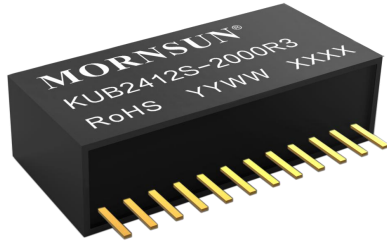


Wide input voltage, non-isolated buck single output



The KUB2412S-2000R3 product is a high-efficiency switching regulator. Constant current output and adjustable. It features high efficiency, low no-load power consumption, short-circuit protection and does not require an external heat sink during use. This product can be widely used in battery charging and other industries.

FEATURES

- Input voltage range: 9 - 36V
- Output voltage range: 6 - 24V
- Output current range: 0.5 - 2A
- Constant current output
- Both output voltage and current are adjustable
- High efficiency up to 92%
- No-load input current as low as 5mA
- Operating ambient temperature range: -40°C to +85°C
- Output short-circuit protection

Selection Guide

Certification	Part No.	Input Voltage (VDC)*		Output		Full Load Efficiency (%) Typ. nominal. Vin	Capacitive Load (μF) Max.
		Nominal (Range)	Voltage (VDC)	Current** (mA) Max.			
--	KUB2412S-2000R3	24 (16-36)	12	2000		92	680

Note: * When the input voltage exceeds 30VDC, the input terminal shall be externally connected with 47μF/100V electrolytic capacitor to prevent module damage caused by voltage spike;
 Input-output drop voltage (nominal): When the output is $\geq 12V$, the voltage drop between the input and output needs to be $\geq 4V$; When the output is $< 12V$, the voltage drop between the input and output needs to be $\geq 3V$;
 ** When the output current of the product is less than or greater than the set output current, the product is in constant voltage mode and constant current mode respectively.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load input current		--	5	15	mA
Reverse the input		Prohibit			
Input Filter		C filter			
Hot Plug		Unavailable			
Input Reverse Polarity Protection		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	Constant voltage model, Input voltage range	10-95% load	--	--	± 3	%
		0-10% load	--	--	± 4	
Current Accuracy	Constant current mode, nominal input voltage, According to the 5V- 95% Vo	--	--	± 5		
Voltage linear regulation	Constant voltage model, Input voltage range, 95% load	--	± 2	± 6		
Current linear regulation	Constant current mode, Input voltage range, 95% output voltage	--	± 2	± 3		
Voltage load regulation	Constant voltage model, nominal input voltage, 10-95% load	--	± 2	± 3		
Current load regulation	Constant current mode, nominal input voltage, 5V-95% load	--	± 2	± 3		
Backfill leakage current	nominal input voltage	--	7	--	μA	
Ripple & Noise*	20MHz bandwidth, nominal input voltage, 10-95% load	--	80	200	mVp-p	

Short-circuit Protection	Constant voltage model	nominal input voltage	Hiccup, constant current model
	Constant current model	nominal input voltage	Hiccup, constant current model

Note: * The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information;

General Specifications					
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	See Fig. 1	-40	--	85	°C
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Weld time: 10 seconds	--	--	260	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Input voltage range, 95% load	--	160	--	kHz
MTBF	MIL-HDBK-217F@25°C	3500	--	--	k hours

Mechanical Specifications	
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimension	32.15 x 14.85 x 9.05 mm
Weight	9.2(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)				
Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 3 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 3 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4kV	perf.Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf.Criteria B
	EFT	IEC/EN61000-4-4	±1kV (see Fig. 3 for recommended circuit)	perf.Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1kV (see Fig. 3 for recommended circuit)	perf.Criteria B
	CS	IEC/EN61000-4-6	3Vr.m.s	perf.Criteria B

