



# M4162 SERIES DC/DC HOLDUP UNIT



#### **PRODUCT HIGHLIGHTS**

- VITA 62 COMPLIANT
- 3U FORM FACTOR
- WIDE INPUT RANGE
- IPMI / 46.11
   COMMUNICATION
- UP to 48J

**Milpower Source, Inc.** • Belmont, NH, **USA** • P: (603) 267-8865 Email: <a href="mailto:sales@milpower.com">sales@milpower.com</a> • Website: <a href="mailto:www.milpower.com">www.milpower.com</a> • CAGE: 0B7R6

MILPOWER SOURCE

Doc: DS\_M4162 Series | Rev e | Jun 7, 2022





### **Electrical Specifications**

**DC** Input

Up to 100V<sub>DC</sub> Continuous work during MIL-STD-704 transients

**DC Output** VS1: Power VS2: Power return Normally: Input Follower

During Power loss: Output is Up to 85V

**Communication** 

IPMI / 46.11 protocol available for voltages

<u>Efficiency</u> <u>EMC</u>

Typical 98% Complies with MIL-STD-461F (5µH LISN): CE101, CE102,

CS101

**Isolation** 

to case

Over 20 M $\Omega$  at test voltage:

200V between Input & output

**Environmental** 

Design to Meet MIL-STD-810G

<u>Temperature</u>

Operating:  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ 

at unit edge

Storage: -55°C to +125°C

<u>Altitude</u>

Method 500.5, Procedure I & II Storage/Air Transport: 40 kft Operation/Air carriage: 70

kf

**Fungus** 

Does not support fungus growth, in accordance with the guidelines of MIL- STD-454, Requirement 4.

**Humidity** 

Method 507.5, Up to 95% RH

Shock

Salt Fog:

Method 509.5

Method 516.6 40g, 11msec sawtooth (all directions)

**Vibration** 

Shock: Saw-tooth, 20g peak, 11mS. Vibration: Figure 514.6E-1. General minimum integrity exposure. (1 hour per axis.)

Normal Quiescent
Current:

Charging Current: 15A Maximum Normal Operation:

0.1A

**Reliability** 

239,210 Hours, calculated IAW, MIL-HDBK-217F Notice 2 at +85 °C, GF (Max Holdup).

Note: *Environmental Stress Screening (ESS)* Including random vibration and thermal cycles is also available. Please consult factory for details.

#### **Protections**

<u>Input</u>

• Inrush Current Limiter

Peak value of 5 x  $I_{IN}$  for initial inrush currents lasting more than  $50\mu Sec.$ 

Under Voltage

Unit shuts down when input voltage drops below 11± 0.5V<sub>DC</sub>.

Automatic restart when input voltage returns to 12V ...

Line.

**General** 

Over Temperature Protection

Automatic shutdown at internal temperature of 95 ± 5°C.

Automatic recovery when temperature drops below 90 ±5°C.

Note: Thresholds and protections can be modified/removed (please consult factory)

Milpower Source, Inc. • Belmont, NH, USA • P: (603) 267-8865 Email: sales@milpower.com • Website: www.milpower.com • CAGE: 0B7R6

SOURCE

Doc: DS\_M4162 Series | Rev e | Jun 7, 2022 Page 2 from 7







**Normal Operation:** During Normal Operation, the M4162 works as an Input follower. Small Voltage drop, of less than 1V is expected

Hold Up Operation: When Voltage at the input of the unit, drops below 18V, the Holdup will discharge

it's internal capacitance into the DC Bus. During this time the M4162 output voltage will rise up to 85V and will decrease as the capacitor bank energy will be discharging.

Recharging of the capacitor bank will start before Input voltage goes back to steady state line.

The M4162 charging time is less than 0.5Sec per Mil-STD-704, during this time, the average charging current taken from the source can be calculated as follow

$$E = \frac{C * Vc^2}{2}$$

$$I = \frac{E}{Vin * t * Eff}$$

Where *E* is Holdup Energy, *Vc* and *C* are the Holdup capacitance and charging voltage, *Vin* is input voltage and *Eff* is the charging circuit efficiency. For specific details contact Factory.

Reducing Charging current and increasing charge time is optional.

