

# CXR-QX3440-E

## IP/TDM DCS-MUX



### FEATURES

#### Cross Connect Capability

- Support full non-blocking DS0 cross connect matrix between TDM interfaces and TDMoE Pseudowires
- Suitable for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications
- Auto A-law/ $\mu$ -law conversion

#### Ethernet Interface

- 2 x Combo GbE (SFP 100/1000BaseFX and 10/100/1000BaseT)
- IEEE 802.3ad Ethernet Link Aggregation\*

#### Pseudowires

- Up to 64 concurrent pseudowires
- Encapsulation format
  - SAToP
  - CESoPSN
  - MEF-8 (CESoETH)
- Configurable CoS and VLAN
- Packet Delay Variation Compensation Depth up to 256 ms

#### Timing

- System clock source can be chosen from Internal, External or E1/T1 Line with SSM
- Automatic/Manual Clock Recovery modes
- Adaptive Clock Recovery for Pseudowires
- Jitter and Wander conforms to G.823/824 for Traffic Interface
- SyncE

#### Management

- RJ45 Ethernet management interface
- SNMPv1/v3, compatible to SNMP-based GUI network management systems and supported by CXR-iNET and CXR-iNMS
- Telnet and SSH v2
- Web GUI Configuration (optional)
- USB console port with VT-100 menu driven interface
- 64K timeslot inband management
- Support Access Control List (ACL)

#### Mechanical and Electrical

- 1U height, 19" rack width. ANSI shelf.
- Up to 7 mini-slots for QX3440 series interface modules.
- All plug-in interface modules are hot swappable
- Up to two  $\pm 48$ Vdc or 100 ~ 240 Vac hot swappable power modules
- Dual DC or AC power with load sharing
- Temperature range from -20° to 65°C
- RoHS compliant

| Model  | QX3440-E              |
|--|-----------------------|
| Chassis  | 1U                    |
| # of Mini-slots  | 5                     |
| # of HS-slots  | 2 <small>Note</small> |
| Max. E1/T1 Ports   | 28                    |
| Cross-Connect Backplane Capacity                                     | 184 Mbps              |
| <small>Note: Supports Mini-slot modules via HS-Slot adapters</small> |                       |

\*Future Option

### DESCRIPTION

The QX3440-E is a compact IP/TDM Access Multiplexer in the CXR Access DCS-MUX series that combines various access interfaces and transport over GbE or E1 uplinks. The QX3440-E supports SAToP/ CESoPSN/ MEF8 Protocols to transport TDM data streams over packet switched network.

The QX3440-E provides full non-blocking DS0 cross-connect matrix for up to 28 x E1/T1 + 64 Pseudowires. Traffic grooming and segregation between the TDM interfaces and the Pseudowires provides flexibility and efficiency and makes the QX3440-E an ideal solution for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications..

*Table of Tributary Modules Applicable to QX3440-E*

| Mini-Slot<br>Tributary<br>Modules | Description                                       | Supported by<br>QX3440-E |
|-----------------------------------|---|--------------------------|
| 1T1                               | 1-channel T1 interface card                       | ✓                        |
| 1E1(E75)                          | 1-channel E1 plug-in card with 75ohm              | ✓                        |
| 1E1(E120)                         | 1-channel E1 plug-in card with 120ohm             | ✓                        |
| 4E1(M4E75)                        | Mini Quad E1 plug-in card with 75ohm              | ✓                        |
| 4E1(M4E120)                       | Mini Quad E1 plug-in card with 120ohm             | ✓                        |
| 4T1 (M4T1)                        | Mini Quad T1 (Four T1 interfaces)                 | ✓                        |
| M1C37                             | 1-channel C37.94 mini plug-in card                | ✓                        |
| 1CD                               | 1-channel G.703 Co-Directional                    | ✓                        |
| Router-A                          | 2-LAN ports/64WAN port router/bridge plug-in card | ✓                        |
| FOM                               | Fiber Optical Module                              | ✓                        |
| 1X.21 (1X21)                      | 1-channel X.21 DCE plug-in card                   | ✓                        |
| 1V.35 (1V35)                      | 1-channel V.35 DCE plug-in card                   | ✓                        |
| 1RS232 (1RS232)                   | 1-channel RS232 DCE plug-in card                  | ✓                        |
| 3RS232a                           | 3-channel RS232 DTE-DCE plug-in card              | ×                        |
| QEMA                              | 4-channel E&M voice plug-in card                  | ✓                        |
| QFXSA                             | 4-channel FXS voice plug-in card                  | ✓                        |
| QFXOA                             | 4-channel FXO voice plug-in card                  | ✓                        |
| QMAGA                             | 4-channel Magneto voice plug-in card              | *                        |
| ECA                               | Echo Cancellation plug-in card                    | ✓                        |
| ABRA                              | Analog Bridging plug-in card                      | ✓                        |
| OCU-DP                            | 1-channel OCUDP plug-in card                      | ✓                        |
| CLKa                              | Common plug-in card, version A                    | *                        |
| CLKb                              | Common plug-in card , version B                   | *                        |

