

Centellis™ 4440, R1.0

AdvancedTCA 40GbE Platform Core

■ Embedded Computing for
Business-Critical Continuity™

The Centellis 4440 is the first 40GbE based ATCA platform core from Emerson Network Power

- Best-in-class thermal and power characteristics
- Fabric interface bandwidth options for 1/10/40GbE
- 14-slot, 13U, 19" form factor
- CP-TA B.4 compliant thermal performance
- Up to 350 Watts/blade power distribution
- Combined switch/control blades to maximize billable application slots
- Variety of payload blades
- Integrated software environment including operating system
- Designed for NEBS/ETSI compliance

The Emerson Network Power Centellis™ 4440 AdvancedTCA® platform core is specifically designed to address the unique carrier-grade requirements of the telecommunications industry. Application examples include wireless infrastructure, packetized voice, wireline data, and cable network head-end network element. Highly integrated and verified hardware and software components, reduced development costs and accelerating time-to-market allow network equipment providers (NEPS) to focus their development resources on critical, differentiating features that provide a competitive advantage.

The heart of the Centellis 4440 platform core is the AXP1440 AdvancedTCA (ATCA®) shelf and includes redundant shelf manager and alarm modules, redundant power entry modules (PEMs) and two fan tray modules. The AXP1440 shelf features a 40GbE “KR-Ready” backplane. This allows for 40Gbps communication across the PICMG® 3.1 fabric interface. Using this technology, it is possible to upgrade to 40GbE capable switch and payload blades in the future without replacing the shelf infrastructure. This is becoming increasingly important as dataplane applications start migrating to ATCA based platforms. Equally important is the thermal characteristics of the AXP1440 shelf. It is designed to meet the CP-TA B.4 thermal profile, the highest level possible. As processor technology advances, thermal (heat dissipation) is one of the industries largest challenges – no other ATCA shelf on the market has better thermal characteristics than the AXP1440.

Another important element of the Centellis 4440, R1.0 platform core is the ATCA-F120 system controller and switching blade. The ATCA-F120 combines PICMG compliant base and fabric interface switching functionality with two AMC slots for additional processing and/or local storage. Assuming an HA environment with redundant ATCA-F120 switch blades, combining these key functions provides customers with two additional slots for billable applications.

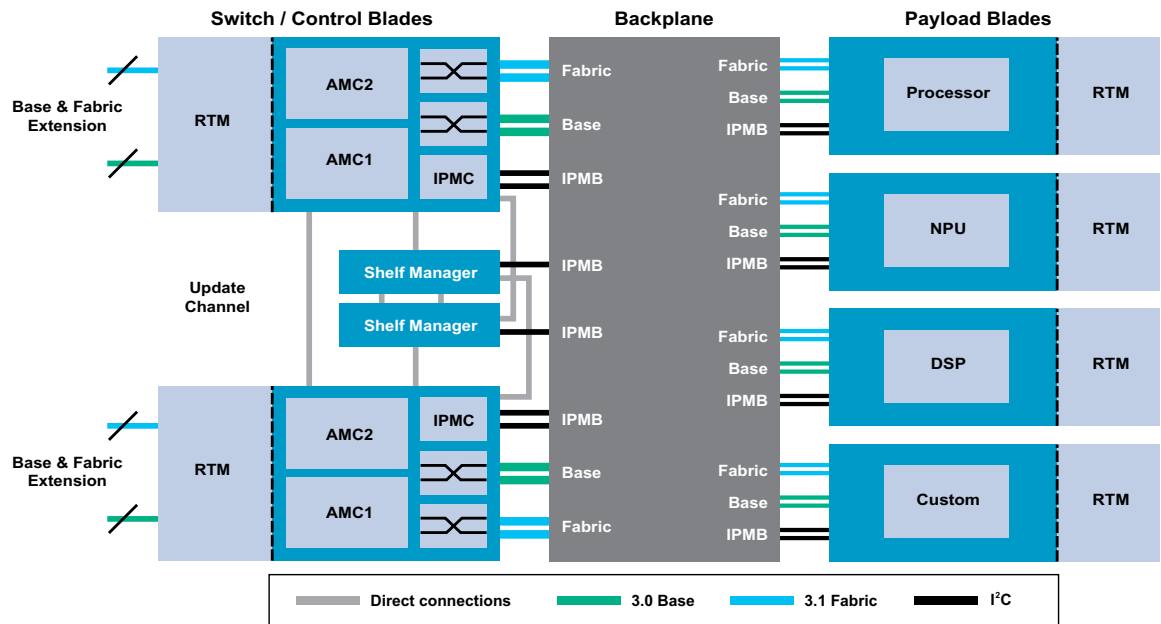
A variety of payload blades, AMCs and accessory products are available for the Centellis 4440, R1.0 platform core depending on application requirements.



