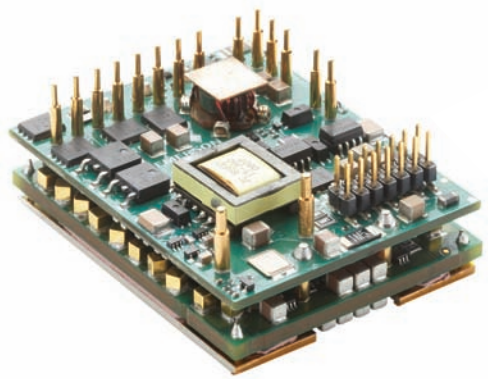
Technical Reference Note

Embedded Power for
Business-Critical Continuity

ATCR250 Series

Dual Input Bus Converter

Total Power: 250 Watts
Input Voltage: -48 VDC
Output: 12 V Intermediate Bus
3.3 V Management Bus



RoHS 2002/95/EC

Product Family: **ATCR250**

Function: **Dual Input Bus Converter**

Usage:

Preliminary

Special Features

- Optimized footprint for high density ATCA applications
- Accepts inputs from -48 V and B Feeds
- CISPR Class A EMI
- Adjustable Hold Up Voltage from 50 to 80 VDC
- I^2C serial bus interface for monitoring and reporting
- Programmable alarm thresholds via I^2C bus
- Hardware alarms via opto-isolators for loss of A or B Feeds
- Comprehensive protection circuitry - current, voltage and temperature
- EU directive 2002/95/EC compliant for RoHS

Definition:

The dual input ATCR250 bus converter provides AdvancedTCA (ATCA/ PICMG3.0) board designers a compact and rugged solution for generating intermediate bus voltages in a footprint-optimized package.

The ATCR250 is more than a power converter. It also provides power interface and power management functionality. The power interface functions include ORing, filtering and inrush control, while power management functionality is facilitated by both I^2C serial bus and direct high-speed interfaces.

Critical alarms, such as loss of A or B feeds, are hardware-implemented. Other alarms are implemented over an I^2C serial bus which is enhanced with an interrupt pin.

The solution is provided in a 2.3 x 1.8 inch (59mm x 46mm) footprint and provides an optimized solution for space-constrained systems that employ distributed power architectures

Safety

- **UL** UL60950/UL2601**
- **CSA** CSA22.2 No. 234 Level 5
- **VDE** EN60950/EN60601-1**
- **BABT** Compliance to EN60950/EN60601 BS7002
- **CB** Certificate and report
- **CE** Mark to LVD

EMERSON
Network Power

Stresses in excess of the maximum ratings can cause permanent damage to the device. Operation of the device is not implied at these or any other conditions in excess of those given in the specification. Exposure to absolute maximum ratings can adversely affect device reliability.

Absolute Maximum Ratings

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - continuous	$V_{in(cont)}$	0		-75	Vdc	$V_{in}(+) - V_{in}(-)$
Input voltage - peak	$V_{in(peak)}$			-100	Vdc	Transients of 1 ms or less duration
Operating temperature	T_{op}	-25		85	°C	Refer to thermal specification section for derating guidelines
Storage temperature	$T_{storage}$	-40		125	°C	
Output power	$P_{out(max)}$	0		250	W	Main output load current must not exceed 20.83 A. Combined power not to exceed 250 Watts.

All specifications are typical at nominal input Vin = 48 V, full load under any resistive load combination at 25 °C unless otherwise stated.

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - operating	$V_{in(oper)}$	-36		-72	Vdc	Management power available down to lower UVLO threshold
Input current - quiescent	$1_{in(off)}$			10	mAdc	Outside working voltage range for 2 s or more
Input Current - operating	$I_{in(cont)\_48\ V}$		0.142		A	@ 55.2 Vin
no load on 12 Vout and 3.3 Vout	$I_{in(cont)\_60\ V}$		0.137		A	@ 69.0 Vin
Input Power w/ Management Power				10	W	with 5 W of 3.3 V Management Power 60 V systems
Input capacitance requirement (external)	$C_{i/p}$			82	µF	See Application Note
Inrush current, maximum amplitude	1_{inrush}		11	13.2	A	Compliant with PICMG 3.0 sec 4.1.4.1 for boards
Inrush current, duration	T_{inrush}			2.00	ms	Compliant with PICMG 3.0 sec 4.1.4.1 for boards
Input fuse				12/15	A	In 48_A,B / RTN A,N lines*

* See Application Note for manufacturer and part number.

Input Characteristics - Overload and Short Circuit Protection

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Primary overload current	I_{pri_OL}	8.3	11	13.2	A	Maximum current draw during overload event
Primary overload duration	T_{pri_OL}		2.8	3.0	ms	
Short circuit protection	$I_{S/C\_switch\ on}$	1.8		5.7	A	Maximum at 35 Volts Vin
across inrush capacitance (pin 11 wrtpin 10). Also includes the main power line from post inrush circuit up to and including the IBC input.	$T_{S/C\_switch\ on}$	2.0	2.4	2.6	ms	
	$I_{S/C\_operational}$			85	A	Worse case at 75 Volts Vin
	$I_{S/C\_operational}$		12			

For all above overload and short circuit conditions, the unit shuts off safely
The unit can be restarted, providing the fault condition is no longer present.

Turn On/Off

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - turn-on	$V_{in(on)}$			-36	Vdc	
Input voltage - turn-off	$V_{in(uvlo)}$	-32			Vdc	
Input voltage - turn-on	$V_{in(on)}$	-72			Vdc	
Input voltage - turn-off	$V_{in(ovlo)}$			-77.2	Vdc	
Rise time	$T_{rise\_3.3V}$			20	ms	0 to 90%, full load, max output capacitance. 3.3V comes up first
	T_{rise_12V}				ms	0 to 90%, full load, max output capacitance.

