12Vin Enpirion EN23xx Module Comparison with LMZ3

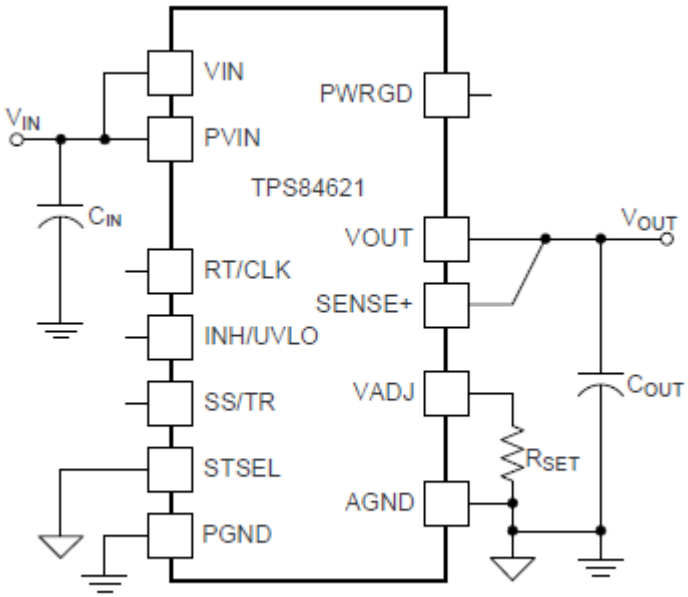
3-A / 6-A Comparison Table

	LMZ31503	LMZ31506	EN2340	EN2360
V_{CC} Voltage	**4.5V – 14.5V**	**4.5V – 14.5V**	2.5V – 5.5V*	2.5V – 5.5V*
PVIN	1.6V – 14.5V	1.6V – 14.5V	4.5V – 14V	4.5V – 14V
Iout	3A	6A	4A	6A
Fsw	330kHz – 780kHz	480kHz – 780kHz	800kHz to 1.6MHz	800kHz to 1.6MHz
Θj/a	**13° C/W**	**13° C/W**	18° C/W	16° C/W
Vout accuracy	±1.5%	±1.5%	±2%	±2%
# Components	**3**	**3**	12	12
Package	47 QFN 9x15x2.8mm	47 QFN 9x15x2.8mm	68 QFN 8x11x3mm	68 QFN 8x11x3mm
Solution size	**195mm2**	**195mm2**	200mm^2	200mm^2
Class B EMI	**Guaranteed**	**Guaranteed**	No	No
Features	Adj. Soft Start, PG, EN, Sync, Remote Sense, Tracking, Adj. UVLO, Prebias	Adj. Soft Start, PG, EN, Sync, Remote Sense, Tracking, Adj. UVLO, Prebias	Adj. Soft Start, PG, EN, Sync, Adj. UVLO	Adj. Soft Start, PG, EN, Sync, Adj. UVLO

*Not required

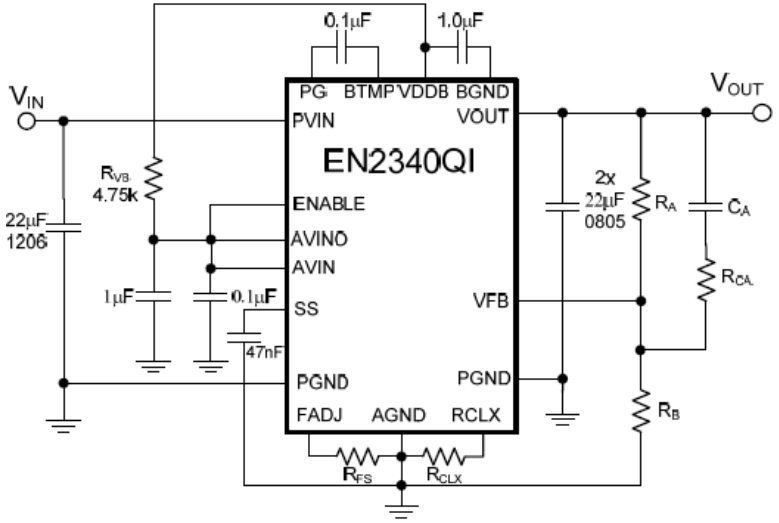
LMZ31506 guarantees EMI performance, has better thermal performance, and fewer external components