**Note:** ✓ = Supported      \* = Future Option      × = Not Supported

## ORDERING INFORMATION



To specify options, choose from the list below:


| Main Unit    |  |  |
|--------------|--|--|
| Model        | Description  | Note   |
| QX3440-E     | 1U height rack chassis with fixed CPU for QX3440-E. <ul style="list-style-type: none"> <li>• Supports cross-connect and TDMoE onboard.</li> <li>• Supports SAToP (CCPA T1 SAToP*), CESoPSN, and MEF-8</li> <li>• Up to 64 Pseudowires</li> <li>• Supports SyncE</li> <li>• Supports Web GUI configuration for selected plug-in cards (with WEBLIC option)</li> </ul> | <ul style="list-style-type: none"> <li>• QX3440-E chassis type <b>CHEA</b> with CPU.</li> <li>• 19"/23" ear mount included.</li> <li>• Please order SFP modules separately from SFP optical modules brochure.</li> <li>• Includes two High Speed Slot Adapters for mini plug-in cards to be used in H1 and H2 slots.</li> <li>• With fixed QX3440-CCPA controller</li> </ul> |
| QX3440-E-NPW | 1U height rack chassis with fixed CPU for QX3440-E (NPW = <b>No Pseudo Wire</b> ). <ul style="list-style-type: none"> <li>• Supports Web GUI configuration for selected plug-in cards (with WEBLIC option)</li> </ul>  | <ul style="list-style-type: none"> <li>• QX3440-E chassis type <b>CHEA</b> with CPU.</li> <li>• 19"/23" ear mount included.</li> <li>• Includes two High Speed Slot Adapters for mini plug-in cards to be used in H1 and H2 slots.</li> <li>• With fixed QX3440-CCPA-NPW controller</li> </ul>   |

| License       |  |   |
|---------------|--|---|
| Model         | Description  | Note  |
| QX3440-LCT    | <ul style="list-style-type: none"> <li>• Feature activation license for QX3440-E CPU card to support LCT Graphical Configuration software</li> </ul> | <ul style="list-style-type: none"> <li>• License based on serial number. Supports GUI graphic PDH/DS0 cross connect. Free Windows installation software.</li> </ul> |
| QX3440-WEBLIC | <ul style="list-style-type: none"> <li>• Feature activation license for QX3440-E CPU card to web Graphical Configuration software</li> </ul>         | <ul style="list-style-type: none"> <li>• License based on serial number. Supports Web GUI configuration.</li> </ul>   |

### Mini Plug-in Module (Select 1 to 7 cards from list below)

| QX34DD-T1                 | 1-channel T1 interface card                        |   |
|---------------------------|--|---|
| QX34DD-E1-BNC             | 1-channel of E1 plug-in card w/ 75 ohm             |   |
| QX34DD-E1                 | 1-channel of E1 plug-in card w/ 120 ohm            |   |
| QX34DD-MQE1-BNC           | Mini Quad E1 plug-in card with 75 ohm              | Includes a three meter conversion cable (3m cable 8 BNC M / DB25)   |
| QX34DD-MQE1               | Mini Quad E1 plug-in card with 120 ohm             | Includes a three meter conversion cable (3m cable 8 RJ45 / DB25).   |
| QX34DD-M3794-LSFOM        | 1- channel C37.94 plug-in mini card                | For <b>LSFOM</b> option, please refer to the table below for detail information.                                |
| QX34DD-RTA                | 2-LAN ports/64 WAN port router/bridge plug-in card |   |
| QX34DD-4E1FO-opt          | Fiber Optical plug-in card                         | For <b>opt</b> option, please refer to the table below for detail information                                   |
| Serial and Digital Access |  |   |
| QX34DD-V35                | 1-channel V.35 plug-in card                        |   |
| QX34DD-X21                | 1-channel X.21 plug-in card                        |   |
| QX34DD-V24                | 1-channel RS232 plug-in card                       |   |
| QX34DD-3RS232a-DTE-DCE    | 3-channel RS232 async/Sync, DCE/DTE plug-in card   | To use with 3RS232a interface card, it is recommended to purchase a conversion cable (ACC-CAB-DB44M-150-2DB25F- |

