



KA5P0680C

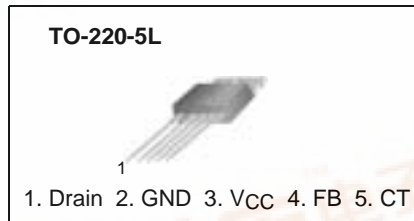
Fairchild Power Switch(FPS)

Features

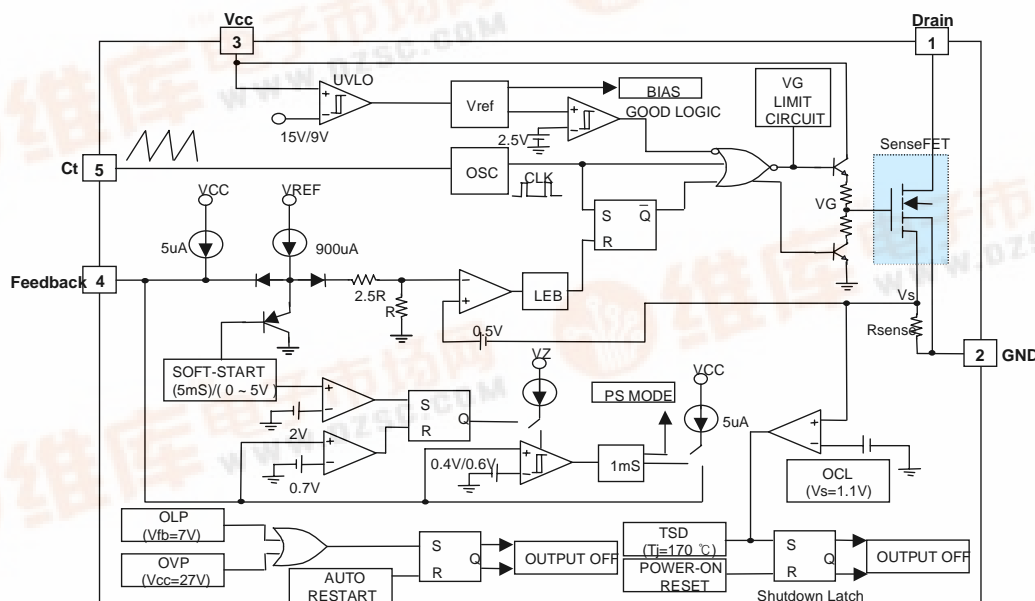
- Adjustable Switching Frequency
- Intelligent Power Saving Mode
- Pulse by Pulse Current Limiting
- Over Current Latch Protection
- Over Voltage Protection
- Internal Thermal Shutdown Function
- Built-in Soft Start Function
- Internal High Voltage Sense FET
- Auto-Restart Mode

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) consist of high voltage power SenseFET and current mode PWM IC. Included 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, and temperature compensated precision current sources for loop compensation and fault protection circuitry. compared to discrete MOSFET and controller or RCC switching converter solution, a Fairchild Power Switch(FPS) can reduce 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 cost effective design in PC SMPS with Power Saving function.



Internal Block Diagram



Absolute Maximum Ratings

(Ta=25°C, unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|-----------------------------------------------|---------|-------------|------|
| Drain-Gate Voltage (RGS=1MΩ) | VDGR | 800 | V |
| Gate-Source (GND) Voltage | VGS | ±30 | V |
| Drain Current Pulsed ⁽²⁾ | IDM | 24.0 | ADC |
| Single Pulsed Avalanche Energy ⁽³⁾ | EAS | 455 | mJ |
| Avalanche Current ⁽⁴⁾ | IAS | 27 | A |
| Continuous Drain Current (TC=25°C) | ID | 6.0 | ADC |
| Continuous Drain Current (TC=100°C) | ID | 4.0 | ADC |
| Maximum Supply Voltage | VCC,MAX | 30 | V |
| Input Voltage Range | VFB | -0.3 to 7V | V |
| Total Power Dissipation | PD | 150 | W |
| | Darting | 1.21 | W/°C |
| Operating Ambient Temperature | TA | -25 to +85 | °C |
| Storage Temperature | TSTG | -55 to +150 | °C |

Note:

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 | BVDSS | VGS=0V, ID=50μA | 800 | - | - | V |
| Zero Gate Voltage Drain Current | IDSS | VDS=Max., Rating, VGS=0V | - | - | 50 | μA |
| | | VDS=0.8Max., Rating, VGS=0V, TC=125°C | - | - | 200 | μA |
| Static Drain-Source on Resistance ^(Note) | RDS(ON) | VGS=10V, ID=4.0A | - | 1.6 | 2.0 | Ω |
| Forward Transconductance ^(Note) | gfs | VDS=15V, ID=4.0A | 1.5 | 2.5 | - | S |
| Input Capacitance | Ciss | VGS=0V, VDS=25V, f=1MHz | - | 1600 | - | pF |
| Output Capacitance | Coss | | - | 140 | - | |
| Reverse Transfer Capacitance | Crss | | - | 42 | - | |
| Turn on Delay Time | td(on) | VDD=0.5BVDSS, ID=7.0A (MOSFET switching time are essentially independent of operating temperature) | - | 60 | - | nS |
| Rise Time | tr | | - | 150 | - | |
| Turn Off Delay Time | td(off) | | - | 300 | - | |
| Fall Time | tf | | - | 130 | - | |
| Total Gate Charge (Gate-Source+Gate-Drain) | Qg | VGS=10V, ID=7.0A, VDS=0.5BVDSS (MOSFET switching time are essentially independent of operating temperature) | - | 70 | - | nC |
| Gate-Source Charge | Qgs | | - | 16 | - | |
| Gate-Drain (Miller) Charge | Qgd | | - | 27 | - | |

Note:

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

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

Electrical Characteristics (Control Part) (Continued)

(Ta=25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|------------------------------------------------|--------------------|-----------------------|------|------|------|------|
| UVLO SECTION | | | | | | |
| Start Threshold Voltage | VSTART | - | 14 | 15 | 16 | V |
| Min. Operating Voltage After Turn On | VSTOP | - | 8.4 | 9 | 9.6 | V |
| OSCILLATOR SECTION | | | | | | |
| Initial Frequency | FOSC | CT=2n | 61 | 67 | 73 | kHz |
| Temperature Stability (Note 1) | ΔFOSC | -25°C ≤ Ta ≤ 85°C | 0 | ±5 | ±10 | % |
| Maximum Duty Cycle | DMAX | RT=21kΩ | 85 | 88 | 91 | % |
| Offset Voltage | Voffset | - | 0.5 | 0.55 | 0.6 | % |
| FEEDBACK SECTION | | | | | | |
| Feedback Source Current | IFB | Vsc = 0V | 0.9 | 1.1 | 1.3 | mA |
| Shutdown Feedback Voltage | Vsd | Vfb ≥ 6V | 6.3 | 6.9 | 7.5 | V |
| Shutdown Delay Current | IDELAY | 4V ≤ Vfb ≤ Vsd | 4 | 5 | 6 | μA |
| CURRENT LIMIT (SELF-PROTECTION) SECTION | | | | | | |
| Peak Current Limit | I _{OVER} | Max. inductor current | 3.52 | 4 | 4.48 | A |
| PROTECTION SECTION | | | | | | |
| Over Voltage Protection | VOVP | Vcc ≥ 22V | 25 | 27 | 29 | V |
| Thermal Shutdown Temp. | TSD | - | 150 | 170 | - | °C |
| POWER-SAVING MODE SECTION | | | | | | |
| Power Saving Mode Feedback Volt. | V _{F(PS)} | VCC=16V | 0.3 | 0.4 | 0.5 | V |
| Power Saving Reset Feedback Volt. | V _{F(RE)} | VCC=16V | 0.5 | 0.6 | 0.7 | V |
| Power Saving Current | I _{PS} | VCC=16V | - | 0.3 | 0.4 | mA |
| Power Saving Mode Fb Current | I _{pfb} | VCC=16V | 3 | 4 | 5 | uA |
| TOTAL DEVICE SECTION | | | | | | |
| Start Up Current | I _{start} | Vcc=14V | - | 0.1 | 0.2 | mA |
| Operating Supply Current | I _{OP} | Vcc ≤ 28V | - | 10 | 18 | mA |

Note:

1. These parameters, although guaranteed, are not 100% tested in production

Typical Performance Characteristics

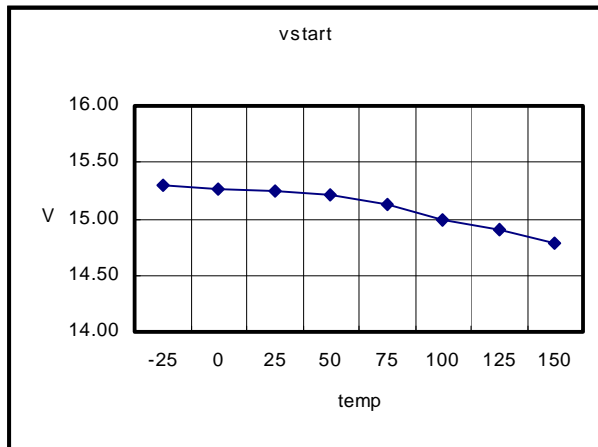


Figure 1. Start Threshold Voltage

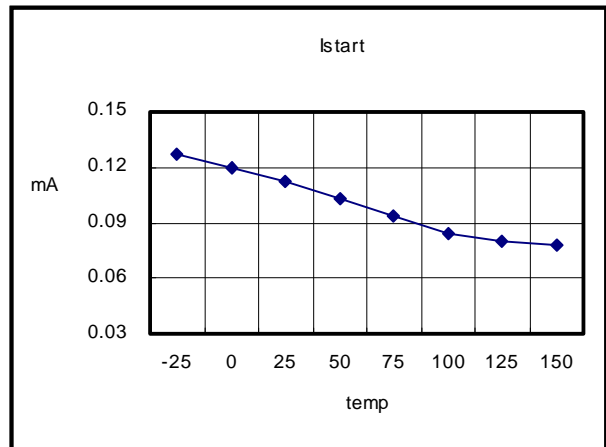


Figure 2. Stop Threshold Voltage

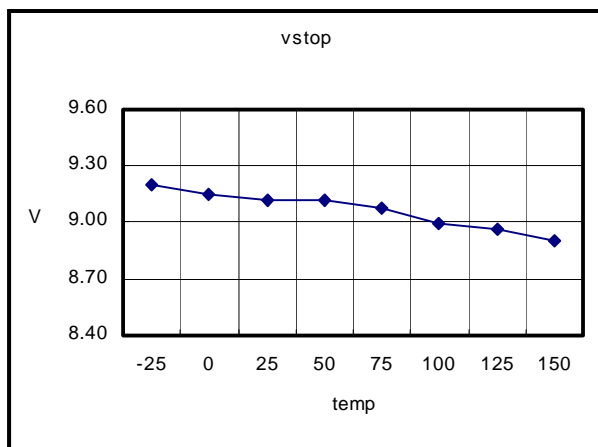


