KA1M0765R/KA1M0765RC

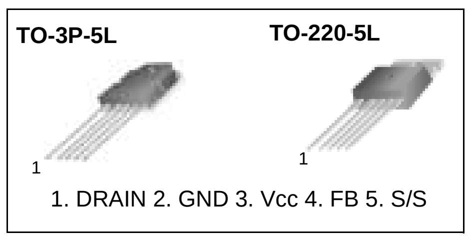
Fairchild Power Switch(FPS)

Features

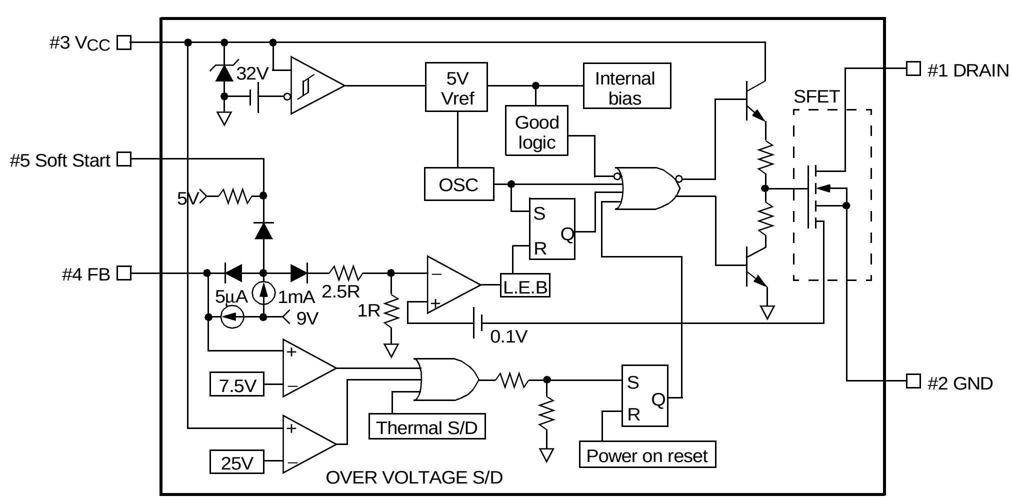
- Precision fixed operating frequency (67kHz)
- Pulse by pulse current limiting
- Over load protection
- Over voltage protecton (Min. 23V)
- Internal thermal shutdown function
- Under voltage lockout
- Internal high voltage sense FET
- Auto restart
- Soft start

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 frequency oscillator, under voltage lock out, leading edge blanking, optimized gate turn-on/turn-off driver, thermal shutdown protection, over voltage protection, temperature compensated precision current sources for loop compensation and fault protection circuit. compared to discrete MOSFET and PWM controller or R_{CC} 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



Rev.1.0.2

©2001 Fairchild Semiconductor Corporation

Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Maximum Drain voltage (1)	$V_{D,MAX}$	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}	28.0	A_{DC}
Single pulsed avalanche energy (3)	E_{AS}	570	mJ
Continuous drain current (T_C=25°C)	I_D	7.0	A_{DC}
Continuous drain current (T_C=100°C)	I_D	5.6	A_{DC}
Maximum Supply voltage	$V_{CC,MAX}$	30	V
Input voltage range	V_{FB}	–0.3 to V_{SD}	V
Total power dissipation	P_D	140	W
	Derating	1.11	W/°C
Operating ambient temperature	T_A	–25 to +85	°C
Storage temperature	T_{STG}	–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, V_{DD}=50V, R_G=25Ω, starting Tj=25°C

