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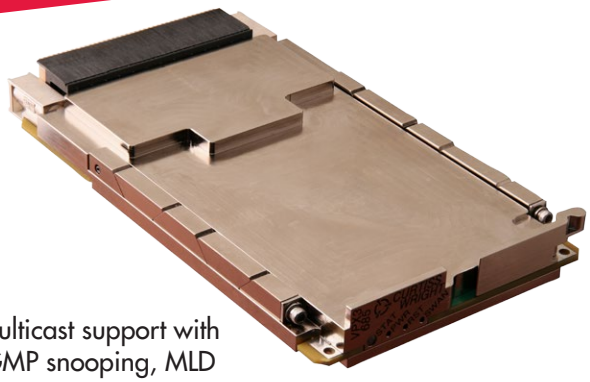




Data Sheet

VPX3-685 Secure Router

14/17/20-Port Secure Ethernet Router



Features

- Fully-managed multi-layer Gigabit Ethernet Switch and Secure Router provides edge protection against worms, trojans, spyware and other malware
- Exceptional SWaP qualities
  - Combines the functionality of a switch, router, firewall, and intrusion detection security device in a small 3U single-slot package.
- Supports up to 20 ports of wire-speed, non-blocking Gigabit plus up to two 10 Gigabit Ethernet interfaces
- 3U VPX form factor complies with OpenVPX™ / VITA-65 for compatibility and ease of integration
- Flexible port configurations
  - 12 ports 10/100/1000Base-T with auto-negotiation plus either:
    - 2 ports 10GBase-BX4 (XAUI) interface
    - 1 port 10GBase-BX4 (XAUI) + 4 ports 1000Base-X (SerDes) Gigabit Ethernet
    - 8 ports 1000Base-X (SerDes) Gigabit Ethernet
- High-performance Layer 2/3+ Switching and Routing Functionality
  - Line-speed Layer-2 switching supports 76 Gbps core switching throughput
  - Wire-speed non-blocking IPv4/v6 routing support
  - Extensive RFC support
  - VLAN support
  - Spanning Trees including STP, RSTP, MSTP
  - Routing Protocols including IGMP, RIP, RIPv2, RIPng, OSPF, OSPFv2, IGMPv2/v3, GMRP
  - Multicast support with IGMP snooping, MLD discovery
  - Link Aggregation and Port Mirroring, Automatic Flow Control
  - Quality of Service (QoS) and CoS with Traffic Shaping
  - DHCP Server, SNTP Time Server
- Enhanced Security Processor with dedicated hardware performance accelerator
  - Deep Packet Inspection (DPI) engine protects against attacks such as Denial of Service (DoS), syn-floods, fragmentation attacks, and protocol and traffic anomalies.
  - Stateful Packet Inspection Firewall
  - Network Address Translation (NAT)
  - Access Control List (ACL) filtering
  - IP Security Engine
    - Encryption/Decryption/Authentication
    - Multiple encryption algorithm support, including AES, DES, 3DES, SHA, MD5
    - Support for IKE
  - Route and policy based VPN with secure tunneling support (IPSec/I2TP)
  - Authentication via PreShared Key (PSK) and RSA

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- Intrusion Detection and Prevention System (IDS/IPS) protects against malicious attacks
  - Signature based detection and protection, with regular signature updates and rule-based (zero-day) protection
  - Traffic anomaly detection and rate limiting
  - Monitoring, logging and notification
- Content filtering support based on ports, protocols & keywords.

- Secure Crypto Key Storage
  - Fully enclosed design guards against physical tamper
  - Immediate crypto key erasure if module is removed from chassis
  - Dedicated purge connection for manual key erasure
- High Availability Features
  - Virtual Router Redundancy Protocol (VRRP) supports master/backup automatic fail-over support
  - Link aggregation and load balancing
  - PPPoE support
- Flexible Management Features
  - Command Line (CLI), HTTP/Web, and SNMP Interfaces
  - Serial RS232 management port
  - Dedicated 10/100Base-TX upgrade port
  - In-band management through any Ethernet port with configurable SSH/SSL security
- Declassification capability removes customer configuration, returning card to factory configuration
- Extensive Built-in Test (BIT) features
  - PBIT for power-up full system test
  - CBIT for continuous non-intrusive system monitoring
  - IBIT for user-initiated on-demand tests
- Full IPMI support
  - Intelligent Platform Management Interface (IPMI) monitors and reports board status, power & temperature
  - Supports remote reset
- Field upgradeable software
- Air-cooled and conduction-cooled versions

Overview

The Curtiss-Wright Defense Solutions VPX3-685 is a fully-featured Layer-2/Layer-3 managed Ethernet Switch and Router with a highly integrated security subsystem.