|   |  |   |
|---|--|---|
|   |  | DB9F-DCE or ACC-CAB-DB44M-150-2DB25M-DB9MF-DTE)   |
| QX3440-S1CD   | 1-channel G.703 Co-Directional Interface at 64 Kbps data rate  |   |
| <b>Voice and Analog Access</b>                                      |  |   |
| QX34DD-QEMA-xx  | Jumper selectable: 2/4 WIRE; A/B side Quad E&M voice card, complied with IEEE1613 standard.  | <ul style="list-style-type: none"><li>For -48 Vdc and AC (100 to 240 Vac) power supply only.</li><li>For xx option, please indicate Tn for Type.</li></ul>  |
| QX34DD-QFXO   | Quad FXO voice plug-in card used with 4 RJ11   | <ul style="list-style-type: none"><li>GS = Ground Start</li><li>MP = Metering Pulse Receive 12/16 KHz</li><li>For -48 Vdc and AC (100 to 240 Vac) power supply only.</li><li>Jumper setting options: Loop Start, Ground Start (GS), Metering Pulse Transmit 12/16 KHz (MP).</li></ul> |
| QX34DD-QFXO-GS  | Quad FXO with GS plug-in card used with 4 RJ11   |   |
| QX34DD-QFXO-GM  | Quad FXO with GS and MP 16 KHz voice plug-in card used with 4 RJ11   |   |
| QX34DD-QFXS-A   | Quad FXSA voice plug-in card   |   |
| QX34DD-QFXS-A-GS  | Quad FXSA with GS plug-in card   |   |
| QX34DD-QMAGA  | Quad channel magneto plug-in card  |   |
| <b>DATA Processing</b>  |  |   |
| QX34DD-ECHO-CANC  | Echo canceller card  |   |
| QX34DD-ABRA   | Analog Bridge Card   |   |
| <b>Teleprotection Access</b>  |  |   |
| QX3440-SM1C3794-LSFOM   | 1- channel C37.94 plug-in mini card  | For <b>LSFOM</b> option, please refer to the table below for detail information.  |
| <b>Clock and Alarm</b>  |  |   |
| QX3440-SCLKa  | CLKa Mini Slot plug-in card.<br>- Clock in x2, clock out x1<br>- Alarm in x1, Alarm out x2   |   |
| QX3440-SCLKb  | CLKb Mini Slot plug-in card.<br>- Fuse ALM x1<br>- Critical ALM x1, MJR ALM x1, MIN ALM x1<br>- Clock in x2, clock out x2                                    |   |
| QX3440-SCLKc  | CLKc Mini Slot plug-in card.<br>- For 1588 CLK in/out (1 x TOD, 1PPS in/out, and 1 x BITS in/out)  |   |
| <b>Accessories</b>  |  |   |
| <b>Power Module</b>   |  |   |
| QX3440-E-PWAC   | Single AC plug-in power supply (100 to 240 Vac, 50/60 Hz) - SAC  | <ul style="list-style-type: none"><li>For AC, choose an appropriate power cord.</li><li>Order two DC or two AC or (one DC and one AC) power modules for redundancy.</li></ul>   |
| QX3440-E-PW48   | Single -48 Vdc (-36 to -72 Vdc) Power Module - SDC   |   |
| <b>HS-SLOT ADAPTER</b>  |  |   |
| QX3440E-ACC-HSADT   | Mechanical adapter for HS-Slot.  | <br>Usage Example:<br>  |
| <b>Mounting Ear</b>   |  |   |
| 19"/23" ear mounts  | A pair of 19"/23" ear mounts is supplied as part of standard package.<br><b>Note:</b> For other sizes, please contact your nearest CXR sales representative. |   |
| <b>Conversion Cables (All conversion cables are RoHS compliant)</b> |  |   |
| CXR-ACC-CAB-HDB15M-100-RJ48M  | One HD-sub 15 pin/Male connector to one RJ48/Male connector; Length: 100 cm  | For external clock interface connection   |

|   |   |   |
|---|---|---|
| CXR-QX34DD-ACC-CAB-DB25M-300-8BNM                         | DB25/Male to eight BNC/Male cable;<br>Length: 300 cm                    | Used in CXR-QX3440-M4E75- <b>G</b>  |
| CXR-QX34DD-ACC-CAB-DB25M-300-4RJ48M                       | DB25/Male to four RJ48C/Male cable;<br>Length: 300 cm                   | Used in CXR-QX3440-M4E120- <b>G</b><br>and CXR-QX3440-M4T1- <b>G</b> plug-in card   |
| CXR-QX34DD-ACC-CAB-DB25M-30-1M34F                         | DSUB-25pin/Male to M34/Female V.35<br>Conversion cable<br>Length: 30 cm | Used in CXR-QX3440-1V35- <b>G</b> plug-in card                                      |
| <b>Blank Panels (All blank panels are RoHS compliant)</b> |   |   |
| CXR-QX3440E-PAN-PW  | Blank Panel for Power Supply Slot (flat)                                |   |
| CXR-QX3440E-PAN-MSLOT                                     | Blank Panel for mini Slot A-E (flat)                                    |   |
| CXR-QX3440E-PAN-HSLOT                                     | Blank Panel for H1 and H2 slot (flat)                                   |  |

\*Future Option

#### For mini LS Optical module (mini C37.94):

■ Where **LSFOM** is to select **LS-Fiber Optical Module** option, each module has 5 letters.

| LSFOM | Description |             |           |             |             |             |          |             |           |              |
|-------|-------------|-------------|-----------|-------------|-------------|-------------|----------|-------------|-----------|--------------|
| Code  | Mode        |             | Data Rate |             | Wave Length |             | Distance |             | Connector |              |
|       | Code        | Description | Code      | Description | Code        | Description | Code     | Description | Code      | Description  |
| ZHHTT | Z           | Multi-mode  | H         | 155 M       | H           | 820nm       | T        | 2km         | T         | ST connector |
| QHATT | Q           | Multi-mode  | H         | 155 M       | A           | 850nm       | T        | 2km         | T         | ST connector |
| NFB3T | N           | Single mode | F         | 125 M       | B           | 1310nm      | 3        | 30km        | T         | ST connector |
| QFBTT | Q           | Multi-mode  | F         | 125 M       | B           | 1310nm      | T        | 2km         | T         | ST connector |
| NHC2S | N           | Single mode | H         | 155 M       | C           | 1550nm      | 2        | 20km        | S         | SC connector |

