G101

Fully Managed Industrial Ethernet Switch with Uplink, A-Coded

3U CompactPCI Serial

- *Fully managed rugged Ethernet switch*
- *Up to 25 Gigabit Ethernet ports on rear I/O*
- *Or 3 ports on front and up to 22 ports on rear*
- *29 Gbit/s carrier grade switch matrix*
- *Special switch protocols*
- *-40 to +85°C with qualified components*
- *EN 50155 class TX compliant (railways)*
- *PICMG CPCI-S.0 CompactPCI Serial system slot and peripheral card*

A Flexible Switch in a Common Modular Format

The G101 is a fully managed 3U flexible multiport Gigabit Switch, with a 29 GBit/s Switch matrix, implemented as a CompactPCI Serial board. It occupies one system slot or one peripheral slot using a 4 HP front panel with two Gigabit Ethernet ports on RJ45 connectors and one 2.5 Gb SFP cage. Alternatively, the G101 can be supplied with three M12 A-coded connectors on the front panel. The new backplane concept for MEN routers and switches allows high flexibility in network applications and management.

High Speed, High Efficiency and Extensive Protocols

The G101 guarantees high speed, high efficiency and an extensive firmware supporting various protocols like security, time synchronicity, stability, as well as for temperature needs. The switch supports EEE (Energy Efficient Ethernet) as a standard on all ports, IEEE1588v2 on ports 1 to 12 and SyncE (synchronous Ethernet) as an option.

Various Connection Possibilities due to Various Port Options

The G101 either features three Ethernet ports on the front and up to 22 ports on the rear, or alternatively all 25 ports on the rear. These include 12 ports with integrated 10/100/1000 Mbit/s copper PHYs. In addition, the G101 features a high performance port with up to 2.5 Gbit/s for a SFP pluggable module to support a high speed uplink.

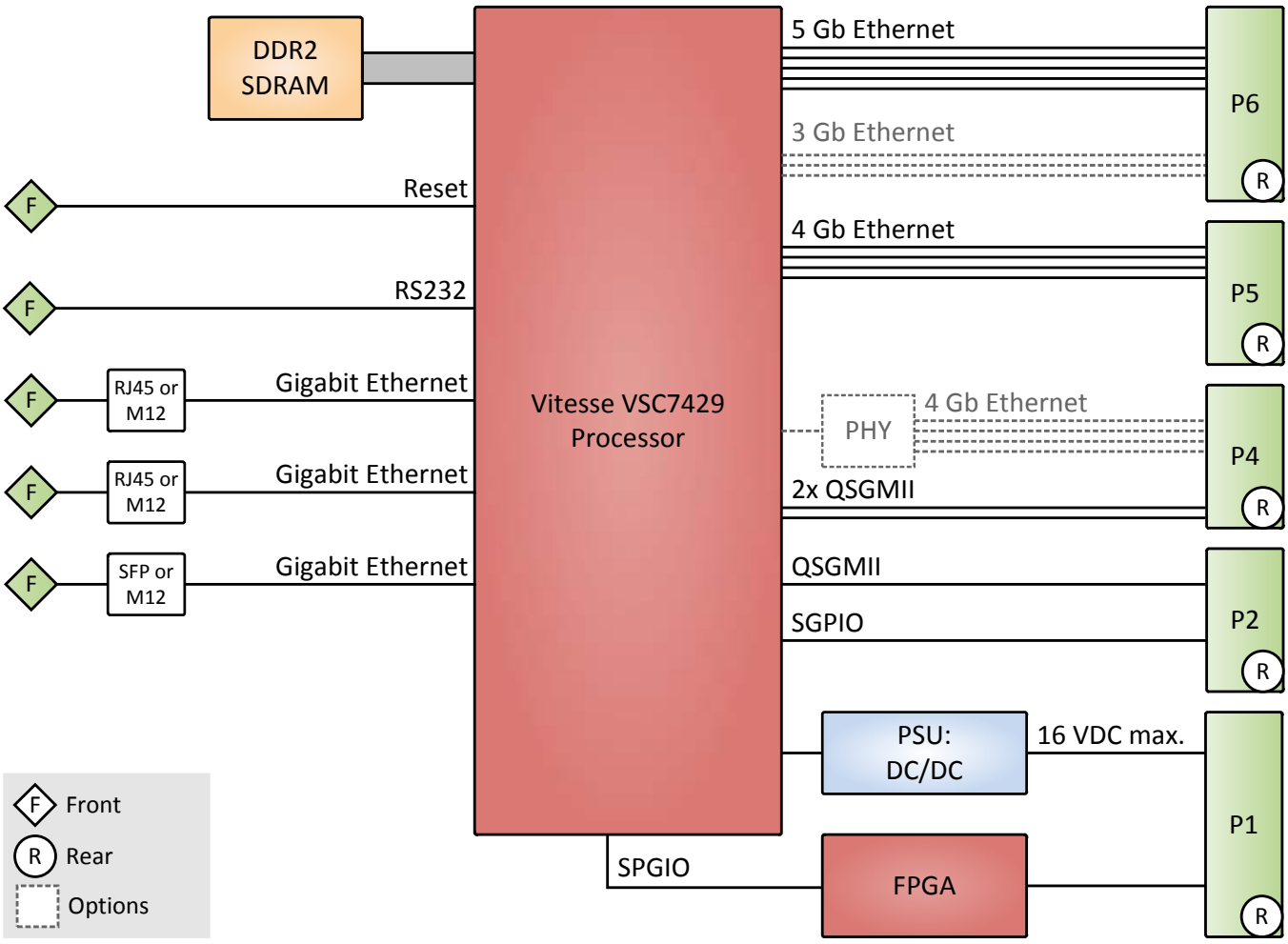
Increased Reliability thanks to Built-In Test Mechanisms

