Implementation Options

This chapter contains the following sections:

LED Definitions

LED functionality is provided by a dedicated SPI controller for driving two LED shift chains for driving the LEDs on the integrator's board. The first LED shift chain connects all of the LEDs associated with the Main Board. The second LED shift chain connects all of the LEDs associated with the Expansion Board. You can select any combination of LEDs listed in the following table to implement. You are not required to implement all of the LEDs.

Note Both shift chains are optional. If you want any functionality from a given shift chain, then you must provide the entire shift chain. For example, if you want the copper LEDs on the Expansion Module shift chain, you must also populate the shift register associated with the SFPs interfaces.

LED	Color	Description
System See Note below for further details about bootup behavior.	Off	System is not powered on.
	Flashing Green	Power on tests in progress.
	Green	System is operating normally.
	Yellow	System fault detected.
Power	Off	Power is not present or unit failed memory test.
	Green	System is powered on.
Alarm Out	Off	Alarm is not configured.
	Solid Green	Alarm Out is configured, no alarm detected.
	Flashing Red	Switch has detected a major alarm.
	Solid Red	Switch has detected a minor alarm.
Port	Off	No link or the port was administratively shut down.
	Green	Link is present; no activity
	Flashing Green	Activity. The port is sending or receiving data.
	Alternating Green and Yellow	Link fault. Error frames can affect connectivity. Errors such as excessive collisions, cyclic redundancy check (CRC), and alignment and jabber errors are monitored for link-fault indication.
	Yellow	Port is disabled.

LED	Color	Description
PoE	Off	PoE is off. If the powered device is receiving power from a non-PoE power source, the port LED is off even if the powered device is connected to the switch port.
	Green	PoE is on. The port LED is green only when the PoE port is providing power.
	Alternating Green and Amber	PoE is denied because providing power to the powered device will exceed the switch power capacity.
	Flashing Amber	PoE is off due to a fault. **Caution** Non-compliant cabling or powered devices can cause a PoE port fault. Use only standard compliant cabling to connect Cisco pre-standard IP Phones and wireless access points or IEEE 802.3af-compliant devices. You must remove any cable or device that causes a PoE fault.
	Amber	PoE for the port is disabled. (PoE is enabled by default).
Zeroize	Off	Normal operation.
	Flashing Green	Factory default procedure has been initiated.
	Yellow	When the Factory default procedure has failed.
	Green	When the factory default procedure has completed and the switch is in rommon prompt post Zeroize process.

Note The System LED will be solid green once the unit is booted up into IOS. That is the expected behavior. The LED should stop blinking shortly after the “Taking LC1 out of reset” text if you do not have an Expansion module. If you have an expansion module, the LED will stop blinking shortly after the “Taking LC3 out of reset” text.

Main Board LED Register Bits

Note Express Setup is not supported on the ESS3300 since the push button input and corresponding LED’s are dedicated to the Zeroize feature. Since the ESS3300 and IE3300 share a common architecture, any reference to Express Setup is reused for the Zeroize feature in the context of the ESS3300.

The following table provides a listing of the Main Board LED register bits for the system integrator.

GPIO Position	LED Function
0 (Least Significant bit in byte, last to shift out)	SYS Yellow LED

GPIO Position	LED Function
1	SYS Green LED
2	Express Setup Yellow LED
3	Express Setup Green LED
4	PoE Yellow LED
5	PoE Green LED
6	DC-A Yellow LED
7 (Most Significant bit in byte, First to shift out)	DC-A Green LED
8 (Least Significant bit in byte, last to shift out)	DC-B Yellow LED
9	DC-B Green LED
10	Reserved Yellow LED
11	Reserved Green LED
12	SFP Te1/1 Yellow LED
13	SFP Te1/1 Green LED
14	SFP Te1/2 Yellow LED
15 (Most Significant bit in byte, First to shift out)	SFP Te1/2 Green LED
16 (Least Significant bit in byte, last to shift out)	SFP Gi1/3 Yellow LED (i.e. Combo Port 1, SFP
17	SFP Gi1/3 Green LED (i.e. Combo Port 1, SFP
18	SFP Gi1/4 Yellow LED (i.e. Combo Port 2, SFP)
19	SFP Gi1/4 Green LED (i.e. Combo Port 2, SFP)
20	SFP Gi1/5 Yellow LED (i.e. Combo Port 3, SFP)
21	SFP Gi1/5 Green LED (i.e. Combo Port 3, SFP)
22	SFP Gi1/6 Yellow LED (i.e. Combo Port 4, SFP
23 (Most Significant bit in byte, First to shift out)	SFP Gi1/6 Green LED (i.e. Combo Port 4, SFP
24 (Least Significant bit in byte, last to shift out)	Gi1/3 Yellow LED (i.e. Combo Port 1, Cu)
25	Gi1/3 Green LED (i.e. Combo Port 1, Cu
26	Gi1/4 Yellow LED (i.e. Combo Port 2, Cu)
27	Gi1/4 Green LED (i.e. Combo Port 2, Cu)
28	Gi1/5 Yellow LED (i.e. Combo Port 3, Cu)

