



**THE DATASHEET OF
AM4406MTR-G1**



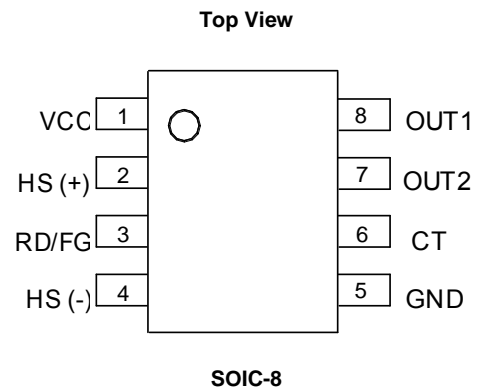
Description

The AM4406/4406F are 2-phase, half-wave motor predrivers fabricated for fan motors. These ICs are equipped with lock shutdown and automatic restart functions. The lock shutdown function turns off the output current when the motor is under lock condition. And when the motor is unlocked, the ICs will automatically restart and allow DC fan to run.

In addition, the AM4406 and AM4406F have RD and FG functions respectively. The RD function is to detect the motor status and FG function enables frequency generation.

The AM4406/4406F are available in SOIC-8 package.

Pin Assignments



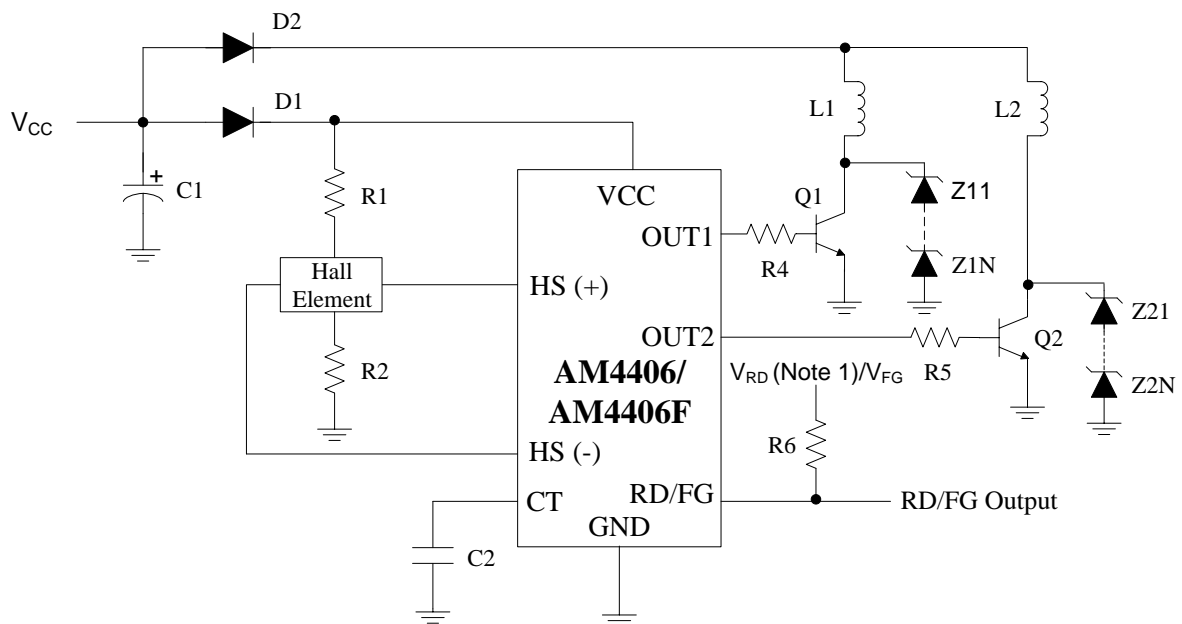
Features

- Hall Inputs with a Hysteresis
- Lock Shutdown and Automatic Restart
- Rotation Detection (RD) Output
- Frequency Generation (FG) Output
- Supply Voltage: 4 to 28V
- Output Current: 70mA Max.
- Operating Temperature: -40 to +95°C

Applications

- High Voltage, High Current Brushless DC Fan
- Power Supply and Switchboards
- Communications Facilities
- Industrial Equipment

