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ZigBee® USB STICKS:

ETRX3USB
ETRX3USB-LRS
ETRX3USB+8M
ETRX3USB-LRS+8M

PRODUCT MANUAL

Not Recommended for New Design

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1 Introduction

The ETRX3USB ZigBee USB Stick is effectively an RS232 to USB bridge connected to an ETRX3 Series ZigBee module. This allows connectivity to a computer's USB port.

The ETRX3USB+8M and ETRX3USB-LRS+8M include an 8Mbit flash memory chip which can be accessed by the firmware in the EM357 ZigBee chip inside the USB stick.

The ETRX3USB-LRS and ETRX3USB-LRS+8M have an ETRX357-LRS module in place of the ETRX357 for longer range. The LRS variant has higher output power and better receiver sensitivity; consult the ETRX357 and ETRX357-LRS Product Manuals for the full details.

The supplied Windows drivers create a virtual COM Port, so that the command line of the ETRX3 series module can be accessed via any terminal software application.

When using Windows® the Telegesis Terminal application can be used as described in the ETRX357 Development Kit manual.

1.1 Supported Operating Systems

Windows 98SE
Windows XP/Vista/7
Windows 2000
Windows CE *
MAC OS-9
MAC OS-X *
Linux *

* drivers for these systems are available from Silicon Labs though most Linux distributions now include a suitable driver. The bridge chip is a CP2102 with Vendor ID 0x10C4 and Product ID 0x8293.

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2 Absolute Maximum Ratings

Parameter	Min.	Max.	Units	Condition
Supply Voltage Vdd	-0.3	5.5	V	
Voltage on any pin	-0.3	V_{dd}+0.3, max 5.8	V	
Storage Temperature range	-40	150	°C	

Table 1: Absolute Maximum Ratings

The absolute maximum ratings given above should under no circumstances be violated. Exceeding one or more of the limiting values may cause permanent damage to the device.

3 8Mb flash memory

3.1 Connections

The +8M devices in the USB stick family contain a Winbond W25Q80DV 8Mb serial flash memory chip with SPI interface to the EM357. The pin connections to the EM357 are shown in Figure 1.

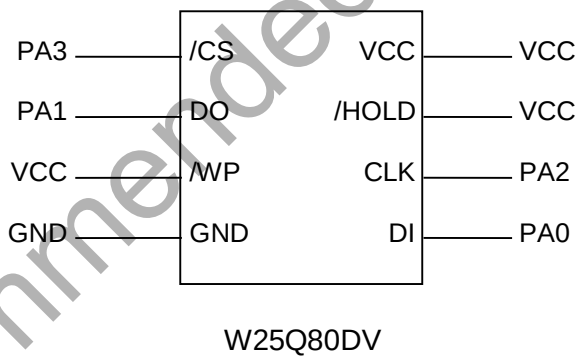

Figure 1. Flash memory connections to EM357

At the time of writing the datasheet for the Winbond W25Q80DV flash memory chip is available at:

www.winbond.com/hq/product/code-storage-flash-memory/serial-nor-flash/?__locale=en&partNo=W25Q80DV

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3.2 Firmware

The Telegesis R3xx firmware does not have any capability of driving the SPI connection to the memory chip. Users will have to write or commission custom firmware to make use of this external memory.

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4 Operating Conditions

Typical values at 5V 25°C.

Parameter	Min.	Typ.	Max.	Units	Condition
Supply Voltage, Vdd	4.5	5	5.5	V	
Supply Current ETRX3USB		56[1]		mA	TX 8dBm
		54[2]		mA	TX 3dBm
		54[1]		mA	TX –43dBm
		52.5[1]		mA	RX
		29.5[1,3]		mA	SED, Power Mode 01
		27[1,2]		mA	SED, Power Mode 02
		26[1,2]		mA	SED, Power Mode 03
Operating ambient temperature range	-20	25	85	°C	

Table 2: Operating Conditions

The Winbond memory chip in the 8M variants draws extra current as shown in Table 3. Full details of its power consumption can be found in the Winbond W25Q80DV datasheet.

Operation	Current		Units
	Typ	Max	
Standby	10	50	µA
Read 50MHz	7	15	mA
Write Status Register	20	25	mA
Page Program	20	25	mA
Sector/Block Erase	20	25	mA
Chip Erase	20	25	mA

Table 3: Flash memory current consumption

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[1] During USB suspend the current will drop by 25.6mA in all modes.
[2] During USB suspend the current will drop by 25.6mA in all modes.
[3] Please note that the power consumption in various power modes is firmware and usage dependent.

