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Testing of

# Electromagnetic Emissions

per

**USA: CFR Title 47, Part 15.231(a,e)**
**Canada: IC RSS-210/GENe**

are herein reported for

# Schrader Electronics
# AG5SD-F, AG5SD-D

Test Report No.: 20150918-RPTSCHR10001Ar0


Applicant/Provider:
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Measured by: Dr. Joseph Brunett, EMC-002790-NE
Report Approved by: Dr. Joseph Brunett, EMC-002790-NE
Report by: Dr. Joseph Brunett, EMC-002790-NE
Report Date of Issue: September 18, 2015

**Results of testing completed on (or before) September 14, 2015 are as follows.**

**Emissions:** The transmitter intentional emissions **COMPLY** with the regulatory limit(s) by no less than 9.3 dB. Transmit chain spurious harmonic emissions **COMPLY** by no less than 5.9 dB.

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# 1 Test Specifications, General Procedures, and Location

## 1.1 Test Specification and General Procedures

The ultimate goal of Schrader Electronics is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Schrader Electronics AG5SD-F, AG5SD-D for compliance to:

| **Country/Region** | **Rules or Directive** | **Referenced Section(s)** |
|---|---|---|
| United States | Code of Federal Regulations | CFR Title 47, Part 15.231(a,e) |
| Canada | Industry Canada | IC RSS-210/GENe |

Schrader Electronics has determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

| | |
|---|---|
| ANSI C63.4:2009 (USA) | "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" |
| ANSI C63.4:2014 (CAN) | "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" |
| Industry Canada | "The Measurement of Occupied Bandwidth" |

### 1.2 Test Location and Equipment Used

**Test Location** The EUT was fully tested by **Willow Run Test Labs, LLC**, 8501 Beck Road, Building 2227, Belleville, Michigan 48111 USA. The Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: 688478) and with Industry Canada, Ottawa, ON (File Ref. No: IC 8719A-1).

**Test Equipment** Pertinent test equipment used for measurements at this facility is listed in Table 1. The quality system employed at Willow Run Test Labs, LLC has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 1: Willow Run Test Labs, LLC Equipment List

| Description | Manufacturer/Model | SN | Quality Num. | Last Cal By / Date Due |
|---|---|---|---|---|
| Spectrum Analyzer | Rhode-Schwarz / FSV30 | 101660 | RSFSV30001 | RS / Apr-2016 |
| Dipole Set (20-1000 MHz) | EMCO / 3121C | 9504-1121 | DIPEMC001 | Liberty Labs / Sep-2016 |
| Ridge-Horn Antenna | Univ. of Michigan / VVL | 5 | UMHORN005 | UM / Aug-2015 |

# 2 Configuration and Identification of the Equipment Under Test

## 2.1 Description and Declarations

The equipment under test is a wireless tire pressure and temperature sensor. The EUT is approximately 2.5 x 2 x 1 cm in dimension, and is depicted in Figure 1. It is powered by a 3 VDC Lithium cell battery. In use, this device is permanently affixed inside the tire of a motor vehicle. Table 2 outlines provider declared EUT specifications.

Figure 1: Photos of EUT.

Table 2: EUT Declarations.

| **General Declarations** | | | |
|---|---|---|---|
| **Equipment Type:** | TPMS | **Country of Origin:** | UK |
| **Nominal Supply:** | 3 VDC | **Oper. Temp Range:** | Not Declared |
| **Frequency Range:** | $314.6 - 315.4, 433.92$ MHz | **Antenna Dimension:** | 10 mm |
| **Antenna Type:** | pcb trace | **Antenna Gain:** | -27 dBi (approx) |
| **Number of Channels:** | 1 | **Channel Spacing:** | Not Applicable |
| **Alignment Range:** | Not Declared | **Type of Modulation:** | ASK, FSK |
| **United States** | | | |
| **FCC ID Number:** | MRXAG5SD | **Classification:** | DSC |
| **Canada** | | | |
| **IC Number:** | 2546A-AG5SD | **Classification:** | Remote Control Device, Vehicular Device |

### 2.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

### 2.1.2 Modes of Operation

This device is capable of three key modes of operation. Upon manually activated LF interrogation (through the use of special LF tool at a vehicle dealership), the EUT responds with a single transmission containing a number

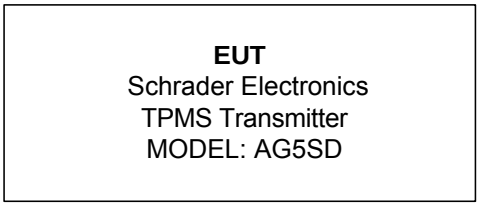


Figure 2: EUT Test Configuration Diagram.

of frames used to configure the device with the vehicle. When the EUT is placed in the vehicle tire and the vehicle drives, it can, in the worst case, periodically transmit where the duration of each transmission is always less than 1 second and the silent period between transmissions is at least 30 times the duration of the transmission, and never less than 10 seconds. In the case of an emergency condition, the EUT will transmit tire pressure and temperature information throughout the duration of the condition. This EUT can be programmed via LF tools to emulate a wide range of tire pressure sensors at a single tool specific frequency.

### 2.1.3 Variants

There are two electrically identical variants of the EUT. Model AG5SD-F (Faraday) employs a smaller plastic chassis. Model AG5SD-D (Delta) employs a slightly larger chassis with a metal ridge molded into it.

### 2.1.4 Test Samples

Eight samples in total were provided; four samples capable of demonstrating worst-case normal operation around 315 MHz and 433.92 MHz, two samples for CW mode activation, and two samples open for testing and photographs. Samples were programmed/activated in worst case on time, worst case emission bandwidth, and CW mode using a supplied LF tool.

### 2.1.5 Functional Exerciser

Normal operating EUT functionality was verified by observation of transmitted signal.

### 2.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory.

### 2.1.7 Production Intent

The EUT appears to be a production ready sample.

### 2.1.8 Declared Exemptions and Additional Product Notes

The EUT is permanently installed in a transportation vehicle. As such, digital emissions are exempt from US and Canadian digital emissions regulations (per FCC 15.103(a) and IC correspondence on ICES-003).

The EUT also employs some modes of operation that alert the vehicle user of sudden changes in tire pressure. Such alert modes fall under FCC 15.231(a)(4), and may operate during the pendency of the alarm condition. A detailed list of all operating modes is included in the Description of Operation exhibit included in this application.