GPIO Position	LED Function
29	Gi1/5 Green LED (i.e. Combo Port 3, Cu)
30	Gi1/6 Yellow LED (i.e. Combo Port 4, Cu)
31 (Most Significant bit in byte, First to shift out)	Gi1/6 Green LED (i.e. Combo Port 4, Cu)
32 (Least Significant bit in byte, last to shift out)	Gi1/7 Yellow LED
33	Gi1/7 Green LED
34	Gi1/8 Yellow LED
35	Gi1/8 Green LED
36	Gi1/9 Yellow LED
37	Gi1/9 Green LED
38	Gi1/10 Yellow LED
39 (Most Significant bit in byte, First to shift out)	Gi1/10 Green LED
40	Alarm Out / Overtemp Yellow LED
41	Alarm Out / Overtemp Green LED
42	Alarm In 1 Yellow LED
43	Alarm in 1 Green LED
44	Alarm In 2 Yellow LED
45	Alarm In 2 Green LED
46	Reserved Yellow LED
47	Reserved Green LED

Expansion Board LED Register Bits

The following table provides a listing of the Expansion Board LED register bits for the system integrator.

GPIO Position	LED Function
0 (Least Significant bit in byte, last to shift out)	Gi2/1 Yellow LED
1	Gi2/1 Green LED
2	Gi2/2 Yellow LED
3	Gi2/2 Green LED
4	Gi2/3 Yellow LED

GPIO Position	LED Function
5	Gi2/3 Green LED
6	Gi2/4 Yellow LED
7 (Most Significant bit in byte, First to shift out)	Gi2/4 Green LED
8 (Least Significant bit in byte, last to shift out)	Gi2/5 Yellow LED
9	Gi2/5 Green LED
10	Gi2/6 Yellow LED
11	Gi2/6 Green LED
12	Gi2/7 Yellow LED
13	Gi2/7 Green LED
14	Gi2/8 Yellow LED
15 (Most Significant bit in byte, First to shift out)	Gi2/8 Green LED
16 (Least Significant bit in byte, last to shift out)	Gi2/9 Yellow LED
17	Gi2/9 Green LED
18	Gi2/10 Yellow LED
19	Gi2/10 Green LED
20	Gi2/11 Yellow LED
21	Gi2/11 Green LED
22	Gi2/12 Yellow LED
23 (Most Significant bit in byte, First to shift out)	Gi2/12 Green LED
24 (Least Significant bit in byte, last to shift out)	Gi2/13 Yellow LED
25	Gi2/13 Green LED
26	Gi2/14 Yellow LED
27	Gi2/14 Green LED
28	Gi2/15 Yellow LED
29	Gi2/15 Green LED
30	Gi2/16 Yellow LED
31 (Most Significant bit in byte, First to shift out)	Gi2/16 Green LED
32 (Least Significant bit in byte, last to shift out)	SFP Gi2/3 Yellow LED

GPIO Position	LED Function
33	SFP Gi2/3 Green LED
34	SFP Gi2/4 Yellow LED)
35	SFP Gi2/4 Green LED
36	SFP Gi2/1 Yellow LED
37	SFP Gi2/1 Green LED
38	SFP Gi2/2 Yellow LED
39 (Most Significant bit in byte, First to shift out)	SFP Gi2/2 Green LED

Main Module I/O Description

The following table provides details on the I/O signals.

IO Name	Description	Direction	I/O Standard	Notes
QSGMII_MAIN_EXP_*	Provides Ethernet connectivity between the Main and Expansion modules.	Output	LVDS	All four lanes must be populated if the Expansion module is used.
QSGMII_EXP_MAIN_*	Provides Ethernet connectivity between the Main and Expansion modules.	Input	LVDS	All four lanes must be populated if the Expansion module is used.
PCIE_*	Provides future PCIe expandability.	Bidirectional	LVDS	**Important** See the PCIe Loopback, on page 8 section.
SDIO1_*	SD card interface.	Bidirectional	1.8V	Requires a level translator for proper operation. Please see the reference design for details.
PUSHBUTTON_L	Provides Zero-ize functionality.	Input	3.3V	The module has an internal Pull Up.
CLK_MAIN_EXPANSION	156.25 MHz Reference Clock from the Main module to the Expansion module.	Output	LVDS	Must be populated if the Expansion module is used.
PTP_SYNC	PTP Alignment Clock between Main and Expansion module.	Output	3.3V	Must be populated if the Expansion module is used, even if PTP is not used.
LED_*	LED Shift Chain Interface.	Output Input	1.8V	Drives shift registers for Main and Expansion Module LEDs.

IO Name	Description	Direction	I/O Standard	Notes
ALARM OUT_L	IOS Alarm asserts this signal.	Output	3.3V	
ALARM_INx_L	Provides Alarm indication to IOS.	Input	3.3V	The module has an internal Pull Up.

