

FAN8700

Camera Motor Drive and Control IC

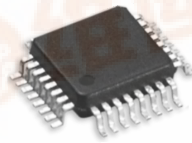
Features

- Built-in DC Motor Driver
: For Film Winding & Zooming
- Voltage Controlled Stepping Motor Driver
- Built-in AE Meter Driver
- Built-in IRED Driver For Auto-Focus
- Low Drop out Regulator(5V/3V)
- Built-in step-up DC/DC Converter Controller

Description

The FAN8700 is a monolithic integrated circuit, and suitable for the motor driver (AE, AF, zoom and reel motor driver) and the controller (IRED driver, supply , step-up converter control, etc.) in camera systems.

32-LQFP-0707



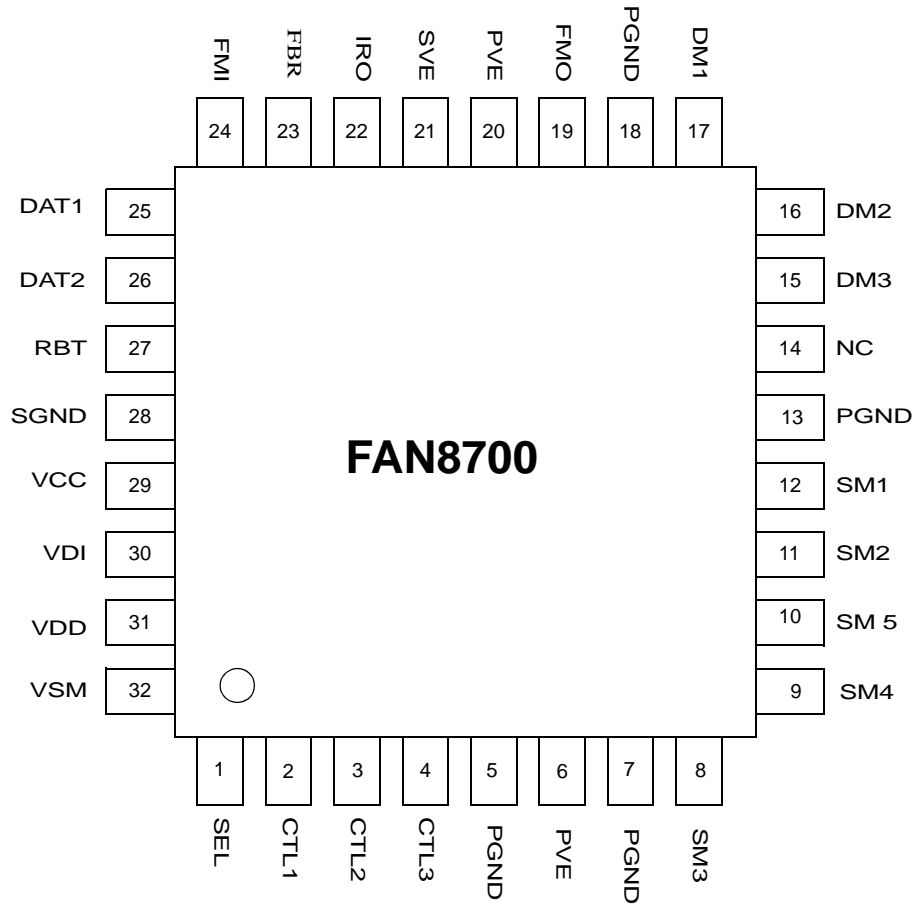
Typical Applications

- Camera system

Ordering Information

| Device | Package | Operating Temp. |
|---------|--------------|-----------------|
| FAN8700 | 32-LQFP-0707 | -20°C ~ +60°C |

