

**Federal Communications Commission
Office of Engineering and Technology
Laboratory Division**

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**MISCELLANEOUS AND BASIC REVIEW AND APPROVAL ITEMS FOR
TRANSMITTING EQUIPMENT USED IN LICENSED RADIO SERVICES**

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I. INTRODUCTION

Supplemental to KDB Publication 971168 D01, using a question and answer format KDB Publication 971168 D02 describes other details about out-of-band emissions measurements and miscellaneous other EMC and radio parameter review and approval guidance on digital transmitters for some example radio service bands.

II. UPPER 700 MHZ PART 27 BLOCK C EMISSION MEASUREMENTS

Question 1. For operations in the 746–758 MHz and 776–788 MHz bands, Section 27.53(c)(3) states that the power of any emission on all frequencies between 763–775 MHz and 793–805 MHz shall be attenuated below the transmitter power by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz segment (for base and fixed stations). Does this mean that all emissions shall be measured in 6.25 kHz segment and compared to the total transmitted power in a licensee's frequency band?

Therefore if a licensee occupies a 5 MHz band and transmits a wide-band signal with equal power across the band, then relative to a 6.25 kHz segment in-band (on a per Hz basis), the emissions must be attenuated by $76 + 10 \log(P) - 10 \log(5 \text{ MHz}/6.25\text{kHz}) = 47 + 10 \log(P)$ dB.

Answer 1. Yes, the term P as used in the attenuation formula $76 + 10 \log(P)$ is the total power of the transmitter. The net effect of the above cited formula is that the levels (in dB) of the undesired emissions relative to the level of the desired emissions are less than the dB figure given in the above cited formula.

On a spectrum analyzer, the levels of the desired emissions for a modulated signal with uniform spectral distribution appear in proportion to the ratio of the occupied bandwidth of the modulated spectrum to the spectrum analyzer resolution bandwidth (RBW) used. Several factors will affect the reading—including the measurement RBW used, the actual shape of the modulated signal, and the modulation method used.

The actual specification remains as written: $76 + 10 \log(P)$ for emissions in a 6.25 kHz band segment.

Question 2. Section 27.53(c)(5) states that measurement instrumentation for measuring emissions outside the licensee's band should employ resolution bandwidth of 100 kHz or greater, except 30 kHz should be employed within the nearest 100 kHz.

Suppose that emissions are being measured in 100 kHz or 30 kHz segments and are being compared to the total power inside the licensee's band. Is it correct that for the above example of a 5 MHz wide signal on a per Hz basis the required attenuation is:

$$43 + 10 \log(P) - 10 \log(5 \text{ MHz}/100 \text{ kHz}) = 26 + 10 \log(P) \text{ dB?}$$

Answer 2. The response in Question 1 also applies to Question 2.

Compliance with the emissions limit at the frequency block edges are a function of the placement of the desired emission with respect to the frequency block edge.

The FCC Grant of Certification lists the highest and lowest operating (center) frequency that will enable compliance with the emissions limit at the frequency block edges.

All readings of emissions are to be adjusted by the ratio of the specified measurement band (bandwidth) or segment to the actual RBW used.¹

III. EXAMPLE PART 101 DEVICE EMISSION MEASUREMENTS

Question: Please provide advice regarding emission mask measurements according to Part 101 of the FCC rules? We are about to make a measurement of the emission mask per Section 101.111 paragraphs (a)(2)(ii) and (a)(2)(iii) of the FCC rules.

Can a resolution bandwidth narrower than 1 MHz be used, or use of video filtering at frequencies in close vicinity to the carrier (removed from the assigned frequency more than 50 % up to and including 250 % of the authorized bandwidth) especially taking into account those frequencies removed more than 250 % of the authorized bandwidth from the assigned frequency shall be investigated with a 4 kHz resolution bandwidth?

Answer: In Section 101.111(a)(2)(ii) of the FCC Rules the required attenuation is specified in a 1 MHz (reference) bandwidth.

¹ In general, scaling of RBW is appropriate only when the signal is noise-like and is relatively flat across the spectrum under measurement. Bandwidth scaling generally is not valid for a CW-like signal, or even for a noise-like signal with a lot of ripple in the pass band.