5 Regulatory Information

The ETRX3USB and ETRX3USB+8M as well as the ETRX3USB-LRS and ETRX3USB-LRS+8M have been designed to meet all national regulations for world-wide use. In particular the following certifications have been obtained:

5.1 FCC compliance Class B Digital Device

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 a 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**.**

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules. An FCC declaration of conformity is available separately from the Telegesis website

The ETRX3USB and ETRX3USB+8M contain a modular radio transmitter with FCC ID S4GEM35XA. The ETRX3USB-LRS and ETRX3USB-LRS+8M contain a modular radio transmitter with FCC ID S4GEM35XB.

5.2 Canada – Industry Canada (IC)

This Class B digital device complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

5.3 European Certification

The ETRX3USB and ETRX3USB+8M as well as the ETRX3USB+LRS and ETRX3USB-LRS+8M limited to a maximum power level of 21.15mW e.i.r.p. (13.2dBm) have been tested and comply with the following standards:

Radio:	EN300 328 v1.8.1

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EMC:	EN301 489-17 v2.2.1
Safety:	EN60950-1:2006/A12:2011

An EC declaration of conformity is available separately from the Telegesis website.

Important Note: In Europe the regulations for the 2.4GHz frequency band only permit.a maximum power spectral density of 10mW/MHz, which with a ZigBee spectrum equates to an e.i.r.p of 13dBm. The ETRX3USB cannot reach this level but the ETRX3USB-LRS can exceed it, so in the latter device the power out of the EM357 chip into the RF power amplifier should be limited to -11dBm. Refer to the ETRX357-LRS Product Manual for more details.

5.4 General

For further technical information, including radio certification, see the corresponding ETRX3 series Module Product Manuals.

When ordering ETRX3USB sticks without printed branding on the case, you may be responsible for applying a marking appropriate to their geographical area of use, such as the CE marking.

For more information on ZigBee compliance and the AT command interface firmware please refer to the latest AT command dictionary and the ETRX357 user guide.

6 ETRX357 I/O Connectivity

The I/Os of the built-in ETRX357 are connected as follows:

PA6 is connected to the LED (drive PA6 low to sink LED current).
PB3 is the CTS input for the ETRX357. Make sure PB3 is never defined as an output.
PB4 is the RTS input for the ETRX357.

Important Note: The lines for hardware handshaking are connected, so even when not using hardware handshaking PB3 should never be defined as an output as this would drive against the incoming CTS signal via a 1kΩ resistor and increase the current consumption.

7 Firmware upgrades

The firmware which is loaded onto the embedded ETRX357 Module can be upgraded over the air or via the virtual COM port as described in the ETRX357 Development Kit Product Manual.

Alternatively, access to the SIF programming interface is possible by opening the cover on the side of the ETRX3USB ZigBee USB stick.

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8 Driver Installation and Operation

The drivers provided will generate a virtual COM port allowing easy access to the serial port of the embedded ETRX357.

To read more about the ETRX357 wireless mesh networking module and its command line interface please read the corresponding documentation which can be found at http://www.silabs.com/telegesisdocuments.

8.1 Windows XP/Vista/7 Driver Installation

The driver package downloadable from the *Support → Software centre* page at http://www.silabs.com/telegesissoftware should be unzipped into a local folder. When executing the file 'TgVCPInstaller.exe' prior to plugging in the ETRX3USB stick an installer will guide you through the steps required for the driver installation.

Figure 2: Found New Hardware Wizard

After insertion of the stick, Windows® may prompt that new hardware has been found. If you have run the 'TgVCPInstaller.exe' Windows will be able to install the driver by automatically, but if you have not run 'TgVCPInstaller.exe' you will have to manually point to the directory into which you have unzipped the driver.

Please note that each ETRX3USB has a unique serial number which requires the installation procedure to be repeated with every new ETRX3USB being attached to the computer, though the process is not obtrusive. This allows multiple ETRX3USB sticks to be used on the same computer at any one time.

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In order to find out the identity/number of the virtual COM port the stick has been assigned to, please open the Device Manager under the Windows Computer Management screen (see below) and click on the Ports (COM and LPT) section where you should find the new virtual COM port. By double clicking on the entry of the virtual COM port you can also change the number assigned to the virtual COM port when entering the advanced setup of the device.

