

EMI Certified Step-Down Converter in 15mm × 9mm μ Module Package Produces 1A, 0.8V_{OUT}–10V_{OUT} from 3.6V_{IN}–36V_{IN}

by David Ng

Introduction

The LTM8031 is a low noise DC/DC step-down μ Module regulator that operates from input voltages from 3.6V to 36V and is independently certified to be compliant with the stringent requirements of EN55022 class B. Its output can be programmed to provide voltages from 0.8V to 10V at up to 1A. A nearly complete converter solution is contained in the 15mm × 9mm × 2.82mm package. As seen in Figure 1, the LTM8031 just requires one resistor to set the output voltage, another resistor to set the operating frequency, and some input and output capacitance.

LTM8031 Features

The LTM8031 comes with many of the features often required in modern power supplies. It can be sequenced via its RUN/SS pin, which also serves to allow the user to control the output behavior at turn on. A PGOOD pin indicates when the output is within 10% of the target regulation voltage. The SYNC pin is used to synchronize the LTM8031 to a desired system frequency.

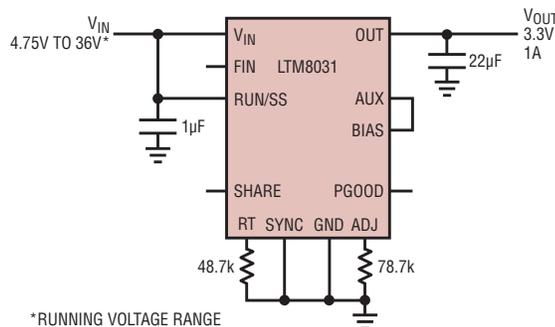


Figure 1. The LTM8031 needs just two resistors and some capacitance to get it running.

Table 1. Low noise μ Module DC/DC step down converters

Product	V _{IN} Range	V _{OUT} Range	I _{LOAD(MAX)}
LTM8020	4V to 36V	1.25V to 5V	200mA
LTM8021	3.6V to 36V	0.8V to 5V	500mA
LTM8031	3.6V to 36V	0.8V to 10V	1A
LTM8032	3.6V to 36V	0.8V to 10V	2A

Through the incorporation of a high Q pi filter and electromagnetic interference reduction design techniques, the LTM8031 is purpose built with low radiated emissions in mind. It has been independently verified to be compliant with EN55022:2006 (Information

Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement). EN55022 has two classes, A and B. The LTM8031 is certified compliant with class B, the more stringent of the two. More than that, the LTM8031 beats the EN55022

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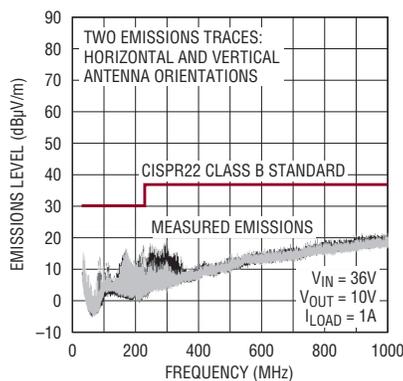


Figure 2. The LTM8031 meets EN55022 Class B while producing 10V_{OUT} at 1A from 36V_{IN}.

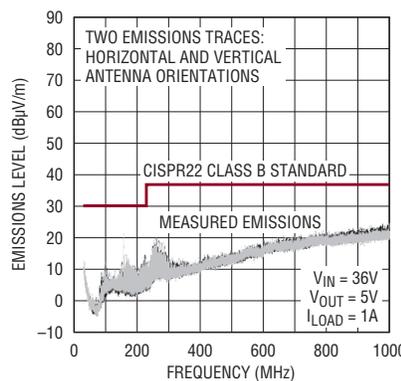


Figure 3. The LTM8031 is EN55022 Class B compliant with 5V_{OUT} at 1A from 36V_{IN}.

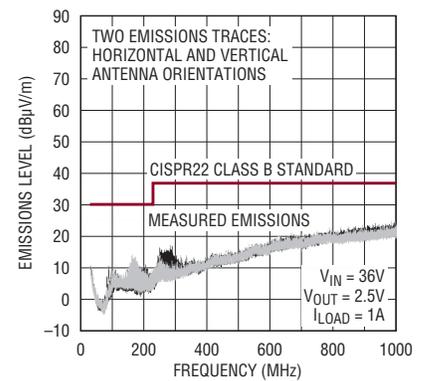


Figure 4. The LTM8031 beats the EN55022 Class B limits by a wide margin with 2.5V_{OUT} at 1A from 36V_{IN}.

New Device Cameos

Low Voltage Hot Swap Controllers Provide Extended Fault Timers

The LTC4215-2 and LTC4215-3 are low voltage Hot Swap™ controllers with onboard ADCs and I²C compatible interfaces. Functionally, the LTC4215-2 and LTC4215-3 are similar to the LTC4215 and LTC4215-1, respectively, with the overcurrent fault timers extended from 20µs to 420µs.

