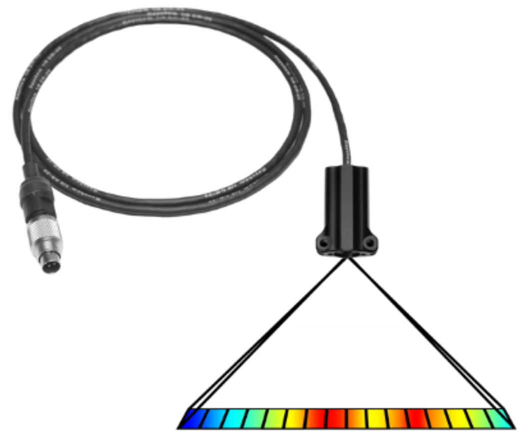
The Izze-Racing infrared sensor is specifically designed to measure the highly transient surface temperature of a tire with spatial fidelity, providing invaluable information for chassis tuning, tire exploitation, compound selection, and driver development.

The sensor is now offered as a complete plug-and-play kit for the AiM MXL2, MXG, MXS, EVO5, and EVO4S. The kit includes four 4, 8, or 16-channel infrared tire temperature sensors with wide (60˚) or ultra-wide (120˚) field-of-views and a complete wiring harness.



SENSOR SPECIFICATIONS

Temperature Measurement Range, T_o	-20 to 300˚C
Package Temperature Range, T_p	-20 to 85˚C
Accuracy (Central 10 Channels, Nominal) (16-Ch Sensor)	±1.0˚C $T_{sensor} < 50$˚C ±2.0˚C $T_{sensor} > 50$˚C
Accuracy (First & Last 3 Channels, Nominal) (16-Ch Sensor)	±2.0˚C $T_{sensor} < 50$˚C ±3.0˚C $T_{sensor} > 50$˚C
Noise Equivalent Temperature Difference, NETD	0.5˚C 16Hz, $\varepsilon = 0.85$, $T_o = 25$˚C
Field of View, FOV	60˚x 8˚ (IRTS-60-V2) 120˚x 14˚ (IRTS-120-V2)
Number of Channels	16, 8, or 4
Sampling Frequency	100, 64, 32, 16, 8, 4, 2, or 1Hz
Thermal Time Constant	2 ms
Effective Emissivity	0.01 to 1.00 (default = 0.85)
Spectral Range	8 to 14 µm

ELECTRICAL SPECIFICATIONS (SENSOR)

Supply Voltage, V_s	5 to 8 V
Supply Current, I_s (typ)	30 mA
Features	• Reverse polarity protection • Over-temperature protection (125˚C)

MECHANICAL SPECIFICATIONS

Weight	< 18.0 g
L x W x H (max, 60˚ FOV)	37.6 x 26.0 x 12.3 mm
L x W x H (max, 120˚ FOV)	32 x 29.0 x 12.3 mm
Protection Rating	IP66

CAN SPECIFICATIONS

Standard	CAN 2.0A (11-bit identifier), ISO-11898
Bit Rate	1 Mbit/s (configurable)
Byte Order	Big-Endian / Motorola
Data Conversion	0.1˚C per bit, -100˚C offset, unsigned
CAN ID's	LF Sensor: 1200 (Dec) / 0x4B0 (Hex) RF Sensor: 1204 (Dec) / 0x4B4 (Hex) LR Sensor: 1208 (Dec) / 0x4B8 (Hex) RR Sensor: 1212 (Dec) / 0x4BC (Hex)
Termination	None

CAN ID: Base ID

Channel 1		Channel 2		Channel 3		Channel 4	
Byte 0 (MSB)	Byte 1 (LSB)	Byte 2 (MSB)	Byte 3 (LSB)	Byte 4 (MSB)	Byte 5 (LSB)	Byte 6 (MSB)	Byte 7 (LSB)

CAN ID: Base ID+1

Channel 5		Channel 6		Channel 7		Channel 8	
Byte 0 (MSB)	Byte 1 (LSB)	Byte 2 (MSB)	Byte 3 (LSB)	Byte 4 (MSB)	Byte 5 (LSB)	Byte 6 (MSB)	Byte 7 (LSB)

CAN ID: Base ID+2

Channel 9		Channel 10		Channel 11		Channel 12	
Byte 0 (MSB)	Byte 1 (LSB)	Byte 2 (MSB)	Byte 3 (LSB)	Byte 4 (MSB)	Byte 5 (LSB)	Byte 6 (MSB)	Byte 7 (LSB)