The switch is fault tolerant and restores itself on its own: If a link is temporarily unavailable, frames can be sent via backup/redundant links (spanning tree protocol/link aggregation) and no data loss occurs. Its built-in test mechanisms make the G101 an even more reliable component in the communication system.

Rugged and Compliant to Railway Standards

The railway Ethernet switch is specifically designed for rugged mobile communication systems and fully compliant with the EN 50155 railway standard, qualified for a -40 to +85°C operation temperature and ready for coating.

Data Sheet


DDR2
SDRAM
Vitesse VSC7429
Processor
5 Gb Ethernet
3 Gb Ethernet
P6
R
Reset
F
4 Gb Ethernet
P5
R
RS232
F
RJ45 or
M12
Gigabit Ethernet
PHY
4 Gb Ethernet
P4
R
2x QSGMII
RJ45 or
M12
Gigabit Ethernet
SFP or
M12
Gigabit Ethernet
QSGMII
SGPIO
P2
R
PSU:
DC/DC
16 VDC max.
P1
R
SPGIO
FPGA
Front
Rear
Options

Diagram

Supported Port Types

- The following configurations are available:
  - RJ45: 12x 1 Gbit/s + 1x 2.5 Gbit/s (2x 1 Gbit/s + 1x 2.5 Gbit/s on front) with "on-the-Fly" SFP detection support (Model: 02G101-02)
  - M12: 12x 1 Gbit/s CU Ports (3x 1 Gbit/s M12 on front)(Model: 02G101-03)

Tested SFP Types

- CISCO GLC-SX-MM, 1 Gbit/s BASE-SX, 220/500 m, 0 to +70°C
- AVAGO ABR-5710 ALZ, 1 Gbit/s BASE-SX, 250/550 m, -40 to +85°C
- Finisar FTLF8519P3BTL, 1 Gbit/s BASE-SX, 300/500 m, -40 to +85°C
- Finisar FTLF1318P3BTL, 1 Gbit/s BASE-LH, 10 km, -40 to +85°C
- Finisar FTLF1518P1BTL, 1 Gbit/s BASE-ZX, 80 km, -40 to +85°C
- AVAGO ABR-57R5APZ, 4.25 Gbit/s BASE-SX, 300 m @ 2.125 Gbps, -10 to +85°C

Switching Matrix

- Max. Throughput: 29 Gbps / 40 Mpps@64 Bytes per packet
- Max. Mac Address Table Size: 8192
- Switching Algorithm: Store-and-Forward with TCAM support

