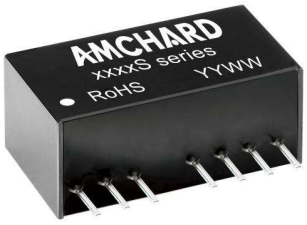
## Product Feature




1. Package Type：SIP8
2. Operating Temperature Range：-40℃ - +105℃
3. Isolation Voltage：3000VDC
4. 2:1 Wide Input Voltage Range
5. High efficiency up to 83%
6. With the output overcurrent protection and output short circuit protection mechanism
7. Fields of application：industry, power, instrumentation, communication, rail transit, etc

RoHS CE 3 years Warranty

## Selection Guide

| Part No. | Input Voltage (VDC) | Output | | | Ripple & Noise (Typ./Max.) (mVp-p) | Full Load Efficiency% (Min./Typ.) | Capacitive Load Max. (μF) |
|---|---|---|---|---|---|---|---|
| | Nominal (Range) | Voltage (VDC) | Current Max.(mA) | Current Min.(mA) | | | |
| BTF0503S-3WR2 | 5 (4.5-9) | 3.3 | 758 | 38 | 40/75 | 67/69 | 1800 |
| BTF0505S-3WR2 | | 5 | 500 | 25 | | 72/74 | 2200 |
| BTF0512S-3WR2 | | 12 | 208 | 10 | | 76/78 | 680 |
| BTF0515S-3WR2 | | 15 | 167 | 8 | | 73/75 | 470 |
| BTF0524S-3WR2 | | 24 | 104 | 5 | | 75/77 | 330 |
| BTE0505S-3WR2 | | ±5 | ±250 | ±13 | | 73/75 | #1000 |
| BTE0512S-3WR2 | | ±12 | ±104 | ±5 | | 76/78 | #470 |
| BTE0515S-3WR2 | | ±15 | ±83 | ±4 | | 76/78 | #330 |
| BTE0524S-3WR2 | | ±24 | ±52 | ±3 | | 75/77 | #220 |
| BTF1203S-3WR2 | 12 (9-18) | 3.3 | 758 | 38 | | 74/76 | 2700 |
| BTF1205S-3WR2 | | 5 | 600 | 30 | | 75/77 | 2200 |
| BTF1212S-3WR2 | | 12 | 250 | 13 | 100/150 | 81/83 | 680 |
| BTF1215S-3WR2 | | 15 | 200 | 10 | | 82/84 | 470 |
| BTF1224S-3WR2 | | 24 | 125 | 6 | | 80/82 | 330 |
| BTE1205S-3WR2 | | ±5 | ±300 | ±15 | 40/75 | 77/79 | #1000 |
| BTE1212S-3WR2 | | ±12 | ±125 | ±6 | | 78/80 | #470 |
| BTE1215S-3WR2 | | ±15 | ±100 | ±5 | | 79/81 | #330 |
| BTF2403S-3WR2 | 24 (18-36) | 3.3 | 758 | 38 | | 7275 | 2700 |
| BTF2405S-3WR2 | | 5 | 600 | 30 | | 80/82 | 2200 |
| BTF2412S-3WR2 | | 12 | 250 | 13 | | 82/84 | 680 |
| BTF2415S-3WR2 | | 15 | 200 | 10 | 100/150 | 82/84 | 470 |
| BTF2424S-3WR2 | | 24 | 125 | 6 | | 82/84 | 330 |
| BTE2405S-3WR2 | | ±5 | ±300 | ±15 | 40/75 | 78/80 | #1000 |
| BTE2412S-3WR2 | | ±12 | ±125 | ±6 | | 82/84 | #470 |
| BTE2415S-3WR2 | | ±15 | ±100 | ±4 | | 82/84 | #330 |
| BTF4803S-3WR2 | 48 (36-75) | 3.3 | 758 | 38 | 100/150 | 74/76 | 2700 |
| BTF4805S-3WR2 | | 5 | 600 | 30 | 40/75 | 75/77 | 2200 |
| BTF4812S-3WR2 | | 12 | 250 | 10 | | 79/81 | 680 |
| BTF4815S-3WR2 | | 15 | 200 | 10 | | 83/85 | 470 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BTF4824S-3WR2 | | 24 | 104 | 5 | 70/100 | 81/83 | 330 |
| BTE4805S-3WR2 | | ±5 | ±300 | ±15 | 40/75 | 78/80 | #1000 |
| BTE4812S-3WR2 | | ±12 | ±125 | ±6 | | 81/83 | #470 |
| BTE4815S-3WR2 | | ±15 | ±100 | ±5 | | 81/83 | #330 |

