REDCA Technical Guidance Note 01
RED compliance requirements for a Radio Equipment often referred to as Radio Module and the Final Radio Equipment Product that integrates a Radio Module

Table of content

This TGN replaces all previously published versions

1. Introduction

The Radio Equipment Directive 2014/53/EU (RED) applies to radio equipment, as defined in Article 2 of Directive 2014/53/EU:

Radio equipment means an electrical or electronic product, which intentionally emits and/or receives radio waves for the purpose of radio communication and/or radio determination, or an electrical or electronic product which must be completed with an accessory, such as antenna, so as to intentionally emit and/or receive radio waves for the purpose of radio communication and/or radio determination.

Radio equipment complying with all aspects of the RED shall be CE Marked if they are to be placed on the market in the EU. A manufacturer's declaration of conformity with the RED requires a conformity assessment of the radio equipment to the essential requirements of the RED. For more information about placing on the market, please refer to the EU Commission's Blue Guide.

There is apparent confusion on the assessment requirements for radio equipment which are intended to be installed into other equipment. Such radio equipment are commonly referred to as radio modules, although that term does not appear in the RED. Examples of different types of radio equipment which can be referred to as radio module are stated below; but not limited to:

- Radio equipment which is also a plug-in device. Intended to be used with or within a host product; creating combined equipment, using the control and power supply of the host product for operation. For example, an internal mini PCI card or a USB dongle.

- Radio equipment module which is intended for installation into a host product. All radio circuitry is contained on the module, including an integral antenna or an antenna connector on the module board. It may use the control and power supply of the host product for operation. It is either soldered or plugged onto the host product and easy to identify as a separate part.

- Radio equipment module which is intended for installation into a host product. All radio circuitry is contained on the module; but the module does not include an integral antenna or an antenna connector. Pins or solder pads are used for connection to a circuit trace on the host product, and the antenna is intended to be placed on the host product. It may use the control and power supply of the host product for operation. It is soldered onto the host product and may take the appearance of an integrated circuit (chip) as part of the host product.

These examples will be studied in more detail in Annex A of this TGN.

2. Scope

This REDCA Technical Guidance Note (TGN) has been written for RED Notified Bodies, so that a harmonised approach is used by all RED Notified Bodies regarding the EU type examination of radio modules, and/or final radio products which incorporate a radio module; to meet the RED.

This TGN replaces all previously published versions

This REDCA TGN also provides guidance to manufacturers, installers and test laboratories on the topics of conformity assessment, documentation and labelling.

This REDCA TGN deals with the two main situations facing the radio module industry:

- The assessment of a radio module.
- The assessment of a host product which contains a radio module.

This REDCA TGN only deals with radio modules which are radio equipment as per the RED. If a module or component does not meet the definition of radio equipment as defined by the RED and is therefore out of scope of the RED, then it is also out of scope of this TGN.

3. Definitions

The following definitions apply for the purpose of this REDCA TGN 01:

3.1. Radio Module

A radio module is the radio equipment (as described in section 1 of this REDCA TGN), which is intended to be installed into a host product.

3.2. Host Product

A host product is a device, product or equipment; into which the radio module will be installed.

3.3. Final Radio Product

A final radio product is the combination of host product and radio module.

According to the RED Guide at the time of issuing this REDCA TGN; the combination of radio module and host product will become a final radio product and subject to assessment to the RED if, at the time of placing on the market, the radio module equipment is already:

- Incorporated into the host product; and

- Permanently attached to the host product in such a way that it cannot be easily accessed and readily removed.

Note: According to the RED Guide at the time of issuing this REDCA TGN: In cases where the radio module or radio equipment is installed into a vehicle or fixed installation; the host vehicle or host fixed installation does not become a final radio product and therefore is not subject to assessment to the RED. In such cases, the radio module remains the CE Marked radio device, even if permanently installed within the vehicle or fixed installation at the time of placing the vehicle or fixed installation on the market.

