

TEST REPORT

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Report Number: 2401Y99438E-RF-00B
FCC ID: 2ATZ4-GA20N2

Test Standard (s)

FCC PART 27; FCC PART 22H; FCC PART 24E

Sample Description

Product Type: Smart phone
Model No.: PG4RBG100
Multiple Model(s) No.: PG4RB100A
Trade Mark: UMIDIGI
Date Received: 2024-10-17
Issue Date: 2024-12-05

Test Result:	Pass▲
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▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

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Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401Y99438E-RF-00B	Original Report	2024-12-05

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Smart phone			
Tested Model	PG4RBG100			
Multiple Model(s) No.	PG4RB100A			
Frequency Range	GSM 850: 824-849MHz(TX); 869-894MHz(RX) PCS 1900: 1850-1910MHz(TX); 1930-1990MHz(RX) WCDMA Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) WCDMA Band 5: 824-849MHz(TX); 869-894MHz(RX) LTE Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) LTE Band 5: 824-849MHz(TX); 869-894MHz(RX) LTE Band 12: 699-716MHz(TX); 729-746MHz(RX) LTE Band 13: 777-787MHz (TX), 746-756MHz (RX) LTE Band 41: 2496-2690MHz(TX/RX)			
Modulation Technique	2G: GMSK, 8PSK 3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM			
Antenna Specification [#]	Antenna	Operation Bands	Antenna Gain (G _T) (dBi)	L _C (dB)
	ANT0	GSM 850/WCDMA B5/LTE B5	-4.97	0.5
		LTE B12/13	-4.01	0.5
	ANT1	PCS1900/WCDMA B2/LTE B2	-0.36	0
		LTE B41	0.55	0
	Note: Lc= Signal Attenuation in the connecting cable between the transmitter and antenna, in dB.			
Voltage Range	DC 5V/9V/12V charging from Adapter or DC 3.89V from battery			
Sample serial number	2SY1-4 for Radiated Emissions Test 2SY1-1 for RF Conducted Test (Assigned by BACL, Shenzhen)			
Sample/EUT Status	Good condition			
Normal/Extreme Condition [#]	VL.: Low Voltage 3.5V _{DC} VN.: Normal Voltage 3.89V _{DC} VH.: High Voltage 4.48V _{DC} (provided by the applicant)			
Adapter Information	Model: QZ-02002AC00 Input: AC100-240V, 50/60Hz, 0.5A Output: DC 5.0V, 3.0A(15.0W) or DC 9.0V, 2.22A or DC 12.0V, 1.67A(20.0W Max.)			
Note: The Multiple models are electrically identical with the test model except for model name and sales channels. Please refer to the declaration letter [#] for more detail, which was provided by manufacturer.				

Objective

This test report is in accordance with Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E, and Part 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability and band edge.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 - Miscellaneous Wireless Communications Services

ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in
Licensed Radio Services
KDB 971168 D01: Power Meas License Digital Systems v03r01

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
RF output power, conducted		0.86dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.60dB(k=2, 95% level of confidence)
RF Frequency		56.6Hz(k=2, 95% level of confidence)
Radiated Emissions	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1°C
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The final qualification test was performed with the EUT operating at normal mode.

Frequency band	Bandwidth (MHz)	Test Frequency		
		(MHz)		
		Low	Middle	High
GSM850	0.25	824.2	836.6	848.8
PCS1900	0.25	1850.2	1880	1909.8
WCDMA B2	4.2	1852.4	1880	1907.6
WCDMA B5	4.2	826.4	836.4	846.6
LTE B2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE B5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE B12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE B13	5	779.5	/	784.5
	10	/	782	/
LTE B41	5	2498.5	2593	2687.5
	10	2501	2593	2685
	15	2503.5	2593	2682.5
	20	2506	2593	2680