CAN ID: Base ID+3

Channel 13		Channel 14		Channel 15		Channel 16	
Byte 0 (MSB)	Byte 1 (LSB)	Byte 2 (MSB)	Byte 3 (LSB)	Byte 4 (MSB)	Byte 5 (LSB)	Byte 6 (MSB)	Byte 7 (LSB)

WIRING SPECIFICATIONS (SENSOR):

Wire	26 AWG M22759/32, DR25 jacket
Cable Length (typ.)	1000 mm
Connector	Binder 5P 712 Male Plug

Supply Voltage, V_s	Red
Ground	Black
CAN +	Blue
CAN -	White

SENSOR CONFIGURATION:

To modify the sensor's configuration, send the following CAN message at 1Hz for at least 10 seconds and then reset the sensor by cycling power:

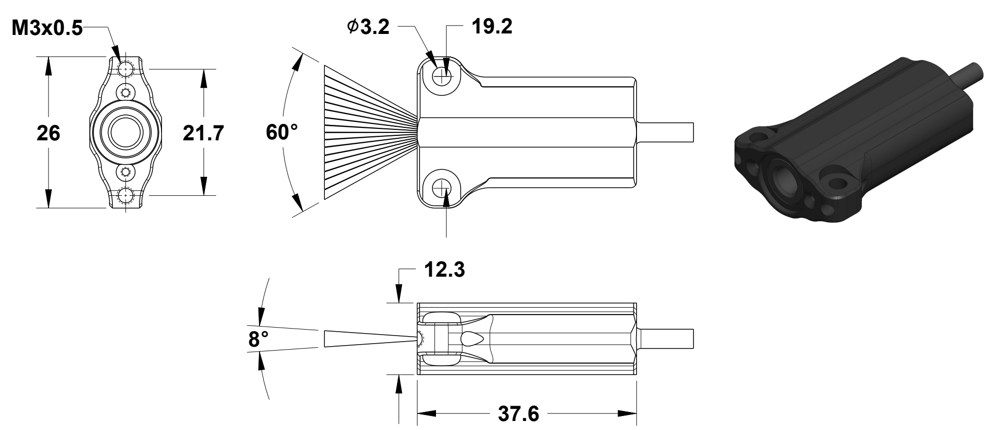
CAN ID: Current Base ID

Programming Constant		New CAN Base ID (11-bit)		Emissivity	Sampling Frequency	Channels	Bite Rate
Byte 0 (MSB)	Byte 1 (LSB)	Byte 2 (MSB)	Byte 3 (LSB)	Byte 4	Byte 5	Byte 6	Byte 7
30000 = 0x7530		1 = 0x001 ⋮ 2047 = 0x7FF		1 = 0.01 ⋮ 100 = 1.00	1 = 1Hz 2 = 2Hz 3 = 4Hz 4 = 8Hz 5 = 16Hz 6 = 32Hz 7 = 64Hz 8 = 100Hz	40 = 4 Ch 80 = 8 Ch 160 = 16 Ch	1 = 1 Mbit/s 2 = 500 kbit/s 3 = 250 kbit/s 4 = 100 kbit/s

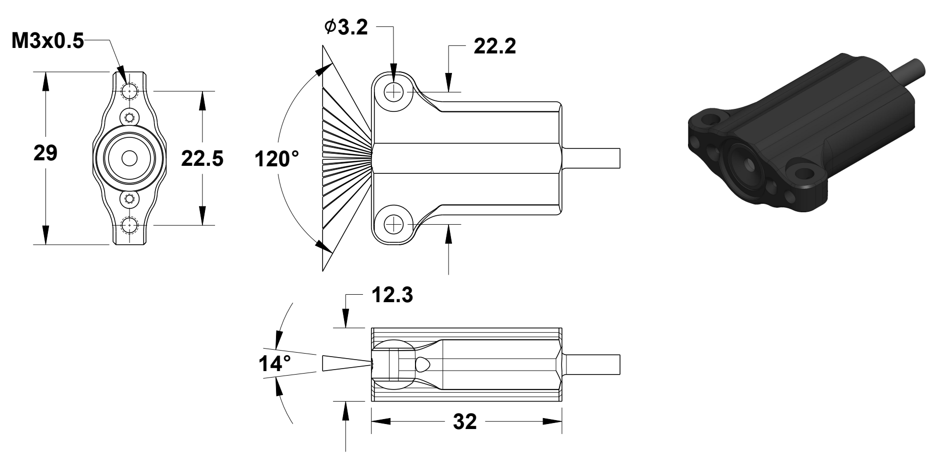
CAN messages should only be sent to the sensor during the configuration sequence.
DO NOT continuously send CAN messages with the same Base CAN ID to the sensor.

