HAC RF TEST REPORT

No. 24T04Z102259-016

For

TCL Communication Ltd

GSM/UMTS/LTE/NR Mobile phone

Model Name: T702Z

with

Hardware Version: 03

Software Version: 9L3N

FCC ID: 2ACCJH184

HAC-2019 Compliance: PASS

Issued Date: 2024-11-23

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
24T04Z102259-016	Rev.0	2024-11-23	Initial creation of test report

TABLE OF CONTENT

1 Test Laboratory

1.1 Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2 Testing Location

CompanyName:	CTTL
Address:	No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

1.3 Testing Environment

Temperature:	18°C~25°C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards	

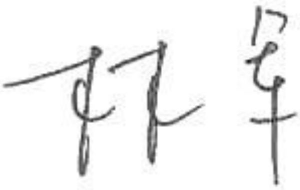
1.4 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Wang Tian
Testing Start Date:	November 7, 2024
Testing End Date:	November 8, 2024

1.5 Signature

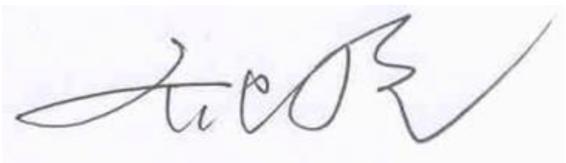
Wang Tian

(Prepared this test report)



Lin Jun

(Reviewed this test report)



Qi Dianyuan

Deputy Director of the laboratory

(Approved this test report)

2 Client Information

2.1 Applicant Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Ting Wang
Contact Email:	ting.wang.hz@tcl.com
Telephone:	+86 752 2639091
Fax	\

2.2 Manufacturer Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Ting Wang
Contact Email:	ting.wang.hz@tcl.com
Telephone:	+86 752 2639091
Fax	\

3 Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1 About EUT

Description:	GSM/UMTS/LTE/NR Mobile phone
Model name:	T702Z
Operating mode(s):	GSM 850/900/1800/1900 WCDMA B1/2/4/5/8 LTE Band:1/2/3/4/5/7/8/9/12/13/14/17/20/25/26/28/29/30/38/39/40/41/42/66/71 5G NR N1/2/3/5/20/25/28/29/30/40/41/48/66/70/71/77/78 BT, Wi-Fi(2.4G), Wi-Fi(5G), NFC

3.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	016605000206233/016605000206241	03	9L3N

*EUT ID: is used to identify the test sample in the lab internally.

3.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	TLp049C9	\	FENGHUA
AE2	Battery	TLp049D7	\	VEKEN

*AE ID: is used to identify the test sample in the lab internally.

3.4 Air Interfaces / Bands Indicating Operating Modes

Air-interface	Band(MHz)	Type	C63.19/tested	Simultaneous Transmissions Not Tested(1)	Name of Voice Service
GSM	850	VO	Yes	BT, WLAN	CMRS Voice
	1900				
GPRS/EDGE	850	DT	Yes		MEET
	1900				
WCDMA (UMTS)	850	VO	Yes	BT, WLAN	CMRS Voice
	1700				
	1900				
	HSPA	DT	Yes		MEET
LTE TDD	Band38/41	V/D	Yes	BT, WLAN	VoLTE, MEET
LTE FDD	Band2/4/5/7/12/13/14/17/25/26/30/66/71	V/D	Yes	BT, WLAN	VoLTE, MEET
NR	n2/n5/n25/n30/n41/n48/n66/n70/n71/n77/n78	V/D	Yes	BT, WLAN	VoNR, MEET
BT	2450	DT	NA	WWAN	NA
WLAN	2450	V/D	Yes	WWAN	VoWiFi, MEET
WLAN	5G	V/D	Yes	WWAN	VoWiFi, MEET

NA: Not Applicable VO: Voice Only V/D: CMRS and IP Voice Service over Digital Transport
DT: Digital Transport

Note1: According to KDB285076 D01, clause 2 d), for the Interference Level, the single transmission scenario of each frequency band is higher than or equal to the simultaneous transmission scenario, so the frequency band that has evaluated the single will not evaluate the simultaneous.

4 Maximum Output Power

Bands	Conducted Power (dBm)
GSM 850	32.5
GSM 1900	30
WCDMA 850	23.5
WCDMA 1700	24.5
WCDMA 1900	24
LTE Band2	24.5
LTE Band4	24.5
LTE Band5	25
LTE Band7	23.5
LTE Band12	25
LTE Band13	25
LTE Band14	25
LTE Band17	25
LTE Band25	24.5
LTE Band26	25
LTE Band30	24.5
LTE Band38	24
LTE Band41 PC2	27
LTE Band41 PC3	25
LTE Band66	24.5
LTE Band71	24
NR n2	25
NR n5	24.5
NR n25	25
NR n30	24.5
NR n66	25
NR n70	25
NR n71	24.5
NR n41 ANT4	27
NR n41 ANT1	27
NR n48	24
NR n77 ANT2	27
NR n77 ANT6	27
NR n78	24
WLAN 2.4GHz	20.5
WLAN 5GHz	19.5

5 Reference Documents

5.1 Reference Documents for testing

The following document listed in this section is referred for testing.

Reference	Title	Version
ANSI C63.19-2019	American National Standard for Methods of Measurement of Compatibility Between Wireless Communication Devices and Hearing Aids	2019 Edition
FCC 47 CFR §20.19	Hearing Aid Compatible Mobile Headsets	2024 Edition
KDB285076 D01 v06r04.	Equipment Authorization Guidance for Hearing Aid Compatibility	2023 Edition

6 Operational Conditions During Test

6.1 HAC MEASUREMENT SET-UP

These measurements are performed using the DASY6/8 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Stäubli), robot controller, Intel Core2 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 Intel Core21.86 GHz computer with Windows 10 system and HAC Measurement Software DASY6/8, A/D interface card, monitor, mouse, and keyboard. The Stäubli 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.

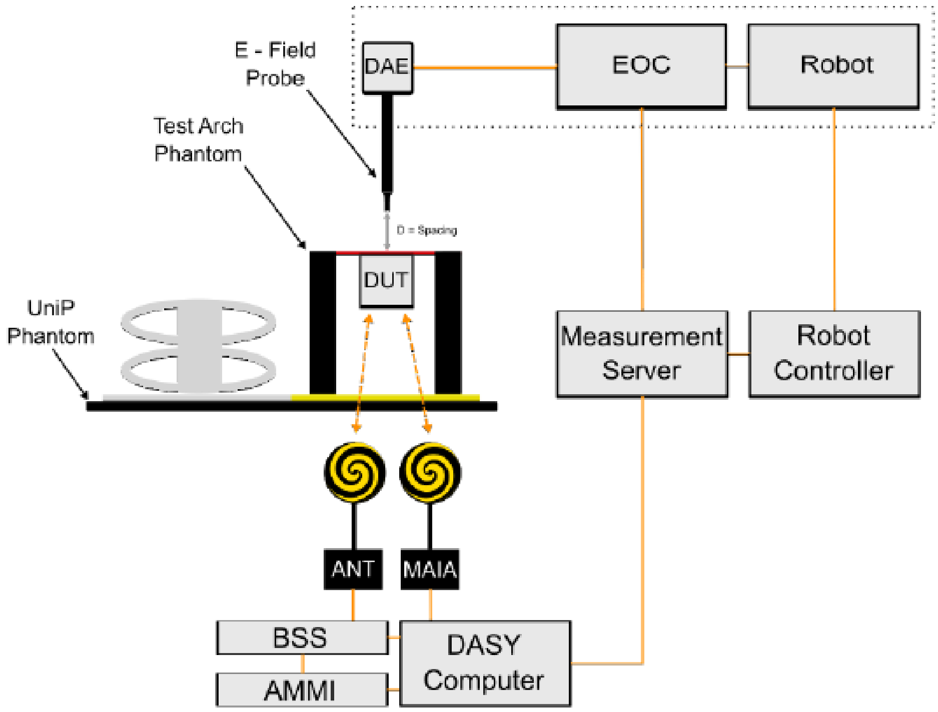
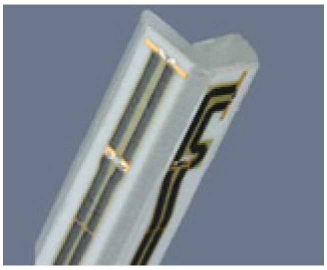


Fig. 1 HAC Test Measurement Set-up

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.

6.2 Probe Specification

E-Field Probe Description



[EF3DV3]

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges
Calibration	In air from 30 MHz to 6.0 GHz (absolute accuracy ±6.0%, k=2)
Frequency	30 MHz to 6 GHz Linearity: ± 0.2 dB (100 MHz to 3 GHz)
Directivity	± 0.2 dB in air (rotation around probe axis) ± 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) Tip diameter: 4 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.5 mm
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms

6.3 Test Arch Phantom &Phone Positioner

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. It enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot (Dimensions: 370 x 370 x 370 mm).

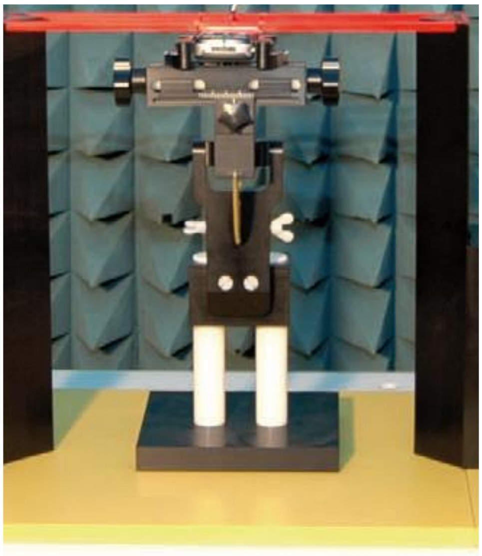


Fig. 2 HAC Phantom & Device Holder

6.4 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX160L

Repeatability: ±0.02 mm

No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Intel Core2

Clock Speed: 1.86GHz

Operating System: Windows 10

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic

Software: DASY6/8 cD6 HAC

Connecting Lines: Optical downlink for data and status info.