Enabling the vision of Network Centric connectivity, the VPX3-685 Secure Router provides an accelerated path to secure network-ready architectures that can interoperate seamlessly within the Global Information Grid (GIG). The VPX3-685 provides the strongest perimeter defense available for your data, in a small 3U VPX form factor.

The VPX3-685 provides up to 20x GbE interfaces, and scales to meet small to large platform requirements through flexible software and port configuration capability. Unused GbE ports can be disabled for lower power consumption. Up to two 10GbE ports are available depending on board options, enabling high-speed switch-to-switch expansion, dual-redundant networks (fail-over), or for architecting high-performance 10Gb/s network backbones. Embedded backplane routing can be achieved with standard Base-T or SerDes GbE and 10GbE XAUI interfaces. A Rear Transition Module (RTM) is available for lab and development use, providing separate connections for all interfaces.

The VPX3-685 follows in the footsteps of our popular 68x series switches/routers, with extensive Layer 2 and Layer 3 switching and routing features, supporting a comprehensive set of industry standard RFCs. The VPX3-685 also supports a familiar industry standard CLI for setup and configuration as well as SNMP and Web management interfaces, accelerating development time to market and simplifying maintenance support.

Addressing the growing need for secure network communications, the VPX3-685 is an ideal solution to prevent unauthorized access to critical information for applications deployed in air, land, and sea platforms. Securing all possible entry points from attack, the VPX3-685 can be used to secure a data storage network, or protect mission critical applications from viruses, trojans, IP Spoofing, Denial of Service (DoS) and other forms of hostile attack.

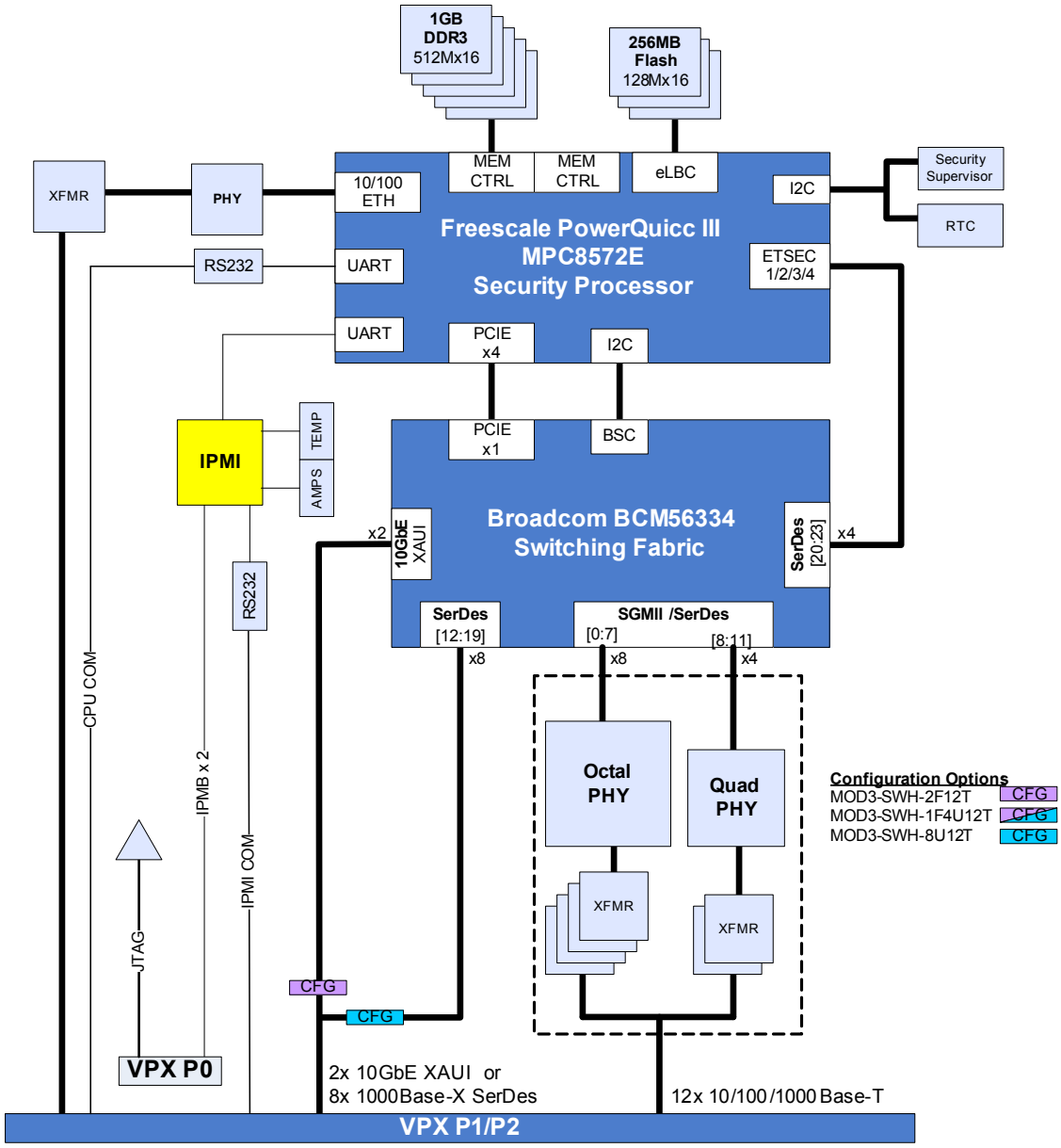
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The VPX3-685 incorporates Enhanced Security Software and a high-performance hardware-based security engine. This all-in-one Unified Threat Management (UTM) system provides VLANs and VPN (IPSec/PPTP/L2TP) to protect dedicated networks, a stateful firewall to protect against multiple evasive attacks, Network Address Translation (NAT) routing for IPv4 masquerading, port and protocol-based Access Control Lists (ACL), Broadcast Storm Control, IPv6 with IPSec tunneling for secure communications channels, and advanced standards-based cryptographic functions such as encryption, decryption, authentication, and key generation.