General Network Support

- IPv4 and IPv6 Forwarding and Management
- IPv6 Ready Logo Phase 2

Ports and Port Control

- Energy Efficient Ethernet (IEEE 802.3az)
- ETH Signal Equalization and Power Control
- Port state (admin), speed, duplex mode and flow control
- Port frame size (Jumbo Frames: 9216 Bytes/Packet max)
- Port status (link monitoring) and statistics (MIB counters)
- Port VeriPHY (cable diagnostics), ActiPHY and PerfectReach
- Inband management (VRAP)

User Configuration Interfaces

- HTTP/HTTPs, Telnet, SSHv2, Console (USB)

Switch Management and Monitoring

- OAM
  - Link OAM: IEEE 802.3ah
  - Flow OAM (ingres, egres): IEEE802.1ag, ITU-T Y.1731 Down-MEP, ITU-T Y.1731 Up-MEP, ITU-T Y.1731 MIP,
  - SMAC/DMAC Swap
  - OAM Performance Monitoring MEF35 Phase 1
  - Redirect back to arrival port debugging feature
- SNMP Management v1, v2c, v3 (RFC 1212, 1901-1908, 3411-3418)
- SNMP v1 Traps (RFC 1157) with multiple destinations
- LLDP (IEEE 802.10AB-2005/LLDP)
- TIA 1057 LLDP-MED extensions
- CDP (Cisco Discovery Protocol)
- RMON Group 1, 2, 3 and 9(RFC 2819)
- Syslog (RFC 5424)
- sFlow (RFC 3176)
- Port and Flow Mirroring (10 Ports max)
- Fallback Firmware

Configuration Management

- TFTP (RFC 1350)
- Import/Export via Web-Interface
- Configuration download and upload: XML and inidustry-standards format

Redundancy and Flow Control

- Static Link Aggregation
- Link Aggregation Protocol (LACP: IEEE 802.3ad)
- Back Pressure Flow Control (IEEE 802.3X)
- Spanning Tree (STP: IEEE 802.1 D)
- Rapid Spanning Tree (RSTP: IEEE 802.1w)
- Multiple Spanning Tree (MSTP: IEEE 802.1s)
- BPDU Restrict and Guard Role (IEEE 802.1w Root Guard)
- Ring and Linear Protection Switching (ITU-T G.8031 and G.8032)
  - 1+1 port protection
  - 1:1 port protection
  - 1:n port protection
- Connectivity Fault Protection (IEEE 802.1ag/ITU-T Y.1731
- Loop Protection

Filtering

- Unicast, Multicast and Broadcast Traffic/broadcast storm control
- Basic ingres limiter
- Dynamic ARP Inspection (RFC 2132 / MAC address based filtering)
- IP Source Guard (draft-baker-sava-cisco-ip-source-guard-00)
- DHCP Snooping (RFC 2132)
- IP MAC binding
- IP MAC binding dynamic to static

Security

- Static L2 Port Isolation
- Port based RADIUS and internal MAC Authentication (IEEE 802.1X)
- RADIUS accounting (RFC 2866ff)
- Single and Multiple IEEE 802.1X
- VLAN and QOS assignment
- TACACS+ (RFC 1492)
- MAC address flood prevention (MAC address table limitation)
- Web and CLI Authentication
- Switch Access Authorization (15 levels)
- ACLs for filtering, policing and port copy

VLAN

- Max. number of VLANs: 4096
- VLAN Tagging and Trunking (IEEE 802.1Q)
- Supported VLAN Types:
  - Private Static VLAN (RFC 5517)
  - MAC, Protocol, IP-Subnet and Port based VLAN (IEEE 802.1Q)
  - VOICE VLAN (IEEE 802.1Q, IEEE 802.1P)
- VLAN Translation (IEEE 802.3ad)
- GVRP VLAN registration (IEEE 802.1Q)
- Multiple VLAN registration protocol (MVRP: IEEE 8021.1ak)
- Guest VLAN Isolation

Multicast

- Max. number of IGMP Groups: 8.000 for Layer 2 and 8.000 for IPv4/IPv6
- IPv4 Internet Group Management protocol (IGMP) v1, v2, v3
- IPv6 Multicast Listener Protocol (MLD) v1, v2 with flooding suppression and router port handling
- Multicast VLAN registration protocol (MVR)
- IGMP throttling, filtering, proxy and leave proxy
- MRP/GMRP GARP Multicast Registration Protocol (IEEE 802.1ak)