Signal Electrical Interface

Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
Remote ON/Off (Input only) pins 14 and 13						Isolated floating opto coupler input. Can use 3.3 V output (secondary) or directly use enable A or B (primary) to turn on main 12 V output
Input current	I_{ih}	1.6		5.0	mA	Current flowing (into pin 14, out of pin 13) to turn on 12 V output
Acceptable high level	I_{ih} (leakage)			10	µA	Acceptable leakage current (into pin 14, out of pin 13)
Low level input voltage	V_{il}	3.0			V	Converter is guaranteed on when r/c voltage (pin 14 wrt to pin 13) is equal to or greater than Vil (min)
Opto coupler voltage drop	$V_{d\ (on)}$			1.5	V	Maximum photodiode voltage drop
Internal resistance	R_{int}		1.0		kOhm	Series resistance between pin 14 and pin 13
Isolation			2250VDC			Isolation of signal from primary & from secondary circuits according to EN60950 and UL60950
A_OK# and B_OK# (Output only) pins 16 and 17						Two open collector outputs, used to monitor the status of -48 V_A and -48V_B buses respectively. Signal is active low, when buses are OK
Input Voltage (IBC		35.0				Minimum voltage required at the input to IBC for A_OK# and B_OK# to be okay
Input current (sink)	I_{ol}	0.3	0.8	3.4	mA	Sink current capability of each pin
Maximum allowable leakage current	$I_{ol\_leakage}$			10	µA	Maximum leakage current in open collector transistor when pin is pulled to 3.3 V
Isolation			2250VDC			Isolation of signal pins from primary circuits according to EN60950 and UL60950
3.3 V Trim (Input only) pin 27/28						Allows the 3.3 V to be trimmed up and down
Controlled output voltage range	V_{o} trim up		3.48	3.52	V	Connect trim pin to output return to trim high, and to 3.3 Vout to trim low. See Application Note
	V_{o} trim down	3.13	3.16		V	
Programme/Vselect law	$R_{control}$		8.06		kOhm	V/mA, current from pin increases output voltage. See Application Note for further details

Signal Electrical Interface Contd.

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Interrupt (output only) pin 18						Output, which goes active low when any of the measured parameters goes outside its limits. See Application Note for further detail.
High level output voltage	V_{oh}	2.90	3.10	3.30	V	Interrupt is not active
Low level output voltage	V_{ol}			0.1	V	Interrupt is active
High level output current	I_{oh}			5.0	mA	Output source current
Low level sink current	I_{ol}			5.0	mA	Output sink current
I^2C Bus (input and output) pins 20 and 22						SDA and SCL referenced to secondary side 3.3V return
Low level sink current	I_{ol}			5.0	mA	Provide the communication path with the host system. See Application Note for further details
Clock frequency	I^2C_{freq}		100		kHz	This value is fixed
Address A0, A1, A2 pins 21, 19 and 17 (input only)						Forms part of the IC2 binary address. These are hardwired to logic 1' via 10 k pull-ups, but can be configured to logic 0' by connecting to 3.3V output return via zero W. See Application Note for further details
Enable A & B (input only)						These two inputs effectively connect to their respective returns once the Zone1 connector mates with the Zone1 socket on the backplane. Both Enables must mate to start up the unit.

Hold up Capacitor Output (Hold Up Trim) from 50 to 80VDC Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Hold up capacitance requirement	C_{holdup}	Chold_min		Chold_max	µF	Chold_max and Chold_min depends on load and hold up requirement on customer system. See Application Note
Hold up Output Voltage Trim	V_{cl}	50		80	V	Adjustable Voltage on hold up capacitors (Hold Up Trim)
Hold Up Voltage OVP	$V_{hold\ up\_ovp}$			92	V	If the holdup voltage exceeds $V_{hold\ up\_ovp}$, the unit trips. Reset is achieved by cycling the input power

Common Protection/Control						
Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overtemperature protection (IBC)	T_{op}	120	125	130	°C	The IBC shuts down, resulting in both shut down of 3.3 V and 12 V. Once the substrate temperature has decreased by 5 °C, the IBC turns back on enabling both voltages
Overtemperature protection (main unit)						Temperature sensors are on primary and secondary side.
Primary side threshold	T_{pri}		116		°C	Once the thresholds have been exceeded, the 12 V output is disabled but the 3.3 V remains. The 12 V output can only be enabled by cycling power or through the I^2C interface provided that the temperature has decreased below its hysterisis level. Adjustable primary and secondary thresholds are also provided and can be set lower than the fixed thresholds. See Application Note.
Secondary side threshold	T_{sec}		116		°C	
Primary side hysterisis	T_{pri_hys}			20	°C	
Secondary side hysterisis	T_{sec_hys}			10	°C	

Reliability and Service Life						
Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
Mean time between failure	MTBF		TBD		Hours	Telcordia SR-332 $V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$; ambient 25 °C; ground benign environment

Other Specifications						
Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
Switching frequency	F_{sw}		400		kHz	As determined by IBC
Weight			120		g	

Environmental Specifications						
Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
Thermal Performance	T_{op}	-25		85	°C	See derating curves (Figures 1, 2, 3)

EMC Electromagnetic Compatibility					
Phenomenon	Port	Standard	Test level	Criteria	Notes and Conditions
Immunity:					
Radiated immunity	Enclosure	EN61000-4-3	6 kV contact 6 kV air		As per ETS 300 386-1 table 5
ESD		EN61000-4-2			
Emissions:					
Conducted emission	-48 V A or B bus and returns	EN55022	B	Conducted	See Application Note for guidelines on how to meet the required EMI standard

Referenced ETSI standards:

ETS 300 386-1 table 5 (1997): Public telecommunication network equipment, EMC requirements

ETS 300 132-2 (1996): Power supply interface at the input to telecommunication equipment: Part 2 operated by direct current (dc)

ETR 283 (1997): Transient voltages at interface A on telecommunication direct current (dc) power distributions

PICMG®3.0 rev 2.0: AdvancedTCA™ Base Specification

Safety Agency Approvals		
Characteristic	Notes and Conditions	
UL/cUL60950-1	TBD	
T V Product Services	TBD	
CB certificate and report to IEC 60950-1	TBD	

Material Ratings		
Characteristic	Notes and Conditions	
Flammability rating	UL94V-0	

Model Numbers						
Model Number	Input Voltage	Output Voltage	Output Current (Max)	Typical Efficiency	Max. Load Regulation	Note
ATCR250-48D12-03J	-36 to -72 Vdc	12 V	20.83 A	89% at full load	± 5%	Total output power = 250 W
		3.3 V	4.5 A		± 3%	Management power