Built to Curtiss-Wright tough environmental standards, the VPX3-685 is durable in the harshest environments with standards-based 2 Level Maintenance (2LM) support that drastically reduces long term maintenance costs.

Figure 1: VPX3-685 Block Diagram



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Designed for Performance

Based on the industry leading Broadcom® StrataXGS® IV multi-layer switching fabric, the VPX3-685 Secure Router is capable of supporting line-rate non-blocked Layer-2 switching on all ports, supported by a fabric capacity of 76Gbps. The key features at the core of the switching fabric that facilitate low latency wire-speed performance include 2MB of high-speed fully integrated on-chip packet buffer memory, advanced ContentAware packet processing, and advanced packet flow control capabilities. The two 10GbE XAUI ports can be used to directly connect high-speed sensors or data storage devices, or they can be used to create high-speed 10GbE backbones between multiple routers.

The VPX3-685's security subsystem has also been highly optimized for maximum throughput.

Advanced Security Features

The VPX3-685 Secure Router has been designed from the ground up to protect critical network resources with a built-in high-performance and very flexible security subsystem. Operating at the edge of a network, the VPX3-685 serves as Unified Threat Management (UTM) router that is capable of strong perimeter defense.

Ethernet ports on the VPX3-685 can be configured to belong to one of two security domains: a trusted LAN group, or an un-trusted WAN group. Any number or mix of ports can belong to each domain.

All traffic within the trusted LAN domain is switched at line speed with limited packet processing for maximum performance. Traffic to and from the un-trusted WAN domain is considered a potential threat, and is routed through the security subsystem.