# 3 Emissions

## 3.1 General Test Procedures

### 3.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our shielded anechoic chamber. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.2 are employed. After indoor pre-scans, emission measurements are made on our outdoor 3-meter Open Area Test Site (OATS). If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3. All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded.

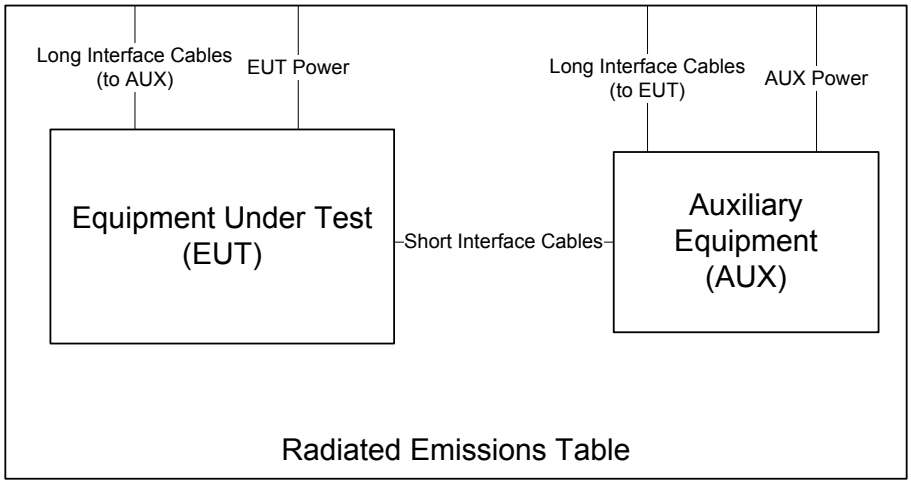


Figure 3: Radiated Emissions Diagram of the EUT.

If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied. For devices with intentional emissions below 30 MHz, a shielded loop antenna is used. It is placed at a 1 meter receive height. Emissions between 30 MHz and 1 GHz are measured using tuned dipoles and/or calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through $360^o$ in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain horn antennas or calibrated broadband ridge-horn antennas on our OATS with a 2.4m $x$ 2.4m square of AN-79 or H-4 absorber placed over the ground screen between the EUT and the test antenna. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to dB$\mu$V/m at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where $P_R$ is the power recorded on spectrum analyzer, in dBm, $K_A$ is the test antenna factor in dB/m, $K_G$ is the combined pre-amplifier gain and cable loss in dB, $K_E$ is duty correction factor (when applicable) in dB, and $C_F$ is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$EIRP(dBm) = E_{3m}(dB\mu V/m) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

Figure 4: Radiated Emissions Test Setup Photograph(s).

### 3.1.2 Conducted Emissions Test Setup and Procedures

**Battery Power Conducted Spurious** The EUT is not subject to measurement of power line conducted emissions as it is powered solely by its internal battery.

### 3.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case the EUT is designed for operation from a battery power source, the extreme test voltages are evaluated over the range specified in the test standard; no less than ±10% of the nominal battery voltage declared by the manufacturer. For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

### 3.1.4 Thermal Variation

Tests at extreme temperatures are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report. The provider has declared that the EUT is designed for operation over the temperature range Not Declared. Before any temperature measurements are made, the equipment is allowed to reach a thermal balance in the test chamber, temperature and humidity are recorded, and thermal balance is verified via a thermocouple based probe.

## 3.2 Intentional Emissions

### 3.2.1 Fundamental Emission Pulsed Operation

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 1.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Duty cycle is reported for all relevant modes of operation. The test equipment employed includes RSFSV30001, DIPEMC001.

**Measurement Results** The details and results of testing the EUT are summarized in Table 3. Plots showing the measurements made to obtain these values are provided in Figure 5.

Table 3: Fundamental Emission Pulsed Operation.

| Detector | Span | IF Bandwidth | Video Bandwidth |
|---|---|---|---|
| Pk | 0 | 1 MHz | 3 MHz |

| | |
|---|---|
| **Test Date:** | 16-Sep-15 |
| **Test Engineer:** | Joseph Brunett |
| **EUT:** | Schrader AG5SD |
| **EUT Mode:** | Modulated |
| **Meas. Distance:** | 10 cm |

FCC/IC

| | | Overall Transmission | | | Internal Frame Characteristics | | | Computed Duty Cycle | |
|---|---|---|---|---|---|---|---|---|---|
| # | EUT Test Mode* | Min. Repetition Rate (sec) | Max. No. of Frames | Total Transmission Length (sec) | Max. Frame Length (ms) | Min. Frame Period (ms) | Frame Encoding | (%) | (dB) |
| 1 | Worst-case 315 MHz Learn Mode. See Subfigure (a) | Single | 16 | 1.60 | 28.6 | 86.2 | When manually actuated by encoded LF, the EUT transmits 16 frames of ASK data. Each frame is 28.6 ms in duration with 86.2 ms period. It is Manchester encoded with 123us / 237 us duty. | 17.2 | -15.3 |
| 2 | Worst-case 433 MHz Learn Mode. See Subfigure (a) | Single | 16 | 1.69 | 28.4 | 86.0 | When manually actuated by encoded LF, the EUT transmits 16 frames of ASK data. Each frame is 28.4 ms in duration with 86.0 ms period. It is Manchester encoded with 130us / 230 us duty. | 18.7 | -14.6 |
| 3 | Worst-case 315 MHz Rolling/Periodic Mode. See Subfigure (b) | 10.20 | 3 | 0.22 | 29.3 | 89.3 | When periodically transmitting, the EUT transmits 3 FSK frames. Each frame is 29.3 ms in duration with 89.3 ms period. FSK REPRESENTS WORST-CASE DUTY. It may also transmit 10 ASK frames, each 38.9 ms in duration with 99.4 ms period. ASK frames are Manchester encoded with 140 us / 250 us duty. | 32.8 | -9.7 |
| 4 | Worst-case 433 MHz Rolling/Periodic Mode. See Subfigure (b) | 10.25 | 3 | 0.22 | 29.3 | 89.0 | When periodically transmitting, the EUT transmits 3 FSK frames. Each frame is 29.3 ms in duration with 89.0 ms period. FSK REPRESENTS WORST-CASE DUTY. It may also transmit 10 ASK frames, each 38.8 ms in duration with 99.0 ms period. ASK frames are Manchester encoded with 130 us / 240 us duty. | 32.9 | -9.7 |

