Efficiency up to 97%

DESIGN KIT
Low Power – Point of Load Solutions

600 mA to 1.5 A, Low Input Voltage Single and Dual Channel Converter

Order Code
IC-744 721 | XRPWRKIT-LWP-1
Version 1.0

Exar Device	Max. Output Current	Input Voltage Range	Output Voltage Range	Operating Frequency	Max Efficiency	Package	Würth Elektronik Inductor	
							Value	Reference
SP6669	0.6 A	2.5 V - 5.5 V	0.6 V - V_{IN}	1.5 MHz	95 %	SOT23-5	4.7 µH	744 025 004
XRP6658	1 A	2.5 V - 5.5 V	0.6 V - V_{IN}	1.5 MHz	97 %	SOT23-5	2.2 µH	744 043 002 2
XRP6668	1A / 1A	2.5 V - 5.5 V	0.6 V - V_{IN}	1.5 MHz	97 % / 97 %	SOIC8	2.2 µH / 2.2 µH	744 043 002 2
XRP6657	1.5 A	2.5 V - 5.5 V	0.6 V - V_{IN}	1.5 MHz	95 %	DFN6	1.8 µH	744 773 018

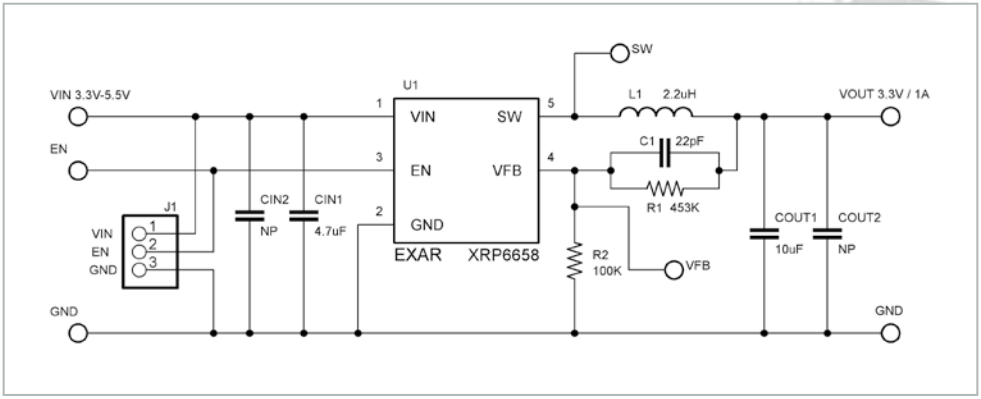
XRP6658

1 A 1.5 MHz Synchronous
Step Down Converter

More information on
www.we-online.com/exar

Evaluation Board Configuration

Input Voltage	2.5 V - 5.5 V
Output Voltage	3.3 V
Max. Output Current	1 A
Operating Frequency	1.5 MHz
Inductor Reference	2.2 µH – WE-TPC 744 043 002 2



Inductor Value L – Resistor Values R1 / R2 Selector

	V_{IN} = 3.3 V			V_{IN} = 5.0 V				
V_{OUT}/I_{OUT}	**100 mA**	**500 mA**	**1000 mA**	**100 mA**	**500 mA**	**1000 mA**	**R1**	**R2**
3.3 V				22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 043 002 2**	453 kΩ	100 kΩ
2.8 V	10 µH 744 089 431 00	1.8 µH 744 043 001 8	1.0 µH 744 089 430 10	22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 373 240 22**	365 kΩ	100 kΩ
2.5 V	15 µH 744 089 431 50	2.2 µH **744 043 002 2**	1.2 µH 744 373 240 12	22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 373 240 22**	316 kΩ	100 kΩ
1.8 V	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	22 µH 744 089 432 20	6.8 µH 744 089 430 68	2.2 µH **744 043 002 2**	200 kΩ	100 kΩ
1.2 V	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	18 µH 744 043 180	3.3 µH 744 373 240 33	1.8 µH 744 043 001 8	100 kΩ	100 kΩ
0.8 V	15 µH 744 089 431 50	2.2 µH **744 043 002 2**	1.2 µH 744 373 240 12	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	33 kΩ	100 kΩ

