

FEATURES

- ▶ Industrial Standard SIP-4 Package
- ▶ Unregulated Output Voltage
- ▶ I/O Isolation 1500VDC
- ▶ Operating Ambient Temp. Range -40°C to +90°C
- ▶ Short Circuit Protection

NEW

PRODUCT OVERVIEW

The MINMAX MBSU03 series is a new range of isolated 3W DC-DC converter modules in SIP-4 package size. There are 9 models available for 5, 12 or 24VDC input. Advanced circuit topology provides continuous short circuit protection and a high efficiency up to 86 which allows operating ambient temperatures range of -40°C to +90°C. These converters offer a better solution for all applications where space critical, wide operating temp. range and fault condition protection are required.

Model Selection Guide

| Model Number | Input Voltage (Range) VDC | Output Voltage VDC | Output Current Max. mA | Input Current | | Max. capacitive Load μF | Efficiency (typ.) @Max. Load % |
|--------------|------------------------------|-----------------------|------------------------------|------------------------|----------------------|----------------------------|--------------------------------------|
| | | | | @Max. Load mA(typ.) | @No Load mA(typ.) | | |
| | | | | MBSU03-05S05 | 5 (4.5 ~ 5.5) | | 5 |
| MBSU03-05S12 | 12 | 250 | 723 | 83 | | | |
| MBSU03-05S15 | 15 | 200 | 714 | 84 | | | |
| MBSU03-12S05 | 12 (10.8 ~ 13.2) | 5 | 600 | 309 | 45 | 81 | |
| MBSU03-12S12 | | 12 | 250 | 294 | | 85 | |
| MBSU03-12S15 | | 15 | 200 | 294 | | 85 | |
| MBSU03-24S05 | 24 (21.6 ~ 26.4) | 5 | 600 | 152 | 18 | 82 | |
| MBSU03-24S12 | | 12 | 250 | 145 | | 86 | |
| MBSU03-24S15 | | 15 | 200 | 145 | | 86 | |

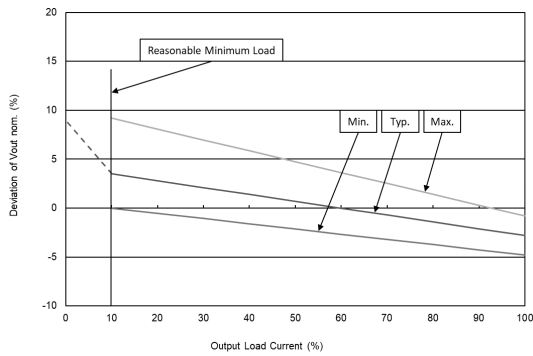
Input Specifications

| Parameter | Model | Min. | Typ. | Max. | Unit |
|-------------------------------------|------------------|--------------------|------|------|------|
| Input Voltage Range | 5V Input Models | 4.5 | 5 | 5.5 | VDC |
| | 12V Input Models | 10.8 | 12 | 13.2 | |
| | 24V Input Models | 21.6 | 24 | 26.4 | |
| Input Surge Voltage (1000 ms. max.) | 5V Input Models | -0.7 | --- | 9 | VDC |
| | 12V Input Models | -0.7 | --- | 18 | |
| | 24V Input Models | -0.7 | --- | 30 | |
| Input Filter | All Models | Internal Capacitor | | | |