#### For FOM card

■ Where **opt** is used to select optical module type (All optical modules are RoHS compliant):

| opt =   | Description   | Note   |
|---------|---|--|
| SM30-SC | Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 30 km                                     | Use dual fiber<br>Units delivered ITU-T G.957 application code   |
| SM50-SC | Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 50 km                                     |  |
| SM30-FC | Single optical module with dual uni-directional fiber, 1310 nm, FC optical connector, 30 km                                     |  |
| SM205SC | Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 20 km                                     |  |
| SM100SC | Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 100 km                                    |  |
| SM30W13 | Single optical module with single bi-directional fiber (master), 1310 nm transmit and 1550 receive, SC optical connector, 30 km | 1310 nm from master to slave<br>Order <b>SM30W13</b> to use with <b>SM30W15</b><br>Use 1 fiber<br>ITU-T G.957 application code |
| SM30W15 | Single optical module with single bi-directional fiber (slave), 1310 nm receive and 1550 transmit, SC optical connector, 30 km  | 1550 nm from slave to master<br>Order <b>SM30W15</b> to use with <b>SM30W13</b><br>Use 1 fiber<br>ITU-T G.957 application code |

**Note:** For other special optical modules, please contact your nearest CXR sales representative.

***QX3440-E Controller on-board CCPA Combo Gigabit Ethernet (GbE) Interface for TDMoE Services***

|   |   |
|---|---|
| Number of Ports   | 2   |
| Speed   | 10/100/1000M bps  |
| Connector   | RJ45 for twisted pair GbE, LC for optical GbE, auto detection   |
| <b><i>Ethernet Function</i></b>   |   |
| Basic Features  | MDI/MDIX for 10/100/1000M BaseT auto-sensing<br>Ping function contained ARP   |
| <b><i>Pseudowire</i></b>  |   |
| Concurrent PW   | Up to 64  |
| Encapsulation Format  | SAToP(CCPA T1 SAToP*), CESoPSN, MEF-8 (CESoETH)   |
| QoS   | User configurable 802.1p CoS, ToS in out-going IP frame   |
| <b><i>Clock Source</i></b>  | Internal, Line Interface, External (E1/T1/2048 KHz), Adaptive Clock Recovery for Pseudowires, SyncE                           |
| <b><i>Alarm Relay</i></b>   |   |
|   | Max. Current: 1A for 24VDC, 0.625A for 48VDC<br>Fuse alarm, performance alarm   |
| <b><i>Management</i></b>  |   |
| Console   | Micro USB Connector<br>User Interface: Menu driven VT-100   |
| Ethernet  | 2 Combo GE port, Connector: RJ45 & SFP<br>SNMPv1/v3, Telnet/SSH, support Radius client function                               |
| Inband Management   | Inband 64 Kbps, support HDLC/PPP  |
| <b><i>System Configuration Parameters</i></b> Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory) |   |
| <b><i>Performance Monitor</i></b>   |   |
| Performance Registers   | Last 24 hours performance in 15 minute intervals and last 7 days in 24 hour summaries   |
| Separate Registers  | Network, user, and remote site  |
| Performance Reports   | Reports include E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes. Also available in Statistics (%)           |
| Alarm Queue   | To record the latest alarm type, location, date and time  |
| Threshold   | Bursty Seconds, Severely Errored Second, Degraded Minutes   |
| <b><i>Diagnostics</i></b>   |   |
| Loopback  | E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback), DTE Loopback (DTE-to-DTE, DTE to Line)                     |
| Test Pattern  | For Controller: 2 <sup>20</sup> -1, 2 <sup>15</sup> -1, 2 <sup>11</sup> -1, 2 <sup>9</sup> -1, and 4-byte user define pattern |
| <b><i>Front Panel</i></b>   |   |
| Controller LED Indicators   | Power, ACTIVE, ALARM  |



**Transportation Cards****Network Line Interface - T1**

|              |                                  |               |                     |
|--------------|----------------------------------|---------------|---------------------|
| Line Rate    | 1.544 Mbps $\pm$ 50 bps          | Output Signal | DSX1                |
| Line Code    | AMI or B8ZS                      | Framing       | D4/ESF (selectable) |
| Input Signal | ABAM cable length up to 655 feet | Connector     | RJ48C               |

**Network Line Interface - E1**

|               |                         |            |                                  |
|---------------|-------------------------|------------|----------------------------------|
| Line Rate     | 2.048 Mbps $\pm$ 50 ppm | Framing    | ITU G.704                        |
| Line Code     | AMI or HDB3             | Connector  | BNC/RJ48C                        |
| Input Signal  | ITU G.703               | Electrical | 75 ohm Coax/120 ohm twisted pair |
| Output Signal | ITU G.703               | Jitter     | ITU G.823                        |

**Network Line Interface - Mini 4E1**

|               |                         |            |                                  |
|---------------|-------------------------|------------|----------------------------------|
| Line Rate     | 2.048 Mbps $\pm$ 50 ppm | Framing    | ITU G.704                        |
| Line Code     | AMI or HDB3             | Connector  | DB25S                            |
| Input Signal  | ITU G.703               | Electrical | 75 ohm Coax/120 ohm twisted pair |
| Output Signal | ITU G.703               | Jitter     | ITU G.823                        |