DIMENSIONS:

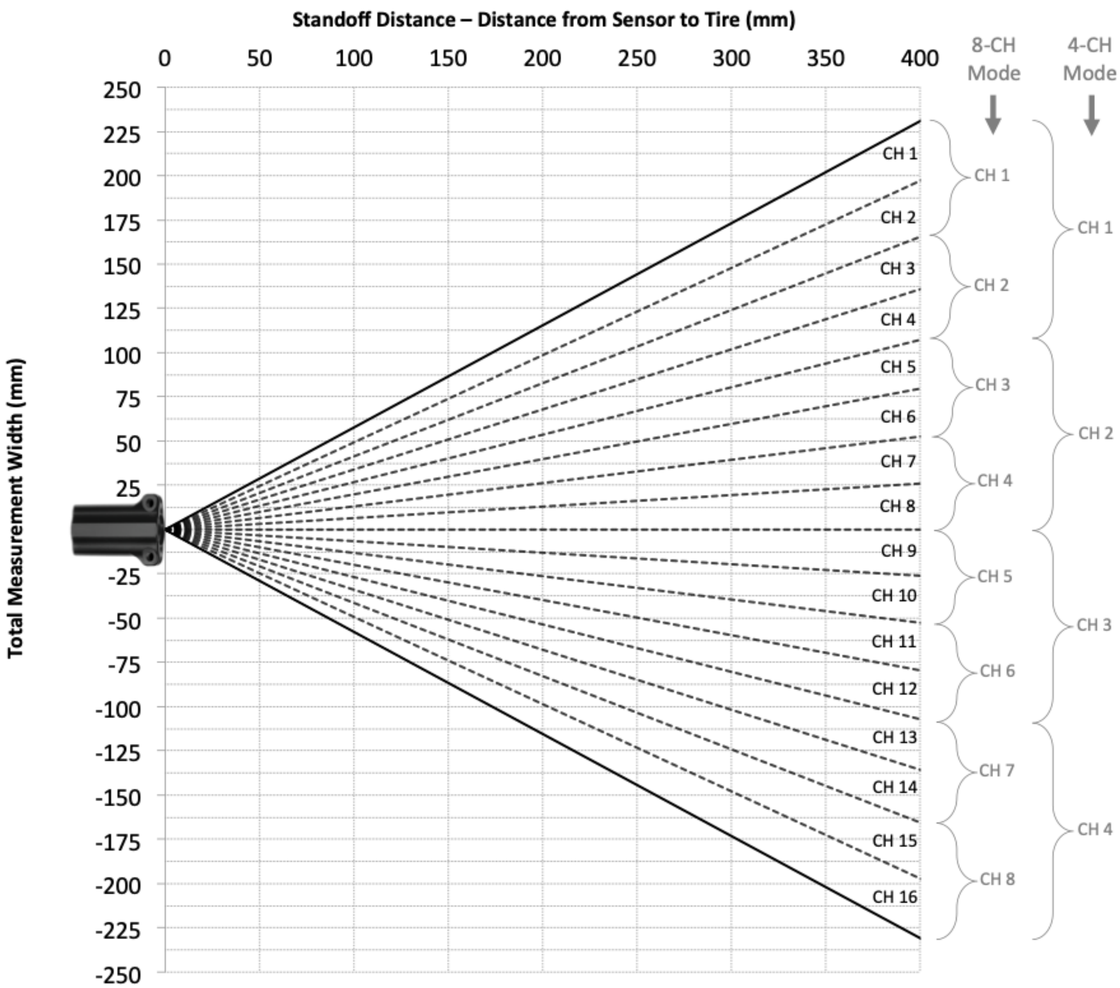
60° Field-of-View, IRTS-60-V3



120° Field-of-View, IRTS-120-V3

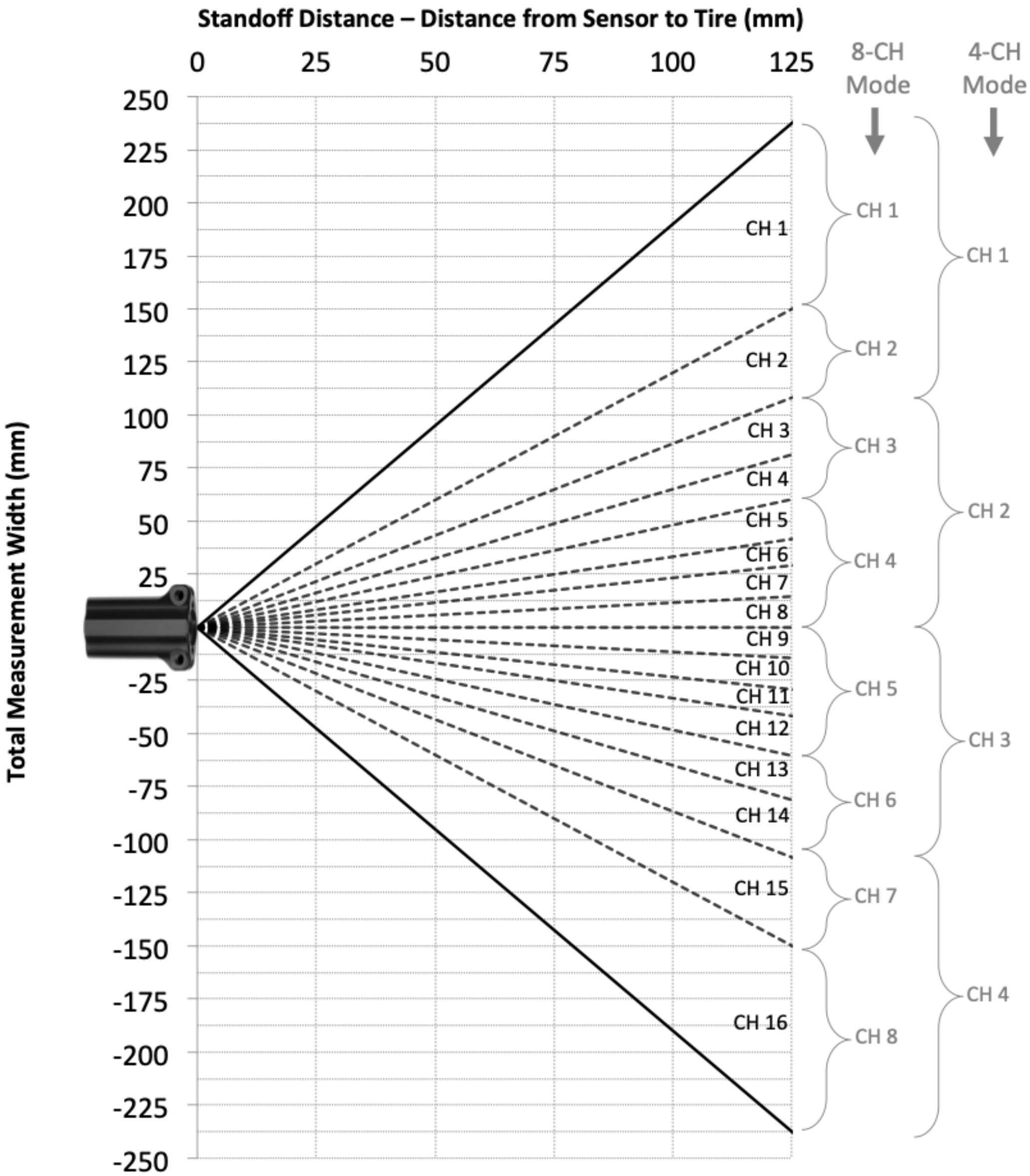


60˚ Field-of-View, IRTS-60-V3:



(Angle offset, z-axis rotation, between -5˚ and +5˚, mounts should allow adjustment accordingly)

120˚ Field-of-View, IRTS-120-V3:



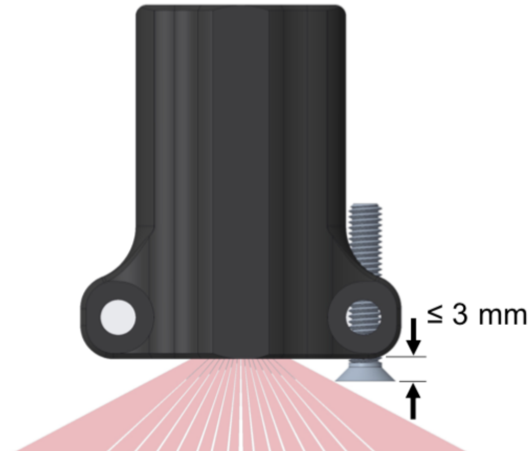
(Angle offset, z-axis rotation, between -5˚ and +5˚, mounts should allow adjustment accordingly)

FRONT FACE MOUNTING, IRTS-120-V3:

- With the IRTS-120-V3, care has to be taken when mounting from the front face holes given the wide width (120˚) of the infrared temperature channels. If the mounting bolt standoff from the front face is greater than 3mm, then it will partially block temperature channels 1 and 16.

