

**FEATURES**

- ▶ Industrial SMD Package
- ▶ I/O Isolation 3000 VDC
- ▶ Operating Ambient Temp. Range -40°C to +85°C
- ▶ Overload and Short Circuit Protection
- ▶ Water-washable Process Available(option)
- ▶ Qualified for Lead-free Reflow Solder Process  
According to IPC/JEDEC J-STD-020D.1
- ▶ Tape & Reel Package Available
- ▶ UL/cUL/IEC/EN 62368-1 (60950-1) Safety Approval & CE Marking


**PRODUCT OVERVIEW**

The MINMAX MSPU01H series is a new range of isolated 1W DC/DC converter modules in SMD package which feature a high I/O isolation voltage rated for 3000VDC and there are 21 models available for 3.3, 5 or 12VDC input.

Advanced circuit topology provides continuous overload, short circuit protection and a high efficiency up to 84% which allows operating ambient temperatures range of -40°C to +75°C without power derating.

These converters offer a cost-effective solution for all applications where a high I/O isolation and fault condition protection are required.

**Model Selection Guide**

Model Number	Input Voltage (Range) VDC	Output Voltage VDC	Output Current		Input Current		Load Regulation % (max.)	Max. capacitive Load μF	Efficiency (typ.)
			Max. mA	Min. mA	@Max. Load mA(typ.)	@No Load mA(typ.)			@Max. Load %
MSPU01-033S033H	3.3 (2.97 - 3.63)	3.3	300	6	390	45	15	220	77
MSPU01-033S05H		5	200	4	384		12		79
MSPU01-033S12H		12	84	1.68	377		10		81
MSPU01-033S15H		15	67	1.34	381		9	80	
MSPU01-033D05H		±5	±100	±2	384		12	100#	79
MSPU01-033D12H		±12	±42	±0.84	377		9		81
MSPU01-033D15H		±15	±33	±0.66	375		9		80
MSPU01-05S033H	5 (4.5 - 5.5)	3.3	300	6	251	30	12	220	79
MSPU01-05S05H		5	200	4	244		11		82
MSPU01-05S12H		12	84	1.68	240		7		84
MSPU01-05S15H		15	67	1.34	236		7	85	
MSPU01-05D05H		±5	±100	±2	244		11	100#	82
MSPU01-05D12H		±12	±42	±0.84	240		7		84
MSPU01-05D15H		±15	±33	±0.66	236		7		84
MSPU01-12S033H	12 (10.8 - 13.2)	3.3	300	6	106	17	9	220	78
MSPU01-12S05H		5	200	4	103		8		81
MSPU01-12S12H		12	84	1.68	101		6		83
MSPU01-12S15H		15	67	1.34	101		6	83	
MSPU01-12D05H		±5	±100	±2	102		7	100#	82
MSPU01-12D12H		±12	±42	±0.84	101		6		83
MSPU01-12D15H		±15	±33	±0.66	99		6		83

# For each output

**Input Specifications**

Parameter	Model	Min.	Typ.	Max.	Unit
Input Voltage Range	3.3V Input Models	2.97	3.3	3.63	VDC
	5V Input Models	4.5	5	5.5	
	12V Input Models	10.8	12	13.2	
Input Surge Voltage (1 sec. max.)	3.3V Input Models	-0.7	---	6	VDC
	5V Input Models	-0.7	---	9	
	12V Input Models	-0.7	---	18	
Input Filter	All Models	Internal Capacitor Type			

**Output Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±3.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.1	±1.0	%
Line Regulation	For Vin Change of 1%	---	±1.2	±1.5	%
Load Regulation	Io=10% to 100%	See Model Selection Guide			
Ripple & Noise	0-20 MHz Bandwidth	---	65	100	mV <sub>P-P</sub>
Temperature Coefficient		---	±0.01	±0.02	%/°C
Over Load Protection	Normal Vin at 25°C	---	160	---	%
Short Circuit Protection		Continuous, Automatic Recovery			

**General Specifications**

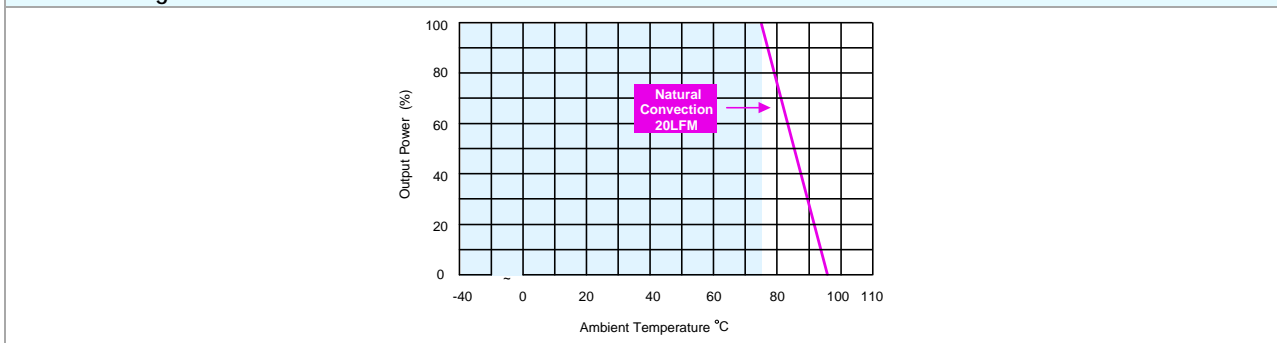
Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	3000	---	---	VDC
I/O Isolation Resistance	500 VDC	10	---	---	GΩ
I/O Isolation Capacitance	100KHz, 1V	---	20	---	pF
Switching Frequency		50	80	110	KHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	3,657,000	---	---	Hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 2			
Safety Approvals	UL/cUL 60950-1 recognition (UL certificate), IEC/EN 60950-1 (CB-report)				
	UL/cUL 62368-1 recognition (UL certificate), IEC/EN 62368-1 (CB-report)				

