User's Manual

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YRL78IOLINKMAX

IO-Link Starter Kit: Tutorial Manual

RENESAS MCU

RL78 Family/ G1x Series

Renesas Electronics
www.renesas.com

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The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

Handling of Unused Pins

Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.

The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

Differences between Products

Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.

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- Device availability
- Ordering information
- Product release schedule
- Availability of related technical literature
- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)
- Network requirements

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Preface

Readers This manual is intended for users who want to understand the functions of the concerned microcontrollers.

Purpose This manual presents the hardware manual for the concerned microcontrollers.

Organisation This system specification describes the following sections:

Pin function

CPU function

Internal peripheral function

Module instances These microcontrollers may contain several instances of a dedicated module. In general the different instances of such modules are identified by the index “n”, where “n” counts from 0 to the number of instances minus one.

Legend Symbols and notation are used as follows:

Weight in data notation:	**Left is high order column, right is low order column**
Active low notation:	xxx (pin or signal name is over-scored) or /xxx (slash before signal name) or _xxx
Memory map address:	High order at high stage and low order at low stage

Note Additional remark or tip

Caution Item deserving extra attention

Numeric notation

Binary:	xxxx or xxxB
Decimal:	xxxx
Hexadecimal	xxxxH or 0x xxxx

Numeric prefixes representing powers of 2 (address space, memory capacity):

K (kilo): $2^{10} = 1024$

M (mega): $2^{20} = 1024^2 = 1,048,576$

G (giga): $2^{30} = 1024^3 = 1,073,741,824$

Register contents X, x = don’t care

Diagrams Block diagrams do not necessarily show the exact wiring in hardware but the functional structure. Timing diagrams are for functional explanation purposes only, without any relevance to the real hardware implementation.

How to Use This Manual

Purpose and Target Readers

This manual is designed to provide the user with an understanding of the hardware functions and electrical characteristics of the MCU. It is intended for users designing application systems incorporating the MCU. A basic knowledge of electric circuits, logical circuits, and MCUs is necessary in order to use this manual. The manual comprises an overview of the product; descriptions of the CPU, system control functions, peripheral functions, and electrical characteristics; and usage notes.

Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the xxx/xx Group. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.

Document Type	Description	Document Title	Document No.
Data Sheet	Hardware overview and electrical characteristics	xxx/xx Group Datasheet	R01DSxxxxEJxxxx
User's manual for Hardware	Hardware specifications (pin assignments, memory maps, peripheral function specifications, electrical characteristics, timing charts) and operation description. Note: Refer to the application notes for details on using peripheral functions.	xxx/xx User's manual for Hardware	This User's manual
User's manual for Software	Description of CPU instruction set	xxx/xx Series User's manual for Software	R01USxxxxEJxxxx
Application Note	Information on using peripheral functions and application examples. Sample programs. Information on writing programs in assembly language and C.	Available from Renesas Electronics Web site.	
Renesas Technical Update	Product specifications, updates on documents, etc.		

Notation of Numbers and Symbols

Register Notation

List of Abbreviations and Acronyms

Abbreviation	Full Form
ACIA	Asynchronous Communication Interface Adapter
bps	bits per second
CRC	Cyclic Redundancy Check
DMA	Direct Memory Access
DMAC	Direct Memory Access Controller
GSM	Global System for Mobile Communications
Hi-Z	High Impedance
IEBus	Inter Equipment Bus
I/O	Input/Output
IrDA	Infrared Data Association
LSB	Least Significant Bit
MSB	Most Significant Bit
NC	Non-Connect
PLL	Phase Locked Loop
PWM	Pulse Width Modulation
SFR	Special Function Register
SIM	Subscriber Identity Module
UART	Universal Asynchronous Receiver/Transmitter
IODD	IO-Link Device Description file

Table of Contents

1.Overview

The *YRL78IOLINKMAX* is an evaluation platform for small scale IO-Link sensor system based on the Renesas RL78/G1A microcontroller, and the Maxim Integrated MAX41821 IO-Link Device transceiver.

An IO-Link Master not included in the kit is necessary to use this kit. In this manual, a TMG USB to IO-Link Master is used to explain the operation of the *YRL78IOLINKMAX*.

This manual provides information on how to use the *YRL78IOLINKMAX* with the Demo Sample Device pre-programmed in the microcontroller at shipment

This demo exhibits all the sensor features available on the platform.

IODDs (IO-Link Device Description) are provided for importation and integration of the *YRL78IOLINKMAX* into the IO-Link Device tool.

An IODD file version 1.1 is provided as well as a version 1.0.1 for older IO-Link Master systems. Please use the appropriate IODD for your system.

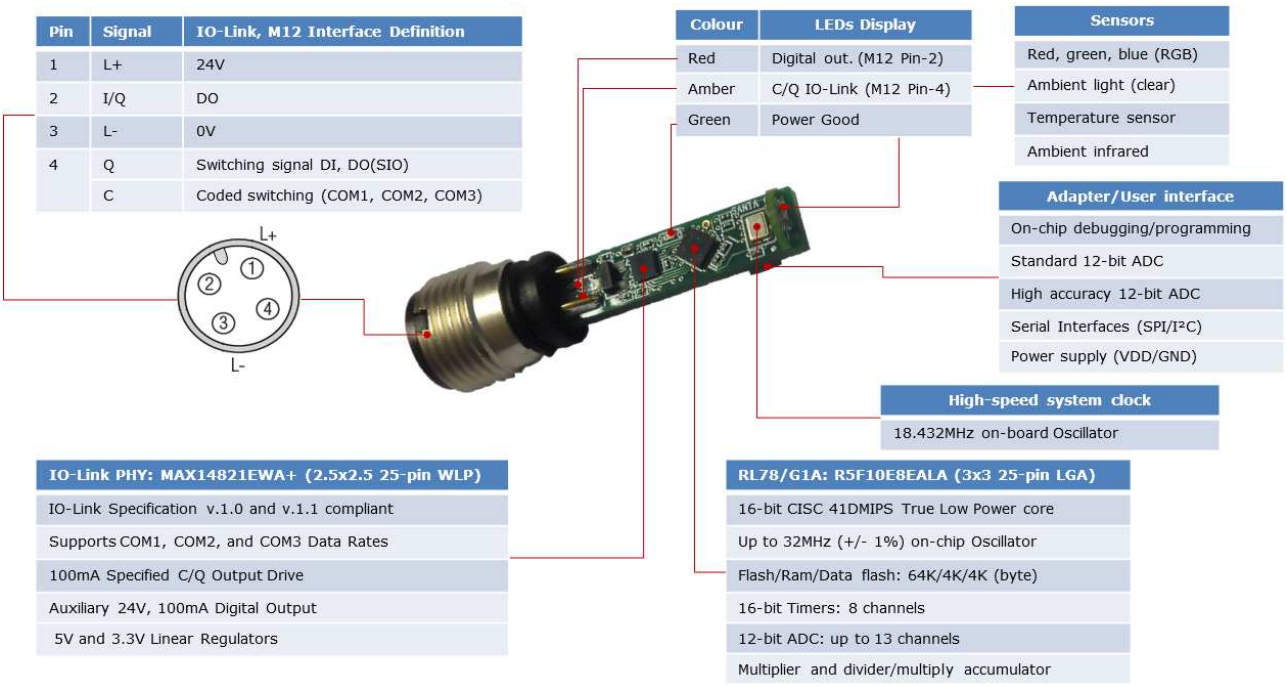

Figure 1-1 *YRL78IOLINKMAX* board Components

1.1 LED Indicators, D5, D6

LEDs D5, D6, are indicating the communication status on the M12 Pin4 and Pin2 respectively.

Table 1-1 LED indications

LED	Colour	Function	PHY	
			connection	Pin
D5	Amber	M12 Pin4 IO-Link Channel communication signalling	C/Q	B1
D6	Red	M12 Pin2 Digital Input/output communication signalling	DI/DO	E1/D1

2.Installation

2.1 Getting Started

The downloadable Starter kit Installer shows the following directory structure:

Table 2-1.*YRL78IOLINKMAX* Downloadable Starter Kit Installer contents

YRL78IOLINKMAX	Description
acroread	Acrobat Reader for Windows OS
Demo Sample Device	Demo Firmware and IODD files
Doc	Datasheets, Manuals, Stack License, board Schematics
IAR	IAR Embedded Workbench for RL78
Quick Start Guide	*YRL78IOLINKMAX* quick start guide
Renesas Flash Programmer	Flash Programmer for RL78/G1A
SampleProgram	Sample project for IAR and IODD for the Starter Kit • IO-Link Ambient light sensor demonstration Project

2.2 IODD Device Description Files Installation

The IODD repository for the Demo sample Device is located in the folder of the same name.

To install the IODD Device Description file for the *YRL78IOLINKMAX* Demo sample, import the corresponding XML file in your IO-Link device tool.

- IODD file name: Renesas-YRL78IOLINKMAX-Sample-V2-20140612-IODD1.1.xml

For further details please refer to section 4.2.2

For the purpose of this demo the TMG USB IO-Link Master has been used. The screenshots in the following sections are those of the TMG device tool software, operating with the TMG Master device.

Once the Device tools software has been updated, the *YRL78IOLINKMAX* board can be controlled from the software GUI.

Remark

If you do not have the TMG USB IO-Link Master, and your equipment does not support the IODD description file, please refer to the “QuickStart Guide IO-Link Device Stack library” installed by the Starter kit Installer, for a list of indexes referring to the application’s process-data and parameters accessible through IO-Link.

