



EZ6301QI Triple Output Module

1.5A DC-DC Buck Module with 2 x 300mA LDOs

EVALUATION BOARD OVERVIEW

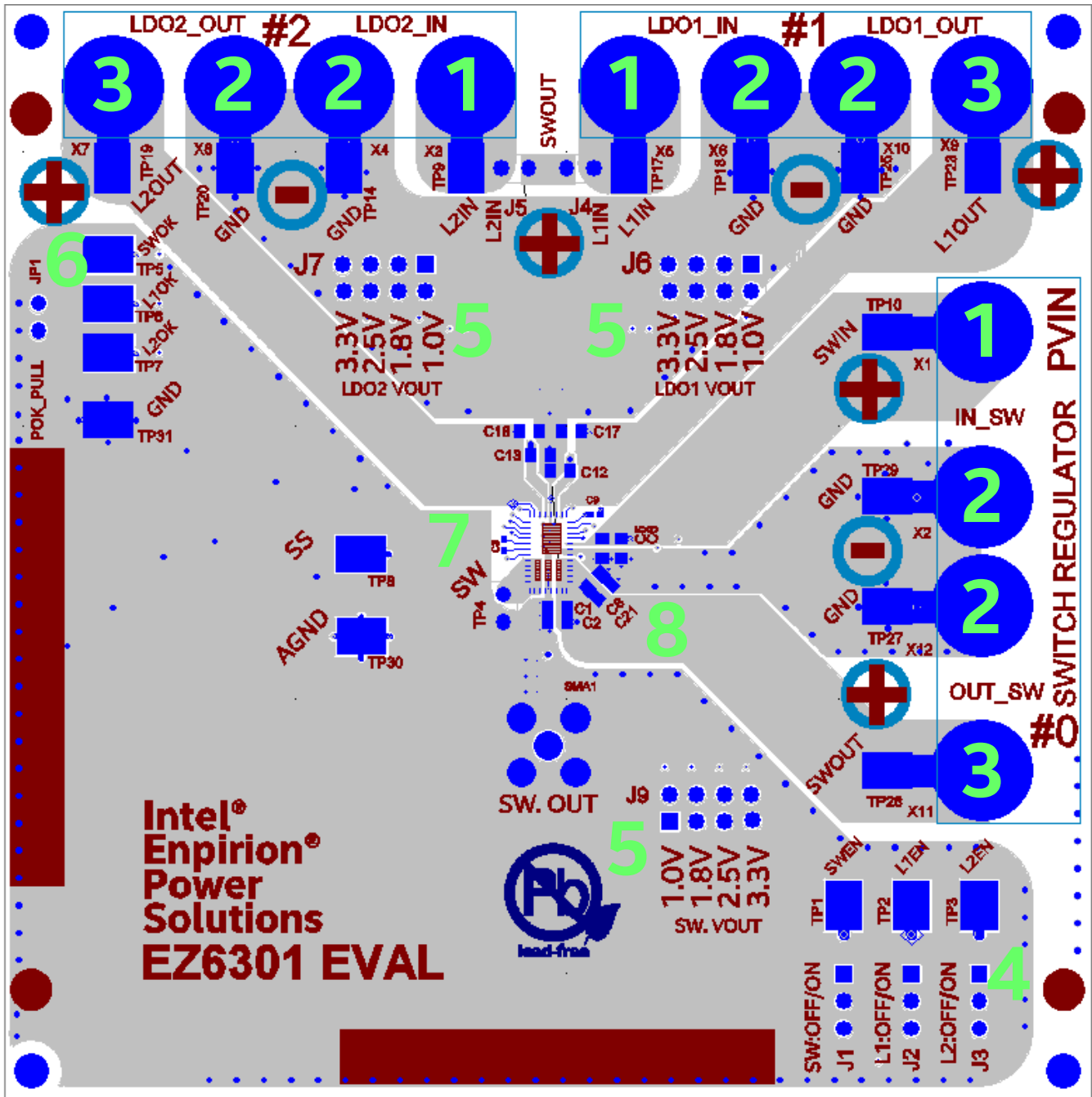


Figure 1: Evaluation Board (EVB) Features (Top View)

NOTE A: The EZ6301QI Evaluation Board is shown in Figure 1 with the important features numbered.

NOTE B: The following instructions will directly correlate with the numbers shown in Figure 1.

EVALUATION BOARD INSTRUCTIONS

1) Input Voltage (PVIN, L1IN, L2IN) - Connect 2.7V to 6.6V supply on the DC-DC Regulator input supply (PVIN). Connect 1.8V to 5.5V on the LDO input supplies (LDO1_IN and LDO2_IN). The LDO input supplies may be jumpered together with J5. Pay attention to input polarity and do not turn on until everything is connected correctly.