PCIe Loopback

The ESS-3300 requires integrators to provide an external connection between the CPU's Root Complex and a PCIe endpoint on the ESS-3300 Main Module. The PCIe interface is exposed to the integrator for future use.

Integrators must connect the following Main Module I/O connector pins with PCIe Gen2 compatible AC coupling capacitors between the two pins:

A31 to B33

A32 to B34

A35 to B37

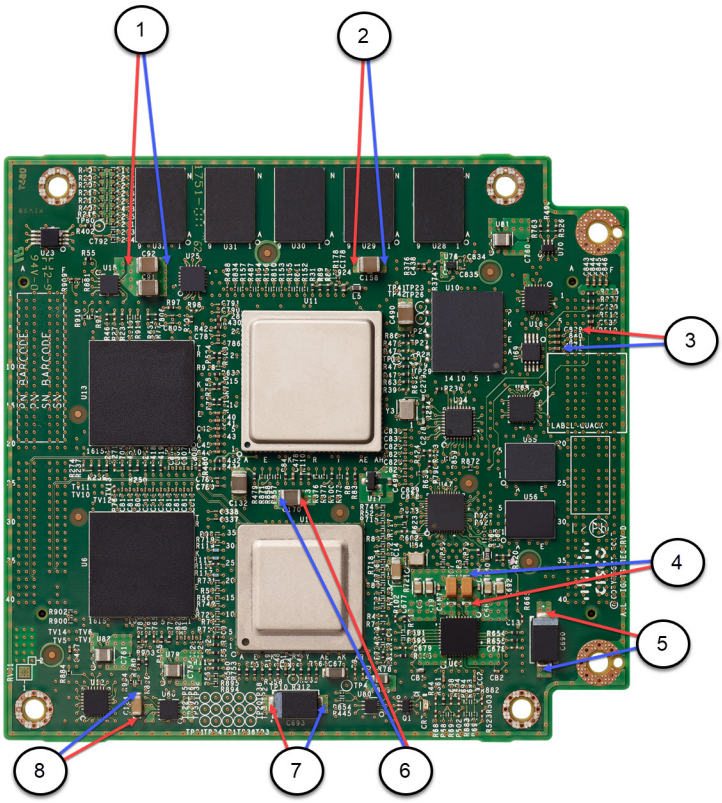
A36 to B38

Main Module Voltage Test Points

The following figure shows voltage test points on the main module with descriptions in the following table.

Note Red lines are Positive, Blue lines are Ground.

Figure 1: Voltage Test Points



Test Point	Location	Voltage
1	C91-92	0.6V
2	C158	1.2V
3	C839-C842	3.3V from carrier
4	C7-C683	5.0V from carrier
5	C690	0.85V
6	C170	1.8V
7	C693	1.0V
8	C124	3.3V (after converter)

Mechanical and Environmental Testing

The tests listed in the following table were successfully executed on the conduction-cooled models of the Cisco ESS-3300. These tests used a representative enclosure that conforms to the mounting and thermal mechanisms shown in Thermal Design Considerations, on page 13. Because this type of testing is highly dependent on factors such as the test enclosure design, the thermal solution, the front panel connectors, and the mounting, the following test results should only be used as a reference.

Table 1: Temperature

High and Low Temperature Cycle Stress (Operational)	High Temperature: 74°C (165°F) Low Temperature: -40°C (-40°F) Reference: MIL-STD-810F, Method 501.4, Procedure II and Method 502.4, Procedure II; SAE J1455 (Rev AUG94), Section 4.1.3
Thermal Shock (Non-Operational)	High Temperature: 85°C (185 °F) Low Temperature: -40°C (-40 °F) Cycle: 2 hours high temperature, 2 hours low temperature Test Period: 2 hour pre-soak at low temperature, followed by 5 cycles Repetition: 5 test periods Reference: MIL-STD-810F, Method 503.4; SAE J1455 (Rev AUG94), Section 4.1.3.2
High Temperature Component Thermal Test (Operational)	Method: Thermocouples on all critical/hot components at board level. Bring temperature of top center surface of thermal plate to 85°C (185 °F) and allow it to stabilize. Ensure that all components are within manufacturer thermal specifications.

Table 2: Altitude

Low Pressure/Altitude (Operational)	Altitude: 4,572m (15,000ft) Equivalent Absolute Pressure: 57.2 kPa (8.3 lbf/in2) Temperature: -40°C (-40°F) to 74°C (165°F) Altitude Ramp Rate: 10m/s (max) Temperature Ramp Rate: 1.5°C (min) to 4.5°C (max) Reference: MIL-STD 810F, Method 500.4, Procedure II; SAE J1455 (Rev AUG94), Section 4.1.3.1

Low Pressure/Altitude (Non-Operational)	Altitude: 12.2km (40,000 ft) Equivalent Absolute Pressure: 18.6kPa (2.7lbf/in2) Temperature: -40°C (-40°F) to 85°C (185°F) Altitude Ramp Rate: 10m/s (max) Temperature Ramp Rate: 1.5°C (min) to 4.5°C (max) Reference: MIL-STD-810F, Method 500.4; SAE J1455 (Rev AUG94), Section 4.1.3.1