3.Hardware setup

- Connect the IO-Link Master to the host computer. The *YRL78IOLINKMAX* board should be now connected to the Master via the M12 cable see Figure 3-1.

Note

There is no lighting for the sensor element and no lens focuses to the object. Therefore the measurement is not optimal and should be tested under easy conditions. E.g. colour bars on a screen are good for demonstration.

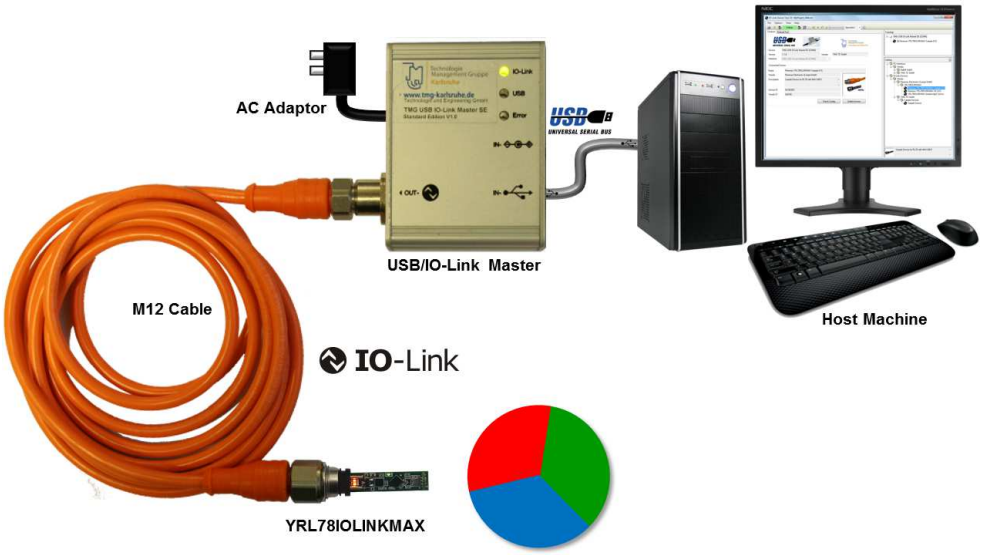

Figure 3-1.YRL78IOLINKMAX Ambient light sensor demo setup

4.Demo Sample Device

4.1 Demo Features

The Renesas Demo Sample Device demonstrates a small size design for an IO-Link sensor based on components of Renesas, Maxim and software of TMG TE. As powerful features the sensor offers RGBC Colours, Ambient light compensation, Infra-red and ambient temperature measurements, transmitted via the IO-Link process data.

For more details on the Maxim sensor MAX4008 capabilities, please refer to the component datasheet installed on the host PC.

4.1.1 Commands

Using the parameterization feature in the IO-Link Device tool, the user can set intensity values, which can be used to detect the presence of an object, a given ambient light condition, or colours.

When the measured ambient light is over the limit set by the user, the Red LED on the board will turn ON as a visual indication.

The demo provides the user with the following executable commands:

- Teaching: four colours, Clear limit, Ambient Light limit, IR limit.
- MAX4008 ADC parameter settings.
- Reset temperature values (min, max, avr).
- Reset to factory settings.

For further details on how to teach the sensor please refer to section 4.4.

4.1.2 Sample Device characteristics

The following tables displays the sample demo's characteristics.

Table 4-1 Sample Program Characteristics

Characteristics	Description
Vendor ID	0x018C
Device ID	0x18C003
IODD V1.1	Renesas-YRL78IOLINKMAX-V2-20140612-IODD1.1.xml
IODD V1.0.1	Renesas-YRL78IOLINKMAX-V2-20140612-IODD1.0.1.xml
IO-Link Version	V1.1, compatible to V1.0
Software	TE GmbH
SIO Mode supported	Yes
Pin 2	Can be configured (V_Pin2Mode) to show the Ambient Light switch point or be controlled from the IO-Link master (e.g. controlled by the PLC). If V_Pin2Mode is set to "Digital Output", Pin 2 bit from the process output bits will control state of Pin2. Pin2 function is available in SIO Mode and IO-Link Mode.
Pin 4	In SIO Mode Pin4 will show the IR switch point

Table 4-2 IO-Link Mode – Process Data

Characteristics	Description		
IO-Link Mode	Process Data:		
	Inputs (56 Bits)	Red	16Bit Value (14 significant)
		Green	16Bit Value (14 significant)
		Blue	16Bit Value (14 significant)
		Switch Points : Booleans (packed in 8 Bit)	Color 1 detected Color 2 detected Color 3 detected Color 4 detected Ambient Light above limit IR above limit Temperature above limit PDout Bit (Pin 2) Mirror of the output bit
		can be set by the tool or PLC function block or taught with the teach command	
	Outputs (8 Bits)	Pin2	Only active if Pin2Mode = “digital output”

Table 4-3 Device specific parameters

Characteristics	Parameter Type	Description
V_AMBPGA	Read/Write (rw)	parameter for gain of the MAX4008 ADC
V_AMBTIM	(rw)	parameter for integration time of the MAX4008 ADC
V_Temperature, V_TemperatureAVR, V_TemperatureMIN, V_TemperatureMAX	Read Only (ro)	temperature measurement
V_Temperature_Limit	(rw)	switch point setting
V_AMB_Clear, V_AMB_Red, V_AMB_Green, V_AMB_Blue, V_AMB_IR, V_AMB_IRComp	(ro)	measurement values
V_Clear_Limit, V_IR_Limit	(rw)	can be set by the tool or PLC function block or taught with the teach command
V_AMB_Red_Hysteresis, V_AMB_Green_Hysteresis, V_AMB_Blue_Hysteresis	(rw)	gives the +/- tolerance of detecting the taught colours
V_AMB_Red/Green/Blue_Value1,2,3,4	(rw)	teach values for colour switch points 1,2,3,4
V_Pin2Mode	(rw)	configures Pin2 behaviour Controlled by process data output bit or By Ambient Light switch point

4.2 Using *YRL78IOLINKMAX* Board Demo with TMG IO-Link Device Tool.

The IO-Link device tool can be used for the configuration of IO-Link Masters, setting and steering parameters as well as the diagnosis of IO-Link devices.

The IO-Link Master initiates the communication, and channels information from the board to the host machine. The operator is able to see the information on the host machine via the installed IO-Link Device Tool.

4.2.1 Getting Started with the TMG Master

- Launch the IO-Link device Tool.

Once the tool is up and running, two panes can be seen in the GUI (Topology at the top left, and Catalog on the right) see figure below.

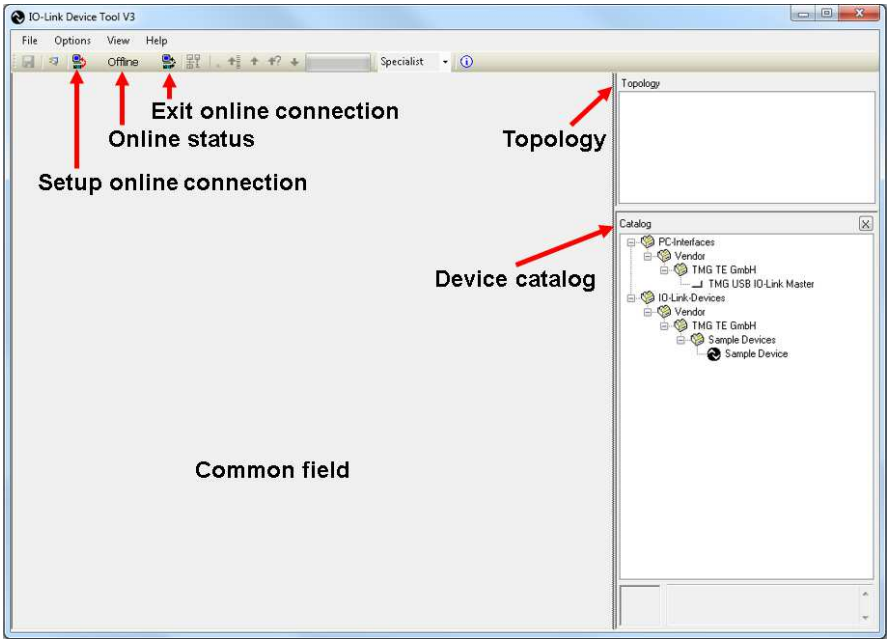

Figure 4-1.IO-Link Device Tool GUI

The topology pane shows the topology from the PC interfaces to the IO-Link Devices.

The Catalog pane shows all the Devices installed with the tool.

On the symbol bar, two icons (setup/exit online connection) allow to set the IO-Link line status.

When the line is Online, the “Online status” symbol will blink green with the symbol “online”.

The common field is currently blank but it will display the description of the devices present in the Topology view.

4.2.2 Updating the IO-Link Device Catalog

Before the *YRL78IOLINKMAX* can be displayed in the device tool, the IO-Link devices catalog must be updated.

- In the menu bar select “Options” then “Import Device Description“.