Optical uplink for commands and clock

7 EUT Arrangement

7.1 WD RF Emission Measurements Reference and Plane

Figure 3 illustrates the references and reference plane that shall be used in the WD emissions measurement.

- The measurement area is 50.0 mm by 50.0 mm.
- The measurement area is centered on the audio frequency output transducer of the WD (speaker or T-Coil signal).
- The measurement area is in a reference plane, which is defined as the planar area tangent to the highest point in the area of the phone that normally rests against the user's ear. It is parallel to the centerline of the receiver area of the phone and is defined by the points of the receiver-end of the WD handset, which, in normal handset use, rest against the ear.
- The measurement plane is parallel to, and 15.0 mm in front of, the reference plane.

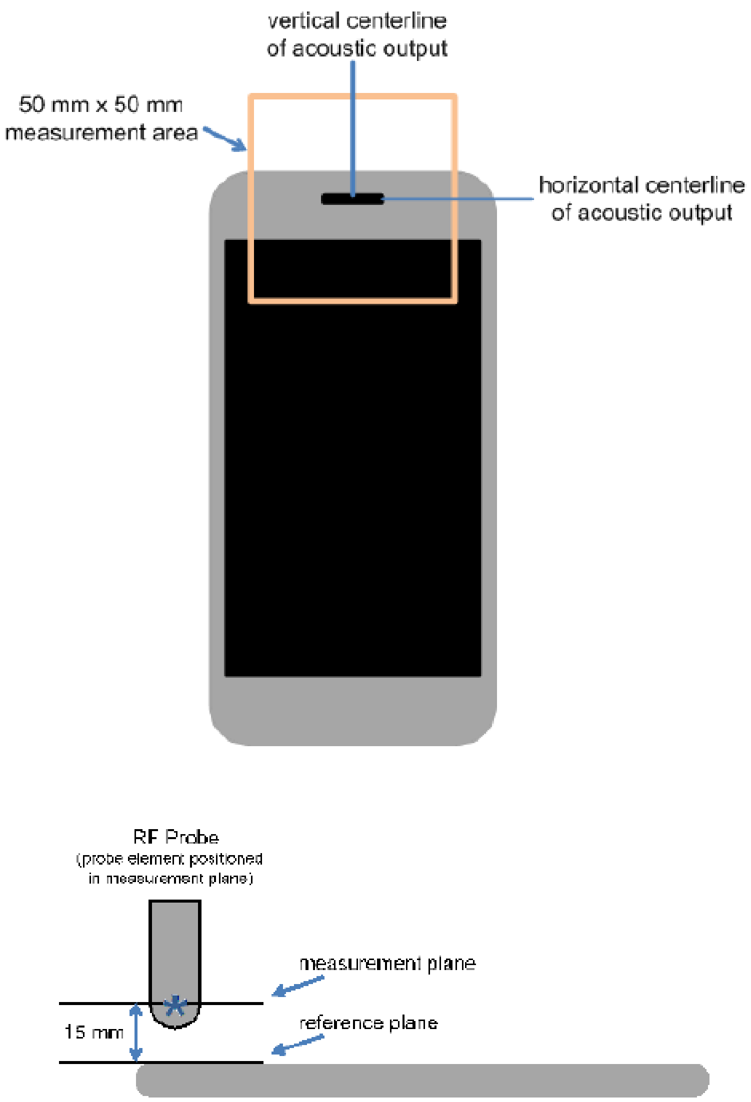


Fig. 3 WD measurement and reference planes for RF emission measurements

8 System Validation

8.1 Validation Procedure

Place a dipole antenna meeting the requirements given in ANSI C63.19 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical output. Position the E-field probes so that:

•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) are 15 mm from the closest surface of the dipole elements.

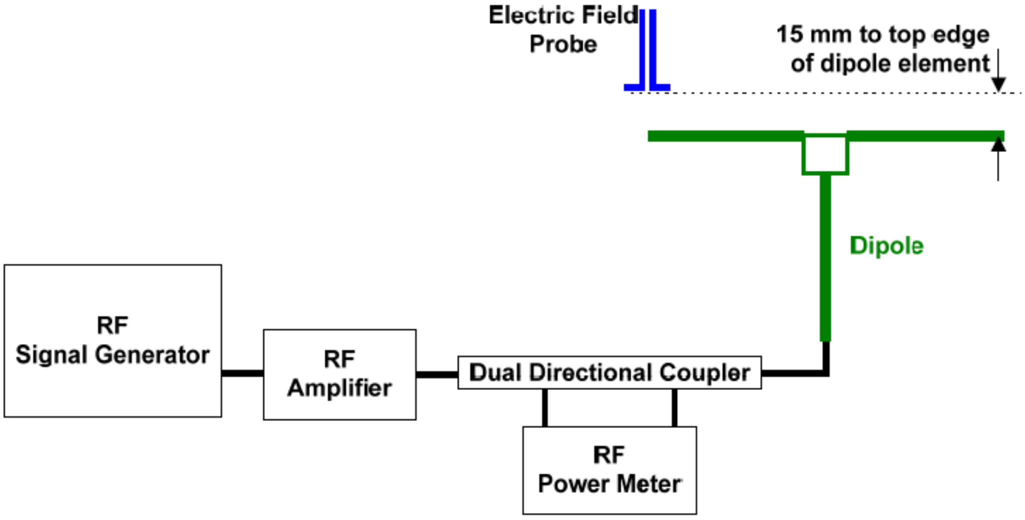


Fig. 4 Dipole Validation Setup

8.2 Validation Result

E-Field Scan						
Mode	**Frequency (MHz)**	**Input Power (mW)**	**Measured[1] Value(V/m)**	**Target[2] Value(V/m)**	**Deviation[3] (%)**	**Limit[4] (%)**
CW	835	100	116.00	112.60	3.02	±18
CW	1880	100	89.30	88.20	1.25	±18
CW	2600	100	82.20	85.30	-3.63	±18
CW	3500	100	79.30	85.70	-7.47	±18
CW	3900	100	81.00	81.80	-0.98	±18

Notes:

1. Please refer to the attachment for detailed measurement data and plot.

2. Target value is provided by SPEAG in the calibration certificate of specific dipoles.

3. Deviation (%) = 100 * (Measured value minus Target value) divided by Target value.

4. ANSI C63.19 requires values within ± 18% are acceptable, of which 12% is deviation and 13% is measurement uncertainty. Values independently validated for the dipole actually used in the measurements should be used, when available.

9 Evaluation of MIF

9.1 Introduction

The HAC Standard ANSI C63.19-2019 defines the MIF as a scaling factor to evaluate the Radio Frequency Audio Interference Level (RFail). It is applicable to any modulation scheme. The MIF (in dB) is added to the measured averaged E-field (in dBV /m) to obtain the RFail (also in dBV/m) which defines the audible amplitude of the measured RF signal strength. The RFail is then compared to the associated qualification level.

The MIF is defined in section D.7 of the ANSI C63.19-2019 as the interference potential of a signal to its steady state RMS signal level or average power level. This factor is a function only of the audio frequency amplitude modulation characteristics of the signal and is the same for field strength or conducted power measurements. The modulated signal is processed as described below:

• The full signal bandwidth is presented to a wideband square law detector which demodulates the signal.

• The baseband signal (after demodulation) is presented to a spectral weighting filter which is

normalized to 1 kHz. The filter frequency response is shown in Section D.4 of the ANSI C63.19-

2019 standard.

• The spectral weighted signal is presented to a temporal weighting filter consisting of rapid Root

Mean Square (RMS) level detection followed by peak detection with a 550 ms decay time.

• The MIF is calculated as $\frac{10 \cdot log10_{10}(filtered\ signal)}{1.154 \cdot RMS\ of\ \ demodulated\ signal}$

Measurements of the MIF value are conducted using the MAIA designed by SPEAG. The resulting deviations from the simulated values are within the requirements of the HAC standard.

MAIA is a hardware interface for evaluating the modulation and audio interference characteristics of RF signals in the frequency range 698–6000 MHz. It uses USB-powered active electronics to identify the modulation of the DUT. It can be operated with the over-the-air interface using the built-in ultra-broadband planar log spiral antenna (698–6000 MHz) or in the conducted mode using the coaxial SMA 50W connector (300–6000 MHz).

Fig. 5 MAIA View

9.2 DUT MIF results

Based on the KDB285076D01v06r02, the handset can also use the MIF values predetermined by the test equipment manufacturer. MIF values applied in this test report were provided by the HAC equipment provider of SPEAG, and the worst values for all air interface are listed below.

