CHANGE NOTIFICATION

Linear Technology Corporation
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May 29, 2015

Dear Sir/Madam: PCN# 052915

Subject: Notification of Change to LTM8001 Datasheet

Please be advised that Linear Technology Corporation has made a minor change to the LTM8001 datasheet, Electrical Characteristics. Removed from the PARAMETER Maximum Differential Voltage is 10V max and CONDITION of I_{OUT1-5} = 750mA. This is used to measure current limit with a differential voltage across the five linear regulators. The 10V test is redundant since 15V and 22V tests accurately determine the current limit. The change is shown on the attached page of the marked up datasheet. There was no change in form, fit, function, quality or reliability of the product. The product shipped after July 29, 2015 will be tested to the new limits.

Should you have any further questions or concerns please contact your local Linear Technology Sales person or you may contact me at 408-432-1900 ext. 2077, or by e-mail at jason.hu@linear.com. If I do not hear from you by July 29, 2015, we will consider this change to be approved by your company.

Sincerely,

Jason Hu
Quality Assurance Engineer

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. RUN = 3V unless otherwise noted (Note 3).

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Maximum V_{OUT0} to V_{OUT1-3} and V_{IN45} to V_{OUT4-5} Differential Voltage (Note 5)	I_{OUT1-5} = 750mA				10	V
	I_{OUT1-5} = 310mA				15	V
	I_{OUT1-5} = 125mA				22	V
BIAS123, BIAS45 Pin Current	I_{OUT1-5} = 100mA				6	mA
	I_{OUT1-5} = 1.1A	●			30	mA
V_{OUT1-5} Current Limit (Note 5)	V_{OUT1-5} = –0.1V			1.3		A
V_{OUT1-5} RMS Output Noise	V_{OUT1-5} = 1V, I_{OUT1-5} = 1.1A, 100Hz to 1MHz			90		μV_{RMS}

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: This µModule regulator includes overtemperature protection that is intended to protect the device during momentary overload conditions. Junction temperature will exceed 125°C when overtemperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

Note 3: The LTM8001E is guaranteed to meet performance specifications from 0°C to 125°C internal. Specifications over the full –40°C to 125°C internal operating temperature range are assured by design, characterization and correlation with statistical process controls. The LTM8001I is guaranteed to meet specifications over the full –40°C to 125°C internal operating temperature range. The LTM8001MP is guaranteed to meet specifications over the full –55°C to 125°C internal operating temperature range. Note that the maximum internal temperature is determined by specific operating conditions in conjunction with board layout, the rated package thermal resistance and other environmental factors.

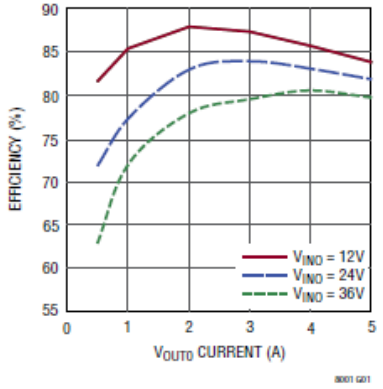
Note 4: No minimum load is required if the respective linear regulator is off, such as when V_{OUT0} = 0V, V_{IN45} = 0V, BIAS123 = 0V or BIAS45 = 0V.

Note 5: The current limit may decrease to zero at input-to-output differential voltages greater than 22V. Operation at voltages for V_{OUT0}, V_{IN45}, BIAS123 and BIAS45 is allowed up to a maximum of 25V as long as the difference between the linear regulator input and output voltage is below the specified differential voltage. Line and load regulation specifications are not applicable when the device is in current limit.

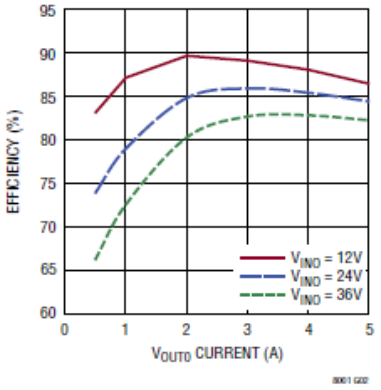
TYPICAL PERFORMANCE CHARACTERISTICS

(T_A = 25°C unless otherwise noted. Configured per Table 1, where applicable.)

