

KA3S0680RB/KA3S0680RFB

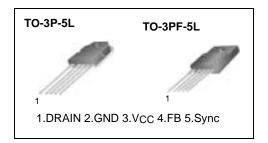
Fairchild Power Switch(FPS)

Features

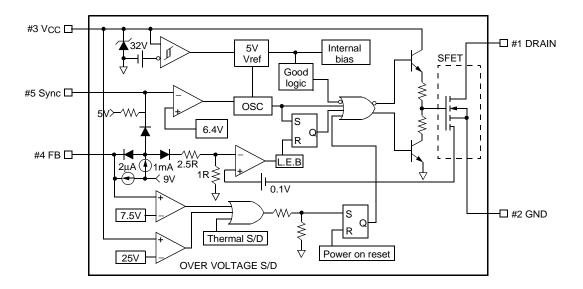
- Wide operating frequency range up to (150kHz)
- Pulse by pulse over current limiting
- Over load protection
- Over voltage protecton (Min. 23V)
- · Internal thermal shutdown function
- Under voltage lockout
- · Internal high voltage sense FET
- · External sync terminal
- · Auto Restart Mode

Description

The Fairchild Power Switch(FPS) product family is specially designed for an off line SMPS with minimal external components. The Fairchild Power Switch(FPS) consist of high voltage power SenseFET and current mode PWM controller IC. controller IC features a trimmed oscillator, under voltage lock out, leading edge blanking, optimized gate turn-on/turn-off driver, thermal shut down protection, over voltage protection, temperature compensated precision current sources for loop compensation and fault protection circuit. compared to discrete MOSFET and controller or RCC switching converter solution, a Fairchild Power Switch(FPS) can reduce total component count, design size, weight and at the same time increase & efficiency, productivity, and system reliability. It has a basic platform well suited for cost effective C-TV power supply.



Internal Block Diagram



Rev.1.0.2

Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Maximum Drain voltage (1)	VD,MAX	800	V
Drain Gate voltage (R _{GS} =1MΩ)	VDGR	800	V
Gate source (GND) voltage	VGS	±30	V
Drain current pulsed (2)	IDM	24.0	ADC
Single pulsed avalanche energy (3)	EAS	455	mJ
Continuous drain current (Tc=25°C)	ID	6.0	ADC
Continuous drain current (Tc=100°C)	ID	4.0	ADC
Maximum supply voltage	VCC,MAX	30	V
Input voltage range	VFB	-0.3 to VsD	V
Total power dissipation	P _D (watt H/S)	150	W
	Derating	1.21	W/°C
Operating ambient temperature	TA	−25 to +85	°C
Storage temperature	T _{STG}	-55 to +150	°C

Note:

- 1. Tj=25°C to 150°C
- 2. Repetitive rating: Pulse width limited by maximum junction temperature
- 3. L=24mH, starting Tj=25 $^{\circ}$ C

Electrical Characteristics (SFET part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Тур.	Max.	Unit
Drain source breakdown voltage	BVDSS	$VGS = 0V$, $ID = 50\mu A$	800	-	-	V
Zero gate voltage drain current	IDSS	V _{DS} = Max., Rating, V _{GS} = 0V	-	-	50	μΑ
		V _{DS} = 0.8Max., Rating, V _{GS} = 0V, T _C = 125°C	1	-	200	mA
Static drain source on resistance (note)	RDS(ON)	VGS = 10V, ID = 4.0A	-	1.6	2.0	W
Forward transconductance (note)	gfs	V _{DS} = 15V, I _D = 4.0A	1.5	2.5	-	S
Input capacitance	Ciss	\\ \\\\\ \\\\\\ \\\\\\\\\\\\\	-	1600	-	pF
Output capacitance	Coss	VGS = 0V, VDS = 25V, f = 1MHz	-	140	-	
Reverse transfer capacitance	Crss	1 - 1101112	-	42	-	
Turn on delay time	td(on)	VDD= 0.5BVDSS, ID= 6.0A (MOSFET switching time are essentially independent of	-	60	-	
Rise time	tr		-	150	-	
Turn off delay time	td(off)		-	300	-	nS
Fall time	tf	operating temperature)	1	130	1	
Total gate charge (gate-source+gate-drain)	Qg	VGS =10V, ID = 6.0A, VDS = 0.5BVDSS (MOSFET	-	70	-	
Gate source charge	Qgs	switching time are	-	16	-	nC
Gate drain (Miller) charge	Qgd	essentially independent of operating temperature)	-	27	-	

