

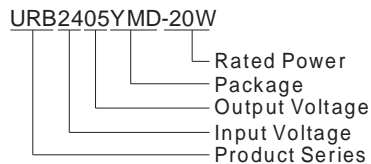
MORNSUN®

URB_YMD-20W Series 20W, ULTRA WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DIP PACKAGING, DC-DC CONVERTER



Patent Protected RoHS

PART NUMBER SYSTEM



FEATURES

- 4:1 Ultra wide input voltage range
- Small footprint, 20W, 1×1 inch
- Efficiency up to 90%
- 1.5KVDC isolation
- Short circuit protection (automatic recovery)
- Over load protection
- Over temperature protection
- Input under voltage protection
- Output over voltage protection
- Metal shielding package
- Meet CISPR22/EN55022 CLASS A
- Low temperature rise, Industrial level specifications
- Inverse polarity protection for A2S (chassis mounting) and A4S (DIN-Rail mounting)

APPLICATION

URB_YMD-20W series are applied to the data transmission device, battery-powered equipment, communications equipment, distributed power systems, mixed analog / digital systems, remote control system, industrial robot system and wide input voltage occasions.

SELECTION GUIDE

Model ①	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (Ma, Typ.)	Max. Capacitive Load(μF)	Efficiency (% , Typ.) @ Max. Load ③
	Nominal (Range)	Max ②		Max.	Min.	@ Max. Load	@ No Load			
URB2403YMD-20W	24 (9-36)	40	3.3	5000	250	780	50	30	10300	87
URB2405YMD-20W			5	4000	200	925	60		5400	90
URB2412YMD-20W			12	1667	84	925	60		1200	90
URB2415YMD-20W			15	1333	67	925	60		750	90
URB4803YMD-20W	48 (18-75)	80	3.3	5000	250	390	25		10300	88
URB4805YMD-20W			5	4000	200	463	30		5400	90
URB4812YMD-20W			12	1667	84	463	30		1200	90
URB4815YMD-20W			15	1333	67	463	30		750	90

Note: ① Series with suffix "H" are heat sink mounting, series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example URB2405YMD-20WHA2S is chassis mounting with heat sink, URB2405YMD-20WA4S is DIN-Rail mounting without heat sink. If the application has a higher requirement for heat dissipation, you can choose modules with heat sink.

② Absolute maximum rating without damage on the converter, but it isn't recommended.

③ The efficiency of "A2S" and "A4S" is approx. 2% lower for the protection of inverse polarity.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec.max.)	24VDC input	-0.7	--	50	VDC
	48 VDC input	-0.7	--	100	
Start-up Voltage	24VDC input	--	--	9	
	48 VDC input	--	--	18	
Under Voltage Shutdown	24VDC input	6	--	--	
	48 VDC input	15	--	--	

Start-up Time	Nominal input& constant resistance load	--	10	--	ms
Ctrl*	Models ON	Ctrl open or connect TTL high level (2.5-12VDC)			
	Models OFF	Ctrl connect GND or low level (0-1.2VDC)			
	Input current (Models OFF)	--	5	--	mA
Input Filter		Pi Filter			
Note:*The Ctrl control pin voltage is refer to GND.					

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output voltage Accuracy		--	±1	±3	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	%
Load Regulation	5% to 100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change,0.1A/Us,0.5mS	--	300	500	us
Transient Response Deviation		--	±3	±5	%
Temperature Drift Coefficient	100% load	--	±0.02	--	%/°C
Ripple & Noise*	20MHz bandwidth	--	50	120	mV p-p
Trim		--	±10%	--	
Output Over Voltage Protection	3.3V output	--	3.9	--	VDC
	5V output	--	6.2	--	
	12V output	--	15	--	
	15V output	--	18	--	
Output Over Current Protection		--	150	--	%
Over Temperature Protection	Input voltage range	--	110	--	°C
Output Short Circuit Protection		Continuous, automatic recovery			
Note:* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at <i>DC-DC Application Notes</i> .					

