



# VITA 62 Power Supply

## VIT270wxx600yzzz

### VITA 62 DC-DC Converter

#### Features & Benefits

- Open VPX – VITA 62
- 220 – 320V input voltage range
- 600W output power
- 3U Open VPX power supply
- Conduction cooled
- 6 outputs
- I<sup>2</sup>C™ monitoring and control
- Remote voltage sense: VS1, VS2, VS3
- Parallel operation capable with proprietary wireless current sharing
- Overcurrent, overvoltage and overtemperature protections
- IPC 610 class 3
- No aluminum electrolytic capacitors
- Enable, inhibit, system reset and power fail controls
- Military standard compliance: <sup>[a]</sup>
  - MIL-STD-704F
  - MIL-STD-461F
  - MIL-STD-810G

#### Typical Applications

- VPX power modules
- Avionics
- Shipborne electronics

#### Product Description

The Vicor VITA 62 power supply is a COTs power supply that is designed for 3U Open VPX systems. The module utilizes Vicor proprietary technology to enable high efficiency and power density for this highly rugged, conduction-cooled model.

Up to four power supplies can be paralleled to increase output power capability of VS1, VS2, VS3 outputs with proprietary wireless current sharing. Conventional current-share pins are eliminated. Current share accuracy is  $\pm 1\text{A}$ .

<sup>[a]</sup> See detailed specifications

## Connector Pin Configuration

ROWS	POWER			SIGNAL								POWER					
				1	2	3	4	5	6	7	8						
D	P1	P2	LP1									P3	P4	P5	LP2	P6	
C																	
B																	
A																	

**3U P0 Connector**

**Note:** See mechanical drawing on page 17 for connector information.

## Connector Pin Descriptions

Pin	Function / Name	Description
P1	–DC_IN	V <sub>IN–</sub>
P2	+DC_IN	V <sub>IN+</sub>
LP1	CHASSIS	Chassis
A1	No Connection	
B1	No Connection	
C1	No Connection	
D1	No Connection	
A2	No Connection	
B2	FAIL*	When any of the output is not within specification, FAIL* signal will be driven low to indicate a failure
C2	INHIBIT*	Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN
D2	ENABLE*	Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN
A3	No Connection	
B3	+12V <sub>AUX</sub>	+12V auxiliary output voltage
C3	No Connection	
D3	No Connection	
A4, B4, C4, D4	+3.3V <sub>AUX</sub>	+3.3V auxiliary output voltage
A5	*GA0	Geographical address defined by VITA 46.11
B5	*GA1	Geographical address defined by VITA 46.11
C5	SM0 (I <sup>2</sup> C Clock)	Primary I <sup>2</sup> C™ communication bus
D5	SM1 (I <sup>2</sup> C Data)	
A6	I <sup>2</sup> C Clock	Redundant I <sup>2</sup> C communication bus (optional feature pending)
B6	I <sup>2</sup> C Data	
C6	–12V <sub>AUX</sub>	–12V auxiliary output voltage
D6	SYS_RESET*	System Reset is actively low. It will float when all outputs are within specification
A7	No Connection	
B7	No Connection	
C7	No Connection	
D7	SIGNAL_RETURN	Ground pin for control signals
A8	+12V <sub>SENSE</sub>	VS1 sense, should be connected at point-of-load or on the backplane to corresponding voltage output
B8	+3.3V <sub>SENSE</sub>	VS2 sense, should be connected at point-of-load or on the backplane to corresponding voltage output
C8	+5V <sub>SENSE</sub>	VS3 sense, should be connected at point-of-load or on the backplane to corresponding voltage output
D8	SENSE_RETURN	Should be connected to POWER_RETURN either remotely or at the connector
P3	+5V <sub>MAIN</sub>	VS3
P4, P5	POWER_RETURN	Common output voltage return pin
LP2	+3.3V <sub>MAIN</sub>	VS2
P6	+12V <sub>MAIN</sub>	VS1

## Part Ordering Information

Product Function	Nominal Input Voltage	Grade	Package Size	Output Power	Conformal Coated	Output Voltage Configuration
VIT	270	w	xx	600	y	zzz
VIT = VITA62	270 = 270V <sub>DC</sub>	H = -40 to 85°C	3U	600 = 600W	B = Bare C = Coated	001 = Standalone 002 = Parallelable

## Absolute Maximum Ratings

The absolute maximum ratings below are stress ratings only. Operation at or beyond these maximum ratings can cause permanent damage to the device.

Parameter	Comments	Min	Max	Unit
Total Output Power	Combined outputs for all rails		600	W
Input Voltage	+IN to -IN	-0.5	460	V
Operating Temperature	Measured at card edge	-40	85	°C
Storage Temperature		-40	125	
Isolation Voltage IN to OUT			1000	V <sub>DC</sub>
Isolation Voltage IN to CASE			1000	V <sub>DC</sub>
Isolation Voltage OUT to CASE			100	V

## Electrical Characteristics

All data at nominal line and nominal load unless otherwise specified.

