



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 μ H	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 μ H	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 μ H / 2.2 μ H	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 μ H	744 773 018

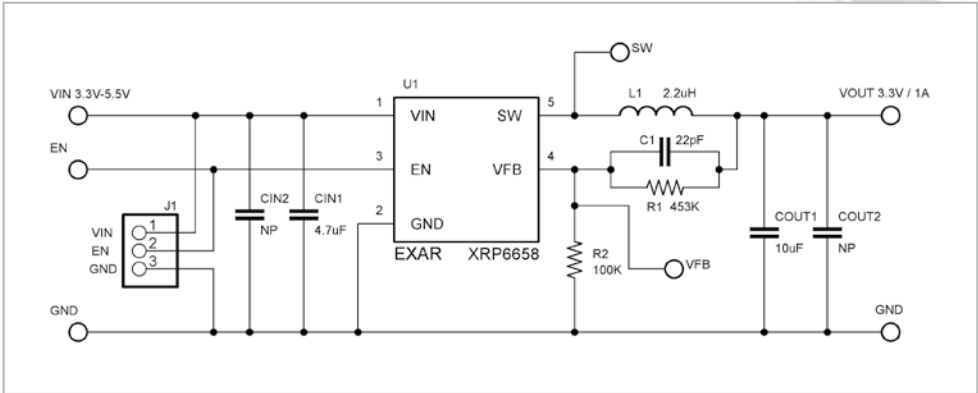
XRP6658

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_{OUT}/I_{OUT}	$V_{IN} = 3.3 V$			$V_{IN} = 5.0 V$			R1	R2
	100 mA	500 mA	1000 mA	100 mA	500 mA	1000 mA		
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

