

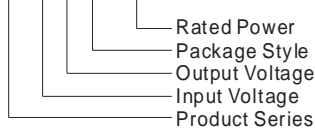
## URB\_LD-20WR2 20W, WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DC-DC CONVERTER



Patent Protection RoHS

### PART NUMBER SYSTEM

URB2405LD-20WR2



### FEATURES

- Efficiency up to 91%
- 4:1 wide input voltage range
- Low Temperature rise
- Short circuit protection
- 1.5KVDC isolation
- Operating temperature range: -40°C ~ +85°C
- Six-sided metal shield
- Industry standard pinout
- Industrial level specifications
- Meet CISPR22/EN55022 CLASS A

### APPLICATION

URB\_LD-20WR2 series are applied to wide voltage range input situation such as data transmission device, battery power supply device, tele-communication device, distributed power supply system, remote control system, industrial robot system etc.

### SELECTION GUIDE

Model Number	Input Voltage (VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		reflection ripple Current (mA,typ.)	Max. Capacitor Load (max,µF)	Efficiency (%. typ.) @ Max. load
	Nominal (Range)	Max*		Max.	Min.	@ Max.load	@ No load			
URB2403LD-20WR2	24 (9-36)	40	3.3	5000	250	800	100	30	18700	86
URB2405LD-20WR2			5	4000	200	920			9600	91
URB2412LD-20WR2			12	1667	84	935			1600	89
URB2415LD-20WR2			15	1333	67	925	1000		90	
URB2424LD-20WR2			24	834	42	925	500		90	
URB4803LD-20WR2	48 (18-75)	80	3.3	5000	250	400	80	30	18700	86
URB4805LD-20WR2			5	4000	200	460			9600	90
URB4812LD-20WR2			12	1667	84	468			1600	89
URB4815LD-20WR2			15	1333	67	460	1000		90	
URB4824LD-20WR2			24	834	42	460	500		90	

Note:\* Input voltage can't exceed this value, or will cause the permanent damage.

### INPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Unit
Surge Voltage (1sec. max.)	24VDC Input	--	--	50	VDC
	48VDC Input	--	--	100	
Start-up Voltage	24VDC Input	--	--	9	
	48VDC Input	--	--	17.8	
Under Voltage Shutdown	24VDC Input	7.5	--	--	
	48VDC Input	16	--	--	
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)	--	1	--	mA
Input filter		π Filter			

\*The CTRL control pin voltage is refer to GND.

### OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		1	--	20	W
Output Voltage Accuracy		--	±1	±3	%
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	10% to 100% load	--	±0.5	±1	

Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Drift	100% load	--	±0.02	--	%/°C
Ripple & Noise *	20MHz Bandwidth	55	70	100	mVp-p
Trim		--	±10%	--	VDC
Output Over Voltage Protection	3.3V output	--	3.9	--	
	5V output	--	6.2	--	
	12V output	--	15	--	
	15V output	--	18	--	
	24V output	--	30	--	
Over Current Protection	Input voltage range	--	160	--	%
Output Short Circuit Protection		Hiccup, Continuous, automatic recovery			

\* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

### COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	24V output	--	2000	--	pF
	Others	--	1000	--	
Switching Frequency		--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours
Case Material		Aluminum Alloy			
Weight		--	28	--	g

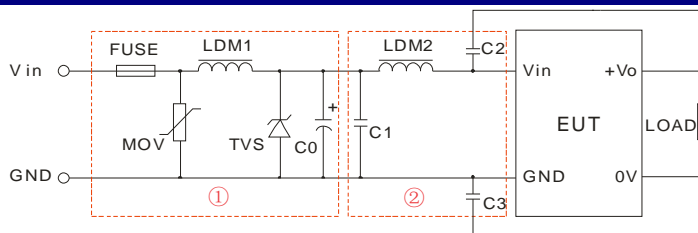
### ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	5	--	95	%
Operating Temperature	See Temperature Derating Curve	-40	--	85	°C
Storage Temperature		-55	--	125	
The Max. Case Temperature	Operating Temperature curve range	--	--	105	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			
Shake		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	3V/m	perf. Criteria A	
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B (External Circuit Refer to Figure1-①)	
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B (External Circuit Refer to Figure1-①)	
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A	
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%	perf. Criteria B	