Some Hot Swap applications require more than the 20µs overcurrent fault filter time provided by the LTC4215 and LTC4215-1. For example, some loads draw brief surge currents and fast input voltage steps cause high transient charging currents into bulk output capacitance. Increasing the overcurrent fault filter time from 20µs to 420µs allows applications to ride out such current surges, while still turning off before MOSFET safe operating area limits have been reached.

The LTC4215-2 also defaults to auto-retry after experiencing an overcurrent fault, making the LTC4215-2 the only part in the LTC4215 family that will auto-retry by default after an overcurrent fault.

The LTC4215-2 and LTC4215-3 work in applications from 12V (with transients to 24V) down to 3.3V and are available in 4mm × 5mm QFN packages.

Isolated RS485 µModule Transceiver Integrates Isolated Power

The LTM2881 is an isolated RS485 µModule transceiver that guards against large ground-to-ground differentials and common mode transients. In practical RS485 systems, ground potentials vary widely from node to node, often exceeding the tolerable range, which can result in an interruption of communications or destruction

of a transceiver. The LTM2881 breaks ground loops by isolating the logic level interface and line transceiver using internal inductive signal isolation that allows for a much larger common mode voltage range plus superior common mode rejection of >30kV/µs. A low EMI DC/DC converter powers the transceiver and provides an isolated 5V supply output for powering any supporting external components. With 2,500V_{RMS} of galvanic isolation, onboard secondary power and a fully compliant RS485 transmitter and receiver, the LTM2881 requires no external components, ensuring a complete, compact µModule solution for isolated serial data communications.

Two versions of the LTM2881 are available for 3.3V and 5V input supplies, in low profile 11.25 × 15mm × 2.8mm surface mount LGA and BGA packages. 

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EN55022B limits by a wide margin, better than 20dB in some bands. This is shown in Figures 2, 3 and 4, where the LTM8031 is operated from 36V_{IN} to produce 10V_{OUT}, 5V_{OUT} and 2.5V_{OUT} at 1A, respectively. The 36V_{IN}, 10V_{OUT} at 1A configuration is a worst case radiated emissions scenario, because the LTM8031 is operating with both maximum rated switching voltage and output power.

The LTM8031 is rated to provide 1A, but what about other load currents? Linear Technology offers three other EN55022 class B compliant µModule DC/DC converters, as well: the LTM8020 for 200mA loads, the LTM8021 for 500mA, and the LTM8032 for 2A loads. These are summarized in Table 1, and the worst case emissions for each are given in Figures 5, 6, and 7, respectively

Conclusion

It is not uncommon to have to design a power system that requires numerous power rails at different load currents, low radiated emissions, and small size. For ease of design, take a look at the LTM8031 and its family of low noise µModule DC/DC step-down converters. 

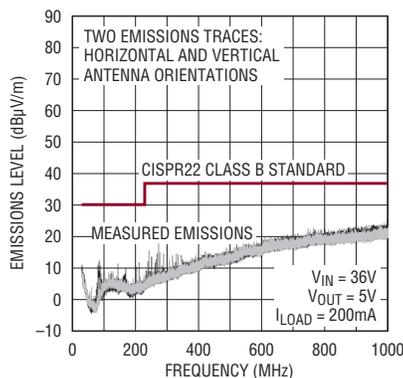


Figure 5. The LTM8020 is our quietest EMC µModule converter, providing 5V at 200mA from 36V_{IN}.

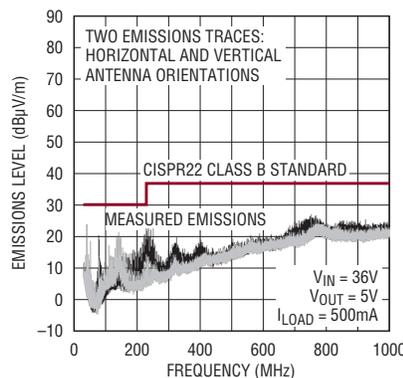


Figure 6. The LTM8021 is another EN55022B compliant device, capable of outputting 5V at 500mA from 36V_{IN}.

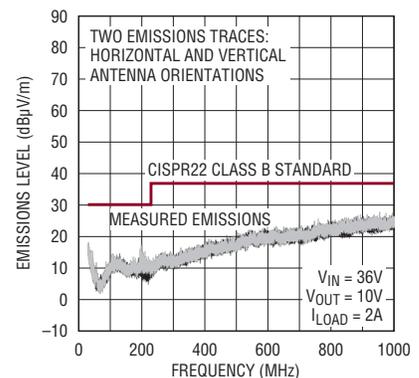


Figure 7. The LTM8032, weighing in at 10V_{OUT} at 2A from 36V_{IN}, meets EN55022 class B.