



# Perle 10/100/1000 Ethernet Media Converter Module

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## Installation Guide

<b>C-1110-XXXXX</b>	<b>Unmanaged Module</b>
<b>CM-1110-XXXXX</b>	<b>Managed Module</b>
<b>C-1110-SFP</b>	<b>Unmanaged Module</b>
<b>CM-1110-SFP</b>	<b>Managed Module</b>



P/N 5500308-20

# Overview

This document contains instructions necessary for the installation and operation of the Perle 10/100/1000 Media Converter Module(s) (C-1110 and CM-1110) to be used in conjunction with a Perle MCR chassis. The C-1110's are unmanaged media converter modules, and the CM-1110's are the managed versions. These products convert a 10/100/1000Base-T cable connection (copper) to a 1000Base-X connection (fiber). The fiber connection can be either single mode (SM) or multimode (MM) and can operate over different wavelengths and distances, depending on the model selected (see table below).

Model	Connector (xx)	Mode - Distance	Wavelength
C-1110-M2xx05 CM-1110-M2xx05	SC/ST/LC	MM - 550 m/1804 ft.	850/850 nm
C-1110-M2xx2 CM-1110-M2xx2	SC/ST/LC	MM - 2 km/1.2 mi.	1310/1310 nm
C-1110-S2xx10 CM-1110-S2xx10	SC/ST/LC	SM - 10 km/6.2 mi.	1310/1310 nm
C-1110-S1SC10U CM-1110-S1SC10U	SC	SM - 10 km/6.2 mi.	1310/1490 nm
C-1110-S1SC10D CM-1110-S1SC10D	SC	SM - 10 km/6.2 mi.	1490/1310 nm
C-1110-S1SC20U CM-1110-S1SC20U	SC	SM - 20 km/12.4 mi.	1310/1490 nm
C-1110-S1SC20D CM-1110-S1SC10D	SC	SM - 20 km/12.4 mi.	1490/1310 nm
C-1110-S2xx40 CM-1110-S2xx40	SC/ST/LC	SM - 40 km/25 mi.	1310/1310 nm
C-1110-S1SC40U CM-1110-S1SC40U	SC	SM - 40 km/25 mi.	1310/1490 nm
C-1110-S1SC40D CM-1110-S1SC40D	SC	SM - 40 km/25 mi.	1490/1310 nm
C-1110-S2xx70 CM-1110-S2xx70	SC/ST/LC	SM - 70 km/43.5 mi.	1550/1550 nm
C-1110-S1SC80U CM-1110-S1SC80U	SC	SM - 80 km/50 mi.	1510/1590 nm

Model	Connector (xx)	Mode - Distance	Wavelength
C-1110-M2xx05 CM-1110-M2xx05	SC/ST/LC	MM - 550 m/1804 ft.	850/850 nm
C-1110-M2xx2 CM-1110-M2xx2	SC/ST/LC	MM - 2 km/1.2 mi.	1310/1310 nm
C-1110-S2xx10 CM-1110-S2xx10	SC/ST/LC	SM - 10 km/6.2 mi.	1310/1310 nm
C-1110-S1SC10U CM-1110-S1SC10U	SC	SM - 10 km/6.2 mi.	1310/1490 nm
C-1110-S1SC10D CM-1110-S1SC10D	SC	SM - 10 km/6.2 mi.	1490/1310 nm
C-1110-S1SC20U CM-1110-S1SC20U	SC	SM - 20 km/12.4 mi.	1310/1490 nm
C-1110-S1SC20D CM-1110-S1SC10D	SC	SM - 20 km/12.4 mi.	1490/1310 nm
C-1110-S2xx40 CM-1110-S2xx40	SC/ST/LC	SM - 40 km/25 mi.	1310/1310 nm
C-1110-S1SC40U CM-1110-S1SC40U	SC	SM - 40 km/25 mi.	1310/1490 nm
C-1110-S1SC40D CM-1110-S1SC40D	SC	SM - 40 km/25 mi.	1490/1310 nm
C-1110-S2xx70 CM-1110-S2xx70	SC/ST/LC	SM - 70 km/43.5 mi.	1550/1550 nm
C-1110-S1SC80D CM-1110-S1SC80D	SC	SM - 80 km/50 mi.	1590/1510 nm
C-1110-S2xx120 CM-1110-S2xx120	SC/ST/LC	SM - 120 km/75 mi.	1550/1550 nm
C-1110-S1SC120U CM-1110-S1SC120U	SC	SM - 120 km/75 mi.	1510/1590 nm
C-1110-S1SC120D CM-1110-S1SC120D	SC	SM - 120 km/75 mi.	1590/1510 nm
C-1110-S2xx160 CM-1110-S2xx160	SC/ST/LC	SM - 160 km/100 mi.	1550/1550 nm
C-1110-SFP CM-1110-SFP	SFP	<b>Note 1</b>	

