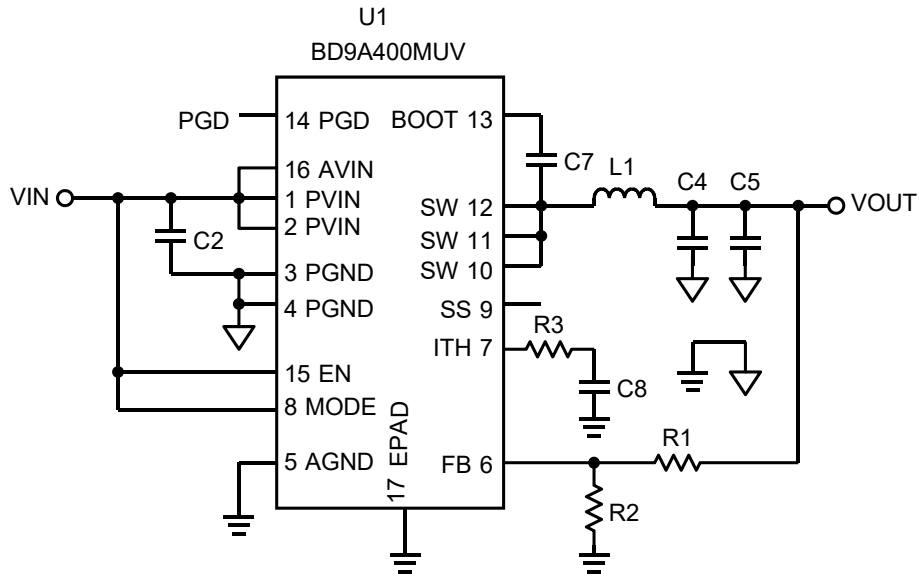


DC/DC Converter Reference Circuit

IC Product Name	BD9A400MUV
Topology	Buck (Step-Down) Switching Regulator
Type	Non-Isolation

	Input	Output
1	2.7V to 5.5V	1.1V, 4A
2	2.7V to 5.5V	1.2V, 4A
3	2.7V to 5.5V	1.5V, 4A
4	2.7V to 5.5V	1.8V, 4A
5	4.71V to 5.5V	3.3V, 4A

■ Typical Application Circuit



■ MODE terminal setting (8-pin)

Terminal state	IC operation
High	Automatic switching operation between PWM and light load mode
Low	PWM fixing operation

■ SS terminal setting (9-pin)

Terminal state	Soft start time
Open	$T_{SS} = 1[ms]$
Capacitor connection	$T_{SS} = \frac{C \times 0.8}{1.8 \times 10^{-6}} [s]$

■ EN terminal setting (15-pin)

Terminal state	IC operation
2.0V to AVIN	Normal operation
GND to 0.8V	Power down

■ Output voltage setting

$$V_{OUT} = \frac{R_1 + R_2}{R_2} \times 0.8 [V]$$

Input/output voltage conditions are required to satisfy the following equations:

$$V_{OUT} = 0.8V \sim (V_{IN} \times 0.7)V$$

■ Bill of Materials

1. $V_O=1.1V$ ($V_{IN}=2.7V$ to $5.5V$)

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
1	C2	Ceramic Capacitor	10 μ F	10V, X5R, \pm 10%	GRM31CR61A106KA01	MURATA	3216
2	C4, C5	Ceramic Capacitor	22 μ F	10V, X5R, \pm 20%	GRM21BR61A226ME44	MURATA	2012
1	C7	Ceramic Capacitor	0.1 μ F	16V, X5R, \pm 10%	GRM155R61C104KA88	MURATA	1005
1	C8	Ceramic Capacitor	2700pF	50V, X7R, \pm 10%	GRM155R71H272KA01	MURATA	1005
1	L1	Inductor	1.5 μ H	See the recommended inductor list of separate volume.			
1	R1	Resistor	10k Ω	0.063W, 50V, 1%	MCR01MZPF1002	ROHM	1005
1	R2	Resistor	27k Ω	0.063W, 50V, 1%	MCR01MZPF2702	ROHM	1005
1	R3	Resistor	8.2k Ω	0.063W, 50V, 5%	MCR01MZPJ822	ROHM	1005
1	U1	IC	-	Buck DC/DC Converter	BD9A400MUV	ROHM	VQFN016V3030

2. $V_O=1.2V$ ($V_{IN}=2.7V$ to $5.5V$)

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
1	C2	Ceramic Capacitor	10 μ F	10V, X5R, \pm 10%	GRM31CR61A106KA01	MURATA	3216
2	C4, C5	Ceramic Capacitor	22 μ F	10V, X5R, \pm 20%	GRM21BR61A226ME44	MURATA	2012
1	C7	Ceramic Capacitor	0.1 μ F	16V, X5R, \pm 10%	GRM155R61C104KA88	MURATA	1005
1	C8	Ceramic Capacitor	2700pF	50V, X7R, \pm 10%	GRM155R71H272KA01	MURATA	1005
1	L1	Inductor	1.5 μ H	See the recommended inductor list of separate volume.			
1	R1	Resistor	10k Ω	0.063W, 50V, 1%	MCR01MZPF1002	ROHM	1005
1	R2	Resistor	20k Ω	0.063W, 50V, 1%	MCR01MZPF2002	ROHM	1005
1	R3	Resistor	8.2k Ω	0.063W, 50V, 5%	MCR01MZPJ822	ROHM	1005
1	U1	IC	-	Buck DC/DC Converter	BD9A400MUV	ROHM	VQFN016V3030