**Network Line Interface - Mini 4T1**

|              |                                     |                |   |
|--------------|-------------------------------------|----------------|---|
| Line Rate    | 1.544 Mbps $\pm$ 32 ppm             | Framing        | D4/ESF  |
| Line Code    | AMI/B8ZS                            | Connector      | DB25S   |
| Input Signal | ITU G.703 DSX-1 0dB to -30dB w/ALBO | Output Signal  | ITU G.703 DSX-1 w/o, -7.5, -15dB LBO<br>ITU G.703 DSX-1 w/short (0-110,<br>110-220, 220-330, 330-440, 440-550,<br>550~660 feet) |
| Jitter       | AT&T TR 62411                       | Pulse Template | AT&T TR 62411   |
| Data Rate    | n * (64) Kbps (n=1-24)              |                |   |

**1CD G.703 Co-directional**

|               |  |
|---------------|--|
| Data Port     | 1 port                                     |
| Interface     | ITU G.703 64 Kbps co-directional interface |
| Connector     | 120ohm, RJ48                               |
| Line Distance | Up to 500 meters                           |
| Loopback      | DTE Payload Loopback, Local Loopback       |

**Fiber Optical Interface (FOM)**

|             |                                    |               |                  |
|-------------|------------------------------------|---------------|------------------|
| Source      | MLM Laser                          | Line Code     | Scrambled NRZ    |
| Wavelength  | 1310 $\pm$ 50 nm, 1550 $\pm$ 40 nm | Detector Type | PIN-FET          |
| 50 Km reach |                                    | Protection    | Optional 1+1 APS |

**Serial and Digital Access****DTE Interface (X.21)**

|           |                                 |
|-----------|---------------------------------|
| Data Port | Up to nine 1-port DTE X.21 card |
| Data Rate | 56 or 64 Kbps, n = 1 to 32      |
| Connector | DB15                            |

**DTE Interface (V.35)**

|           |  |
|-----------|--|
| Data Port | Up to nine 1-port DTE V.35 card                          |
| Data Rate | 56 or 64 Kbps, n = 1 to 32                               |
| Connector | DB25S (optional conversion cable DB25S to M34 connector) |

**DTE Interface (RS232)**

|           |                           |
|-----------|---------------------------|
| Data Port | 1-port RS232 card         |
| Data Rate | 56 or 64 Kbps *n, n=1 - 2 |
| Mapping   | Any sequential time slots |

**1 Port OCU-DP Interface Card**

|                                     |  |
|-------------------------------------|--|
| Ports                               | 1 Ports card   |
| Operating Modes                     | 4-wire DDS or switched 56  |
| Dedicated Rates                     | SYNC: 2.4, 4.8, 9.6, 19.2, 56 and 64k clear channel                                  |
|                                     | Conforms with AT&T Pub 41458   |
| OCU DP Operation                    | Conforms with AT&T 62310 and ANSI T1.410   |
| Local Loop Signal                   | Bipolar return to zero, 50% duty cycle   |
| Transmit Amplitude                  | +/- 1.5 V (+/- 10%) peak, all rates except 9.6k<br>+/- 0.75 V (+/- 10%) peak at 9.6k |
| Transmit Source Impedance           | 135 Ohms +/- 20%   |
| Receive Input Impedance             | 135 Ohms +/- 20%   |
| Receiver Sensitivity/ Dynamic Range | 0 to 43 dB loop loss at 72K & 56K<br>0 to 34 all other rates                         |
| Physical Interface                  | 4-wire loop interface<br>RJ45 modular connector                                      |
| Network to Loop Test Codes          | Zero code suppression, Idle  |
| Loop to Network Test Codes          | Zero code suppression, Idle, latch/non-latch, DSU loop-back                          |

**1CD G.703 Co-directional**

|               |  |
|---------------|--|
| Data Port     | 1 port                                     |
| Interface     | ITU G.703 64 Kbps co-directional interface |
| Connector     | 120ohm, RJ48                               |
| Line Distance | Up to 500 meters                           |
| Loopback      | DTE Payload Loopback, Local Loopback       |

**Voice and Analog Access****Voice Card (QEMA)**

|                                    |   |
|------------------------------------|---|
| Connector                          | One 44-pin connector, adapter cable included for 4 RJ45 connectors.   |
| Alarm Conditioning                 | CGA busy after 2.5 seconds of LOS, LOF  |
| Encoding                           | A-law or $\mu$ -law, user selectable as a group   |
| Impedance                          | Balanced 600 $\Omega$ or 900 $\Omega$   |
| Gain Adjustment (Per-port setting) | -10 to +7 dB / 0.1dB step for transmit (D/A) gain<br>-10 to +14 dB / 0.1dB step for receive (A/D) gain  |
| Gain Variation                     | $\pm$ 0.5 dB at 0 dBm0 input  |
| Frequency Response                 | $\pm$ 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712   |
| I/O Power Range                    | A/D Analog input level: -66 dBm (0.00039 Vrms) ~ + 3 dBm (1.09 Vrms)<br>D/A Analog output level: -66 dBm (0.00039 Vrms) ~ + 4 dBm (1.22 Vrms) |
| Longitudinal Balance               | > 63dB  |
| Longitudinal Conversion Loss       | 46dB  |
| Total Distortion                   | 35 dB at 0 dBm0 input   |
| Idle Channel Noise                 | -65 dBm0p   |
| Wire Mode                          | 2 wire and 4 wire   |
| Signaling                          | Type I, Type II, Type III, Type IV, Type V, and also TO (Transmit Only)   |
| M Lead Output Current              | 18 mA (maximum)   |
| E Lead Sensor Current              | 0.3 mA (minimum)  |
| EM Type Setting                    | Jump Selectable   |
| Operational Temp.                  | 0°C to +50°C  |
| Relative Humidity                  | 0% to 95%   |
| Carrier Connection                 | Side A and side B setup by Jump   |