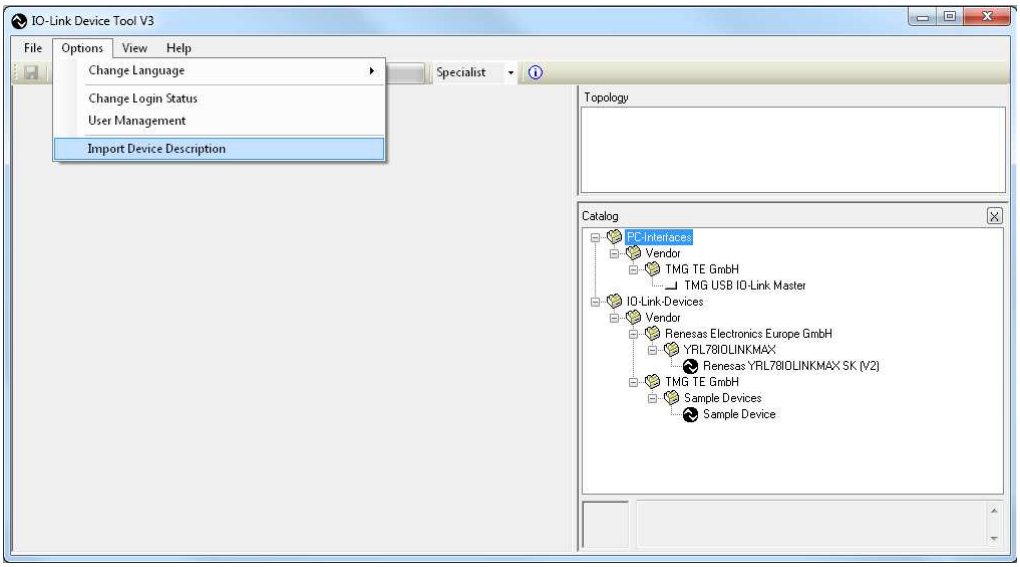

Figure 4-2.Catalog update

A new window opens, in which you can browse your PC to find the Renesas-YRL78IOLINKMAX-sample-V2 IODD file.

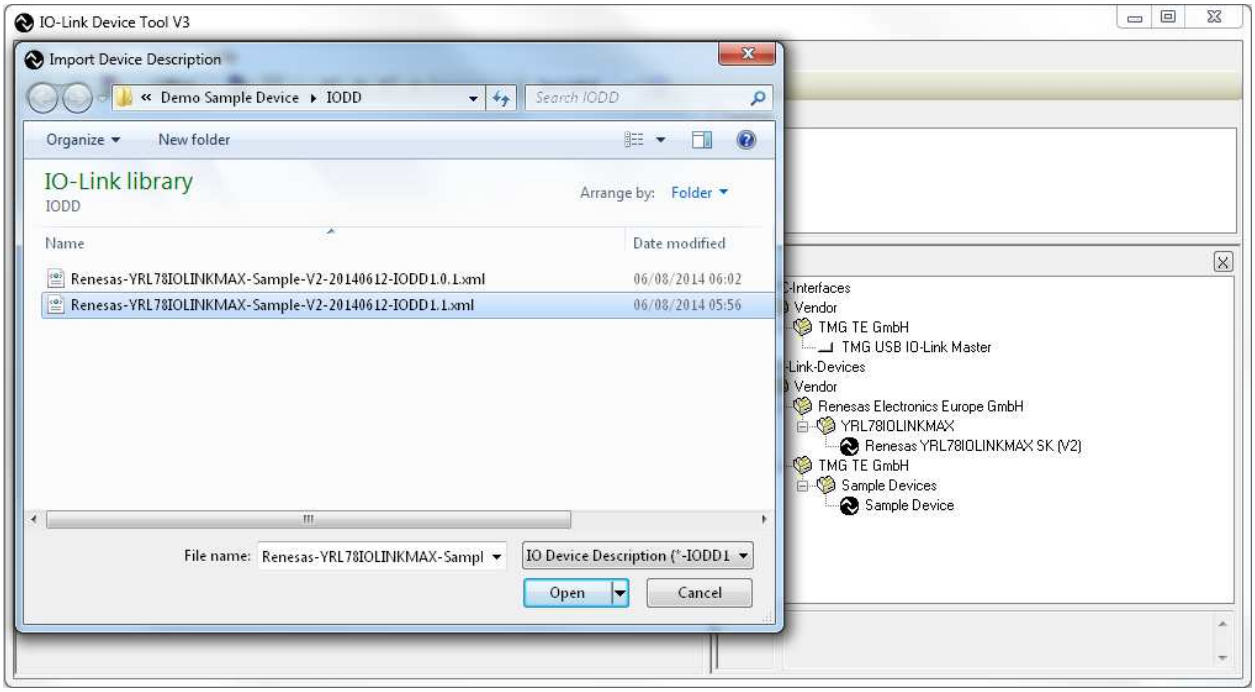

Figure 4-3.Import Device Description

- Press the open button.

4.2.3 Catalog Update Confirmation

A successful update shows the Renesas Electronics Europe GmbH vendor and the *YRL78IOLINKMAX* Sample (V2), in the IO-Link Devices section of the catalog.

The TMG USB IO-Link Master can also be seen under “PC Interfaces” section of the catalog.

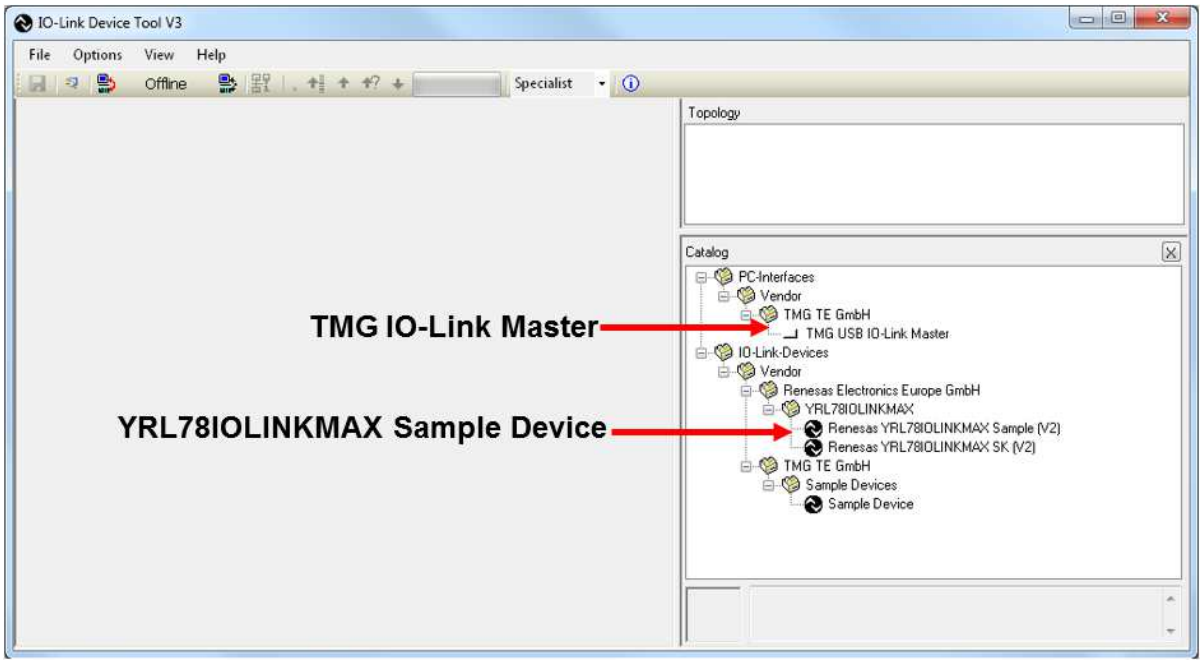

Figure 4-4.*YRL78IOLINKMAX* in Device catalog

4.2.4 IO-Link Communication Set-up

- From the Catalog pane, drag and drop the TMG USB IO-Link Master into the Topology pane.
- Left click on TMG USB IO-Link Master DE in the Topology pane, and the IO-Link Master’s details can be seen in the Common pane (left section of the GUI).

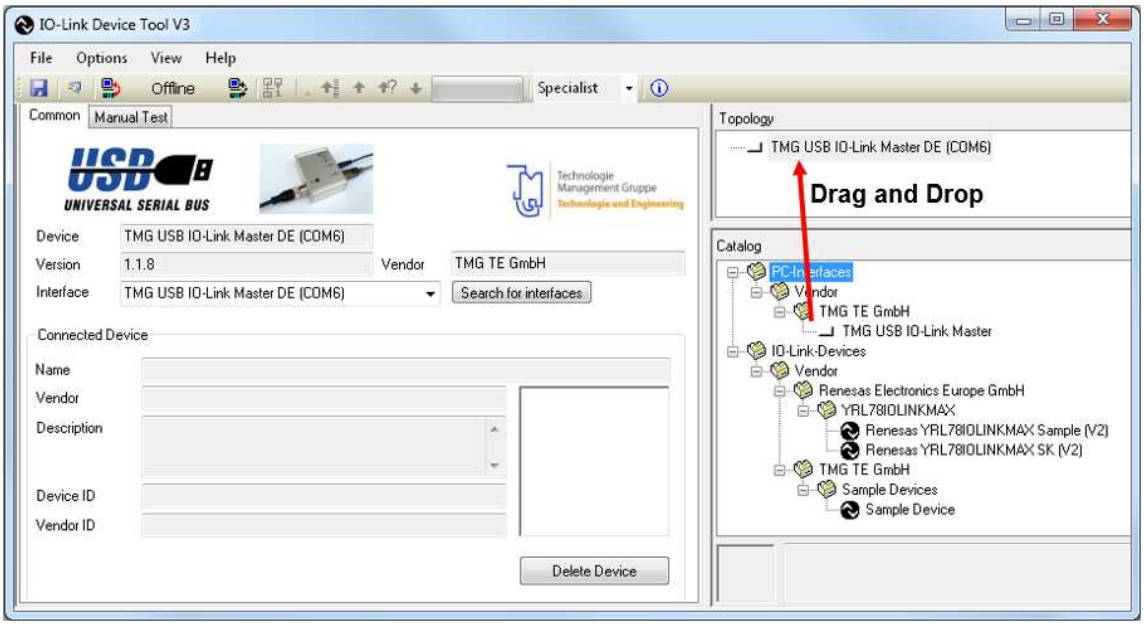

Figure 4-5.TMG USB IO-Link Master

- Left click on the "Setup online connection" icon in the Device Tool GUI, shows the "Check Config" button within the "Connected Device" area, of the Common section.

