

10W, Ultra wide input, isolated & regulated single output, DIP/SMD package, DC-DC converter



Patent Protection RoHS

URB_J(M)D/T-10W series are isolated 10W DC-DC products with 4:1 input voltage, 500VAC / 1500VDC isolation, input under-voltage protection, output over-voltage, over-current, short circuit protection, which make them widely applied in industrial control, electricity, instruments, communication fields.

FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 88%
- No-load power consumption as low as 0.096W
- Isolation voltage : 500VAC / 1500VDC
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit, over-current, over-voltage protection
- Optional package:DIP/SMD

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency ^③ (%Min./Typ.) @ Full Load	Max. Capacitive Load (μF)
		Nominal (Range)	Max. ②	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
---	URB2405J(M)D/T-10W	24 (9-36)	40	5	2000/0	82/84	2200
	URB2412J(M)D/T-10W			12	833/0	85/87	680
	URB2415J(M)D/T-10W			15	667/0	86/88	470

Notes:

- ① URBxxxJ(M)D/T-10W contains 4 types of products, include URBxxxJD-10W (DIP package without housing) 、URBxxxJMD-10W (DIP package with housing) 、URBxxxJT-10W (SMD package without housing) and URBxxxJMT-10W (SMD package with housing) ;
- ② Absolute maximum rating without damage on the converter, but it isn't recommended;
- ③ Efficiency is measured in nominal input voltage and rated output load.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	5V output	--	496/4	508/40	mA
		12V output	--	479/3	490/12	
		15V output	--	474/4	485/15	
Reflected Ripple Current	Nominal input voltage		--	40	--	
Surge Voltage (1sec. max.)			-0.7	--	50	VDC
Starting Voltage			--	--	9	
Shutdown Voltage			5.5	6.5	--	
Input Filter			Pi filter			
Hot Plug			Unavailable			
Ctrl*	Operating Temperature range	Module switch on	Ctrl pin connected to GND or low level (0-1.2VDC)			
		Module switch off	Ctrl pin suspended or connected to High level (2.4-12VDC)			
	Normal temperature @25°C	Input current when switched off	--	6	--	mA

Note: *The voltage of Ctrl pin is relative to input pin GND.

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0% -100% load	--	±1	±3	%
Line Regulation	Full load, the input voltage is from low voltage to high voltage	--	±0.2	±0.5	
Load Regulation ^①	5% -100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs

Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple & Noise ^②	20MHz bandwidth, 5% -100% load	--	50	100	mVp-p
Trim	Nominal input voltage	--	±5	--	%Vo
Output Over-voltage Protection	Input voltage range	110	--	160	%Vo
Output Over-current Protection		110	140	200	%Io
Short circuit Protection		Hiccup, Continuous, self-recovery			

Note: ①When testing from 0% -100% load working conditions, load regulation index of ±5%;
②0% - 5% load ripple&Noise is no more than 5%Vo.Ripple and noise are measured by "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation.

General Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 5mA	500	--	--	VAC
	Input-case, with the test time of 1 minute and the leak current lower than 5mA (Only for URB_JMD/JMT-10W series products)	500	--	--	
	output-case, with the test time of 1 minute and the leak current lower than 5mA (Only for URB_JMD/JMT-10W series products)	500	--	--	
	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
	Input-case, with the test time of 1 minute and the leak current lower than 1mA (Only for URB_JMD/JMT-10W series products)	1500	--	--	
	output-case, with the test time of 1 minute and the leak current lower than 1mA (Only for URB_JMD/JMT-10W series products)	1500	--	--	
Insulation Resistance	Input-output, insulation voltage 500VDC, Ta=25°C, humidity=70%RH	100	--	--	MΩ
	Input-case, insulation voltage 500VDC, Ta=25°C, humidity=70%RH (Only for URB_JMD/JMT-10W series products)	100	--	--	
	output-case, insulation voltage 500VDC, Ta=25°C, humidity=70%RH (Only for URB_JMD/JMT-10W series products)	100	--	--	
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	°C
Storage Humidity	Without condensation	5	--	95	%RH
Storage Temperature		-55	--	+125	°C
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
Reflow soldering Temperature	Only for URB_J(M)T-10W series products	Peak temp.≤245°C, maximum duration time≤60s at 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1.			
Vibration		10-150Hz, 5G, 90Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	350	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Note:* This series of products using reduced frequency technology, the switching frequency is test value of full load.When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Physical Specifications