Typical MIF levels in ANSI C63.19-2019	
Transmission protocol	Modulation interference factor
GSM-FDD (TDMA, GMSK)	+3.63 dB
EDGE-FDD (TDMA, 8PSK, TN 0-1)	+1.23dB
EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	-0.52dB
EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	-1.82dB
UMTS-FDD(WCDMA, AMR)	-25.43dB
UMTS-FDD (HSPA+)	-20.39dB
LTE-FDD (SC-FDMA, 1RB, 20MHz, QPSK)	-15.63 dB
LTE-FDD (SC-FDMA, 1RB, 20MHz, 16QAM)	-9.76 dB
LTE-FDD (SC-FDMA, 1RB, 20MHz, 64QAM)	-9.93 dB
LTE-TDD (SC-FDMA, 1RB, 20MHz, QPSK)	-1.62 dB
LTE-TDD (SC-FDMA, 1RB, 20MHz, 16QAM)	-1.44 dB
LTE-TDD (SC-FDMA, 1RB, 20MHz, 64QAM)	-1.54 dB
LTE-TDD(SC-FDMA,1RB,20MHz,QPSK,UL Subframe=2,3,4,7,8,9)	-3.41 dB
LTE-TDD(SC-FDMA,1RB,20MHz,16QAM,UL Subframe=2,3,4,7,8,9)	-3.17 dB
LTE-TDD(SC-FDMA,1RB,20MHz,64QAM,UL Subframe=2,3,4,7,8,9)	-3.31 dB

IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	-5.90 dB
IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	-5.17 dB
IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	-3.37 dB
IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	-2.02 dB
IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	-0.36dB
IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	-15.80 dB
IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	-5.82 dB
IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	-12.23dB
5G NR (DFT-s-OFDM, 1RB, 100 MHz, QPSK, 30 kHz)	-1.64dB
5G NR (CP-OFDM, 1RB, 20 MHz, QPSK, 15 kHz)	-1.65dB
5G NR (DFT-s-OFDM, 1RB, 20 MHz, QPSK, 15 kHz)	−15.06dB
5G NR (CP-OFDM, 1RB, 5 MHz, QPSK, 15 kHz)	−12.18dB
5G NR (CP-OFDM, 1RB, 10 MHz, QPSK, 15 kHz)	−12.26dB
5G NR (CP-OFDM, 1RB, 15 MHz, QPSK, 15 kHz)	−12.08dB
5G NR (CP-OFDM, 1RB, 20 MHz, QPSK, 15 kHz)	−12.20dB
5G NR (CP-OFDM, 1RB, 5 MHz, QPSK, 30 kHz)	−14.39dB
5G NR (CP-OFDM, 1RB, 10 MHz, QPSK, 30 kHz)	−14.47dB
5G NR (CP-OFDM, 1RB, 15 MHz, QPSK, 30 kHz)	−14.33dB
5G NR (CP-OFDM, 1RB, 20 MHz, QPSK, 30 kHz)	−14.46dB
5G NR (CP-OFDM, 1RB, 25 MHz, QPSK, 30 kHz)	−14.35dB
5G NR (CP-OFDM, 1RB, 30 MHz, QPSK, 30 kHz)	−14.32dB
5G NR (CP-OFDM, 1RB, 40 MHz, QPSK, 30 kHz)	−14.32dB
5G NR (CP-OFDM, 1RB, 50 MHz, QPSK, 30 kHz)	−14.55dB
5G NR (CP-OFDM, 1RB, 60 MHz, QPSK, 30 kHz)	−14.45dB
5G NR (CP-OFDM, 1RB, 80 MHz, QPSK, 30 kHz)	−14.47dB
5G NR (CP-OFDM, 1RB, 90 MHz, QPSK, 30 kHz)	−14.43dB
5G NR (CP-OFDM, 1RB, 100 MHz, QPSK, 30 kHz)	−14.38dB
5G NR (DFT-s-OFDM, 1RB, 5 MHz, QPSK, 15 kHz)	−15.06dB
5G NR (DFT-s-OFDM, 1RB, 10 MHz, QPSK, 15 kHz)	−15.06dB
5G NR (DFT-s-OFDM, 1RB, 15 MHz, QPSK, 15 kHz)	−15.06dB
5G NR (DFT-s-OFDM, 1RB, 20 MHz, QPSK, 15 kHz)	−15.06dB

10 Evaluation of RF Audio Interference Power Level

According to ANSIC 63.19-2019, the WD's conducted power must be at or below either the stated RF_{AIPL} (Table 13-1) or the stated peak power level (Table 13-2), or the average near-field emissions over the measurement area must be at or below the stated RF_{AIL} (Table 13-3), or the stated peak field strength (Table 13-4). The WD may demonstrate compliance by meeting any of these four requirements, but it must do so in each of its operating bands at its established worst-case normal speech-mode operating condition. This chapter will evaluate the RF audio interference power level of WD.

Bands	Average $Power_{max}$ (dBm)	MIF_{worst} (dB)	Power + MIF	C63.19 Lowest RF_{AIPL}(dBm)	Compliance
GSM 850	32.5	3.63	36.13	29	To be tested
GSM 1900	30	3.63	33.63	26	To be tested
WCDMA 850	23.5	-20.39	3.11	29	PASS
WCDMA 1700	24.5	-20.39	4.11	26	PASS
WCDMA 1900	24	-20.39	3.61	26	PASS
LTE Band2	24.5	-9.76	14.74	26	PASS
LTE Band4	24.5	-9.76	14.74	26	PASS
LTE Band5	25	-9.76	15.24	29	PASS
LTE Band7	23.5	-9.76	13.74	25	PASS
LTE Band12	25	-9.76	15.24	29	PASS
LTE Band13	25	-9.76	15.24	29	PASS
LTE Band14	25	-9.76	15.24	29	PASS
LTE Band17	25	-9.76	15.24	29	PASS
LTE Band25	24.5	-9.76	14.74	26	PASS
LTE Band26	25	-9.76	15.24	29	PASS
LTE Band30	24.5	-9.76	14.74	25	PASS
LTE Band38	24	-1.62	14.24	25	PASS
LTE Band41 PC2	27	-1.62	25.38	25	To be tested
LTE Band41 PC3	25	-1.62	23.38	25	PASS
LTE Band66	24.5	-9.76	14.74	26	PASS
LTE Band71	24	-9.76	14.24	29	PASS
NR n2	25	-1.64	23.36	26	PASS
NR n5	24.5	-1.64	22.86	29	PASS
NR n25	25	-1.64	23.36	26	PASS
NR n30	24.5	-1.64	22.86	25	PASS
NR n66	25	-1.64	23.36	26	PASS
NR n70	25	-1.64	23.36	26	PASS
NR n71	24.5	-1.64	22.86	29	PASS

NR n41 ANT4	27	-1.64	25.36	25	To be tested
NR n41 ANT1	27	-1.64	25.36	25	To be tested
NR n48	24	-1.64	22.36	25	PASS
NR n77 ANT2	27	-1.64	25.36	25	To be tested
NR n77 ANT6	27	-1.64	25.36	25	To be tested
NR n78	24	-1.64	22.36	25	PASS
WLAN 2.4GHz	20.5	-0.36	20.14	25	PASS
WLAN 5GHz	19.5	-5.82	13.68	25	PASS

According to the above table, the RF_{AIPL} for WCDMA, LTE FDD, WIFI and NR FDD are less than the stated RF_{AIPL} (Table 13.1). Near field emission testing is required for the GSM, LTE TDD, NR TDD bands.

11 Near-field Emission Test Procedures

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 gauge block can simplify this positioning.

3) 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.

4) The measurement area shall be centered on the acoustic output or the T-Coil mode measurement reference point, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm measurement area, which is contained in the measurement plane. If the field alignment method is used, align the probe for maximum field reception

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

6) Scan the entire 50 mm by 50 mm measurement area in equally spaced step sizes and record the reading at each measurement point.

7) Calculate the average of the measurements taken in Step 6)

8) The RF audio interference level in dB(V/m) is obtained by adding the Modulation Interference Factor (in decibels) to the average steady state rms field strength reading over the measurement area, in dB(V/m)

9) Compare this RF audio interference level to the limits in ANSI C63.19-2019 clause 4.7 and record the result.

12 Near-field Emission Test Results

Bands	Frequency （MHz）	Channel	RFail (dBV/m)	Compliance
GSM 850	848.8	251	**38.27**	**PASS**
	836.6	190	**38.72**	**PASS**(see Fig B.1)
	824.2	128	**38.53**	**PASS**
GSM 1900	1909.8	810	**34.79**	**PASS**
	1880	661	**35.03**	**PASS**
	1850.2	512	**35.33**	**PASS**(see Fig B.2)
LTE Band41	2680	41490	**32.49**	**PASS**
	2636.5	41055	**33.80**	**PASS**
	2593	40620	**34.27**	**PASS**(see Fig B.3)
	2549.5	40185	**33.90**	**PASS**
	2506	39750	**33.85**	**PASS**
NR n41 ANT1	2546.01	509202	**21.00**	**PASS**
	2592.990	518598	**23.81**	**PASS**(see Fig B.4)
	2640	528000	**22.88**	**PASS**
NR n41 ANT4	2546.01	509202	**34.05**	**PASS**
	2592.990	518598	**34.26**	**PASS**
	2640	528000	**34.94**	**PASS**(see Fig B.5)
NR n77 ANT2	3460.020	630668	**29.76**	**PASS**
	3500.010	633334	**31.28**	**PASS**
	3540.000	636000	**32.72**	**PASS**(see Fig B.6)
	3750.000	650000	**31.80**	**PASS**
	3822.000	654800	**31.94**	**PASS**
	3930.000	662000	**30.97**	**PASS**
NR n77 ANT6	3460.020	630668	**32.54**	**PASS**
	3500.010	633334	**33.49**	**PASS**
	3540.000	636000	**33.62**	**PASS**
	3750.000	650000	**33.81**	**PASS**(see Fig B.7)
	3822.000	654800	**32.10**	**PASS**
	3930.000	662000	**33.71**	**PASS**