AdvancedTCA®


EMERSON™
Network Power

Block Diagram



Platform Architecture

The Centellis 4440 platform core was designed to provide a common platform on which multiple 1, 10 and 40 Gigabit Ethernet applications can be deployed. In order to leverage the platform across a wide range of applications, a standards-based approach was essential and deployed at all levels of design.

- PICMG 3.0 – Chassis/mechanical form factor and power/cooling design
- PICMG 3.1 – High performance fabric interface capable of 1, 10 and 40Gbps operation
- OSDL CGL – OSDL compliant Carrier Grade Linux distribution
- SA Forum – Standard interface support at the hardware level (HPI) and HPI to ATCA mapping

The availability of industry standards for hardware and software components clearly paves the way for overall platform cost reduction, freedom of choice and resource preservation. However, to provide a true open platform requires the integration and verification of these components into a system for which a telecommunications vendor or can simply port their application. This critical integration and verification activity represents significant time and resources that could otherwise be devoted to higher level application development or other activities to create competitive product features. The Centellis 4440 platform core integrates industry standards, hardware and software components and verifies them to create an operational platform ready for customer application development.

AXP1440 Shelf Overview

The AXP1440 shelf includes all the components required to create a complete, redundant ATCA platform. Redundant shelf manager and alarm modules, redundant power entry modules and an N+1 cooling architecture via two tray modules are all included. The shelf form factor allows for three complete AXP1440 shelves configured in a standard 42U telecom rack with several U slots available for breaker panels and management

elements. Some of the salient features/functions of the AXP1440 shelf include:

- Advanced fabric operation – 40G “KR-Ready” backplane
- Best-in-class thermal performance – CP-TA B.4 compliant
- Excellent cable management
- Price parity with 1G and 10G ATCA shelves

ENCLOSURE

- 14 slots for 8U blades
- 14 slots for 8U rear transition modules (RTMs)
- 40G “KR-Ready” backplane
- Front to rear cooling architecture
- ESD and earth grounding points

ENCLOSURE DIMENSIONS

- Height – 573.0 mm
- Width – 448.8 mm (not including the mounting ears)
- Depth – 527.2 mm
- Weight – 90.8 lbs.

SHELF MANAGEMENT

- N+1 redundancy architecture
- Two (2) shelf management & alarm module slots
- Embedded Telco Alarm functionality

POWER DISTRIBUTION

- N+1 redundancy architecture
- Two (2) PEM slots

COOLING

- One (1) top fan tray module slot
- One (1) bottom fan tray module slot

FRONT ALARM DISPLAY PANEL (ADP)

- Two COM ports (one for each shelf manager)
- LEDs to indicate “active” shelf manager
- Telco alarm indicators (PWR, Minor, Major, Critical)
- Alarm reset

BACKPLANE

- Zone 1
 - ▲ Redundant, radial IPMI to all blade slots
 - ▲ Redundant, bussed –48 VDC to all blade slots
- Zone 2
 - ▲ Dual star configuration for the base interface
 - ▲ Dual star configuration for the fabric interface*
 - ▲ Update channel routing for all blade slots
 - ▲ Three redundant, bussed telecom clock signals to all blade slots
- Zone 3
 - ▲ PICMG 3.0 defined open area, application specific

*Note – The AXP1440 backplane is “40G, KR-Ready”. The backplane is capable of 40G communication via the four (4) standard differential pairs that constitute the PICMG 3.1 fabric interface. This allows 40G fabric operation when blades supporting this functionality are available.