RoHS Compliance Ordering Information	
RoHS 2002/95/EC	The J at the end of the part number indicates that the part is Pb-free (RoHS 6/6 compliant). TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Main Output - 12 V						
Nominal set-point voltage	$V_{o(nom)}$		12.2		Vdc	$V_{in} = V_{in}$ (nom)
Total regulation band	V_o	11.4		12.6	V	For all line, static load and temperature variations
Output current continuous	I_{out}	0		20.83	Adc	
Output current limit	I_{ocp}	23.6	24.5	25.4	Adc	During a short-circuit or when current limit of 12 V is exceeded,12 V lATCRhes off, 3.3 V remains on. The 12 V can only be enabled by cycling power, or via the I^2C interface, providing the fault condition has cleared. See Application Note.
Overvoltage protection for IBC	V_{ovp}	13.4	14.6	15.9		OVP response time is 50 µs (typ)
Output voltage - noise, pk-pk	V_{pk-pk}	13.4	14.6	15.9		Measurement bandwidth 20 MHz
	V_{rms}	0	20	50	mVrms	Measurement bandwidth 20 MHz
Output voltage during hold up event	Vo (hold)	11			Vdc	Lowest value of Vo @ Iout max. with input removed for hold up duration with recommended hold up capacitance
Output capacitance	$C_{o/p}$	1000		6000	µF	Capacitance should be low ESR type. See Application Note.

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Management Power - 3.3 V						
Nominal set-point voltage	$V_{o(nom)}$		3.32		Vdc	$V_{in} = V_{in}$ (nom)
Total regulation band	V_o	3.20		3.40	V	For all line, static load and temperature variations
Output current continuous	I_{out}			4.5	Adc	
Output current limit	$I_{out\_95\%}$		6		Adc	Current measured at approximately 95% of output voltage
Output current at short circuit	$I_{s/c}$			4.0	Adc	Short circuit of less than 10 mW average value. Output self recovers upon removal of the short circuit
Output voltage monitor limits	V_{uvp}	2.94	3.00		Vdc	If the 3.3 V goes outside these limits, the 12 V output is disabled. The 12 V output is enabled again by cycling input power, or by resetting via I^2C
	V_{ovp}		3.60	3.67	Vdc	
Output voltage - noise, pk-pk	V_{pk-pk}	0	40	75	mV p-p	Measurement bandwidth 20 MHz
	V_{rms}	0	22	50	mV rms	Measurement bandwidth 20 MHz
Output voltage during hold up event	Vo (hold)	3.25			Vdc	Lowest value of Vo @ Iout max. with input removed for hold up duration with recommended hold up capacitance
Output capacitance	$C_{o/p}$	100		1000	µF	Capacitance should be low ESR type. See Application Note.

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η	86	89		%	Full load, low to high line (12 V and 3.3 V = 250 W)

Isolation Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input to output insulation system					Basic	
Input to output test voltage				2,250	Vdc	
Input to output capacitance			2000		pF	
Input to output resistance		100			MOhm	Measured with 500 Vdc
A_OK# and B_OK#					Basic	Isolation from primary circuit
ON/OFF+ and ON/OFF-					Basic	Isolation from both primary and secondary circuits

I²C Serial Bus Interface - This page is a summary of the I²C features set. For further detail refer to App 206 I²C Serial Bus Interface

I²C Addressing and Access

Value Registers,
Address 20 h to 28 h

Type	Parameter Name	Description	Scaling Factor	Address
Voltage (Pri)	-48 V	Voltage between HU- and HU+IN	0.2915 V/bit	20 h
Current (Pri)	-48 V	Current after input OR-ing	0.0273 A/bit	21 h
Voltage (Pri)	-48 V_A	Voltage between 48 V A and RTN A	0.2817 V/bit	22 h
Voltage (Pri)	-48 V_B	Voltage between 48 V A and RTN A	0.2817 V/bit	23 h
Voltage (Sec)	3.3 V	Management power voltage	0.0170 V/bit	24 h
Voltage (Sec)	12 V	Intermediate bus voltage	0.0598 V/bit	25 h
Current (Sec)	12 V	Current in intermediate bus	0.1327 A/bit	26 h
Temperature (Sec)	Temp	Secondary side temperature	0.5 °C/bit-10 °C	27 h
Temperature (Pri)	Temp	Primary side temperature	0.5 °C/bit-10 °C	28 h

The temperature parameter is scaled at 0.5 °C/bit with an offset of -10 °C for a range of -10 °C (00 h) to 117 °C (FFh)

Serial Bus Interface

General Description

Characteristic	Notes and Conditions
Bus type	I²C
Clock frequency	100 kHz
Supply Voltage (Note 1)	3.3 V

Inventory Data

Parameter Name	Address	Field Size
Firmware revision (primary)	40 h - 47 h	8
Firmware revision (secondary)	48 h - 4F h	8
Firmware P/N (primary)	50 h - 5F h	16
Firmware P/N (secondary)	60 h - 6F h	16
ATCR250 P/N (Emerson format)	70 h - 87 h	24
ATCR250 Revision	88 h - 8F h	8
ATCR250 Serial No.	90 h - 97 h	8
ATCR250 Date Code	98 h - 9F h	8
ATCR250 Vendor (Emerson)	A0 h - A7 h	8