Best suitable inductor **Lowest profile inductor** **Evaluation board configuration**

SP6669

600 mA 1.5 MHz PWM Synchronous Step Down Converter

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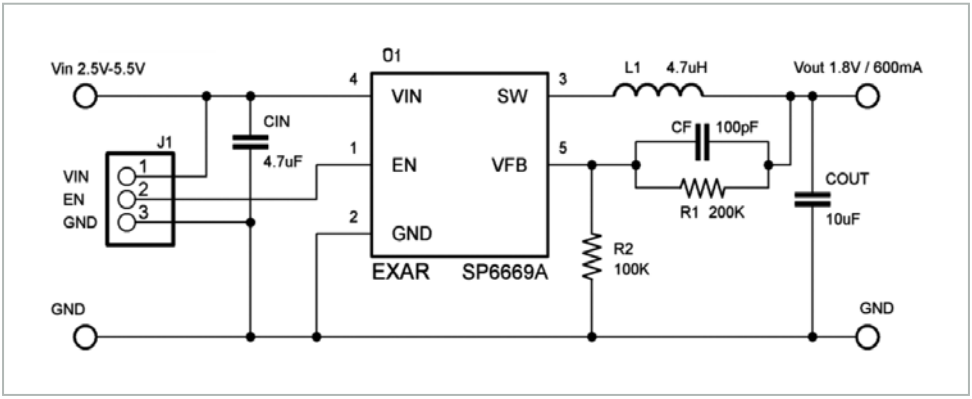
Evaluation Board Configuration	
Input Voltage	2.5 V - 5.5 V
Output Voltage	1.8 V
Max. Output Current	600 mA
Operating Frequency	1.5 MHz
Inductor Reference	4.7 µH – WE-TPC 744 025 004



Inductor Value L – Resistor Values R1 / R2 Selector

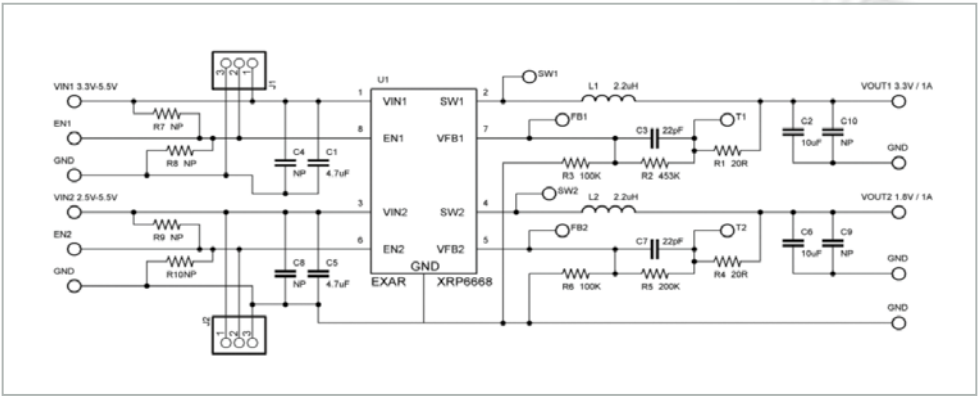
	V_{IN} = 3.3 V			V_{IN} = 5.0 V				
V_{OUT}/I_{OUT}	**100 mA**	**300 mA**	**600 mA**	**100 mA**	**300 mA**	**600 mA**	**R1**	**R2**
3.3 V				22 µH 744 025 220	6.8 µH 744 025 006	4.7 µH **744 025 004**	453 kΩ	100 kΩ
2.8 V	10 µH 744 032 910 0	3.3 µH 744 025 003	1.5 µH	22 µH 744 025 220	6.8 µH 744 025 006	4.7 µH **744 025 004**	365 kΩ	100 kΩ
2.5 V	15 µH 744 025 150	4.7 µH **744 032 900 4**	2.2 µH 744 032 900 2	22 µH 744 025 220	6.8 µH 744 025 006	4.7 µH **744 025 004**	316 kΩ	100 kΩ
1.8 V	15 µH 744 025 150	4.7 µH **744 032 900 4**	3.3 µH 744 025 003	22 µH 744 025 220	6.8 µH 744 025 006	4.7 µH **744 025 004**	200 kΩ	100 kΩ
1.2 V	15 µH 744 025 150	4.7 µH **744 032 900 4**	3.3 µH 744 025 003	18 µH 744 032 180	6.8 µH 744 025 006	3.3 µH 744 025 003	100 kΩ	100 kΩ
0.8 V	15 µH 744 025 150	4.7 µH **744 032 900 4**	2.2 µH 744 032 9002	15 µH 744 032 001 5	4.7 µH **744 025 004**	2.2 µH 744 025 002	33 kΩ	100 kΩ