Casing Material	Aluminum alloy	
Dimension	URB_JD-10W series	39.20*20.80*6.10mm
	URB_JT-10W series	41.40*20.80*6.30mm
	URB_JMD-10W series	40.20*22.00*6.80mm
	URB_JMT-10W series	41.40*22.00*7.00mm
Weight	URB_JD/JT-10W series	5.7g(Typ.)
	URB_JMD/JMT-10W series	6.7g(Typ.)
Cooling method	Free air convection (20LFM)	

EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS A(Bare component)/CLASS B (see Fig.3-① for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-① for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (see Fig.3-② for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig.3-② for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Product Characteristic Curve

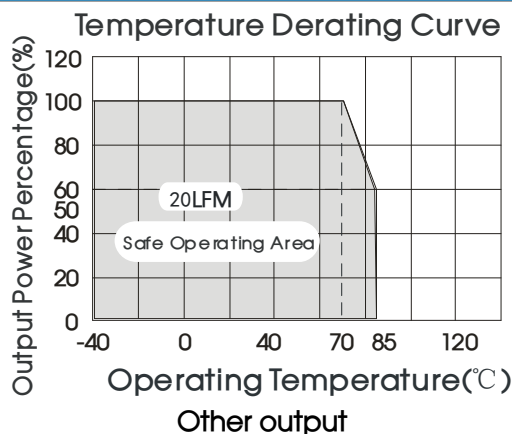
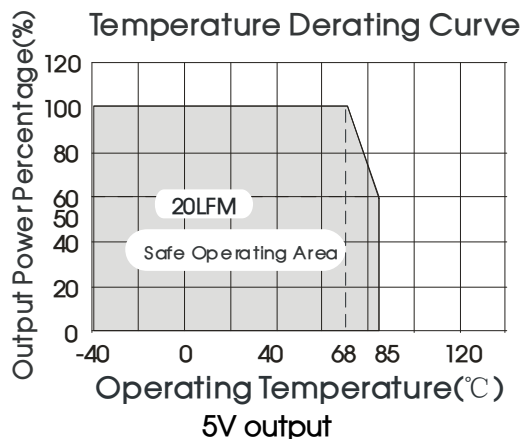
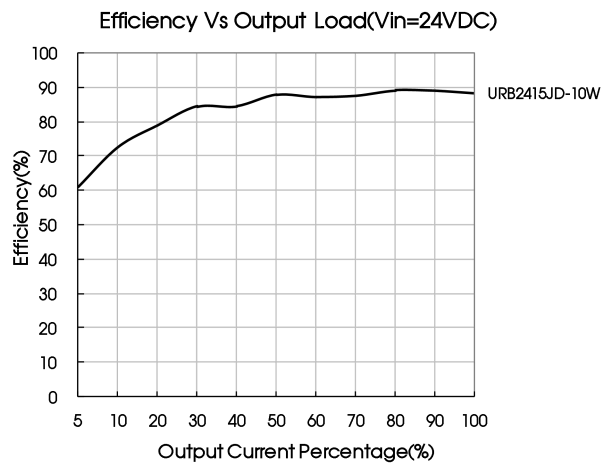
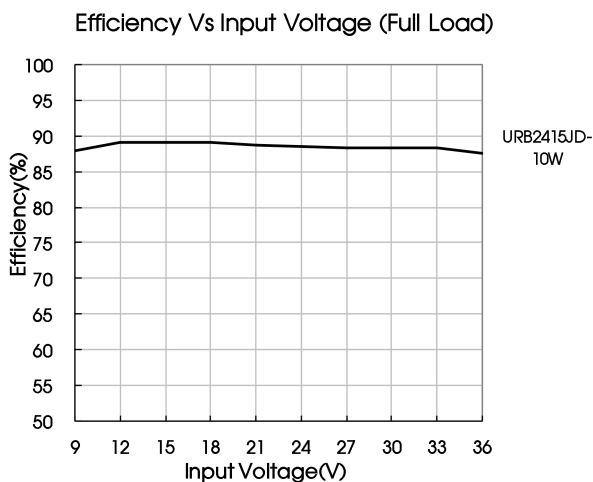
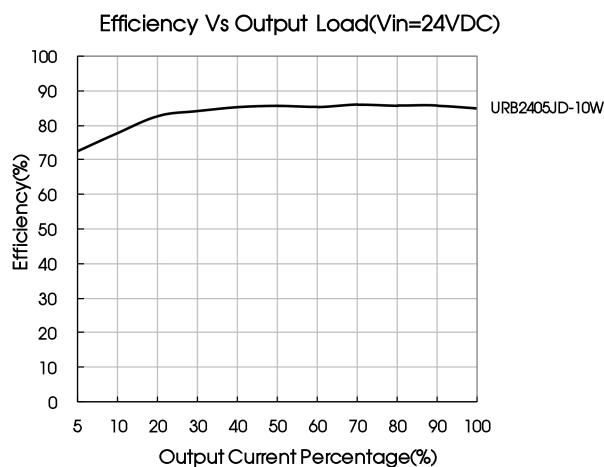
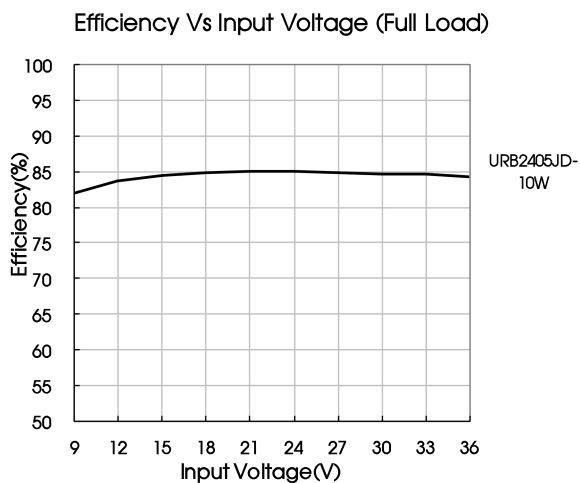