Example Calculation: Worst Case FSK Duty (%) = (29.3 ms / 89 ms ) x 100 = 32.9 %
Equipment Used: DIPEMC001, RSFSV30001

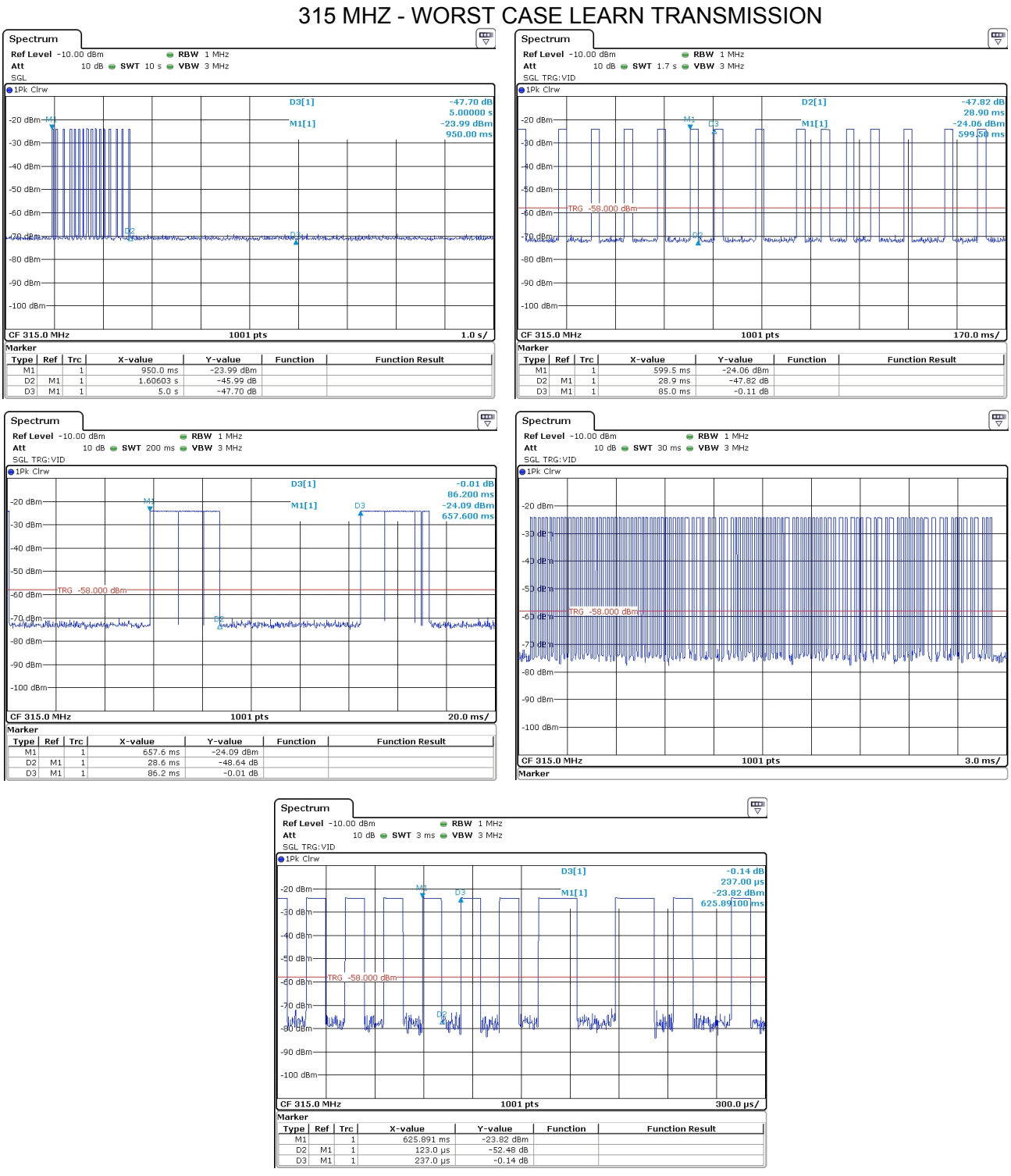


Figure 5(a): Fundamental Emission Pulsed Operation.