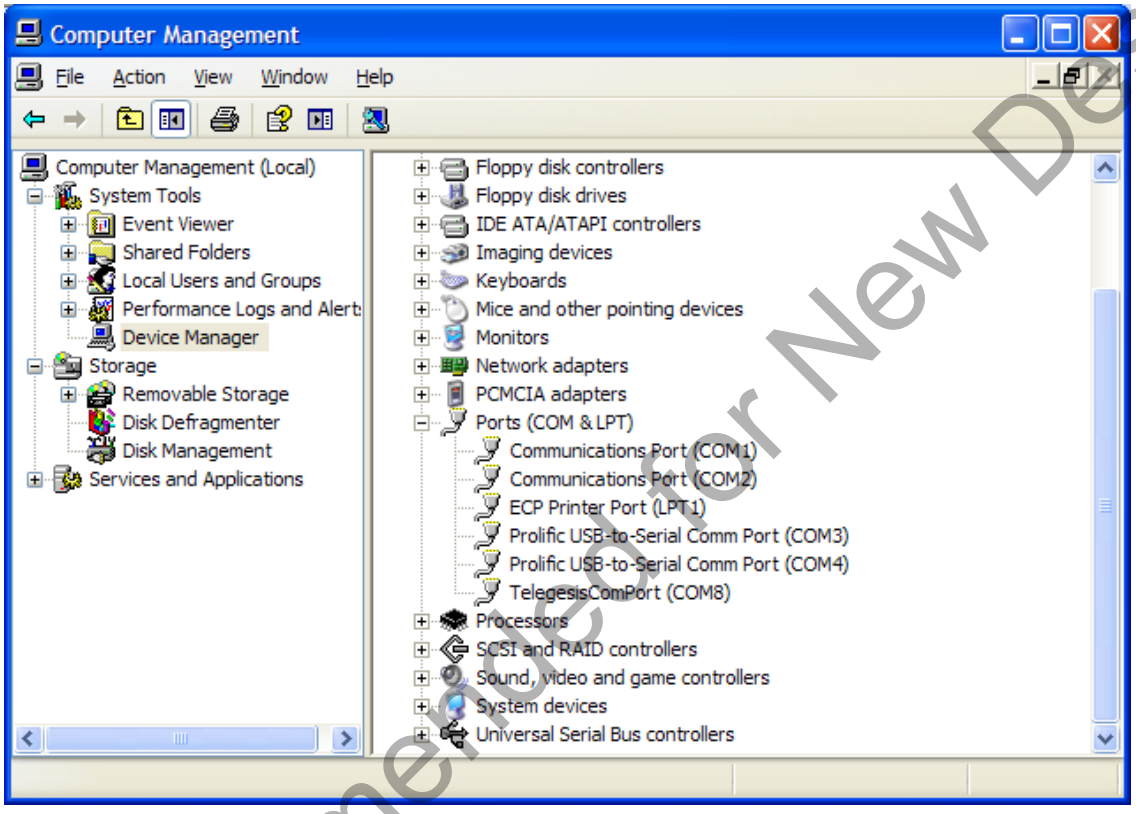

Figure 3. Device Manager

Once the correct COM port has been selected, the Terminal software can be used to control the ETRX3USB stick as per the Development Kit Manual. Telegesis Terminal is a free download from http://www.silabs.com/telegesissupport