Fig. 1



Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery. If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors C_{in} and C_{out} or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.



Fig. 2

Single output voltage (VDC)	$C_{in}(\mu F)$	$C_{out}(\mu F)$
5/12/15	10	100

2. EMC solution-recommended circuit

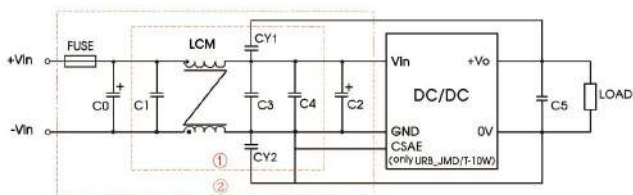


Fig. 3

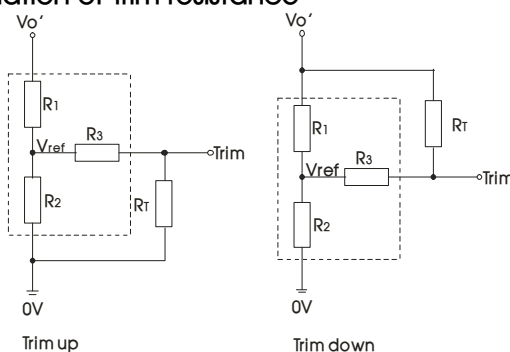
Notes: Part ① in the Fig. 3 is used for EMI test and part ② for EMC filtering; selected based on needs.

Parameter description:

Model	$V_{in}:24V$
FUSE	Choose according to actual input current
C0	680 μF /100V
C1/C3/C4	4.7 μF /50V
C2	470 μF /100V
C5	10 μF /25V
LCM	3.3mH
CY1/CY2	1000pF/ $\geq 2000VDC$

Note: *For URBxxxJMD/T-10W, the housing should be connected to input pin GND when testing EMC performance