Shelf Management

The purpose of shelf management, as defined by the PICMG 3.0 standard, is to assure proper operation of AdvancedTCA blades and other shelf components within the shelf. The shelf management entity continually monitors all low-level, hardware functionality (inventory, sensor, status data, etc.) and reports status to the system manager. It also provides control access to these attributes. Management access to this information is provided via local console and Ethernet interfaces as well as the SA Forum defined HPI interface. Each blade and major shelf accessory has an Intelligent Platform Management Controller (IPMC) that is responsible for providing this information to the shelf management entity.

The AXP shelf provides redundant shelf management functionality utilizing an active/standby architecture. In addition, the Telco Alarm functionality is integrated into the same module to maximize critical real estate within the shelf and is also redundant. Visual indicators, as well as physical interfaces, are provided for direct front panel access.

PANEL ACCESS & INTERFACES

- One (1) RS-232 console, RJ-11
- One (1) 10/100BaseT Ethernet, RJ-45
- One (1) Telco Alarm interface, dry relay contact, DB-15

TELCO ALARM STATUS INDICATORS

- Critical/major/minor
- In service/out-of-service: green/red

SHELF MANAGER LED STATUS INDICATORS

- Hot swap: blue

Shelf Layout

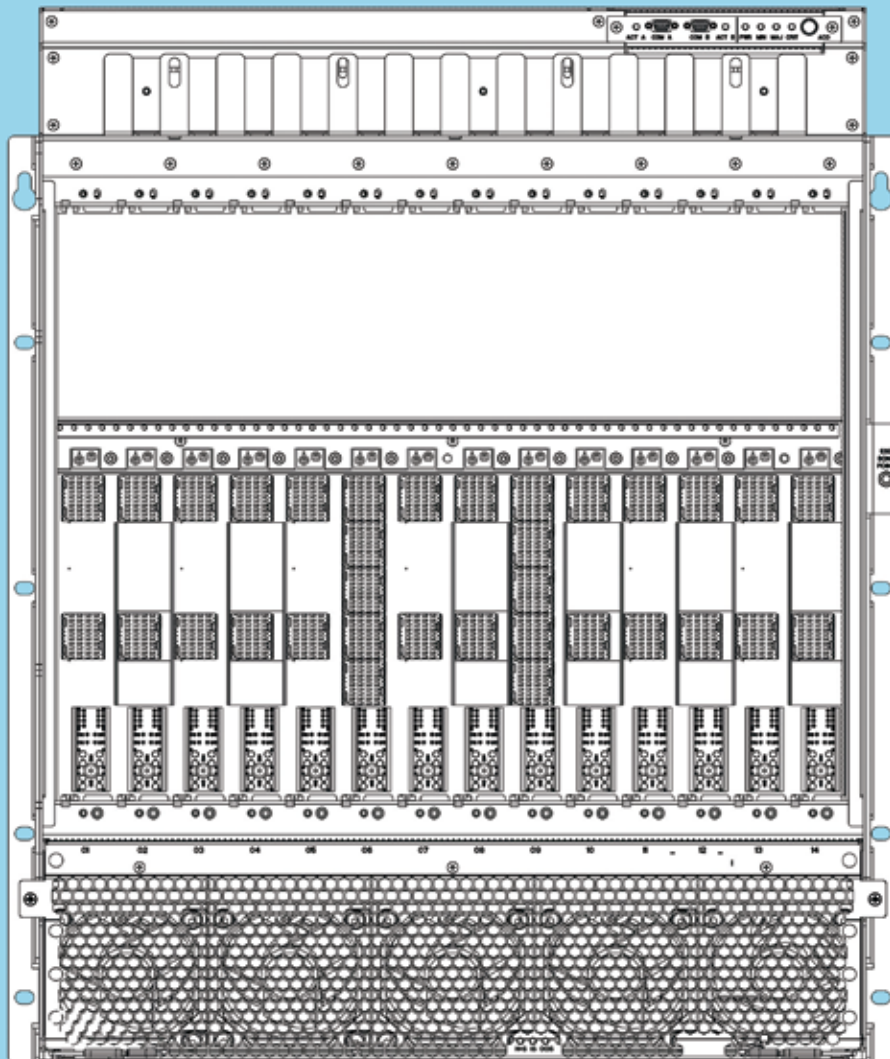
FRONT (TOP TO BOTTOM)