Electrical Characteristics (SFET part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=50μA	650	-	-	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	mA
Static drain-source on resistance (note)	$R_{DS(ON)}$	V_{GS}=10V, I_D=4.0A	-	1.25	1.6	W
Forward transconductance (note)	gfs	V_{DS}=15V, I_D=4.0A	3.0	-	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	1600	-	pF
Output capacitance	Coss		-	310	-	
Reverse transfer capacitance	Crss		-	120	-	
Turn on delay time	$t_{d(on)}$	V_{DD}=0.5BV_{DSS}, I_D=7.0A (MOSFET switching time are essentially independent of operating temperature)	-	25	-	nS
Rise time	tr		-	55	-	
Turn off delay time	$t_{d(off)}$		-	80	-	
Fall time	tf		-	50	-	
Total gate charge (gate-source+gate-drain)	Qg	V_{GS}=10V, I_D=7.0A, V_{DS}=0.5BV_{DSS} (MOSFET switching time are essentially independent of operating temperature)	-	-	72	nC
Gate source charge	Qgs		-	9.3	-	
Gate drain (Miller) charge	Qgd		-	29.3	-	

Note:

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

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

Electrical Charcteristics (CONTROL part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Typ.	Max.	Unit
UVLO SECTION						
Start threshold voltage	V_{START}	-	14	15	16	V
Stop threshold voltage	V_{STOP}	After turn on	9	10	11	V
OSCILLATOR SECTION						
Initial accuracy	F_{OSC}	Ta=25°C	61	67	73	kHz
Frequency change with temperature (2)	ΔF/ΔT	–25°C ≤ Ta ≤ +85°C	-	±5	±10	%
Maximum duty cycle	Dmax	-	74	77	80	%
FEEDBACK SECTION						
Feedback source current	I_{FB}	Ta=25°C, 0V ≤Vfb ≤ 3V	0.7	0.9	1.1	mA
Shutdown Feedback voltage	V_{SD}	-	6.9	7.5	8.1	V
Shutdown delay current	Idelay	Ta=25°C, 5V ≤ Vfb ≤ V_{SD}	4.0	5.0	6.0	µA
SOFT START SECTION						
Soft Start Voltage	V_{SS}	V_{FB} =2V	4.7	5.0	5.3	V
Soft Start Current	I_{SS}	Sync & S/S=GND	0.8	1.0	1.2	mA
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
CURRENT LIMIT (SELF-PROTECTION) SECTION						
Peak Current Limit	I_{OVER}	Max. inductor current	4.40	5.00	5.60	A
PROTECTION SECTION						
Thermal shutdown temperature (Tj) (1)	T_{SD}	-	140	160	-	°C
Over voltage protection voltage	V_{OVP}	-	23	25	28	V
TOTAL DEVICE SECTION						
Start Up current	I_{START}	V_{CC}=14V	0.1	0.3	0.4	mA
Operating supply current (control part only)	I_{OP}	Ta=25°C	6	12	18	mA
V_{CC} zener voltage	V_Z	I_{CC}=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