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

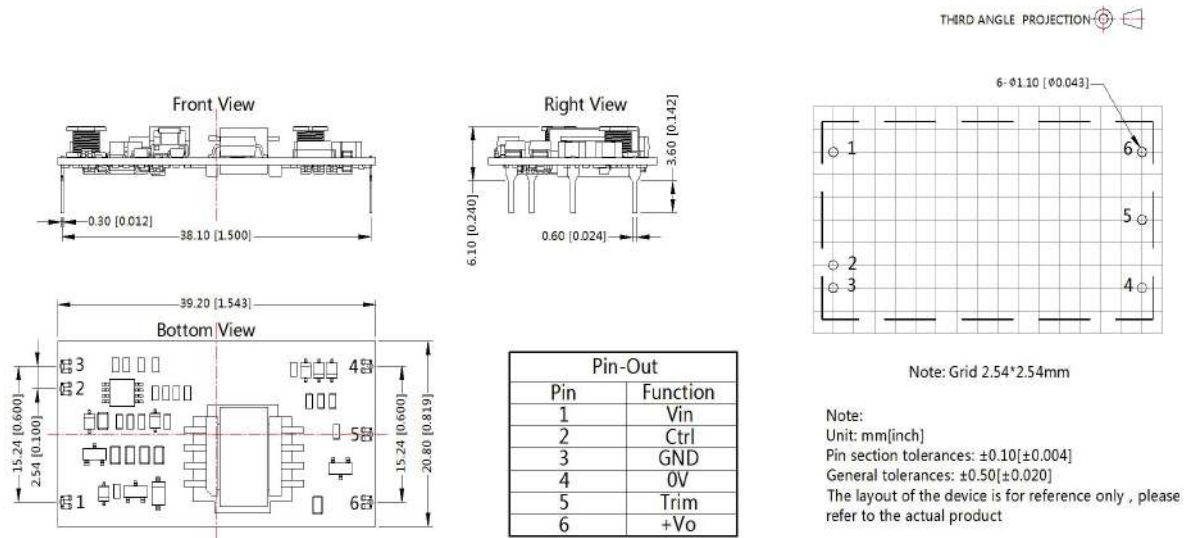
R_T is Trim resistance, a is a self-defined parameter, with no real meaning. $V_{o'}$ for the actual needs of the up or down regulated voltage

$V_{out}(VDC)$	$R_1(K\Omega)$	$R_2(K\Omega)$	$R_3(K\Omega)$	$V_{ref}(V)$
5	2.94	2.87	15	2.5
12	11	2.87	33	2.5
15	14.5	2.87	15	2.5

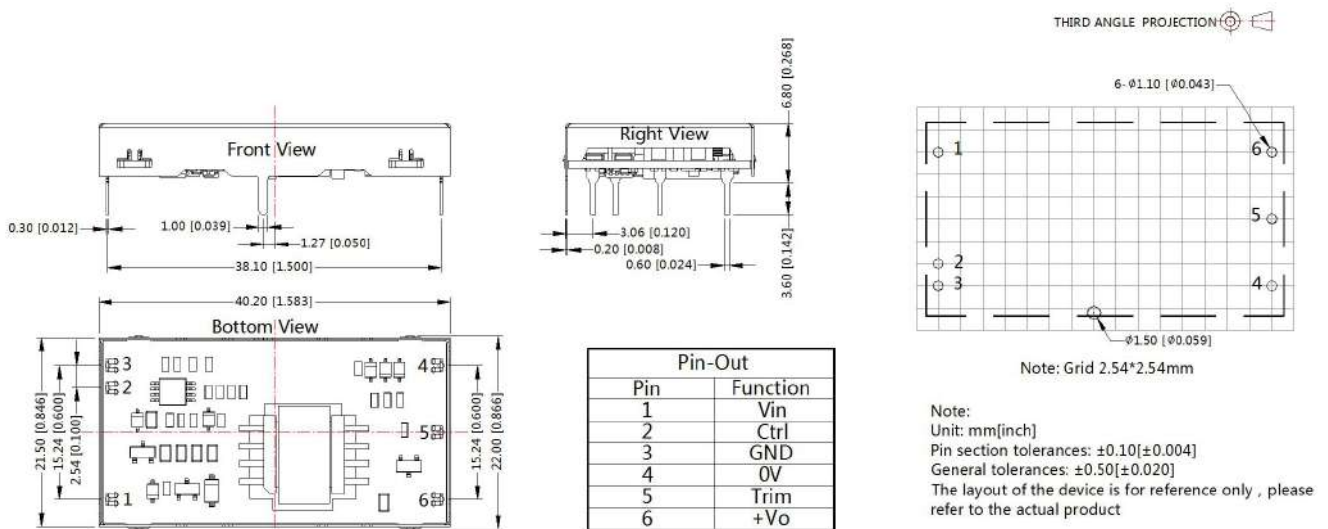
4. It is not allowed to connect modules output in parallel to enlarge the power

