

KA2S0965/KA2S09655

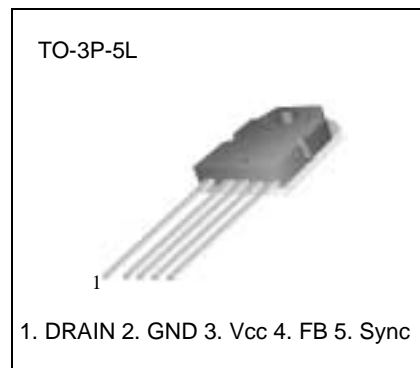
Fairchild Power Switch(SPS)

Features

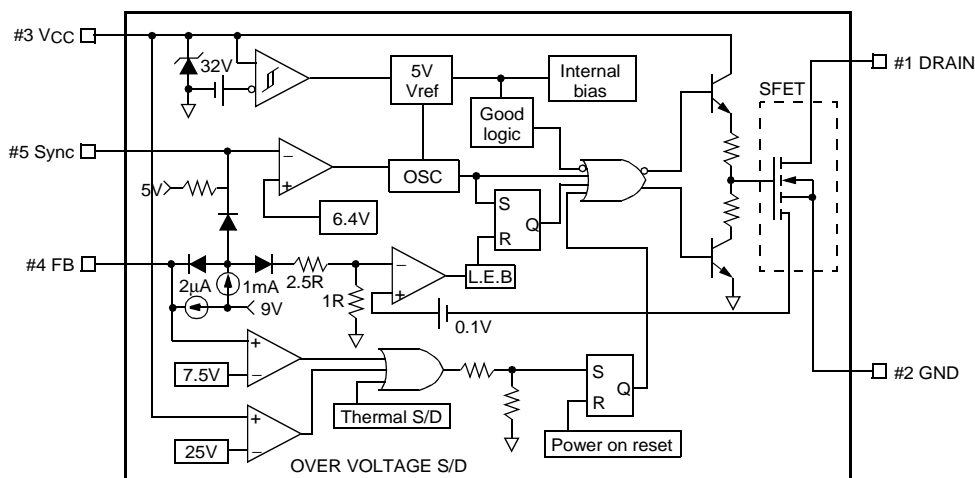
- Wide operating frequency range up to (150kHz)
- Pulse by pulse over current limiting
- Over load protection
- Over voltage protection (Min. 23V)
- Internal thermal shutdown function
- Under voltage lockout
- Internal high voltage sense FET
- External sync terminal
- Latch up Mode

Description

The SPS product family is specially designed for an offline SMPS with minimal external components. The SPS consist of high voltage power SenseFET and current mode PWM Controller IC. control 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 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 Monitor power supply.



Internal Block Diagram



Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Drain-source (GND) voltage ⁽¹⁾	V _{DSS}	650	V
Drain-Gate voltage (R _{GS} =1MΩ)	V _{DGR}	650	V
Gate-source (GND) voltage	V _{GS}	±30	V
Drain current pulsed ⁽²⁾	I _{DM}	36.0	ADC
Single pulsed avalanche energy ⁽³⁾	E _{AS}	950	mJ
Continuous drain current (T _C =25°C)	I _D	9.0	ADC
Continuous drain current (T _C =100°C)	I _D	5.8	ADC
Supply voltage	V _{CC}	30	V
Analog input voltage range	V _{FB}	-0.3 to V _{SD}	V
Total power dissipation	P _D	170	W
	Derating	1.33	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=20mH, V_{DD}=50V, R_G=27Ω, starting T_j=25 °C

Electrical Characteristics (SFET part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BVDSS	V _{GS} =0V, I _D =50μA	650	–	–	V
Zero gate voltage drain current	IDSS	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)	RDS(ON)	V _{GS} =10V, I _D =4.5A	–	0.96	1.2	Ω
Forward transconductance ^(note)	gfs	V _{DS} =50V, I _D =4.5A	5.0	–	–	S
Input capacitance	Ciss	V _{GS} =0V, V _{DS} =25V, f=1MHz	–	1750	–	pF
Output capacitance	Coss		–	190	–	
Reverse transfer capacitance	Crss		–	78	–	
Turn on delay time	td(on)	V _{DD} =0.5BVDSS, I _D =9.0A (MOSFET switching time are essentially independent of operating temperature)	–	20	50	nS
Rise time	tr		–	23	55	
Turn off delay time	td(off)		–	85	180	
Fall time	tf		–	30	70	
Total gate charge (gate-source+gate-drain)	Qg	V _{GS} =10V, I _D =9.0A, V _{DS} =0.5BVDSS (MOSFET switching time are essentially independent of operating temperature)	–	74	95	nC
Gate-source charge	Qgs		–	12	–	
Gate-drain (Miller) charge	Qgd		–	35.4	–	

