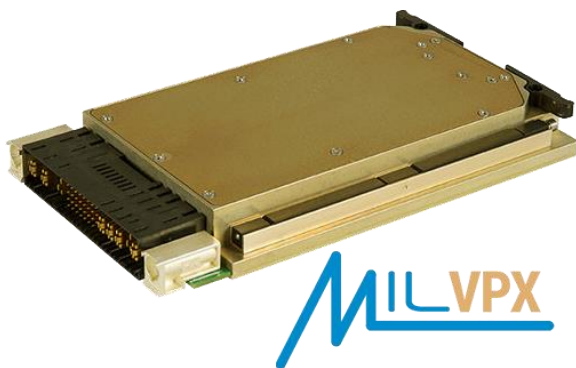


M4265 SERIES

DC/DC POWER SUPPLY



PRODUCT HIGHLIGHTS

- VITA 62 COMPLIANT
- 3U VPX FORM FACTOR
- DC/DC CONVERTER
- 6 OUTPUTS
- 600W (700W PEAK)
- Current Share for VS# Outputs
- Input Options:
 - MIL-STD-704
 - MIL-STD-1275
- Cyber secure

Electrical Specifications

DC Input

18 to 48 V_{DC}

Max Non-Operating 100V

Options:

- 1) MIL-STD-704 (A-F)
Normal and Abnormal
Steady State
- 2) MIL-STD-704(A-F)
transients Up to 50V, 80V
- 3) MIL-STD-1275 Surge
- 4) Def Stan 61-5 170V Load
dump.

DC Output

VS1: 12V up to 30A

VS2: 3.3V up to 20A

VS3: 5V up to 30A

12V_Aux: 12V up to 1A

-12V_Aux: -12V up to 1A

3.3V_Aux: 3.3V up to 5A

Peak power option:

VS1: 12V up to 40A

VS3: 5V up to 35A

Isolation

Over 20 MΩ at test voltage:

200V between Input and Output

200V between Input and Case

100V between Output and Case

Current Sharing

Optional for VS1, VS2, VS3

Line/Load regulation

See Table 2 on page 7

Efficiency

Up to 88%

85.5 % @ Full Load

(See Para. 4)

EMC

Complies with MIL-STD-461F^{1 2}

(5μH LISN²): CE101, CE102,

CS101, CS114, CS115, CS116

Ripple and Noise

Typically, less than 50mV_{p-p}

(max.1%p). Measured across a 0.1μF capacitor and 10μF capacitor on load at Input Voltage of 18V-36V, all

Temperature Range.

Load Transient Overshoot and Undershoot

Output dynamic response of less than 5% at load Step of 30%-60%.

Output returns to regulation in less than 1mSec

Communication

IPMI protocol available for voltages, currents and temperature for all positive voltages (GAX, SCL, SDA)

Notes:

1. Compliance achieved with 5μH LISN, shielded cable and static resistive load.
2. See M4165 for 50 μH compliance

Environmental ¹

Design to Meet MIL-STD-810G

Temperature

Operating: -55 °C to +85 °C
at unit edge
Storage: -55 °C to +125 °C

Altitude

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

Salt Fog:

Method 509.5

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

Method 516.6
40g, 11msec saw-tooth
(all directions)

Vibration

Vibration: Figure 514.6E-1. General minimum integrity exposure. (1 hour per axis.)

Reliability: 305,000 Hours, calculated IAW MIL-HDBK-217F Notice 2 at +65 °C, GF.

Note 1: **Environmental Stress Screening (ESS)** Including random vibration and thermal cycles is also available. **Please consult factory for details.**

Protections ^{*}

Input

Input Reverse Polarity:
Protection for unlimited time

Inrush Current Limiter
Peak value of 5 x I_{IN} for initial inrush currents lasting more than 50 μSec.

Under Voltage
Unit shuts down when input voltage drops below 17± 0.5VDC.
Automatic restart when input voltage returns to nominal range.

Over Voltage Lock-Out
Unit shuts down when input steady state voltage rise above 55 ± 2VDC.
Automatic restart when input voltage returns to nominal range.

Output

Passive over voltage protection on Aux outputs
Zener selected at 25% ± 5% above nominal voltage, is placed across the output for passive voltage limit.