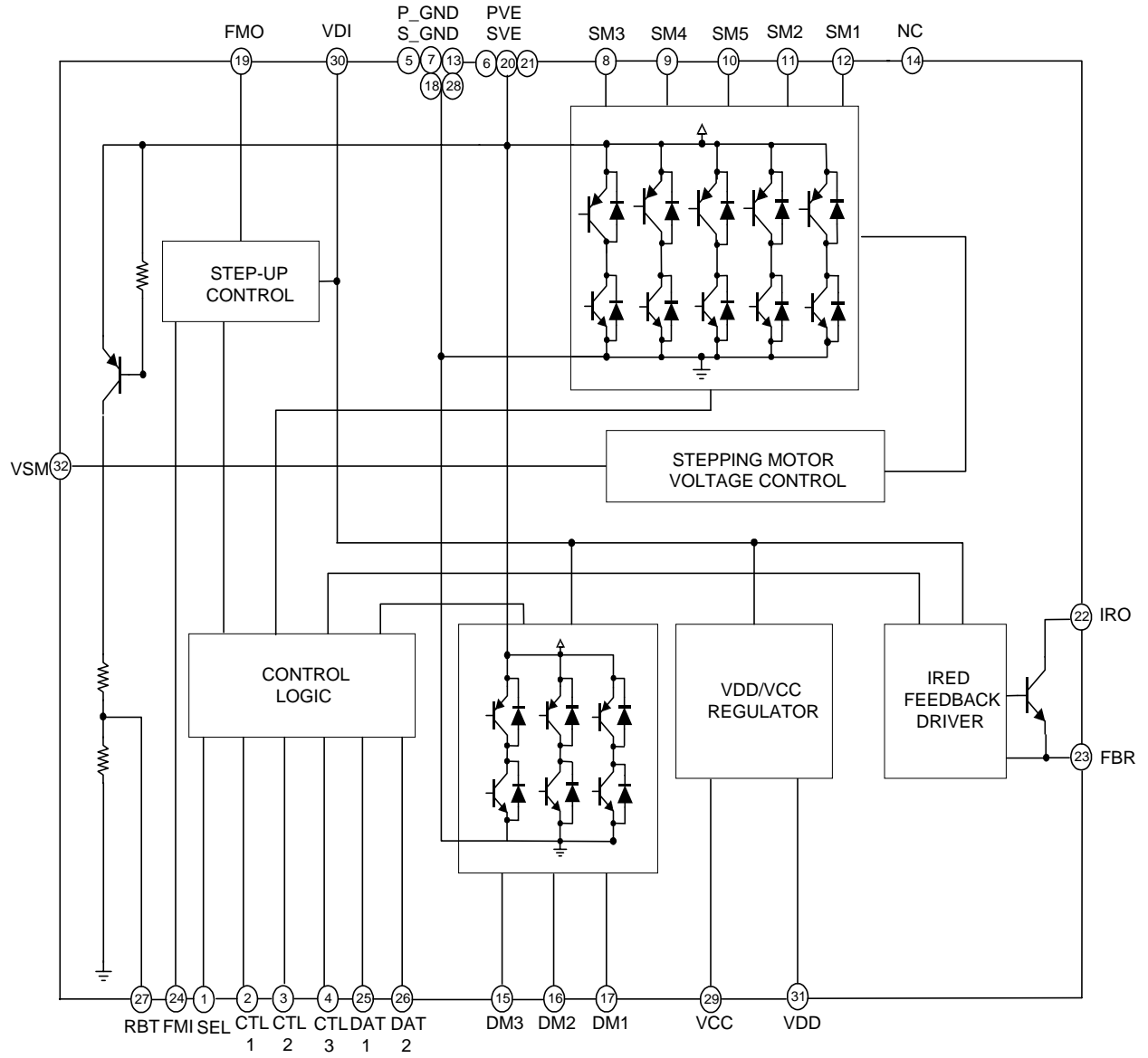
Pin Assignments



Pin Definitions

| Pin Number | Pin Name | Pin Function Description |
|------------|----------|---|
| 1 | SEL | IC Enable Input |
| 2 | CTL1 | Operating Mode Control Input1 |
| 3 | CTL2 | Operating Mode Control Input2 |
| 4 | CTL3 | Operating Mode Control Input3 |
| 5 | PGND | Power Ground |
| 6 | PVE | Power VE |
| 7 | PGND | Power Ground |
| 8 | SM3 | Stepping Motor Output3 |
| 9 | SM4 | Stepping Motor Output4 /AE Meter Output |
| 10 | SM5 | Stepping Motor Output5 /AE Meter Output |
| 11 | SM2 | Stepping Motor Output2 |
| 12 | SM1 | Stepping Motor Output1 |
| 13 | PGND | Power Ground |
| 14 | NC | No Connection |
| 15 | DM3 | DC Motor Output 3 |
| 16 | DM2 | DC Motor Output 2 |
| 17 | DM1 | DC Motor Output 1 |
| 18 | PGND | Power Ground |
| 19 | FMO | Step-up Converter Switching Output |
| 20 | PVE | Power VE |
| 21 | SVE | Signal VE |
| 22 | IRO | IRED drive output |
| 23 | FBR | IRED Drive Current Setting Input |
| 24 | FMI | Step-up converter switching Clock input |
