CISSOID The SOI design Specialists

# CHT-LDOS

*Preliminary datasheet*
*Version 1.0 (05/2006)*

## High-Temperature, 2.5V; 3.3V; 5V; 5.5V; 9V; 10V; 12V; 13V or 15V, 1A, Low-Dropout SOI-CMOS Voltage Regulator for symmetrical voltage applications.

### General Description

The CHT-LDOS is a 1A, low-dropout linear voltage regulator compatible with high-temperature environments. Typical operation temperature range extends from -30°C to 225°C.

The circuit is stable throughout the whole temperature range and under a large choice of capacitive loads.

The minimum dropout voltage ($V_{in}$-$V_{out}$) is 2V with a 1A load current at 225°C and 1V for load currents lower than 400mA. The dropout voltage can span from 1 Volts to 20 Volts(1).

The circuit is a one-die solution.

CHT-LDOS is available in die and packages (currently TO-3 and TO-254) on demand.

Related documents:

- ***AN-06016****: "Selecting correct CISSOID regulator depending on your application"*
- ***AN-06002:*** *"Voltage regulator short-circuit protection and associated potential startup problem".*

### Applications

Power supplies for high-temperature electronic systems used in Well logging, Automotive, Aeronautics or Aerospace applications.

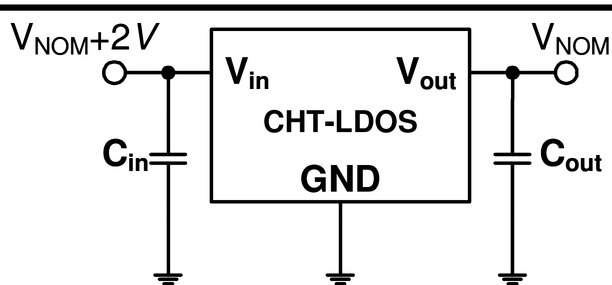
### Features

- 1V to 20V dropout Voltage @400mA(1)
- 2V to 20V dropout Voltage @1A(1)
- Max 1A output current @ 225°C
- 60dB input ripple rejection (0-100Hz)
- $C_{load}$ from 100nF to 1000µF, large ESR range
- Available on die or in custom package on demand. (3-pins compatible)
- Stand-by mode available. (4-pins)
- Tungsten interconnects for long-term reliability
- The start-up is operative over the whole temperature range
- Latch-up free

### Available voltages:

- CHT-LDOS-025: 2.5V
- CHT-LDOS-033: 3.3V
- CHT-LDOS-050: 5.0V
- CHT-LDOS-055 : 5.5V
- CHT-LDOS-090 : 9.0V
- CHT-LDOS-100 : 10.0V
- CHT-LDOS-120: 12.0V
- CHT-LDOS-130: 13.0V
- CHT-LDOS-150: 15.0V

### Typical application



## Absolute Maximum Ratings

Supply Voltage Vin -0.3V…40V
Junction Temperature(2) (Tj) 315°C
Power dissipation (3)

### ESD Rating (expected)

Human Body Model >1kV

## Operating Conditions

Supply Voltage 1V to 20V dropout(1)
Junction temperature -30°C to 225°C
Power Dissipation (3)

## Electrical Characteristics

*Following table is relative to the 5V mode (CHT-LDOS-050).*
*For other nominal voltage, see notes under this table.*