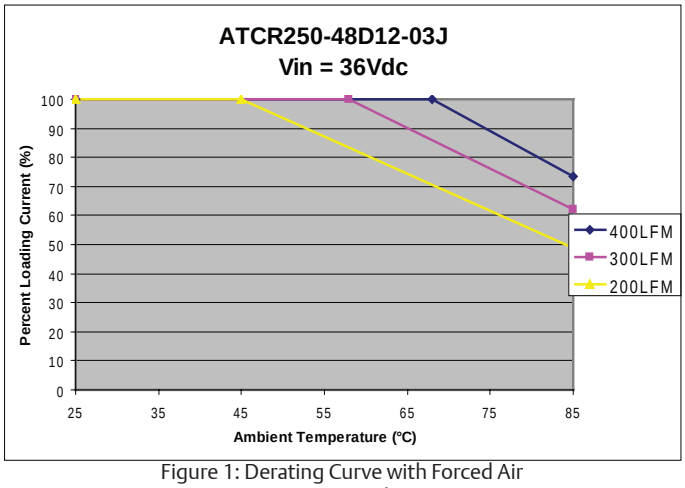


Figure 1: Derating Curve with Forced Air
Vin = 36 Vdc

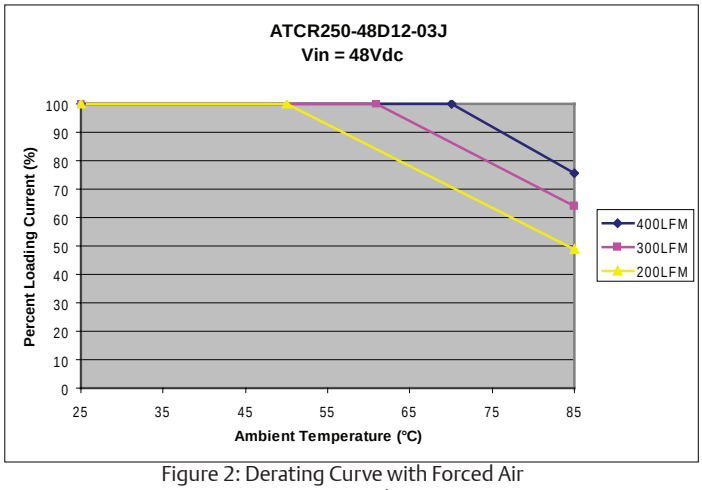


Figure 2: Derating Curve with Forced Air
Vin = 48 Vdc

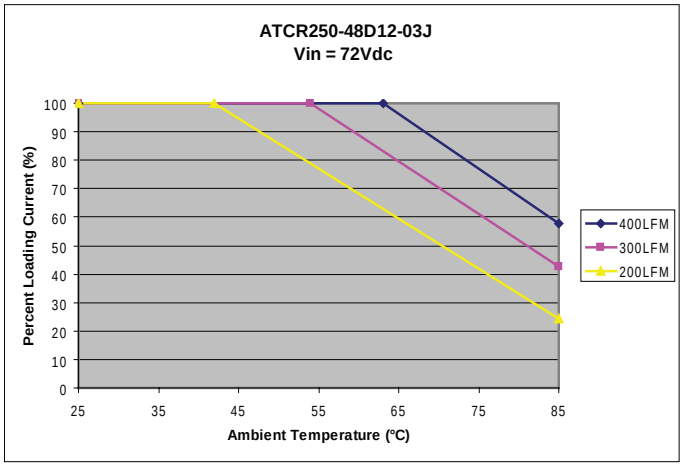


Figure 3: Derating Curve with Forced Air
Vin = 72 Vdc

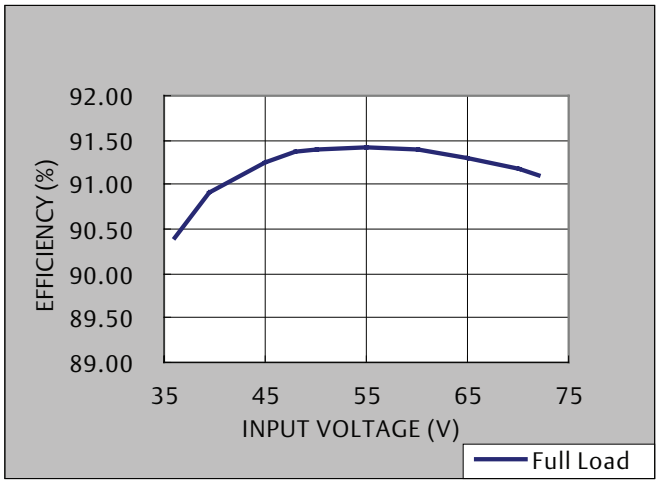


Figure 4: Efficiency vs. Line (Full Load)

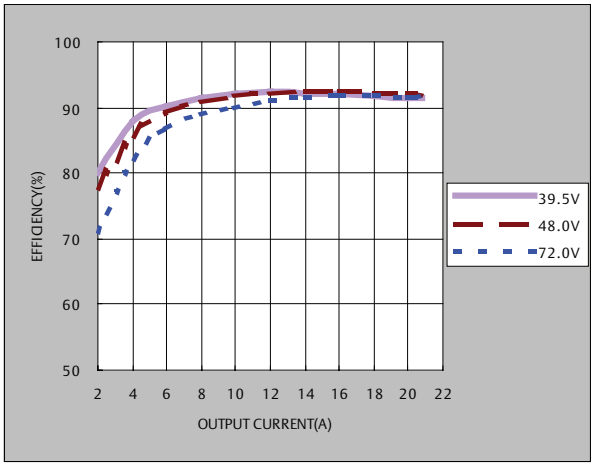


Figure 5: Efficiency vs. Load

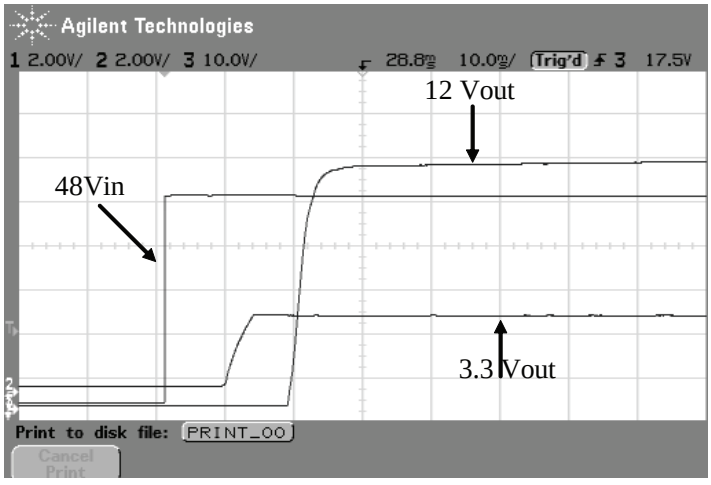


Figure 6: Turn-On Characteristic (48 vin)
Channel 1: 12 Vout; Channel 2: 3.3 Vout; Channel 3: 48 Vin