### EMC RECOMMENDED CIRCUIT



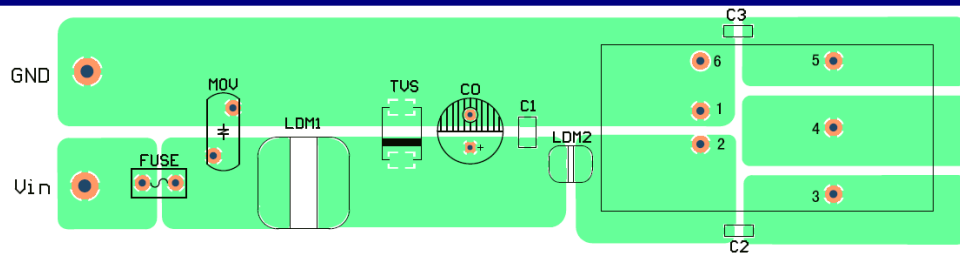
(Figure1)

Note: In Figure 1, part ① is EMS Recommended external circuit, part ② is EMI recommended external circuit (CLASS B). Choose according to requirements.

Recommended external circuit parameters:

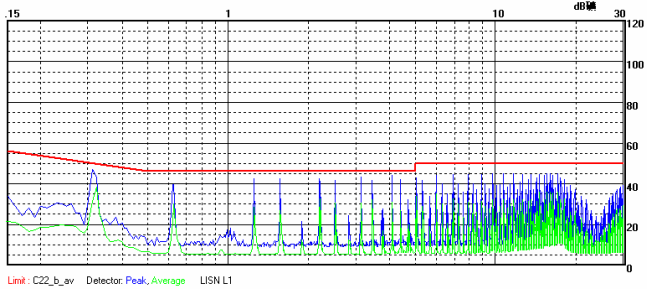
Model	URB24_LD-20WR2	URB48_LD-20WR2
FUSE	Choose according to practical input current	
MOV	10D560	10D101
LDM1	56μH	
TVS	SMCJ48A	SMCJ90A
C0	120μF/50V	120μF/100V
C1	105K/50V	105K/100V
LDM2	4.7μH	
C2、C3	102K/2KV	

# EMC RECOMMENDED CIRCUIT PCB LAYOUT

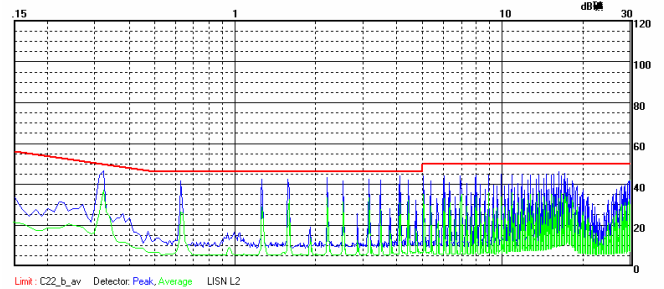


(Figure 2)

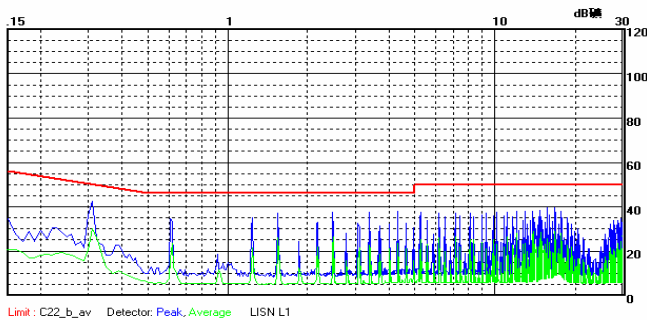
# EMC TEST WAVEFORM



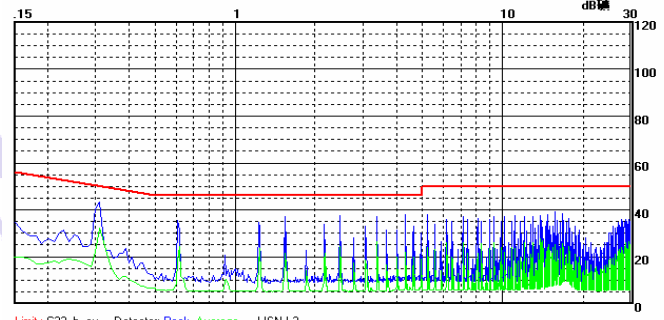
URB2405LD-20WR2 CE (Positive line)