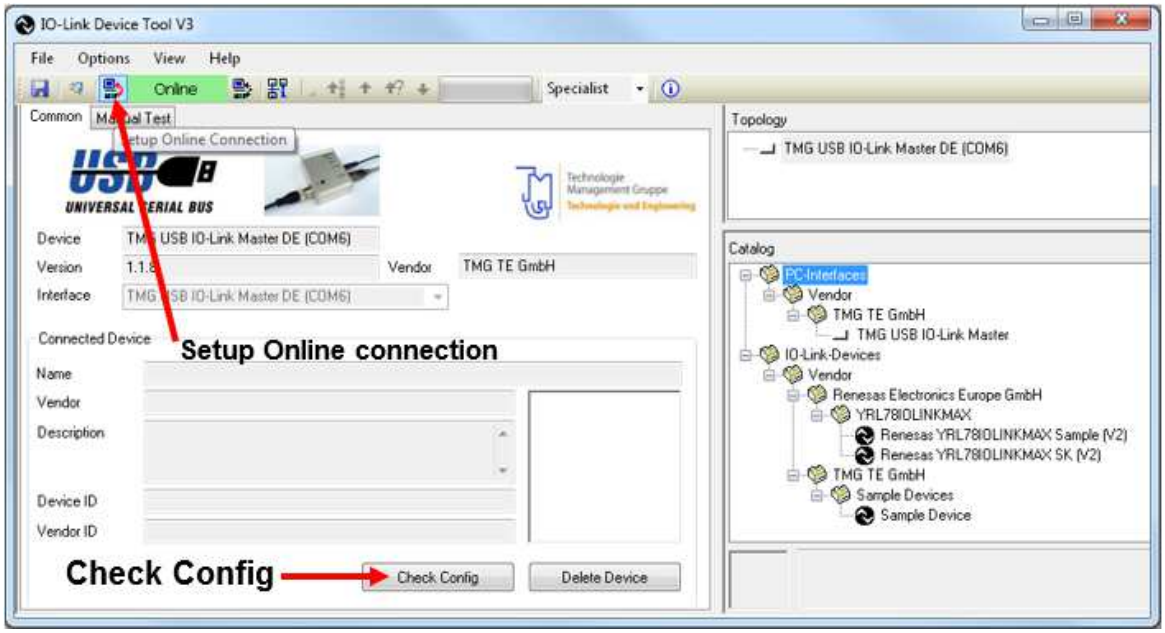

Figure 4-6.Online status, Check Config

- Click on the "Check Config" button.

The LEDs on the Master will blink as the Master tries to connect to the *YRL78IOLINKMAX board*

If the *YRL78IOLINKMAX board* is working and the Master can connect to it, a small window shows up with information on the board and a “Take over type of device(s) into engineering” button. See following figure.

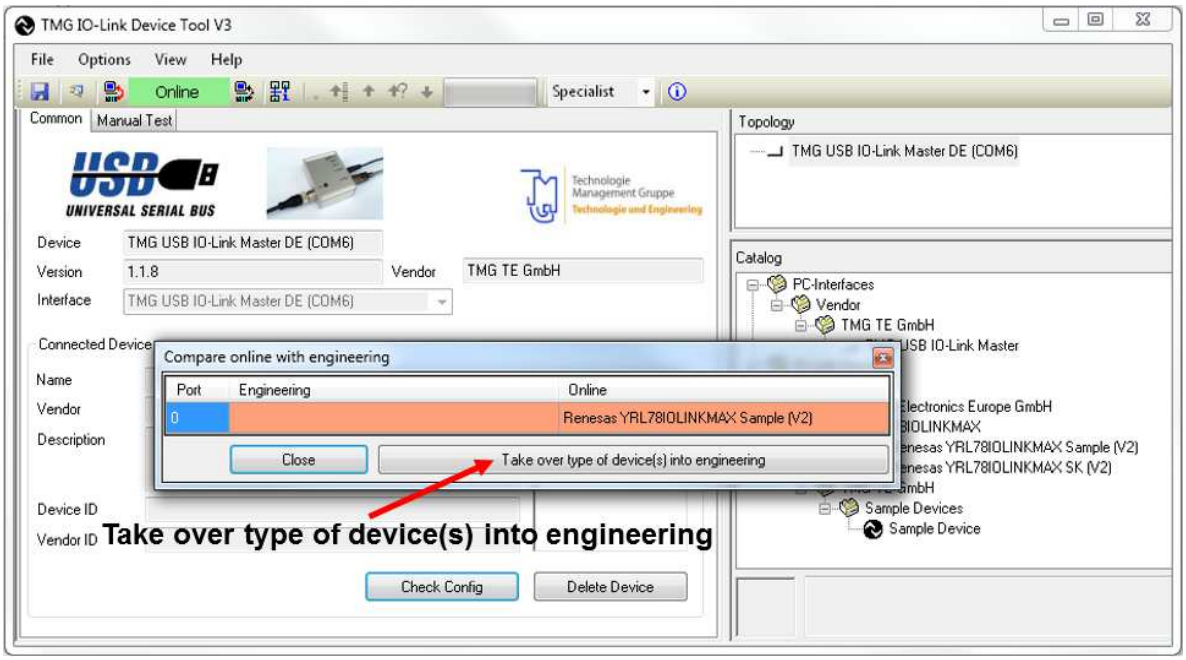

Figure 4-7.Check Config successful

If the Master cannot connect to the *YRL78IOLINKMAX* board, a window with an error message “can’t read configuration” or an empty “Compare with Engineering” window will appear. See following Figure 4-8.

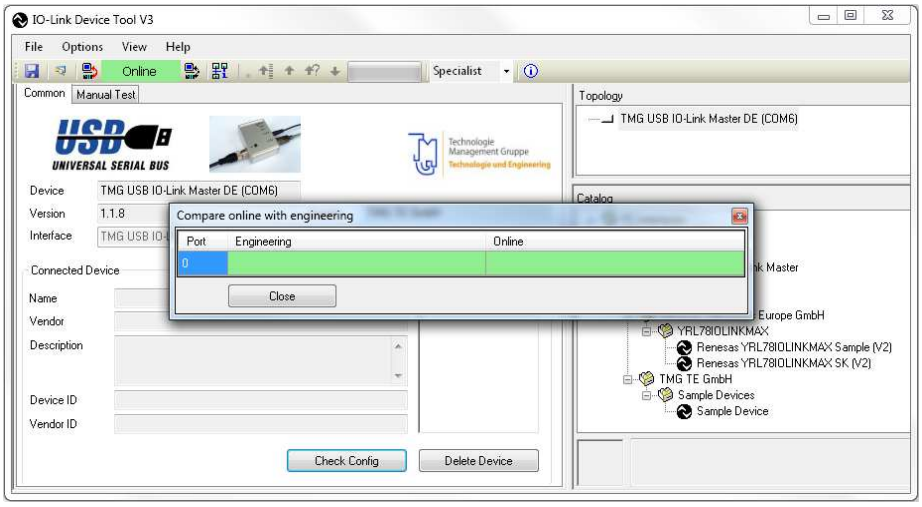

Figure 4-8.Check Config failure

Caution

It can happen that the "can't read configuration" message appears in the Device Tool when the Master is not properly initialized. Unplugging the Master from the USB port of the host machine and re-starting the Device tool solves this problem. Also please check that the *YRL78IOLINKMAX* board is properly connected and powered by the IO-Link Master. The external power supply adapter provided with the TMG USB IO-Link Master must be used for this purpose.

Other possible sources of malfunction could be a blank microcontroller, or faulty IO-Link communication channel.

- Click on the "Take over type of device into engineering" button.

The *YRL78IOLINKMAX* board now appears under the TMG USB IO-Link Master DE in the topology pane, and details on the board can be read in the Common pane.