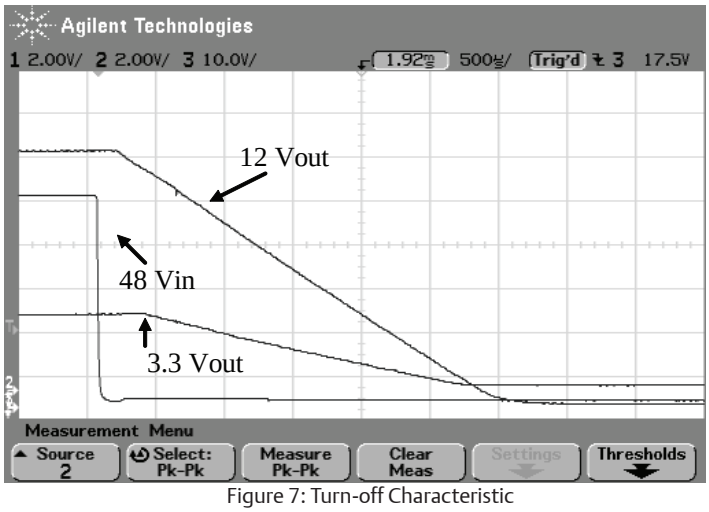


Figure 7: Turn-off Characteristic
Full Resistive Load (Input Power Removed)
Channel 1: 12 Vout; Channel 2: 3.3 Vout; Channel 3: 48 Vin

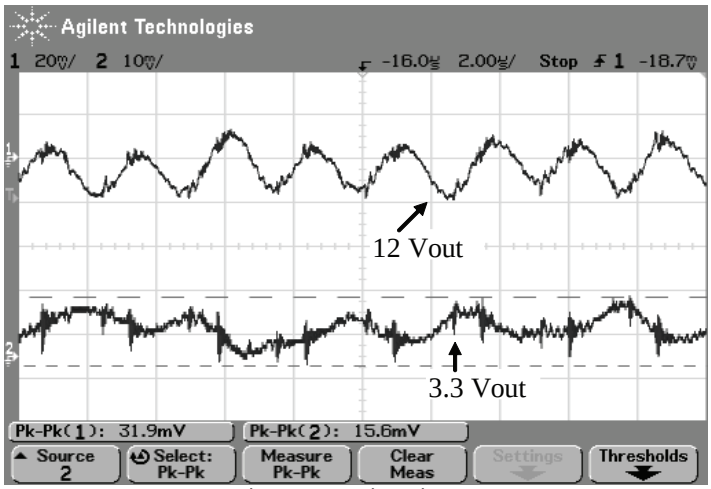


Figure 8: Typical Output Ripple and Noise Measurement
Channel 1: 12 Vout; Channel 2: 3.3 Vout

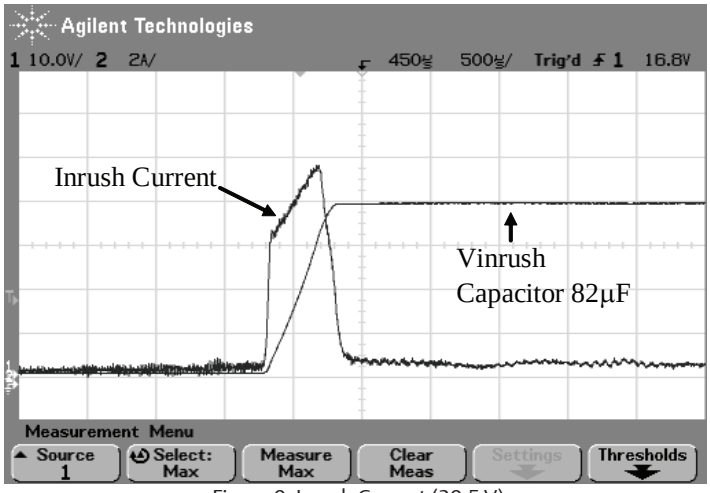


Figure 9: Inrush Current (39.5 V)
Channel 2: Inrush Current;
Channel 1: Voltage Across Inrush Capacitor

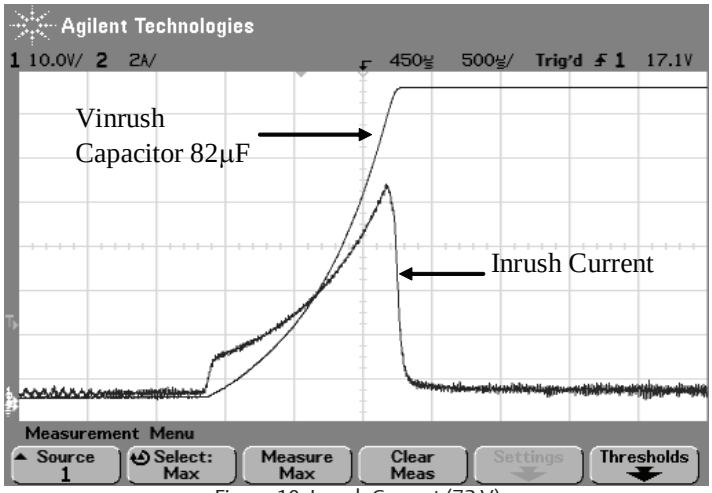


Figure 10: Inrush Current (72 V)
Channel 2: Inrush Current;
Channel 1: Voltage Across Inrush Capacitor

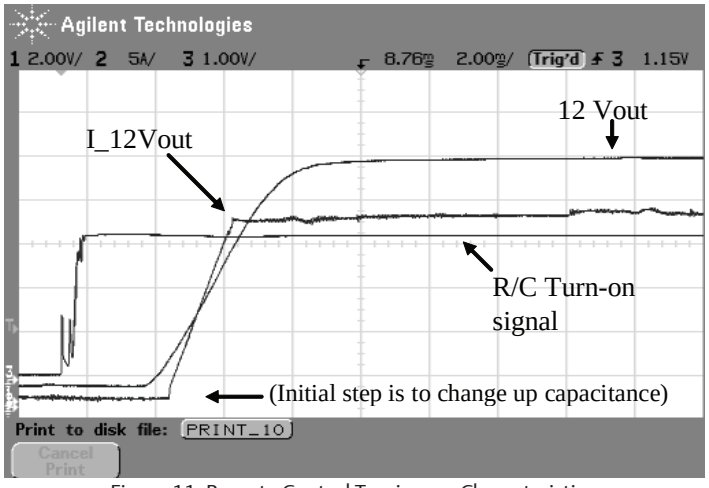


Figure 11: Remote Control Turning-on Characteristic
Vin = 48 Volts, Turning-on into Full Load for 12 Vout & 3.3 Vout

