ER6230QI 3A Buck Regulator

Step-Down DC-DC Switching Converter with Integrated MOSFET

EVALUATION BOARD OVERVIEW

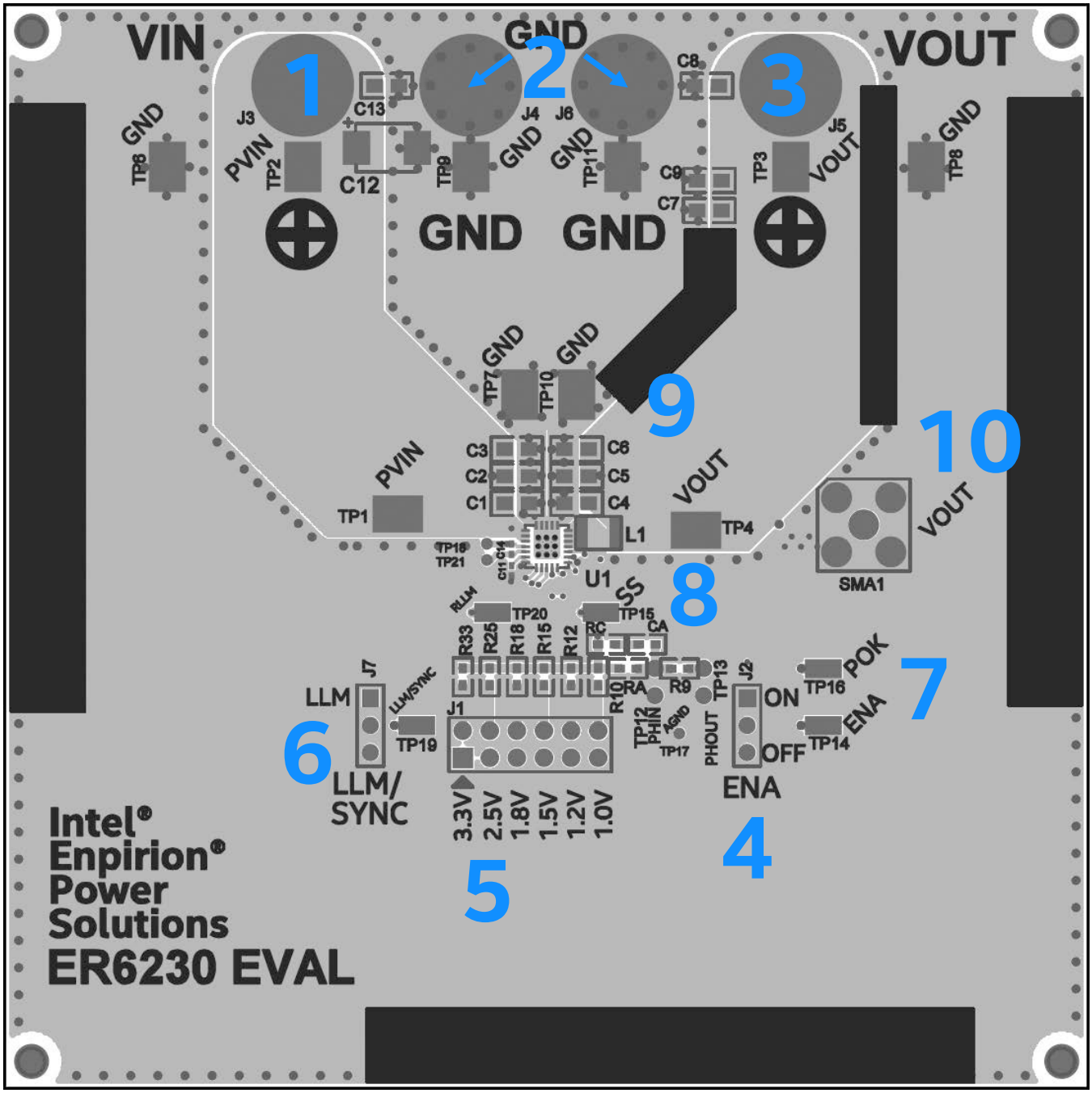


Figure 1: Evaluation Board (EVB) Features (Top View)

NOTE A: The ER6230QI 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 Supply (VIN) - Connect 2.7V to 6.6V supply on VIN (J3). 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 (J4, J6).

3) Output Voltage (VOUT) - Connect the load to VOUT (J5). If the instructions were followed up to this point, the device may be powered on.

4) Enable (ENA) – The ENABLE is used to enable or disable the device. Connecting a jumper on ENA (J2) towards the OFF side will disable the device. Similarly, connecting a jumper on the ENA (J2) towards the ON side will enable the device. An external signal may be applied to the ENA (TP14) to enable or disable the device (ON > 1.5V, OFF < 1.2V) .