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

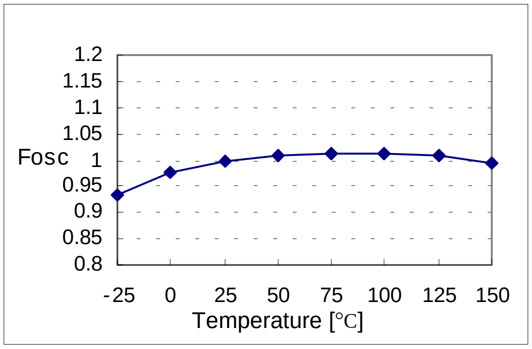


Figure 1. Operating Frequency

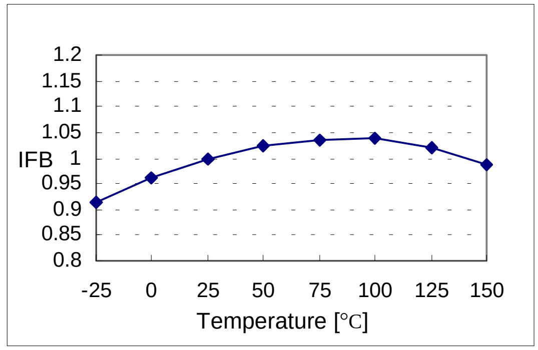


Figure 2. Feedback Source Current

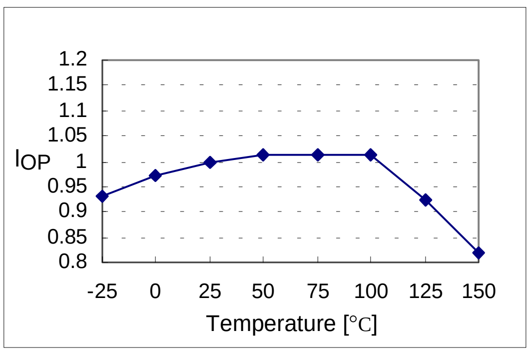


Figure 3. Operating Supply Current

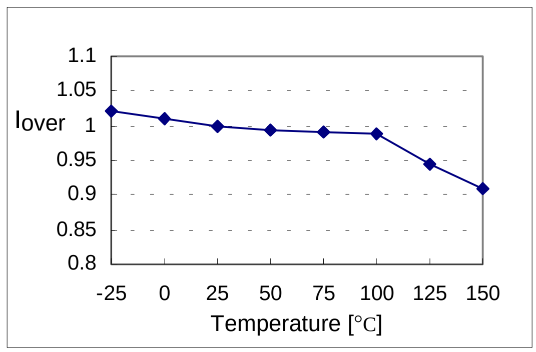


Figure 4. Peak Current Limit

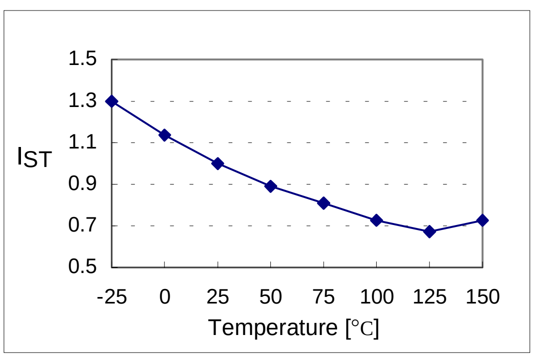


Figure 5. Start up Current

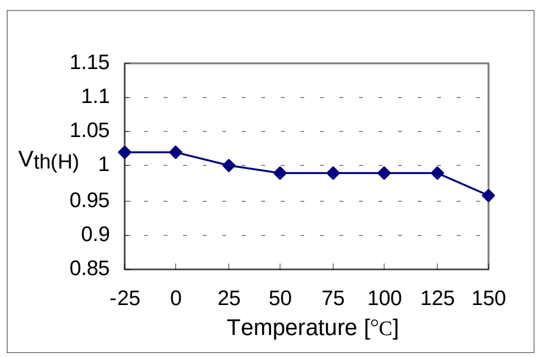


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (Continued)

