

Small Footprint High Ratio Multiphase 2x 400W Hybrid Buck

General Description

The evaluation circuit EVAL-LTC7822-BZ features LTC7822: a dual-phase hybrid step-down synchronous controller with a load current monitor. The LTC7822 uses an ADI-proprietary architecture that merges a soft switching charge pump topology with a dual-phase interleaved synchronous step-down converter to provide superior efficiency and low EMI performance. The LTC7822 can operate at a wide V_{IN} Range: 19V to 90V (100V ABS Max), output voltage up to 35V and a phase-lockable fixed frequency from 150kHz to 1.5MHz, enabling flexible configuration for different applications.

The two-channel, single output EVAL-LTC7822-BZ operates from 36V to 60V input voltage and produces an output of 5V. With forced-air cooling, an 800W total output power delivery is achieved in a dual quarter-brick solution size. Optimized at 150kHz, the EVAL-LTC7822-BZ is ideal for 48V to 5V applications with high-power density and a peak efficiency of 96.6% at these operating conditions.

Due to the proprietary architecture, the quad-phase EVAL-LTC7822-BZ features a minimum total C_{MID} capacitance value compared with traditional paralleled single-phase hybrid switched cap solutions. The 10V gate drive voltage

of the LTC7822 reduces MOSFET power loss. The onboard 12V auxiliary supply reduces loss in LTC7822's internal LDO by providing a lower input voltage than the main V_{IN} . Furthermore, the coupled inductors installed on the board enable minimum solution size and high efficiency performance.

The output voltage and V_{IN} ENABLE/UVLO voltage are both programmed by resistor dividers on the FB pins and RUN pins, respectively. The RUN pins are set so the circuit will turn on when input voltage rises above 33.5V and will turn off when input voltage falls below 30V. PGOOD and \overline{FAULT} status flags indicate V_{OUT} voltage deviation, excessive die temperature, and other fault conditions. IMONBUF reports channel output current and can be easily accessed on the board for system monitoring purposes.

The LTC7822 is provided in a 48-lead, 7mm x 7mm plastic QFN package. The LTC7822 data sheet gives a complete description of the part operation and application information. The LTC7822 data sheet must be read in conjunction with this user guide to properly use the evaluation circuit EVAL-LTC7822-BZ.

Performance Summary ($T_A = 25^\circ\text{C}$)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}			36		60	V
Output Voltage	V_{OUT}				5		V
Maximum Output Current	I_{OUT}	Forced-air cooling required (min 400LFM)			160		A
Gate Driver Supply Voltage	V_{DRVCC}				10		V
V_{IN} Turn-On Rising	$V_{IN_EN(+)}$				33		V
V_{IN} Undervoltage Lockout (UVLO) Falling	$V_{IN_UVLO(-)}$				27		V
Switching Frequency	f_{SW}				150		kHz
Full Load Efficiency	η_{FULL}	$I_{OUT} = 160\text{A}$	$V_{IN} = 42\text{V}$		95.4		%
			$V_{IN} = 48\text{V}$		95.3		%
			$V_{IN} = 54\text{V}$		95.2		%
Peak Efficiency	η_{PEAK}	$I_{OUT} = 65\text{A}$	$V_{IN} = 48\text{V}$		96.6		%
		$I_{OUT} = 60\text{A}$	$V_{IN} = 36\text{V}$		97.2		%

Notes

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