KA3S0880RB/KA3S0880RFB

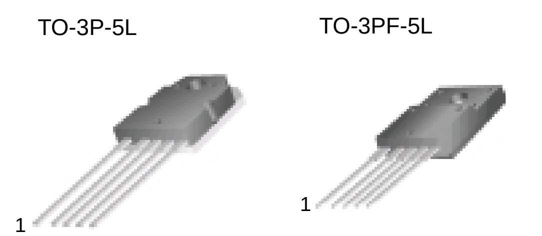
Fairchild Power Switch(SPS)

Features

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

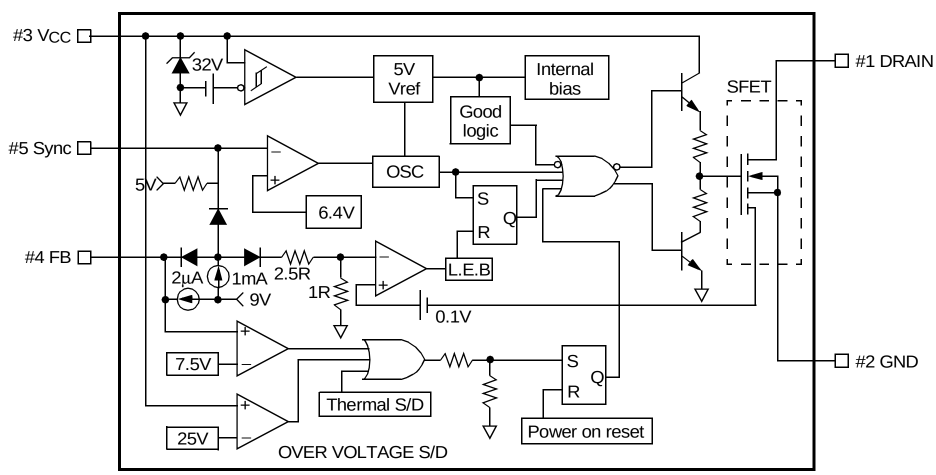
Description

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 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 design in C-TV power supply.



1. DRAIN 2. GND 3. V_{CC} 4. FB 5. Sync

Internal Block Diagram



Rev.1.0.1

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Maximum Drain voltage [1]	$V_{D,MAX}$	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	A_{DC}
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	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	190	W
	Derating	1.54	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, starting Tj=25°C
4. L=13µH, starting Tj=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)	gfs	V_{DS}=15V, I_D=5.0A	1.5	2.5	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	2460	-	pF
Output capacitance	Coss		-	210	-	
Reverse transfer capacitance	Crss		-	64	-	
Turn on delay time	td(on)	V_{DD}=0.5BV_{DSS}, I_D=8.0A (MOSFET switching time are essentially independent of operating temperature)	-	-	90	nS
Rise time	tr		-	95	200	
Turn off delay time	td(off)		-	150	450	
Fall time	tf		-	60	150	
Total gate charge (gate-source+gate-drain)	Qg	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	Qgs		-	20	-	
Gate-drain (Miller) charge	Qgd		-	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
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	18	20	22	kHz
Frequency change with temperature (2)	$\Delta F/\Delta T$	–25°C≤Ta≤+85°C	-	±5	±10	%
Maximum duty cycle	Dmax	-	92	95	98	%
FEEDBACK SECTION						
Feedback source current	I_{FB}	Ta=25°C, Vfb=GND	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}	1.4	1.8	2.2	μA
SYNC. & 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
Sync threshold voltage (3)	V_{SYTH}	Vfb=5V	6.0	6.4	6.8	V
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	0.55	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

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 Ta=25°C)