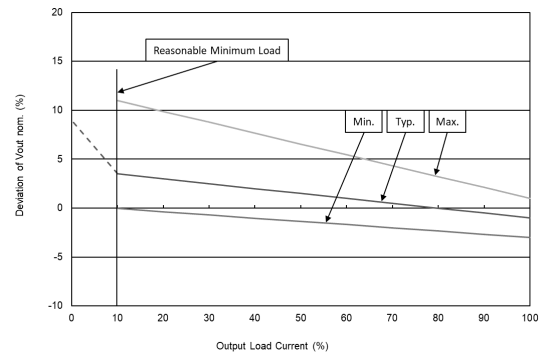
Output Specifications

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------------------|--------------------------------|--|-------|-------|-------------------|
| Line Regulation | For Vin Change of 1% | --- | ±1.2 | ±1.5 | % |
| Load Regulation | Io=10% to 100% | See Model Selection Guide (Operation at lower load will not damage the converter, but it may not meet all specifications) | | | |
| Ripple & Noise | 0-20 MHz Bandwidth | --- | 100 | --- | mV _{p-p} |
| Temperature Coefficient | | --- | ±0.01 | ±0.02 | %/°C |
| Short Circuit Protection | Continuous, Automatic Recovery | | | | |

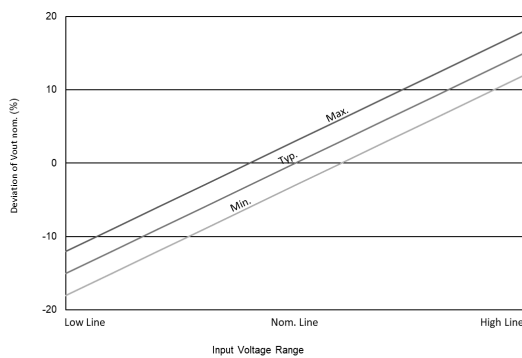
Output Voltage Tolerance



Output Voltage VS Output Load Current
For 5V Output Models



Output Voltage VS Output Load Current
For 12V & 15V Output Models



Output Voltage VS Input Voltage Range

Isolation, Safety Standards

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|------------|------|------|------|------|
| I/O Isolation Voltage | 60 Seconds | 1500 | --- | --- | VDC |
| | 1 Second | 1800 | --- | --- | VDC |
| I/O Isolation Resistance | 500 VDC | 1000 | --- | --- | MΩ |
| I/O Isolation Capacitance | 100kHz, 1V | --- | 120 | 160 | pF |

General Specifications

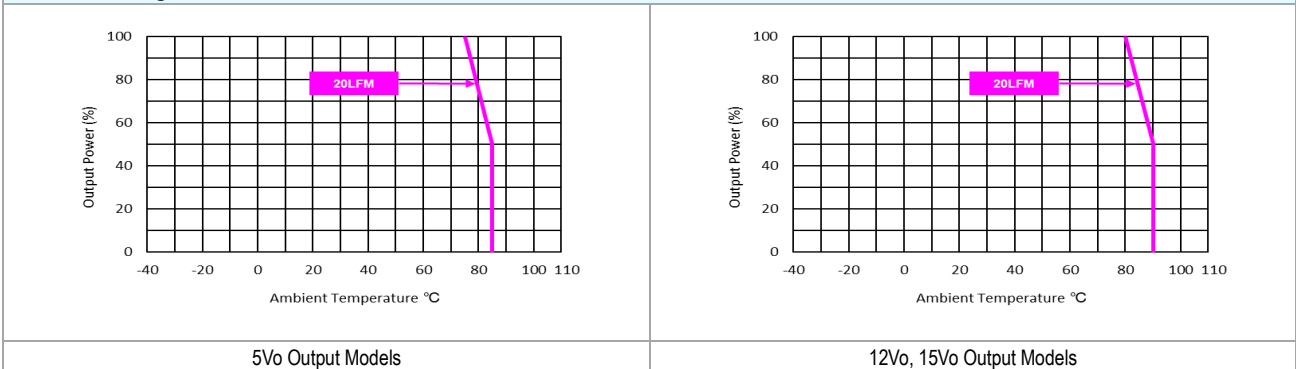
| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|-----------|------|------|-------|
| Switching Frequency | | --- | 60 | --- | kHz |
| MTBF (calculated) | MIL-HDBK-217F@25°C, Ground Benign | 4,963,645 | --- | --- | Hours |

