Low Dropout Linear Regulator

## Features

- Output Current: 200mA
- Low Quiescent Current: 0.8μA
- Input Voltage: 3V ～ 5.5V
- Fixed Output Voltage: 2.8V, 3.1V, 3.3V
- Only 1μF Output Capacitor Required for Stability
- Dropout Voltage: 240mV@200mA
- Overload/Over Temperature Protection
- Package: DFN1.2*1.6-4L (lead-free packaging is now available)
- Specified from: -40℃ ～ +85℃

## Applications

- MP3/MP4 Players
- Cellular phones, radiophone, digital cameras, and portable electronics
- Laptop/notebook/palmtop computers
- Portable devices
- Disk driver
- Battery chargers
- Bluetooth and other radio products

## Description

The JTMH2031 is 200mA low dropout linear regulator optimized to provide a high performance solution to low power system.

The device offers a new level of cost-effective performance in cellular phones, laptop and notebook computers, and other portable devices. Proprietary design techniques ensure high performance.

The JTMH2031 is designed to make use of low cost ceramic capacitors which ensure the stability of the output current, and enhance the efficiency in order to prolong the battery life of those portable devices.

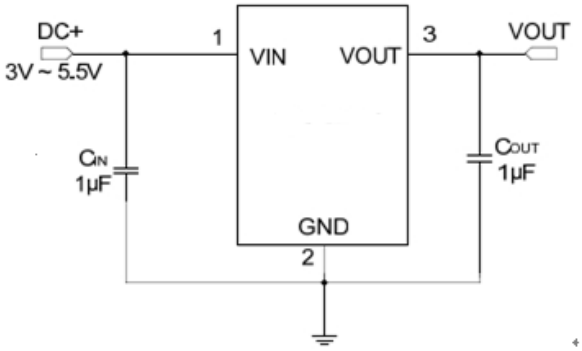
The JTMH2031 regulators are available in the industry standard DFN1.2*1.6-4L power packages (or upon request).

## Order Information

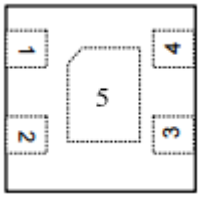
JTMH2031—① ②:

| SYMBOL | DESCRIPTION |
|---|---|
| ① | Denotes Output Voltage:<br>E:2.8V<br>L:3.1V<br>G: 3.3V |
| ② | Denotes Package Type:<br>D: DFN1.2*1.6-4L |

## Typical Application Circuit




## Pin Assignment and Description




| PIN | NAME | FUNCTION |
|---|---|---|
| 1 | VIN | Power Input |
| 2 | GND | Ground |
| 3 | VOUT | Output Pin |
| 4,5 | NC | No Connect |

## Absolute Maximum Ratings (Note 1)

- Supply Input Voltage ……-0.3V ～ 6V
- Operating Temperature Range(Note 2)……-40°C ～ +85℃
- Junction Temperature Range ……-40°C ～ +125℃
- Storage Temperature Range ……-65℃ ～ +150℃
- Lead Temperature (Soldering, 10 sec.) ……+265℃

**Note 1:** Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

**Note 2:** The JTMH2031 is guaranteed to meet performance specifications from 0°C to 70°C. Specifications over the –40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.

