

# Engineering Advisory 48152



## Power Consumption and Management on Polycom Phones

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This engineering advisory shows detailed information about the power consumption and management of the Polycom® SoundPoint® IP desktop phones, Polycom® SoundStation® IP and Polycom® SoundStation Duo™ conference phones, Polycom® VVX® business media phones, and Polycom® CX series phones.

This engineering advisory applies to the following Polycom phones:

- SoundPoint IP phones running UC software 3.3.0 or later
- SoundStation IP phones running UC software 3.3.0 or later
- SoundStation Duo phones running UC software 4.0.0 or later
- VVX 300/310 and VVX 400/410 phones running UC software 4.1.4 or later
- VVX 500 phones running UC software 4.0.1B or later
- VVX 600 phones running UC software 4.1.2 or later
- VVX 1500 phones running UC software 3.3.0 or later
- CX500, CX600, CX700, CX3000 phones running software 4.0.7577.4372 or later

The topics in this advisory include:

- [Power Management](#)
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- [Power Dissipation](#) Power consumption data for Polycom phones.
- [PD and PSE Power Classification](#) Classification of available maximum and minimum power levels.
- [Test Condition Terminology](#) Description of conditions used when testing the power consumption of the phones.
- [Power Management Alerts](#) Description on various alerts when using Expansion Modules
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# Power Management

## Why Power Management is needed

The phone draws power from the switch/power adapter to power itself and peripherals attached to it. The actual power drawn by a phone varies with the combinations of peripherals attached. If a phone tries to draw more power than a switch or power adapter can provide, this can result in brownout conditions such as power loss, peripheral malfunction, and reboots. To handle this discrepancy in power, the phones use a centralized power management system that carries out power budgeting and allocates power to the peripherals according to a priority sequence.

## How the phone budgets power to peripherals

**Fixed priority sequence:** When the phone is not connected to a call, the priority of the peripherals is fixed and as follows: **Expansion Module > Top port USB Device (camera) > Rear Port USB Device**. In the case of a power deficit, devices with lower priority may be powered down to power on a device with higher priority.

**First Come First Serve Priority Sequence:** When the phone is connected to a call, first come first serve priority is followed in the case of a power deficit, irrespective of the priority; the devices that are attached will not be powered on.

**Table 1: Power Reservation for different peripherals on Polycom Phones**

The following table shows how much power needs to be reserved before a peripheral is connected.

<i>Phone Model</i>	<i>Power Reserved for the phone</i>	<i>Power Reserved for EM</i>	<i>Power Reserved for Top USB Port</i>	<i>Power Reserved for Rear USB Port</i>	<i>Power reserved for Bluetooth</i>
VVX 500	5.0W	0W	0.5W	0.5W	N/A
VVX 600	5.4W	0W	0.5W	0W	0.3W

**Table 2: USB power output**

<i>Phone Model</i>	<i>Max power output for Rear USB Port</i>	<i>Max power output for top USB port</i>	<i>Max power output for side USB port</i>
VVX 500	2.5 Watts, 0.5 amp	5 Watts, 0.5 amps	n/a
VVX 600	7.5 Watts, 1.5 amps	5 Watts, 0.5 amps	n/a
VVX 1500	n/a	n/a	2.5 Watts, 0.5 amp

**Note: Higher power output on VVX 600 phone**

The rear USB port on the VVX 600 phone can output power at 1.5 amps and 7.5 Watts which is triple the output of the VVX 500.

## Power Dissipation

Testing of the Polycom phones reveals the power consumption data shown in [Table 3: Power Dissipation and Advertisement for Polycom Phones](#).

**Note: When the CDP Advertisement is Displayed**

Only Polycom phones running UC software 3.3.0 or later display the CDP advertisement shown in [Table 3](#).

**Table 3: Power Dissipation and Advertisement for Polycom Phones**

<i>Phone Model</i>	<i>Idle State (minimum power)</i>	<i>Call State (nominal hands- free volume)</i>	<i>Maximum Power</i>	<i>Class Advertisement<sup>1</sup> (IEEE 802.3af)</i>	<i>CDP Advertisement<sup>4</sup></i>
<b>SoundPoint IP</b>					
IP 321	2.1W	2.5W	3.4W	1	3.5
IP 331	2.3W	3.0W	3.7W	1	3.7
IP 335	2.4W	3.3W	4.3W	2	3.9
IP 450	2.2W	3.8W	5.3W	2	5.4
IP 550	2.3W	3.9W	5.6W	0	5.9
IP 560	4.1W	7.3W	8.0W	0	8.3
IP 650	3.5W	4.6W	6.5W	0	6.5, 12.0 <sup>4</sup>
IP 650 Expansion Module (Backlit)	1.4W	n/a	2.0W	0 <sup>3</sup>	<sup>3</sup>
IP 670	4.2W	7.4W	8.4W	0	8.4, 14.0 <sup>4</sup>
IP 670 Expansion Module (Color Backlit) <sup>5</sup>	1.5W	n/a	2.0W	0 <sup>3</sup>	3
<b>SoundStation IP</b>					
IP 5000	3.7W	4.3W	6.0W	2	5.8