- Alarm display panel
- Cable management system
- 14 vertical, 8U blade slots
- One (1) bottom fan tray module slot

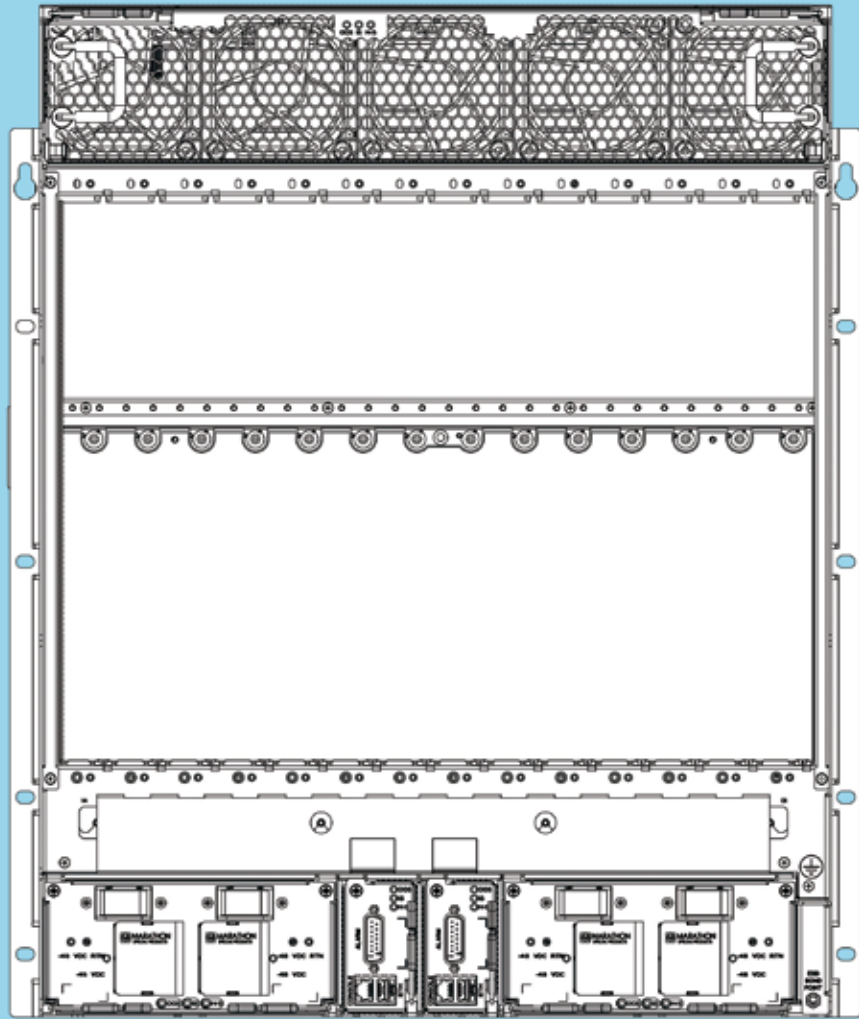
REAR (TOP TO BOTTOM)

- Air outlet/top rear fan tray slot
- One (1) top fan tray module slot
- 14 vertical, 8U RTM slots
- Two (2) shelf management modules
- Two (2) PEM slots
- Cable management system

FRONT VIEW



REAR VIEW



Fan Tray Modules

The AXP1440 shelf provides fault-tolerant cooling to all front blades and RTM slots in an N+1 cooling architecture that is implemented using two fan tray modules, one front/bottom and one rear/top. Each fan tray module has redundant fans with voltage and fan speed monitoring.

