MultiPoint
A Rhein Tech EMC Regulatory Update

February 2007

EMC Regulatory Update

Dear Colleague,
We have provided typical questions and answers that represent in most cases technical opinions with justification in FCC and CE requirements. The particulars of the product for certification must be considered with respect to the applicability of these questions and answers. We hope you find our update valuable and welcome your feedback if you have any special needs or questions. Call at 703-689-0368 or view archived issues of MultiPoint at our web site.

Band-edge Measurements

QUESTION: What is the procedure for making band edge measurements on a Part 15 wireless device?

ANSWER: ANSI Standard C63.4- 2003, as incorporated into the FCC Rules by reference in Part 15.31(a) (3), is the procedure the FCC uses for testing intentional radiators. ANSI C63.4-2003 also provides guidance on the use of a spectrum analyzer for making the measurements. In making radiated band edge measurements, there can be a problem obtaining meaningful data since a measurement instrument that is tuned to a band edge frequency may also capture some in-band signals when using the resolution bandwidth (RBW) as specified by measurement procedure ANSI C63.4- 2003, unless precautions are followed.

The following technique may be used for determining band edge compliance in an effort to ensure that the proper precautions are followed.

1. Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function for the frequency being measured, as required by C63.4 and FCC Rules. For example, for a device operating in the 902-928 MHz band under Section 15.249, use a 120 kHz RBW with a CISPR Quasi-Peak detector. A peak detector with 100 kHz RBW may also be used. For transmitters operating above 1 GHz, use a 1 MHz RBW, a 1 MHz VBW, and a peak detector (as required by Part 15.35). Repeat the measurement with an average detector (i.e., 1 MHz RBW with 10 Hz VBW). Note: For pulsed emissions, other factors (e.g., pulse desensitization correction factor) must be included in the calculations. Also, note that radiated measurements of the fundamental emission of a transmitter operating under 15.247 are not normally required, but they are necessary in connection with this procedure.
2. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band edge emission (i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band edge emission. This is not a field strength measurement; it is a relative measurement, performed to determine the amount by which the emission drops at the band edges relative to the highest fundamental emission level.
3. Subtract the delta measured in (2) from the field strengths measured in (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band edge compliance as required by Section 15.205.
4. The above delta measurement technique may be used for measuring emissions that are up to two standard bandwidths away from the band edge, where a standard bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore, you may use the delta technique for measuring emissions up to 2 MHz removed from the band edge. Radiated emissions that are removed by more than two standard bandwidths must be measured in the conventional manner.

SAR Requirements

QUESTION: Our company manufactures a wireless handset that hangs from a lanyard. The lanyard strap is used for carrying the device on the wrist or around a person's neck with the device next to the person's body. How should Specific Absorption Rate (SAR) compliance be demonstrated for such devices?

ANSWER: The procedure used to test a body-worn device for compliance with the RF safety requirements in Section 2.1093 of the FCC's rules is divided into two sections: extremity and body.

1. Extremity: Demonstration of SAR compliance for extremities in wrist worn situations is not necessary, except when the antenna configurations or other radiating structures of a handset can cause hand or wrist SAR to exceed the extremity SAR limit (4.0 W/kg averaged over 10 grams). Such a situation may arise when the antenna or other known peak SAR locations are very close to the extremity tissues. For example, when the antenna or other known peak SAR locations are within 1 cm of the extremity tissues, one may need to take into consideration the output power, antenna design, device operating configurations and exposure conditions, etc. to determine if SAR evaluation for extremity tissues is necessary.
2. Body: When a handset can be worn on a person's body by means of a strap or other similar accessory, demonstration of SAR compliance for the applicable body- worn operating configurations and exposure conditions is required. SAR should generally be evaluated with the front and then the back of the device in contact with a body equivalent phantom filled with appropriate Muscle equivalent tissue material. Most handsets are not expected to rest against a person's body on the side while being carried with a strap. Unless the design of a device promotes such operating configurations, testing SAR with the front and back of the device against a phantom is generally sufficient. It is appropriate to include the operating configurations evaluated for SAR compliance within the user's manual.

