



Installing and Configuring the MGX-10C12POS and the MGX-20C12POS Back Cards

This chapter describes how to install and configure the single-port MGX-10C12POS (Packet Over SONET) back card and the dual-port MGX-20C12POS back card on a Cisco RPM-XF.

This chapter includes the following sections:

- [MGX-10C12POS-IR Overview and Features](#)
- [MGX-20C12POS Overview and Features](#)
- [Installation Guidelines](#)
- [Software Configuration](#)
- [Troubleshooting the Back Card](#)

MGX-10C12POS-IR Overview and Features

The MGX-10C12POS-IR back card ([Figure 5-1](#)) is fully compatible with standards-based POS implementations on platforms such as the Cisco 7200, the Cisco 7500, the Cisco 10000 edge services router (ESR), and the Cisco 12000 series gigabit switch router (GSR).

Figure 5-1 MGX-10C12POS-IR Back Card

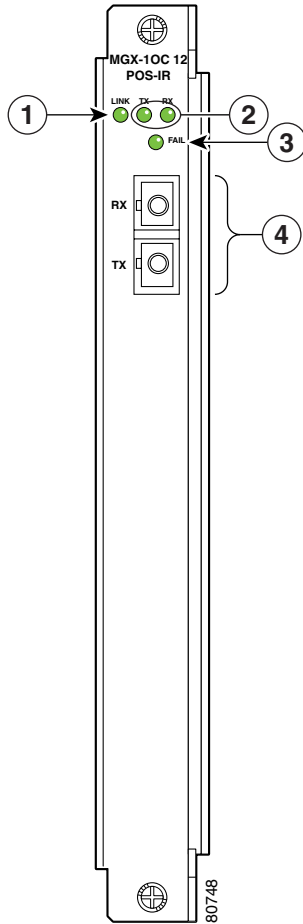


Table 5-1 MGX MGX-10C12POS-IR Front Panel LED and Port Descriptions

| LED | Description |
|-------------------|--|
| 1 LINK LED | Green—A link has been established. Off—A link has not been established. |
| 2 TX and RX LEDs | Green—The back card is receiving or transmitting traffic. Off—The back card is not receiving or transmitting traffic. |
| 3 FAIL LED | Yellow—The back card has failed. Off—The back card is operating properly. |
| 4 TX and RX Ports | SC connectors |

The MGX-10C12POS-IR back card (see [Figure 5-1](#)) provides a trunk uplink that supports OC-12c/STM-4c bandwidth of 622 Mbps throughput over a standard SONET/SDH interface using a single-mode fiber, intermediate-reach SC connector.

| Fiber Type | Wavelength (nm) | Core Size (microns) | Cable Distance |
|-------------------|-----------------|---------------------|-------------------|
| Single-mode fiber | 1300 | 8 to 10 | 49,213 ft (15 km) |

The MGX-10C12POS-IR back card provides the following key features:

- Efficient, high-performance bandwidth utilization—OC-12 performance of 622 Mbps provides the bandwidth required to meet the most demanding user requirements, such as faster access to web pages, real-time video, large file transfers, and other data-intensive applications.

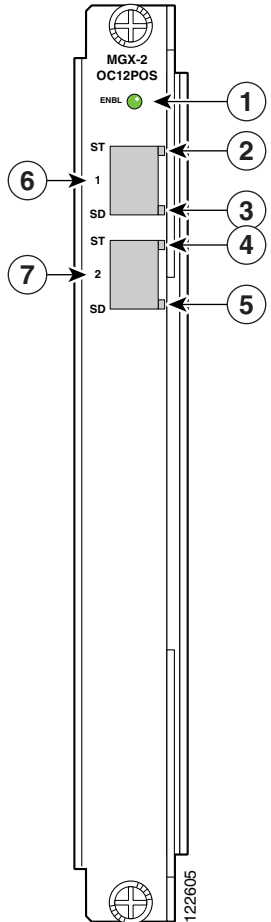
The Cisco POS implementation offers a 25 to 30 percent gain in efficiency over multiservice IP traffic now running over ATM networks. It achieves this efficiency gain by eliminating the overhead required in ATM implementations, such as ATM cell header, IP over ATM encapsulation, and segmentation and reassembly (SAR).