13 ANSIC 63.19-2019 Limits

13-1 Wireless device RF audio interference power level

Frequency range (MHz)	RF_{AIPL} (dBm)
<960	29
960–2000	26
>2000	25

13-2 Wireless device RF peak power level

Frequency range (MHz)	$RF_{Peak\ Power}$ (dBm)
<960	35
960–2000	32
>2000	31

13-3 Wireless device RF audio interference level

Frequency range (MHz)	RF_{AIL} [dB(V/m)]
<960	39
960–2000	36
>2000	35

13-4 Wireless device RF peak near-field level

Frequency range (MHz)	RF_{Peak} [dB(V/m)]
<960	45
960–2000	42
>2000	41

14 Measurement Uncertainty

Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) Eav	Std. Unc. E
Measurement System					
Probe Calibration	±5.1 %	N	1	1	±5.1 %
Axial Isotropy	±4.7 %	R	√3	1	±2.7 %
Sensor Displacement	±7.2 %	R	√3	0.5	±2.1 %
Boundary Effects	±2.4 %	R	√3	1	±1.4 %
Phantom Boundary Effect	±7.2 %	R	√3	1	±4.2 %
Probe Linearity	±4.7 %	R	√3	1	±2.7 %
Scaling to Peak Power with MIF	±10.0 %	R	√3	1	±5.8 %
System Detection Limit	±1.0 %	R	√3	1	±0.6 %
Readout Electronics	±0.3 %	N	1	1	±0.3 %
Response Time	±0.8 %	R	√3	0	±0 %
Integration Time	±2.6 %	R	√3	0	±0 %
RF Ambient Conditions	±3.0 %	R	√3	1	±1.7 %
RF Reflections	±12.0 %	R	√3	1	±6.9 %
Probe Positioner	±1.2 %	R	√3	1	±0.7 %
Probe Positioning	±3.0 %	R	√3	1	±1.7 %
Extrapolation and Interpolation	±1.0 %	R	√3	1	±0.6 %
Test Sample Related					
Device Positioning Vertical	±4.7 %	R	√3	1	±2.7 %
Device Positioning Lateral	±1.0 %	R	√3	1	±0.6 %
Device Holder and Phantom	±2.4 %	R	√3	1	±1.4 %
Power Drift	±5.0 %	R	√3	1	±2.9 %
Phantom and Setup Related					
Phantom Thickness	±2.4 %	R	√3	1	±1.4 %
Combined Std. Uncertainty					±13.2 %
Expanded Std. Uncertainty on Power					**±26.4 %**
Expanded Std. Uncertainty on Field					**±13.2 %**

15 Main Test Instruments

Table 1: List of Main Instruments

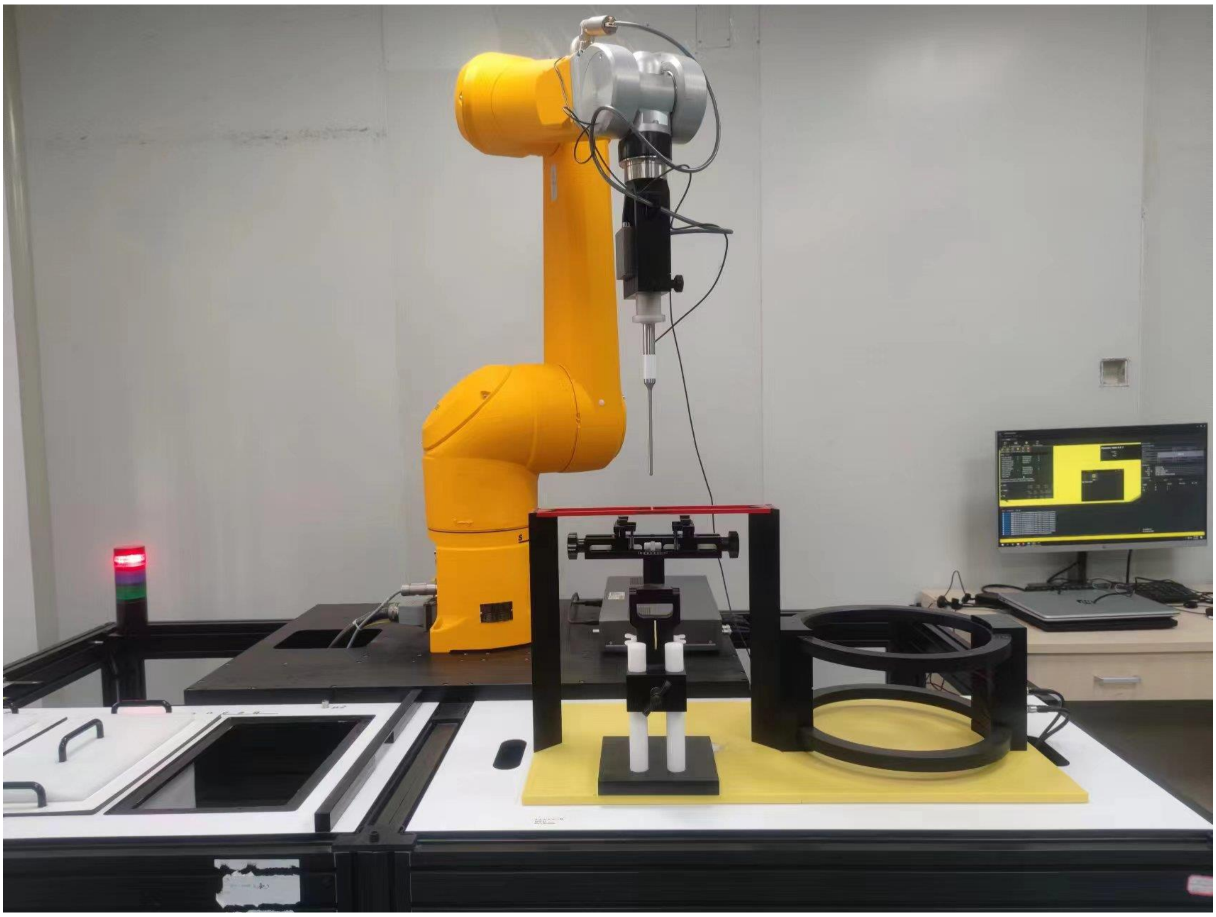
No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Signal Generator	E4483C	MY49071430	December 25, 2023	One Year
02	Power meter	NRP2	106276	May 17, 2024	One year
03	Power sensor	NRP6A	101369		
04	Amplifier	60S1G4	0331848	No Calibration Requested	
05	E-Field Probe	EF3DV3	4060	May 23, 2024	One year
06	DAE	SPEAG DAE4	1524	October 18, 2024	One year
07	HAC Dipole	CD835V3	1023	August 16, 2024	One year
08	HAC Dipole	CD1880V3	1018	August 16, 2024	One year
09	HAC Dipole	CD2600V3	1017	August 16, 2024	One year
10	HAC Dipole	CD3500V3	1008	August 16, 2024	One year
11	BTS	CMW500	166370	July 4, 2024	One year
12	BTS	CMX500	102152	Apr 17,2024	One year
13	MAIA	SE UMS 171 DB	1554	No Calibration Requested	

16 Conclusion

The HAC measurement indicates that the EUT complies with the HAC limits of the ANSIC63.19-2019. It is comprehensively determined as **PASS**

END OF REPORT BODY

ANNEX A TEST LAYOUT



Picture A1:HAC RF System Layout

ANNEX B TEST PLOTS

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	GSM-FDD (TDMA, GMSK)	190	836.6

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
38.95	35.09	3.63	38.72

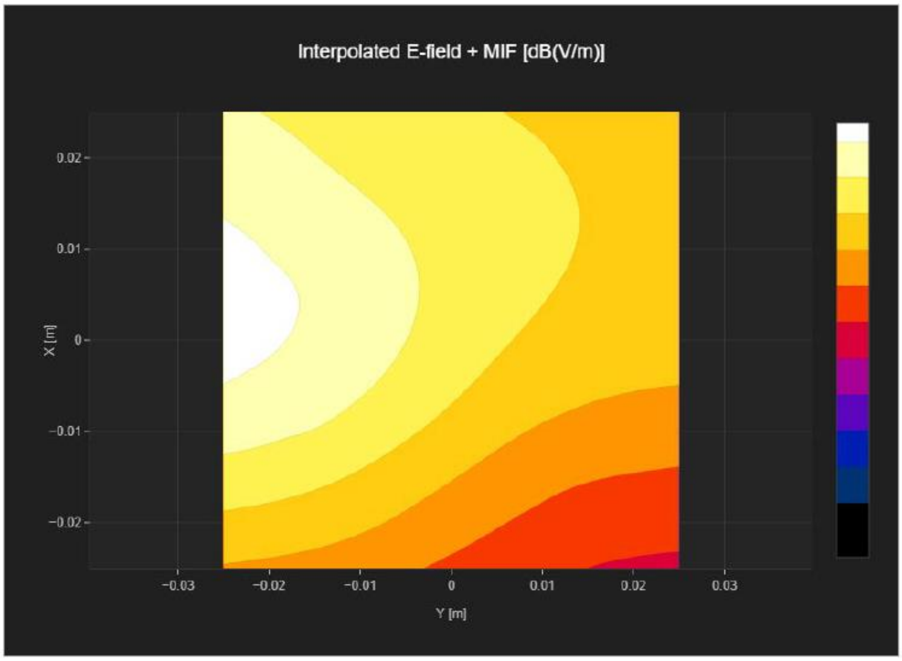


Fig B.1 GSM 850

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
PCS 1900	GSM-FDD (TDMA, GMSK)	512	1850.2

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
33.73	31.7	3.63	35.33

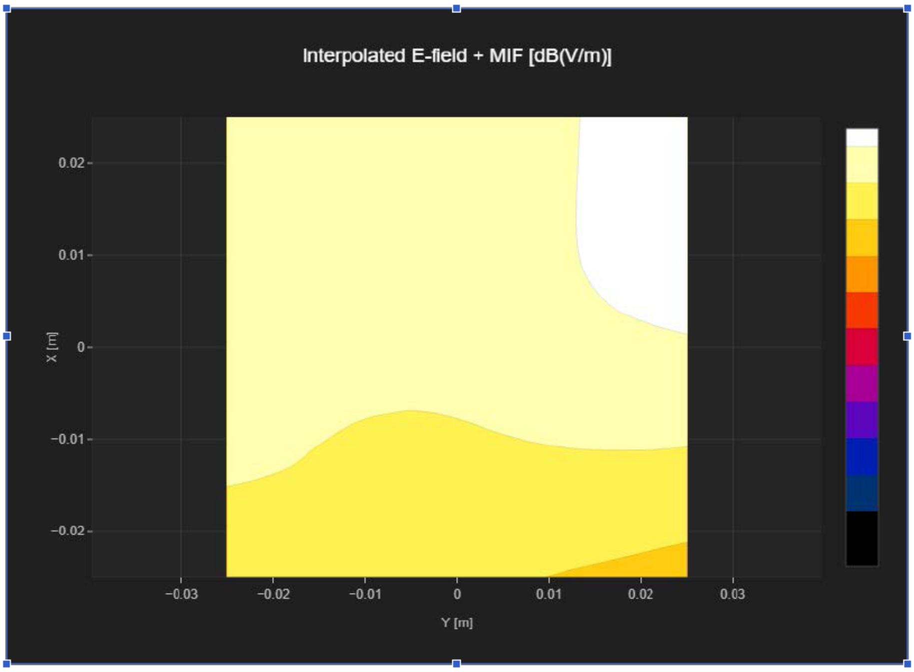


Fig B.2 GSM 1900

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41, E-UTRA/TDD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	40620	2593.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
38.18	35.89	-1.62	34.27

