

## **TYCO ELECTRONICS eDIGEST**

A series of technology briefs spanning Tyco Electronics' product portfolio

### **Technology Focus: Power Systems**

#### ***Industry's First ATCA Compliant Power Input Module***

Tyco Electronics Power Systems, a division of Tyco Electronics, is a leading global power and components provider with a wide-ranging service capability, provisioning many of the world's largest, most demanding communications, computer and data networking companies. Tyco Electronics Power Systems has the capability to engineer, supply and install power products worldwide. This service allows customers to obtain complete turnkey solutions. As a manufacturer of high quality AC-DC and DC-DC power solutions, our products have earned a reputation for reliability and innovative technology. This high standard, an integral part of our heritage, dates back more than a century to the invention of the telephone. Our customers ultimately benefit from the superior design and engineering excellence of our power solutions.

Tyco Electronics provides carrier class power systems products for all applications ranging from our all-in-one power solutions like the NP Series™, CPS6000™, Fiber to the Node, YUKON™, and GALAXY™ product families offering both 24V and 48V up to 10,000 amps, to our board mounted Point-of-Load (POL) modules like our latest ATCA offering, the PIM200™. The PIM200 is the industry's first power input management solutions for ATCA boards and incorporates all of the features required by ATCA PICMG 3.0™ specifications.

#### ***Background***

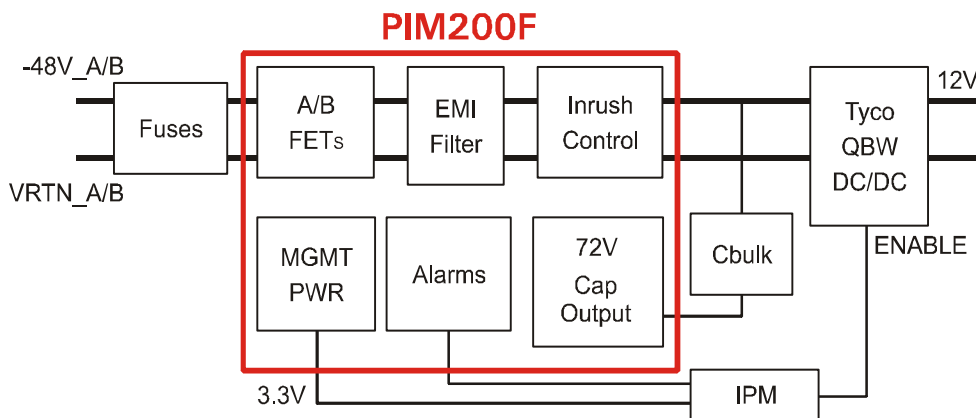
ATCA, or Advanced Telecom Computing Architecture, is one of the industry's latest open standard specifications developed by PICMG. ATCA incorporates the latest trends in high speed interconnect technologies, next generation processors, and improved reliability, manageability and serviceability, resulting in a new blade (board) and chassis (shelf) form factor optimized for communications. ATCA creates a modular platform for carrier class telecommunications equipment and provides a means for the telecommunications equipment market to take advantage of standardized, off-the-shelf hardware, thereby enabling differentiation through application level software.

With the downturn in the telecommunications industry, ATCA has provided a much needed boost by reducing the time to market, increasing the available choices to vendors, increasing flexibility by supporting multiple switch fabrics and user defined I/O, as well as allowing a lower overall cost to the customer. By incorporating standardized hardware, research and development costs are reduced so OEMs can focus on the application and system level software.

The ATCA PICMG 3.0 specification was developed in collaboration with major components providers and OEMs for the telecom industry. It provides detailed specifications on shelf, chassis, backplanes, hardware and software interfaces and power and cooling requirements on the shelf and board levels. Each ATCA compliant system must meet these PICMG 3.0 specific requirements and undergo industry specific testing.

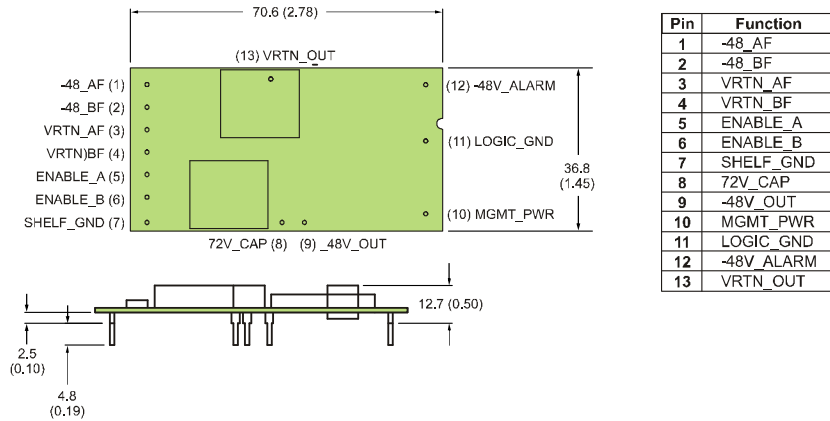
### *PIM200 Series*

As a leading power solution provider to major OEMs in the telecommunications industry, Tyco Electronics Power Systems launched the industry's first ATCA compliant power input module. PIM200 series provides a complete power management solution for ATCA boards. The compact and innovative design saves valuable board real estate and the off-the-shelf module provides a lower overall cost solution for board manufacturers while reducing the time to market compared to discrete solutions.



