

FIRST INFRA RED SENSOR TECHNOLOGY 16 BY 4 IR SENSOR

This document details the CAN message format for the data obtained from the FIRST infra red sensor that can be used for tyre temperature measurement. The CAN message should be set up to transmit with the following parameters.

Standard identifier

Message length 8 bytes of 8 bits each

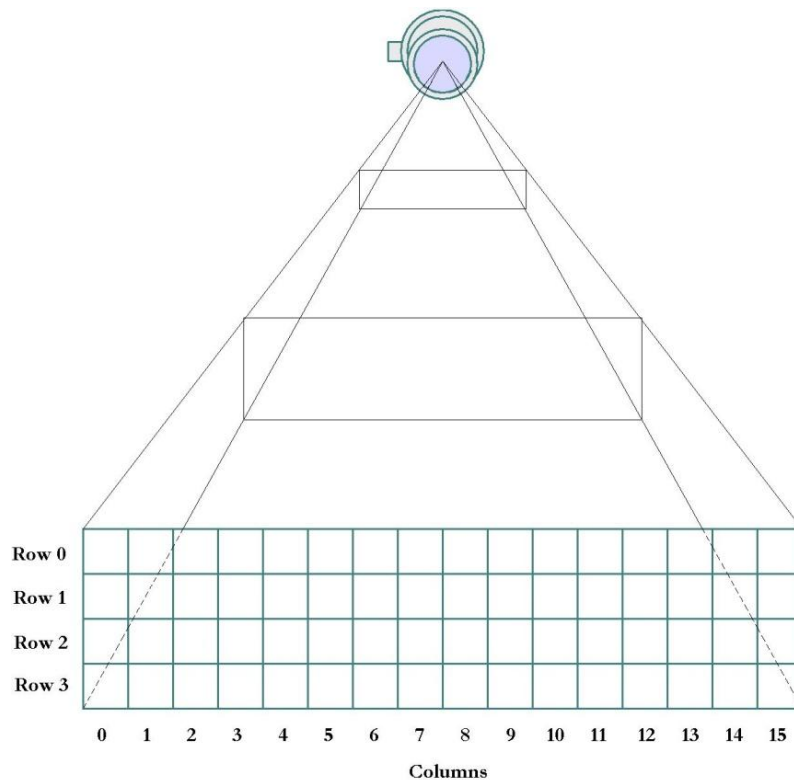
Baud rate 1 M/bit per second

Synchronise jump width time is $2 \times T_q$

Phase buffer segment 1 is $2 \times T_q$

Phase buffer segment 2 is $3 \times T_q$

Propagation time segment is $1 \times T_q$



The CAN message string is made up of twenty four, eight byte, eight bit words. There follows a description of these words.

0x07n0h Multiplexed word 1

Byte 0 01h Multiplex identifier for message 01

Byte 1 00h always 00h

Byte 2 nn Ascii data for first character (letter) of life code

Byte 3 nn Ascii data for second character (letter) of life code

Byte 4 nn Ascii data for third character (number) of life code

Byte 5 nn Ascii data for fourth character (number) of life code

Byte 6	nn	Ascii data for fifth character (number) of life code
Byte 7	00h	always 00h

0x07n0h Multiplexed word 2

Byte 0	02h	Multiplex identifier for message 02
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 0
Byte 3	nn	Least significant 8 bits of sensor row 0, column 0
Byte 4	nn	Most significant 8 bits of sensor row 0, column 1
Byte 5	nn	Least significant 8 bits of sensor row 0, column 1
Byte 6	nn	Most significant 8 bits sensor row 0, column 2
Byte 7	nn	Least significant 8 bits sensor row 0, column 2

0x07n0h Multiplexed word 3

Byte 0	03h	Multiplex identifier for message 03
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 3
Byte 3	nn	Least significant 8 bits of sensor row 0, column 3
Byte 4	nn	Most significant 8 bits of sensor row 0, column 4
Byte 5	nn	Least significant 8 bits of sensor row 0, column 4
Byte 6	nn	Most significant 8 bits sensor row 0, column 5
Byte 7	nn	Least significant 8 bits sensor row 0, column 5

0x07n0h Multiplexed word 4

Byte 0	04h	Multiplex identifier for message 04
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 6
Byte 3	nn	Least significant 8 bits of sensor row 0, column 6
Byte 4	nn	Most significant 8 bits of sensor row 0, column 7
Byte 5	nn	Least significant 8 bits of sensor row 0, column 7
Byte 6	nn	Most significant 8 bits sensor row 0, column 8
Byte 7	nn	Least significant 8 bits sensor row 0, column 8