2) Ground (GND) - Connect the input and output ground to GND for each rail, respectively.

3) Output Voltage (OUT_SW, L1OUT, L2OUT) - Connect the load to the buck output (OUT_SW), the LDO1 output (L1OUT) and the LDO2 output (L2OUT). If the instructions were followed up to this point, the device may be powered on.

4) Enable (SWENk, L1EN, L2EN) - The ENABLE is internally pulled low to ground. The jumpers J1, J2 and J3 may be used to enable or disable each rail, respectively. An external signal may be applied to the J1, J2 or J3 pins to enable or disable each corresponding rail.

5) Output Voltage Settings - The output voltage of each rail may be adjusted quickly by placing a jumper on the jumper sets J6, J7 and J9. The voltages available for the buck regulator are 0.6V, 1V, 1.8V, 2.5 and 3.3V. The voltages available for the LDOs are 0.9V, 1V, 1.8V, 2.5V and 3.3V. The compensation CA may be adjusted according to Table 1 for best results. The output voltage may also be adjusted to any voltage as indicated by the equation for RB shown in Figure 2 and Figure 3.

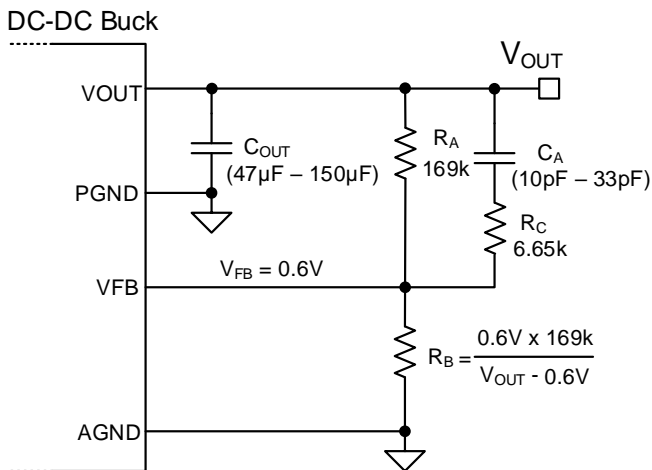


Figure 2: DC-DC VOUT Resistor Divider & Compensation Capacitor

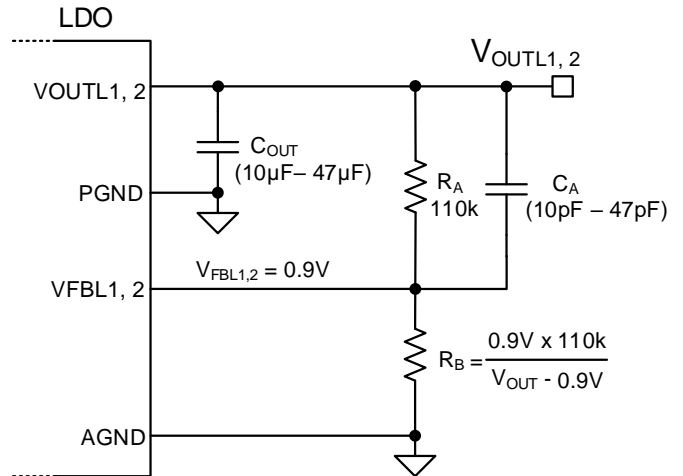


Figure 3: LDO VOUT Resistor Divider & Compensation Capacitor

Table 1: External Compensation Recommendations

Rail	V _{OUT}	R _B	C _A	R _A	R _C	C _{OUT}
DC-DC	0.6V	OPEN	33pF	169k Ω	6.65k Ω	47 μ F or 2 x 22 μ F
	0.9V	590k Ω	33pF			
	1.0V	374k Ω	33pF			
	1.2V	249k Ω	33pF			
	1.5V	165k Ω	27pF			
	1.8V	124k Ω	27pF			
	2.5V	78.7k Ω	27pF			
	3.3V	37.4k Ω	27pF			
LDO	1.0V	1M Ω	33pF	110k Ω	0	47 μ F or 2 x 22 μ F
	1.2V	332k Ω	33pF			
	1.5V	165k Ω	27pF			
	1.8V	110k Ω	27pF			
	2.5V	61.9k Ω	27pF			
	3.3V	41.2k Ω	27pF			

6) Power OK (SWOK, L1OK, L2OK) - The power OK is an open drain flag. When output voltage is within $\pm 10\%$ of regulation, the power OK flag will be pulled high to PVIN through a 100k resistance for each rail. Be sure there is a jumper on JP1 to connect the POKs to PVIN.

