
International EMC compliance requirements

This chapter surveys EMC compliance regimes outside the EU. It is, of course, only a snapshot at the time of writing (Spring 2016), as far as possible obtained from the agencies' own websites. Compliance regulations have a habit of changing frequently, so you should not regard this information as definitive: **make sure you obtain up-to-date advice on the current situation in your target markets before making any commercial decisions.** Note that what follows is not principally concerned with radio or medical equipment regulation, which in many countries has an EMC dimension and is controlled by different authorities. Nor does it cover safety certification, which is typically at least as important for the proper application of the various countries' schemes.

3.1 Introduction

Many countries that require EMC compliance also have other constraints to market entry, such as particular certification processes, deviations from international standards or in-country testing. This means that a compliance strategy based solely on CE Marking is almost certainly not enough if you need global access. Each country or region retains its right to determine:

- If EMC is a mandatory compliance aspect that must be met prior to placing products on the market
- What authority will be responsible for regulating EMC
- The technical requirements that must be met and identification of the standards required
- Compliance procedures and filings
- What test reports will be accepted
- Specification of any marks that must be applied

But on the other side of the coin, there are also simplifying arrangements and agreements that allow your EMC testing to cover wider market areas. These are Mutual Recognition Agreements (MRAs). Multilateral agreements between countries or regions are intended to facilitate market access for signatory members. MRAs can cover the mutual recognition of product testing, certification or both, and allow testing and certification by conformity assessment bodies (CABs, which are nearly always accredited test labs in the case of EMC) in one region or country to be accepted in another region or country.

Therefore, one of the first things you need to do when planning worldwide marketing of a product is to find out what requirements apply in your target regions and whether MRAs allow you to rationalise your testing strategy.

3.2 The USA: FCC Rules



In the USA, radio frequency interference requirements are controlled by the FCC (Federal Communications Commission), which is an independent government agency responsible for regulating inter-state and international communications by radio, television, satellite and cable. The requirements are detailed in CFR (Code of Federal Regulations) 47, available on the web as e-CFR [235]. Part 15 of these regulations applies to RF devices, principally unintentional and intentional radiators but with additional subparts for a variety of specific types such as ultra-wideband, broadband over power line and white space devices.

Part 15 subpart B, applying to unintentional radiators, includes clauses which cover specific classes of device such as power line carrier systems, TV receivers and TV interface devices. Industrial, scientific and medical devices which intentionally generate RF energy are covered under Part 18 of the rules. But the major impact of Part 15 is on those products which incorporate digital devices.

3.2.1 Approval routes

A “digital device” (previously defined as a computing device) is any electronic device or system that generates and uses timing signals or pulses exceeding 9kHz and uses digital techniques. Two classes are defined, depending on the intended market: Class A for business, commercial or industrial use, and Class B for residential use (specifically, marketed for use by the general public). These classes are subject to different limits, Class B being the stricter. Before being able to market his equipment in the USA, a manufacturer must follow one of three routes, defined in Part 2 of the Regulations:

- *verification*, which is totally a self certification process;
- *declaration of conformity (DoC)*, similar to verification except that testing must be carried out in an accredited test laboratory;
- *certification*, where the manufacturer must send a package of information including test data, installation and operating instructions, and fees to a Telecoms Certification Body (TCB), which issues the approval.

There is a proposal, not yet enacted, to merge the verification and DoC routes. Which route is to be followed depends on the type of product, as listed in para. 15.101 of the Regulations. (Note that the certification route applies to more than just telecom products.) Since June 2000, the FCC itself has declined to become involved directly in any of these routes. Under the EU/US Mutual Recognition Agreement, European laboratories are capable of acting as TCBs for certification or as Certification Bodies for the DoC route.

There are some quite broad exemptions from the rules depending on application. These include digital devices used exclusively in transport vehicles, industrial plant or public utility control systems, industrial, commercial and medical test equipment, specialized medical computing equipment, and a digital device used in an appliance. Also, low-power devices (< 6nW), passive add-on devices, and those with a top internal frequency less than 1.705MHz which cannot operate from the mains, are exempt.

3.2.2 Test requirements

Limits apply to conducted interference on the mains lead between 150kHz and 30MHz, and radiated interference measured either at 10m or 3m from 30MHz to 960MHz and

above. The limits are similar but not identical to those laid down in CISPR-derived standards, and the conducted limits have now been aligned with CISPR 22; the CISPR 22 (Edition 3) radiated limits may alternatively be applied, but the test procedures of ANSI C63.4 [227] must be followed and the US mains voltage must be used during the tests[†]. The upper frequency limit is extended to a possible maximum of 40GHz, depending on the frequencies used within the device. The relationship between internal clock (or other) frequencies and the maximum measurement frequency is shown in Table 4.4 on page 104. From this you can see that devices with clock frequencies exceeding 108MHz must be tested for emissions well into the microwave region.