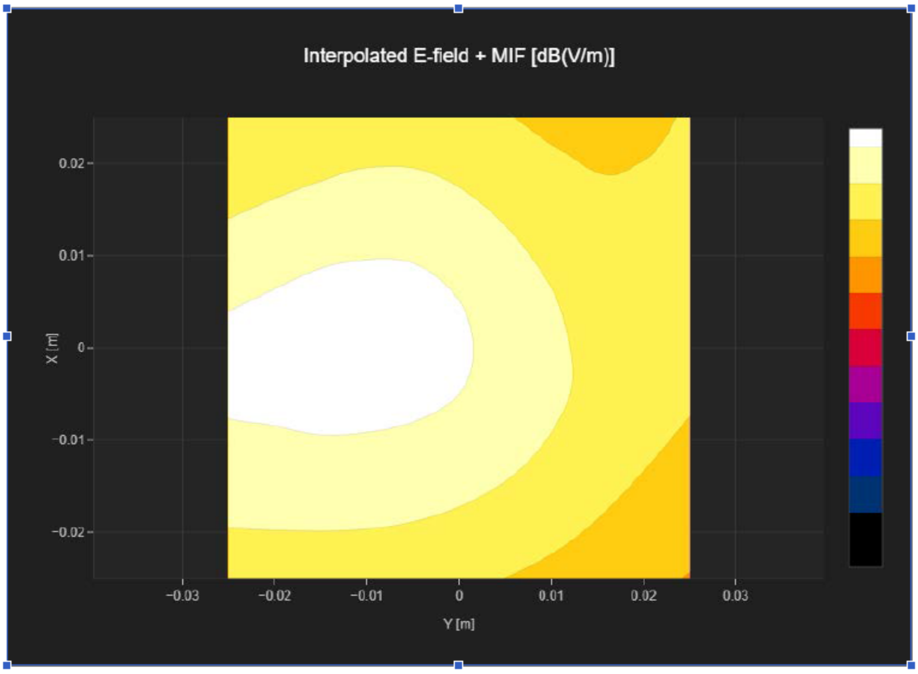


Fig B.3 LTE Band41

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n41	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	518598	2592.99

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
28.71	25.45	-1.64	23.81

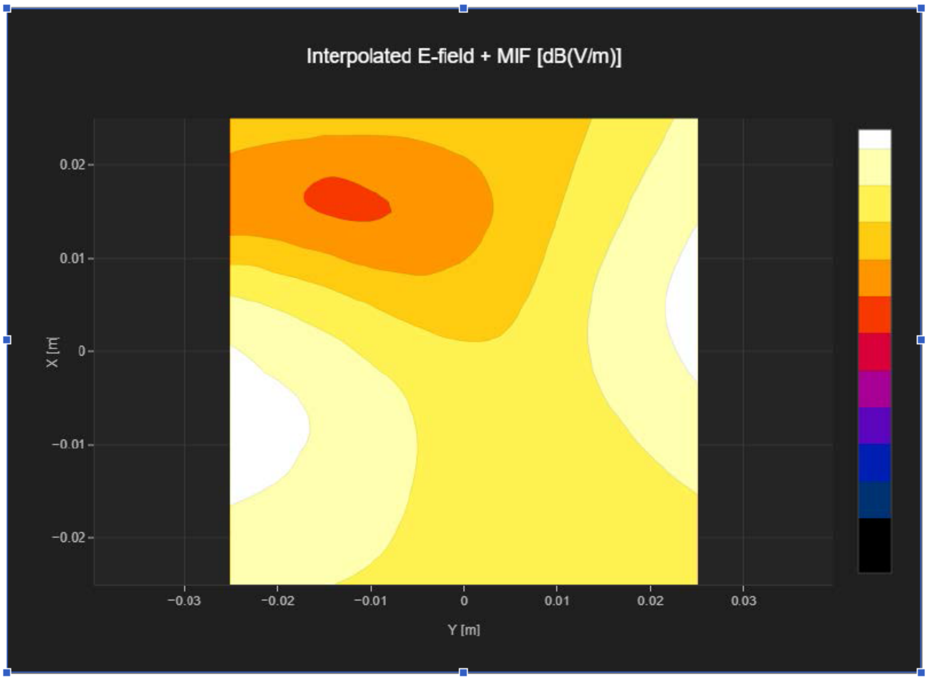


Fig B.4 NR n41 ANT1

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n41	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	528000	2640.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
39.54	36.58	-1.64	34.94

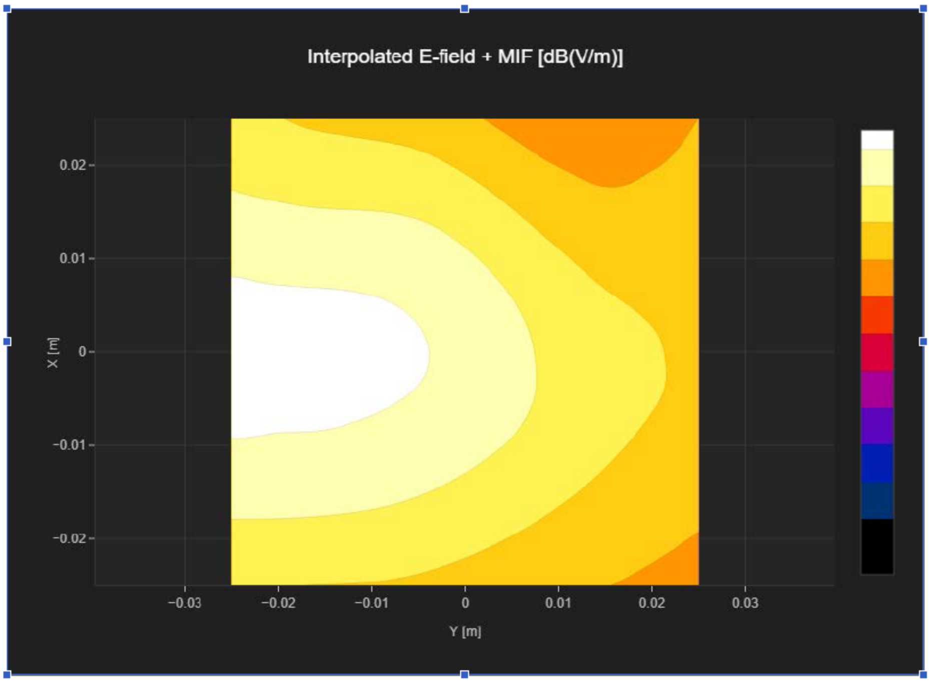


Fig B.5 NR n41 ANT4

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n77	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	636000	3540.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
36.83	34.36	-1.64	32.72

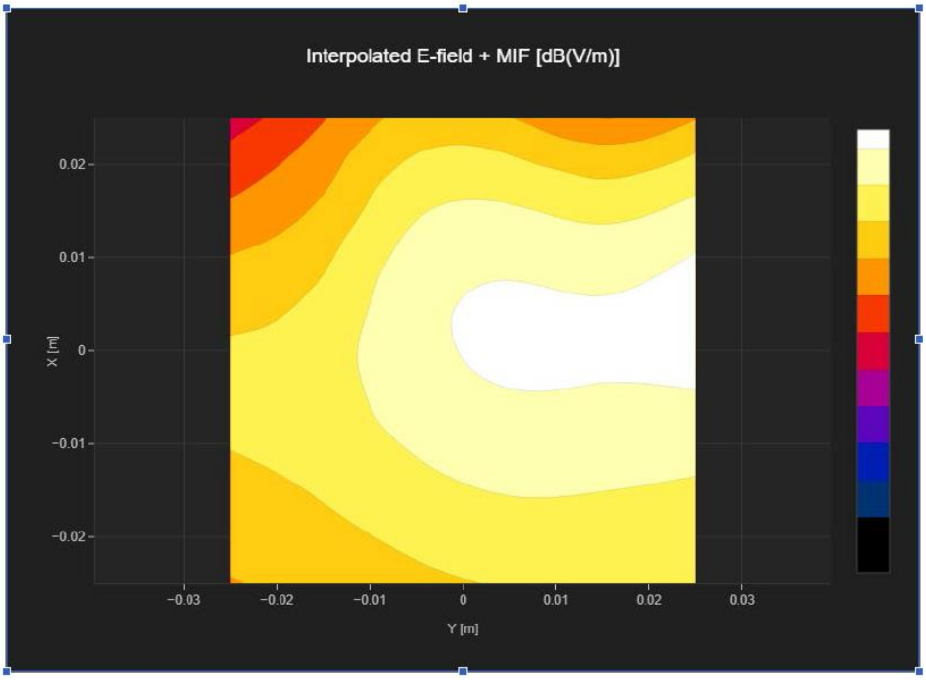


Fig B.6 NR n77 ANT2

Device Under Test

Manufacturer	Model	Dimensions[mm]	Speaker Position [mm]
1	1	146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n77	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	650000	3750.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
50.0	50.0	10.0	10.0	15.0

Results

Emax [dB(V/m)]	Eavg50x50 max [dB(V/m)]	MIF [dB]	RFail [dB(V/m)]
38.13	35.45	-1.64	33.81