- It's recommended to use M3 x 0.5 flat head bolts with a 90˚ countersunk hole to keep bolt-to-face standoff distances < 3mm.

- If this cannot be prevented, ignore temperature readings from CH1 and CH16.



GERMANIUM PROTECTIVE WINDOW, IRTS-GE-V1:

- A Germanium protective window is available for applications subjected to impinging debris (e.g., sensor placed behind tire).

- The widow is specifically designed for the IRTS sensor to achieve superior accuracy with minimal IR signal attenuation.

  ⓘ The effective emissivity is lowered by 10% with the widow installed

    - Default emissivity = 0.75 (IRTS-120-V2), 0.68 (IRTS-60-V2)

- The window mounts with two #00 Philips screws.

  ⓘ Screws require blue thread locker

  ⚠ Lightly torque screws, excessive torque could crack window

SENSOR & WIRING INSTALLATION FOR AiM KIT:

The Tire Temperature Kit for the AiM MXL2, MXG, MXS, SOLO 2 DL, MXP, MXM, EVO5, and EVO4S includes all of the components shown below. The kit attaches to the AiM system with either a – by default – flying lead (CAN+, CAN-, POWER, GND) to Binder 712 adapter harness with an integrated 5V voltage regulator or – optionally – a 22-socket Deutsch to Binder 712 Harness (if the auxiliary AiM harness isn't being used). The flying lead adapter harness may be attached to either "CAN1" or "CAN2".

(4) 4, 8, or 16-Ch Infrared Tire Temperature Sensors

(1) Flying Lead to Binder or Deutsch (optional)