## Electrical Characteristics

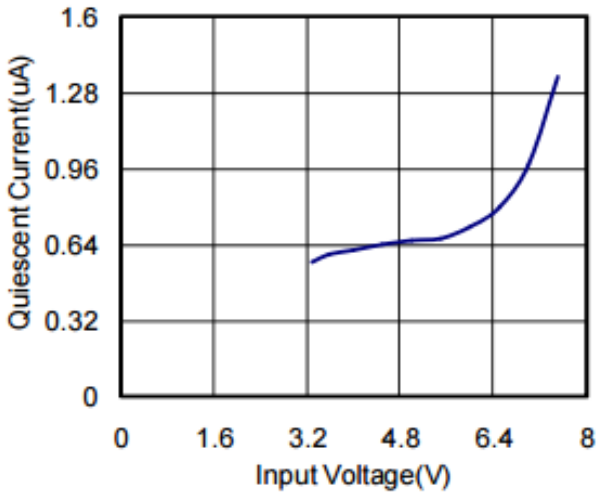
Operating Conditions: TA=25℃, $V_{IN}$ = $V_{OUT}$+0.5V, $C_{IN}$ = $C_{OUT}$ = 1μF, unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $V_{IN}$ | Input Voltage Range | | 3 | | 5.5 | V |
| $\Delta V_{OUT}$ | Output Voltage Accuracy | | -2 | | +2 | % |
| $I_Q$ | Quiescent Current | $I_{OUT}$ = 0mA | | 0.8 | | μA |
| $I_{LIM}$ | Current Limit | | | 300 | | mA |
| $V_{DROP}$ | Dropout Voltage(Note 3) | $I_{OUT}$ = 100mA | | 110 | | mV |
| | | $I_{OUT}$ = 200mA | | 240 | | mV |
| $\Delta V_{LINE}$ | Line Regulation | $V_{IN}$ = ($V_{OUT}$+0.5V) to 5.5V, $I_{OUT}$ = 1mA | | 2 | | mV |
| $\Delta V_{LOAD}$ | Load Regulation | 1mA ≤ $I_{OUT}$ ≤ 200mA, $V_{IN}$=$V_{OUT}$+0.5V | | 15 | | mV |

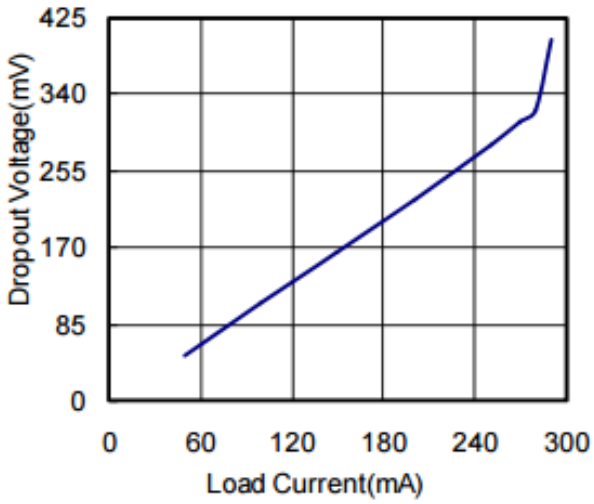
**Note 3:** The dropout voltage is defined as $V_{IN}$-$V_{OUT}$, which is measured when $V_{OUT}$ is $V_{OUT(NORMAL)}$ – 100mV.