All in-band signaling tones are carried transparently by the digitizing process.

Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.

**Voice Card (QFXOA)**

|                              |  |
|------------------------------|--|
| Connector                    | Four RJ11 connector                                    |
| Alarm Conditioning           | CGA busy after 2.5 seconds of LOS, LOF                 |
| Encoding                     | A-law or $\mu$ -law, user selectable together for all  |
| AC Impedance                 | Balanced 600 or 900 ohms (selectable together for all) |
| Longitudinal Conversion Loss | > 46dB   |
| Gain Adjustment              | -15 to +10 dB / 0.1dB step transmit & receive          |





|  |   |
|--|---|
| Signal/ Distortion   | > 25dB with 1004 Hz, 0dBm input   |
| Frequency Response   | ± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712   |
| Idle Channel Noise   | Max. -65 dBm0p  |
| Variation of Gain  | ±0.5dB  |
| FXO  | <div>Ringing REN0.5B (AC)</div> <div>Detectable Ringing25 Vrms</div> <div>Loop Resistance≤ 1800 Ω</div> <div>DC Impedance (ON-HOOK)&gt; 1M Ω</div> <div>DC Impedance(OFF-HOOK)235 Ω @ 25mA feed</div> |
| Signaling Bit A,B,C,D  | Per-port configurable   |
| <ul style="list-style-type: none"> <li>All in-band signaling tones are carried transparently by the digitizing process.</li> <li>Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.</li> </ul> |   |

**NOTE:** The default setting for signaling bits is ETSI and for trunk condition is ON-HOOK.

#### Voice Card (QFXSA)

Quad FXSA voice card (4 FXS per plug-in)

|                        |  |
|------------------------|--|
| Connector              | 1, 2, 3, or 4 FXS per RJ11 connector   |
| Alarm Conditioning     | CGA busy after 2.5 seconds of LOS, LOF   |
| Encoding               | A-law or $\mu$ -law (user selectable)  |
| AC impedance           | Balanced 600 or 900 ohms (user selectable)   |
| Longitudinal Rejection | 55 dB  |
| Gain Adjustment        | -21 to +3 dB / 0.1 dB step for transmit (D/A) & receive (A/D) gain   |
| Signal/ Distortion     | > 46dB with 1004 Hz, 0dBm input  |
| Frequency Response     | ± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712  |
| Loop Feed              | ±48Vdc with 25mA current limit per port<br>Jumper selectable: 25mA, 30mA, 35mA   |
| Ringing                | Support 2 REN per port (1 REN = 6930Ω + 8 $\mu$ F)<br>16.7Hz, 20Hz, 25Hz, 50Hz (user programmable)<br>Default 78 Vrms (sine wave) (64 Vrms by jumper setting)<br>2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR (user programmable) |
| Metering Pulse         | 12KHz/ 16KHz (2.4Vrm/1Vrm user programmable)   |
| Signaling              | Loop Start (Metering Pulse, DTMF, Dialing Pulse, PLAR), GND-Start (Tip Open, Ring GND), OOS Alarm, Battery Reverse   |

All in-band signaling tones are carried transparently by the digitizing process.

Customer is responsible for in-band signalling compatibility between a telephone and a switch, or between a PBX and a switch.

#### Voice Card(QMAGA)\*

|                                    |  |
|------------------------------------|--|
| Connector                          | RJ11 x 4   |
| Alarm Conditioning                 | CGA busy after 2.5 seconds of LOS, LOF   |
| Encoding                           | A-law or $\mu$ -law, user selectable per card configurable   |
| Impedance                          | Balanced 600 or 900 ohms (for magneto telephone impedance )  |
| Longitudinal Conversion Loss       | > 46dB   |
| Gain Adjustment                    | -16 to +7 dB / 0.1dB step transmit gain (D-A)<br>-16 to +13 dB/0.1dB step receive gain (A-D)   |
| Signal/ Distortion                 | > 25dB with 1004 Hz, 0dBm input  |
| Frequency Response                 | ± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712  |
| Idle Channel Noise                 | Max. -65 dBm0p   |
| <u>Signaling</u>                   |  |
| Minimum Detectable Ringing Voltage | 16 Vrms  |
| Crank Detectable Across            | L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND) per port<br>software programmable  |
| Crank Detected time                | Valid crank: more than 250 ms<br>Invalid crank: less than 160 ms   |
| Ringing Generation                 | Voltage: 76 Vrms (sine wave)<br>Frequency: 25Hz  |
| Ring duration                      | Software configurable options:<br>1. PLAR OFF (Continuous Mode)<br>Ring duration depends on cranking time<br>2. PLAR OFF (One-time) Mode |