#### Functions and Signals - According to VITA 62

Signal No.	Signal Name	Туре	Description	Pin No'
1	Power Down	Output	Indicates that Holdup event has occurred. Open Drain. Normally Open, goes low during Holdup time.	D1
2	Power Ready	Output	Indicates to other modules that Holdup capacitor bank is Fully charged. Open Drain. Normally Open, goes low when Holdup energy under 90%.	А3
5	GA0, GA1	Input	Used for geographical addressing. GA1 is the most significant bit and GA0 is the least significant bit.	A5,B5
6	SCL, SDA	Bidirectional	I2C bus Clock and Data respectively. Through this bus the voltage and temperature readouts can be shared.	C5,D5

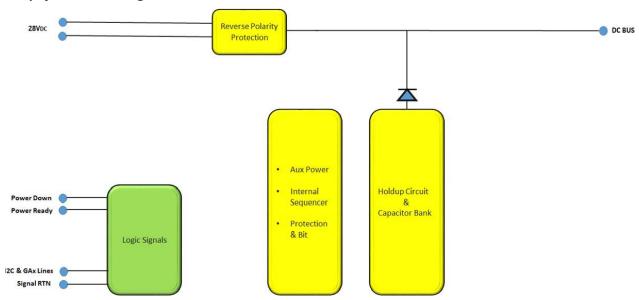
MILPOWER

**Milpower Source, Inc.** • Belmont, NH, **USA** • P: (603) 267-8865 Email: <a href="mailto:sales@milpower.com">sales@milpower.com</a> • Website: <a href="mailto:www.milpower.com">www.milpower.com</a> • CAGE: 0B7R6

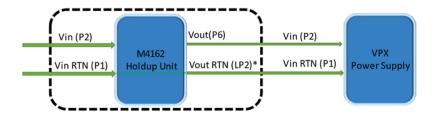




#### Simplified Block Diagram



#### **Typical Application**



- Vin RTN & Vout RTN are internally shorted
- When Input Current exceed 20A, P5 should be added as Vout RTN line
- · Since Hold-up event generate ground noise, it is important to keep Power Supply Input to Output grounds isolation
- All signals are floating and can be referred to Power Supply Signal ground

SOURCE

Milpower Source, Inc. • Belmont, NH, USA • P: (603) 267-8865 Email: sales@milpower.com • Website: www.milpower.com • CAGE: 0B7R6

Doc: DS\_M4162 Series | Rev e | Jun 7, 2022 Page 4 from 7





## Pin Assignment

Pin Number	Pin Name
P1	-DC_IN
P2	+DC_IN
LP1	CHASSIS
Р3	N.C.
P4	N.C.
P5	N.C.
LP2	Bus_RTN
P6	Bus
A8	N.C.
B8	N.C.
C8	N.C.
D8	N.C.
A7	N.C.
В7	N.C.
C7	N.C.
D7	Sig_RTN
A6	SCL_B
В6	SDA_B
C6	N.C.
D6	N.C.
A5	GA0*
B5	GA1*
C5	SCL_A
D5	SDA_A
A4	N.C.
B4	N.C.
C4	N.C
D4	N.C
А3	Power_Ready
В3	N.C.
C3	N.C.
D3	N.C.
A2	N.C.
B2	N.C.
C2	N.C.
D2	N.C.
A1	N.C.
B1	N.C
C1	N.C.
D1	Power_Down

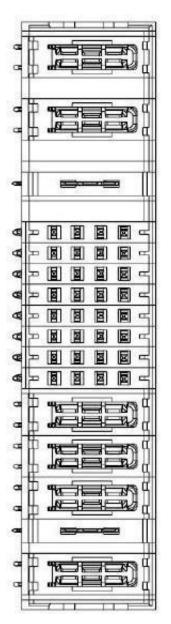
**Milpower Source, Inc.** • Belmont, NH, **USA** • P: (603) 267-8865 Email: <a href="mailto:sales@milpower.com">sales@milpower.com</a> • Website: <a href="mailto:www.milpower.com">www.milpower.com</a> • CAGE: 0B7R6