Typical Applications Circuit

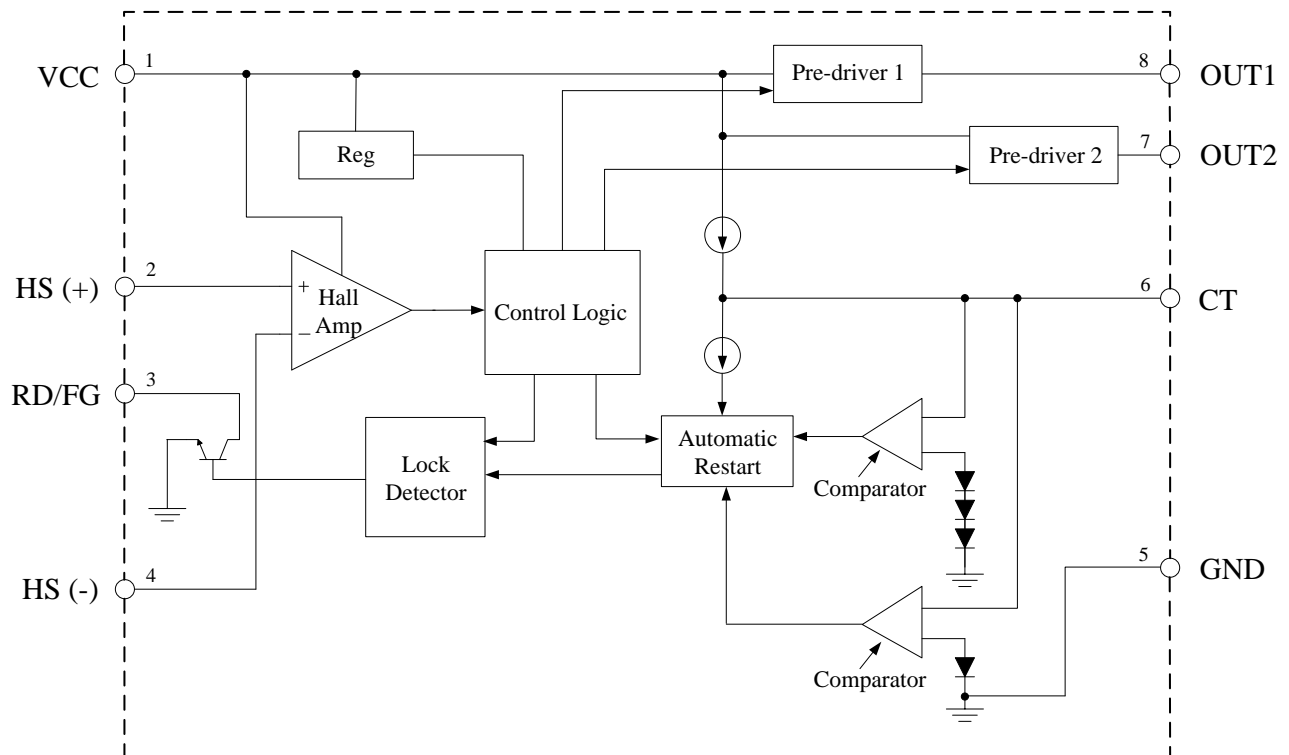


Note1: V_{RD} should be equal or smaller than V_{CC}

Pin Descriptions

| Pin Number | Pin Name | | Function |
|------------|----------|---------|---|
| | AM4406 | AM4406F | |
| 1 | VCC | VCC | Power supply |
| 2 | HS (+) | HS (+) | Hall input (+) |
| 3 | RD | FG | Rotation detection/Frequency generation |
| 4 | HS (-) | HS (-) | Hall input (-) |
| 5 | GND | GND | Ground |
| 6 | CT | CT | Timing capacitor |
| 7 | OUT2 | OUT2 | Driver output 2 |
| 8 | OUT1 | OUT1 | Driver output 1 |

Functional Block Diagram



Absolute Maximum Ratings (Note 2)

| Symbol | Parameter | Value | Unit |
|------------------|---------------------------|--------------|------|
| V _{CC} | Supply Voltage | 30 | V |
| I _{OUT} | Output Current | 70 | mA |
| P _D | Power Dissipation | 550 (Note 3) | mW |
| T _{STG} | Storage Temperature Range | -55 to +125 | °C |
| ESD | ESD (Human Body Model) | 3000 | V |
| ESD | ESD (Machine Model) | 300 | V |

Note 2: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Note 3: Reduced by 5.5mW/°C when T_A is over +25°C.

