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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild guestions@onsemi.com.

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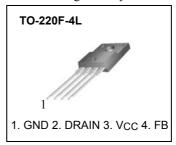
KA5L0565RFairchild Power Switch(FPSTM)

Features

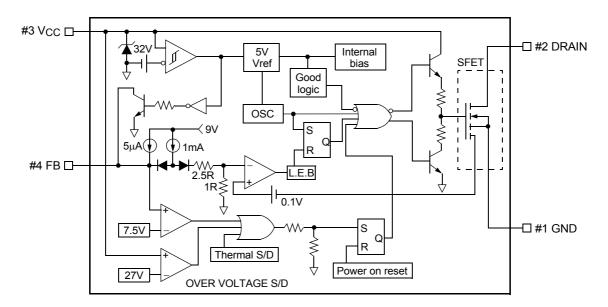
- Precision Fixed Operating Frequency (50kHz)
- Low Start-up Current(Typ. 100uA)
- Pulse by Pulse Current Limiting
- Over Current Protection
- Over Voltage Protection (Min. 25V)
- · Internal Thermal Shutdown Function
- Under Voltage Lockout
- · Internal High Voltage Sense FET
- · Auto-Restart Mode

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) consists of a high voltage power SenseFET and a current mode PWM IC. Included PWM controller integrates the fixed frequency oscillator, the under voltage lock-out, the leading edge blanking, the optimized gate turn-on/turn-off driver, the thermal shutdown protection, the over voltage protection, and the temperature compensated precision current sources for the loop compensation and the fault protection circuitry. Compared to a discrete MOSFET and a PWM controller or an RCCsolution, a Fairchild Power Switch(FPS) can reduce the total component count, design size and weight and at the same time increase efficiency, productivity, and system reliability. It has a basic platform well suited for the cost effective design in a flyback converter.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Gate Voltage (R _{GS} =1MΩ)	VDGR	650	V
Gate-Source (GND) Voltage	Vgs	±30	V
Drain Current Pulsed (2)	IDM	20	ADC
Single Pulsed Avalanche Current (3)(Energy (2))	IAS(EAS)	13(400)	A(mJ)
Continuous Drain Current (T _C =25°C)	ID	5.0	ADC
Continuous Drain Current (Tc=100°C)	ID	3.5	ADC
Maximum Supply Voltage	VCC,MAX	30	V
Input Voltage Range	VFB	-0.3 to V _{SD}	V
Total Power Dissipation	PD	38	W
Total Fower Dissipation	Darting	0.3	W/°C
Operating Ambient Temperature	TA	-25 to +85	°C
Storage Temperature	TSTG	-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 = 30mH, V_{DD} = 50V, R_G = 27 Ω , starting T_j = 25°C

Electrical Characteristics (SenseFET part)

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit
Drain-Source Breakdown Voltage	BVDSS	VGS=0V, ID=50μA	650	-	-	V
Zero Gate Voltage Drain Current	IDSS	V _{DS} =Max., Rating, V _{GS} =0V	-	-	50	μА
		V _{DS} =0.8Max., Rating, V _{GS} =0V, T _C =125°C	-	-	200	μА
Static Drain-Source on Resistance (Note)	RDS(ON)	V _{GS} =10V, I _D =2.5A	-	1.76	2.2	Ω
Forward Transconductance (Note)	gfs	V _{DS} =50V, I _D =2.5A	2.5	-	-	S
Input Capacitance	Ciss	\\ 0\\\\\ 0\\\\\	-	1457	-	pF
Output Capacitance	Coss	VGS=0V, VDS=25V, f=1MHz	-	130	-	
Reverse Transfer Capacitance	Crss	1 1101112	-	38.8	-	
Turn on Delay Time	t _{d(on)}	VDD=0.5BVDSS, ID=5.0A (MOSFET switching time are essentially independent of operating temperature)	-	-	60	
Rise Time	tr		-	-	150	nS
Turn Off Delay Time	t _{d(off)}		-	-	300	113
Fall Time	tf		-	-	130	
Total Gate Charge (Gate-Source+Gate-Drain)	Qg	V _{GS} =10V, I _D =5.0A, V _{DS} =0.5BV _{DS} S (MOSFET	-	-	56	
Gate-Source Charge	Qgs	switching time are essentially independent of	-	10.3	-	nC
Gate-Drain (Miller) Charge	Qgd	operating temperature)	-	22.3	-	

Note:

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

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

Electrical Characteristics (Control Part) (Continued)

(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	8.4	9	9.6	V
OSCILLATOR SECTION						
Initial Accuracy	Fosc	KA5L0565R	45	50	55	kHz
Frequency Change With Temperature (2)	ΔΕ/ΔΤ	-25°C ≤ Ta ≤ +85°C	-	±5	±10	%
Maximum Duty Cycle	Dmax	KA5L0565R	72	77	82	%
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	I _{delay}	Ta=25°C, $5V \le Vfb \le V_{SD}$	4.0	5.0	6.0	μΑ
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	1.76	2.00	2.24	Α
PROTECTION SECTION						
Thermal Shutdown Temperature (Tj) ⁽¹⁾	T _{SD}	-	140	160	-	°C
Over Voltage Protection Voltage	Vovp	-	25	27	29	V
TOTAL DEVICE SECTION						
Start Up Current	ISTART	V _{CC} =14V	-	100	170	uA
Operating Supply Current (Control Part Only)	IOP	Ta=25°C	-	7	12	mA

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)