Note: It is possible for any radio equipment to be installed into a host product; even though the installed radio equipment may already be considered a 'final product' itself and not a typical

radio module. In such cases, if the radio equipment is permanently installed into the host product at the time of placing the final combined equipment on the market and the original radio equipment cannot be easily removed from the host product; then the system becomes a final radio product and the guidance of this REDCA TGN may be followed.

4. Conformity Assessment of the Radio Module to the RED.

4.1. Radio Module Introduction

A radio module meeting the definition of radio equipment (as per Article 2 of the RED) to be placed on the market in the EU; is within scope of the RED and must be assessed to the RED, regardless of whether the radio module is available openly on the public market, or supplied exclusively through a business-to-business contract.

A radio module must be assessed for its intended use. It is essential for the radio module manufacturer to clearly document in the installation instructions, how the module has been assessed and the conditions for compliant use.

4.2. Radio Module Assessment

In all cases, an assessment of the radio module must be made to the requirements of Article 3 of the RED.

Despite the possibility that the radio module's operation may be re-assessed later as part of a final radio product; a full assessment of safety, EMC and radio performance is necessary for the radio module to demonstrate compliance with the RED.

The radio module may require external accessories, such as input supply voltage, communication or input signal, software and/or connection to an antenna, to operate as radio equipment.

It may be necessary to test the module at the end of a cable, or on a test-jig, or some other host device. It is the responsibility of the module manufacturer to consider any influences of a test-jig or support equipment when assessing the performance of the radio module.

If the intended host (or range of intended hosts) are known, it may be possible for the module manufacturer to assess the radio module within the intended host(s), for that environment.

If the module manufacturer does not know all possible future installation environments that their module could be used in, the radio module manufacturer must define at least one operating environment (or selection of environments) for their assessment; and this must be clearly detailed in the technical documentation of the radio module. This also represents an important part of the radio module installation instructions, so that an installer knows the environment for which the radio module has been assessed and is compliant.

For radio modules which are to be installed by end users and not for professional installation by another equipment manufacturer, it may be necessary for the radio module manufacturer to assess the radio module in a range of possible environments; or limit the types of installation permitted, perhaps through some form of two-way authentication protocol.

The radio module manufacturer must consider the range of possible conditions such as; input voltage, temperature and other environmental conditions which may apply in the final environment of use. This will include the internal operating temperatures and voltage variations of possible host devices.

Other aspects should be considered by the radio module manufacturer, such as:

- Antenna type and gain
- Antenna assembly, path or configuration
- Software versions or modifications
- Installation
- Type of operation and use
- Shielding or reflective effects of the host product (if known)
- All safety aspects

Any items which could affect RED compliance, such as critical accessories, antennas, antenna assembly or path, software versions, etc., shall be documented in the radio module's installation instructions and on the radio module's EU declaration of conformity.

5. Conformity Assessment of the Final Radio Product

5.1. Final Radio Product Introduction

This section of the REDCA TGN deals with the responsibilities of the installer of the radio module into a host product; creating a final radio product (as per the definitions in section 3 of this TGN).

An assessment must be considered of any combined equipment of radio module and host product; therefore the final radio product. The final radio product is effectively a new product.

Section 3.3 of this TGN includes the criteria to identify when such a combination becomes a new final radio product. The manufacturer responsible for placing the final radio product on the market, is responsible for the overall compliance of the final radio product.

Reminder: CE + CE ≠ CE

5.2. Final Radio Product Assessment

When installing a radio module into a host product, and if the host product was not used at the time of original assessment of the radio module, some assessment or testing will be required at the final radio product level.

Many of the test cases used to show compliance with Article 3 of the RED are specific to the host environment. This applies to the EMC assessments, the product safety assessments, and any radio performance assessments which could be affected by a change to the relevant parameters.

In all cases, an assessment of the final radio product must be made to the requirements of Article 3 of the RED.