Typical Performance Curves

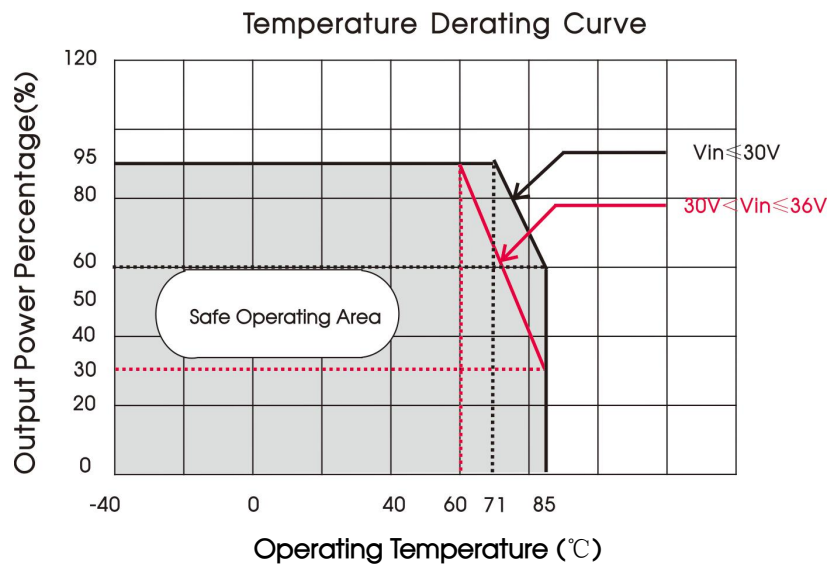


Fig. 1

Design Reference

1. Typical application

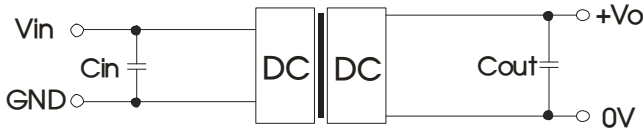


Fig. 2

Part No.	Cin (ceramic capacitor)	Cout (ceramic capacitor)
KUB2412S-2000R3	10μF/50V	22μF/25V

Table 1

Notes:

1. The required Cin and Cout capacitors must be connected as close as possible to the terminals of the module;
2. Refer to Table 1 for Cin and Cout capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead;
3. Converter cannot be used for hot swap and with output in parallel.

2. EMC compliance circuit

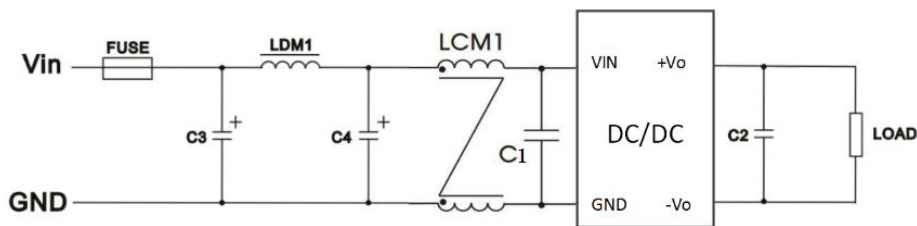


Fig. 3

Notes: When the input voltage exceeds 30VDC, an external 47μF/100V electrolytic capacitor must be connected to the input terminal to prevent module damage caused by voltage spikes

	FUSE	C3	LDM1	C4	LCM1	C1	C2
Emissions	Select according to customer's actual input current	100μF /50V	22μH	100μF /50V	27μH	4.7μF/50V	22μF/25V
Immunity		680μF /50V		680μF /50V			

Table. 2

3. Trim function of Vo

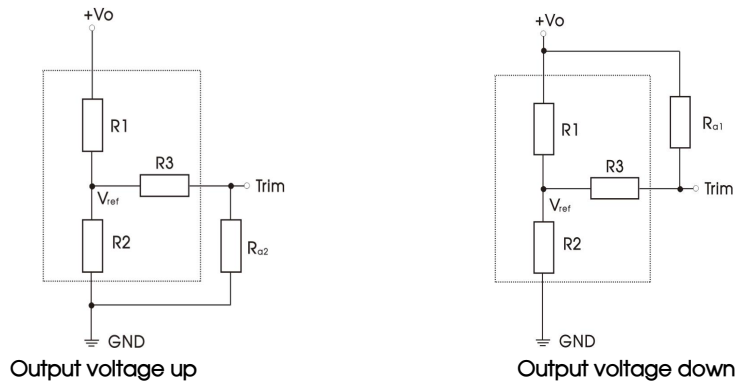


Fig. 4 Trim function of Vo (dotted box means product inside)

Trim (Vo) resistance is calculated as follows:

Output voltage up: $R_{a2} = \frac{aR_2}{R_2 - a} - R_3$, $a = R_2 // (R_3 + R_{22}) = \frac{V_{ref}}{V_o - V_{ref}} R_1$

Output voltage down: $R_{a1} = \frac{aR_1}{R_1 - a} - R_3$, $a = R_1 // (R_3 + R_{21}) = \frac{V_o - V_{ref}}{V_{ref}} R_2$

Table. 3

Vo(V)	Ra2(kΩ)	Ra1(kΩ)	Vref(V)
6	/	92	1
9	/	300	1
15	29.4	/	1
24	1	/	1

4. Trim function of I_o

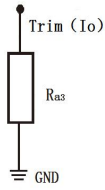


Fig. 5 Trim function of I_o

I _o (mA)	R _{as} (Ω)
500	37
1000	375
1500	1380

Table. 4

Trim(I_o): Connect the resistor to GND to adjust the output current; (See Table. 4)

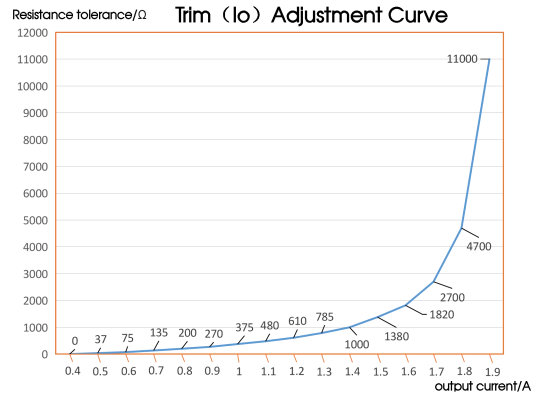


Fig. 6 Resistance curve of Trim (I_o) and constant current point adjustment

5. Product application range curve

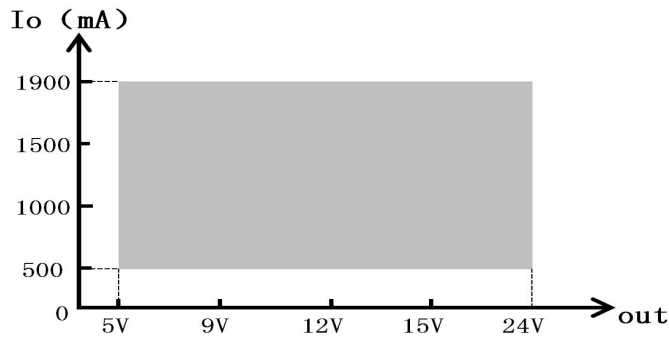
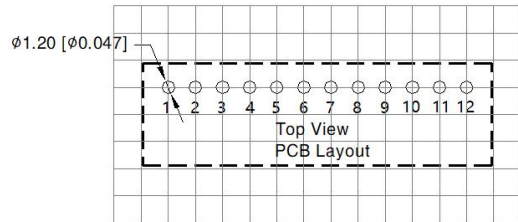
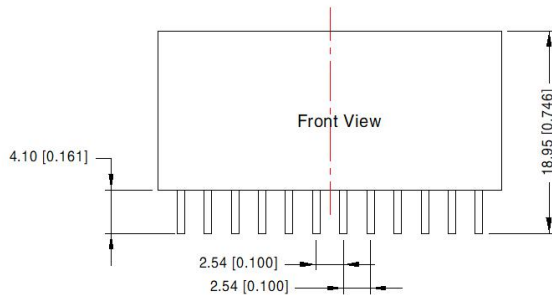


Fig. 7 Product application scope

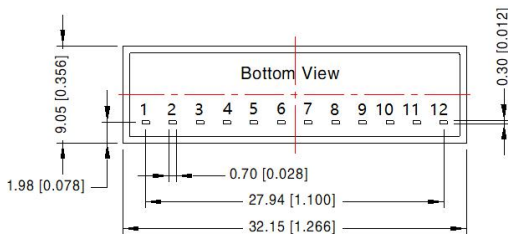
6. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Note: Grid 2.54*2.54mm



Pin-Out	
Pin	Mark
1,2,3	Vin
4	Trim(Io)
5,6,7	GND
8,9	-Vo
10	Trim(Vo)
11,12	+Vo

Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210075;
2. The maximum capacitive load offered were tested at nominal input voltage and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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