Best suitable inductor **Lowest profile inductor** **Evaluation board configuration**

XRP6668

1 A/1 A Dual Channel 1.5 MHz Synchronous Step Down Converter

Evaluation Board Configuration	
Input Voltage	2.5 V - 5.5 V
Output Voltage	3.3 V/1.8 V
Max. Output Current	1 A/1 A
Operating Frequency	1.5 MHz
Inductor Reference	2.2 µH – WE-TPC 744 043 002 2



Inductor Value L – Resistor Values R1/R5 and R2/R6 Selector

	V_{IN} = 3.3 V			V_{IN} = 5.0 V				
V_{OUT}/I_{OUT}	100 mA	500 mA	1000 mA	100 mA	500 mA	1000 mA	R1/R5	R2/R6
3.3 V				22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 043 002 2**	453 kΩ	100 kΩ
2.8 V	10 µH 744 089 431 00	1.8 µH 744 043 001 8	1.0 µH 744 089 430 10	22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 373 240 22**	365 kΩ	100 kΩ
2.5 V	15 µH 744 089 431 50	2.2 µH **744 043 002 2**	1.2 µH 744 373 240 12	22 µH 744 089 432 20	4.7 µH 744 373 240 47	2.2 µH **744 373 240 22**	316 kΩ	100 kΩ
1.8 V	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	22 µH 744 089 432 20	6.8 µH 744 089 430 68	2.2 µH **744 043 002 2**	200 kΩ	100 kΩ
1.2 V	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	18 µH 744 043 180	3.3 µH 744 373 240 33	1.8 µH 744 043 001 8	100 kΩ	100 kΩ
0.8 V	15 µH 744 089 431 50	2.2 µH **744 043 002 2**	1.2 µH 744 373 240 12	15 µH 744 089 431 50	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	33 kΩ	100 kΩ

Best suitable inductor **Lowest profile inductor** **Evaluation board configuration**

Note: The above table values apply to each channel of the XRP6668.

XRP6657

1.5 A 1.3 MHz Synchronous Step Down Converter

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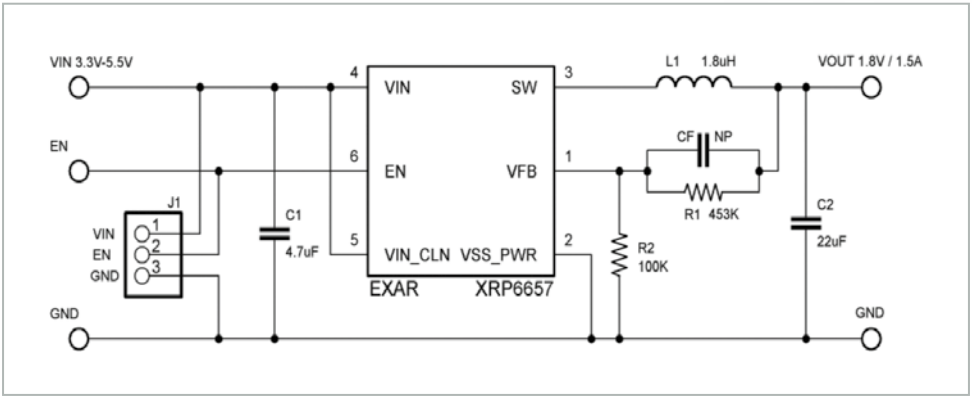
Evaluation Board Configuration