Figure 3. Start Up Current

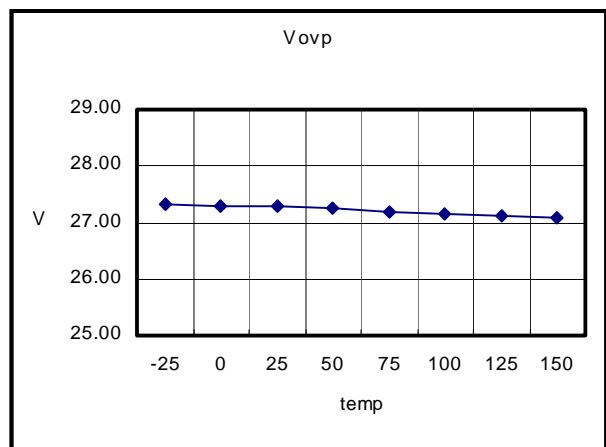


Figure 4. Over Voltage Protection

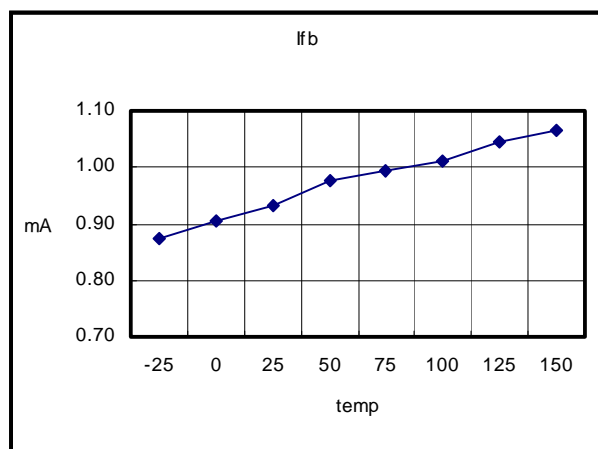


Figure 5. Feedback Source Current

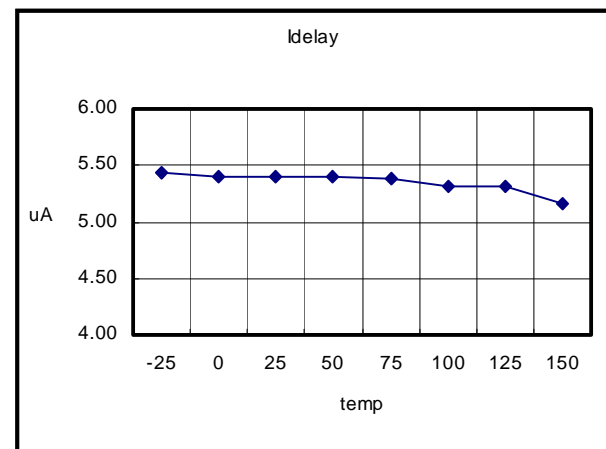


Figure 6. Shutdown Delay Current

Typical Performance Characteristics (Continued)