Normally the measurement bandwidth (spectrum analyzer resolution bandwidth (RBW) setting) also would be 1 MHz. If a lesser value RBW is used, then the measured attenuation should be decreased by the same dB ratio. Use the formula 10 times the log of the specified bandwidth divided by the measurement bandwidth to determine the correction factor.

For example, if a 100 kHz RBW were used for measurements, in this region, the measured attenuation would be decreased by 10 times the log of (1 MHz / 100 kHz) or 10 times the log of 10 or 10 dB. The video bandwidth (VBW) setting on the analyzer should not be less than the RBW setting. However, use of video averaging is allowed because the mean power of emissions is specified in paragraph (a) of Section 101.111.

IV. PART 27 BRS/EBS MOBILE DIGITAL STATION DEVICES

The following paragraphs provide additional details on out-of-band emissions measurements for equipment authorization (part 2 subpart J) of digital transmitters to be operated as mobile station equipment (including hand-held and portable devices) under part 27 subparts C (Technical Standards) and M (Broadband Radio Service and Educational Broadband Service).

Question 1. Sections 27.5(i) , 27.53(m), and part 27 subpart M service rules use various terms for defining spectrum available and the emissions limits for BRS/EBS station equipment, including “licensee’s frequency bands of operation,” “out-of-band,” “edges of the contiguous channels,” “channel edge of its frequency block,” “adjacent channel,” “band edge.” Please explain how to apply “channel edge” as used in Section 27.53(m)(4) for demonstrating compliance to emissions limits in equipment authorization applications.

Answer 1. Pertaining to BRS/EBS spectrum and operations, whereas Sections 27.5(i) and 27.53(m) for example use terms including “channel” and “channel edge,” for equipment authorization purposes the BRS/EBS channels are basically analogous to frequency blocks, for example like part 24 Broadband PCS (Sections 24.229, 24.238). Note also that except for one sentence about television operations, for a number of years the out-of-band emission (OOBE) measurement procedures in Section 27.53(m)(6) were identical to those in Section 24.238(b). Besides Section 27.53(m)(4), the provisions of the first paragraph of Section 27.53(m) (licensee’s frequency bands of operation comprising multiple contiguous channels) and Section 27.1220 [subchannelize licensee’s authorized bandwidth; exceed standard bandwidth, fka “superchannelize” (e.g., FCC-98-231)²] are also relevant for equipment authorization of BRS/EBS mobile digital station equipment.

Question 2. Please explain how emission limits of Section 27.53(m)(4) would apply for devices with channel emission bandwidths that do not fit exactly within and/or cross over the channel edges defined by Section 27.5(i).

² FCC-98-231; Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions; MM Docket No. 97-217, RM-9060; REPORT AND ORDER; Adopted: September 17, 1998; Released: September 25, 1998.

Answer 2. The emission limits for mobile digital station equipment, contained in paragraph (¶) (m)(4) of Section 27.53, were recently updated by rulemaking Order FCC-14-76.³

For convenience, the following gives a condensed summary of the Section 27.53(m)(4) emission limits, along with relevant provisions from Section 27.1220.

- a) A licensee may subchannelize its authorized bandwidth, when using digital modulation, and aggregate power not exceeding the authorized power for the channel. [Section 27.1220]
- b) Licensees may coordinate for transmitting utilizing bandwidth in excess of one's authorized bandwidth, when using digital modulation, and all power spectral density requirements of part 27 are met, and the out-of-band emissions restrictions of Section 27.53 are met at the edges of the channels used. [Section 27.1220]
- c) If a licensee has multiple contiguous channels (i.e., licensee's frequency bands of operation), OOBE shall be measured from the upper and lower edges of the contiguous channels. [Section 27.53(m) ¶ 1]
- d) The power of any emissions outside the licensee's frequency bands of operation (i.e., OOBE) shall be attenuated below the transmitter power (P) in watts per the following provisions. [Section 27.53(m) ¶ 1]
- e) For mobile digital station devices, the attenuation factor shall be not less than:
 - $40 + 10 \log P$ dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge,
 - $43 + 10 \log P$ dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and
 - $55 + 10 \log P$ dB (-25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB). [Section 27.53(m)(4)]
- f) In addition, the attenuation factor (fixed limit) shall not be less than:
 - $43 + 10 \log P$ dB on all frequencies between 2490.5 MHz and 2496 MHz, and
 - $55 + 10 \log P$ dB at or below 2490.5 MHz. [Section 27.53(m)(4)]

Question 3. Please explain how frequencies should be listed on grants based on emissions test data submitted in applications for mobile devices such as those operating in 3GPP LTE band 41 and band 7.