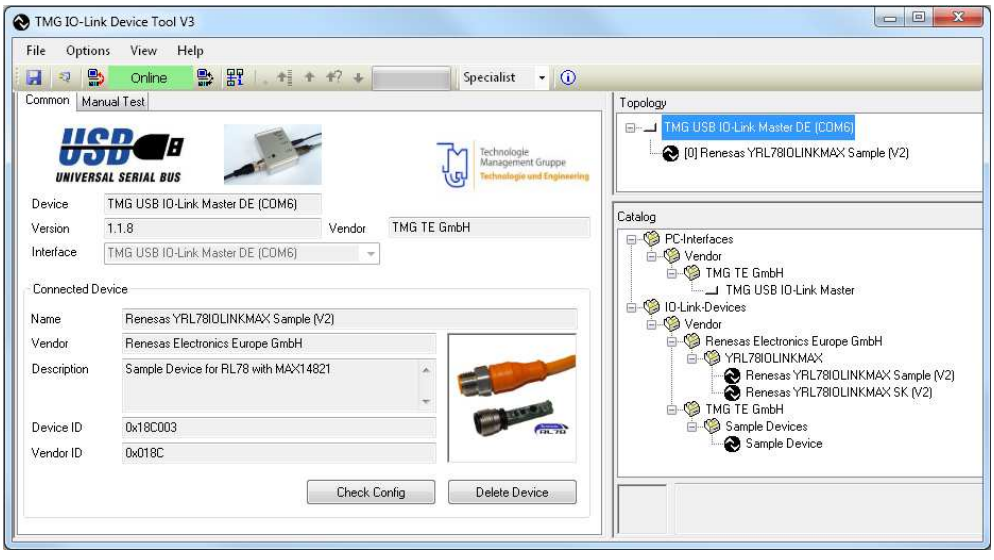

Figure 4-9.IO-Link communication active

The IO-Link communication is now active and we can have a closer look at the device and the sensor application running on the board.

The Common pane provides information on the connected device such as:

Device name: Renesas YRL78IOLINKMAX Sample (V2); Device ID: 0x18C003; Vendor name: Renesas Electronics Europe GmbH; Vendor ID: 0x018C; Picture of the Io-Link device connected to the Master.

4.3 *YRL78IOLINKMAX* Board Sensor Demo in IO-Link device tool

In this section we see how the *YRL78IOLINKMAX* board works with the IO-Link Master and how the demo's features explained earlier can be used from the IO-Link Device tool GUI.

- Left click on the *YRL78IOLINKMAX* in the topology pane to display generic information on the board in the Common pane.

Next to the Common tab, two other tabs can be seen (Process data and Parameter). See figure below.

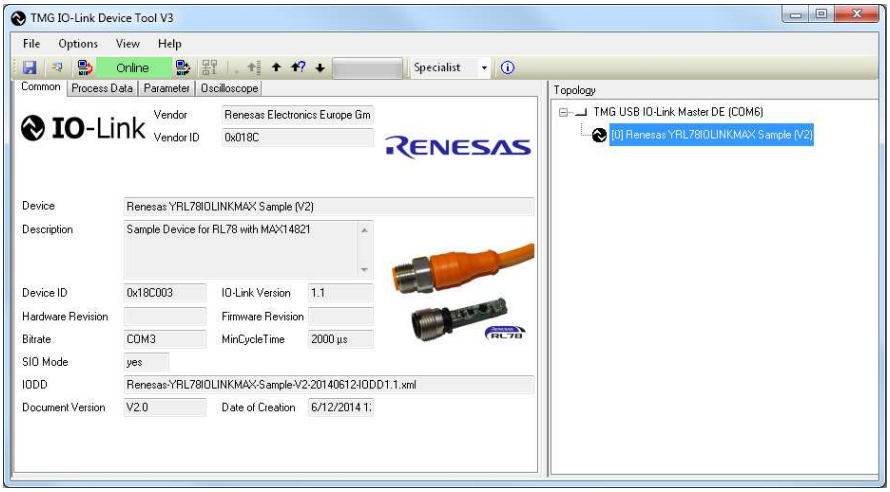

Figure 4-10. *YRL78IOLINKMAX* Sample (V2) in device tool

4.3.1 Common Tab

The Common pane provides information on the device such as:

Picture of the device; Device name, Product ID, Device ID, vendor name; Hardware and firmware revision; Device description file, its version and date of creation; Device version; IO-Link version.

4.3.2 Process Data Tab

The Process data tab displays the sensor measurements (raw process data inputs from the sensor).

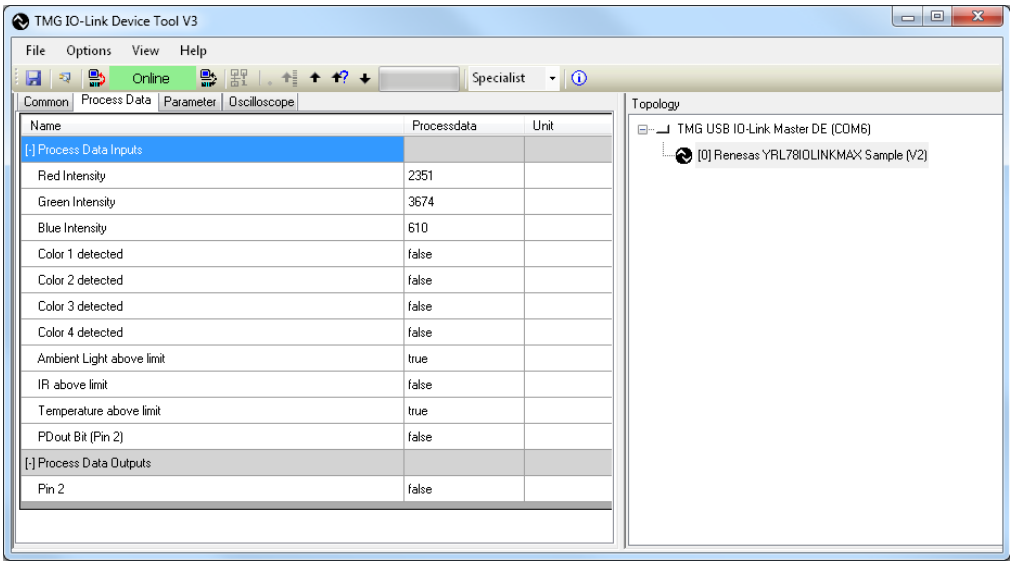

Figure 4-11. *YRL78IOLINKMAX* Sample (V2) Process data

The user can find information such as the colour intensity, a range of flags on switch point such as detected colours, Ambient light, infra-Red, and temperature limits. Out of the box, all the detected colours are false and the limit switch points are reflecting to the factory settings.

4.3.3 Parameter Tab

The Parameter tab displays the sensor's identification settings, as well as enabling the user to read data from the sensor, or teach the sensor by writing new values to the board.

Three types of information can found on this page (Identification, parameter and observation).

"Identification" and "observation" information are read only (ro) information, while parameter can be read/write (rw), write only (wo).

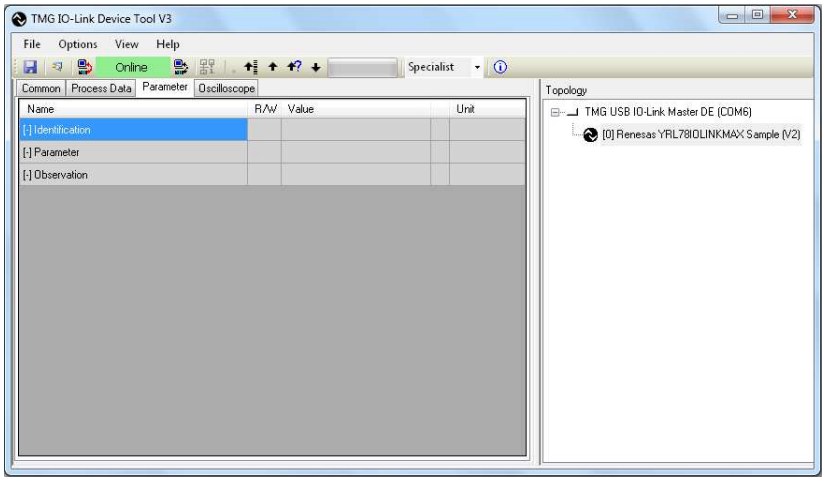

Figure 4-12.*YRL78IOLINKMAX* Sample (V2) Parameter page

4.3.3.1 Identification settings

Provides the default settings allowing to identify the sensor connected to the Master. By default the factory information recorded in the IODD are displayed.

The user can find information such as: Vendor and Product names, hardware and firmware revisions.

- Left click in the "Value" column, to read the information stored in the sensor and find out whether the sensor connected is of the same hardware and firmware revision as that of the released version.

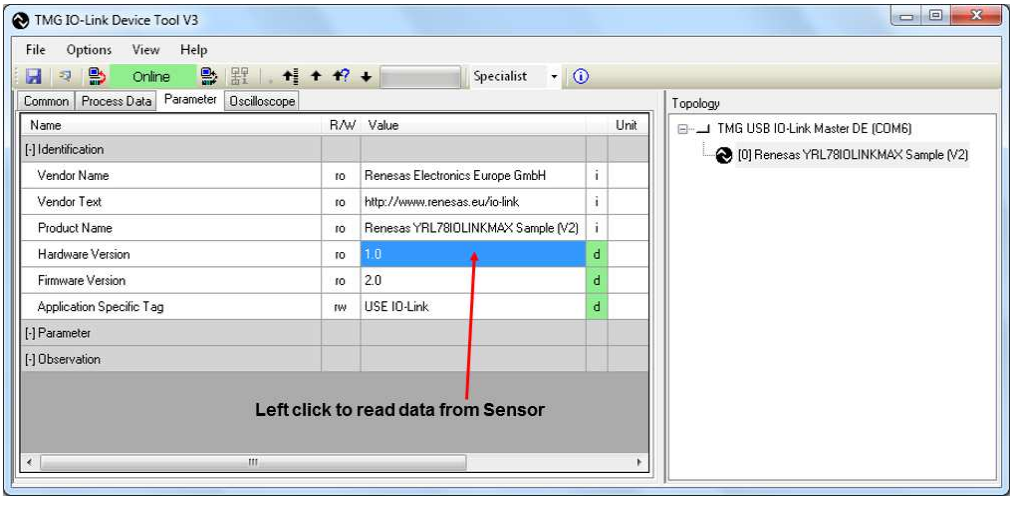

Figure 4-13.*YRL78IOLINKMAX* Sample (V2) Identification settings

4.3.3.2 Parameter settings

Provides the user access to the parameters to teach the sensor.