Table 3: Humidity

Temperature & Humidity Cycle Stress (Non-Operational; Energized)	Humidity: 95% +/- 5% RH Pressure: 103.4 kPa (15 lbf in2) Temperature: -40°C (-40°F) to 65°C (149°F) Cycle: One, 24 hour cycle Reference: SAE J1455 (Rev AUG94), Section 4.2.3
Active Temperature/Humidity 10 Day Soak (Non-Operational; Energized)	Temperature: -40°C (-40°F) to 65 °C (149 °F) Humidity: 95% +/- 5% RH Cycle: Ramp from 25°C to -40°C over 75 minute period, dwell at -40°C for 240 minutes, ramp to 65°C over 120 minute period, dwell at 65°C for 240 minutes (95% +/- 5% RH), ramp to 25°C over 45 minute period, dwell at 25°C for 120 minutes (50% +/- 5% RH) Repetition: 20 total cycles (10 days total) Reference: MIL-STD-810F, Method 507.4; SAE J1211 (Rev NOV78), Section 4.2.2; SAE J1455 (Rev AUG94), Section 4.2.3

Table 4: Vibration

Random Vibration (Operational)	Acceleration: 1.04g rms vertical, 0.204g rms transverse, 0.740g rms longitudinal Duration: 2 hours per axis Test orientation: 3 axes Reference: MIL-STD-810F, Method 514.5, Category 4

Table 5: Shock

Crash Hazard Shock (Non-Operational)	Acceleration: 75G Duration: 8-13ms Test orientation: 3 axes (positive and negative) Number of shocks: 2 shocks in each direction, 12 shocks total Reference: MIL-STD-810F, Method 516.5, Procedure V
Functional Shock (Operational)	Acceleration: 40G Duration: 15-23ms Test orientation: All 6 faces, in 3 perpendicular axes Reference: MIL-STD-810F, Method 516.5, Procedure I
Bench handling shock (tip) (Operational)	Test orientation: All four edges of each face to form 10° angle with bench top Reference: MIL-STD-810F, Method 516.5, Procedure VI

Overtemperature Detection

Both the Main Board and the Expansion Board have a temperature sensor mounted on the edge of the board and thermally attached to the cooling plate. When the temperature sensor on either the Main Board or the Expansion Board detects a temperature exceeding the temperature threshold of 203°F (95°C), the overtemperature LED will illuminate. The temperature sensor is identified as U23 in Thermal Design Considerations, on page 13.

The digital temperature sensor measures the temperature of the conduction plate (or the integrators equivalent of the conduction plate), not the local ambient temperature. The product datasheet states the board will operate as long as the conduction plate is in the range of -40C to +85C. The alarms are set accordingly and the high temperature alarm thresholds are set as follows:

- Minor alarm at +80C the conduction plate temperature is close to the rated thermal limit of the unit, and will notify the user. The components are still within the specification, so there is no degradation to the long term reliability of the system.
- Major alarm at +90C the conduction plate temperature is over the rated thermal limit of the unit, and will notify the user. This will impact the long term reliability of the system.
- Critical alarm at +96C the conduction plate temperature is way over the rated thermal limit of the unit, and will notify the user. This will impact the long term reliability of the system. For the Critical Alarm threshold to be reached, it means that the ambient temperature of the system will be exceeded. Hardware failure is immanent, and the failure time will depend upon your installation. Depending on the severity at this point, the failure may be temporary or permanent.

Caution IOS will never shut down a device because the temperature exceeds the specification. Cisco does not guarantee the functionality, nor the long term reliability of a device operating beyond Cisco specifications, but lets the device continue operating until some piece of hardware physically shuts down. Operating outside of the temperature specifications will void the product warranty.

The status of the temperature sensors can be reported from the Cisco ESS-3300 IOS CLI:

```
Switch# show environment all
ALARM CONTACT 1
   Status:      not asserted
   Description: external alarm contact 1
   Severity:    minor
   Trigger:     closed
ALARM CONTACT 2
   Status:      not asserted
   Description: external alarm contact 2
   Severity:    minor
   Trigger:     closed
Supervisor Temperature Value: 51 C
Temperature State: GREEN
System Temperature thresholds
------------------------------
Minor Threshold    : 80 C (Yellow)
Major Threshold    : 90 C (Red)
Critical Threshold : 96 C
Shutdown Threshold : 105 C
Pwr Supply         Type     Status
-------------------------------------
POWER SUPPLY-A      DC      OK
POWER SUPPLY-B      DC      OK
```

Thermal Design Considerations

The following sections outline the methods for dealing with thermal issues and the mounting options involving the Cisco-designed conduction cooling plate.

As the Cisco ESS 3300 is intended for use in extreme environments, industrial temperature rated components are used. The SKUs with a thermal plate make integration easier by abstracting the component level thermal concerns. Cisco has already performed the thermal analysis at the component level so that the integrator need only be concerned with the thermal plate temperature. As a general rule, the thermal plate of the card needs to make contact with an adequate thermal mass to draw heat away from the card. This can be done in a number of ways.