5) Output Voltage Settings (J1) - The output voltage may be adjusted quickly by placing a jumper one of the selections on J1. The voltages are pre-set by the resistors R33, R25, R18, R15, R12, R10 which corresponds to 3.3V, 2.5V, 1.8V, 1.5V, 1.2V and 1.0V respectively. 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 R_B shown in Figure 2.

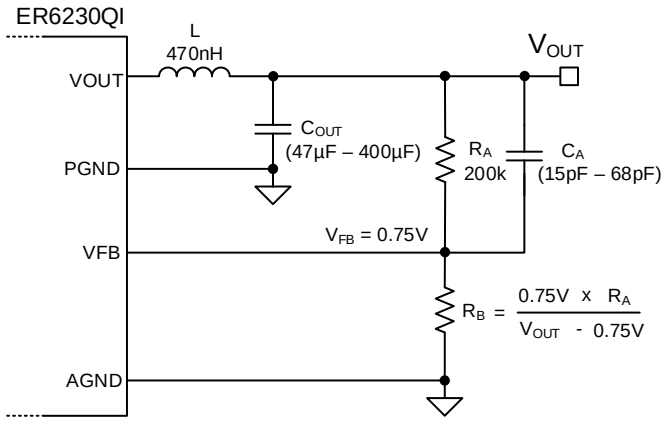


Figure 2: VOUT Resistor Divider & Compensation Capacitor

6) Clock Sync and LLM (LLM/SYNC) – At static Logic HIGH, device will allow automatic engagement of light load mode. At static logic LOW, the device is forced into PWM only. A clocked input to this pin will synchronize the internal switching frequency to the external signal. Do not leave this pin floating.

7) Power OK (POK) - This is the open drain Power OK flag. When VOUT is over 90% of regulation, POK will be pulled high to VIN through the R_{POK} resistor (R_{POK} is on the backside of the board).

Table 1: External Compensation Recommendations

V_{IN}	V_{OUT}	R_B	C_A	R_A	C_{OUT} (0805)
2.5V – 6.6V	0.75V	OPEN	33pF	200kΩ	2 x 47µF
	0.9V	1MΩ	33pF		
	1.0V	600kΩ	27pF		
	1.2V	332kΩ	27pF		
	1.5V	200kΩ	22pF		
	1.8V	143kΩ	22pF		
	2.5V	84.5kΩ	18pF		
	3.3V	59kΩ	15pF		

8) Soft Start Capacitor (CSS) – The soft start capacitor (C_{SS}) is 15nF by default and can be between 10nF to 100nF. The output rise time is controlled by C_{SS}. The voltage rise time calculation is shown:

Rise Time → t_{RISE} [ms] = C_{ss} [nF] x 0.08

C_{SS} = 15nF → $t_{RISE} \approx$ 1.2ms

C_{SS} = 100nF → $t_{RISE} \approx$ 8ms

The C_{SS} capacitor is on the backside of the board.

