



XPD900 User Manual

Revision 1.2

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Revision History

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1 Introduction

The XPD900 transceiver module is not sold as a stand-alone device. The XPD900 module is a subassembly intended for use inside Eaton host products. This manual provides information regarding the integration of the module with host products. The XPD900 radio module has been certified for the FCC and ISED as a portable single-modular transmitter. The XPD900 PCB revision 5 radio module has the FCC ID: IA9XPD900A and the ISED certification number: 1338B-XPD900A.

2 List of Applicable FCC and ISED Rules

The following FCC rules are applicable to the transmitter: FCC Title 47 CFR Subpart C Part 15.203, Part 15.247, Part 15.205(a), Part 15.209(a).

The following ISED rules are applicable to the transmitter: RSS-Gen Section 7.1.2, RSS-247 Issue 2 (5.1)(a),(b), and (c), RSS-Gen Issue 5 (8.9), (8.10), RSS-210.

3 Specific Operational Use Conditions

The radio module may be used with the antenna that were certified with the module.

4 Limited Module Procedure

There aren't limiting conditions on the module that require a host device to remedy. The radio module meets all the eight requirements in FCC Part 15.212(a)(1) for modular approval.

5 Trace Antenna Designs

The radio module was certified with antennas that utilized trace design. Trace design is RF traces on the and passive matching components between the module and the radiating element located on the host device PCB. The module does not have a trace antenna radiating element, it only has the trace design as part of the antenna. To replicate the trace design from a host product that was used to certify an antenna type the parts list, layout information, antenna, connectors can be derived from internal documentation referenced from the host device part numbers provided in the antenna discussion in section 8.

The trace designs were verified by the EMC test lab during the module certification with multiple antenna types.

New host products that utilize the same trace design will have the RF path verified through review of the existing ECAD files, the BOM parts will be confirmed against the trace design, and by checking impedance.

For manufacturing testing refer to internal test plans for how the RF trace design path is verified on host products.

6 RF Exposure Considerations

The XPD900 radio module and antenna must be physically located such that SAR limits are not exceeded. Several antennas were tested with the radio module and a test report was created that provides the calculated distance requirements that must be maintained between the radio antenna and the user.

For portable module certification the test report, “E10788-2103_Cooper Electrical_XPD900_RF_Exposure_Rev 1.0.pdf” was crated with details for keep away distances for the XPD900 radio module and various antenna.

A summary of the distances for the FCC and ISES evaluation follow. Ensure that the host product meets the following keep away distances from the product when using the specific antenna. Refer to the antenna section 8 for details about the antenna.

	FCC	FCC	ISED	ISED
	Body Worn	Extremity	Body	Limb
Antenna	Exempt from 1-g SAR testing (mm)	Exempt from 10-g SAR testing (mm)	Exemption from 1-g SAR testing (mm)	Exempt from 10-g SAR testing (mm)
1	62.21	29.3	82	35
2	47.51	19	66	22.5
3	22.63	9.05	26.68	10
4	37.91	15.16	43	17.8

Table 1 Summary of FCC SAR Exemption Distances for XPD900

The radio was evaluated at 21 dBm output power conducted, 53% worst case duty cycle, and using the appropriate antenna gains.

When the host product provides simultaneous transmission operation, the case of two transmitters, the host manufacturer must determine if there are additional RF exposure filing requirements. If the RF module in combination with the other simultaneously operating transmitter complies with the RF exposure simultaneous transmission SAR test exclusion requirements, then the host manufacturer may perform their own evaluation without filing by using reasonable engineering judgement and testing to confirming compliance with out-of-band, restricted band, and spurious emission requirements in the simultaneous transmission operational mode. Otherwise filing is required if SAR test exclusion limits are not met.

6.1 RF Exposure Statement for Host Product Manuals

The XPD900 module was certified with various antenna listed in the Intentional Radiator Test Report. Each host product’s user manual requires a specific statement for the approved antenna used by the host product. The following is a template for the host product’s user manual statement. The specific antenna, physical product details and location of the user’s body or extremity, colocation of other radios, and SAR exemption details shall be updated in the following statement as applicable for each specific host product.

Refer to the XPD900 module’s RF Exposure Test Report for details on the antenna types, SAR calculations, and minimum separation distance. For example, various antenna types such as a whip, dome, host

product SMT antenna, and host product dipole antennas were evaluated and require different minimum separation distances between the user and the radiating element.

RF Exposure Statement

To comply with FCC and ISED RF exposure requirements, installation of this transmitter system's antenna must be performed in a manner that will provide the appropriate distance from the antenna to any user or member of the public.