- Optimized for IP-based differentiated services—The Cisco POS solution supports Internet-based multiservice networks based on IP. The Cisco POS implementation places the IP layer directly above the SONET layer and eliminates the overhead required to run IP over ATM over SONET.
- Configurable clock sources—The MGX-10C12POS-IR back card is capable of providing the clock source for the POS link and also retrieving the clock source from network.
- Configurable loopbacks for troubleshooting—The MGX-10C12POS-IR back card is capable of configuring both an internal loopback (loops outbound traffic back towards the front card) and a network loopback (loops inbound traffic back towards the network).
- Alarm processing—The MGX-10C12POS-IR back card implements SONET alarms that are fully Bellcore GR-253 compliant.

MGX-20C12POS Overview and Features

The MGX-20C12POS back card ([Figure 5-2](#)) is fully compatible with standards-based POS implementations on platforms such as the Cisco 7200, the Cisco 7500, the Cisco 10000 edge services router (ESR), and the Cisco 12000 series gigabit switch router (GSR).

Figure 5-2 MGX-20C12POS Back Card



| | | | |
|----------|--|----------|---|
| 1 | ENBL LED <ul style="list-style-type: none"> Off—The back card is functioning. Yellow—The back card has failed | 2 | Port 0 status LED <ul style="list-style-type: none"> Green—The link is up. Yellow—The link is down. |
| 3 | Port 0 signal detect LED <ul style="list-style-type: none"> Green—A signal is present. Green (flashing)—Loss of signal | 4 | Port 1 status LED <ul style="list-style-type: none"> Green—The link is up. Yellow—The link is down. |
| 5 | Port 1 signal detect LED <ul style="list-style-type: none"> Green—A signal is present. Green (flashing)—Loss of signal | 6 | Port 0 SFP receptacle |
| 7 | Port 1 SFP receptacle | | |

The MGX-20C12POS back card (see [Figure 5-2](#)) provides two trunk uplinks. Each trunk supports an OC-12c/STM-4c bandwidth of 622 Mbps throughput. Each port provides a standard SONET/SDH SFP module (see [Table 5-2](#)).

Table 5-2 SFP Modules and Cables

| SFP Module | 9/125 um Single-mode 1310 nm Cable |
|-------------------|---|
| SMFIR-622-SFP | 15 km |
| SMFLR-622-SFP | 40 km |

The MGX-20C12POS back card provides the following key features:

- Efficient, high-performance bandwidth utilization—OC-12 performance of 622 Mbps provides the bandwidth required to meet the most demanding user requirements, such as faster access to web pages, real-time video, large file transfers, and other data-intensive applications.

The Cisco POS implementation offers a 25 to 30 percent gain in efficiency over multiservice IP traffic now running over ATM networks. It achieves this efficiency gain by eliminating the overhead required in ATM implementations, such as ATM cell header, IP over ATM encapsulation, and segmentation and reassembly (SAR).

- Optimized for IP-based differentiated services—The Cisco POS solution supports Internet-based multiservice networks based on IP. The Cisco POS implementation places the IP layer directly above the SONET layer and eliminates the overhead required to run IP over ATM over SONET.
- Configurable clock sources—The MGX-20C12POS back card is capable of providing the clock source for the POS link and also retrieving the clock source from network.
- Configurable loopbacks for troubleshooting—The MGX-20C12POS back card is capable of configuring both an internal loopback (loops outbound traffic back towards the front card) and a network loopback (loops inbound traffic back towards the network).
- Alarm processing—The MGX-20C12POS back card implements SONET alarms that are fully Bellcore GR-253 compliant.
- SFP (Small Form Factor Pluggable) Hot Swapping and Security—The MGX-20C12POS back card is hot swappable and can be removed and replaced even when the interfaces are NOT shutdown.
- Card OIR (Online Insertion & Removal) support—There is online support for the insertion and removal of the MGX-20C12POS back card.