Marine VHF Radios

QUESTION: Our firm is designing a marine radio and we would like an explanation of the VHF frequencies, specifically the 156 -162 MHz band vis-a-vis ship radio frequency allocations, with respect to domestic and international regulations.

ANSWER: Marine VHF radios certified under Part 80 of the FCC rules must comply with the following:

1. Transmitting frequencies must be limited to those described in 47 CFR 80.871(d), i.e., using the ship station frequencies in the table in the simplex and semi-duplex modes (as applicable).
2. The unit and manual provided channel numbers must be consistent with the table in 47 CFR 80.871(d).
3. If the unit and manual provided a domestic mode (e.g., US, domestic use), the frequencies in the domestic mode may consist only of those listed in 47 CFR 80.371 (c) and 80.373(f), except for following case. **EXCEPTION:** The domestic mode may contain marine VHF channel numbers 3, 21, 23, 61, 64, 81, 82, or 83, so long as either the unit or the manual make clear that these frequencies are not for use by the general public in US waters (a user would require special authorization under a private land mobile license or from the Coast Guard). The domestic mode may not contain marine VHF channel numbers 2, 4, 60, and 62 (these are slightly offset from private land mobile frequencies and there is no means to legally use these as carrier frequencies in US waters). Note that the rules do not provide authority to require specific warning labels or place additional burdens on manufacturers that meet these requirements.
4. If the unit and manual provided an international mode (e.g., international, ITU, Appendix 18, foreign) or a mode specific to a particular administration (e.g., Canada, Japan, UK), the unit and manual need only comply with item #1 listed above.

FCC Interpretation of 47 CFR 90.214

QUESTION: How does the FCC interpret transient frequency behavior in 47 CFR 90.214?

ANSWER: This requirement can be attributed to the FCC's response to interference from data modems operating in simplex mode. These modems were subject to turn-on transients when the data transceiver would switch from receiver to transmitter. This transient effect occurs when any transmitter reaches full power many milliseconds before the synthesizer locks on to the frequency. An emission is produced as the modem powers up, many megahertz before the frequency determining circuits lock on to the assigned frequency, quickly sweeping the carrier across the band. For voice-only products, this transient effect is not considered a big problem. Turn-on transients from push-to-talk radios are tolerable and sometimes only produce an easily ignored pop on the afflicted channels. However, with the proliferation of data radios, transient effects are more critical. Disturbances to the spectrum cause increased bit error rates and error-correcting retransmissions. This problem has worsened due to faster and faster bit rates and the error corrections are that are now more prevalent.

The general technical requirements for transient frequency behavior for a transmitter operating in the Private Land Mobile Radio Service are contained in 47 CFR Subpart I of Part 90 of the FCC's rules. The requirements for transient frequency behavior are located in 47 CFR 90.214. All radio devices that operate in the frequency bands 150-174 MHz and 421-512 MHz must be tested and reported, but the time interval (T1 and T3) limits of 47 CFR 90.214 do not apply to devices with 6 W or less output power.

Radar Detectors: US and EU Bands

QUESTION: Our firm manufactures radar detectors and we would like to know if the FCC allows the issuance of a grant of certification in which the applicable US frequency band for radar detectors is listed as well as the European frequency band 13.4 GHz to 13.5 GHz. Would this band interfere in the US? Should manufacturers disable this band in radar detectors marketed in the US?