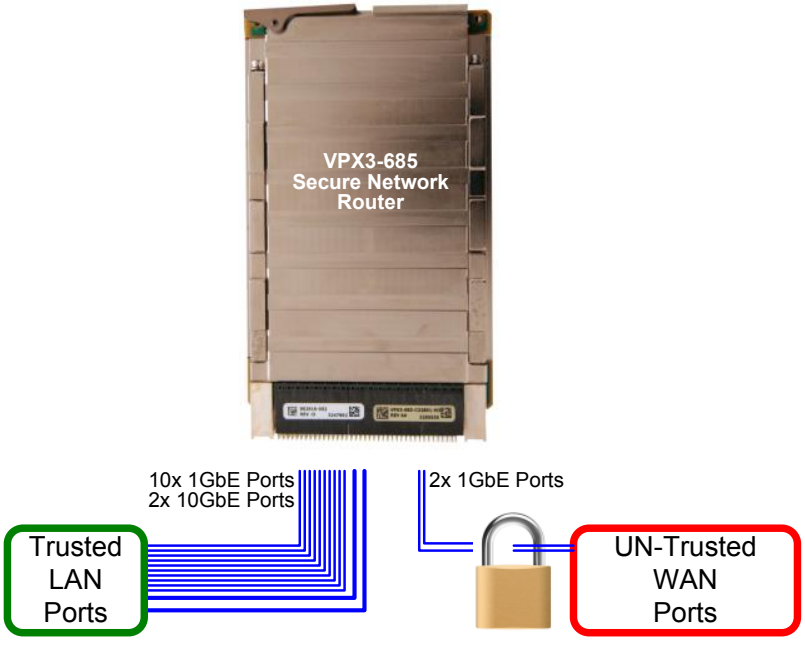
Security Subsystem

The VPX3-685 Security Subsystem protects network traffic in a number of ways, providing a highly-efficient layered security system.

Intrusion Detection and Protection

The VPX3-685 contains a signature-based Intrusion Detection System (IDS), which monitors all packets for malicious activity and content. Using a Deep Packet Inspection engine (DPI), malicious threats such as Denial of Service (DoS), syn-floods, fragmentation attacks, and protocol and traffic anomalies are detected and logged. Attack responses, such as discarding packets or disabling ports, can be taken.

Figure 2: Example configuration with 2 GbE ports un-trusted on the WAN and 10x GbE + 2x 10GbE ports on the trusted LAN



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Regular attack signature updates, based on the industry standard Snort engine, can be applied at any time, and can be provided by Curtiss-Wright. Alternatively, customers can create their own IDS security signatures. For "0-day" immediate turnaround, the VPX3-685 can accept additional signatures during operations without the need for dedicated down time.

IPSec

IP Security (IPSec) allows secure network communications by authenticating and encrypting network packets. The VPX3-685 supports IPSec using a variety of authentication techniques and encryption protocols. Sophisticated key generation and management is an integral part of the VPX3-685's security subsystem.

The VPX3-685 includes dedicated cryptography hardware to increase the performance of IPSec operations.

Firewall

The VPX3-685 provides a number of different firewall means to ensure only authorized traffic is allowed through the system. Port, MAC and IP based Access Control Lists (ACLs) can be set up to authorize only approved devices to communicate. ACLs can also be set up to allow or block specific protocols or even specific URLs (such as www.nastywebaddress.com).

Network Address Translation

Network Address Translation (NAT) provides a mechanism to hide internal IP addresses within a network (LAN) from the outside (WAN) network. Two-way communications are fully supported, but must be initiated from within the trusted LAN network. Using NAT protects internal network devices from being probed from the outside WAN, further strengthening the internal network from possible attacks.

Security Certifications

The VPX3-685 has completed NIST FIPS-140-2 certification for cryptographic modules and NIAP Common Criteria (EAL) certification for Information Assurance. These two certifications ensure the VPX3-685 meets the strict IA requirements of governments and defense agencies worldwide.

VPX Backplane Port Configurations

The VPX3-685 has the following external Ethernet ports available on the VPX backplane:

- 12 ports 10/100/1000Base-T, routed on thin pipes (4-pair)
- 2 ports 10GBase-BX4 (XAUI), routed on fat pipes (8-pair)
- 8 ports 1000Base-X (SerDes), routed on ultra-thin pipes (2-pair)

Port configurations offered are shown in Table 1, and are mapped to the VPX backplane P1/P2 connectors.

The VPX3-685 is designed to be VITA-46/VITA-65/ OpenVPX compliant, meeting the following OpenVPX profiles:

- MOD3-SWH-2F12T
- MOD3-SWH-1F4U12T
- MOD3-SWH-8U12T.

IPMI

The VPX3-685 includes an Intelligent Platform Management Interface (IPMI), enabling system monitoring and management. On-board supply voltages and current, along with temperature measurements, can be queried by an IPMI system controller.

Additionally, the IPMI system controller can perform a system reset to the VPX3-685 module.