- Crank the phone for one time, and the ring duration of the far-end phone could be 0.7, 1.0, 1.5 or 2.0 sec
3. PLAR ON  
When FXS phone off-hooked, the ring duration of the far-end magneto phone could be 0.7, 1.0, 1.5 or 2.0 sec

|  |  |
|--|--|
| Ringling Send Across Signaling   | L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND)                  |
| Signaling Bit A,B,C,D  | Turn Magneto Phone crank (Ringing across Tip and Ring or Tip and Ground) |
|  | Programmable   |
| <ul style="list-style-type: none"> <li>• Signaling is carried transparently by the digitizing process.</li> <li>• Use Magneto card default setting for communications between magneto telephones</li> <li>• Use Magneto card PLAR mode setting for communications between a magneto telephone and a regular telephone</li> </ul> |  |

\*Future Option

## Data Processing

### Analog Bridge Card (ABRA)

|   |   |
|---|---|
| Group                                     | Up to 8 groups per card, 16 members per group   |
| Analog Bridge Mode                        | Master/Slave Architecture<br>Downstream : 2 to many<br>Upstream : many to 2                                   |
| Voice Conference Mode with CAS Signalling | Any-to-any conference bridge<br><br>Up to 16 members in one conference group<br>Silence detection/suppression |
| RS232 Data Bridge Mode                    | Master/Slave Architecture<br>Downstream : 2 to many (up to 14 Slave units)<br>Upstream : many to 2            |
| Voice Protection Mode                     | One Master to two Slaves for 1+1 protection<br>Analog signals only<br>42 protection groups                    |
| OCU-DP Data Bridge Mode (MJU Mode)        | Master/Slave Architecture<br>Downstream: 1 to many (up to 14 Slave units)<br>Upstream: many to 1              |
| PCM encoder/decoder                       | Compatible with ITU-T G.711 A-law/Mu-law coding.  |
| LED Indicator                             | Multi-color indication  |
| 1:1 Card Protection <sup>NOTE</sup>       | Dual-card redundancy  |

**NOTE:** Supported by QX3440-E-CHEA SW V12.05.01 and up.

### Echo Canceller Card

|                           |   |
|---------------------------|---|
| Echo Cancellation Channel | 64ms uni-directional, 64ms bi-directional and 128ms uni-directional<br>Up to 64 channels  |
| Functions                 | <ul style="list-style-type: none"> <li>- one way or bi-direction cancellation from PCM bus to ECA card</li> <li>- E1/T1 multichannel echo cancellation</li> </ul> |
| PCM encoder/decoder       | Compatible with ITU-T G.711 A-law/Mu-law coding.  |
| LED Indicator             | Multi-color indication  |
| Compliant                 | ITU-T G.165 and ITU-T G.168-2000 and 2002   |

## Packet Access

### Router-A Interface

|                      |  |
|----------------------|--|
| Number of Ports      | 2 LAN ports, Max. 64 WAN ports, Each WAN port has data rate $n \times 64K$ bps, $1 \leq n \leq 32$ ( $\leq 4Mbps$ for total of all 64 WAN ports) |
| Physical Interface   | 10/100 BaseT x 2   |
| Connector            | RJ45   |
| Routing Protocol     | RIP-I, RIP-II, OSPF, Static  |
| Supporting Protocols | PPP (IPCP/BCP), MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC, NAT/NAPT, DHCP  |
| Diagnostic           | Ping, Trace route  |
| QoS                  | Rate limit   |

**Teleprotection Access****Mini C37.94 Card****ZRATT**

Multi-Mode, 2Mbps, 820nm, 2KM, ST/UPC connector

| Tx          |     |       |                 |     |     | Rx          |     |      |                 |     |     | Note |
|-------------|-----|-------|-----------------|-----|-----|-------------|-----|------|-----------------|-----|-----|------|
| Power (dBm) |     |       | Wavelength (nm) |     |     | Power (dBm) |     |      | Wavelength (nm) |     |     |      |
| Min         | Typ | Max   | Min             | Typ | Max | Min         | Typ | Max  | Min             | Typ | Max |      |
| -19.8       | --  | -12.8 | 792             | 820 | 865 | -25.4       | --  | -9.2 | 792             | 820 | 865 |      |
| -16         | --  | -9    |                 |     |     | -25.4       | --  | -9.2 |                 |     |     |      |

**QRATT**

Multi-Mode, 2Mbps, 850nm, 2KM, ST/UPC connector

| Tx          |     |     |                 |     |     | Rx          |     |     |                 |     |     | Note |
|-------------|-----|-----|-----------------|-----|-----|-------------|-----|-----|-----------------|-----|-----|------|
| Power (dBm) |     |     | Wavelength (nm) |     |     | Power (dBm) |     |     | Wavelength (nm) |     |     |      |
| Min         | Typ | Max | Min             | Typ | Max | Min         | Typ | Max | Min             | Typ | Max |      |
| -23         | --  | -11 | 790             | --  | 870 | -32         | --  | -11 | 790             | --  | 870 |      |
| -19         | --  | -11 |                 |     |     | -32         | --  | -11 |                 |     |     |      |