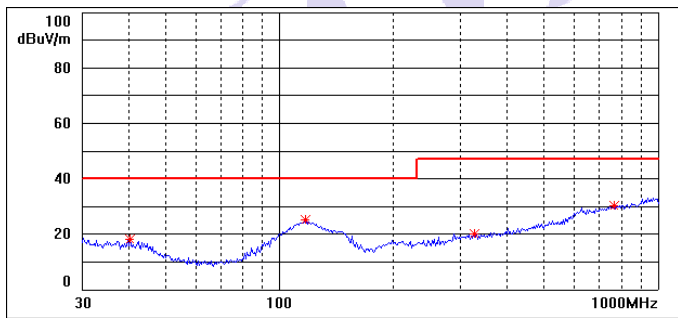
URB2405LD-20WR2 CE (Negative line)



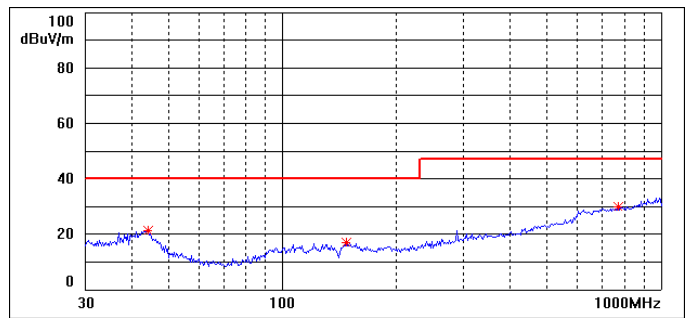
URB4815LD-20WR2 CE (Positive line)



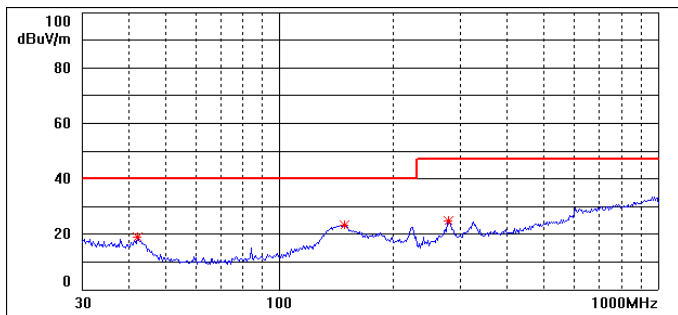
URB4815LD-20WR2 CE (Negative line)



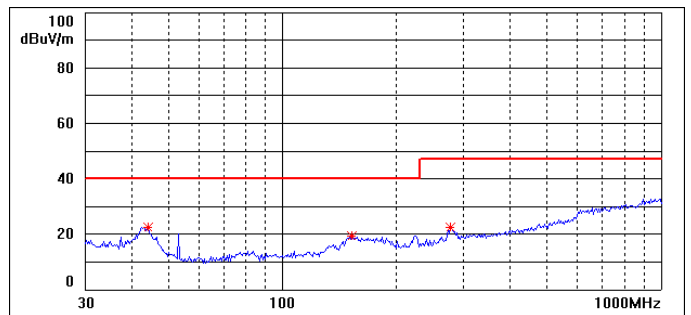
URB2405LD-20WR2 RE(Horizontal)



URB2405LD-20WR2 RE(Vertical)

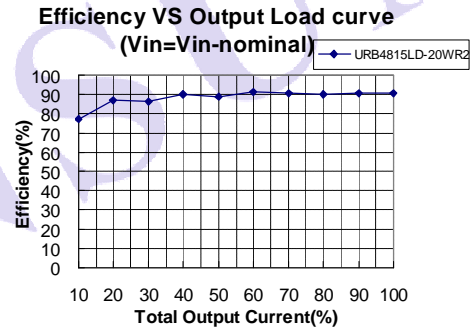
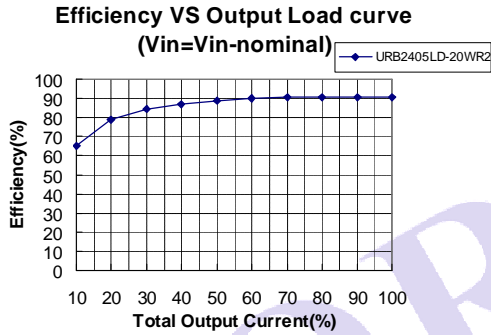
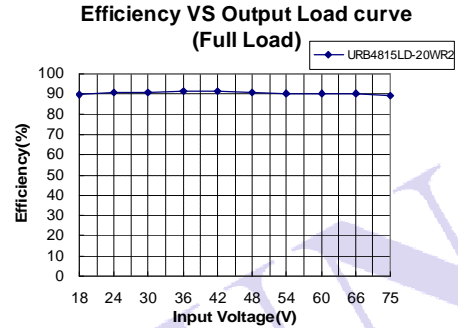
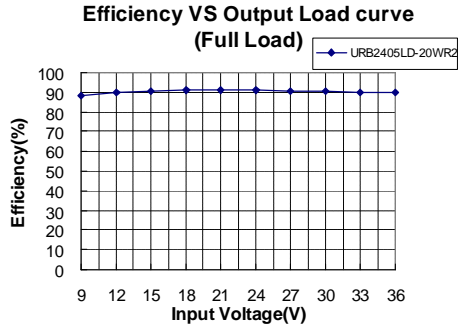
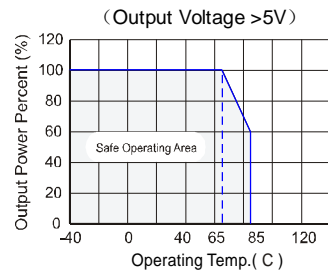
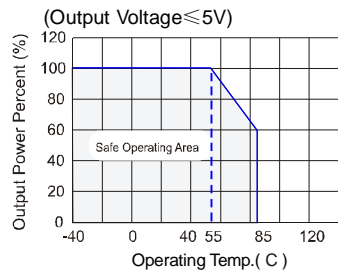