Answer 3. For each emission bandwidth supported by a mobile/portable device, listings on Form-731 applications and Form-731A grants may use either:

³ FCC 14-76; Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands; WT Docket No. 03-66, RM-11614; FIFTH REPORT AND ORDER; Adopted: June 6, 2014; Released: June 9, 2014; 79 FR 41448-41454, July 16, 2014.

- a) center frequencies of the lowest and highest channels tested, or
- b) lower and upper allocation-band frequencies.

With the latter provision (i.e., listing full allocation band), when measuring for demonstrating compliance with the emission limits the nominal center frequency (and corresponding emission bandwidth) shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the equipment design permits.

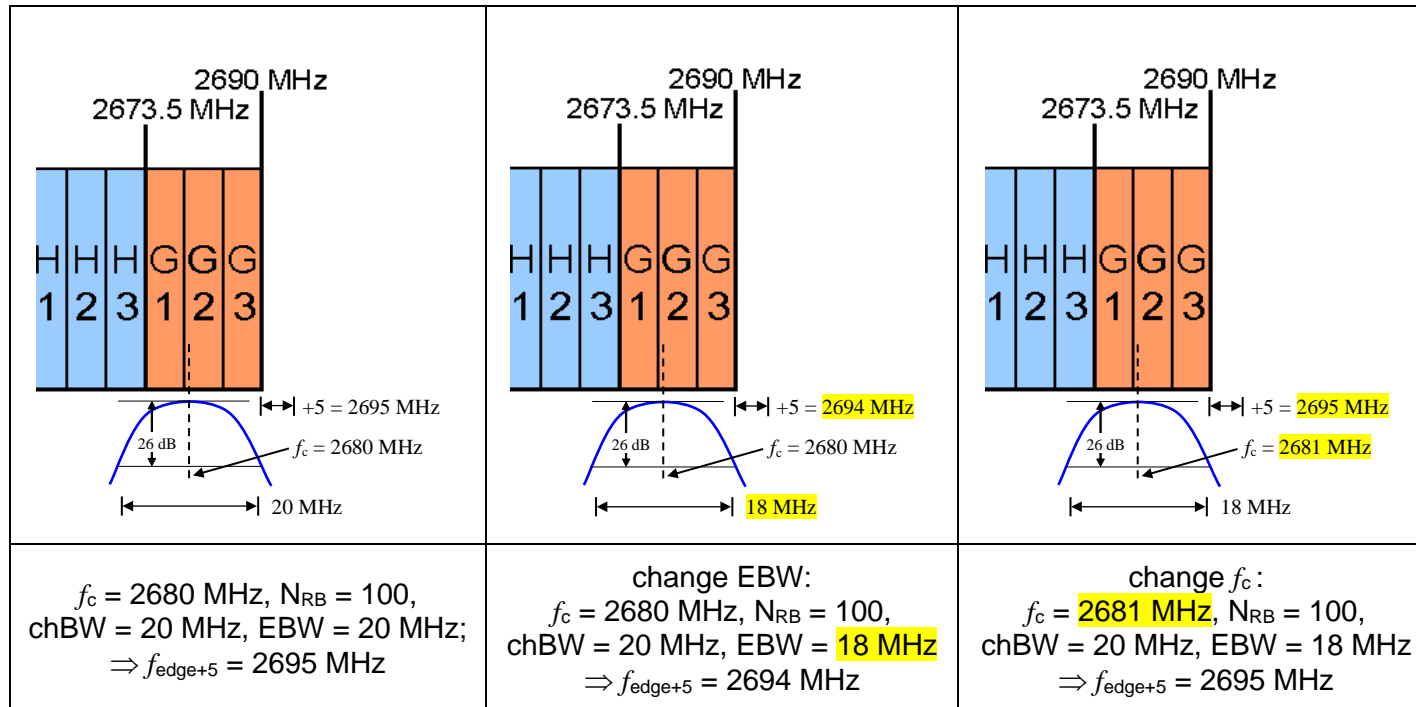
For 3GPP LTE devices, emissions compliance data should be provided at minimum with all resource blocks (RB) active for each channel bandwidth.