7) Soft Start Capacitor (C9) – The soft start capacitor (C9) is 15nF by default and can be between 10nF to 100nF. The output rise time is controlled by C9. The voltage rise time calculation is shown:

$$\text{Rise Time} \rightarrow t_{\text{RISE}} [\text{ms}] = C_{\text{SS}} [\text{nF}] \times 0.065$$

$$C_{\text{SS}} = 10\text{nF} \rightarrow t_{\text{RISE}} \approx 0.65\text{ms}$$

$$C_{\text{SS}} = 100\text{nF} \rightarrow t_{\text{RISE}} \approx 6.5\text{ms}$$

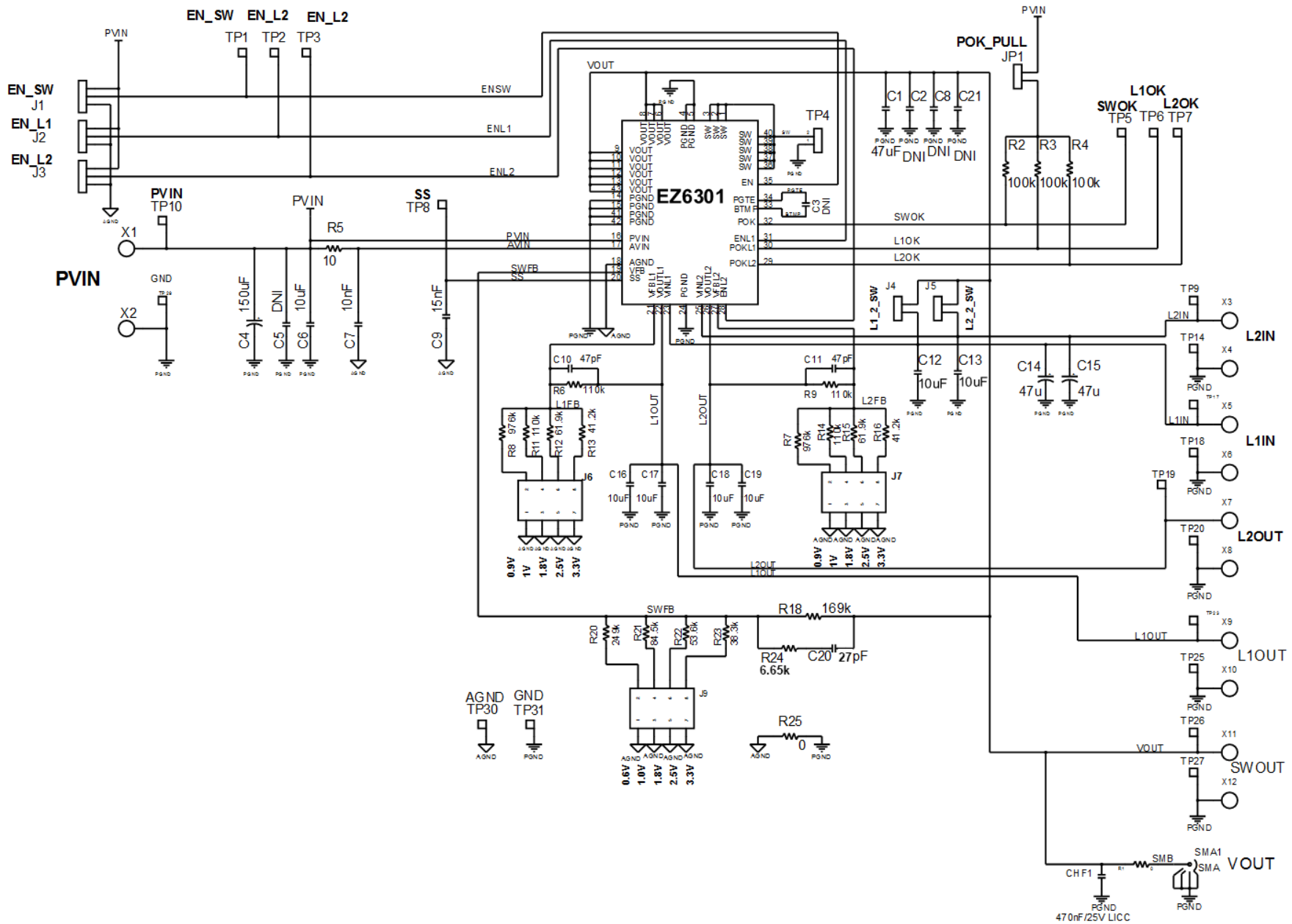
8) Bulk Capacitors – The EZ6301QI DC-DC buck regulator may support up to 150 μ F on the output, but

the compensation should be adjusted accordingly. Using Table 1 as the reference for C_A , if C_{OUT} is increased, then the C_A should also be increased. The relationship is linearly shown below:

$$\Delta C_{\text{OUT}} \approx +50\mu\text{F} \rightarrow \Delta C_A \approx +5\text{pF}$$

The recommended maximum output capacitance ($C_{\text{OUT_MAX}}$) is 150 μ F and phase-lead capacitance (C_{A_MAX}) is 47pF. The LDO output capacitance range should be between 10 μ F to 47 μ F.

