5	125	Active HI	1.5	Auto Reset	Yes
FPF2105	SOT-23	400	5.5	125	Active LO	1.5	Auto Reset	Yes
FPF2106	SOT-23	400	5.5	125	Active HI	1.5	Shut Down	Yes
FPF2107	SOT-23	400	5.5	125	Active HI	1.5	Current Source	Yes
FPF2500	SOT-23	Adj. (500–2000)	20	320	Active HI	3.75	Auto Reset	No
FPF2501	SOT-23	Adj. (500–2000)	20	320	Active HI	3.75	Shut Down	No
FPF2502	SOT-23	Adj. (500–2000)	20	320	Active HI	3.75	Current Source	No
FPF2503	SOT-23	400	20	320	Active HI	3.75	Auto Reset	Yes
FPF2504	SOT-23	400	20	320	Active HI	3.75	Current Source	Yes
FPF2505	SOT-23	800	20	320	Active HI	3.75	Auto Reset	Yes
FPF2506	SOT-23	800	20	320	Active HI	3.75	Current Source	Yes



Reverse Current Blocking Load Switch

Reverse current blocking load switches provide full protection to systems and loads that may encounter large reverse current conditions. These devices contain a range of 75-125mΩ current-limited P-channel MOSFET that can operate over an input voltage range of 1.8V–5.5V. Internally, reverse current blocking prevents current from flowing when the MOSFET is off, and the output voltage is higher than the input voltage. When the switch current reaches the current limit, the family has options of shut down, auto reset or constant current to prohibit excessive current from causing circuit damage.

Features

- 1.8V to 5.5V input voltage range
- Controlled turn-on
- Current limit
- Undervoltage lockout
- Thermal shutdown
- Low shutdown current
- Fast current limit response time
- 3µs to moderate over currents
- 20ns to hard shorts

Integrated Load Switch With Protection & Reverse Blocking

Part Number	Package Type	I Lim Min (mA)	V _{IN} Max (V)	R _{ON} Typ (mΩ)	On Pin State	UVLO Min (V)	Behavior/Options	Flag Output Pin	Power Good
FPF2108	SOT-23	400	5.5	125	Active LO	1.5	Shut Down	Yes	No
FPF2109	SOT-23	200	5.5	125	Active HI	1.5	Current Source	Yes	No
FPF2110	SOT-23	400	5.5	125	Active HI	1.5	Current Source	Yes	No
FPF2116	SOT-23	200	5.5	125	Active HI	1.5	Auto Reset	Yes	No
FPF2123	SOT-23	Adjustable	5.5	125	Active HI	1.5	Auto Reset	No	No
FPF2124	SOT-23	Adjustable	5.5	125	Active HI	1.5	Shut Down	No	No
FPF2125	SOT-23	Adjustable	5.5	125	Active HI	1.5	Current Source	No	No
FPF2140	MLP 2x2	200	5.5	110	Active HI	1.55	Auto Restart	Yes	Yes
FPF2142	MLP 2x2	200	5.5	110	Active HI	1.55	Shutdown	Yes	Yes
FPF2143	MLP 2x2	200	5.5	110	Active HI	1.55	Current Source	Yes	Yes
FPF2144	MLP 2x2	400	5.5	110	Active HI	1.55	Auto Restart	Yes	Yes
FPF2146	MLP 2x2	400	5.5	110	Active HI	1.55	Shutdown	Yes	Yes
FPF2147	MLP 2x2	400	5.5	110	Active HI	1.55	Current Source	Yes	Yes
FPF2148	MLP 2x2	200	5.5	110	Active LO	1.55	Current Source	Yes	Yes
FPF2163	MLP 2x2	Adj. (0.15-1.5A)	5.5	120	Active HI	1.55	Auto Restart	Yes	No
FPF2164	MLP 2x2	Adj. (0.15-1.5A)	5.5	120	Active HI	1.55	Shutdown	Yes	No
FPF2165	MLP 2x2	Adj. (0.15-1.5A)	5.5	120	Active HI	1.55	Current Source	Yes	No
FPF2172	MLP 3x3 6L	200	5.5	125*	Active HI	1.5	Shut Down	Yes	No
FPF2174	MLP 3x3 6L	200	5.5	125*	Active HI	1.5	Shut Down	Yes	No
FPF2180	CSP 1x1.5	200	5.5	75	Active HI	1.55	Auto Restart	Yes	Yes
FPF2182	CSP 1x1.5	200	5.5	75	Active HI	1.55	Shutdown	Yes	Yes
FPF2183	CSP 1x1.5	200	5.5	75	Active HI	1.55	Current Source	Yes	Yes
FPF2184	CSP 1x1.5	400	5.5	75	Active HI	1.55	Auto Restart	Yes	Yes
FPF2186	CSP 1x1.5	400	5.5	75	Active HI	1.55	Shutdown	Yes	Yes
FPF2187	CSP 1x1.5	400	5.5	75	Active HI	1.55	Current Source	Yes	Yes
FPF2193	CSP 1x1.5	Adj. (0.15-1.5A)	5.5	75	Active HI	1.55	Auto Restart	Yes	No
FPF2194	CSP 1x1.5	Adj. (0.15-1.5A)	5.5	75	Active HI	1.55	Shutdown	Yes	No
FPF2195	CSP 1x1.5	Adj. (0.15-1.5A)	5.5	75	Active HI	1.55	Current Source	Yes	No