Active over voltage protection on VS# outputs
20% ± 5% above nominal voltage.
Automatic recovery when output voltage drops below threshold.

Overload / Short-Circuit Protection
Continuous Hiccup protection (110-130%) for VS#.
Aux Typical:
3.3Vaux / 8A
12Vaux. 1.5A-2A
-12Vaux. 2.5A-3A

General

Over Temperature Protection
Automatic shutdown at temperature of 95 ± 5 °C (at unit edge)
Automatic recovery when temperature drops below 90 ± 5 °C.

Note 1: Thresholds and protections can be modified / removed (please consult factory)

Functions and Signals - According to VITA 62

Signal No.	Signal Name	Type	Description
1	FAIL*	Output	Indicates to other modules in the system that a failure has occurred in one of the outputs. Please refer to Figure 2 This signal is referenced to SIGNAL RTN .
2	SYSRESET*	Output	Indicates to other modules in the system that all outputs are within their working level. Please refer to Figure 2 This signal is referenced to SIGNAL RTN .
3	INHIBIT*	Input	Controls power supply outputs. This signal in conjunction with INHIBIT controls the outputs. Please refer to Table 1 and Figure 1 This signal is referenced to SIGNAL RTN .
4	ENABLE*	Input	Controls power supply outputs. This signal in conjunction with INHIBIT controls the outputs. Please refer to Table 1 and Figure 1 This signal is referenced to SIGNAL RTN .
5	GA0*, GA1	Input	Used for geographical addressing. GA1 is the most significant bit and GA0 is the least significant bit. This signal is referenced to SIGNAL RTN .
6	SCL, SDA	Bidirectional	I2C bus Clock and Data respectively. Through this bus the voltage and temperature readouts can be shared. This signal is referenced to SIGNAL RTN .
7	REF_CLK	Input	The REF_CLK signal is used to allow the power supply frequency to sync with the system frequency. This signal is referenced to SIGNAL RTN .
8	VOUT SENSE	Input	The SENSE is used to achieve accurate load regulations at load terminals (this is done by connecting the pins directly to the load's terminals).
9	VS# SHARE	Bidirectional	Used for paralleling several M4265 units (optional).
10	SIGNAL RTN	Gnd	Signal ground for all signal. Internally tied to output Power ground

Table 1 – Inhibit and Enable Functionality

INHIBIT*	Low	Low	High	High
ENABLE*	Low	High	Low	High
VS1 ,VS2,VS3,±12VAux	OFF	OFF	ON	OFF
3.3V_AUX	ON	OFF	ON	OFF