EMC Specifications

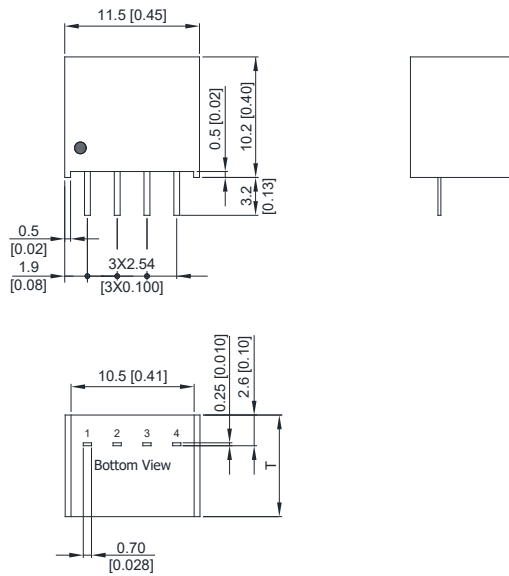
| Parameter | Standards & Level | | Performance |
|--------------------|--------------------|------------------------|---|
| EMI ₍₅₎ | Conduction | EN 55032 | With external components Class A |
| | Radiation | | |
| EMS ₍₅₎ | EN 55035 | | |
| | ESD | Direct discharge | Indirect discharge HCP & VCP Contact ± 6kV |
| | | EN 61000-4-2 Air ± 8kV | |
| | Radiated immunity | EN 61000-4-3 10V/m | |
| | Fast transient | EN 61000-4-4 ±2kV | |
| | Surge | EN 61000-4-5 ±1kV | |
| | Conducted immunity | EN 61000-4-6 10Vrms | |
| PFMF | EN 61000-4-8 30A/m | | |

Environmental Specifications

| Parameter | Model | Min. | Max. | Unit |
|--|--------------------------|------|------|----------|
| Operating Ambient Temperature Range Nominal Vin, Load 100% Inom. (for Power Derating see relative Derating Curves) | 5Vo Output Models | -40 | +75 | °C |
| | 12Vo, 15Vo Output Models | | +80 | |
| Case Temperature | | --- | 105 | °C |
| Storage Temperature Range | | -50 | +125 | °C |
| Humidity (non condensing) | | --- | 95 | % rel. H |
| Lead Temperature (1.5mm from case for 10Sec.) | | --- | 260 | °C |

Power Derating Curve

Notes

- Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
- These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
- We recommend to protect the converter by a slow blow fuse in the input supply line.
- Other input and output voltage may be available, please contact MINMAX.
- The external components might be required to meet EMI/EMS standard for some of test items. Please contact MINMAX for the solution in detail.
- Specifications are subject to change without notice.
- The repeated high voltage isolation testing of the converter can degrade isolation capability, to a lesser or greater degree depending on materials, construction, environment and reflow solder process. Any material is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage. Furthermore, the high voltage isolation capability after reflow solder process should be evaluated as it is applied on system.

Package Specifications
Mechanical Dimensions

Pin Connections

| Pin | Single Output |
|-----|---------------|
| 1 | -Vin |
| 2 | +Vin |
| 3 | -Vout |
| 4 | +Vout |

T: 8.6mm(0.34 inch) for 5V & 12V Input Models

T: 9.6mm(0.38 inch) for 24V Input Models

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.01)
- ▶ Pins ±0.05 (±0.002)

Physical Characteristics

| | |
|----------------------------|--|
| Case Size (5V & 12V Input) | : 11.5x10.2x8.6mm (0.45x0.40x0.34 inches) |
| Case Size (24V Input) | : 11.5x10.2x9.6mm (0.45x0.40x0.38 inches) |
| Case Material | : Plastic resin (flammability to UL 94V-0 rated) |
| Pin Material | : Phosphor Bronze |
| Weight (5V & 12V Input) | : 3.20g |
| Weight (24V Input) | : 3.40g |