Table 1: VPX3-685 Ethernet Port Pinouts

Product Variant	Port Description	GbE Base-T Ports	GbE SerDes Ports	10GbE XAUI Ports
VPX3-685-xxxx14 14-port Secure Router	12x GbE Base-T 2x 10GbE XAUI	P1w9 – P1w16 P2w1 – P2w16	none	P1w1 – P1w4 P1w5 – P1w8
VPX3-685-xxxx17 17-port Secure Router	12x GbE Base-T 4x GbE SerDes 1x 10GbE XAUI		P1w5 – P1w8	P1w1 – P1w4
VPX3-685-xxxx20 20-port Secure Router	12x GbE Base-T 8x GbE SerDes		P1w1 – P1w4 P1w5 – P1w8	none

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Complete Integrated Software Solution

The VPX3-685 is a complete networking solution, with pre-integrated and optimized software that runs on its on-board processor. All software is included for the full suite of Layer-2 switching and Layer-3 routing protocols, along with a comprehensive set of management interfaces to configure and monitor the 685.

Management

Management interfaces include an industry standard command line interface (CLI), accessible through a dedicated serial RS232 port, and also available in-band through any Ethernet port via Telnet. The use of a CLI allows system integrators to "script" operational and test configurations.

An HTTP/Web interface is also supported through in-band Ethernet ports, and offers a more visual way to configure the router.

For centralized configuration and management, the VPX3-685 fully supports SNMP network management protocols.

In-band management security is assured using SSL/SSH secure login protocols, along with user-level password security.

Built-in Test (BIT)

The VPX3-685 supports Power up BIT (PBIT), Continuous BIT (CBIT), and Initiated BIT (IBIT) designed to detect system faults. BIT results are available on all management interfaces.

Declassification

All Curtiss-Wright routing products provide a Declassification utility that erases all non-essential content in the board's non-volatile flash memory. This process deletes all routing tables, filters and user configurations, purges the switch of Ethernet packets, and restores the board to its factory default configuration. This feature provides an extra layer of security, often required when removing a module from service, and can also be used to recover a default configuration in the event of misconfiguration or corruption.

Accessories

Rear Transition Module

For building networks in the lab environment, Curtiss-Wright provides a VPX3-685 Rear Transition Module (RTM) that plugs into the backside of the VPX backplane and provides access to the following connections: 12 ports of 10/100/1000Base-T via RJ45 connectors, 2 ports of 10GBase-BX4 via InfiniBand® CX4 connectors, one 10/100Base-TX debug port via RJ45, two RS232 serial interfaces via RJ45, and includes both a reset switch and headers for other utility signals.

Table 2: Hardware Specifications

Feature	Description
Switching Fabric	Broadcom StrataXGS IV 563xx series
Management/Control Processor	Freescale Power Architecture MPC8572E ◆ 1 GB DDR3 RAM ◆ 256 MB Flash
Ethernet Fabric Ports	◆ 12 ports 1000Base-T supporting 10Base-T, 100Base-TX, and 1000Base-T ◆ up to 2 ports 10GBase-BX4 (XAUI) ◆ up to 8 ports 1000Base-X (SerDes)
Ethernet Port Specifications	◆ 10Base-T interfaces per IEEE 802.3 ◆ 100Base-TX interfaces per IEEE 802.3u ◆ 1000Base-T interfaces per IEEE 802.3ab - auto MDI/MDIX crossover - max 100m segment length ◆ 1000Base-X interface per IEEE 802.3ap ◆ 10GBase-CX4 interface (XAUI) per IEEE 802.3ae
Debug Ports	10/100Base-TX Ethernet Port RS232 Serial Port
Reset	Reset switch on RTM or via backplane
LEDs	Front panel LEDs for: ◆ Status ◆ Power ◆ Reset ◆ Secure WAN mode
Security Features	Mechanical tamper evidence seal
Power	Maximum power required from +5V (VS3) Supply: 45W
Form Factor	3U VPX
Environmental	◆ Convection (air-cooled): Available in levels 0 (AC L0) and 100 (AC L100) - Required airflow is 15 CFM at sea level ◆ Conduction-cooled: Available at level 200 (CC L200) *Unless otherwise noted environmental tolerance is as defined in Curtiss-Wright's Ruggedization Guidelines factsheet.*
Weight	Air-cooled: 498 g Conduction-cooled: 450 g

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Table 3: Software/Functional Specifications

