FEATURES

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

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)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	%
MBSU03-05S05	5 (4.5 ~ 5.5)	5	600	759	85	2200	79
MBSU03-05S12		12	250	723		1000	83
MBSU03-05S15		15	200	714		820	84
MBSU03-12S05	12 (10.8 ~ 13.2)	5	600	309	45	2000	81
MBSU03-12S12		12	250	294		1000	85
MBSU03-12S15		15	200	294		820	85
MBSU03-24S05	24 (21.6 ~ 26.4)	5	600	152	18	2000	82
MBSU03-24S12		12	250	145		1000	86
MBSU03-24S15		15	200	145		820	86

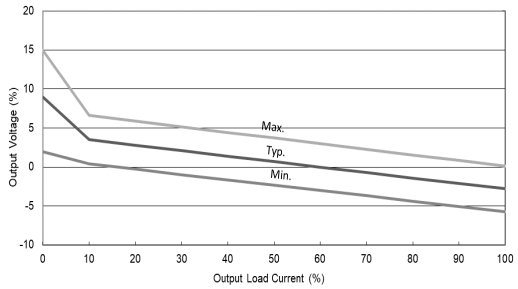
Input Specifications

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	
	12V Input Models	-0.7	---	18	
	24V Input Models	-0.7	---	30	
Input Filter	All Models	Internal Capacitor			

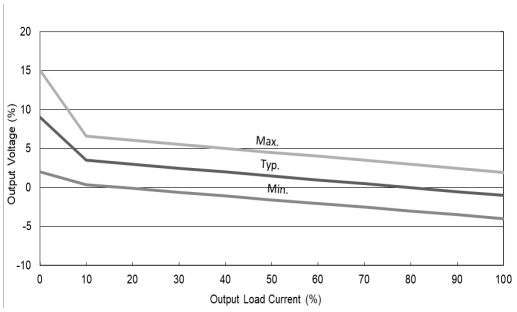
Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Line Regulation	For Vin Change of 1%	---	±1.2	±1.5	%
Load Regulation	Io=10% to 100%	---	---	±10	%
Ripple & Noise	0-20 MHz Bandwidth	---	100	---	mV $_{P-P}$
Temperature Coefficient		---	±0.01	±0.02	%/°C
Short Circuit Protection	Continuous, Automatic Recovery				

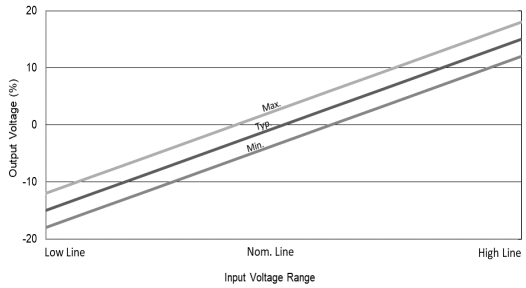
Output Voltage Tolerance



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℃, Ground Benign	4,963,645	---	---	Hours

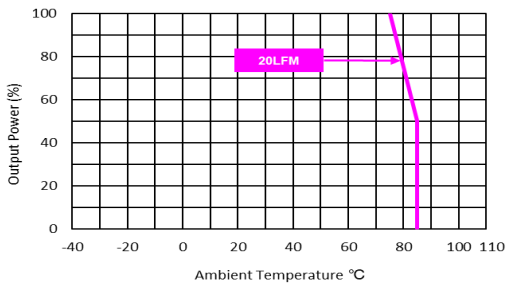
EMC Specifications

Parameter	Standards & Level			Performance
EMI	Conduction	EN 55032	With external components	Class A (5)
	Radiation			
EMS	EN 55024, EN 55035			
	ESD	Direct discharge	Indirect discharge HCP & VCP	A
		EN 61000-4-2 Air ± 8kV	Contact ± 6kV	
	Radiated immunity	EN 61000-4-3 10V/m		A
	Fast transient (6)	EN 61000-4-4 ±2kV		A
	Surge (6)	EN 61000-4-5 ±1kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 30A/m		A

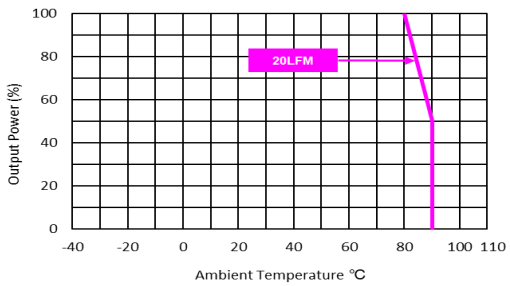
Environmental Specifications

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

Power Derating Curve



5Vo Output Models



12Vo, 15Vo Output Models

Notes

1 Specifications typical at Ta=+25℃, resistive load, nominal input voltage and rated output current unless otherwise noted.

2 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.

3 We recommend to protect the converter by a slow blow fuse in the input supply line.

4 Other input and output voltage may be available, please contact MINMAX.

5 To meet EN 55032 Class A with an external filter, please contact MINMAX.

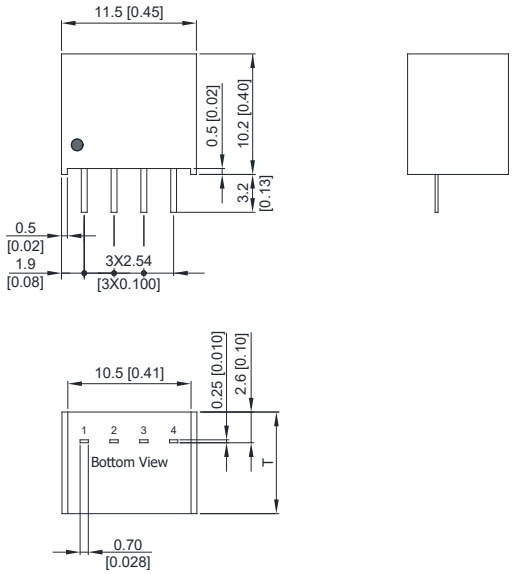
6 To meet EN 61000-4-4 & EN 61000-4-5 an external capacitor and Transient Voltage Suppressor diode parallel across the input pins is required, please contact MINMAX.

7 Specifications are subject to change without notice.

8 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 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