GENERAL CHARACTERISTICS

- CP-TA B.4 compliant cooling architecture
- Front blade cooling capacity: 40 cubic feet per minute (CFM) at 55° C
- RTM cooling capacity: 5 CFM at 55° C
- Automatic fan speed control
- Operating range: -5° C to 55° C

LED STATUS INDICATORS

- In service/out-of-service: green/red
- Hot swap: blue

Power Entry Module (PEM)

Power conditioning for the AXP1440 shelf is provided by a pair of redundant PEMs. They provide wiring studs for connection to redundant -48 VDC or -60 VDC power sources and provide power to the backplane on the redundant -48 VDC power rails for blades, RTMs and other shelf components.

GENERAL CHARACTERISTICS

- Input voltage range (-40 VDC to -72 VDC)
- 160 amp, dual feed PEM (80A + 80A)
- Power infrastructure capable of supporting 350 watts/slot
- EMI filtering
- Transient voltage suppression

ATCA-F120 System Controller and Switch Blade

The Emerson ATCA-F120 system controller and 10GbE switching blade is a key element within the Centellis 4440 platform. This blade combines standard PICMG 3.0 base interface and PICMG 3.1 fabric interface 10Gb Ethernet switching (hub functionality) with two AMC slots to support a wide variety of applications, including processing, storage, security and light I/O. By combining these essential functions on a single blade, the ATCA-F120 can provide a completely redundant switching and system management environment while consuming only two slots in the shelf, maximizing the number of slots available for billable applications.

The ATCA-F120 provides base and fabric extension interfaces which allow multiple AXP telecom shelves to be interconnected within, or across, a frame, creating a single access point for management and control. These extensions can be used to scale the networks to multiple shelves or frames—for example in a large distributed application environment. Multiple network extension interfaces provide redundant connections to reduce fault domains in the event of connectivity failure.

The ATCA-F120 blade uses the PICMG standard Update Channel to create a high performance, low latency data synchronization channels between redundant ATCA-F120 blades. This provides seamless, stateful system fail-over in the event of connectivity and/or blade failure.



Intelligent Platform Management Controller

The PICMG 3.0 AdvancedTCA standard specifies a low-level, environmental management architecture referred to as Intelligent Platform Management Interface (IPMI). The ATCA-F120 blade implements this functionality utilizing an off-the-shelf hardware and software based IPM controller (IPMC) that monitors all local, blade specific environmental information. Management access to this information is provided through the Service Availability Forum (SA Forum) defined HPI.

Standard Networking Support

The Emerson ATCA-F120 blade provides dual star, hub switching functions for the PICMG 3.0 base interface and the PICMG 3.1 fabric 10GbE interface within the AXP series of telecom shelves. The ATCA-F120 blade is designed to occupy logical slots 1 and 2 within the shelf as specified in the PICMG 3.0 standard.

External Interfaces

The ATCA-F120 blade supports a full suite of standard external interfaces including a RS-232 serial and management Ethernet interfaces. An IPMI controller debug interface is also provided.

The PICMG 3.0 base interface switch supports redundant Gigabit Ethernet links to all slots within the AXP series of telecom shelves. The PICMG 3.1 fabric interface supports PICMG 3.1 Option 1 Gigabit Ethernet and PICMG 3.1 Option 9, 10 Gigabit Ethernet links to all slots, providing a bandwidth to support high bandwidth and/or latency sensitive traffic.

Hardware Specifications

PROCESSOR

- MPC8548E PowerQuicc III processor

MEMORY

- 512MB ECC-protected SDRAM
- 16KB NVRAM
- 1.0MB boot flash, single bank architecture
- 31MB application flash, dual bank architecture
- 16MB CPU reset-persistent memory

COUNTERS/TIMERS

- Four 32-bit programmable timer/counters
- Watchdog timer

BASE AND FABRIC INTERFACES

- Dual star configuration
- PICMG 3.0 base interface switching – Gigabit Ethernet (1.0Gbps)
- PICMG 3.1, Option 1, 9 fabric interface – Gigabit Ethernet (1.0Gbps, 10Gbps)