**Vin = *Vout* + 2V**

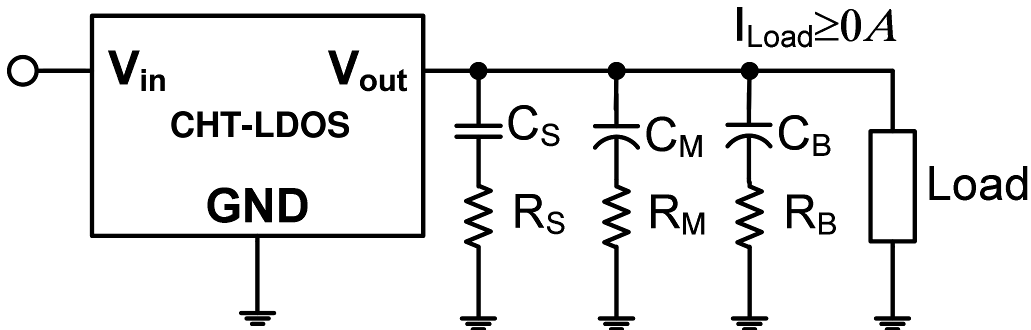
| Parameter | Condition | Min | Typ | Max | Units | note |
|---|---|---|---|---|---|---|
| Output voltage accuracy | $I_L$=10mA<br>-30°C <Tj <225°C | -2 | 0 | 2 | % | |
| Output voltage T° drift | $I_L$=10mA<br>25°C <Tj <225°C | 0 | 40 | 80 | ppm | *(4)* |
| Output voltage line regulation | dropout=2V to 15V<br>$I_L$=60mA, -30°C <Tj <225°C | -1 | | 1 | mV/V | *(5)* |
| Output voltage load regulation (i.e. $R_{out}$) | $I_L$=10mA to 1A @2V dropout<br>-30°C <Tj <225°C | | 0.04 | 0.1 | V/A | *(6)* |
| (Vin-Vout) *(droupout)* | $I_L$≤400mA, -30°C <Tj <225°C | 1 | | | V | |
| | $I_L$=1A, -30°C <Tj <225°C | 2 | | | V | |
| Quiescent Ground Pin current | 0 < $I_L$ <1A<br>-30°C<br>225°C | | <br>3.2<br>2.9 | | mA | *(7)* |
| Power supply rejection ratio | f=0Hz ..100Hz<br>$I_{load}$=100mA | tbd | | | dB | *(8)* |
| Foldback current | | | 2.5 | | A | |
| Short-circuit current | 20°C <Tj <225°C | | 300 | | mA | |
| Output noise | 10Hz-10kHz<br>$I_L$=100mA, -30°C <Tj <225°C | | tbd | | $\mu V_{RMS}$ | |

**Notes:**
(1) Vin max=30V
(2) Above 225°C ($T_j$), a minimum load current of few mA could be required.
(3) Max Power dissipation depends on packaging. CHT-LDOS in TO-3 or TO-254 packages presents a “junction-to-case” thermal resistance of maximum 5°C/W (Rth).

(4) ppm are defined as [d(Vout)/d(T)]/Vout. For 5V mode, 40ppm corresponds to 200µV/°C.
(5) Defining “***x***” as the nominal voltage, the line regulation is better than ***x****/5* mV/V.
(6) This includes the packaging parasitic resistor.
(7) Defining “***x***” as the nominal voltage, the typical quiescent current at 2V dropout can be approximated as 2.8+***x***/13 mA @ -30°C and 2.5+***x***/13 mA at 225°C.

(8) Defining “***x***” as the nominal voltage, the minimum power supply rejection ratio is …(tbd)….

## Output Load, recommended specifications




Resistances in series with capacitors represent the internal ESR of these capacitors.

For large capacitors:

$C_B$= 0 to 1000µF

$R_B$= 0.2 to ∞ Ω

For medium capacitors:

$C_M$= 0 to 6µF

$R_M$=0.1 to 1 Ω

For small Capacitors:

$C_S$= 100n to 220nF

$R_S$=10m to 50m Ω

## Start-up conditions

The start-up is operative over the whole temperature range.
Refer to our application note for more details when using symmetrical voltages.

- ***AN-06016***: *"Selecting correct CISSOID regulator depending on your application"*
- ***AN-06002:*** *"Voltage regulator short-circuit protection and associated potential startup problem".*

## **Measurements** *(CHT-LDOS-150)*

Note: Temperatures hereafter are ambient temperatures, not junction temperatures.