**Note 1:** Fiber characteristics will vary by SFP Fiber module.

Refer the Perle web site for the most up to date Installation guides, models and specifications. <http://www.perle.com/>

# Installation

The module comes equipped with a bank of DIP switches and jumpers for setting configuration. The default dip switch settings (all switches UP) and default jumper settings will work for most installations. For information on the management options of the CM-1110 module, refer to the MCR-MGT Module User's Guide.

The following steps are used to configure the Perle 10/100/1000 Ethernet Media Converter Module:

1. Insert SFP Module. (SFP Models only)
2. Set the Auto-MDIX jumper setting. (optional).
3. Set the Auto-Config jumper. (CM-1110 only) (optional)
4. Set the DIP switch settings (optional).
5. Insert the Media Converter Module into the chassis.
6. Connect the copper cable.
7. Connect the fiber cable.

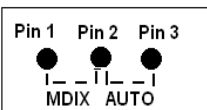
## Auto-MDIX Jumper

**Note:** The factory settings for Auto-MDIX will work for most installations, but if a settings change is needed, follow the procedure below.

The AUTO-MDIX jumper (J6) is located on the upper edge, at the midpoint of the module (see diagram below for labelling). By covering or strapping pins 2 and 3(AUTO), the C-1110 and CM-1110 will automatically detect the Ethernet cable's polarity and configure itself as either an MDI or an MDIX device. By covering or strapping pins 1 and 2(MDIX), the C-1110 and CM-1110 will operate as an MDIX device

Removing the strapping is the same as AUTO.

**Note:** The default jumper setting is AUTO



# Auto-Config Jumper (CM-1110 only)

The Auto-Config jumper (J5) is located just above the Auto-MDIX jumper (see above). Refer to the diagram below for labelling. This jumper only applies to CM-1110 modules.

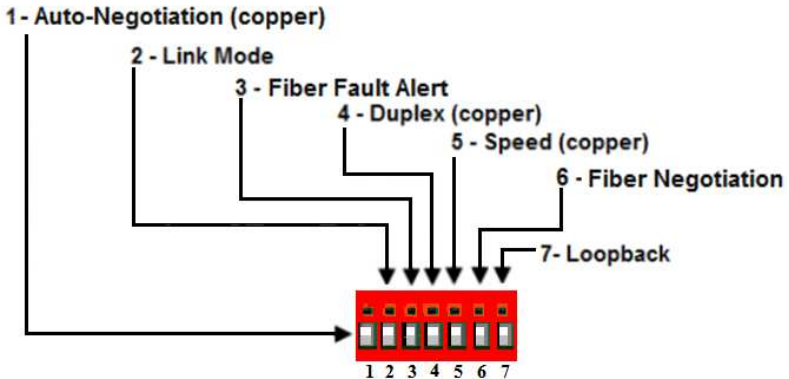
Strapping pins 1 and 2 of the jumper will set the module in SW mode and strapping pins 2 and 3 will set it in Auto Config mode.

**Auto:** When set to Auto the module will, at power-up, check its internal flash memory to see if configuration information has been downloaded to it from a management module. If so, it will use this as its running configuration. If there is no configuration in flash it will read the settings of the DIP switches and use those as its running configuration.

**SW:** When set to SW (Switch), the module will, at power-up, read the settings of the DIP Switches and use those as its running configuration. It will ignore any configuration information in its flash memory.

**Note:** The default jumper setting is Auto

## Dip Switches



## ***Auto Negotiation copper (Switch 1)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	Auto
Down	Off

**Note:** Auto negotiation should only be turned off, if the copper link partner does not support Auto Negotiation and fixed settings are required by the copper link partner.

**Auto:** When enabled, the Media Converter Module will negotiate with its link partner to determine the most optimal parameters for this connection. The C-1110 and CM-1110 will advertise capabilities of 10,100 and 1000 Mbps, full and half duplex as well as pause, and remote fault capabilities to the link partner.

If the copper link partner does not support Auto negotiation, the C-1110 and CM-1110 will parallel detect to 10 or 100 Mbps and force Half Duplex mode as per IEEE specifications.