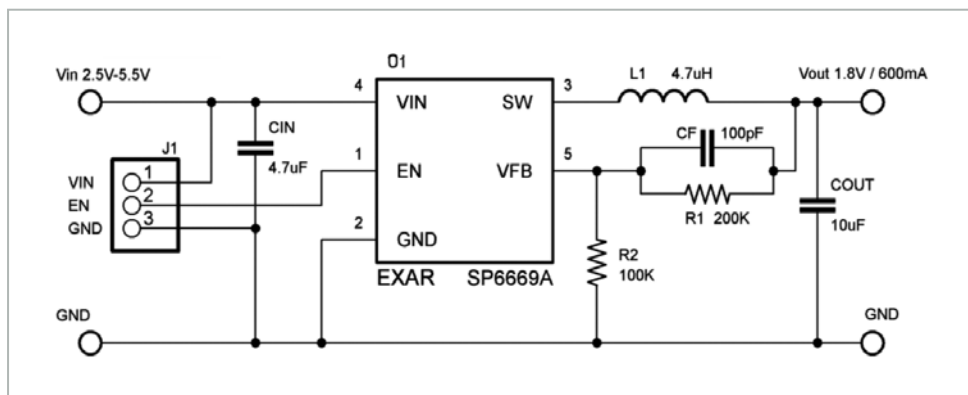
SP6669

600 mA 1.5 MHz PWM Synchronous
Step Down Converter



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 μ H – WE-TPC 744 025 004



Inductor Value L – Resistor Values R1 / R2 Selector

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

Best suitable inductor

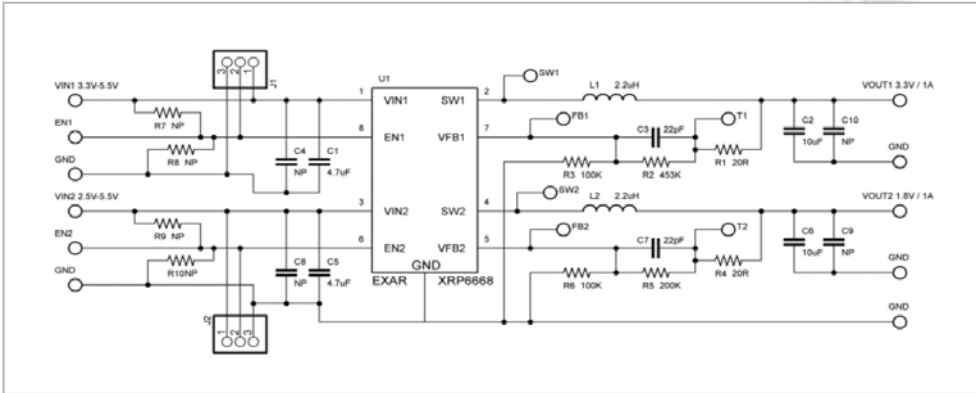
Lowest profile inductor

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 μ H – WE-TPC 744 043 002 2



Inductor Value L – Resistor Values R1 /R5 and R2/R6 Selector								
V _{OUT} /I _{OUT}	V _{IN} = 3.3 V			V _{IN} = 5.0 V			R1/R5	R2/R6
	100 mA	500 mA	1000 mA	100 mA	500 mA	1000 mA		
3.3 V				22 μ H 744 089 432 20	4.7 μ H 744 373 240 47	2.2 μ H 744 043 002 2	453 k Ω	100 k Ω
2.8 V	10 μ H 744 089 431 00	1.8 μ H 744 043 001 8	1.0 μ H 744 089 430 10	22 μ H 744 089 432 20	4.7 μ H 744 373 240 47	2.2 μ H 744 373 240 22	365 k Ω	100 k Ω
2.5 V	15 μ H 744 089 431 50	2.2 μ H 744 043 002 2	1.2 μ H 744 373 240 12	22 μ H 744 089 432 20	4.7 μ H 744 373 240 47	2.2 μ H 744 373 240 22	316 k Ω	100 k Ω
1.8 V	15 μ H 744 089 431 50	3.3 μ H 744 373 240 33	1.5 μ H 744 373 240 15	22 μ H 744 089 432 20	6.8 μ H 744 089 430 68	2.2 μ H 744 043 002 2	200 k Ω	100 k Ω
1.2 V	15 μ H 744 089 431 50	3.3 μ H 744 373 240 33	1.5 μ H 744 373 240 15	18 μ H 744 043 180	3.3 μ H 744 373 240 33	1.8 μ H 744 043 001 8	100 k Ω	100 k Ω
0.8 V	15 μ H 744 089 431 50	2.2 μ H 744 043 002 2	1.2 μ H 744 373 240 12	15 μ H 744 089 431 50	3.3 μ H 744 373 240 33	1.5 μ H 744 373 240 15	33 k Ω	100 k Ω

Best suitable inductor Lowest profile inductor

Evaluation board configuration

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

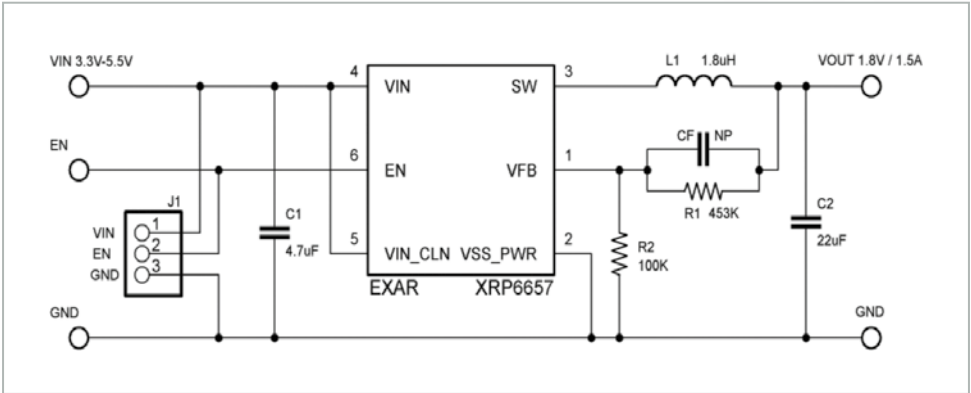
XRP6657

1.5 A 1.3 MHz Synchronous
Step Down Converter



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 μ H – WE-PD2 744 773 018



Inductor Value L – Resistor Values R1 / R2 Selector

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

Best suitable inductor

Lowest profile inductor

Evaluation board configuration

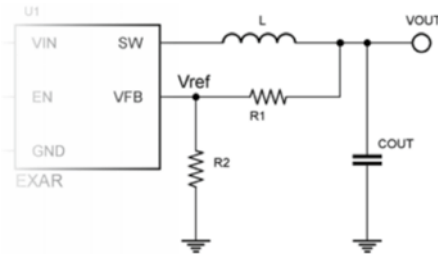


Design Tips

Output Voltage Selection

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

$$V_{OUT} = V_{REF} \cdot \left(1 + \frac{R1}{R2}\right)$$



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:

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

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