0x07n0h Multiplexed word 5

Byte 0	05h	Multiplex identifier for message 05
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 9
Byte 3	nn	Least significant 8 bits of sensor row 0, column 9
Byte 4	nn	Most significant 8 bits of sensor row 0, column 10
Byte 5	nn	Least significant 8 bits of sensor row 0, column 10
Byte 6	nn	Most significant 8 bits sensor row 0, column 11
Byte 7	nn	Least significant 8 bits sensor row 0, column 11

0x07n0h Multiplexed word 6

Byte 0	06h	Multiplex identifier for message 06
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 12
Byte 3	nn	Least significant 8 bits of sensor row 0, column 12
Byte 4	nn	Most significant 8 bits of sensor row 0, column 13
Byte 5	nn	Least significant 8 bits of sensor row 0, column 13
Byte 6	nn	Most significant 8 bits sensor row 0, column 14
Byte 7	nn	Least significant 8 bits sensor row 0, column 14

0x07n0h Multiplexed word 7

Byte 0	07h	Multiplex identifier for message 07
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 0, column 15
Byte 3	nn	Least significant 8 bits of sensor row 0, column 15
Byte 4	nn	Most significant 8 bits of sensor row 1, column 0
Byte 5	nn	Least significant 8 bits of sensor row 1, column 0
Byte 6	nn	Most significant 8 bits sensor row 1, column 1
Byte 7	nn	Least significant 8 bits sensor row 1, column 1

0x07n0h Multiplexed word 8

Byte 0	08h	Multiplex identifier for message 08
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 1, column 2
Byte 3	nn	Least significant 8 bits of sensor row 1, column 2
Byte 4	nn	Most significant 8 bits of sensor row 1, column 3
Byte 5	nn	Least significant 8 bits of sensor row 1, column 3
Byte 6	nn	Most significant 8 bits sensor row 1, column 4
Byte 7	nn	Least significant 8 bits sensor row 1, column 4

0x07n0h Multiplexed word 9

Byte 0	09h	Multiplex identifier for message 09
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 1, column 5
Byte 3	nn	Least significant 8 bits of sensor row 1, column 5
Byte 4	nn	Most significant 8 bits of sensor row 1, column 6
Byte 5	nn	Least significant 8 bits of sensor row 1, column 6
Byte 6	nn	Most significant 8 bits sensor row 1, column 7
Byte 7	nn	Least significant 8 bits sensor row 1, column 7

0x07n0h Multiplexed word 10

Byte 0	0ah	Multiplex identifier for message 010
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 1, column 8
Byte 3	nn	Least significant 8 bits of sensor row 1, column 8

Byte 4	nn	Most significant 8 bits of sensor row 1, column 9
Byte 5	nn	Least significant 8 bits of sensor row 1, column 9
Byte 6	nn	Most significant 8 bits sensor row 1, column 10
Byte 7	nn	Least significant 8 bits sensor row 1, column 10

0x07n0h Multiplexed word 11

Byte 0	0bh	Multiplex identifier for message 011
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 1, column 11
Byte 3	nn	Least significant 8 bits of sensor row 1, column 11
Byte 4	nn	Most significant 8 bits of sensor row 1, column 12
Byte 5	nn	Least significant 8 bits of sensor row 1, column 12
Byte 6	nn	Most significant 8 bits sensor row 1, column 13
Byte 7	nn	Least significant 8 bits sensor row 1, column 13

0x07n0h Multiplexed word 12

Byte 0	0ch	Multiplex identifier for message 012
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 1, column 14
Byte 3	nn	Least significant 8 bits of sensor row 1, column 14
Byte 4	nn	Most significant 8 bits of sensor row 1, column 15
Byte 5	nn	Least significant 8 bits of sensor row 1, column 15
Byte 6	nn	Most significant 8 bits sensor row 2, column 0
Byte 7	nn	Least significant 8 bits sensor row 2, column 0

0x07n0h Multiplexed word 13

Byte 0	0dh	Multiplex identifier for message 013
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 2, column 1
Byte 3	nn	Least significant 8 bits of sensor row 2, column 1
Byte 4	nn	Most significant 8 bits of sensor row 2, column 2
Byte 5	nn	Least significant 8 bits of sensor row 2, column 2
Byte 6	nn	Most significant 8 bits sensor row 2, column 3
Byte 7	nn	Least significant 8 bits sensor row 2, column 3