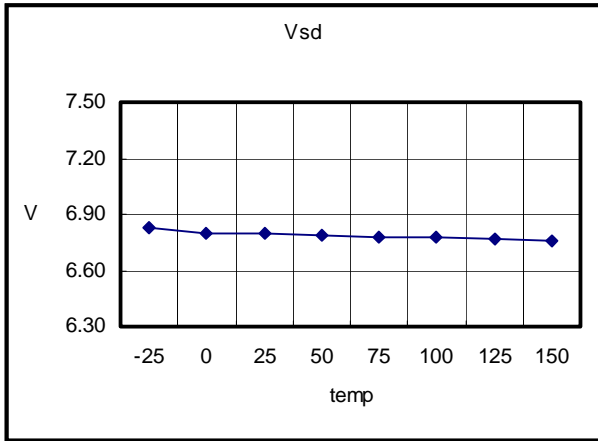


Figure 7. Shutdown Feedback Voltage

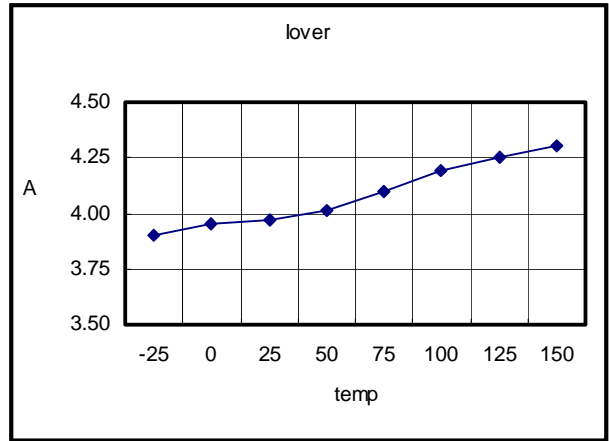


Figure 9. Peak Current Limit

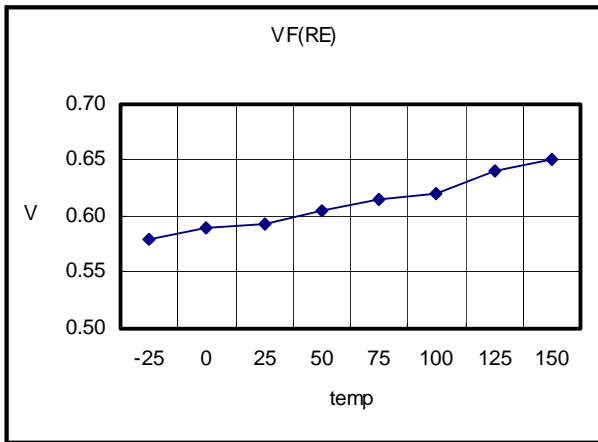


Figure 9. Power-Saving Reset Feedback Voltage

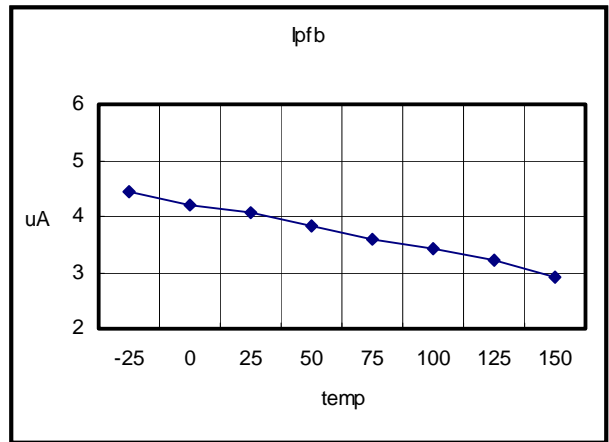


Figure 10. Power-Saving Mode Feedback Current

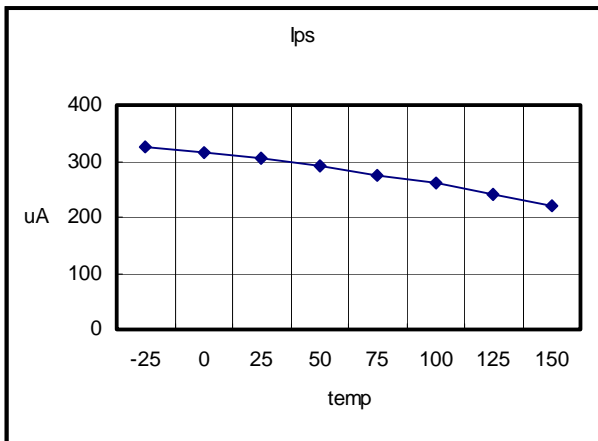


Figure 11. Power-Saving Current

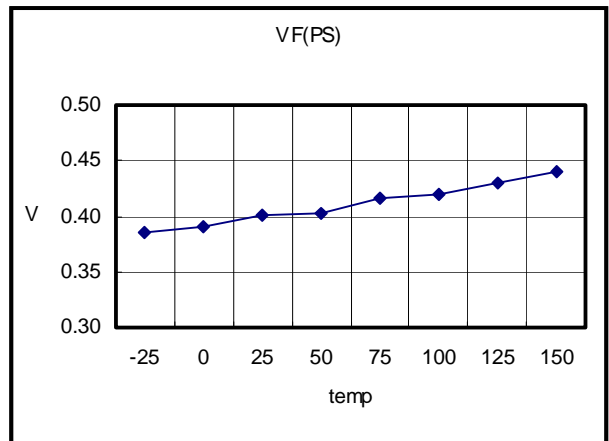


Figure 12. Power-Saving Mode Feedback Voltage

Typical Performance Characteristics (Continued)