| 25 | DAT1 | Each Mode Output Control Input1 |
| 26 | DAT2 | Each Mode Output Control Input2 |
| 27 | RBT | VE Voltage Divided Output |
| 28 | SGND | Signal Ground |
| 29 | VCC | Low Drop-out Regulator Output |
| 30 | VDI | Setp-up Output Voltage Feedback Input |
| 31 | VDD | Low Drop-out Regulator Output |
| 32 | VSM | Stepping Motor Output Voltage Control Input |

Internal Block Diagram



Equivalent Circuits

| Description | Pin No. | Internal Circuit |
|---|-----------|------------------|
| 1.5-Channel DC Motor Drive Block | | |
| SEL | 1 | |
| CTL1~3 | 2~4 | |
| DAT1~2 | 25,26 | |
| DM1 | 17 | |
| DM2 | 16 | |
| DM3 | 15 | |
| PVE | 6,20 | |
| P_GND | 5,7,13,18 | |
| Step-up Control Block | | |
| SEL | 1 | |
| CTL1~3 | 2~4 | |
| DAT1~2 | 25,26 | |
| SM1 | 12 | |
| SM2 | 11 | |
| SM3 | 8 | |
| SM4 | 9 | |
| SM5 | 10 | |
| P_GND | 5,7,13,18 | |
| IRED Drive Block | | |
| SEL | 1 | |
| CTL1~3 | 2~4 | |
| DAT1~2 | 25,26 | |
| IRO | 22 | |
| FBR | 23 | |

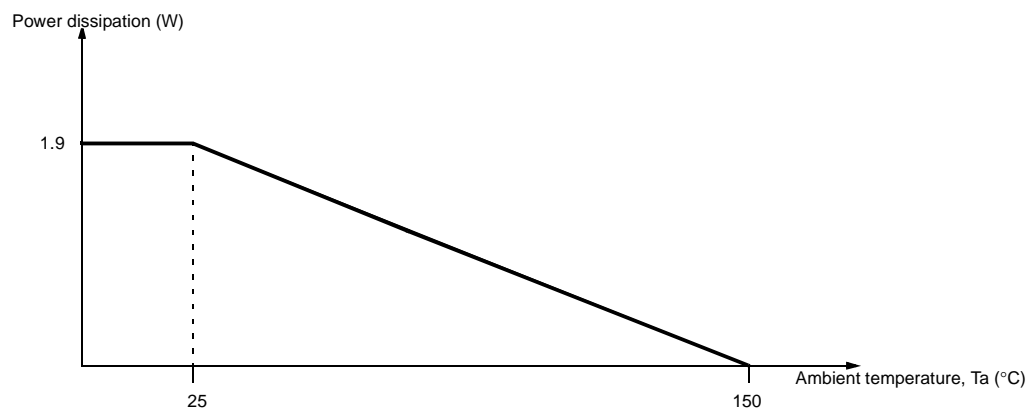
Equivalent Circuits (Continued)