Feature	Specification
Layer 2 Switching Performance	76 Gbps aggregate switching performance
Capacity	• 2 MB Packet Buffer with dynamic buffer management • Support for Jumbo Packets up to 13KB • Up to 15K Layer 2 MAC Addresses • Up to 4K IPv4 or IPv6 IP Routes • Up to 4K VLANs • Up to 1K Layer-2 Multicast groups
Layer 2 Switching Features	• VLAN routing and support, • GARP for LAN information • VLAN broadcast, 802.1Q VLAN tagging & double-tagging • GMRP for multicast registration propagation • IGMP Snooping for forwarding of multicast traffic • Link Aggregation (802.3ad, 802.1ax) for increased bandwidth and load sharing • Port Mirroring • Packet or byte-based rate limiting on a per-port basis • IEEE 802.3x flow control and back-pressure support
Layer 3 Routing Features	• Support for IPv4 and IPv6 • Automatic route learning or static routing tables • Routing and messaging protocols including ARP, GVRP, RIP(v1/v2/MD4/ng), BGP, OSPF(v2/v3), ICMP, ARP, RARP, CIDR • Loop-free topology via Spanning Tree Protocol (STP per 802.1D, RSTP per 802.1w, MSTP per 802.1s) • Inter-VLAN routing • QoS/DiffServ, 802.1p tagging, port mapping and programmable traffic queue shaping • Multicast route computation using PIM and DMVRP • VRRP for router redundancy and load sharing
Security Features	• Stateful Firewall • IDPS – Intrusion Detection and Prevention System • NAT – Network Address Translation • ACL – Access Control Lists • VPN/IPSec • Encryption Algorithms include: AES, DES, 3DES, SHA, MD5 • IKE for Key Exchange • FIPS-140-2 Certification • Common Criteria EAL2+ Certification
Other Features	• DHCP server • BOOTP server • SNTP Network Time server • Router configuration save and restore • Multiple router configuration selectable via Geographical Addressing • Log file download via TFTP • RMON and BSD syslog • Management via CLI, Web/HTTP, and SNMP • Secure Management via HTTPS (SSL) and secure shell (SSH)
Built-in Test	• PBIT for powerup self-test • IBIT for user initiated self-test • CBIT for continuous self-test

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Recommended Models

Models in the following table support the full functionality listed, but are not FIPS/EAL certified.

Table 4: Available Models

Product Number	Ruggedization	1000Base-T	1000Base-X (SerDes)	10GbE (XAUI)
VPX3-685-A05014-S0	AC L0	12	-	2
VPX3-685-A15014-S0	AC L100			
VPX3-685-C23014-S0	CC L200			
VPX3-685-A05017-S0	AC L0	12	4	1
VPX3-685-A15017-S0	AC L100			
VPX3-685-C23017-S0	CC L200			
VPX3-685-A05020-S0	AC L0	12	8	-
VPX3-685-A15020-S0	AC L100			
VPX3-685-C23020-S0	CC L200			

Models in the following table support the full functionality listed, and carry the FIPS/EAL certification. Some cryptographic algorithms may be disabled when in FIPS mode if they are not appropriate when operating under FIPS-140-2.

Table 5: Available Models with FIPS/EAL Certification

Product Number	Ruggedization	1000Base-T	1000Base-X (SerDes)	10GbE (XAUI)
VPX3-685-A13014-FC	AC L100	12	-	2
VPX3-685-C23014-FC	CC L200			
VPX3-685-A13020-FC	AC L100	12	8	-
VPX3-685-C23020-FC	CC L200			

Table 6: Accessories

Product Number	Description
RTM3-685-0014	Rear Transition Module (RTM) for the 685 product ◆ Ideally suited for the development phase ◆ Breaks out the I/O for the VPX3-685: 12-ports 10/100/1000MBase-T to RJ45 connectors, 8-ports 1000Base-X or 2-ports 10GbE XAUI on CX4 connectors, 10/100MBase-TX debug on RJ45, RS-232 debug on RJ45. Air-cooled for lab use. ◆ Includes one RJ45 to DB9 serial cable adapter (1m length)
QSK-685-0001	Quickstart Program kit consisting of the following products: ◆ 1x VPX3-932-A40000 2-slot 3U VPX desktop chassis ◆ 1x VPX3-685-A05014-S0 685 Secure Network Router – 12x 1000Base-T + 2x 10GbE XAUI ◆ 1x RTM3-685-0014 Rear Transition Module (RTM) for the 685

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Warranty

This product has a one year warranty.

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