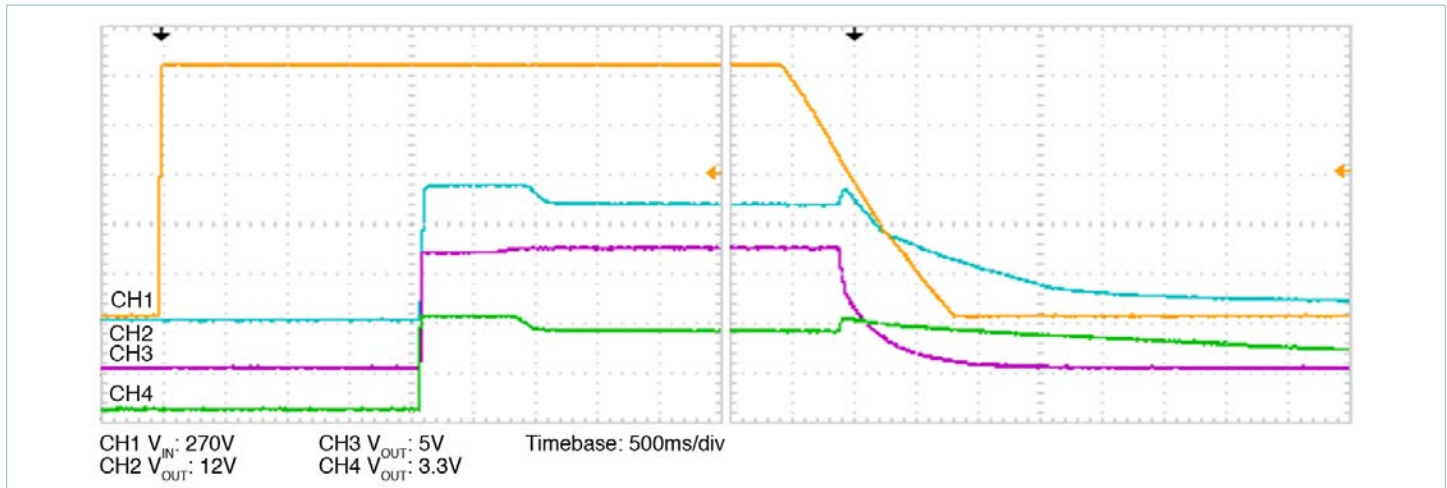
Attribute	Symbol	Conditions / Notes	Min	Typ	Max	Unit
Overall System Characteristics						
System Efficiency		Nominal line, 20% aggregate loads		83		%
		Nominal line, 50% aggregate loads		89		
		Nominal line, 100% aggregate loads		89		
Power Input Characteristics						
Operating Input Voltage Range		Full load	220	270	320	V
Transient					450	V
Input Current (No Load)		270V Input, enable asserted (input on), inhibit de-asserted (output on)		30	75	mA
Inrush Current		Peak no load, high line		1.4	5	A
Main Outputs						
+12V Output						
Output Voltage Set Point		Nominal line, nominal load	11.9	12	12.1	V
Line Regulation		50% load		0.12	0.2	%
Load Regulation		Nominal line			0.5	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW		50.4	120	mV <sub>p-p</sub>
Maximum Capacitive Load		External			9000	μF
Output Current Range			0		40	A
Output Overvoltage Protection		Two consecutive OVP events to trip			13.2	V
Output Overcurrent Protection		Three consecutive OCP events to trip		48		A
+5V Output						
Output Voltage Set Point		Nominal line, nominal load	4.93	5.0	5.07	V
Line Regulation		50% load			0.15	%
Load Regulation		Nominal line		0.5	1.1	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW		20	50	mV <sub>p-p</sub>
Maximum Capacitive Load		External			9000	μF
Output Current Range			0		30	A
Output Overvoltage Protection		Two consecutive OVP events to trip			5.6	V
Output Overcurrent Protection		Three consecutive OCP events to trip		40		A

## Electrical Characteristics (Cont.)

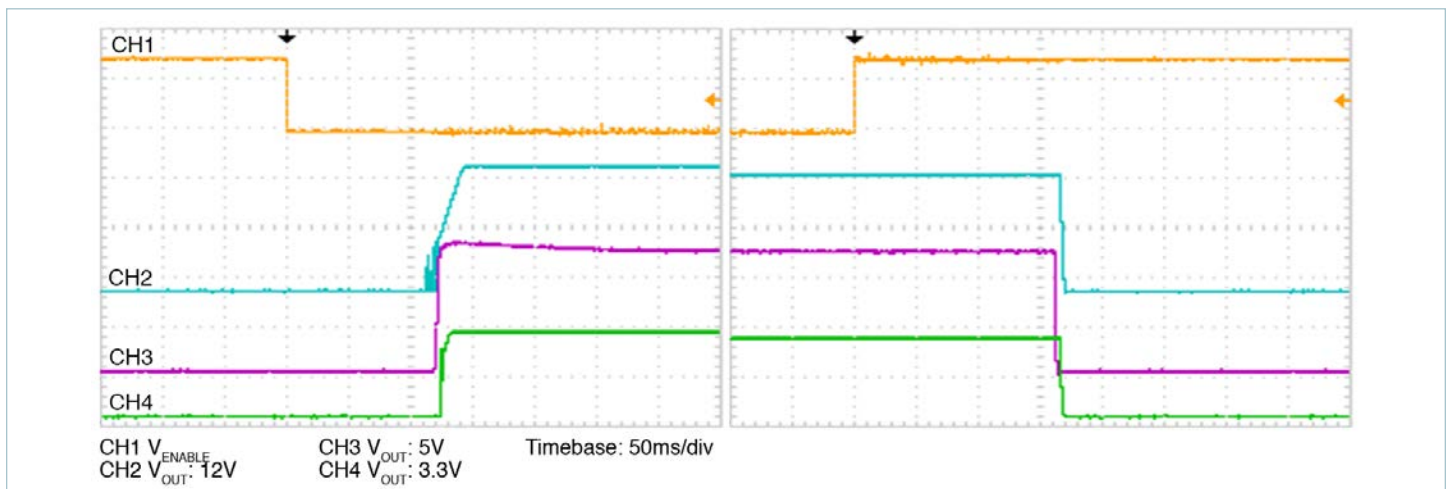
All data at nominal line and nominal load unless otherwise specified.

Attribute	Symbol	Conditions / Notes	Min	Typ	Max	Unit
Main Outputs (Cont.)						
+3.3V Output						
Output Voltage Set Point		Nominal line, nominal load	3.25	3.3	3.45	V
Line Regulation		50% load			0.15	%
Load Regulation		Nominal line		0.6	1.2	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW		20	50	mV <sub>p-p</sub>
Maximum Capacitive Load		External			9000	μF
Output Current Range			0		20	A
Output Overvoltage Protection		Two consecutive OVP events to trip			3.7	V
Output Overcurrent Protection				30		A
Auxilliary Outputs						
-12V Output						
Output Voltage Set Point		Nominal line, nominal load	-11.8	-12.00	-12.1	V
Line Regulation		50% load			0.15	%
Load Regulation		Nominal line		1.66	2.0	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW		10.4	50	mV <sub>p-p</sub>
Output Current Range			0		1	A
Output Overcurrent Protection				2		A
+12V Output						
Output Voltage Set Point			11.9	12.00	12.1	V
Line Regulation		50% load			0.1	%
Load Regulation		Nominal line		1.21	1.25	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW			50	mV <sub>p-p</sub>
Output Current Range			0		1	A
Output Overcurrent Protection				2		A
+3.3V Output						
Output Voltage Set Point			3.2	3.3	3.4	V
Line Regulation		50% load			0.14	%
Load Regulation		Nominal line		2.0	2.5	%
Output Ripple / Noise (Peak-to-Peak)		Nominal line over load range, 20MHz BW			50	mV <sub>p-p</sub>
Output Current Range			0		6	A
Output Overcurrent Protection				10		A