In general, there is a desire to avoid unnecessarily repeating the radio performance assessment at the final radio product level, if compliance can be justified on the basis of technical analysis, test data and information provided by the radio module manufacturer to the final radio product manufacturer. However, if a meaningful and representative assessment of the radio performance requirements on the radio module were not performed, or are not available to the final radio product manufacturer; then a complete assessment of the final radio product is required. The information relating to the compliance of the radio module, and the responsibility of the final radio product manufacturer, should be made clear in the information provided by the radio module manufacturer concerning the installation and intended purpose of the radio module.

Product safety according to Article 3.1a of the RED applies to the final radio product and a full assessment will be required at the final radio product level; which in most cases will mean full safety testing of the final radio product. Safety tests performed on the radio module do not provide confidence of safety compliance of the final radio product.
See Annex A of this REDCA TGN for examples where the RF exposure assessment of the radio module may be applicable to the assessment of the final radio product.

EMC according to Article 3.1b of the RED applies to the final radio product and a full assessment will be required at the final radio product level; which in most cases will mean full EMC testing of the final radio product. EMC tests performed on the radio module do not provide confidence of EMC compliance of the final radio product.

Radio performance according to Article 3.2 of the RED applies to the final radio product and a full assessment will be required at the final radio product level; but that does not necessarily mean full radio testing must be performed on the final radio product. Some radio tests performed on the radio module may provide confidence of radio compliance of the final radio product.
See Annex A of this REDCA TGN for examples where the radio performance assessment of the radio module may be applicable to the assessment of the final radio product.

If the manufacturer of the final radio product does rely on radio performance test results/data from the radio module to demonstrate compliance of the final radio product to Article 3.2 of the RED, and if the radio module test data for Article 3.2 of the RED is not available or not supplied to the manufacturer of the final radio product; then the final radio product may need to be fully tested to provide the final radio product manufacturer with the information needed to state compliance with the RED.

The decision to accept test data from the radio module, by the manufacturer of the final radio product, for applicability to the final radio product, is at the discretion and responsibility of the manufacturer of the final radio product and should form part of their RED risk assessment.

Article 3.3 of the RED applies to the final radio product and a full assessment will be required at the final radio product level, for any applicable clauses of Article 3.3. The decision of whether to accept Article 3.3 compliance from the radio module for part of the assessment of the final radio product is on a case-by-case basis by the manufacturer of the final radio product.

In addition to the assessment of the radio operation for Safety and EMC, the final radio product must be assessed for all other functions the device performs, also covered by RED Article 3.1. For example, a host product and final radio product may have other functions besides the

operation of the radio module. In such cases, the RED Article 3.1 assessment will cover an assessment of the radio operation and also the other functions, which may likely be covered under different standards.

6. Technical Documentation

6.1. Technical Documentation of the Radio Module

The manufacturer of the radio module is responsible for maintaining the technical documentation of the radio module, to show compliance with the RED.

The technical documentation of the radio module must include details of the environment for which the module has been assessed; and such information must be made clear and available to the installer and manufacturer of the final radio product. This includes critical information such as input power supply, operating temperature range, geographical permitted areas, safe distance from persons or domesticated animals, etc.

Critical accessories such as the permitted antennas, cables, input power supply, host board, test jig and software version on the module and/or associated host software must be detailed on the EU declaration of conformity. This is important information to any installer and should act as a reminder that changing any of these accessories will require additional assessment. This information should also appear in the radio module installation instructions.

For radio modules which do not have a fixed or dedicated antenna and rely on an antenna assembly or antenna trace path as part of the installation, this must be described in detail by the radio module manufacturer for the installer and manufacturer of the final radio product.

In cases where the RED Article 3.2 test standard is not listed on the RED official journal of harmonised standards at the time of placing the radio module on the market; the radio module will require a Notified Body EU type examination certificate before being CE Marked to the RED.