Figure 1 – Inhibit and Enable Input stage

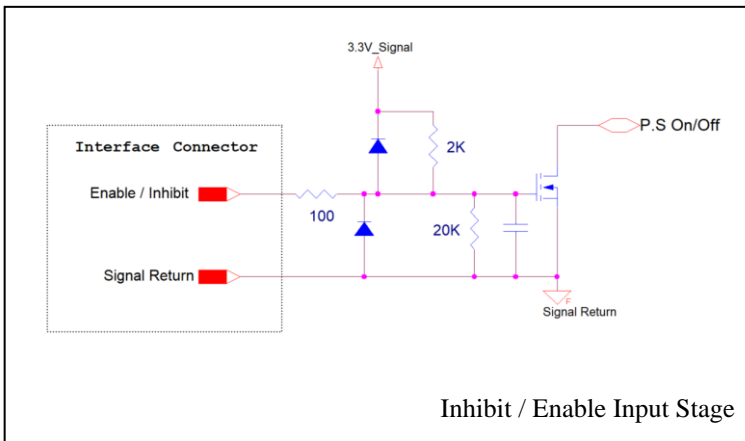
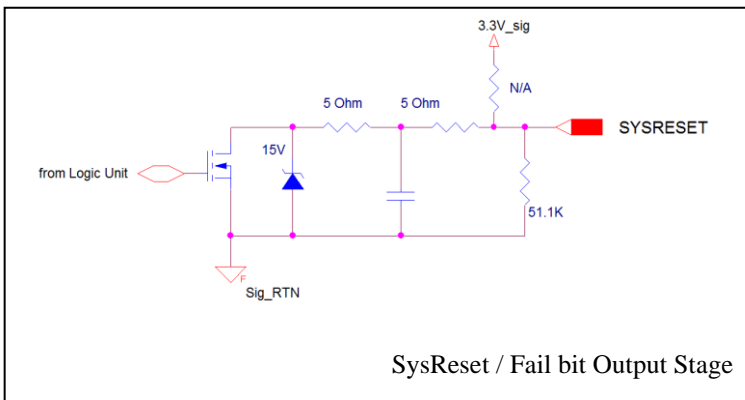
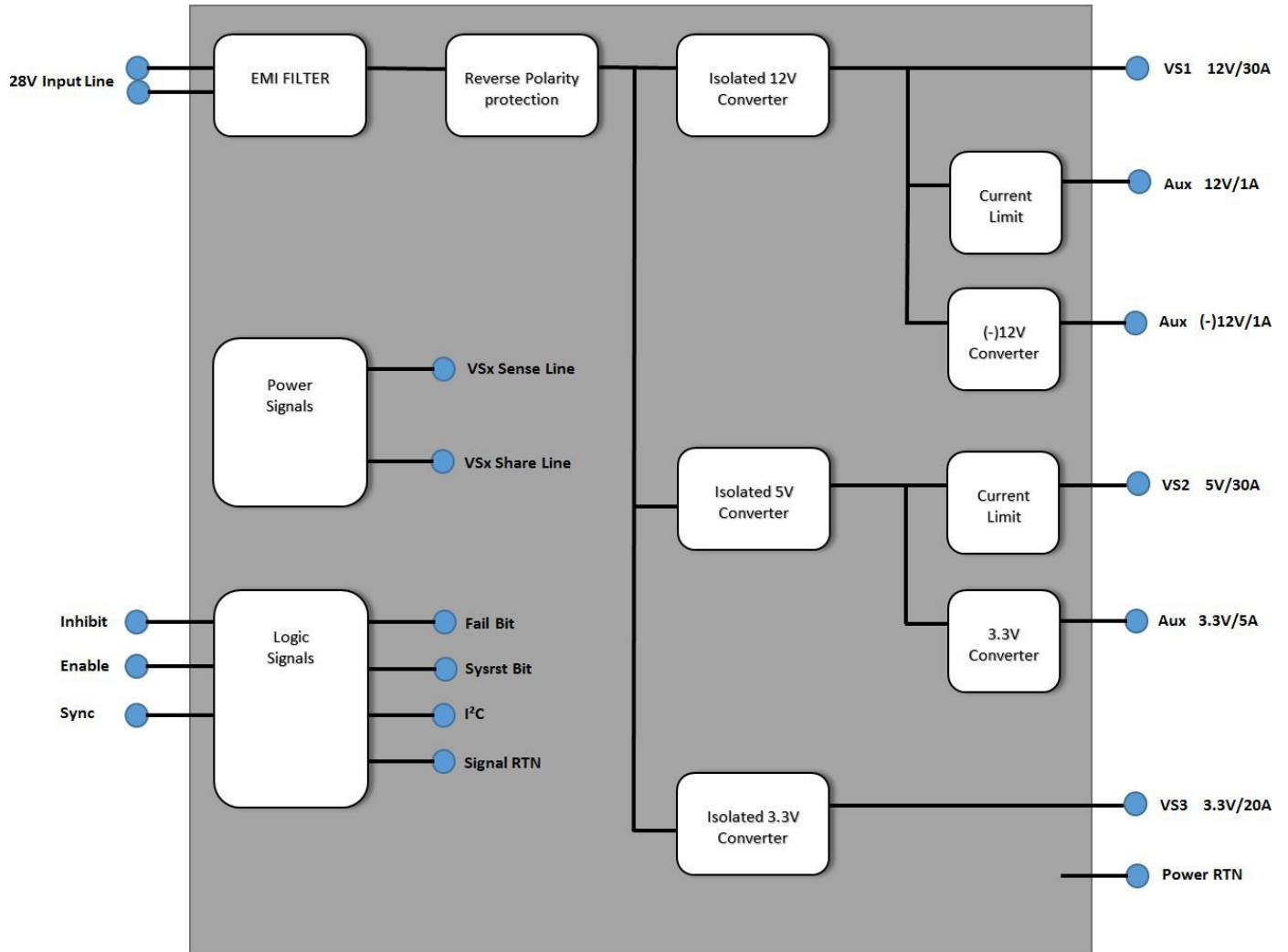


Figure 2 – SysReset and Fail Bit output stage



Simplified Block Diagram



Detailed Information

1. M4265 Input Voltage Operation Range.

The M4265 steady state operation voltage is 18V to 48V, continuously work up to 50V Input line. Unit can be modified to work up to 100V or down to 16V transient and Surge.
Max Non operation Voltage 100V.