Note:

Pulse test: Pulse width $\leq 300 \mu S$, duty cycle $\leq 2\%$

$$S = \frac{1}{R}$$

Electrical Charcteristics (SFET part) (Continued)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Тур.	Max.	Unit
UVLO SECTION	UVLO SECTION					
Start threshold voltage	VSTART	-	14	15	16	V
Stop operating voltage	VSTOP	After turn on	9	10	11	V
OSCILLATOR SECTION			•			
Initial accuracy	Fosc	Ta = 25°C	18	20	22	kHz
Frequency change with temperature (2)	ΔΕ/ΔΤ	-25°C ≤ Ta ≤ +85°C	-	±5	±10	%
Maximum duty cycle	DMAX	-	92	95	98	%
FEEDBACK SECTION			•		•	
Feedback source current	IFB	Ta = 25°C, Vfb = GND	0.7	0.9	1.1	mA
Shutdown Feedback voltage	VsD	-	6.9	7.5	8.1	V
Shutdown delay current	Idelay	Ta = 25°C, 5V ≤ Vfb ≤VsD	1.4	1.8	2.2	μΑ
SYNC. & SOFT START SECTION				l	l	
Soft start voltage	Vss	VFB = 2V	4.7	5.0	5.3	V
Soft start current	Iss	Sync & S/S = GND	0.8	1.0	1.2	mA
Sync threshold voltage ⁽³⁾	Vsyth	Vfb = 5V	6.0	6.4	6.8	V
REFERENCE SECTION						
Output voltage (1)	Vref	Ta = 25°C	4.80	5.00	5.20	V
Temperature Stability (1)(2)	Vref/∆T	–25°C ≤ Ta ≤ +85°C	-	0.3	0.6	mV/°C
CURRENT LIMIT (SELF-PROTECTION) SECTION						
Peak Current Limit	IOVER	Max. inductor current	3.52	4.00	4.48	Α
PROTECTION SECTION						
Thermal shutdown temperature (Tj) (1)	TSD	-	140	160	-	°C
Over voltage protection voltage	VOVP	-	23	25	28	V
TOTAL DEVICE SECTION						
Start Up current	ISTART	VCC = 14V	0.1	0.3	0.55	mA
Operating supply current (control part only)	lop	Ta = 25°C	6	12	18	mA
VCC zener voltage	Vz	ICC = 20mA	30	32.5	35	V

Note:

- 1. These parameters, although guaranteed, are not 100% tested in production
- 2. These parameters, although guaranteed, are tested in EDS(water test) process
- 3. The amplitude of the sync. pulse is recommended to be between 2V and 3V for stable sync. function.

Typical Performance Characteristics (control part)

(These characteristic graphs are normalized at $Ta = 25^{\circ}C$)