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, tested for 1 minute , leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Input-Output, test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	1000	--	pF
Switching Frequency	PWM mode	--	320	--	KHz
MTBF	MIL-HDBK-217F @25°C	1000	--	--	K hours
Case Material		Aluminum Alloy			
Size	PCB mounting (without heat sink)	25.4x25.4x11.7			mm
	PCB mounting (with heat sink)	25.4x25.4x16.4			
	A2S chassis mounting (without heat sink)	76.0x31.5x21.2			
	A2S chassis mounting (with heat sink)	76.0x31.5x25.2			
	A4S DIN-Rail mounting (without heat sink)	76.0x31.5x25.8			
	A4S DIN-Rail mounting (with heat sink)	76.0x31.5x29.8			
Weight	PCB mounting (without heat sink)	--	15	--	g
	PCB mounting (with heat sink)	--	20	--	
	A2S chassis mounting (without heat sink)	--	35	--	
	A2S chassis mounting (with heat sink)	--	40	--	
	A4S DIN-Rail mounting (without heat sink)	--	54	--	
	A4S DIN-Rail mounting (with heat sink)	--	59	--	

ENVIRONMENTAL SPECIFICATIONS

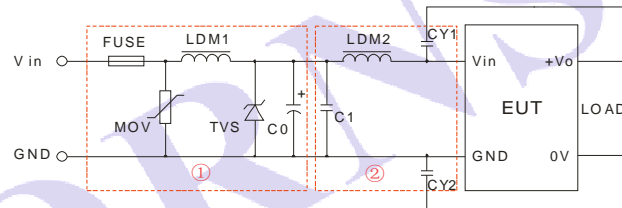
Item	Test Conditions	Min.	Typ.	Max.	Unit
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Storage Humidity	Non condensing	5	--	95	%
Operating Temperature	Refer to temperature derating curve(see Figure3)	-40	--	85	°C
Storage Temperature		-55	--	125	
The Max. Case Temperature	Operating Temperature curve range (No wind)	--	--	105	
	25°C, rated input, 100%load output (No wind)	--	58	--	
	60°C, rated input, 100%load output (No wind)	--	93	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS A(Without External Circuit) / CLASS B (External Circuit Refer to Figure1-②)
	RE	CISPR22/EN55022	CLASS A(Without External Circuit) / CLASS B (External Circuit Refer to Figure1-②)
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (External Circuit Refer to Figure1-①) perf. Criteria B
	Surge	IEC/EN61000-4-5	±2KV (External Circuit Refer to Figure1-①) perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%

EMC RECOMMENDED CIRCUIT



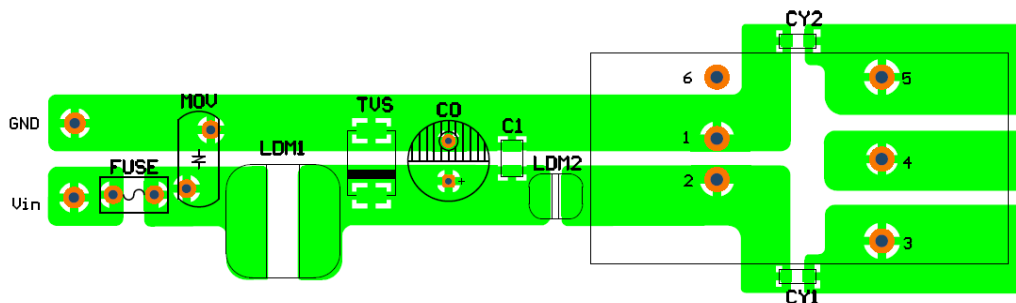
(Figure 1)

Recommended external circuit parameters:

Model	Vin:24 V	Vin:48 V
FUSE	Choose according to practical input current	
MOV	S14K35	S14K60
LDM1	56μH	
TVS	SMCJ48A	SMCJ90A
C0	330μF/50V	330μF/100V
C1	1μF/50V	1μF /100V
LDM2	4.7μH	
CY1,CY2	1nF/2KV	

Note: In Figure 1, part ① is EMS recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.