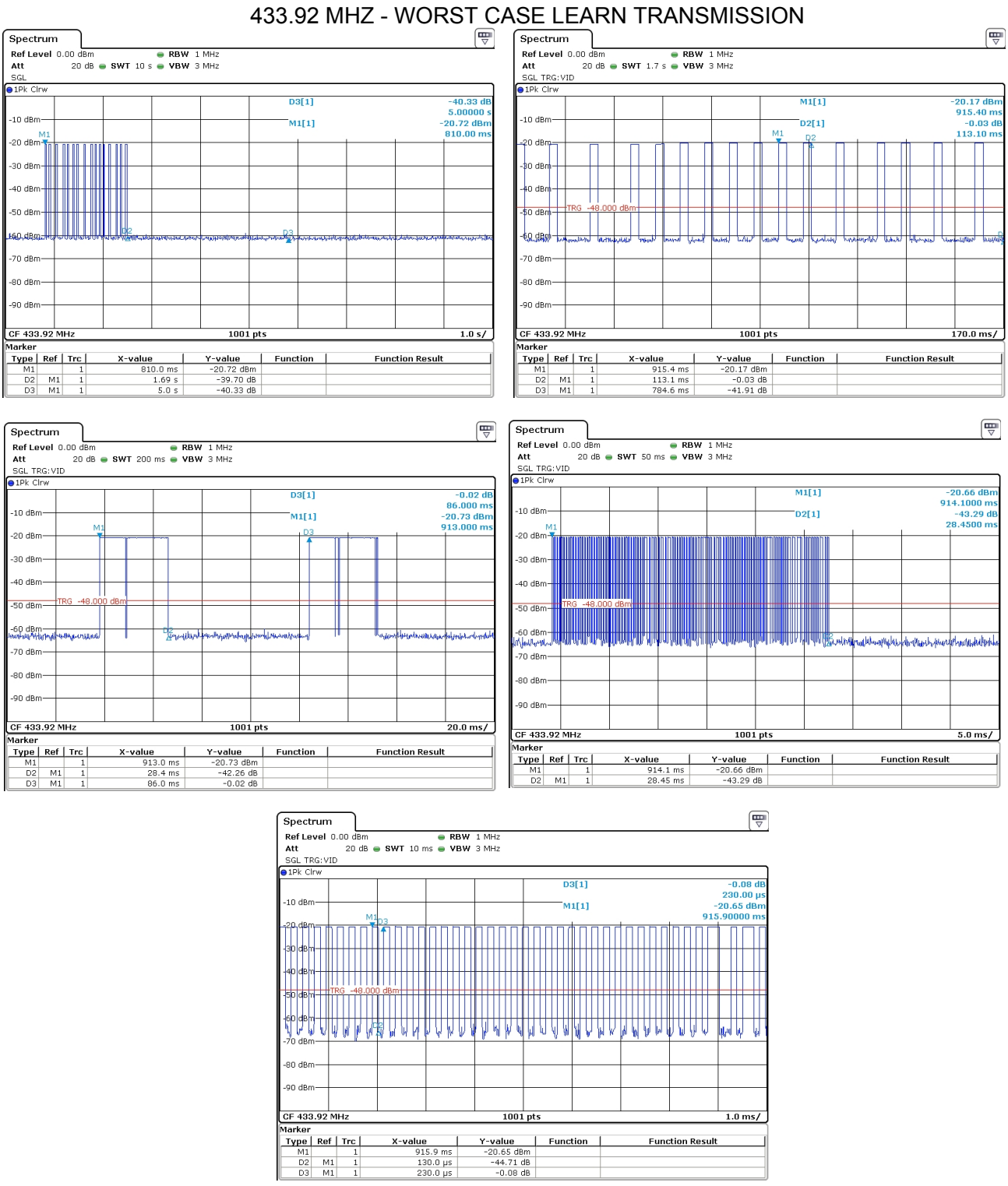


Figure 5(b): Fundamental Emission Pulsed Operation.

315 MHz - WORST CASE ROLL MODE TRANSMISSION

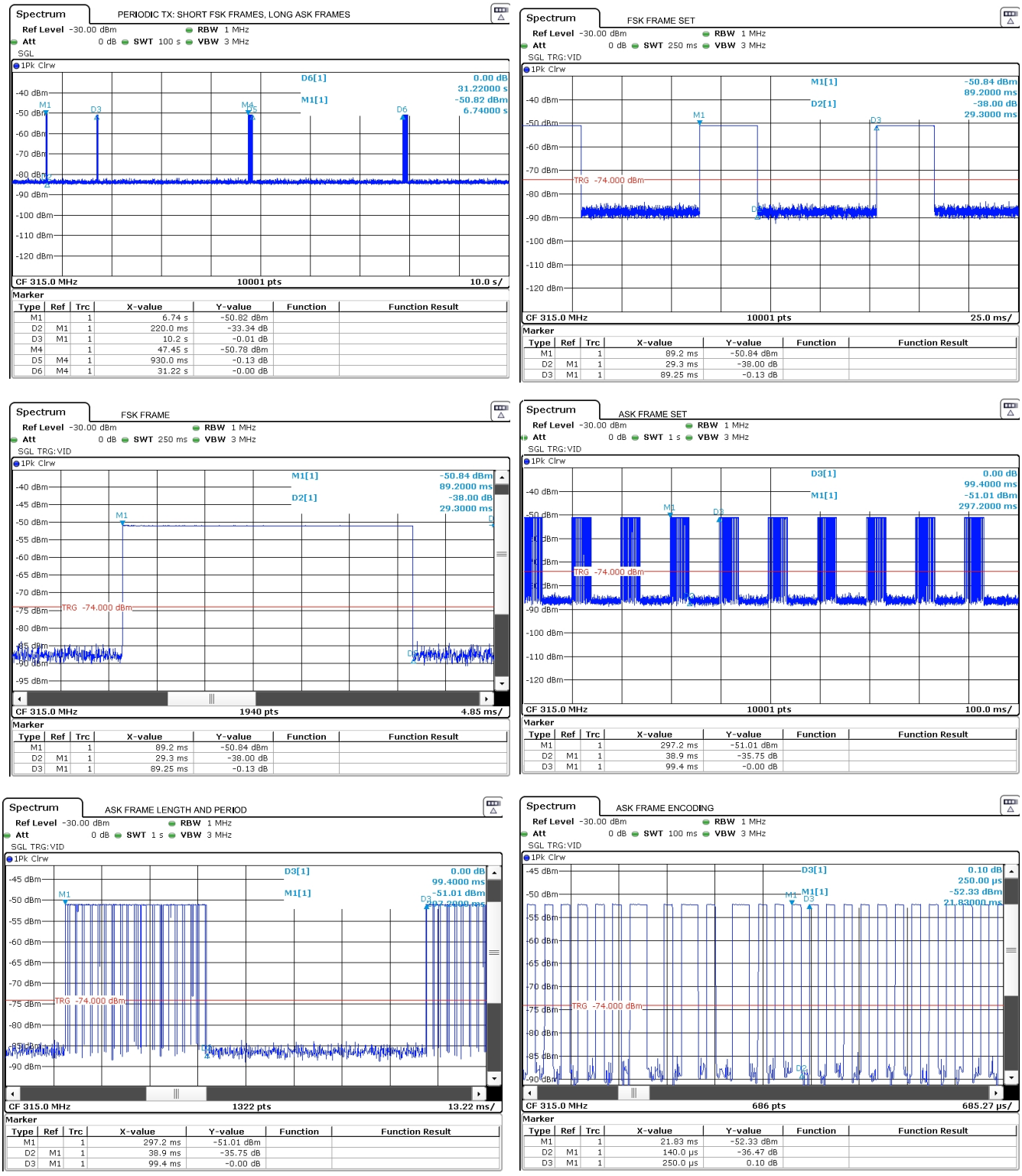


Figure 5(c): Fundamental Emission Pulsed Operation.