| Description | Pin No. | Internal Circuit |
|-----------------------|--------------|------------------|
| Step-up Control Block | | |
| SEL | 1 | |
| FMI | 24 | |
| VDI | 30 | |
| FMO | 19 | |
| P_GND | 5, 7, 13, 18 | |
| Regulator Block | | |
| SEL | 1 | |
| VCC | 29 | |
| VDD | 31 | |
| P_GND | 5, 7, 13, 18 | |
| RBT Block | | |
| SEL | 1 | |
| RBT | 27 | |
| P_GND | 5, 7, 13, 18 | |

Absolute Maximum Ratings (Ta=25°C)

| Parameter | Symbol | Value | Unit | Remark |
|-------------------------------|--------------|------------|------|---------------|
| Supply voltage | VE | 4.5 | V | - |
| VCC output current | IVCC | 50 | mA | - |
| VDD output current | IVDD | 80 | mA | - |
| Stepping motor output current | ISM1,2,3,4,5 | 500 | mA | - |
| DC motor output current | IDM | 2000 | mA | 500ms |
| IRED output current | IRED | 2000 | mA | (3000mA/10mS) |
| Output terminal voltage | VOUT | 5.5 | V | 500us |
| Input terminal voltage | VIN | 5.5 | V | - |
| Power dissipation | PD | 1.9 | W | - |
| Thermal resistance | Rja | 65 | °C/W | - |
| Operating temperature range | TOPR | -20 ~ +60 | °C | - |
| Storage temperature range | TSTG | -55 ~ +125 | °C | - |

Power Dissipation Curve



Note:

1. PCB Information (Ref. EIA/JSED51-3 and EIA/JSED51-7)
2. Board Layer : 1 Layer
3. Board Thickness : 1.6mm
4. Board Dimension : 76.2 X 114.3 mm

Recommended Operating Conditions (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|--------------------------|--------|------|------|------|------|
| Operating supply voltage | VE | 2.0 | - | 4.0 | V |