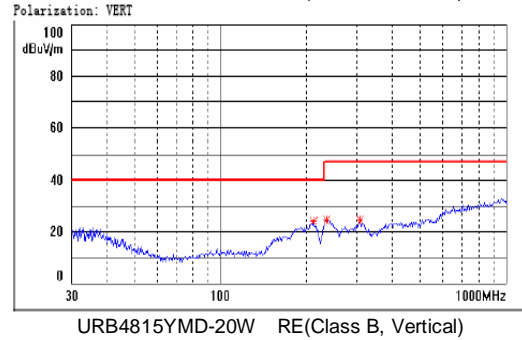
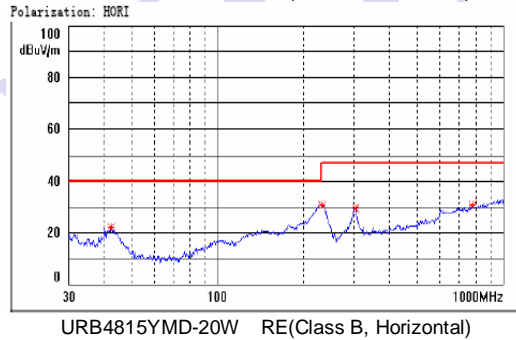
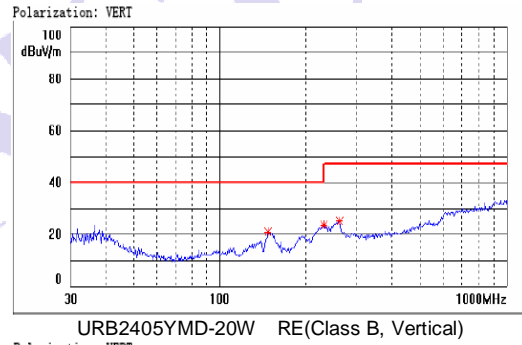
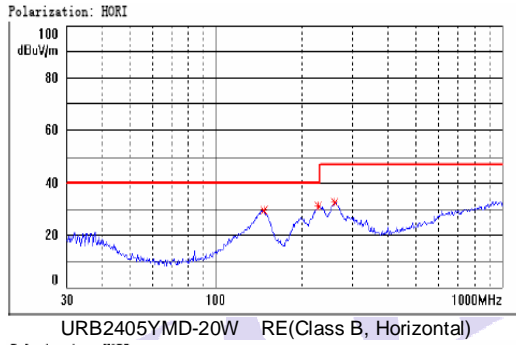
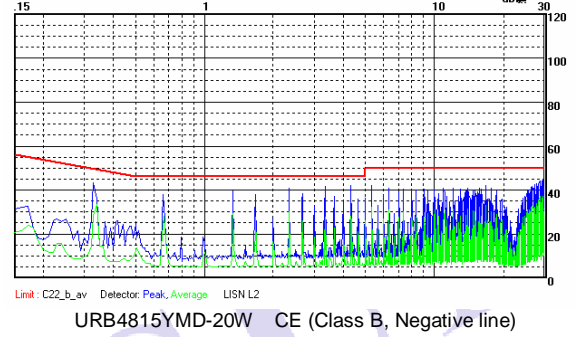
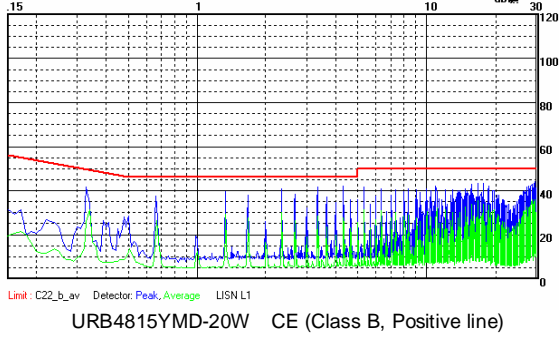
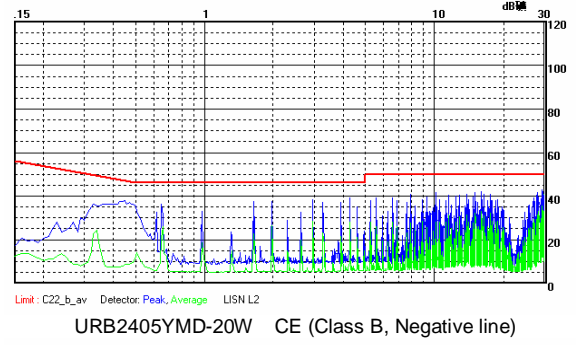
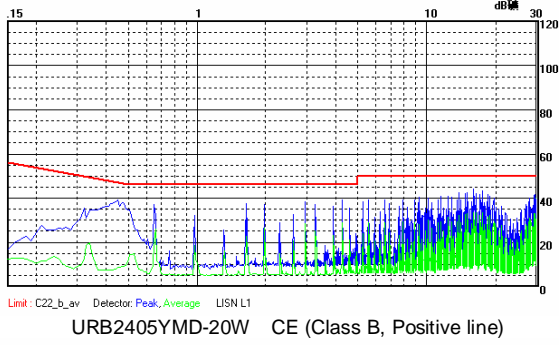
EMC MODULE RECOMMENDED CIRCUIT PCB LAYOUT