**Off:** When the Auto Negotiation switch is set to the OFF position, the Media Converter Module will not negotiate the Ethernet parameters with the copper link partner. The parameters used by the Media Converter Module will be determined by the Duplex (switch 4) and Speed (switch 5) DIP switch settings.

## ***Link Mode (Switch 2)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	Smart Link Pass-Through Mode
Down	Standard Mode

**Smart Link Pass-Through:** In this mode, the link state on one connection is directly reflected through the Media Converter Module to the other connection. If link is lost on one of the connections, then the other link will be brought down by the Media Converter Module.

With Media Converters on both ends of the fiber link and both setup for Link Pass-Through, a loss of copper link on the far end device will propagate through both Converters and will result in a

loss of copper link at the near end device. This would, in effect, resemble a direct copper connection.

**Standard Mode:** In this mode, the links on the fiber and copper sides can be brought up and down independently of each other. A loss of link on either the fiber or copper port can occur without affecting the other connection.

### ***Fiber Fault Alert (Switch 3)***

Switch Position	Mode
Up (default)	Enabled
Down	Disabled

**Enabled:** If the Media Converter Module detects a loss of signal on the fiber receiver, it will immediately disable its fiber transmitter signal. This, in effect, notifies the fiber link partner that an error condition exists on the fiber connection.

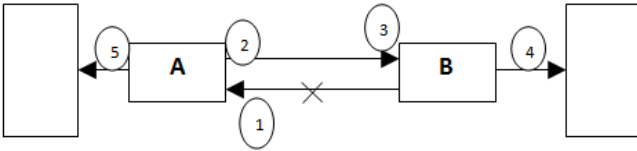
If the remote Media Converter is set up for Fiber Fault Alert (FFA) and the local Media Converter is set up with Link Pass-Through, a loss of fiber link on either the transmit or receive line will be passed through to the local copper connection thus notifying the connected device.

If the Media Converter has been set to Smart Link Pass-Through mode, the effect will be the same as FFA, since the link loss on the fiber receiver will result in bringing down the copper link, which will in turn cause the transmit fiber link to be brought down.

**Note:** This feature only takes effect if Fiber Negotiation has been turned off.

**Disabled:** The Media Converter Module will not monitor for or generate Fiber Fault Alert.

The following diagram is an illustration of the operation of this feature.



**(A)** – Remote Media Converter setup for Fiber Fault Alert Enabled, Fiber Negotiation – OFF and Link Mode – Standard.

**(B)** – Local Media Converter setup for Fiber Fault Alert -Enabled, Smart Link Pass-Through - Enabled and Fiber Negotiation - OFF

**(A)** Loses fiber connection on its receiver.

**(A)** Disables fiber transmitter.

**(B)** Detects loss of link on its fiber receiver.

**(B)** Drops link on copper connection because Smart Link Pass-Through is configured.

**(A)** Link on copper connection is not affected because Smart Link Mode is set to Standard.

### ***Duplex copper (Switch 4)***

Switch Position	Mode
Up (default)	Full
Down	Half

**Note:** When Auto Negotiation (SW1) is set to Off, the Media Converter will use this Duplex setting for its copper connection.

**Up:** The Media Converter Module will be set to Full Duplex mode.

**Down:** The Media Converter Module will be set to Half Duplex mode.



## ***Speed copper (Switch 5)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	100
Down	10

**Note** When Auto Negotiation (SW1) is set to Off, the Media Converter Module will use this switch setting for its Ethernet copper speed setting.

**Up:** The Media Converter will be fixed at 100 Mbps.

**Down:** The Media Converter will be fixed at 10 Mbps.

## ***Fiber Negotiation (Switch 6)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	Auto
Down	Off

**Up:** The Media Converter will negotiate Ethernet parameters on the fiber connection. This will ensure that the most optimal connection parameters will be in effect. If connecting to another Perle Media Converter, this parameter should be set to Auto. The Media Converter Module will advertise 1000Mbps, Full and Half Duplex, no Pause.

**Down:** The Media Converter Module's fiber will be fixed to 1000Mbps, Full Duplex.

## ***When using a 100 Mbit SFP module Full/Half Duplex on Fiber (Switch 6)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	Full
Down	Half

**Up:** The Media Converter Module will be set to Full Duplex mode on its fiber link.

**Down:** The Media Converter Module will be set to Half Duplex mode on its fiber link.

## ***Loopback (Switch 7)***

<b>Switch Position</b>	<b>Mode</b>
Up (default)	Disabled
Down	Enabled

**Disabled:** This is the setting for normal operation. The switch must be set to this position in order for data to pass through the Media Converter Module.

