

DESIGNERS AND MANUFACTURERS OF ELECTRONIC CONTROLS

KAR-TECH.com

MOD190

MODULAR TRANSCEIVER

OEM INSTALLATION AND OPERATION MANUAL

NOTE: THIS MODULE IS LIMITED TO OEM INSTALLATION ONLY

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DESCRIPTION

The MOD190 is a frequency hopping spread spectrum transceiver module designed to be compatible with US (FCC Part 15.247) and Canadian (RSS-247) regulations for license free use in the 900 MHz ISM band. The MOD190 is designed for mobile applications in accordance to Part 2.1091(b).

The MOD190 transceiver is only integrated into Kar-Tech remote control products by Kar-Tech, at Kar-Tech. There are no user serviceable parts on the MOD190 transceiver.

The MOD190 is not designed for multiple antenna applications and should not be used to transmit simultaneously with any other transmitter.

OPERATION

The MOD190 is a radio transceiver module for the 900 MHz ISM bands. The transceiver microcontroller includes a CPU, GPI/O, a fully integrated frequency synthesizer, a power amplifier, a modulator and a receiver unit. The MOD190 microcontroller serial port is connected to the host via protection circuits. The data is sent through a serial port to RF processor and then to RF circuit to the antenna and the data received from antenna is sent to the serial port and to the host. The microcontroller is responsible for the control of the entire communication. The MOD190 transceiver contains a DC regulator which generates a constant 1.8 VDC for the digital circuitry. The RF section runs on the 3.3V supply.

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synchronization with the transmitter's signals.

The MOD190 hops on 50 channel frequencies that are selected in a pseudo random order. An example of the order is:

{48, 25, 17, 20, 41, 37, 36,

10, 15, 44, 30, 6, 42, 33,

5, 8, 28, 1, 23, 49, 16, 3,

19, 29, 21, 43, 31, 9, 18,

27, 22, 45, 13, 2, 32, 11,

14, 46, 12, 24, 4, 7, 38, 4

7, 35, 40, 50, 34, 39, 26}

where Channel 1 is 902.5 MHZ and Channel 50 is 927.00 MHZ.

The dwell time of the hopping is 350ms. Each channel is used equally on average.

The receivers are matched to the transmitters to use the same hopping channel sequence and they hop channels in

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INSTALLATION

antenna.

- 1) Solder the MOD190 transceiver directly to the host's compatible connector.
- 2) Print and attach the label as shown below:



- 3) Place a label on the outside of the host enclosure in a visible area. On the label, include the following: "Contains Transmitter Module FCC ID: P4U-MOD190" and "Contains Transmitter Module IC: 4534A-MOD190"
- 4) Connect the appropriate antenna. Either a $\frac{1}{4}$ wavelength wire, or a RPSMA $\frac{1}{4}$ wavelength

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Application Requirements:

A) Power the MOD190 Transceiver with 3.3VDC nominal voltage, with peak current draw of 750mA.

B) Do not remove the shield on the MOD190.

C) If you use something other than the $\frac{1}{4}$ wave antenna or the wire antenna, the unit needs separate approval.

D) The antenna should be mounted at least 20cm from all persons, and must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi transmitter product procedures.

E) The MOD190 is to be installed only in mobile

applications. See Part 2.1091 for definitions of mobile and fixed applications.

F) Do not operate the MOD190 without an antenna.

G) Documentations: In the host's User Manual include the following:

a. That there are no user serviceable parts in the radio modules. They should not remove or install radio modules.

b. The "Instructions To The User" section.

c. The "Industry Canada Statement".

d. Include in the manual, "This device is granted for use in Mobile only configurations in which the antennas used for this

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transmitter must be installed to provide a separation distance of at least 20cm from all person and not be co-located with any other transmitters except in accordance with FCC and Industry Canada multi-transmitter product procedures."

BEFORE APPLYING POWER!

- Check power and ground for proper polarity.
- Read the rest of this manual.

TROUBLESHOOTING

There are no user serviceable parts in the MOD190 Transceiver. Contact your KAR-TECH representative for further instructions or servicing.

