intelligence everywhere™

CPX8221

High Availability CompactPCI System

- 21-slot CompactPCI® passive backplane with dual domains
  - Domain A with six I/O slots
  - Domain B with 11 I/O slots
- PowerPC® 750 controller CPU option
- Hot-swappable CPU and I/O boards
- Up to three 350W hot-swappable, N+1 redundant power supplies
- Wide ranging AC and DC input versions
- Three hot-swappable, N+1 redundant fans with filter options
- Front-access service and installation of CompactPCI boards, fans and power supplies
- Rear connection of CPU I/O allows card removal without disconnecting field wiring
- Detection and remote reporting of power, temperature and fan fail conditions
- NEBS compliant alarm status display panel
- Support for Linux® and other popular operating systems

Ideal solution for telecom infrastructure applications

The CPX8221 system provides an ideal solution for telecom infrastructure applications that requires a high concentration of network blades in a 19-inch rack. Based on CompactPCI technology, CPX8221 systems have built-in redundancy for active system components—including system-slot CPU boards—enabling active modules to be exchanged for repair or upgrade while the system continues to operate. Designed as a carrier-grade platform for operation in NEBS and ETSI environments, the CPX8221 is particularly well suited for switching applications and deployment within unattended sites.

MOTOROLA digital dna™

Standards Compliance

NEBS

The CPX8221 family of systems is intended to meet the requirements of the Bellcore standards, *Network Equipment Building System (NEBS) Requirements: Physical Protection, GR-63-CORE and Electromagnetic Compatibility and Electrical Safety-Generic Criteria for Network Telecommunication Equipment, GR-1089-CORE.* The product is currently being tested to the requirements for NEBS Level 3 criteria.

Criteria	NEBS	
	Specification	**Reference**
Temperature	Normal: 5° C to 40° C Short-term: –5° C to 55° C	GR-63-CORE, R4-7
Relative Humidity	Normal: 5% to 85% RH Short-term: 5% to 90% RH	GR-63-CORE, R4-7
Office Vibration	0.1 G @ 5–100 Hz with 0.1 octave/min 1.5 G @ 100–500 Hz with 0.25 octave/min	GR-63-CORE, R4-56 GR-63-CORE, R4-57
Transportation Vibration	5–50 Hz @ 0.1 octave/min 50–500 Hz @ 0.25 octave/min	GR-63-CORE, R4-58
Earthquake	Zone 4	GR-63-CORE R4-44 to O-55
Drop	Packaged: 300 mm drop height Unpackaged: 50 mm drop height	GR-63-CORE, R4-41 GR-63-CORE, R4-43
Altitude	–60 to 1800 m ASL without temp. derating 1800 to 4000 m ASL with temp. derating	GR-63-CORE, R4-8 GR-63-CORE, R4-9 GR-63-CORE, O4-9
Acoustic Noise	60 dBA @ 600 mm	GR-63-CORE, O4-62
Heat Dissipation	Documentation 300/w/m^2/m max per shelf 38° C max. aisle-facing surface temp. @ 26° C ambient	GR-63-CORE, R4-11 GR-63-CORE, R4-12 GR-63-CORE, O4-13
Fire Resistance and Materials	All material UL94V-1 or better. See GR-63-CORE, Section 4.2	GR-63-CORE, R4-14 to O4-40
Illumination	See GR-63-CORE, Section 4.7	GR-63-CORE, R4-63 to O4-69
Airborne Contaminant	Sulfate: 30 µg/m^3 Nitrite: 12 µg/m^3 Volatile organics: 12 µg/m^3 Sulfur Dioxide: 12 ppb Hydrogen Sulfide: 40 ppb Ammonia: 50 ppb NO: 50 ppb NO_2: 250 ppb HNO_3: 50 ppb Ozone: 250 ppb HCL + Cl_2: 6 ppb	GR-63: R4-59, O4-60

ETSI

The CPX8221 family of systems is intended to meet the requirements of the European Telecom Standard (ETSI) including:

- *Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment,* ETS 300 019-1-3
- Storage: ETS 300 019-1-1, for Class 1.2 equipment
- Transportation: ETS 300 019-1-2, for Class 2.3 equipment

