



## General Description

HLM3480IM3X series are a set of Low Dropout Linear Regulator ICs implemented in CMOS technology. They can withstand voltage 30V. And they are available with lowvoltage drop and low quiescent current, widely used in audio, video and communication appliances.

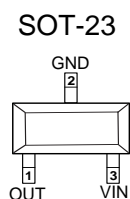
## Features

- Low Power Consumption
- Low Voltage Drop
- Low Temperature Coefficient
- Withstanding Voltage 30V
- Quiescent Current 5.0 $\mu$ A
- Output Voltage Accuracy: tolerance  $\pm 2\%$
- High output current: 120mA

## Application

- Battery-powered Equipments
- Communication Equipments
- Audio/Video Equipments

## Pin Configuration And Descriptions



| No. | Name             | Functions Description |
|-----|------------------|-----------------------|
| 1   | V <sub>OUT</sub> | Output                |
| 2   | GND              | Ground                |
| 3   | V <sub>IN</sub>  | Input                 |

## Order Information

| Orderable Device     | Package | Output Voltage | Packing Option |
|----------------------|---------|----------------|----------------|
| HLM3480IM3X-3.3/NOPB | SOT-23  | 3.3V           | 3000/Reel      |
| HLM3480IM3X-5.0/NOPB | SOT-23  | 5.0V           | 3000/Reel      |



## Absolute Maximum Ratings

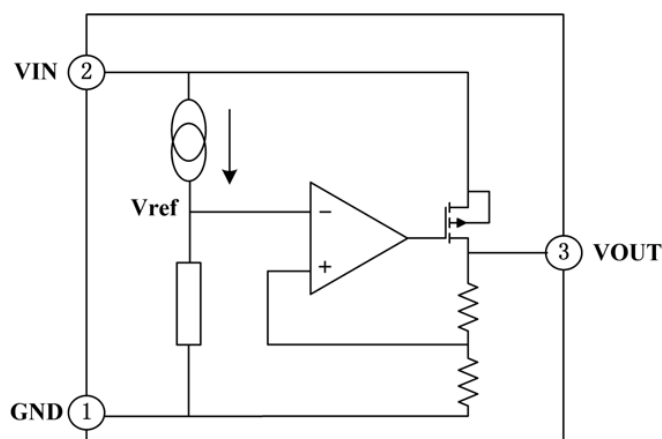
| Description                          | Symbol    | Value Range | Unit |
|--------------------------------------|-----------|-------------|------|
| Limit Power Voltage                  | $V_{IN}$  | -0.3~+34    | V    |
| Storage Temperature Range            | $T_{STG}$ | -50~+125    | °C   |
| Operating Free-air Temperature Range | $T_A$     | -40~+85     | °C   |

Note: Stresses greater than those listed under “Absolute Maximum Ratings” 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.

## Heat Dissipation

| Description        | Symbol        | Package | Value Range | Unit |
|--------------------|---------------|---------|-------------|------|
| Thermal resistance | $\theta_{JA}$ | SOT-23  | 500         | °C/W |
| Power dissipation  | $P_W$         | SOT-23  | 200         | mW   |

## Block Diagram





## DC Characteristics (unless otherwise noted $T_A = 25^\circ\text{C}$ )

( $V_{IN} = V_{OUT} + 2.0\text{V}$ ,  $C_{IN} = C_L = 10\mu\text{F}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted)

### Series +3.3V OUTPUT

| Parameter               | Symbol  | Test Condition  | Min.  | Typ. | Max.  | Unit                  |
|-------------------------|---|---|-------|------|-------|-----------------------|
| Output Voltage          | $V_{OUT}$   | $V_{IN} = V_{OUT} + 2.0\text{V}$ ,<br>$I_{OUT} = 10\text{mA}$   | 3.234 | 3.30 | 3.366 | V                     |
| Output Current          | $I_{OUT}$   | $V_{IN} = V_{OUT} + 2.0\text{V}$  |       | 120  |       | mA                    |
| Load Regulation         | $\Delta V_{OUT}$  | $V_{IN} = V_{OUT} + 2.0\text{V}$<br>$1\text{mA} \leq I_{OUT} \leq 50\text{mA}$  |       | 25   | 60    | mV                    |
| Voltage Drop            | $V_{DIF}$   | $I_{OUT} = 1\text{mA}$ , $\Delta V_{OUT} = 2\%$   |       | 25   | 55    | mV                    |
| Quiescent Current       | $I_{SS}$  | No Load   |       | 5.0  | 8.0   | $\mu\text{A}$         |
| Line Regulation         | $\frac{\Delta V_{OUT}}{V_{OUT}} / \frac{\Delta V_{IN}}{V_{IN}}$ | $V_{OUT} + 1.0\text{V} \leq V_{IN} \leq 30\text{V}$ ,<br>$I_{OUT} = 1\text{mA}$                                       |       |      | 0.2   | %/V                   |
| Input Voltage           | $V_{IN}$  |   |       |      | 30    | V                     |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T_A} / V_{OUT}$                   | $V_{IN} = V_{OUT} + 2.0\text{V}$ ,<br>$I_{OUT} = 10\text{mA}$ ,<br>$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ |       | 100  |       | ppm/ $^\circ\text{C}$ |

Note: When  $V_{IN} = V_{OUT} + 2.0\text{V}$ , as the output voltage declined 2%, the  $V_{DIF} = V_{IN} - V_{OUT}$ .