Table 1 provides examples of several channel placements, frequency offsets, attenuations per Section 27.53(m)(4), and associated parameters, to serve as guidance for testing and grant frequency listing of BRS/EBS mobile station devices. A further illustrative example is shown in Figure 1, for hypothetical device various bandwidths and center frequencies.

TABLE 1—Example channel placements, frequency offsets, attenuations per Section 27.53(m)(4), and associated parameters

#	Center freq. MHz	ch span	BRS/EBS ch	ch BW MHz	EBW MHz	X MHz	Above or Below EBW	40+10logP ± 5 MHz	43+10logP ± (5 to X) MHz	fixed 43+10logP 2490.5-2496 MHz	55+10logP ± X MHz	fixed 55+10logP f < 2490.5 MHz
1	2680	2670-2690	BRS H3 2668-2673.5 EBS G1 2673.5-2679 EBS G2 2679-2684.5 EBS G3 2684.5-2690	20	20	20	A	2690-2695	2695-2710	na	f > 2710	na
2	2680	2671-2689	do	20	18	18	A	2689-2694	2694-2707	na	f > 2707	na
3	2681	2672-2690	do	20	18	18	A	2690-2695	2695-2708	na	f > 2708	na
4	2560	2550-2570 (LBS)	EBS C3 2546-2551.5 EBS D1 2551.5-2557 EBS D2 2557-2562.5 EBS D3 2562.5-2568 EBS J 2568-2572	20	20	20	A	2570-2575 (LBS, MBS)	2575-2590 (MBS)	na	f > 2590	na
5	2510	2500-2520	BRS 1 2496-2502 EBS A1 2502-2507.5 EBS A2 2507.5-2513 EBS A3 2513-2518.5 EBS B1 2518.5-2524	20	20	20	B	2496-2500	na	2490.5-2496	na	f < 2490.5
6	2510	2501-2519	do	20	18	18	B	2496-2501	na	2490.5-2496	na	f < 2490.5
7	2509	2500-2518	do	20	18	18	B	2496-2500	na	2490.5-2496	na	f < 2490.5
8	2502.5	2500-2505	BRS 1 2496-2502 EBS A1 2502-2507.5	5	5	6	B	2496-2500	na	2494-2496	f < 2494	na
9	2502.5	2500.5-2504.5	do	5	4	6	B	2496-2500.5	na	2494.5-2496	f < 2494.5	na
10	2502	2500-2504	do	5	4	6	B	2496-2500	na	2494-2496	f < 2494	na
11	2498.5	2496-2501	BRS 1 2496-2502	5	5	6	B	na	na	2490.5-2496	na	f < 2490.5
12	2498.5	2496.5-2500.5	BRS 1 2496-2502	5	4	6	B	na	na	2490.5-2496	na	f < 2490.5

KEY: ch = channel; BW = bandwidth; EBW = emission bandwidth [Section 27.53(m)(6)]; do = ditto; na = not applicable; f = frequencies; BRS/EBS ch are names per Section 27.5(i).



NOT TO SCALE

Figure 1—Example channel placements and frequency offsets for hypothetical 3GPP LTE band 41 device (yellow highlight text indicates parameters changed going from left to right)

V. PART 90 SUBPART Y EMISSION AND BANDWIDTH REQUIREMENTS

Question 1: Please provide advice regarding emission mask measurements according to Sections 90.210(l) and 90.210(m) for Part 90 Subpart Y Public Safety 4940-4990 MHz (4.9 GHz) Band devices.⁴

Answer 1: Concerning Sections 90.210(l) (*Emission Mask L*; $P \leq 20$ dBm) and 90.210(m) (*Emission Mask M*; $P > 20$ dBm), the rules indicate using a minimum RBW of 1 % of the fundamental emission to determine the zero dB reference level, and also to determine the mask skirts. The mask plot should be developed using the same RBW throughout, for the zero dB reference level and the mask skirts. Sections 90.210(l)(7) and (m)(7) mention average, therefore average power is used to measure the L and M masks. In other words, the fundamental emission highest average power spectral density (RBW = 1 % \times OBW, or larger) across the designated channel bandwidth is compared to the highest average power spectral density (with the same RBW) for the specified offsets from the channel center frequency. Whereas the conventional $43 + 10 \log P$ attenuation leads to -13 dBm absolute, $55 + 10 \log P$ gives -25 dBm absolute [Section 90.210(m)(6)].