Electrical Characteristics

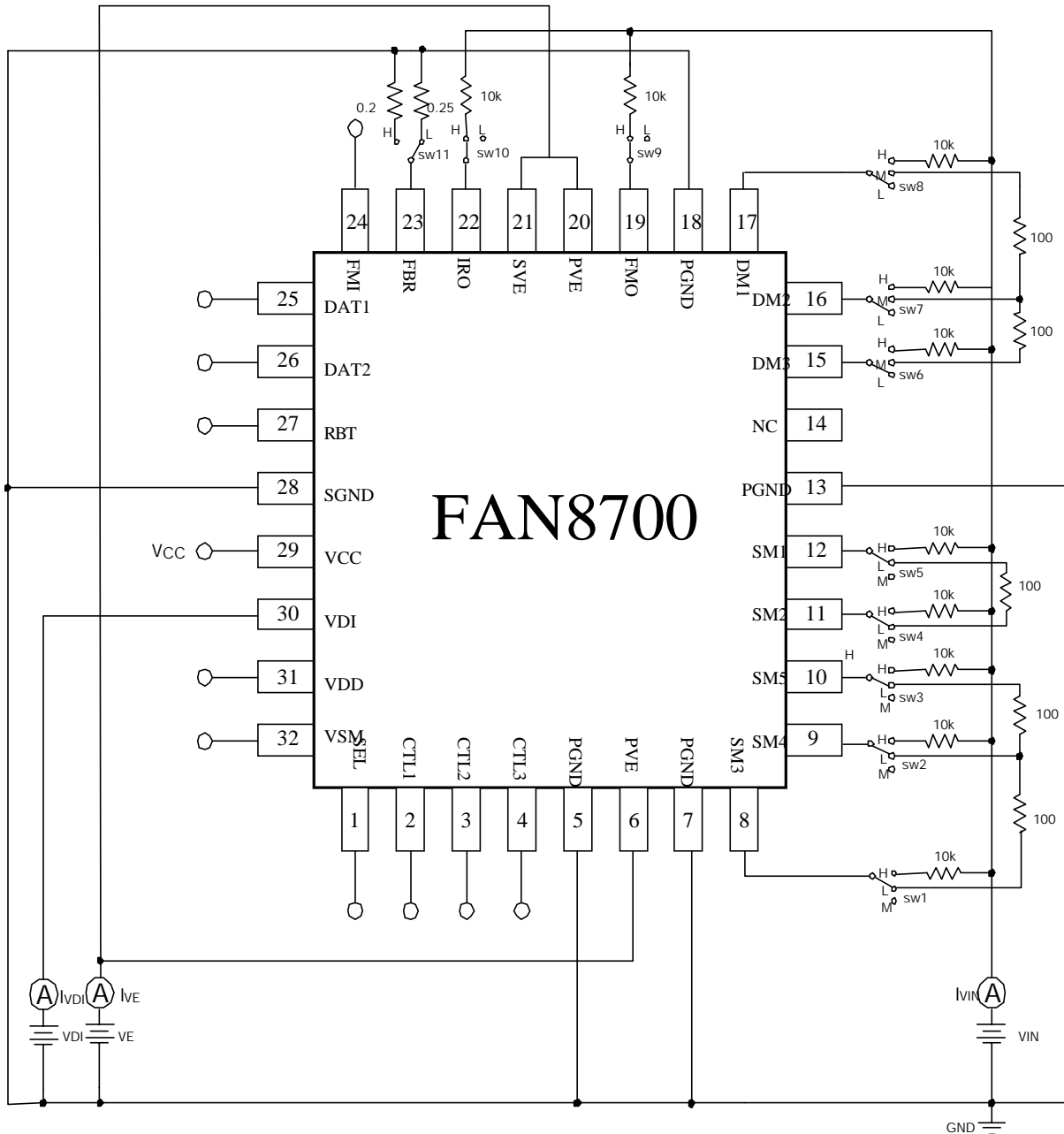
(Ta = -20°C ~ 60°C, VE = 2V)