3. $V_O=1.5V$ ($V_{IN}=2.7V$ to $5.5V$)

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
1	C2	Ceramic Capacitor	10 μ F	10V, X5R, \pm 10%	GRM31CR61A106KA01	MURATA	3216
2	C4, C5	Ceramic Capacitor	22 μ F	10V, X5R, \pm 20%	GRM21BR61A226ME44	MURATA	2012
1	C7	Ceramic Capacitor	0.1 μ F	16V, X5R, \pm 10%	GRM155R61C104KA88	MURATA	1005
1	C8	Ceramic Capacitor	2700pF	50V, X7R, \pm 10%	GRM155R71H272KA01	MURATA	1005
1	L1	Inductor	1.5 μ H	See the recommended inductor list of separate volume.			
1	R1	Resistor	16k Ω	0.063W, 50V, 1%	MCR01MZPF1602	ROHM	1005
1	R2	Resistor	18k Ω	0.063W, 50V, 1%	MCR01MZPF1802	ROHM	1005
1	R3	Resistor	9.1k Ω	0.063W, 50V, 5%	MCR01MZPJ912	ROHM	1005
1	U1	IC	-	Buck DC/DC Converter	BD9A400MUV	ROHM	VQFN016V3030

■ Bill of Materials (continued)

4. $V_O=1.8V$ ($V_{IN}=2.7V$ to $5.5V$)

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
1	C2	Ceramic Capacitor	10 μ F	10V, X5R, \pm 10%	GRM31CR61A106KA01	MURATA	3216
2	C4, C5	Ceramic Capacitor	22 μ F	10V, X5R, \pm 20%	GRM21BR61A226ME44	MURATA	2012
1	C7	Ceramic Capacitor	0.1 μ F	16V, X5R, \pm 10%	GRM155R61C104KA88	MURATA	1005
1	C8	Ceramic Capacitor	2700pF	50V, X7R, \pm 10%	GRM155R71H272KA01	MURATA	1005
1	L1	Inductor	1.5 μ H	See the recommended inductor list of separate volume.			
1	R1	Resistor	30k Ω	0.063W, 50V, 1%	MCR01MZPF3002	ROHM	1005
1	R2	Resistor	24k Ω	0.063W, 50V, 1%	MCR01MZPF2402	ROHM	1005
1	R3	Resistor	9.1k Ω	0.063W, 50V, 5%	MCR01MZPJ912	ROHM	1005
1	U1	IC	-	Buck DC/DC Converter	BD9A400MUV	ROHM	VQFN016V3030

5. $V_O=3.3V$ ($V_{IN}=4.71V$ to $5.5V$)

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
1	C2	Ceramic Capacitor	10 μ F	10V, X5R, \pm 10%	GRM31CR61A106KA01	MURATA	3216
2	C4, C5	Ceramic Capacitor	22 μ F	10V, X5R, \pm 20%	GRM32NR61A226ME19	MURATA	3225
1	C7	Ceramic Capacitor	0.1 μ F	16V, X5R, \pm 10%	GRM155R61C104KA88	MURATA	1005
1	C8	Ceramic Capacitor	2700pF	50V, X7R, \pm 10%	GRM155R71H272KA01	MURATA	1005
1	L1	Inductor	1.5 μ H	See the recommended inductor list of separate volume.			
1	R1	Resistor	75k Ω	0.063W, 50V, 1%	MCR01MZPF7502	ROHM	1005
1	R2	Resistor	24k Ω	0.063W, 50V, 1%	MCR01MZPF2402	ROHM	1005
1	R3	Resistor	18k Ω	0.063W, 50V, 5%	MCR01MZPJ183	ROHM	1005
1	U1	IC	-	Buck DC/DC Converter	BD9A400MUV	ROHM	VQFN016V3030

■ Precautions for use

- (1) This document provides the BOM for evaluation boards. Small parts can also be selected for resistor, capacitor, and coil.
- (2) When miniaturizing a resistor, consider decrease in rated power and withstand voltage.
- (3) When miniaturizing a ceramic capacitor, consider decrease in withstand voltage. In addition, the capacity may be decreased by DC bias characteristics, and the desired characteristics may not be obtained.
- (4) If ceramic capacitor models differ even when they have the same capacity and withstand voltage, the capacity may be decreased by DC bias characteristics depending on the model, and desired characteristics may not be obtained. Be sure to check the DC bias characteristics.
- (5) When miniaturizing a coil, consider increase in direct current resistance and decrease in rated current. An increase in DC resistance can cause a deterioration of power conversion efficiency. A decrease in rated current can saturate the coil when outputting a large current, which may deteriorate efficiency or make it impossible to obtain the desired output current.
- (6) If there is a possibility that the output will short-circuit, use a coil with a rated current that is larger than the maximum IC output current. For example, even when up to 100 mA is actually used for an IC that can output 1 A, select a coil whose rated current is larger than 1 A. If a coil with a small rated current is used, it will be saturated by a large current in the event of output short-circuiting, resulting in a steep increase in output voltage. The IC may be broken down because the processing speed of the overcurrent protecting function of the IC cannot keep up with the increase in voltage.
- (7) This circuit constant is the value for our evaluation board. It may be necessary to adjust the constant for the actual board. Carry out suitable evaluations.

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