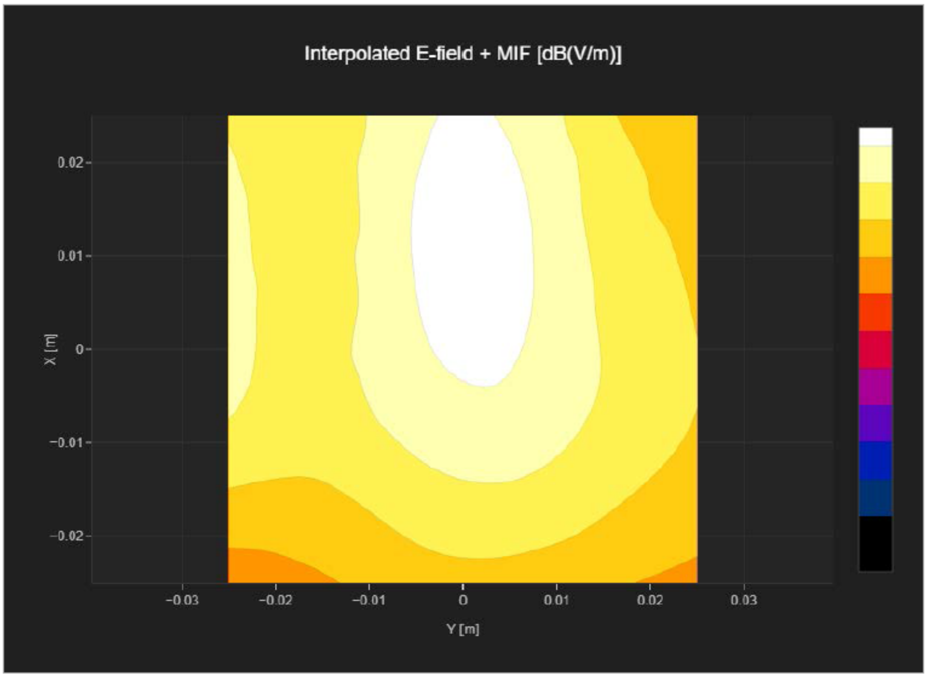


Fig B.7 NR n77 ANT6

ANNEX C SYSTEM VALIDATION RESULT

E SCAN of Dipole 835 MHz

Device Under Test

Manufacturer	Model	Dimensions [mm]	Speaker Position [mm]
		146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

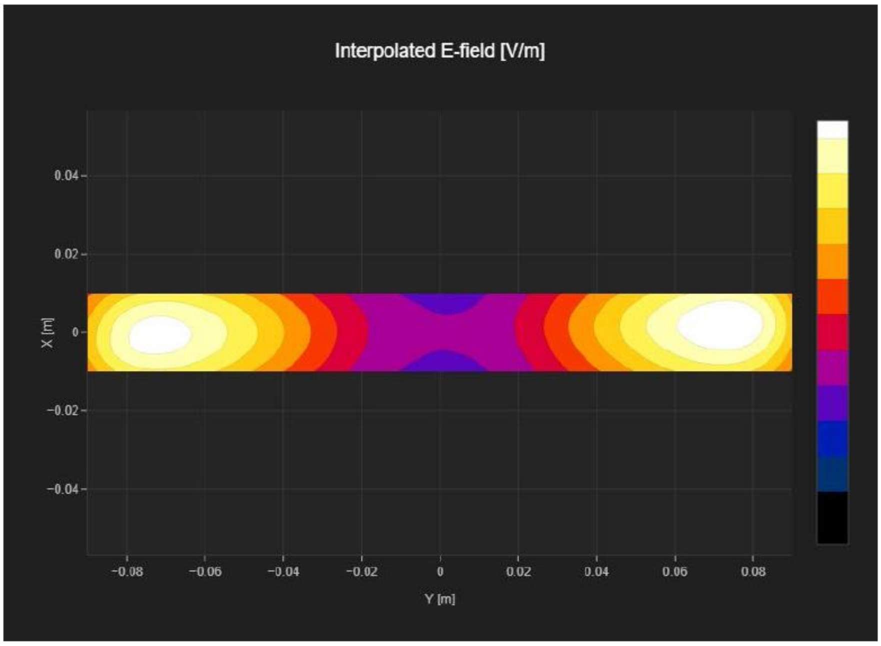
Band Name	Communication Systems Name	Channel	Frequency [MHz]
CD835	CW	50	835.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
20.0	180.0	5.0	5.0	15.0

Results

Dipole Type	Dipole Serial Number	Emax [V/m]	Drift [dB]
CD835	XXXX	116	0.17



E SCAN of Dipole 1880 MHz

Device Under Test

Manufacturer	Model	Dimensions [mm]	Speaker Position [mm]
		146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

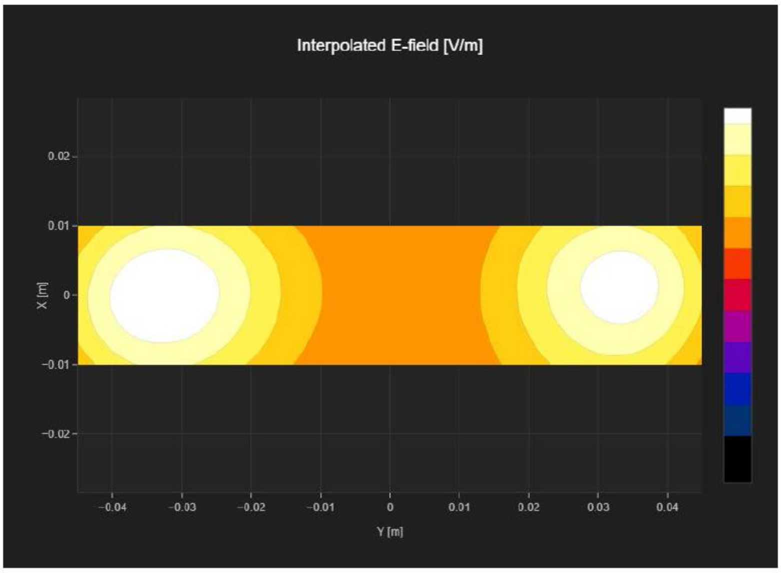
Band Name	Communication Systems Name	Channel	Frequency [MHz]
CD1880	CW	0	1880.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
20.0	90.0	5.0	5.0	15.0

Results

Dipole Type	Dipole Serial Number	Emax [V/m]	Drift [dB]
CD1880	XXXX	89.3	-0.0



E SCAN of Dipole 2600 MHz

Device Under Test

Manufacturer	Model	Dimensions [mm]	Speaker Position [mm]
		146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

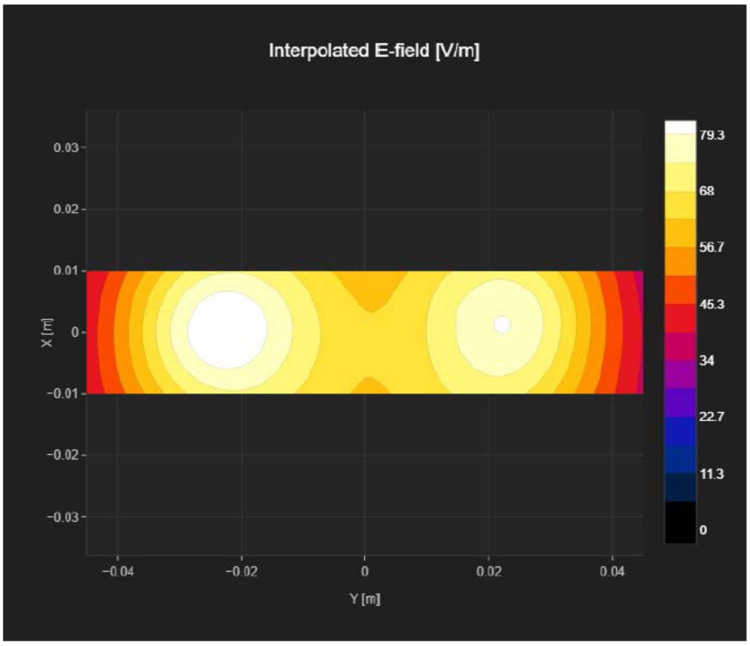
Band Name	Communication Systems Name	Channel	Frequency [MHz]
CD2600V3	CW	50	2600.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
20.0	90.0	5.0	5.0	15.0

Results

Dipole Type	Dipole Serial Number	Emax [V/m]	Drift [dB]
CD2600	XXXX	82.2	0.0



E SCAN of Dipole 3500 MHz

Device Under Test

Manufacturer	Model	Dimensions [mm]	Speaker Position [mm]
		146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

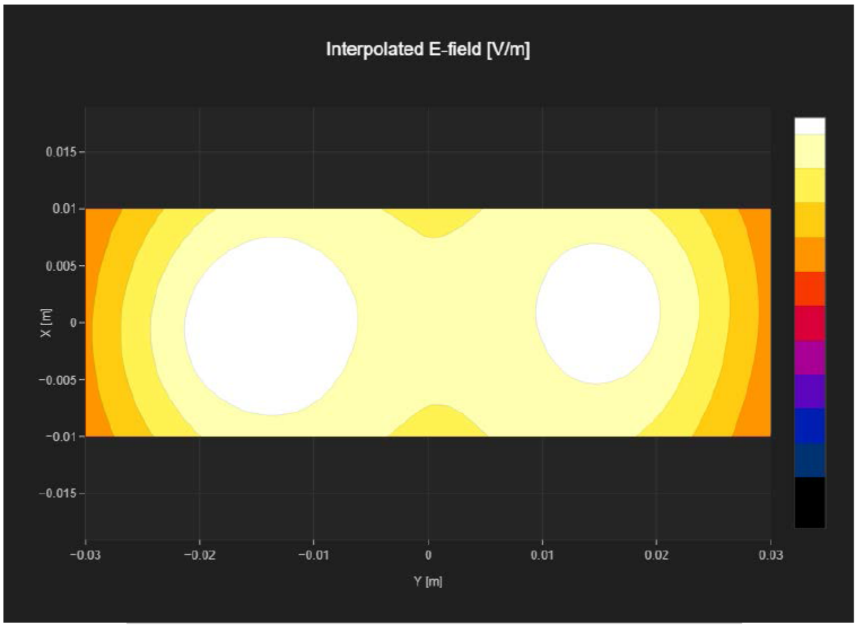
Band Name	Communication Systems Name	Channel	Frequency [MHz]
CD3500V3	CW	50	3500.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
20.0	60.0	5.0	5.0	15.0