| Block | Characteristics | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---------------------------|---|---------|--|------|------|------|-------|
| Total | Leakage Current | ISTB | VE = 4.0V, VSEL = 0V | - | - | 1.0 | mA |
| | Input Threshold Voltage | VIT | - | 0.75 | 1.1 | 1.5 | V |
| | Input High Current | IIH | VIH = 3V | - | - | 150 | mA |
| Step-up & DC-DC CONVERTER | Minimum Operating Voltage | VOPR1 | - | - | - | 1.0 | V |
| | Step-up Output Voltage 1 | VVDI1 | ILOAD=100mA | 5.3 | 5.5 | 5.7 | V |
| | Step-up Output Voltage 2 | VVDI2 | ILOAD=100mA | 8.3 | 8.6 | 8.9 | |
| | FMO Output Voltage 1 | VSAT1/1 | ILOAD=700mA | - | - | 0.3 | V |
| | FMO Output Voltage 2 | VSAT1/2 | ILOAD=1000mA | - | - | 0.4 | |
| | FMI Step-up Clock Range | f | - | 39 | 156 | 313 | KHz |
| Regulator | VDD Output Voltage | VDD | IvDD=60mA | 2.85 | 3.0 | 3.15 | V |
| | VDD Drop-out Voltage | VSAT2/1 | IvDD=60mA, VDD=2V | - | - | 0.3 | |
| | VCC Output Voltage | VCC | IvCC=40mA | 4.8 | 5.00 | 5.2 | V |
| | VCC Drop-out Voltage | VSAT2/2 | IvCC=40mA, VCC=3V | - | - | 0.3 | V |
| RBT | Minimum Operating Voltage | VOPR3 | - | - | - | 1.5 | V |
| | Stand-by Output Voltage | VSTB | VE=4V, VSEL=0V | - | - | 0.1 | V |
| | Output Voltage | VRBT | - | 0.47 | 0.5 | 0.53 | × VE |
| | Output Voltage Temperature Coefficient | VT | - | - | - | 2.0 | mV/°C |
| DC Motor | Minimum Operating Voltage | VOPR4 | - | - | - | 1.0 | V |
| | Output Saturation Voltage | VSAT4 | VE=1.6V, IDM=400mA | - | - | 0.45 | V |
| Step motor Driver | Minimum Operating Voltage | VOPR5 | - | - | - | 1.6 | V |
| | Output Saturation Voltage | VSAT5 | VE=2.6V, ISM=500mA | - | - | 0.7 | V |
| | Output Voltage Relative Difference | DV | VE=2.6V VSM=1.0V, RL=10W SM1~2, SM3~4 | -0.1 | 0 | 0.1 | V |
| | Output Voltage 1 (Output Pin to Ground) | VO1 | VE=2.6V, RL=10W, VSM=1.0V SM1, SM2, SM3, SM4 | 1.9 | 2.0 | 2.1 | V |
| | Output Voltage 2 (Output Pin to Ground) | VO2 | VE=2.6V, RL=5W, VSM=1.0V, SM4, SM5 | 1.85 | 1.95 | 2.05 | V |
| Ired | Minimum Operating Voltage | VOPR6 | - | - | - | 1.5 | V |
| | Output Saturation Voltage | VSAT6 | IIRED=1000mA | - | - | 1.0 | V |
| | Output Current | IIRED | RFBR=0.3W | 0.9 | 1.0 | 1.1 | A |