The MGX-20C12POS back card uses the MGX-2GE driver, which performs the following tasks:

- Initializing the POS driver subsystem at Cisco IOS boot time
- Initializing and configuring the GE back card
- Downloading the POS back card firmware images
- Collecting statistics for the CLI and SNMP
- Managing alarm and trap events after insertion, removal, and hot swap
- Managing interface status and configuration changes
- Processing events and alarms
- Monitoring data path hardware failures
- Controlling front card and back card port and card status LEDs

Installation Guidelines

This section contains guidelines for the following procedures:

- New installation
- Replacement installation

The Cisco MGX-10C12POS-IR back cards are cold swappable, which means that you can remove and replace the back cards only when all the interfaces on are shutdown.

The Cisco MGX-20C12POS back cards are hot swappable, which means that you can remove and replace the back cards even when the interfaces are not shutdown.

**Caution**

To prevent electrostatic discharge (ESD) damage, handle back cards by the faceplate or the card carrier edges only. Avoid touching the back card printed circuit board, components, or any connector pins.

New Installation Guidelines

For information on installing the back card hardware, see [Chapter 3, “Installing the MGX RPM-XF Front and Back Cards.”](#)

After installing the MGX-10C12POS-IR or the MGX-20C12POS for the first time, you must configure it by entering the **configure** command. For information about configuring the MGX-10C12POS-IR and MGX-20C12POS back cards, see the [“Software Configuration”](#) section below.

Replacement Installation Guidelines

For information on removing and installing the back card hardware, see [Chapter 3, “Installing the MGX RPM-XF Front and Back Cards.”](#)

If an MGX-10C12POS-IR or an MGX-20C12POS back card is replaced, the system automatically downloads the necessary information from the RPM-XF front card. There is no need to configure the new back card, unless the front card has been reloaded or switched over subsequent to the removal of the back card of the same type. After the information is downloaded, the system recognizes only those interfaces that match the previous MGX-10C12POS-IR or MGX-20C12POS back card configuration (those configured as Up).

Software Configuration

After the MGX-10C12POS-IR or MGX-20C12POS back card is successfully installed, you can configure the card for network use.

**Note**

You do not need to configure the MGX-10C12POS-IR or MGX-20C12POS back card if this is a replacement installation. The system automatically downloads the necessary configuration information from the RPM-XF front card.

This section covers the following topics:

- [Back Card Default Values](#)
- [MGX-10C12POS-IR Back Card Syntax](#)
- [MGX-2 OC12POS Back Card Syntax](#)
- [Configuring the Interface](#)
- [Customizing the MGX-10C12POS-IR or MGX-20C12POS](#)
- [Example Configuration](#)
- [Checking System Status](#)

Back Card Default Values

This section lists default values for the MGX-10C12POS-IR and MGX-20C12POS back cards. The commands marked with an asterisk (*) are described in the Cisco *IOS* command reference documentation. The other commands are among those described in this chapter.

The following table includes the command used for modifying a default value and indicates whether a value needs to be the same (or opposite) on the remote end of the connection.

| Command Name | Default Setting | Command Syntax | Remote Side Setting |
|--------------------------------|---------------------------------|--|--|
| bandwidth* | 622000 | bandwidth <i>kilobits</i> | Same. |
| clock source | line | clock source [<i>line</i> <i>internal</i>] | At least one side must be set to <i>internal</i> . |
| crc* | 32 | crc [<i>16</i> <i>32</i>] | Same. |
| encapsulation* | HDLC | encapsulation [<i>hdlc</i> <i>ppp</i>] | Same. |
| keepalive* | 10 second keepalive | [<i>no</i>] keepalive <i>period</i> | Same. |
| mtu* ¹ | 4470 | mtu <i>size</i> | Same. |
| pos framing | SONET | pos framing [<i>sonet</i> <i>sdh</i>] | Same. |
| pos scramble-atm | No scrambling | [<i>no</i>] pos scramble-atm | Same. |
| pos flag ² (| c2—0xcf j0—0x01 s1s0—0x00 | pos flag [<i>c2</i> <i>j0</i> <i>s1s0</i>] <i>value</i> | Same. |

1. mtu=maximum transmission unit
2. SONET overhead

MGX-10C12POS-IR Back Card Syntax

To specify an interface number in a configuration command, use the syntax in [Table 5-3](#) to identify interfaces on the MGX-10C12POS-IR back card.