0x07n0h Multiplexed word 14

Byte 0	0eh	Multiplex identifier for message 014
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 2, column 4
Byte 3	nn	Least significant 8 bits of sensor row 2, column 4
Byte 4	nn	Most significant 8 bits of sensor row 2, column 5
Byte 5	nn	Least significant 8 bits of sensor row 2, column 5
Byte 6	nn	Most significant 8 bits sensor row 2, column 6
Byte 7	nn	Least significant 8 bits sensor row 2, column 6

0x07n0h Multiplexed word 15

Byte 0	0fh	Multiplex identifier for message 015
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 2, column 7
Byte 3	nn	Least significant 8 bits of sensor row 2, column 7
Byte 4	nn	Most significant 8 bits of sensor row 2, column 8
Byte 5	nn	Least significant 8 bits of sensor row 2, column 8
Byte 6	nn	Most significant 8 bits sensor row 2, column 9
Byte 7	nn	Least significant 8 bits sensor row 2, column 9

0x07n0h Multiplexed word 16

Byte 0	10h	Multiplex identifier for message 016
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 2, column 10
Byte 3	nn	Least significant 8 bits of sensor row 2, column 10
Byte 4	nn	Most significant 8 bits of sensor row 2, column 11
Byte 5	nn	Least significant 8 bits of sensor row 2, column 11
Byte 6	nn	Most significant 8 bits sensor row 2, column 12
Byte 7	nn	Least significant 8 bits sensor row 2, column 12

0x07n0h Multiplexed word 17

Byte 0	11h	Multiplex identifier for message 017
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 2, column 13
Byte 3	nn	Least significant 8 bits of sensor row 2, column 13
Byte 4	nn	Most significant 8 bits of sensor row 2, column 14
Byte 5	nn	Least significant 8 bits of sensor row 2, column 14
Byte 6	nn	Most significant 8 bits sensor row 2, column 15
Byte 7	nn	Least significant 8 bits sensor row 2, column 15

0x07n0h Multiplexed word 18

Byte 0	12h	Multiplex identifier for message 018
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 3, column 0
Byte 3	nn	Least significant 8 bits of sensor row 3, column 0
Byte 4	nn	Most significant 8 bits of sensor row 3, column 1
Byte 5	nn	Least significant 8 bits of sensor row 3, column 1
Byte 6	nn	Most significant 8 bits sensor row 3, column 2
Byte 7	nn	Least significant 8 bits sensor row 3, column 2

0x07n0h Multiplexed word 19

Byte 0	13h	Multiplex identifier for message 019
Byte 1	00h	always 00h

Byte 2	nn	Most significant 8 bits of sensor row 3, column 3
Byte 3	nn	Least significant 8 bits of sensor row 3, column 3
Byte 4	nn	Most significant 8 bits of sensor row 3, column 4
Byte 5	nn	Least significant 8 bits of sensor row 3, column 4
Byte 6	nn	Most significant 8 bits sensor row 3, column 5
Byte 7	nn	Least significant 8 bits sensor row 3, column 5

0x07n0h Multiplexed word 20

Byte 0	14h	Multiplex identifier for message 020
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 3, column 6
Byte 3	nn	Least significant 8 bits of sensor row 3, column 6
Byte 4	nn	Most significant 8 bits of sensor row 3, column 7
Byte 5	nn	Least significant 8 bits of sensor row 3, column 7
Byte 6	nn	Most significant 8 bits sensor row 3, column 8
Byte 7	nn	Least significant 8 bits sensor row 3, column 8

0x07n0h Multiplexed word 21

Byte 0	15h	Multiplex identifier for message 021
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 3, column 9
Byte 3	nn	Least significant 8 bits of sensor row 3, column 9
Byte 4	nn	Most significant 8 bits of sensor row 3, column 10
Byte 5	nn	Least significant 8 bits of sensor row 3, column 10
Byte 6	nn	Most significant 8 bits sensor row 3, column 11
Byte 7	nn	Least significant 8 bits sensor row 3, column 11

0x07n0h Multiplexed word 22

Byte 0	16h	Multiplex identifier for message 022
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 3, column 12
Byte 3	nn	Least significant 8 bits of sensor row 3, column 12
Byte 4	nn	Most significant 8 bits of sensor row 3, column 13
Byte 5	nn	Least significant 8 bits of sensor row 3, column 13
Byte 6	nn	Most significant 8 bits sensor row 3, column 14
Byte 7	nn	Least significant 8 bits sensor row 3, column 14

0x07n0h Multiplexed word 23

Byte 0	17h	Multiplex identifier for message 023
Byte 1	00h	always 00h
Byte 2	nn	Most significant 8 bits of sensor row 3, column 15
Byte 3	nn	Least significant 8 bits of sensor row 3, column 15
Byte 4	nn	Most significant 8 bits of ambient temperature sensor
Byte 5	nn	Least significant 8 bits of ambient temperature sensor