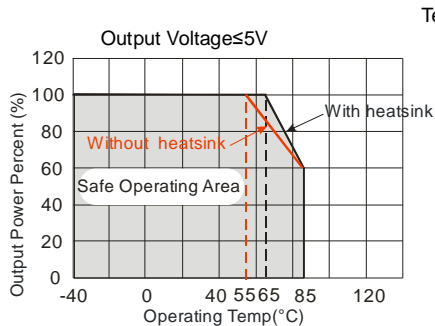
(Figure 2)

Note: The pad space between input and output (CY1/CY2) must $\geq 2\text{mm}$.

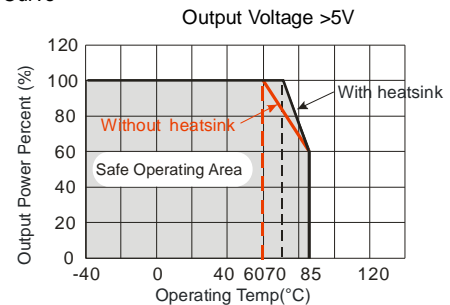
EMI TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1-②)



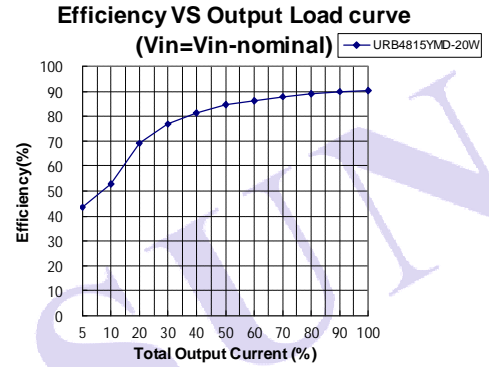
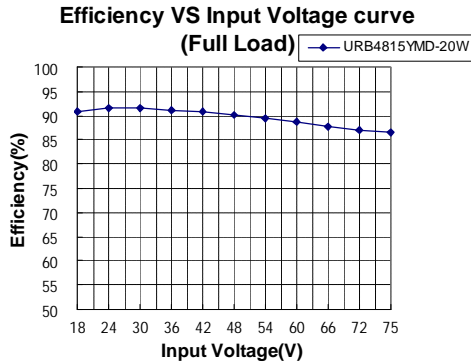
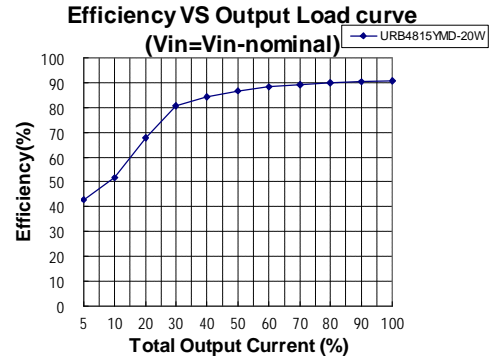
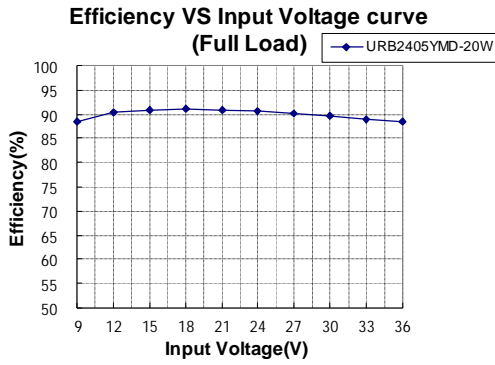
PRODUCT TYPICAL CURVE



