

KA1L0880B/KA1M0880B

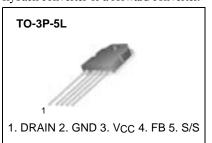
Fairchild Power Switch(FPS)

Features

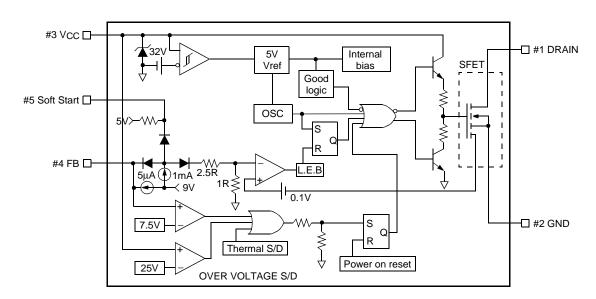
- · Precision fixed operating frequency
- KA1L0880B(50KHz),KA1M0880B(67KHz)
- Pulse by pulse over current limiting
- · Over load protection
- Over voltage protection (Min. 23V)
- Internal thermal shutdown function
- Under voltage lockout
- · Internal high voltage sense FET
- · Latch up mode
- · Soft start

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. PWM controller features integrated fixed 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 design in either a flyback converter or a forward converter.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Maximum Drain voltage (1)	V _{D,Max}	800	V
Drain-Gate voltage (R _{GS} =1MΩ)	VDGR	800	V
Gate-source (GND) voltage	VGS	±30	V
Drain current pulsed (2)	I _{DM}	32.0	ADC
Single pulsed avalanche energy (3)	EAS	810	mJ
Avalanche current (4)	IAS	15	A
Continuous drain current (Tc=25°C)	ID	8.0	ADC
Continuous drain current (T _C =100°C)	ID	5.6	ADC
Maximum Supply voltage	VCC,MAX	30	V
Input voltage range	VFB	-0.3 to V _{SD}	V
Total namer dissipation	PD	190	W
Total power dissipation	Derating	1.54	W/°C
Operating ambient temperature	TA	−25 to +85	°C
Storage temperature	TSTG	−55 to +150	°C

Notes:

- 1. Tj=25°C to 150°C
- 2. Repetitive rating: Pulse width limited by maximum junction temperature
- 3. L=24mH, VDD=50V, RG=25 Ω , starting Tj=25 $^{\circ}$ C
- 4. L=13 μ H, starting Tj=25°C

Electrical Characteristics (SFET part)

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit
Drain source breakdown voltage	BVDSS	VGS=0V, ID=50μA	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	μΑ
Static drain source on resistance (note)	RDS(ON)	VGS=10V, ID=5.0A	-	1.2	1.5	Ω
Forward transconductance (note)	gfs	VDS=15V, ID=5.0A	1.5	2.5	-	S
Input capacitance	Ciss)/ O)/)/ OF)/	-	2460	-	
Output capacitance	Coss	VGS=0V, VDS=25V, f=1MHz	-	210	-	pF
Reverse transfer capacitance	Crss	1-11/11/2	-	64	-	
Turn on delay time	td(on)	VDD=0.5BVDSS, ID=8.0A (MOSFET switching time are essentially independent of operating temperature)	-	-	90	
Rise time	tr		-	95	200	nS
Turn off delay time	td(off)		-	150	450	113
Fall time	tf		-	60	150	
Total gate charge (gate-source+gate-drain)	Qg	VGS=10V, ID=8.0A, VDS=0.5BVDSS (MOSFET switching time are essentially independent of operating temperature)	-	-	150	
Gate source charge	Qgs		-	20	-	nC
Gate drain (Miller) charge	Qgd		-	70	-	

Note:

Pulse test: Pulse width $\leq 300 \mu S$, duty cycle $\leq 2\%$ $S = \frac{1}{R}$

Electrical Characteristics (CONTROL part)

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit	
UVLO SECTION							
Start threshold voltage	VSTART	-	14	15	16	V	
Stop threshold voltage	VSTOP	After turn on	9	10	11	V	
OSCILLATOR SECTION							
Initial accuracy	Fosc	KA1L0880B	45	50	55	kHz	
		KA1M0880B	61	67	73		
Frequency change with temperature (2)	ΔΕ/ΔΤ	–25°C ≤ Ta ≤ +85°C	-	±5	±10	%	
Maximum duty cycle	Dmax		74	77	80	%	
FEEDBACK SECTION				•			
Feedback source current	IFB	Ta=25°C, 0V ≤ Vfb ≤ 3V	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 ≤ V _{SD}	4.0	5.0	6.0	μΑ	
SOFT START SECTION	SOFT START SECTION						
Soft Start Voltage	Vss	V _{FB} =2V	4.7	5.0	5.3	V	
Soft Start Current	Iss	Sync & S/S=GND	0.8	1.0	1.2	mA	
REFERENCE SECTION	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	4.40	5.00	5.60	Α	
PROTECTION SECTION							
Thermal shutdown temperature (Tj) ⁽¹⁾	T _{SD}	-	140	160	-	°C	
Over voltage protection voltage	Vovp	-	23	25	28	V	
TOTAL DEVICE SECTION							
Start Up current	ISTART	V _{CC} =14V	0.1	0.3	0.45	mA	
Operating supply current (control part only)	IOP	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 (wafer test) process