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

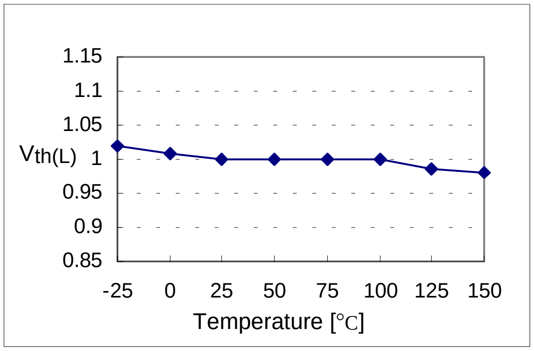


Figure 7. Stop Threshold Voltage

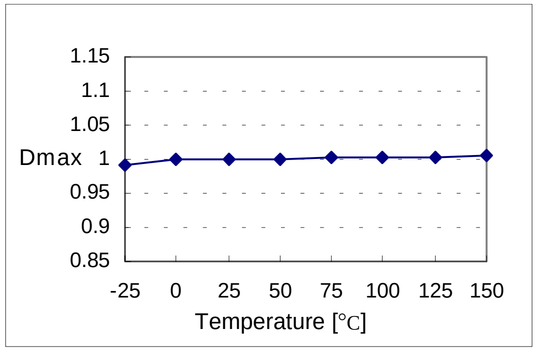


Figure 8. Maximum Duty Cycle

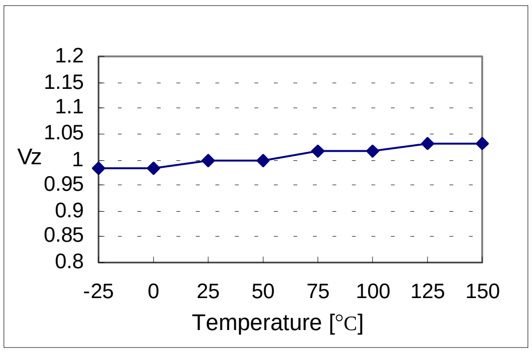


Figure 9. V_{CC} Zener Voltage

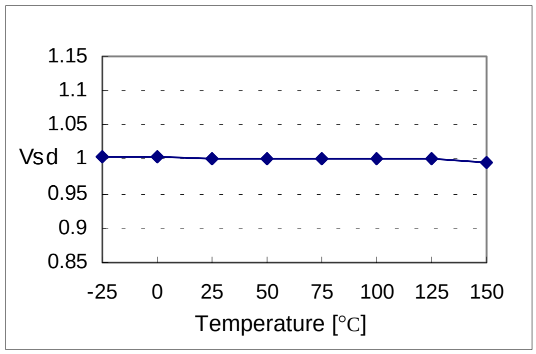


Figure 10. Shutdown Feedback Voltage

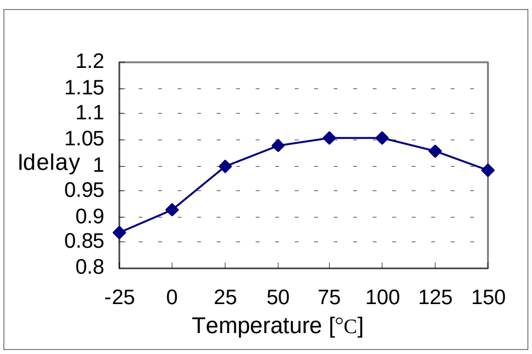


Figure 11. Shutdown Delay Current

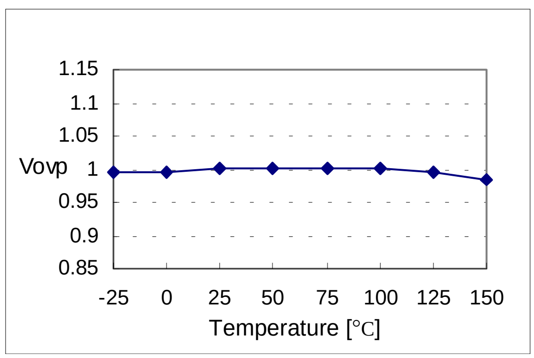


Figure 12. Over Voltage Protection

Typical Performance Characteristics (Continued)