There are companies who install radio modules into host products but do not understand the requirements of the RED with regard to the issues discussed in this REDCA TGN. To avoid the incorrect situation where an installer or manufacturer of a final radio product mistakenly believes that they can install a radio module into their host product without further assessment; it is recommended that the installation instructions for the radio module should clearly explain to the installer that an assessment of a final radio product which contains the radio module will be necessary and it should also detail which tests should be performed on the final radio product.

In cases where a Notified Body issues an EU type examination certificate for the radio module; it is understood by those involved in the assessment that the module has been evaluated only for the use configuration and environment chosen by the radio module manufacturer. For example, most likely the radio module has been assessed for use while on a test jig or evaluation board, with specified input voltage, temperature range, antenna, antenna path, etc. The Notified Body for the radio module is requested to detail the conditions in which the module was assessed, on the EU type examination certificate. For examples, see Annex B of this TGN 01.

6.2. Technical Documentation of the Final Radio Product

The final radio product is the combined device of radio module and host product.

The manufacturer of the final radio product, placing the final radio product on the market in the EU, is required to keep and maintain the technical documentation and evidence of compliance of the final radio product. This will include compliance evidence relating to all radio aspects of the final radio product. If compliance of the final radio product is based on any part of the compliance of the radio module, the relevant information of the radio module becomes part of the technical documentation for the final radio product. For example, if the manufacturer of the final radio product chooses to accept test result data from the assessment of the radio module, without fully testing the final radio product; then the test result data or test report from the radio module becomes part of the technical documentation of the final radio product.

It may not be possible for the final radio product manufacturer to obtain the radio module manufacturer's proprietary documentation, such as component parts lists or circuit diagrams. However, it is important to note that if a market surveillance authority wishes to inspect the technical documentation of the final radio product, which is a combination of the host product and the radio module, they will most likely request to see the radio module's technical documentation. In such cases, it may be necessary for the manufacturer of the final radio product to arrange for the manufacturer of the radio module to send the information directly to the market surveillance authority. In any case, that information must be made available to the authorities and the final radio product manufacturer is responsible for ensuring there are provisions in place to achieve it.

The final radio product manufacturer should ensure that the build status and software version of the radio module they have installed is known and detailed within their technical documentation.

The final radio product manufacturer's risk assessment will need to contain explanations and consideration of any test data accepted from the radio module level, which has been used to show compliance of the final radio product.

If the radio module technical documentation contains a valid Notified Body EU type examination certificate showing compliance of the radio module to the latest requirements of Article 3.2 of the RED; the final product manufacturer may choose to accept the radio module Notified Body EU type examination certificate instead of actual test data from the radio module manufacturer. This is acceptable but does incur additional risk by the final radio product manufacturer and should be considered by the final radio product manufacturer when creating their RED risk assessment and signing their declaration of conformity. It is important to note that the existence of an EU type examination certificate for the radio module is useful for the Notified Body reviewing the final radio product; but it does not provide any guarantee of compliance of the final radio product. For example, the Notified Body reviewing the final radio product would be expected to check that the environment and conditions during the radio module assessment were applicable to the final radio equipment, before accepting test data from the radio module technical documentation.
This could include input voltage, temperature range, antenna, antenna path, etc.

If the manufacturer of the final radio product does not have full compliance evidence or test reports for the final radio product which meet standards listed on the RED Official Journal for Article 3.2 of the RED, then the manufacturer of the final radio product does not have

presumption of conformity and they will need to obtain a Notified Body EU type examination certificate to the RED.

It is not possible to use the Notified Body EU type examination certificate of a radio module and consider it applicable to the final radio product.

In cases where the final radio product requires a Notified Body assessment for EU type examination involving the submission of technical documentation to a Notified Body, and the radio module manufacturer has not made their technical documentation available to the final radio product manufacturer; the radio module manufacturer will be asked by the manufacturer of the final radio product to make the radio module technical documentation and test data available directly to the Notified Body. Not having the radio module technical documentation may prevent the Notified Body from delivering the EU type examination certificate to the final radio product manufacturer.