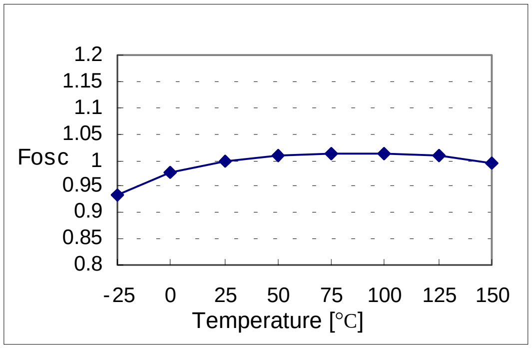


Figure 1. Operating Frequency

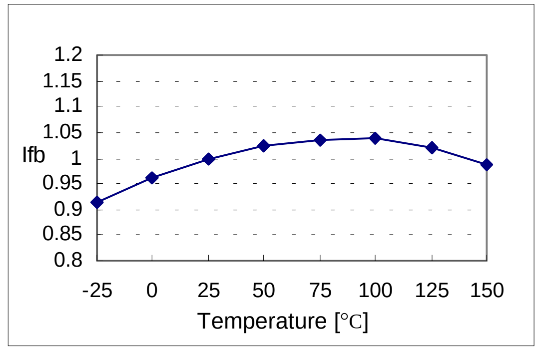


Figure 2. Feedback Source Current

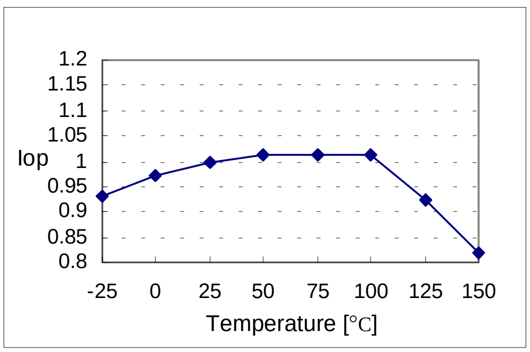


Figure 3. Operating Supply Current

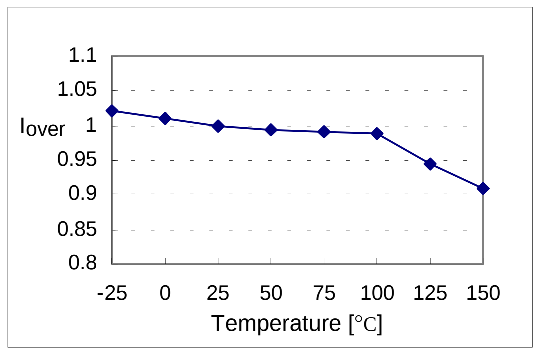


Figure 4. Peak Current Limit

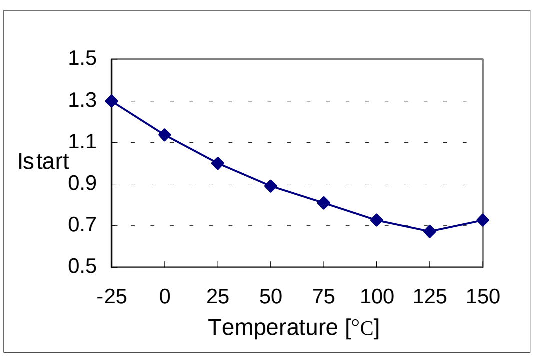


Figure 5. Start up Current

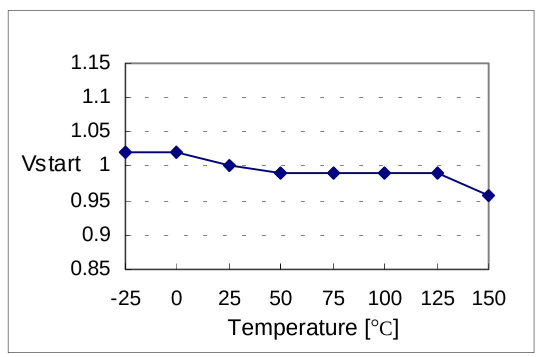


Figure 6. Start Threshold Voltage

Typical Performance Characteristics (Continued)