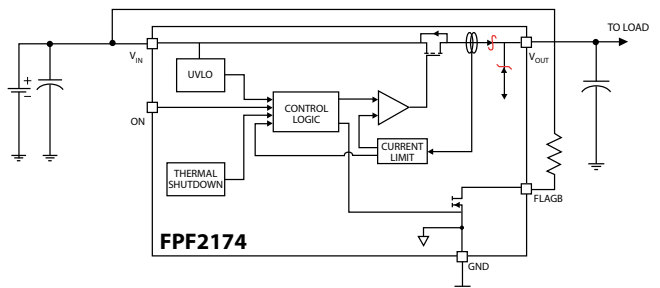
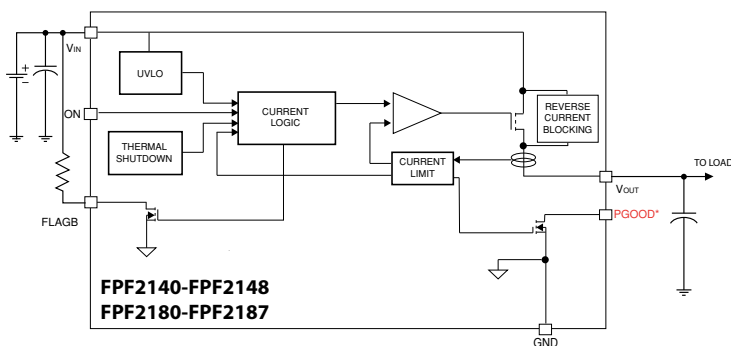
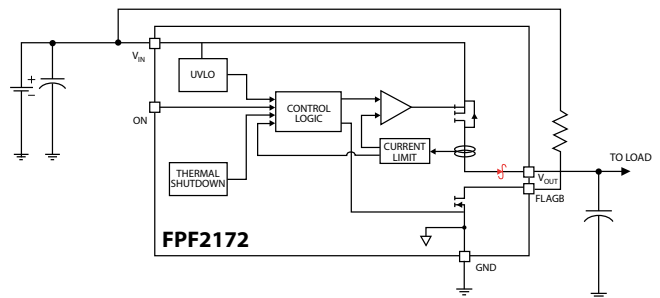
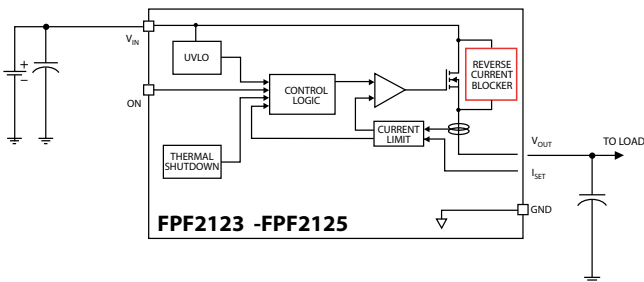
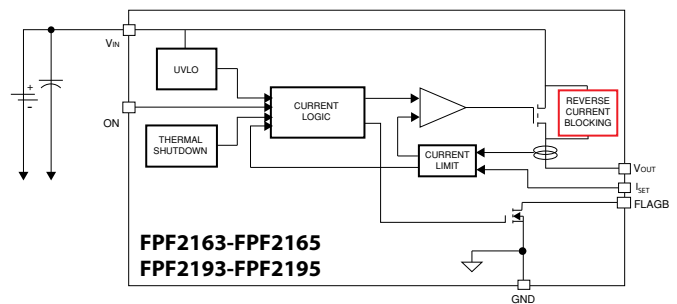
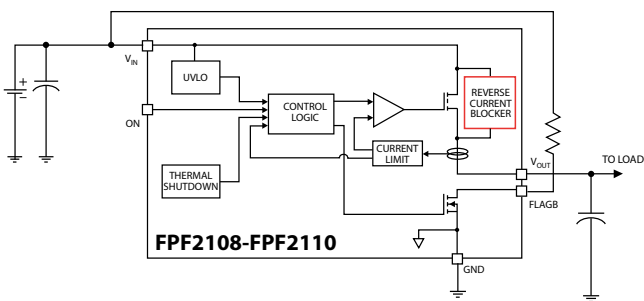
*Note: The R_{DS(ON)} for FPF2172 and FPF2174 is 125mΩ. This specification is based on the internal power device switch only.

Power Good

FPF214X and FPF218x family has a "Power Good" feature. PGOOD pin is an open-drain MOSFET that asserts high when the output voltage reaches 90% of the input voltage. PGOOD pin requires an external pull-up resistor that is connected to the output voltage when there is no battery in the load side and the logic level of the subsequent controller permits. This functionality gives logic levels similar to a CMOS output stage for PGOOD, while still keeping the option to tie the pull-up to a different supply voltage. A typical value of 100K is recommended to be used as pull-up resistor. The PGOOD pin status is independent of the ON pin position. Meaning that PGOOD pin stays low when the load switch is OFF. If the Power Good feature is not used in the application the pin can be connected directly to GND.

Sequential Power Startup using Power Good

"Power Good" feature allows driving subsequent circuits. The Power Good pin can be connected to an active high load switch's enable pin to implement sequential power startup. As the output of primary load switch starts to ramp to the 90% of its input voltage the second switch remains in OFF state. Whereas the output voltage of primary load switch passes the 90% threshold, Power Good signal becomes active and asserts high. This signal will turn on the secondary load switch and output of second load switch will start to increase. The total startup time may vary according to the difference between supply voltages that are used in the application. For more details please refer to FPF214X and FPF218X families datasheets.



* With Power Good feature

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TRIACs

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