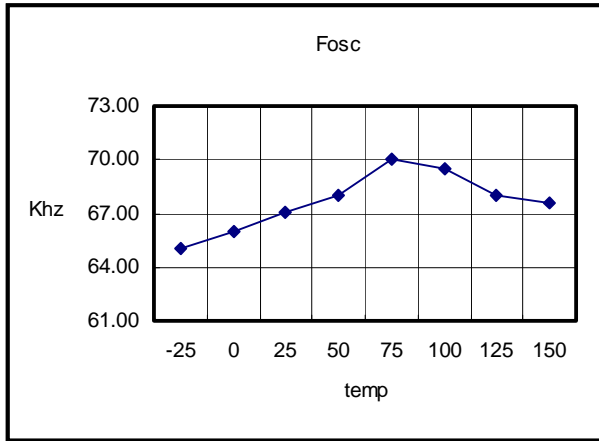


Figure 13. Operating Frequency

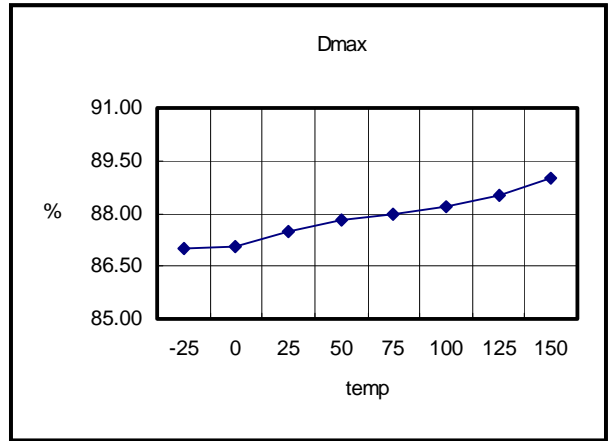
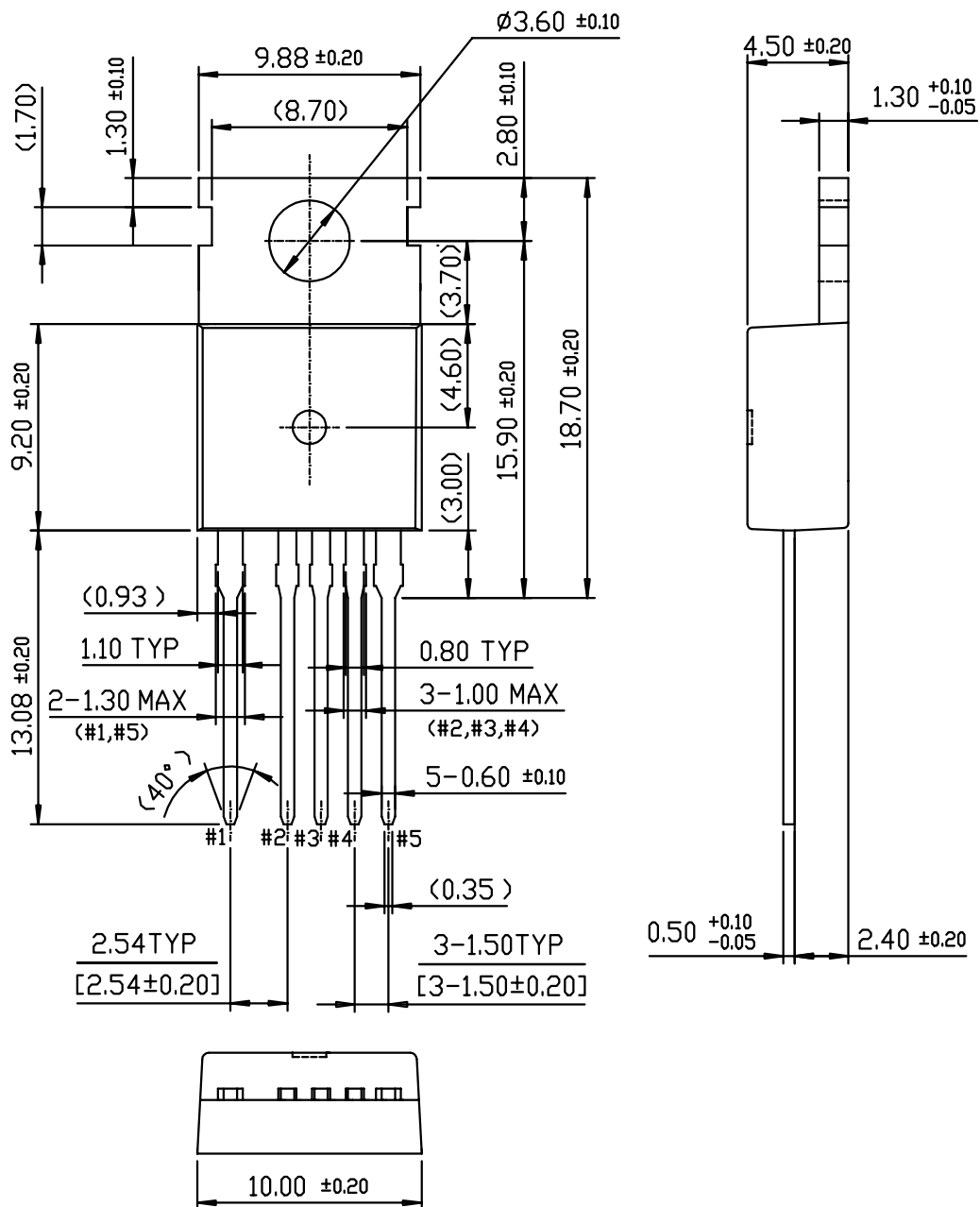