Important The thermal plate temperature, as measured at the center of the top surface of the thermal plate, must not exceed 85° C. As long as this requirement is satisfied, all of the card's components will be within a safe operating temperature range on the high temperature side.

Heat dissipation methods:

As a general rule, the thermal plate of the board needs to make contact with an adequate thermal mass to draw heat away from the board. There are many ways to achieve this goal.

Examples:

- Transfer heat away from the thermal plate and into the enclosure wall by utilizing a “shelf” of metal. The shelf encompasses the entire Cisco ESS 3300 thermal plate surface. This shelf is illustrated by item 1 in the following figure.
- Mount the Cisco ESS 3300 thermal plate directly to the enclosure wall by using thermal interface material.

Figure 2: Thermally Significant Components of Cisco ESS-3300 (Main Card)

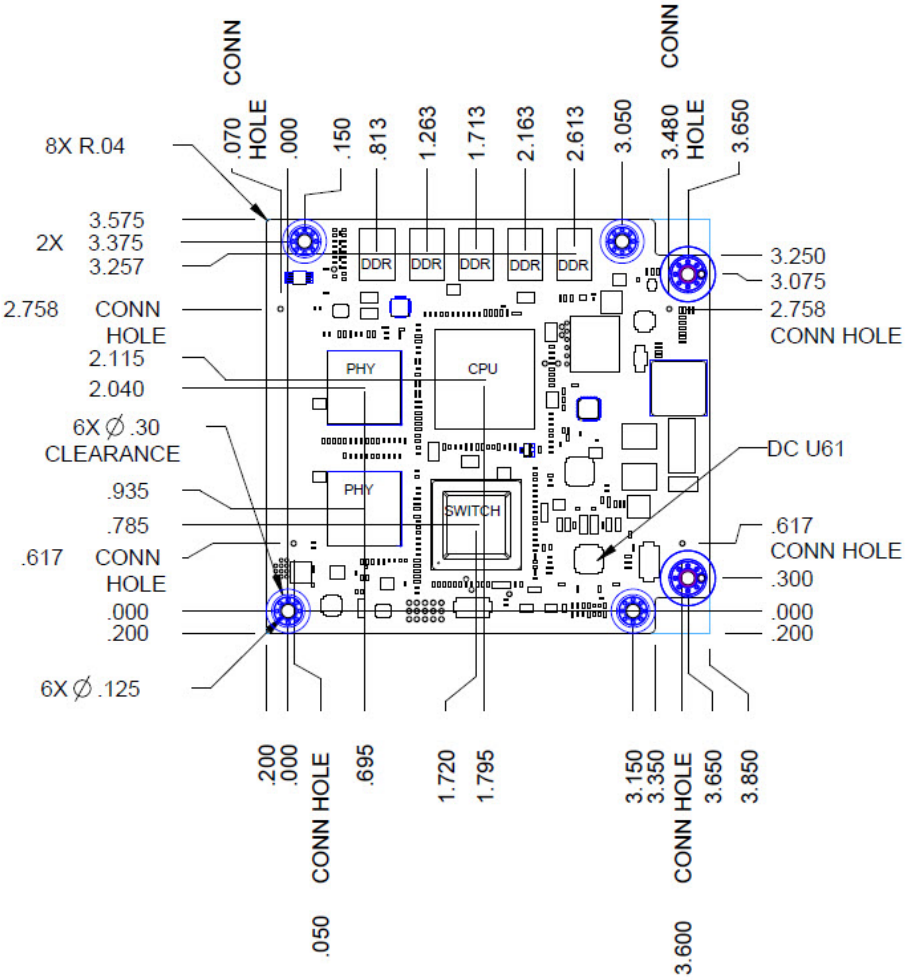


Table 6: Thermal Details for the Thermally Significant Components of Cisco ESS 3300 (Main Card)

RefDes	Thermal Design Power (W)	Allowable Junction Temperature	Allowable Case Temperature	Package Type	Theta JC (degC/W)	Theta JB (degC/W)
U1	5.6	115	—	HFCBGA573	.55	5.55
U11	4.9	100	—	SFVC784	0.5	2.67
U28 U29 U30 U31 U32	0.2 each	—	95	FBGA96	3.0	—

RefDes	Thermal Design Power (W)	Allowable Junction Temperature	Allowable Case Temperature	Package Type	Theta JC (degC/W)	Theta JB (degC/W)
U6 U13	1.5 each	110	—	FBGA256	13.6	16.45
U61	1	125	—	VQFN	18.8	6
U23	—	125	—	MSOP8	—	—

Note Cisco uses the following TIMs at each REFDES:

The U23, U28, U29, U30, U31, U32, and U61 use the Chomerics GEL30. The U1, U6, U11, and U13 use the Laird TFLEX SF800. Samtec has 3D models, footprints, and schematic symbols for their connectors here:

https://www.samtec.com/connectors/high-speed-board-to-board/high-density-arrays/searay