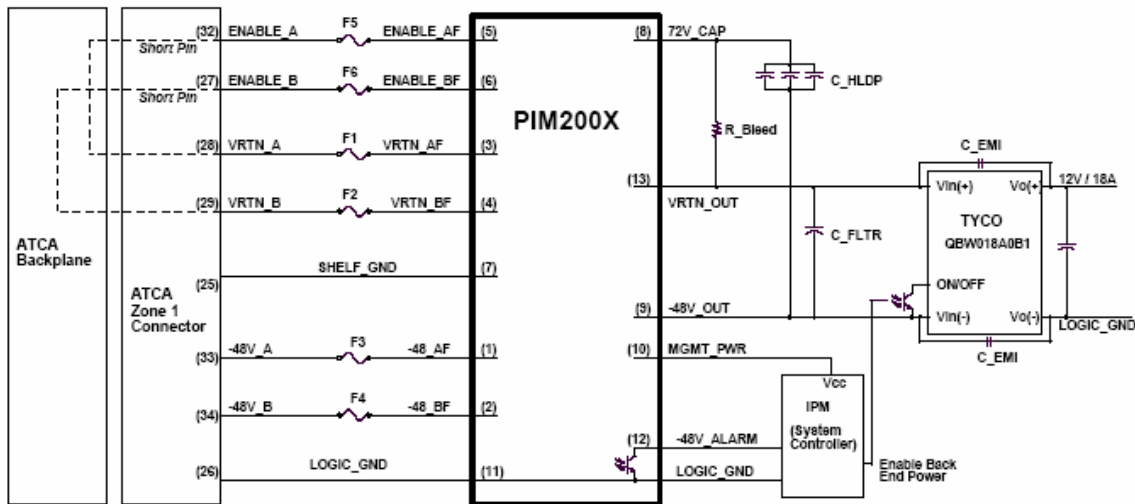
Supporting 200W of maximum output power with a wide input voltage range of  $-38\text{Vdc}$  to  $-75\text{Vdc}$ , the PIM200 is suitable for both  $-48\text{Vdc}$  and  $-60\text{Vdc}$  power distribution. The PIM modules incorporate all of the features required by the AdvancedTCA PICMG 3.0 specification including inrush current protection, ORing functionality with MOSFETs, EMI filtering meeting Class B CISPR Limits, hot-swap control and input under-voltage and over-voltage protections. The modules are available in both through hole and surface mount packages and are lead free compliant under Directive 2002/95/EC. Other features include an A/B feed loss alarm, 72V charging current for external holdup/bulk capacitors, and 8W of isolated auxiliary power for IPM available in both the 3.3V and 5V versions.

## Outline Drawing



## Typical Application Circuit using PIM200

The ATCA board power management and conditioning design is relatively simple when using the PIM200 module (typical application circuit is shown). This module solution needs very few external components and results in significantly reduced design-in time compared to discrete implementation that requires extensive layout, debug, testing and qualification effort. Critical EMI component selection and placement can be verified on a component level rather than waiting for the board design completion, which allows for early corrective actions. The separation of the energy storage bulk capacitors from filter capacitors has reduced the stress amount on the hot swap FET during startup. Thermal derating curves and recommended layout provided in the data sheet enable designers to optimize their board layout and component placement.



***System Level Benefits***

The PIM200 module provides regulated 72Vdc for charging external bulk/hold-up capacitors. With 72Vdc output, ATCA's 0Vdc/5msec transient requirement can be met with 1,500µF / 80V bulk capacitors compared to 6,000 µF / 100V needed for conventional designs, resulting in significant real estate and cost savings. The 1500uf bulk capacitor supports the hold-time during the ramp-down (0.86msec) and ramp up (3.44msec) below 43Vdc in addition to 5msec downtime per PICMG 3.0 specifications. The low bulk capacitance also enables very low bleeder resistor required for capacitor discharge when removing the board from chassis. In addition, the NFET OR'ing design allows for more throughput power for the payload and very high efficiency (97% typical) of the module compared to OR'ing diodes. The module also provides 8W of auxiliary isolated power supply required for house-keeping functionality prior to turning the payload power. The alarm functions are designed per PICMG specifications and send signal to IPM in case of loss of a feed or fuse. The in-rush control and hot-swap features enable designer to upgrade the blade cards as systems level requirements changes. The PIM200 can be used in non-ATCA applications as well.

