

KA2S0880B

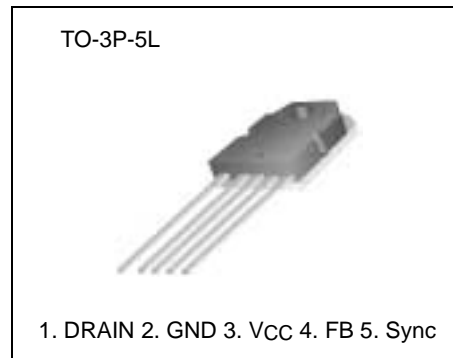
Fairchild Power Switch(SPS)

Features

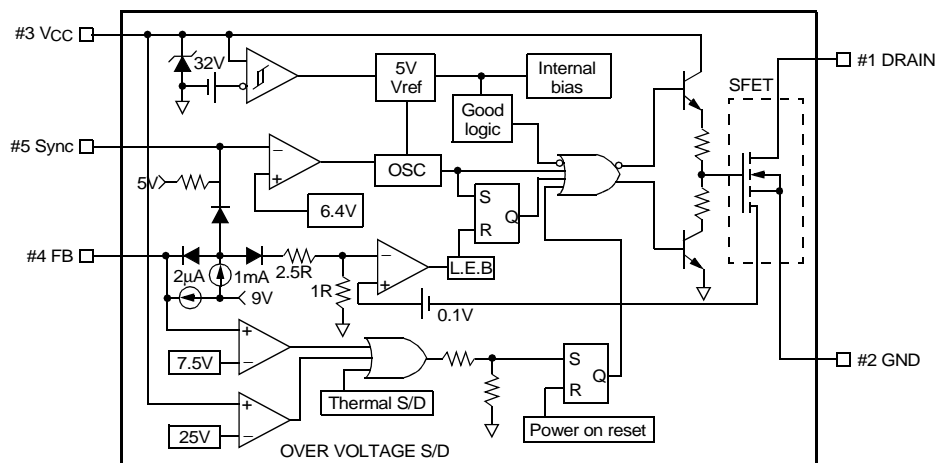
- Wide operating frequency range up to 150KHz
- Pulse by pulse over current limiting
- Over load protection
- Over voltage protection (Min. 23V)
- Internal thermal shutdown function
- Under voltage lockout
- Internal high voltage sense FET
- External sync terminal
- Latch up Mode

Description

The SPS product family is specially designed for an off-line SMPS with minimal external components. The SPS consist of high voltage power SenseFET and current mode PWM Controller IC. PWM controller features integrated fixed oscillator, under voltage lockout, 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 SPS 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 monitor power supply.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source (GND) voltage ⁽¹⁾	V _{DSS}	800	V
Drain-Gate voltage (R _{GS} =1MΩ)	V _{DGR}	800	V
Gate-source (GND) voltage	V _{GS}	±30	V
Drain current pulsed ⁽²⁾	I _{DM}	32.0	ADC
Single pulsed avalanche energy ⁽³⁾	E _{AS}	810	mJ
Avalanche current ⁽⁴⁾	I _{AS}	25	A
Continuous drain current (T _C =25°C)	I _D	8.0	ADC
Continuous drain current (T _C =100°C)	I _D	5.6	ADC
Supply voltage	V _{CC}	30	V
Analog input voltage range	V _{FB}	-0.3 to V _{SD}	V
Total power dissipation	P _D	190	W
	Derating	1.54	W/°C
Operating temperature	T _{OPR}	-25 to +85	°C
Storage temperature	T _{STG}	-55 to +150	°C

Notes:

1. T_j=25°C to 150°C
2. Repetitive rating: Pulse width limited by maximum junction temperature
3. L=24mH, V_{DD}=50V, R_G=25Ω, starting T_j=25°C
4. L=13μH, starting T_j=25°C

Electrical Characteristics (SFET part)