**Enabled:** This is a test mode. All data received on the receive (RX) fiber connection is looped back to the transmit (TX) fiber connection. The state of the copper link is not relevant since no data is passed through to the copper side. This mode will override all other switch settings.

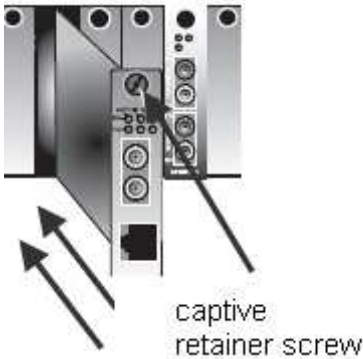
## ***Installing or Replacing Media Converter Modules***

**Caution:** Observe electrostatic discharge precautions when installing the Media Converter Module(s) into the Chassis. Failure to observe this caution could result in damage to the Media Converter Module(s) and /or chassis.

The Perle Media Converter Modules can be installed in any available slot and in any order within the chassis.

1. Remove the Media Converter Module from its packaging.
2. Using a cross-head screwdriver, remove the screw holding the face plate to the Chassis to reveal the slot opening.
3. Set the jumpers and DIP switches on the Media Converter Module to the desired operating mode.
4. Locate the top and bottom alignment guides inside the Chassis.
5. Using the module alignment guides gently slide the module into the slot until it becomes flush with the front of the Chassis. Light pressure may be needed to seat the module. Do not force the module as you might cause some damage. If there is resistance, remove the module, check the module connector for damaged or incorrectly aligned pins, if there is no damage, retry to insert the module.

6. Tighten the captive retainer screw to ensure the Media Converter Module is locked in place.
7. Remove the dust cap from the fiber connector and connect the fiber and copper cables.



## ***Removing Media Converter Modules***

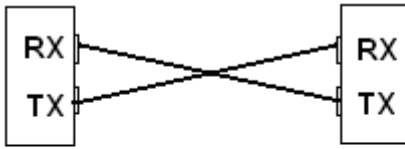
1. Loosen the captive retainer screw on the front of the Media Converter Module and gently pull the Media Converter Module out.
2. If not inserting a replacement, cover the opening slot with a face plate and secure the screw.

## ***Installing the SFP Fiber Module***

1. C-1110-SFP and CM-1110-SFP require an SFP fiber module. Locate appropriate fiber module and insert into opening.
2. Ensure the SFP module is properly seated.
3. SFP module may be inserted before or after the Media Converter module is inserted into the chassis.
4. Proceed with cable connections.

## ***Installing the Duplex Fiber Cable***

1. Locate a 1000Base-X compliant duplex (2 strands) fiber cable with appropriate connectors.
2. Connect the fiber cables from the Media Converter to the other Media Converter/switch/fiber device ensuring that the RX and TX are reversed (crossed) at the opposite end.



Perle Media  
Converter  
Module

Perle Media  
Converter  
Module

## ***Installing the Simplex Fiber Cable***

1. Locate a 1000Base-X compliant simplex (1 strand) fiber cable with appropriate connectors.
2. Connect the fiber cable from the Media Converter Module to the other Media Converter/switch/fiber device.

## ***Installing the Copper Cable***

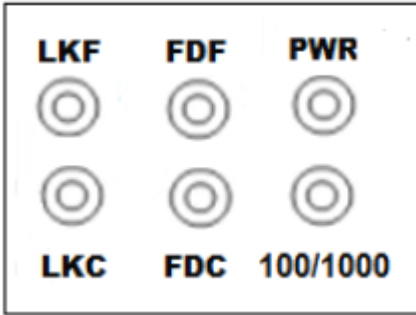
1. Locate 10/100/1000Base-T compliant copper cables with male, RJ-45 connectors installed at both ends.
2. Connect the RJ-45 cable between the Perle Media Converter Module and the device.

**Note:** The Perle Media Converter Module supports Auto-MDIX which allows a straight-through or cross-over Ethernet cable. See page 4 in this guide for jumper positions.

# Operation

## Status LED

The C(M)-1110 Module has six status LEDs located on the face plate of the module.