# each output

## Input Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Current (full load/no load) | 5VDC Input | | -- | 800/60 | 846/65 | mA |
| | 12VDC Input | 3.3VDC Output | -- | 277/25 | 286/30 | |
| | | Other Output | -- | 314/25 | 338/30 | |
| | 24VDC Input | 3.3VDC Output | -- | 140/8 | 145/13 | |
| | | Other Output | -- | 154/8 | 163/13 | |
| | 48VDC Input | 3.3VDC Output | -- | 69/3 | 72/10 | |
| | | Other Output | -- | 78/3 | 85/10 | |
| Reflected Ripple Current | 5VDC Input | | -- | 20 | -- | |
| | 12VDC Input | | -- | 20 | -- | |
| | 24VDC Input | | -- | 55 | -- | |
| | 48VDC Input | | -- | 55 | -- | |
| Impulse Voltage | 5VDC Input | | -0.7 | -- | 12 | VDC |
| | 12VDC Input | | -0.7 | -- | 25 | |
| | 24VDC Input | | -0.7 | -- | 50 | |
| | 48VDC Input | | -0.7 | -- | 100 | |
| Starting Voltage | 5VDC Input | | 3.5 | 4 | 4.5 | |
| | 12VDC Input | | 4.5 | 8 | 9 | |
| | 24VDC Input | | 11 | 16 | 18 | |
| | 48VDC Input | | 24 | 33 | 36 | |
| Input Filter | | | Capacitance Filter | | | |
| Hot Plug | | | Unavailable | | | |
| CTRL | Module off | | 0-0.7V turn off | | | |
| | Module on | | No connect or 3.5-12V on | | | |

## Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Output Voltage Accuracy | 5% - 100% Load | -- | ±1.0 | ±3.0 | % |
| No-load Output Voltage Accuracy | Input Voltage Range | -- | ±1.5 | ±5.0 | |
| Linear Regulation | Full load, Input voltage from low limit to high limit | -- | ±0.2 | ±0.5 | |
| Load Regulation | 5% - 100% Load | -- | ±0.4 | ±0.75 | |
| Transient Recovery Time | 25% load step change | -- | 0.5 | 3 | ms |
| Transient Response Deviation | | -- | ±2.5 | ±5 | % |

| | | | | | |
|---|---|---|---|---|---|
| Temperature Coeffcient | Full Load | -- | ±0.02 | ±0.03 | %/℃ |
| Ripple & Noise | 20MHZ Bandwidth | See the selection guide for data | | | |
| Short-circuit Protection | | Continuous, Self-Recovery | | | |

## General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Insulation Voltage | Input-output, test time 1 minute, leakage current less than 1mA | 3000 | -- | -- | VDC |
| Insulation Resistance | Input-output, insulated voltage 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 30 | 50 | pF |
| Operating Temperature | Derating when operating temperature≥85℃, (See Figure 1) | -40 | -- | +85 | ℃ |
| Storage Temperature | | -55 | -- | +105 | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Pin welding can withstand the highest temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | 300 | ℃ |
| Switching Frequency | Full Load, Nominal Input Voltage | 150 | 208 | 300 | kHz |
| MTBF | MIL-HDBK-217F@25℃ | >1000Kh | | | |

## Mechanical Specifications

| | |
|---|---|
| **Case Material** | Black plastic; flame-retardant and heat-resistant（UL 94V-0 rated） |
| **Package Dimensions** | 22.00 * 12.00 * 9.50 mm |
| **Weight** | 3.8g (Typ.) |
| **Cooling Method** | Free air convection |

