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.

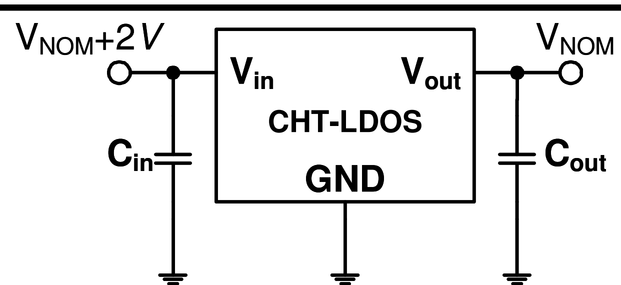
Features

- 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]	

Operating Conditions

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

ESD Rating (expected)

Human Body Model	>1kV

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

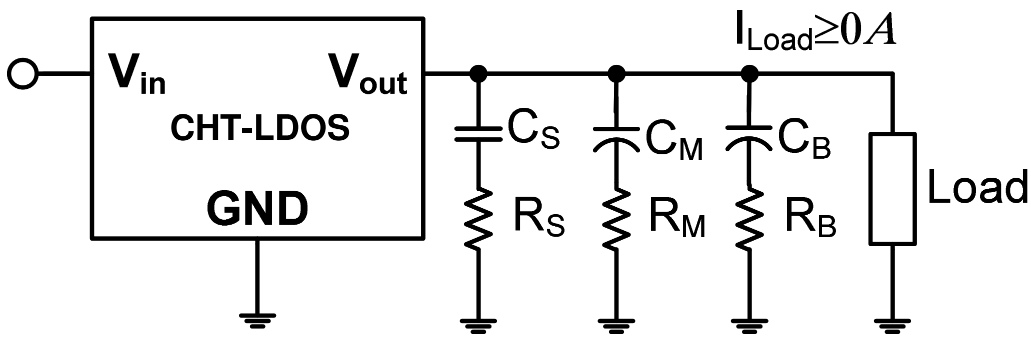
Parameter	Condition	Min	Typ	Max	Units	*note*
Output voltage accuracy	I_L=10mA -30°C <Tj <225°C	-2	0	2	%	
Output voltage T° drift	I_L=10mA 25°C <Tj <225°C	0	40	80	ppm	*(4)*
Output voltage line regulation	dropout=2V to 15V I_L=60mA, -30°C <Tj <225°C	-1		1	mV/V	*(5)*
Output voltage load regulation (i.e. R_{out})	I_L=10mA to 1A @2V dropout -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 -30°C 225°C		 3.2 2.9		mA	*(7)*
Power supply rejection ratio	f=0Hz ..100Hz 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 I_L=100mA, -30°C <Tj <225°C		tbd		µV_{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.

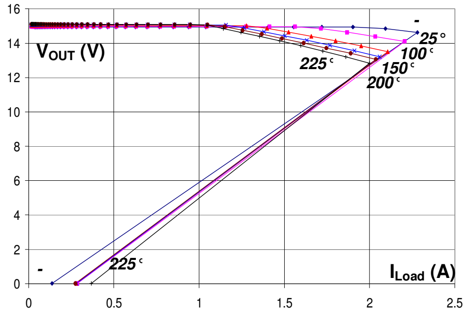


Figure 1: V_{out} vs. I_{Load} @ 2V dropout

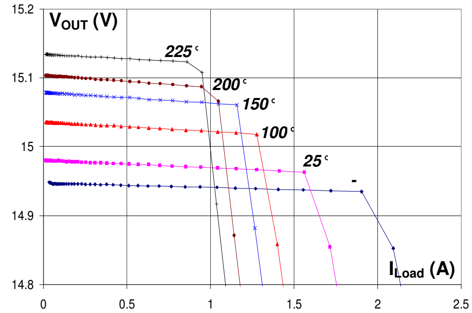


Figure 2: Zoom on figure 1

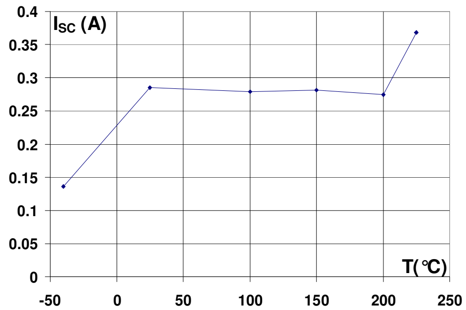


Figure 3: Typical short-circuit current vs. T°

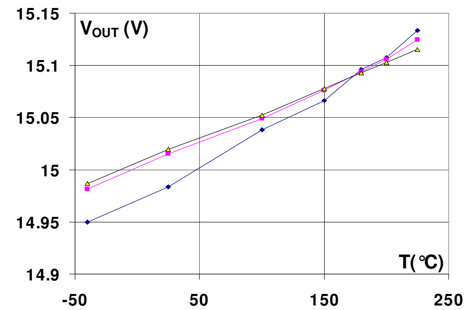


Figure 4: V_{out} vs. T° (2V dropout, 3 samples)

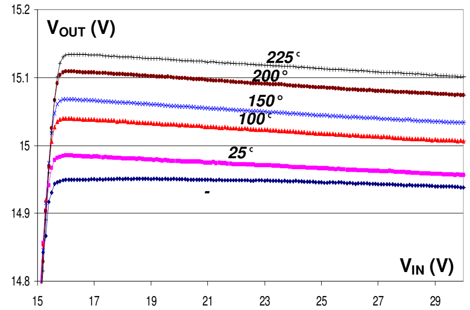


Figure 5: V_{out} vs. V_{in} over T°

Tbd
Should be very similar to CHT-LDO datasheet

Figure 6: Input ripple rejection

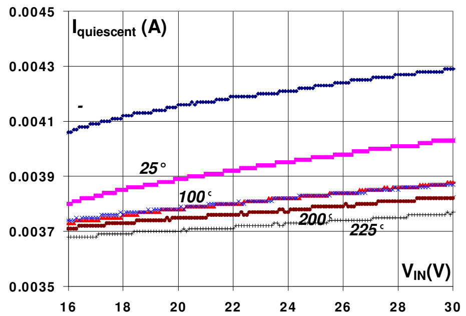


Figure 7: $I_{Quiescent}$ vs. V_{in} over T°

Tbd
Should be very similar to CHT-LDO datasheet

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

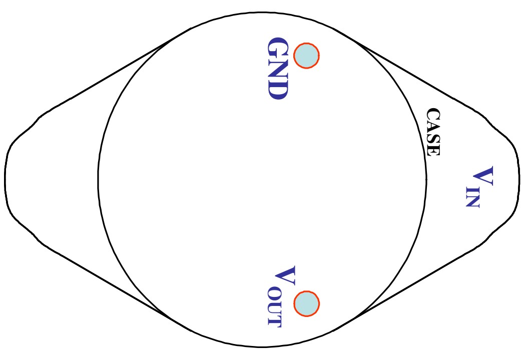
Tbd
Should be very similar to CHT-LDO datasheet

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.

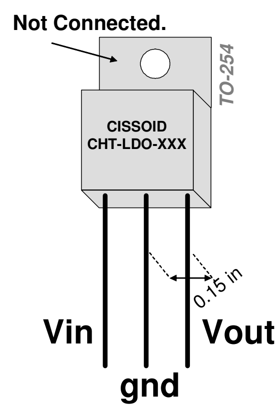
Available packaging and pinout.

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

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