## Application Characteristics

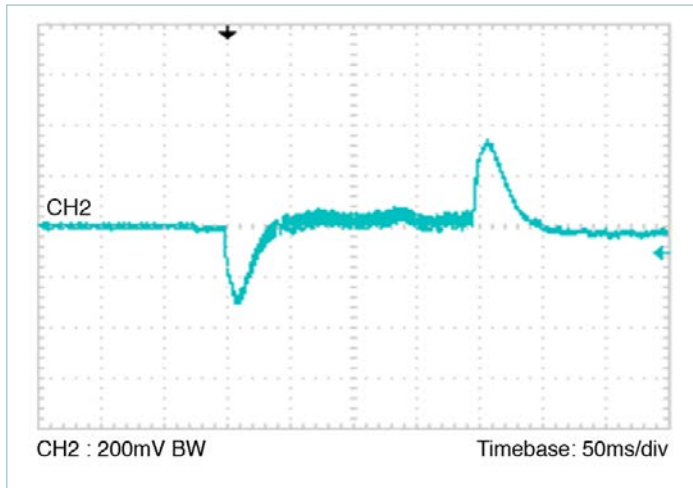


**Figure 1** — Turn-on and turn-off characteristics at nominal line and nominal load, to main outputs

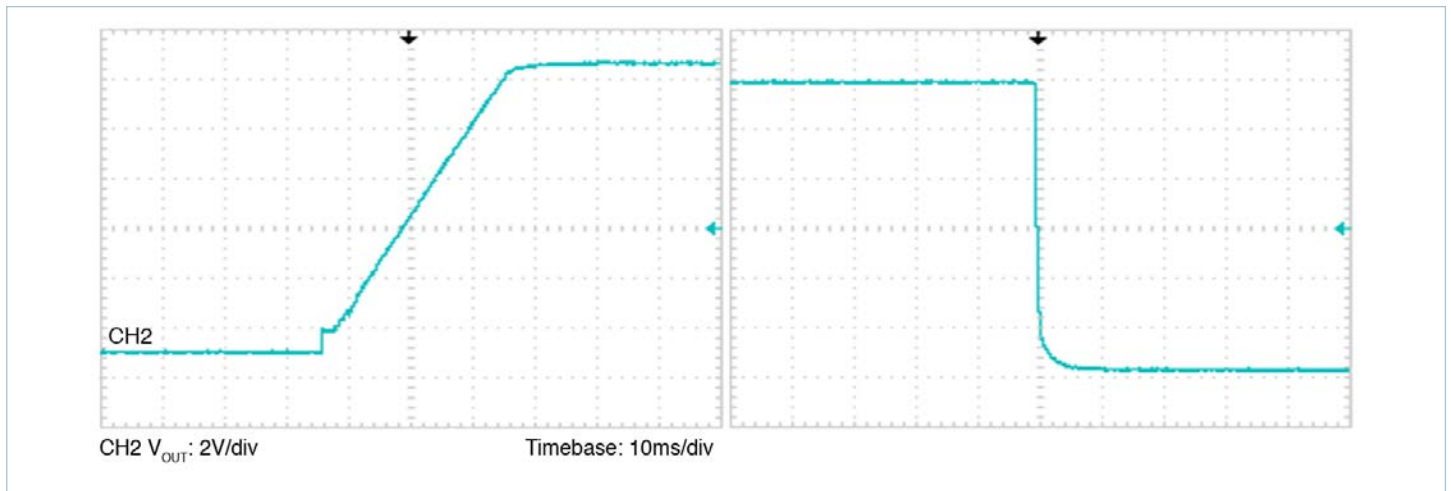


**Figure 2** — Turn-on and turn-off time from enable to outputs

## Application Characteristics (Cont.)



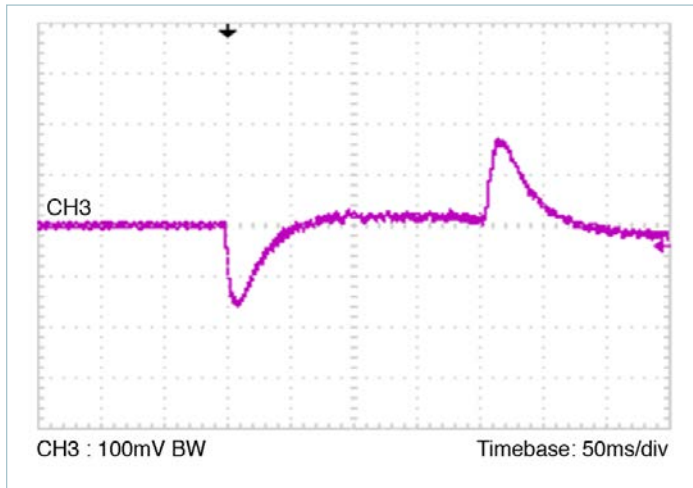
**Figure 3** — Transient response, +12V output at nominal line,  
10% – 90% – 10% load



