HCT Co., Ltd.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

# HAC RF Emission Test Report

| | |
|---|---|
| **Applicant Name:**<br>**SAMSUNG Electronics Co., Ltd.**<br>129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea | **Date of Issue: JAN** 22, 2021<br>**Test Report No.:** HCT-SR-2101-FC006-R1<br>**Test Site: HCT CO., LTD.** |

| | |
|---|---|
| **FCC ID** | **A3LSMA725F** |
| **Equipment Type:** | **Mobile Phone** |
| **Application Type** | **Certification** |
| **FCC Rule Part(s):** | **CFR §20.19 , ANSI C63.19-2011** |
| **Model Name:** | **SM-A725F/DS** |
| **Date of Test:** | **Dec. 28, 2020~ Dec. 30, 2020** |

| | |
|---|---|
| **C63.19-2011 HAC Category** | **M3 (RF EMISSION CATEGORY)** |

This wireless portable device has been shown to be hearing-aid compatible under the above rated category, specified in ANSI/IEEE Std. C63.19-2011 and had been tested in accordance with the specified measurement procedures. Hearing-Aid Compatibility is based on the assumption that all production units will be designed electrically identical to the device tested in this report.
I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

**Tested by**

**Jung-Hun, Park**
**Test Engineer**
**SAR Team**
**Certification Division**

**Technical Manager**

**Yun Jeang, Heo**
**Technical Manager**
**SAR Team**
**Certification Division**

**REVISION HISTORY**

The revision history for this test report is shown in table.

| Revision No. | Date of Issue | Description |
|---|---|---|
| 0 | Jan. 15, 2021 | Initial Release |
| 1 | Jan. 22, 2021 | Revised Page 26 |

This test results were applied only to the test methods required by the standard.

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

# Table of Contents

# 1. Test Regulations

The tests were performed according to the following regulations:

| | |
|---|---|
| Test Standard | FCC 47 CFR §20.19 ANSI C63.19-2011 |
| Test Method | · KDB 285076 D01 HAC Guidance v05r01<br>· KDB 285076 D03 HAC FAQ v01r03<br>· TCB workshop updates |

# 2. Attestation of test Result of Device Under Test

| Test Laboratory | |
|---|---|
| Company Name: | HCT Co., LTD |
| Address: | 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea |
| Telephone: | +82 31 645 6300 |
| Fax.: | +82 31 645 6401 |

| Attestation of SAR test result | |
|---|---|
| Applicant Name: | SAMSUNG Electronics Co., Ltd. |
| Model Name | SM-A725F/DS |
| Additional Model Name: | SM-A725F |
| EUT Type: | Mobile Phone |
| Application Type: | Certification |

## 2.1 Test Methodology

The Tests document in this report were performed in accordance with ANSI C63.19-2011 method of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, FCC published KDB 285076 D01 HAC Guidance v05r01, FCC Published KDB285076 D03 HAC FAQ v01r03 and TCB Workshop updates .

# 3. Device Under Test Description

## 3.1 DUT specification

| Device Wireless specification overview | | |
|---|---|---|
| **Band & Mode** | **Operating Mode** | **Tx Frequency** |
| GSM850 | Voice / Data | 824.2 ㎒ ~ 848.8 ㎒ |
| GSM1900 | Voice / Data | 1 850.2 ㎒ ~ 1 909.8 ㎒ |
| UMTS 850 | Voice / Data | 826.4 ㎒ ~ 846.6 ㎒ |
| UMTS 1700 | Voice / Data | 1 712.4 ㎒ ~ 1 752.6 ㎒ |
| UMTS 1900 | Voice / Data | 1 852.4 ㎒ ~ 1 907.6 ㎒ |
| LTE Band 2 (PCS) | Voice / Data | 1 850.7 ㎒ ~ 1 909.3 ㎒ |
| LTE Band 4 (AWS) | Voice / Data | 1 710.7 ㎒ ~ 1 754.3 ㎒ |
| LTE Band 5 (Cell) | Voice / Data | 824.7 ㎒ ~ 848.3 ㎒ |
| LTE Band 12 | Voice / Data | 699.7 ㎒ ~ 715.3 ㎒ |
| LTE Band 17 | Voice / Data | 706.5 ㎒ ~ 713.5 ㎒ |
| LTE Band 26 | Voice / Data | 814.7 ㎒ ~ 848.3 ㎒ |
| LTE TDD Band 41 | Voice / Data | 2 498.5 ㎒ ~ 2 687.5 ㎒ |
| LTE Band 66 (AWS) | Voice / Data | 1 710.7 ㎒ ~ 1 779.3 ㎒ |
| U-NII-1 | Voice / Data | 5 180 ㎒ ~ 5 240 ㎒ |
| U-NII-2A | Voice / Data | 5 260 ㎒ ~ 5 320 ㎒ |
| U-NII-2C | Voice / Data | 5 500 ㎒ ~ 5 720 ㎒ |
| U-NII-3 | Voice / Data | 5 745 ㎒ ~ 5 825 ㎒ |
| 2.4 ㎓ WLAN | Voice / Data | 2 412 ㎒ ~ 2 472 ㎒ |
| Bluetooth / LE 5.0 | Data | 2 402 ㎒ ~ 2 480 ㎒ |
| NFC | Data | 13.56 ㎒ |

## 3.2 Device Under Test

| | | |
|---|---|---|
| **Normal operation** | Held to head | |
| **Back Cover** | The Back Cover is not removable | |
| **Test sample information** | S/N | Notes |
| | TL94922M | RF Emssion Test |

# 4. HAC Measurement Set-Up

These measurements are performed using the DASY5 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium IV computer, near-field probe, probe alignment sensor. The robot is a six-axis industrial robot performing precise movements.

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and HAC Measurement Software DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

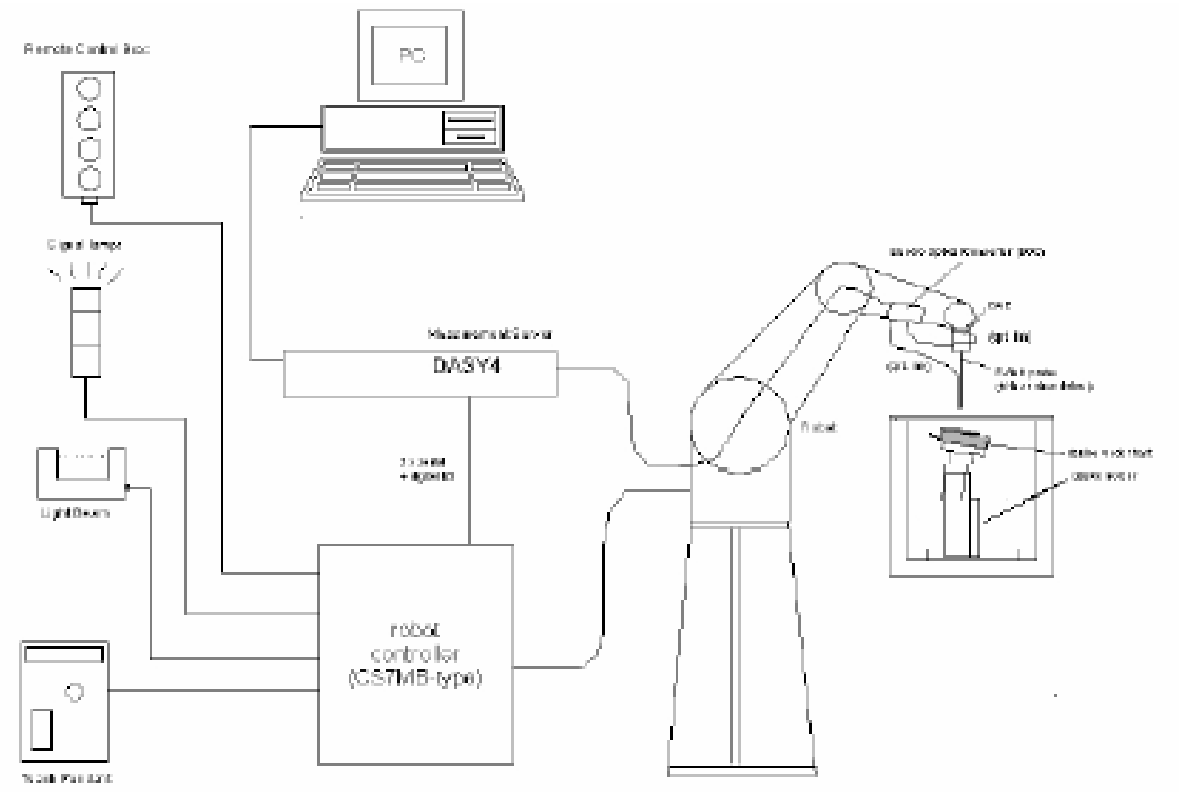



Figure 1. HAC Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

# 5. System Specifications

## 5.1 Probe

### E-Field Probe Description

| | | |
|---|---|---|
| Construction | One dipole parallel, two dipoles normal to probe axis<br>Built-in shielding against static charges |  <br>[ E-Field Probe ] |
| Calibration | In air from 100 ㎒ to 3.0 GHz (absolute accuracy ± 6.0 %, *k* = 2) | |
| Frequency | 100 ㎒ to > 6 GHz; Linearity: ± 0.2 dB (100 ㎒ to 3 GHz) | |
| Directivity | ± 0.2 dB in air (rotation around probe axis)<br>± 0.4 dB in air (rotation normal to probe axis) | |
| Dynamic Range | 2 V/m to > 1000 V/m<br>(M3 or better device readings fall well below diode compression point) | |
| Linearity | ± 0.2 dB | |
| Dimensions | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 1.5 mm | |

## 5.2 Phantom & Device Holder

Figure 2. HAC Phantom & Device Holder

The Test Arch phantom should be positioned horizontally on a stable surface. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

The devices can be easily, accurately, and repeatable positioned according to the FCC specifications.

## 5.3 Robotic System Specifications

| | |
|---|---|
| **Specifications** | |
| **POSITIONER:** | Stäubli Unimation Corp. Robot Model: TX90 XLspeag |
| **Repeatability:** | 0.02 mm |
| **No. of axis:** | 6 |
| **Data Acquisition Electronic (DAE) System** | |
| **Cell Controller** | |
| **Processor:** | Core i7 |
| **Clock Speed:** | 3.0 GHz |
| **Operating System:** | Windows 7 |
| **Data Card:** | DASY5 PC-Board |
| **Data Converter** | |
| **Features:** | Signal Amplifier, multiplexer, A/D converter, and control logic |
| **Software:** | DASY5 software |
| **Connecting Lines:** | Optical downlink for data and status info.<br>Optical uplink for commands and clock |
| **PC Interface Card** | |
| **Function:** | 24 bit (64 ㎒) DSP for real time processing<br>Link to DAE<br>16 bit A/D converter for surface detection system<br>serial link to robot<br>direct emergency stop output for robot |

# 6. HAC RF Emmissions Test Procedure

The following are step-by-step test procedures.

a) Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.

b) Position the WD in its intended test position.

c) Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operations likely to occur less than 1% of the time during normal operation, may be excluded from consideration.

d) The center sub-grid shall be centered on the T-Coil mode perpendicular measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane, refer to illustrated in Figure 1. If the field alignment method is used, align the probe for maximum field reception.

e) Record the reading at the output of the measurement system.

f) Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.

g) Identify the five contiguous sub-grids around the center sub-grid whose maximum reading is the lowest of all available choices. This eliminates the three sub-grids with the maximum readings. Thus, the six areas to be used to determine the WD's highest emissions are identified.

h) Identify the maximum reading within the non-excluded sub-grids identified in step g).

i) Convert the highest field reading within identified in step h) to RF audio interference level, in V/m, by taking the square root of the reading and then dividing it by the measurement system transfer function, established in 5.5.1.1 Convert this result to dB(V/m) by taking the base-10 logarithm and multiplying by 20. Indirect measurement method Replacing step i), the RF audio interference level in dB (V/m) is obtained by adding the MIF (in dB) to the maximum steady-state rms field-strength reading, in dB (V/m), from step h). Use this result to determine the category rating.

j) Compare this RF audio interference level with the categories in Clause 8 (ANSI C63.19) and record the resulting WD category rating.

Otherwise, repeat step a) through step i), with the grid shifted so that it is centered on the perpendicular measurement point. Record the WD category rating.


Figure 3. WD reference and plane for RF emission measurements

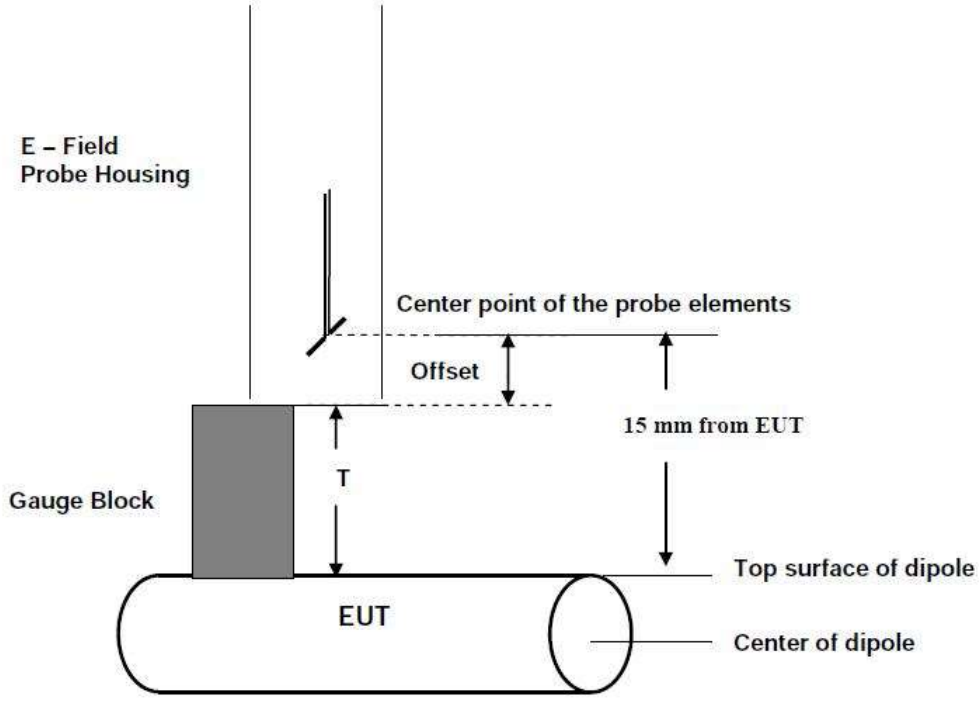



Figure 4. Gauge Block with E-Field Probe

# 7. System Specifications

E-field measurements are performed using the DASY52 automated dosimetric assessment system. The DASY52 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland.

The DASY52 HAC Extension consists of the following parts:

**Test Arch Phantom**

The specially designed Test Arch allows high precision positioning of both the device and any of the validation dipoles.

EF3DV3 Isotropic E-Field Probe

| | |
|---|---|
| Construction: | One dipole parallel, two dipoles normal to probe axis<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material |
| Calibration: | In air from 100 MHz to 3.0 GHz(absolute accuracy ±6.0%, k=2)<br>ISO/IEC 17025 calibration service available. |
| Frequency: | 40 MHz – >6 GHz (can be extended to < 20 MHz);<br>Linearity: ±0.2 dB (100 MHz – 3 GHz) |
| Directivity: | ± 0.2 dB in air (rotation around probe axis)<br>± 0.4 dB in air (rotation normal to probe axis) |
| Dynamic Range: | 2 V/m to > 1000 V/m; Linearity: ± 0.2 dB |
| Dimensions: | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 1.5 mm<br>Sensor displacement to probe's calibration point: <0.7 mm |
| Application: | General near-field measurements up to 6 GHz<br>HAC measurements up to 6 GHz<br>Field component measurements<br>Fast automatic scanning in phantoms |

# 8. System Validation

The test setup was validated when first configured and verified periodically thereafter to ensure proper function. The procedure provided in this section is a validation procedure using dipole antennas for which the field levels were computed by numeric modeling.

Procedure:

Place a dipole antenna meeting the requirements given in ANSI C63.19 in the normally occupied by the WD.

The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field probe so that the following occurs:

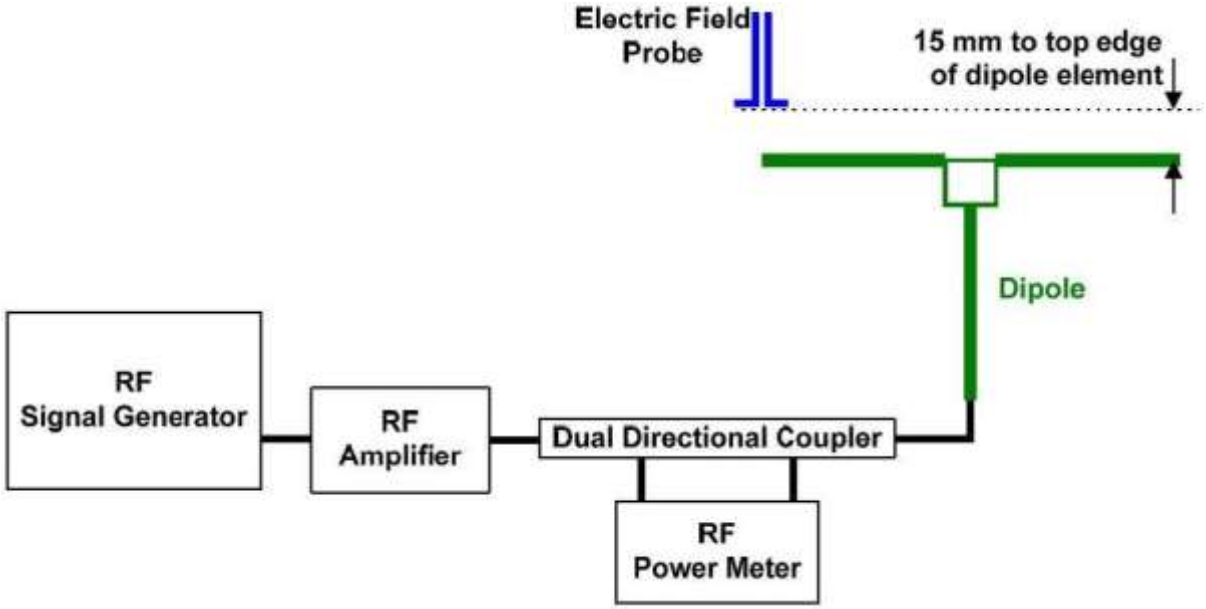
- The probes and their cables are parallel to the coaxial feed of the dipole antenna

- The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions

- The center point of the probe element(s) is 15 mm from the closest surface of the dipole elements.

Scan the length of the dipole with the E-field probe and record the two maximum values found near the dipole ends. Average the two readings and compare the reading to the expected value in the calibration certificate or the expected value in this standard.

Setup diagram



## 8.1 SYSTEM Validation Result106.1

| Mode | Date | Dipole Type_Seria_ Freq. | Input Power | MAX. Measured from | | Average max. above arm | Target Value SPEAG | Dev. | Dipole Calib. Date |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Above high end | Above low end | | | | |
| | | | [dBm] | [V/m] | [V/m] | [V/m] | [V/m] | [%] | |
| CW | 12/28/2020 | CD835V3_SN:1024_(835 ㎒) | 20 | 96.05 | 106.17 | 101.11 | 105.3 | -3.98 | 02/21/2021 |
| CW | 12/28/2020 | CD1880V3_SN:1019_(1880 ㎒) | 20 | 90.57 | 89.23 | 89.90 | 85.3 | +5.39 | 02/21/2021 |
| CW | 12/30/2020 | CD2450V3_SN:1022_(2450 ㎒) | 20 | 85.31 | 87.50 | 86.41 | 85.5 | +1.06 | 01/22/2021 |
| CW | 12/29/2020 | CD2600V3_SN:1019_(2600 ㎒) | 20 | 81.38 | 84.04 | 82.71 | 85.3 | -3.04 | 09/24/2021 |

Notes:

1) Deviation (%) = 100 * (Measured value minus Target value) divided by Target value.
ANSI-C63.19 requires values to be within 25% of their targets. 12% is deviation and 13% is measurement uncertainty.
2) The maximum E-field was evaluated and compared to the target values provided by SPEAG in the calibration certificate of specific dipoles.
3) Please refer to the attachment for detailed measurement data and plot.

# 9. Modulation Interference Factor (MIF)

The HAC Standard ANSI C63.19 defines a new scaling using the Modulation Interference Factor (MIF) which replaces the need for the Articulation Weighting Factor (AWF) during the evaluation and is applicable to any modulation scheme.

The Modulation Interference factor (MIF, in dB) is added to the measured average E-field (in dBV/m) and converts it to the RF Audio Interference level (in dBV/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not interfere with the hearing aid electronics. Modulations without time slots and low fluctuations at low frequencies have low MIF values, TDMA modulations with narrow transmission and repetition rates of few 100 Hz have high MIF values and give similar classifications as ANSI C63.19.

Definitions

E-field probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the “indirect” measurement method according to ANSI C63.19 which is the primary method. These near field probes read the averaged E-field measurement. Especially for the new high peak-to- average (PAR) signal types, the probes shall be linearized by probe modulation response (PMR) calibration in order to not overestimate the field reading.

The evaluation method or the MIF is defined in ANSI C63.19 section D.7. An RMS demodulated RF signal is fed to a spectral filter (similar to an A weighting filter) and forwarded to a temporal filter acting as a quasi-peak detector. The averaged output of these filtering is called to a 1 kHz 80% AM signal as reference. MIF measurement requires additional instrumentation and is not well suited for evaluation by the end user with reasonable uncertainty It may alternatively be determined through analysis and simulation, because it is constraint and characteristic for a communication signal. DASY52 uses well defined signals for PMR calibration. The MIF of these signals has been determined by simulation and is automatically applied.

MIF values were not tested by a probe or as specified in the standards but are based on analysis provided by SPEAG for all the air interfaces (CDMA, GSM, WCDMA, LTE, and Wi-Fi). The data included in this report are for the worst case operating modes. The UIDs used are listed below:

A PMR calibrated probe is linearized for the selected waveform over the full dynamic range within the uncertainty specified in its calibration certificate. E-field probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the \indirect" measurement method according to ANSI C63.19 which is the primary method. These near field probes read the averaged E-field measurement. Especially for the new high peak-to-average (PAR) signal types, the probes shall be linearized by PMR calibration in order to not overestimate the field reading.

The MIF measurement uncertainty is estimated as follows, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

- *0.2 dB for MIF -7 to +5 dB,*
- *0.5 dB for MIF -13 to +11 dB*
- *1 dB for MIF > -20 dB*

**SPEAG test files**

| UID | Communication System Name | MIF (dB) |
|---|---|---|
| 10021-DAC | GSM-FDD (TDMA, GMSK) | 3.63 |
| 10460-AAA | UMTS-FDD (WCDMA,AMR) | -25.43 |
| 10170-CAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16QAM) | -9.76 |
| 10182-CAE | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16QAM) | -9.76 |
| 10176-CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16QAM) | -9.76 |
| 10173-CAG | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16QAM) | -1.44 |
| 10061-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps) | -2.02 |
| 10077-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps) | 0.12 |
| 10591-AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle) | -5.59 |
| 10069-CAC | IEEE 802.11a/n WiFi 5 GHz (OFDM, 54 Mbps) | -3.15 |
| 10616-AAB | IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle) | -5.57 |
| 10030-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH1) | 1.02 |

# 10. Analysis of RF Air interface Technologies

An analysis was performed, following the guidance of 4.3 and 4.4 of the ANSI standard, of the RF air interface technologies being evaluated. The factors that will affect the RF interference Potential were evaluated, and the worst case operating modes were identified and used in the evaluation. A WD's interference potential is a function both of the WD's average near-field field strength and of the signal's audio-frequency amplitude modulation characteristics. Per 4.4, RF air interface technologies that have low power have been found to produce sufficiently low RF interference potential, so it is possible to exempt them from the product testing specified in Clause 5 of the ANSI standard. An RF air interface technology of a device is exempt from testing

When its average antenna input power plus its MIF is ≤ 17dBm for all of its operating modes.

The worst case MIF plus the worst case average antenna input power for all modes are investigated below to determine the testing requirements for this device.

## 10.1 Air Interfaces and Operating Mode

| Air-Interface | Band (㎒) | Type | HAC Tested | Simultaneous Transmissions Note: Not to be tested | Name of Voice service | Power Reduction |
|---|---|---|---|---|---|---|
| GSM | 850 | VO | Yes | Yes: BT, WLAN | CMRS Voice | N/A |
| | 1900 | | | | | |
| | GPRS/EDGE | VD | N/A | Yes: BT, WLAN | google Duo | N/A |
| WCDMA | 850 | VO | No[1] | Yes: BT, WLAN | CMRS Voice | N/A |
| | 1700 | | | | | |
| | 1900 | | | | | |
| | HSPA | VD | N/A | Yes: BT, WLAN | google Duo | N/A |
| LTE (FDD) | 700 (B12) | VD | No[1] | Yes: BT, WLAN | VOLTE,google Duo | N/A |
| | 700 (B17) | | | | | |
| | 850 (B5,B26) | | | | | |
| | 1700 (B4) | | | | | |
| | 1900 (B2) | | | | | |
| LTE (TDD) | 2600 (B41) | VD | Yes | Yes: BT, WLAN | VOLTE,google Duo | N/A |
| WLAN | 2450 | VD | No[1] | Yes: WWAN | VoWIFI, google Duo | Yes |
| | 5200(UNII 1) | | No[1] | Yes: WWAN | | |
| | 5300(UNII 2A) | | No[1] | | | |
| | 5500(UNII 2C) | | No[1] | | | |
| | 5800(UNII 3) | | No[1] | | | |
| BT | 2450 | DT | Yes | Yes: WWAN | N/A | N/A |
| Type Transport<br>VO = CMRS Voice Service<br>DT = Digital Transport<br>VD = CMRS IP Voice Service and Digital Transport | | | | Note:<br>[1]. Evaluated for MIF and low power exemption. | | |

## 10.2 Individual Mode Evaluations

Max. Average Power + MIF calculations for Low Power Exemptions

| Air Interface | Maximum Average Power | Worst case MIF | Total (Power + MIF) | C63.19 Testing Required |
|---|---|---|---|---|
| | [dBm] | [dBm] | [dBm] | |
| GSM850 | 34.0 | 3.63 | 37.63 | Yes |
| GSM1900 | 31.0 | 3.63 | 34.63 | Yes |
| WCDMA 850 | 25.0 | -25.43 | -0.43 | No |
| WCDMA 1700 | 24.0 | -25.43 | -1.43 | No |
| WCDMA 1900 | 24.5 | -25.43 | -0.93 | No |
| LTE Band 2 | 24.5 | -9.76 | 14.74 | No |
| LTE Band 4 | 25.0 | -9.76 | 15.24 | No |
| LTE Band 5 | 25.0 | -9.76 | 15.24 | No |
| LTE Band 12 | 25.0 | -9.76 | 15.24 | No |
| LTE Band 17 | 25.0 | -9.76 | 15.24 | No |
| LTE Band 26 | 25.5 | -9.76 | 15.74 | No |
| LTE TDD Band 41 | 24.5 | -1.44 | 23.06 | Yes |
| LTE Band 66 | 25.0 | -9.76 | 15.24 | No |
| 802.11b(2.4GHz) | 13.0 | -2.02 | 10.98 | No |
| 802.11g(2.4GHz) | 13.0 | 0.12 | 13.12 | No |
| 802.11n (2.4GHz) | 13.0 | -5.59 | 7.41 | No |
| 802.11a(5GHz) 20㎒ | 11.0 | -3.15 | 7.85 | No |
| 802.11n(5GHz) 20㎒ | 11.0 | -3.15 | 7.85 | No |
| 802.11n(5GHz) 40㎒ | 11.0 | -3.15 | 7.85 | No |
| 802.11ac(5GHz) 20㎒ | 11.0 | -5.57 | 5.43 | No |
| 802.11ac(5GHz) 40㎒ | 11.0 | -5.57 | 5.43 | No |
| 802.11ac(5GHz) 80㎒ | 11.0 | -5.57 | 5.43 | No |
| Bluetooth | 18.0 | 1.02 | 19.02 | Yes |

**Note(s):**

1. Max tune-up limit.
2. WLAN mode was applied RCV-On Back-off during the Voice call mode.

## 10.3 Low-Power Exemption Conclusions

Per ANSI C63.19-2011, RF Emissions testing for this device is required only for,GSM Vocie Mode as well as LTE TDD, Bluetooth data mode voice. All other applicable air interfaces are exempt.