Note:

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

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

Electrical Characteristics (CONTROL part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test 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	I _{FB}	Ta=25°C, Vfb=GND	0.8	1	1.2	mA
Shutdown delay current	I _{delay}	Ta=25°C, 5V≤Vfb≤VSD	1.4	1.8	2.2	μA
OVER CURRENT PROTECTION SECTION						
Over current protection	I _{L(max)}	KA2S0965	5.28	6.00	6.72	A
		KA2S09655	4.40	5.00	5.60	
UVLO SECTION						
Start threshold voltage	V _{th(H)}	-	14	15	16	V
Minimum operating voltage	V _{th(L)}	After turn on	9	10	11	V
TOTAL STANDBY CURRENT SECTION						
Start current	I _{ST}	V _{CC} =14V	0.1	0.3	0.55	mA
Operating supply current (control part only)	I _{OPR}	Ta=25°C	6	12	18	mA
V _{CC} zener voltage	V _Z	I _{CC} =20mA	30	32.5	35	V
SHUTDOWN SECTION						
Shutdown Feedback voltage	V _{SD}	-	6.9	7.5	8.1	V
Thermal shutdown temperature (T _J) ⁽¹⁾	T _{SD}	-	140	160	-	°C
SOFT START SECTION						
Soft start current	I _{SS}	Sync & S/S=GND	0.8	-	-	mA
Soft start voltage	V _{SS}	V _{FB} =2V	4.7	5.0	5.3	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