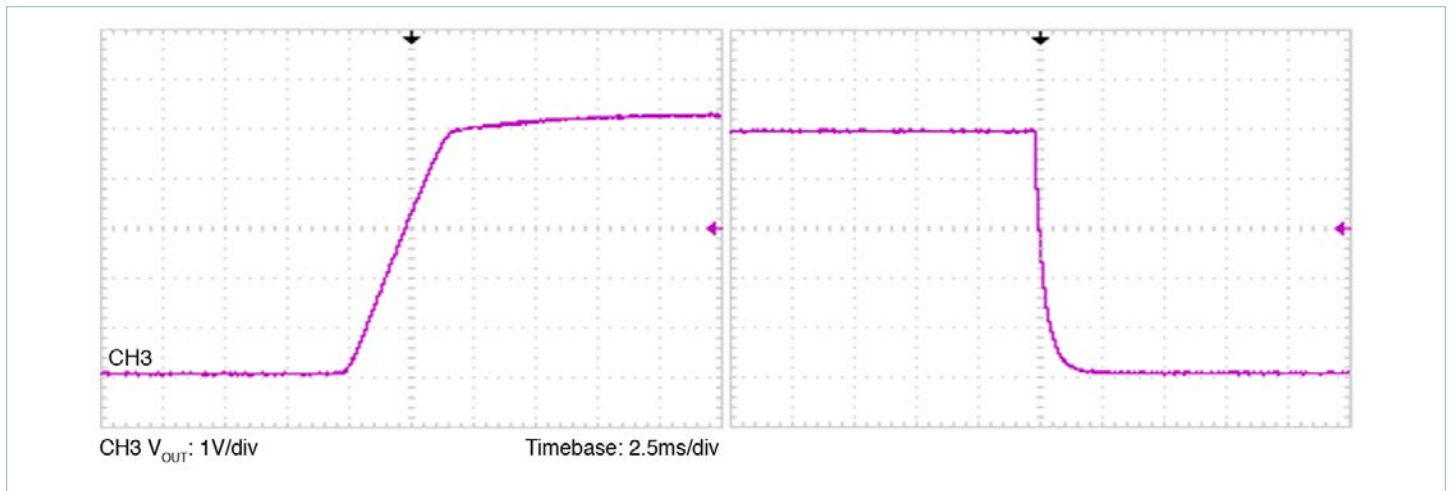
**Figure 4** — Rise and fall, +12V output, nominal line, nominal load, enable/disable