# 11. Test Procedure

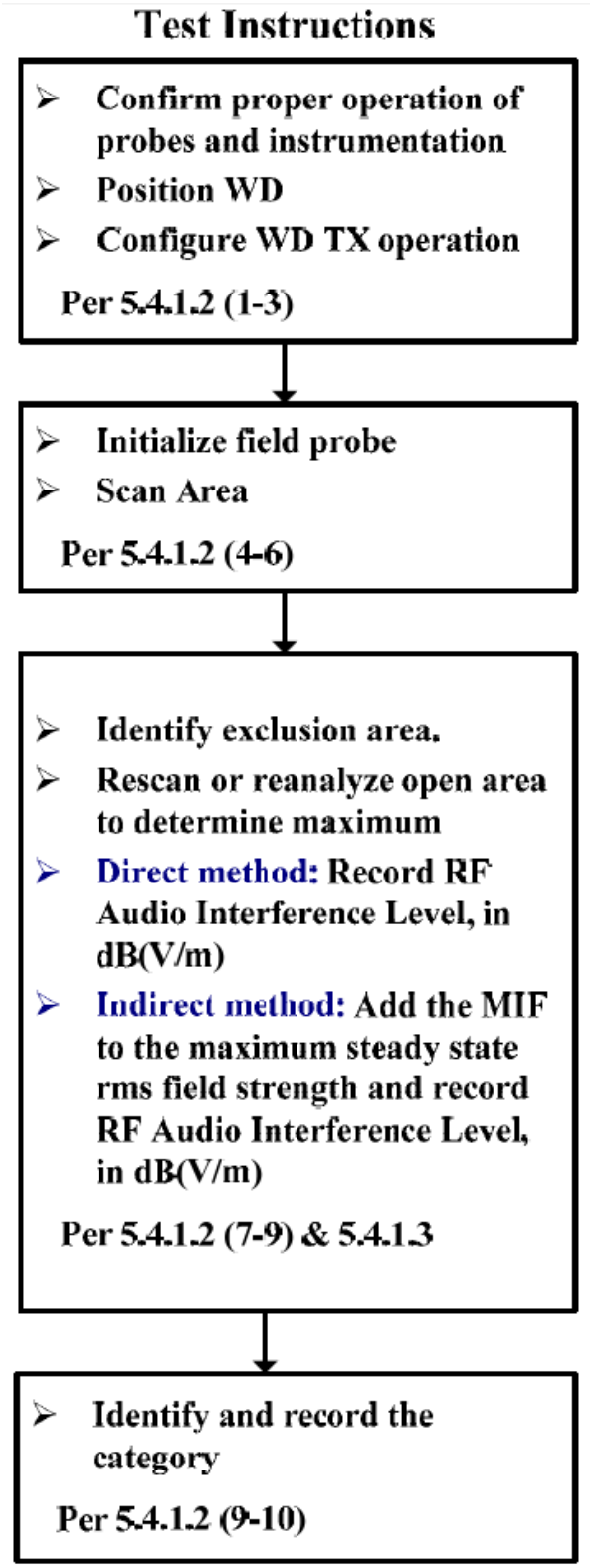



Figure 6. WD near-field emission automated test flowchart

**The evaluation was performed with the following procedure:**

1. Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.
2. Position the WD in its intended test position. The measurement should be performed at a distance 1.5 cm
   from the probe elements so the gauge block can simplify this positioning.
3. Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters, as intended for the test.
4. The center sub-grid shall be centered on the center of the WD output (acoustic or T-Coil output), as appropriate.
5. A Surface calibration was performed before each setup change to ensure repeatable spacing and roper maintenance of the measurement plane using the HAC Phantom.
6. Locate the field probe at reference location and measure the field strength.
7. Scan the entire 5 cm by 5 cm region at 5 mm increments and record the reading at each measurement point.
8. Identify the maximum field reading within the non-excluded sub-grids identified in Step 7.
9. Move the probe to the location of maximum scan measurement and then 360° rotating the probe to align it for the maximum reading at that position.
10. Locate the field probe at the reference location and measure the field strength for drift evaluation. If conducted power deviations of more than 5 % occurred, the tests were repeated.
11. Convert the maximum field strength reading identified in Step 8 to V/m or A/m, as appropriate. For probes which require a probe modulation factor, this conversion shall be done using the appropriate probe modulation.
12. Repeat Step 1 through Step 11 for both the E-field measurements.

# 12. ANSI/IEEE C63.19 Performance Categories

**The EUT must meet the following M3 or M4 category:**

| Emission Catdegories | E-field emissions dB [V/m] | |
|---|---|---|
| | < 960 ㎒ | > 960 ㎒ |
| Category M1 | 50 to 55 | 40 to 45 |
| Category M2 | 45 to 50 | 35 to 40 |
| Category M3 | 40 to 45 | 30 to 35 |
| Category M4 | < 40 | < 30 |

Telephone near-field categories in linear units

# 13. Measurement Uncertainties

| Error Description | Uncertainty value [±%] | Probe Dist. | Div. | (Ci) E | (Ci) H | Std. Unc. E [±%] |
|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | |
| Probe Calibration | 5.1 | N | 1 | 1 | 1 | 5.1 |
| Axial Isotropy | 4.7 | R | √3 | 1 | 1 | 2.7 |
| Sensor Displacement | 16.5 | R | √3 | 1 | 0.145 | 9.5 |
| Boundary Effects | 2.4 | R | √3 | 1 | 1 | 1.4 |
| Phantom Boundary Effect | 7.2 | R | √3 | 1 | 0 | 4.1 |
| Linearity | 4.7 | R | √3 | 1 | 1 | 2.7 |
| Scaling with PMR calibration | 10.0 | R | √3 | 1 | 1 | 5.8 |
| System Detection Limit | 1.0 | R | √3 | 1 | 1 | 0.6 |
| Readout Electronics | 0.3 | N | 1 | 1 | 1 | 0.3 |
| Response Time | 0.8 | R | √3 | 1 | 1 | 0.5 |
| Integration Time | 2.6 | R | √3 | 1 | 1 | 1.5 |
| RF Ambient Conditions | 3.0 | R | √3 | 1 | 1 | 1.7 |
| RF Reflections | 12 | R | √3 | 1 | 1 | 6.9 |
| Probe Positioner | 1.2 | R | √3 | 1 | 0.67 | 0.7 |
| Probe Positioning | 4.7 | R | √3 | 1 | 0.67 | 2.7 |
| Extrap. and Interpolation | 1.0 | R | √3 | 1 | 1 | 0.6 |
| **Test Sample Related** | | | | | | |
| Device Positioning Vertical | 4.7 | R | √3 | 1 | 0.67 | 2.7 |
| Device Positioning Lateral | 1.0 | R | √3 | 1 | 1 | 0.6 |
| Device Holder and Phantom | 2.4 | R | √3 | 1 | 1 | 1.4 |
| Power Drift | 5.0 | R | √3 | 1 | 1 | 2.9 |
| **Phantom and Setup Related** | | | | | | |
| Phantom Thickness | 2.4 | R | √3 | 1 | 0.67 | 1.4 |
| Combined Std. Uncertainty | | (k=1) | | | | 16.3 |
| Expanded Std. Uncertainty on Power | | (Coverage Factor for 95%, k =2) | | | | **32.6** |
| Expanded Std. Uncertainty on Field | | (Coverage Factor for 95%) | | | | **16.3** |

# 14. HAC Test Data Summary

## E-Field Measurement Result (GSM850/ GSM1900)

| Mode | Channel | Conducted Power | Time Avg. Filed | Audio Inteference Level | FCC Limit | FCC Margin | MIF | Result | Exclusion Block | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | [dBm] | [V/m] | [dBV/m] | [dBV/m] | [dB] | | | | |
| GSM 850 | 128 | 33.06 | 41.93 | 36.08 | 45 | 8.92 | 3.63 | M4 | none | 1 |
| | 190 | 33.02 | 30.37 | 33.28 | 45 | 11.72 | 3.63 | M4 | none | 2 |
| | 251 | 32.89 | 37.67 | 35.15 | 45 | 9.85 | 3.63 | M4 | none | 3 |
| GSM 1900 | 512 | 29.72 | 25.29 | 31.69 | 35 | 3.31 | 3.63 | M3 | none | 4 |
| | 661 | 29.81 | 19.39 | 29.38 | 35 | 5.62 | 3.63 | M4 | none | 5 |
| | 810 | 30.19 | 18.69 | 29.06 | 35 | 5.94 | 3.63 | M4 | none | 6 |

## E-Field Measurement Result (LTE TDD)

| Mode | Channel | Mod. | BW | RB Size | RB offset | Time Avg. Filed [V/m] | Audio Inteference Level [dBV/m] | FCC Limit [dBV/m] | FCC Margin [dB] | MIF | Result | Exclu-sion Block | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LTE Band 41 | 39750 | 16QAM | 20 | 1 | 0 | 15.69 | 22.47 | 35 | 12.53 | -1.44 | M4 | none | 7 |
| | 40185 | 16QAM | 20 | 1 | 0 | 17.84 | 23.59 | 35 | 11.41 | -1.44 | M4 | none | 8 |
| | 40620 | 16QAM | 20 | 1 | 0 | 19.77 | 24.48 | 35 | 10.52 | -1.44 | M4 | none | 9 |
| | 41055 | 16QAM | 20 | 1 | 0 | 19.30 | 24.27 | 35 | 10.73 | -1.44 | M4 | none | 10 |
| | 41490 | 16QAM | 20 | 1 | 0 | 19.70 | 24.45 | 35 | 10.55 | -1.44 | M4 | none | 11 |

## E-Field Measurement Result (Bluetooth)

| Mode | Channel | Time Avg. Filed | Audio Inteference Level | FCC Limit | FCC Margin | MIF | Result | Exclusion Block | Plot No. |
|---|---|---|---|---|---|---|---|---|---|
| | | [V/m] | [dBV/m] | [dBV/m] | [dB] | | | | |
| Bluetooth DH1 | 0 | 14.88 | 24.47 | 45 | 20.53 | 1.02 | M4 | none | 12 |
| | 39 | 14.96 | 24.52 | 45 | 20.48 | 1.02 | M4 | none | 13 |
| | 78 | 14.89 | 24.48 | 45 | 20.52 | 1.02 | M4 | none | 14 |

# 15. HAC Test Equipment Chamber List

**The test sites and measurement facilities used to collect data are located at**

SAR 9 Room(HAC)

# 16. HAC Test Equipment List

| Manufacturer | Type / Model | S/N | Calib. Date | Calib.Interval | Calib.Due |
|---|---|---|---|---|---|
| SPEAG | HAC Phantom | - | N/A | N/A | N/A |
| HP | SAR System Control PC | - | N/A | N/A | N/A |
| Staubli | TX60 Xlspeag | F/20/0018446/A/001 | N/A | N/A | N/A |
| Staubli | CS8Cspeag-TX90 | F/20/0018446/C/001 | N/A | N/A | N/A |
| Staubli | Teach Pendant (Joystick) | D21142608A | N/A | N/A | N/A |
| Staubli | Light Alignment Sensor | 1159 | N/A | N/A | N/A |
| SPEAG | DAE3 | 504 | 02/26/2020 | Annual | 02/26/2021 |
| SPEAG | E-Field Probe EF3DV3* | 4034 | 02/25/2020 | Annual | 02/25/2021 |
| SPEAG | Dipole CD835V3 | 1024 | 02/21/2020 | Annual | 02/21/2021 |
| SPEAG | Dipole CD1880V3 | 1019 | 02/21/2020 | Annual | 02/21/2021 |
| SPEAG | Dipole CD2450V3 | 1022 | 01/22/2020 | Annual | 01/22/2021 |
| SPEAG | Dipole CD2600V3 | 1019 | 09/24/2020 | Annual | 09/24/2021 |
| HP | Power Meter E4419B | MY40511244 | 05/06/2020 | Annual | 05/06/2021 |
| Agilent | Power Sensor 8481A | SG1091286 | 10/05/2020 | Annual | 10/05/2021 |
| Agilent | Power Sensor 8481A | MY41090873 | 10/05/2020 | Annual | 10/05/2021 |
| Agilent | Power Meter N1911A | MY45101406 | 08/31/2020 | Annual | 08/31/2021 |
| Agilent | Power Sensor N1921A | MY55220026 | 08/31/2020 | Annual | 08/31/2021 |
| Agilent | Signal Generator N5182A | MY47070230 | 05/06/2020 | Annual | 05/06/2021 |
| Agilent | 11636B/Power Divider | 58698 | 02/28/2020 | Annual | 02/28/2021 |
| TESTO | 175-H1/Thermometer | 44606559906 | 01/29/2020 | Annual | 01/29/2021 |
| EMPOWER | RF Power Amplifier / 2135DEFAAXLXX | 1084 | 07/01/2020 | Annual | 07/01/2021 |
| MICRO LAB | LP Filter / LA-30N | - | 10/05/2020 | Annual | 10/05/2021 |
| MICRO LAB | LP Filter / LA-15N | - | 10/05/2020 | Annual | 10/05/2021 |
| Apitech | Attenuator (3dB) 18B-03 | 1 | 06/04/2020 | Annual | 06/04/2021 |
| Agilent | Attenuator (20dB) 33340C | 18128 | 03/05/2020 | Annual | 03/05/2021 |
| WEINSCHEL | Attenuator (10dB) 3M-10 | z6226 | 11/17/2020 | Annual | 11/17/2021 |
| Agilent | Directional Bridge | 3140A03878 | 06/08/2020 | Annual | 06/08/2021 |
| Agilent | Wireless Communication Test Set E5515C | MY48361100 | 10/06/2020 | Annual | 10/06/2021 |
| Anritsu | Radio Communication Tester MT8821C | 6262044720 | 12/22/2020 | Annual | 12/22/2021 |
| R&S | Bluetooth CBT | 100272 | 03/02/2020 | Annual | 03/02/2021 |

*: According to SPEAG's Technical Report, "MIF Verification", Doc # TR-FB-12.09.04-1, issued date: 9/4/2012. E-field probes are calibrated with specified uncertainty according to ISO 17025 as described in their calibration certificate. The MIF according to the definition in ANSI C63.19 is specific for a modulation and can therefore be used as a constant value if the probe has been PMR calibrated.

# 17. CONCLUSION

The HAC measurement indicates that the EUT complies with the HAC limits of the ANSI-C63.19-2011. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise Laboratory measures were taken to assure repeatability of the tests.

# 18. Appendix A. TEST SETUP PHOTO

Please refer to test Setup Photo file no. as follows;

| Rev. No. | File No. |
|---|---|
| 0 | HCT-SR-2101-FC006 |

# 19. Appendix B. HAC RF Emission Test Plots

**Plot No.1** **Date : 2020-12-28**

GSM850 128ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 824.2 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

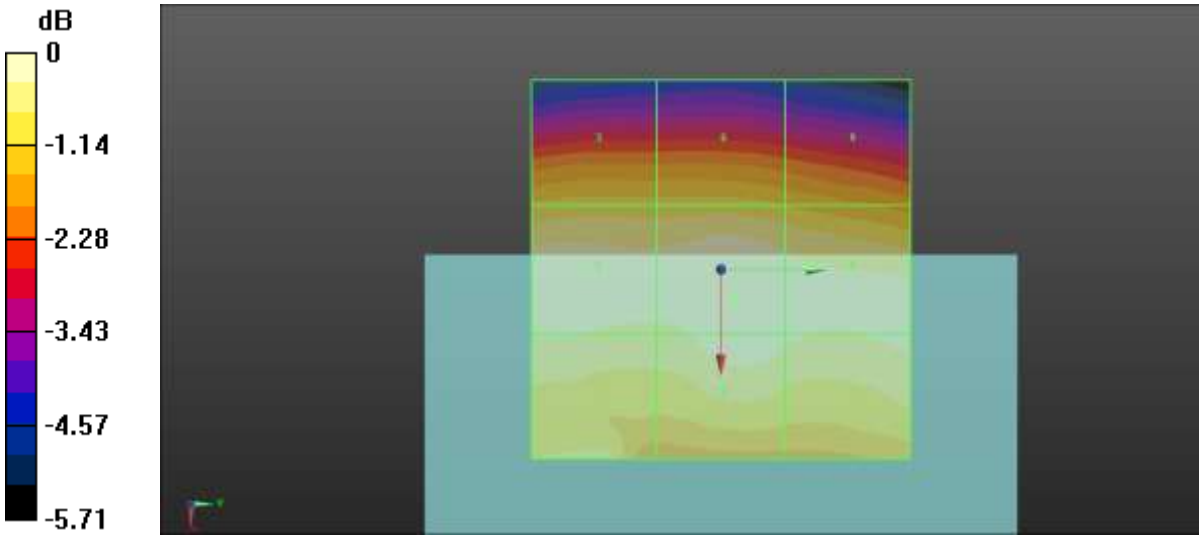
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 824.2 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 57.29 V/m; Power Drift = -0.12 dB
Applied MIF = 3.63 dB
RF audio interference level = 36.08 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **35.73 dBV/m** | Grid 2 **M4** **35.94 dBV/m** | Grid 3 **M4** **35.11 dBV/m** |
| Grid 4 **M4** **35.96 dBV/m** | Grid 5 **M4** **36.08 dBV/m** | Grid 6 **M4** **35.12 dBV/m** |
| Grid 7 **M4** **35.79 dBV/m** | Grid 8 **M4** **35.92 dBV/m** | Grid 9 **M4** **34.93 dBV/m** |

**Cursor:**
Total = 36.08 dBV/m
E Category: M4
Location: 4, 2, 7.7 mm




0 dB = 63.66 V/m = 36.08 dBV/m

**Plot No.2** **Date : 2020-12-28**
GSM850 190ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 836.6 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

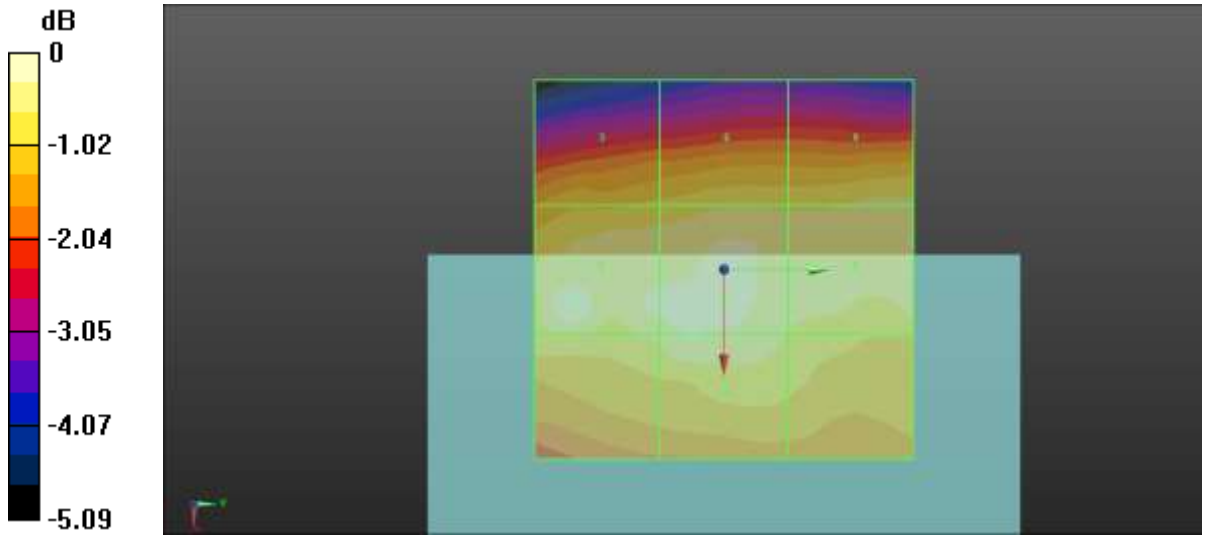
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 836.6 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 40.22 V/m; Power Drift = -0.10 dB
Applied MIF = 3.63 dB
RF audio interference level = 33.28 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **32.75 dBV/m** | Grid 2 **M4** **33.28 dBV/m** | Grid 3 **M4** **32.35 dBV/m** |
| Grid 4 **M4** **32.98 dBV/m** | Grid 5 **M4** **33.17 dBV/m** | Grid 6 **M4** **32.58 dBV/m** |
| Grid 7 **M4** **32.6 dBV/m** | Grid 8 **M4** **32.96 dBV/m** | Grid 9 **M4** **32.73 dBV/m** |

**Cursor:**
Total = 33.28 dBV/m
E Category: M4
Location: 4.5, -20, 7.7 mm




0 dB = 46.14 V/m = 33.28 dBV/m

**Plot No.3** **Date : 2020-12-28**

GSM850 251ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 848.8 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

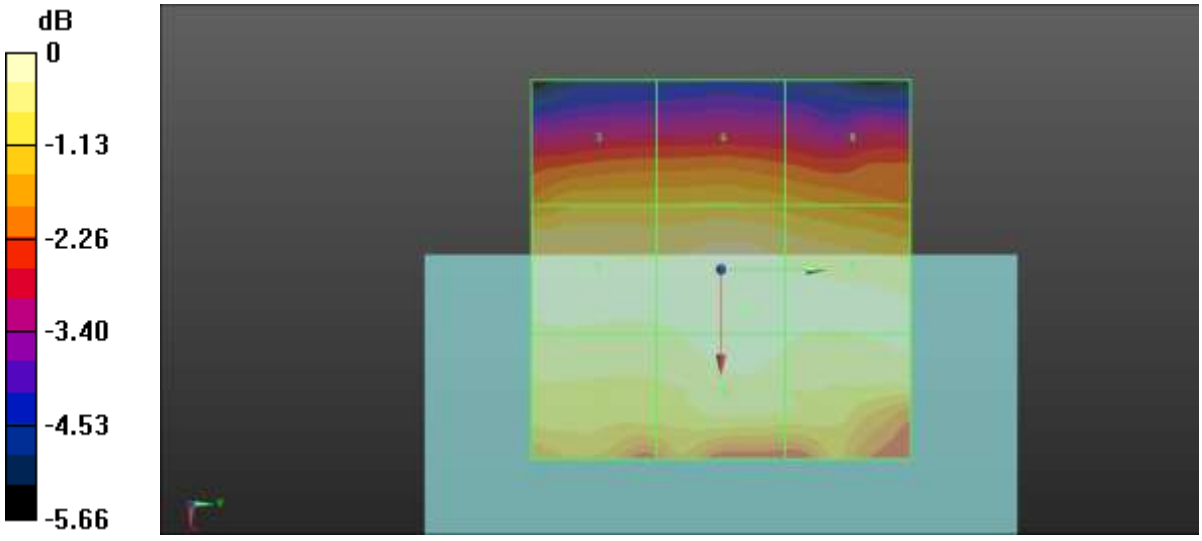
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 848.6 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 47.12 V/m; Power Drift = 0.13 dB
Applied MIF = 3.63 dB
RF audio interference level = 35.15 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **34.75 dBV/m** | Grid 2 **M4** **34.9 dBV/m** | Grid 3 **M4** **34.04 dBV/m** |
| Grid 4 **M4** **35.06 dBV/m** | Grid 5 **M4** **35.15 dBV/m** | Grid 6 **M4** **34.12 dBV/m** |
| Grid 7 **M4** **34.86 dBV/m** | Grid 8 **M4** **34.96 dBV/m** | Grid 9 **M4** **33.88 dBV/m** |

**Cursor:**
Total = 35.15 dBV/m
E Category: M4
Location: 5, 3.5, 7.7 mm




0 dB = 57.23 V/m = 35.15 dBV/m

**Plot No.4** **Date : 2020-12-28**

GSM1900 512ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1850.2 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

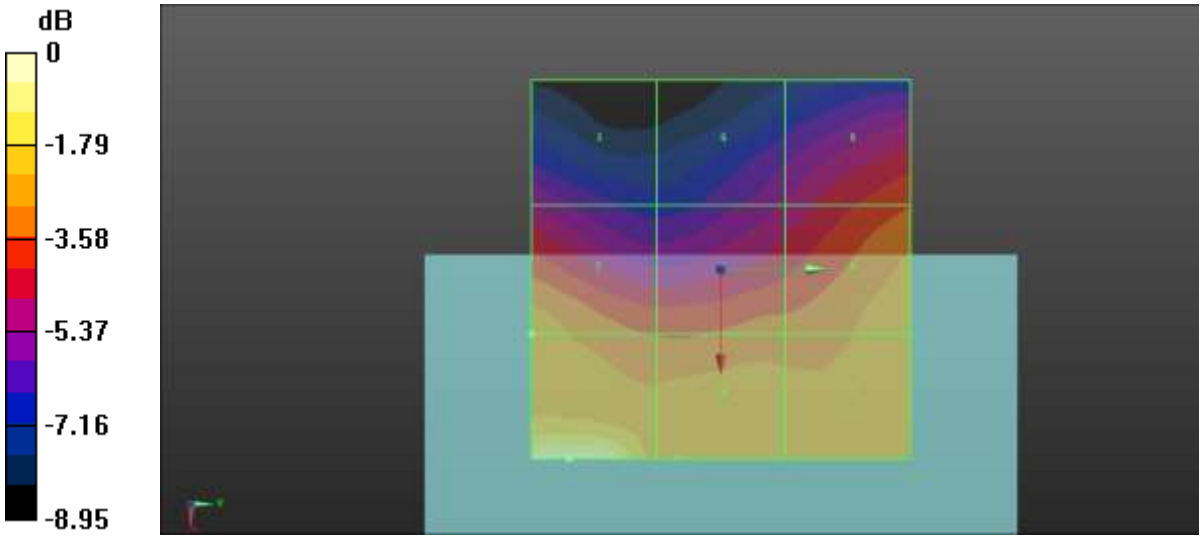
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 1850.2 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 21.91 V/m; Power Drift = -0.17 dB
Applied MIF = 3.63 dB
RF audio interference level = 31.69 dBV/m
**Emission category: M3**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M3** **31.69 dBV/m** | Grid 2 **M4** **29.03 dBV/m** | Grid 3 **M4** **26.31 dBV/m** |
| Grid 4 **M4** **29.34 dBV/m** | Grid 5 **M4** **28.38 dBV/m** | Grid 6 **M4** **26.43 dBV/m** |
| Grid 7 **M4** **29.1 dBV/m** | Grid 8 **M4** **29.02 dBV/m** | Grid 9 **M4** **28.09 dBV/m** |

**Cursor:**
Total = 31.69 dBV/m
E Category: M3
Location: 25, -20, 7.7 mm




0 dB = 38.41 V/m = 31.69 dBV/m

**Plot No.5** **Date : 2020-12-28**

GSM1900 661ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

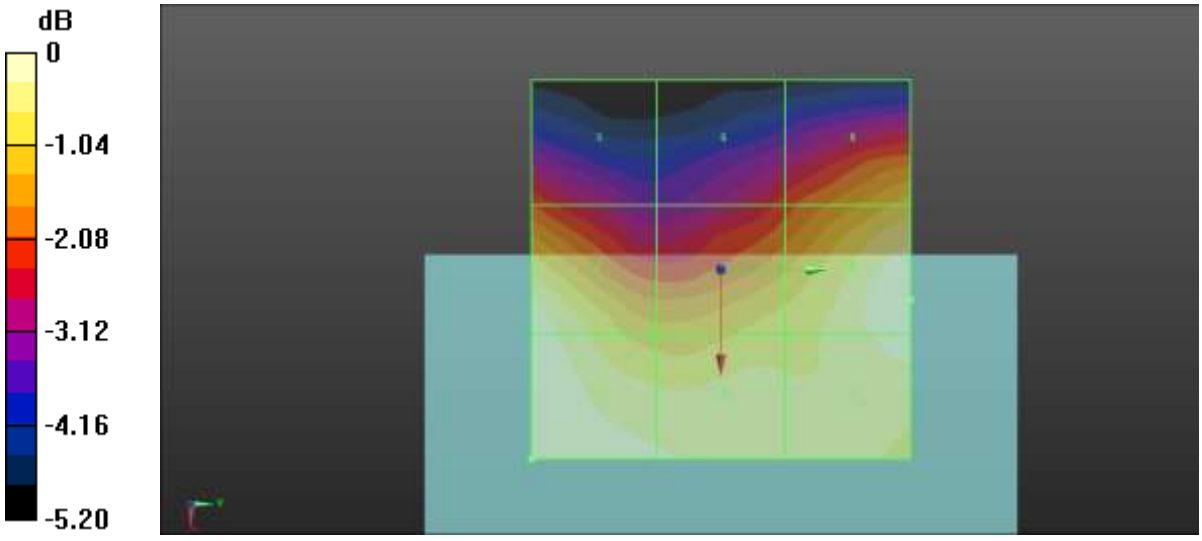
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 1880 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 20.21 V/m; Power Drift = -0.09 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.38 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **29.31 dBV/m** | Grid 2 **M4** **29.26 dBV/m** | Grid 3 **M4** **27.34 dBV/m** |
| Grid 4 **M4** **29.13 dBV/m** | Grid 5 **M4** **28.49 dBV/m** | Grid 6 **M4** **27.15 dBV/m** |
| Grid 7 **M4** **29.23 dBV/m** | Grid 8 **M4** **29.38 dBV/m** | Grid 9 **M4** **28.55 dBV/m** |

**Cursor:**
Total = 29.38 dBV/m
E Category: M4
Location: 4, 25, 7.7 mm




0 dB = 29.44 V/m = 29.38 dBV/m

**Plot No.6** **Date : 2020-12-28**

GSM1900 810ch

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1909.8 MHz;Duty Cycle: 1:8.69961
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

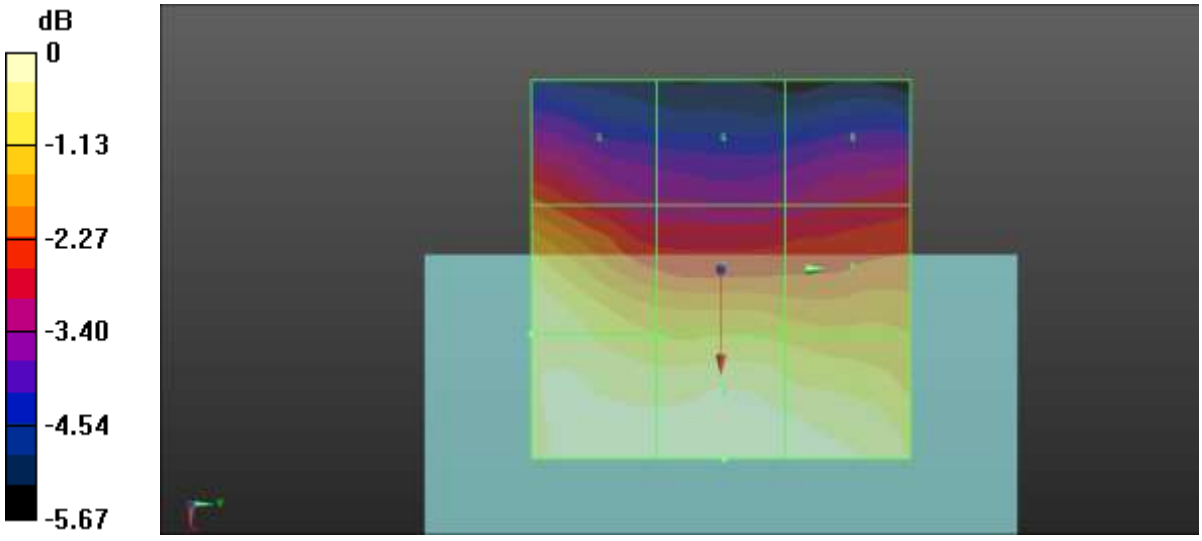
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 1909.8 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 18.10 V/m; Power Drift = 0.17 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.06 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **28.95 dBV/m** | Grid 2 **M4** **28.63 dBV/m** | Grid 3 **M4** **26.99 dBV/m** |
| Grid 4 **M4** **29.06 dBV/m** | Grid 5 **M4** **27.95 dBV/m** | Grid 6 **M4** **25.81 dBV/m** |
| Grid 7 **M4** **28.99 dBV/m** | Grid 8 **M4** **27.79 dBV/m** | Grid 9 **M4** **26.34 dBV/m** |