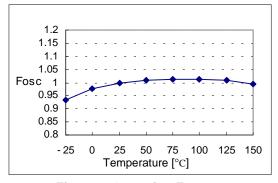


Figure 1. Operating Frequency

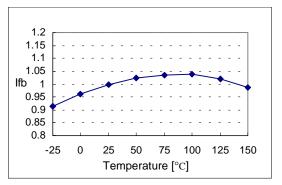


Figure 2. Feedback Source Current

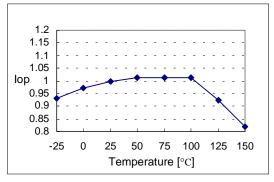


Figure 3. Operating Supply Current

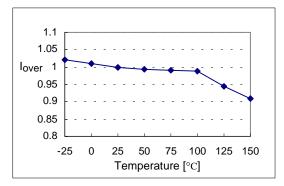


Figure 4. Peak Current Limit

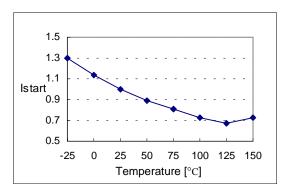


Figure 5. Start up Current

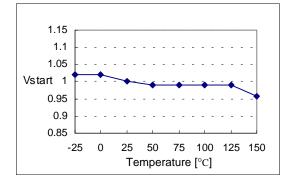


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (continued)

(These characteristic graphs are normalized at Ta = 25°C)

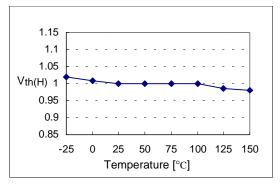


Figure 7. Stop Threshold Voltage

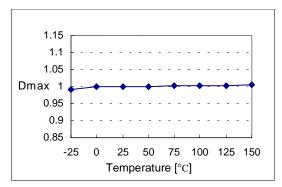


Figure 8. Maximum Duty Cycle

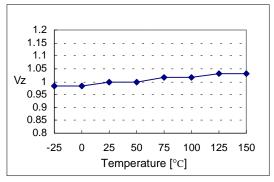


Figure 9. VCC Zener Voltage

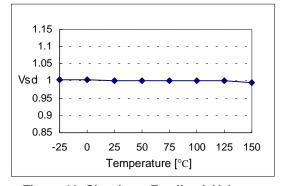


Figure 10. Shutdown Feedback Voltage

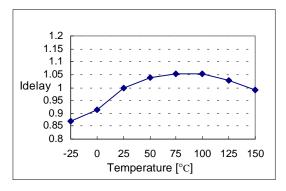


Figure 11. Shutdown Delay Current

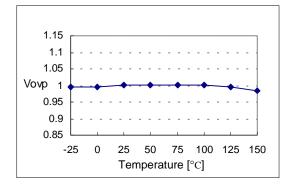


Figure 12. Over Voltage Protection

Typical Performance Characteristics (continued)

(These characteristic graphs are normalized at $Ta = 25^{\circ}C$)

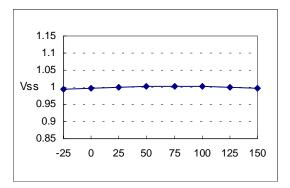


Figure 13. Soft Start Voltage

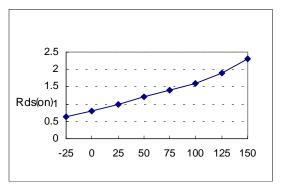
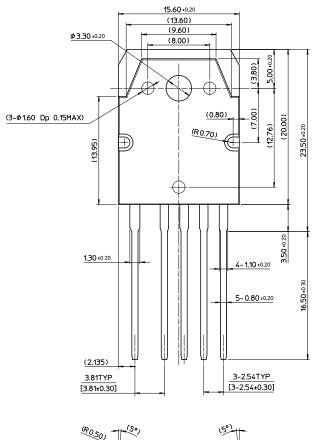
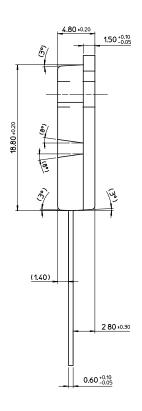


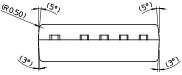
Figure 14. Static Drain-Source on Resistance