Results

Dipole Type	Dipole Serial Number	Emax [V/m]	Drift [dB]
CD3500	XXXX	79.3	-0.0



E SCAN of Dipole 3900 MHz

Device Under Test

Manufacturer	Model	Dimensions [mm]	Speaker Position [mm]
		146.2 x 71.8 x 7.5	144.3

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
EF3DV3 - SN4060	May 23, 2024	DAE4 Sn1524	October 18, 2024

Communication Systems

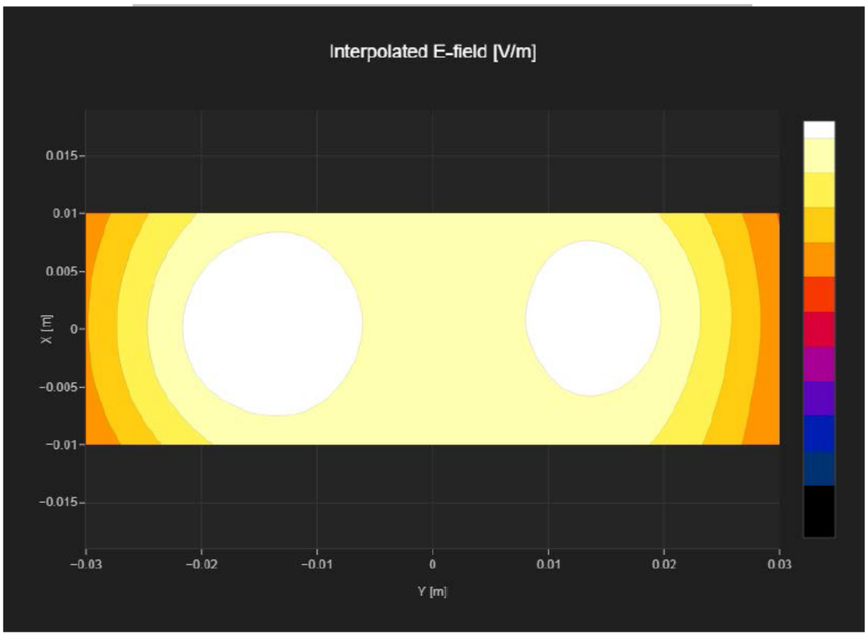
Band Name	Communication Systems Name	Channel	Frequency [MHz]
CD3500V3	CW	XX	3900.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
20.0	60.0	5.0	5.0	15.0

Results

Dipole Type	Dipole Serial Number	Emax [V/m]	Drift [dB]
CD3500	XXXX	81.0	0.11



ANNEX D PROBE CALIBRATION CERTIFICATE

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **CTTL**
Beijing

Certificate No. **EF-4060_May24**

CALIBRATION CERTIFICATE

Object	EF3DV3 - SN:4060
Calibration procedure(s)	QA CAL-02.v9, QA CAL-25.v8 Calibration procedure for E-field probes optimized for close near field evaluations in air
Calibration date	May 23, 2024

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 NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
Power sensor NRP-Z91	SN: 103245	26-Mar-24 (No. 217-04037)	Mar-25
Reference 20 dB Attenuator	SN: CC2552 (20x)	26-Mar-24 (No. 217-04046)	Mar-25
DAE4	SN: 789	18-Oct-23 (No. DAE4-789_Oct23)	Oct-24
Reference Probe ER3DV6	SN: 2328	02-Oct-23 (No. ER3-2328_Oct23)	Oct-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Jeffrey Katzman	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: May 23, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: EF-4060_May24 Page 1 of 21

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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., $\vartheta = 0$ 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 $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz in 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. 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).

Parameters of Probe: EF3DV3 - SN:4060

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm (μV/(V/m)^2)	0.79	0.74	1.29	±10.1%
DCP (mV) [B]	92.8	98.2	93.9	±4.7%

Calibration Results for Frequency Response (30 MHz – 5.8 GHz)

Frequency MHz	Target E-field (En) V/m	Measured E-field (En) V/m	Deviation E-field (En)	Target E-field (Ep) V/m	Measured E-field (Ep) V/m	Deviation E-field (Ep)	Unc ($k = 2$)
30	77.1	77.3	0.2%	77.1	77.0	−0.2%	±5.1%
100	77.0	78.0	1.3%	77.0	78.1	1.5%	±5.1%
450	77.2	78.1	1.2%	77.1	78.2	1.3%	±5.1%
600	77.1	77.6	0.6%	77.1	77.6	0.7%	±5.1%
750	77.1	77.4	0.4%	77.1	77.4	0.3%	±5.1%
1800	143.0	139.9	−2.2%	143.2	140.3	−2.0%	±5.1%
2000	135.0	129.5	−4.1%	134.9	129.6	−4.0%	±5.1%
2200	127.6	124.6	−2.4%	127.5	125.7	−1.4%	±5.1%
2500	125.5	120.3	−4.2%	125.6	121.3	−3.4%	±5.1%
3000	79.4	76.2	−4.1%	79.4	77.2	−2.8%	±5.1%
3500	256.2	255.4	−0.3%	255.8	251.8	−1.6%	±5.1%
3700	250.4	245.4	−2.0%	250.8	243.7	−2.8%	±5.1%
5200	50.8	50.9	0.2%	50.7	51.1	0.8%	±5.1%
5500	49.7	48.9	−1.5%	49.6	49.1	−1.0%	±5.1%
5800	48.9	48.1	−1.6%	48.9	47.6	−2.6%	±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] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EF3DV3 - SN:4060

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k=2$
0	CW	X	0.00	0.00	1.00	0.00	126.1	±3.3%	±4.7%
		Y	0.00	0.00	1.00		164.6		
		Z	0.00	0.00	1.00		127.1		
10352	Pulse Waveform (200Hz, 10%)	X	2.79	66.36	9.95	10.00	60.0	±2.8%	±9.6%
		Y	2.98	67.14	10.50		60.0		
		Z	2.96	67.04	10.32		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	1.54	64.47	8.15	6.99	80.0	±1.1%	±9.6%
		Y	1.71	65.56	8.89		80.0		
		Z	1.22	63.13	7.66		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.83	63.89	7.11	3.98	95.0	±0.8%	±9.6%
		Y	1.01	65.47	8.04		95.0		
		Z	0.77	63.73	6.98		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	20.00	85.19	12.98	2.22	120.0	±0.9%	±9.6%
		Y	20.00	86.18	13.45		120.0		
		Z	20.00	82.99	11.82		120.0		
10387	QPSK Waveform, 1 MHz	X	2.18	73.12	18.36	1.00	150.0	±2.1%	±9.6%
		Y	1.71	68.59	15.68		150.0		
		Z	1.96	71.52	17.24		150.0		
10388	QPSK Waveform, 10 MHz	X	2.61	71.82	18.19	0.00	150.0	±1.0%	±9.6%
		Y	2.23	68.76	16.25		150.0		
		Z	2.42	70.54	17.37		150.0		
10396	64-QAM Waveform, 100 kHz	X	2.33	69.82	19.41	3.01	150.0	±1.8%	±9.6%
		Y	1.80	65.17	17.48		150.0		
		Z	2.24	68.95	18.67		150.0		
10399	64-QAM Waveform, 40 MHz	X	3.55	67.76	16.55	0.00	150.0	±1.2%	±9.6%
		Y	3.43	66.95	15.82		150.0		
		Z	3.55	67.72	16.40		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	4.72	65.81	15.97	0.00	150.0	±2.4%	±9.6%
		Y	4.71	65.74	15.68		150.0		
		Z	4.64	65.61	15.78		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%.

[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EF3DV3 - SN:4060

Sensor Frequency Model Parameters

	Sensor X	Sensor Y	Sensor Z
Frequency Corr. (LF)	0.17	0.20	4.63
Frequency Corr. (HF)	2.82	2.82	2.82

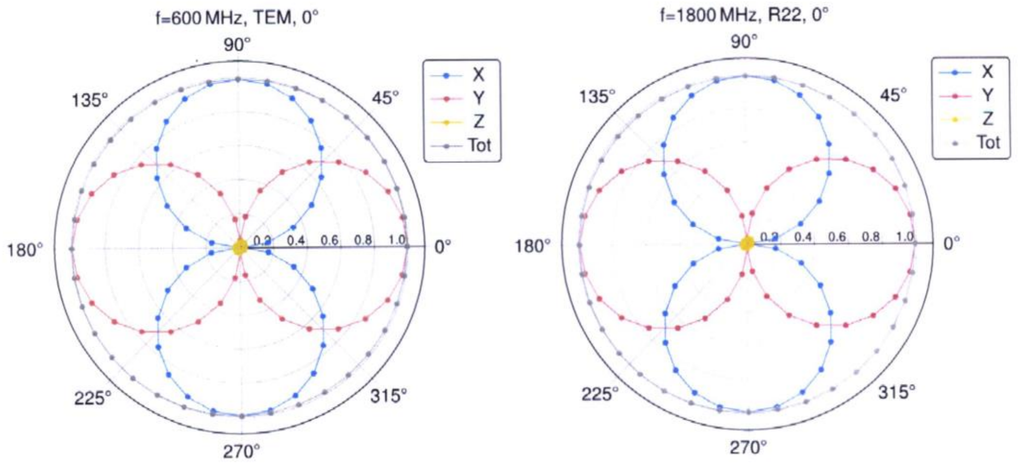
Sensor Model Parameters

	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	36.0	239.41	37.41	5.51	0.05	4.95	0.77	0.01	1.00
y	35.1	230.50	36.41	5.15	0.00	4.97	0.00	0.00	1.01
z	33.7	225.26	37.55	4.26	0.03	4.97	0.69	0.02	1.00