3.3 Canada

The regulation of EMC in Canada is similar to that in the US. Industry Canada (IC) establishes the compliance regulations for radios, digital devices and other unintentional radiators. Typical emissions standards are Interference-Causing Equipment Standard ICES-003 for ITE products and ICES-001 for ISM equipment. Some applications of digital devices are exempted from IC technical standards, in a manner similar to the FCC.

Approval requires verification for all unintentional radiators. No accreditation is needed except for radio products (from 2017) and there are no immunity requirements. Emissions limits cover frequency ranges from 9kHz to 40GHz using ANSI 63.4 rules, or there is the option to test under CISPR 22 up to 6GHz as for CE Marking.

3.4 China

3.4.1 CCC

In December 2001 China issued the Regulations for Compulsory Product Certification. This system replaced the original Quality License System for Commodity Inspection and Safety Certification System for Electrical Equipment. China Compulsory Product Certification is abbreviated to CCC or 3C. It is the statutory compulsory safety certification system and has been in force since May 1st, 2002. Items subject to CCC cover 135 products divided into 20 categories, as listed below in Table 3.1; but note that information about China's system, though readily available on the internet, is occasionally confusing and contradictory, and clearly some of these categories have no electrical content, let alone EMC. The system also allows for voluntary certification of items not on this list.

Products within the scope of this system must bear the CCC mark prior to entering the Chinese marketplace. Once you have determined what category your device falls under, you then determine which mandatory standards are needed for certification. The GB series standards, which are usually harmonized to the IEC or EN standards, sometimes with national deviations, are used for CCC certification.

The application process requires the submission of a formal application and additional supporting documentation. The supporting documentation includes a user's guide or operating manual, a critical component list both for safety and EMC, a



[†] In early 2006 the FCC fined a German company \$1m for non-compliance with the Rules, despite the company's claim that its products were "CE-compliant". The FCC says that "such testing neither is the equivalent of nor demonstrates compliance with the Commission's technical standards".

Table 3.1 CCC categories

Category	Title
1	Electrical wires and cables
2	Circuit switches, electric devices for protection or connection
3	Low-voltage electrical apparatus
4	Low power motors
5	Electric tools
6	Welding machines
7	Household and similar electrical appliances
8	Audio and video apparatus (not including the audio apparatus for broadcasting service and automobiles)
9	Information technology equipment
10	Lighting apparatus (not including the lighting apparatus with the voltage lower than 36V)
11	Motor vehicles and safety accessories
12	Motor vehicle Tyres
13	Safety Glasses
14	Agricultural Machinery
15	Telecommunication Terminal Products
16	Fire Fighting Equipment
17	Safety Protection Products
18	Wireless LAN products
19	Decoration Materials
20	Toys

marking label, and other specific information related to the operation, handling, storage, and intended use of the product to be certified.

Once the application is approved, the product will have to be formally tested at a designated testing laboratory in China, although there is the future possibility that foreign labs with a Chinese operation which has qualified as a CCC certification body could offer a CCC certification service by sub-contracting. Chinese labs are not going to offer help with EMC fixes on the fly, and product failures can easily delay the approval process by several months. For this reason you need to be sure that the sample you send will comply with the standards with a reasonable margin to allow for inter-lab uncertainties (a subject which is discussed in more detail in section 10.2.7). Also, the certification body (CB) will send an inspector to factory locations where the products are made, to perform an initial factory quality inspection. If the CB is satisfied with the test report and the manufacturer passes the inspection, the report will be approved and the CCC certificate will be released.

The CCC certificate is generally valid for five years and requires follow-up inspections that verify quality control and product consistency.

3.5 Australia and New Zealand

The authority for EMC in Australia is the ACMA (the Australian Communications and Media Authority), and for New Zealand it is the Radio Spectrum Management Agency. The ACMA regulatory framework for products supplied to the Australian market covers:



- telecommunications customer equipment (CE) and customer cabling (CC)
- radiocommunications devices
- electromagnetic compatibility (EMC) performance of electrical and electronic devices, vehicles and devices with internal combustion engines
- electromagnetic energy (EME) from radio transmitters

Each of these incorporates a legislative instrument, referred to as a labelling notice (LN). The labelling notices identify the applicable technical standards and testing, record-keeping and labelling requirements (Regulatory Compliance Mark, RCM) for products supplied into Australia. The EMC LN recognises three risk levels in relation to a device: Low-risk, Medium-risk and High-risk.