5. For more information please find DC-DC converter application notes on www.mornsun-power.com

URB_JD-10W (DIP package without housing) Dimensions and Recommended Layout

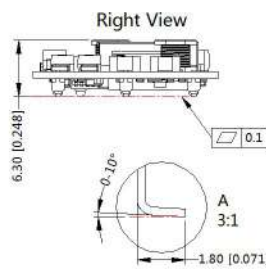
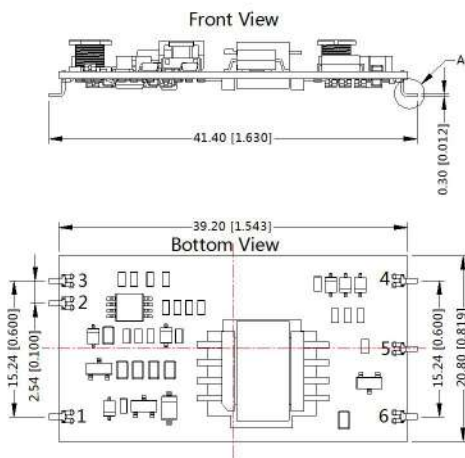


URB_JMD-10W (DIP package with housing) Dimensions and Recommended Layout

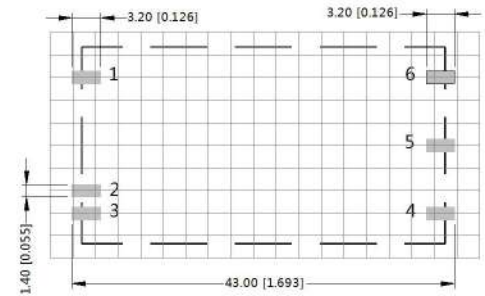


URB_JT-10W (SMD package without housing) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

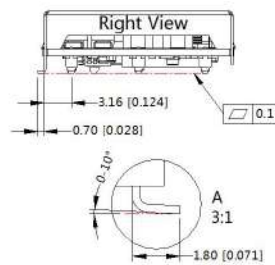
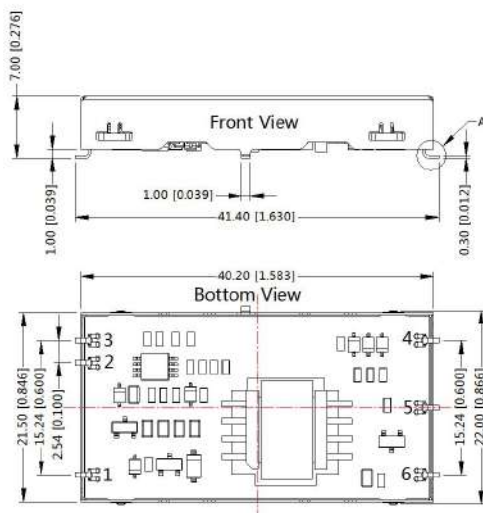


Note: Grid 2.54*2.54mm

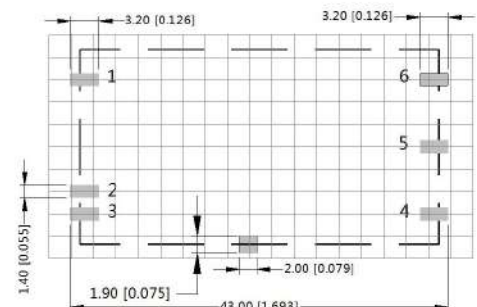
Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$
The layout of the device is for reference only, please refer to the actual product

URB_JMT-10W (SMD package with housing) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo



Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$
The layout of the device is for reference only, please refer to the actual product

Note:

1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing bag number :58210054;
2. The maximum capacitive load offered were tested at input voltage range 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's 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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