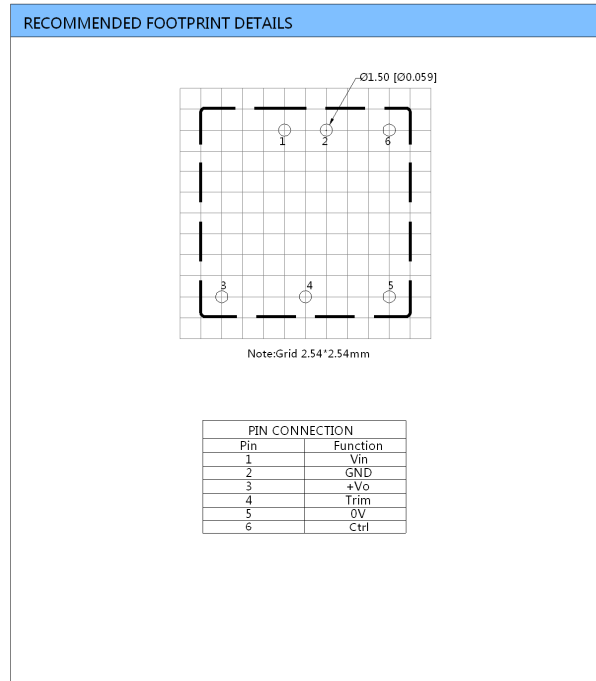
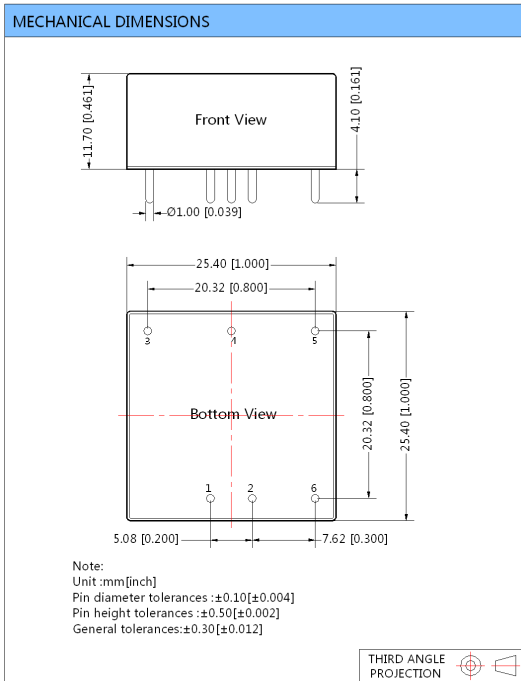
Temperature Derating Curve