ANSWER: Yes, the FCC would allow listing the bands without any qualifying statement on the grant of certification. The 13.4 GHz - 13.5 GHz band is shared with the Federal Government and is available for non- Federal government radiolocation use (such as police radar) on a secondary basis to Federal Government's own radiolocation uses. See Section 90.103(b) and (c)(12) of the FCC's rules. The 13.4 GHz – 13.5 GHz band is not used for police radar in the U.S. The FCC does not oppose manufacturers including this frequency band so the radar detectors can work in other countries. The inclusion of this band should not raise any interference concerns either as the interference potential of a radar detector depends on the level and frequency of the local oscillator radiation rather than the frequency it is intended to receive. The only interference concerns the FCC has investigated is that of radar detectors to VSAT downlinks in the 11.7 GHz and 12.2 GHz band. This is the reason for the emission limits and certification requirement that was adopted by the FCC. The FCC does not recommend including a statement on a radar detector grant that the 13.4 GHz - 13.5 GHz band is for European use. It is permissible to include this band in U.S. and there is no need to disable it.

INTERNATIONAL UPDATE

EU: NEW CENELEC STANDARDS RELEASED THIS MONTH

This is a shortened list of the CENELEC standards published during the past month:

- **EN 60825-2:2004/A1:2007** (2/16/2007) Safety of laser products -- Part 2: Safety of optical fibre communication systems (OFCS)
- **EN 60086-1:2007** (2/14/2007) Primary batteries -- Part 1: General
- **EN 60934:2001/A1:2007** (2/13/2007) Circuit- breakers for equipment (CBE)
- **EN 60938-1:1999/A1:2007** (2/9/2007) Fixed inductors for electromagnetic interference suppression -- Part 1: Generic specification
- **EN 60938-2:1999/A1:2007** (2/9/2007) Fixed inductors for electromagnetic interference suppression -- Part 2: Sectional specification
- **EN 60730-1:2000/A15:2007** (1/30/2007) Automatic electrical controls for household and similar use -- Part 1: General requirements
- **EN 60745-2-1:2003/A11:2007** (1/30/2007) Hand- held motor- operated electric tools - Safety -- Part 2-1: Particular requirements for drills and impact drills
- **EN 61643-11:2002/A11:2007** (1/30/2007) Low-voltage surge protective devices -- Part 11: Surge protective devices connected to low-voltage power systems - Requirements and tests

See www.cenelec. org for additional information.

EU: NEW IEC STANDARDS RECENTLY RELEASED

This is a shortened list of the new IEC standards published during the past month:

- **CISPR 15** (1/17/07) Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- **CISPR 16-4-3** (1/18/07) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-3: Uncertainties, statistics and limit modelling - Statistical considerations in the determination of EMC compliance of mass- produced products
- **CISPR 16-SER** (1/18/07) Specification for radio disturbance and immunity measuring apparatus and methods - ALL PARTS
- **IEC 60747-16-1-am1** (1/26/07) Amendment 1 - Semiconductor devices - Part 16-1: Microwave integrated circuits - Amplifiers
- **IEC 61557-2** (1/29/07) Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 2: Insulation resistance
- **IEC 61000-4-20** (1/31/07) Electromagnetic compatibility (EMC) - Part 4-20: Testing and measurement techniques - Emission and immunity testing in transverse electromagnetic (TEM) waveguides
- **IEC 60669-1** (1/31/07) Switches for household and similar fixed-electrical installations - Part 1: General requirements
- **IEC 61347-1** (1/31/07) Lamp controlgear - Part 1: General and safety requirements
- **IEC 62228** (2/16/07) Integrated circuits - EMC evaluation of CAN transceivers
- **IEC 61310-2** (2/16/07) Safety of machinery - Indication, marking and actuation - Part 2: Requirements for marking

See IEC for additional information.

EU: NEW ETSI STANDARDS RELEASED THIS MONTH

This is a shortened list of the new ETSI standards published during the past month:

- ETSI EN 301 178-1 V1.3.1 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Portable Very High Frequency (VHF) radiotelephone equipment for the maritime mobile service operating in the VHF bands (for non-GMDSS applications only); Part 1: Technical characteristics and methods of measurement
- ETSI EN 301 178-2 V1.2.2 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Portable Very High Frequency (VHF) radiotelephone equipment for the maritime mobile service operating in the VHF bands (for non-GMDSS applications only); Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
- ETSI EN 302 500-1 V1.1.1 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra WideBand (UWB) technology; Location Tracking equipment operating in the frequency range from 6 GHz to 8.5 GHz; Part 1: Technical characteristics and test methods
- ETSI EN 302 500-2 V1.1.1 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra WideBand (UWB) technology; Location Tracking equipment operating in the frequency range from 6 GHz to 8.5 GHz; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
- ETSI TR 102 555 V1.1.1 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics of multiple gigabit wireless systems in the 60 GHz range System Reference Document
- ETSI TR 102 546 V1.1.1 (February 2007) Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics for Professional Wireless Microphone Systems (PWMS); System Reference Document

See ETSI for additional information.

EU: RFID HARMONIZATION

Several parts of the EU ERC Recommendation 70-03 (relating to the use of short range devices) were recently adopted by the Frequency Management, Regulatory Affairs and Spectrum Engineering Working Groups in February 2007. ERC Recommendation 70-03 is an informative document providing technical parameters and the frequency implementation status of EU countries for SRDs. Specifically, Annex 2 Annex 12, and Appendix 3 of ERC Recommendation 70-03 were modified in February 2007.
Link to ERC Recommendation 70-03

EU: 2 AND 5 GHz RADIO SPECTRUM CHANGES

5 GHz: On February 12, 2007, the EU Commission adopted the decision to restrict the frequency band of 5.15 - 5.35 GHz to indoor use with a maximum mean e.i.r.p. of 200 mW. Additionally, this band's maximum e.i.r.p. density is limited to 10 mW/MHz in any 1 MHz band. Link

2 GHz: On February 14, 2007, the EU Commission adopted the decision to further harmonize the frequency band of 1.98 GHz to 2.01 GHz and 2.17 GHz to 2.2 GHz. As of July 1, 2007, these frequency bands will be available for systems providing mobile satellite services. Link

USA: FCC RELEASES 2006 BIENNIAL REVIEW On February 14, 2007, the FCC's Office of Engineering and Technology released the 2006 Biennial Regulatory Review, ET Docket No. 06-155. As part of the biennial review, the OET staff examined existing rules and sought recommendations from the public regarding which rules and procedures should be modified or eliminated. The OET assists the FCC to facilitate innovative services and eliminate rules that are no longer in the public interest. Link

CANADA: STANDARDS AMENDED (ICES-002 and ICES-005) On February 10, 2007, Industry Canada released newly amended ICES-002 and ICES-005.

ICES-002 sets out standards for radio noise emissions from spark ignition systems of vehicles and other devices equipped with internal combustion engines. Newly released Issue 4 of ICES-002 harmonizes Industry Canada requirements for spark ignition systems and internal combustion engines with those of U.S. auto manufacturers, by referencing the Canadian Standards Association (CSA) adaptation of the international standard CISPR 12.

ICES-005 sets out standards for radio noise emissions from Radio Frequency Lighting Devices (RFLDs). Newly released Issue 2 of ICES-005 harmonizes Industry Canada requirements for RFLDs with those of the Federal Communications Commission (FCC) Part 18 for conducted emissions limits.

JAPAN: MRA WITH THE U.S. The U.S. and Japan recently signed an agreement that will help U.S. telecommunications and radio equipment manufacturers market and sell their products more easily in Japan. The mutual recognition agreement (MRA) requires Japan to accept U.S. product testing and certification results that show U.S. equipment meets Japan's technical requirements. This is the sixth telecommunications MRA covering certification that the United States has concluded, following those with European Union and EEA-EFTA (Iceland, Liechtenstein, and Norway), and with Canada, Hong Kong and Singapore.

ABOUT US

RTL has provided EMC compliance engineering & testing services since 1988 and has a superior reputation with both the Federal Communications Commission and others in the industry. RTL provides testing services to meet the emissions, immunity, and safety requirements of the European EMC Directive and the EU R&TTE Directive, all FCC rules and regulations, VCCI (Japan), ACMA (Australia), and other international standards.

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