Figure 3: Thermally Significant Components of Cisco ESS-3300-24T (Expansion Card)

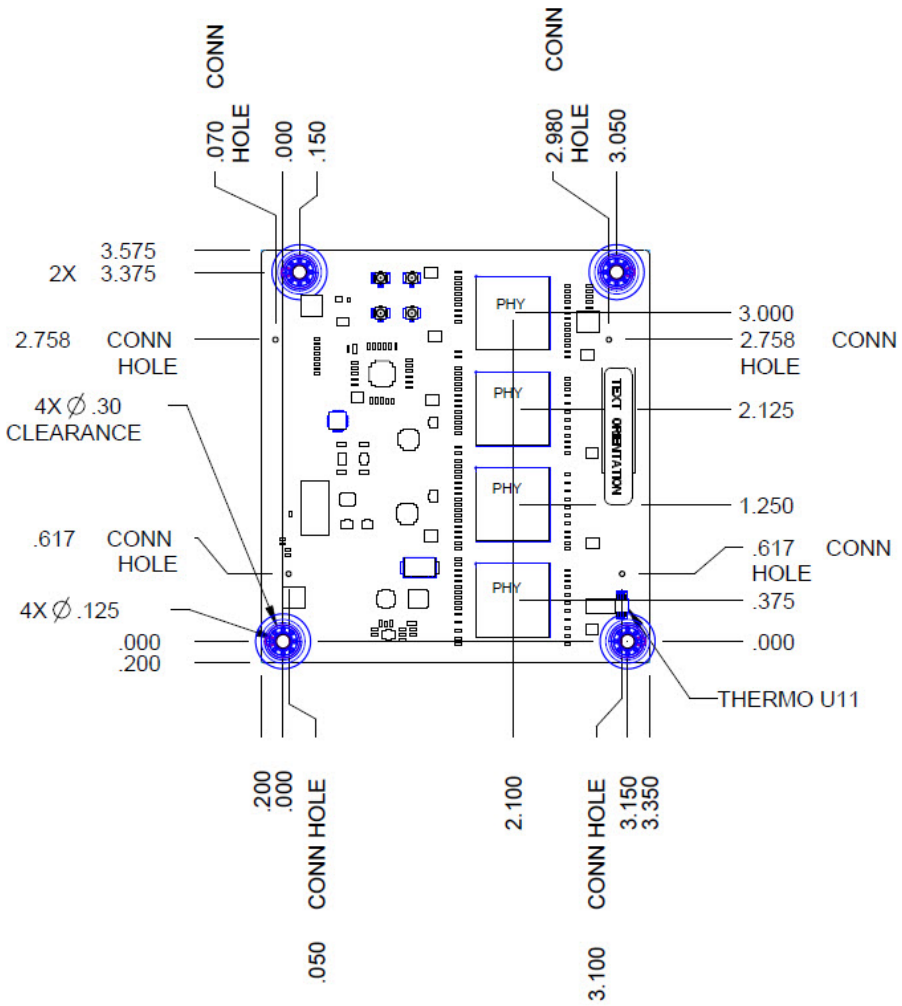


Table 7: Thermal Details for the Thermally Significant Components of Cisco ESS-3300-24T (Expansion Card)

RefDes	Thermal Design Power (in W)	Allowable junction temp (in degC)	Allowable case temp (in degC)	Package Characteristics		
				Package Type	Theta Jc (in degC/W)	Theta Jb (in degC/W)
U1,U3,U6,U7	1.5 each	110	—	FBGA256	13.6	16.45
U11	—	125	—	MSOP8	—	—

Note U43 is the Cisco ESS-3300-24T (Expansion Board) thermal sensor.

Validating a Thermal Solution

To validate a thermal solution, monitor the thermal sensor of the Cisco ESS 3300 cards in a thermal chamber set to the desired maximum ambient operating temperature and with traffic running.

Each card has a single sensor located near the center of the card, which makes contact with the thermal plate using thermal interface material. The temperature of the sensors should be less than 90.5C. The **show environment all** command can be executed from the IOS prompt to monitor the thermal sensor temperatures

```
Switch# show environment all
ALARM CONTACT 1
   Status:      not asserted
   Description: external alarm contact 1
   Severity:    minor
   Trigger:     closed
ALARM CONTACT 2
   Status:      not asserted
   Description: external alarm contact 2
   Severity:    minor
   Trigger:     closed
Supervisor Temperature Value: 51 C
Temperature State: GREEN
System Temperature thresholds
------------------------------
Minor Threshold    : 80 C (Yellow)
Major Threshold    : 90 C (Red)
Critical Threshold : 96 C
Shutdown Threshold : 105 C
Pwr Supply         Type     Status
------------------------------------
POWER SUPPLY-A      DC      OK
POWER SUPPLY-B      DC      OK
 SYSTEM TEMPERATURE is OK
 System Temperature Value: 36 Degree Celsius
 Extension Board Temperature Value: 32 Degree Celsius
```

Product Specifications

The following tables list the product specifications for the Cisco ESS 3300.