In cases where the radio module technical documentation contains a valid Notified Body EU type examination certificate showing compliance of the radio module to the latest requirements of Article 3.2 of the RED; the Notified Body performing the review of the final radio product may accept the Notified Body EU type examination certificate of the radio module, instead of the technical documentation from the radio module manufacturer. This is acceptable for the Notified Body.

Any acceptance of test data from the radio module by the final radio product manufacturer, for any of Article 3 of the RED, needs to be detailed in the final radio product manufacturers' technical documentation and risk assessment.

The final radio product must be labelled with the CE Mark to show compliance with all the EU Directives that are applicable to it, including the RED.

Disclaimer
This guidance document does not replace the text of the Radio Equipment Directive and is for guidance only. In legal disputes the text of the Directive or its implementation in National legislation takes precedence.

Annex A – Example Cases

A.1.1. Radio Equipment Installed into Other Equipment

In this section we consider the example of radio equipment which is also a plug-in device. Intended to be used with or within a host product; creating combined equipment, using the control and power supply of the host product for operation. For example, an internal mini PCI card or a USB dongle.

If the radio equipment is plugged into a product and easily removable, such as a USB dongle or PCI card into a connection port on a laptop or computer, then this is not considered a module installation. In such cases, the radio equipment and the other product should already be assessed by their manufacturers for inter-connection, as part of the intended use of those devices.
Guidance exists on the topic of 'combined radio and non-radio equipment' (such as EG 203 367) and that topic is outside the scope of this REDCA TGN.

If the radio equipment is installed inside another product, permanently, at the time of placing the final system on the market; then it is treated like the installation of a radio module into a host product, to create a final radio product.

The final radio product will need to be fully assessed to Article 3.1a of the RED, for product safety.

With regard to RF exposure for Article 3.1a of the RED, the manufacturer of the final radio product will need to assess if the compliance assessment of the original radio equipment/module remains relevant to the final radio product, or if further action is necessary. As examples:
If the radio transmitter cannot transmit more than 20 mW output power, then the final radio product assessment could conclude that the final radio product is compliant with RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at the same distance from a person or domesticated animal as the radio module was assessed, (for example: >20cm), then the final radio product assessment could conclude that the final radio product is compliant with the RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at a closer distance from a person or domesticated animal than the radio module was assessed, then the final radio product assessment could not automatically conclude that the final radio product is compliant with the RF exposure requirements without additional actions; and further assessment is necessary.

The final radio product will need to be fully assessed to Article 3.1b of the RED, for EMC.

EMC testing of the radio equipment/module will have been performed but the installation of the radio equipment/module into the host product may have affected the compliance and EMC performance; and therefore may not be applicable to the final radio product.
Most likely the host product will have its own EMC assessment for other functions, which should be performed with the radio module installed; and inclusion of the radio module into the host product will also require an assessment, such as to the relevant applicable part of EN 301 489, on the final radio product.

In addition to this REDCA TGN, combined-equipment guidance should be consulted and it may be possible for the final radio product manufacturer to reduce some EMC immunity testing in cases where the radio module is connected into the host product using a standardised connection (such as USB) and compliance with that connection was already assessed on radio module/equipment for connection to other equipment. For example, the USB input port should have been assessed; such that the radio performance during EMC immunity testing is already demonstrated when connected to other equipment using that interface.

Radio performance according to Article 3.2 of the RED may be performed at the final radio product level, but also the final radio product manufacturer may be able to utilise test data or test results from measurements made of the radio equipment/module.

In this example of radio equipment/module installed into a host product, some radio performance test cases may be taken from the measurements of the radio module.
For example, measurements of test cases such as the signal bandwidth, transmitter timing, duty cycle, frequency hopping rates, etc., measured on the radio module, may be considered consistent with the values expected when the module is installed into the host product; and therefore the installer of the radio module into the final radio product may choose not to repeat those tests on the final radio product. In addition, radio transmitter or receiver measurements made as conducted measurements at the radio module antenna port may be considered applicable to the radio performance of the final radio product, at the decision of the manufacturer of the final radio product, if the installation is considered to not affect those measurements. The radio equipment/module input conditions, such as variation in input voltage or input signal type, should be already assessed when using standardised connection types (such as USB) and therefore the manufacturer of the final radio product should not need to test the effects of input voltage variation.