### PWR

**On** – Power is on; module is operating normally

**Blinking (slow)** – The module is in Loopback mode.

**Blinking (fast)** – The module has a hardware failure.

### FDF (fiber)

**On** – Full Duplex Mode.

**Off** – Half Duplex Mode.

### LKF (fiber)

**On** – Fiber link is present.

**Off** – No fiber link present.

**Blinking (slow)** – Copper link down but fiber link appears functional.

**Blinking (fast)** – Fiber link is up and receiving data.

### 100/1000 (copper speed)

**Green** – 1000 Mbps

**Yellow** – 100 Mbps.

**Off** – 10 Mbps (if link is present).

### FDC (copper duplex)

**On** – Full Duplex Mode.

**Off** – Half Duplex Mode.

### LKC (copper)

**On** – Copper link is present.

**Off** – No copper link present.

**Blinking (slow)** – Fiber link down but copper link appears functional.

**Blinking (fast)** – Copper link is up and receiving data

# Other Features

## ***Auto-MDIX***

Auto-MDIX (automatic medium-dependent interface crossover) detects the signalling on the 10/100/1000BASE-T interface to determine the type of cable connected (straight-through or crossover) and automatically configures the connection.

## ***Error Recovery***

In certain configurations, and under specific conditions where the Media Converter Module brings down a link to convey status, there is potential for a deadlock. Recovery is achieved by momentarily restoring the link to see if the original failure has been resolved. If it has not, the link will be forced down again, however if the original problem has been resolved, the link will be restored.

## ***Pause (IEEE 802.3xy)***

Integrated Pause signalling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed. The Perle Media Converter Module can generate and respond to Pause messages.

# Troubleshooting

## **General**

- Ensure that the Media Converter Module is securely seated in the chassis.
- Ensure both devices on either end of the fiber are compatible. If using a simplex fiber connection, ensure that you have both an Upstream (U) and Downstream (D) Media Converter.
- Ensure all cabling is of the correct type and is in good working order.
- For duplex fiber connections, ensure the RX and TX has been reversed between the two Media Converters.

## **No connectivity**

If unable to get full connectivity with all DIP switches in the UP position these methods are recommended for troubleshooting.

### **Method 1**

1. If the Module is a CM-1110, set the Auto-Config jumper (J5) to SW so that DIP switches are being read.
2. Set the Link mode to Standard (SW2 – Down) on both Media Converters. Leave all other switches in the Up position.
3. Connect the near end device to the copper connection. The LKC LED indicates good copper connection. If the LKC LED is not lit, then check the copper cable and the attached device. Repeat for the far end Media Converter.
4. Connect the fiber cable to both Media Converters. The LKF LED indicates good fiber connection. If no LKF LED then check the fiber cabling.
5. Return converters to their desired configuration.

### **Method 2:**

Configure the remote Media Converter for loopback mode. The LKF LEDs on both Media Converters Modules should be lit. Data should pass through the local converter, over the fiber connection to the remote Media Converter. At the remote Media Converter, the data will be looped back and passed through the fiber, back to the local Media Converter Module and passed to the copper link.

# Technical Specifications

<b>Power Input/Consumption:</b>	12V DC / 2.6 W
<b>Operating Temperature:</b>	0 °C to 50 °C (32 °F to 122 °F)
<b>Storage Temperature:</b>	-25 °C to 70 °C (-13 °F to 158 °F)
<b>Operating Humidity:</b>	5% to 90% non-condensing
<b>Storage Humidity:</b>	5% to 95% non-condensing
<b>Operating Altitude:</b>	Up to 3,048 m (10,000 ft)
<b>MTBF: (C-1110)</b>	534,120 hours
(C-1110-SFP)	636,848 hours (without SFP)
(CM-1110)	520,375 hours
(CM-1110-SFP)	617,404 hours (without SFP)