**Cursor:**
Total = 29.06 dBV/m
E Category: M4
Location: 25, 0.5, 7.7 mm




0 dB = 28.39 V/m = 29.06 dBV/m

**Plot No.7** **Date : 2020-12-29**

LTE Band 41 20MHz 16QAM 1RB 0offset 39750ch

Communication System: UID 10173 - CAG, LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM);
Frequency: 2506 MHz;Duty Cycle: 1:8.8736
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

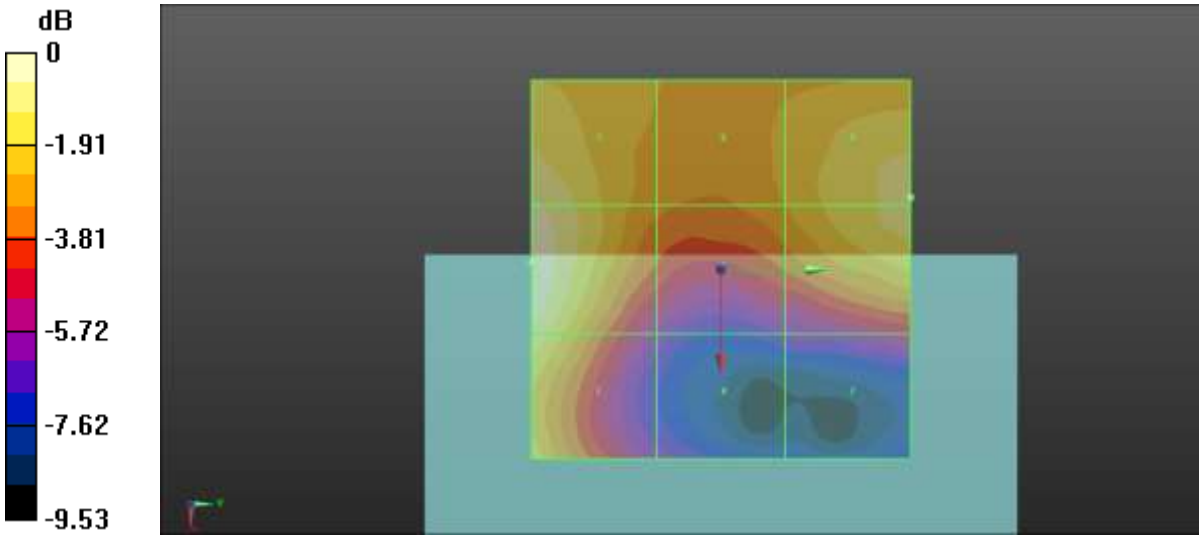
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2506 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 11.28 V/m; Power Drift = -0.18 dB
Applied MIF = -1.44 dB
RF audio interference level = 22.47 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **21.7 dBV/m** | Grid 2 **M4** **22.47 dBV/m** | Grid 3 **M4** **22 dBV/m** |
| Grid 4 **M4** **16.67 dBV/m** | Grid 5 **M4** **19.95 dBV/m** | Grid 6 **M4** **20.15 dBV/m** |
| Grid 7 **M4** **17.62 dBV/m** | Grid 8 **M4** **21.46 dBV/m** | Grid 9 **M4** **21.46 dBV/m** |

**Cursor:**
Total = 22.47 dBV/m
E Category: M4
Location: -1, -25, 7.7 mm




0 dB = 13.29 V/m = 22.47 dBV/m

**Plot No.8** **Date : 2020-12-29**

LTE Band 41 20MHz 16QAM 1RB 0offset 40185ch

Communication System: UID 10173 - CAG, LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM);
Frequency: 2549.5 MHz;Duty Cycle: 1:8.8736
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

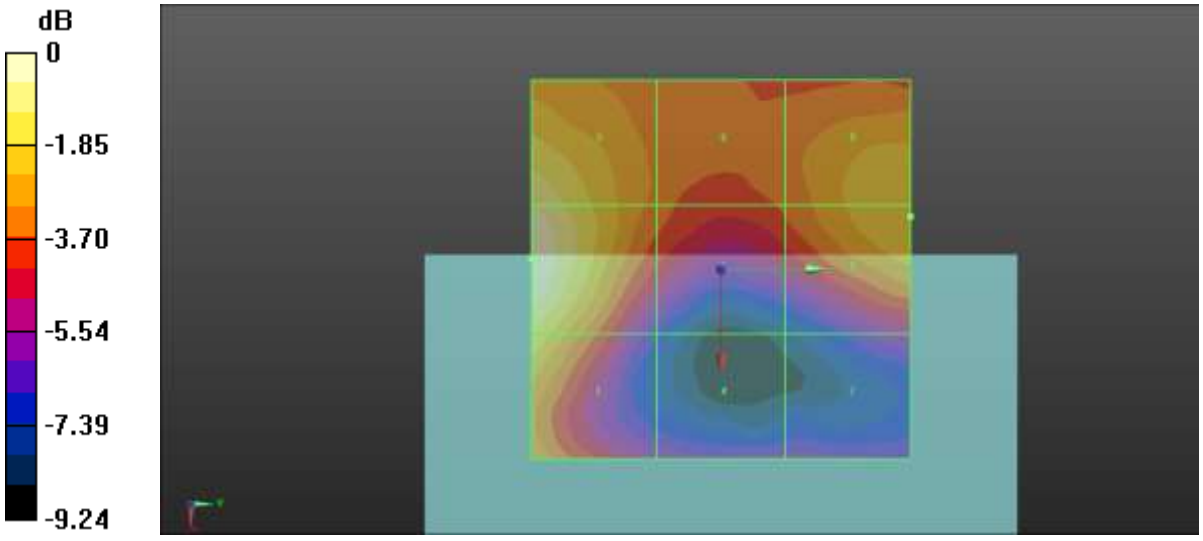
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2549.5 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 11.98 V/m; Power Drift = -0.03 dB
Applied MIF = -1.44 dB
RF audio interference level = 23.59 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.37 dBV/m** | Grid 2 **M4** **23.59 dBV/m** | Grid 3 **M4** **23.02 dBV/m** |
| Grid 4 **M4** **18.13 dBV/m** | Grid 5 **M4** **20.29 dBV/m** | Grid 6 **M4** **20.43 dBV/m** |
| Grid 7 **M4** **18.16 dBV/m** | Grid 8 **M4** **21.69 dBV/m** | Grid 9 **M4** **21.67 dBV/m** |

**Cursor:**
Total = 23.59 dBV/m
E Category: M4
Location: -1.5, -25, 7.7 mm




0 dB = 15.12 V/m = 23.59 dBV/m

**Plot No.9** **Date : 2020-12-29**

LTE Band 41 20MHz 16QAM 1RB 0offset 40620ch

Communication System: UID 10173 - CAG, LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM);
Frequency: 2593 MHz;Duty Cycle: 1:8.8736
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

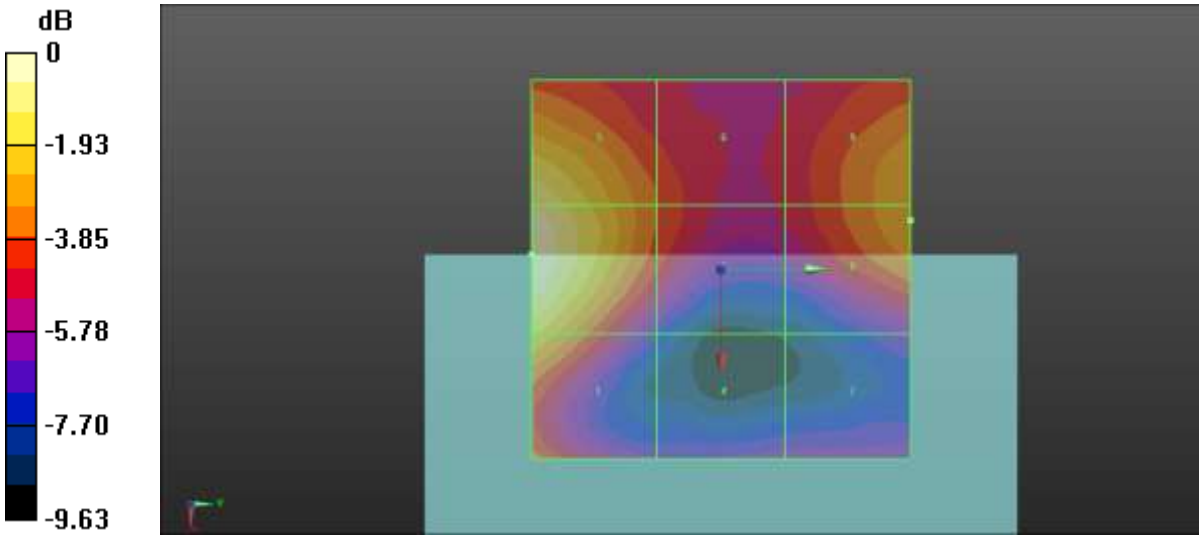
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2593 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 12.28 V/m; Power Drift = -0.07 dB
Applied MIF = -1.44 dB
RF audio interference level = 24.48 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.71 dBV/m** | Grid 2 **M4** **24.48 dBV/m** | Grid 3 **M4** **23.89 dBV/m** |
| Grid 4 **M4** **18.53 dBV/m** | Grid 5 **M4** **20.69 dBV/m** | Grid 6 **M4** **20.69 dBV/m** |
| Grid 7 **M4** **18.73 dBV/m** | Grid 8 **M4** **21.89 dBV/m** | Grid 9 **M4** **21.84 dBV/m** |

**Cursor:**
Total = 24.48 dBV/m
E Category: M4
Location: -2, -25, 7.7 mm




0 dB = 16.76 V/m = 24.49 dBV/m

**Plot No.10** **Date : 2020-12-29**

LTE Band 41 20MHz 16QAM 1RB 0offset 41055ch

Communication System: UID 10173 - CAG, LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM);
Frequency: 2636.5 MHz;Duty Cycle: 1:8.8736
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

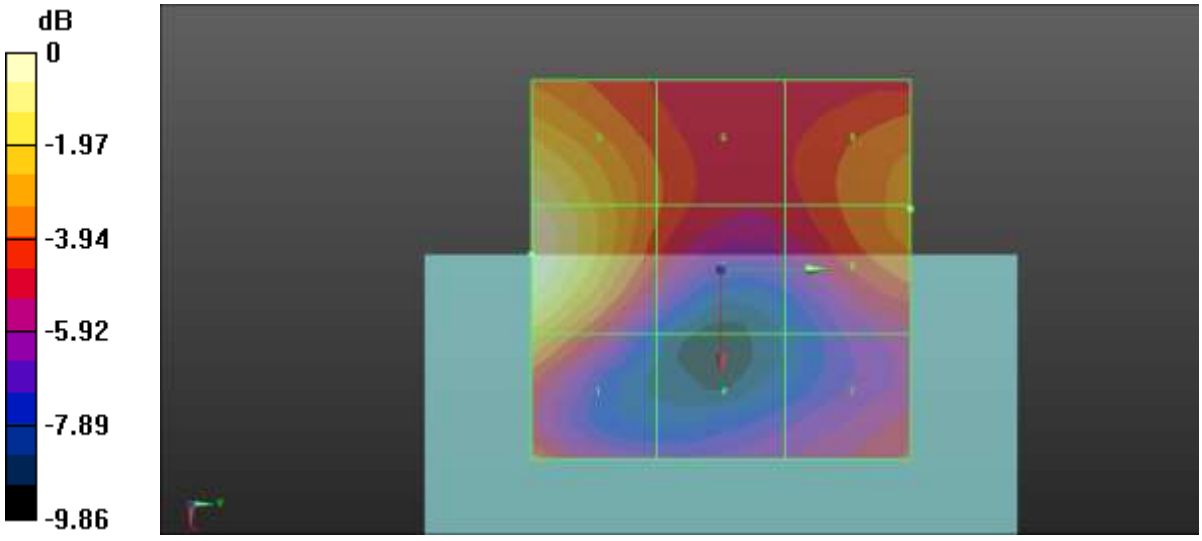
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2636.5 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 11.76 V/m; Power Drift = -0.08 dB
Applied MIF = -1.44 dB
RF audio interference level = 24.27 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.1 dBV/m** | Grid 2 **M4** **24.27 dBV/m** | Grid 3 **M4** **23.85 dBV/m** |
| Grid 4 **M4** **18.4 dBV/m** | Grid 5 **M4** **20.48 dBV/m** | Grid 6 **M4** **20.52 dBV/m** |
| Grid 7 **M4** **19.9 dBV/m** | Grid 8 **M4** **21.29 dBV/m** | Grid 9 **M4** **21.28 dBV/m** |

**Cursor:**
Total = 24.27 dBV/m
E Category: M4
Location: -2, -25, 7.7 mm




0 dB = 16.36 V/m = 24.28 dBV/m

**Plot No.11** **Date : 2020-12-29**

LTE Band 41 20MHz 16QAM 1RB 0offset 41490ch

Communication System: UID 10173 - CAG, LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM);
Frequency: 2680 MHz;Duty Cycle: 1:8.8736
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

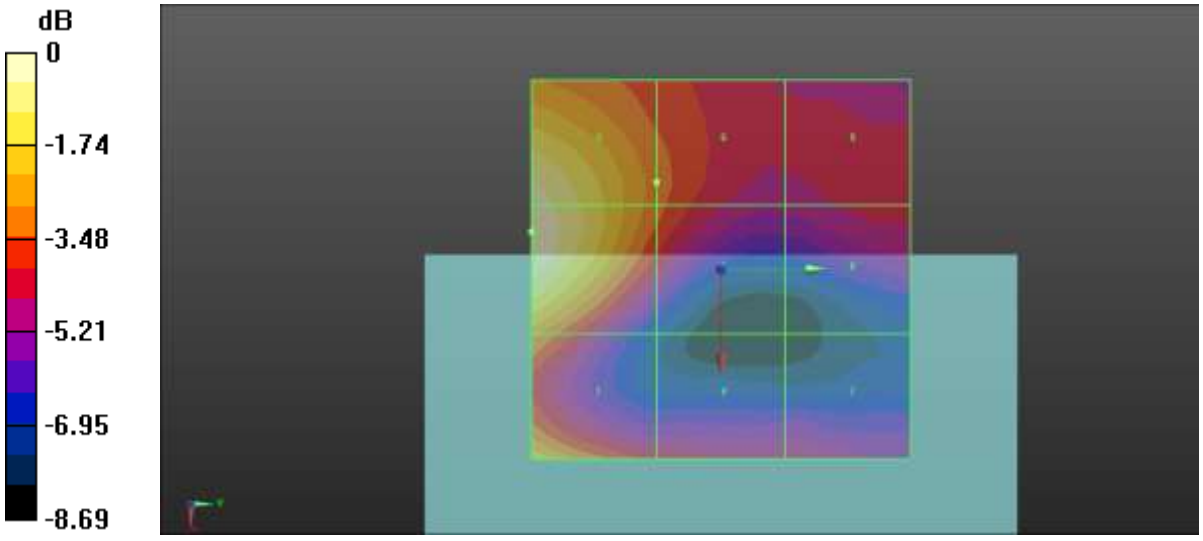
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2680 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 11.05 V/m; Power Drift = -0.14 dB
Applied MIF = -1.44 dB
RF audio interference level = 24.45 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.84 dBV/m** | Grid 2 **M4** **24.45 dBV/m** | Grid 3 **M4** **24.25 dBV/m** |
| Grid 4 **M4** **20.25 dBV/m** | Grid 5 **M4** **21.22 dBV/m** | Grid 6 **M4** **21.31 dBV/m** |
| Grid 7 **M4** **19.57 dBV/m** | Grid 8 **M4** **20.03 dBV/m** | Grid 9 **M4** **20.15 dBV/m** |

**Cursor:**
Total = 24.45 dBV/m
E Category: M4
Location: -5, -25, 7.7 mm




0 dB = 16.68 V/m = 24.44 dBV/m

**Plot No.12** **Date : 2020-12-30**

**Bluetooth DH1 0ch**

Communication System: UID 10030 - CAA, IEEE 802.15.1 Bluetooth (GFSK, DH1); Frequency: 2402 MHz;Duty Cycle: 1:3.38454
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

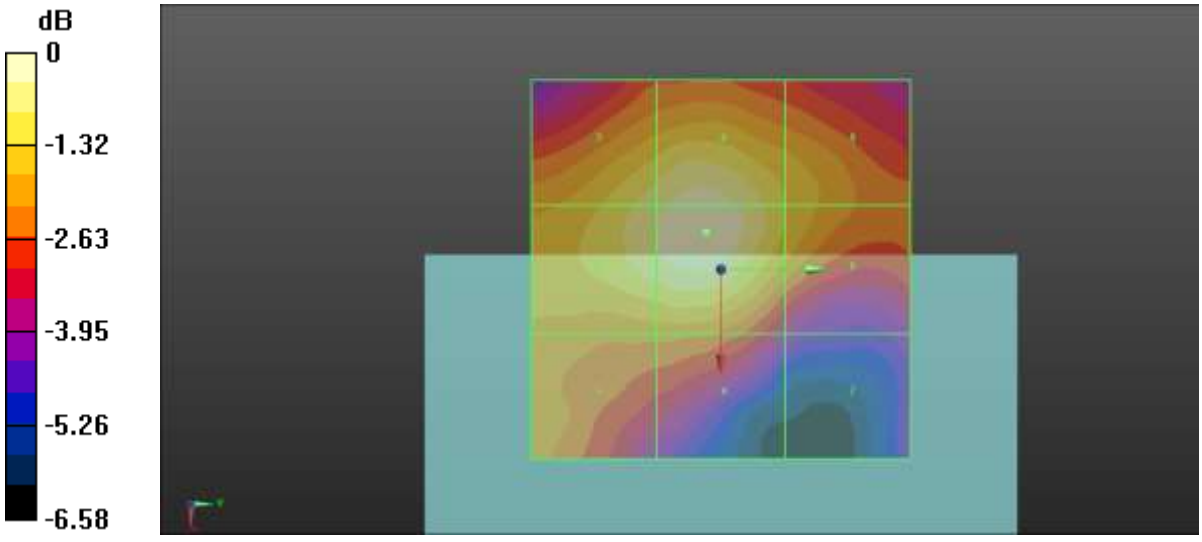
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2402 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 22.45 V/m; Power Drift = 0.05 dB
Applied MIF = 1.02 dB
RF audio interference level = 24.47 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.67 dBV/m** | Grid 2 **M4** **24.03 dBV/m** | Grid 3 **M4** **23.88 dBV/m** |
| Grid 4 **M4** **22.46 dBV/m** | Grid 5 **M4** **24.47 dBV/m** | Grid 6 **M4** **24.27 dBV/m** |
| Grid 7 **M4** **20.64 dBV/m** | Grid 8 **M4** **23.19 dBV/m** | Grid 9 **M4** **23.17 dBV/m** |

**Cursor:**
Total = 24.47 dBV/m
E Category: M4
Location: -5, -2, 7.7 mm




0 dB = 16.73 V/m = 24.47 dBV/m

**Plot No.13** **Date : 2020-12-30**

**Bluetooth DH1 39ch**

Communication System: UID 10030 - CAA, IEEE 802.15.1 Bluetooth (GFSK, DH1); Frequency: 2441 MHz;Duty Cycle: 1:3.38454
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

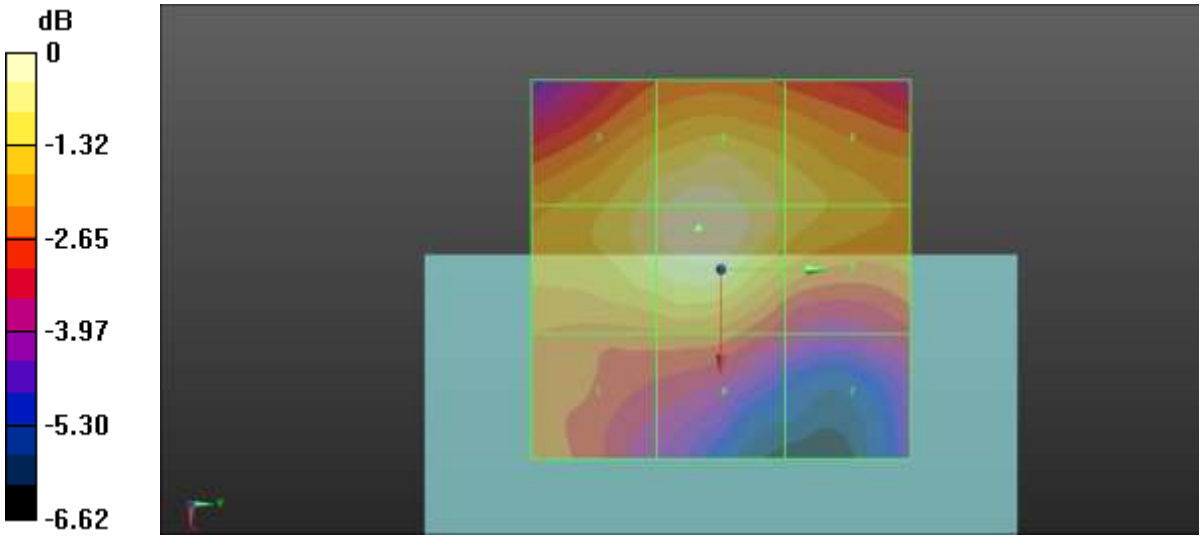
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2441 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 21.79 V/m; Power Drift = 0.11 dB
Applied MIF = 1.02 dB
RF audio interference level = 24.52 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.36 dBV/m** | Grid 2 **M4** **24.04 dBV/m** | Grid 3 **M4** **23.9 dBV/m** |
| Grid 4 **M4** **22.27 dBV/m** | Grid 5 **M4** **24.52 dBV/m** | Grid 6 **M4** **24.34 dBV/m** |
| Grid 7 **M4** **21.34 dBV/m** | Grid 8 **M4** **23.55 dBV/m** | Grid 9 **M4** **23.55 dBV/m** |

**Cursor:**
Total = 24.52 dBV/m
E Category: M4
Location: -5.5, -3, 7.7 mm




0 dB = 16.82 V/m = 24.52 dBV/m

**Plot No.14** **Date : 2020-12-30**

**Bluetooth DH1 78ch**

Communication System: UID 10030 - CAA, IEEE 802.15.1 Bluetooth (GFSK, DH1); Frequency: 2480 MHz;Duty Cycle: 1:3.38454
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: RF Section

DASY Configuration:

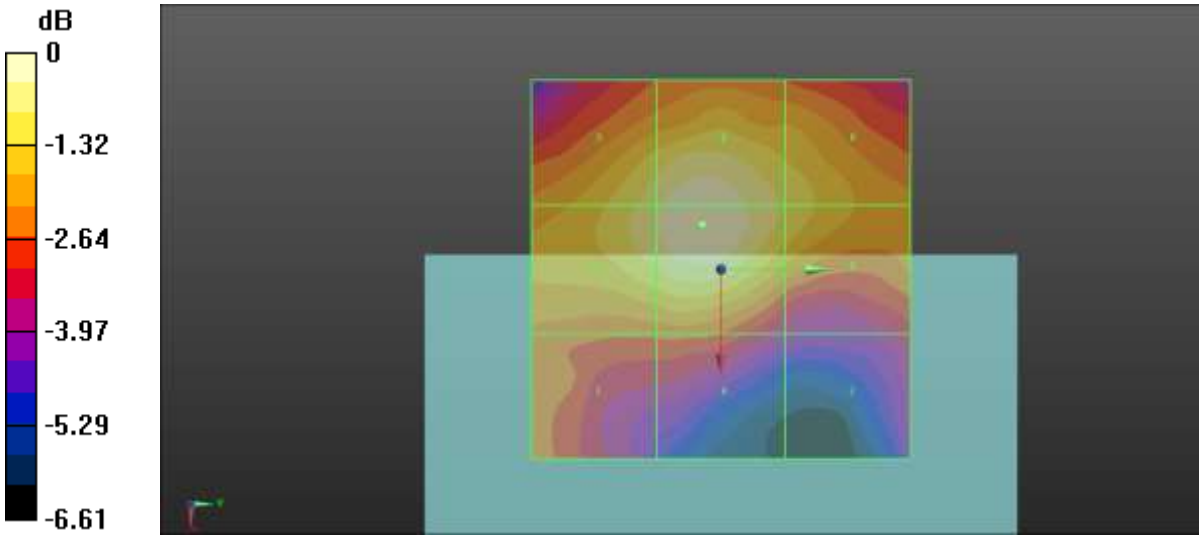
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2480 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 22.14 V/m; Power Drift = -0.07 dB
Applied MIF = 1.02 dB
RF audio interference level = 24.48 dBV/m
**Emission category: M4**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **22.21 dBV/m** | Grid 2 **M4** **24.05 dBV/m** | Grid 3 **M4** **23.92 dBV/m** |
| Grid 4 **M4** **22.02 dBV/m** | Grid 5 **M4** **24.48 dBV/m** | Grid 6 **M4** **24.37 dBV/m** |
| Grid 7 **M4** **21.23 dBV/m** | Grid 8 **M4** **23.52 dBV/m** | Grid 9 **M4** **23.52 dBV/m** |

**Cursor:**
Total = 24.48 dBV/m
E Category: M4
Location: -6, -2.5, 7.7 mm




0 dB = 16.76 V/m = 24.49 dBV/m

# 20. Appendix C. System Validation Plots

**835MHz Verification** **Date : 2020-12-28**

**DUT: HAC Dipole 835 MHz; Type: CD835V3**

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: TCoil Section

DASY Configuration:

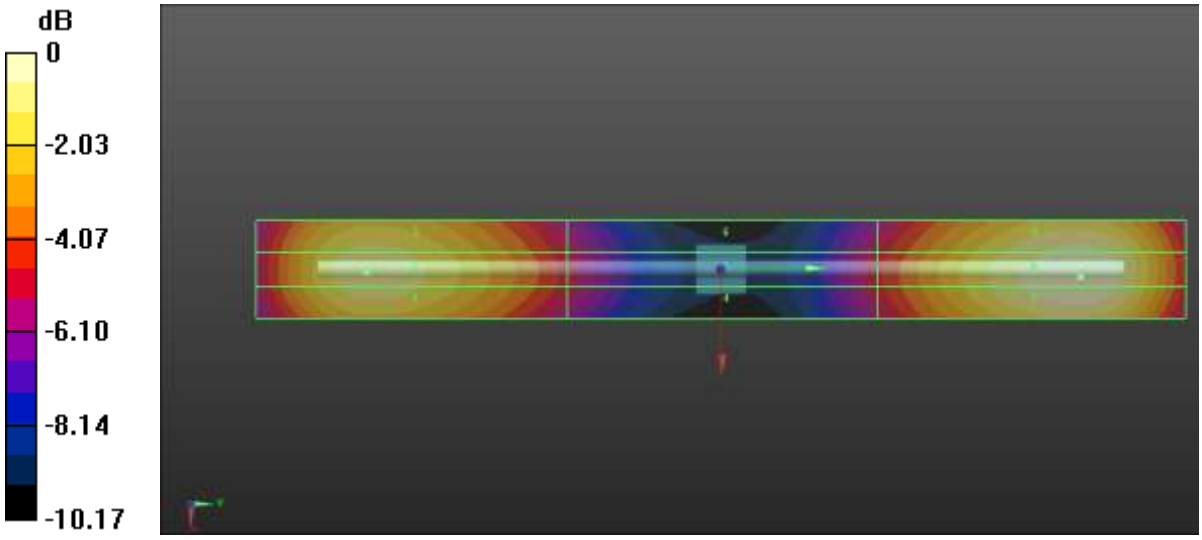
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 835 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (41x381x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 53.78 V/m; Power Drift = 0.13 dB
Applied MIF = 0.00 dB
RF audio interference level = 40.52 dBV/m
**Emission category: M3**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M4** **39.53 dBV/m** | Grid 2 **M4** **39.65 dBV/m** | Grid 3 **M4** **39.38 dBV/m** |
| Grid 4 **M4** **35.56 dBV/m** | Grid 5 **M4** **35.66 dBV/m** | Grid 6 **M4** **35.32 dBV/m** |
| Grid 7 **M3** **40.46 dBV/m** | Grid 8 **M3** **40.52 dBV/m** | Grid 9 **M3** **40.14 dBV/m** |

**Cursor:**
Total = 40.52 dBV/m
E Category: M3
Location: 1.5, 73.5, 9.7 mm




0 dB = 106.2 V/m = 40.52 dBV/m

**1880MHz Verification** **Date : 2020-12-28**

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3**

Communication System: UID 0, CW (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: TCoil Section

DASY Configuration:

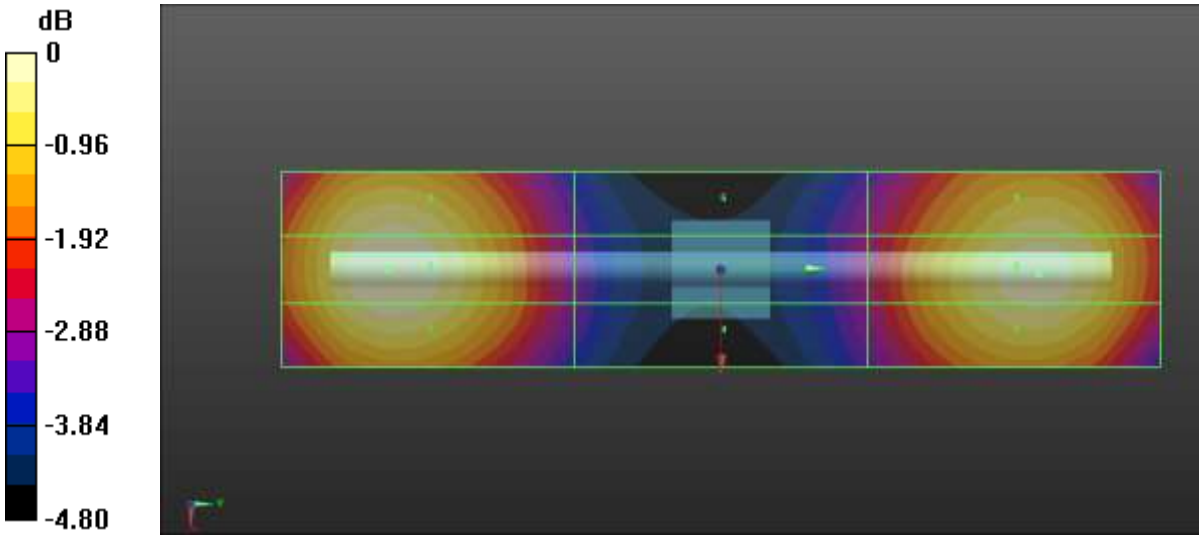
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 1880 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 69.25 V/m; Power Drift = 0.07 dB
Applied MIF = 0.00 dB
RF audio interference level = 39.14 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.98 dBV/m** | Grid 2 **M2** **39.14 dBV/m** | Grid 3 **M2** **38.95 dBV/m** |
| Grid 4 **M2** **36.32 dBV/m** | Grid 5 **M2** **36.45 dBV/m** | Grid 6 **M2** **36.32 dBV/m** |
| Grid 7 **M2** **38.86 dBV/m** | Grid 8 **M2** **39.01 dBV/m** | Grid 9 **M2** **38.75 dBV/m** |

**Cursor:**
Total = 39.14 dBV/m
E Category: M2
Location: 0, -34, 9.7 mm




0 dB = 90.53 V/m = 39.14 dBV/m

**2450MHz Verification** **Date : 2020-12-30**

**DUT: HAC Dipole 2450 MHz; Type: CD2450V3**

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: TCoil Section

DASY Configuration:

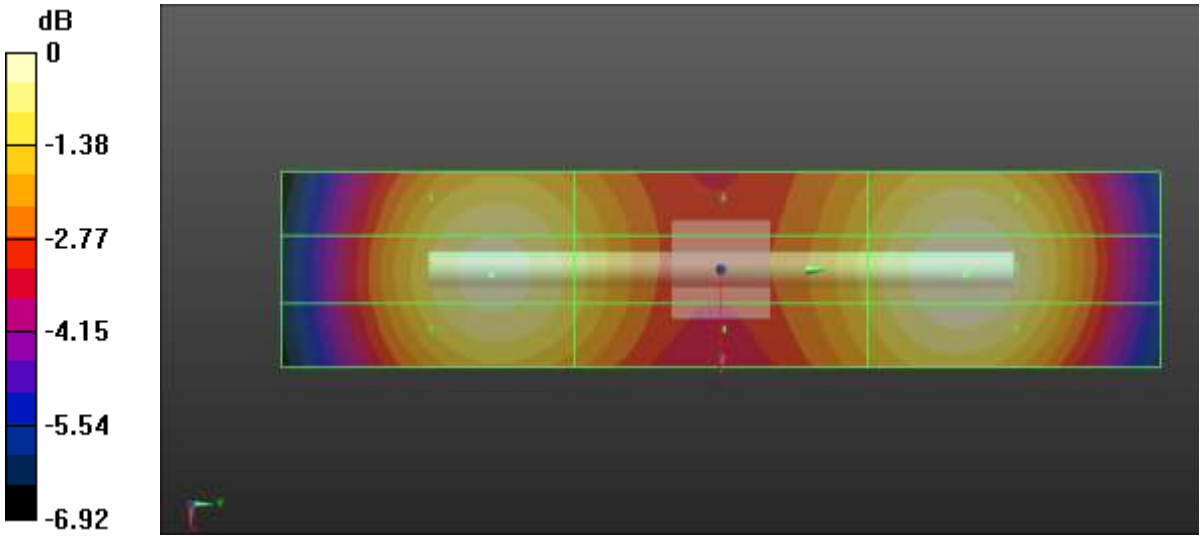
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2450 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 73.20 V/m; Power Drift = 0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.84 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.48 dBV/m** | Grid 2 **M2** **38.62 dBV/m** | Grid 3 **M2** **38.38 dBV/m** |
| Grid 4 **M2** **37.64 dBV/m** | Grid 5 **M2** **37.71 dBV/m** | Grid 6 **M2** **37.59 dBV/m** |
| Grid 7 **M2** **38.71 dBV/m** | Grid 8 **M2** **38.84 dBV/m** | Grid 9 **M2** **38.61 dBV/m** |

**Cursor:**
Total = 38.84 dBV/m
E Category: M2
Location: 0.5, 25, 9.7 mm




0 dB = 87.53 V/m = 38.84 dBV/m

**2600MHz Verification** **Date : 2020-12-29**

**DUT: HAC Dipole 2600 MHz; Type: CD2600V3**

Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma$ = 0 S/m, $\varepsilon_r$ = 1; $\rho$ = 0 kg/m$^3$
Phantom section: TCoil Section

DASY Configuration:

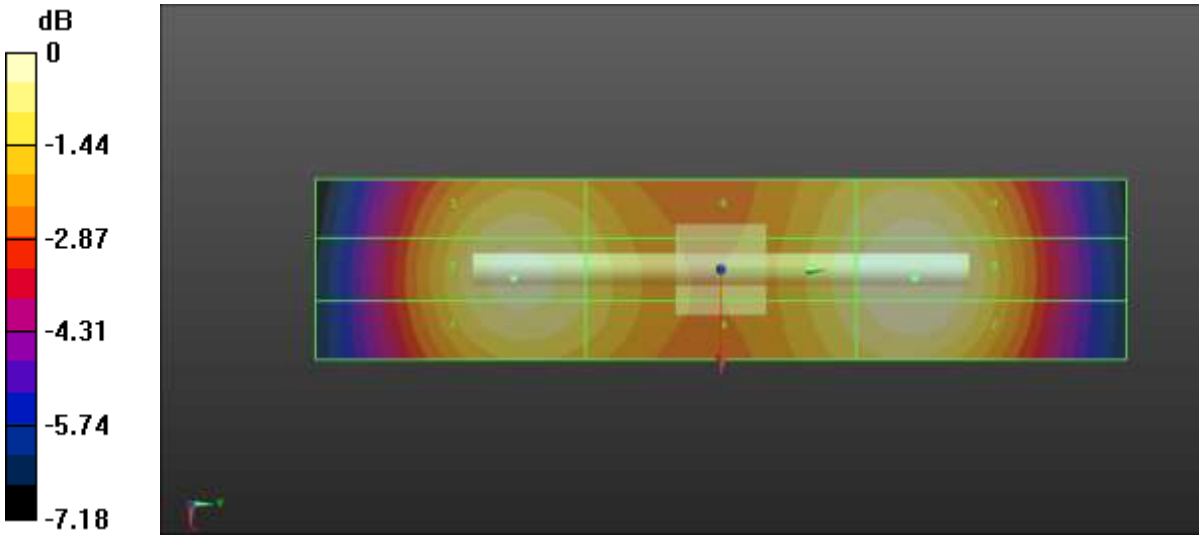
- Probe: EF3DV3 - SN4034; ConvF(1, 1, 1) @ 2600 MHz;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn504; Calibrated: 2020-02-26
- Phantom: HAC Test Arch with AMCC
- Measurement SW: DASY52, Version 52.10 (4);

**Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 72.71 V/m; Power Drift = 0.07 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.49 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.11 dBV/m** | Grid 2 **M2** **38.21 dBV/m** | Grid 3 **M2** **37.91 dBV/m** |
| Grid 4 **M2** **37.91 dBV/m** | Grid 5 **M2** **38 dBV/m** | Grid 6 **M2** **37.78 dBV/m** |
| Grid 7 **M2** **38.42 dBV/m** | Grid 8 **M2** **38.49 dBV/m** | Grid 9 **M2** **38.25 dBV/m** |

**Cursor:**
Total = 38.49 dBV/m
E Category: M2
Location: 1, 21.5, 9.7 mm




0 dB = 84.05 V/m = 38.49 dBV/m

# 21. Appendix D. Probe Calibration Data

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Swiss Calibration Service

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Accreditation No.: SCS 0108

Client HCT (Dymstec) Certificate No: EF3-4034_Feb20

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | EF3DV3- SN:4034 |
| Calibration procedure(s) | QA CAL-02.v9, QA CAL-25.v7<br>Calibration procedure for E-field probes optimized for close near field evaluations in air |
| Calibration date: | February 25, 2020 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 03-Apr-19 (No. 217-02892/02893) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103244 | 03-Apr-19 (No. 217-02892) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103245 | 03-Apr-19 (No. 217-02893) | Apr-20 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-19 (No. 217-02894) | Apr-20 |
| DAE4 | SN: 789 | 27-Dec-19 (No. DAE4-789_Dec19) | Dec-20 |
| Reference Probe ER3DV6 | SN: 2328 | 05-Oct-19 (No. ER3-2328_Oct19) | Oct-20 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| Power meter E4419B | SN: GB41293874 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A | SN: MY41498087 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A | SN: 000110210 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| RF generator HP 8648C | SN: US3642U01700 | 04-Aug-99 (in house check Jun-18) | In house check: Jun-20 |
| Network Analyzer E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Michael Weber | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 25, 2020

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: **SCS 0108**

## Glossary:

| | |
|---|---|
| NORMx,y,z | sensitivity in free space |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| En | incident E-field orientation normal to probe axis |
| Ep | incident E-field orientation parallel to probe axis |
| Polarization φ | φ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2005, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
b) CTIA Test Plan for Hearing Aid Compatibility, Rev 3.1.1, May 2017

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 for XY sensors and ϑ = 90 for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart).
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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# DASY/EASY - Parameters of Probe: EF3DV3 - SN:4034

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$) | 0.95 | 0.79 | 1.23 | ± 10.1 % |
| DCP (mV)[B] | 96.5 | 96.7 | 97.1 | |

## Calibration results for Frequency Response (30 MHz – 6 GHz)

| Frequency MHz | Target E-Field V/m | Measured E-field (En) V/m | Deviation E-normal in % | Measured E-field (Ep) V/m | Deviation E-normal in % | Unc (k=2) % |
|---|---|---|---|---|---|---|
| 30 | 77.3 | 77.2 | -0.1% | 77.4 | 0.2% | ± 5.1 % |
| 100 | 77.3 | 78.3 | 1.3% | 77.9 | 0.7% | ± 5.1 % |
| 450 | 77.2 | 78.2 | 1.3% | 77.8 | 0.8% | ± 5.1 % |
| 600 | 77.2 | 77.8 | 0.8% | 77.5 | 0.4% | ± 5.1 % |
| 750 | 77.2 | 77.7 | 0.7% | 77.4 | 0.3% | ± 5.1 % |
| | | | | | | |
| 1800 | 143.1 | 139.4 | -2.6% | 139.5 | -2.5% | ± 5.1 % |
| 2000 | 135.0 | 131.5 | -2.6% | 131.7 | -2.5% | ± 5.1 % |
| 2200 | 127.5 | 123.5 | -3.1% | 124.7 | -2.2% | ± 5.1 % |
| 2500 | 125.5 | 122.5 | -2.3% | 123.5 | -1.5% | ± 5.1 % |
| 3000 | 79.5 | 75.8 | -4.7% | 76.8 | -3.5% | ± 5.1 % |
| | | | | | | |
| 3500 | 256.5 | 248.2 | -3.2% | 245.6 | -4.3% | ± 5.1 % |
| 3700 | 251.1 | 240.3 | -4.3% | 239.5 | -4.6% | ± 5.1 % |
| | | | | | | |
| 5200 | 50.1 | 50.6 | 0.9% | 50.8 | 1.4% | ± 5.1 % |
| 5500 | 49.6 | 49.3 | -0.7% | 48.2 | -2.9% | ± 5.1 % |
| 5800 | 48.9 | 48.6 | -0.7% | 49.6 | 1.3% | ± 5.1 % |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[B] Numerical linearization parameter; uncertainty not required.
[C] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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# DASY/EASY - Parameters of Probe: EF3DV3 - SN:4034

## Calibration Results for Modulation Response

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Max dev. | Max Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.00 | 0.00 | 1.00 | 0.00 | 146.4 | ± 3.5 % | ± 4.7 % |
| | | Y | 0.00 | 0.00 | 1.00 | | 128.3 | | |
| | | Z | 0.00 | 0.00 | 1.00 | | 130.0 | | |
| 10352-AAA | Pulse Waveform (200Hz, 10%) | X | 5.28 | 73.54 | 14.01 | 10.00 | 60.0 | ± 2.4 % | ± 9.6 % |
| | | Y | 5.37 | 73.54 | 14.44 | | 60.0 | | |
| | | Z | 5.43 | 73.89 | 14.11 | | 60.0 | | |
| 10353-AAA | Pulse Waveform (200Hz, 20%) | X | 10.00 | 81.25 | 15.41 | 6.99 | 80.0 | ± 0.8 % | ± 9.6 % |
| | | Y | 7.96 | 79.44 | 15.33 | | 80.0 | | |
| | | Z | 15.64 | 85.48 | 16.64 | | 80.0 | | |
| 10354-AAA | Pulse Waveform (200Hz, 40%) | X | 20.00 | 87.49 | 15.68 | 3.98 | 95.0 | ± 0.8 % | ± 9.6 % |
| | | Y | 20.00 | 88.97 | 16.70 | | 95.0 | | |
| | | Z | 20.00 | 88.07 | 15.98 | | 95.0 | | |
| 10355-AAA | Pulse Waveform (200Hz, 60%) | X | 20.00 | 86.08 | 13.85 | 2.22 | 120.0 | ± 0.8 % | ± 9.6 % |
| | | Y | 20.00 | 90.22 | 16.09 | | 120.0 | | |
| | | Z | 20.00 | 87.22 | 14.43 | | 120.0 | | |
| 10387-AAA | QPSK Waveform, 1 MHz | X | 1.91 | 69.23 | 16.64 | 1.00 | 150.0 | ± 2.1 % | ± 9.6 % |
| | | Y | 2.05 | 71.14 | 17.64 | | 150.0 | | |
| | | Z | 1.98 | 70.75 | 17.24 | | 150.0 | | |
| 10388-AAA | QPSK Waveform, 10 MHz | X | 2.62 | 71.19 | 17.47 | 0.00 | 150.0 | ± 0.9 % | ± 9.6 % |
| | | Y | 2.73 | 72.30 | 18.20 | | 150.0 | | |
| | | Z | 2.62 | 71.72 | 17.86 | | 150.0 | | |
| 10396-AAA | 64-QAM Waveform, 100 kHz | X | 3.01 | 71.96 | 19.81 | 3.01 | 150.0 | ± 0.7 % | ± 9.6 % |
| | | Y | 3.11 | 72.94 | 20.25 | | 150.0 | | |
| | | Z | 2.61 | 69.96 | 18.85 | | 150.0 | | |
| 10399-AAA | 64-QAM Waveform, 40 MHz | X | 3.65 | 68.02 | 16.47 | 0.00 | 150.0 | ± 1.5 % | ± 9.6 % |
| | | Y | 3.71 | 68.47 | 16.79 | | 150.0 | | |
| | | Z | 3.66 | 68.24 | 16.64 | | 150.0 | | |
| 10414-AAA | WLAN CCDF, 64-QAM, 40MHz | X | 4.98 | 66.19 | 16.06 | 0.00 | 150.0 | ± 3.1 % | ± 9.6 % |
| | | Y | 4.80 | 65.81 | 15.89 | | 150.0 | | |
| | | Z | 4.76 | 65.71 | 15.84 | | 150.0 | | |

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# DASY/EASY - Parameters of Probe: EF3DV3 - SN:4034

## Sensor Frequency Model Parameters

| | Sensor X | Sensor Y | Sensor Z |
|---|---|---|---|
| Frequency Corr. (LF) | 0.20 | 0.10 | 6.36 |
| Frequency Corr. (HF) | 2.82 | 2.82 | 2.82 |

## Sensor Model Parameters

| | C1 fF | C2 fF | α $V^{-1}$ | T1 $ms.V^{-2}$ | T2 $ms.V^{-1}$ | T3 ms | T4 $V^{-2}$ | T5 $V^{-1}$ | T6 |
|---|---|---|---|---|---|---|---|---|---|
| X | 49.9 | 334.09 | 37.69 | 10.10 | 0.29 | 5.03 | 0.51 | 0.33 | 1.01 |
| Y | 45.3 | 298.23 | 36.80 | 10.29 | 0.56 | 5.00 | 0.79 | 0.25 | 1.00 |
| Z | 43.6 | 290.37 | 37.50 | 10.33 | 0.27 | 5.03 | 0.16 | 0.31 | 1.00 |

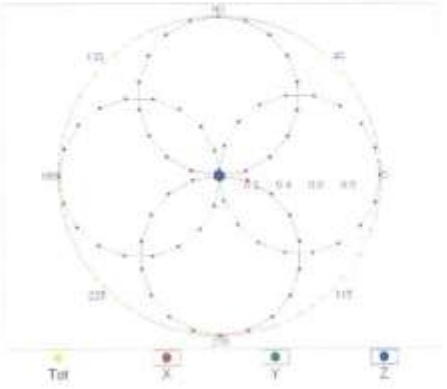
## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Rectangular |
| Connector Angle (°) | 8.1 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 12 mm |
| Tip Length | 25 mm |
| Tip Diameter | 4 mm |
| Probe Tip to Sensor X Calibration Point | 1.5 mm |
| Probe Tip to Sensor Y Calibration Point | 1.5 mm |
| Probe Tip to Sensor Z Calibration Point | 1.5 mm |

## Receiving Pattern (ϕ), ϑ = 0°

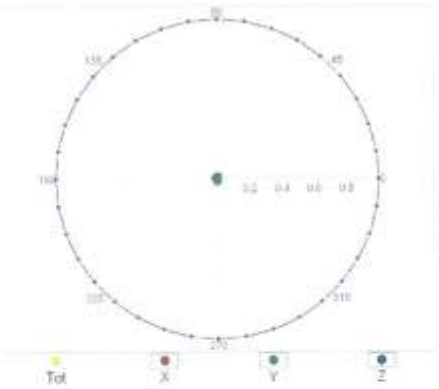
f=600 MHz,TEM,0°


f=1800 MHz,R22,0°

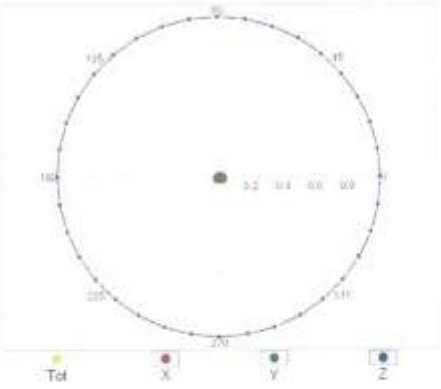



## Receiving Pattern (ϕ), ϑ = 90°

f=600 MHz,TEM,90°




f=1800 MHz,R22,90°



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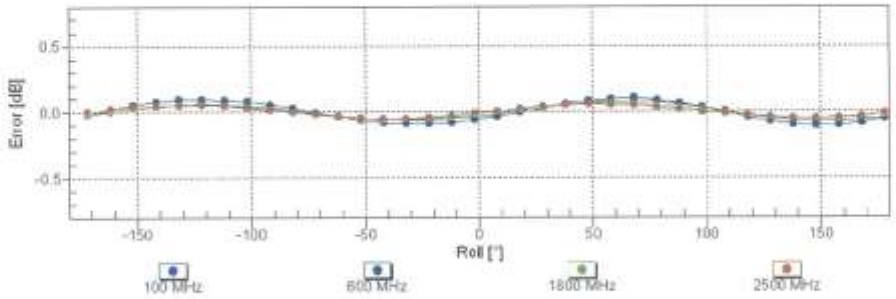
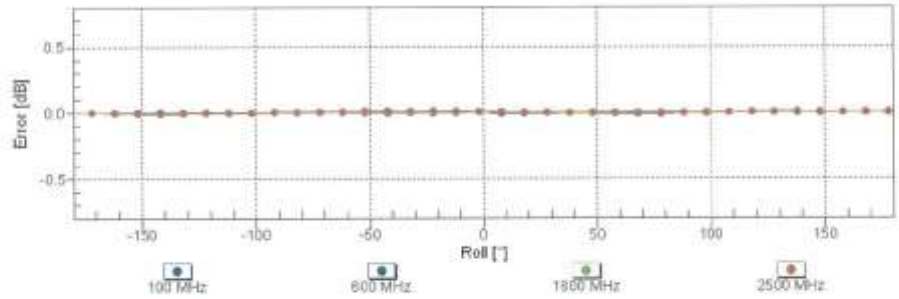
## Receiving Pattern (ϕ), ϑ = 0°




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

## Receiving Pattern (ϕ), ϑ = 90°




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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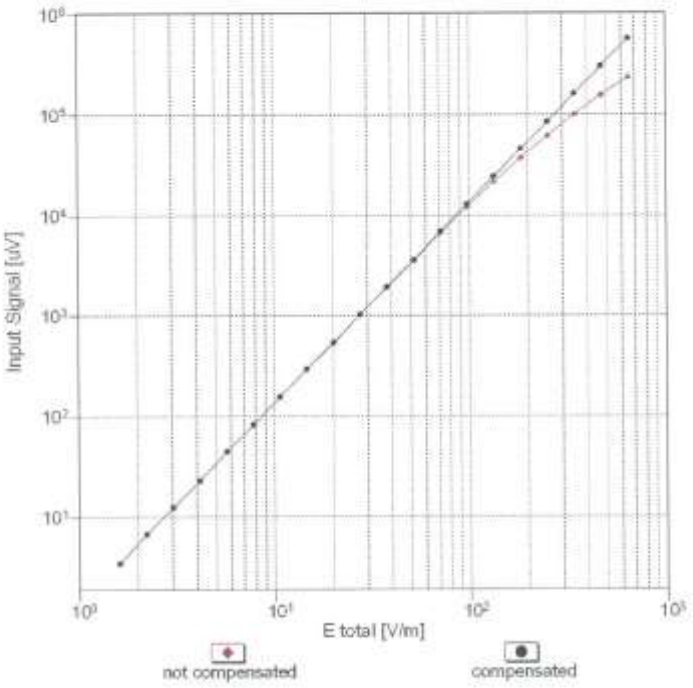
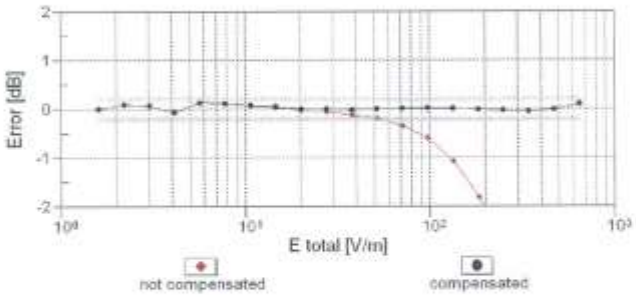
## Dynamic Range f(E-field)
(TEM cell, f = 900 MHz)




**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

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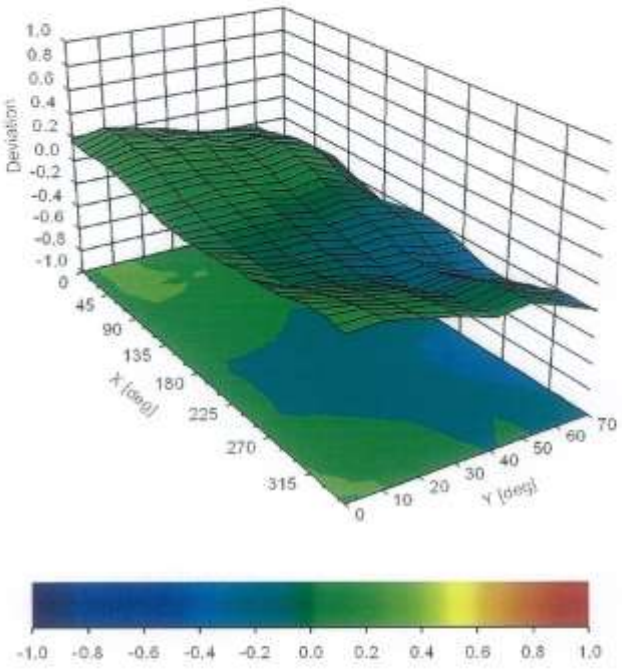
## Deviation from Isotropy in Air

**Error (ϕ, ϑ), f = 900 MHz**




**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**

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## Appendix: Modulation Calibration Parameters

| UID | Rev | Communication System Name | Group | PAR (dB) | Unc[E] (k=2) |
|---|---|---|---|---|---|
| 0 | | CW | CW | 0.00 | ± 4.7 % |
| 10010 | CAA | SAR Validation (Square, 100ms, 10ms) | Test | 10.00 | ± 9.6 % |
| 10011 | CAB | UMTS-FDD (WCDMA) | WCDMA | 2.91 | ± 9.6 % |
| 10012 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | WLAN | 1.87 | ± 9.6 % |
| 10013 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | WLAN | 9.46 | ± 9.6 % |
| 10021 | DAC | GSM-FDD (TDMA, GMSK) | GSM | 9.39 | ± 9.6 % |
| 10023 | DAC | GPRS-FDD (TDMA, GMSK, TN 0) | GSM | 9.57 | ± 9.6 % |
| 10024 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1) | GSM | 6.56 | ± 9.6 % |
| 10025 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0) | GSM | 12.62 | ± 9.6 % |
| 10026 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1) | GSM | 9.55 | ± 9.6 % |
| 10027 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2) | GSM | 4.80 | ± 9.6 % |
| 10028 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3) | GSM | 3.55 | ± 9.6 % |
| 10029 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2) | GSM | 7.78 | ± 9.6 % |
| 10030 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH1) | Bluetooth | 5.30 | ± 9.6 % |
| 10031 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH3) | Bluetooth | 1.87 | ± 9.6 % |
| 10032 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5) | Bluetooth | 1.16 | ± 9.6 % |
| 10033 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1) | Bluetooth | 7.74 | ± 9.6 % |
| 10034 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3) | Bluetooth | 4.53 | ± 9.6 % |
| 10035 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5) | Bluetooth | 3.83 | ± 9.6 % |
| 10036 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH1) | Bluetooth | 8.01 | ± 9.6 % |
| 10037 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH3) | Bluetooth | 4.77 | ± 9.6 % |
| 10038 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH5) | Bluetooth | 4.10 | ± 9.6 % |
| 10039 | CAB | CDMA2000 (1xRTT, RC1) | CDMA2000 | 4.57 | ± 9.6 % |
| 10042 | CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate) | AMPS | 7.78 | ± 9.6 % |
| 10044 | CAA | IS-91/EIA/TIA-553 FDD (FDMA, FM) | AMPS | 0.00 | ± 9.6 % |
| 10048 | CAA | DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24) | DECT | 13.80 | ± 9.6 % |
| 10049 | CAA | DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12) | DECT | 10.79 | ± 9.6 % |
| 10056 | CAA | UMTS-TDD (TD-SCDMA, 1.28 Mcps) | TD-SCDMA | 11.01 | ± 9.6 % |
| 10058 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3) | GSM | 6.52 | ± 9.6 % |
| 10059 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps) | WLAN | 2.12 | ± 9.6 % |
| 10060 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps) | WLAN | 2.83 | ± 9.6 % |
| 10061 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps) | WLAN | 3.60 | ± 9.6 % |
| 10062 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps) | WLAN | 8.68 | ± 9.6 % |
| 10063 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps) | WLAN | 8.63 | ± 9.6 % |
| 10064 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps) | WLAN | 9.09 | ± 9.6 % |
| 10065 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps) | WLAN | 9.00 | ± 9.6 % |
| 10066 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps) | WLAN | 9.38 | ± 9.6 % |
| 10067 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps) | WLAN | 10.12 | ± 9.6 % |
| 10068 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps) | WLAN | 10.24 | ± 9.6 % |
| 10069 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps) | WLAN | 10.56 | ± 9.6 % |
| 10071 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps) | WLAN | 9.83 | ± 9.6 % |
| 10072 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps) | WLAN | 9.62 | ± 9.6 % |
| 10073 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps) | WLAN | 9.94 | ± 9.6 % |
| 10074 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps) | WLAN | 10.30 | ± 9.6 % |
| 10075 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps) | WLAN | 10.77 | ± 9.6 % |
| 10076 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps) | WLAN | 10.94 | ± 9.6 % |
| 10077 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps) | WLAN | 11.00 | ± 9.6 % |
| 10081 | CAB | CDMA2000 (1xRTT, RC3) | CDMA2000 | 3.97 | ± 9.6 % |
| 10082 | CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate) | AMPS | 4.77 | ± 9.6 % |
| 10090 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-4) | GSM | 6.56 | ± 9.6 % |
| 10097 | CAB | UMTS-FDD (HSDPA) | WCDMA | 3.98 | ± 9.6 % |
| 10098 | CAB | UMTS-FDD (HSUPA, Subtest 2) | WCDMA | 3.98 | ± 9.6 % |
| 10099 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-4) | GSM | 9.55 | ± 9.6 % |
| 10100 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | LTE-FDD | 5.67 | ± 9.6 % |
| 10101 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM) | LTE-FDD | 6.42 | ± 9.6 % |
| 10102 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM) | LTE-FDD | 6.60 | ± 9.6 % |
| 10103 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | LTE-TDD | 9.29 | ± 9.6 % |
| 10104 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM) | LTE-TDD | 9.97 | ± 9.6 % |
| 10105 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM) | LTE-TDD | 10.01 | ± 9.6 % |
| 10108 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | LTE-FDD | 5.80 | ± 9.6 % |