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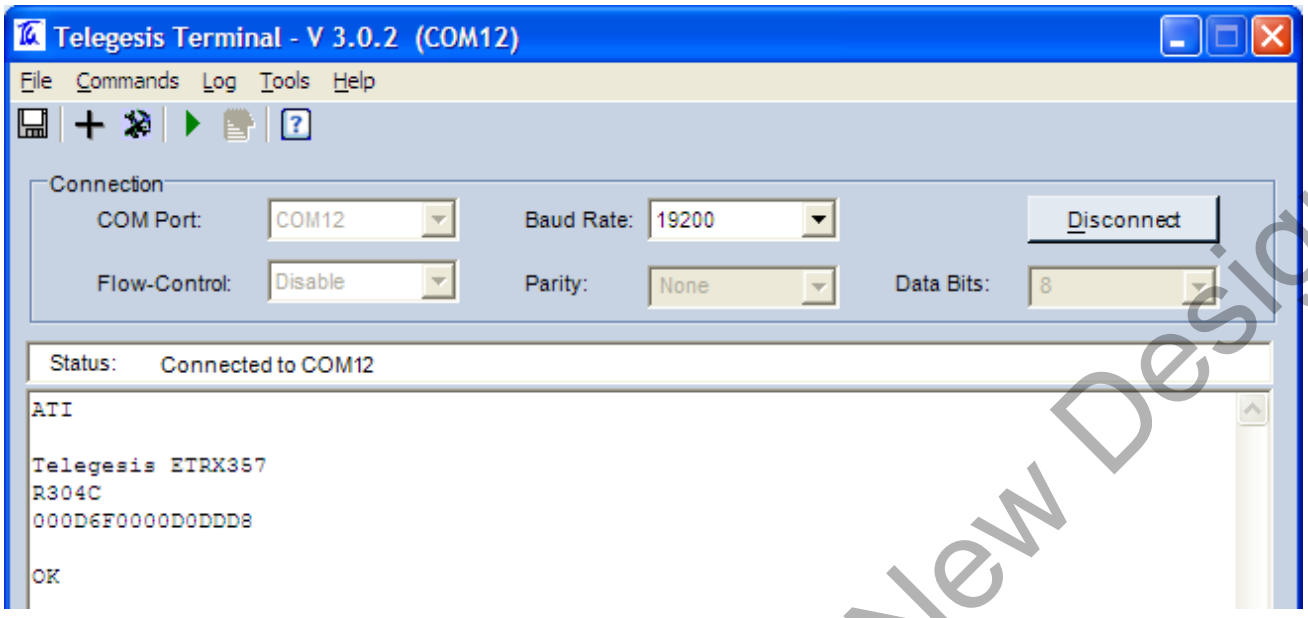

Figure 4. Telegesis Terminal

8.2 Macintosh and Linux drivers

A Virtual Com Port driver kit for Mac and Linux can be obtained by following the link on our website on the *Support → Software centre* page. Recent versions of the Linux kernel have native support for Telegesis USB devices.

The Silicon Laboratories CP2102 serial-to-USB bridge chip is configured with Vendor ID 0x10C4 and Product ID 0x8293, and the drivers must be written to recognise these identifiers.

9 Custom Firmware Development

If you intend to develop custom firmware to go onto the ETRX3USB you need to contact Silicon Labs to obtain access to their suite of development tools and their stack. The USB stick contains an ETRX357 module based on the Silicon Labs EM357 and a USB-to-serial bridge chip. The ETRX357 communicates via its serial port, so the user's firmware must use the UART of Serial Controller 1. The nRTS and nCTS lines are connected to the USB bridge chip. The LED on the USB stick is driven from EM357 pad PA6.

In order to download custom firmware onto the ETRX357, the Silicon Labs bootloader can be used or alternatively the ETRX3USB can be directly connected to the Silicon Labs InSight Adapter for programming and real time debugging.

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10 Ordering Information

Ordering/Product Code	Description
ETRX3USB	USB stick with ETRX357 module
ETRX3USB-LRS	USB stick with ETRX357-LRS long-range module
ETRX3USB+8M	USB stick with ETRX357 module and 8Mb flash memory chip
ETRX3USB-LRS+8M	USB stick with ETRX357-LRS long-range module and 8Mbit flash memory chip
ETRX357	Telegesis Wireless Mesh Networking Module with Silicon Labs ZigBee Technology: • Based on Silicon Labs EM357 • Telegesis AT Style Command Interpreter based on EmberZNet meshing and self-healing ZigBee PRO stack • Integrated 2.4GHz Antenna
ETRX357HR	Telegesis Wireless Mesh Networking Module with Silicon Labs ZigBee Technology: • Based on Silicon Labs EM357 • Telegesis AT Style Command Interpreter based on EmberZNet meshing and self-healing ZigBee PRO stack • U.FL coaxial Antenna Connector
ETRX357DVK	Telegesis Development Kit with: • 3 x ETRX35xDV Development Boards • 3 x USB cables • 2 x ETRX35x on carrier boards • 2 x ETRX35xHR on carrier boards • 2 x ETRX35x-LRS on carrier boards • 2 x ETRX35xHR-LRS on carrier boards • 1 x ETRX3USB USB stick • 2 x ½-wave antennae • 2 x ¼-wave antennae
Notes: • Customers' PO's must state the Ordering/Product Code. • There is no "blank" version of the ETRX357 Module available. All Modules carry both the Silicon Labs Stack and the Telegesis AT style Command Layer. Where customers wish to add their own firmware they can erase and write it to the flash memory of the EM357. • Please contact Telegesis if you require additional AT style commands or specific integration assistance.	