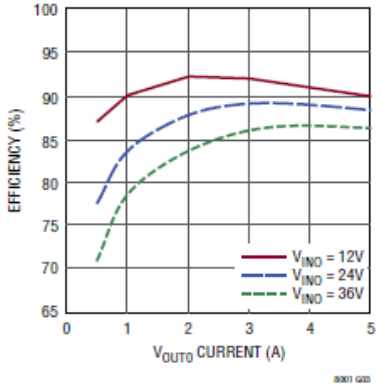
Efficiency vs Output Current, V_{OUT0} = 2.5V



Efficiency vs Output Current, V_{OUT0} = 3.3V



Efficiency vs Output Current, V_{OUT0} = 5V



OPERATION

The LTM8001 consists of two major parts: the first is a standalone nonisolated step-down switching DC/DC power converter that can deliver up to 5A of output current. The second part is an array of five parallelable 1.1A LDOs. The DC/DC converter provides a precisely regulated output voltage programmable via one external resistor from 1.2V to 24V. The input voltage range is 6V to 36V. Given that it is a step-down converter, make sure that the input voltage is high enough to support the desired output voltage and load current. The linear regulator array consists of five low drop-out regulators, of which three inputs are dedicated to the buck converter's output (V_{OUT0}) and two tie to an undedicated input (V_{IN45}). Each individual linear regulator may be set to a unique voltage through its SET pin, or may be paralleled with other LDOs by tying their respective SET and V_{OUT} pins together.

The LTM8001 step-down switching converter utilizes fixed frequency, average current mode control to accurately regulate the output current. This results in a constant-voltage, constant-current output characteristic, making the LTM8001's step-down regulator well suited for many supercapacitor and battery charging applications. As shown in the Typical Performance Characteristics, the current limit works in both directions. The control loop will regulate the current in the internal inductor. Once the V_{OUT0} output has reached the regulation voltage determined by the resistor from the FBO pin to ground, the voltage regulation loop will reduce the output current and maintain the output voltage. The ILIM input may be used to set the maximum allowable current output of the LTM8001. The analog control range of the ILIM pin is from 0V to 1.5V. If the ILIM pin is raised above 1.5V, there is little or no effect.

The RUN pin functions as a precision enable for the step-down switching converter connected to V_{OUT0}. If all V_{OUT1-3} LDO inputs including BIAS are tied to V_{OUT0}, the RUN pin will also implicitly enable or disable these LDOs as well, ~~unless some external power source is tied to V_{OUT0}~~. Refer to the Applications Information section Shorted Input Protection if V_{OUT0} is forced above V_{IN0}. When the voltage at the RUN pin is lower than 1.55V, switching is terminated. Below the turn-on threshold, the RUN pin sinks 5.5µA. This current can be used with a resistor between RUN and V_{IN0} to set hysteresis. Please refer to the UVLO and Shutdown section in the Applications Information for further details. During start-up, the SS pin is held low until the part is enabled, after which the capacitor at the soft-start pin is charged with an 11µA current source.

The LTM8001 is equipped with thermal shutdown circuitry to protect the device during momentary overload conditions. It is set above the 125°C absolute maximum internal temperature rating to avoid interfering with normal specified operation, so internal device temperatures will exceed the absolute maximum rating when the overtemperature protection is active. Thus, continuous or repeated activation of the thermal shutdown may impair device reliability. During thermal shutdown, all switching is terminated and the SS pin is driven low.

The switching frequency is determined by a resistor at the RT pin. The LTM8001 may also be synchronized to an external clock through the use of the SYNC pin. Please see the Switching Frequency Synchronization section in the Applications Information for further details.

The V_{OUT1-5} linear regulators are easy to use and have all the protection features expected in high performance regulators. Included are short-circuit protection and safe operating area protection, as well as thermal shutdown. These linear regulators are especially well suited to applications needing multiple rails. Their architecture allows their outputs to be adjusted down to zero volts. The output voltage is set by a single resistor, handling modern low voltage digital ICs as well as allowing easy parallel operation and simplified thermal management.

period

The linear regulators can be operated in two modes. One mode has the BIAS123 and BIAS45 pins connected to the linear regulator power input pins (V_{OUT0} and V_{IN45}) which gives a limitation of about 1.6V dropout. In the other mode, the BIAS123 and BIAS45 pins can be tied to a voltage at least 1.6V above their highest respective outputs. The linear regulator power input (V_{OUT0} and V_{IN45}) can then be set to a lower voltage that meets the dropout requirement, minimizing the power dissipation.

If an external power source is applied to BIAS123 alone or in combination with V_{OUT0}, RUN will not disable V_{OUT1-3}.