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| | | | | | |
|---|---|---|---|---|---|
| 10109 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM) | LTE-FDD | 6.43 | ± 9.6 % |
| 10110 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK) | LTE-FDD | 5.75 | ± 9.6 % |
| 10111 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM) | LTE-FDD | 6.44 | ± 9.6 % |
| 10112 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM) | LTE-FDD | 6.59 | ± 9.6 % |
| 10113 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM) | LTE-FDD | 6.62 | ± 9.6 % |
| 10114 | CAC | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK) | WLAN | 8.10 | ± 9.6 % |
| 10115 | CAC | IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM) | WLAN | 8.46 | ± 9.6 % |
| 10116 | CAC | IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM) | WLAN | 8.15 | ± 9.6 % |
| 10117 | CAC | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | WLAN | 8.07 | ± 9.6 % |
| 10118 | CAC | IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM) | WLAN | 8.59 | ± 9.6 % |
| 10119 | CAC | IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM) | WLAN | 8.13 | ± 9.6 % |
| 10140 | CAE | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM) | LTE-FDD | 6.49 | ± 9.6 % |
| 10141 | CAE | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM) | LTE-FDD | 6.53 | ± 9.6 % |
| 10142 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK) | LTE-FDD | 5.73 | ± 9.6 % |
| 10143 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM) | LTE-FDD | 6.35 | ± 9.6 % |
| 10144 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM) | LTE-FDD | 6.65 | ± 9.6 % |
| 10145 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK) | LTE-FDD | 5.76 | ± 9.6 % |
| 10146 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM) | LTE-FDD | 6.41 | ± 9.6 % |
| 10147 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM) | LTE-FDD | 6.72 | ± 9.6 % |
| 10149 | CAE | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM) | LTE-FDD | 6.42 | ± 9.6 % |
| 10150 | CAE | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM) | LTE-FDD | 6.60 | ± 9.6 % |
| 10151 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK) | LTE-TDD | 9.28 | ± 9.6 % |
| 10152 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM) | LTE-TDD | 9.92 | ± 9.6 % |
| 10153 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM) | LTE-TDD | 10.05 | ± 9.6 % |
| 10154 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK) | LTE-FDD | 5.75 | ± 9.6 % |
| 10155 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM) | LTE-FDD | 6.43 | ± 9.6 % |
| 10156 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK) | LTE-FDD | 5.79 | ± 9.6 % |
| 10157 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM) | LTE-FDD | 6.49 | ± 9.6 % |
| 10158 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM) | LTE-FDD | 6.62 | ± 9.6 % |
| 10159 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM) | LTE-FDD | 6.56 | ± 9.6 % |
| 10160 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK) | LTE-FDD | 5.82 | ± 9.6 % |
| 10161 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM) | LTE-FDD | 6.43 | ± 9.6 % |
| 10162 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM) | LTE-FDD | 6.58 | ± 9.6 % |
| 10166 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK) | LTE-FDD | 5.46 | ± 9.6 % |
| 10167 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM) | LTE-FDD | 6.21 | ± 9.6 % |
| 10168 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM) | LTE-FDD | 6.79 | ± 9.6 % |
| 10169 | CAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK) | LTE-FDD | 5.73 | ± 9.6 % |
| 10170 | CAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM) | LTE-FDD | 6.52 | ± 9.6 % |
| 10171 | AAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM) | LTE-FDD | 6.49 | ± 9.6 % |
| 10172 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK) | LTE-TDD | 9.21 | ± 9.6 % |
| 10173 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10174 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10175 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK) | LTE-FDD | 5.72 | ± 9.6 % |
| 10176 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM) | LTE-FDD | 6.52 | ± 9.6 % |
| 10177 | CAI | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK) | LTE-FDD | 5.73 | ± 9.6 % |
| 10178 | CAG | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM) | LTE-FDD | 6.52 | ± 9.6 % |
| 10179 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM) | LTE-FDD | 6.50 | ± 9.6 % |
| 10180 | CAG | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM) | LTE-FDD | 6.50 | ± 9.6 % |
| 10181 | CAE | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK) | LTE-FDD | 5.72 | ± 9.6 % |
| 10182 | CAE | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM) | LTE-FDD | 6.52 | ± 9.6 % |
| 10183 | AAD | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM) | LTE-FDD | 6.50 | ± 9.6 % |
| 10184 | CAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK) | LTE-FDD | 5.73 | ± 9.6 % |
| 10185 | CAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM) | LTE-FDD | 6.51 | ± 9.6 % |
| 10186 | AAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM) | LTE-FDD | 6.50 | ± 9.6 % |
| 10187 | CAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK) | LTE-FDD | 5.73 | ± 9.6 % |
| 10188 | CAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM) | LTE-FDD | 6.52 | ± 9.6 % |
| 10189 | AAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM) | LTE-FDD | 6.50 | ± 9.6 % |
| 10193 | CAC | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK) | WLAN | 8.09 | ± 9.6 % |
| 10194 | CAC | IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM) | WLAN | 8.12 | ± 9.6 % |
| 10195 | CAC | IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM) | WLAN | 8.21 | ± 9.6 % |
| 10196 | CAC | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK) | WLAN | 8.10 | ± 9.6 % |
| 10197 | CAC | IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM) | WLAN | 8.13 | ± 9.6 % |
| 10198 | CAC | IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM) | WLAN | 8.27 | ± 9.6 % |
| 10219 | CAC | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK) | WLAN | 8.03 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10220 | CAC | IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM) | WLAN | 8.13 | ± 9.6 % |
| 10221 | CAC | IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM) | WLAN | 8.27 | ± 9.6 % |
| 10222 | CAC | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK) | WLAN | 8.06 | ± 9.6 % |
| 10223 | CAC | IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM) | WLAN | 8.48 | ± 9.6 % |
| 10224 | CAC | IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM) | WLAN | 8.08 | ± 9.6 % |
| 10225 | CAB | UMTS-FDD (HSPA+) | WCDMA | 5.97 | ± 9.6 % |
| 10226 | CAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.49 | ± 9.6 % |
| 10227 | CAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM) | LTE-TDD | 10.26 | ± 9.6 % |
| 10228 | CAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK) | LTE-TDD | 9.22 | ± 9.6 % |
| 10229 | CAD | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10230 | CAD | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10231 | CAD | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK) | LTE-TDD | 9.19 | ± 9.6 % |
| 10232 | CAG | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10233 | CAG | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10234 | CAG | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK) | LTE-TDD | 9.21 | ± 9.6 % |
| 10235 | CAG | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10236 | CAG | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10237 | CAG | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK) | LTE-TDD | 9.21 | ± 9.6 % |
| 10238 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10239 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10240 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK) | LTE-TDD | 9.21 | ± 9.6 % |
| 10241 | CAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.82 | ± 9.6 % |
| 10242 | CAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM) | LTE-TDD | 9.86 | ± 9.6 % |
| 10243 | CAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK) | LTE-TDD | 9.46 | ± 9.6 % |
| 10244 | CAD | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10245 | CAD | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10246 | CAD | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK) | LTE-TDD | 9.30 | ± 9.6 % |
| 10247 | CAG | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM) | LTE-TDD | 9.91 | ± 9.6 % |
| 10248 | CAG | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM) | LTE-TDD | 10.09 | ± 9.6 % |
| 10249 | CAG | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK) | LTE-TDD | 9.29 | ± 9.6 % |
| 10250 | CAG | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM) | LTE-TDD | 9.81 | ± 9.6 % |
| 10251 | CAG | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM) | LTE-TDD | 10.17 | ± 9.6 % |
| 10252 | CAG | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK) | LTE-TDD | 9.24 | ± 9.6 % |
| 10253 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM) | LTE-TDD | 9.90 | ± 9.6 % |
| 10254 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM) | LTE-TDD | 10.14 | ± 9.6 % |
| 10255 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK) | LTE-TDD | 9.20 | ± 9.6 % |
| 10256 | CAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.96 | ± 9.6 % |
| 10257 | CAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM) | LTE-TDD | 10.08 | ± 9.6 % |
| 10258 | CAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK) | LTE-TDD | 9.34 | ± 9.6 % |
| 10259 | CAD | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM) | LTE-TDD | 9.98 | ± 9.6 % |
| 10260 | CAD | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM) | LTE-TDD | 9.97 | ± 9.6 % |
| 10261 | CAD | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK) | LTE-TDD | 9.24 | ± 9.6 % |
| 10262 | CAG | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM) | LTE-TDD | 9.83 | ± 9.6 % |
| 10263 | CAG | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM) | LTE-TDD | 10.16 | ± 9.6 % |
| 10264 | CAG | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK) | LTE-TDD | 9.23 | ± 9.6 % |
| 10265 | CAG | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM) | LTE-TDD | 9.92 | ± 9.6 % |
| 10266 | CAG | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM) | LTE-TDD | 10.07 | ± 9.6 % |
| 10267 | CAG | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | LTE-TDD | 9.30 | ± 9.6 % |
| 10268 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10269 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM) | LTE-TDD | 10.13 | ± 9.6 % |
| 10270 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK) | LTE-TDD | 9.58 | ± 9.6 % |
| 10274 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10) | WCDMA | 4.87 | ± 9.6 % |
| 10275 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4) | WCDMA | 3.96 | ± 9.6 % |
| 10277 | CAA | PHS (QPSK) | PHS | 11.81 | ± 9.6 % |
| 10278 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.5) | PHS | 11.81 | ± 9.6 % |
| 10279 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.38) | PHS | 12.18 | ± 9.6 % |
| 10290 | AAB | CDMA2000, RC1, SO55, Full Rate | CDMA2000 | 3.91 | ± 9.6 % |
| 10291 | AAB | CDMA2000, RC3, SO55, Full Rate | CDMA2000 | 3.46 | ± 9.6 % |
| 10292 | AAB | CDMA2000, RC3, SO32, Full Rate | CDMA2000 | 3.39 | ± 9.6 % |
| 10293 | AAB | CDMA2000, RC3, SO3, Full Rate | CDMA2000 | 3.50 | ± 9.6 % |
| 10295 | AAB | CDMA2000, RC1, SO3, 1/8th Rate 25 fr. | CDMA2000 | 12.49 | ± 9.6 % |
| 10297 | AAD | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK) | LTE-FDD | 5.81 | ± 9.6 % |
| 10298 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK) | LTE-FDD | 5.72 | ± 9.6 % |
| 10299 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM) | LTE-FDD | 6.39 | ± 9.6 % |

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| 10300 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM) | LTE-FDD | 6.60 | ± 9.6 % |
| 10301 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC) | WiMAX | 12.03 | ± 9.6 % |
| 10302 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols) | WiMAX | 12.57 | ± 9.6 % |
| 10303 | AAA | IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC) | WiMAX | 12.52 | ± 9.6 % |
| 10304 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC) | WiMAX | 11.86 | ± 9.6 % |
| 10305 | AAA | IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols) | WiMAX | 15.24 | ± 9.6 % |
| 10306 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols) | WiMAX | 14.67 | ± 9.6 % |
| 10307 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols) | WiMAX | 14.49 | ± 9.6 % |
| 10308 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC) | WiMAX | 14.46 | ± 9.6 % |
| 10309 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols) | WiMAX | 14.58 | ± 9.6 % |
| 10310 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols) | WiMAX | 14.57 | ± 9.6 % |
| 10311 | AAD | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK) | LTE-FDD | 6.06 | ± 9.6 % |
| 10313 | AAA | iDEN 1:3 | iDEN | 10.51 | ± 9.6 % |
| 10314 | AAA | iDEN 1:6 | iDEN | 13.48 | ± 9.6 % |
| 10315 | AAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | WLAN | 1.71 | ± 9.6 % |
| 10316 | AAB | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10317 | AAC | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10352 | AAA | Pulse Waveform (200Hz, 10%) | Generic | 10.00 | ± 9.6 % |
| 10353 | AAA | Pulse Waveform (200Hz, 20%) | Generic | 6.99 | ± 9.6 % |
| 10354 | AAA | Pulse Waveform (200Hz, 40%) | Generic | 3.98 | ± 9.6 % |
| 10355 | AAA | Pulse Waveform (200Hz, 60%) | Generic | 2.22 | ± 9.6 % |
| 10356 | AAA | Pulse Waveform (200Hz, 80%) | Generic | 0.97 | ± 9.6 % |
| 10387 | AAA | QPSK Waveform, 1 MHz | Generic | 5.10 | ± 9.6 % |
| 10388 | AAA | QPSK Waveform, 10 MHz | Generic | 5.22 | ± 9.6 % |
| 10396 | AAA | 64-QAM Waveform, 100 kHz | Generic | 6.27 | ± 9.6 % |
| 10399 | AAA | 64-QAM Waveform, 40 MHz | Generic | 6.27 | ± 9.6 % |
| 10400 | AAD | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle) | WLAN | 8.37 | ± 9.6 % |
| 10401 | AAD | IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle) | WLAN | 8.60 | ± 9.6 % |
| 10402 | AAD | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle) | WLAN | 8.53 | ± 9.6 % |
| 10403 | AAB | CDMA2000 (1xEV-DO, Rev. 0) | CDMA2000 | 3.76 | ± 9.6 % |
| 10404 | AAB | CDMA2000 (1xEV-DO, Rev. A) | CDMA2000 | 3.77 | ± 9.6 % |
| 10406 | AAB | CDMA2000, RC3, SO32, SCH0, Full Rate | CDMA2000 | 5.22 | ± 9.6 % |
| 10410 | AAG | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4) | LTE-TDD | 7.82 | ± 9.6 % |
| 10414 | AAA | WLAN CCDF, 64-QAM, 40MHz | Generic | 8.54 | ± 9.6 % |
| 10415 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle) | WLAN | 1.54 | ± 9.6 % |
| 10416 | AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | WLAN | 8.23 | ± 9.6 % |
| 10417 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle) | WLAN | 8.23 | ± 9.6 % |
| 10418 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule) | WLAN | 8.14 | ± 9.6 % |
| 10419 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule) | WLAN | 8.19 | ± 9.6 % |
| 10422 | AAB | IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK) | WLAN | 8.32 | ± 9.6 % |
| 10423 | AAB | IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM) | WLAN | 8.47 | ± 9.6 % |
| 10424 | AAB | IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM) | WLAN | 8.40 | ± 9.6 % |
| 10425 | AAB | IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK) | WLAN | 8.41 | ± 9.6 % |
| 10426 | AAB | IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM) | WLAN | 8.45 | ± 9.6 % |
| 10427 | AAB | IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM) | WLAN | 8.41 | ± 9.6 % |
| 10430 | AAD | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1) | LTE-FDD | 8.28 | ± 9.6 % |
| 10431 | AAD | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1) | LTE-FDD | 8.38 | ± 9.6 % |
| 10432 | AAC | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1) | LTE-FDD | 8.34 | ± 9.6 % |
| 10433 | AAC | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1) | LTE-FDD | 8.34 | ± 9.6 % |
| 10434 | AAA | W-CDMA (BS Test Model 1, 64 DPCH) | WCDMA | 8.60 | ± 9.6 % |
| 10435 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10447 | AAD | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%) | LTE-FDD | 7.56 | ± 9.6 % |
| 10448 | AAD | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%) | LTE-FDD | 7.53 | ± 9.6 % |
| 10449 | AAC | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%) | LTE-FDD | 7.51 | ± 9.6 % |
| 10450 | AAC | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%) | LTE-FDD | 7.48 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10451 | AAA | W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%) | WCDMA | 7.59 | ± 9.6 % |
| 10453 | AAD | Validation (Square, 10ms, 1ms) | Test | 10.00 | ± 9.6 % |
| 10456 | AAB | IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle) | WLAN | 8.63 | ± 9.6 % |
| 10457 | AAA | UMTS-FDD (DC-HSDPA) | WCDMA | 6.62 | ± 9.6 % |
| 10458 | AAA | CDMA2000 (1xEV-DO, Rev. B, 2 carriers) | CDMA2000 | 6.55 | ± 9.6 % |
| 10459 | AAA | CDMA2000 (1xEV-DO, Rev. B, 3 carriers) | CDMA2000 | 8.25 | ± 9.6 % |
| 10460 | AAA | UMTS-FDD (WCDMA, AMR) | WCDMA | 2.39 | ± 9.6 % |
| 10461 | AAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10462 | AAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.30 | ± 9.6 % |
| 10463 | AAB | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.56 | ± 9.6 % |
| 10464 | AAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10465 | AAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.32 | ± 9.6 % |
| 10466 | AAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.57 | ± 9.6 % |
| 10467 | AAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10468 | AAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.32 | ± 9.6 % |
| 10469 | AAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.56 | ± 9.6 % |
| 10470 | AAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10471 | AAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.32 | ± 9.6 % |
| 10472 | AAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.57 | ± 9.6 % |
| 10473 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10474 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.32 | ± 9.6 % |
| 10475 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.57 | ± 9.6 % |
| 10477 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.32 | ± 9.6 % |
| 10478 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.57 | ± 9.6 % |
| 10479 | AAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10480 | AAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.18 | ± 9.6 % |
| 10481 | AAB | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.45 | ± 9.6 % |
| 10482 | AAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.71 | ± 9.6 % |
| 10483 | AAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.39 | ± 9.6 % |
| 10484 | AAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.47 | ± 9.6 % |
| 10485 | AAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.59 | ± 9.6 % |
| 10486 | AAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.38 | ± 9.6 % |
| 10487 | AAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.60 | ± 9.6 % |
| 10488 | AAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.70 | ± 9.6 % |
| 10489 | AAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.31 | ± 9.6 % |
| 10490 | AAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.54 | ± 9.6 % |

| | | | | | |
|---|---|---|---|---|---|
| 10491 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10492 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.41 | ± 9.6 % |
| 10493 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.55 | ± 9.6 % |
| 10494 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10495 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.37 | ± 9.6 % |
| 10496 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.54 | ± 9.6 % |
| 10497 | AAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.67 | ± 9.6 % |
| 10498 | AAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.40 | ± 9.6 % |
| 10499 | AAB | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.68 | ± 9.6 % |
| 10500 | AAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.67 | ± 9.6 % |
| 10501 | AAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.44 | ± 9.6 % |
| 10502 | AAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.52 | ± 9.6 % |
| 10503 | AAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.72 | ± 9.6 % |
| 10504 | AAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.31 | ± 9.6 % |
| 10505 | AAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.54 | ± 9.6 % |
| 10506 | AAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10507 | AAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.36 | ± 9.6 % |
| 10508 | AAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.55 | ± 9.6 % |
| 10509 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.99 | ± 9.6 % |
| 10510 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.49 | ± 9.6 % |
| 10511 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.51 | ± 9.6 % |
| 10512 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10513 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.42 | ± 9.6 % |
| 10514 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.45 | ± 9.6 % |
| 10515 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle) | WLAN | 1.58 | ± 9.6 % |
| 10516 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle) | WLAN | 1.57 | ± 9.6 % |
| 10517 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle) | WLAN | 1.58 | ± 9.6 % |
| 10518 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle) | WLAN | 8.23 | ± 9.6 % |
| 10519 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle) | WLAN | 8.39 | ± 9.6 % |
| 10520 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle) | WLAN | 8.12 | ± 9.6 % |
| 10521 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle) | WLAN | 7.97 | ± 9.6 % |
| 10522 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10523 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle) | WLAN | 8.08 | ± 9.6 % |
| 10524 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle) | WLAN | 8.27 | ± 9.6 % |
| 10525 | AAB | IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10526 | AAB | IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle) | WLAN | 8.42 | ± 9.6 % |
| 10527 | AAB | IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle) | WLAN | 8.21 | ± 9.6 % |
| 10528 | AAB | IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10529 | AAB | IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10531 | AAB | IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle) | WLAN | 8.43 | ± 9.6 % |
| 10532 | AAB | IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10533 | AAB | IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle) | WLAN | 8.38 | ± 9.6 % |

| | | | | | |
|---|---|---|---|---|---|
| 10534 | AAB | IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10535 | AAB | IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10536 | AAB | IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle) | WLAN | 8.32 | ± 9.6 % |
| 10537 | AAB | IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle) | WLAN | 8.44 | ± 9.6 % |
| 10538 | AAB | IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle) | WLAN | 8.54 | ± 9.6 % |
| 10540 | AAB | IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle) | WLAN | 8.39 | ± 9.6 % |
| 10541 | AAB | IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle) | WLAN | 8.46 | ± 9.6 % |
| 10542 | AAB | IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle) | WLAN | 8.65 | ± 9.6 % |
| 10543 | AAB | IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle) | WLAN | 8.65 | ± 9.6 % |
| 10544 | AAB | IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle) | WLAN | 8.47 | ± 9.6 % |
| 10545 | AAB | IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle) | WLAN | 8.55 | ± 9.6 % |
| 10546 | AAB | IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle) | WLAN | 8.35 | ± 9.6 % |
| 10547 | AAB | IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle) | WLAN | 8.49 | ± 9.6 % |
| 10548 | AAB | IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle) | WLAN | 8.37 | ± 9.6 % |
| 10550 | AAB | IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle) | WLAN | 8.38 | ± 9.6 % |
| 10551 | AAB | IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle) | WLAN | 8.50 | ± 9.6 % |
| 10552 | AAB | IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle) | WLAN | 8.42 | ± 9.6 % |
| 10553 | AAB | IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10554 | AAC | IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle) | WLAN | 8.48 | ± 9.6 % |
| 10555 | AAC | IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle) | WLAN | 8.47 | ± 9.6 % |
| 10556 | AAC | IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle) | WLAN | 8.50 | ± 9.6 % |
| 10557 | AAC | IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle) | WLAN | 8.52 | ± 9.6 % |
| 10558 | AAC | IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle) | WLAN | 8.61 | ± 9.6 % |
| 10560 | AAC | IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle) | WLAN | 8.73 | ± 9.6 % |
| 10561 | AAC | IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle) | WLAN | 8.56 | ± 9.6 % |
| 10562 | AAC | IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle) | WLAN | 8.69 | ± 9.6 % |
| 10563 | AAC | IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10564 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle) | WLAN | 8.25 | ± 9.6 % |
| 10565 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10566 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle) | WLAN | 8.13 | ± 9.6 % |
| 10567 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle) | WLAN | 8.00 | ± 9.6 % |
| 10568 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle) | WLAN | 8.37 | ± 9.6 % |
| 10569 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle) | WLAN | 8.10 | ± 9.6 % |
| 10570 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle) | WLAN | 8.30 | ± 9.6 % |
| 10571 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle) | WLAN | 1.99 | ± 9.6 % |
| 10572 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle) | WLAN | 1.99 | ± 9.6 % |
| 10573 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle) | WLAN | 1.98 | ± 9.6 % |
| 10574 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle) | WLAN | 1.99 | ± 9.6 % |
| 10575 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle) | WLAN | 8.59 | ± 9.6 % |
| 10576 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle) | WLAN | 8.60 | ± 9.6 % |
| 10577 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10578 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle) | WLAN | 8.49 | ± 9.6 % |
| 10579 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10580 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle) | WLAN | 8.76 | ± 9.6 % |
| 10581 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle) | WLAN | 8.35 | ± 9.6 % |
| 10582 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle) | WLAN | 8.67 | ± 9.6 % |
| 10583 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle) | WLAN | 8.59 | ± 9.6 % |
| 10584 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle) | WLAN | 8.60 | ± 9.6 % |
| 10585 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10586 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle) | WLAN | 8.49 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10587 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10588 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle) | WLAN | 8.76 | ± 9.6 % |
| 10589 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle) | WLAN | 8.35 | ± 9.6 % |
| 10590 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle) | WLAN | 8.67 | ± 9.6 % |
| 10591 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle) | WLAN | 8.63 | ± 9.6 % |
| 10592 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle) | WLAN | 8.79 | ± 9.6 % |
| 10593 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle) | WLAN | 8.64 | ± 9.6 % |
| 10594 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle) | WLAN | 8.74 | ± 9.6 % |
| 10595 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle) | WLAN | 8.74 | ± 9.6 % |
| 10596 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle) | WLAN | 8.71 | ± 9.6 % |
| 10597 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle) | WLAN | 8.72 | ± 9.6 % |
| 10598 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle) | WLAN | 8.50 | ± 9.6 % |
| 10599 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle) | WLAN | 8.79 | ± 9.6 % |
| 10600 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle) | WLAN | 8.88 | ± 9.6 % |
| 10601 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10602 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle) | WLAN | 8.94 | ± 9.6 % |
| 10603 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle) | WLAN | 9.03 | ± 9.6 % |
| 10604 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle) | WLAN | 8.76 | ± 9.6 % |
| 10605 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle) | WLAN | 8.97 | ± 9.6 % |
| 10606 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10607 | AAB | IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle) | WLAN | 8.64 | ± 9.6 % |
| 10608 | AAB | IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10609 | AAB | IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle) | WLAN | 8.57 | ± 9.6 % |
| 10610 | AAB | IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle) | WLAN | 8.78 | ± 9.6 % |
| 10611 | AAB | IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10612 | AAB | IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10613 | AAB | IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle) | WLAN | 8.94 | ± 9.6 % |
| 10614 | AAB | IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle) | WLAN | 8.59 | ± 9.6 % |
| 10615 | AAB | IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10616 | AAB | IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10617 | AAB | IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle) | WLAN | 8.81 | ± 9.6 % |
| 10618 | AAB | IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle) | WLAN | 8.58 | ± 9.6 % |
| 10619 | AAB | IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle) | WLAN | 8.86 | ± 9.6 % |
| 10620 | AAB | IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle) | WLAN | 8.87 | ± 9.6 % |
| 10621 | AAB | IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10622 | AAB | IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle) | WLAN | 8.68 | ± 9.6 % |
| 10623 | AAB | IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10624 | AAB | IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle) | WLAN | 8.96 | ± 9.6 % |
| 10625 | AAB | IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle) | WLAN | 8.96 | ± 9.6 % |
| 10626 | AAB | IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle) | WLAN | 8.83 | ± 9.6 % |
| 10627 | AAB | IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle) | WLAN | 8.88 | ± 9.6 % |
| 10628 | AAB | IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle) | WLAN | 8.71 | ± 9.6 % |
| 10629 | AAB | IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle) | WLAN | 8.85 | ± 9.6 % |
| 10630 | AAB | IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle) | WLAN | 8.72 | ± 9.6 % |
| 10631 | AAB | IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle) | WLAN | 8.81 | ± 9.6 % |
| 10632 | AAB | IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle) | WLAN | 8.74 | ± 9.6 % |
| 10633 | AAB | IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle) | WLAN | 8.83 | ± 9.6 % |
| 10634 | AAB | IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle) | WLAN | 8.80 | ± 9.6 % |
| 10635 | AAB | IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle) | WLAN | 8.81 | ± 9.6 % |
| 10636 | AAC | IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle) | WLAN | 8.83 | ± 9.6 % |
| 10637 | AAC | IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle) | WLAN | 8.79 | ± 9.6 % |
| 10638 | AAC | IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle) | WLAN | 8.86 | ± 9.6 % |
| 10639 | AAC | IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle) | WLAN | 8.85 | ± 9.6 % |
| 10640 | AAC | IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle) | WLAN | 8.98 | ± 9.6 % |
| 10641 | AAC | IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle) | WLAN | 9.06 | ± 9.6 % |
| 10642 | AAC | IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle) | WLAN | 9.06 | ± 9.6 % |
| 10643 | AAC | IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle) | WLAN | 8.89 | ± 9.6 % |
| 10644 | AAC | IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle) | WLAN | 9.05 | ± 9.6 % |
| 10645 | AAC | IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle) | WLAN | 9.11 | ± 9.6 % |
| 10646 | AAG | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7) | LTE-TDD | 11.96 | ± 9.6 % |
| 10647 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7) | LTE-TDD | 11.96 | ± 9.6 % |
| 10648 | AAA | CDMA2000 (1x Advanced) | CDMA2000 | 3.45 | ± 9.6 % |
| 10652 | AAE | LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD | 6.91 | ± 9.6 % |
| 10653 | AAE | LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD | 7.42 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10654 | AAD | LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD | 6.96 | ± 9.6 % |
| 10655 | AAE | LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD | 7.21 | ± 9.6 % |
| 10658 | AAA | Pulse Waveform (200Hz, 10%) | Test | 10.00 | ± 9.6 % |
| 10659 | AAA | Pulse Waveform (200Hz, 20%) | Test | 6.99 | ± 9.6 % |
| 10660 | AAA | Pulse Waveform (200Hz, 40%) | Test | 3.98 | ± 9.6 % |
| 10661 | AAA | Pulse Waveform (200Hz, 60%) | Test | 2.22 | ± 9.6 % |
| 10662 | AAA | Pulse Waveform (200Hz, 80%) | Test | 0.97 | ± 9.6 % |
| 10670 | AAA | Bluetooth Low Energy | Bluetooth | 2.19 | ± 9.6 % |
| 10671 | AAA | IEEE 802.11ax (20MHz, MCS0, 90pc duty cycle) | WLAN | 9.09 | ± 9.6 % |
| 10672 | AAA | IEEE 802.11ax (20MHz, MCS1, 90pc duty cycle) | WLAN | 8.57 | ± 9.6 % |
| 10673 | AAA | IEEE 802.11ax (20MHz, MCS2, 90pc duty cycle) | WLAN | 8.78 | ± 9.6 % |
| 10674 | AAA | IEEE 802.11ax (20MHz, MCS3, 90pc duty cycle) | WLAN | 8.74 | ± 9.6 % |
| 10675 | AAA | IEEE 802.11ax (20MHz, MCS4, 90pc duty cycle) | WLAN | 8.90 | ± 9.6 % |
| 10676 | AAA | IEEE 802.11ax (20MHz, MCS5, 90pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10677 | AAA | IEEE 802.11ax (20MHz, MCS6, 90pc duty cycle) | WLAN | 8.73 | ± 9.6 % |
| 10678 | AAA | IEEE 802.11ax (20MHz, MCS7, 90pc duty cycle) | WLAN | 8.78 | ± 9.6 % |
| 10679 | AAA | IEEE 802.11ax (20MHz, MCS8, 90pc duty cycle) | WLAN | 8.89 | ± 9.6 % |
| 10680 | AAA | IEEE 802.11ax (20MHz, MCS9, 90pc duty cycle) | WLAN | 8.80 | ± 9.6 % |
| 10681 | AAA | IEEE 802.11ax (20MHz, MCS10, 90pc duty cycle) | WLAN | 8.62 | ± 9.6 % |
| 10682 | AAA | IEEE 802.11ax (20MHz, MCS11, 90pc duty cycle) | WLAN | 8.83 | ± 9.6 % |
| 10683 | AAA | IEEE 802.11ax (20MHz, MCS0, 99pc duty cycle) | WLAN | 8.42 | ± 9.6 % |
| 10684 | AAA | IEEE 802.11ax (20MHz, MCS1, 99pc duty cycle) | WLAN | 8.26 | ± 9.6 % |
| 10685 | AAA | IEEE 802.11ax (20MHz, MCS2, 99pc duty cycle) | WLAN | 8.33 | ± 9.6 % |
| 10686 | AAA | IEEE 802.11ax (20MHz, MCS3, 99pc duty cycle) | WLAN | 8.28 | ± 9.6 % |
| 10687 | AAA | IEEE 802.11ax (20MHz, MCS4, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10688 | AAA | IEEE 802.11ax (20MHz, MCS5, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10689 | AAA | IEEE 802.11ax (20MHz, MCS6, 99pc duty cycle) | WLAN | 8.55 | ± 9.6 % |
| 10690 | AAA | IEEE 802.11ax (20MHz, MCS7, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10691 | AAA | IEEE 802.11ax (20MHz, MCS8, 99pc duty cycle) | WLAN | 8.25 | ± 9.6 % |
| 10692 | AAA | IEEE 802.11ax (20MHz, MCS9, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10693 | AAA | IEEE 802.11ax (20MHz, MCS10, 99pc duty cycle) | WLAN | 8.25 | ± 9.6 % |
| 10694 | AAA | IEEE 802.11ax (20MHz, MCS11, 99pc duty cycle) | WLAN | 8.57 | ± 9.6 % |
| 10695 | AAA | IEEE 802.11ax (40MHz, MCS0, 90pc duty cycle) | WLAN | 8.78 | ± 9.6 % |
| 10696 | AAA | IEEE 802.11ax (40MHz, MCS1, 90pc duty cycle) | WLAN | 8.91 | ± 9.6 % |
| 10697 | AAA | IEEE 802.11ax (40MHz, MCS2, 90pc duty cycle) | WLAN | 8.61 | ± 9.6 % |
| 10698 | AAA | IEEE 802.11ax (40MHz, MCS3, 90pc duty cycle) | WLAN | 8.89 | ± 9.6 % |
| 10699 | AAA | IEEE 802.11ax (40MHz, MCS4, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10700 | AAA | IEEE 802.11ax (40MHz, MCS5, 90pc duty cycle) | WLAN | 8.73 | ± 9.6 % |
| 10701 | AAA | IEEE 802.11ax (40MHz, MCS6, 90pc duty cycle) | WLAN | 8.86 | ± 9.6 % |
| 10702 | AAA | IEEE 802.11ax (40MHz, MCS7, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10703 | AAA | IEEE 802.11ax (40MHz, MCS8, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10704 | AAA | IEEE 802.11ax (40MHz, MCS9, 90pc duty cycle) | WLAN | 8.56 | ± 9.6 % |
| 10705 | AAA | IEEE 802.11ax (40MHz, MCS10, 90pc duty cycle) | WLAN | 8.69 | ± 9.6 % |
| 10706 | AAA | IEEE 802.11ax (40MHz, MCS11, 90pc duty cycle) | WLAN | 8.66 | ± 9.6 % |
| 10707 | AAA | IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle) | WLAN | 8.32 | ± 9.6 % |
| 10708 | AAA | IEEE 802.11ax (40MHz, MCS1, 99pc duty cycle) | WLAN | 8.55 | ± 9.6 % |
| 10709 | AAA | IEEE 802.11ax (40MHz, MCS2, 99pc duty cycle) | WLAN | 8.33 | ± 9.6 % |
| 10710 | AAA | IEEE 802.11ax (40MHz, MCS3, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10711 | AAA | IEEE 802.11ax (40MHz, MCS4, 99pc duty cycle) | WLAN | 8.39 | ± 9.6 % |
| 10712 | AAA | IEEE 802.11ax (40MHz, MCS5, 99pc duty cycle) | WLAN | 8.67 | ± 9.6 % |
| 10713 | AAA | IEEE 802.11ax (40MHz, MCS6, 99pc duty cycle) | WLAN | 8.33 | ± 9.6 % |
| 10714 | AAA | IEEE 802.11ax (40MHz, MCS7, 99pc duty cycle) | WLAN | 8.26 | ± 9.6 % |
| 10715 | AAA | IEEE 802.11ax (40MHz, MCS8, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10716 | AAA | IEEE 802.11ax (40MHz, MCS9, 99pc duty cycle) | WLAN | 8.30 | ± 9.6 % |
| 10717 | AAA | IEEE 802.11ax (40MHz, MCS10, 99pc duty cycle) | WLAN | 8.48 | ± 9.6 % |
| 10718 | AAA | IEEE 802.11ax (40MHz, MCS11, 99pc duty cycle) | WLAN | 8.24 | ± 9.6 % |
| 10719 | AAA | IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle) | WLAN | 8.81 | ± 9.6 % |
| 10720 | AAA | IEEE 802.11ax (80MHz, MCS1, 90pc duty cycle) | WLAN | 8.87 | ± 9.6 % |
| 10721 | AAA | IEEE 802.11ax (80MHz, MCS2, 90pc duty cycle) | WLAN | 8.76 | ± 9.6 % |
| 10722 | AAA | IEEE 802.11ax (80MHz, MCS3, 90pc duty cycle) | WLAN | 8.55 | ± 9.6 % |
| 10723 | AAA | IEEE 802.11ax (80MHz, MCS4, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10724 | AAA | IEEE 802.11ax (80MHz, MCS5, 90pc duty cycle) | WLAN | 8.90 | ± 9.6 % |
| 10725 | AAA | IEEE 802.11ax (80MHz, MCS6, 90pc duty cycle) | WLAN | 8.74 | ± 9.6 % |
| 10726 | AAA | IEEE 802.11ax (80MHz, MCS7, 90pc duty cycle) | WLAN | 8.72 | ± 9.6 % |

