



Datasheet

IP-50E

November 2021 | Rev. E.02



Note: For feature availability, check the Release Notes for the CeraOS version you are using.

Radio

Supported Frequency Range

71-76 GHz, 81-86 GHz

Radio Configurations

1+0, 2+0 (XPIC), 1+1 HSB Protection with Unit Redundancy

Radio Features

- ATPC*
- High spectral utilization: BPSK to 512 QAM w/ACMB
- Built-in frequency scanner to determine the current interference level for each channel
- Adaptive Bandwidth Notification (EOAM)*
- XPIC
- Multiband (with IP-20C, IP-20C-HP, IP-20S, IP-20N, IP-20A, or third-party radio carrier)
- Multiband with Layer 1 Link Bonding (with IP-50C)
- Multiband with Layer 1 Link Bonding (with IP-20N or IP-20A)

Ethernet

Ethernet Interfaces

Port 1:

- DC port

Port 2:

- RJ-45 1GE/Management/PoE Port (no traffic)

Port 3:

- SFP – 1/2.5GE port

Port 4:

- QSFP – 4 x 1/10GE, 1 x 1/10GE, or 1x40GE traffic interface (QSFP+)
- Option for SFP+ (1x10GE) with adaptor
- Option for CPRI with adaptor*

Port 5:

- SFP –1 GE and 10 GE traffic interface (SFP+)

Notes: For information on which interfaces are supported, refer to the Release Notes for the CeraOS release you are using.

SFP+ and QSFP+ devices must be of industrial grade (-40°C to +85°C, -40°F to +185°F)

Ethernet Features

MTU – 9612 Bytes

Quality of Service

- Multiple Classification criteria (VLAN ID, P-bits, IPv4 DSCP, IPv6 TC, MPLS EXP)
- 8 CoS queues per port
- Deep buffering (configurable up to 64 Mbit per queue)
- WRED
- P-bit marking/remarking

4K VLANs

VLAN add/remove

MSTP, ERP (ITU-T G.8032)

Y.1731 Ethernet OAM

Y.1731 Ethernet Bandwidth Notification (ETH-BN)

Management Protocols

SNMP

REST

SDN Support:

- NETCONF/YANG

Synchronization Protocols

Enhanced Ethernet Equipment Clock (eEEEC) Specification (G.8262.1)

PTP Telecom Class C Boundary Clock (T-BC) and Time Slave Clock (T-TSC) Specification (G.8273.2)

PTP Telecom Class C Transparent Clock (T-TC) Specification (G.8273.3)

Enhanced SyncE Network Limits (G.8261, clause 9.2.1)

Enhanced PTP Network Limits (G.8271.1)

Ethernet Synchronization Messaging Channel (ESMC) (G.8264, clause 11)

PTP Telecom Profile for Time (Full Timing Support) (G.8275.1)

Precision Time Protocol (version 2, IEEE1588-2008)

* Planned for future release.



Standards

MEF

Carrier Ethernet 2.0 (CE 2.0)

Supported Ethernet Standards

10/100/1000base-T/X (IEEE 802.3)

10GBase-LR (IEEE 802.3)

Ethernet VLANs (IEEE 802.3ac)

Virtual LAN (VLAN, IEEE 802.1Q)

Class of service (IEEE 802.1p)

Provider bridges (QinQ – IEEE 802.1ad)

Link aggregation (IEEE 802.1AX)

Auto MDI/MDIX for 1000baseT

RFC 1349: IPv4 TOS

RFC 2474: IPv4 DSCP

RFC 2460: IPv6 Traffic Classes

Security

Radio Encryption – AES 256

Secured protocols:

- HTTPS
- SNMPv3
- SSH
- SFTP

RADIUS authentication and authorization

TACACS+ Authentication, Authorization, and Accounting (session-based)

Standards Compliance

Radio Spectral Efficiency: FCC Part 101, EN 302 217-2 Certification ordinance Article 2-1-31-5, Land Mobile Station in the 80GHz band (Japan)

EMC: EN 301 489-1, EN 301 489-4, Class A (Europe)

FCC 47 CFR, part 15, subpart B, class A (US)

ICES-003, Class A (Canada)

TEC/SD/DD/EMC-221/05

TEC/SD/DD/EMC-221/05/OCT-16, Class A (India)

IEC 61000-4-29

Surge: EN61000-4-5, Class 4 (for PWR and ETH1/PoE ports)