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



Figure 1. Operating Frequency

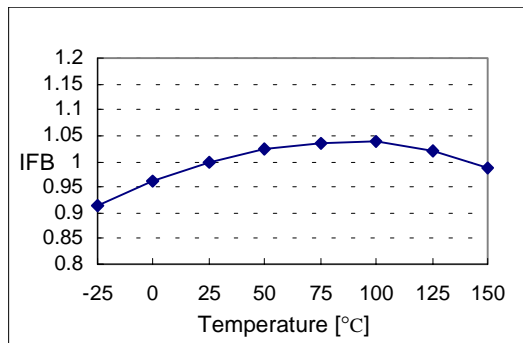


Figure 2. Feedback Source Current

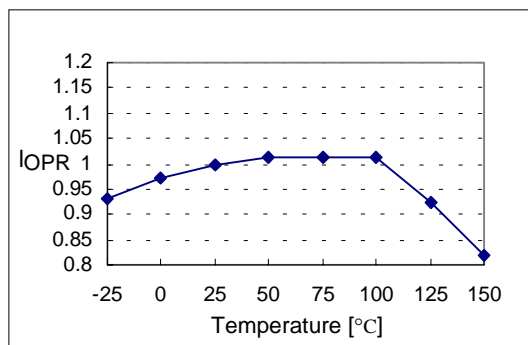


Figure 3. Operating Current

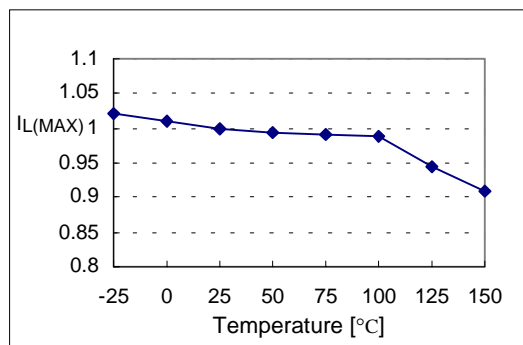


Figure 4. Max. Inductor Current

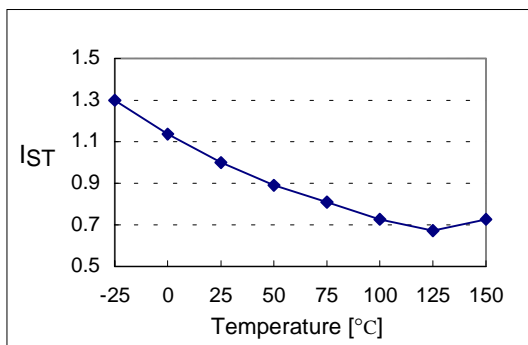


Figure 5. Start up Current

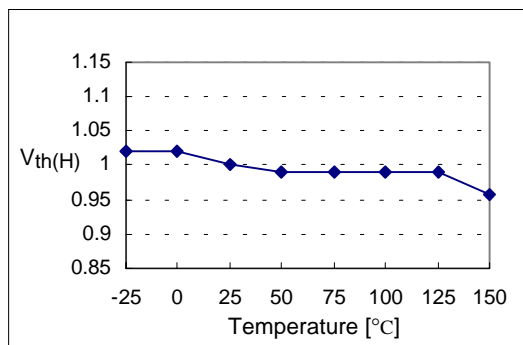


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (Continued)

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



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

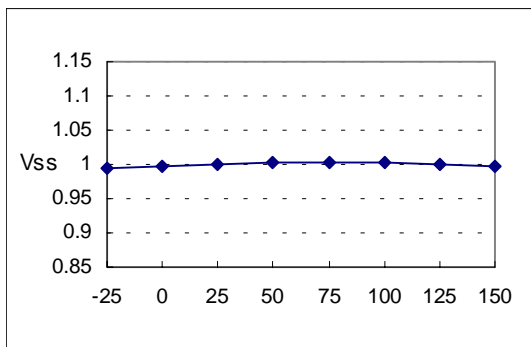


Figure13. Soft Start Voltage

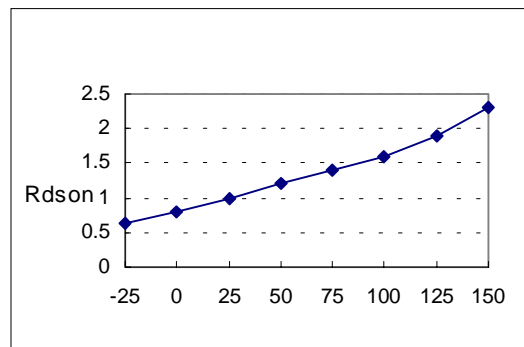
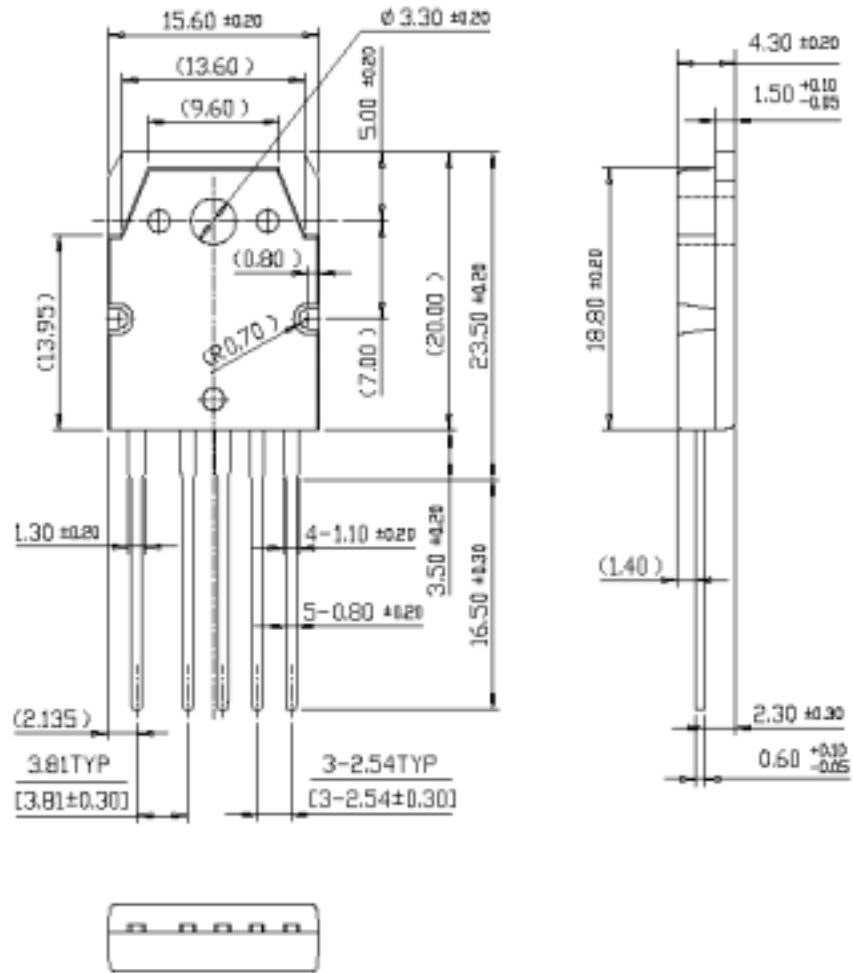