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

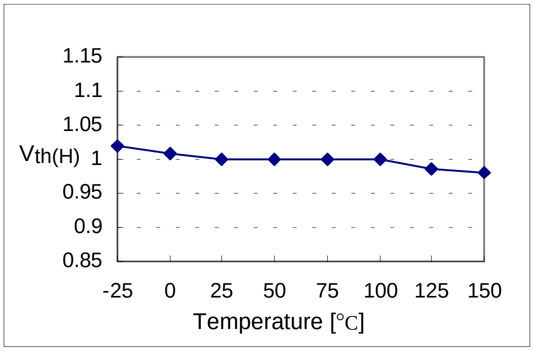


Figure 7. Stop Threshold Voltage

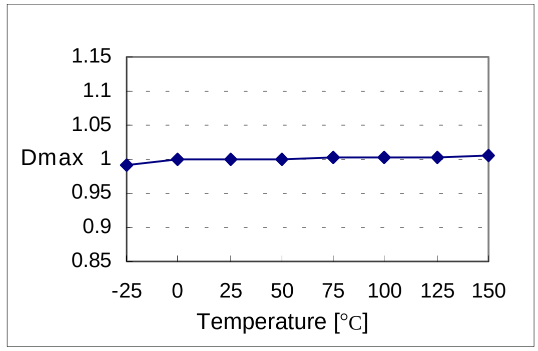


Figure 8. Maximum Duty Cycle

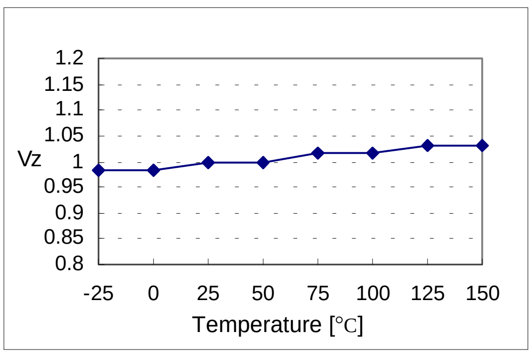


Figure 9. V_{CC} Zener Voltage

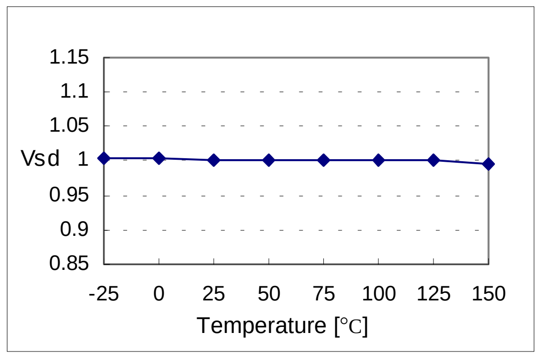


Figure 10. Shutdown Feedback Voltage

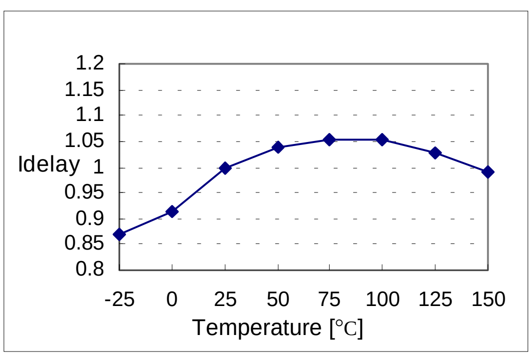


Figure 11. Shutdown Delay Current

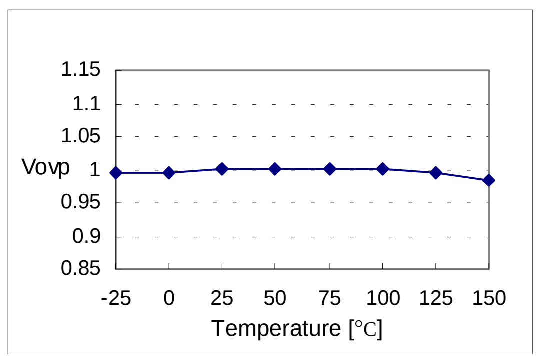


Figure 12. Over Voltage Protection

Typical Performance Characteristics (Continued)