Safety: EN 60950-1, EN 62368-1, IEC 60950-1, IEC 62368-1, UL 60950-1, UL 62368-1, CAN/CSA C22.2 NO 60950-1, CAN/CSA C22.2 NO 62368-1, EN 60950-22, IEC 60950-22, UL 60950-22, CAN/CSA C22.2 NO 60950-22

Storage: ETSI EN 300 019-1-1 Class 1.2

Transportation: ETSI EN 300 019-1-2 Class 2.3

Technical Specifications

Mechanical Specifications

Dimensions (Direct Mount HW) –

322mm(H), 227/270mm(W), 86mm(D), 5.5kg
12.67”(H), 8.93”/10.62”(W), 3.38”(D), 12.12 lbs.

Dimensions (43dBi Integrated Antenna) -

341mm(H), 270/276mm(W), 103mm(D), 7kg
13.42”(H), 10.62/10.86”(W), 4.05”(D), 15.43 lbs.

Pole Diameter Range (for Remote Mount Installation)

8.89cm – 11.43cm; 3.5” – 4.5”

Environmental Specifications

-33°C to +55°C (-45°C to +60°C extended)

-27°F to +131°F (-49°F to +140°F extended)

Power Input Specifications

Standard Input: -48 VDC; DC Input range: -40.5 to -60 VDC

Power Redundancy option by using both a DC power input and a passive PoE injector simultaneously.

Power Consumption Specifications

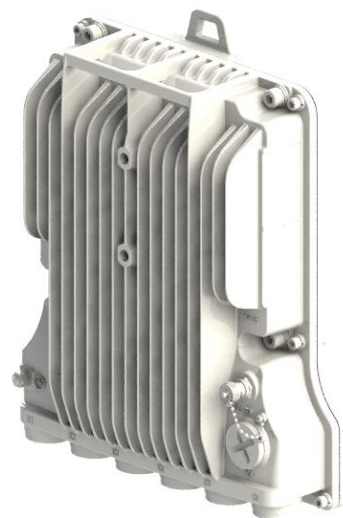
Active with XPIC – 70W

Active without XPIC – 61W

Standby – 47W

Product Images

IP-50E



Radio Specifications

Note that the modulation per profile differs per channel bandwidth. For 250-2000 MHz channels, IP-50E implements ACMB with eleven available working points, as shown in the following table:

| Profile and Modulation | 250-2000 MHz |
|------------------------|-----------------------------|
| Profile 0 | BPSK – ¼ channel spacing |
| Profile 1 | BPSK – ½ channel spacing |
| Profile 2 | BPSK – full channel spacing |
| Profile 3 | QPSK |
| Profile 4 | 8 PSK |
| Profile 5 | 16 QAM |
| Profile 6 | 32 QAM |
| Profile 7 | 64 QAM |
| Profile 8 | 128 QAM |
| Profile 9 | 256 QAM |
| Profile 10 | 512 QAM |

For 62.5 channels, Profile 0 is BPSK with the normal (62.5 MHz) channel spacing, Profile 1 is QPSK, and so on.

For 125 MHz channels, Profile 0 is BPSK with ½ channel spacing. Profile 1 BPSK is BPSK with the normal channel spacing, Profile 2 is QPSK, and so on.

Ethernet Capacity [Mbps]

| Profile | 62.5 | 125 | 250 | 500 | 750 |
|---------|---------|---------|-----------|-----------|-----------|
| 0 | 37-48 | 39-51 | 46-60 | 92-120 | 136-176 |
| 1 | 77-99 | 81-104 | 92-120 | 186-241 | 271-351 |
| 2 | 116-150 | 163-211 | 186-241 | 372-482 | 557-722 |
| 3 | 155-201 | 246-318 | 373-484 | 766-992 | 1115-1444 |
| 4 | 195-252 | 328-425 | 576-746 | 1150-1489 | 1673-2167 |
| 5 | 234-303 | 421-546 | 768-994 | 1533-1986 | 2232-2892 |
| 6 | 273-354 | 505-654 | 960-1244 | 1916-2482 | 2790-3614 |
| 7 | 313-405 | 590-764 | 1153-1494 | 2301-2980 | 3348-4337 |
| 8 | – | 674-873 | 1346-1743 | 2684-3476 | 3907-5061 |
| 9 | – | 759-983 | 1538-1993 | 3068-3975 | 4465-5784 |
| 10 | – | – | 1730-2242 | 3452-4472 | – |