URB4815LD-20WR2 RE(Horizontal)



URB4815LD-20WR2 RE(Vertical)

# PRODUCT TYPICAL CURVE



# OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

**MECHANICAL DIMENSIONS**

(Main View)

(Bottom View)

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

Note:  
 Unit:mm[inch]  
 Pin diameter tolerances:  $\pm 0.10\text{mm}[\pm 0.004\text{inch}]$   
 Pin height tolerances:  $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
 General tolerances:  $\pm 0.30\text{mm}[\pm 0.012\text{inch}]$

**RECOMMENDED FOOTPRINT**

Note: grid 2.54\*2.54mm.

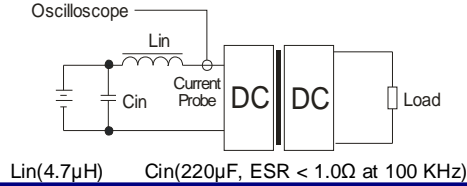
**TUBE OUTLINE DIMENSIONS**

Unit :mm[inch]  
 General tolerances:  $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
 L=220mm[8.661inch] Pcs/Tube:7  
 Inner package dimensions: L\*W\*H= 255\*170\*80mm  
 Outer package dimensions(with six inner packaging boxes):  
 L\*W\*H= 375\*280\*270mm

## TEST CONFIGURATIONS

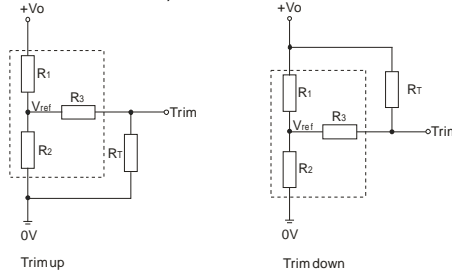
### Input Reflected-Ripple Current Test Setup

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: 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.

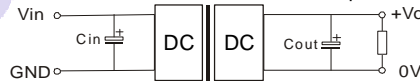
(TABLE 1)

Parameter \ $V_o$	3.3(VDC)	5(VDC)	12(VDC)	15(VDC)	24(VDC)
$R_1(K\Omega)$	4.801	2.883	10.971	14.497	24.872
$R_2(K\Omega)$	2.863	2.864	2.864	2.864	2.863
$R_3(K\Omega)$	15	10	17.8	17.8	20
$V_{ref}(V)$	1.24	2.5	2.5	2.5	2.5

## RECOMMENDED CIRCUIT

If you want to further decrease the input surge voltage and the output ripple etc, an capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 3).

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 3)

EXTERNAL CAPACITOR TABLE (TABLE 2)

Capacitance Output Voltage	$C_{out}(\mu F)$	$C_{in}(\mu F)$
3.3V/5V	470	100
12V/15V	220	
24V	100	

### Cannot use in parallel and hot swap

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specification listed.
2. Max. Capacitive Load tested at nominal input voltage and constant resistive load .
3. All specifications measured at  $T_a=25^\circ C$ , humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

### MORNSUN Science & Technology Co.,Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou,P.R.China.

Tel: 86-20-28203030

Fax:86-20-38601272

[Http://www.mornsun-power.com](http://www.mornsun-power.com)