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

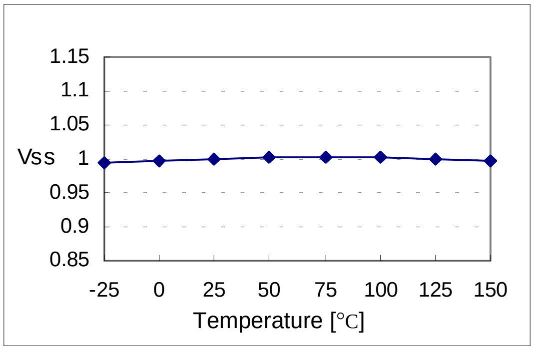


Figure 13. Soft Start Voltage

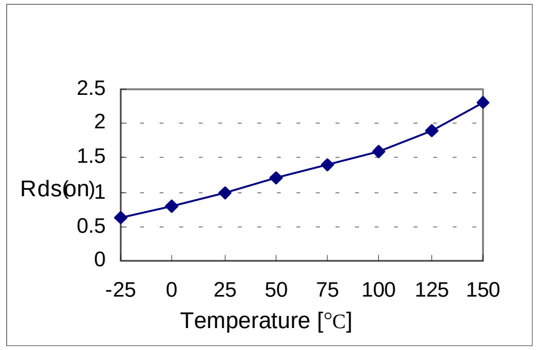
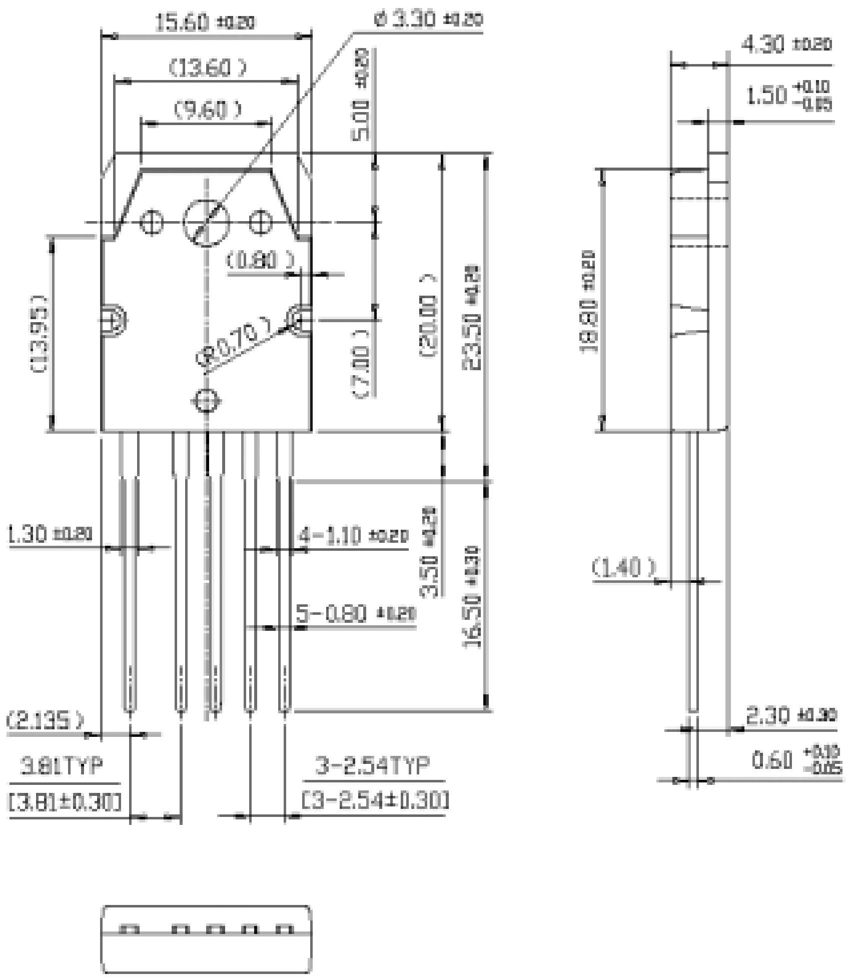