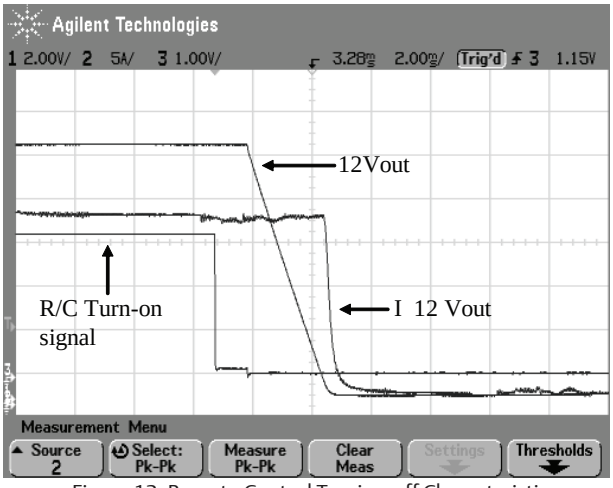


Figure 12: Remote Control Turning-off Characteristic
Vin = 48 Volts, Turning-off into Full Load for 12 Vout & 3.3 Vout

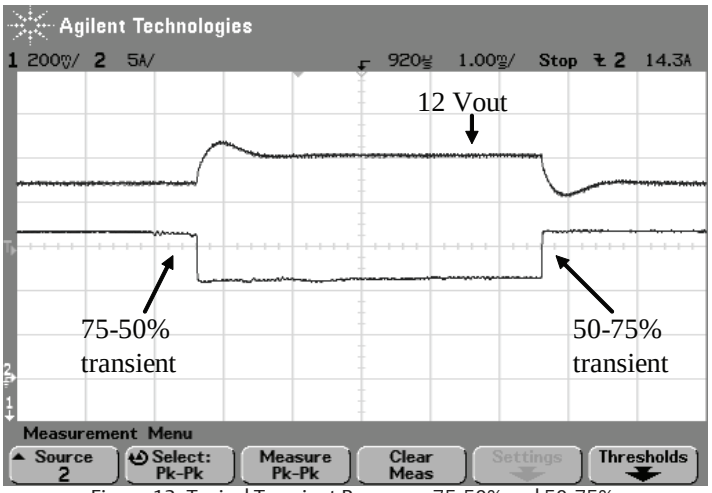


Figure 13: Typical Transient Response 75-50% and 50-75%
Step Load Change (1 A/µs),
Channel 1: 12 Vout; Channel 2: Iout (12 Vout). Cout = 6000 µF

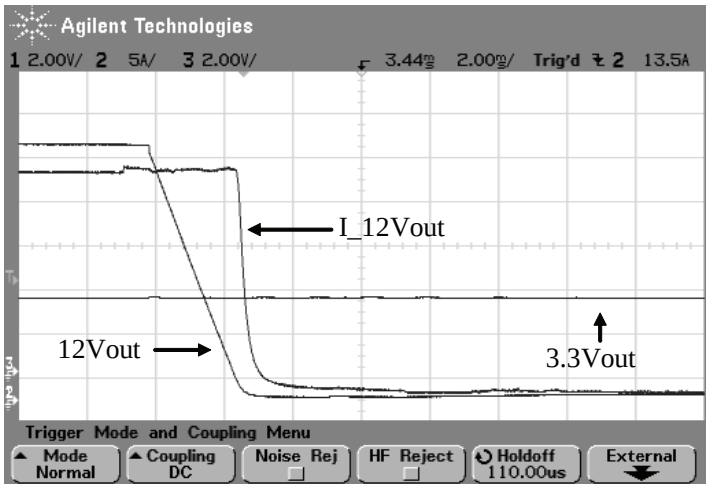


Figure 14: 12 Vout Current Limit
Channel 1: 12 Vout; Channel 3: 3.3 Vout;
Channel 2: Iout (12 Vout)

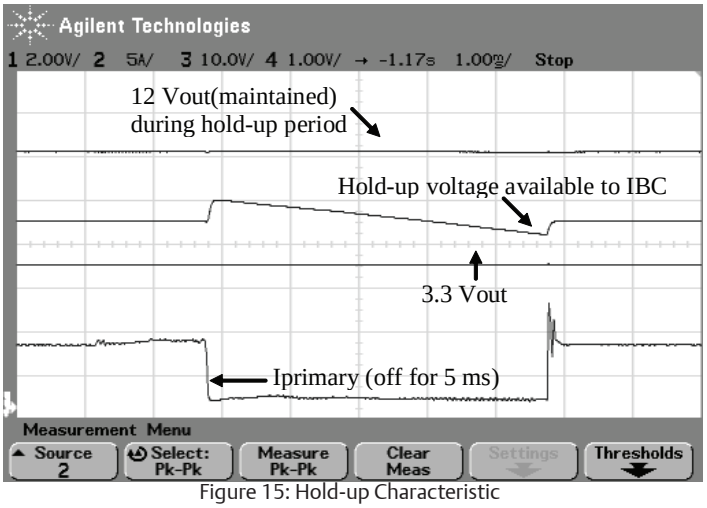


Figure 15: Hold-up Characteristic
Vin = 43 Volts, 12 Vout @ 19.6 Amps, 3.3 Vout @ 4.5 Amps

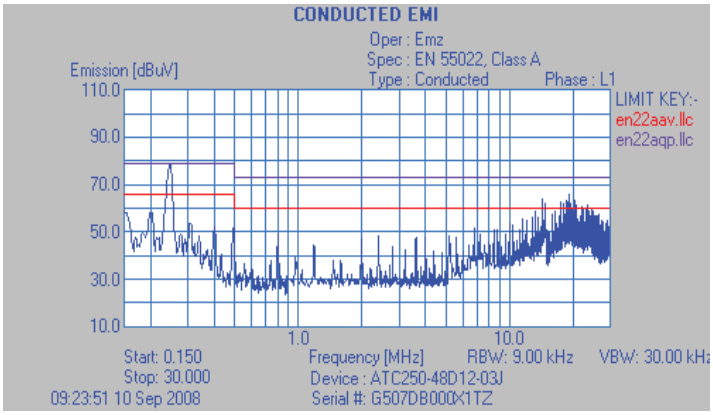


Figure 16: Class A Line 1
Vin = 48Vdc, Vo1 = 12Vdc, Vo2 = 3.3Vdc,
Io1 = 19.6 A, Io2 = 4.5 A