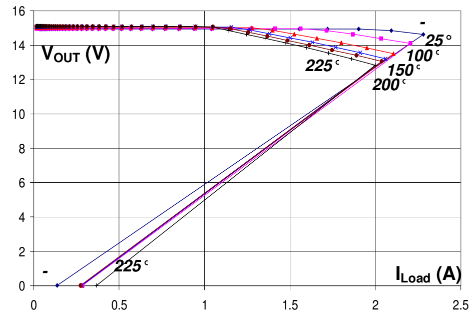



Figure 1: $V_{out}$ vs. $I_{Load}$ @ 2V dropout

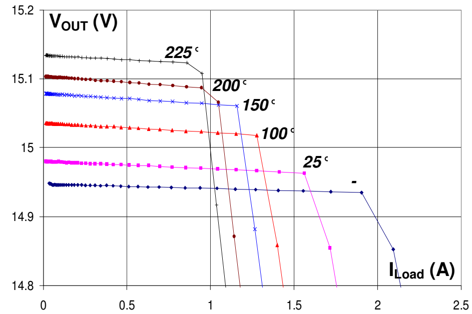



Figure 2: Zoom on figure 1

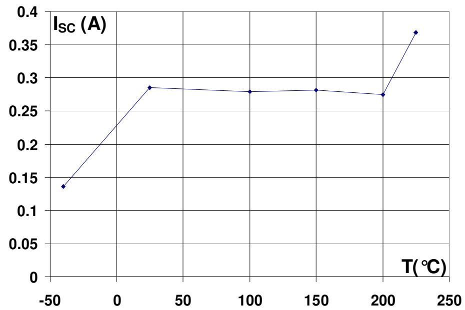



Figure 3: Typical short-circuit current vs. T°

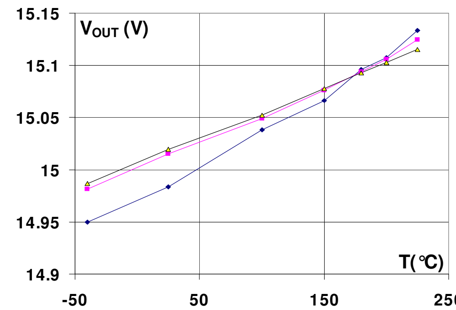



Figure 4: $V_{out}$ vs. T° (2V dropout, 3 samples)

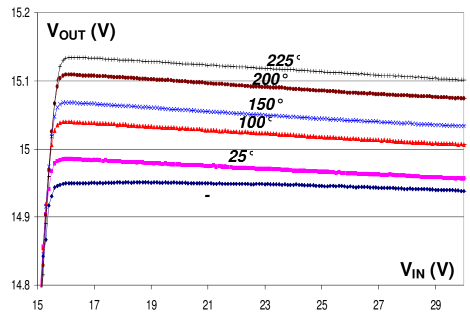



Figure 5: $V_{out}$ vs. $V_{in}$ over T°

*Tbd*
*Should be very similar to CHT-LDO datasheet*

Figure 6: Input ripple rejection

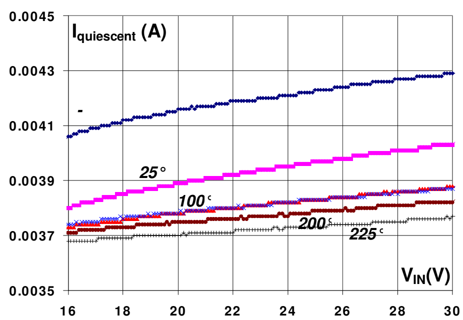



Figure 7: $I_{Quiescent}$ vs. $V_{in}$ over T°

*Tbd*
*Should be very similar to CHT-LDO datasheet*

Figure 8: $S_{Vout}$($V^2$/Hz) @25°C, $I_{Load}$=100mA

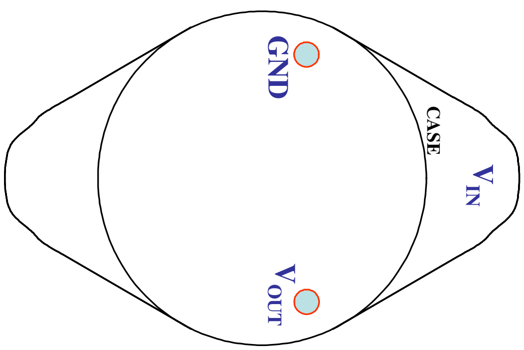
*Tbd*
*Should be very similar to CHT-LDO datasheet*

Figure 9: Typical max load current over T° vs. dropout

AC rejection, noise and maximum load current vs. dropout measurements have not been performed yet on CHT-LDOS family. However, based on simulation results, measurements result should be very similar to those presented in our CHT-LDO family datasheet.

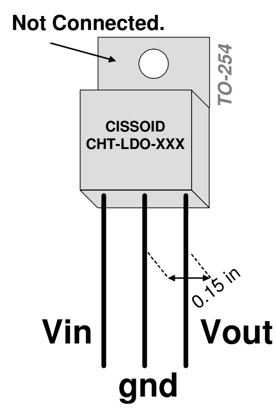
## Available packaging and pinout.

**TO-3:** (Bottom View)




**Bottom View**

**TO-254:**




## Contact & Ordering

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Product Reference : CHT-LDOS-XXX-YYYY

XXX= Output voltage. Example : 3.3V=033 ; 5V =050 ; 15V=150
YYYY=Package. TO3 or TO254 or DIE

Ex: CHT-LDOS-050-TO3 = 5V voltage regulator with TO3 package

## Disclaimer