1.1 Low Line Turn-on and Turn-off Limits

To avoid Turn-on and Turn-off cycling glitch the unit have about 2V Hysteresis. The Turn-on threshold is under 20V and turn- off below 18V.
Those limits can be adjusted, contact Factory for more information.

2. Outputs Voltage Regulation

The M4265 contains accurate internal sense lines to keep output voltage at less than 3% regulation for all Line/ Load and temperature range (see Table 2).

Output	12V/25A	5V/30A	3.3V/20A	3.3VAux/5A	12VAux/1A	(-)12VAux/1A	Notes
Voltage Range	11.85 – 12.15	4.9 – 5.1	3.28 – 3.42	3.2 – 3.4	11.7 – 12.2	(-)11.85 – (-)12.15	
Voltage Range	11.80 – 12.20	4.8 – 5.2	3.20 – 3.40	3.2 – 3.4	11.7 – 12.2	(-)11.7 – (-)12.2	Current share configuration

Table 2: Outputs voltage regulation. VIN 18V – 48V, Temperature -55 °C – 85 °C single and parallel configuration.

2.1. Sense Lines

Sense Lines are provided for VS1, VS2 and VS3 output to compensate line voltage drop.

Sense Lines proper connection is shown in Figure 3.

Each VSx output has its own *Sense Lines*, additional common *Sense RTN Line* is provided for all VSx Outputs (VITA 62 Standard).

Contact Factory for Sense configuration different than the VITA 62 standard

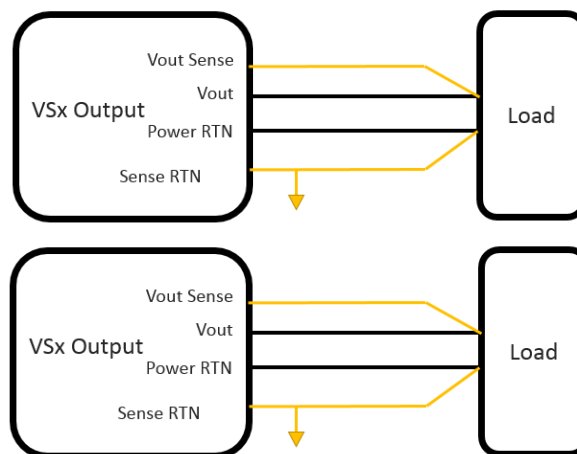


Figure 3: M4265 Sense line connection

3. Output Power

The M4265 can deliver up to 616W steady State at all temperature and input range. Unit can support a peak power of 700W, please contact factory for more details and limitations.

Max Total Power Output	12V/30A	5V/30A	3.3V/20A	3.3VAux/5A	12VAux/1A	(-)12VAux/1A
616W	30A	30A	20A	5A	1A	1A
700W	40A	35A	20A	5A	1A	1A

3.1 Current Sharing (Optional)

Current sharing is available for VS1, VS2 and VS3 outputs. Load share pins should be connected for Hiccup synchronization. 3.3VAux and ±12V Aux can be safely paralleled. To obtain a good current sharing the following steps should be taken

- Connect hiccup pins of desired outputs to guarantee simultaneously Turn-on of paralleled outputs.
- Connect Sense Line of both paralleled outputs to the same point.
- Make sure Power traces are as identical as possible for both current sharing outputs.