Criteria	ETSI	
	Specification	**Reference**
Temperature	Storage: –25° C to 55° C Trans.: –40° C to 70° C Operating: –5° C to 45° C	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-14
Relative Humidity	Storage: 10% to 100% RH (non-condensing and condensing) Trans.: 95% @ –40° C to 45° C Operating: 5% to 95% RH (non-condensing and condensing)	IEC 60068-2-56 IEC 60068-2-30
Vibration	Storage: 1.5 mm @ 2–9 Hz, 0.5 G @ 9–200 Hz Trans. sinusoidal: 3.5 mm @ 2–9 Hz, 1 G @ 9–200 Hz, 1.5 Gs @ 200–500 Hz Trans. random: 1 m^2/s^3 @ 10–200 Hz, 0.3 m^2/s^3 @ 200–2000 Hz. Operating: 1.5 mm @ 2–9 Hz, 0.5 G @ 9–200 Hz	IEC 60068-2-6 IEC 60068-2-36
Shock	Storage, Type I: 4 Gs @ 22 ms Trans., Type I: 30 Gs @ 11 ms Operating: 4 Gs @ 22 ms	IEC 60068-2-27 IEC 60068-2-29
Earthquake	5 G, 0.3 to 35 Hz	IEC 60068-2-57
Drop	Trans.: 0.4 m free fall	IEC 60068-2-32
Load	Storage: 5 kPa Trans.: 10 kPa	N/A
Altitude	–471 to 3708 m ASL	N/A
Water	Trans.: 6 mm/min	IEC 60068-2-18
Acoustic Noise	7.2 bels @ 1 m	ETS 300 753 ISO 7779
Fire Resistance and Materials	All material UL 94V-1 or better	UL1950 UL94 BS2782 Part 1 (ISO 181)
Airborne Contaminant	$S0_2$: 0.3/1.0 mg/m^3 H_2S: 0.1/0.5 mg/m^3 Salt mist: sea and road salt CL_2: 0.1/0.3 mg/m^3 HCl: 0.1/0.5 mg/m^3 NO_x: 0.5/1.0 mg/m^3 NH_3: 1.0/3.0 mg/m^3 HF: 0.01/0.03 mg/m^3 O_3: 0.05/0.1 mg/m^3 Dust sedimentation: 0.4 mg/m^2h Dust suspension: 5 mg/m^3	N/A

Specifications

Chassis

Size:	21.00" [533 mm] high (12U), 18.90" [480 mm] wide including mounting flanges, 17.13" [435 mm] deep from mounting flanges
Weight:	Approx. 30 lbs. [13.6 kg] unloaded Approx. 70 lbs. [31.85 kg] fully loaded
Mounting:	Per EIA Standard RS-310-C in 19" rack or 23" rack with mounting brackets
Slots:	21 hot-swap-capable 4HP CompactPCI slots including two CPU slots, two HSC bridge slots and seventeen I/O slots.
Power Supplies/Fans:	Three bays, front-accessible
Airflow:	Front inlet, rear exhaust
ESD Grounding:	Two ESD ground points, one front and one rear
Earth Ground:	Two points at rear per NEBS requirements
Metal:	Aluminum alloy, 5052-H32
Metal Plating:	Chemical film per MIL-C-5541, Class 3, clear
Slot, LED, and Switch Marking:	Black silk screen on white removable overlays

PowerPC High-Availability CPU Card

Processor:	366 MHz PowerPC 750
Memory:	Up to 256MB DRAM, 1MB L2 cache, CompactFlash™ IDE flash drive option
I/O:	EIDE, 10/100 Ethernet, USB, serial (sync/async), parallel
I/O Access:	Front
PMC Site:	Yes

Hot Swap Controller (HSC) Bridge Card

Form Factor:	80 mm rear transition
Control:	CompactPCI bus and slot control per CompactPCI Hot Swap Specification
Alarm Status Registers:	Yes
Hot-Swappable:	Yes

Backplane

Domains:	Two; one 8-slot, one 13-slot, 64-bit CompactPCI
Slots:	One CPU slot, one HSC bridge slot, and six I/O slots in domain A; PCI Domain B has access to 11 I/O slots
DC Power Distribution:	Yes
Alarm Signal Routing:	Yes

Hot-Swappable Alarm Board

CompactPCI Slot LEDs:	Two for each slot; In Service and Out of Service
Telecom Status LEDs:	Minor, major and critical
Output:	RJ-45 connector with dry relay contacts

Power Supplies and Fan Modules

The CPX8221 uses up to three 350-watt hot-swappable power supplies in an N+1 redundant configuration. Each supply is load sharing and diode protected. An industry-standard, open-frame supply is enclosed in a sled assembly that supports the power supply, fan assembly, blind mate connectors, power supply/fan control board and interconnect wiring harness. Either AC or DC versions are available. Fan-only sled assemblies are available and are required for unfilled power supply bays to ensure managed cooling of the system.