| | | | | | |
|---|---|---|---|---|---|
| 10727 | AAA | IEEE 802.11ax (80MHz, MCS8, 90pc duty cycle) | WLAN | 8.66 | ± 9.6 % |
| 10728 | AAA | IEEE 802.11ax (80MHz, MCS9, 90pc duty cycle) | WLAN | 8.65 | ± 9.6 % |
| 10729 | AAA | IEEE 802.11ax (80MHz, MCS10, 90pc duty cycle) | WLAN | 8.64 | ± 9.6 % |
| 10730 | AAA | IEEE 802.11ax (80MHz, MCS11, 90pc duty cycle) | WLAN | 8.67 | ± 9.6 % |
| 10731 | AAA | IEEE 802.11ax (80MHz, MCS0, 99pc duty cycle) | WLAN | 8.42 | ± 9.6 % |
| 10732 | AAA | IEEE 802.11ax (80MHz, MCS1, 99pc duty cycle) | WLAN | 8.46 | ± 9.6 % |
| 10733 | AAA | IEEE 802.11ax (80MHz, MCS2, 99pc duty cycle) | WLAN | 8.40 | ± 9.6 % |
| 10734 | AAA | IEEE 802.11ax (80MHz, MCS3, 99pc duty cycle) | WLAN | 8.25 | ± 9.6 % |
| 10735 | AAA | IEEE 802.11ax (80MHz, MCS4, 99pc duty cycle) | WLAN | 8.33 | ± 9.6 % |
| 10736 | AAA | IEEE 802.11ax (80MHz, MCS5, 99pc duty cycle) | WLAN | 8.27 | ± 9.6 % |
| 10737 | AAA | IEEE 802.11ax (80MHz, MCS6, 99pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10738 | AAA | IEEE 802.11ax (80MHz, MCS7, 99pc duty cycle) | WLAN | 8.42 | ± 9.6 % |
| 10739 | AAA | IEEE 802.11ax (80MHz, MCS8, 99pc duty cycle) | WLAN | 8.29 | ± 9.6 % |
| 10740 | AAA | IEEE 802.11ax (80MHz, MCS9, 99pc duty cycle) | WLAN | 8.48 | ± 9.6 % |
| 10741 | AAA | IEEE 802.11ax (80MHz, MCS10, 99pc duty cycle) | WLAN | 8.40 | ± 9.6 % |
| 10742 | AAA | IEEE 802.11ax (80MHz, MCS11, 99pc duty cycle) | WLAN | 8.43 | ± 9.6 % |
| 10743 | AAA | IEEE 802.11ax (160MHz, MCS0, 90pc duty cycle) | WLAN | 8.94 | ± 9.6 % |
| 10744 | AAA | IEEE 802.11ax (160MHz, MCS1, 90pc duty cycle) | WLAN | 9.16 | ± 9.6 % |
| 10745 | AAA | IEEE 802.11ax (160MHz, MCS2, 90pc duty cycle) | WLAN | 8.93 | ± 9.6 % |
| 10746 | AAA | IEEE 802.11ax (160MHz, MCS3, 90pc duty cycle) | WLAN | 9.11 | ± 9.6 % |
| 10747 | AAA | IEEE 802.11ax (160MHz, MCS4, 90pc duty cycle) | WLAN | 9.04 | ± 9.6 % |
| 10748 | AAA | IEEE 802.11ax (160MHz, MCS5, 90pc duty cycle) | WLAN | 8.93 | ± 9.6 % |
| 10749 | AAA | IEEE 802.11ax (160MHz, MCS6, 90pc duty cycle) | WLAN | 8.90 | ± 9.6 % |
| 10750 | AAA | IEEE 802.11ax (160MHz, MCS7, 90pc duty cycle) | WLAN | 8.79 | ± 9.6 % |
| 10751 | AAA | IEEE 802.11ax (160MHz, MCS8, 90pc duty cycle) | WLAN | 8.82 | ± 9.6 % |
| 10752 | AAA | IEEE 802.11ax (160MHz, MCS9, 90pc duty cycle) | WLAN | 8.81 | ± 9.6 % |
| 10753 | AAA | IEEE 802.11ax (160MHz, MCS10, 90pc duty cycle) | WLAN | 9.00 | ± 9.6 % |
| 10754 | AAA | IEEE 802.11ax (160MHz, MCS11, 90pc duty cycle) | WLAN | 8.94 | ± 9.6 % |
| 10755 | AAA | IEEE 802.11ax (160MHz, MCS0, 99pc duty cycle) | WLAN | 8.64 | ± 9.6 % |
| 10756 | AAA | IEEE 802.11ax (160MHz, MCS1, 99pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10757 | AAA | IEEE 802.11ax (160MHz, MCS2, 99pc duty cycle) | WLAN | 8.77 | ± 9.6 % |
| 10758 | AAA | IEEE 802.11ax (160MHz, MCS3, 99pc duty cycle) | WLAN | 8.69 | ± 9.6 % |
| 10759 | AAA | IEEE 802.11ax (160MHz, MCS4, 99pc duty cycle) | WLAN | 8.58 | ± 9.6 % |
| 10760 | AAA | IEEE 802.11ax (160MHz, MCS5, 99pc duty cycle) | WLAN | 8.49 | ± 9.6 % |
| 10761 | AAA | IEEE 802.11ax (160MHz, MCS6, 99pc duty cycle) | WLAN | 8.58 | ± 9.6 % |
| 10762 | AAA | IEEE 802.11ax (160MHz, MCS7, 99pc duty cycle) | WLAN | 8.49 | ± 9.6 % |
| 10763 | AAA | IEEE 802.11ax (160MHz, MCS8, 99pc duty cycle) | WLAN | 8.53 | ± 9.6 % |
| 10764 | AAA | IEEE 802.11ax (160MHz, MCS9, 99pc duty cycle) | WLAN | 8.54 | ± 9.6 % |
| 10765 | AAA | IEEE 802.11ax (160MHz, MCS10, 99pc duty cycle) | WLAN | 8.54 | ± 9.6 % |
| 10766 | AAA | IEEE 802.11ax (160MHz, MCS11, 99pc duty cycle) | WLAN | 8.51 | ± 9.6 % |
| 10767 | AAB | 5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 7.99 | ± 9.6 % |
| 10768 | AAB | 5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.01 | ± 9.6 % |
| 10769 | AAB | 5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.01 | ± 9.6 % |
| 10770 | AAB | 5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.02 | ± 9.6 % |
| 10771 | AAB | 5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.02 | ± 9.6 % |
| 10772 | AAB | 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.23 | ± 9.6 % |
| 10773 | AAB | 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.03 | ± 9.6 % |
| 10774 | AAB | 5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.02 | ± 9.6 % |
| 10776 | AAB | 5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.30 | ± 9.6 % |
| 10778 | AAB | 5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10780 | AAB | 5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.38 | ± 9.6 % |
| 10781 | AAB | 5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.38 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10782 | AAB | 5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.43 | ± 9.6 % |
| 10783 | AAB | 5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.31 | ± 9.6 % |
| 10784 | AAB | 5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.29 | ± 9.6 % |
| 10785 | AAB | 5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.40 | ± 9.6 % |
| 10786 | AAB | 5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.35 | ± 9.6 % |
| 10787 | AAB | 5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.44 | ± 9.6 % |
| 10788 | AAB | 5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.39 | ± 9.6 % |
| 10789 | AAB | 5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.37 | ± 9.6 % |
| 10790 | AAB | 5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz) | 5G NR FR1 TDD | 8.39 | ± 9.6 % |
| 10791 | AAB | 5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.83 | ± 9.6 % |
| 10792 | AAB | 5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.92 | ± 9.6 % |
| 10793 | AAB | 5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.95 | ± 9.6 % |
| 10794 | AAB | 5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.82 | ± 9.6 % |
| 10795 | AAB | 5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.84 | ± 9.6 % |
| 10796 | AAB | 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.82 | ± 9.6 % |
| 10797 | AAB | 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.01 | ± 9.6 % |
| 10798 | AAB | 5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.89 | ± 9.6 % |
| 10799 | AAB | 5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.93 | ± 9.6 % |
| 10801 | AAB | 5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.89 | ± 9.6 % |
| 10802 | AAB | 5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.87 | ± 9.6 % |
| 10803 | AAB | 5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 7.93 | ± 9.6 % |
| 10805 | AAB | 5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10806 | AAB | 5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.37 | ± 9.6 % |
| 10809 | AAB | 5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10810 | AAB | 5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10812 | AAB | 5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.35 | ± 9.6 % |
| 10817 | AAB | 5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.35 | ± 9.6 % |
| 10818 | AAB | 5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10819 | AAB | 5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.33 | ± 9.6 % |
| 10820 | AAB | 5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.30 | ± 9.6 % |
| 10821 | AAB | 5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10822 | AAB | 5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10823 | AAB | 5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.36 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10824 | AAB | 5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.39 | ± 9.6 % |
| 10825 | AAB | 5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10827 | AAB | 5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.42 | ± 9.6 % |
| 10828 | AAB | 5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.43 | ± 9.6 % |
| 10829 | AAB | 5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 8.40 | ± 9.6 % |
| 10830 | AAB | 5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.63 | ± 9.6 % |
| 10831 | AAB | 5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.73 | ± 9.6 % |
| 10832 | AAB | 5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.74 | ± 9.6 % |
| 10833 | AAB | 5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.70 | ± 9.6 % |
| 10834 | AAB | 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.75 | ± 9.6 % |
| 10835 | AAB | 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.70 | ± 9.6 % |
| 10836 | AAB | 5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.66 | ± 9.6 % |
| 10837 | AAB | 5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.68 | ± 9.6 % |
| 10839 | AAB | 5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.70 | ± 9.6 % |
| 10840 | AAB | 5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.67 | ± 9.6 % |
| 10841 | AAB | 5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 7.71 | ± 9.6 % |
| 10843 | AAB | 5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.49 | ± 9.6 % |
| 10844 | AAB | 5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10846 | AAB | 5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10854 | AAB | 5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10855 | AAB | 5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.36 | ± 9.6 % |
| 10856 | AAB | 5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.37 | ± 9.6 % |
| 10857 | AAB | 5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.35 | ± 9.6 % |
| 10858 | AAB | 5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.36 | ± 9.6 % |
| 10859 | AAB | 5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.34 | ± 9.6 % |
| 10860 | AAB | 5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10861 | AAB | 5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.40 | ± 9.6 % |
| 10863 | AAB | 5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10864 | AAB | 5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.37 | ± 9.6 % |
| 10865 | AAB | 5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz) | 5G NR FR1 TDD | 8.41 | ± 9.6 % |
| 10866 | AAB | 5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 5.68 | ± 9.6 % |
| 10868 | AAB | 5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz) | 5G NR FR1 TDD | 5.89 | ± 9.6 % |
| 10869 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 5.75 | ± 9.6 % |

EF3DV3 – SN:4034 February 25, 2020

| | | | | | |
|---|---|---|---|---|---|
| 10870 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 5.86 | ± 9.6 % |
| 10871 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 5.75 | ± 9.6 % |
| 10872 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 6.52 | ± 9.6 % |
| 10873 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 6.61 | ± 9.6 % |
| 10874 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 6.65 | ± 9.6 % |
| 10875 | AAC | 5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 7.78 | ± 9.6 % |
| 10876 | AAC | 5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 8.39 | ± 9.6 % |
| 10877 | AAC | 5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 7.95 | ± 9.6 % |
| 10878 | AAC | 5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 8.41 | ± 9.6 % |
| 10879 | AAC | 5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 8.12 | ± 9.6 % |
| 10880 | AAC | 5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 8.38 | ± 9.6 % |
| 10881 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 5.75 | ± 9.6 % |
| 10882 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 5.96 | ± 9.6 % |
| 10883 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 6.57 | ± 9.6 % |
| 10884 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 6.53 | ± 9.6 % |
| 10885 | AAC | 5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 6.61 | ± 9.6 % |
| 10886 | AAC | 5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 6.65 | ± 9.6 % |
| 10887 | AAC | 5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 7.78 | ± 9.6 % |
| 10888 | AAC | 5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz) | 5G NR FR2 TDD | 8.35 | ± 9.6 % |
| 10889 | AAC | 5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 8.02 | ± 9.6 % |
| 10890 | AAC | 5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz) | 5G NR FR2 TDD | 8.40 | ± 9.6 % |
| 10891 | AAC | 5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 8.13 | ± 9.6 % |
| 10892 | AAC | 5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz) | 5G NR FR2 TDD | 8.41 | ± 9.6 % |

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# 22. Appendix E. Dipole Calibration Data

**Calibration Laboratory of**
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**Accreditation No.: SCS 0108**

**Client** HCT (Dymstec)

**Certificate No: CD835V3-1024_Feb20**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | CD835V3 - SN: 1024 |
| Calibration procedure(s) | QA CAL-20.v7<br>Calibration Procedure for Validation Sources in air |
| Calibration date: | February 21, 2020 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 03-Apr-19 (No. 217-02892/02893) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103244 | 03-Apr-19 (No. 217-02892) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103245 | 03-Apr-19 (No. 217-02893) | Apr-20 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-19 (No. 217-02894) | Apr-20 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-19 (No. 217-02895) | Apr-20 |
| Probe EF3DV3 | SN: 4013 | 31-Dec-19 (No. EF3-4013_Dec19) | Dec-20 |
| DAE4 | SN: 781 | 27-Dec-19 (No. DAE4-781_Dec19) | Dec-20 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter Agilent 4419B | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 24, 2020

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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**Accreditation No.: SCS 0108**

**References**

[1] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| DASY Version | DASY5 | V52.10.4 |
|---|---|---|
| Phantom | HAC Test Arch | |
| Distance Dipole Top - Probe Center | 15 mm | |
| Scan resolution | dx, dy = 5 mm | |
| Frequency | 835 MHz ± 1 MHz | |
| Input power drift | < 0.05 dB | |

## Maximum Field values at 835 MHz

| E-field 15 mm above dipole surface | condition | Interpolated maximum |
|---|---|---|
| Maximum measured above high end | 100 mW input power | 107.0 V/m = 40.59 dBV/m |
| Maximum measured above low end | 100 mW input power | 103.5 V/m = 40.30 dBV/m |
| Averaged maximum above arm | 100 mW input power | **105.3 V/m ± 12.8 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

## Antenna Parameters

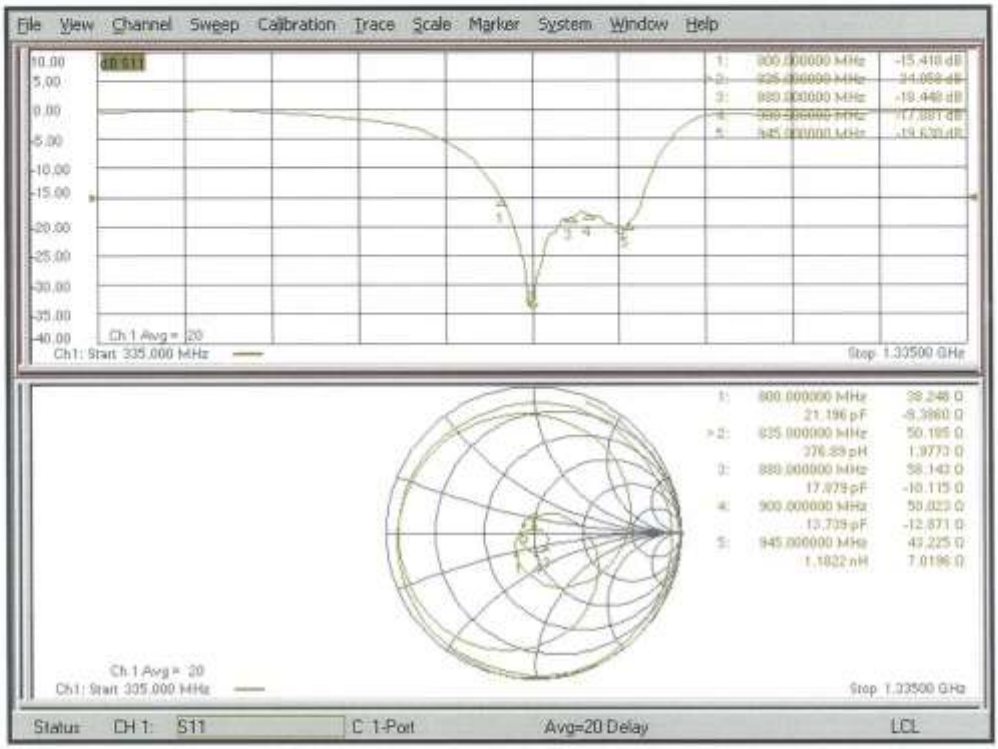
| Frequency | Return Loss | Impedance |
|---|---|---|
| 800 MHz | 15.4 dB | 38.2 Ω - 9.4 jΩ |
| 835 MHz | 34.1 dB | 50.2 Ω + 2.0 jΩ |
| 880 MHz | 18.4 dB | 58.1 Ω - 10.1 jΩ |
| 900 MHz | 17.9 dB | 50.0 Ω - 12.9 jΩ |
| 945 MHz | 19.6 dB | 43.2 Ω + 7.0 jΩ |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

**Impedance Measurement Plot**



## DASY5 E-field Result

Date: 21.02.2020

Test Laboratory: SPEAG Lab2

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1024**

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

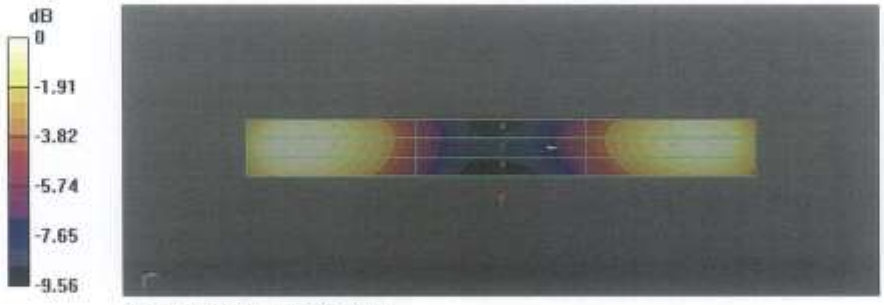
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 835 MHz; Calibrated: 31.12.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 27.12.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/Hearing Aid Compatibility Test (41x361x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 122.7 V/m; Power Drift = -0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 40.59 dBV/m
**Emission category: M3**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M3** **40.24 dBV/m** | Grid 2 **M3** **40.59 dBV/m** | Grid 3 **M3** **40.5 dBV/m** |
| Grid 4 **M4** **35.16 dBV/m** | Grid 5 **M4** **35.55 dBV/m** | Grid 6 **M4** **35.55 dBV/m** |
| Grid 7 **M4** **39.85 dBV/m** | Grid 8 **M3** **40.3 dBV/m** | Grid 9 **M3** **40.29 dBV/m** |




0 dB = 107.0 V/m = 40.59 dBV/m

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Accreditation No.: **SCS 0108**

Client **HCT (Dymstec)** Certificate No: **CD1880V3-1019_Feb20**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | CD1880V3 - SN: 1019 |
| Calibration procedure(s) | QA CAL-20.v7<br>Calibration Procedure for Validation Sources in air |
| Calibration date: | February 21, 2020 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 03-Apr-19 (No. 217-02892/02893) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103244 | 03-Apr-19 (No. 217-02892) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103245 | 03-Apr-19 (No. 217-02893) | Apr-20 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-19 (No. 217-02894) | Apr-20 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-19 (No. 217-02895) | Apr-20 |
| Probe EF3DV3 | SN: 4013 | 31-Dec-19 (No. EF3-4013_Dec19) | Dec-20 |
| DAE4 | SN: 781 | 27-Dec-19 (No. DAE4-781_Dec19) | Dec-20 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter Agilent 4419B | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 24, 2020

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**Accreditation No.: SCS 0108**

**References**

[1] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| DASY Version | DASY5 | V52.10.4 |
|---|---|---|
| Phantom | HAC Test Arch | |
| Distance Dipole Top - Probe Center | 15 mm | |
| Scan resolution | dx, dy = 5 mm | |
| Frequency | 1880 MHz ± 1 MHz | |
| Input power drift | < 0.05 dB | |

## Maximum Field values at 1880 MHz

| E-field 15 mm above dipole surface | condition | Interpolated maximum |
|---|---|---|
| Maximum measured above high end | 100 mW input power | 85.9 V/m = 38.68 dBV/m |
| Maximum measured above low end | 100 mW input power | 84.8 V/m = 38.57 dBV/m |
| Averaged maximum above arm | 100 mW input power | **85.3 V/m ± 12.8 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters

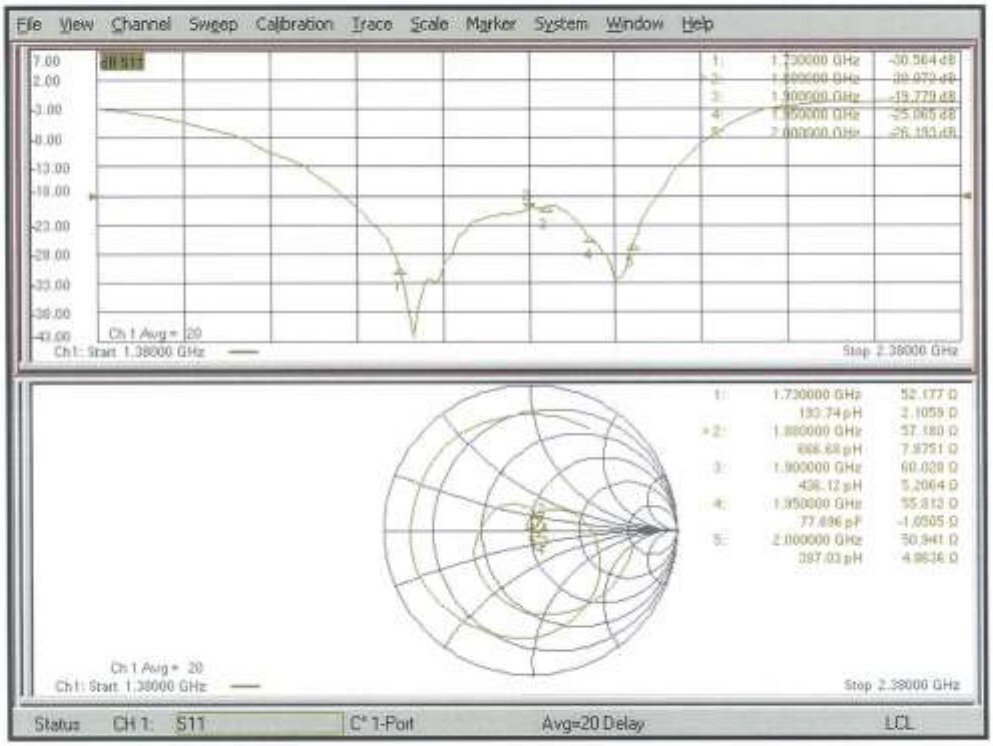
| Frequency | Return Loss | Impedance |
|---|---|---|
| 1730 MHz | 30.6 dB | 52.2 Ω + 2.1 jΩ |
| 1880 MHz | 20.1 dB | 57.2 Ω + 7.9 jΩ |
| 1900 MHz | 19.8 dB | 60.0 Ω + 5.2 jΩ |
| 1950 MHz | 25.1 dB | 55.8 Ω - 1.1 jΩ |
| 2000 MHz | 26.2 dB | 50.9 Ω + 4.9 jΩ |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

**Impedance Measurement Plot**



**DASY5 E-field Result**

Date: 21.02.2020

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1019**

Communication System: UID 0 - CW; Frequency: 1880 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

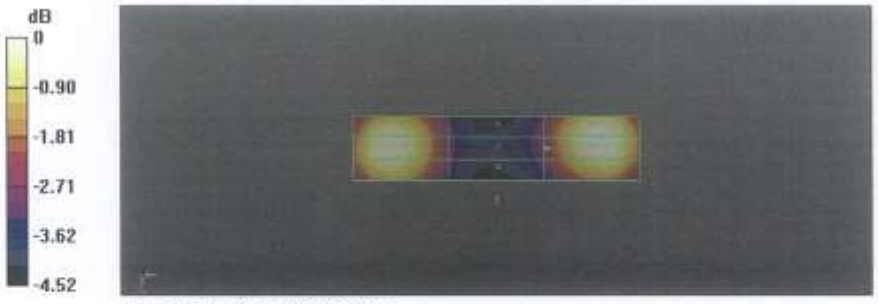
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 1880 MHz; Calibrated: 31.12.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 27.12.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 149.6 V/m; Power Drift = -0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.68 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.36 dBV/m** | Grid 2 **M2** **38.57 dBV/m** | Grid 3 **M2** **38.44 dBV/m** |
| Grid 4 **M2** **35.82 dBV/m** | Grid 5 **M2** **36.07 dBV/m** | Grid 6 **M2** **36.07 dBV/m** |
| Grid 7 **M2** **38.27 dBV/m** | Grid 8 **M2** **38.68 dBV/m** | Grid 9 **M2** **38.67 dBV/m** |