The radio module was certified with [insert approved antenna type used on host product here].

The maximum radiated output power of this antenna satisfies the specific absorption rate (SAR) limits as specified in §1.1310 of FCC regulations, and RSS-102 (2.5.1) of ISED regulations, for general population/uncontrolled exposure provided the minimum separation distance of [insert the applicable configuration distance here, it is a value from Table 1] is maintained between the radiating element and the person.

7 FCC and ISED Regulatory Statements

The host products that integrate the radio module will include the following statements in their user manual.

7.1 FCC Statement

In accordance with FCC rule 15.21 and requirements 15.19(a)(5), the following statement shall be included in the user manual.

FCC Part 15

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications to this device, not expressly approved by Cooper Industries (Electrical) Inc. could void the user's authority to operate the equipment.

7.2 ISED Statement

In accordance with the requirement of RSS-GEN 8.4, the following statement shall be included in the user manual.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- 1. This device may not cause interference.**
- 2. This device must accept any interference, including interference that may cause undesired operation of the device.**

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et**
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.**

8 Antennas

The radio module is only certified for certain antenna. To avoid triggering additional certification work, the following certified antenna and trace designs must be used with host devices that integrate the XPD900 radio module.

Trace design is the connection from the module to an antenna via the host's PCB microstrip trace to an external connector, trace antenna, or component (chip) antenna on a PCB. This includes the passive matching components on the host PCB, (KDB 996369 D02 Q11). Note the RF traces, dimensions, thickness, passive components, layout, dielectric constant, impedance, and PCB stack up on new host product PCB must not change from the approved designs.

There is a total of 8 antenna that were approved for use with the radio module. There are four physical antennas radiating elements, and the remainder are antenna trace designs. The module test report, "The Module Test Report, "E10788-2103_Cooper Electrical_XPD900_FCC-ISED_Rev-1.0.pdf" includes antenna information certified with the module.

The following antennas are approved for use with the module. For antenna 3 and 4 the trace design must be duplicated as explained above.

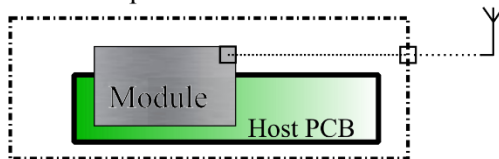
When using the internal antennas, antenna 3 and 4, ensure that the PCB trace design and cable of the new host product matches one of the host trace designs listed in Table 3.

Antenna	1	2	3	4
Part Number	AKIT-3591-04	AKIT-3591-07	A0042	ACAB-2683-07
Center Frequency (MHz)	914.9	914.9	916	915
Dimensions	Maximum height 13.5"	3.1 X 1.496"	0.5 x 0.36"	2.75"
Connection	SMA	SMA	Surface mount	Through hole solder mount
Bandwidth (MHz)	70	262	25	
Wavelength	Collinear Array 5/8λ over 1/2λ	1/4λ monopole	1/4λ monopole	1/4λ monopole
VSWR	2:1	3.3:1	≤ 2.0 typical at centre	3:1
Peak Gain (dBi)	5.4	3.52	2.54	2.54
Impedance (Ω)	50	50	50	50
Notes			Multiple trace designs. Must follow existing host device trace design that was certified.	Multiple trace designs. Must follow existing host device trace design that was certified.
Host Devices Tested	R260 R7, R260 R13, R270 R3	R260 R7, R260 R13, R270 R3	TD3100 R4, TD2100 R3, TD1141 R2	R270 R3, R260 R7, R260 R13

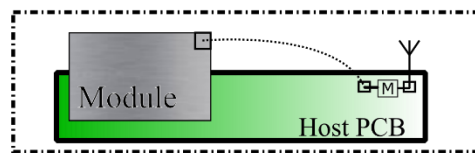
Table 2 Antenna's certified with XPD900 Module

The following diagram is an overview of how the antennas connect to the module and the host device.

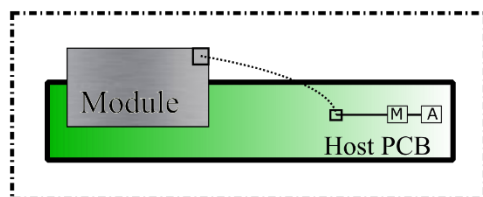
Antenna Option 1 and 2:



Antenna Option 4:



Antenna Option 3:



- Host device enclosure
- [M] Matching circuit on host pcb
- [A] SMT Antenna
- Coaxial Cable

Figure 1 Antenna Configurations

Table 3 list gives the specific details of the host products and their respective antenna types that were certified with the XPD900 module. See the hardware part number for the details of the PCB. The cable part number used to connect to the radio module is also provided.