**NRB2T**

Single-Mode, 2Mbps, 1310nm, 20KM, ST/UPC connector

| Tx          |     |     |                 |      |      | Rx          |     |     |                 |     |      | Note |
|-------------|-----|-----|-----------------|------|------|-------------|-----|-----|-----------------|-----|------|------|
| Power (dBm) |     |     | Wavelength (nm) |      |      | Power (dBm) |     |     | Wavelength (nm) |     |      |      |
| Min         | Typ | Max | Min             | Typ  | Max  | Min         | Typ | Max | Min             | Typ | Max  |      |
| -20         | --  | 0   | 1261            | 1310 | 1360 | -32         | --  | 0   | 1260            | --  | 1610 |      |

**Clock and Alarm****CLKa Card Specifications**

|                                |  |
|--------------------------------|--|
| Clock Input (CLK1_In, CLK2_In) | 1.048Mbps, 1.544Mbps, 2048KHz                |
| Clock Output (CLK1_Out)        | 1.048Mbps, 1.544Mbps, 2048KHz                |
| Alarm Output (Fuse, SYS_ALM)   | Max. Current: 1A for 24VDC, 0.625A for 48VDC |
|                                | Fuse alarm, System alarm                     |
| LED Indicator                  | Multi-color LED indication                   |

**Physical /Electrical**

|                   |  |                   |
|-------------------|--|-------------------|
| Dimensions        | 442 x 44 x 297 mm (W×H×D)  |                   |
| Power             | Single/ Dual -48 Vdc (-36 to -72 Vdc)<br>Single/ Dual AC plug-in power supply (100 to 240 Vac, 50/60 Hz) |                   |
| Temperature       | Operating  | Storage           |
|                   | -20 to 65°C  | -30 to 70°C       |
| Weight            | Net Weight   | Max. Weight       |
|                   | 5.5 Kg (12.13lbs)  | 7.5 Kg (16.53lbs) |
| Humidity          | 0-95%RH (non-condensing)   |                   |
| Mounting          | Desk-top stackable, 19" /23" rack mountable  |                   |
| Power Consumption | QX3440E : 30 Watts, maxi 65W, with full interface.   |                   |

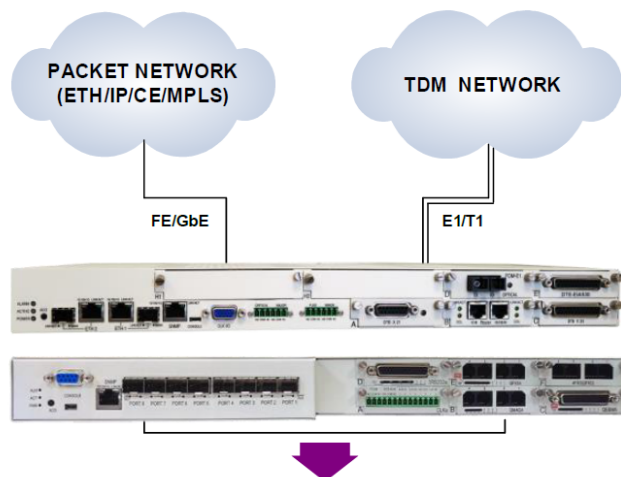
**Certification**

|         |   |
|---------|---|
| EMI/EMC | EN55032 Class A, BS EN55032 Class A, EN55035, BS EN55035, FCC Part 15 Class A |
| Safety  | EN62368-1, BS EN 62368-1  |

Compliance

ITU G.703, G.704, G.706, G.732, G.736, G.823, G.826, G.711, G.712, G.775, O.151, V.11, V.28, V.54  
IETF SNMP v.3 (RFC2571~2575), ITU-T Rec.G.821, ITU-T Rec.G.827

## APPLICATION ILLUSTRATION



**Mini Slot Plug-in Cards**

- ➔ 1-channel T1 interface card
- ➔ 1-channel E1 plug-in card with 75ohm
- ➔ 1-channel E1 plug-in card with 120ohm
- ➔ Mini Quad E1 plug-in card with 75ohm
- ➔ Mini Quad E1 plug-in card with 120ohm
- ➔ Mini Quad T1 plug-in card
- ➔ Fiber Optical Module
- ➔ 1-channel X.21 plug-in card
- ➔ 1-channel V.35 plug-in card
- ➔ 1-channel RS232 plug-in card
- ➔ 3-channel RS232 plug-in card
- ➔ 1-channel OCU-DP Interface card
- ➔ 1-channel G.703 Co-Directional plug-in card
- ➔ 1-channel C37.94 mini plug-in card
- ➔ 4-channel E&M voice plug-in card
- ➔ 4-channel FXS voice plug-in card
- ➔ 4-channel FXO voice plug-in card
- ➔ 4-channel magneto voice plug-in card\*
- ➔ Echo Cancellation plug-in card
- ➔ Analog Bridging plug-in card
- ➔ 2-LAN ports/64 WAN port router/bridge plug-in card
- ➔ CLKa Mini Slot plug-in card