## EMC Specifications

| | | | |
|---|---|---|---|
| **EMI** | CE | CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 3-②) | |
| | RE | CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 3-②) | |
| **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<br>(The recommended circuit is shown in Figure 3-①) | Perf.Criteria B |
| | Surge | IEC/EN61000-4-5 line to line±2KV<br>(The recommended circuit is shown in Figure 3-①) | Perf.Criteria B |
| | Cs | IEC/EN61000-4-6 3 Vr.m.s | Perf.Criteria A |
| | Voltage dips、DIPS and short interruptions | IEC/EN61000-4-29 0%，70% | Perf.Criteria B |

## Typical Characteristic Curves

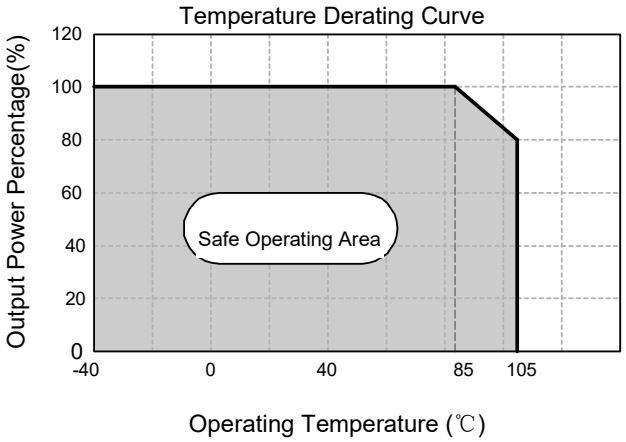
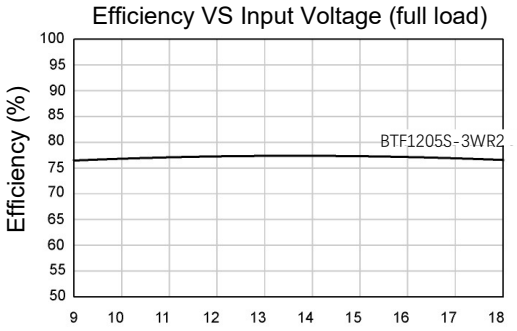
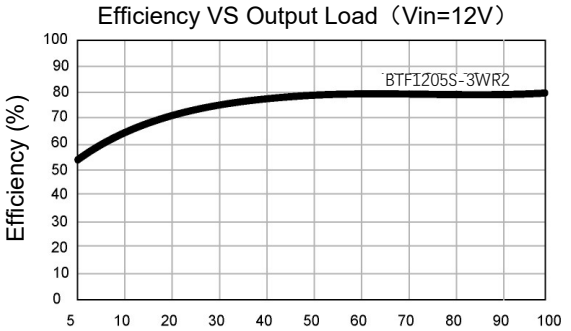
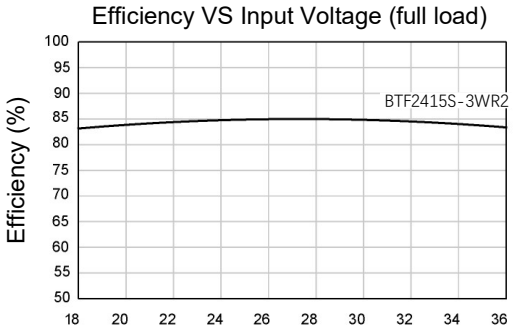
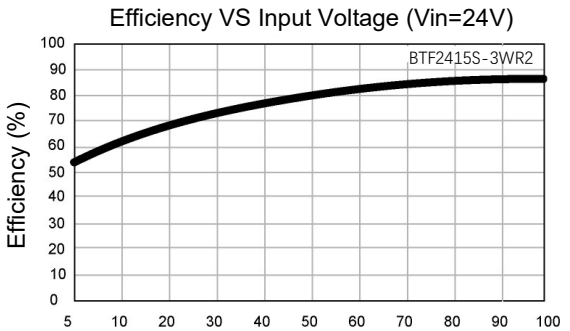



Figure 1




## Circuit Design and Application

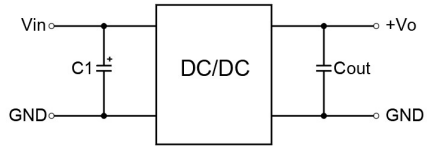



Figure 2

| Recommended Capacitive Load Value Table | |
|---|---|
| Cin(μF) | Cout(μF) |
| 100 | 22 |
| | |