Two types of teaching methods are available to send parameters to the sensor:

- Automatic teaching (Standard Commands): identifiable by the write only (wo) type. The user can only execute these parameters.
- Manual teaching: identifiable by the read/write (rw) type. The user can manually enter a value to be transmitted to the sensor.
    - A sub parameter section referred to as “Teach Values”, provides the set of parameters to manually teach the various colour intensity, ambient light and infra-red limits.

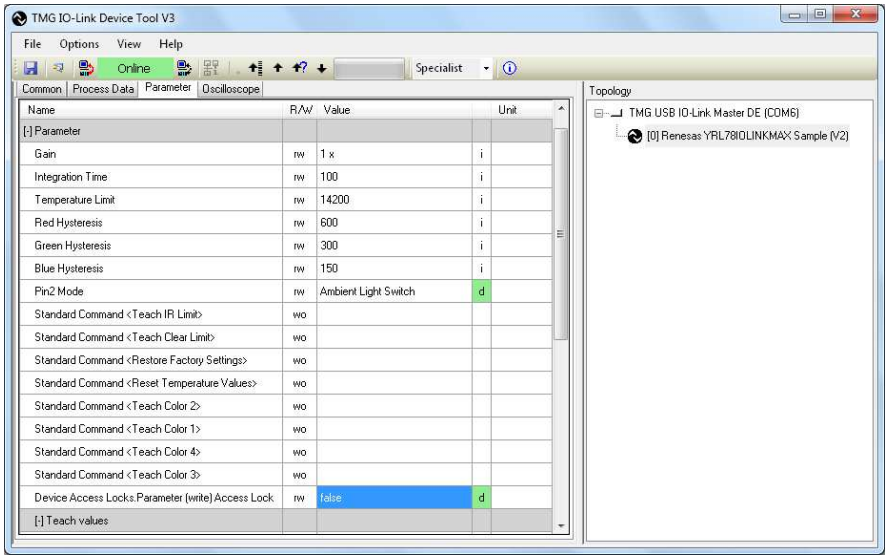

Figure 4-14.*YRL78IOLINKMAX* Sample (V2) Parameter settings

The table below summarises the parameters offered in the demo and their capabilities.

Table 4-4 Device specific parameters

Parameter	Teaching Method	Factory Setting	Value range	Description
Gain	Manual	1x	1x, 1/4x, 1/16x, 1/256x	MAX4008’s ADC gain parameter
Integration Time	Manual	100	1.5625, 6.25, 25, 100, 400	MAX4008’s ADC integration time
Temperature Limit	Manual	14200	UInteger16	Temperature measurement switch point
Red Hysteresis	Manual	600	100..1000	+/- tolerance detection of taught colours
Green Hysteresis	Manual	300	50..1000	
Blue Hysteresis	Manual	150	50..1000	
Pin2 Mode	Manual	ABS	Ambient Light Switch (ABS), Digital Output	Pin 2 behaviour control
Standard Command	Automatic	NA	Executable	Colours, lights, factory reset teaching
Device Access Locks	Manual	false	false, true	Parameterisation lock capability
Teach Values	Manual	0	Process Data in values (UInteger16)	Colours intensity, Ambient light limit, Infra-red Limit

4.3.3.3 Observation settings

Provides a snapshot of the “Process Data In” and “Process Data Out” values (Read Only) recorded by the sensor.

The values displayed in this section can be used to manually teach the sensor with the “Teach values” parameters.

Please refer to section 4.4 for information on how to read data and write data to the sensor.

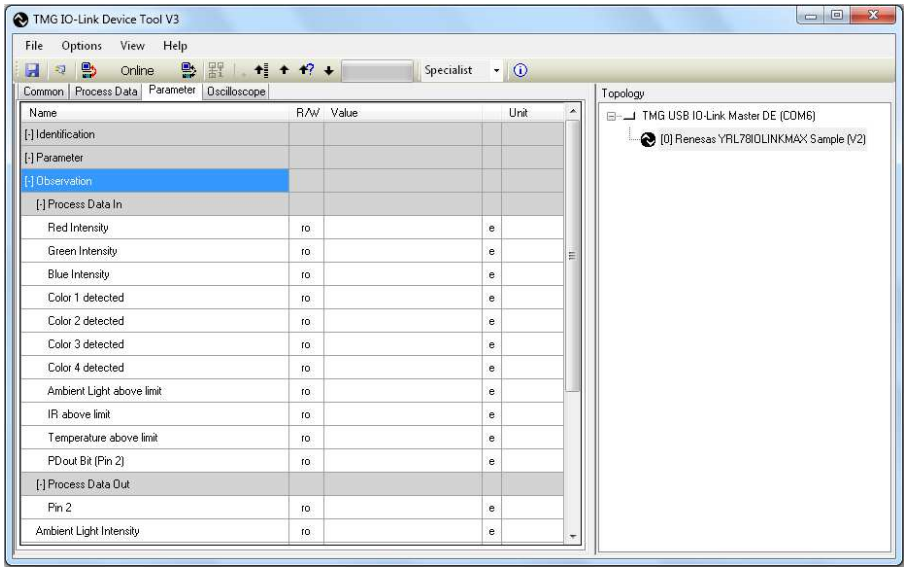

Figure 4-15.*YRL78IOLINKMAX* Sample (V2) Observation settings

4.3.4 Oscilloscope Tab

The oscilloscope function enables the visualization of process data in the scope window.

The following section describes the scope window and its features.

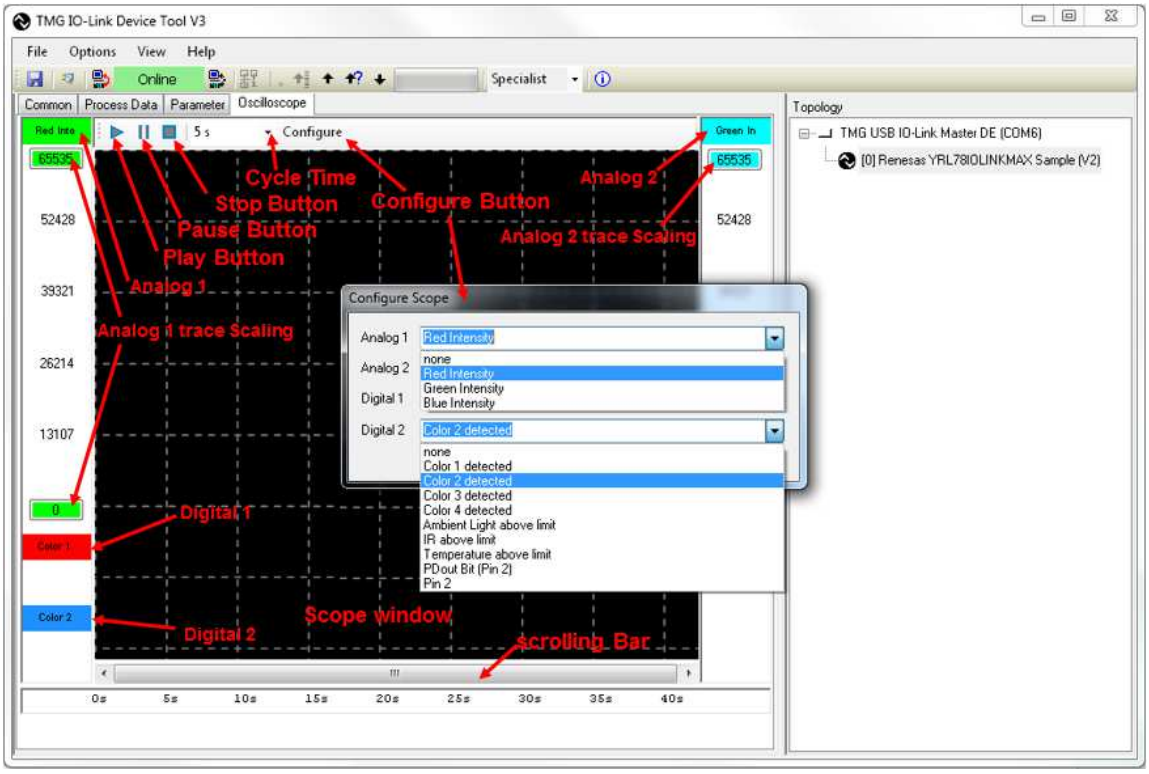

Figure 4-16. *YRL78IOLINKMAX* Sample (V2) Oscilloscope window

4.3.4.1 Configure Button

- Left click on the configure button to select the process data variables to be display in the scope window.
    - Set Analog 1 and Analog 2 to display the colour intensity measurements.
    - Set Digital 1 and Digital 2 to display the switch points available in the demo.

4.3.4.2 Analog trace Scaling.

The user can set the range of values to be displayed in the scope window for Analog1 and Analog 2 traces. Therefore enabling a zoom function on the trace.

- To set the maxim range value for a trace, right click the box indicating the max value, and enter a new value.
    - Press Enter on your keyboard to confirm.
- To set the minimum range value for a trace, right click the box indicating the min value, and enter a new value.
    - Press Enter on your keyboard to confirm.