Each risk level determines the evidence a supplier must obtain to demonstrate the product complies with the applicable EMC standard. The levels correspond to the risk associated with the supply of a product that is not compliant with the applicable EMC technical standard/s. The higher the level, the greater the risk of interference presented by a non-compliant product. The greater the risk, the more stringent the testing and record-keeping requirements are to demonstrate compliance.

For a Low- and Medium-risk device, testing can be conducted by any testing body or in-house test facility. A High-risk device must be tested by an accredited testing body. This can be a testing body that is accredited by the National Association of Testing Authorities, Australia (NATA), or by another accredited lab from a country with which NATA has an agreement for the mutual recognition of test reports.

3.5.1 Procedures

A supplier of a product subject to the EMC regulatory arrangements is required to maintain documentary evidence (compliance records) to demonstrate that the product complies with the applicable technical standard. These requirements are specified in the EMC LN. The level of evidence required to be obtained and maintained by a supplier varies depending on the risk of interference that may be expected from the product—high-, medium- and low-risk. The compliance levels are

- High-risk: Group 2 ISM equipment as per CISPR 11 2nd edition; labelling, accredited test report to applicable standard, DoFC and documentation required
- Medium-risk: anything other than high risk which contains a SMPS, a transistor switching circuit, a microprocessor, a commutator, a slip-ring motor or an electronic device operating in a switching or non-linear mode, but not battery-powered devices (not capable of being connected to an external power supply); requirements as for high risk, but test report need not be accredited
- Low-risk: everything else, including battery-powered devices; labelling and DoFC optional

The EMC LN requires a supplier (a manufacturer, importer or their authorised agent) of products (other than low-risk devices) subject to the EMC regulatory arrangements to apply a compliance label to a product before it can be supplied to the Australian market. A compliance label must not be applied to a product unless the product is compliant with the applicable EMC standard(s) and the supplier holds the relevant documentary evidence to prove compliance.

Supplier registration

Before a supplier applies a compliance label to a product, the supplier must register on the national database as a “responsible supplier”.

3.5.2 Standards

The ACMA technical standards are legislative instruments that directly reference technical performance requirements contained in industry standards. The EMC standards list, available from the ACMA website, provides all current applicable EMC standards. All products covered by the EMC regulatory arrangements must comply with an applicable technical standard. The standards list groups the standards by equipment type, and is similar to the EU’s listing for the EMC Directive, although not as extensive. It includes reference to both IEC and EN versions as well as Australian/New Zealand national versions, and also includes transitional dates for revisions. Many of the product standards on the list have immunity requirements; but the list preamble states, rather obliquely

The ACMA only mandates performance requirements in relation to emissions therefore compliance to standards within this list is only required to the extent that matters within the standard that relate to interference to: (a) radiocommunications; and, (b) any uses or functions of devices.

A supplier may continue to supply a product that has been tested to an expired industry standard, provided that standard was in effect at the time of signing the Declaration of Conformity. With some caveats, the supplier is not required to re-test the product to the amended or replacement standard.

3.6 Russia and the EAEU

Compliance to Customs Union Technical Regulations is required when exporting to the Eurasian Economic Union – EAEU (former Customs Union). Member states are: Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan. For many years Russia operated the GOST certification system. This is gradually being replaced by certification to the Customs Union Technical Regulations (CU TR). Technical Regulations are similar to EU Directives, covering the requirements for the entire product’s life cycle. Each TR is supported by GOSTs and other standards in terms of product-specific requirements and testing methods.

Products successfully assessed with the Customs Union Technical Regulations are marked with EAC Mark of Conformity (EAC stands for Eurasian Conformity). The EAC Mark applies to exports to, and goods manufactured in the EAEU. Applicable conformity assessment documents have to be in place for the Customs clearance and for sale and/or marketing within the member states.



3.6.1 The Technical Regulation

Several types of conformity assessment are currently in place depending on the type of product: certification or declaring to national GOST systems, Customs Union TR certification or declaring State Registration. For EMC, the relevant technical regulation is TR TC 020/2011 [210]. This bears a certain resemblance to the first edition of the EU's EMC Directive: the EMC requirements are given in Article 4:

Technology should be designed and manufactured in such a way that when it is applied as intended and meet the requirements for installation, operation (use), storage, transportation (transportation) and maintenance:

- electromagnetic interference caused by technical means, do not exceed a level that ensures operation of communications and other equipment, according to their purpose;
- equipment has been the level of immunity to electromagnetic interference (noise), with its operation in the electromagnetic environment for the application in which it is intended.