Radiated test cases however, such as radio spurious emissions, e.i.r.p., critical receiver performance, etc., may not be comparable from the radio equipment/module to the final radio product. Note that installation of a radio module into a host product may cause reflections or shielding of radio signals. Reflections can increase radiated levels, which can increase e.i.r.p. or field strength levels. Shielding can decrease radiated levels, which can affect the input levels to the radio receiver.

In cases where the radio module test data is applicable to the installation within the final radio product, and the test results data are available to the final radio product manufacturer; the final radio product manufacturer may choose to only test the radiated performance test cases, such as spurious emissions, e.i.r.p, critical receiver performance aspects, etc. In such cases, the final radio product manufacturer may also choose to perform only partial testing for Article 3.2 on those test cases. For example, a radio module with multiple modulation modes, multiple bandwidth types, multiple data rates, may have been fully tested on three operating channels in all modes at the radio module level. At the final radio product level, the final radio product manufacturer may choose to begin by re-testing only the mode(s) and channel(s) which exhibited the worst case test results at the radio module level, until the final radio product manufacturer has performed enough testing to obtain confidence and show evidence of compliance of the final radio product.

The manufacturer of the final radio product is reminded that a radio module's receiver performance when tested stand-alone in a test lab, may be different to the receiver performance actually experienced in an electrically noisy environment like a host product.

This section could also be applied to any type of finished product, such as a WLAN access point or router, which may be connected to, or installed into, some other product.

Additional guidance for assessment of combined equipment may be seen in ETSI documents: EG 203 367 and the EN 303 446-x series.

A.1.2. Complete Radio Module Board with Antenna; Installed into Host Product

In this section we consider the example of a radio equipment module which is intended for installation into a host product. All radio circuitry is contained on the module, including an integral antenna or an antenna connector on the module board. It may use the control and power supply of the host product for operation. It is either soldered or plugged onto the host product and easy to identify as a separate part.

The final radio product will need to be fully assessed to Article 3.1a of the RED, for product safety.

With regard to RF exposure for Article 3.1a of the RED, the manufacturer of the final radio product will need to assess if the compliance assessment of the original radio equipment/module remains relevant to the final radio product, or if further action is necessary. As examples:
If the radio transmitter cannot transmit more than 20 mW output power, then the final radio product assessment could conclude that the final radio product is compliant with RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at the same distance from a person or domesticated animal as the radio module was assessed, (for example: >20cm), then the final radio product assessment could conclude that the final radio product is compliant with the RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at a closer distance from a person or domesticated animal than the radio module was assessed, then the final radio product assessment could not automatically conclude that the final radio product is compliant with the RF exposure requirements without additional actions; and further assessment is necessary.

The final radio product will need to be fully assessed to Article 3.1b of the RED, for EMC.

EMC testing of the radio module will have been performed but the installation of the radio module into the host product will have affected the compliance and EMC performance; and therefore will not be applicable to the final radio product. Radio modules are typically EMC tested for radiated RF immunity and ESD (on the horizontal and vertical coupling planes); but often radio module input ports are not EMC tested; and the final radio product manufacturer should be aware of this.
Most likely the host product will have its own EMC assessment for other functions, which should be performed with the radio module installed; and inclusion of the radio module into the host product will also require an assessment, such as to the relevant applicable part of EN 301 489, on the final radio product.

Radio performance according to Article 3.2 of the RED may be performed at the final radio product level, but also the final radio product manufacturer may be able to utilise some test data or test results from measurements made of the radio module.

In this example of a radio module installed into a host product, some radio performance test cases may be taken from the measurements of the radio module.