QOS

- Active Priority Queues per Port: 8
- Class of Service (IEEE 802.1p)
- Port and queue egress shaper
- Port and User priority mode
- Input priority mapping (PCP, DEI to QOS, DP level)
- Scheduler Mode (weighted and fair scheduling)
- QOS control list (QCL ID, QCL to QCE mapping)
- QCE mapping based on ETH-Type, VLAN ID, UDP/TCP port range, DiffServ field and Tag priority
- Random early discard (RED)
- Policers: port, service, queue and global/VCAP (ACL)
- DiffServ (RFC 2474) and Tag remarking

DHCP

- DHCP Server (RFC 2131/ 3132)
- DHCP Client (RFC 2131 / 3132)
- DHCP Option 82 (DHCP Relay Agent Information Option)

DNS

- DNS Client (RFC 2136)
- DNS Proxy (RFC 5625)

Synchronization

- NTPv4 Client (RFC 5005)
- IEEE 1588v2 PTP with one-step and two-step clock
- IEEE 1588v2 PTP with redundant masters and timing domains
- IEEE 1588v2 boundary, end-to-end and peer-to-peer clock
- IEEE 1588v2 unicast and multicast support
- Optional Synchronous Ethernet (ITU-T G.8261, G.8262 and G.8264)
- Optional combined SyncE and IEEE 1588v2 solution

Layer 2 Bridging

- IEEE 802.1D Bridge with source source specific multicast filtering
  - auto MAC address learning and aging
  - static MAC addresses
- IEEE 802.10d Provider Bridge (native or translated VLAN Q-in-Q bridging)
- Service enabled Provider Bridge (E-LINE: EPL, EVPL; E-Lan: EP-LAN, EVP-LAN)

Layer 3 support

- Classification of Layer 3 flow (SIP, IP Prot, SProt, DProt)
- DHCP Option 82 relay
- Universal Plug and Play (UPnP)
- IPv4 Unicast static routing

Front Interfaces

- Ethernet
  - Two RJ45 connectors, 1000BASE-T (1 Gbit/s), IEEE802.3 compliant, and one SFP slot, 1000BASE-T (1 Gbit/s), or
  - Three M12 A-coded connectors, 1000BASE-T (1 Gbit/s)
- RS232 for configuration (console)
- Status LEDs
  - One board status LED
  - Two Ethernet status LEDs
- Dongle interface (only on models with M12 connectors)

Rear Interfaces

- USB
  - One channel, USB2.0 as a console interface for configuration
- Ethernet
  - Twelve channels 1000BASE-T (1 Gbit/s)
- Serial GPIO (SGPIO)
  - Compliant with SFF 8485 specification

Supervision and Control

- Watchdog
- Temperature monitoring

Backplane Standard

- 7-slot switch/router backplane for full Ethernet functionality
  - Based on CompactPCI Specification PICMG CPCI-S.0 with MEN switch extensions
  - System or peripheral slot

Electrical Specifications

- Supply voltages
  - +5V (-5%) to 16 VDC max.
- Power consumption
  - Max. 16 W max.
- Isolation voltage for Ethernet
  - IEE802.3 (2012), Section 1; 9.7 Electrical Isolation - Environment B

Mechanical Specifications

- Dimensions: 3U, 4 HP
- Weight: 192 g (model 02G101-00)

Environmental Specifications

- Temperature range (operation):
  - -40°C to +85°C
  - Airflow 1.5m/s
- Temperature range (storage): -40°C to +85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +2000 m
- Shock: 50 m/s², 30 ms
- Vibration (Function): 1 m/s², 5 Hz to 150 Hz (EN 61373)
- Vibration (Lifetime): 7.9 m/s², 5 Hz to 150 Hz (EN 61373)
- Conformal coating on request

Reliability

- MTBF: 692.753 h @ 40°C according to IEC/TR 62380 (RDF2000)

Safety

- Flammability
  - UL 94V-0
- Electrical Safety
  - EN 50155 (Insulation)
  - EN 50155 (Voltage)

EMC

- EN 55022 (radio disturbance)
- EN 61000-4-2 (ESD Immunity)
- EN 61000-4-4 (burst)

Software Support

- Firmware for configuration and management

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