**Benefits:**

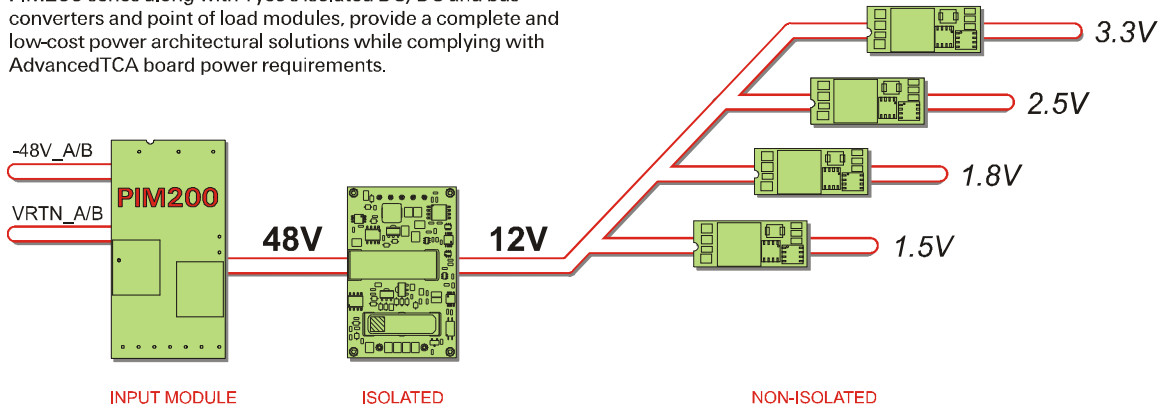
	<b>PIM200</b>	<b>Discrete</b>
PICMG 3.0 compliant	Yes	Board level
Fully tested and burned-in	Yes	Board level
Fully qualified	Yes	Board level
Parts count	1	> 100
Design-in time	Lower	Higher
Assembly cost	Lower	Higher
Yield/Repair cost	Lower	Higher
Time to market	Lower	Higher
Second sourced	Yes	No
Standard off-shelf part	Yes	No

***Recommended Architecture***

The recommended architecture for ATCA boards with power >100 watts is Intermediate Bus, or IBA. IBA offers higher scalability and efficiencies and lower overall power cost. This architecture can save board level power costs by as much as 50%, while reducing overall development time. IBA offers other design advantages as well. In addition to cost savings, IBA allows for the utilization of a high bus voltage that is less sensitive to distribution loss. It also optimizes thermal performance and allows for maximum flexibility and scalability for POL solutions when designing for a variety of load requirements. In support of IBA, Tyco Electronics has developed several bus converter families in eighth brick, quarter brick, and half brick standard footprints that provide maximum flexibility to meet a wide range of design needs.

## A Complete Power Architecture

PIM200 series along with Tyco's isolated DC/DC and bus converters, provide a complete and low-cost power architectural solutions while complying with AdvancedTCA board power requirements.



## Isolated Bus Converters

Full featured dc-dc Converter Series	Output Power (W)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Efficiency (%)	Current Share	Form Factor	Conn Type	Base Plate
EQW006A0B	72W	6A	48V(36-75)	12V(11.6-12.4)	92%	No	Eighth-brick	TH/SMT	No
QRW010A0B	120W	10A	48V(36-75)	12V(11.7-12.3)	93%	No	Qtr-brick	TH	Yes
QBW018A0B	200W	18A	48V(36-75)	12V(11.4-12.6)	94%	Yes	Qtr-brick	TH	Yes
JRW017A0B	200W	17A	48V(36-75)	12V(11.7-12.3)	92%	Yes	Half-brick	TH	Yes

## Non-isolated dc-dc Converters

Austin Lynx Series	Output Current (A)	Input Voltage Range (V)	Output Voltage Range (V)	Efficiency (%)	Output Programmable	Remote On/Off	Remote Sense	EZ-SEQUENCE	Conn Type
Austin MiniLynx	3A	8.3 -14V	0.75 -5.0V	91%	Yes	Yes	No	No	SIP/SMT
Austin MicroLynx	5A	10 -14V	0.75 -5.0V	89%	Yes	Yes	No	No	SIP/SMT
Austin Lynx	10A	10 -14V	0.75 -5.0V	93%	Yes	Yes	Yes	No	SIP/SMT
Austin SuperLynx	16A	10 -14V	0.75 -5.0V	92%	Yes	Yes	Yes	No	SIP/SMT

Austin Lynx II Series	Output Current (A)	Input Voltage Range (V)	Output Voltage Range (V)	Efficiency (%)	Output Programmable	Remote On/Off	Remote Sense	EZ-SEQUENCE	Conn Type
Austin MicroLynx II	6A	8.3 -14V	0.75 -5.0V	89%	Yes	Yes	No	Yes	SIP/SMT
Austin Lynx II	10A	8.3 -14V	0.75 -5.0V	93%	Yes	Yes	Yes	Yes	SIP/SMT
Austin SuperLynx II	16A	8.3 -14V	0.75 -5.0V	92%	Yes	Yes	Yes	Yes	SIP/SMT
Austin MegaLynx II	25A	6.0 -14V	0.75 -5.0V	92.5%	Yes	Yes	Yes	Yes	SIP/SMT

Tyco Electronics offers more than complete lifecycle power systems solutions. We provide the system design, installation and network management services together with consulting and project management services. With over 400 service and installation engineer our professional services are uniquely positioned to service our customers' local needs.

**For additional technical information, contact your local Tyco Electronics Sales Engineer, or visit <http://power.tycoelectronics.com>**