For other background information, the provision for “total power contained in the channel bandwidth” mentioned in the first unnumbered paragraph of Section 90.210 was inserted by the Part 90 rewrite FCC-95-255 Report and Order. That provision was not considered in the rulemaking proceedings (docket no. 00-32) that created the Part 90 Subpart Y service rules, and therefore it is taken to be not applicable for *Emission Mask L* and *Emission Mask M* compliance testing purposes. As discussed in the FCC-04-265 Memorandum Opinion and Order (paragraphs 10-13),⁵ the parameters of the 4940-4990 MHz Band masks were derived from the ASTM E 2213-03 DSRC-A and DSRC-C masks. As mentioned in FCC-04-265 and ASTM E 2213-03, the DSRC-A mask is the same as the IEEE Std 802.11a-1999 transmit spectrum mask.⁶ The 802.11 mask is in terms of dBr, i.e., dB relative to the maximum spectral density of the signal.

For certification application review and approval purposes, a quick way to check that proper measurement procedures were used is to confirm that the highest level of the in-band portion of a spectrum plot aligns with the top of the spectrum mask, e.g., as shown with example “signal spectrum” curves in Figure 17-13 and Figure D-1 of IEEE Std 802.11-2016.

Question 2: What instrumentation detector type or function should be used for Section 90.1215(a)(2) peak power-spectral density?

Answer 2: Following a 2009 rulemaking release,⁷ the general guidance has been that the same measurement methods used for the peak power-spectral density requirements of Section 15.407 for U-NII devices may be used for Section 90.1215. For background, the U-NII device testing guidance KDB Pub 789033 D01 v01 originated circa 2011; prior to that, testing guidance for Section 15.407 was

⁴ For reference, other relevant rules for Public Safety 4940-4990 MHz Band devices and operations include: Sections 90.15, 90.20(c)(3), 90.20(d)(85), 90.205(p), 90.1201 through 90.1217.

⁵ FCC-04-265; The 4.9 GHz Band Transferred from Federal Government Use; MEMORANDUM OPINION AND ORDER; docket no. 00-32; Adopted: November 9, 2004; Released: November 12, 2004; 19 FCC Rcd 22329.

⁶ The transmit spectrum mask is described in 17.3.9.2 and shown in Figure 120 of IEEE Std 802.11a-1999; the modern equivalents are 17.3.9.3 and Figure 17-13 in IEEE Std 802.11-2016.

⁷ FCC-09-29; Amendment of Part 90 of the Commission's Rules; docket no. 07-100; REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING; Adopted: April 7, 2009, Released: April 9, 2009; 24 FCC Rcd 4298-4341.

given mainly by FCC DA-02-2138.⁸ Note that for 4940-4990 MHz devices, test data also remains needed for Section 90.1215(e) peak excursion (different from Section 15.407, which was recently modified per FCC 14-30⁹).

VI. PART 90 SUBPART R PUBLIC SAFETY 700 MHz BAND DEVICES

Question: What are application filing guidelines for devices operating in the 758-775 MHz and 788-805 MHz bands under Part 90 Subpart R?

Answer: The Public Safety 700 MHz Band under Part 90 Subpart R is divided into two different types of operations in two paired sub-bands each with separate requirements, as follows.