## Typical Performance Characteristics

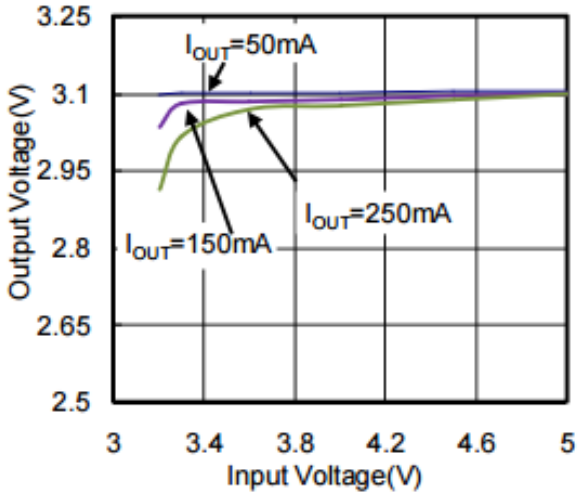
**Quiescent Current vs. Input Voltage**



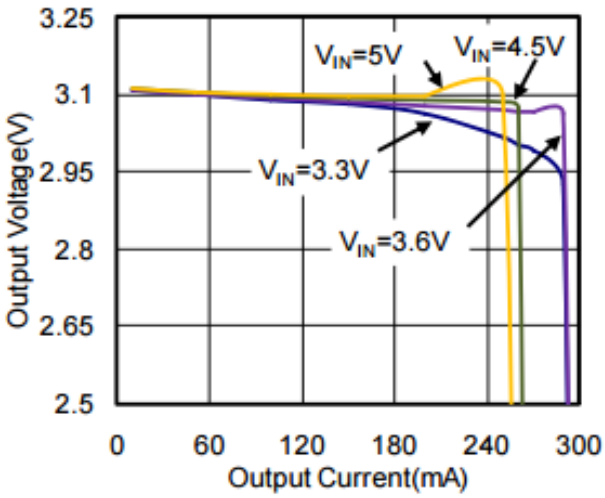

**Dropout Voltage vs. Load Current**



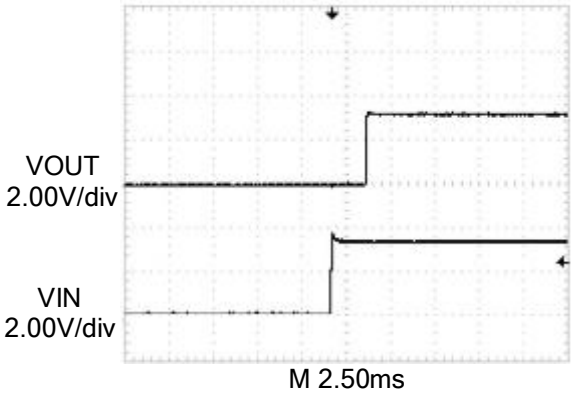

**Input and Output Voltage**



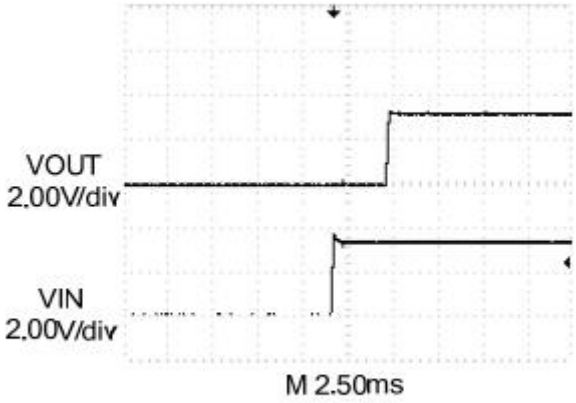

**Output Voltage vs.Output Current**



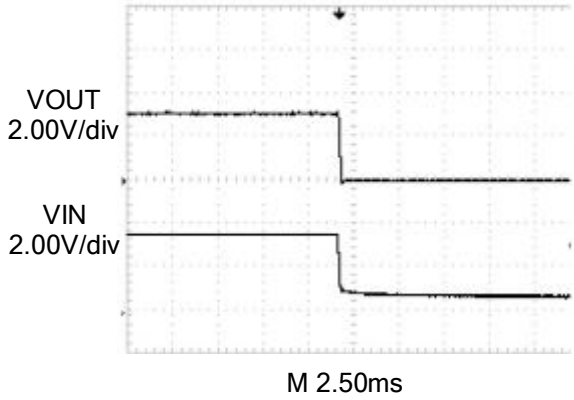
Start Up
($V_{IN}$ = 3.6V, $I_{OUT}$ = 100mA)



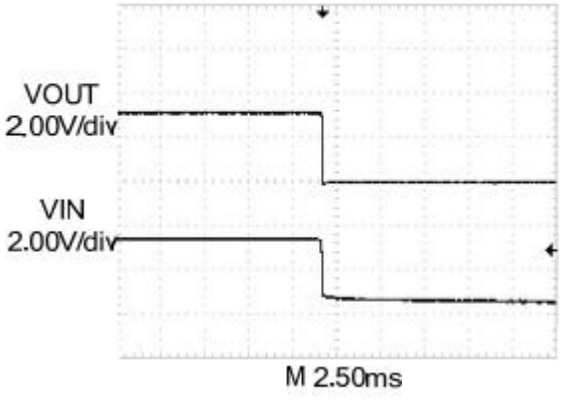

Start Up
($V_{IN}$ = 3.6V, $I_{OUT}$ = 200mA)