Figure 14. Static Drain-Source on Resistance

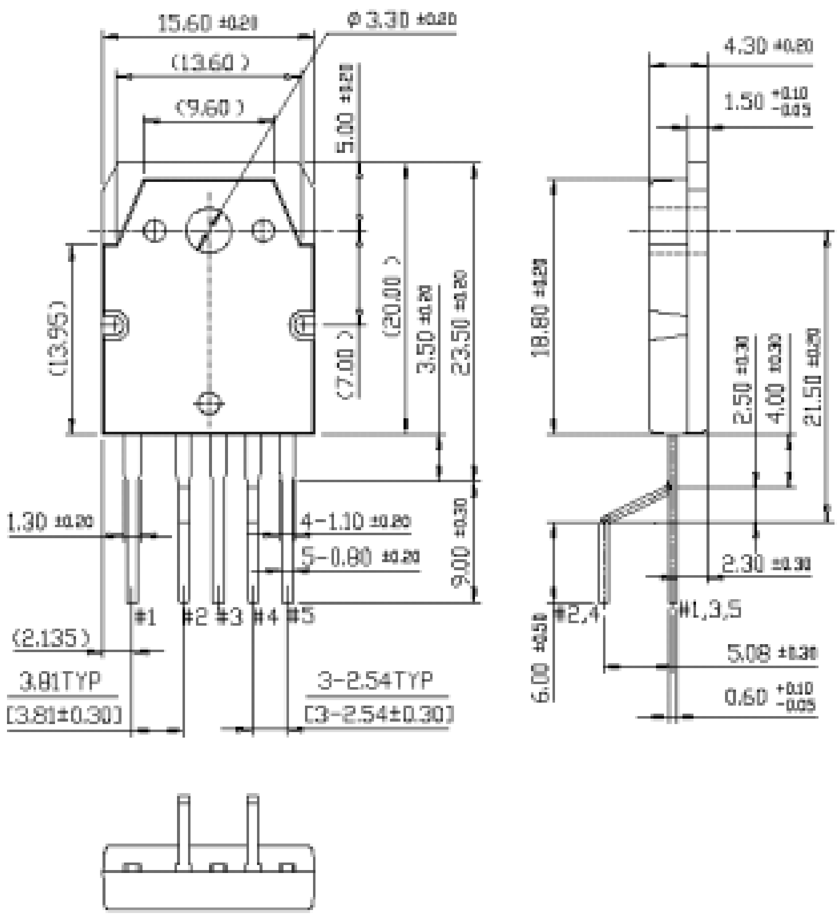
Package Dimensions

TO-3P-5L



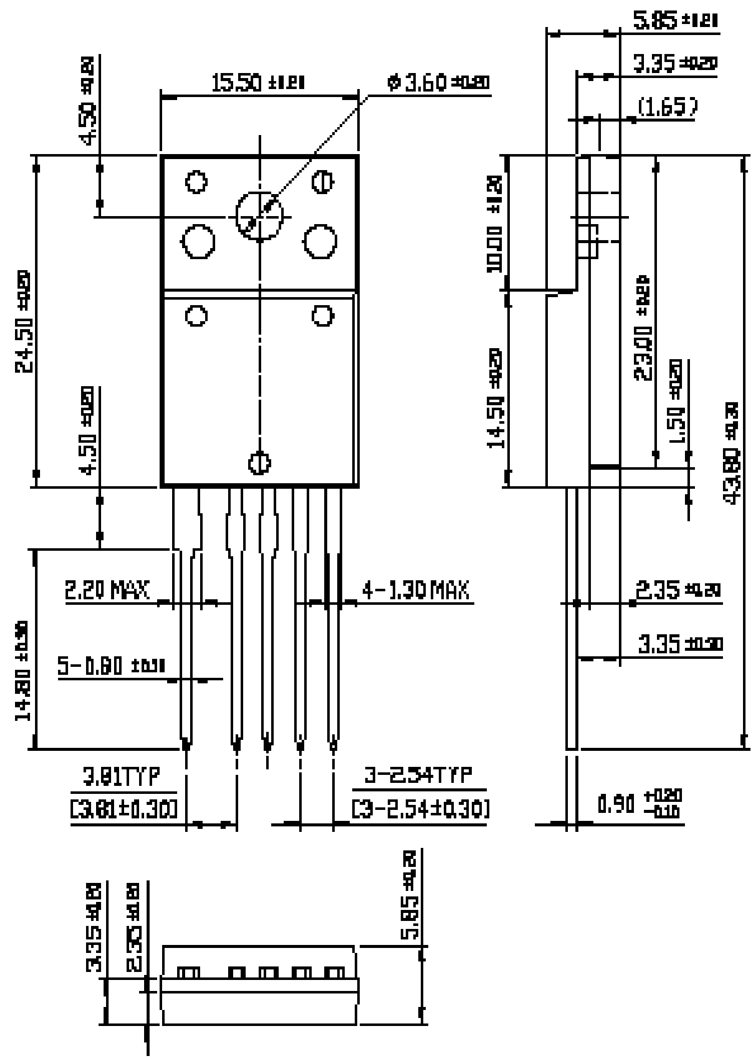
Package Dimensions (Continued)