Package Dimensions

TO-3P-5L

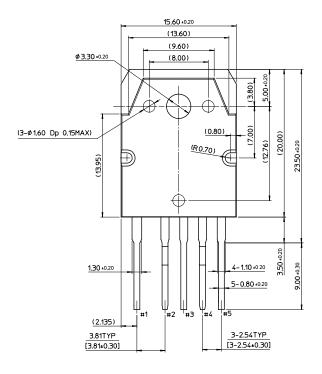


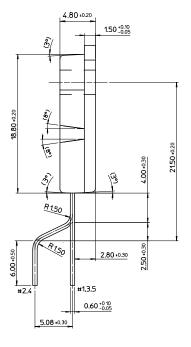


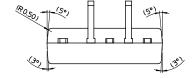


Package Dimensions (Continued)

TO-3P-5L (Forming)

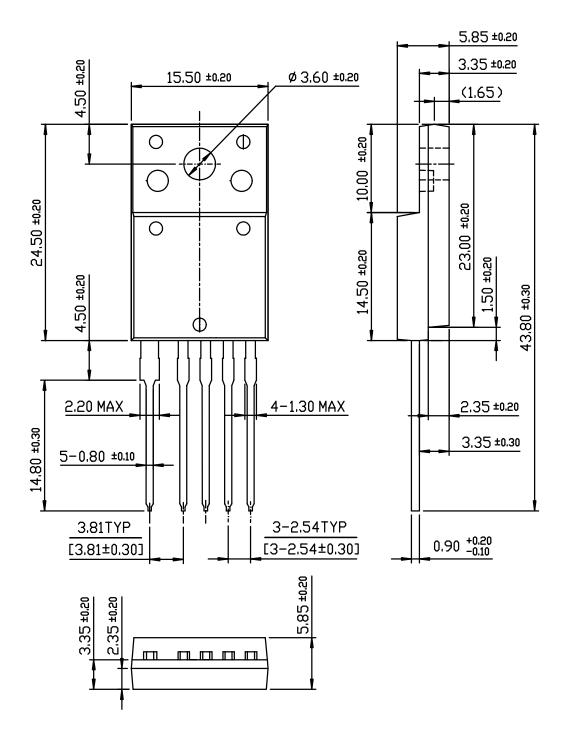






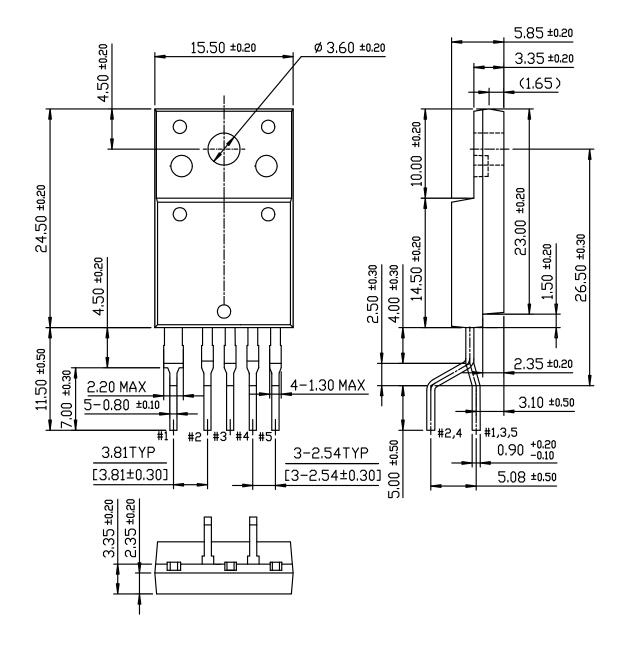
Package Dimensions (Continued)

TO-3PF-5L



Package Dimensions (Continued)

TO-3PF-5L(Forming)



Ordering Information

Product Number	Package	Operating Temperature
KA3S0680RB-TU	TO-3P-5L	-25°C to +85°C
KA3S0680RB-YDTU	TO-3P-5L(Forming)	-23 C to +63 C
KA3S0680RFB-TU	TO-3PF-5L	-25°C to +85°C
KA3S0680RFB-YDTU	TO-3PF-5L(Forming)	-23 C to +65 C

TU: Non Forming Type YDTU: Forming Type

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
- A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com