### Series +5.0V OUTPUT

| Parameter               | Symbol  | Test Condition  | Min. | Typ. | Max. | Unit                  |
|-------------------------|---|---|------|------|------|-----------------------|
| Output Voltage          | $V_{OUT}$   | $V_{IN} = V_{OUT} + 2.0\text{V}$ ,<br>$I_{OUT} = 10\text{mA}$   | 4.9  | 5.0  | 5.1  | V                     |
| Output Current          | $I_{OUT}$   | $V_{IN} = V_{OUT} + 2.0\text{V}$  |      | 120  |      | mA                    |
| Load Regulation         | $\Delta V_{OUT}$  | $V_{IN} = V_{OUT} + 2.0\text{V}$<br>$1\text{mA} \leq I_{OUT} \leq 50\text{mA}$  |      | 25   | 60   | mV                    |
| Voltage Drop            | $V_{DIF}$   | $I_{OUT} = 1\text{mA}$ , $\Delta V_{OUT} = 2\%$   |      | 25   | 55   | mV                    |
| Quiescent Current       | $I_{SS}$  | No Load   |      | 5.0  | 8.0  | $\mu\text{A}$         |
| Line Regulation         | $\frac{\Delta V_{OUT}}{V_{OUT}} / \frac{\Delta V_{IN}}{V_{IN}}$ | $V_{OUT} + 1.0\text{V} \leq V_{IN} \leq 30\text{V}$ ,<br>$I_{OUT} = 1\text{mA}$                                       |      |      | 0.2  | %/V                   |
| Input Voltage           | $V_{IN}$  |   |      |      | 30   | V                     |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T_A} / V_{OUT}$                   | $V_{IN} = V_{OUT} + 2.0\text{V}$ ,<br>$I_{OUT} = 10\text{mA}$ ,<br>$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ |      | 100  |      | ppm/ $^\circ\text{C}$ |

Note: When  $V_{IN} = V_{OUT} + 2.0\text{V}$ , as the output voltage declined 2%, the  $V_{DIF} = V_{IN} - V_{OUT}$ .

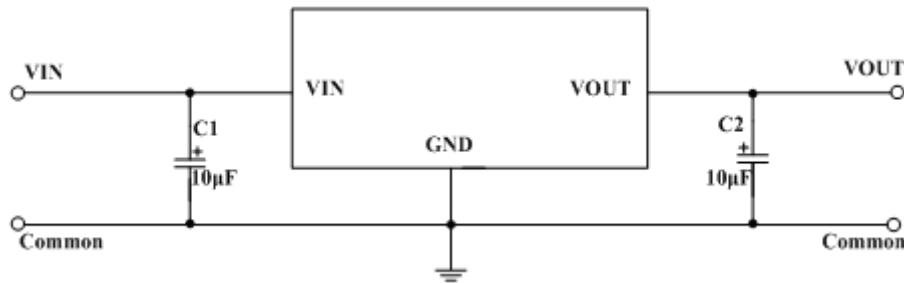


## Function Description

HLM3480IM3X series are linear voltage regulator ICs withstanding 30V voltage. The series IC consists of a voltage reference, an error amplifier, a current limiter and a phase compensation circuit plus a driver transistor. The output stabilization capacitor is also compatible with low ESR ceramic capacitors. The over current protection circuit and the over voltage protection circuit are built-in. The protection circuit will operate when the output current or input voltage reaches limit level.

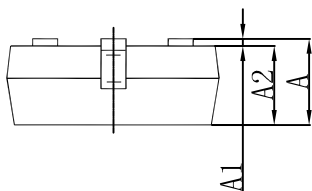
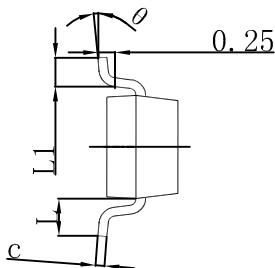
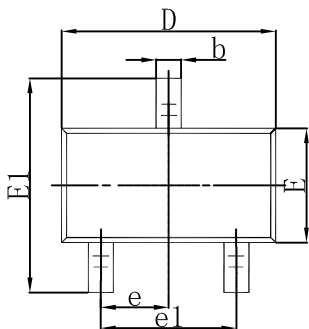
## Application Circuit

### Basic Circuits



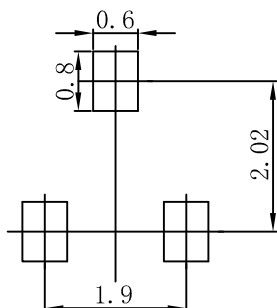


## Package Dimensions SOT-23



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 0.900                     | 1.050 | 0.035                | 0.041 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.080                     | 0.150 | 0.003                | 0.006 |
| D        | 2.800                     | 3.000 | 0.110                | 0.118 |
| E        | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1       | 2.250                     | 2.550 | 0.089                | 0.100 |
| e        | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.550 REF                 |       | 0.022 REF            |       |
| L1       | 0.300                     | 0.500 | 0.012                | 0.020 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

## Suggested Pad Layout



### Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.



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