For some types of apparatus compliance requires certification, for most others it is declaration of conformity. The certification requirements apply to many types of domestic and consumer appliances, personal computers and some peripherals, and electric musical instruments. There is also a list of passive-EMC equipment which is explicitly not subject to the regulation.

3.6.2 Standards

GOST, short for Gosstandart (State Committee for Quality Control and Standardization), is the national standardization body in Russia. Nowadays its EMC standards reflect IEC and CISPR documents, but there are a number of 20th-century Russian standards still available which do not have an IEC equivalent.

An annex to the technical regulation TR TC 020/2011 lists the (mainly) GOST standards that are applicable under this regulation. Some older ones pre-date the international approach, but most are harmonized with IEC/CISPR standards or ENs.

3.7 Japan

The Japanese system of EMC regulation can be separated principally into consumer appliances and ITE.

3.7.1 Appliances

The Ministry of Economy, Trade and Industry (METI) is responsible for appliance safety, including RF emissions (EMI). The Electrical Appliance and Material Safety Law was implemented on 1st April 2001. Products subject to regulation are mandated to be labelled with the PSE mark, although most of these are more concerned with safety than with EMC. A wide range of products can be self-verified to the requirements and carry no regulatory marking. The RF emissions limits established for appliances are similar to corresponding CISPR standards, although deviations exist. Immunity is not required.

Manufacturers or importers of products classified as “electrical appliances and materials” are obliged to notify the METI of the commencement of their enterprise and conform to the technical standards and fulfil other duties, and only those enterprises who have fulfilled these obligations including notification are allowed to display the



PSE label as evidence of the fact that they have followed the procedures according to the law. The sale of any Electrical Appliances and Materials that are not labelled according to the law is prohibited in Japan.

3.7.2 ITE

The system of Information Technology EMC regulation is somewhat different to most others, in that it is “voluntary”, although it is so well established that for most suppliers it is pretty much mandatory. In 1985 Japanese business associations set up the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). The Voluntary Control applies to ITE to be shipped for the domestic market in Japan. If you want to ship your product with the VCCI mark and/or register your measurement site to VCCI, you need to be a member of VCCI first.



In this measure of voluntary control the member must assure that his products meet the VCCI specified limits before distributing them in Japan. Before the shipment of his product the member has to file a conformity verification report to VCCI based on the ITE Class of the product in question and affix the VCCI mark of the Class on the product.

The member manufacturers are required to verify technical requirement conformity and submit a report as indicated below.

- **Testing:** perform conformity verification tests on their ITE products to confirm that they meet the technical requirements. Conformity verification tests shall be performed at measurement facilities which are registered at VCCI. The VCCI requirements are based largely on CISPR 22.
- **Registration of Compliance:** manufacturers performing conformity verification testing should present a “Conformity Verification Report”, using the specified form to the Council for its approval prior to shipment of the ITE products. ITE for which the member manufacturer has filed a conformity verification report shall designate the fact using a label for Class A ITE and a mark/logo for Class B ITE.

3.8 Taiwan

The authority for safety and EMC for a wide variety of appliances and equipment in Taiwan is the Bureau of Standards, Metrology and Inspection (BSMI). EMC standards are generally harmonized with CISPR for RF emissions. A range of products are subject to mandatory inspection, including audio and video appliances, ITE, power supplies, video games and office machines, household appliances and lighting equipment. As with the Chinese and Russian systems, a long list of specific types of equipment is provided. Testing can be done by BSMI or by designated testing labs, either in Taiwan or overseas. Some types of product may use a Declaration of Conformity route, in which the manufacturer prepares the documentation, draws up a DoC and applies to the BSMI for registration and a registration number, which must be affixed to the product.



3.9 South Korea

EMC in the Republic of Korea is regulated by the Radio Environment Research Division of the Korean Radio Research Agency (RRA). The conformity assessment system is split into those equipments requiring certification of conformity, and those that only need “registration of compatibility”, as well as a further category known as “Interim of Conformity” which applies to equipment whose conformity assessment criteria are not yet available. The first category include ITE, home electrical appliances, medical treatment equipment, industrial equipment, and in-vehicle equipment. Certification can be obtained by submitting documentation (in Korean) plus a test report from the authorized test lab or a designated lab whose country has an MRA. The product can then carry the KC Mark.