LMZ31506 – Fewer External Components



3 External Component Required

- Voltage programming resistor
- CIN & COUT not included



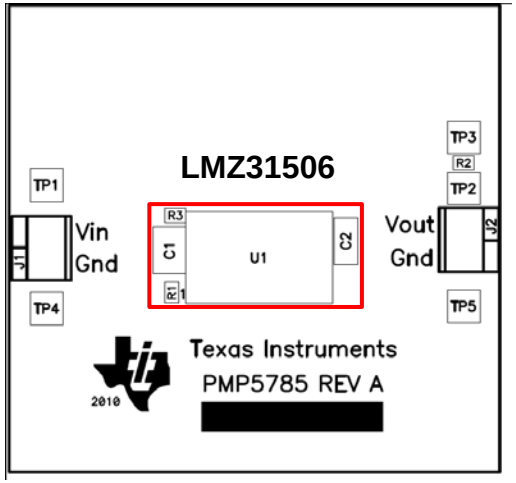
12 External Components Required

- Loop compensation
- Voltage programming
- Current limit resistor
- Soft start capacitor
- AVIN, VDDB, BTMP, bias capacitors
- Frequency select resistor
- Rvs resistor
- CIN & COUT not included

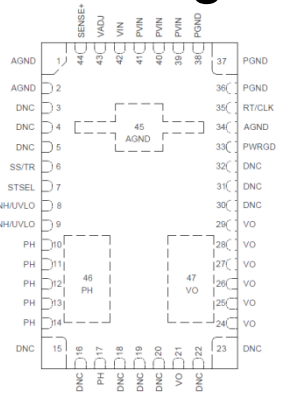
External component count affects the complexity & total solution size

LMZ31506 - Smaller Solution Size

Solution

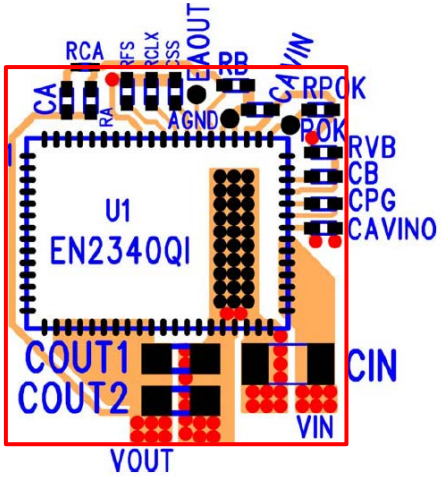


Package

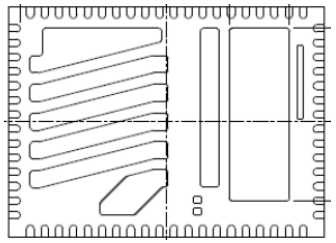


- **195mm² total solution size**
- Uses critical components only
- 9x15x2.8mm package (135mm²)
- 0.8mm pin pitch
- Shielded Flat-Wire inductor

Solution



Package

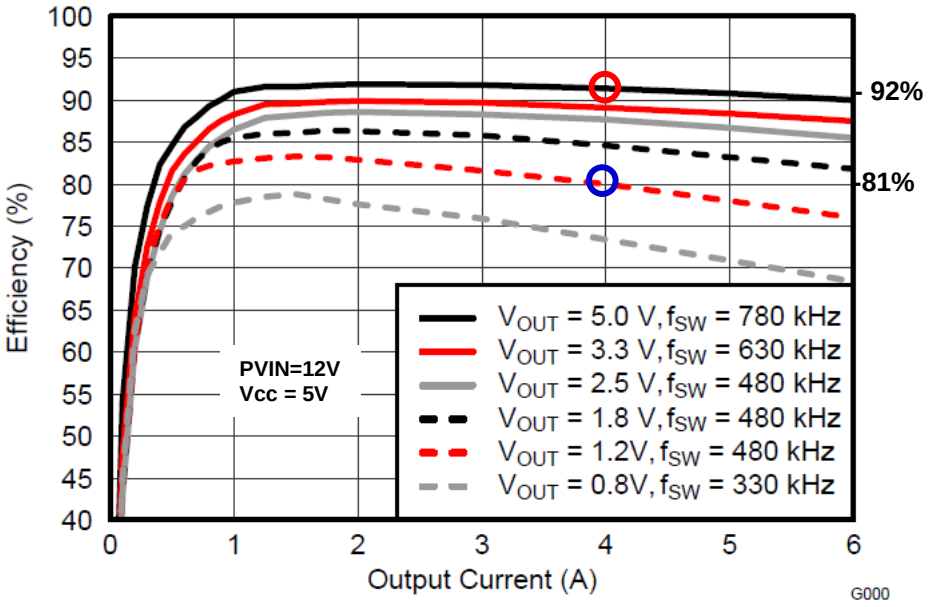


- **200mm² total solution size**
- Uses critical components only
- 8x11x3mm package (88mm²)
- 0.5mm pin pitch
- Split-Rod inductor