- a) 700 MHz Public Safety Broadband (PS BB): 758-768 MHz / 788-798 MHz; LTE.
- 1) Service rules and routine licensing are not available for PS NB operations within PS BB spectrum
 - i) PS BB spectrum has the single nationwide licensee FirstNet (<https://www.firstnet.gov/>). [Sections 90.19, 90.523(e), 90.532; 47 U.S.C. § 1401 et seq.]
 - ii) Consequently, FCC equipment authorization for PS NB operations within PS BB spectrum is not applicable, except as described in item 1) f).
 - 2) New grants in PS BB spectrum should support LTE operations (3GPP band 14) [consistent with, e.g., FirstNet Network “LTE, Core & RAN” ([https://www.firstnet.gov/content/applications-apps#Applications%20\(Apps\)\)](https://www.firstnet.gov/content/applications-apps#Applications%20(Apps)))].
 - 3) The 768-769 MHz / 798-799 MHz paired band is PS BB reserved guardband, i.e., not allocated or routinely licensable for any station operations (nor equipment authorizations). [Section 90.531(f)]
 - 4) Form-731 line entries for PS BB modes in 758-768 MHz / 788-798 MHz should include the PF grant note. [NOTE—Use PF note code only for FirstNet band line entries.]
 - 5) Minimum rules for compliance documentations in filings per Sections 2.911(c) and 2.1033(c) include: Sections 90.531(f), 90.531(g), 90.542, 90.543 first paragraph, 90.543(e), 90.543(f).
 - 6) Notwithstanding items 1) a) through 1) c), at present OET Laboratory Division has not precluded new grants in PS BB spectrum (e.g., 763-769 MHz / 793-799 MHz) for devices with only narrowband operating modes.
 - i) Such devices must also support narrowband operations in 769-775 MHz / 799-805 MHz (i.e., further to KDB Publication 634817 D01 contiguous-bands requirements).
 - ii) Form-731 line entries for PS NB modes in 763-769 MHz / 793-799 MHz (i.e., PS BB spectrum range) should address the applicable KDB Publication 634817 provisions [i.e., split frequency ranges, or EF grant note with associated letter exhibit identifying intended operating jurisdiction(s), etc.].
 - iii) Form-731 grant comments field should include: “This filing contains compliance information and test data for incumbent or duly-authorized public safety narrowband operations in Public Safety Broadband (FirstNet) spectrum.”
- b) 700 MHz Public Safety Narrowband (PS NB): 769-775 MHz / 799-805 MHz; ABW < 25 kHz

⁸ DA-02-2138; Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands; Public Notice; Released: August 30, 2002; 17 FCC Rcd 16521-16524.

⁹ FCC-14-30; Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band; docket no. 13-49; FIRST REPORT AND ORDER; Adopted: March 31, 2014, Released: April 1, 2014; 29 FCC Rcd 4127-4185; paragraph 124.

- 1) Service rules and routine licensing (with associated equipment authorizations) for PS NB [ABW < 25 kHz, e.g., Project (P25)] operations are available only in 769-775 MHz / 799-805 MHz.
 - i) Part 90 narrowband service rules and routine licensing with associated equipment authorizations are generally not available for the obsolete PS NB paired bands 764-776 MHz / 794-806 MHz.¹⁰
 - ii) Especially the paired sub-band 775-776 MHz / 805-806 MHz has been Part 27 since 2007, thus routine Part 90 test data submission or grant listing is not applicable.
- 2) Sections 90.203(j)(4) and 90.203(j)(5) narrowbanding requirements are not applicable for 700 MHz PS NB devices; rather bandwidth and spectrum efficiency requirements are per Sections 90.203(m) and 90.535.
- 3) Minimum rules for compliance documentations in filings per Sections 2.911(c) and 2.1033(c) include: Sections 90.203(m), 90.531(b), 90.531(d)(1), 90.535, 90.539(a)-(c) [“wideband” of 90.539(d)-(e) is obsolete], 90.541, 90.543 first paragraph, 90.543(a)-(d), 90.543(f), 2.1033(c)(20).
- 4) Section 2.1033(c)(20) revised per FCC-16-111 Order on Reconsideration (81 FR 66832; pending OMB approval) allows P25 CAP compliance¹¹ or the equivalent to be demonstrated after equipment certification but prior to marketing or sale of a device.

VII. POWER MEASUREMENTS FOR CMRS PARTS 22, 24, 27 DEVICES

Question: Please clarify the recommended methods for peak and average output power measurements of CMRS devices operating under Parts 22, 24, and 27.

Answer: Guidance is as follows for output power measurements on devices subject to Part 22 Cellular, Part 24 PCS, and Part 27 AWS-1 service rules.