| Profile | 1000 | 1250 | 1500 | 1750 | 2000 |
|---------|-----------|-----------|-----------|-----------|-----------|
| 0 | 185-239 | 231-299 | 271-351 | 303-392 | 323-419 |
| 1 | 370-480 | 475-616 | 557-722 | 621-804 | 663-859 |
| 2 | 761-985 | 952-1233 | 1114-1443 | 1242-1609 | 1326-1717 |
| 3 | 1524-1974 | 1905-2467 | 2232-2892 | 2487-3222 | 2652-3436 |
| 4 | 2287-2962 | 2859-3703 | 3349-4339 | 3733-4836 | 4128-5347 |
| 5 | 3050-3951 | 3811-4937 | 4467-5787 | 4978-6448 | 5504-7130 |
| 6 | 3813-4939 | 4766-6174 | 5584-7234 | 6223-8061 | 6867-8896 |
| 7 | 4575-5927 | 5719-7409 | 6697-8675 | 7453-9655 | 8241-9882 |
| 8 | 5339-6916 | 6673-8645 | 7804-9882 | 8691-9882 | 9882-9940 |
| 9 | 6101-7903 | 7612-9861 | – | – | – |



Transmit Power [dBm]

Note: The accuracy of these values is up to +/-2dB.

In order to comply with the TELEC standard, it is necessary to reduce the power listed in the table below by the following:

- Up to QPSK: 2 dB
- 8 QAM: 1 dB for all channels except 2000 MHz
- 8 QAM at 2000 MHz: 2 dB

No reduction is necessary for modulations above 8 QAM.

| Channel Spacing (MHz) | 62.5 | 125 | 250 | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 |
|-----------------------|------|-----|-----|-----|-----|------|------|------|------|------|
| ¼ BPSK | – | – | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| ½ BPSK | – | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| BPSK | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 4 QAM | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 8 QAM | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 16 QAM | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 16 |
| 32 QAM | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 16 |
| 64 QAM | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 |
| 128 QAM | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 |
| 256 QAM | 15 | 15 | 15 | 15 | 15 | 15 | 15 | – | – | – |
| 512 QAM | – | 14 | 14 | 14 | – | – | – | – | – | – |

Receive Level Threshold [dBm@10E-6]

Note: The values listed in this section are typical. Actual values may differ in either direction by up to 2dB.

| Channel Spacing (MHz) | 62.5 | 125 | 250 | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ¼ BPSK | – | – | -81.8 | -78.8 | -76.5 | -75.8 | -74.0 | -74.0 | -73.0 | -73.4 |
| ½ BPSK | – | -81.8 | -78.8 | -75.8 | -73.5 | -72.8 | -71.0 | -71.0 | -70.0 | -70.4 |
| BPSK | -80.0 | -78.8 | -75.8 | -72.8 | -70.5 | -69.8 | -68.0 | -68.0 | -67.0 | -67.4 |
| 4 QAM | -78.0 | -76.7 | -73.7 | -70.5 | -68.5 | -67.6 | -66.0 | -65.5 | -65.0 | -64.9 |
| 8 QAM | -73.2 | -72.1 | -69.1 | -65.8 | -63.5 | -62.8 | -61.0 | -60.5 | -60.0 | -59.9 |
| 16 QAM | -71.3 | -70.3 | -67.3 | -64.3 | -62.5 | -61.2 | -60.0 | -59.5 | -58.0 | -58.6 |
| 32 QAM | -70.0 | -67.8 | -64.8 | -60.7 | -60.0 | -58.6 | -57.0 | -56.5 | -56.0 | -55.5 |
| 64 QAM | -68.3 | -65.5 | -61.9 | -57.6 | -57.5 | -55.7 | -55.0 | -53.5 | -53.0 | -52.4 |
| 128 QAM | -64.1 | -63.0 | -58.9 | -54.7 | -54.5 | -52.6 | -52.0 | -50.5 | -50.0 | -48.0 |
| 256 QAM | -61.0 | -59.5 | -56.0 | -50.4 | -51.5 | -49.8 | -48.5 | – | – | – |
| 512 QAM | – | -55.4 | -52.4 | -49.4 | – | – | – | – | – | – |