EVALUATION BOARD SCHEMATIC



BILL OF MATERIALS (B.O.M.)

Quantity	Reference	Description	Manufacturer	Part Number
2	C10,C11	CAP CER 47PF 50V 5% NPO 0603	AVX	06035A470JAT2A
1	C1	CAP CER 47UF 4V X6S 0805	Murata	GRM21BC80G476ME15L
1	C9	15NF X7R 0402 25V 10% CERAMIC CAPACITOR	Murata	GRM155R71E153KA61D
7	C5,C12,C13,C16,C17,C18,C19	CAP, 10UF 0805 X7R 10% 10V CERAMIC	Murata	GRM21BR71A106KE51L
1	R20	RES - 255K OHM, 1/16W, +/- 1%, 0402 SMD	Panasonic	ERJ-2RKF2553X
3	R2,R3,R4	RES 100K OHM 1/16W 1% 0402 SMD	Panasonic	ERJ-2RKF1003X
1	R25	RES ZERO OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEY0R00V
1	R24	RES ZERO 6.65k OHM 1/10W 1% 0603 SMD	Panasonic	ERJ-3GEY6651V
1	R1	RESISTOR ZERO OHM 1/10W 5% 0402 SMD	Panasonic	ERJ-2GE0R00X
1	R18	RESISTOR 169K OHM 1/16W 1% 0402 SMD	Panasonic	ERJ-2RKF1693X
2	R11,R14	RES 110K OHM 1% 1/16W 0402 SMD	Panasonic	ERJ-2RKF1103X
2	R6,R9	RES SMD 110K OHM 1% 1/10W 0603	Vishay Dale	CRCW0603110KFKEA
1	R5	RES, 10 OHM,, 1/16W, 0402, 1%, SMD	Yageo	RC0402FR-0710RL
2	R7,R8	RES, 976K, 1/16W, 0402, 1%, SMD	Vishay Dale	CRCW0402976KFKED
1	R23	RES - 38.3K OHM, 1/16W, 1%, 0402 SMD	Panasonic	ERJ-2RKF3832X
2	R13,R16	RES - 41.2K OHM, 1/16W, 1%, 0402 SMD	Vishay	CRCW040241K2FKED
2	R12,R15	RES - 61.9K OHM, 1%, 1/16W, 0402 SMD	Panasonic	ERJ-2RKF6192x
1	R22	RES - 53.6K OHM, 1/16W, 1%, 0402 SMD	Yageo America/Phycomp	RC0402FR-0753K6L
1	R21	RES - 84.5K OHM, 1/10W, 1%, 0402 SMD	Panasonic	ERJ-2RKF8452X
1	C7	CAP - CER, 10NF, 50V, +/-10%, X7R, 0402 SMD	Murata	GRM155R71H103KA88D

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1	C20	CAP - CER, 27PF, 50V, +/-5%, COG, 0603 SMD	Murata	GCM1885C1H270JA16D
2	C14,C15	CAP - POLY TANT, 47UF, 35V, 20%, ESR 0.070 OHM, SMD 7343-43	Kemet Corporation	T521X476M035ATE070
1	C4	CAP - TANT POLYMER, 150UF, 16V, 50MOHM ESR20%, 7343*1.8MM	Panasonic	16TQC150MYF
1	CHF1	CAP CER 0.47UF 25V 20% X7R 0612	Murata	LLL31MR71E474MA01L
1	L1	1000 NH 3.2MM X 2.5MM X 1.2MM INDUCTOR	FDK	MIPSAZ3225D1R0
1	C1	CAP CER 2200PF 16V X7R 0201	MURATA ELECTRONICS NORTH AMERICA	GRM033R71C222KA88D
1	U1	EZ6301QI TRIPLE OUTPUT BUCK MODULE W/ 2XLDO 7X4MM	Intel	EZ6301QI-GTP-02

WHERE TO GET MORE INFORMATION

For more information about Intel and Intel Enpirion PowerSoCs, visit:

<https://www.altera.com/products/power/overview.html>