3.2 Typical Efficiency (Typical results at room temperature)

Input Voltage	Output Power	Efficiency
28V	170W	88%
	200W	87.6%
	600W	86.1%

4. Typical EMI Tests

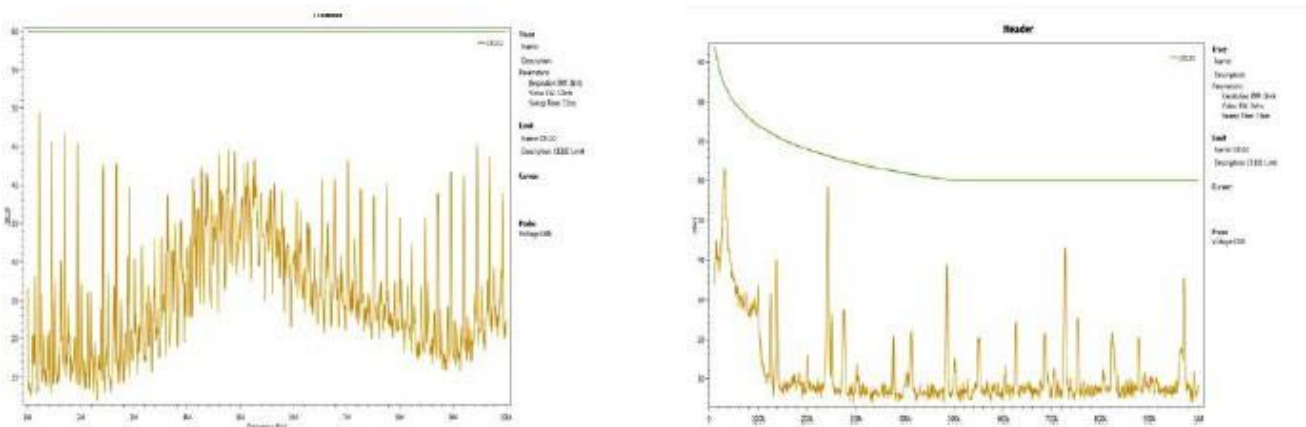


Figure 4: 28V Line, Full Load, 5UH LISN

5. IPMI Protocol

Electrical Parameters

Vcc: 3.3VDC
 Pull-up: 10K Ohm
 Input Capacitance 330Pf

Slave Device Addressing

- 256 address spaces
- Baud rate: 200kHz maximum
- 7 Bit Protocol
- Support Slot Addressing per VITA 62
- Support Global Address 10100101 R/W

Slot Number	MSB							LSB
	A6	A5	A4	A3	A2	A1/*GA1	A0/*GA0	R/W
Slot0	0	1	0	0	0	0	0	
Slot1	0	1	0	0	0	0	1	
Slot2	0	1	0	0	0	1	0	
Slot3	0	1	0	0	0	1	1	
Global Address	1	0	1	0	1	0	1	

* Slot location is determined by GAx per VITA 62.

Communications Supported

Read Command – 21Hex, deliver 64Bytes of Data. (More commands are available by request)
 The communication starts when the master sends a start followed by the unit slave address, command, checksum and a stop. A second start followed by the slave address and a read will be followed by a 64 Bytes response.

S	Slave Address	R/W	A	Command	A	Check sum	A	P
	A6:A0	0	0	21 Hex	0	DF Hex	0	

S	Slave Address	R/W	A	DATA	A	DATA	A	DATA	A	...	DATA	A	Check sum	N/A	P
	A6:A0	1	0	D7:D0	0	D7:D0	0	D7:D0	0		D7:D0	0	D7:D0	1	