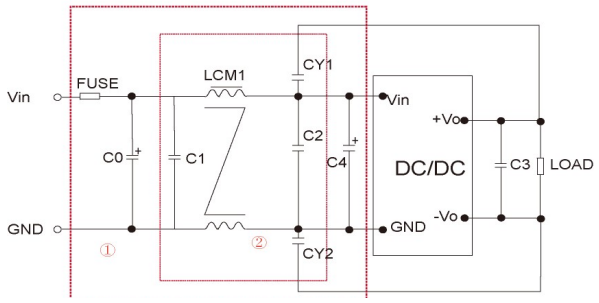


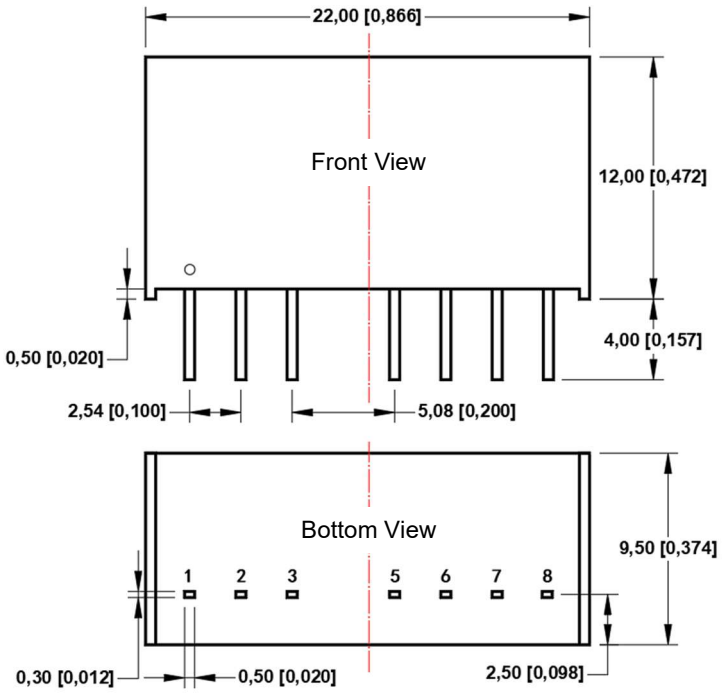
Figure 3

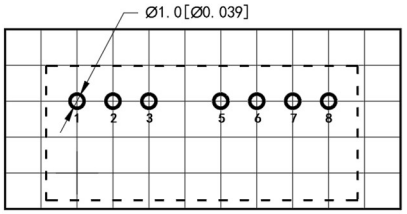
| EMI Recommended Parameter Table | | |
|---|---|---|
| Model | Vin:12V | Vin:24V |
| FUSE | Select according to the actual input current of the customer | |
| C0、C4 | 330uF/35V | 330uF/50V |
| C1、C2 | 10μF/50V | |
| LCM1 | 1.4-1.7mH | |
| C3 | 22μF/50V | |
| CY1、CY2 | 1nF/400VAC | |

Note: Part 1 in Figure 3 is for EMC testing; The second part is used for EMI filtering, which can be selected according to the demand.

## Dimensions and Recommended Layout

**Dimensions** | **PCB Printing Layout & Pin Definition Table**




Note: The grid distance is 2.54mm*2.54mm

| Pin | Function(single) | Function(double) |
|---|---|---|
| 1 | GND | GND |
| 2 | Vin | Vin |
| 3 | CTRL | CTRL |
| 5 | NC | NC |
| 6 | +Vo | +Vo |
| 7 | -Vo | COM |
| 8 | NC | -Vo |

NC: Pin to be isolated from circuity

Note:
Unit: mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.50[±0.020]

**Note:**

1.The input voltage cannot exceed the specified range value, otherwise permanent and irreparable damage may be caused ;

2. Unless otherwise specified,the parameters in this datasheet were measured at 25℃, humidity 40%~75%, input nominal voltage and output pure resistance mode under full load;

3. All index test methods are based on our company's enterprise standards.