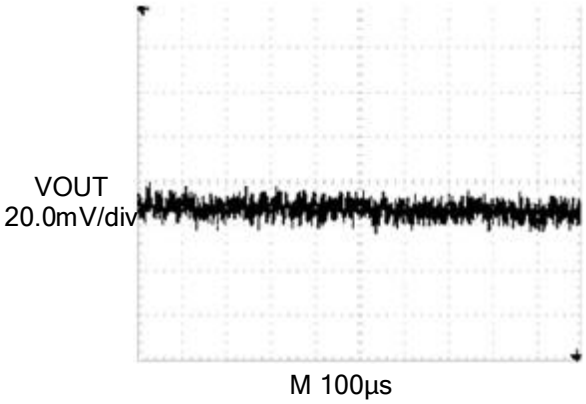

Shutdown
($V_{IN}$ = 3.6V, $I_{OUT}$ = 100mA)



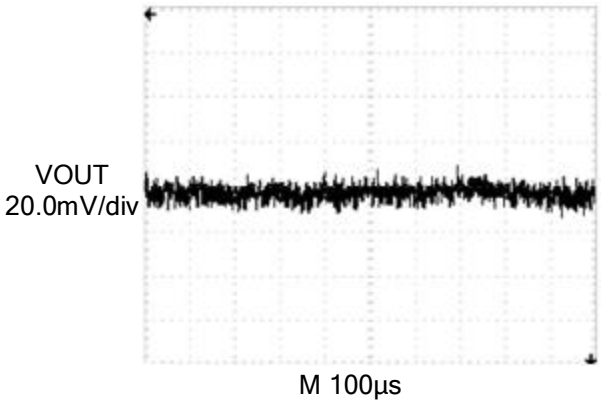

Shutdown
($V_{IN}$ = 3.6V, $I_{OUT}$ = 200mA)




Noise Waveform
($V_{IN}$ = 3.6V, $I_{OUT}$ = 100mA)




Noise Waveform
($V_{IN}$ = 3.6V, $I_{OUT}$ = 200mA)



## Pin Functions

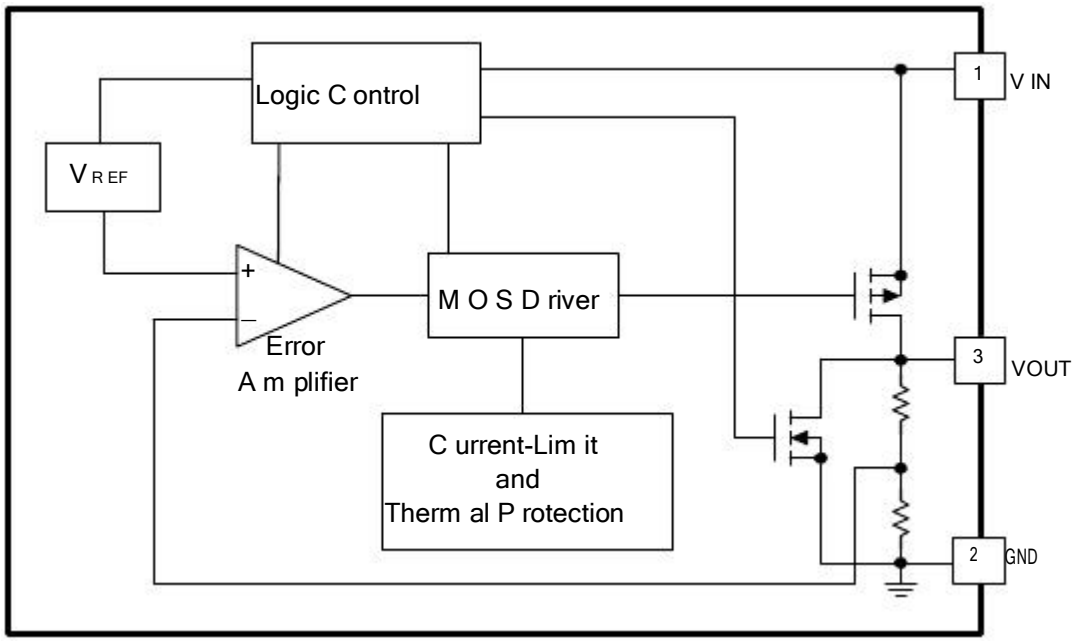
**VIN (Pin 1):** Power Input Voltage. Must be locally bypassed.