Table 5-3 *MGX-10C12POS-IR Interface Syntax*

| Type of Interface | Bay/ (always 1) | Port |
|-------------------|-----------------|------|
| POS interface | 1/ | 0 |

The following example shows the syntax for configuring an MGX-10C12POS-IR back card.

```
Router(config)# interface pos 1/0
```

MGX-20C12POS Back Card Syntax

To specify an interface number in a configuration command, use the syntax in [Table 5-4](#) to identify interfaces on the MGX-20C12POS back card.

Table 5-4 *MGX-20C12POS Interface Syntax*

| Type of Interface | Bay/ (always 1) | Port |
|-------------------|-----------------|--------|
| POS interface | 1/ | 0 or 1 |

The following example shows the syntax for configuring an MGX-20C12POS back card.

```
Router(config)# interface pos 1/0
Router(config)# interface pos 1/1
```

Configuring the Interface

After you verify that the MGX-10C12POS-IR or MGX-20C12POS back card is installed correctly, use the following procedure to configure the new interface. Be prepared with the information you will need, such as the interface IP address.

The following procedure is for creating a basic configuration—Enabling an interface.

-
- Step 1** At the global configuration prompt, specify the new interface to configure by entering the **interface pos <bay/port>** command and interface address. For example,
- ```
Router(config)# interface pos 1/0
```
- Step 2** Assign an IP address and a subnet mask to the interface with the **ip address** configuration subcommand, as in the following example.
- ```
Router(config-if)# ip address 192.168.255.255 255.255.255.0
```
- Step 3** Specify either HDLC or PPP encapsulation. For example,
- ```
Router(config-if)# encapsulation hdlc
```



- Step 4** If necessary, modify the MGX-10C12POS-IR or MGX-20C12POS back card configuration or that of the remote device to ensure that, where appropriate, they use the same settings. For more information, see the “Remote Side Setting” column in the “[Back Card Default Values](#)” section on page 5-7.
- Step 5** Add any other configuration subcommands required for the enabling of routing protocols and adjust the interface characteristics.
- Step 6** Enter the **no shutdown** command to enable the interface.
- ```
Router(config-if)# no shutdown
```
- Step 7** When you have included all of the configuration subcommands to complete the configuration, press **Ctrl-Z** to exit configuration mode.
- Step 8** Write the new configuration to memory.
- ```
Router# copy running-config startup-config
```
- The system displays an OK message when the configuration is stored.
- 

After you complete your configuration, check it by entering the **show interface pos <bay/port>** command.

## Customizing the MGX-10C12POS-IR or MGX-20C12POS

The following sections present some of the commands that you can use to customize your MGX-10C12POS-IR or MGX-20C12POS back card configuration.

This section covers the following topics:

- [Setting the Clock Source](#)
- [Configuring Framing](#)
- [Specifying SONET Overhead](#)
- [Configuring POS SPE Scrambling](#)
- [Configuring Loopback Testing](#)

### Setting the Clock Source

At the prompt, set the internal or line clock source by entering the **clock source** command.

```
clock source [internal | line]
```

| Parameter       | Description                                       |
|-----------------|---------------------------------------------------|
| <b>internal</b> | Specifies that the internal clock source is used. |
| <b>line</b>     | Specifies that the network clock source is used.  |

The default is **clock source line**.

In this example, the back card is instructed to use a line clock source.

```
Router(config)# interface pos 1/0
Router(config-if)# clock source line
```

## Configuring Framing

You can use the **pos framing** command to set framing to SONET STS-3c or SDH STM-1 framing.

```
pos framing [sdh | sonet]
[no] pos framing
```

The default is SONET.

Make sure your system supports SDH before using this option.

Use the **no** form of the command to restore the default framing mode.