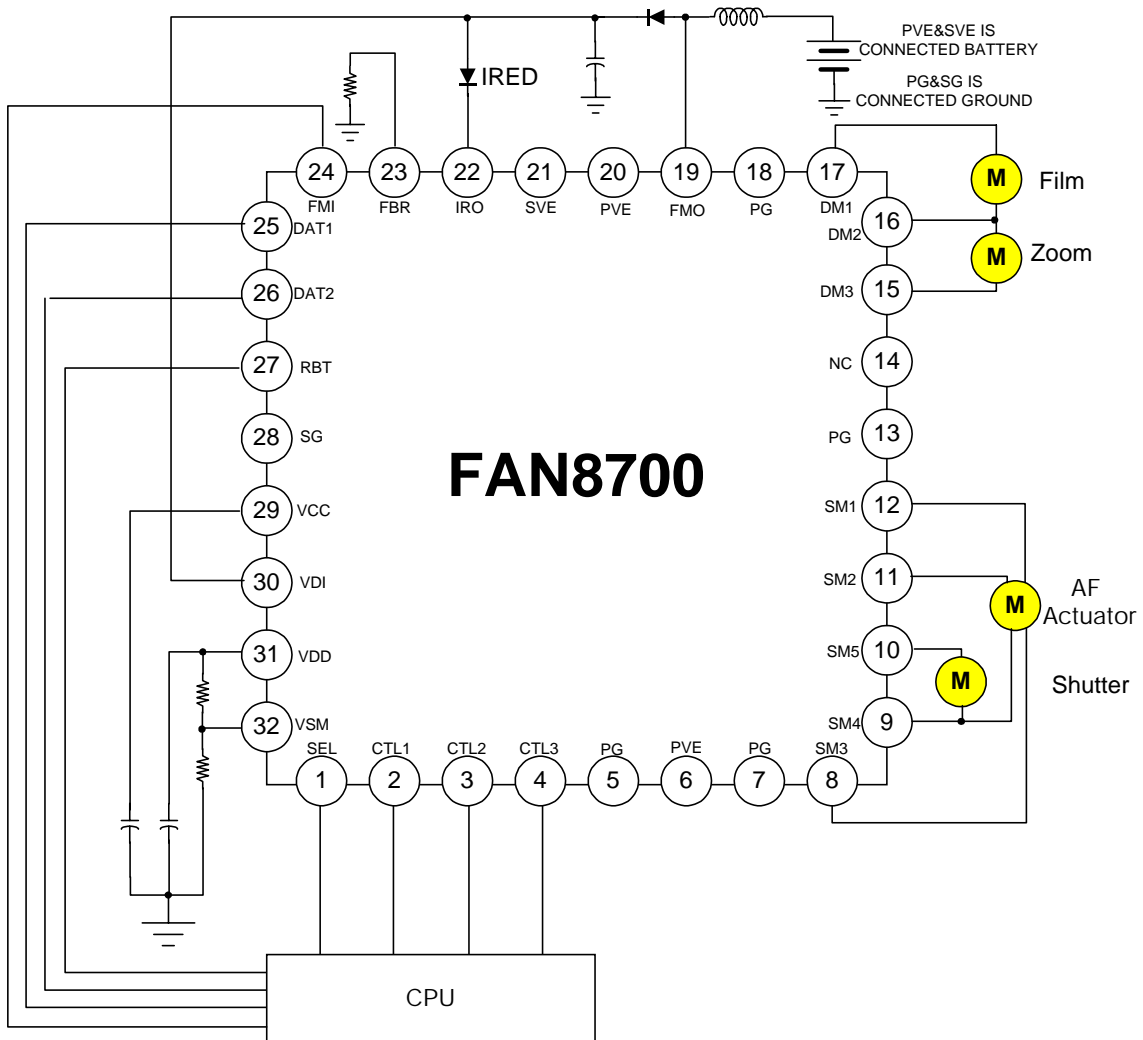
Control Code Table

| Mode | Sel | Ctl1 | Ctl2 | Ctl3 | Dat1 | Dat2 | Output Port | | | | Remark | |
|----------------------|-----|------|------|------|------|------|-------------|-----|-----|-----|---------------------|---|
| - | - | L | L | L | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | SM1 | SM2 | SM3 | SM4 | | |
| Stepping Motor Drive | H | H | L | H | L | L | L | H | L | H | | |
| | | | | | L | H | L | H | H | L | | |
| | | | | | H | L | H | L | L | H | | |
| | | | | | H | H | H | L | H | L | | |
| - | - | - | - | - | - | - | SM4 | SM5 | - | - | | |
| Ae Meter Drive | H | H | L | L | L | L | OFF | OFF | - | - | | |
| | | | | | L | H | H | L | - | - | | |
| | | | | | H | L | L | H | - | - | | |
| | | | | | H | H | L | L | - | - | | |
| Ired | H | H | H | H | L | L | - | - | - | - | 5.5V Step-up | |
| | | | | | L | H | - | - | - | - | 8.6V Step-up | |
| | | | | | H | L | - | - | - | - | Ired On Step-up Off | |
| | | | | | H | H | - | - | - | - | 5.5V Step-up | |
| - | - | - | - | - | - | - | CTL | DM1 | DM2 | DM3 | | |
| Dcmotor1 Control | H | L | L | H | L | L | - | OFF | OFF | OFF | OFF | |
| | | | | | L | H | - | H | L | OFF | CW | |
| | | | | | H | L | - | L | H | OFF | CCW | |
| | | | | | H | H | - | L | L | OFF | Brake | |
| Dcmotor2 Control | H | L | H | L | L | L | - | OFF | OFF | OFF | OFF | |
| | | | | | L | H | - | OFF | H | L | CW | |
| | | | | | H | L | - | OFF | L | H | CCW | |
| | | | | | H | H | - | OFF | L | L | Brake | |