Recommended Operating Conditions

| Symbol | Parameter | Min | Max | Unit |
|---------------------|---------------------------------|-----|----------------------|------|
| V _{CC} | Supply Voltage | 4 | 28 | V |
| V _{HS (+)} | Hall Input Voltage (+) (Note 4) | 1.0 | V _{CC} -0.5 | V |
| V _{HS (-)} | Hall Input Voltage (-) (Note 4) | 1.0 | V _{CC} -0.5 | V |
| T _A | Operating Temperature | -40 | +95 | °C |

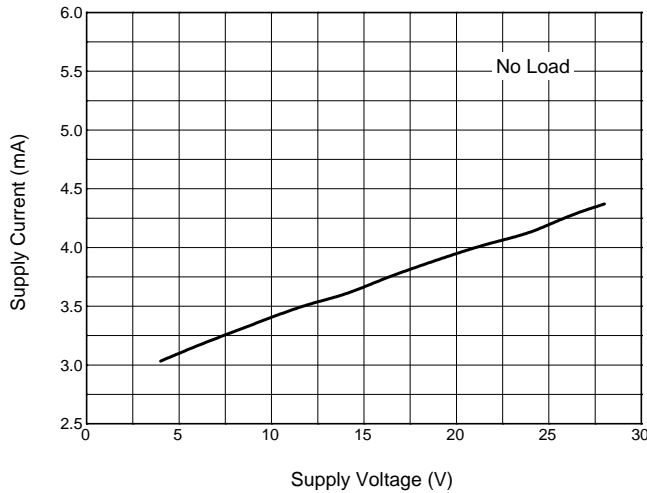
Note 4: Hall input voltage range includes the amplitude of signal.

Electrical Characteristics ($V_{CC}=12V$, $T_A=+25^{\circ}C$, unless otherwise specified.)

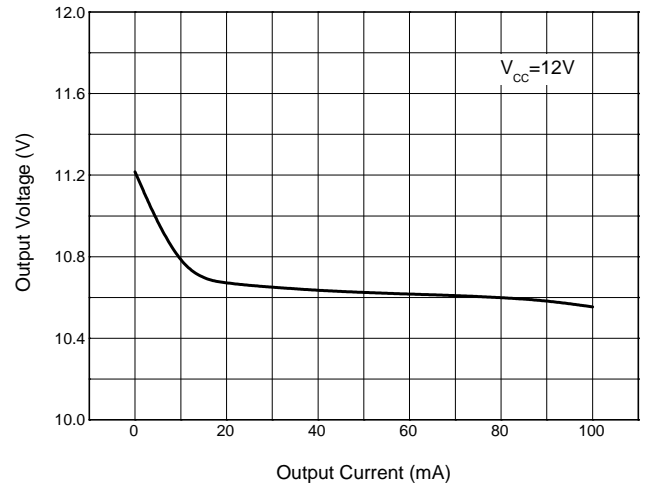
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|-------------------------------------|--|------|------|------|---------|
| I_{CC} | Supply Current | No load | – | 3.2 | 5.0 | mA |
| $V_{HYS (+)}$ | Hall Amplifier Input Hysteresis (+) | Zero to peak including offset and hysteresis | 3 | – | 15 | mV |
| $V_{HYS (-)}$ | Hall Amplifier Input Hysteresis (-) | Zero to peak including offset and hysteresis | -3 | – | -15 | mV |
| I_{CHG} | CT Charge Current | $V_{CT}=1.5V$ | 2 | 3.45 | 5.25 | μA |
| I_{DHG} | CT Discharge Current | $V_{CT}=1.5V$ | 0.35 | 0.8 | 1.45 | μA |
| RCD | CT Charge and Discharge Ratio | I_{CHG}/I_{DHG} | 3 | 4.5 | 8 | – |
| V_{CL} | CT Clamp Voltage | – | 2.2 | 2.6 | 3 | V |
| V_{CP} | CT Comparator Voltage | – | 0.4 | 0.6 | 0.8 | V |
| V_{OH1} | OUT1 High Level Voltage | $I_{OUT1}=10mA$ | 10 | 10.5 | – | V |
| V_{OH2} | OUT2 High Level Voltage | $I_{OUT2}=10mA$ | 10 | 10.5 | – | V |
| $V_{RD L}$ | RD Output Low Level Voltage | $I_{RD}=5mA$ | – | 0.2 | 0.5 | V |
| I_{RD} | RD Current Capacity | $V_{RD}=2V$ | 8 | 18 | – | mA |
| V_{FGL} | FG Output Low Level Voltage | $I_{FG}=5mA$ | – | 0.2 | 0.5 | V |
| I_{FG} | FG Current Capacity | $V_{FG}=2V$ | 8 | 18 | – | mA |