Command – 21Hex read all 64 Bytes

S – Start

P – Stop

Master Transmit	Unit Transmit
-----------------	---------------

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Memory Space

Response Byte #	Data Type	Meaning	Interpretation	Reading Range
0	U Integer, MSB First	Echo of Command		21 Hex
1		Reserved		00 Hex
2	S Integer, MSB First	Temperature -55C to 120C	T(C°)=+/- 7bit Dec	-55 C° to 125 C°
3		Reserved		00 Hex
4-5	U Integer, MSB First	12V VS1 Voltage	V(out) = Data · m ₂	16.38V
6-7	U Integer, MSB First	3.3V VS2 Voltage	V(out) = Data · m ₂	16.38V
8-9	U Integer, MSB First	5V VS3 Voltage	V(out) = Data · m ₂	16.38V
10-11	U Integer, MSB First	3.3V Aux Voltage	V(out) = Data · m ₂	16.38V
12-13	U Integer, MSB First	12V Aux Voltage	V(out) = Data · m ₂	16.38V
14-15	U Integer, MSB First	(-)12V Aux Voltage	V(out) = Data · m ₂	16.38V
16-17	U Integer, MSB First	12V VS1 Current	V(out) = Data · m ₃	37.03A*
18-19	U Integer, MSB First	3.3V VS2 Current	V(out) = Data · m ₃	37.03A*
20-21	U Integer, MSB First	5V VS2 Current	V(out) = Data · m ₃	37.03A*
22-23	U Integer, MSB First	3.3V Aux Current	V(out) = Data · m ₄	20.44A
24-35	U Integer, MSB First	12V Aux Current	V(out) = Data · m ₅	10.22A
26-27	U Integer, MSB First	(-)12V Aux Current	V(out) = Data · m ₆	4A
28-29	U Integer, MSB First	Reserved		00Hex
30-31	U Integer, MSB First	Reserved		00Hex
32-51	Character String (ASCII)	Part Number	M4265-X (Note1)	20 Characters
52-53	Decimal, MSB First	Serial Number, 2MSB Dig	X,X Dec (Note2)	8 digits
54-55	Decimal, MSB First	Serial Number, 2LSB Dig	X,X Dec (Note2)	
56-57	Decimal, MSB First	Date Code	Week, Year (Note3)	4 digits
58-59	Character String (ASCII)	Hardware Rev	B01 & B02 Boards (Note4)	2 Characters
60-61	Decimal, MSB First	Firmware Rev	X,X,X,X Dec (Note5)	4 digits
62	U Integer, MSB First	Reserved		AA Hex
63	U Integer, MSB First	Zero Checksum	Value required to make the sum of bytes 0 to 62 added to a multiple of 256	

Note:

$$M_2 = 16.38/2^{16}-1$$

$$M_3 = 37.03/2^{16}-1$$

$$M_4 = 20.44/2^{16}-1$$

$$M_5 = 10.22/2^{16}-1$$

$$M_6 = 4/2^{16}-1$$

$$M_7 = 80/2^{16}-1$$

* For unit configuration with paralleled outputs within a single M4265, reading range is 80A.

Translation is V(out) = Data · M₇.

Notes 1 to 5

1. Part Number Example: M4065-4

Byte No'	32	33	34	35	36	37	38	39 – 51
Character	M	4	0	6	5	(-)	4	0
Hex	4D	34	30	36	35	2D	34	00

2. Serial Number Example: 25

Byte No'	52		53		54		55	
Dec Number	0	0	0	0	0	0	2	5
Binary	"0000"	"0000"	"0000"	"0000"	"0000"	"0000"	"0010"	"0101"

3. Date Code Example: week 35 of 2018

Byte No'	56		57	
Dec Number	3	5	1	8
Binary	"0011"	"0101"	"0001"	"1000"

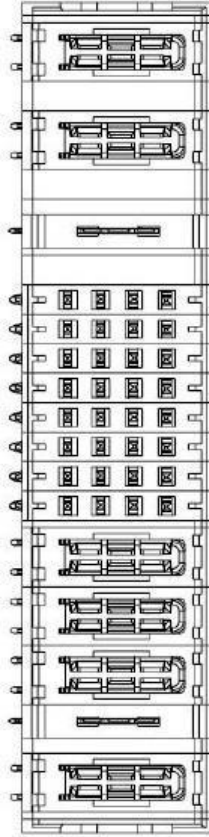
4. Hardware Rev Example: B01 Rev (-), B01 Rev A