Doc: DS\_M4162 Series | Rev e | Jun 7, 2022







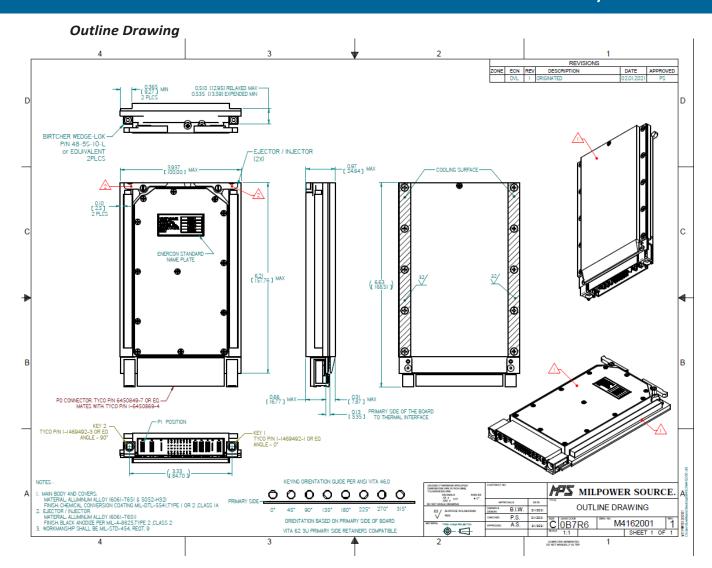
ROWS POWER SIGNAL    P1   P2   LP1   1   2   3   4   5   6     D   Z5   Z5   Z5   Z5   Z5   Z5     C   T1   LT   R5   R5   R5   R5   R5     A   A   A   B   B   B   B   B   B   B	POWER SIGNAL  PI PZ LPI I 2 3 4 5 6  Z5 Z5 Z5 Z5 Z5 Z5 Z5  II II LI R5 R5 R5 R5 R5 R5  05 05 05 05 05 05	POWER    P1   P2   LP1   1   2   3	POWER SIGNAL  PI P2 LPI I 2 3 4 5 6 7  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  II II LI R5 R5 R5 R5 R5 R5  R5 R5 R5 R5 R5 R5 R5	POWER SIGNAL  PI P2 LPI I 2 3 4 5 6 7 8 P3 P4  Z5  II II LI R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01	Y5 Y5 Y5 Y5 X5 R5 R5 R5 R5 R5 O5	2409.11.0.220.200.11.0.11.02		0100010	PART NUMBER			
Y5 Y5 Y5 Y5 Y5 R5	Y5 Y5 Y5 Y5 R5	SIGNAL  Pi I 2 3 4 5 6 7  Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5  R5 R5 R5 R5 R5  R5 R5 R5 R5 R5	SIGNAL  PI 1 2 3 4 5 6 7 8  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01	SIGNAL  PI   2   3   4   5   6   7   8   P3   P4    Z5   Z5   Z5   Z5   Z5   Z5   Z5   Z	SIGNAL P  P  SIGNAL P  P  SIGNAL P  A  F  SIGNAL P  SIGNAL P		A	В	n	D	0.00	DOWC
Y5 Y5 Y5 Y5 Y5 R5	Y5 Y5 Y5 Y5 R5	SIGNAL  Pi I 2 3 4 5 6 7  Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5  R5 R5 R5 R5 R5  R5 R5 R5 R5 R5	SIGNAL  PI 1 2 3 4 5 6 7 8  Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01	SIGNAL  PI 1 2 3 4 5 6 7 8 P3 P4  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01	P.P.I. 2 3 4 5 6 7 8 P3 P4  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 05 01				=		Р	
Y5 Y5 Y5 Y5 Y5 R5	Y5 Y5 Y5 Y5 Y5 R5	SIGNAL  Pi I 2 3 4 5 6 7  Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5  R5 R5 R5 R5 R5  R5 R5 R5 R5 R5	SIGNAL  PI 1 2 3 4 5 6 7 8  Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 05 01	SIGNAL  PI 1 2 3 4 5 6 7 8 P3 P4  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01	PI 1 2 3 4 5 6 7 8 P3 P4  Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 05 01				7		P2	3MOc
2 3 4 5 6 25 25 25 25 275 75 75 75 28 85 85 85 85 05 05 05 05	2 3 4 5 6 25 25 25 25 275 75 75 75 28 85 85 85 85 05 05 05 05	SIGNAL  2 3 4 5 6 7  25 25 25 25 25  Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5  05 05 05 05 05 05	SIGNAL       2     3     4     5     6     7     8       25     25     25     25     25     25     25       75     75     75     75     75     75     75       R5     R5     R5     R5     R5     R5       05     05     05     05     05     01	SIGNAL  2 3 4 5 6 7 8 P3 P4  25 25 25 25 25  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 01	SIGNAL   P   P   P   P   P   P   P   P   P	ı		-	70		LPI	20