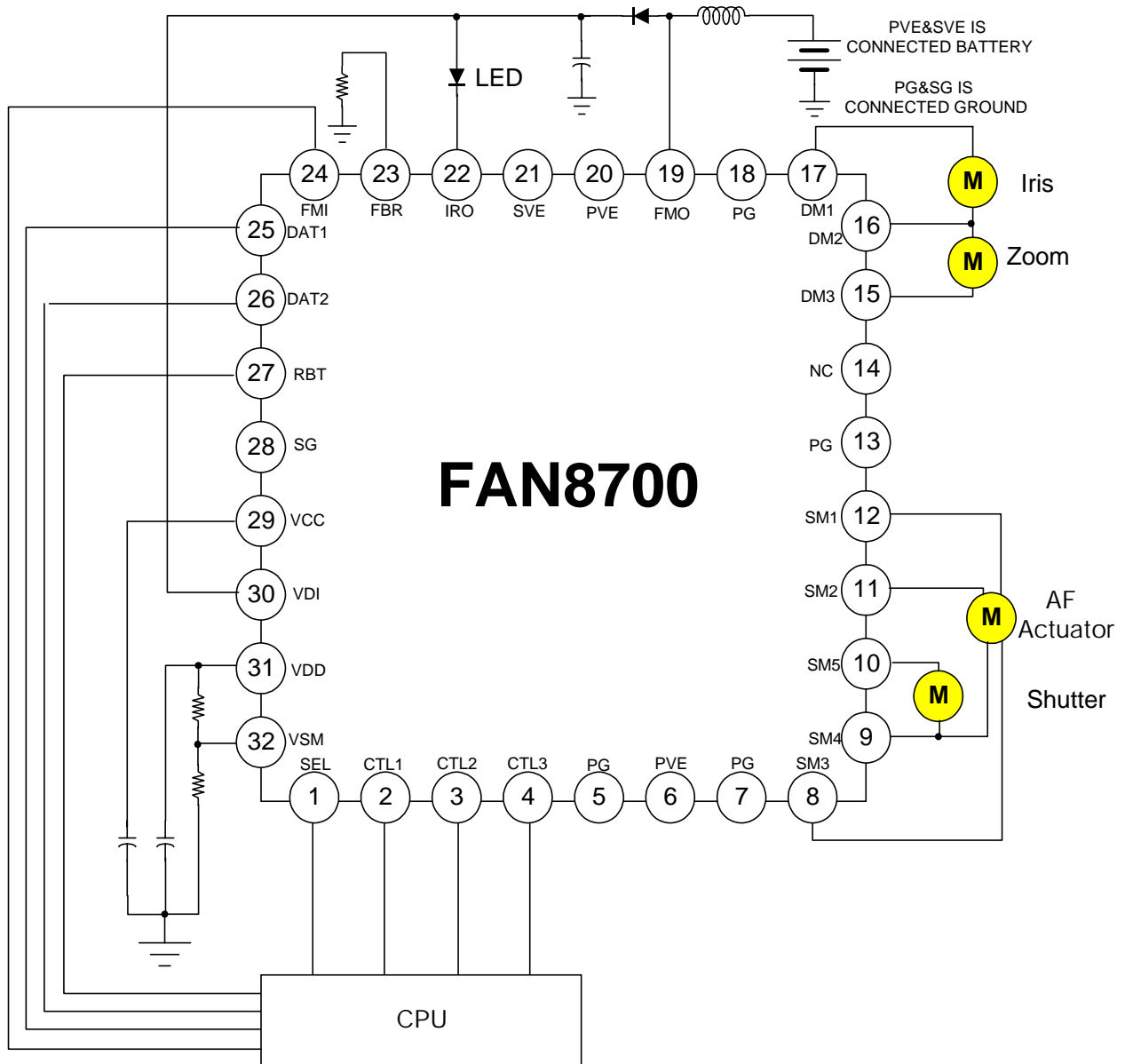
Test Circuits



Typical Application Circuits 1



Typical Application Circuits 2



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.