(2) AiM Data Hubs

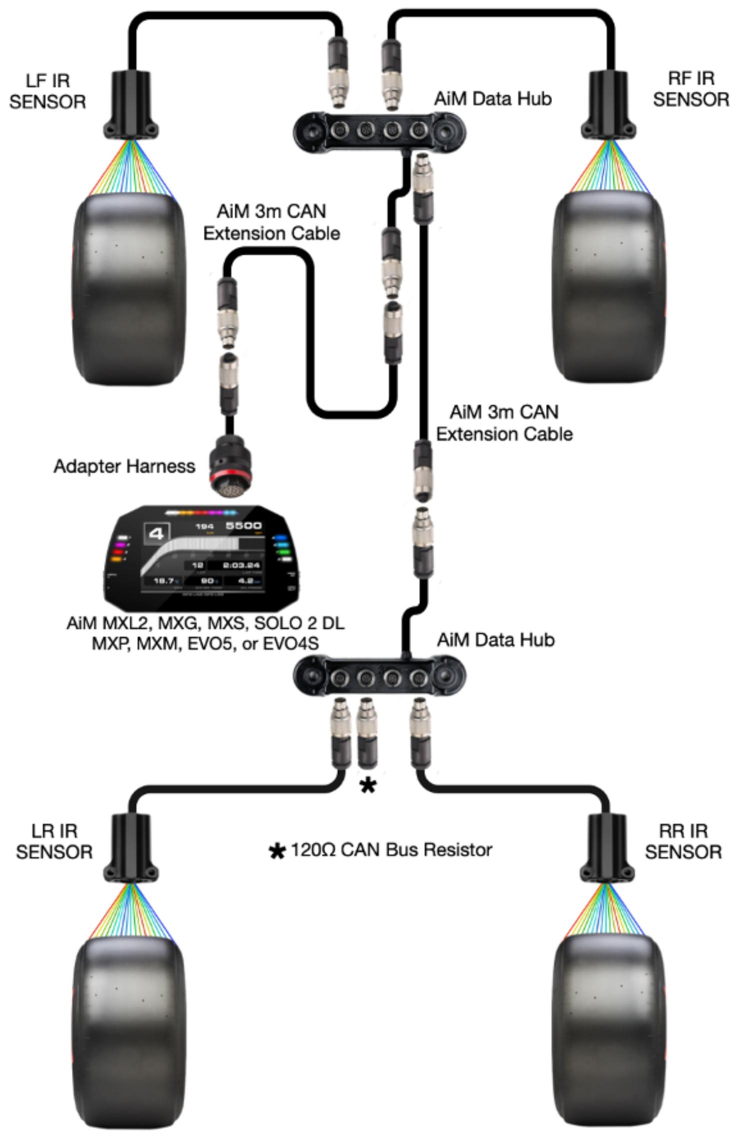
(2) AiM 3m CAN Cables

(1) 120Ω CAN Bus Resistor

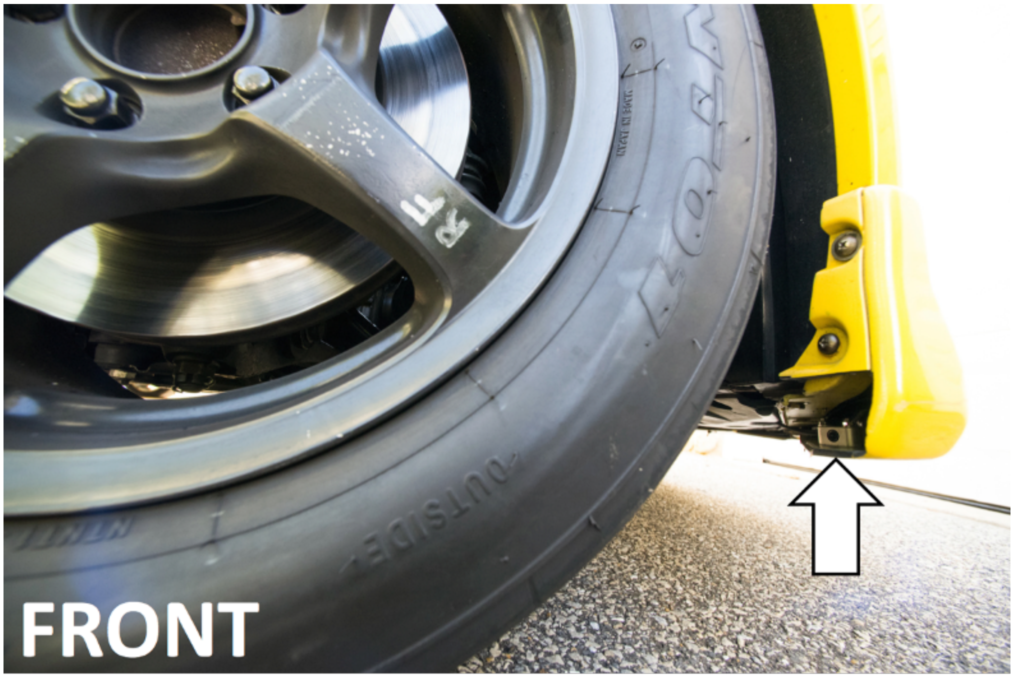
(2) Data Hub Caps

Install the sensors and wiring harness according to the diagram shown below.

- The sensors should be placed forward of the tires, facing the front of each tire.
- Refer to the Field of View graphs on pg. 4-5 for the standoff distance (distance from the sensor to the tire) required for the sensor to measure the entire width of the tire. For example, a 245mm wide tire will require a standoff distance of approximately 200mm and 65mm for a 60˚ and 120˚ FOV sensor, respectively.
- Refer to the pictures below for mounting examples. The sensors may be placed at an angle relative to the longitudinal axis (between 90˚ and 0˚) in order to mitigate lateral tire movement caused by steering.
- Place the AiM Data Hub's in between the front and rear pair of sensors and block off the unused Data Hub ports with the provided caps.