## Application Characteristics (Cont.)

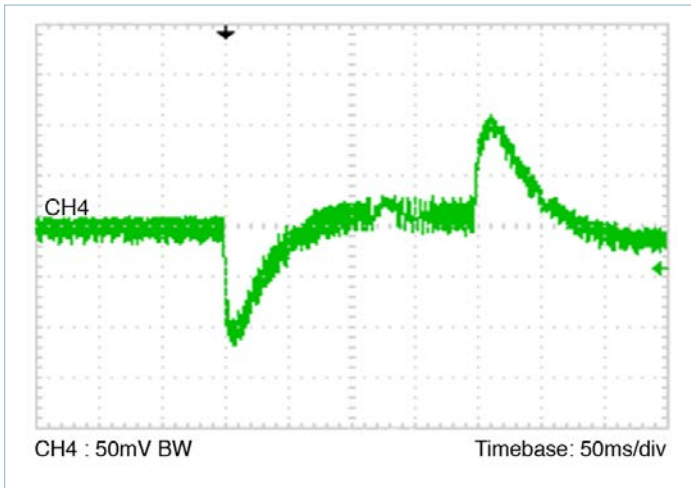


**Figure 5** — Transient response, +5V output at nominal line, 10% – 90% – 10% load

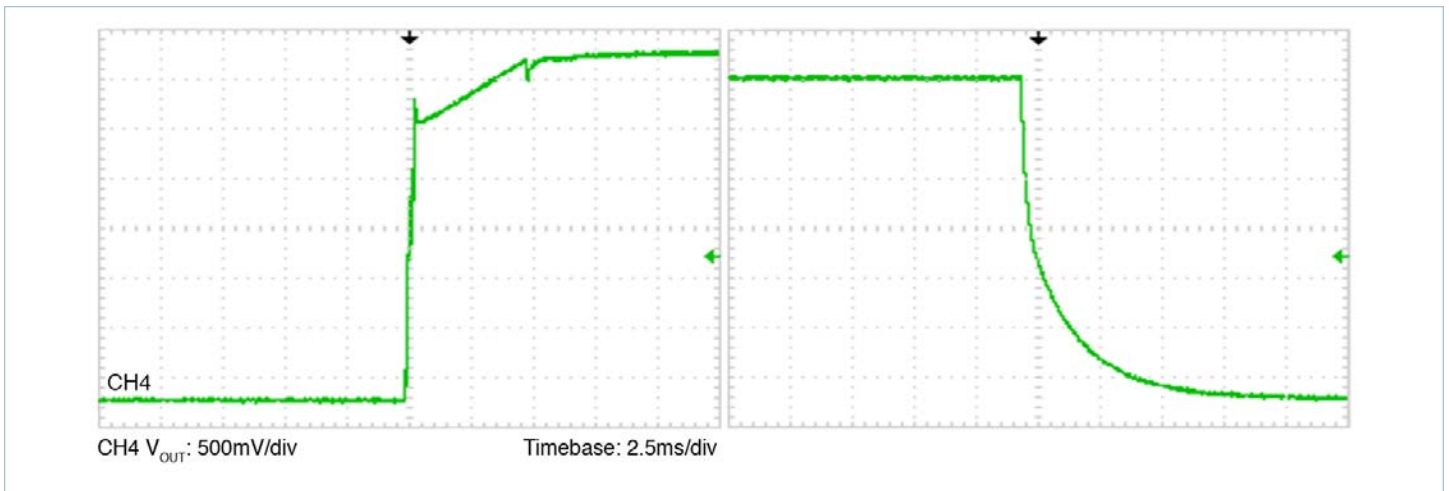


**Figure 6** — Rise and fall, +5V output, nominal line, nominal load, enable/disable

## Application Characteristics (Cont.)



**Figure 7** — Transient response, +3.3V output at nominal line, 10% – 90% – 10% load



**Figure 8** — Rise and fall, +3.3V output, nominal line, nominal load, enable/disable

## Conducted Emissions Testing

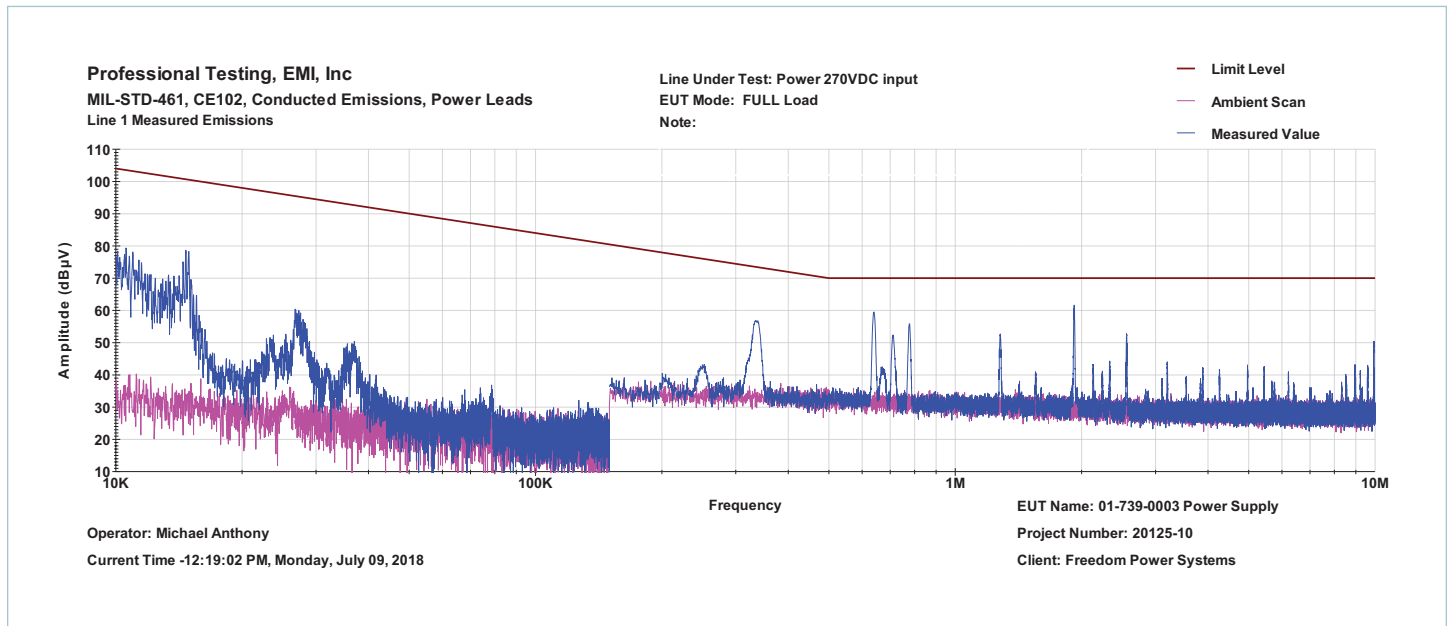
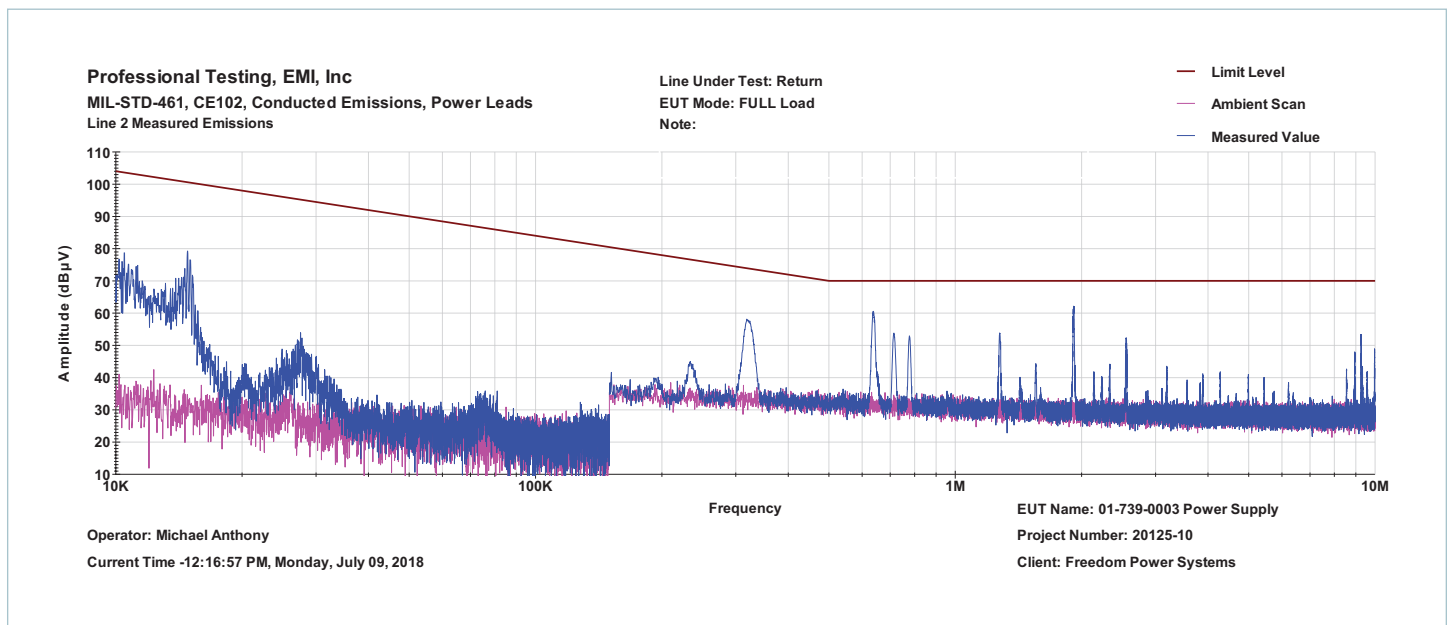
Figure 9 — Conducted emissions of 270V<sub>DC</sub> input at full load