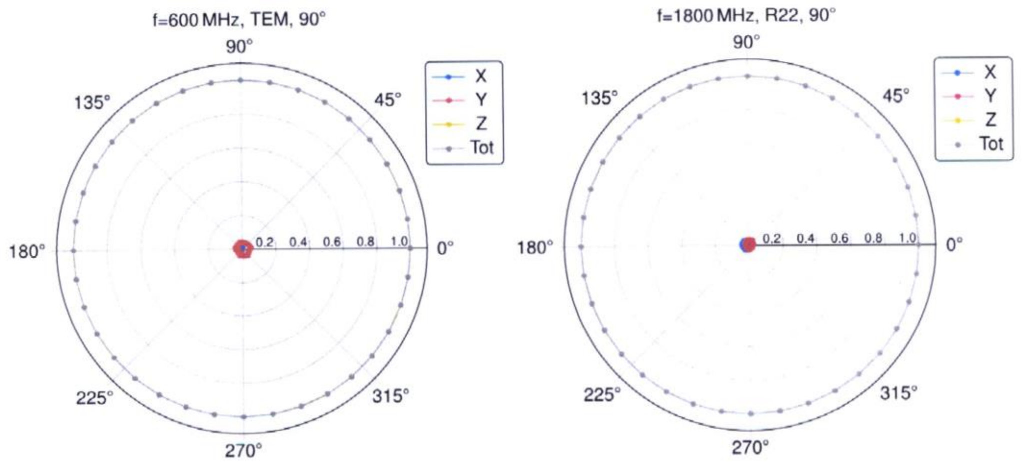
Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle	-38.9°
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

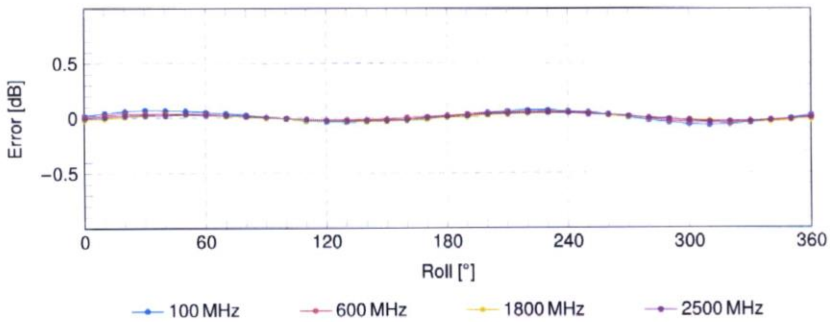
Receiving Pattern (ϕ), $\vartheta = 0°$



Receiving Pattern (ϕ), $\vartheta = 90°$

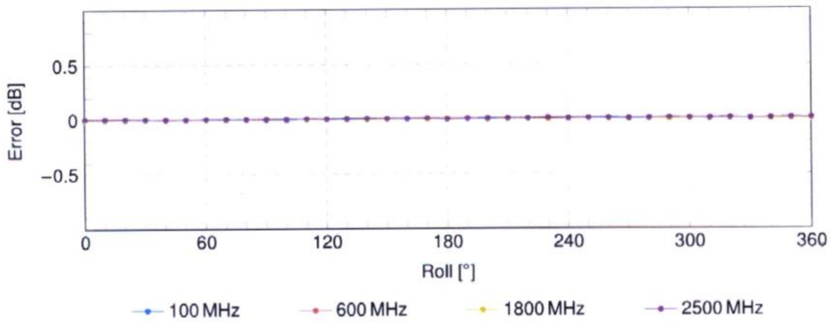


Receiving Pattern (ϕ), $\vartheta = 0°$



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

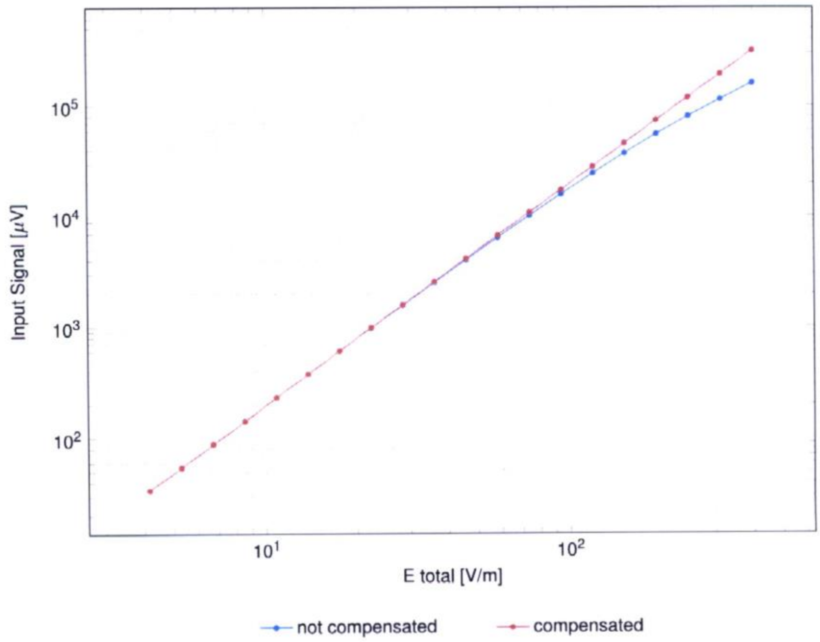
Receiving Pattern (ϕ), $\vartheta = 90°$

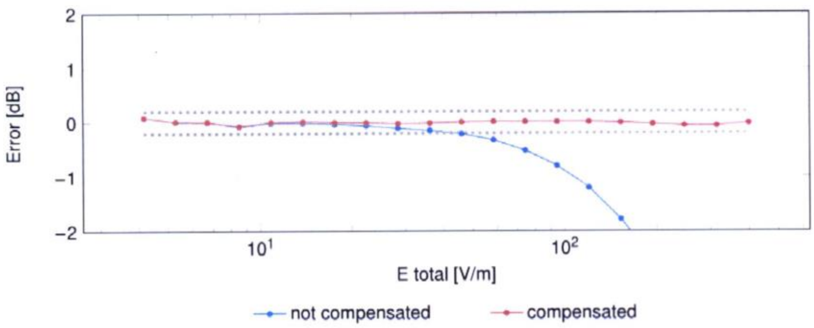


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(E-field)

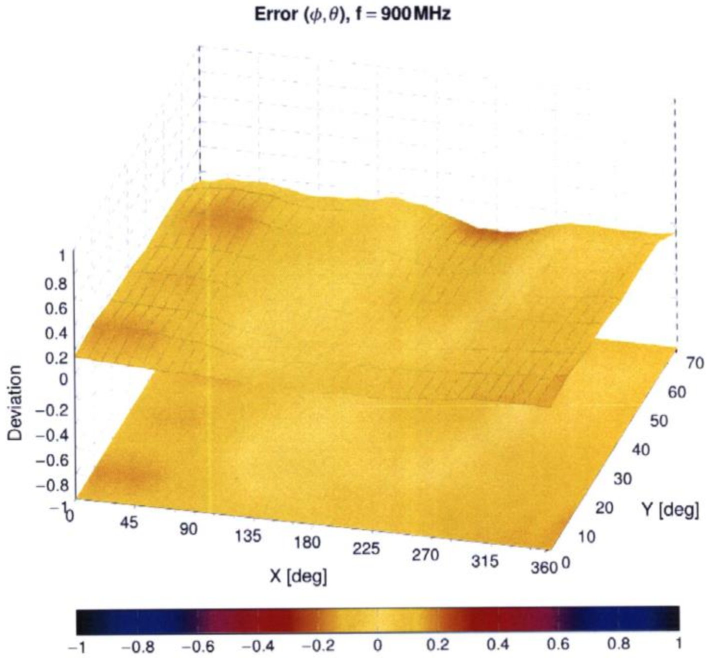
(TEM cell, f_{eval} = 900 MHz)





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

Deviation from Isotropy in Air



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

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
0		CW	CW	0.00	±4.7
10010	CAB	SAR Validation (Square, 100 ms, 10 ms)	Test	10.00	±9.6
10011	CAC	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	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	±9.6
10063	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	±9.6
10064	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6
10065	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6
10066	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	±9.6
10067	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	±9.6
10068	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	±9.6
10069	CAE	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	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	±9.6
10098	CAC	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	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	±9.6
10101	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10102	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10103	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	±9.6
10104	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	±9.6
10105	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	±9.6
10108	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	±9.6
10109	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10110	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6
10111	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	±9.6

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UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10112	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	±9.6
10113	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10114	CAE	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	±9.6
10115	CAE	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6
10116	CAE	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6
10117	CAE	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	±9.6
10118	CAE	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	±9.6
10119	CAE	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	±9.6
10140	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10141	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	±9.6
10142	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10143	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	±9.6
10144	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	±9.6
10145	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	±9.6
10146	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	±9.6
10147	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6
10149	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10150	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10151	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6
10152	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10153	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	±9.6
10154	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	±9.6
10155	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10156	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	±9.6
10157	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10158	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10159	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6
10160	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	±9.6
10161	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10162	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	±9.6
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	±9.6
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	±9.6
10169	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6
10170	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10171	AAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	±9.6
10172	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	±9.6
10173	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10174	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10175	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6
10176	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10177	CAJ	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	±9.6
10178	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10179	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10180	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10181	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	±9.6
10182	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10183	AAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10184	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10185	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	±9.6
10186	AAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	±9.6
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10189	AAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10193	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	±9.6
10194	CAE	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	±9.6
10195	CAE	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	±9.6
10196	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	±9.6
10197	CAE	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	±9.6
10198	CAE	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	±9.6
10219	CAE	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6
10220	CAE	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	±9.6
10221	CAE	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6
10222	CAE	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	±9.6
10223	CAE	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	±9.6
10224	CAE	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.6