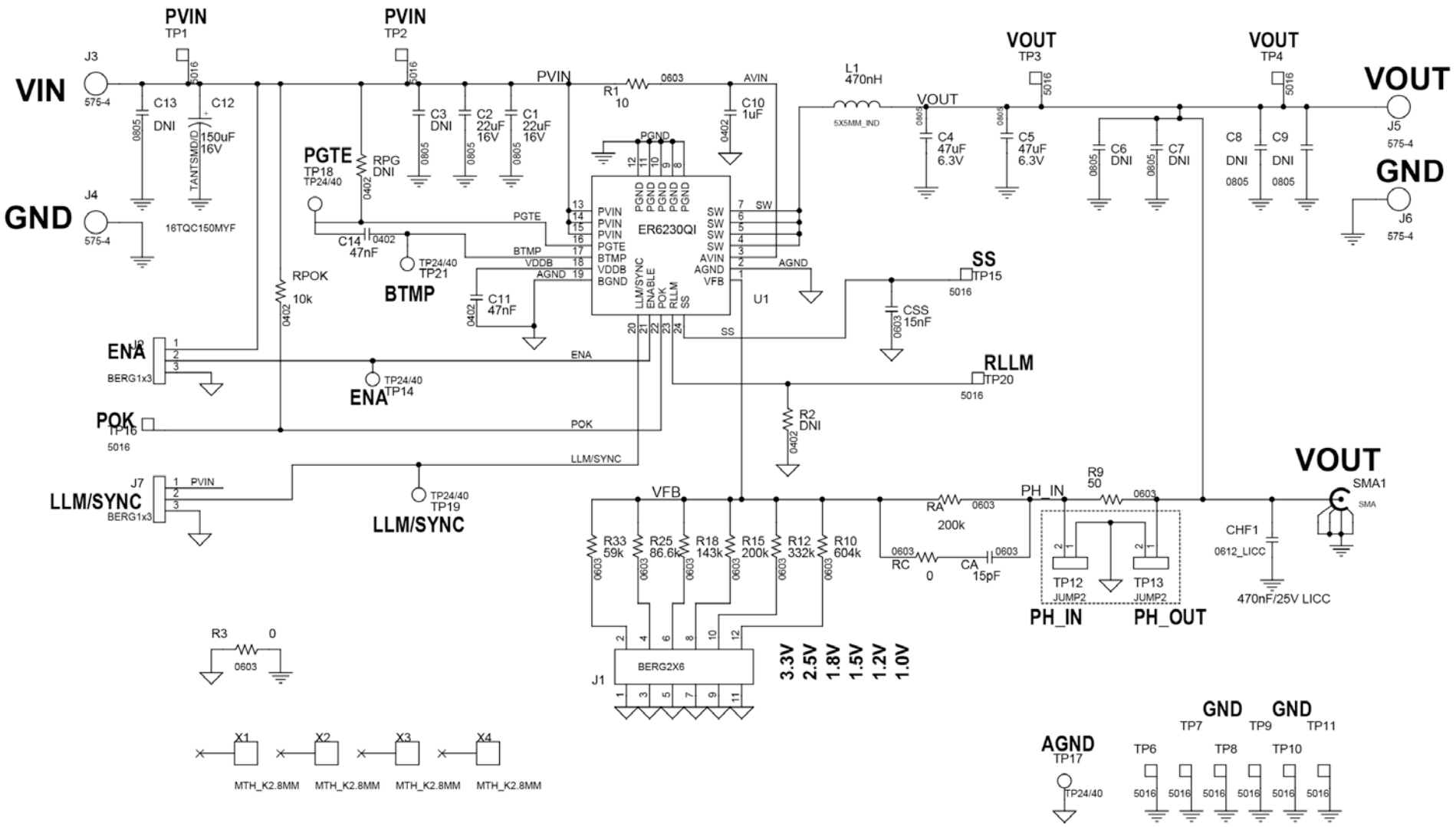
9) Bulk Capacitors – The ER6230QI may support up to 400µF on the output, but the compensation should be adjusted accordingly. Using Table 1 as the reference for C_A, if C_{OUT} is increased, then the C_A should also be increased. The relationship is linearly shown below:

$\Delta C_{OUT} \approx +100\mu F \rightarrow \Delta C_A \approx +10pF$

The recommended maximum output capacitance (C_{OUT_MAX}) is 400µF and phase-lead capacitance (C_{A_MAX}) is 68pF.

10) Output Ripple Measurement (SMA1) – A SMA cable may be connected to SMA1 to measure the AC coupled output ripple.

EVALUATION BOARD SCHEMATIC



BILL OF MATERIALS (B.O.M.)

Quantity	Reference	Value	Manufacturer	Part Number	PCB Footprint	Voltage	Tolerance	Power	Dielectric
1	CA	15pF	Murata	GRM1885C1H150JA01D	0603	50V	5%		C0G
1	CHF1	470nF	Murata	LLL31MR71E474MA01L	0612				X7R
1	CSS	15nF	Murata	GRM155R71E153KA61D	0402	50V	±10%		X7R
2	C1,C2	22uF	TDK Electronics	C2012X5R1C226M125AC	0805	16V	20%		X5R
2	C4,C5	47uF	Taiyo Yuden	JMK212BJ476MG-T	0805	6.3V	±20%		X5R
1	C10	1uF	TDK Electronics	CGB2A1X5R1E105K033BC	0402	25V	±10%		X5R
2	C11,C14	47nF	Murata	GRM155R71A473KA01	0402	10V	±10%		X7R
1	C12	150uF	Panasonic	16TQC150MYF	TANTSMD/D	16V	20%		
1	L1	470nH	FDK	MIPSAZ3225D	MIPSAZ3225D		30%		
2	R15,RA	200k	Stackpole Electronics Inc	RMCF0603FT200K	0603		±1%	1/8W	
2	R3,RC	0	Panasonic	ERJ-3GEY0R00V	0603			1/10W	
1	RPOK	10k	Yageo	ERJ-2RKF1002X	0402		± 1%	1/16W	
1	R1	10	Panasonic	ERJ-2RKF10R0X	0402		±1%	1/16W	
1	R9	50	Vishay	FC0603E50R0BTBST1	0603		±1%	1/8W	
1	R10	604k	Yageo	RC0603FR-07604KL	0603		±1%	1/8W	
1	R12	332k	Yageo	RC0603FR-07332KL	0603		±1%	1/8W	
1	R18	143k	Yageo	RC0603FR-07143KL	0603		±1%	1/8W	
1	R25	86.6k	Vishay Dale	CRCW060386K6FKEA	0603		±1%	1/8W	
1	R33	59k	Yageo	RC0603FR-0759KL	0603		±1%	1/8W	
1	U1	ER6230QI	Intel	ER6230QI	QFN24_4x4				

WHERE TO GET MORE INFORMATION

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

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

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