Byte 6	nn	Most significant 8 bits of supply voltage
Byte 7	nn	Least significant 8 bits of supply voltage

0x07n0h Multiplexed word 24

Byte 0	18h	Multiplex identifier for message 024
Byte 1	00h	always 00h
Byte 2	00h	always 00h
Byte 3	00h	always 00h
Byte 4	00h	always 00h
Byte 5	00h	always 00h
Byte 6	nn	Most significant 8 bits of software version
Byte 7	nn	Least significant 8 bits of software version

CONFIGURATION MESSAGE (0x150h) – TRANSMIT ONLY FROM ECU AT 1Hz

0x150h Multiplexed word 1 (IR Sensor number 1)

Byte 0	01h	Multiplex identifier for message 01
Byte 1	nn	Ascii data for third character (number) of life code
Byte 2	nn	Ascii data for fourth character (number) of life code
Byte 3	nn	Ascii data for fifth character (number) of life code

Byte 4 nn MSB of CAN ID base address
 Byte 5 nn LSB of CAN ID base address
 Byte 6 nn Configuration Byte (see table 1 below)

0x150h Multiplexed word 2 (IR Sensor number 2)

Byte 0 02h Multiplex identifier for message 02
 Byte 1 nn Ascii data for third character (number) of life code
 Byte 2 nn Ascii data for fourth character (number) of life code
 Byte 3 nn Ascii data for fifth character (number) of life code
 Byte 4 nn MSB of CAN ID base address
 Byte 5 nn LSB of CAN ID base address
 Byte 6 nn Configuration Byte (see table 1 below)

0x150h h Multiplexed word 3 (IR Sensor number 3)

Byte 0 03h Multiplex identifier for message 03
 Byte 1 nn Ascii data for third character (number) of life code
 Byte 2 nn Ascii data for fourth character (number) of life code
 Byte 3 nn Ascii data for fifth character (number) of life code
 Byte 4 nn MSB of CAN ID base address
 Byte 5 nn LSB of CAN ID base address
 Byte 6 nn Configuration Byte (see table 1 below)

0x150h Multiplexed word 4 (IR Sensor number 4)

Byte 0 04h Multiplex identifier for message 04
 Byte 1 nn Ascii data for third character (number) of life code
 Byte 2 nn Ascii data for fourth character (number) of life code
 Byte 3 nn Ascii data for fifth character (number) of life code
 Byte 4 nn MSB of CAN ID base address
 Byte 5 nn LSB of CAN ID base address
 Byte 6 nn Configuration Byte (see table 1 below)

Continue with same format if more than 4 sensors are on the CAN bus.....

Configuration Byte

The configuration byte is split into two with the 4 Least Significant Bits being reserved for the rate data and the 4 most significant bits being reserved for the row data.

TABLE 1 : Bits 0-3

Rate Code	Transmission Rate	Comment
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0	No Change	No change to what is stored in flash
1	1Hz	
2	2Hz	
3	5Hz	
4	10Hz	*default rate
5	20Hz	
6-15	Reserved	Future Options

TABLE 2 : Bits 4 -8

Rate Code	Transmission Rate	Comment
0	No Change	No change to what is stored in flash
1	All rows	*note frequency restrictions
2	ROW 0 ONLY	**Reduced messages sent
3	ROW 1 ONLY	**Reduced messages sent
4	ROW 2 ONLY	**Reduced messages sent
5	ROW 3 ONLY	**Reduced messages sent
6	AVERAGE OF ALL 4 ROWS	
7-15	Reserved	Future options

- If too high a rate is selected for the number of rows selected then the sensor will default to transmitting at 10Hz
- If only one row is selected then the sensor will only transmit the corresponding multiplexed messages, for example if row 0 only is to be transmitted only CAN multiplex messages 1 to 7 inclusive will be transmitted. Multiplexed message 23&24 will always be sent so that sensor body temperature, supply voltage a software version can be decoded by the end user.
- If zero is sent in the configuration byte then the sensor will use it's existing settings that are stored in flash memory.
- If no configuration message is received in the first 5secs of power-up then the sensor will use its last known settings (CAN ID , frequency and number of rows).

Technical information

Accuracy +/- 1 C

max Bandwidth per pixel 20 HZ

Current consumption 24 Ma

standard bandwidth per pixel 10 Hz

Max operating Temperature 95 C

voltage range 5 V to 18 V (5V preferred)

Fly lead as standard

1mB Can output