Byte No'	58	59
Character	(-)	A
Hex	2D	41

5. Firmware Rev Example: 2.1.0.0

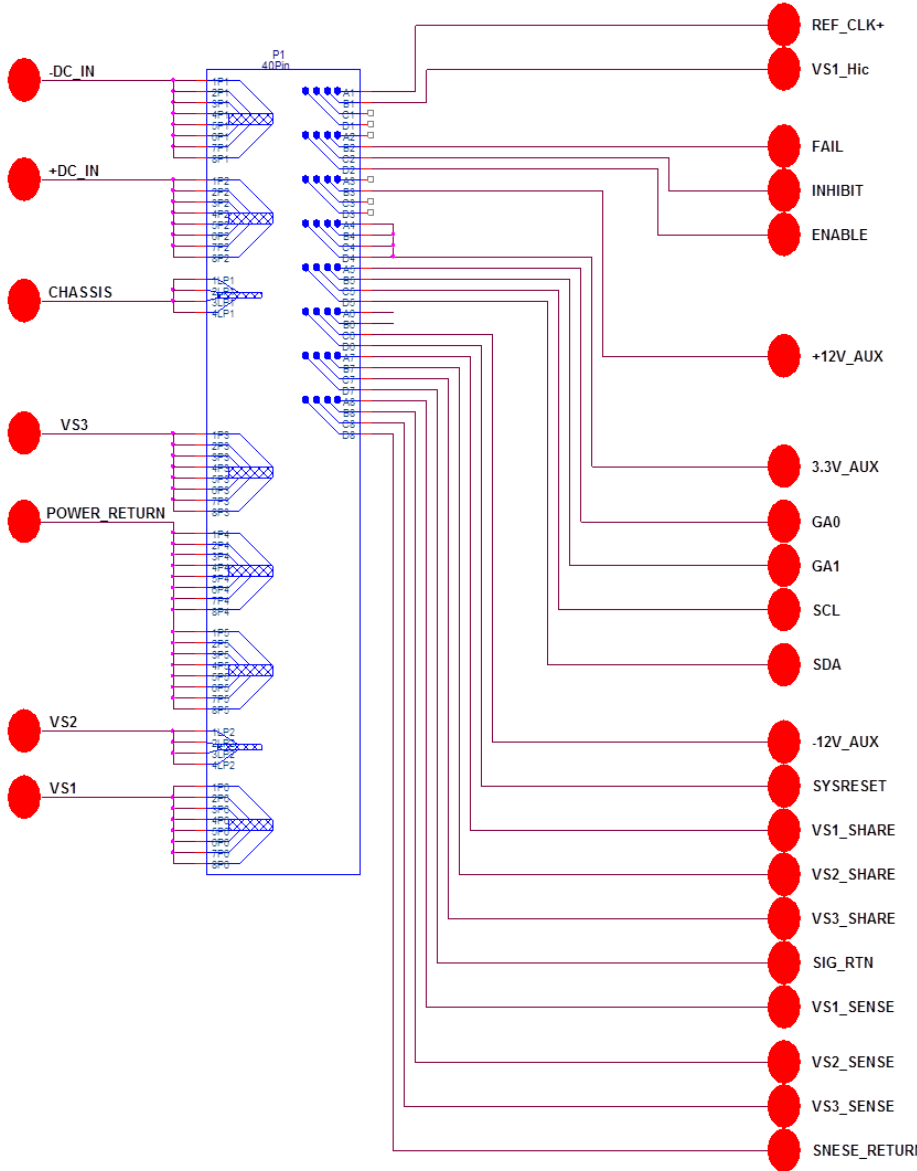
Byte No'	60		61	
Dec Number	2	1	0	0
Binary	"0010"	"0001"	"0000"	"0000"

Pin Assignment



PART NUMBER	ROWS	POWER						SIGNAL								POWER					
		P1	P2	LP1	1	2	3	4	5	6	7	8	P3	P4	P5	LP2	P6				
6450849-7	D				Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5	Z5				
	C	TT	TT	LT	Y5	Y5	Y5	Y5	Y5	Y5	Y5	Y5	Y5	Y5	Y5	Y5					
	B				R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5					
	A				O5	O5	O5	O5	O5	O5	O5	O5	O5	O5	O5	O1					
2ACP+1LP+32S+3HDP+1LP+1HDP																					