Figure 14. Maximum Duty Cycle

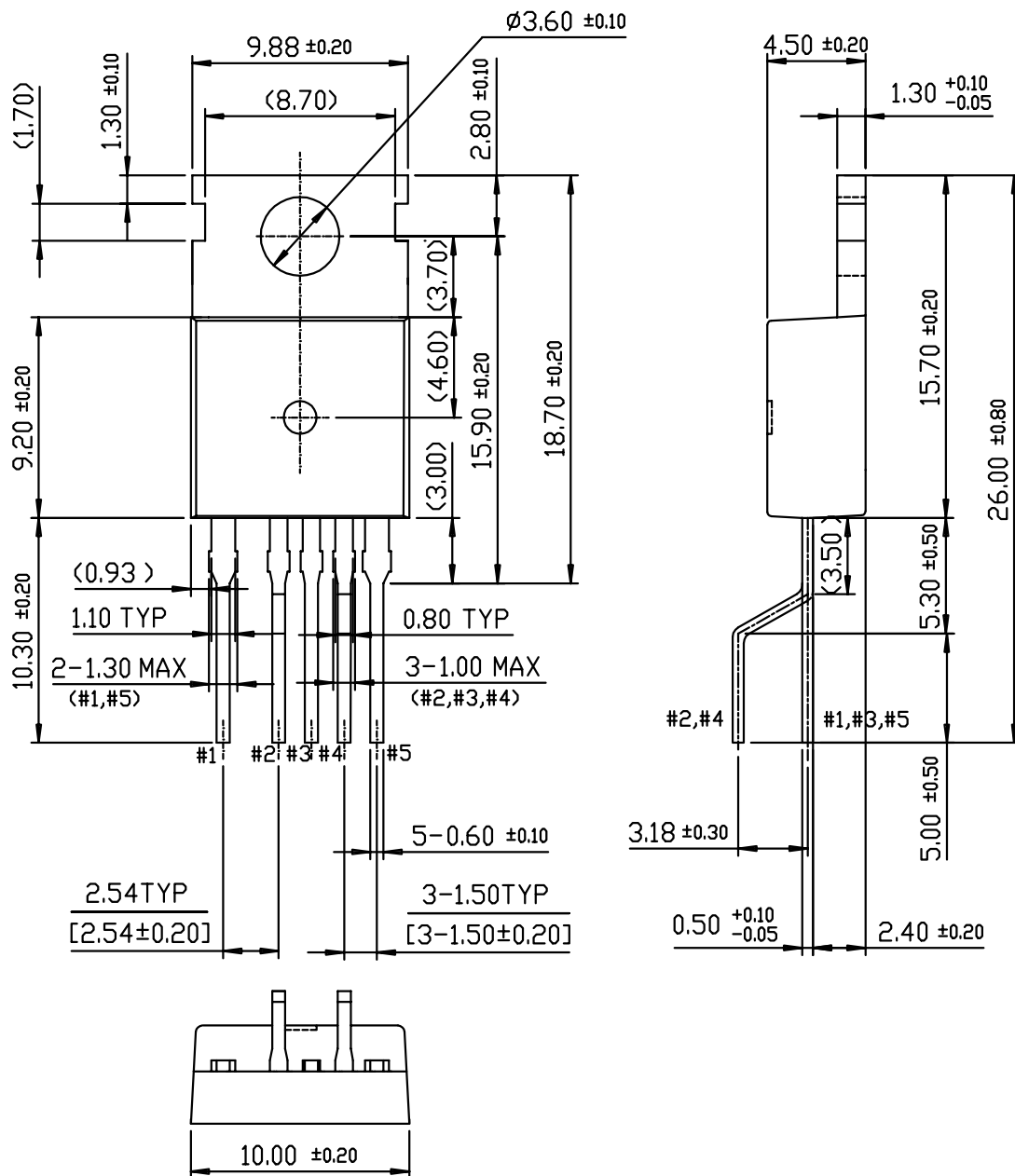
Package Dimensions

TO-220-5L



Package Dimensions (Continued)

TO-220-5L(Forming)



Ordering Information

| Product Number | Package | Rating | Topr (°C) |
|----------------|--------------------|----------|----------------|
| KA5P0680CTU | TO-220-5L | 800V, 6A | -25°C to +85°C |
| KA5P0680CYDTU | TO-220-5L(Forming) | | |

TU : Non Forming Type

YDTU : Forming Type

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