**GND (Pin 2):** Signal and Power Ground. Provide a short direct PCB path between GND and the (–) side of the output capacitor(s).

**VOUT (Pin 3):** Output Voltage. It is a fixed output voltage for the Micropower LDO Regulator.

**NC (Pin 4, 5):** NO Connect.

## Block Diagram



## Application Information

**Input and Output Capacitor**

Like any low dropout regulator, the external capacitors used with the JTMH2031 must be carefully selected for regulator stability and performance. Using a capacitor whose value is >1μF on the JTMH2031 input and the amount of capacitance can be increased without limit. The input capacitor must be located a distance of not more than 0.5 inch from the input pin of the IC and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response. The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application.

The JTMH2031 is designed specifically to work with low ESR ceramic output capacitor in space-saving and performance consideration. Using a ceramic capacitor whose value is at least 1μF with ESR is > 25mΩ on the JTMH2031 output ensures stability. The JTMH2031 still works well with output capacitor of other types due to the wide stable ESR range.

**Current Limit**

The JTMH2031 contains an independent current limiter, which monitors and controls the pass transistor's gate voltage, limiting the output current. It protects the part even directly short the output to GND.

**Thermal Consideration**

Thermal protection limits power dissipation in the JTMH2031. When the operating junction temperature exceeds 135℃, the OTP circuit starts the thermal shutdown function and turns the pass element off. The pass element turns on again after the junction temperature cools by 10℃.

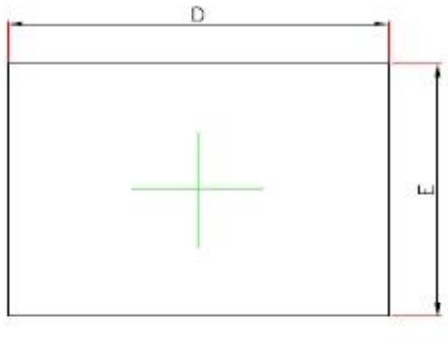
For continuous operation, do not exceed absolute maximum operation junction temperature 125℃. The power dissipation definition in device is:

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_Q$$

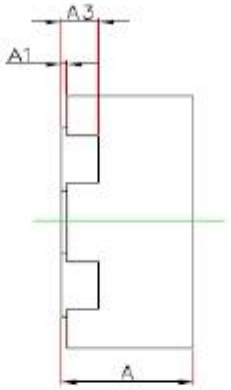
The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surroundings airflow and temperature difference between junction to ambient.

## Packaging Information

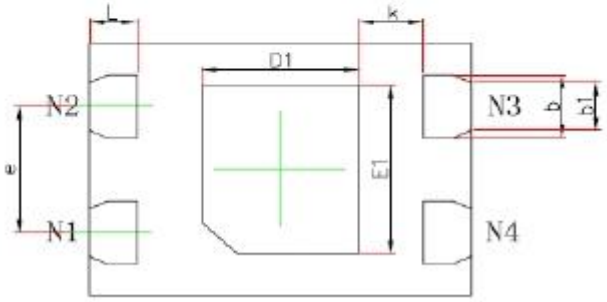
DFN1.2*1.6-4L Package Outline Dimension




TOP VIEW




SIDE VIEW




BOTTOM VIEW

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.500 | 0.600 | 0.020 | 0.024 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.152REF. | | 0.006REF. | |
| D | 1.500 | 1.700 | 0.059 | 0.067 |
| E | 1.100 | 1.300 | 0.043 | 0.051 |
| D1 | 0.560 | 0.760 | 0.022 | 0.030 |
| E1 | 0.700 | 0.900 | 0.028 | 0.035 |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| b1 | 0.175 | 0.275 | 0.007 | 0.011 |
| e | 0.600TYP. | | 0.024TYP. | |
| L | 0.150 | 0.250 | 0.006 | 0.010 |
| k | 0.200MIN. | | 0.008TYP. | |