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

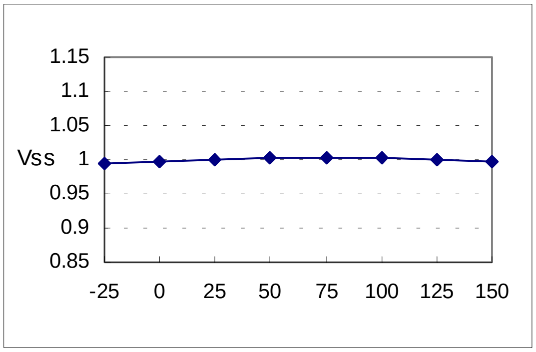


Figure13. Soft Start Voltage

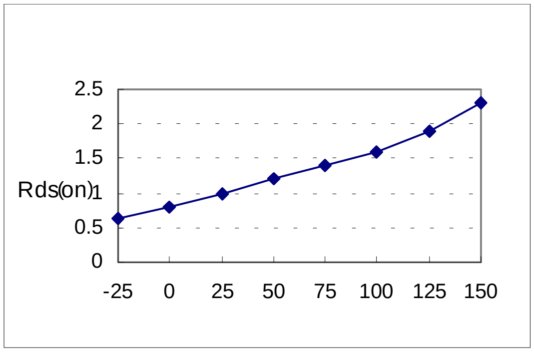
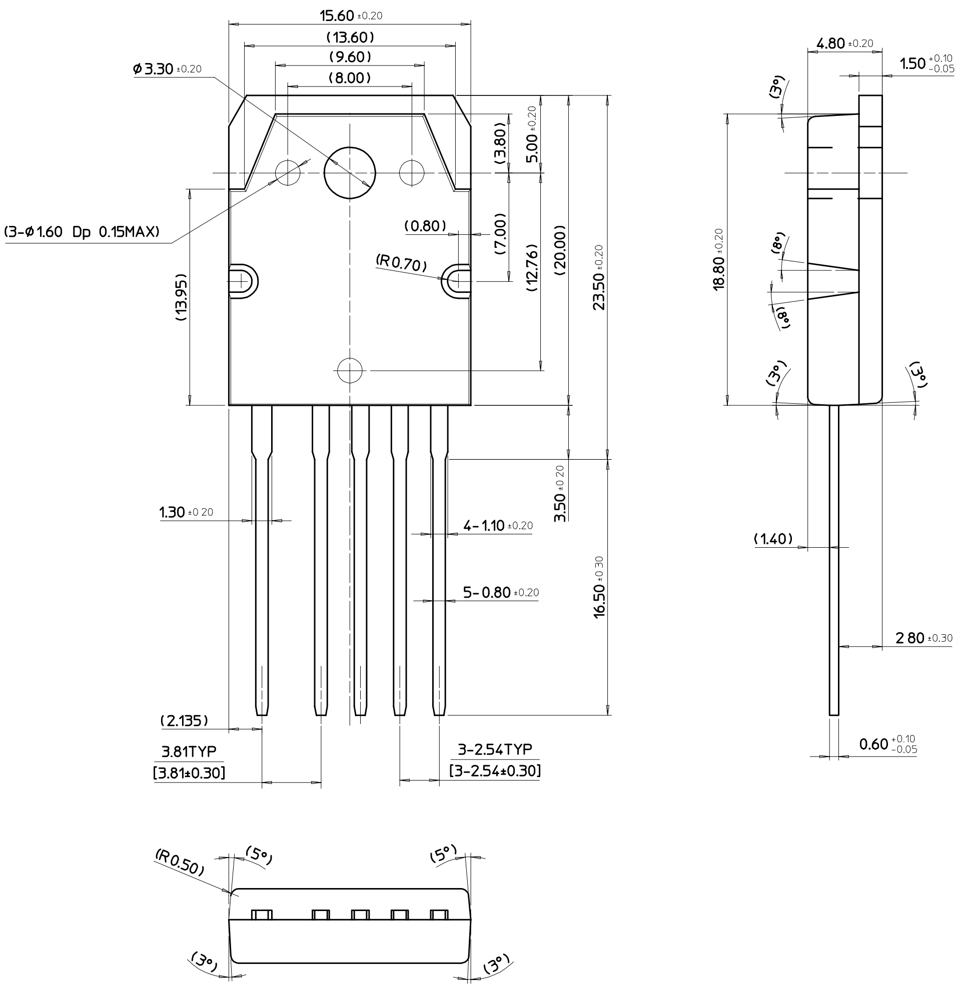