Antenna	Host Product	Revision	Part Number	Trace Design	Module Connection	Cable to Module PN	Applicable Host BOM Components
1	R260	7	FPCB-3375R07	N/A	Coaxial	W0270	N/A
2	R260	7	FPCB-3375R07	N/A	Coaxial	W0270	N/A
4	R260	7	FPCB-3375R07	Follow Gerber & BOM	Matching cct. on PCB	W0272	C80=C0278, L3=L4=DNP, C198=C0234, D96=D0065, CN6=I0512
1	R260	13	FPCB-3375R13	N/A	Coaxial	W0270	N/A
2	R260	13	FPCB-3375R13	N/A	Coaxial	W0270	N/A
4	R260	13	FPCB-3375R13	Follow Gerber & BOM	Matching cct. on PCB	W0272	C80=C0278, L3=L4=DNP, C198=C0234, D96=D0065, CN6=I0512
1	R270	3	FPCB-3958R03	N/A	Coaxial	W0270	N/A
2	R270	3	FPCB-3958R03	N/A	Coaxial	W0270	N/A
4	R270	3	FPCB-3958R03	Follow Gerber & BOM	Matching cct. on PCB	W0272	L1=L2=DNP, C1=C0278, C3=C2=C75=C0234, D18=D0065, CN2=I0512
3	TD3100	4	FPCB-3875R04	Follow Gerber & BOM	Matching cct. on Display PCB	W0272	C16=C0245, L3=DNP, C17=C0271, C7=C0343, CN5=I0512
3	TD2100	3	FPCB-4014R03	Follow Gerber & BOM	Matching cct. on Switch PCB	W0272	C260=C0243, L8=C0343, C250=C0283, C261=DNP, CN5=I0512
3	TD1141	2	FPCB-4053R02	Follow Gerber & BOM	Matching cct. on PCB	W0288	C4=C0246, L4=DNP, C2=C0246, C27=C0336, CN13=I0512

Table 3 Host Device used for Antenna Certification – Use these trace designs on new host products

9 Label and Compliance Information

When the module’s FCC and ISED identification number is not visible when the module is installed inside a host product, then the host product must display a label referring to the enclosed module.

9.1.1 FCC Label

In accordance with 15.212(a)(1)(vi)(A) and KDB 784748 D01 A.6 the host product shall use a physical label stating:

“Contains Transmitter Module FCC ID: IA9XPD900A”

or,

“Contains FCC ID: IA9XPD900A”.

Note in the case that host product contains multiple radios, and only when approved to do so through correct certification or declaration, the label shall state:

“Contains FCC IDs: IA9XPD900A, [*insert name of other module’s FCC ID*]”.

9.1.2 ISED Label

In accordance with RSS-GEN 4.3 the host product shall use a physical label stating:

“Contains IC: 1338B-XPDP900A”

10 Information on Test Modes and Additional Testing Requirements

The host product must be tested with the radio module. Composite investigation testing should be done to verify the host product meets all the applicable FCC rules (KDB 996360 D04). The radio module should be installed in the host product and transmitting RF signal to confirm no emissions exceed the highest limit permitted for any one individual transmitter. If there are additional radio modules those radio modules should also be operating.

When testing for unintentional radiator of the host product, the transmitters shall be placed in the receive or idle mode. If that isn't possible the radio should be passive (preferred) and/or active scanning, and thus not turned off. In addition, the host product should be setup to ensure there is activity on the communications BUS of the product (e.g. USB, CAN bus, GPIO) to ensure unintentional radiator circuitry is enabled.

The product code may be used for testing when the radio needs to be in a transmit mode. When the radio is turned on and attempting to pair it will continue to transmit. This mode may be used for testing that requires the module to be transmitting. When an additional radio module inside the host product must be enabled for testing the production code may be used and a product configuration created that utilizes both radios.

For testing that require the radio to be in receive or idle mode, the device will need to be configured as a slave device. In this mode the radio will be in passive scanning mode. For host products that can not be configured as slave devices test firmware would need to be used to obtain this operational mode.

11 Additional Testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rules in the grant. The host product must still comply to any other FCC rules not covered by the modular transmitter grant of certification. If the host product is already Part 15 Subpart B compliant without the module, the host product will still require Part 15 Subpart B compliance testing with the modular transmitter installed.