Input Voltage	2.5 V - 5.5 V
Output Voltage	1.8 V
Max. Output Current	1.5 A
Operating Frequency	1.3 MHz
Inductor Reference	1.8 µH – WE-PD2 744 773 018



Inductor Value L – Resistor Values R1 / R2 Selector

	V_{IN} = 3.3 V			V_{IN} = 5.0 V				
V_{OUT}/I_{OUT}	**100 mA**	**750 mA**	**1500 mA**	**100 mA**	**750 mA**	**1500 mA**	**R1**	**R2**
3.3 V				33 µH 744 042 330	3.3 µH 744 373 240 33	1.8 µH **744 042 018**	453 kΩ	100 kΩ
2.8 V	10 µH 744 042 100	1.5 µH 744 373 240 15	1.0 µH 744 373 240 10	33 µH 744 042 330	3.3 µH 744 373 240 33	1.8 µH **744 042 018**	365 kΩ	100 kΩ
2.5 V	15 µH 744 042 150	1.8 µH **744 773 018**	1.0 µH 744 373 240 10	33 µH 744 042 330	3.3 µH 744 373 240 33	1.8 µH **744 773 018**	316 kΩ	100 kΩ
1.8 V	18 µH 744 042 180	2.2 µH 744 773 022	1.5 µH 744 373 240 15	33 µH 744 042 330	3.3 µH 744 373 240 33	1.8 µH **744 773 018**	200 kΩ	100 kΩ
1.2 V	18 µH 744 042 180	2.2 µH 744 773 022	1.0 µH 744 373 240 10	22 µH 744 373 242 20	3.3 µH 744 373 240 33	1.5 µH 744 373 240 15	100 kΩ	100 kΩ
0.8 V	15 µH 744 042 150	1.8 µH **744 773 018**	1.0 µH 744 373 240 10	15 µH 744 042 150	2.2 µH 744 773 022	1.0 µH 744 373 240 10	33 kΩ	100 kΩ

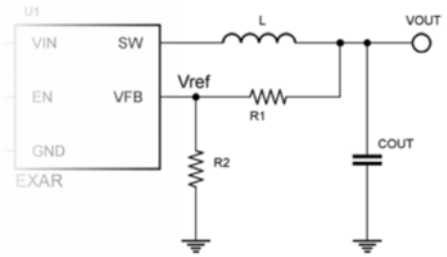
Best suitable inductor **Lowest profile inductor** **Evaluation board configuration**

Design Tips

Output Voltage Selection

The output voltage is adjustable via the external resistor network R1 and R2 as per the following formula:

$$V_{OUT} = V_{REF} \bullet (1 + \frac{R1}{R2})$$



Where

V_{REF} = Reference voltage at 0.6 V

The feedback resistors must be chosen such that power dissipation of the network is minimal. R1 and R2 are typically allowed within a given range; adhere to the recommended values in the tables.

Inductor Selection

Inductor ripple current and saturation current ratings are two factors to be considered when selecting the inductor value.

A low R_{DC} inductor is preferred. The inductor value L can be calculated from the following equation:

$$L = (V_{IN} - V_{OUT}) \bullet (\frac{V_{OUT}}{V_{IN}}) \bullet (\frac{1}{f}) \bullet (\frac{1}{\Delta IL})$$

Where

L = Inductor value

V_{IN} = Input voltage

V_{OUT} = Output voltage

f = Operating frequency

ΔIL = Current ripple – usually set between 30% and 40% of output current desired

The inductor value for the evaluation boards is set for an output current ripple of approximately 30% to 40% of the maximum output current desired. An output current ripple level of 30% to 40% is acceptable in most designs and may provide extra flexibility in selecting the appropriate inductor value.

Note

All product documentations, including datasheets, evaluation board manuals and bill of material can be found on

www.exar.com/wurth_electronics

www.we-online.com/exar