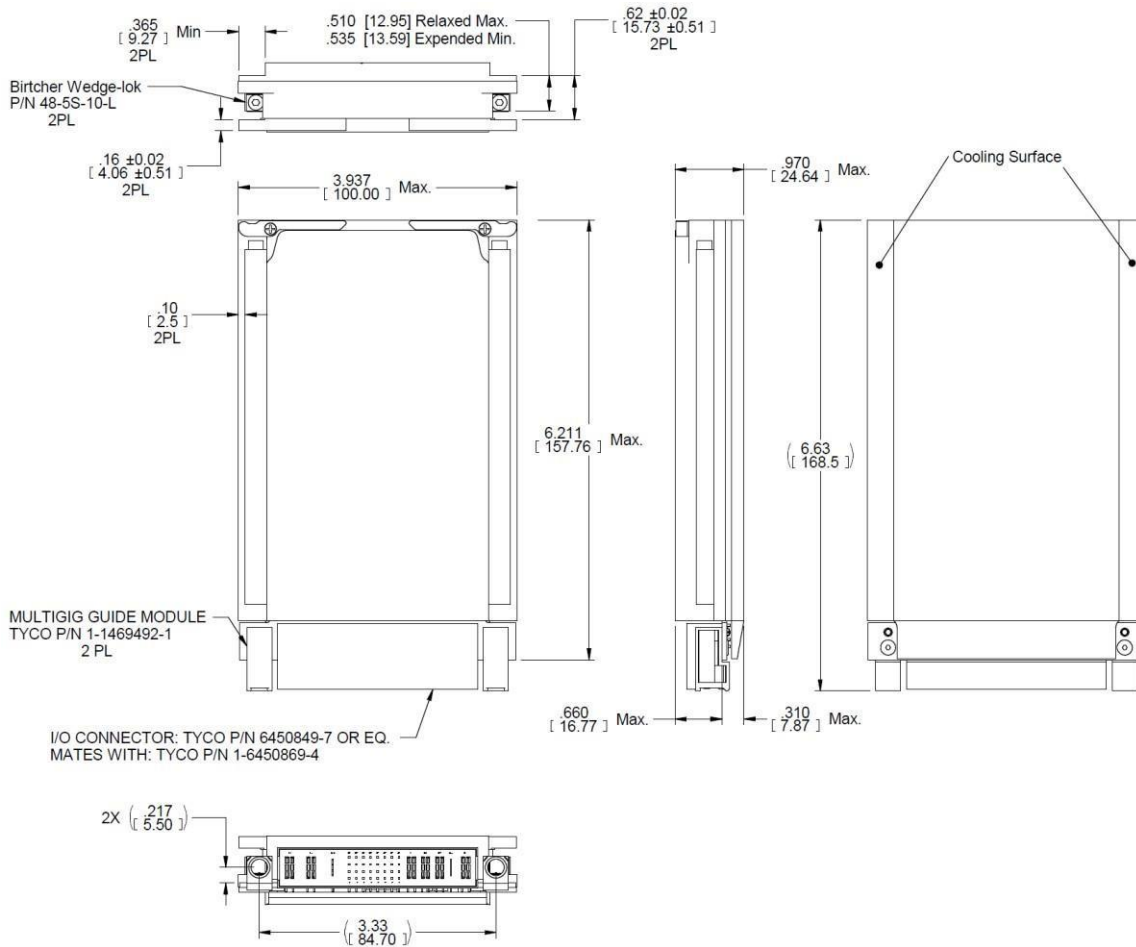
M4265 SERIES VPX DC/DC POWER SUPPLY



Pin Number	Pin Name
P1	-DC_IN
P2	+DC_IN
LP1	CHASSIS
P3	VS3
P4	POWER_RETURN
P5	POWER_RETURN
LP2	VS2
P6	VS1
A8	VS1_SENSE
B8	VS2_SENSE
C8	VS3_SENSE
D8	SENSE_RETURN
A7	VS1_SHARE
B7	VS2_SHARE
C7	VS3_SHARE
D7	SIG_RTN
A6	N.C
B6	N.C
C6	-12V_AUX
D6	SYSRESET*
A5	GA0*
B5	GA1*
C5	SCL
D5	SDA
A4	+3.3V_AUX
B4	+3.3V_AUX
C4	+3.3V_AUX
D4	+3.3V_AUX
A3	N.C
B3	+12V_AUX
C3	N.C
D3	N.C
A2	N.C
B2	FAIL*
C2	INHIBIT*
D2	ENABLE*
A1	REF_CLK+
B1	VS1_Hic
C1	N.C
D1	N.C

M4265 SERIES VPX DC/DC POWER SUPPLY

Outline Drawing



Notes

1. Dimensions are in Inches [mm]
2. Tolerance is:
 $.XX \pm 0.02$ IN
 $.XXX \pm 0.008$ IN
3. Weight: Approx. 796 g (28.08 oz)
4. 3D model available

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