- **External component count increases Enpirion's total solution size**
- **TI 0.8mm pin pitch is easier and less costly in manufacturing**
- **Split Rod inductor relies on user's PCB layout to complete the coil turns**

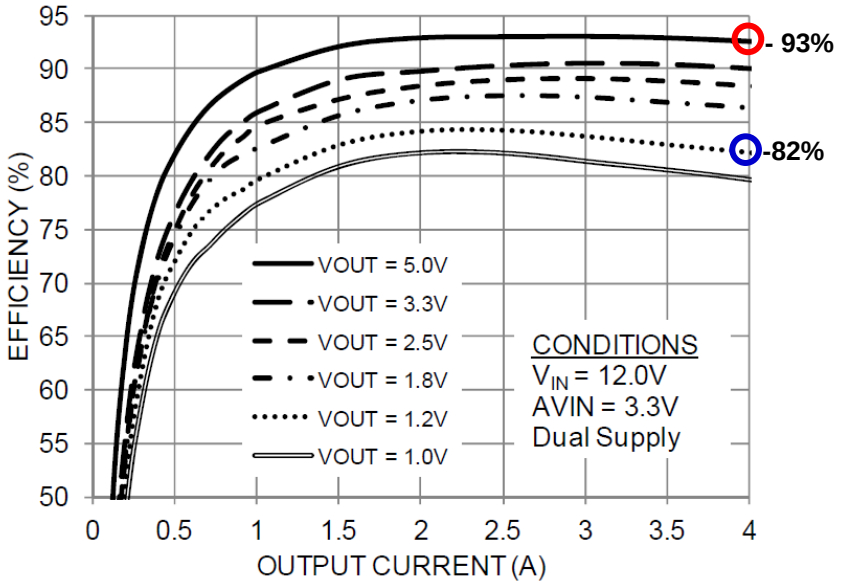
Similar Efficiency Performance

LMZ31506



- VCC and PVIN can be tied together with no external components

EN2340

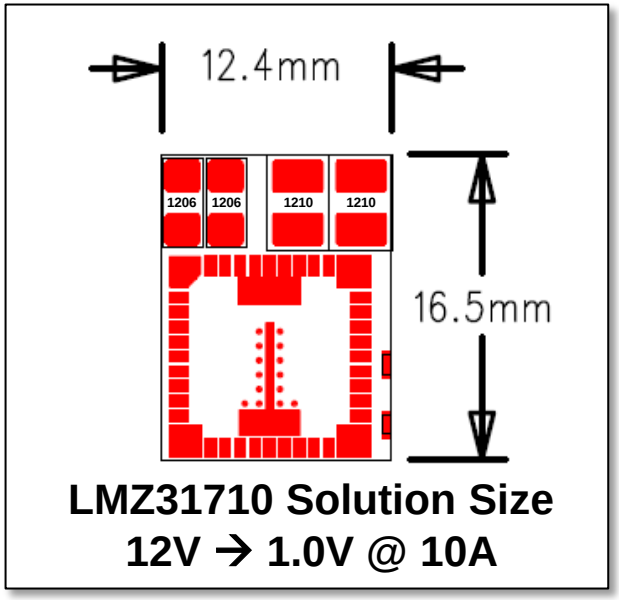


- Single supply plot not in datasheet
- Using dual supplies requires sequencing care.

- **Efficiency plots are very similar at 4A load**
- **6A EN2360 datasheet shows simulated data only at time of writing. It is similar to the 4A EN2340 efficiency**
- **Using a lower AVIN or VCC reduces loss of internal LDO and improves efficiency**

10A Comparison Table

	LMZ31710	EN2390
V_{CC} Voltage	4.5V – 17V	2.5V – 5.5V
PVIN	1.6V – 17V	4.5V – 14V
Iout	10A	9A
Fsw	200kHz – 1.2MHz	800kHz to 1.6MHz
Θj/a	TBD	16° C/W
Vout accuracy	±1.5%	±2%
# Components	3	11
Package	47 QFN 10x10x4.3mm	77 QFN 11x10x3mm
Solution size	205mm^2	235mm^2
Class B EMI	Guaranteed *	No
Features	Adj. Soft Start, PG, EN, Sync, Remote Sense, Tracking, Adj. UVLO, Prebias, 180° out of phase	Adj. Soft Start, PG, EN, Sync, Adj. UVLO