Figure 10 — Conducted emissions of power return at full load

## Conducted Emissions Testing (Cont.)

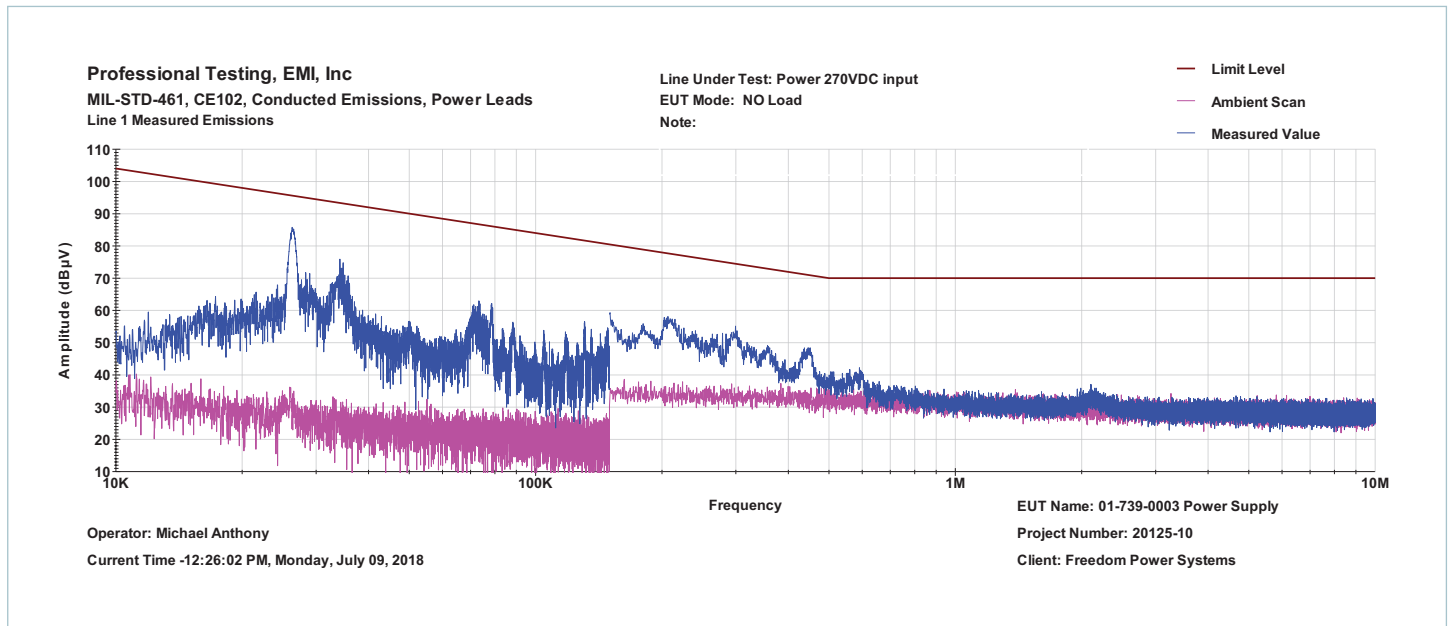
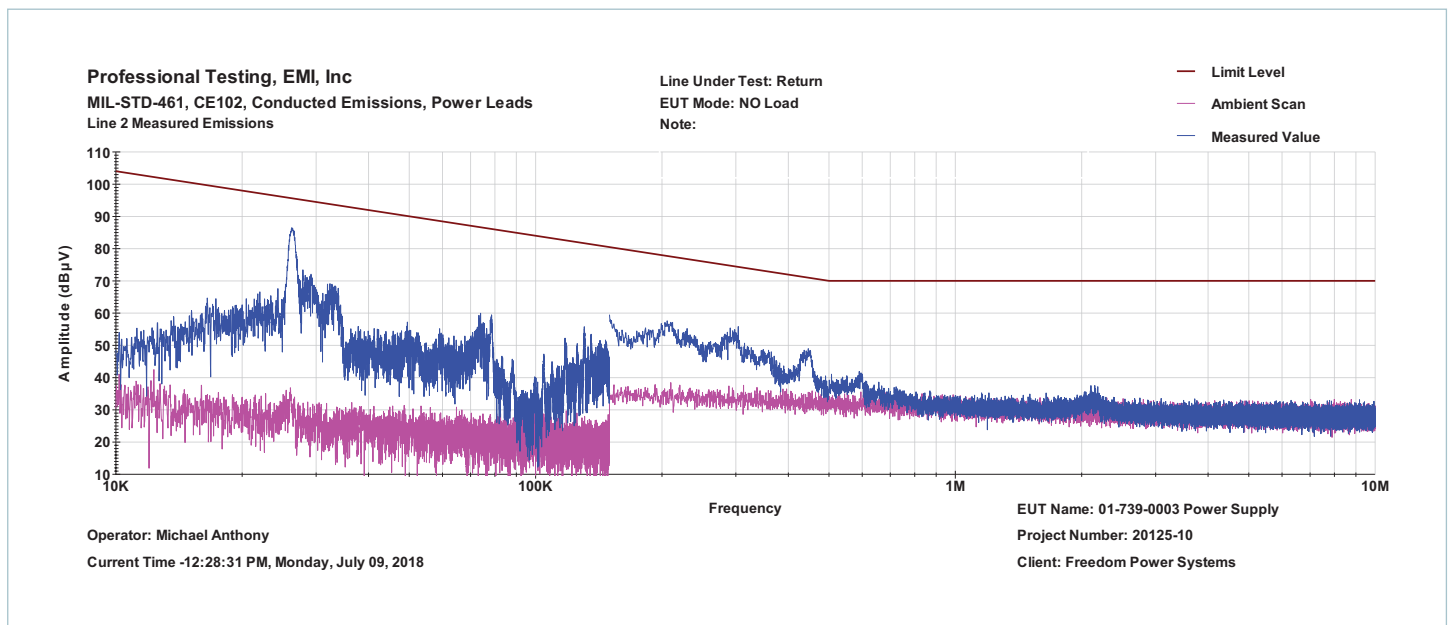
Figure 11 — Conducted emissions of 270V<sub>DC</sub> input at no load

Figure 12 — Conducted emissions of power return at no load

## General Characteristics

Attribute	Symbol	Conditions / Notes	Min	Typ	Max	Unit
Mechanical						
Length	L	Per VITA62		6.634		in
Width	W	Per VITA62		3.937		in
Height	H	Per VITA62		0.951		in
Weight	W			665 [23.5]		g [oz]
Wedge-Lock Torque		Manufacturer's recommended value		7		in-lbs
Thermal						
Operating Temperature	T <sub>WEDGE-LOCKS</sub>		-40		85	°C
Assembly						
Storage Temperature			-40		125	°C
ESD Withstand	V <sub>ESD</sub>	Human Body Model			2000	V
Safety						
MTBF		MIL-HDBK-217Plus Parts Count - 25°C Ground Benign, Stationary, Indoors / Computer		356,721		Hrs
		Telcordia Issue 2 - Method I Case III; 25°C Ground Benign, Controlled		709,585		Hrs