Figure 14. Drain Source Turn-on Resistance

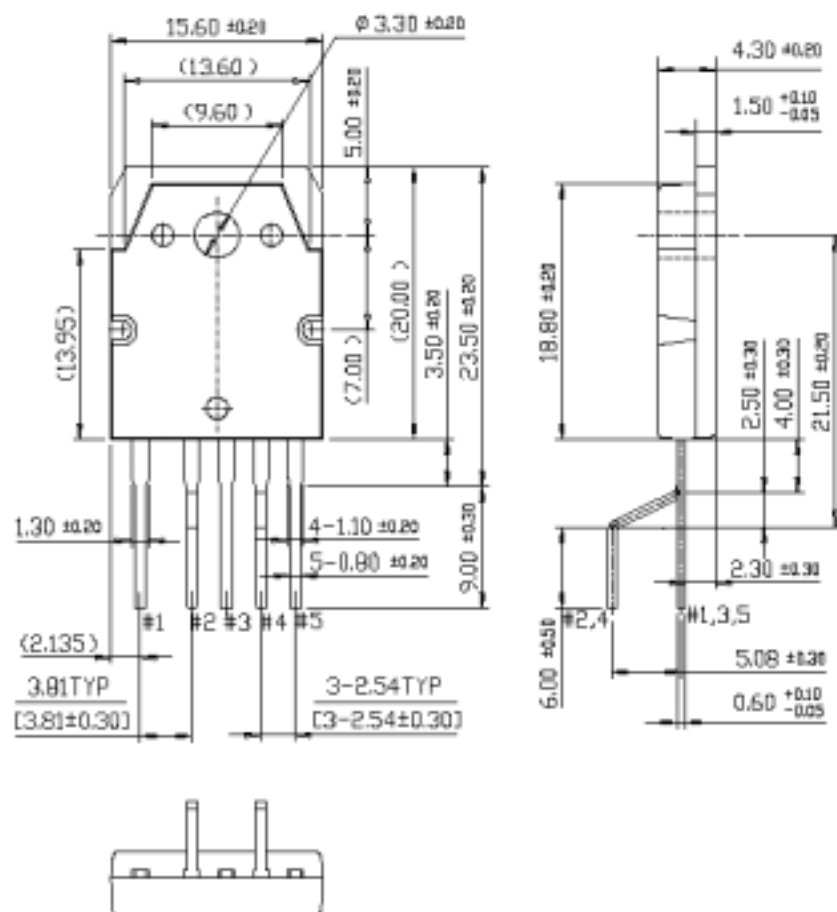
Package Dimensions

TO-3P-5L



Package Dimensions (Continued)

TO-3P-5L (Forming)



Ordering Information

Product Number	Package	Rating	Over current protection
KA2S0965-TU	TO-3P-5L	650V, 9A	6A
KA2S0965-YDTU	TO-3P-5L(Forming)		
KA2S09655-TU	TO-3P-5L	650V, 9A	5A
KA2S09655-YDTU	TO-3P-5L(Forming)		

TU : Non Forming Type

YDTU : Forming Type

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