Table 8: Interface Support

ESS-3300	2 ports of 10 GE fiber, 24 ports of GE copper 4 of 8 GE ports can be combo ports on mainboard
ESS-3300-24T	2 ports of 10 GE fiber, 24 ports of GE copper 4 of 8 GE ports can be combo ports on mainboard 4 of 16 GE ports can be combo ports on expansion board

Table 9: Memory

DRAM	4GB

SPI Flash	64MB
eMMC Flash	1.2GB (usable)

Table 10: Environmental

Industrial-grade components	-40degF to +185degF (-40degC to +85degC) component local ambient temperature specifications
Operating temperature	-40degF to +185degF (-40degC to +85degC) as measured at the center of the top surface of the –CON SKU thermal plate. Temperature range of a completed solution depends on the enclosure thermal design characteristics used by the integrator. If –NCP SKU is used, integrator is responsible for designing a thermal solution that meets the component level requirements provided in this document.
Non-Operating Temperature	-40degF to +185degF (-40degC to +85degC)
Operating altitude	15,000ft (4,572m)
Non-operating altitude	40,000ft (12,200m)
Humidity	95% +/- 5% RH

Table 11: Hardware Specifications

Hardware Specifications	+5Vdc (+/- 5%) and +3.3Vdc (+/- 3%)
Total Power	Thermal Power Main Board = 16W Thermal Power Main and Expansion Board = 22W Max Power Main Board = 17W Max Power Main and Expansion Board = 24W
Mass	ESS-3300-Main: 81 grams ESS-3300-Main with cooling plate: 178 grams ESS-3300-Expansion: 59 grams ESS-3300-Expansion with cooling plate: 159 grams
MTBF (Mean Time Before Failure)	ESS-3300 (-CON and –NCP) standalone Ground, Fixed, Controlled: 1,065,092 (in hours) ESS-3300-24T (-CON and –NCP) combined Ground, Fixed, Controlled: 919,768 (in hours)

Power Requirements

Both the Main Board and the Expansion Board require +5 VDC and +3.3 VDC to operate. The following table lists the DC power requirements for the Main Board and the Expansion Board.

The ESS-3300 can display a POWER GOOD status for two Power Inputs via the DC-A-GOOD and DC-B-GOOD signals. If these signals are not used, connect DC-A-GOOD to 3.3 V and DC-B-GOOD to ground.

Note There is no specific voltage sequence requirement for the 5V and 3.3V power inputs of the ESR. They can ramp up in any order.

Dying Gasp

In the case of a temporary power outage, the switch will send a Dying Gasp packet. If the power recovers, the switch will continue to operate normally.

Electrical Power Consumption

The following two tables show the power requirements.

Table 12: Power Requirements for the Main Board

Voltage Rail	Tolerance	Typical Current (A)	Maximum Current (A)
5V	+/- 3%	N/A	2.2
3.3V	+/- 3%	N/A	1.95
P3_3V RTC	+10% / -60%	400e-9	700e-9

Table 13: Power Requirements for the Expansion Board

Voltage Rail	Tolerance	Typical Current (A)	Maximum Current (A)
5V	+/- 3%	N/A	0.9
3.3V	+/- 3%	N/A	0.75

Power Over Ethernet (PoE)

The ESS-3300 supports IOS software control of PoE if the partner adds the appropriate circuitry to their host chassis. This is a chip to be integrated on the host motherboard, and is not an external power injector. Cisco uses the Microchip (formerly Microsemi) PD69208MILQ-TR-LE.

A maximum of 720W of power is supported through to PDs via the per port PSE controllers.

Note The actual amount of power available for POE may be less depending on size of the power supply included by the integrator.

Note Beginning with release 16.11.1, Cisco software started enforcing that the power bank must be set to 3 by hardware for PoE to turn on. Prior to release 16.11.1, software would let PoE turn on with any power bank setting, including Power Bank 1. The power bank should be set to 3 on all available PoE controllers (1-3).

Verify your setting through the **show controller power inline** CLI:

```
Switch#show controller power inline
Dragonite details
  Hardware version   : 0x4A02
  Product number     : 23
  Software version   : 02.1.1
  Parameter number   : 26
  Build number       : 1
  Internal SW number : 825

Dragonite System Status:
  poe controller error          : 0
  firmware download is required : 0
  poe controller memory error   : 0
  Factory Default               : 0
  General Internal Error        : 0
  Private_Label                 : 0x0
  User_Byte                     : 0xFF

  PoE Device  | Device Fail |  Temperature Disconnect  |  Temperature Alarm
   1          0                    0                          0
   2          1                    0                          0
   3          1                    0                          0
  System Reset Status:
    Low Voltage Detect     : 0
    Lockup Exception       : 0
    Illegal Opcode         : 0
    Watchdog timer         : 0
    External Rest Pin      : 0
    Power on Reset         : 0
  Reset_Info:
    Communication reset command                : 0
    Clock recovery failure for more than 5sec  : 0
    PoE Device failure                         : 0
    I2C module was restarted                   : 0
    Self reset                                 : 0
   Save_Command_counter                        : 0
```

```
Total Power details:
  Power Bank#               : 3
  Power Consumption[mW]     : 4000
  Calculated Power[mW]      : 8000
  Available Power[mW]       : 92000
  Power Limit [mW]          : 100000
  Max Shutdown Voltage[mW] : 57000
  Min Shutdown Voltage[mW] : 44000
  Vmain Voltage[mV]         : 53800
  Imain Current[mA]         : 0

Port Data[8-1]:
Current State       : 1B 1B 1B 1B 1B 01 1B 1B
Port Enabled        : 01 01 01 01 01 01 01 01
Power delivering    : 00 00 00 00 00 01 00 00
Device class        : 00 00 00 00 00 02 00 00
```

