Product Manual

E_UHBDD-20W

Data Sheet

Wide voltage input,isolated,voltage regulator,single output



Product Series

Product Series	Temperature Range	Isolated Voltage	Package
E_UHBDD-20W	-40℃～+105℃	1500VDC	DIP

UL 62368-1 EN 62368-1 IEC 62368-1 RoHS

Features

- Efficiency up to 91%
- Isolated voltage 1500VDC
- Sustainable short circuit, self-recovery
- Output over-voltage protection,output over-current protection
- No additional radiator
- Black aluminum housing and potting compound meet the UL94 V-0 standards
- Package is pin-to-pin compatible with international and domestic similar product

Applications

- Industrial control systems
- Data communication systems
- Distributed power control systems
- Digital and analog hybrid systems
- BMS systems, instrumentation
- Distribution terminal,etc.
- ……

Product Model

Part Number	Certification	Input Voltage (VDC)		Output		Full Load Efficiency (%,Min/Typ)	Maximum Capacitive Load (μF)
		Nominal (Range)	Max.(1)	Nominal Voltage (VDC)	Current (mA) (Min./ Max.)		
E2403UHBDD-20W	UL/EN/IEC	24 (9-36)	40	3.3	0/5000	85/87	10000
E2405UHBDD-20W				5	0/4000	88/90	10000
E2412UHBDD-20W				12	0/1667	87/89	1600
E2415UHBDD-20W				15	0/1333	87/89	1000
E2424UHBDD-20W				24	0/833	89/91	500
E4803UHBDD-20W		48 (18-75)	80	3.3	0/5000	85/87	10000
E4805UHBDD-20W				5	0/4000	88/90	10000
E4812UHBDD-20W				12	0/1667	88/90	1600
E4815UHBDD-20W				15	0/1333	88/90	1000
E4824UHBDD-20W				24	0/833	89/91	500

Note:(1) The input voltage can not exceed the specified range, the max. value is transient,otherwise it may cause permanent unrecoverable damage.

Limit Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Input Surge Voltage (1s，max)(1)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Lead Soldering Temperature	1.5mm from case,10s	--	--	300	℃
Hot Plug		Unavailable			

Input Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
No Load/Full Load Input Current	24VDC input,3.3VDC output	--	35/782	65/800	mA
	24VDC input,5VDC output	--	35/926	65/947	
	24VDC input,12VDC output	--	6/930	10/960	
	24VDC input,15VDC output	--	7/926	11/940	
	24VDC input,24VDC output	--	13/926	17/940	
	48VDC input,3.3VDC output	--	30/395	45/405	
	48VDC input,5VDC output	--	30/465	40/480	
	48VDC input,12VDC output	--	3/465	8/480	
Starting Voltage	24VDC input	--	8.3	9	VDC
	48VDC input	--	17	18	
Input Under Voltage Protection	24VDC input	--	7.0	--	
	48VDC input	--	15.0	--	
Ctrl	Input current when turned off	--	--	1	mA
	Module on	Ctrl is floating or connected to TTL high level (3.5-12VDC)			
	Module off	Ctrl connected to GND or low level (0-1.5VDC)			
Input Filter		π type filter			

Output Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Line Regulation	Full load,input voltage from low to high	--	±0.2	±0.5	%
Load Regulation	Nominal input voltage,load varies from 5% to 100%	--	±0.5	±1	
No-load Output Voltage Accuracy	No load	--	±3	±5	
Output Voltage Accuracy	Load is from 5% to 100%	--	±1	±3	
Temperature Drift Coefficient	100% load	--	--	±0.03	%/℃
Output Ripple & Noise(1)	20MHz bandwidth	--	50	100	mVp-p
Transient Recovery Time	Load step change 75%-50%-75%	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Adjustable Output Voltage (Trim)	Input voltage range	90	--	110	%Vo
Over-Voltage Protection		110	--	160	%Vo
Over-Current Protection(4)		110	--	190	%Io
Output Short-Circuit Protection		Sustainable short circuit, self-recovery			

Note: (1)Under 0%-5% load condition, the maximum output voltage accuracy is ±5%.

(2)The output ripple & noise under 0%-5% load is≤150mV;The ripple and noise are measured using the parallel- line test method.

General Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Isolation Voltage	Input-output, time 1 minute, leakage current less than 1mA	1500	--	--	VDC
Isolation Resistance	Input-output,isolation voltage 500VDC	1	--	--	GΩ
Isolation Capacitance	Input-output,100kHz,0.1V	--	2000	--	pF
Switching Frequency	Nominal input voltage, 100% load	--	300	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Package Size		25.40×25.40×11.80			mm
Package Material		Metal shell			

Environmental Characteristics

Parameter	Conditions		Min	Typ	Max	Unit
Operating Temperature	See the ambient temperature derating curve for details	3.3V、5V	-40	--	+95	℃
		Others	-40		+105	
Storage Temperature	--		-55	--	+125	
Casing Temperature Rise	Ta=25℃		--	40	--	
Storage Humidity	No condensation		--	--	95	%
Cooling Method			Natural air cooling			
Vibration			5-200Hz, 5G, 0.75mm. along X, Y and Z			

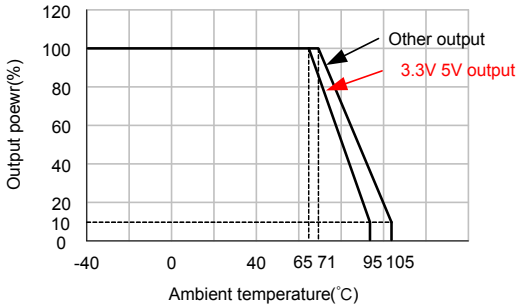
EMC Characteristics

EMI	CE	EN 55032,CLASS B(Figure 2-②)	
	RE	EN 55032,CLASS B(Figure 2-②)	
EMS	ESD	IEC/EN 61000-4-2 Contact±6kV	Perf.Criteria B
	RS	IEC/EN 61000-4-3 10V/m	Perf.Criteria A
	EFT	IEC/EN 61000-4-4 ±2kV(Figure 2-①)	Perf.Criteria B
	Surge	IEC/EN 61000-4-5 ±2kV(Figure 2-①)	Perf.Criteria B
	CS	IEC/EN 61000-4-6 3Vr.m.s	Perf.Criteria A

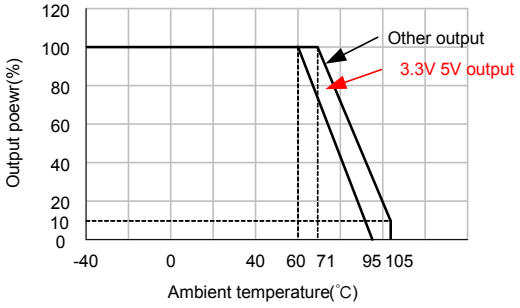
Notes:(1)Unless specified specially, parameters in this manual are measured under the conditions of 25℃, 40%~75% humidity, input nominal voltage and rated output load.

(2)This product adopts light load frequency reduction technology, and the switching frequency is the test value at full load output. When the load is lower than 40%, the switching frequency decreases with the decrease of load.

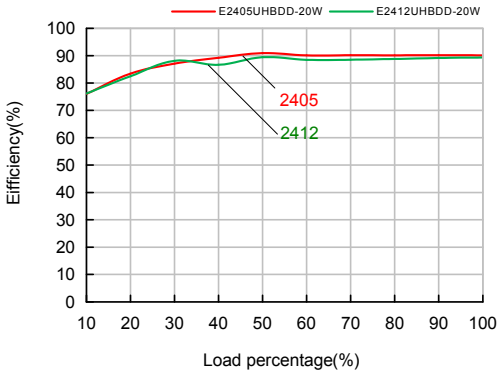
Product Characteristic Graph



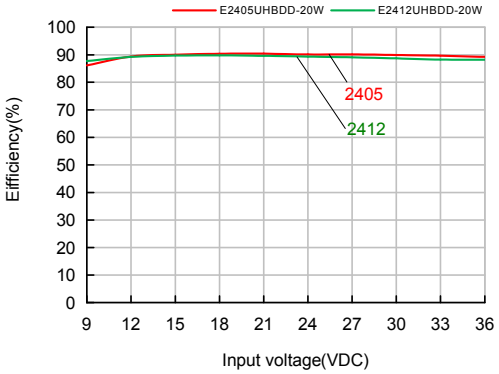
24V input Temperature Derating Graph



48V input Temperature Derating Graph



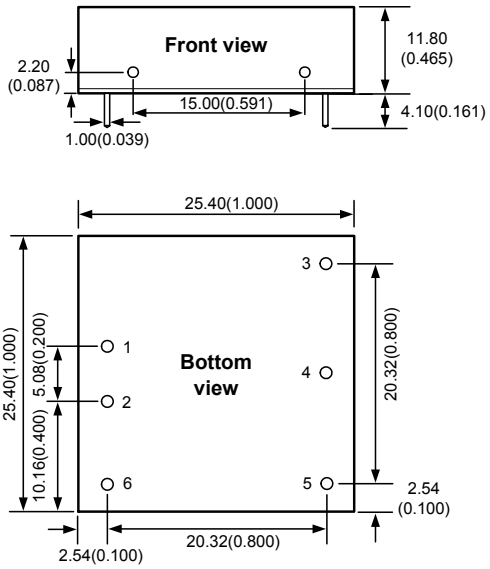
Efficiency VS load(Nominal input voltage)



Eifficiency VS input voltage(Full load)