Typical Performance Characteristics

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

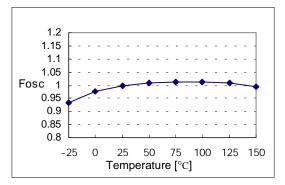


Figure 1. Operating Frequency

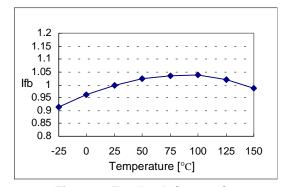


Figure 2. Feedback Source Current

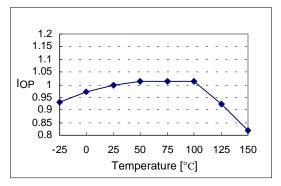


Figure 3. Operating Supply Current

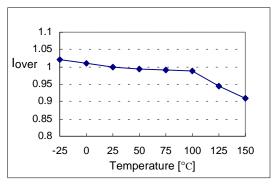


Figure 4. Peak Current Limit

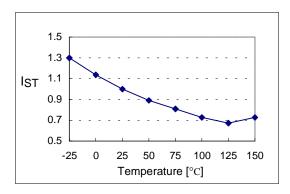


Figure 5. Start up Current

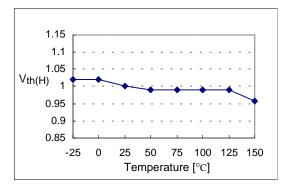


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (Continued)

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

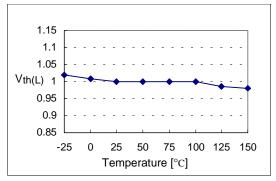


Figure 7. Stop Threshold Voltage

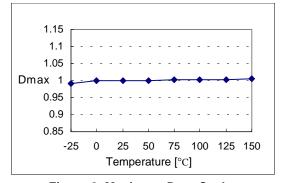


Figure 8. Maximum Duty Cycle

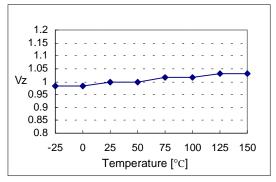


Figure 9. VCC Zener Voltage

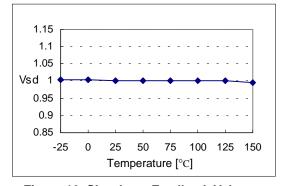


Figure 10. Shutdown Feedback Voltage

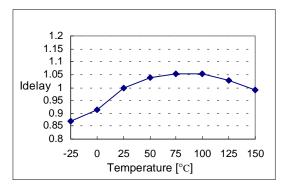


Figure 11. Shutdown Delay Current

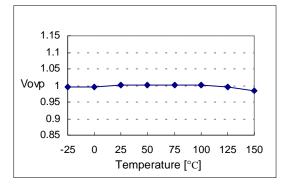


Figure 12. Over Voltage Protection

Typical Performance Characteristics (Continued)

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

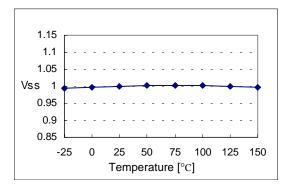


Figure 13. Soft Start Voltage

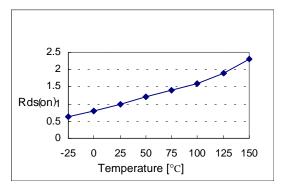
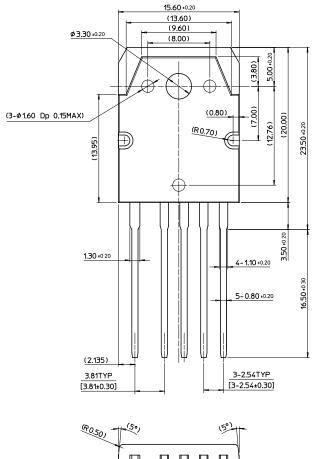
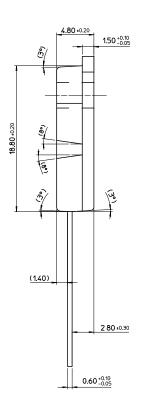


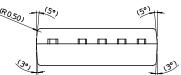
Figure 14. Static Drain Source on Resistance

Package Dimensions

TO-3P-5L

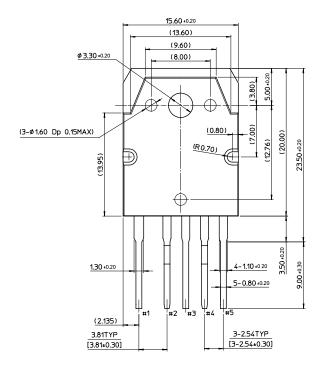


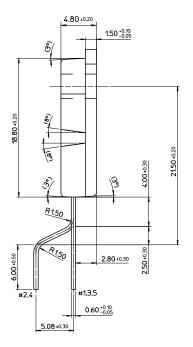


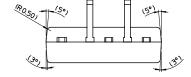


Package Dimensions

TO-3P-5L (Forming)







Ordering Information

Product Number	Package	Rating	Fosc	
KA1L0880B-TU	TO-3P-5L	800V, 8A	50kHz	
KA1L0880B-YDTU	TO-3P-5L(Forming)	600 V, 6A		
KA1M0880B-TU	TO-3P-5L	800V, 8A	67kHz	
KA1M0880B-YDTU	TO-3P-5L(Forming)	000 V, 6A	O/ KHZ	

TU: Non Forming Type YDTU: Forming type

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- 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.

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