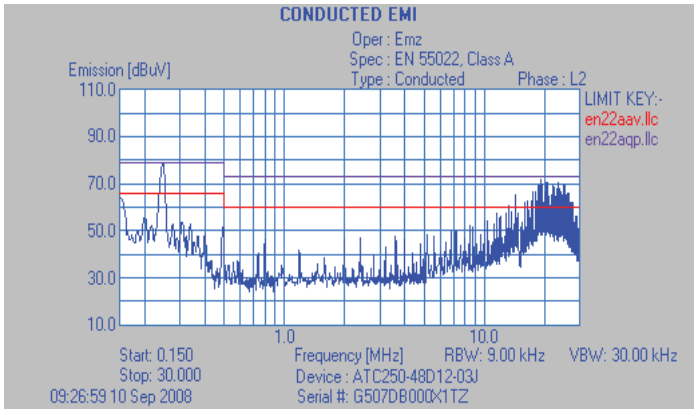


Figure 16: Class A Line 2
Vin = 48Vdc, Vo1 = 12Vdc, Vo2 = 3.3Vdc,
Io1 = 19.6 A, Io2 = 4.5 A

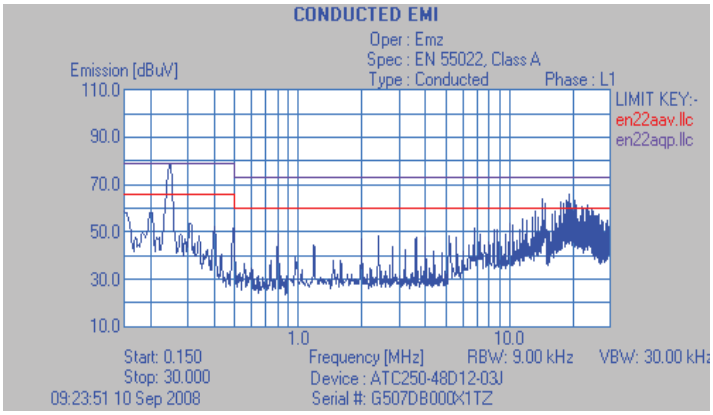


Figure 18: Class B Test Filter with Capacitors & Common_mode choke

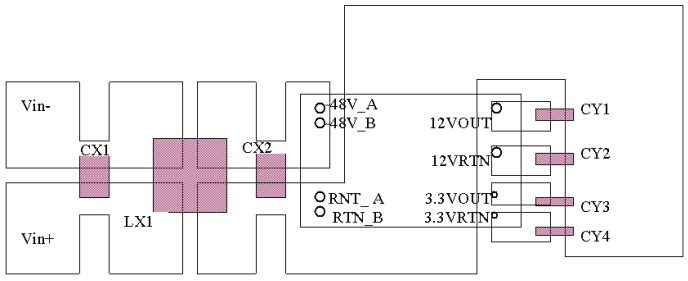


Figure 19: Conducted EMI filter recommended layout

Suggested Capacitors for Filter in Figure 18:
CY1,CY2,CY3,CY4: 4.7nF Y1, muRata DE1E3KX472MN5A or equivalent
CX1: 2.2nF*4 100 V, muRata GRM32ER72A225KA35L or equivalent
CX2: 2.2nF*8 100 V, muRata GRM32ER72A225KA35L or equivalent
LX1: 0.59mH Common Mode Choke, Pulse PO353 or equivalent

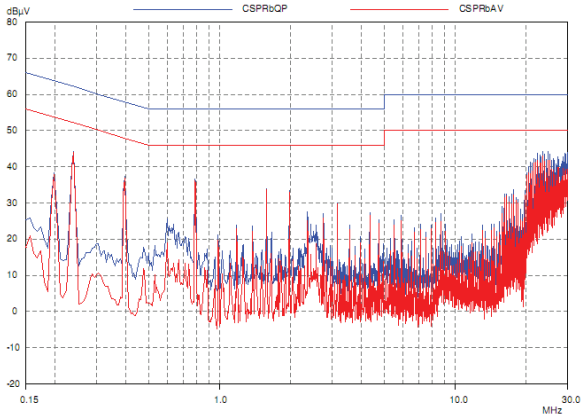
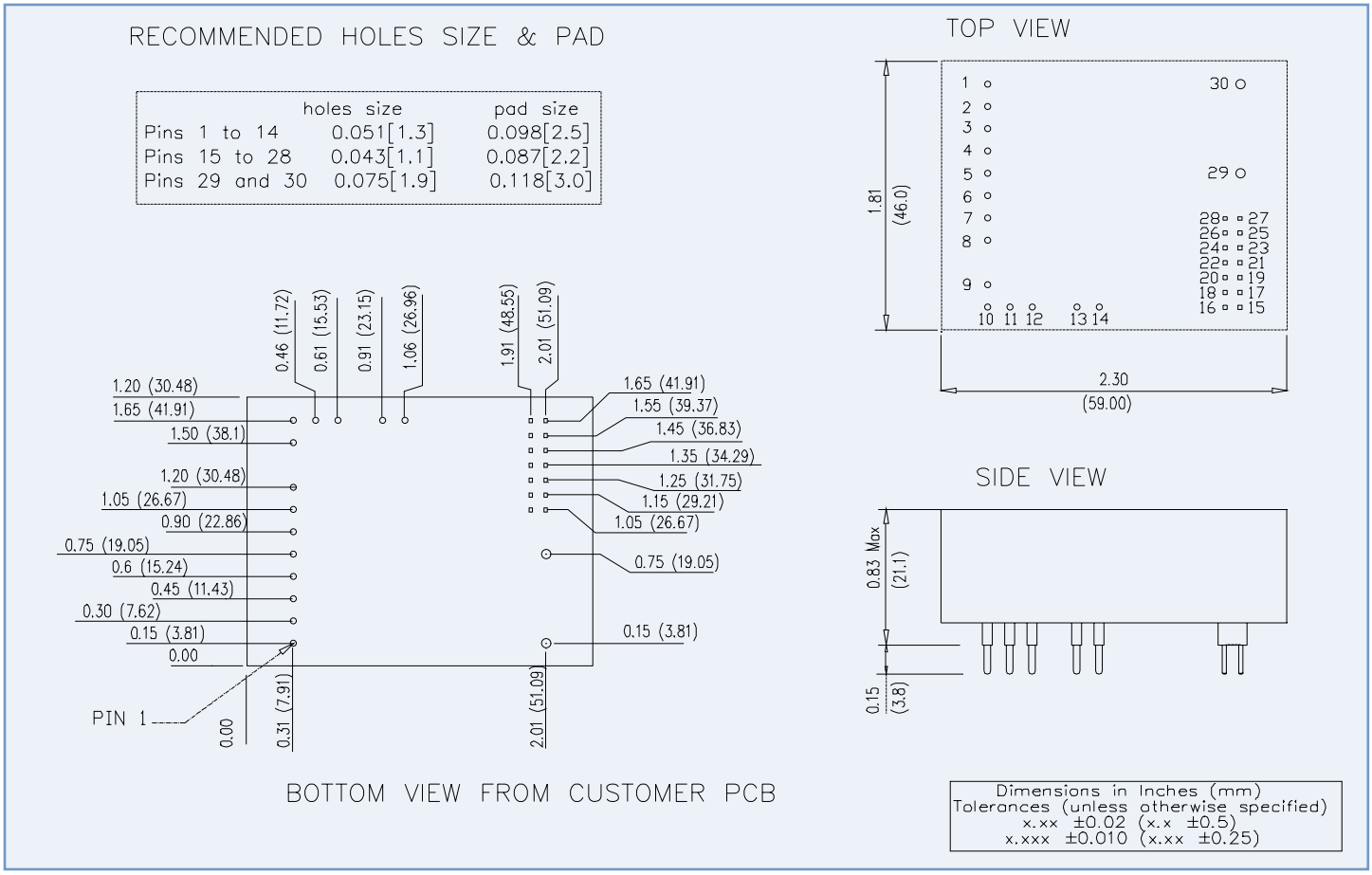