IP 6000	4.1W	5.0W	7.0W	0	9.8
IP 7000	4.6W	6.1W	9.9W	0	9.8
Duo	3.0W	4.5W	7.0W	0	7.0
<i>Phone Model</i>	<i>Idle State (minimum power)</i>	<i>Call State (nominal hands- free volume)</i>	<i>Maximum Power</i>	<i>Class Advertisement<sup>1</sup> (IEEE 802.3af)</i>	<i>CDP Advertisement<sup>4</sup></i>
VVX					
VVX 300	1.8W	3.0W	3.5W	2 <sup>6</sup>	5.0
VVX 310	1.9W	3.1W	3.5W	2 <sup>6</sup>	5.0
VVX 400	2.4W	4.1W	4.5W	2 <sup>6</sup>	5.0
VVX 410	2.4W	4.3W	4.5W	2 <sup>6</sup>	5.0
VVX 500	3.4W	4.2W	5.0W	4 <sup>2</sup>	8.0
VVX 600	4.3W	5.0W	5.4W	4 <sup>2</sup>	8.0
VVX 1500	6.5W	9.4W	10.5W	0	11.8
VVX Expansion Module (Paper)	0.5W	n/a	2.1W <sup>7</sup>	n/a <sup>3</sup>	n/a <sup>3</sup>
VVX Expansion Module (LCD)	1.4W	n/a	2.9W	n/a <sup>3</sup>	n/a <sup>3</sup>
CX					
CX500	2.0W	3.3W	4.3W	2	
CX600	2.4W	4.5W	4.9W	2	
CX700	3.1W	4.7W	5.2W		
CX3000	2.3W	3.3W	5.5W	3	

1 See Table 4: PD Power Classification (IEEE 802.3af).

2 VVX 500 and VVX 600 advertise as Class 4, in conformance with IEEE802.3at specification (backwards compatible with IEEE802.3af).

3 Class/CDP advertised through Host Phone (no native PoE on-board).

4 CDP values are reflected for SoundPoint IP phones running SIP 3.1.0. 'EM Power' can be disabled through the phone's menu; this would lower the advertised power in CDP. The higher values reflect 'EM-enabled' CDP advertisement (default).

5 Polycom recommends that you use a power supply adapter with the SoundPoint IP 670 when more than one color Expansion Module is attached to the phone.

- 6 The VVX300/310/400/410 will change their power classification to level 0 when an EM is attached
- 7 Paper label VVX Expansion Modules added beyond the first will use an additional 0.1W for a total of 2.2W.

## Power Classification changes on connecting an EM

On their own, VVX3xx/4xx phones default to PoE Class 2 signature to the PoE Switch (3.8W-6.5W). This provides sufficient power to operate the VVX phones under all call conditions.

When an Expansion Module is connected, the hard-wired signature reverts to PoE Class 0 (0-13W) after power-up, signaling to the Switch to allocate more power allowing up to 3 x Expansion Modules to be connected.

The phone **must** be power-cycled to initiate this PoE Class change. If you attempt to plug 3 x Expansion Modules into an already running VVX 3xx/4xx there will not be sufficient power for them until the next reboot.

## PD and PSE Power Classification

Powered Device (PD) power classification is shown in [Table 4: PD Power Classification \(IEEE 802.3af\)](#). This defines the maximum power levels available at the PD (phone).

**Table 4: PD Power Classification (IEEE 802.3af)**

<i>Class</i>	<i>Usage</i>	<i>Maximum Power Range Used by the PD (phone)</i>
0	Default	0.44 to 12.95W
1	Optional	0.44 to 3.84W
2	Optional	3.84 to 6.49W
3	Optional	6.49 to 12.95W
4	Optional	Reserved for future use (for example: IEEE802.3at)

Power Sourcing Equipment (PSE) power classification is shown in [Table 5: PSE Power Classification \(IEEE 802.3af\)](#). This defines the minimum power levels available at the PSE (PoE switch).

**Table 5: PSE Power Classification (IEEE 802.3af)**

<i>Class</i>	<i>Usage</i>	<i>Minimum Power Levels at Output of PSE (PoE switch)</i>
0	Default	15.4 Watts
1	Optional	4.0 Watts

2	Optional	7.0 Watts
3	Optional	15.4 Watts
4	Reserved	Reserved for future use (for example: IEEE802.3at)

The deltas in power level between Table 4 and 5 provision voltage and current losses in cabling lengths of up to 100m (330ft), that may be encountered in enterprise installations.