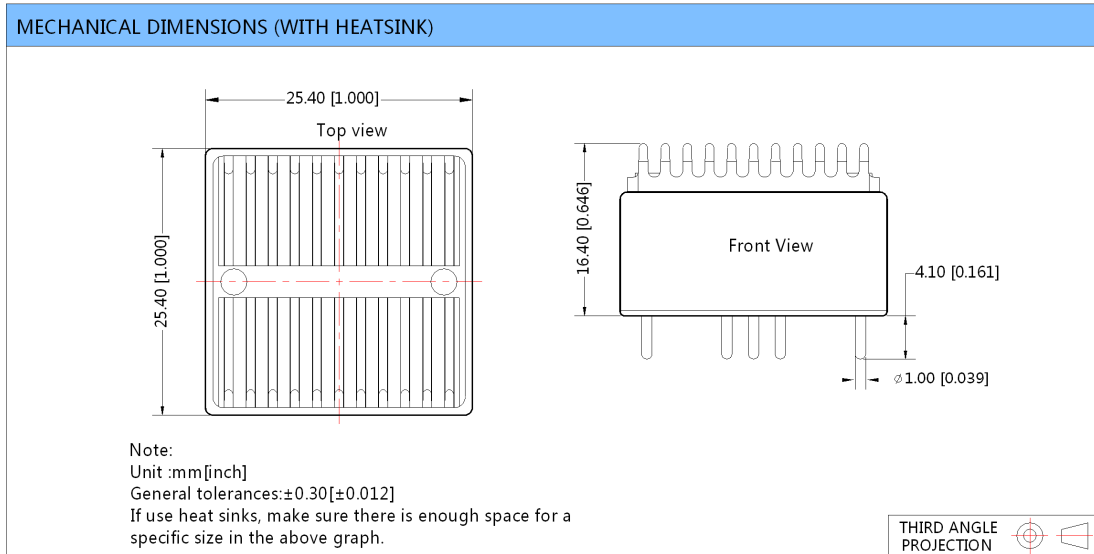
(Figure3)



URB_YMD-20W PCB MOUNTING OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT (WITHOUT HEAT SINK)



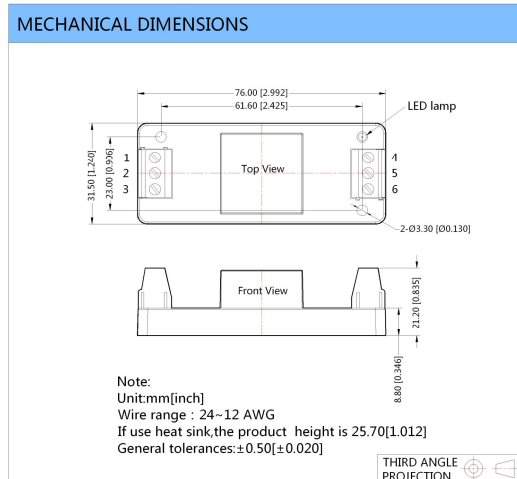
URB_YMD-20WH PCB MOUNTING OUTLINE DIMENSIONS (WITH HEAT SINK)



URB_YMD-20WA2S CHASSIS MOUNTING WITH OUTLINE DIMENSIONS



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

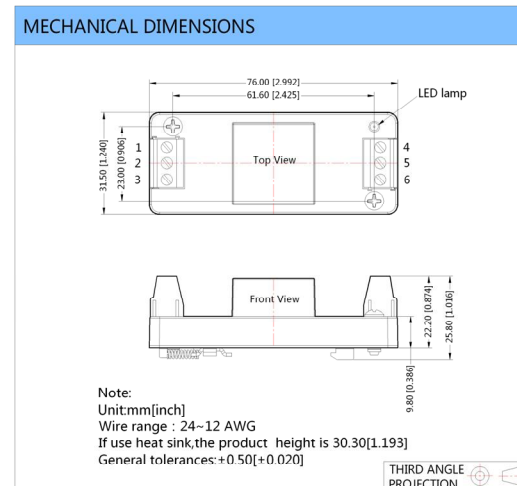


URB_YMD-20WA4S DIN-RAIL MOUNTING OUTLINE DIMENSIONS



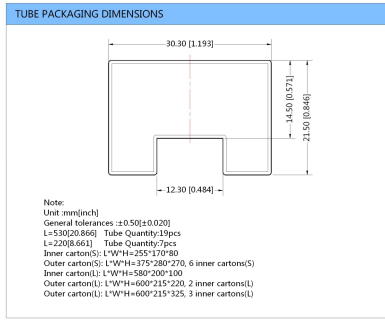
DIN-rail modules are fitting to TS35 rails