0 dB = 85.92 V/m = 38.68 dBV/m

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Accreditation No.: SCS 0108

Client HCT (Dymstec) Certificate No: CD2450V3-1022_Jan20

# CALIBRATION CERTIFICATE

Object CD2450V3 - SN: 1022

Calibration procedure(s) QA CAL-20.v7
Calibration Procedure for Validation Sources in air

Calibration date: January 22, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 03-Apr-19 (No. 217-02892/02893) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103244 | 03-Apr-19 (No. 217-02892) | Apr-20 |
| Power sensor NRP-Z91 | SN: 103245 | 03-Apr-19 (No. 217-02893) | Apr-20 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-19 (No. 217-02894) | Apr-20 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-19 (No. 217-02895) | Apr-20 |
| Probe EF3DV3 | SN: 4013 | 31-Dec-19 (No. EF3-4013_Dec19) | Dec-20 |
| DAE4 | SN: 781 | 27-Dec-19 (No. DAE4-781_Dec19) | Dec-20 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter Agilent 4419B | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: January 24, 2020

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Accreditation No.: SCS 0108

**References**

[1] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| DASY Version | DASY5 | V52.10.3 |
|---|---|---|
| Phantom | HAC Test Arch | |
| Distance Dipole Top - Probe Center | 15 mm | |
| Scan resolution | dx, dy = 5 mm | |
| Frequency | 2450 MHz ± 1 MHz | |
| Input power drift | < 0.05 dB | |

## Maximum Field values at 2450 MHz

| E-field 15 mm above dipole surface | condition | Interpolated maximum |
|---|---|---|
| Maximum measured above high end | 100 mW input power | 86.7 V/m = 38.76 dBV/m |
| Maximum measured above low end | 100 mW input power | 84.4 V/m = 38.53 dBV/m |
| Averaged maximum above arm | 100 mW input power | **85.5 V/m ± 12.8 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

## Antenna Parameters

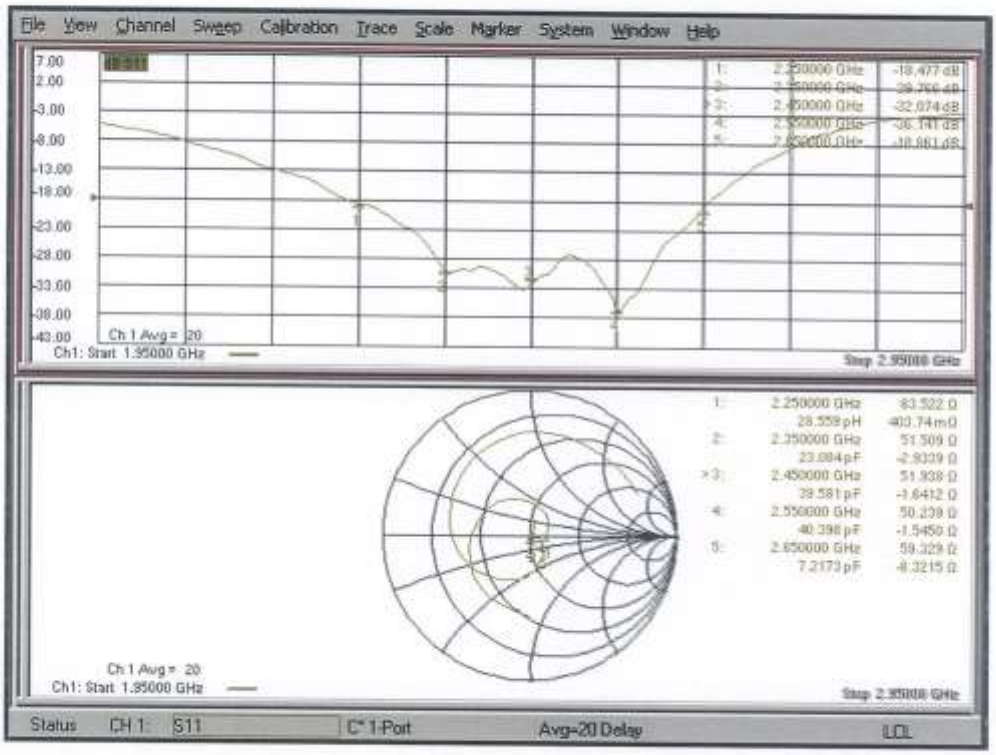
| Frequency | Return Loss | Impedance |
|---|---|---|
| 2250 MHz | 18.5 dB | 63.5 Ω + 0.4 jΩ |
| 2350 MHz | 28.8 dB | 51.5 Ω - 2.9 jΩ |
| 2450 MHz | 32.1 dB | 51.9 Ω - 1.6 jΩ |
| 2550 MHz | 36.1 dB | 50.2 Ω - 1.5 jΩ |
| 2650 MHz | 18.9 dB | 59.3 Ω - 8.3 jΩ |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

## Impedance Measurement Plot



## DASY5 E-field Result

Date: 22.01.2020

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 2450 MHz; Type: CD2450V3; Serial: CD2450V3 - SN: 1022**

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

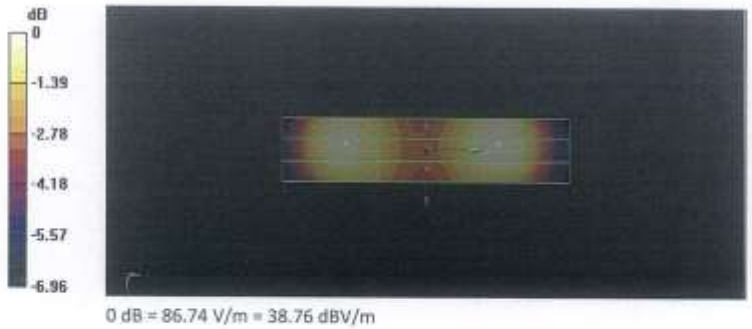
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 2450 MHz; Calibrated: 31.12.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 27.12.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

**Dipole E-Field measurement @ 2450MHz/E-Scan - 2450MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 72.77 V/m; Power Drift = -0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.76 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.08 dBV/m** | Grid 2 **M2** **38.53 dBV/m** | Grid 3 **M2** **38.51 dBV/m** |
| Grid 4 **M2** **37.56 dBV/m** | Grid 5 **M2** **37.9 dBV/m** | Grid 6 **M2** **37.89 dBV/m** |
| Grid 7 **M2** **38.35 dBV/m** | Grid 8 **M2** **38.76 dBV/m** | Grid 9 **M2** **38.74 dBV/m** |




0 dB = 86.74 V/m = 38.76 dBV/m

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Accreditation No.: SCS 0108

Client: HCT (Dymstec)

Certificate No: CD2600V3-1019_Sep20

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | CD2600V3 - SN: 1019 |
| Calibration procedure(s) | QA CAL-20.v7<br>Calibration Procedure for Validation Sources in air |
| Calibration date: | September 24, 2020 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 01-Apr-20 (No. 217-03100/03101) | Apr-21 |
| Power sensor NRP-Z91 | SN: 103244 | 01-Apr-20 (No. 217-03100) | Apr-21 |
| Power sensor NRP-Z91 | SN: 103245 | 01-Apr-20 (No. 217-03101) | Apr-21 |
| Reference 20 dB Attenuator | SN: BH9394 (20k) | 31-Mar-20 (No. 217-03106) | Apr-21 |
| Type-N mismatch combination | SN: 310982 / 06327 | 31-Mar-20 (No. 217-03104) | Apr-21 |
| Probe EF3DV3 | SN: 4013 | 31-Dec-19 (No. EF3-4013_Dec19) | Dec-20 |
| DAE4 | SN: 781 | 27-Dec-19 (No. DAE4-781_Dec19) | Dec-20 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter Agilent 4419B | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 24, 2020

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Accreditation No.: SCS 0108

**References**

[1] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| DASY Version | DASY5 | V52.10.4 |
|---|---|---|
| Phantom | HAC Test Arch | |
| Distance Dipole Top - Probe Center | 15 mm | |
| Scan resolution | dx, dy = 5 mm | |
| Frequency | 2600 MHz ± 1 MHz | |
| Input power drift | < 0.05 dB | |

## Maximum Field values at 2600 MHz

| E-field 15 mm above dipole surface | condition | Interpolated maximum |
|---|---|---|
| Maximum measured above high end | 100 mW input power | 86.1 V/m = 38.70 dBV/m |
| Maximum measured above low end | 100 mW input power | 84.6 V/m = 38.55 dBV/m |
| Averaged maximum above arm | 100 mW input power | **85.3 V/m ± 12.8 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters

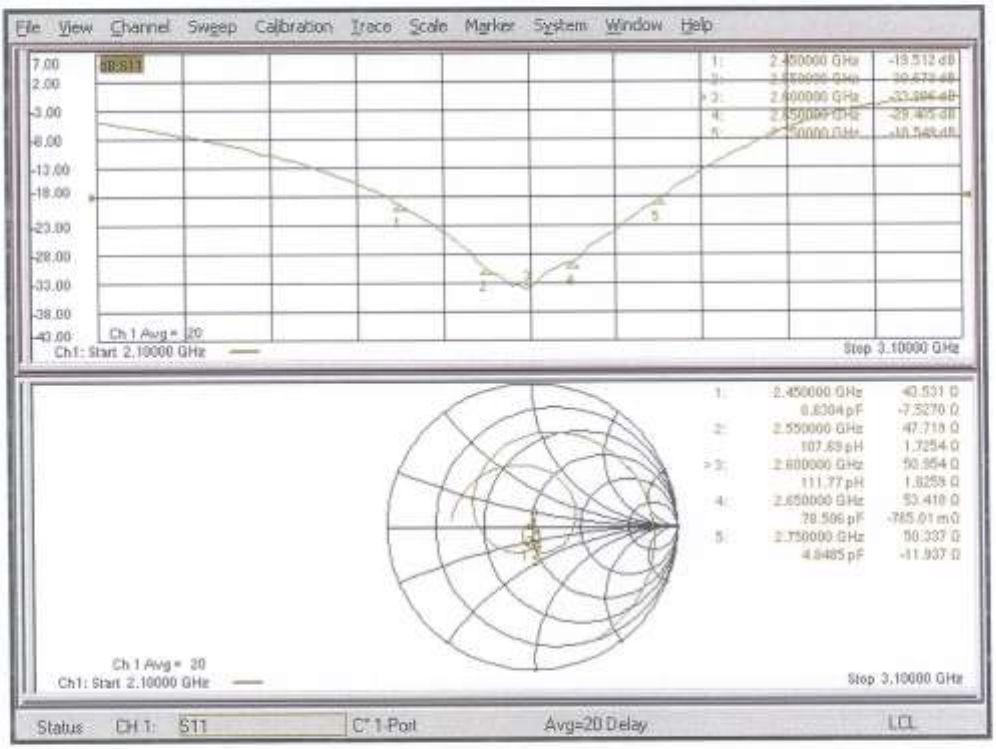
| Frequency | Return Loss | Impedance |
|---|---|---|
| 2450 MHz | 19.5 dB | 43.5 Ω - 7.5 jΩ |
| 2550 MHz | 30.7 dB | 47.7 Ω + 1.7 jΩ |
| 2600 MHz | 33.8 dB | 51.0 Ω + 1.8 jΩ |
| 2650 MHz | 29.4 dB | 53.4 Ω - 0.8 jΩ |
| 2750 MHz | 18.5 dB | 50.3 Ω - 11.9 jΩ |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

## Impedance Measurement Plot



## DASY5 E-field Result

Date: 24.09.2020

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 2600 MHz; Type: CD2600V3; Serial: CD2600V3 - SN: 1019**

Communication System: UID 0 - CW ; Frequency: 2600 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m$^3$
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

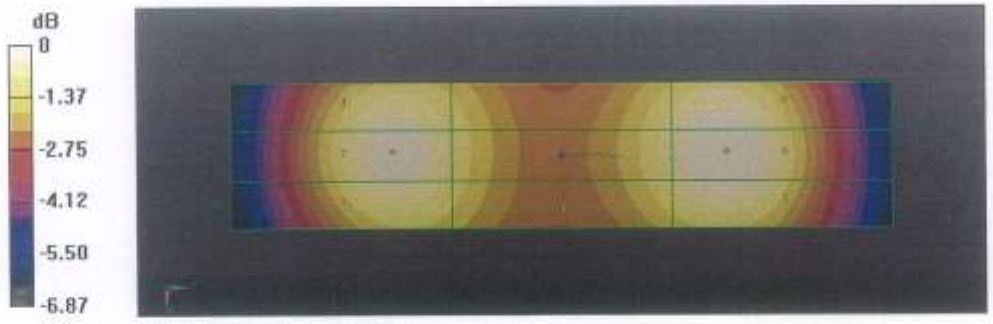
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 2600 MHz; Calibrated: 31.12.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 27.12.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Dipole E-Field measurement @ 2600MHz/E-Scan - 2600MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):**
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 68.23 V/m; Power Drift = 0.03 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.70 dBV/m
**Emission category: M2**

MIF scaled E-field

| | | |
|---|---|---|
| Grid 1 **M2** **38.31 dBV/m** | Grid 2 **M2** **38.55 dBV/m** | Grid 3 **M2** **38.41 dBV/m** |
| Grid 4 **M2** **37.86 dBV/m** | Grid 5 **M2** **38.05 dBV/m** | Grid 6 **M2** **37.96 dBV/m** |
| Grid 7 **M2** **38.47 dBV/m** | Grid 8 **M2** **38.7 dBV/m** | Grid 9 **M2** **38.57 dBV/m** |




0 dB = 86.06 V/m = 38.70 dBV/m

# 23. Appendix F. UID Specifications

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| | |
|---|---|
| Name: | GSM-FDD (TDMA, GMSK) |
| Group: | GSM |
| UID: | 10021-DAC |
| PAR: [1] | 9.39 dB |
| MIF: [2] | 3.63 dB |
| Standard Reference: | ETSI TS 100 909 V8.9.0 (2005-01)<br>FCC OET KDB 941225, D03 and D04 |
| Category: | Periodic pulsed modulation |
| Modulation: | GMSK |
| Frequency Band: | GSM 450 (450.4 - 457.6 MHz)<br>GSM 480 (478.8 - 486.0 MHz)<br>GSM 710 (698.0 - 716.0 MHz)<br>GSM 750 (747.0 - 763.0 MHz)<br>GSM 850 (824.0 - 849.0 MHz)<br>P-GSM 900 (890.0 - 915.0 MHz)<br>E-GSM 900 (880.0 - 915.0 MHz)<br>R-GSM 900 (876.0 - 915.0 MHz)<br>DCS 1800 (1710.0 - 1785.0 MHz)<br>PCS 1900 (1850.0 - 1910.0 MHz)<br>ER-GSM 900 (873.0 - 915.0 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Active Slot: TN0<br>Data: PN9 continuous<br>Frame: composed out of 8 Slots<br>Multiframe: 26th (IDLE) Frame set blank<br>Slottype & -timing: Normal burst for GMSK |
| Bandwidth: | 0.2 MHz |
| Integration Time: | 120.0 ms |

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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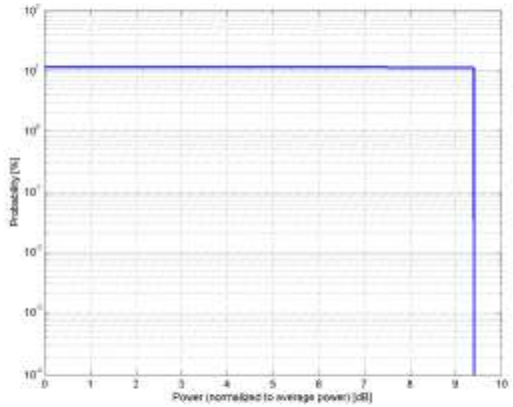
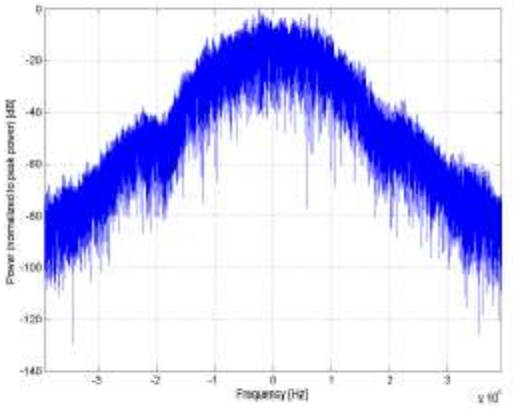
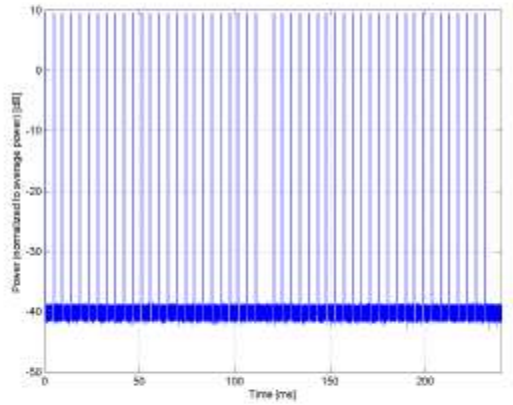



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

**Calibration Laboratory of**
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| | |
|---|---|
| Name: | **UMTS-FDD (WCDMA, AMR)** |
| Group: | WCDMA |
| UID: | 10460-AAA |
| PAR: [1] | **2.39 dB** |
| MIF: [2] | **-25.43 dB** |
| Standard Reference: | FCC OET KDB 941225 D01 SAR test for 3G devices v03 |
| Category: | Random amplitude modulation |
| Modulation: | QPSK |
| Frequency Band: | Band 1, UTRA/FDD (1920.0-1980.0 MHz, 20000)<br>Band 2, UTRA/FDD (1850.0-1910.0 MHz, 20001)<br>Band 3, UTRA/FDD (1710.0-1785.0 MHz, 20002)<br>Band 4, UTRA/FDD (1710.0-1755.0 MHz, 20003)<br>Band 5, UTRA/FDD (824.0-849.0 MHz, 20004)<br>Band 6, UTRA/FDD (830.0-840.0 MHz, 20005)<br>Band 7, UTRA/FDD (2500.0-2570.0 MHz, 20006)<br>Band 8, UTRA/FDD (880.0-915.0 MHz, 20007)<br>Band 9, UTRA/FDD (1749.9-1784.9 MHz, 20008)<br>Band 10, UTRA/FDD (1710.0-1770.0 MHz, 20009)<br>Band 11, UTRA/FDD (1427.9-1452.9 MHz, 20010)<br>Band 12, UTRA/FDD (698.0-716.0 MHz, 20011)<br>Band 13, UTRA/FDD (777.0-787.0 MHz, 20012)<br>Band 14, UTRA/FDD (788.0-798.0 MHz, 20013)<br>Band 19, UTRA/FDD (830.0-845.0 MHz, 20130)<br>Band 20, UTRA/FDD (832.0-862.0 MHz, 20131)<br>Band 21, UTRA/FDD (1447.9-1462.9 MHz, 20132)<br>Band 22, UTRA/FDD (3410.0-3490.0 MHz, 20217)<br>Band 25, UTRA/FDD (1850.0-1915.0 MHz, 20218)<br>Band 26, UTRA/FDD (814.0-849.0 MHz, 20219) |
| Detailed Specification: | Dedicated Channel Type: 12.2 kbps AMR<br>3.4 kbps SRB |
| Bandwidth: | 5.0 MHz |
| Integration Time: | 100.0 ms |

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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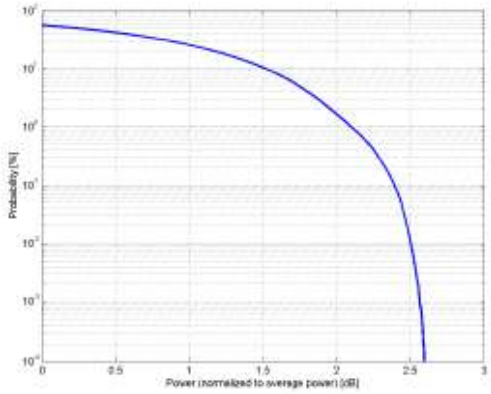
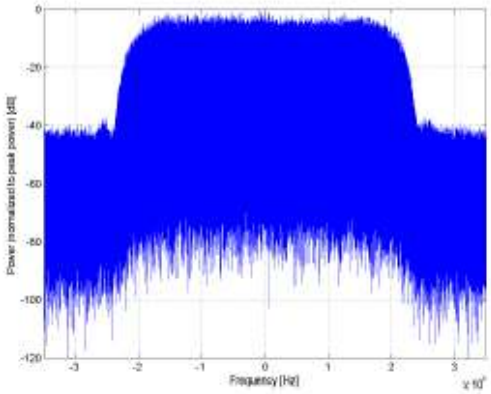
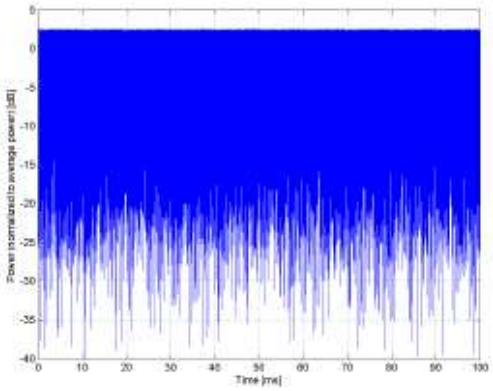



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM) |
| Group: | LTE-FDD |
| UID: | 10170-CAE |
| PAR: [1] | 6.52 dB |
| MIF: [2] | -9.76 dB |
| Standard Reference: | 3GPP / ETSI TS 136.101 V8.4.0<br>3GPP / ETSI TS 136.213 V8.4.0<br>FCC OET KDB 941225 D05 SAR for LTE Devices v01 |
| Category: | Random amplitude modulation |
| Modulation: | 16-QAM |
| Frequency Band: | Band 1, E-UTRA/FDD (1920.0 - 1980.0 MHz)<br>Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz)<br>Band 3, E-UTRA/FDD (1710.0 - 1785.0 MHz)<br>Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz)<br>Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz)<br>Band 9, E-UTRA/FDD (1749.9 - 1784.9 MHz)<br>Band 10, E-UTRA/FDD (1710.0 - 1770.0 MHz)<br>Band 20, E-UTRA/FDD (832.0 - 862.0 MHz)<br>Band 22, E-UTRA/FDD (3410.0 - 3490.0 MHz)<br>Band 23, E-UTRA/FDD (2000.0 - 2020.0 MHz)<br>Band 25, E-UTRA/FDD (1850.0 - 1915.0 MHz)<br>Band 28 E-UTRA/FDD (703.0 - 748.0 MHz)<br>Band 65, E-UTRA/FDD (1920.0 - 2010.0 MHz)<br>Band 66, E-UTRA/FDD (1710.0 - 1780.0 MHz)<br>Band 70, E-UTRA/FDD (1695.0 - 1710.0 MHz)<br>Band 71, E-UTRA/FDD (663.0 - 698.0 MHz)<br>Band 74, E-UTRA/FDD (1427.0 - 1470.0 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Modulation Scheme: SC-FDMA<br>Number of PUSCHs: 1<br>Settings for Subframe #0 to #9:<br>Modulation Scheme: 16QAM<br>Data Type: UL-SCH<br>Number RB: 1<br>Transport Block Size: 256<br>TBS Index: 14<br>MCS Index: 15<br>Data Type: PN9 |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 10.0 ms |

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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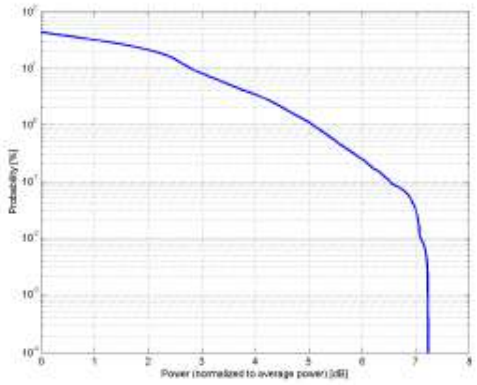
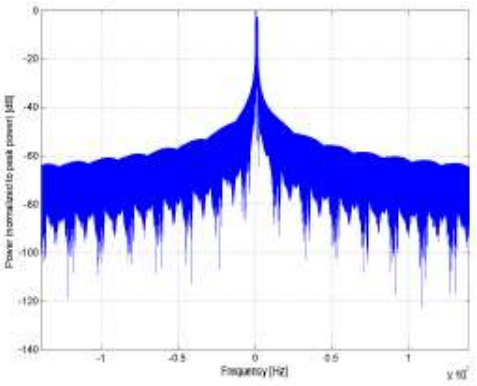
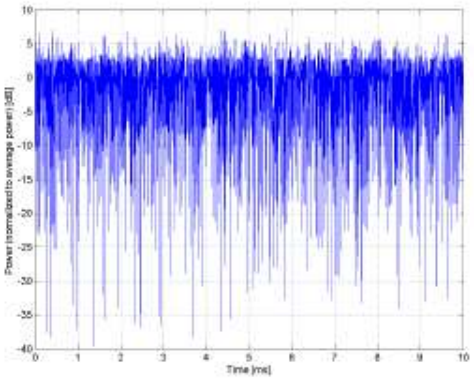



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM) |
| Group: | LTE-FDD |
| UID: | 10182-CAE |
| PAR: [1] | 6.52 dB |
| MIF: [2] | -9.76 dB |
| Standard Reference: | 3GPP/ ETSI TS 136.101 V8.4.0<br>3GPP/ ETSI TS 136.213 V8.4.0<br>FCC OET KDB 941225 D05 SAR for LTE Devices v01 |
| Category: | Random amplitude modulation |
| Modulation: | 16-QAM |
| Frequency Band: | Band 1, E-UTRA/FDD (1920.0 - 1980.0 MHz)<br>Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz)<br>Band 3, E-UTRA/FDD (1710.0 - 1785.0 MHz)<br>Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz)<br>Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz)<br>Band 9, E-UTRA/FDD (1749.9 - 1784.9 MHz)<br>Band 10, E-UTRA/FDD (1710.0 - 1770.0 MHz)<br>Band 18, E-UTRA/FDD (815.0 - 830.0 MHz)<br>Band 19, E-UTRA/FDD (830.0 - 845.0 MHz)<br>Band 20, E-UTRA/FDD (832.0 - 862.0 MHz)<br>Band 21, E-UTRA/FDD (1447.9 - 1462.9 MHz)<br>Band 22, E-UTRA/FDD (3410.0 - 3490.0 MHz)<br>Band 23, E-UTRA/FDD (2000.0 - 2020.0 MHz)<br>Band 25, E-UTRA/FDD (1850.0 - 1915.0 MHz)<br>Band 26 E-UTRA/FDD (814.0 - 849.0 MHz)<br>Band 28 E-UTRA/FDD (703.0 - 748.0 MHz)<br>Band 65, E-UTRA/FDD (1920.0 - 2010.0 MHz)<br>Band 66, E-UTRA/FDD (1710.0 - 1780.0 MHz)<br>Band 68, E-UTRA/FDD (698.0 - 728.0 MHz)<br>Band 70, E-UTRA/FDD (1695.0 - 1710.0 MHz)<br>Band 71, E-UTRA/FDD (663.0 - 698.0 MHz)<br>Band 74, E-UTRA/FDD (1427.0 - 1470.0 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Modulation Scheme: SC-FDMA<br>Number of PUSCHs: 1<br>Settings for Subframe #0 to #9:<br>Modulation Scheme: 16QAM<br>Data Type: UL-SCH<br>Number RB: 1<br>Transport Block Size: 256<br>TBS Index: 14<br>MCS Index: 15<br>Data Type: PN9 |
| Bandwidth: | 15.0 MHz |
| Integration Time: | 10.0 ms |

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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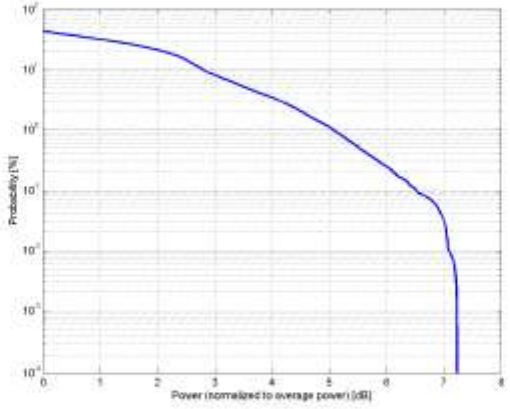
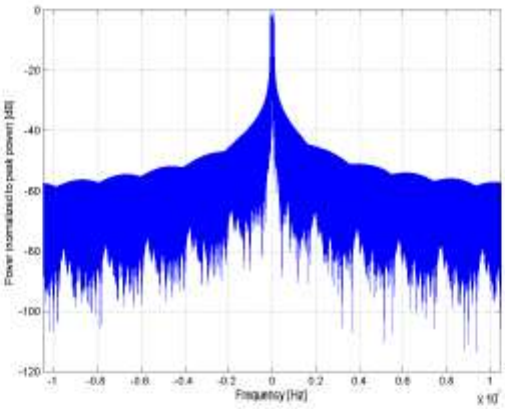
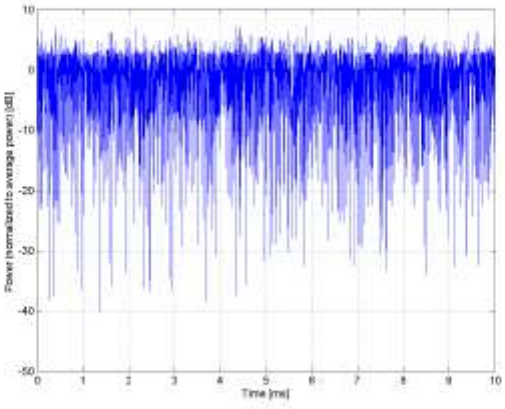