The integrator should contact Cisco for any additional details.

SD Support

There is one Cisco SD card that has been tested and is recommended, the SD-IE-4GB. If the end user or system integrator chooses to use a 3rd party device, it may work for their application and to their satisfaction. However the end user or system integrator is solely responsible for testing and ensuring proper operation.

When a non Cisco SD card is installed, the following message appears:

```
WARNING: Non-IT SD flash detected. Use of this card during normal operation can impact and
severely degrade performance of the system. Please use supported SD flash cards only.
```

You can find Cisco's policy on Third Party Components here:

https://www.cisco.com/c/en/us/products/warranties/warranty-doc-c99-740959.html#_Toc3320258

SFP Support

Both 100BASE-X and 1000BASE-X SFP transceivers are supported by the eight combo ports, four on the Main Board and four on the Expansion Board. The following table lists the specific SFP transceivers and their characteristics.

Important The two SFP+ ports support only 10 GE SFP+ transceivers, and 1 GE SFP transceivers. 100 Mbps SFP transceivers are NOT supported on these two ports.

Note The ESS-3300 has internal pull-ups on the I2C interfaces to the SFP. Recommend adding a weak (e.g. 100K) pull up to 3.3V on host board.

Supported SFP (plus marker) Modules

SFP	Distance	Fiber	Commercial(0C to 70C)	Extended(-5C to 85C)	Industrial(-40C to 85C)	DOM
SFP-10G-SR-X	2 km	MMF	—	X	—	—
SFP-10G-LR-X	10 km	SMF	—	X	—	—
SFP-10G-SR	2 km	MMF	X	—	—	—
SFP-10G-LR	10 km	SMF	X	—	—	—
SFP-10G-ER	40 km	SMF	X	—	—	—
SFP-10G-BXD-I	10 km	SMF	—	—	X	—
SFP-10G-BXU-I	10 km	SMF	—	—	X	—
SFP-10G-BX40D-I	40 km	SMF	—	—	X	—
SFP-10G-BX40U-I	40 km	SMF	—	—	X	—
SFP-H10G-CU1M	1 m	Passive Twinax	X	—	—	—
SFP-H10G-ACU7M		Active Twinex	X	—	—	—
SFP-H10G-ACU10M		Active Twinex	X	—	—	—

Supported SFP Modules

SFP	Distance	Fiber	Commercial(0C to 70C)	Extended(-5C to 85C)	Industrial(-40C to 85C)	DOM
GLC-SX-MM-RGD	220-550 m	MMF	—	—	X	—
GLC-LX-SM-RGD	550 m/10 km	MMF/SMF	—	—	X	—
GLC-ZX-SM-RGD	70 km	SMF	—	—	X	X
SFP-GE-S	220-550 m	MMF	—	X	—	X
SFP-GE-L	550 m/10 km	MMF/SMF	—	X	—	X
SFP-GE-Z	70 km	SMF	—	X	—	X
GLC-BX-U	10 km	SMF	X	—	—	X
GLC-BX-D	10 km	SMF	X	—	—	X
GLC-SX-MM	220-550 m	MMF	X	—	—	—

SFP	Distance	Fiber	Commercial(0C to 70C)	Extended(-5C to 85C)	Industrial(-40C to 85C)	DOM
GLC-LH-SM	550 m/10 km	MMF/SMF	X	—	—	—
GLC-ZX-SM	70 km	SMF	X	—	—	X
GLC-EX-SMD	40 km	SMF	X	—	—	X

Supported Fast Ethernet SFP Modules

SFP	Distance	Fiber	Commercial(0C to 70C)	Extended(-5C to 85C)	Industrial(-40C to 85C)	DOM
GLC-FE-100FX-RGD	2 km	MMF	—	—	X	—
GLC-FE-100LX-RGD	10 km	SMF	—	—	X	—
GLC-FE-100FX	2 km	MMF	X	—	—	—
GLC-FE-100LX	10 km	SMF	X	—	—	—
GLC-FE-100EX	40 km	SMF	X	—	—	—
GLC-FE-100ZX	80 km	SMF	X	—	—	—
GLC-FE-100BX-U	10 km	SMF	X	—	—	—
GLC-FE-100BX-D	10 km	SMF	X	—	—	—