Measurements of test cases such as the signal bandwidth, transmitter timing, duty cycle, frequency hopping rates, etc., measured on the radio module, may be considered consistent with the values expected when the radio module is installed into the host product; and therefore the installer of the radio module into the final radio product may choose not to repeat those tests on the final radio product. The manufacturer must consider such things as input voltage, driver software, environmental conditions, etc.; and if these differ from those declared by the radio module manufacturer, then an assessment of those test cases may become necessary. In addition, radio transmitter or receiver measurements made as conducted measurements at the radio module antenna port may be considered applicable to the radio performance of the final radio product, at the decision of the manufacturer of the final radio product, if the installation is considered not to affect those measurements. Radiated test cases however, such as radio spurious emissions, e.i.r.p., critical receiver performance, etc., may not be comparable from the radio module to the final radio product. Note that installation of a radio module into a host product may cause reflections or shielding of radio signals. Reflections can increase radiated levels, which can increase e.i.r.p. or field strength levels. Shielding can decrease radiated levels, which can affect the input levels to the radio receiver.

In cases where the radio module has a remotely located antenna and the radio antenna is fitted externally to the final radio product (i.e., the antenna is not contained within the enclosure of the final radio product), correctly in accordance with the radio module manufacturer's instructions; then it may be possible for the final radio product manufacturer to determine items such as e.i.r.p. and correct receiver performance from the radio module test results, without the need to test these items at the final radio product level.

In cases where the radio module test data is applicable to the installation within the final radio product, and the test results data are available to the final radio product manufacturer; the final radio product manufacturer may choose to only test the radiated performance test cases, such as spurious emissions, e.i.r.p, critical receiver performance aspects, etc. In such cases, the final radio product manufacturer may also choose to perform only partial testing for Article 3.2 on those test cases. For example, a radio module with multiple modulation modes, multiple bandwidth types, multiple data rates, may have been fully tested on three operating channels in all modes at the radio module level. At the final radio product level, the final radio product manufacturer may choose to begin by re-testing only the mode(s) and channel(s) which exhibited the worst case test results at the radio module level, until the final radio product manufacturer has performed enough testing to obtain confidence and show evidence of compliance of the final radio product.

The manufacturer of the final radio product is reminded that a radio module's receiver performance when tested stand-alone in a test lab, may be different to the receiver performance actually experienced in an electrically noisy environment like a host product.

Additional guidance for assessment of combined equipment may be seen in ETSI documents: EG 203 367 and the EN 303 446-x series.

A.1.3. Radio Module IC or Chip; Soldered into Host Product

In this section we consider the example of a radio equipment module which is intended for installation into a host product. All radio circuitry is contained on the module; but the module does not include an integral antenna or an antenna connector. Pins or solder pads are used for connection to a circuit trace on the host product, and the antenna is on the host product. It may use the control and power supply of the host product for operation. It is soldered onto the host product and may take the appearance of an integrated circuit (chip) as part of the host

product.

The final radio product will need to be fully assessed to Article 3.1a of the RED, for product safety.

With regard to RF exposure for Article 3.1a of the RED, the manufacturer of the final radio product will need to assess if the compliance assessment of the original radio equipment/module remains relevant to the final radio product, or if further action is necessary. As examples:
If the radio transmitter cannot transmit more than 20 mW output power, then the final radio product assessment could conclude that the final radio product is compliant with RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at the same distance from a person or domesticated animal as the radio module was assessed, (for example: >20cm), then the final radio product assessment could conclude that the final radio product is compliant with the RF exposure requirements without additional actions.
If the radio transmitter can transmit more than 20 mW output power and the final radio equipment is used at a closer distance from a person or domesticated animal than the radio module was assessed, then the final radio product assessment could not automatically conclude that the final radio product is compliant with the RF exposure requirements without additional actions; and further assessment is necessary.

The final radio product will need to be fully assessed to Article 3.1b of the RED, for EMC.