Figure 14. Static Drain-Source on Resistance

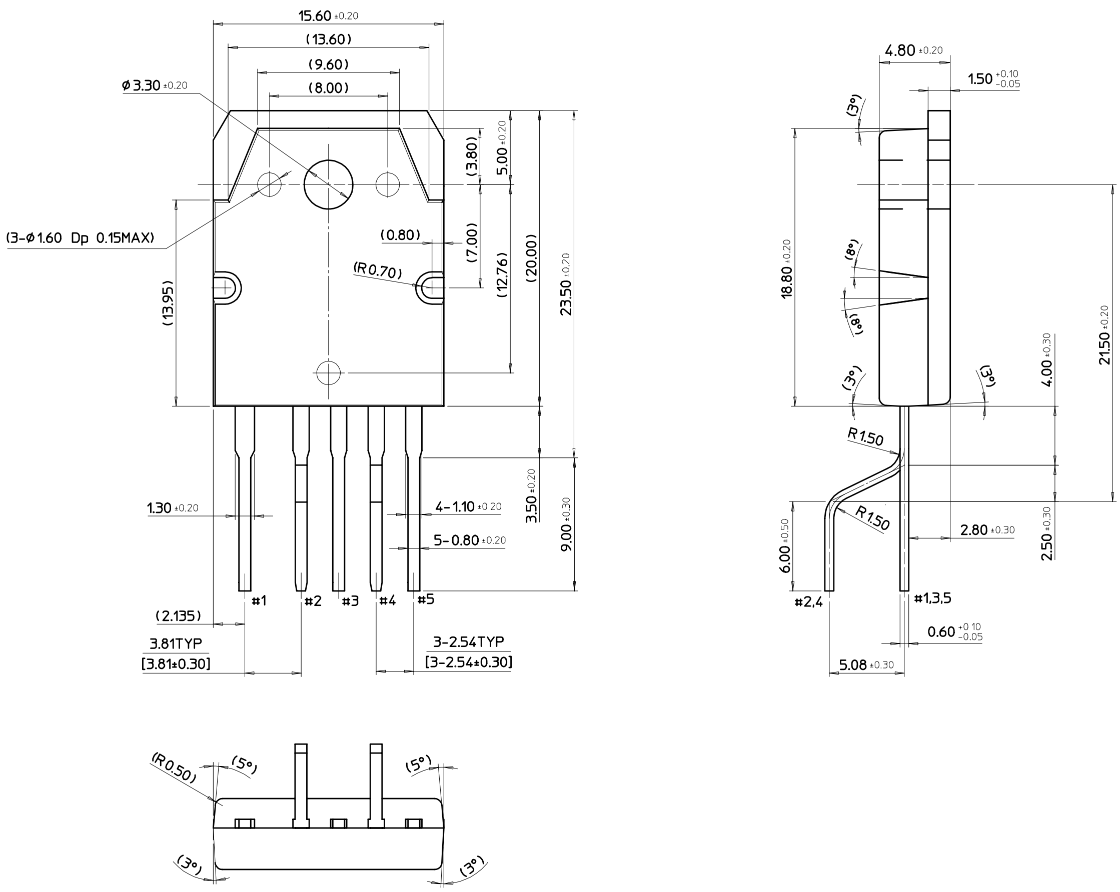
Package Dimensions