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

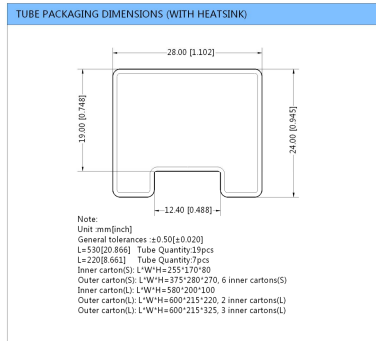


PACKAGE DIAGRAM

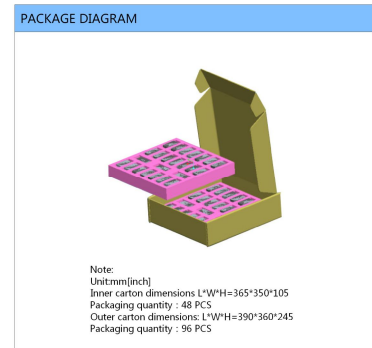
PCB mounting Series (Without heat sink)



PCB mounting Series (With heat sink)



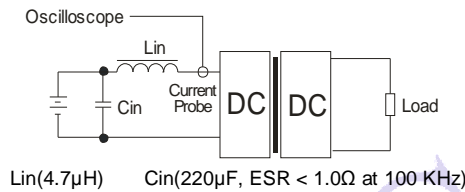
Special Package Series (A2S/A4S)



TEST CONFIGURATIONS

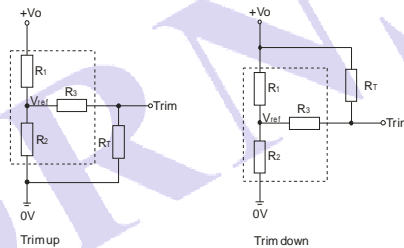
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} and Capacitor C_{in} to simulate source impedance.



TRIM APPLICATION & TRIM RESISTANCE

Application circuit for TRIM (Part in broken line is the interior of models)



Formula for resistance of TRIM

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

Note: Leave open if not used. Value for R_1 , R_2 , R_3 , and V_{ref} refer to the above table 1. R_T : Resistance of Trim. a : User-defined parameter, no actual meanings. V_o' : The trim up/down voltage.

(Table 1)

V_o	3.3(VDC)	5(VDC)	12(VDC)	15(VDC)
Parameter				
$R_1(K\Omega)$	4.841	15	10	15
$R_2(K\Omega)$	2.87	15	2.609	3
$R_3(K\Omega)$	12.4	15	15	20
$V_{ref}(V)$	1.24	2.5	2.5	2.5

DESIGN CONSIDERATIONS

① Recommended circuit

All the URB_YMD-20W Series have been tested according to the following recommended testing circuit before leaving factory (see Figure 4)

The product must be tested with load.

If you want to further decrease the input surge voltage and the output ripple, you can increase a capacitance properly or choose capacitors with low ESR. It should also be noted that the capacitance of filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 2).



(Figure 4)

EXTERNAL CAPACITOR TABLE (Table 2)

Vout \ Capacitance	Cout(μ F)	Cin(μ F)
3.3V/5V	470	100
12V/15V	220	

②It is not recommended to increase the output power capability by connecting two or more converters in parallel. The product is not hot-swappable.

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Recommended Dual output models unbalanced load is $\leq \pm 5\%$, If the product operates $> \pm 5\%$, it may not be guaranteed to meet all specifications listed. Please contact our technical support for more details.
3. Max. Capacitive Load is tested at input voltage range and full load.
4. All specifications measured at $T_a=25^\circ\text{C}$, humidity $<75\%$, nominal input voltage and rated output load unless otherwise specified.
5. In this datasheet, all test methods are based on our corporate standards.
6. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
7. Please contact our technical support for any specific requirement.
8. Specifications of this product are subject to changes without prior notice.

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