Performance Characteristics

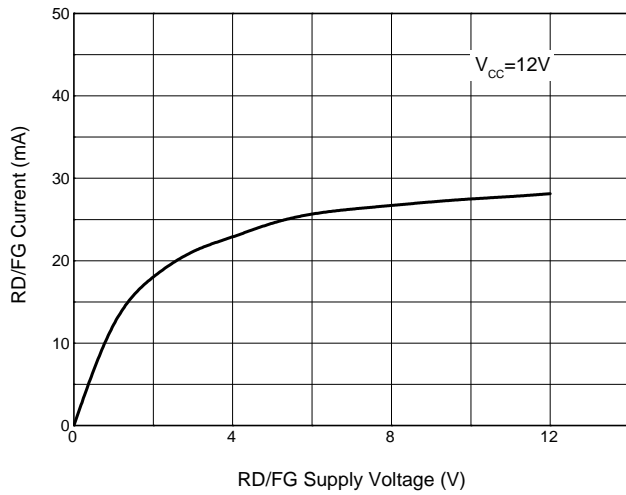
Supply Current vs. Supply Voltage



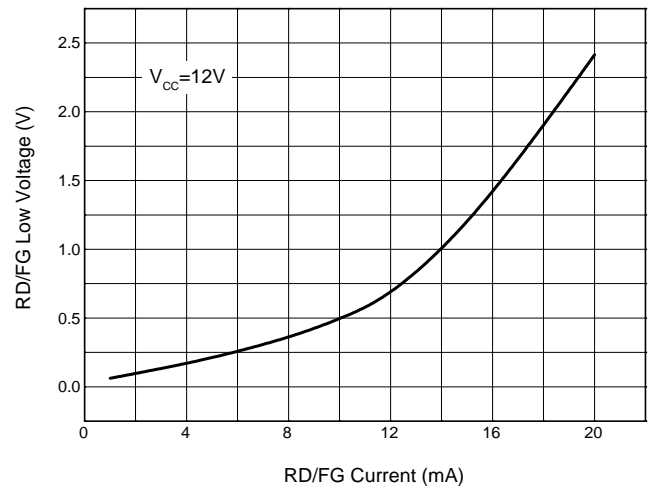
Output Voltage vs. Output Current



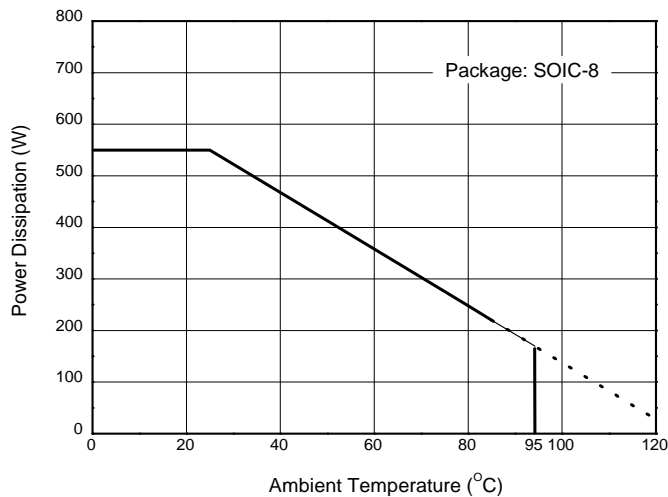
RD/FG Current vs. RD/FG Supply Voltage



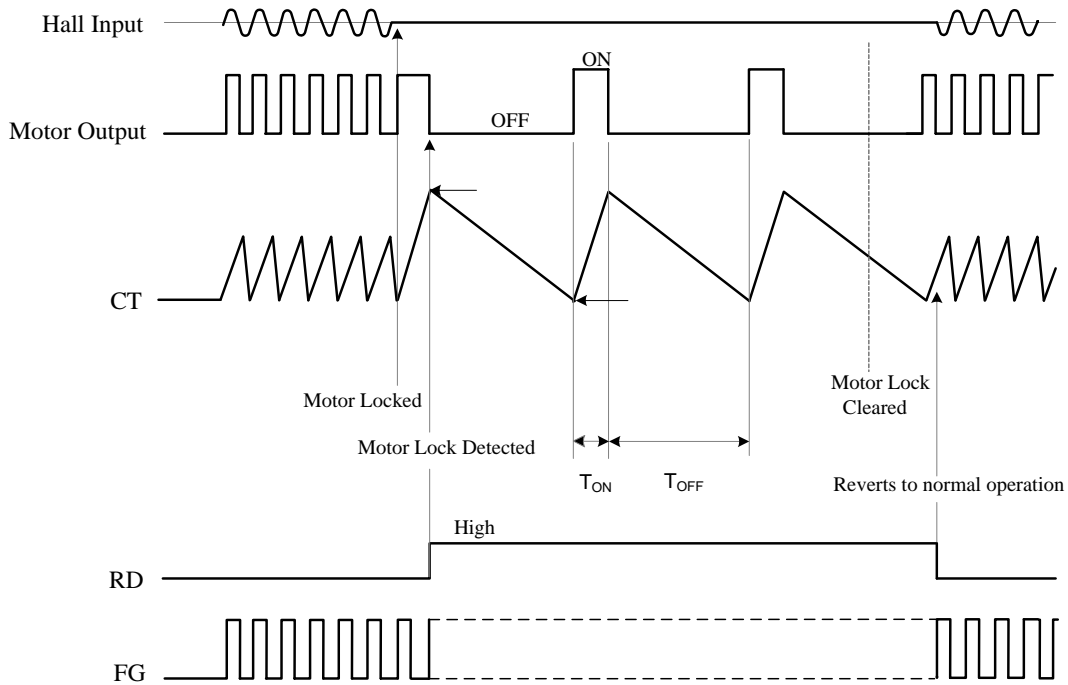
RD/FG Low Voltage vs. RD/FG Current



Power Dissipation vs. Ambient Temperature



Operating Diagram



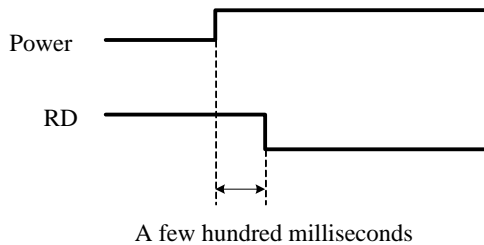
Note 5: Automatic restart is performed in the following manner. A motor lock condition is detected when the Hall