

## CE Marking ZigBee Radio Products

### Introduction

To place the CE mark on a product that contains a 'ZigBee radio' you must comply with all of the relevant European Directives that are applicable to the intended use and installation environment for the end product. Directive 1999/5/EC, the Radio and Telecom Terminal Equipment (R&TTE) directive, applies to both Radio and Telecommunications products as is the most applicable CE marking directives for these product types<sup>1</sup>. This document covers only products containing radio communications and the test method associated with this. For Telecommunications products please contact TRL Compliance Ltd. for more information.

For simplicity the R&TTE directive can be split in to three distinct disciplines Radio performance, Electro Magnetic Compatibility (EMC) and Product Safety. With respect to product safety the R&TTE directive modifies the Low Voltage Directive (LVD) by removing the 75Vdc/50Vac lower threshold and hence requires all radio devices to be assessed against the requirements.

The amount of testing required for each product will depend on the type of product. For example, a wireless temperature sensing system:

The battery powered remote thermometer will require considerably less testing than the base unit it transmits the temperature data back to. The remote unit does not have any connections and is battery powered, whereas the base unit may have connections to a PC and supplied power from a 230Vac power brick.

Some manufacturers chose not to design their own radios as they don't have the time, expertise in RF design and ZigBee protocol. Pre-approved radio modules can overcome these issues.

### What do I need to do to place the CE mark my product if I use...?

- A module that has no approvals or is using a chipset and designing ones own radio.
- A module that is approved to the Radio Approval requirements of EN 300 328.
- A module that is approved to the R&TTE directive.

#### ***Using a Module that has no approvals or using a chipset and designing my own radio.***

You will need to comply with the requirements of the R&TTE directive and perform testing to cover the following disciplines:

- Radio Approval
- Electromagnetic Compatibility (EMC)
- Safety Approval (LVD)

#### ***Using a module that is already approved to EN300 328.***

You will need to comply with the requirements of the R&TTE directive and perform testing to cover the following disciplines:

- Electromagnetic Compatibility
- Safety Approval (LVD)

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<sup>1</sup> Environmental directives such as WEEE and RoHS will also be applicable in due course

**Using a module that is already approved to R&TTE directive.** <sup>2 and 3</sup>

You will need to comply with the requirements of the R&TTE directive and perform testing to cover the following disciplines:

- Electromagnetic Compatibility
- Safety Approval (LVD)

This testing will only need to be performed on the circuitry built around the radio module and not the module itself, although the module will form an integral part of the equipment.

**Testing required for ZigBee radios:**

**Radio Approvals for ZigBee modules**

The specification that contains the essential radio test suite and test methods required for testing a radio operating in the 2.4GHz ISM band is EN300 328V1.6.1(2004-11) <sup>4</sup>  
 EN 300 328 requires a number of different tests to be performed. TRL Compliance Ltd radio test laboratory is fully accredited for all of the tests detailed in EN 300 328.

The required tests and the limits are:

Equivalent Isotropic Radiated Power	100mW e.i.r.p*		
Maximum Spectral Power Density	10mW per MHz eirp		
Frequency Range	The carrier shall remain within the band 2.4GHz to 2.4835MHz when measured at -30dBm using a 100kHz bandwidth.*		
Transmitter Spurious Emissions	Frequency Range	Limit TX on	Limit TX off
Wideband	30MHz to 1GHz	-36dBm	-57dBm
	1GHz to 12,75GHz	-30dBm	-47dBm
	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	-47dBm	-47dBm
Narrowband	30MHz to 1GHz	-86dBm/Hz	-107dBm/Hz
	1GHz to 12,75GHz	-80dBm/Hz	-97dBm/Hz
	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	-97dBm/Hz	-97dBm/Hz
Receiver Spurious emissions	Frequency Range	Limit	
Wideband	30MHz to 1GHz	-57dBm	
	1GHz to 12,75GHz	-47dBm	
Narrowband	30MHz to 1GHz	-107dBm/Hz	
	1GHz to 12,75GHz	-97dBm/Hz	

\* Test to be performed at normal and extreme temperatures and voltage.

<sup>2</sup> This assumes that no changes have been made to the pre approved radio module or it's antenna. If changes have been made check with the manufacturer/test house to ensure that these will not affect the validity of the test results.

<sup>3</sup> Assumes the manufacturer of the module provides a test report.

<sup>4</sup> This standard is constantly being updated. Please check the R&TTE Official Journal of the European Union (OJEU) to find out which is the most up to date standard to apply. A copy of the R&TTE OJEU can be found on the [TRL Compliance Limited](http://www.trlcompliance.com) web site

## EMC Approval for ZigBee modules

<b>Emission Tests</b>	
Radiated emissions	EN55022 Class B (only applicable to non radio circuitry)
AC Power Line Conduction	EN55022 Class B
DC Power Line conduction	EN55022 Class B (DC power cables over 3 metres)
Voltage fluctuations and flicker	EN61000-3-3 limits apply AC powered unit consuming more that 75Watts
Telecommunication port conducted emissions	EN 55022 limits
<b>Immunity Tests</b>	
Radiated susceptibility	3V/m 80%AM 80MHz – 1GHz and 1.4GHz -2GHz
Conducted susceptibility	3V/m 80%AM 150kHz – 80MHz
Electrostatic discharge	±4kV Contact and ±8kV Air
Fast Burst transients	±1.0KV AC power ports ±0.5kV DC power ports ±0.5kV Signal lines
Surges	±2kV Common mode ±1kV differential mode
Transients and surges in the vehicular environment	Applicable to units that will be powered via car battery
Voltage dips and interruptions	30% of supply voltage for 10ms 60% of supply voltage for 100ms >95% of supply voltage for 5000ms

## LVD (safety) approvals for ZigBee modules

The safety of battery powered transceivers is relatively straight forward. The difficulty comes with the introduction of ac power. Manufacturers tend to use 3<sup>rd</sup> party approved power supplies to remove the design issues. The actual test standards will depend upon the product's end function. For example, EN61010-1 for Test and Measurement equipment, EN60950-1 for information technology and EN54 for alarm applications.