In the following example, the framing type is set to SONET.

```
Router(config)# interface pos 1/0
Router(config-if)# no pos framing
```

## Specifying SONET Overhead

You can use the **pos flag** command to assign values for specific elements of the frame header. This command is typically used to meet a standards requirement or to ensure interoperability with another vendor's equipment.

```
pos flag [c2 | j0 | s1s0 value]
[no] pos flag [c2 | j0 | s1s0 value]
```

| Parameter   | Description                                                                                                                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>c2</b>   | Specifies a path signal identifier, and <i>value</i> is one of the following: <ul style="list-style-type: none"> <li>0xCF for PPP or HDLC without scrambling</li> <li>0x16 for PPP or HDLC with scrambling</li> </ul> |
| <b>j0</b>   | Specifies the section trace byte, and <i>value</i> is 0x1 for interoperability with some SDH devices in Japan.                                                                                                        |
| <b>s1s0</b> | Designates part of the payload pointer byte, and <i>value</i> is one of the following: <ul style="list-style-type: none"> <li>0 for OC-3c</li> <li>2 for AU-4</li> </ul>                                              |

The default values are c2–0xCF, j0–0x01, and s1s0–0.

Use the **no** form of the command to restore the default values.

In the following example, the c2 bit is set to 0xCF.

```
Router(config)# interface pos 1/0
Router(config-if)# pos flag c2 0xCF
```

## Configuring POS SPE Scrambling

The **pos scramble-atm** command allows you to scramble the POS synchronous payload envelope (SPE). SONET payload scrambling applies a self-synchronous scrambler to the SPE of the interface to ensure sufficient bit transition density.

```
pos scramble-atm
[no] pos scramble-atm
```

The default is no POS SPE scrambling.

Use the **no** form of the command to disable scrambling.

In the following example, scrambling is enabled:

```
Router(config)# interface pos 1/0
Router(config-if)# pos scramble-atm
```

## Configuring Loopback Testing

To enable loopback testing of data transmitted from the front card to the MGX-10C12POS-IR or MGX-20C12POS back card and back, use the **loopback** command in interface configuration mode.

```
loopback [line | internal]
[no] loopback [line | internal]
```

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>line</b>     | Loops any inbound traffic received at the MGX-10C12POS-IR or MGX-20C12POS back card's network interface back into the network.<br><br><b>Note</b> Even though the inbound traffic is looped back towards the network, the inbound traffic continues to flow into the front card. Outbound traffic (from the front card) is silently dropped by the back card's network interface.      |
| <b>internal</b> | Loops any outbound traffic received at the MGX-10C12POS-IR or MGX-20C12POS back card's network interface back into the front card.<br><br><b>Note</b> Even though the outbound traffic is looped back towards the front card, the outbound traffic continues to flow towards the network. Inbound traffic (from the network) is silently dropped by the back card's network interface. |

Use the **no** form of the command to stop the loopback test.

In the following example, a loopback is set for the MGX-10C12POS-IR or MGX-20C12POS back card:

```
Router(config)# interface pos 1/0
Router(config-if)# loopback line
```

## Example Configuration

The following is an example of configuration file commands for a Cisco RPM-XF with an MGX-10C12POS-IR or MGX-20C12POS back card (Router 1) connected back-to-back with a Cisco 12000 series router with an OC-12c/STM-4c Layer 3 POS back card in slot 3 (Router 2).

Router 1:

```
interface pos 1/0
ip address 10.1.2.4 255.0.0.0
clock source line
no shutdown
no keepalive
no cdp enable
crc 32
Router 2:
```

```
interface pos 3/0
ip address 10.1.2.3 255.0.0.0
clock source internal
no shutdown
no keepalive
no cdp enable
no ip mroute-cache
crc 32
```

## Checking System Status

Each back card maintains information about its configuration, traffic, errors and so on. You can access this information by entering the **show** commands. Following are descriptions and examples of show commands that display back card information and status.