## Standards Compliance

MIL-STD-461F		
CE102 Power Lead	10kHz – 10MHz FIGURE CE102-1, 270V Curve See Figures 9 – 12	Pass
CS101 Power Lead	30Hz – 150kHz Curve 1	Pass
CS114, Bulk Cable (Power)	10kHz – 200MHz Curve 5	Pending
CS114, Bulk Cables (I/O)	10kHz – 200MHz Curve 5	Pending
CS115 Bulk Cable (Power)	Impulse Excitation FIGURE CS115-1	Pass
CS115 Bulk Cables (I/O)	Impulse Excitation FIGURE CS115-1	Pass
CS116 Bulk Cable (Power)	Damped Sinusoidal Transients 10kHz – 100MHz FIGURE CS116-2	Pass
CS116 Bulk Cables (I/O)	Damped Sinusoidal Transients 10kHz – 100MHz FIGURE CS116-2	Pass
MIL-STD-704F-7		
Normal Transients HDC-105		Pass
Abnormal Transients HDC-302		Pass
Distortion Spectrum HDC-103		Pass
MIL-STD-810G		
Vibration Method 514.6 Procedure I	5 – 100Hz PSD increasing at 3dB/octave	Pass
	100 – 1000Hz PSD = 0.1g <sup>2</sup> /Hz	
	1000 – 2000Hz PSD decreasing at 6dB/octave	
Operating Shock, Method 516 Procedure I	40g, 11ms shock half-sine	Pass
	40g, 11ms, terminal saw tooth shock pulses in all three axes	

## I<sup>2</sup>C™ Sensor Commands

Commands are sent by SMBus compatible packets over the I<sup>2</sup>C physical interface. The I<sup>2</sup>C bus will communicate at 100kHz. Pull-up resistors to +3.3V are expected on the system backplane.

Two pins, labeled \*GA1 and \*GA0 are provided at each power supply slot, where \*GA1 and \*GA0 are defined to be active (SET) when low. The power supply will respond to I<sup>2</sup>C address 010 00[GA1][GA0]

The general format is as follows:

■ **Command from controller I<sup>2</sup>C / SMBus master:**

Address+R/\*W  
Command Byte  
Number of Bytes  
Zero Checksum

■ **Response from power supply I<sup>2</sup>C / SMBus slave:**

Command Echo  
Data Bytes  
Zero Checksum

Commands similar to SMBus 3.0 specs except optional PEC are modified to be a simpler zero sum checksum, noted as 0 PEC below.

## Commands Recognized by Power Supply

0x21: Sensor Data (Read Only) <sup>[a]</sup>			
Byte Number	Contents	Format	Scaling
0	0x21	Byte	
1	Status Reg	Byte	see below, same as used by command 0x55
2, 3	Temperature C	INT16	16384 = 100C
4, 5	+12V VSENSE	UINT16	16384 = 12.0V
6, 7	+3.3V VSENSE	UINT16	16384 = 3.3V
8, 9	+5V VSENSE	UINT16	16384 = 5.0V
10, 11	+3.3VAUX VSENSE	UINT16	16384 = 3.3V
12, 13	+12VAUX VSENSE	UINT16	16384 = 12.0V
14, 15	-12VAUX VSENSE	UINT16	16384 = -12.0V
16, 17	+12V IOUT	UINT16	16384 = 30A
18, 19	+3.3V IOUT	UINT16	16384 = 20A
20, 21	+5V IOUT	UINT16	16384 = 40A
22, 23	+3.3VAUX IOUT	UINT16	16384 = 4A
24, 25	+12VAUX IOUT	UINT16	16384 = 1A
26, 27	-12VAUX IOUT	UINT16	16384 = -1A
28, 29	INT REFERENCE	UINT16	16384 = 2.50V
30, 31	Reserved	0x0000	
32, 51	Part Number	CHAR[20]	no 0 term, padded with 0x20
52 – 55	Serial Number	UINT32	Unsigned 32-bit integer
56, 57	Date Code	UINT16	Byte 56: YY - 0x12 is 18 or 2018 Byte 57: WW - 0x1A is the 26th Week.
58, 59	Hardware Rev	UINT16	Byte 58: MAJOR REV Byte 59: MINOR REV 0x01,0x0C for Rev 1.12
60, 61	Firmware Rev	UINT16	Byte 60: MAJOR REV Byte 61: MINOR REV 0x01,0x0C for Rev 1.12
62	Reserved	0x00	
63	Zero Checksum	Byte	Sum(byte 0:63) = 0

<sup>[a]</sup> Most-significant bit of each byte is transmitted first. Most-significant byte of UINT16 and UINT32 transmitted first.

## Commands Recognized by Power Supply (Cont.)

**0x44: Firmware Date (Read Only) <sup>[a]</sup>**

- Uses SMBus Read 64 type protocol similar to section 6.5.13, but extended to 16 bytes, with or without 0 PEC

Byte Number	Contents	Format	Typical Value
0	0x44	Byte	
1 – 4	Year	CHAR[4]	2018
5, 6	Month	CHAR[2]	12
7, 8	Day	CHAR[2]	31
9, 10	Hour	CHAR[2]	23
11, 12	Minute	CHAR[2]	59
13, 14	Second	CHAR[2]	42
15	Zero Checksum	Byte	Sum(byte 0:15) = 0

**0x45: Hardware Address (Read Only) <sup>[a]</sup>**

- Uses SMBus Read Byte protocol, section 6.5.5, with or without 0 PEC

Byte Number	Contents	Format	Typical Value
0	0x45	Byte	
1	I <sup>2</sup> C Address	Byte	0x23, set by *GA1, *GA0
2	Zero Checksum	Byte	Sum(byte 0:2) = 0