- a) Output power parameters and measurement methods for CMRS devices operating under Part 24 (PCS) and 27 (AWS-1) were synchronized in 2008;¹² i.e., Sections 24.232 and 27.53(d). Per those rules, compliance testing for any station equipment types (e.g., base, fixed, repeater, mobile, portable) shall use:
 - 1) A peak power measurement method, across any continuous signal transmission interval, with instrumentation calibrated in terms of an rms-equivalent voltage, and results properly adjusted for any instrument limitations such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., such that a true peak emission result is obtained over the full channel bandwidth; or
 - 2) An FCC-approved average power measurement method, along with the measured peak-to-average ratio (PAR) for each emission.

¹⁰ For example KDB Publication 634817 D02 shows graphs for the now-obsolete 1998 and 2007 PS NB band plans, which in 2012 were changed to the present PS NB allocated bands that are available for equipment authorizations.

¹¹ DHS Science and Technology Directorate Project 25 Compliance Assessment Program, (<https://www.dhs.gov/science-and-technology/p25-cap>).

¹² FCC-08-85; Biennial Regulatory Review - Amendment of Parts 1, 22, 24, 27 and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services; docket no. 03-264; THIRD REPORT AND ORDER; Adopted: March 18, 2008; Released: March 21, 2008; 23 FCC Rcd 5219.

3) Compliance testing measurement methods for peak power, average power, and PAR are provided in KDB Publication 971168 D01.

b) Concerning CMRS devices operating under Part 22 Subpart H (Cellular), discussions in the FCC-17-27 Report and Order rulemaking document reflect that the same basic parameters and measurement methods as used for PCS and AWS operations are also applicable for Cellular operations.¹³ The FCC-17-27 Report and Order also instructs that the recommended methods for compliance testing power measurements are those provided in the FCC Laboratory’s Knowledge Database.¹⁴

Like in (a)(1), (a)(2)(ii), (a)(3), (a)(4)(ii), and (f)(2) of Section 22.913, the first paragraph of the power measurements Section 22.913(d) also mentions base transmitters and repeaters; however, the rules do not otherwise indicate power measurement methods for mobile transmitters. Therefore, further to the preceding FCC-17-27 discussions and consistent with the PCS and AWS-1 provisions described in VII) a), FCC Laboratory is requiring that an FCC-approved average power measurement method along with the measured peak-to-average ratio (PAR) for each emission applies also for equipment authorization application submissions of mobile transmitters subject to the ERP limit of Section 22.913(a)(5).

Compliance testing measurement methods for peak power, average power, and PAR applicable for any Part 22 Subpart H station equipment types (e.g., base, fixed, repeater, mobile, portable) are provided in KDB Publication 971168 D01.

VIII. EXAMPLE CROSS-RULE OPERATIONS—3GPP BAND 26 FOR PART 90 AND PART 22

a) 3GPP LTE standards define E-UTRA Band 5 as 824-849 MHz uplink paired with 869-894 MHz downlink. In terms of FCC allocations and service rules, this LTE band 5 corresponds directly to the Cellular Radiotelephone Service (Part 22 Subpart H) bands defined in 22.905. Part 2 Subpart J equipment authorizations are handled accordingly using Part 22 Subpart H service rules.

Rule Section	UL, MHz	DL, MHz	band span, MHz
22.905(a)	824-835	869-880	2 × 11
22.905(b)	835-845	880-890	2 × 10
22.905(a)	845-846.5	890-891.5	2 × 1.5
22.905(b)	846.5-849	891.5-894	2 × 1.5
22.905 overall	824-849	869-894	2 × 25

b) In recent years devices supporting 3GPP E-UTRA Band 26 have become common, which is 814-849 MHz uplink paired with 859-894 MHz downlink. In terms of FCC radio services, LTE band 26 represents an aggregation of the contiguous Enhanced Specialized Mobile Radio (ESMR) bands [i.e., Sections 90.614(b) and 90.614(c), under Part 90 Subpart S] combined with the Part 22 Subpart H bands.

¹³ FCC-17-27; Amendment of Parts 1 and 22 of the Commission’s Rules with Regard to the Cellular Service, Including Changes in Licensing of Unserved Area; docket no. 12-40; SECOND REPORT AND ORDER (CELLULAR REFORM); Adopted: March 23, 2017; Released: March 24, 2017; 32 FCC Rcd 2518-2605; see paragraphs 94, 96, 99, etc.