Outline and Footprint Dimensions

Mechanic Size

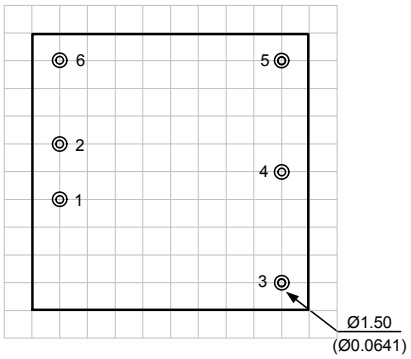


Notes:
Unit: mm(inch)
Unlabeled tolerance: ±0.5(±0.020)

Pack Instruction

Carton Size: L×W×H=269×254×127mm
144pieces/carton

PCB Silkscreen Diagram



Note: Grid distance: 2.54×2.54mm

Pin Function Description

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

Circuit Design and Application

1. Recommended circuit

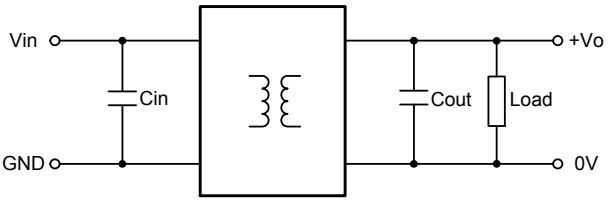


Figure 1 Recommended circuit

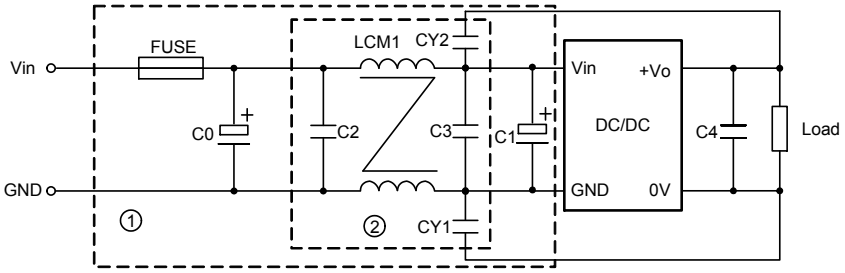


Figure 2 EMC recommended circuit

2. Filter capacitor

For the selection of filter capacitor, please refer to values in Table 1. If the ESR is less than 1Ω (when the frequency is 100KHz), the ceramic or electrolytic capacitor is recommended to use, and the tantalum capacitor is not recommended to use. The value of input and output filter capacitor can not be too large, otherwise it may cause startup problem.

Table 1 The reference value of the external capacitor

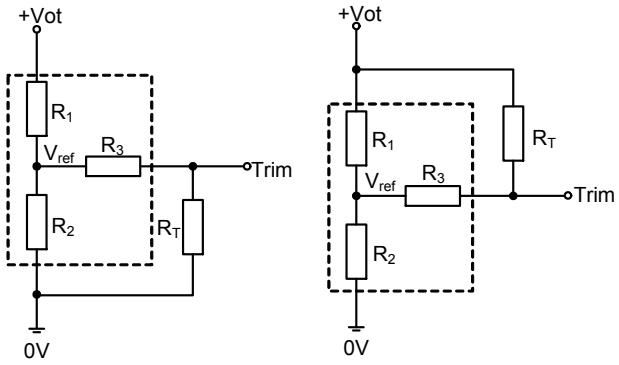
Vin(VDC)	Cin(μF)	+Vo(VDC)	Cout(μF)
24	100	3.3/5.0	100
		12/15	
		24	47
48	100	3.3/5.0	100
		12/15/24	

Typical recommended circuit for EMC

Table 2 Recommended EMC external circuit parameters

Model	Vin：24VDC	Vin：48VDC
FUSE	Select according to the actual input current of the customer	
C0	470uF/50V	330uF/100V
C1	470uF/50V	330uF/100V
C2	4.7uF/50V	4.7uF/100V
C3	10uF/50V	4.7uF/100V
C4	Refer to Table 1	
CY1	1nF/2KV	1nF/2KV
CY2	1nF/2KV	1nF/2KV
LCM1	470uH	470uH

3. Trim usage and resistance calculation



Trim up　　Trim down

Trim's use circuit(dotted box is inside the product):

Calculation formula of Trim resistance ：

$$\text{up：}R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{V_{ref}}{Vo'-V_{ref}}\cdot R_1$$

$$\text{down：}R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-V_{ref}}{V_{ref}}\cdot R_2$$

R_T is Trim resistance,a is a user-defined parameter,no practical mean

Table 3　Trim circuit parameter

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.99	3.000	10	1.25
5.0	3.74	1.245	8.2	1.25
12	15.00	3.916	20	2.5
15	15.00	3.000	20	2.5
24	20.00	2.310	20	2.5

4. Load requirements

In order to ensure efficient and reliable operation of the module, it is recommended that the output load should be between 5% and 100% of the rated power.

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