4.3.4.3 Play Button (Data Display)

- Left click on the Play button to start the real time display of process data.

4.3.4.4 Pause Button

- Left click on the Pause button freezes the display of measured information in the scope window, while the recording of process data continues in the background.
- Another click on the Pause button displays the information recorded during the paused period, followed by the real time measurement.

4.3.4.5 Stop Button

- Left click on the stop button to terminate the real time display of process data.

The latest information measured remains displayed on screen. The user can use the scroll bar to view different sections of the information recorded. However a click on the play button will reset the scope window to zero and restart the recording.

4.3.4.6 Cycle Time

- Left click on the cycle time button to set the cycle time (10 samples per cycle are displayed).

4.4 *YRL78IOLINKMAX* Board Sensor Read/Teach-in

When the user opens the parameter page for the first time, the device specific parameters are set to their default values in the “Value” columns. These values are recorded in the IODD file. See Figure 4-13 for details.

4.4.1 Read Parameter from the *YRL78IOLINKMAX* Board Sensor

To read or refresh the display with the current or most recent information recorded by the sensor:

- Use a left click under the “Value” column, in the cell you want to check the information.

The cell being read is highlighted in blue and the current parameter value is displayed.

A green status cell with the data type right next to the cell being read, lets the user know that the read command was successful.

If the read command fails the status cell will be Red.

In Figure 4-17 below, the Ambient light intensity limit set in the device is being checked.

We can also see that other Parameters and Observation data have been read as their status cell is green.

The intensity values are set 0 and colours are not detected since the sensor has not been taught any colour.

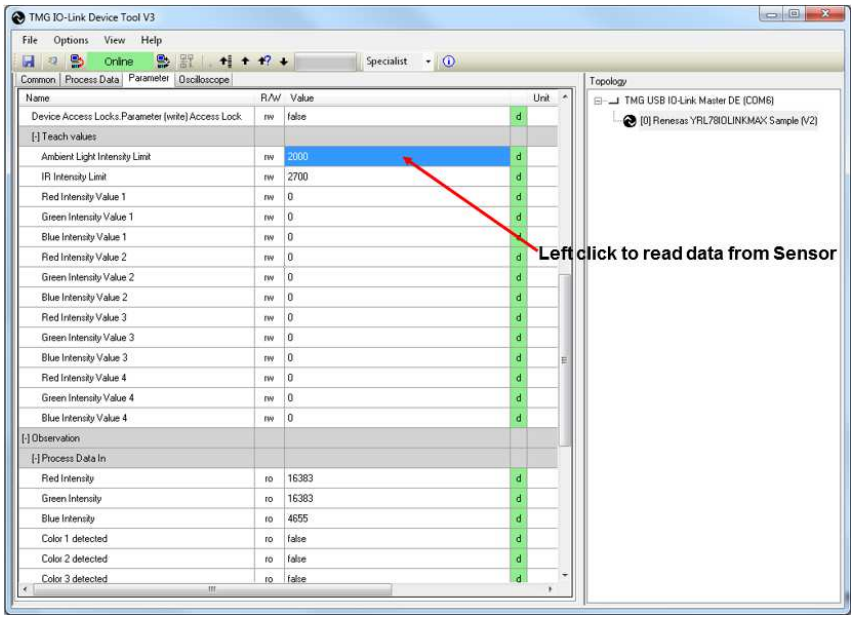

Figure 4-17.Parameter and data reading

4.4.2 Write Parameter to the *YRL78IOLINKMAX* Board Sensor

- When teaching parameters, please make sure the parameter “Device Access Parameter Locks” is set to “false”, or any attempt to write information to the sensor will fail.

Parameters can be transmitted to the board automatically by using the “Standard commands”, or manually by using the “Teach Values” parameters.

4.4.2.1 Using “Teach values” parameters

The example below shows the manual teaching of “IR intensity Limit”.

When manually teaching a colour, the Red, Green, and Blue intensity for that colour must be taught.

To write or teach a parameter to the board using a Teach Values parameters:

- Right click in the “Value” field corresponding to the parameter you want to teach. (“IR intensity Limit”)

The cell is highlighted in blue and a dialog box shows up.

- Enter a value in the box and click “Transmit this Value” or press Enter on your Keyboard”.

Figure 4-18 shows the dialog box and setting of the IR limit been set to 7000.

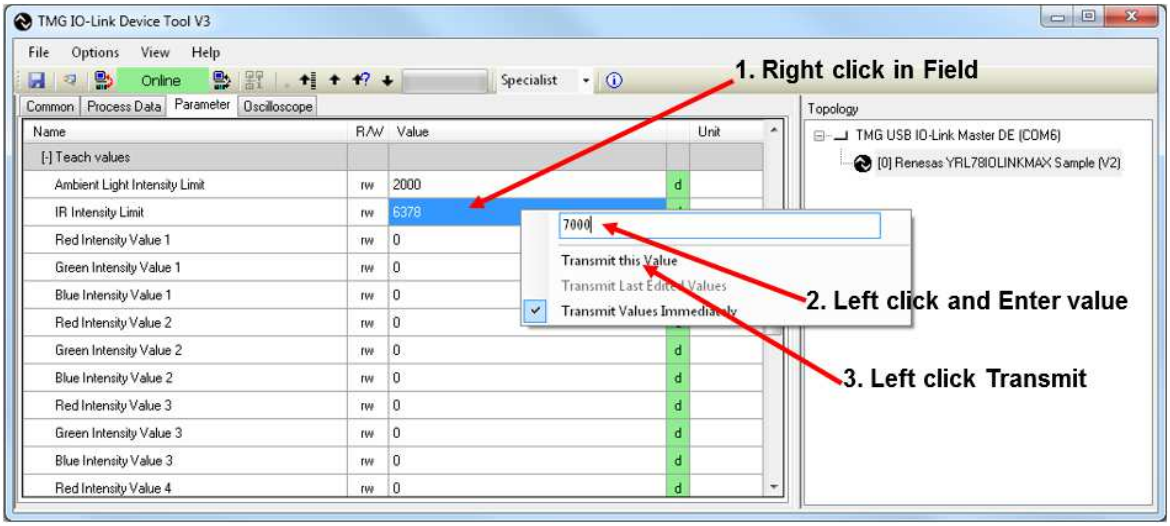

Figure 4-18.*YRL78IOLINKMAX* IR Limit teaching

Note:

The value entered must be of the correct type and in the correct range, or the teaching will fails as shown in the figure below.

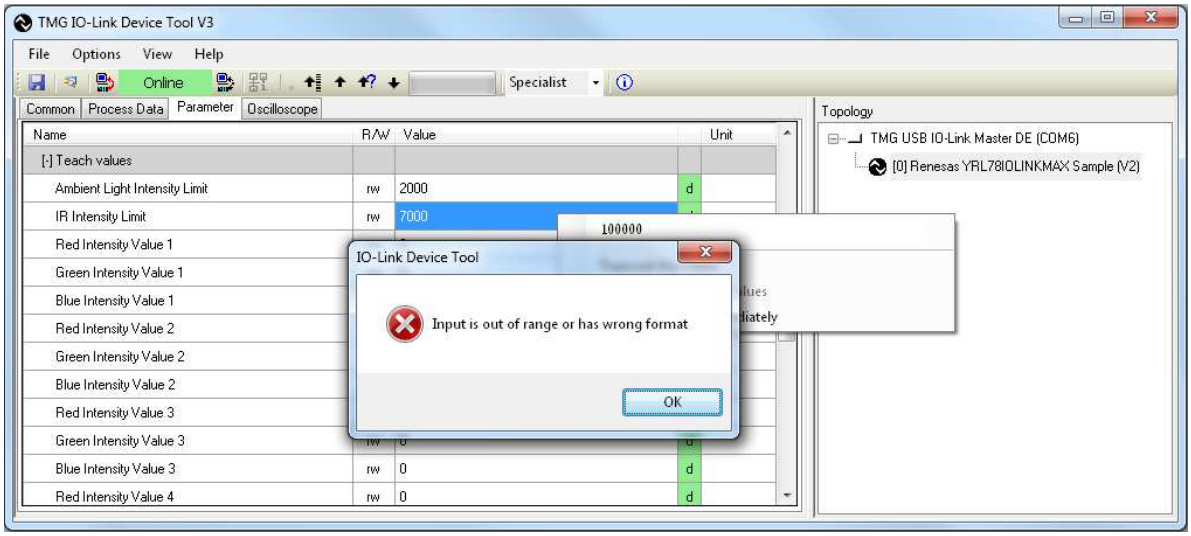

Figure 4-19.*YRL78IOLINKMAX* IR limit Teach value failure

4.4.2.2 Using Standard Commands

The example below shows the automatic teaching of IR Limit “Teach IR Limit”.

To write or teach a parameter to the board using a Standard command:

- Right click in the “Value” field corresponding to the parameter you want to teach.

The cell is highlighted in blue and a dialog box show up.

- Left click “Execute”.

You can verify the value taught by reading the parameter in the “Teach value” section.

Figure 4-20 shows the dialog box and setting of the IR limit.