Figure 20: Typical Spectrum of the ATCR250 Test circuit as per Figure 18 & 19
Class B Limit Lines are shown



Pin Functionality		
Pin Number	Pin Name	Pin Size
1	-48VA	1.02 mm
2	-48VB	1.02 mm
3	Reserved	See Note 2
4	Hold up trim	1.02 mm
5	RTN A	1.02 mm
6	RTN B	1.02 mm
7	ENA	1.02 mm
8	ENB	1.02 mm
9	C_CL-	1.02 mm
10	HU-	1.02 mm
11	HU + OUT	1.02 mm
12	HU + IN	1.02 mm
13	ON/OFF-	1.02 mm
14	ON/OFF+	1.02 mm
15	B_OK#	0.64 mm Sq

Pin Functionality		
Pin Number	Pin Name	Pin Size
16	A_OK#	0.64 mm Sq
17	A2	0.64 mm Sq
18	INTRPT	0.64 mm Sq
19	A1	0.64 mm Sq
20	SCL	0.64 mm Sq
21	A0	0.64 mm Sq
22	SDA	0.64 mm Sq
23	3V3 RTN	0.64 mm Sq
24	3V3 RTN	0.64 mm Sq
25	3V3 OUT	0.64 mm Sq
26	3V3 OUT	0.64 mm Sq
27	3V3 TRIM	0.64 mm Sq
28	3V3 TRIM	0.64 mm Sq
29	12V RTN	1.58 mm
30	12V OUT	1.58 mm

Pin Functionality

Pin Number	Pin Name	Function	Note
1	-48VA	Power input from A' bus	Connects to ATCA Zone 1 connector pin 33 via external 12 A fuse
2	-48VB	Power input from B' bus	Connects to ATCA Zone 1 connector pin 34 via external 12 A fuse
3	Reserved	For future use	
4	Hold up trim	Hold up voltage trim	Connects a resistor between this pin and pin 11 to trim hold up voltage
5	RTN A	Power return from A' bus	Connects to ATCA Zone 1 connector pin 28 via external 15 A fuse
6	RTN B	Power return from B' bus	Connects to ATCA Zone 1 connector pin 29 via external 15 A fuse
7	ENA	When connected to RTN A, turns ON isolated open collector A enabled device (See Note 3)	Connects to ATCA Zone 1 connector pin 32 via external 1 A fuse. Used to signal to management system correct board insertion and presense of A' bus
8	ENB	When connected to RTN B, turns ON isolated open collector B enabled device (See Note 3)	Connects to ATCA Zone 1 connector pin 27 via external 1 A fuse. Used to signal to management system correct board insertion and presense of B' bus
9	C_CL-	Connection to module of auxiliary capacitor hold up array -ve	Utilizes greater capacitance ion a given can size of lower voltage capacitors. Clamped to -50V wrt HU+OUT
10	HU-	Connection to module of hold up capacitor array -ve	
11	HU + OUT	Connection from on board filter and management circuits to hold up capacitor array +ve	May also connect to input of boost module to reduce hold up storage area
12	HU + IN	Connection to main power converter from hold up capacitor array +ve	May also connect to output of boost module to reduce hold up storage area
13	ON/OFF-	Current from pin to turn main output ON	Fully floating remote ON/OFF signal, may be used with management system or ATCA ENABLE_A/B via R-D network
14	ON/OFF+	Current into pin to turn main output ON	Fully floating remote ON/OFF signal, may be used with management system or ATCA ENABLE_A/B via R-D network
15	B_OK#	Open collector signal, monitors status of B feed	Low when OK
16	A_OK#	Open collector signal, monitors status of B feed	Low when OK
17	A2		I^2C lines, address strapping
18	INTRPT	Interrupt Alarm	I^2C Register out of limits, LM80 pin INT#' direct connection
19	A1		I^2C lines, address strapping
20	SCL	Clock	I^2C lines, clock line input
21	A0		I^2C lines, address strapping
22	SDA	Data	I^2C lines, serial data
23, 24	3v3 RTN	Management power return and I^2C	Also return for A_OK#' and B_OK# signals. Externally connected to ATCA Zone 1 connector pin 26
25, 26	3VE OUT	3V3, 6 W management power	
27, 28	3V3 TRIM	Trim pin for management power	
29	12V RTN	12 V return	Externally connected to ATCA Zone 1 connector pin 26
30	12V OUT	12 V power	

Note 1
The reference return for the I^2C bus is on the secondary (SELV) side of the converter (i.e. 3V3_RTN)

Note 2
Pins reserved for future use

Note 3
Either one or both Enable (ENA/ENB) has to be connected to the respective RTN to enable the internal power management IC

CAUTION: Hazardous internal voltage and high temperatures. Ensure that unit is accessible only to trained personnel. The user must provide the recommended fusing in order to comply with safety approvals.

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