EXPANSION

- AMC slots (2)

EXTERNAL INTERFACES

- Front panel
 - ▲ 10/100BaseT Ethernet, RJ-45 (1)
 - ▲ Serial, mini DB-9 (1)
- Via optional RTM
 - ▲ Base interface extension, 10GbE CX4 (2), 1GbE RJ-45 (4)
 - ▲ Fabric interface extension, 10GbE CX4 (4), 1GbE RJ-45 (4)
 - ▲ IPMI debug, mini DB-9 (1)

BLADE SIZE

- 8U form factor, 280 mm x 322.5 mm, single slot

RELEVANT STANDARDS

- PICMG 3.0 (form factor, IPMI, base interface, hot swap, RTM)
- PICMG 3.1, Options 1 and 9

POWER REQUIREMENTS

- Dual redundant –48V rails
- Input range: -39.5 VDC to -72 VDC

CHARACTERISTICS

- Operating range: -5° C to +55° C

Centellis 4440 Software

The Centellis 4440 platform comes complete with software that, when combined with the hardware, creates a fully integrated and verified platform core. The ATCA-F120 software package comes complete with a standard Carrier Grade Linux (CGL) distribution and Basic Blade Services (BBS) software.

For a carrier grade operating system, Wind River Platform for Network Equipment Linux Edition 2.0 (PNE-LE 2.0) was selected. This includes all required Board Support Packages (BSPs) to support the Emerson ATCA-F120 switch blade.

Basic Blades Services (BBS) software is provided to enable a set of ATCA hardware and software components into a fully integrated and verified telecom platform – the Centellis 4440 platform core. This platform is ready for a customer's HA middleware and application environment.

- Basic Blade Services:
 - ▲ Hardware Platform Management including local IPMC, LED, EKeying and blade extraction software
 - ▲ Firmware upgrade utility
 - ▲ Local management access (SNMP, CLI)
 - ▲ OpenHPI support – Centralized access to blade specific HPI information from the shelf manager and presentation to a higher level systems management application.
 - ▲ Switch management software – Includes hardened network drivers, default network configuration scripts and network configuration tools.
 - ▲ Network protocol support – Basic Layer 2 (L2) protocols

Note: Emerson also provides robust L2-L3 protocol support via an optional software package referred to as SRstackware. Please contact your sales representative to obtain a free SRstackware upgrade CD.

RELEVANT STANDARDS

- Linux Foundation
- SA Forum
 - ▲ Hardware Platform Interface (HPI), B.01.01
 - ▲ HPI to ATCA mapping HPI-B.01.01-ATCA

Ordering Information	
Marketing Number	Description
Platform Core Products	
CENT-4440-R10-01	(1) AXP1440, (1) ATCA-F120, (1) SA-BBS-WR-F120
CENT-4440-R10-02	(1) AXP1440, (2) ATCA-F120, (2) SA-BBS-WR-F120
Optional Platform Core Products	
PRAMC-7211	AMC CPU blade w/Intel Core™2 Duo processor 64B @ 1.5 GHz, 2G DDR2 and mid-size
SA-BBS-721X	PrAMC-721x, BBS only, binary RPMS, PNE 2.x, CD
SA-BBS-WR2X-721X	PrAMC-721x, BBS binary RPMS, eval kernel + runtime, PNE LE 2.x, CD
AMC-S320-M-80G	Storage AMC with 80GB HDD-Extreme temp-SATA interface
RTM-ATCA-F120C	Copper RTM for the ATCA-F120
RTM-ATCA-F120OPT	Optical RTM for the ATCA-F120
SFP-MM-SX-LC	Single form-factor pluggable - 850NM, 1000BASE-SX, LC connector
SFPP-MM-SR-LC	SFP plus multimode - 850NM, 10 Gigabit Ethernet-SR, LC connector
SFPP-SM-LR-LC	SFP plus single mode - 1310NM, 10 Gigabit Ethernet-LR, LC connector
AXP-F-FILL-PANEL	Blank filler panel, AXP1620 and AXP1440, AXP1410 – Front
AXP-R-FILL-PANEL	Blank filler panel, AXP1620 and AXP1440, AXP1410 – Rear