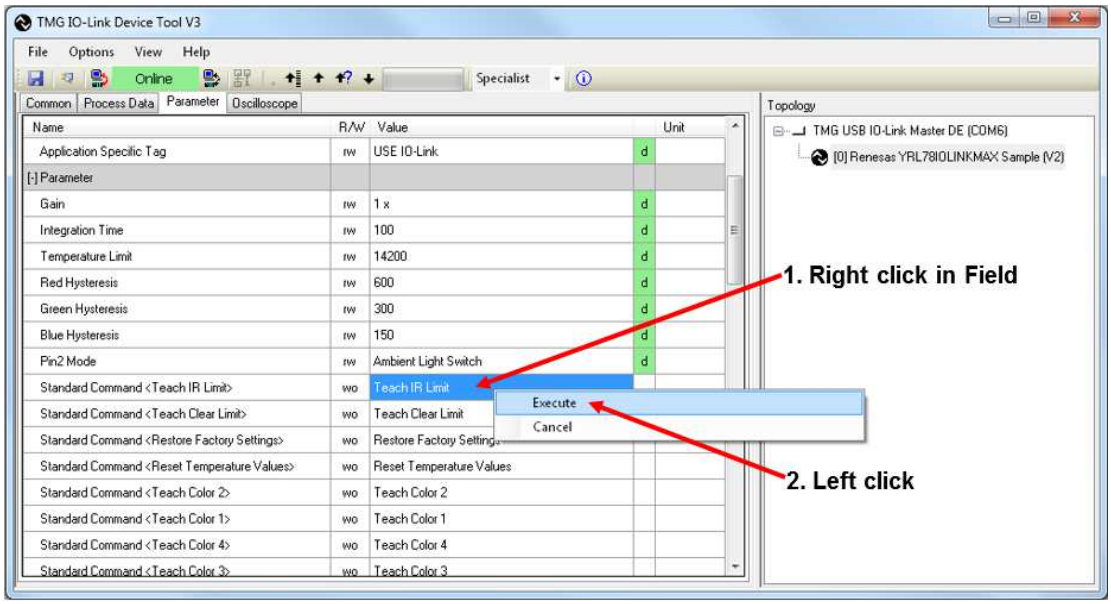

Figure 4-20.*YRL78IOLINKMAX* IR Limit teaching

4.4.2.3 Factory Settings Restoration

Similarly, to restore the sensor' settings to factory settings:

- Under the "Value" column, click Right in the cell corresponding to the parameter you want to change. (Restore Factory Settings).

The cell is highlighted in blue and a dialog box shows up.

- Left click "Execute".

Figure 4-21 shows the dialog box and setting of the factory settings restoration.

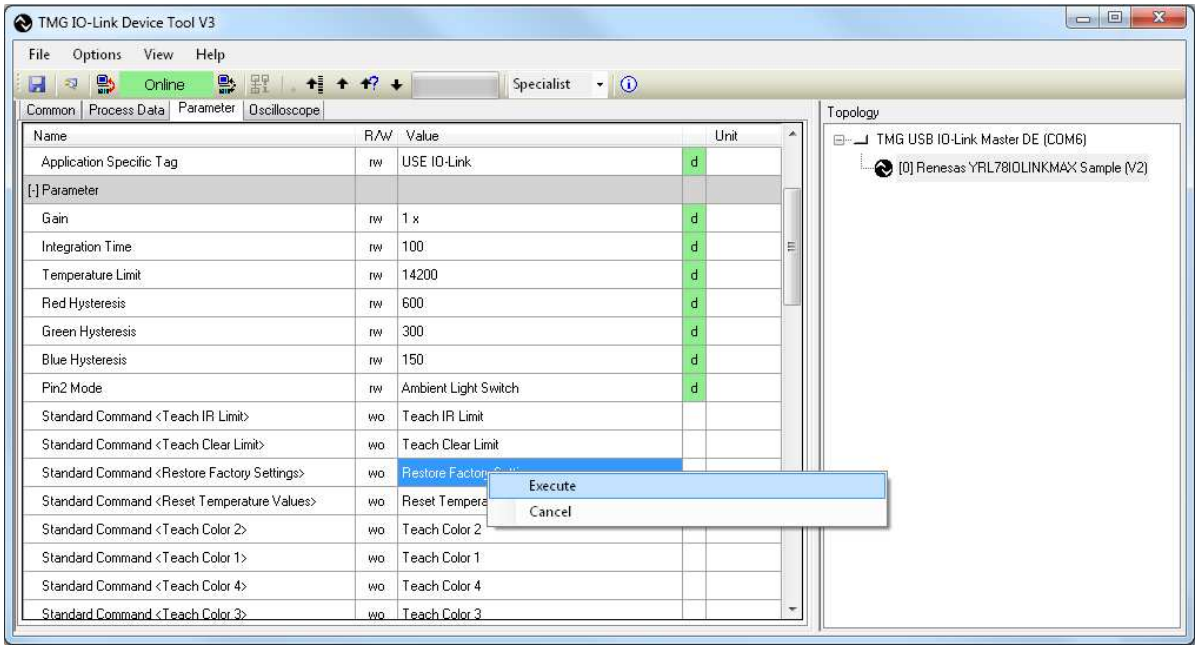

Figure 4-21.*YRL78IOLINKMAX* Factory restoration setting

4.4.3 Colours detection visualisation in Oscilloscope window

Figure 4-22 shows the colours detection as the RGB wheel is turned in front of the sensor.

In this instance the sensor has been taught to detect Red as colour 1 and Green as colour 2.

The table below summarises the variables used to display the traces and the switch points for the two colours.

Table 4-5 Oscilloscope variables

Scope window variable	Process Data	Trace colour	Description
Analog 1	Red Intensity	Green	Red intensity level in the colour detected
Analog 2	Green Intensity	Light Blue	Green intensity level in the colour detected
Digital 1	Colour 1 detected	Red	Switch point for Red colour detection
Digital 2	Colour 2 detected	Dark Blue	Switch point for Green colour detection

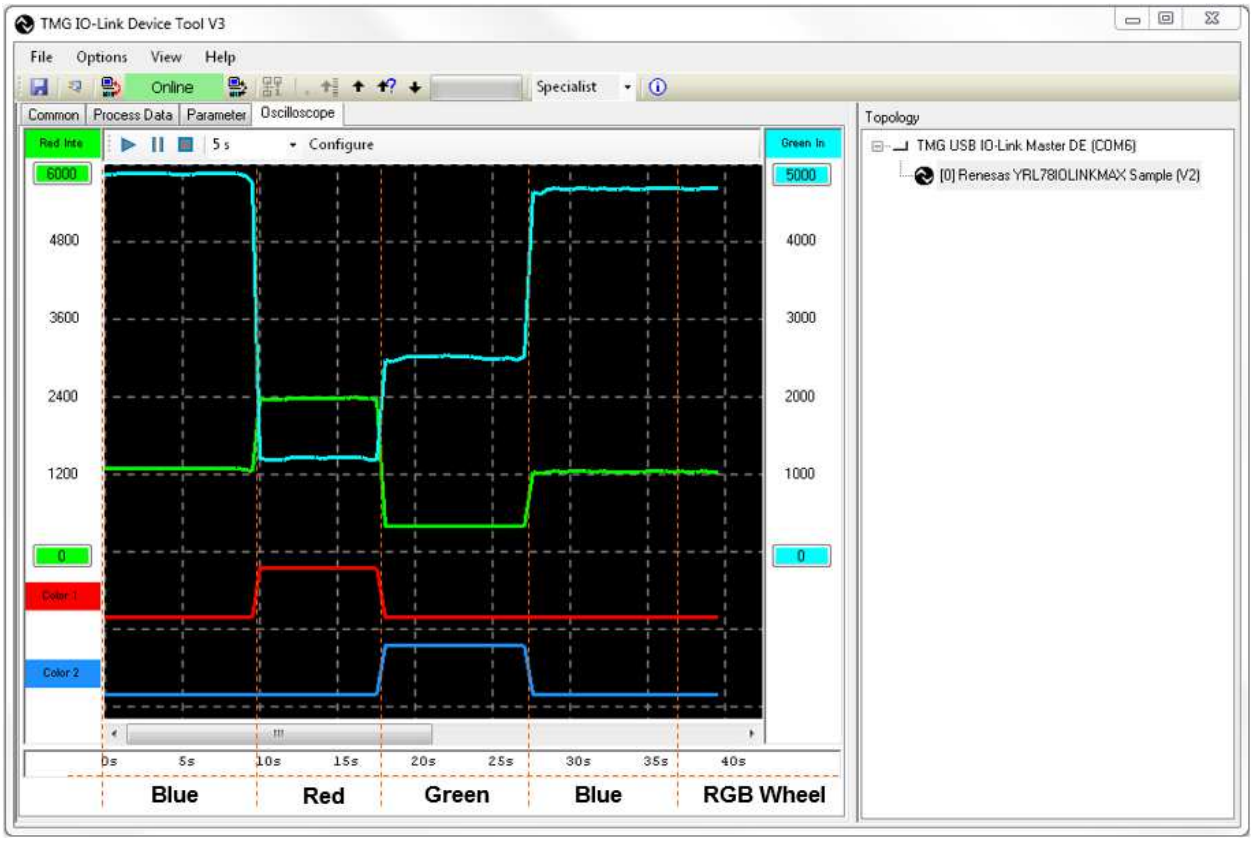

Figure 4-22. *YRL78IOLINKMAX* sample (V2) Colour Detection in Oscilloscope window

Revision History

Rev	Date	Description	
		Page	Summary
1.00	Jul ,2014	-	First edition issued

YRL78IOLINKMAX IO-Link Starter Kit

Renesas Electronics Corporation

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