¹⁴ FCC-17-27, paragraphs 96, 133.

Rule Section	UL, MHz	DL, MHz	band span, MHz	Section 90.613 channel nos.
90.614(b)	817-824	862-869	2 × 7	551-830
90.614(c)	813.5-824	858.5-869	2 × 10.5	411-830
90.614 + 22.905 overall	814-849	859-894	2 × 35	

- c) For EMC and radio parameter purposes in equipment authorizations, Part 90 Subpart S and Part 22 Subpart H individually differ mainly by the output power limit quantity (Section 90.635(b) conducted, Section 22.913(a) ERP) and the unwanted emissions limits (Sections 90.691, 22.917).

For Section 90.691(a) compliance testing, use RBW = 300 Hz for offsets less than 37.5 kHz from a channel edge; RBW = 100 kHz for offsets greater than 37.5 kHz is allowed.

- d) Along with the basic KDB Publication 634817 test frequency provisions and test data for the outer edges of a device overall transmit band, applications should contain EMC/radio test data for:
- 1) Upper band edge for emissions with bandwidths contained in the Part 90 Subpart S band (adjacent to Part 22 Subpart H lower band edge).
 - 2) Lower band edge for emission with bandwidths contained in the Part 22 Subpart H band (adjacent to Part 90 Subpart S upper band edge).
 - 3) Emissions with bandwidths centered at the allocation boundary, i.e., spanning both rule parts (unless it is demonstrated in an application that the device does not support cross-rule channels).
 - 4) For cross-rule channels, list maximum ERP with a “22H, 90S” multi-rule line entry, and list Section §90.635(b) conducted power in the grant comments field.

CHANGE NOTICE

9/30/2014: 971168 D02 Misc OOBE License Digital Systems v01 is the initial publication version.

- The contents of previous KDB Publication 149672 are incorporated and updated to be section II of new 971168 D02 Misc OOBE License Digital Systems v01; the previous 149672 is withdrawn.
- The contents of previous KDB Publication 245669 are incorporated and updated to be section III of new 971168 D02 Misc OOBE License Digital Systems v01; the previous 245669 is withdrawn.
- Section IV added; based on inquiries, internal FCC discussions, as well as concepts from Oct. 2003 FCC-TCB conference licensed devices notes.

10/27/2017: 971168 D02 Misc OOBE License Digital Systems v01 is replaced by 971168 D02 Misc Rev Approv License Devices v02.

- Filename and corresponding reference in document footer changed.
- Page-view document title changed from “EXAMPLE EMISSION MEASUREMENTS GUIDANCE FOR SPECIFIC SERVICE RULES” to “MISCELLANEOUS AND BASIC REVIEW AND APPROVAL ITEMS FOR TRANSMITTING EQUIPMENT USED IN LICENSED RADIO SERVICES.”
- Clause III) is revised to apply bandwidth scaling to measured results rather than limits (limits are fixed). The obsolete last paragraph of Clause III) is omitted.
- Values in Table 1 of Clause IV) is corrected at rows 1-4 and columns 10 and 12 to apply (5 to X) rather than (5 + X).
- Clause V) is added to reiterate policies on emission measurements, maximum bandwidth, and detector function for 4940-4990 MHz band devices.
- Clause VI) is added to reiterate policies on application filings for Public Safety 700 MHz devices.

- Clause VII) is added to clarify power measurement methods for Part 22 Subpart H devices further to the FCC-17-27 Report and Order.
- Clause VIII) is added to reiterate policies on EMC/radio-parameter testing where emission signals span across two rule parts, e.g., LTE band 26.

11/03/2017: 971168 D02 Misc OOB License Digital Systems v02 is replaced by 971168 D02 Misc Rev Approv License Devices v02r01.

- Page numbering corrected.

04/24/2023: 971168 D02 Misc Rev Approv License Devices v02r01 is replaced by 971168 Misc Rev Approv License Devices v02r02.

- Question and Answer #2 in Clause V. removed to reflect that channel-aggregated transmitter bandwidth limitations were removed from Part 90Y by FCC Report and Order 23-3.