Table 11. Ordering Information (see Telegesis website for more products)

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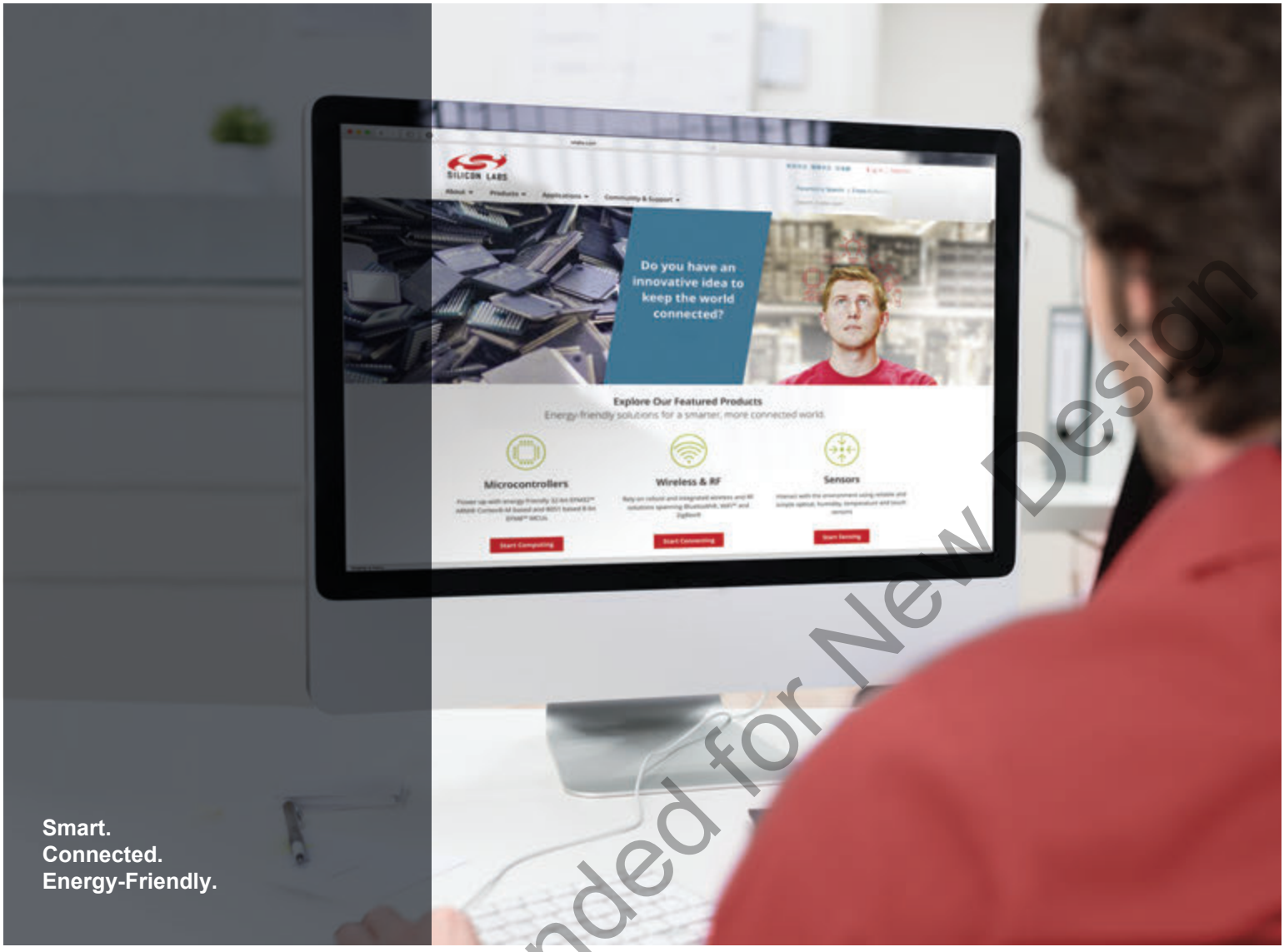

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