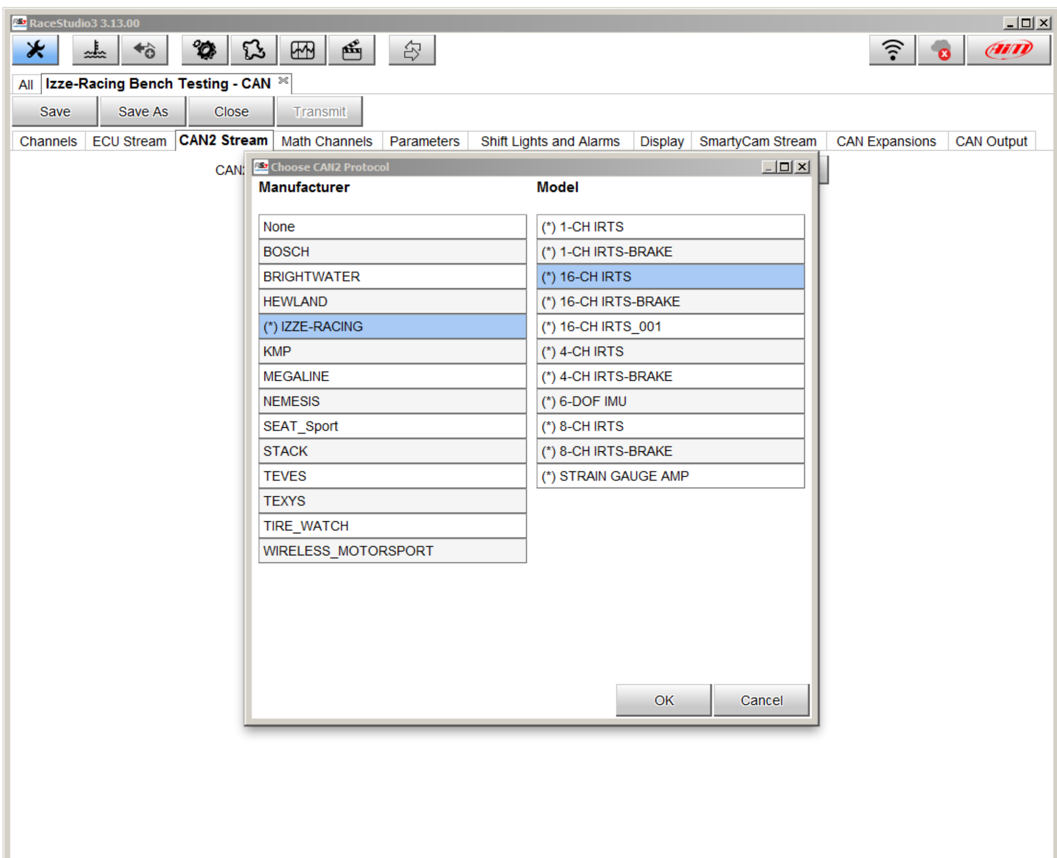


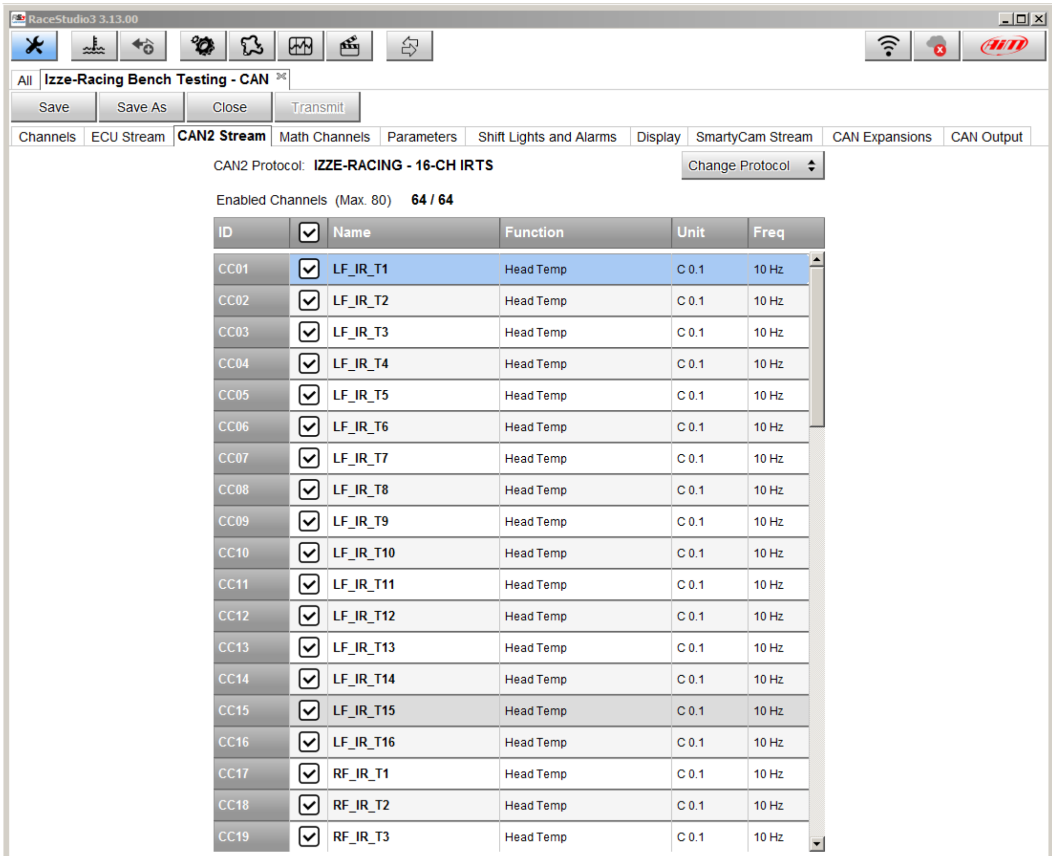
Tire Temperature Sensor Installation Example:



SOFTWARE SETUP FOR AiM KIT:

1. Open RaceStudio3 (version 3.13.00 or later) and the current configuration for your AiM MXL2, MXG, MXS, or EVO5.
2. Download and unzip the AiM CAN Configuration Templates for the tire temperature sensors at: www.izzeracing.com/AIM_CAN_CONFIG_IRTS.zip
3. In RaceStudio3, click the wrench (preferences) in the upper left hand corner and select “Import CAN Protocols”. Open the folder unzipped in step 2 and select the XC1 file for either the 4, 8 or 16-channel sensors.
4. In RaceStudio3, select the “CAN2 Stream” tab if the sensors are attached to “CAN2” (auxiliary harness) OR select “ECU Stream” if the sensors are attached to “CAN1” (main harness), select the “Change Protocol” button, then select “IZZE-RACING” under “Manufacture” and “16-CH IRTS”, “8-CH IRTS”, or “4-CH IRTS” under “Model”. Click “OK”.

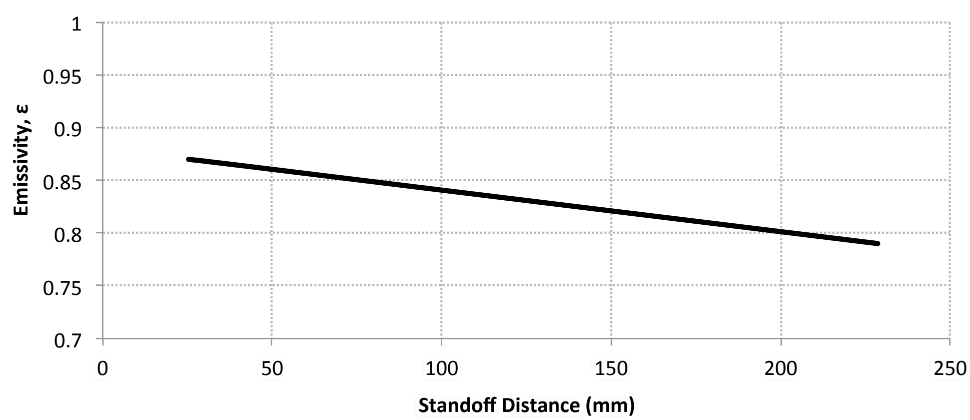




5. Change the “Freq” of each channel to 20Hz if your sensors have an update rate of 16Hz (default) or 50Hz if your sensors have an update rate of 32Hz (optional).
6. Click the “Transmit” button to upload the current configuration to the data logger.

ADDITIONAL INFORMATION:

- Stated accuracy is under isothermal package conditions; for utmost accuracy, avoid abrupt temperature transients and gradients across the sensor's package.
- Point the sensor in the downstream direction (facing front of tire) to avoid contamination, pitting, and/or destruction of the sensor's lens from debris. Protective windows are available upon request.
- The *effective* emissivity of most tires ranges from approximately 0.75 to 0.90 in the 8 to 14 μm spectrum.
    - Generally, the emissivity should be lowered as the standoff distance (distance from tire to sensor) increases; this is particularly important with the 60˚ FOV sensor due to the larger standoff distances required. The suggested emissivity vs. standoff distance is shown in the graph below:



    - Lowering the emissivity increases the measured object temperature and vice versa
- Noise Equivalent Temperature Difference (NETD) increases with increasing sampling frequency:
    - Provided that tire surface temperature is highly transient, it is usually advantageous to use a higher sampling frequency at the cost of increased noise. A sampling frequency of 16 or 32 Hz is recommended for most applications.