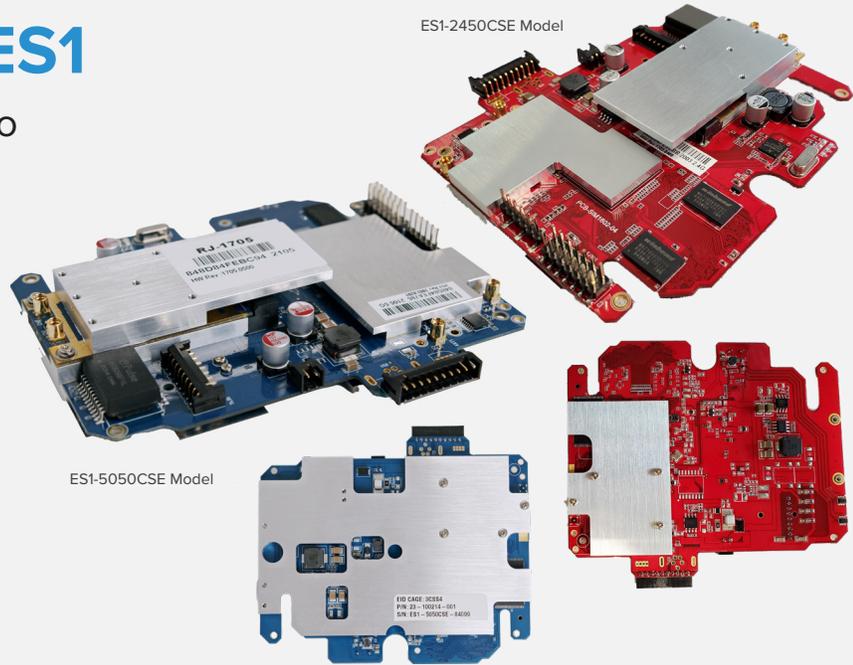


BreadCrumb® OEM ES1

Industrial Extended Range Dual-Radio Kinetic Mesh Wi-Fi Network Board

The OEM ES1 is for integration inside any small industrial machine or robot or for any mobile application where Wi-Fi is needed as well as Machine-to-Machine (M2M) connectivity to extend range beyond the limitations of Wi-Fi Access Points.

The OEM ES1 is designed to fit inside machines and robots and automatically fills in coverage gaps with concurrent dual radio communications to avoid the hassle and cost associated with constantly adding new access points and antenna solutions. Applications included fully autonomous, tele-remote and manual robots, machines and forklifts.

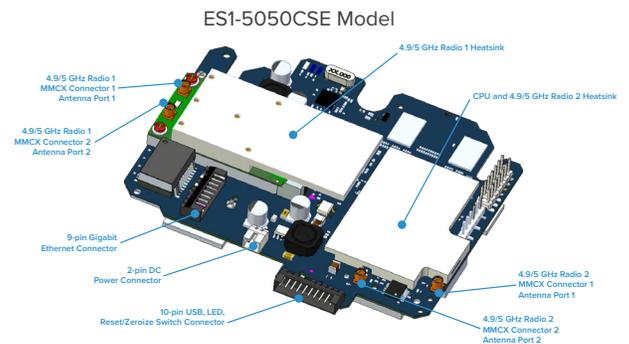
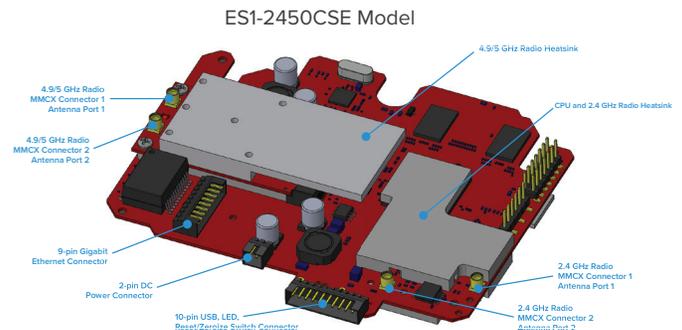


BreadCrumb OEM ES1: Ideal for Mobile Applications & Certified for Global Deployments

The OEM ES1 is based on the popular ES1-2450R and ES1-5050R which are both enclosed within an IP67 enclosure and certified for global deployments. The OEM ES1 variants maintain the industrial temperature and range while removing the IP67 enclosure and provide additional heat sinking as well as universal data, RF and power connectors to simplify integration inside existing machines, devices, and robots.