SIGNAL  2 3 4 5 6  25 25 25 25  Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5  05 05 05 05 05	SIGNAL  2 3 4 5 6  25 25 25 25  Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5  05 05 05 05 05	SIGNAL  2 3 4 5 6 7  25 25 25 25 25  Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5  05 05 05 05 05 05	SIGNAL  2 3 4 5 6 7 8  25 25 25 25 25 25  Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 01	SIGNAL  2 3 4 5 6 7 8 P3 P4  25 25 25 25 25 25  Y5 Y5 Y5 Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5 R5 R5  05 05 05 05 05 05 01	SIGNAL   P   P   P   P   P   P   P   P   P		05	R5	75	25	-	
\$1GNAL 4 5 6 Z5 Z5 Z5 Y5 Y5 Y5 R5 R5 R5 05 05 05	\$1GNAL 4 5 6 Z5 Z5 Z5 Y5 Y5 Y5 R5 R5 R5 05 05 05	SIGNAL  4 5 6 7  Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5  R5 R5 R5 R5  R5 R5 R5 R5  O5 O5 O5 O5	\$1GNAL  4 5 6 7 8  Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5  R5 Q5 Q5 Q5 Q1	\$1GNAL	SIGNAL P 4 5 6 7 8 P3 P4 Z5 Z5 Z5 Z5 Z5 Y5 Y5 Y5 Y5 Y5 R5 R5 R5 R5 R5 D5 Q5 Q5 Q1 T1		05	₹5		25	2	
\$1GNAL 4 5 6 Z5 Z5 Z5 Y5 Y5 Y5 R5 R5 R5 R5 R5 R5	\$1GNAL 4 5 6 Z5 Z5 Z5 Y5 Y5 Y5 R5 R5 R5 R5 R5 R5	SIGNAL  4 5 6 7  Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5  R5 R5 R5 R5  R5 R5 R5 R5  05 05 05 05	SIGNAL  4 5 6 7 8  Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5  R5 Q5 Q5 Q5 Q1	SIGNAL 8 P3 P4  4 5 6 7 8 P3 P4  Z5 Z5 Z5 Z5 Z5  Y5 Y5 Y5 Y5 Y5  R5 R5 R5 R5 R5  D5 05 05 05 01	SIGNAL P 4 5 6 7 8 P3 P4 Z5 Z5 Z5 Z5 Z5 Y5 Y5 Y5 Y5 Y5 R5 R5 R5 R5 R5 D5 Q5 Q5 Q1		05	R5	15	25	w	
NAL 5 6 Z5 Z5 Y5 Y5 R5 R5 R5 Q5	NAL 5 6 7 25 25 25 75 75 75 R5 R5 R5 05 05 05		01 R5 75	8 P3 P4 75 TT TT	8 P3 P4 25 75 11 11		05	R5	<b>Y</b> 5	7.5	4	SIG
98 75 75 6	6 7 Z5 Z5 Y5 Y5 R5 R5 05 05		01 R5 75	8 P3 P4 75 TT TT	8 P3 P4 25 75 11 11	I	05	25	Y 5	7.5	Ch	NAL
	75 75 75 75 75 75 75 75 75 75 75 75 75 7		8 25 75 875	8 P3 P4 25 175 11 11	8 P3 P4 25 75 11 11		05	R5	75	25	on	
8 P3	7 P4 P	P4 P5 LP2	P5 LP2	LP2			=				P 6	

**Milpower Source, Inc.** • Belmont, NH, **USA** • P: (603) 267-8865 Email: <a href="mailto:sales@milpower.com">sales@milpower.com</a> • Website: <a href="mailto:www.milpower.com">www.milpower.com</a> • CAGE: 0B7R6









#### Notes:

- 1. Dimensions are in inches [mm]
- 2. Tolerance is:
  - .XX  $\pm$  0.02 IN
  - .XXX ± 0.008 IN
- 3. Weight: Approx. TBD
- 4. 3D model available

Note: Specifications are subject to change without prior notice by the manufacturer.

**Milpower Source, Inc.** • Belmont, NH, **USA** • P: (603) 267-8865 Email: <a href="mailto:sales@milpower.com">sales@milpower.com</a> • Website: <a href="mailto:www.milpower.com">www.milpower.com</a> • CAGE: 0B7R6



Doc: DS\_M4162 Series | Rev e | Jun 7, 2022