Cooling Features

- Three hot-swappable, N+1 modules in system
- DC tube axial fan
- Cooling sensor detects airflow and temperature changes
- Air filter option
- Software monitoring and speed control
- LED status indicators

Electrical Specifications

Power Factor:	0.98 min. at full load, nominal line (AC only)
Inrush Current:	40 A peak @ 115 VAC for one line cycle 40 A peak @ –36 VDC within 4 ms
Efficiency:	> 65% @ full load, nominal line
Output Power:	350 watts in this application
Hold-Over Storage:	20 ms at full load @ 90 VAC
Transient Response:	All outputs return to 1% within 2 ms of a 25% load change
Dynamic Load:	The supply operates properly when subjected to a 10% load delta with a 50% duty cycle, from 0 to 2 MHz
Over Voltage Protection:	+5V output < 6.4 VDC +3.3V output < 4.2 VDC
Short Circuit Protection:	Short between outputs causes latch off

Module DC Output

(Total combined output loading not to exceed 350 watts)

Voltage	Regulation	Min. Load	Max. Load	Peak Load 5 Sec. Max	Ripple P/P
+5.06V	± 3%	0.5 A	40.0 A	—	50 mV
+3.36V	± 3%	0.5 A	40.0 A	—	34 mV
+12.1V	± 5%	0.3 A	8.0 A	10.0 A	120 mV
–12.1V	± 5%	0.3 A	4.0 A	—	120 mV

Power Distribution Module

AC Input Version

- 90–132 VAC or 190–260 VAC input, auto selecting, 47–63 Hz
- Double-pole rocker on/off switch and IEC AC input receptacle
- 12 A maximum input current at 115 VAC
- 6 A maximum input current at 230 VAC

DC Input Version

- –36 VDC to –72 VDC input
- Double-pole circuit breaker with on/off switch and reset
- Dual (redundant) input terminal blocks, diode protected
- 30 A maximum input current at –48 VDC

Reliability and Serviceability

The redundant configuration characteristics of the CPX8221 provide detection, isolation, notification and hot swap replacement of a failed field replaceable unit (FRU). This method prevents degradation of performance or loss of service during a single fault condition.

Field Replaceable Units (FRUs)

Field Replaceable Units	Hot Swap	Redundant	MTTR*
CompactPCI boards	X	X	5 min.
HSC/bridge board	X	X	5 min.
Power supply/fan modules	X	X	5 min.
Power distribution module			5 min.
Alarm board	X		5 min.
*Mean time to replace			

System MTBF

CPX8221FSK01: 107,161

Note: System MTBF is demonstrated at accelerated life testing.

Regulatory Compliance

Safety: CSA NRTL/C, VDE EN60950, CE Mark per European Low Voltage Directive 72/23/EEC

EMC: U.S.: FCC Part 15, Subpart B, Class A
Canada: ICES-003, Class A
Europe: CE Mark per European EMC Directive 89/336/EEC with Amendments; Emissions: EN55022 Class A; Immunity: EN50082-1 and EN55024

OEM Customization Services

Motorola Computer Group provides a wide range of customization options, including:

- Labeling, marking and paint options
- Electrical and/or mechanical modifications
- Hardware integration
- Software integration
- Third-party device integration
- Single-point service and FRU point of contact

Contact your Motorola Computer Group Sales representative for additional information.

Software Support

Motorola Computer Group partners with selected software providers to ensure a wide range of application availability within the framework of the CPX8221 high availability environment. Additional information can be obtained by contacting the partners listed below.

Operating Systems

- LynxOS® from LynuxWorks, www.lynx.com
- VxWorks® from Wind River Systems, www.wrs.com
- Linux (contact Motorola Computer Group)

PowerPC Firmware

On-board PowerPC firmware expands features like power-up tests with extensive diagnostics, and provides an evaluation and debug tool for simple or high-level development support. It also supports booting of operating systems and/or real-time kernels.

Ordering Information

Starter Kits

Starter kits provide a complete hardware platform designed to reduce development time. In addition, operating systems and development software is available from the Motorola Computer Group and selected partners. See the Software Support section. Also included is CPU-based debugger and diagnostics which provide self-testing and system-level diagnosis including loop-back, register tests and memory address/data tests.

Starter Kit Part Number	Description
CPX8221FSK01	PowerPC Starter Kit - Pre-configured platform that contains: • 21-slot CompactPCI chassis with front I/O only • Dual 366 MHz CPX750HA CPUs with 128MB DRAM • Dual hot swap controller bridges • Alarm panel • Three AC power supplies
CPX8221FSK02	PowerPC Starter Kit - Pre-configured platform that contains: • 21-slot CompactPCI chassis with front I/O • Dual 366 MHz CPX750HA CPUs with 256MB DRAM • Dual hot swap controller bridges • Alarm panel • Three AC power supplies

www.motorola.com/computer 1-800-759-1107

MOTOROLA

Motorola Computer Group Worldwide Headquarters: 2900 S. Diablo Way, Tempe, AZ 85282
Sales Offices: *United Kingdom:* +44 (0) 1256 790555 • *Asia Pacific and Japan:* 852-2966-3209 • *France:* +33 (0) 1 64 86 64 00 • *Germany:* +49 (0) 611-3611 604 • *East Mediterranean:* 972-3-568-4388 • *Canada & Central Pan America:* 888-366-3624 • *Eastern Pan America:* 508-357-8260 • *Western Pan America:* 408-991-8634