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =50μA	800	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =Max., Rating, V _{GS} =0V	-	-	50	μA
		V _{DS} =0.8Max., Rating, V _{GS} =0V, T _C =125°C	-	-	200	μA
Static drain-source on resistance ^(note)	R _{DS(ON)}	V _{GS} =10V, I _D =5.0A	-	1.2	1.5	Ω
Forward transconductance ^(note)	g _{fs}	V _{DS} =15V, I _D =5.0A	1.5	2.5	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	2460	-	pF
Output capacitance	C _{oss}		-	210	-	
Reverse transfer capacitance	C _{rss}		-	64	-	
Turn on delay time	t _{d(on)}	V _{DD} =0.5BV _{DSS} , I _D =8.0A (MOSFET switching time are essentially independent of operating temperature)	-	-	90	nS
Rise time	t _r		-	95	200	
Turn off delay time	t _{d(off)}		-	150	450	
Fall time	t _f		-	60	150	
Total gate charge (gate-source+gate-drain)	Q _g	V _{GS} =10V, I _D =8.0A, V _{DS} =0.5BV _{DSS} (MOSFET switching time are essentially independent of operating temperature)	-	-	150	nC
Gate-source charge	Q _{gs}		-	20	-	
Gate-drain (Miller) charge	Q _{gd}		-	70	-	

Note:

Pulse test: Pulse width ≤ 300μS, duty cycle ≤ 2%

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

Electrical Characteristics (CONTROL part)

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Output voltage ⁽¹⁾	Vref	Ta=25°C	4.80	5.00	5.20	V
Temperature Stability ⁽¹⁾⁽²⁾	Vref/ΔT	-25°C≤Ta≤+85°C	-	0.3	0.6	mV/°C
OSCILLATOR SECTION						
Initial accuracy	FOSC	Ta=25°C	18	20	22	kHz
Frequency change with temperature ⁽²⁾	ΔF/ΔT	-25°C≤Ta≤+85°C	-	±5	±10	%
Sync threshold voltage ⁽³⁾	VSYTH	Vfb=5V	6.0	6.4	6.8	V
PWM SECTION						
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 delay current	Idelay	Ta=25°C, 5V≤Vfb≤VSD	1.4	1.8	2.2	μA
OVER CURRENT PROTECTION SECTION						
Over current protection	IL(max)	Max. inductor current	4.40	5.00	5.60	A
UVLO SECTION						
Start threshold voltage	Vth(H)	-	14	15	16	V
Minimum operating voltage	Vth(L)	After turn on	9	10	11	V
TOTAL STANDBY CURRENT SECTION						
Start current	IST	VCC=14V	0.1	0.3	0.55	mA
Operating supply current (control part only)	IOPR	Ta=25°C	6	12	18	mA
VCC zener voltage	VZ	ICC=20mA	30	32.5	35	V
SHUTDOWN SECTION						
Shutdown Feedback voltage	VSD	-	6.9	7.5	8.1	V
Thermal shutdown temperature (Tj) ⁽¹⁾	TSD	-	140	160	-	°C
Over voltage protection voltage	VOVP	-	23	25	28	V
SOFT START SECTION						
Soft start current	ISS	Sync & S/S=GND	0.8	1.0	1.2	mA
Soft start voltage	VSS	VFB=2V	4.7	5.0	5.3	V

Notes:

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

Typical Performance Characteristics

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



Figure 1. Operating Frequency



Figure 2. Feedback Source Current

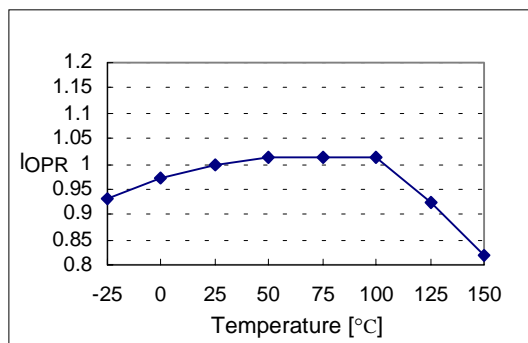


Figure 3. Operating Current

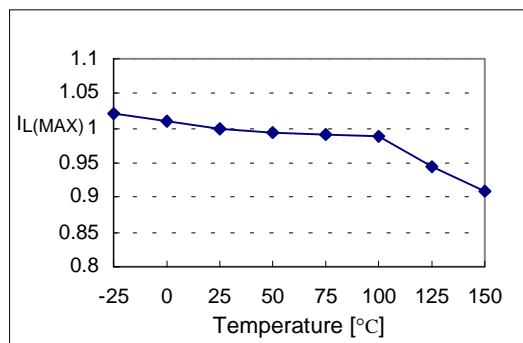


Figure 4. Max. Inductor Current



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 $T_a=25^\circ\text{C}$)

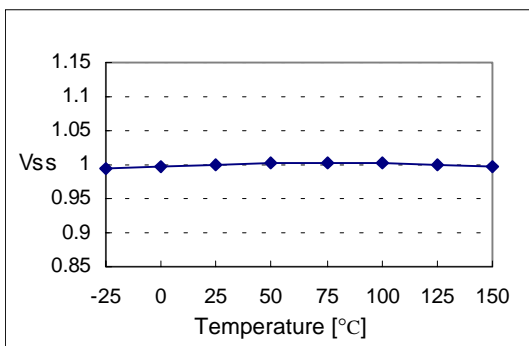


Figure 13. Soft Start Voltage

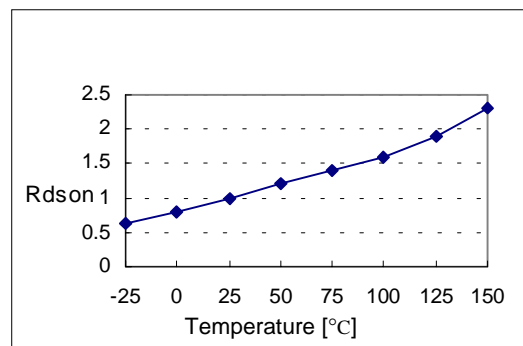
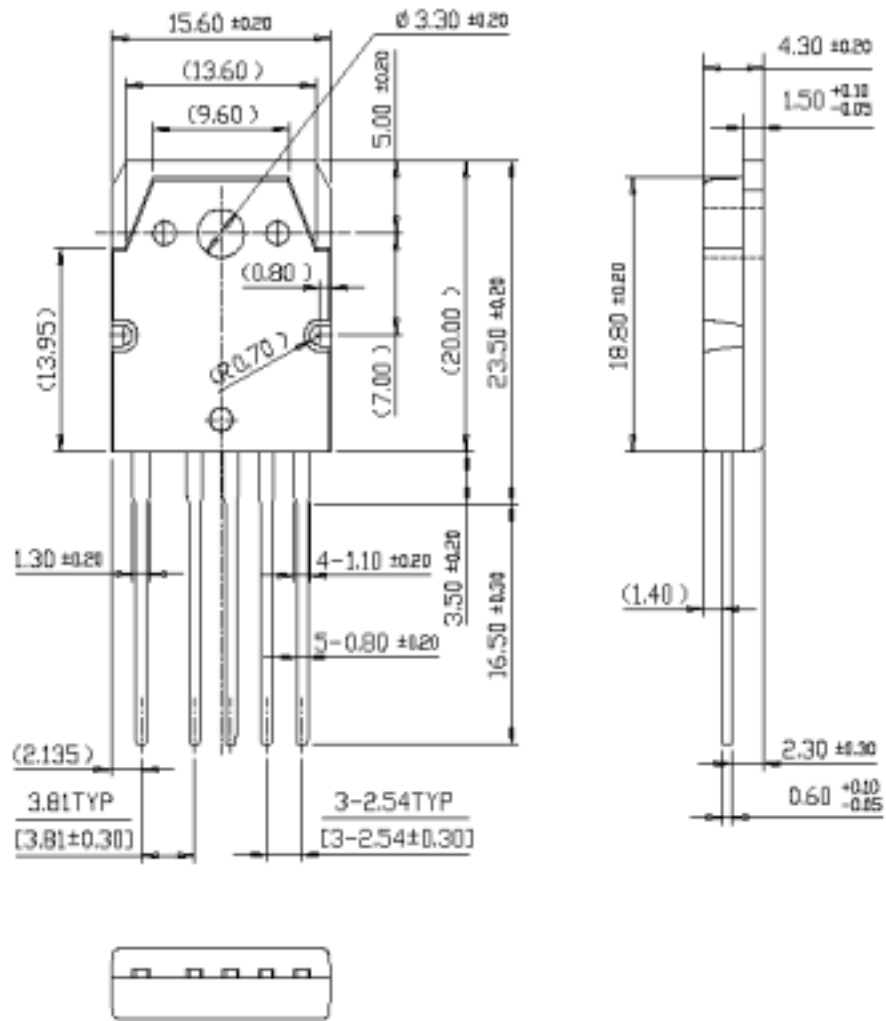