# Fiber Optic Specifications

Model	Mode	Wavelength (nm)	TX Power (dB)	RX Power (dB)	Budget (dB)
C-1110-M2xx05 CM-1110-M2xx05	MM	TX: 850 RX: 850	Min: -9.5 Max: -4	Min: -17 Max: -3	7.5
C-1110-M2xx2 CM-1110-M2xx2	MM	TX: 1310 RX:1310	Min: -6 Max: -0	Min: -17 Max: -3	11
C-1110-S2xx10 CM-1110-S2xx10	SM	TX: 1310 RX:1310	Min: -9.5 Max: -3	Min: -20 Max: -3	10.5
C-1110-S1SC10U CM-1110-S1SC10U	SM	TX: 1310 RX:1490	Min: -9 Max: -3	Min: -20 Max: -3	11
C-1110-S1SC10D CM-1110-S1SC10D	SM	TX:1490 RX:1310	Min: -9 Max: -3	Min: -20 Max: -3	11
C-1110-S1SC20U CM-1110-S1SC10U	SM	TX: 1310 RX:1490	Min: -8 Max: -3	Min: -22 Max: -3	14
C-1110-S1SC20D CM-1110-S1SC10D	SM	TX:1490 RX:1310	Min: -8 Max: -3	Min: 22 Max: -3	14
C-1110-S2SC40 CM-1110-S2SC40	SM	TX: 1310 RX:1310	Min: -3 Max: 5	Min: -23 Max: -3	20
C-1110-S2ST40 CM-1110-S2ST40	SM	TX: 1310 RX:1310	Min: -3 Max: 5	Min: -23 Max: -3	20



Model	Mode	Wavelength (nm)	TX Power (dB)	RX Power (dB)	Budget (dB)
C-1110-S2LC40 CM-1110-S2LC40	SM	TX: 1310 RX:1310	Min: -3 Max: 2	Min: -23 Max: -3	20
C-1110-S1SC40U CM-1110-S1SC40U	SM	TX: 1310 RX:1490	Min: -3 Max: 2	Min: -23 Max: -3	14
C-1110-S1SC40D CM-1110-S1SC40D	SM	TX:1490 RX:1310	Min: -2 Max: -3	Min: 23 Max: -3	14
C-1110-S2SC70 CM-1110-S2SC70	SM	TX: 1550 RX:1550	Min: -2 Max: 5	Min: -23 Max: -3	21
C-1110-S2ST70 CM-1110-S2ST70	SM	TX: 1550 RX:1550	Min: 0 Max: 5	Min: -23 Max: -3	23
C-1110-S2LC70 CM-1110-S2LC70	SM	TX: 1550 RX:1550	Min: 0 Max: 5	Min: -23 Max: -3	23
C-1110-S1SC80U CM-1110-S1SC80U	SM	TX: 1510 RX:1590	Min: -2 Max: 3	Min: -26 Max: -3	24
C-1110-S1SC80D CM-1110-S1SC80D	SM	TX:1590 RX:1510	Min: -2 Max: -3	Min: 23 Max: -3	14
C-1110-S2xx120 CM-1110-S2SC120	SM	TX: 1550 RX:1550	Min: 0 Max: 5	Min: -32 Max: -9	32
C-1110-S1SC120U CM-1110-S1SC120U	SM	TX: 1510 RX:1590	Min: -2 Max: 3	Min: -26 Max: -3	24
C-1110-S1SC120D CM-1110-S1SC120D	SM	TX:1590 RX:1510	Min: -2 Max: -3	Min: 23 Max: -3	14
C-1110-S2xx160 CM-1110-S2xx160	SM	TX: 1550 RX:1550	Min: 0 Max: 5	Min: -32 Max: -9	32
C-1110-SFP CM-1110-SFP	SFP	<b>Note 1</b>			

**Note 1:** Fiber characteristics will vary by SFP Fiber module.

## ***Fiber Cabling Requirements***

**MM:** 50/125 microns or 62.5/125 microns

**SM:** 9/125 microns

## ***Ethernet Copper Cabling Requirements***

Category 5 UTP or STP

24-22 AWG

Straight through or Ethernet crossover

## Compliance Information

### FCC

This product has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this Guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

### EN 55022, Class A

**WARNING** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### EN 55024, Class A

### Laser Safety – IEC 60825-1:2007

This product meets Class I Laser safety requirements per IEC-60825-1:2007 standard and complies with FDA/CDRH 21 CFR1040.10 and 21 CFR1040.11.

**WARNING:** Visible and invisible laser radiation may be present when cables are not connected. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

**WARNING:** Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

## Warranty / Registration

Perle's standard Lifetime Warranty provides customers with return to factory repairs for Perle products that fail under the conditions of the warranty coverage. Details can be found at:

[http://www.perle.com/support\\_services/warranty.shtml](http://www.perle.com/support_services/warranty.shtml)

## Contacting Technical Support

Contact information for the Perle Technical Assistance Center (PTAC) can be found at the link below. A Technical Support Query may be made via this web page.

[www.perle.com/support\\_services/support\\_request.shtml](http://www.perle.com/support_services/support_request.shtml)

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