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

## Calibration Laboratory of
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| | |
|---|---|
| Name: | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM) |
| Group: | LTE-FDD |
| UID: | 10176-CAG |
| PAR: [1] | 6.52 dB |
| MIF: [2] | -9.76 dB |
| Standard Reference: | 3GPP / ETSI TS 136.101 V8.4.0<br>3GPP / ETSI TS 136.213 V8.4.0<br>FCC OET KDB 941225 D05 SAR for LTE Devices v01 |
| Category: | Random amplitude modulation |
| Modulation: | 16-QAM |
| Frequency Band: | Band 1, E-UTRA/FDD (1920.0 - 1980.0 MHz)<br>Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz)<br>Band 3, E-UTRA/FDD (1710.0 - 1785.0 MHz)<br>Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz)<br>Band 5, E-UTRA/FDD (824.0 - 849.0 MHz)<br>Band 6, E-UTRA/FDD (830.0 - 840.0 MHz)<br>Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz)<br>Band 8, E-UTRA/FDD (880.0 - 915.0 MHz)<br>Band 9, E-UTRA/FDD (1749.9 - 1784.9 MHz)<br>Band 10, E-UTRA/FDD (1710.0 - 1770.0 MHz)<br>Band 11, E-UTRA/FDD (1427.9 - 1447.9 MHz)<br>Band 12, E-UTRA/FDD (699.0 - 716.0 MHz)<br>Band 13, E-UTRA/FDD (777.0 - 787.0 MHz)<br>Band 14, E-UTRA/FDD (788.0 - 798.0 MHz)<br>Band 17, E-UTRA/FDD (704.0 - 716.0 MHz)<br>Band 18, E-UTRA/FDD (815.0 - 830.0 MHz)<br>Band 19, E-UTRA/FDD (830.0 - 845.0 MHz)<br>Band 20, E-UTRA/FDD (832.0 - 862.0 MHz)<br>Band 21, E-UTRA/FDD (1447.9 - 1462.9 MHz)<br>Band 22, E-UTRA/FDD (3410.0 - 3490.0 MHz)<br>Band 23, E-UTRA/FDD (2000.0 - 2020.0 MHz)<br>Band 24, E-UTRA/FDD (1626.5 - 1660.5 MHz)<br>Band 25, E-UTRA/FDD (1850.0 - 1915.0 MHz)<br>Band 26 E-UTRA/FDD (814.0 - 849.0 MHz)<br>Band 27 E-UTRA/FDD (807.0 - 824.0 MHz)<br>Band 28 E-UTRA/FDD (703.0 - 748.0 MHz)<br>Band 30, E-UTRA/FDD (2305.0 - 2315.0 MHz)<br>Band 65, E-UTRA/FDD (1920.0 - 2010.0 MHz)<br>Band 66, E-UTRA/FDD (1710.0 - 1780.0 MHz)<br>Band 68, E-UTRA/FDD (698.0 - 728.0 MHz)<br>Band 70, E-UTRA/FDD (1695.0 - 1710.0 MHz)<br>Band 71, E-UTRA/FDD (663.0 - 698.0 MHz)<br>Band 74, E-UTRA/FDD (1427.0 - 1470.0 MHz)<br>Band 85, E-UTRA/FDD (698.0 - 716.0 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Modulation Scheme: SC-FDMA<br>Number of PUSCHs: 1<br>Settings for Subframe #0 to #9:<br>Modulation Scheme: QPSK<br>Data Type: UL-SCH<br>Number RB: 1<br>Transport Block Size: 256<br>TBS Index: 14<br>MCS Index: 15<br>Data Type: PN9 |
| Bandwidth: | 10.0 MHz |
| Integration Time: | 10.0 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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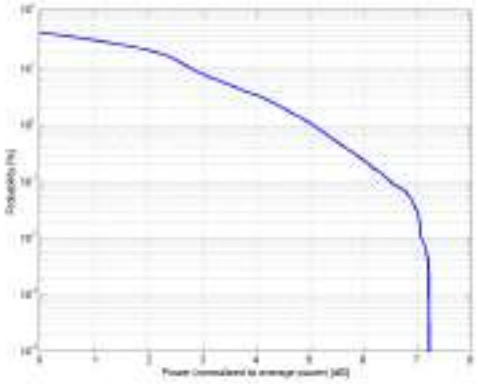
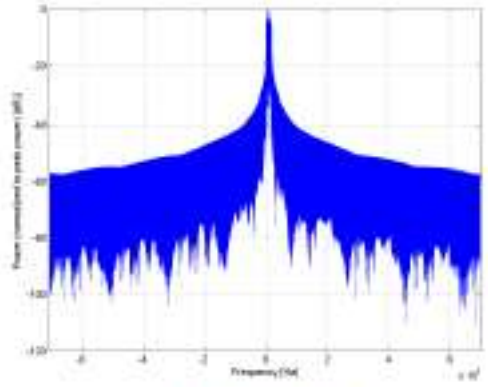
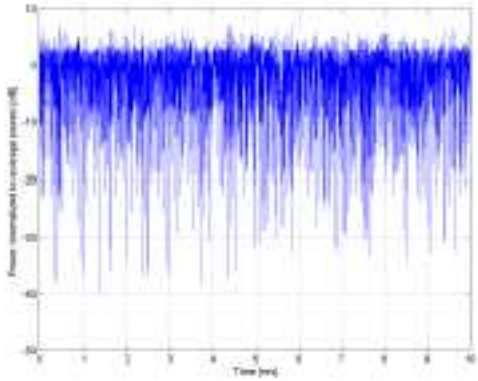


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

**Calibration Laboratory of**
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| | |
|---|---|
| Name: | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM) |
| Group: | LTE-TDD |
| UID: | 10173-CAG |
| PAR: [1] | 9.48 dB |
| MIF: [2] | -1.44 dB |
| Standard Reference: | 3GPP / ETSI TS 136.101 V8.4.0<br>3GPP / ETSI TS 136.213 V8.4.0<br>FCC OET KDB 941225 D05 SAR for LTE Devices v02 |
| Category: | Random amplitude modulation |
| Modulation: | 16-QAM |
| Frequency Band: | Band 33, E-UTRA/TDD (1900.0 - 1920.0 MHz)<br>Band 35, E-UTRA/TDD (1850.0 - 1910.0 MHz)<br>Band 36, E-UTRA/TDD (1930.0 - 1990.0 MHz)<br>Band 37, E-UTRA/TDD (1910.0 - 1930.0 MHz)<br>Band 38, E-UTRA/TDD (2570.0 - 2620.0 MHz)<br>Band 39, E-UTRA/TDD (1880.0 - 1920.0 MHz)<br>Band 40, E-UTRA/TDD (2300.0 - 2400.0 MHz)<br>Band 41, E-UTRA/TDD (2496.0 - 2690.0 MHz)<br>Band 42, E-UTRA/TDD (3400.0 - 3600.0 MHz)<br>Band 43, E-UTRA/TDD (3600.0 - 3800.0 MHz)<br>Band 44, E-UTRA/TDD (703.0 - 803.0 MHz)<br>Band 45, E-UTRA/FDD (1447.0 - 1467.0 MHz)<br>Band 46, E-UTRA/FDD (5150.0 - 5925.0 MHz)<br>Band 47, E-UTRA/TDD (5855.0 - 5925.0 MHz)<br>Band 48, E-UTRA/TDD (3550.0 - 3700.0 MHz)<br>Band 49, E-UTRA/TDD (3550.0 - 3700.0 MHz)<br>Band 50, E-UTRA/TDD (1432.0 - 1517.0 MHz)<br>Band 76, E-UTRA/FDD (3300.0 - 3400.0 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Modulation Scheme: SC-FDMA<br>Uplink-downlink configuration: 1<br>Special Subframe configuration: 4<br>Number of Frames: 1<br>Settings for UL Subframe 2,3,7,8:<br>Number of PUSCHs: 1<br>Modulation Scheme: 16QAM<br>Allocated RB: 1<br>Start Number of RB: 50<br>Data Type: PN9fix |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 6.0 ms |

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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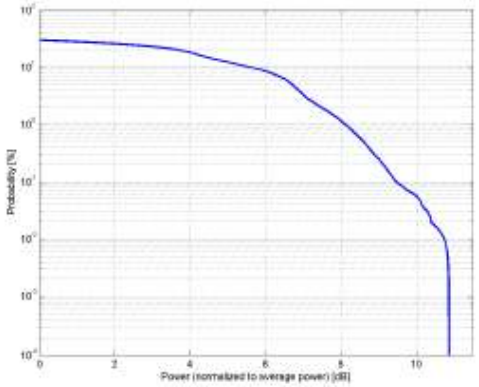
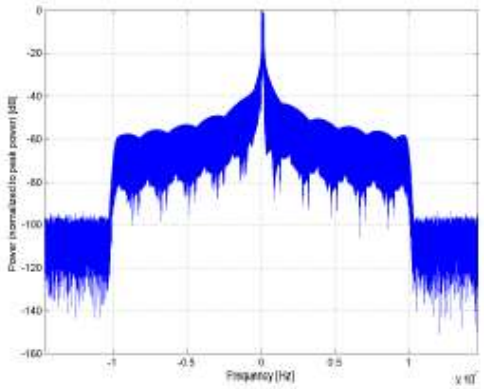
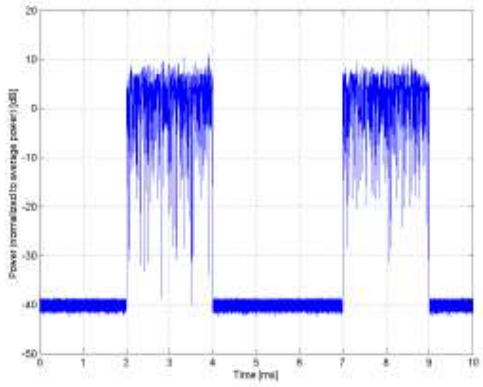



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

**Calibration Laboratory of**
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| | |
|---|---|
| Name: | **IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)** |
| Group: | WLAN |
| UID: | 10061-CAB |
| PAR: [1] | **3.60 dB** |
| MIF: [2] | **-2.02 dB** |
| Standard Reference: | IEEE 802.11b-1999 , Part 11, FCC SAR meas for 802 11 a b g v01r02 (248227 D01) |
| Category: | Random amplitude modulation |
| Modulation: | DQPSK |
| Frequency Band: | WLAN 2.4GHz (2412.0-2484.0 MHz, 20230) |
| Detailed Specification: | Data Rate: 11 Mbps<br>Spreading, Coding: CCK<br>PPDU format: Long Preamble & Heading<br>PSDU Length: 1024<br>PSDU Data: PN9 |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 1.5 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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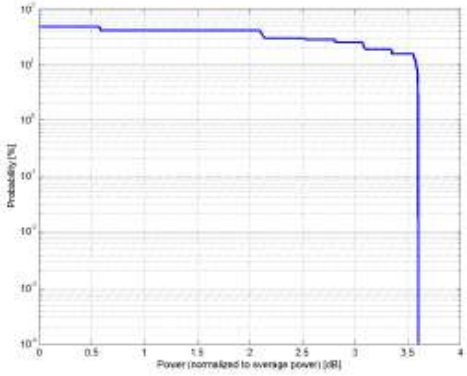
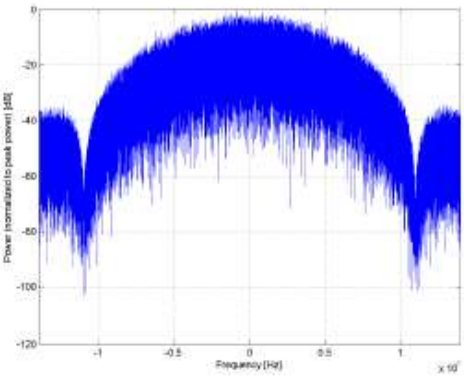
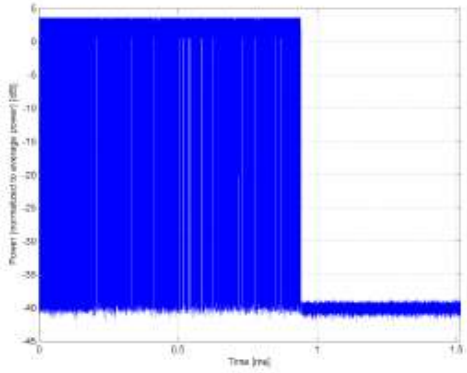



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | **IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)** |
| Group: | WLAN |
| UID: | 10077-CAB |
| PAR: [1] | **11.00 dB** |
| MIF: [2] | **0.12 dB** |
| Standard Reference: | IEEE 802.11g-2003 , Part 11 |
| | FCC SAR meas for 802 11 a b g v01r02 (248227 D01) |
| Category: | Random amplitude modulation |
| Modulation: | 64-QAM |
| Frequency Band: | WLAN 2.4GHz (2412.0-2484.0 MHz, 20230) |
| Detailed Specification: | Data Rate: 54 Mbps |
| | Coding Rate: 3/4 |
| | Coded bits per subcarrier: 6 |
| | Coded bits per OFDM symbol: 288 |
| | Data bits per OFDM symbol: 216 |
| | PSDU Length: 1000 Bytes |
| | PSDU Data: PN9 |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 0.9 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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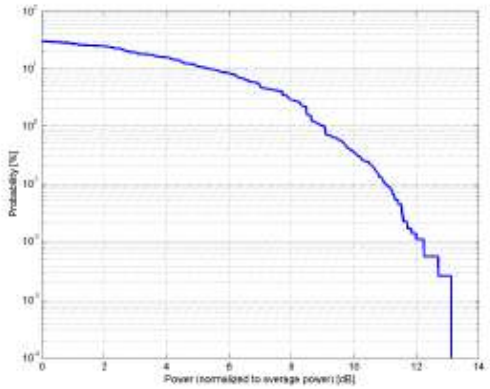
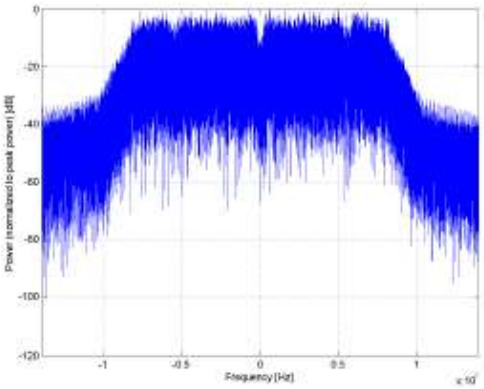
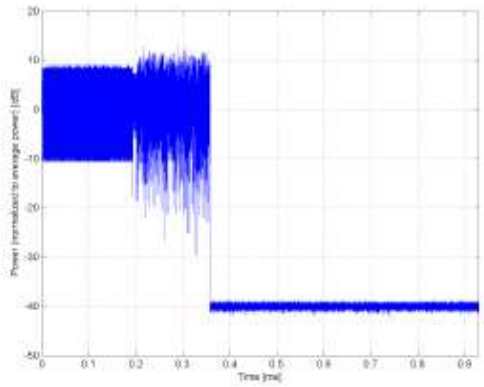



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle) |
| Group: | WLAN |
| UID: | 10591-AAB |
| PAR: [1] | 8.63 dB |
| MIF: [2] | -5.59 dB |
| Standard Reference: | IEEE 802.11-2012<br>FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02r01 |
| Category: | Random amplitude modulation |
| Modulation: | BPSK |
| Frequency Band: | WLAN 2.4GHz (2412.0 - 2484.0 MHz)<br>WLAN 5GHz (4915.0 - 5825.0 MHz)<br>U-NII-1, U-NII-2A (5170 - 5330 MHz)<br>U-NII-2C Standalone (5490 - 5710 MHz)<br>U-NII-2C <5.65 GHz (5490 - 5650 MHz)<br>U-NII-3 Standalone (5735 - 5835 MHz)<br>U-NII-2C, U-NII-3 (5650 - 5835 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Duty cycle: 90%<br>MPDU length: 4096 bytes<br>MCS: 0<br>Guard Interval: long |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 5.6 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"

2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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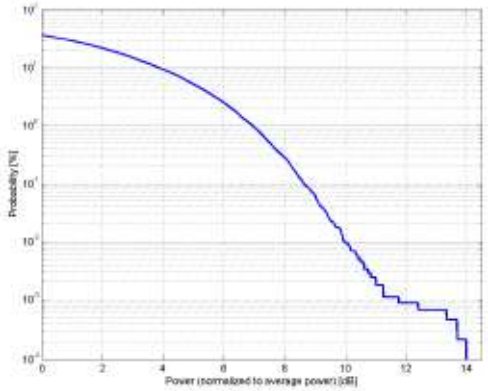
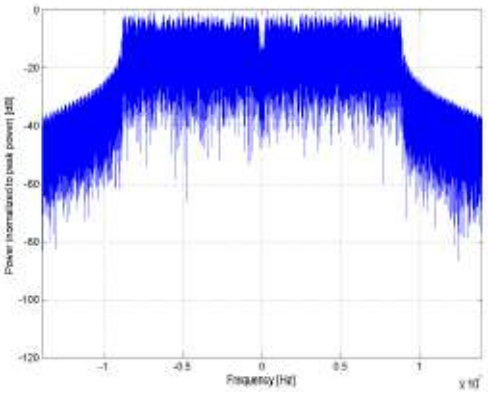
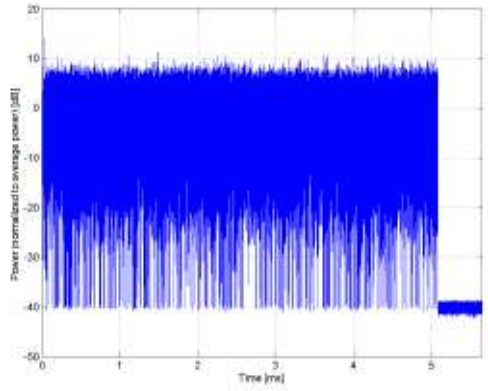



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps) |
| Group: | WLAN |
| UID: | 10069-CAC |
| PAR: [1] | 10.56 dB |
| MIF: [2] | -3.15 dB |
| Standard Reference: | IEEE 802.11a-1999 (R2003) , Part 11<br>IEEE 802.11h-2003 , Part 11<br>FCC SAR meas for 802 11 a b g v01r02 (248227 D01) |
| Category: | Random amplitude modulation |
| Modulation: | 64-QAM |
| Frequency Band: | WLAN 5GHz (4915.0 - 5825.0 MHz)<br>U-NII-1, U-NII-2A (5170 - 5330 MHz)<br>U-NII-2C Standalone (5490 - 5710 MHz)<br>U-NII-2C <5.65 GHz (5490 - 5650 MHz)<br>U-NII-3 Standalone (5735 - 5835 MHz)<br>U-NII-2C, U-NII-3 (5650 - 5835 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Data Rate: 54 Mbps<br>Coding Rate: 3/4<br>Coded bits per subcarrier: 6<br>Coded bits per OFDM symbol: 288<br>Data bits per OFDM symbol: 216<br>PSDU Length: 1000 Bytes<br>PSDU Data: PN9 |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 0.3 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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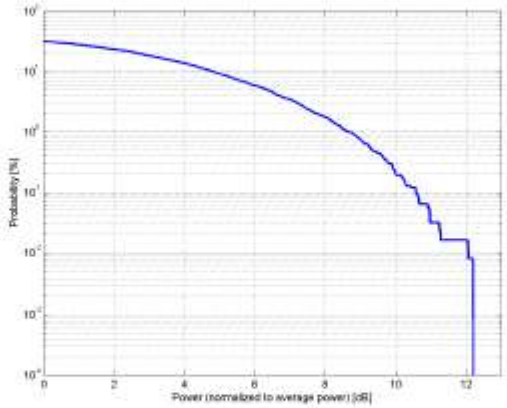
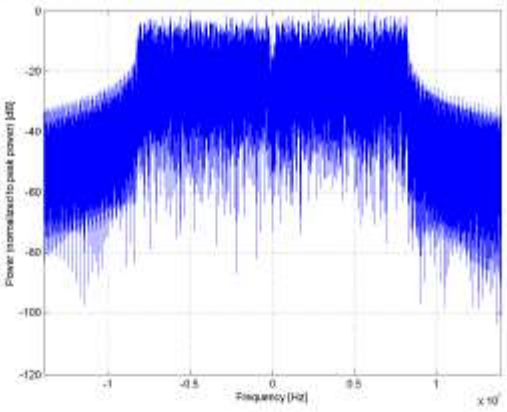
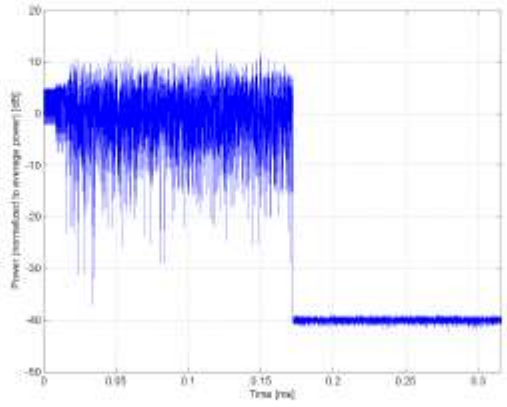



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle) |
| Group: | WLAN |
| UID: | 10616-AAB |
| PAR: [1] | 8.82 dB |
| MIF: [2] | -5.57 dB |
| Standard Reference: | IEEE 802.11-2013<br>FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02r01 |
| Category: | Random amplitude modulation |
| Modulation: | BPSK |
| Frequency Band: | WLAN 2.4GHz (2412.0 - 2484.0 MHz)<br>WLAN 5GHz (4915.0 - 5825.0 MHz)<br>U-NII-1, U-NII-2A (5170 - 5330 MHz)<br>U-NII-2C Standalone (5490 - 5710 MHz)<br>U-NII-2C <5.65 GHz (5490 - 5660 MHz)<br>U-NII-3 Standalone (5735 - 5835 MHz)<br>U-NII-2C, U-NII-3 (5660 - 5835 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Bandwidth: 40MHz<br>Duty cycle: 90%<br>MCS: 0<br>Number of spatial streams: 1<br>MPDU length: 8192 |
| Bandwidth: | 40.0 MHz |
| Integration Time: | 5.4 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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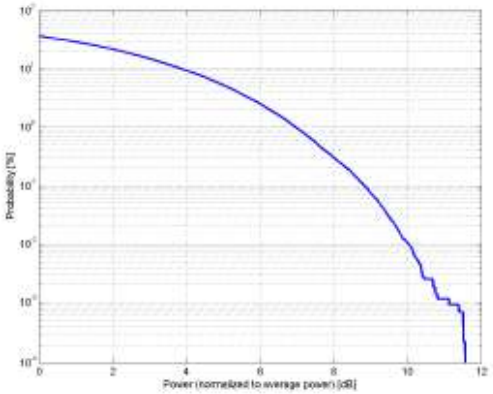
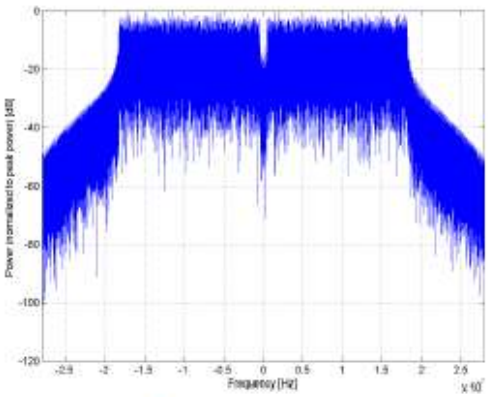
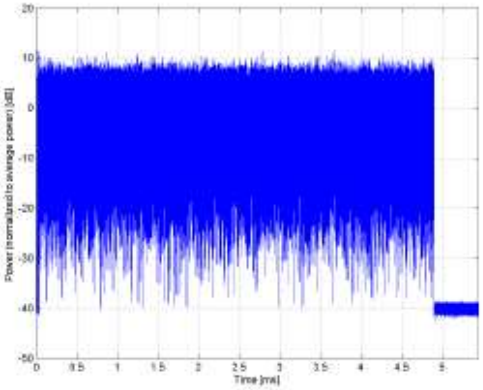



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | IEEE 802.11ax (20MHz, MCS0, 90pc duty cycle) |
| Group: | WLAN |
| UID: | 10671-AAA |
| PAR: [1] | 9.09 dB |
| MIF: [2] | -5.58 dB |
| Standard Reference: | SPEAG |
| Category: | Random amplitude modulation |
| Modulation: | BPSK |
| Frequency Band: | WLAN 2.4GHz (2412.0 - 2484.0 MHz)<br>WLAN 5GHz (4915.0 - 5825.0 MHz)<br>U-NII-1, U-NII-2A (5170 - 5330 MHz)<br>U-NII-2C Standalone (5490 - 5710 MHz)<br>U-NII-2C <5.65 GHz (5490 - 5650 MHz)<br>U-NII-3 Standalone (5735 - 5835 MHz)<br>U-NII-2C, U-NII-3 (5650 - 5835 MHz)<br>Validation band (0.0 - 6000.0 MHz) |
| Detailed Specification: | Bandwidth: 20MHz<br>Duty Cycle: 90%<br>Number of spatial stream: 1 |
| Bandwidth: | 20.0 MHz |
| Integration Time: | 5.0 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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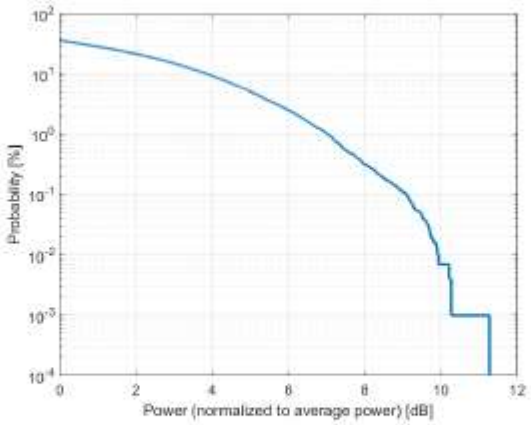
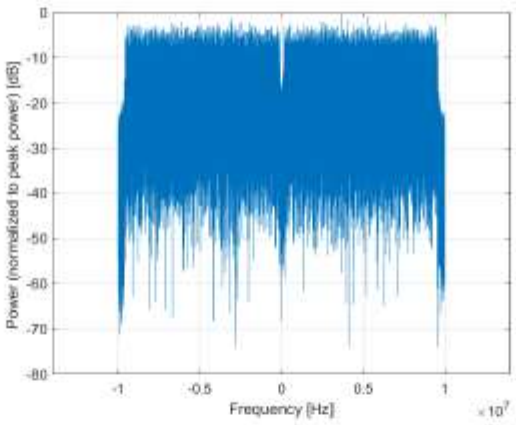
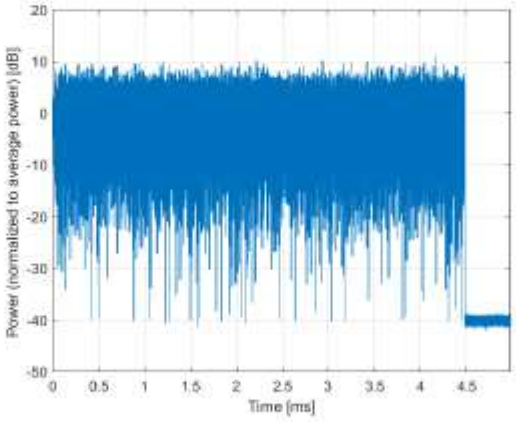



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**

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| | |
|---|---|
| Name: | **IEEE 802.15.1 Bluetooth (GFSK, DH1)** |
| Group: | Bluetooth |
| UID: | 10030-CAA |
| PAR: [1] | **5.30 dB** |
| MIF: [2] | **1.02 dB** |
| Standard Reference: | Bluetooth 1.2 (IEEE Standard 802.15.1-2005) |
| Category: | Periodic pulsed modulation |
| Modulation: | GFSK |
| Frequency Band: | ISM 2.4 GHz Band (2400.0-2483.5 MHz, 20052) |
| Detailed Specification: | Basic Rate, 1 Slot active<br>Data Rate: 1 Mbps<br>Packet Type: DH1<br>Payload Body: 27 Bytes<br>PN9 data is inserted into the payload body<br>Modulation for Payload: GFSK<br>Modulation Index: 0.32 |
| Bandwidth: | 1.4 MHz |
| Integration Time: | 2.5 ms |

1 PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
2 Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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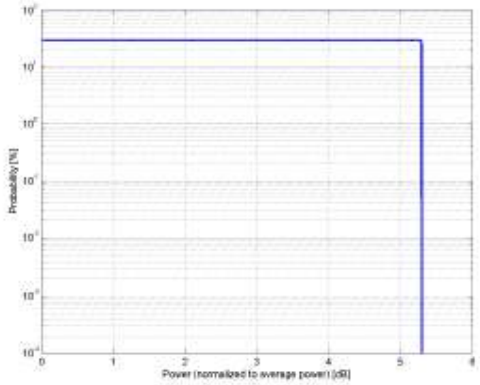
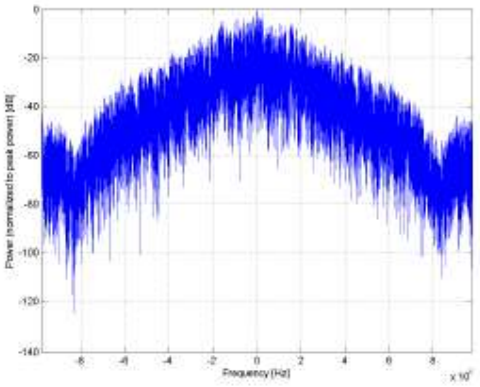
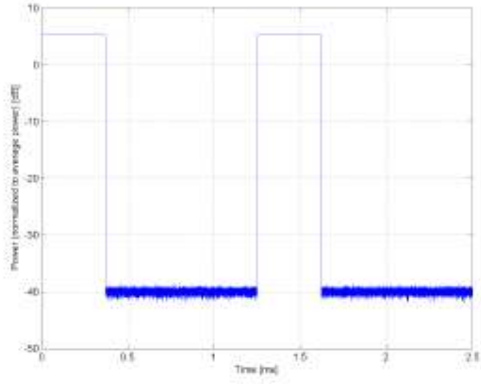



**Complementary Cumulative Distribution Function (CCDF)**




**Frequency Domain**




**Time Domain**