PARTS LIST

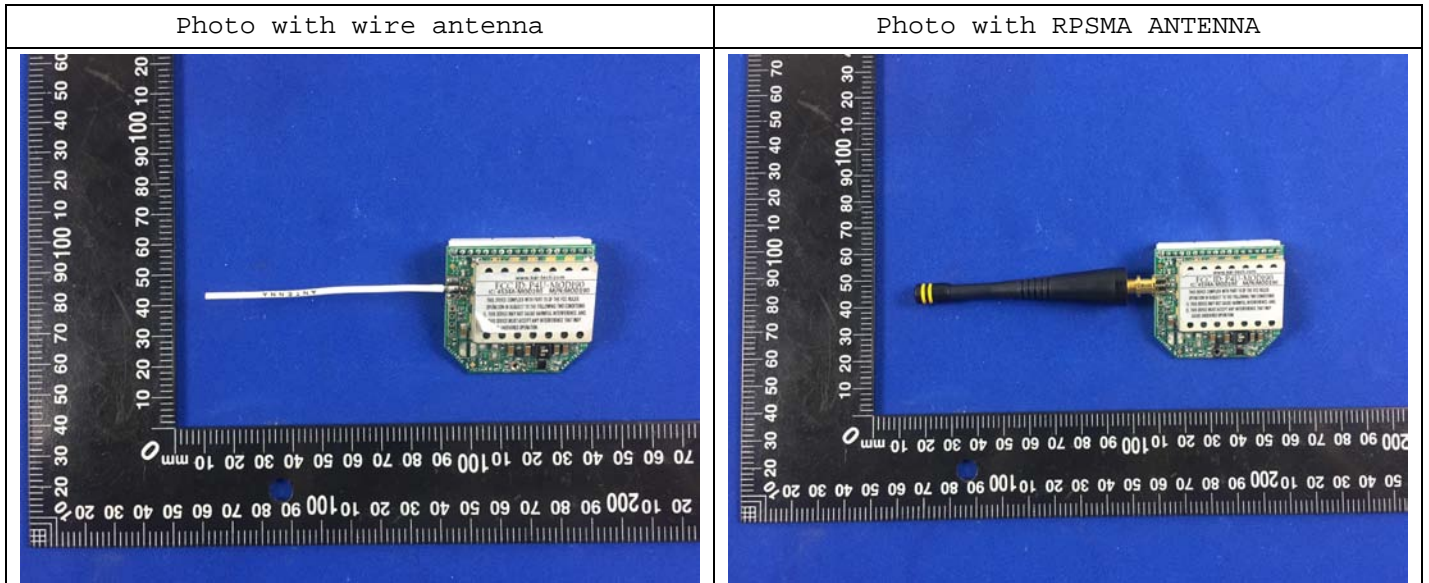
<i>PART NUMBER</i>	<i>DESCRIPTION</i>
021901A	MOD190 RADIO TRANSCEIVER – WIRE ANTENNA
021902A	MOD190 RADIO TRANSCEIVER – RPSMA ANTENNA

There are no user-serviceable parts inside the transmitter or the receiver. Return the units for service.

The information, specifications, and illustrations in this manual are those in effect at the time of printing. We reserve the right to change specifications or design at any time without notice.

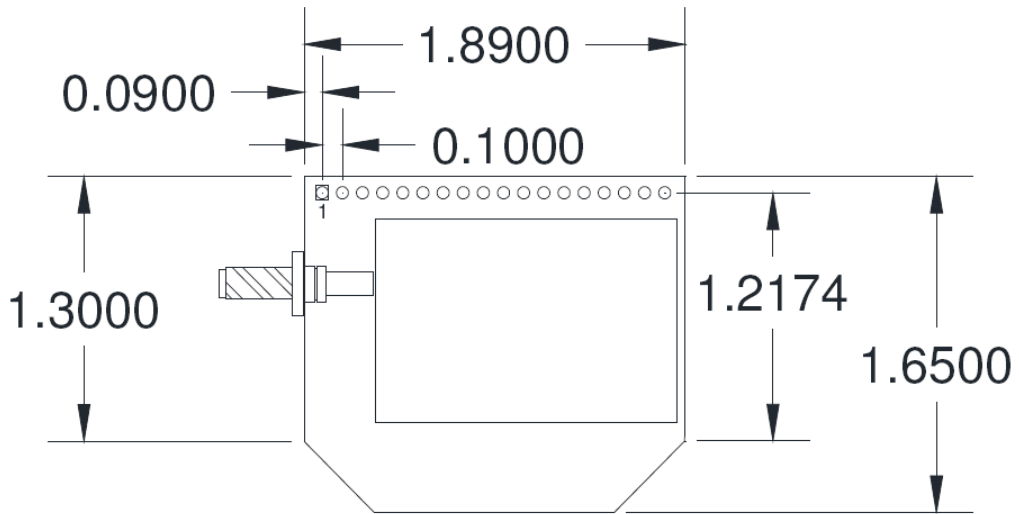
Part No.	Antenna type	Gain	Remark
021901A	WIRE ANTENNA	0.75dBi	Integral antenna
021902A	RPSMA ANTENNA	1.10dBi	External antenna

Antenna type: External Antenna with reversed polarity non standard antenna port



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TRANSCEIVER PICTORIAL



MOD190 Pinout

Pin	Function
1	GROUND
2	NOT USED
3	GROUND
4	NC
5	NC
6	NC
7	NC
8	NOT USED
9	MODE OUTPUT
10	NC
11	DATA IN
12	DATA OUT
13	NOT USED
14	NC
15	NC
16	NC
17	VCC
18	GROUND

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SPECIFICATIONS

Equipment Class Part 15 Spread Spectrum Transmitter
FCC ID:P4U-MOD190
IC: 4534A-MOD190

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Power supply 3.3VDC
Operating temperature - Radio..... -40 °C to +85 °C
Storage temperature -40 °C to +100 °C
RF Frequency 902.5-927 MHz
RF Receive Sensitivity..... -126 dBm

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INSTRUCTION TO THE USER

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not

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be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID:P4U-MOD190"

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product

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INDUSTRY CANADA STATEMENTS

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

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OEM Responsibilities to comply with FCC and Industry Canada Regulations

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

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

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada . Son fonctionnement est soumis aux deux conditions suivantes :

- (1) Ce dispositif ne peut causer d'interférences ; et
- (2) Ce dispositif doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

IC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with IC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body. Cette modulaire doit être installé et utilisé à une distance minimum de 20 cm entre le radiateur et le corps de l'utilisateur.

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

“Contains IC: 4534A-MOD190”

when the module is installed inside another device, the user manual of this device must contain below warning statements;

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1. This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

2. Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada . Son fonctionnement est soumis aux deux conditions suivantes :

(1) Ce dispositif ne peut causer d'interférences ; et

(2) Ce dispositif doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.