TO-3P-5L



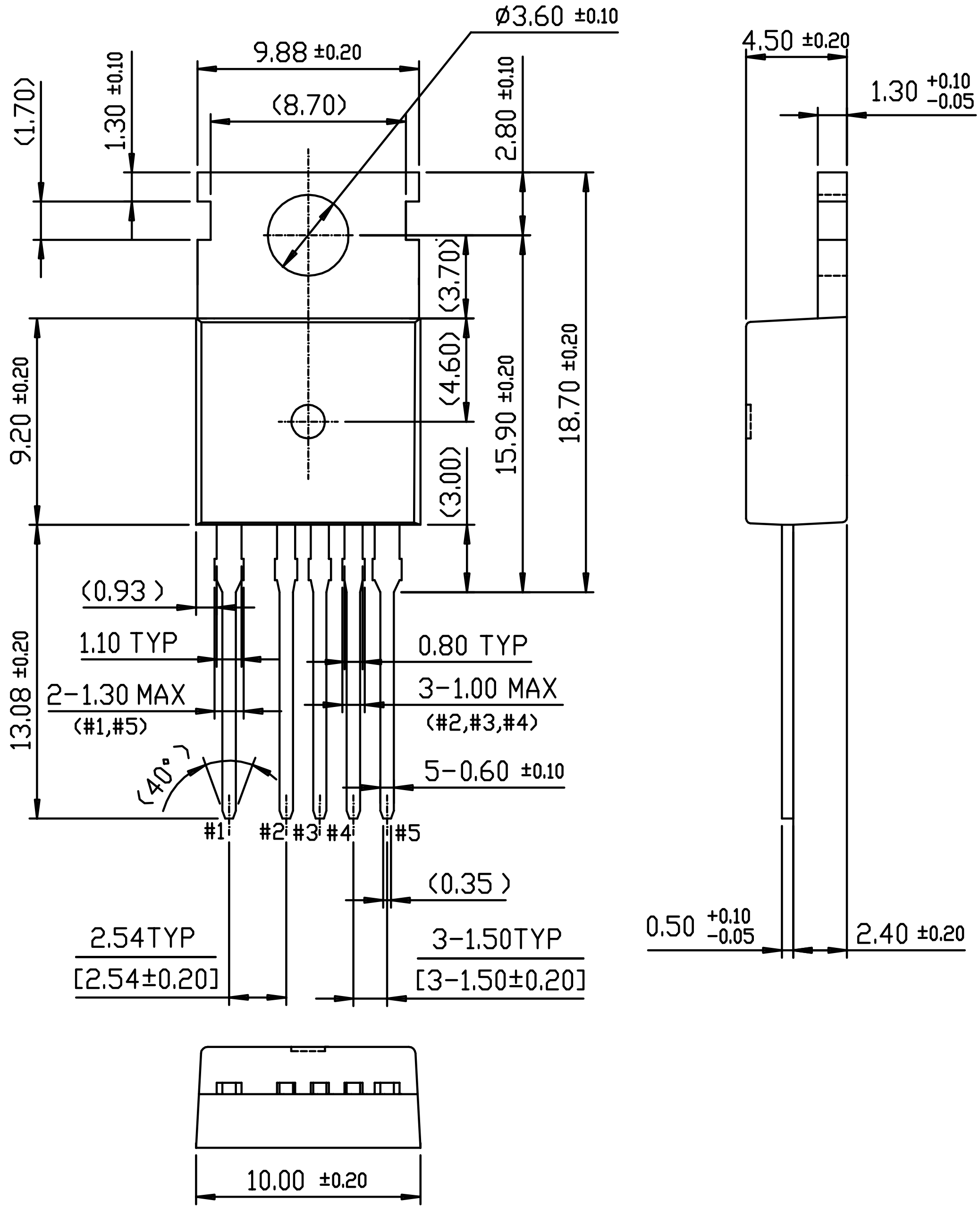
Package Dimensions (Continued)

TO-3P-5L (Forming)