Enter the **show interface pos <bay/port>** command to show general information about the interface, as shown in the following example.

```
Router# show interface pos 1/0
POS1/0 is up, line protocol is up
 Hardware is Skystone 4302 Sonet Framer
 Internet address is 1.1.100.2/24
 MTU 4470 bytes, BW 622000 Kbit, DLY 100 usec,
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation HDLC, crc 32, loopback not set
 Keepalive set (10 sec)
 Scramble disabled
 Last input 00:00:02, output 00:00:07, output hang never
 Last clearing of "show interface" counters 00:00:16
 Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
 Queueing strategy: fifo
 Output queue :0/40 (size/max)
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
 0 packets input, 0 bytes, 0 no buffer
 Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 0 packets output, 0 bytes, 0 underruns
 0 output errors, 0 collisions, 0 interface resets
 0 output buffer failures, 0 output buffers swapped out
 0 carrier transitions
```

Use the **show controller pos <bay/port >** command to show controller-specific information about the interface, as shown in the following example. For the MGX-10C12POS-IR or MGX-20C12POS back card, this includes information such as, which SONET alarms are currently active, the SONET information received from the remote end, and the SONET configuration parameters.

```
Router# show controller pos 1/0

POS1/0
SECTION
 LOF = 0 LOS = 0 BIP(B1) = 0
LINE
 AIS = 0 RDI = 0 FEBE = 0 BIP(B2) = 0
PATH
 AIS = 0 RDI = 0 FEBE = 0 BIP(B3) = 0
 LOP = 0 NEWPTR = 0 PSE = 0 NSE = 0

Active Defects: None
Active Alarms: None
Alarm reporting enabled for: SF SD SLOS SLOF B1-TCA LAIS LRDI B2-TCA PAIS PLOP PRDI PUNEQ
B3-TCA

Framing: SONET
OVERHEAD BYTES
 S1/S0 = 0, C2 = CF
CLOCK RECOVERY
 RDOOL = 0
 State: RDOOL_state = False
PATH TRACE BUFFER: STABLE
 Remote hostname : Router
 Remote interface: POS1/0
 Remote IP addr : 0.0.0.0
 Remote Rx(K1/K2): B1/32 Tx(K1/K2): 08/00

BER thresholds: SF = 10e-3 SD = 10e-6
TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6

Clock source: internal
```

## Troubleshooting the Back Card

The following table describes the LEDs on the MGX-10C12POS-IR or MGX-20C12POS back card. Follow the instructions in [Table 5-5](#) to troubleshoot the installation.

| LED           | Status | Description                               |
|---------------|--------|-------------------------------------------|
| LINK          | Green  | Carrier detected.                         |
|               | Off    | Carrier not detected.                     |
| TX (transmit) | Green  | Transmitting traffic.                     |
|               | Off    | Not transmitting traffic.                 |
| RX (receive)  | Green  | Receiving traffic.                        |
|               | Off    | Not receiving traffic.                    |
| FAIL          | Yellow | Major failure has disabled the back card. |
|               | Off    | Back card is operating properly           |

**Table 5-5** *MGX-10C12POS-IR or MGX-20C12POS Installation Troubleshooting*

| Symptom                                                                   | Possible Cause                            | Corrective Action                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The back card fail LED does not light during the power-on self-test.      | The back card is not properly seated.     | Be sure the ejector levers are fully closed and that the captive screws have been tightened.                                                                                                                                         |
|                                                                           | Bad back card slot or midplane connector. | Remove the back cards (upper and lower slots) and the front card and install them into another chassis slot.                                                                                                                         |
| Back card initialization fails.                                           | Bad back card slot or midplane connector. | Remove the back cards (upper and lower slots) and the front card and install them into another chassis slot.                                                                                                                         |
|                                                                           | Bad back card.                            | Replace the back card.                                                                                                                                                                                                               |
|                                                                           | Bad front card.                           | Replace the front card.                                                                                                                                                                                                              |
| The interface does not come up or constantly comes up and then goes down. | Configuration mismatched.                 | Check the configuration on both sides. (Refer to the <a href="#">“Software Configuration”</a> section on page 5-6 for more information.)                                                                                             |
|                                                                           | Cables connected incorrectly.             | Check the cabling on both sides. Ensure the receive is connected to the transmit on the remote end and vice versa.                                                                                                                   |
|                                                                           | Bad cables.                               | Replace the cables. Ensure your cabling meets the specifications in the <a href="#">“MGX-10C12POS-IR Overview and Features”</a> section on page 5-1 or the <a href="#">“MGX-20C12POS Overview and Features”</a> section on page 5-3. |