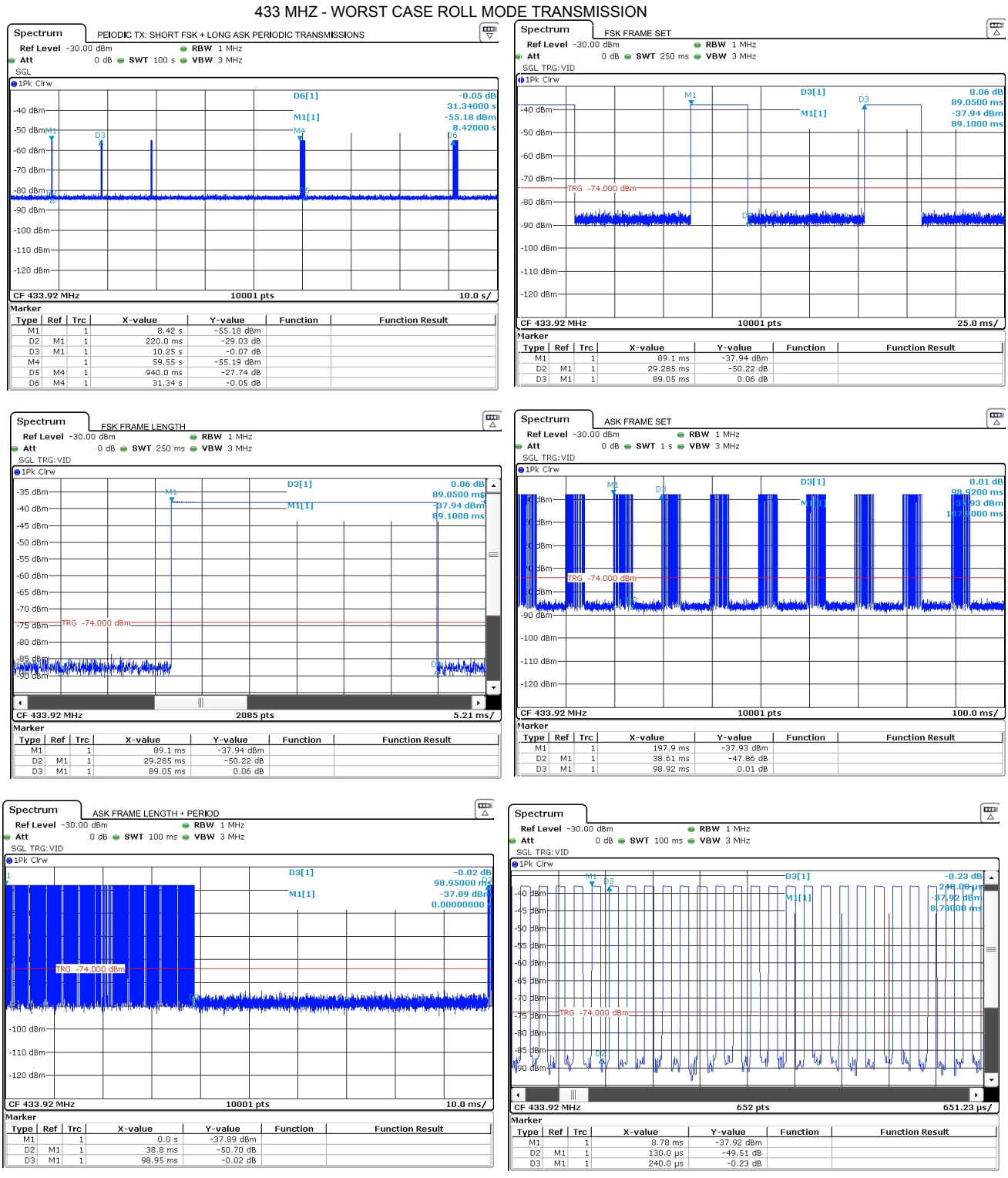


Figure 5(d): Fundamental Emission Pulsed Operation.

### 3.2.2 Fundamental Emission Bandwidth

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 1.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available frame length and minimum frame spacing. The 20 dB EBW is measured as the max-held peak-detected signal when the IF bandwidth is greater than or equal to 1% of the receiver span. For complex modulations other than ASK and FSK, the 99% emission bandwidth per IC test procedures has a different result, and is also reported. The test equipment employed includes RSFSV30001, DIPEMC001.

**Measurement Results** The details and results of testing the EUT are summarized in Table 4. Plots showing the measurements made to obtain these values are provided in Figure 6.

Table 4: Fundamental Emission Bandwidth.

| Detector | IF Bandwidth | Video Bandwidth |
|---|---|---|
| Pk | 10 kHz | 30 kHz |

**Test Date:** 12-Dec-14
**Test Engineer:** Joseph Brunett
**EUT:** Schrader AG5SD
**EUT Mode:** Modulated
**Meas. Distance:** 10 cm

| | | | | | FCC/IC | | |
|---|---|---|---|---|---|---|---|
| # | Modulation | Center Frequency (MHz) | 20 dB EBW (MHz) | EBW Limit (MHz) | 99% EBW (MHz) | | |
| 1 | FSK | 433.92 | 0.1359 | 1.0848 | 0.16583 | | |
| 2 | ASK | 433.92 | 0.0909 | 1.0848 | 0.43856 | | |
| 3 | FSK | 315.00 | 0.1399 | 0.7875 | 0.20080 | | |
| 4 | ASK | 315.00 | 0.0949 | 0.7875 | 0.44955 | | |
| 5 | | | | | | | |