signal stops switching. The output is ON when CT pin is being charged. C2 is the external capacitor of the CT pin. Output ON time and OFF time are determined by the capacitance of C2.

Note 6: RD pin is ON during normal operation, and OFF when the motor is locked. It is an open collector output pin.

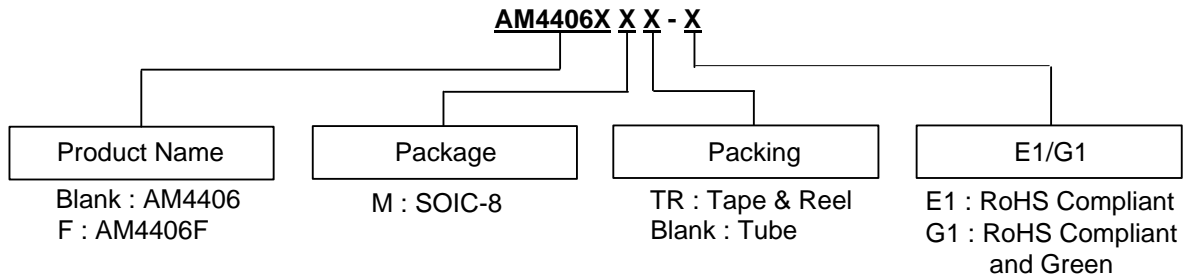
$$T_{ON} = \frac{C2 * (V_{CL} - V_{CP})}{I_{CHG}} (Sec.)$$

$$T_{OFF} = \frac{C2 * (V_{CL} - V_{CP})}{I_{DHG}} (Sec.)$$

Note 7: The RD pin may maintain HIGH level for a few hundred milliseconds when the power is turned on.