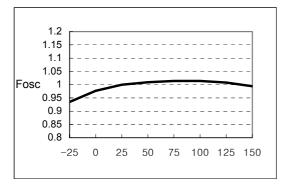


Figure 1. Operating Frequency

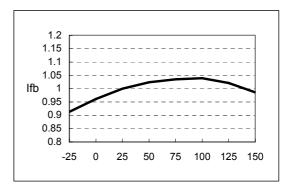


Figure 2. Feedback Source Current

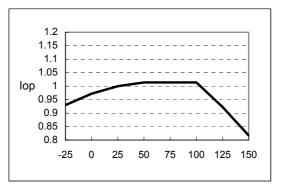


Figure 3. Operating Supply Current

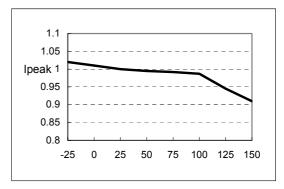


Figure 4. Peak Current Limit

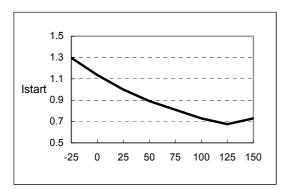


Figure 5. Start up Current

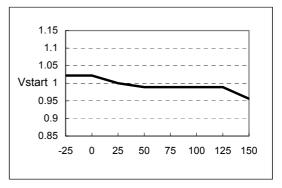


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (Continued)

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

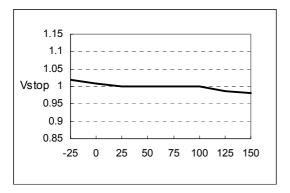
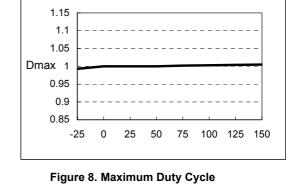


Figure 7. Stop Threshold Voltage



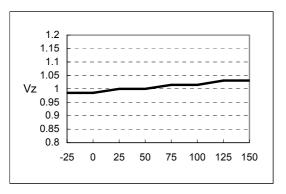


Figure 9. VCC Zener Voltage

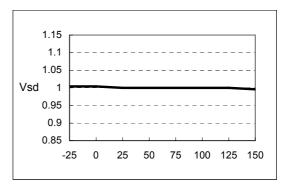


Figure 10. Shutdown Feedback Voltage

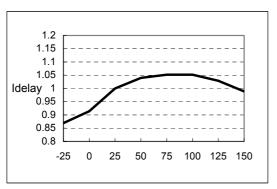


Figure 11. Shutdown Delay Current

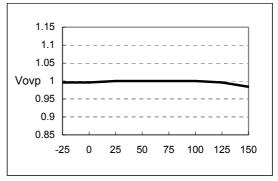


Figure 12. Over Voltage Protection

Typical Performance Characteristics (Continued)

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

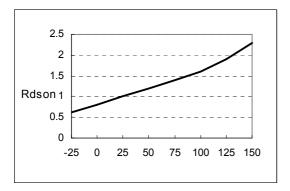
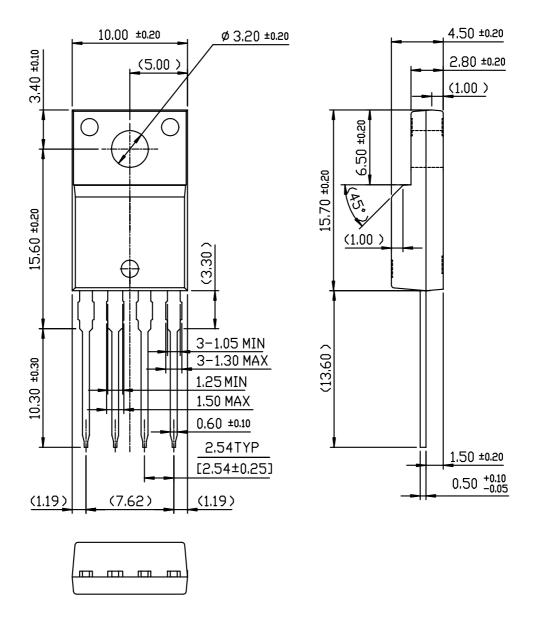


Figure 13. Static Drain-Source on Resistance

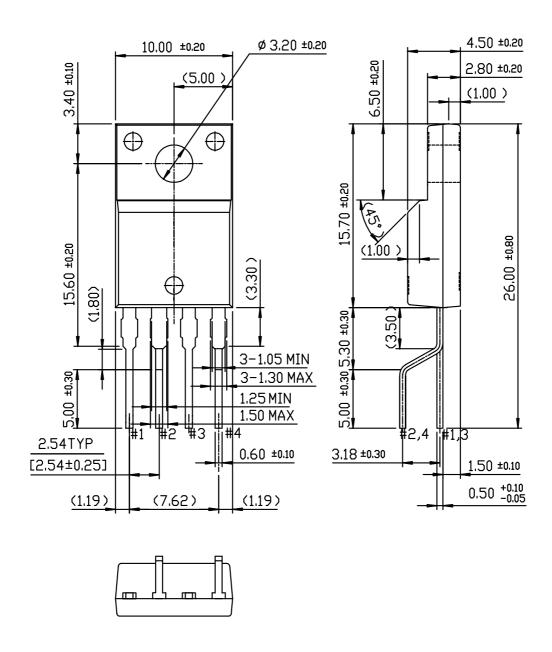
Package Dimensions

TO-220F-4L



Package Dimensions (Continued)

TO-220F-4L(Forming)



Ordering Information

Product Number	Package	Rating	Fosc		
KA5L0565RTU	TO-220F-4L	650V. 5A	50kHz		
KA5L0565RYDTU	TO-220F-4L(Forming)	030V, 3A	JUNIZ		

TU : Non Forming Type YDTU : Forming Type

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