Equipment Used: DIPEMC001, RSFSV30001

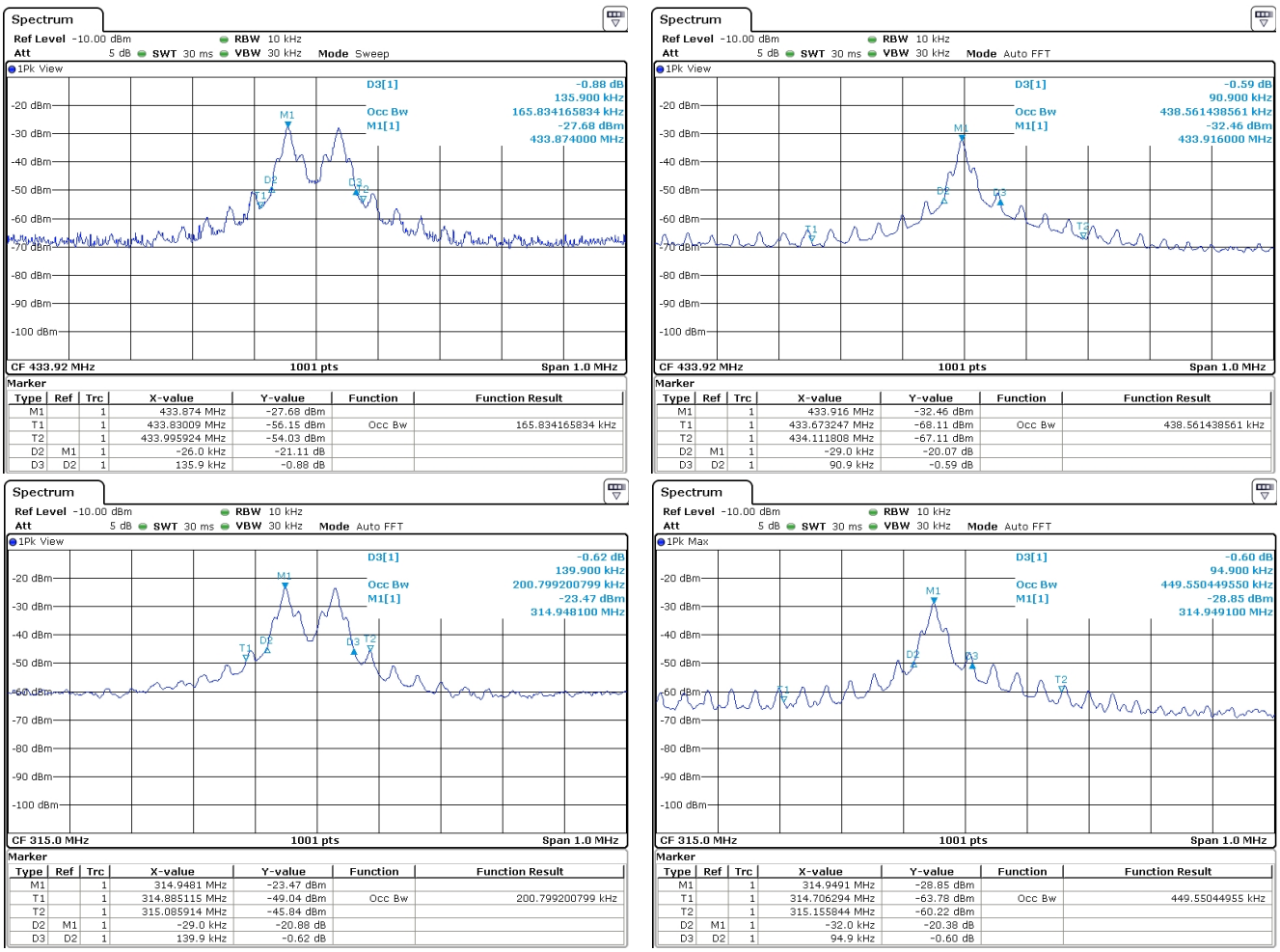


Figure 6: Fundamental Emission Bandwidth.

### 3.2.3 Fundamental Emission Field Strength

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 1.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Fundamental emissions are measured at the regulatory distance on our OATS. The test equipment employed includes RSFSV30001, DIPEMC001.

**Measurement Results** The details and results of testing the EUT are summarized in Table 5.

Table 5(a): Fundamental Emission Field Strength.

| Frequency Range | Det | IF Bandwidth | Video Bandwidth | | |
|---|---|---|---|---|---|
| 25 MHz ≤ f ≤ 1 000 MHz | Pk/QPk | 120 kHz | 300 kHz | **Test Date:** | 26-Jul-15 |
| f > 1 000 MHz | Pk | 1 MHz | 3 MHz | **Test Engineer:** | Joseph Brunett |
| f > 1 000 MHz | Avg | 1 MHz | 10 kHz | **EUT:** | Schrader AG5SD |
| | | | | **EUT Mode:** | CW |
| | | | | **Meas. Distance:** | 3 meters |

| | | | | | | | | | | FCC/IC | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Freq. MHz | Ant. Used | Ant. Pol. | Pr (Pk) dBm | Pr (Avg)* dBm | Ka dB/m | Kg dB | E3(Pk) dBµV/m | E3(Avg) dBµV/m | FCC/IC E3(Avg) Lim. dBµV/m | Pass dB | Comments |
| 1 | **Faraday Housing** | | | | | | | | | | | |
| 2 | 315.0 | Dip | H | -26.3 | -36.0 | 18.6 | 32.4 | 66.9 | 57.2 | 67.7 | 10.5 | end |
| 3 | 315.0 | Dip | V | -28.4 | -38.1 | 18.6 | 32.4 | 64.8 | 55.1 | 67.7 | **12.6** | flat |
| 4 | **Delta Housing** | | | | | | | | | | | |
| 5 | 315.0 | Dip | H | -25.1 | -34.8 | 18.6 | 32.4 | 68.1 | 58.4 | 67.7 | 9.3 | side |
| 6 | 315.0 | Dip | V | -26.0 | -35.7 | 18.6 | 32.4 | 67.2 | 57.5 | 67.7 | **10.2** | flat |
| # | Freq. MHz | DC Supply Voltage | | Relative Pr (Pk) dBm** | | | | | | | | |
| 7 | 315.0 | 2.60 | | -25.9 | | | | | | | | |
| 8 | 315.0 | 2.80 | | -25.7 | | | | | | | | |
| 9 | 315.0 | 3.00 | | -25.1 | | | | | | | | |
| 10 | 315.0 | 3.15 | | -25.0 | | | | | | | | |
| 11 | 315.0 | 3.30 | | -24.8 | | | | | | | | |

*Avg data computed from Peak Measured Data and EUT Duty Cycle. EUT in CW mode.
** EUT in CW mode.
Equipment Used: DIPEMC001, RSFSV30001

Table 5(b): Fundamental Emission Field Strength.