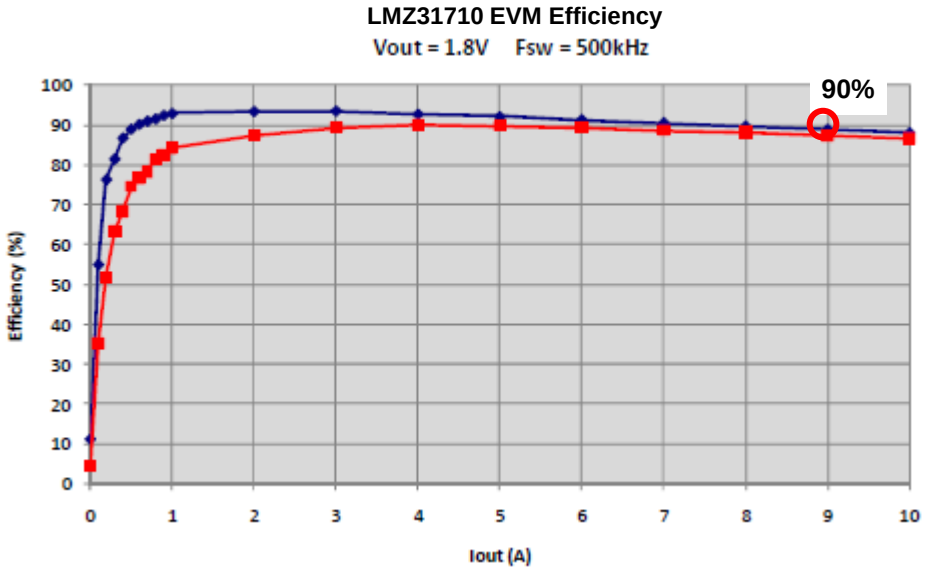


LMZ31710 Solution Size
12V → 1.0V @ 10A

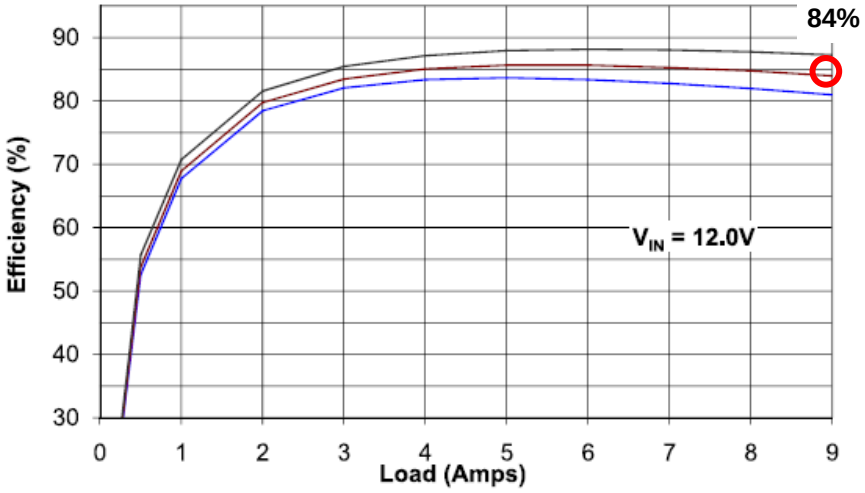
- **LMZ31710 has a 15% smaller total solution size**
- **LMZ31710 requires fewer external components**
- **LMZ31710 is sampling now**
- **EN2390 is not orderable at time of writing**

*** Prelim LMZ31710 EMI results pass. Officially "guaranteed" when pass UL testing prior to RTM**

LMZ31710 – Higher Efficiency



Efficiency: Red = 12Vin, Blue – 5Vin



Efficiency: V_{IN} = 12V,
V_{OUT} (top to bottom) = 3.3, 1.8, 1.2V

Efficiency results:

LMZ31710: **90%** from 12Vin to 1.8Vo at 9A with much higher light load efficiency

EN2390: **84%** from 12V to 1.8Vo at 9A

Summary

- LMZ31506 & LMZ31503 have better package thermal resistance for cooler operation and longer life
- LMZ31506 and LMZ31503 meet FCC Class B EMI performance
- Enpirion packaging requires the user to complete the coil turns on the PCB with multi segment split-rod core inductors. These types don't enclose the magnetic fields, and create a noisier EMI environment. LMZ31506 and LMZ31503 use a shielded, closed magnetic path inductor.
- Although Enpirion packaging is smaller, the required external components produce a slightly larger total solution size
- The efficiency performance is about the same. Both devices have the ability to use a dual power supply to reduce internal LDO losses with lower Vcc.
- The LMZ31506 and LMZ31503 can start up into a pre-biased load condition that some DSPs and FPGAs require.

For 10A/12V applications – Consider LMZ31710 (sampling now)

- 10-A LMZ31710 has a smaller footprint and total solution size than 9-A EN2390
- LMZ31710 is 3-6% more efficient than EN2390 depending on load conditions