OEM ES1 Key Features:

- ES1-2450CSE contains one 2.4 GHz MIMO radio and one 4.95-5.85 GHz MIMO radio
- ES1-5050CSE contains two 4.95-5.85GHz MIMO radios
- -40C to +60C temperature range
- 29dBm TX power on both 2.4 and 4.9/5 GHz for extended range
- Additional heat sinks included as well as internal temperature chip to determine if additional heat sinking, e.g. fins or thermal coupling is required. For indoor deployments, unless the co-located components are generating extreme heat, additional heat dissipation is most likely not required as internal chips are specified to run up to 85C



- 9 bin Gigabit Ethernet, 2 pin Power (9-30V DC) and 11 pin USB, LED, Reset connectors included
- The OEM ES1 does not come with any wireless or safety related certifications. It is the OEM customer's responsibility to obtain the certifications required for the system that the OEM ES1 is integrated in

OEM ES1 Pinout and Mating Connectors

All OEM ES1 models use the same pinouts and connectors.

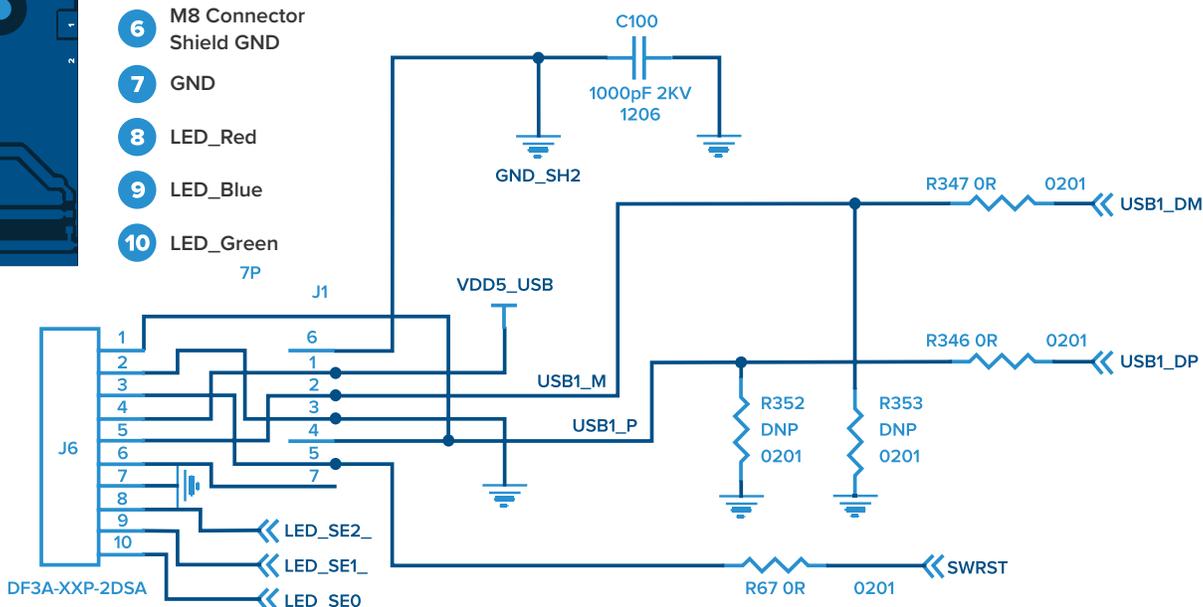
USB 2.0, LED and reset/zeroize switch interfaces are provided through a 10-pin Hirose DF3-10P-2DS(01) connector with the following pinout:



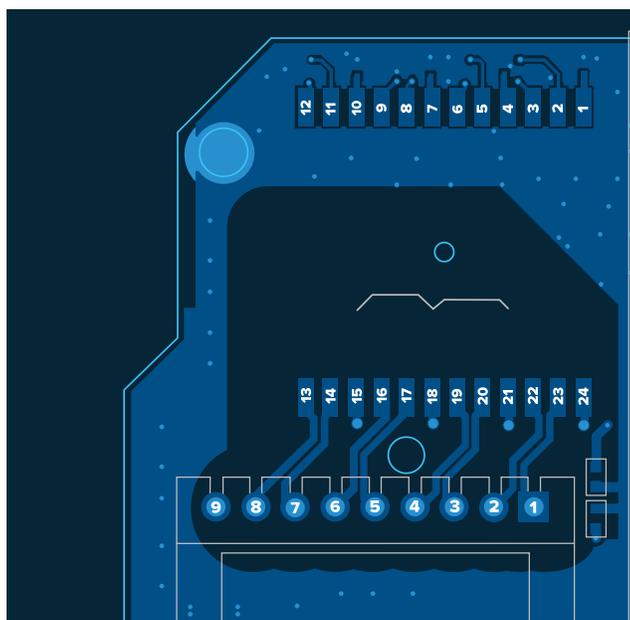
- 1 USB Data +
- 2 GND
- 3 Reset / Zeroize Sw
- 4 USB VDD (+5 V)
- 5 USB Data -
- 6 M8 Connector Shield GND
- 7 GND
- 8 LED_Red
- 9 LED_Blue
- 10 LED_Green

The mating connectors for DF3-10P-2DS(01) are:

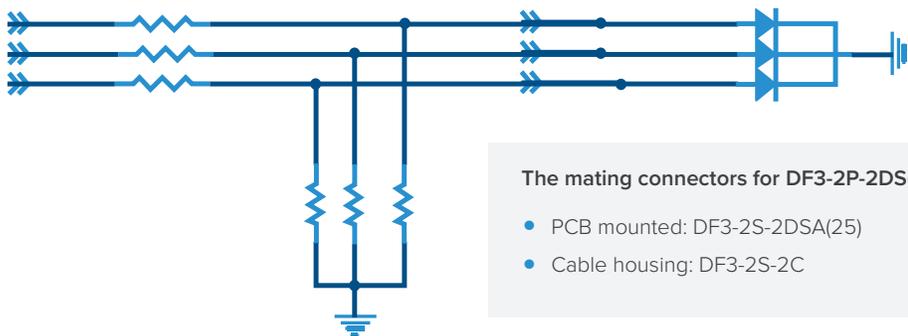
- PCB mounted: DF3-10S-2DSA(25)
- Cable housing: DF3-10S-2C



A Gigabit Ethernet interface is provided through a 9-pin Hirose DF3-9P-2DS(01) connector with the following pinout:



- 1 DA +
- 2 DA -
- 3 DB +
- 4 DB -
- 5 DC +
- 6 DC -
- 7 DD +
- 8 DD -
- 9 SHIELD (connected through 1 nF Capacitor to System GND)



The mating connectors for DF3-2P-2DS(01) are:

- PCB mounted: DF3-2S-2DSA(25)
- Cable housing: DF3-2S-2C

A DC power interface is provided through a 2-pin Hirose DF3-2P-2DS(01) connector with the following pinout:



The mating connectors for DF3-2P-2DS(01) are:

- PCB mounted: DF3-2S-2DSA(25)
- Cable housing: DF3-2S-2C

- 1 V+
- 2 V-

Model	Description
ES1-2450CSE	OEM ES1 with (1) 2.4 GHz, 2x2 MIMO, 300 Mbps and (1) 4.9/5 GHz, 2x2 MIMO, 300 Mbps transceivers
ES1-5050CSE	OEM ES1 with (2) 4.9/5 GHz, 2x2 MIMO, 300 Mbps transceivers
Power	
Input Voltage	9 – 30 VDC
Power Consumption¹	2.8 W (average, idle); 15 W (maximum, peak) @ 24 V
USB Port	Up to 2.5 W of additional power will be needed if a peripheral is being powered by USB (500 mA at 5 V is available at the USB port).
Physical	
Weight	ES1-2450CSE: 95 g (3.35 oz) ES1-5050CSE: 119 g (4.20 oz)
Dimensions	112 mm x 99 mm x 16 mm (4.41 in x 3.90 in x 0.63 in)

⁸ Weight depends on transceiver configuration