| Frequency Range | Det | IF Bandwidth | Video Bandwidth | | |
|---|---|---|---|---|---|
| 25 MHz ≤ f ≤ 1 000 MHz | Pk/QPk | 120 kHz | 300 kHz | **Test Date:** | 26-Jul-15 |
| f > 1 000 MHz | Pk | 1 MHz | 3 MHz | **Test Engineer:** | Joseph Brunett |
| f > 1 000 MHz | Avg | 1 MHz | 10 kHz | **EUT:** | Schrader AG5SD |
| | | | | **EUT Mode:** | CW |
| | | | | **Meas. Distance:** | 3 meters |

| | | | | | | | | | | FCC/IC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Freq. MHz | Ant. Used | Ant. Pol. | Pr (Pk) dBm | Pr (Avg)* dBm | Ka dB/m | Kg dB | E3(Pk) dBµV/m | E3(Avg) dBµV/m | FCC/IC E3(Avg) Lim. dBµV/m | Pass dB | Comments |
| 1 | **Faraday Housing** | | | | | | | | | | | |
| 2 | 433.9 | Dip | H | -23.3 | -33.0 | 21.5 | 32.4 | 72.8 | 63.1 | 72.9 | 9.8 | end |
| 3 | 433.9 | Dip | V | -22.8 | -32.5 | 21.5 | 32.4 | 73.3 | 63.6 | 72.9 | **9.3** | flat |
| 4 | **Delta Housing** | | | | | | | | | | | |
| 5 | 433.9 | Dip | H | -24.3 | -34.0 | 21.5 | 32.4 | 71.8 | 62.1 | 72.9 | 10.8 | side |
| 6 | 433.9 | Dip | V | -22.8 | -32.5 | 21.5 | 32.4 | 73.3 | 63.6 | 72.9 | **9.3** | flat |

| # | Freq. MHz | DC Supply Voltage | Relative Pr (Pk) dBm** |
|---|---|---|---|
| 7 | 433.9 | 2.60 | -23.4 |
| 8 | 433.9 | 2.80 | -23.0 |
| 9 | 433.9 | 3.00 | -22.8 |
| 10 | 433.9 | 3.15 | -22.6 |
| 11 | 433.9 | 3.30 | -22.3 |

*Avg data computed from Peak Measured Data and EUT Duty Cycle. EUT in CW mode.
** EUT in CW mode.
Equipment Used: DIPEMC001, RSFSV30001

## 3.3 Unintentional Emissions

### 3.3.1 Transmit Chain Spurious Emissions

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 1.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Spurious radiated emissions measurements are performed to 10 times the highest fundamental operating frequency. The test equipment employed includes RSFSV30001, DIPEMC001, UMHORN005.

**Measurement Results** The details and results of testing the EUT are summarized in Table 6.

Table 6(a): Transmit Chain Spurious Emissions.

| Frequency Range | Det | IF Bandwidth | Video Bandwidth | | |
|---|---|---|---|---|---|
| 25 MHz ≤ f ≤ 1 000 MHz | Pk/QPk | 120 kHz | 300 kHz | **Test Date:** | 26-Jul-15 |
| f > 1 000 MHz | Pk | 1 MHz | 3 MHz | **Test Engineer:** | Joseph Brunett |
| f > 1 000 MHz | Avg | 1 MHz | 10kHz | **EUT:** | Schrader AG5SD |
| | | | | **EUT Mode:** | CW |
| | | | | **Meas. Distance:** | 3 meters |

| Transmitter Unintentional Spurious Emissions | | | | | | | | | | | | FCC/IC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Freq. MHz | Ant. Used | Ant. Pol. | Pr (Pk) dBm | Pr (Avg)* dBm | Ka dB/m | Kg dB | E3(Pk) dBµV/m | E3(Avg) dBµV/m | FCC/IC E3lim (Avg) dBµV/m | Pass dB | Comments |
| 1 | **Faraday Housing** | | | | | | | | | | | |
| 2 | 630.0 | Dip | H | -66.1 | -75.8 | 24.4 | 29.1 | 36.2 | 26.5 | 47.7 | 21.1 | max all |
| 3 | 630.0 | Dip | V | -73.4 | -83.1 | 24.4 | 29.1 | 28.9 | 19.2 | 47.7 | 28.4 | max all |
| 4 | 945.0 | Dip | H | -62.6 | -72.3 | 28.8 | 26.1 | 47.1 | 37.4 | 47.7 | 10.2 | max all |
| 5 | 945.0 | Dip | V | -70.4 | -80.1 | 28.8 | 26.1 | 39.3 | 29.6 | 47.7 | 18.0 | max all |
| 6 | 1260.0 | R-Horn | H | -87.9 | -97.6 | 25.0 | -0.2 | 44.3 | 34.6 | 54.0 | 19.4 | max all |
| 7 | 1575.0 | R-Horn | H | -93.6 | -103.3 | 27.7 | -0.2 | 41.3 | 31.6 | 54.0 | 22.4 | max all |
| 8 | 1890.0 | R-Horn | H | -88.9 | -98.6 | 29.4 | -0.2 | 47.7 | 38.0 | 54.0 | 16.0 | max all |
| 9 | 2205.0 | R-Horn | H | -91.8 | -101.5 | 30.9 | -0.3 | 46.3 | 36.6 | 54.0 | 17.3 | max all |
| 10 | 2520.0 | R-Horn | H | -87.9 | -97.6 | 33.1 | -0.3 | 52.5 | 42.8 | 54.0 | 11.1 | max all |
| 11 | 2835.0 | R-Horn | H | -85.6 | -95.3 | 35.6 | -0.3 | 57.3 | 47.6 | 54.0 | **6.4** | max all |
| 12 | 3150.0 | R-Horn | H | -91.7 | -101.4 | 36.7 | -0.3 | 52.3 | 42.6 | 54.0 | 11.3 | max all |
| 13 | **Delta Housing** | | | | | | | | | | | |
| 14 | 630.0 | Dip | H | -63.9 | -73.6 | 24.4 | 29.1 | 38.4 | 28.7 | 47.7 | 18.9 | max all |
| 15 | 630.0 | Dip | V | -70.5 | -80.2 | 24.4 | 29.1 | 31.8 | 22.1 | 47.7 | 25.5 | max all |
| 16 | 945.0 | Dip | H | -65.2 | -74.9 | 28.8 | 26.1 | 44.5 | 34.8 | 47.7 | 12.8 | max all |
| 17 | 945.0 | Dip | V | -71.3 | -81.0 | 28.8 | 26.1 | 38.4 | 28.7 | 47.7 | 18.9 | max all |
| 18 | 1260.0 | R-Horn | H | -94.5 | -104.2 | 25.0 | -0.2 | 37.7 | 28.0 | 54.0 | 26.0 | max all |
| 19 | 1575.0 | R-Horn | H | -94.4 | -104.1 | 27.7 | -0.2 | 40.5 | 30.8 | 54.0 | 23.2 | max all |
| 20 | 1890.0 | R-Horn | H | -92.6 | -102.3 | 29.4 | -0.2 | 44.0 | 34.3 | 54.0 | 19.7 | max all |
| 21 | 2205.0 | R-Horn | H | -93.7 | -103.4 | 30.9 | -0.3 | 44.4 | 34.7 | 54.0 | 19.2 | max all |
| 22 | 2520.0 | R-Horn | H | -92.8 | -102.5 | 33.1 | -0.3 | 47.6 | 37.9 | 54.0 | 16.0 | max all |
| 23 | 2835.0 | R-Horn | H | -91.2 | -100.9 | 35.6 | -0.3 | 51.7 | 42.0 | 54.0 | **12.0** | max all |
| 24 | 3150.0 | R-Horn | H | -92.8 | -102.5 | 36.7 | -0.3 | 51.2 | 41.5 | 54.0 | 12.4 | max all |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |

*Avg data computed from Peak Measured Data and EUT Duty Cycle. EUT in CW mode.

Equipment Used: DIPEMC001, UMHORN005, RSFSV30001

Table 6(b): Transmit Chain Spurious Emissions.

| Frequency Range | Det | IF Bandwidth | Video Bandwidth | | |
|---|---|---|---|---|---|
| 25 MHz ≤ f ≤ 1 000 MHz | Pk/QPk | 120 kHz | 300 kHz | **Test Date:** | 26-Jul-15 |
| f > 1 000 MHz | Pk | 1 MHz | 3 MHz | **Test Engineer:** | Joseph Brunett |
| f > 1 000 MHz | Avg | 1 MHz | 10kHz | **EUT:** | Schrader AG5SD |
| | | | | **EUT Mode:** | CW |
| | | | | **Meas. Distance:** | 3 meters |

| **Transmitter Unintentional Spurious Emissions** | | | | | | | | | | | | FCC/IC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Freq. MHz | Ant. Used | Ant. Pol. | Pr (Pk) dBm | Pr (Avg)* dBm | Ka dB/m | Kg dB | E3(Pk) dBµV/m | E3(Avg) dBµV/m | FCC/IC E3lim (Avg) dBµV/m | Pass dB | Comments |
| 1 | **Faraday Housing** | | | | | | | | | | | |
| 2 | 867.8 | Dip | H | -57.0 | -66.7 | 27.8 | 28.2 | 49.6 | 39.9 | 52.9 | 12.9 | flat |
| 3 | 867.8 | Dip | V | -59.9 | -69.6 | 27.8 | 28.2 | 46.7 | 37.0 | 52.9 | 15.8 | end |
| 4 | 1301.8 | R-Horn | H | -91.4 | -101.1 | 25.4 | -0.2 | 41.2 | 31.5 | 54.0 | 22.5 | max all |
| 5 | 1735.7 | R-Horn | H | -85.2 | -94.9 | 28.7 | -0.2 | 50.7 | 41.0 | 54.0 | 13.0 | max all |
| 6 | 2169.6 | R-Horn | H | -94.0 | -103.7 | 30.7 | -0.3 | 43.9 | 34.2 | 54.0 | 19.7 | max all |
| 7 | 2603.5 | R-Horn | H | -86.1 | -95.8 | 33.8 | -0.3 | 55.0 | 45.3 | 54.0 | **8.7** | max all |
| 8 | 3037.4 | R-Horn | H | -93.0 | -102.7 | 36.5 | -0.3 | 50.8 | 41.1 | 54.0 | 12.8 | max all |
| 9 | 3471.4 | R-Horn | H | -97.8 | -107.5 | 36.0 | -0.4 | 45.6 | 35.9 | 54.0 | 18.1 | max all |
| 10 | 3905.3 | R-Horn | H | -99.3 | -109.0 | 33.9 | -0.4 | 42.0 | 32.3 | 54.0 | 21.6 | max all |
| 11 | 4339.2 | R-Horn | H | -99.7 | -109.4 | 33.1 | -0.4 | 40.8 | 31.1 | 54.0 | 22.9 | max all |
| 12 | **Delta Housing** | | | | | | | | | | | |
| 13 | 867.8 | Dip | H | -62.1 | -71.8 | 27.8 | 28.2 | 44.5 | 34.8 | 52.9 | 18.0 | flat |
| 14 | 867.8 | Dip | V | -60.4 | -70.1 | 27.8 | 28.2 | 46.2 | 36.5 | 52.9 | 16.3 | end |
| 15 | 1301.8 | R-Horn | H | -89.5 | -99.2 | 25.4 | -0.2 | 43.1 | 33.4 | 54.0 | 20.6 | max all |
| 16 | 1735.7 | R-Horn | H | -83.2 | -92.9 | 28.7 | -0.2 | 52.7 | 43.0 | 54.0 | 11.0 | max all |
| 17 | 2169.6 | R-Horn | H | -86.7 | -96.4 | 30.7 | -0.3 | 51.2 | 41.5 | 54.0 | 12.4 | max all |
| 18 | 2603.5 | R-Horn | H | -83.3 | -93.0 | 33.8 | -0.3 | 57.8 | 48.1 | 54.0 | **5.9** | max all |
| 19 | 3037.4 | R-Horn | H | -92.7 | -102.4 | 36.5 | -0.3 | 51.1 | 41.4 | 54.0 | 12.5 | max all |
| 20 | 3471.4 | R-Horn | H | -99.1 | -108.8 | 36.0 | -0.4 | 44.3 | 34.6 | 54.0 | 19.4 | max all |
| 21 | 3905.3 | R-Horn | H | -99.8 | -109.5 | 33.9 | -0.4 | 41.5 | 31.8 | 54.0 | 22.1 | max all |
| 22 | 4339.2 | R-Horn | H | -99.1 | -108.8 | 33.1 | -0.4 | 41.4 | 31.7 | 54.0 | 22.3 | max all |
| 23 | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |

*Avg data computed from Peak Measured Data and EUT Duty Cycle. EUT in CW mode.

Equipment Used: DIPEMC001, UMHORN005, RSFSV30001