Figure 14. Drain Source Turn-on Resistance

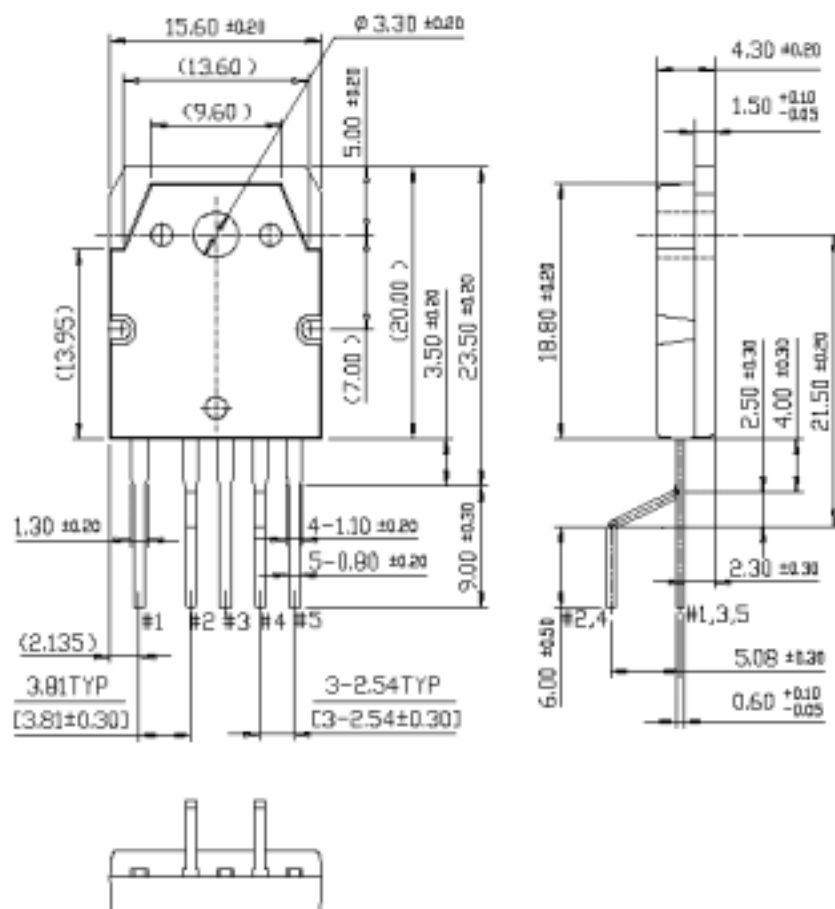
Package Dimensions

TO-3P-5L



Package Dimensions (Continued)

TO-3P-5L (Forming)



Ordering Information

Product Number	Package	Rating	Operating Temperature
KA2S0880B-TU	TO-3P-5L	800V,8A	-25°C to +85°C
KA2S0880B-YDTU	TO-3P-5L(Forming)		

TU : Non Forming Type

YDTU : Forming Type

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