## Power Management Alerts

This section describes the Power Management Alerts that are displayed on a phone that uses Expansion Modules:

- **“EM1 cannot be powered on”**: The power available is not sufficient to power on the first Expansion Module. To power it on, remove any USB devices that are connected to the phone or move the phone to a higher power source.
- **“EM2 cannot be powered on”**: The power available is not sufficient to power on the second Expansion Module. To power it on, remove any USB devices that are connected to the phone or move the phone to a higher power source.
- **“EM3 cannot be powered on”**: The power available is not sufficient to power on the third Expansion Module. To power it on, remove any USB devices connected to the phone or move the phone to a higher power source.
- **“Top port USB Device cannot be powered on”**: The power available is not sufficient to power on the USB device connected to the Top USB port. To power on the device, remove any Expansion Module connected to the phone or move to a higher power source.
- **“Rear port USB device cannot be powered on”**: The power available is not sufficient to power on the USB device connected to the Rear USB port. To power on the device, remove any Expansion Module connected to the phone or move to a higher power source.
- **“Top port USB Device is powered down”**: The power available is not sufficient to power on an Expansion Module that was attached. According to the Fixed Priority sequence, the Top port USB device was powered down. To power on the device, remove an Expansion Module or move to a higher power source.
- **“Rear port USB Device is powered down”**: The power available is not sufficient to power on an Expansion Module/a USB device on the Top USB port. According to the fixed priority sequence, the Rear port USB device was powered down. To power on the device, remove an Expansion Module/USB device on the Top USB port or move to a higher power source.
- **“Top USB port is powered down”**: The power available is not sufficient to power on a non-compliant /over current drawing device connected to the Top USB port. This may happen both when the device is connected during power deficit or when a higher priority device was connected and the Top port device was powered down. To power on the device, remove and Expansion Module or move to a higher power source.
- **“Rear USB port is powered down”**: The power available is not sufficient to power on a non-compliant /over current drawing device connected to the Rear USB port. This may happen both when the device is connected during power deficit or when a higher priority device was connected and the Rear port USB device was powered down. To power on the device, remove an Expansion Module or move to a higher power source.

## Supported Devices

The USB port on the phones only supports USB thumb drives, headsets, and the VVX camera. Phones do not support DVD writers, hubs or any devices not compliant to the USB specification.

## Test Condition Terminology

The following test condition terminology was used in [Table 3](#).

- Idle State
  - The phone has completed the boot-up process.
  - Ethernet speed at 10/100 Mbps on LAN port; PC port not connected
  - The idle screen is shown on the LCD.
  - Where applicable, the LCD backlight was set to default minimum (sleep mode) brightness.
  - There was no call state established.
- Call State
  - Both LAN and PC ports running at maximum capable data rates
  - The hands-free transducer was activated for each UUT and was set to default nominal volume.
  - Normal call established in hands-free mode.
  - The LCD backlight set to default maximum brightness.
- Maximum Power
  - All ports and peripherals running at maximum data rates
  - Maximum volume on hands-free transducer; running codec stress tests with select wav files
  - LCD backlight and line LEDs set at maximum brightness.
- Class Advertisement
  - The Power over Ethernet (PoE) class advertisement circuitry on-board SoundPoint IP, SoundStation IP, and VVX phones
- CDP Advertisement
  - The power requirements for CDP reported by SoundPoint IP, SoundStation IP, and VVX phones running minimum release of SIP 3.1.0 and BootROM 4.1.2.
- Power consumption measured using PoE IEEE802.3af standard powering
  - The measurements were taken as average from six IEEE802.3af compliant PoE switches.
  - The power consumption using AC/DC adapters is similar to above, but must account for approximately 72% efficiency rating from AC source.
  - Power consumption does not include power sourcing to external USB devices (SoundPoint IP 670, VVX 500, VVX 600, and VVX 1500 models).
- Power consumption measured at the SoundPoint IP and SoundStation IP phone end
  - 7ft maximum length LAN cord to PoE switch during measurement
  - 2.45W maximum power loss allowable over 100m (330ft) cable lengths

## Troubleshooting tips

This section describes some basic troubleshooting tips for the issues commonly faced while using Expansion Modules.

### USB Headset does not work

- Refer to the section on peripheral priority. Unplug an expansion module or any device on the Top/Rear USB port. Then reconnect the USB Headset.
- Use a higher power source

### USB pen drive does not work

- Refer to the section on peripheral priority. Unplug an expansion module or any device on the Top/Rear USB port. Then reconnect the USB Pen drive.
- Use a higher power source

### VVX Camera does not work

- Refer to the section on peripheral priority. Unplug an expansion module or any device on the Rear USB port. Then reconnect the VVX Camera.
- Use a higher power source

### Expansion Module does not work

- Unplug any USB devices connected to the Top/Rear USB ports and reconnect the Expansion Module.
- Use a higher power source

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