EMC testing of the radio module will have been performed on some sort of temporary host or test jig; but now the module is in a new host product and the EMC performance of the final radio product must be assessed. Most likely the host product will have its own EMC assessment for other functions, which should be performed with the radio module installed; and inclusion of the radio module into the host product will also require an assessment, such as to the relevant applicable part of EN 301 489, on the final radio product.

Radio performance according to Article 3.2 of the RED may be performed at the final radio product level, but also the final radio product manufacturer may be able to utilise some test data or test results from measurements made of the radio module.

In this example of a radio module chip soldered into a host product, some radio performance test cases may be taken from the measurements of the radio module, only if the installation follows exactly the installation instructions from the radio module manufacturer. Measurements of test cases such as the signal bandwidth, transmitter timing, duty cycle, frequency hopping rates, etc., measured on the radio module, may be considered consistent with the values expected when the radio module is installed into the host product; and therefore the installer of the radio module into the final radio product may choose not to repeat those tests on the final radio product. The manufacturer must consider such things as input voltage, driver software, environmental conditions, etc.; and if these differ from those declared by the radio module manufacturer, then an assessment of those test cases may become necessary.

In theory, radio transmitter or receiver measurements made as conducted measurements at a radio module antenna port may be considered applicable to the radio performance of the final radio product. However, in this example, the radio module does not have an antenna port. The radio module has a pin which leads through a PCB trace to an antenna on the host product. If the manufacturer of the final radio product wishes to use conducted power, conducted emissions or receiver performance measurements from the radio module to show

compliance of the final radio product, then they will need to follow exactly the detailed instructions from the radio module manufacturer; including input voltage, driver software, environmental conditions, antenna trace layout design construction and material, circuit board layout design construction and material, nearby circuitry, etc. In reality, it is expected that manufacturers of final radio products will need to test the output power, conducted spurious emissions and receiver performance requirements on the final radio product; and not take the results of those test cases from the radio module test reports. Radiated test cases will also need to be performed on the final radio product.

Additional guidance for assessment of combined equipment may be seen in ETSI documents: EG 203 367 and the EN 303 446-x series.

Disclaimer
This guidance document does not replace the text of the Radio Equipment Directive and is for guidance only. In legal disputes the text of the Directive or its implementation in National legislation takes precedence.

Annex B – EU Type Examination Certificate

B.1.1. Notes for the NB EU Type Examination Certificate

For consistency between Notified Bodies and for information to the radio module installer and final radio product manufacturer, it is recommended that the Notified Body should add a note to the EU type examination certificate. The following text, or similar variation of the following text should be added by the Notified Body.

In addition to the basic text (example 1, below); if there are limitations associated with the module which are deemed relevant or important to a radio module installer, then those details should be included on the NB EU type examination certificate note (examples 2 to 5, below).

The important information to be detailed on the EU type examination of the module would include:

- If the module was assessed on a test jig, or length of cable, or in a typical host.
- The input voltage range and operating temperature, over which the module was assessed.
- The antenna with which the module was assessed.

These suggested notes (below) represent the minimum expected information and most likely the EU type examination of the radio module will include more information than this.

The Notified Body may create their note according to the assessment of the radio module but is encouraged to follow the wording suggested in section B.1.2 of this REDCA TGN.

B.1.2. Examples of Notes for the NB EU Type Examination Certificate

Example 1:

This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Example 2:

This radio module has been assessed for use with cables of less than 3m in length. This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Example 3:

This radio module has been assessed for use in the temperature range of -5°C to +30°C and with an input voltage of 3.6 V DC, ±0.3 V. This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Example 4:

This radio module is for indoor use only. This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Example 5:

This radio module has been assessed for use with cables of less than 3m in length. This radio module has been assessed for use in the temperature range of -5°C to +30°C and with an input voltage of 3.6 V DC, ±0.3 V. This radio module is for indoor use only. This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Disclaimer
This guidance document does not replace the text of the Radio Equipment Directive and is for guidance only. In legal disputes the text of the Directive or its implementation in National legislation takes precedence.