TO-3P-5L (Forming)



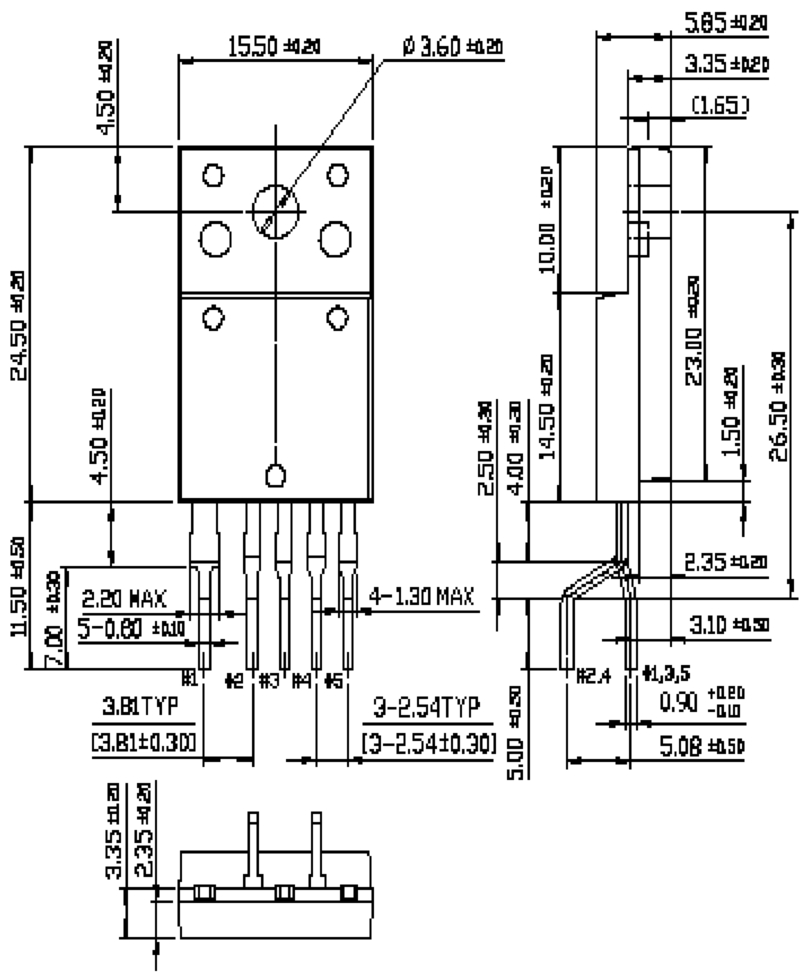
Package Dimensions

TO-3PF-5L



Package Dimensions (Continued)

TO-3PF-5L (Forming)



Ordering Information

Product Number	Package	Topr (°C)
KA3S0880RB-TU	TO-3P-5L	–25°C to +85°C
KA3S0880RB-YDTU	TO-3P-5L(Forming)	
KA3S0880RFB-TU	TO-3PF-5L	–25°C to +85°C
KA3S0880RFB-YDTU	TO-3PF-5L(Forming)	

TU : Non Forming Type
YDTU : Forming Type

2/5/01 0.0m 001
Stock#DSxxxxxxxx