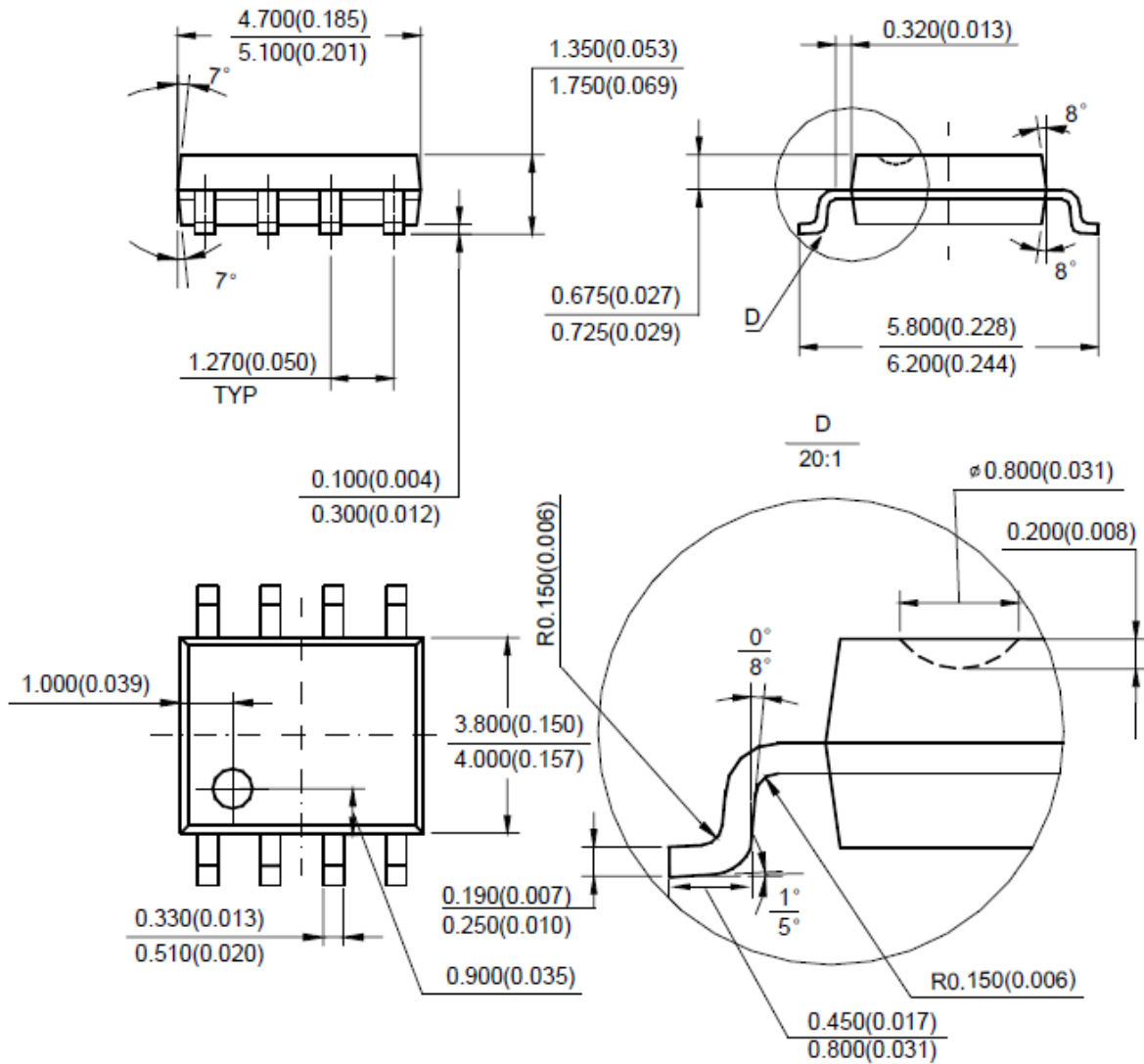
Ordering Information



| Package | Temperature Range | Part Number | | Marking ID | | Packing |
|---------|-------------------|----------------|--------------------------|----------------|--------------------------|-------------|
| | | RoHS Compliant | RoHS Compliant and Green | RoHS Compliant | RoHS Compliant and Green | |
| SOIC-8 | -40 to +95°C | AM4406M-E1 | AM4406M-G1 | AM4406M | AM4406M-G1 | Tube |
| | | AM4406MTR-E1 | AM4406MTR-G1 | AM4406M | AM4406M-G1 | Tape & Reel |
| | | - | AM4406FMTR-G1 | - | AM4406FM-G1 | Tape & Reel |

Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SOIC-8



Note: Eject hole, oriented hole and mold mark is optional.

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