**Environmental Specifications**

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+85	°C
Case Temperature		---	+95	°C
Storage Temperature Range		-50	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Natural Convection			
Lead-free Reflow Solder Process	IPC/JEDEC J-STD-020D.1			

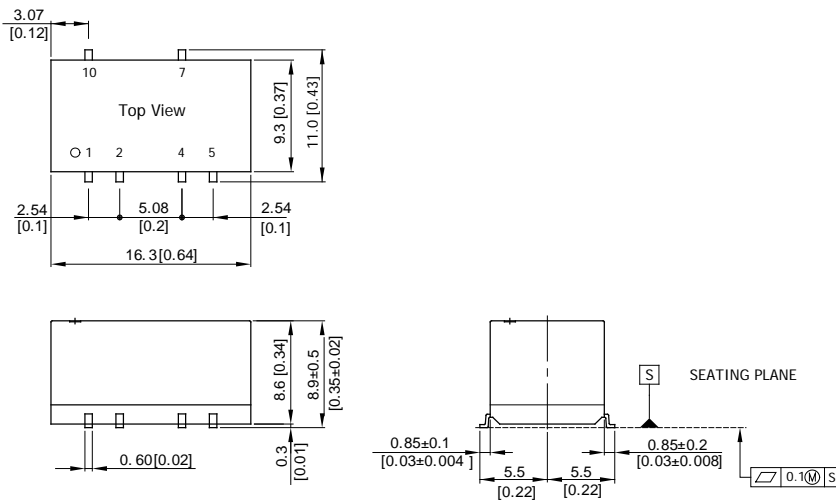
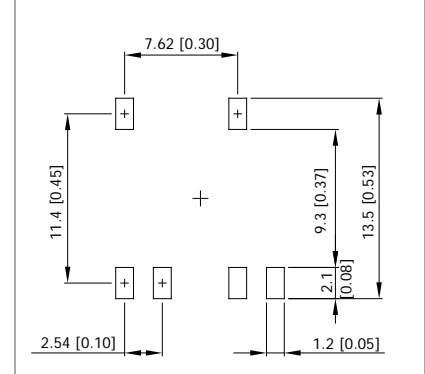
**EMC Specifications**

Parameter	Standards & Level		Performance
EMI	Conduction	EN 55032, EN 55022, FCC part 15	Class A <sub>(5)</sub>
EMS	EN55024		
	ESD	EN61000-4-2 Air ± 8kV , Contact ± 6kV	A
	Radiated immunity	EN61000-4-3 10V/m	A
	Fast transient (6)	EN61000-4-4 ±2kV	A
	Surge (6)	EN61000-4-5 ±1kV	A
	Conducted immunity	EN61000-4-6 10Vrms	A
	PFMF	EN61000-4-8 3A/m	A

**Power Derating Curve**


**Notes**

- 1 Specifications typical at Ta=+25°C, 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 fast blow fuse in the input supply line.
- 4 Other input and output voltage may be available, please contact factory.
- 5 To meet EN55022 Class A an external filter, please contact MINMAX.
- 6 To meet EN61000-4-4 & EN61000-4-5 an external capacitor across the input pins is required. Suggested capacitor: 1800µF/50V KY AI-E Cap.
- 7 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
- 8 Specifications are subject to change without notice.

**Package Specifications**
**Mechanical Dimensions**

**Connecting Pin Patterns**


- ▶ 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)

Pin Connections		
Pin	Single Output	Dual Output
1	-Vin	-Vin
2	+Vin	+Vin
3	No Pin	No Pin
4	-Vout	Common
5	No Pin	-Vout
6	No Pin	No Pin
7	+Vout	+Vout
8	No Pin	No Pin
9	No Pin	No Pin
10	NC	NC

NC: No Connection

**Physical Characteristics**

Case Size	: 16.3x9.3x8.6 mm (0.64x0.37x0.34 inches)
Case Material	: Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	: Phosphor Bronze
Weight	: 1.9g

Order Code Table	
Standard	For water-washable process
MSPU01-033S033H	MSPU01-033S033H-W
MSPU01-033S05H	MSPU01-033S05H-W
MSPU01-033S12H	MSPU01-033S12H-W
MSPU01-033S15H	MSPU01-033S15H-W
MSPU01-033D05H	MSPU01-033D05H-W
MSPU01-033D12H	MSPU01-033D12H-W
MSPU01-033D15H	MSPU01-033D15H-W
MSPU01-05S033H	MSPU01-05S033H-W
MSPU01-05S05H	MSPU01-05S05H-W
MSPU01-05S12H	MSPU01-05S12H-W
MSPU01-05S15H	MSPU01-05S15H-W
MSPU01-05D05H	MSPU01-05D05H-W
MSPU01-05D12H	MSPU01-05D12H-W
MSPU01-05D15H	MSPU01-05D15H-W
MSPU01-12S033H	MSPU01-12S033H-W
MSPU01-12S05H	MSPU01-12S05H-W
MSPU01-12S12H	MSPU01-12S12H-W
MSPU01-12S15H	MSPU01-12S15H-W
MSPU01-12D05H	MSPU01-12D05H-W
MSPU01-12D12H	MSPU01-12D12H-W
MSPU01-12D15H	MSPU01-12D15H-W