**0x55: Status Command (Read/Write) <sup>[a]</sup>**

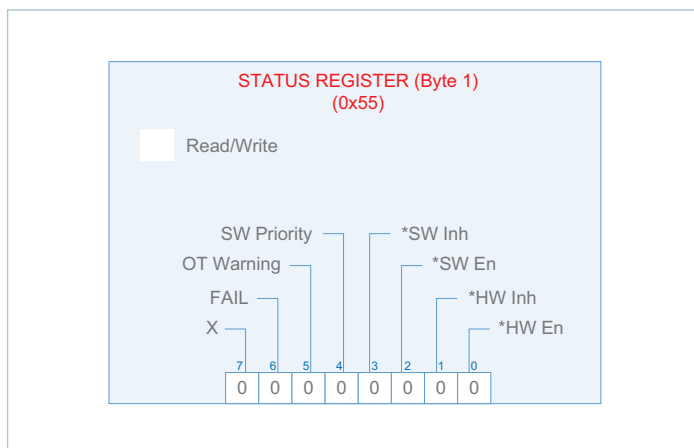
- Uses SMBus Write Byte/Read Byte protocol, section 6.5.4, 6.5.5, with or without 0 PEC

Byte Number	Contents	Format	Typical Value
0	0x55	Byte	
1	Status Byte	Byte	0x18 = All outputs ON
2	Zero Checksum	Byte	Sum(byte 0:2) = 0

<sup>[a]</sup> Most-significant bit of each byte is transmitted first. Most-significant byte of UINT16 and UINT32 transmitted first.

**Status Register Bit Map (Byte 1) used in command 0x55**

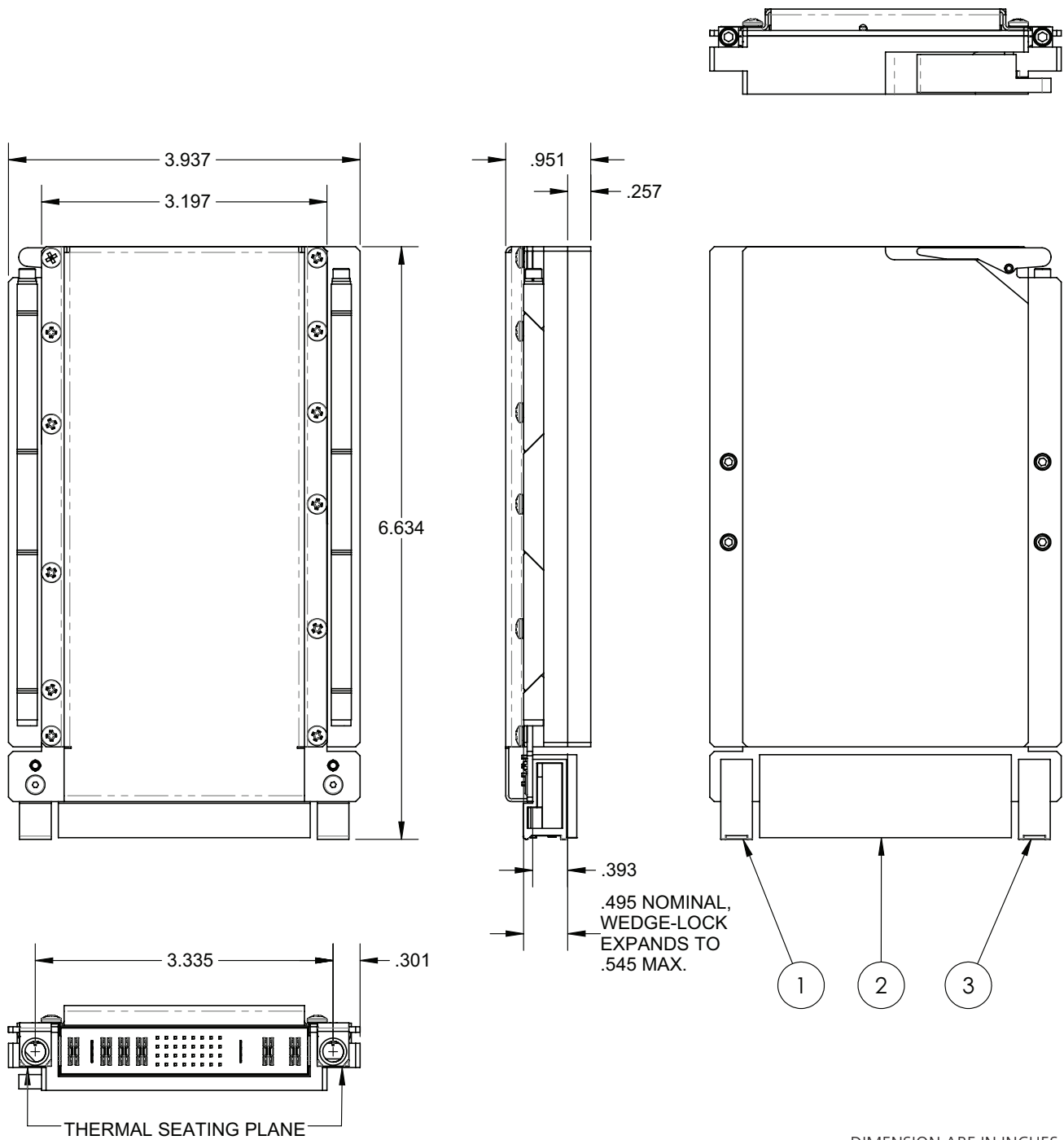
Bit 0 and 1 allow you to monitor what the power supply is reading from the input connector.



Bit	Name	Condition	Default
7	X	0	0
6	FAIL	If set to 1 my System Manager, a fault condition will clear this bit.	0
5	OT Warning	If set to 1 my System Manager, an OT fault will clear this bit.	0
4	SW Priority	Set to 1 for SW Control	0
3	*SW Inh	EN all, 0 EN only 3.3V	0
2	*SW En	ALL outputs regardless	0
1	*HW Inh	As read by HW	BACKPLANE
0	*HW En	As read by HW	BACKPLANE



## Mechanical Drawing



DIMENSION ARE IN INCHES

## Connector Components

Item #	Description	Manufacturer	Manufacturer Part Number
1	VITA46 0 DEG Guide Socket	TE Connectivity	1-1469492-1
2	VITA62 Connector Plug	TE Connectivity	6450849-7
3	VITA46 315 DEG Guide Socket	TE Connectivity	1-1469492-8

## Revision History

Revision	Date	Description	Page Number(s)
1.0	08/21/18	Initial release	n/a
1.1	10/15/18	Updated features & benefits, product description Updated connector pin descriptions Updated current specs for main +3.3V output Updated 0x21 table Updated command 0x55 table	1 3 6 15 16

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