Regulatory Compliance	
Item	Description
Designed to comply with NEBS	GR-63-CORE, NEBS Physical Protection, Level 3
	GR-1089-CORE, Electromagnetic Compatibility and Electrical Safety — Generic Criteria for Network Telecommunications Equipment. Level 3, Equipment Type 2
Designed to comply with ETSI	ETSI Storage, ETS 300 019-2-1, Class 1.2 equipment, Not Temperature Controlled Storage Locations
	ETSI Transportation, ETS 300 019-2-2, Class 2.3 equipment, Public Transportation
	ETS 300-132-2 Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)
	ETSI Operation, ETS 300 019-2-3, Class 3.1 equipment, Partly Temperature Controlled Locations
Designed to comply with Acoustic	ETS-300-753, Equipment Engineering (EE); Acoustic noise emitted by telecommunications equipment
EMC	EN-300-386 Electromagnetic compatibility and Radio spectrum Matters (ERM); telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements, Telecommunication equipment room (attended)
	FCC 47 CFR Part 15 Subpart B (US), Class A
	EMC Directive 89/336/EEC (EU)
	AS/NZS 3548 (Australia/New Zealand), Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment
	VCCI Class A (Japan), Voluntary Control Council for Interference by Information Technology Equipment
	Industry Canada ICES-003 Class A
Safety	Compliance to UL/CSA 60950-1, EN 60950-1 and IEC 60950-1 CB Scheme. Marked with U.S. NRTL, Canadian Safety and CE Mark. Safety of information technology equipment, including electrical business equipment
RoHS/WEEE compliance	DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
	DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on waste electrical and electronic equipment (WEEE)













SOLUTION SERVICES

Emerson Network Power provides a portfolio of solution services optimized to meet your needs throughout the product lifecycle. Design services help speed time-to-market. Deployment services include global 24x7 technical support. Renewal services enable product longevity and technology refresh.

PICMG, AdvancedTCA and the AdvancedTCA logo are registered trademarks of the PCI Industrial Manufacturers Group. Service Availability Forum is a proprietary trademark used under license. All other product or service names are the property of their respective owners.

This document identifies products, their specifications, and their characteristics, which may be suitable for certain applications. It does not constitute an offer to sell or a commitment of present or future availability, and should not be relied upon to state the terms and conditions, including warranties and disclaimers thereof, on which Emerson Network Power may sell products. A prospective buyer should exercise its own independent judgment to confirm the suitability of the products for particular applications. Emerson Network Power reserves the right to make changes, without notice, to any products or information herein which will, in its sole discretion, improve reliability, function, or design. Emerson Network Power does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent or other intellectual property rights or under others. This disclaimer extends to any prospective buyer, and it includes Emerson Network Power's licensee, licensee's transferees, and licensee's customers and users. Availability of some of the products and services described herein may be restricted in some locations.

Emerson Network Power.
The global leader in enabling
Business-Critical Continuity™.

-  AC Power
-  Embedded Power
-  Precision Cooling
-  Connectivity
-  Infrastructure Management & Monitoring
-  Racks & Integrated Cabinets
-  DC Power
-  Outside Plant
-  Services
-  Embedded Computing
-  Power Switching & Controls
-  Surge Protection

Emerson Network Power

Offices: Tempe, AZ U.S.A. 1 800 759 1107 or +1 602 438 5720
 Paris, France +33 1 60 92 31 20 • Munich, Germany +49 89 9608 2333 • Tel Aviv, Israel +972 9 9560361
 Hong Kong +852 2176 3540 • Shanghai, China +8610 8563 1122 • Tokyo, Japan +81 3 5403 2730 • Seoul, Korea +82 2 3483 1500

EmersonNetworkPower.com/EmbeddedComputing

Emerson, Business-Critical Continuity and Emerson Network Power are trademarks of Emerson Electric Co. or one of its affiliated companies. ©2009 Emerson Electric Co.