Product Manual

# E_UHBDD-20WN

Data Sheet

**Wide voltage input,isolated,voltage regulator,single output**




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

## Product Series

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

## 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.) | | |
| E2405UHBDD-20WN | UL/EN/IEC | 24 (9-36) | 40 | 5 | 0/4000 | 88/90 | 10000 |
| E2412UHBDD-20WN | | | | 12 | 0/1667 | 87/89 | 1600 |
| E2415UHBDD-20WN | | | | 15 | 0/1333 | 87/89 | 1000 |
| E2424UHBDD-20WN | | | | 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 |
| 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 | 5VDC output | -- | 35/926 | 65/947 | mA |
| | 12VDC output | -- | 6/930 | 10/960 | |
| | 15VDC output | -- | 7/926 | 11/940 | |
| | 24VDC output | -- | 13/926 | 17/940 | |
| Starting Voltage | | -- | 8.3 | 9 | VDC |
| Input Under Voltage Protection | | -- | 7.0 | -- | |
| 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 | 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 | | | |

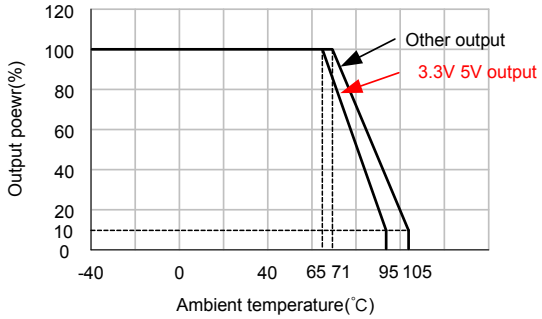
## EMC Characteristics

| | | | |
|---|---|---|---|
| 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 |

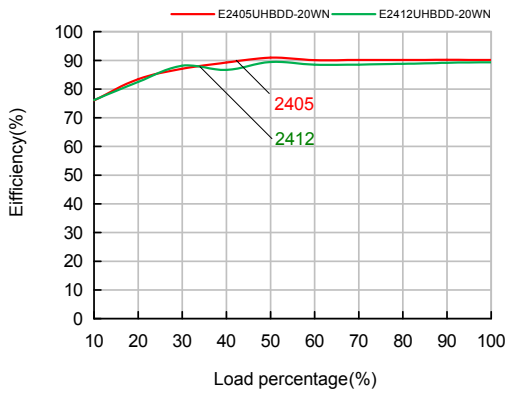
Notes:(1)Unless specified specially, parameters in this manual are measured under the conditions of 25℃, 40%~75% humidity, input nominal voltage and rated output load.

(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.

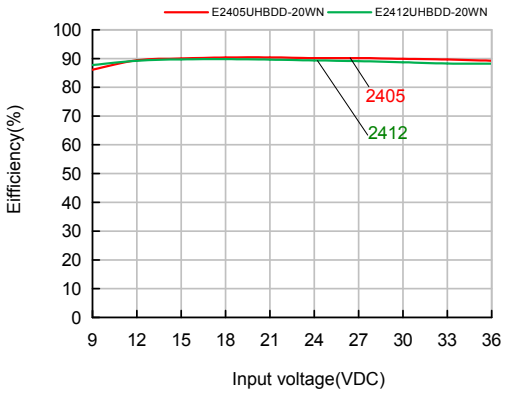
## Product Characteristic Graph




Temperature Derating Graph



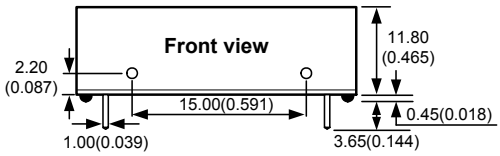

Efficiency VS load(Nominal input voltage)

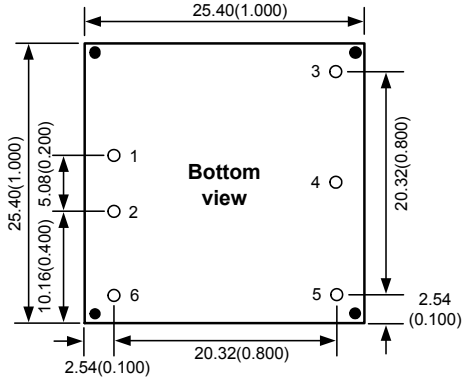



Eifficiency VS input voltage(Full load)

## Outline and Footprint Dimensions

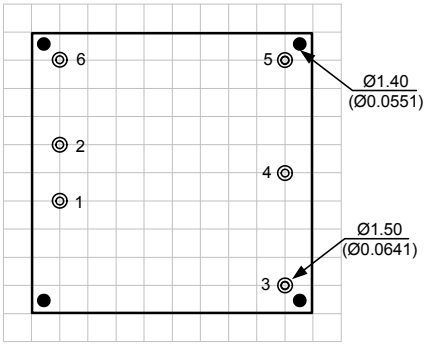
### Mechanic Size




Notes：
Unit：mm(inch)
Unlabeled tolerance：±0.5(±0.010)

### PCB Silkscreen Diagram




Note：Grid distance：2.54×2.54mm

### Pin Function Description

| Pin | Funtion |
|---|---|
| 1 | Vin |
| 2 | GND |
| 3 | +Vo |
| 4 | No Pin |
| 5 | 0V |
| 6 | No Pin |

Note: 'No Pin' indicates that the module has no pins

### Pack Instruction

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

## Circuit Design and Application

1. Recommended circuit

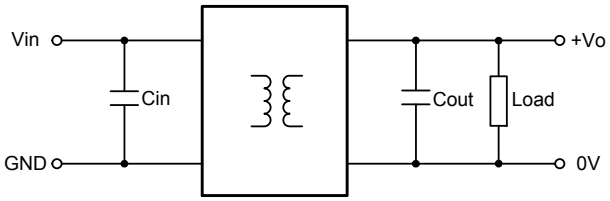



Figure 1　Recommended circuit

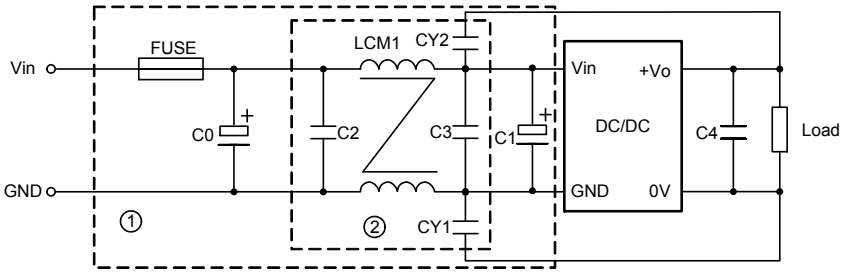



Figure 2　EMC recommended circuit

## 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 |

## Typical recommended circuit for EMC

Table 2 Recommended EMC external circuit parameters

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

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 |

## 3. 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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