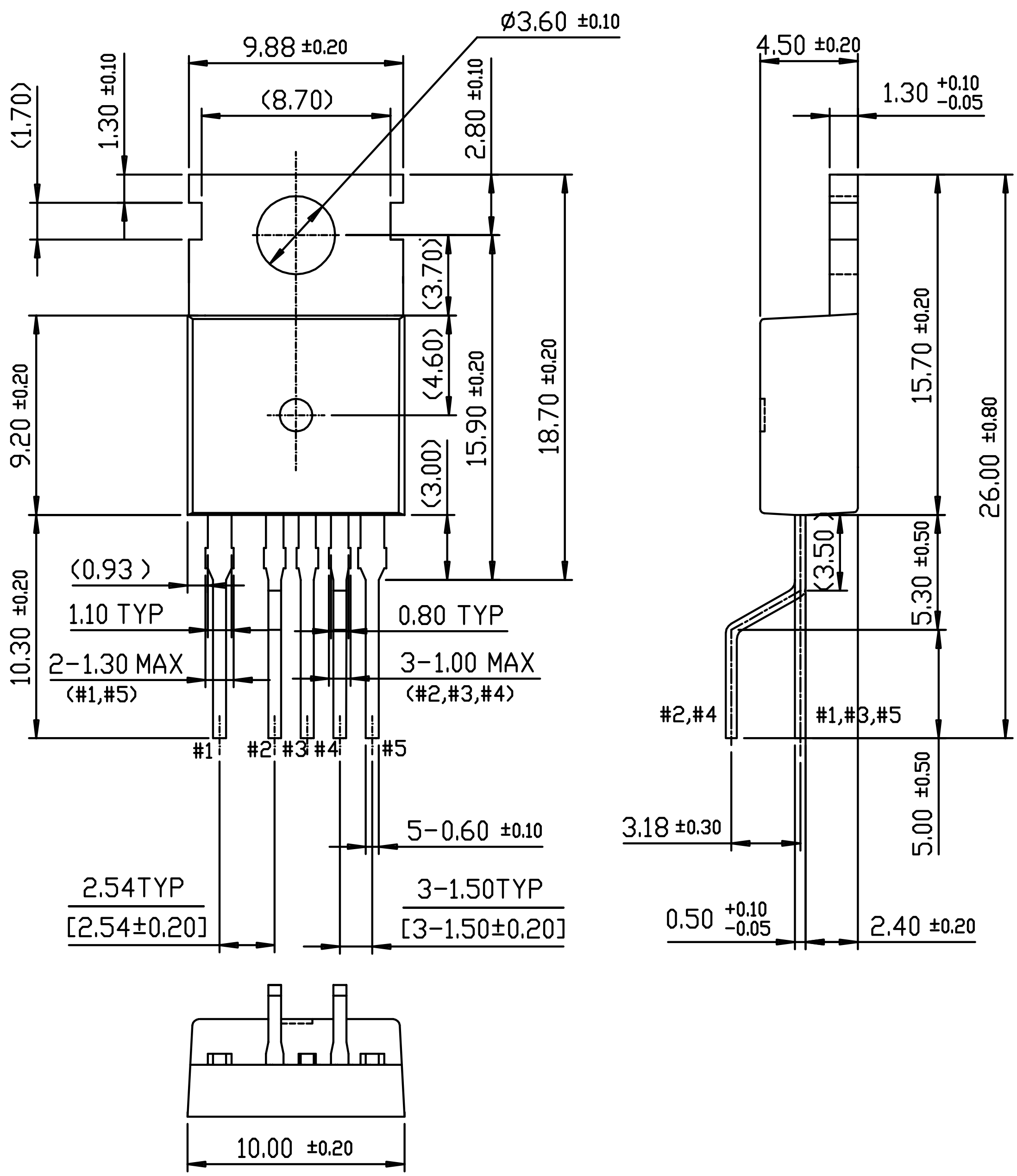
Package Dimensions (Continued)

TO-220-5L



Package Dimensions (Continued)

TO-220-5L(Forming)



Ordering Information

Product Number	Package	Rating	Fosc
KA1M0765R-TU	TO-3P-5L	650V, 7A	67kHz
KA1M0765R-YDTU	TO-3P-5L(Forming)		
KA1M0765RC-TU	TO-220-5L	650V, 7A	67kHz
KA1M0765RC-YDTU	TO-220-5L(Forming)		

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:

1. 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.
2. 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.

10/17/01 0.0m 001
Stock#DSxxxxxxxx
© 2001 Fairchild Semiconductor Corporation