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

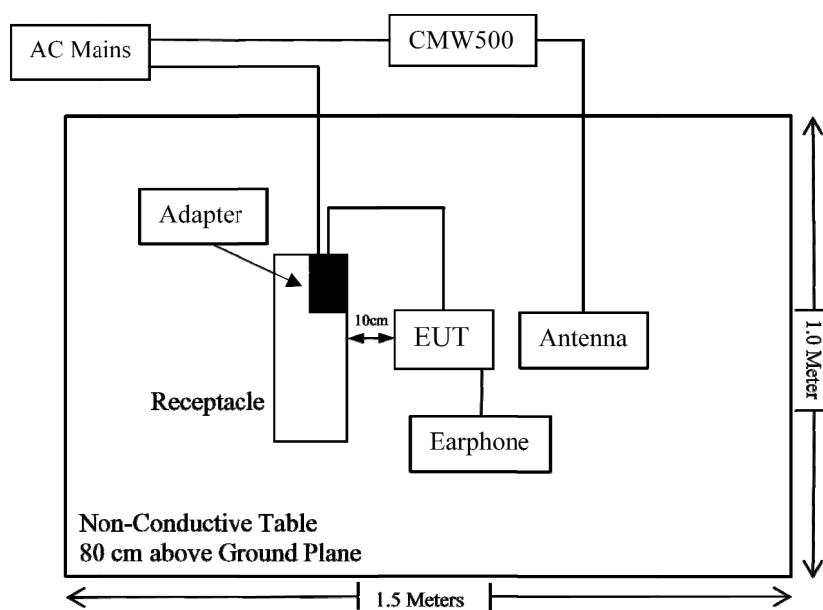
Manufacturer	Description	Model	Serial Number
unknown	Earphone	unknown	unknown
Rohde & Schwarz	Universal Radio Communication Tester	CMW500	141718
unknown	Receptacle	unknown	unknown

External I/O Cable

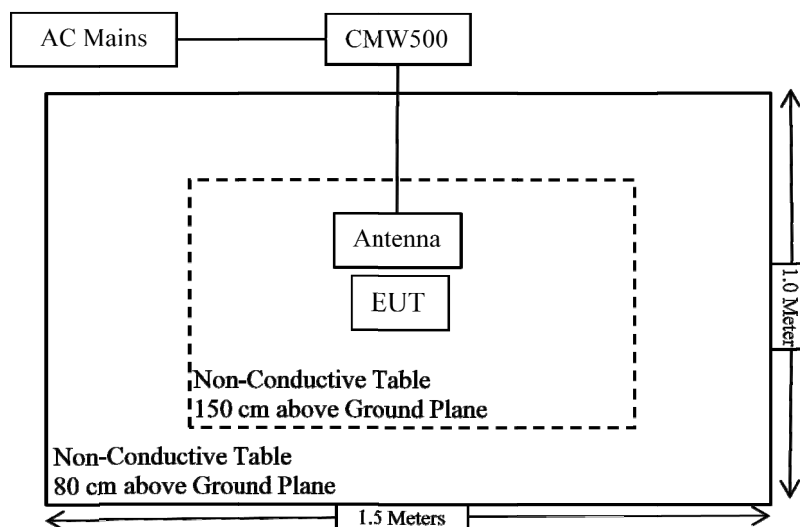
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	0.8	EUT	Adapter
Shielded Un-detachable AC Cable	1.5	Receptacle	AC Mains
Un-shielding Detachable Audio Cable	1	Earphone	EUT
Shielded Detachable AC Cable	1.2	CMW500	AC Mains

Block Diagram of Test Setup

For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§2.1046; § 22.913 (a) (d); § 24.232 (c) (d); §27.50 (b) (c) (h)	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliant
§ 2.1051; §22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliant
§ 22.917 (a); § 24.238 (a); §27.53 (c) (g) (m)	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235; §27.54	Frequency stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
COM-POWER	Dipole Antenna	3121C	9209-860	NCR	NCR
Agilent	Signal Generator	N5183A	MY50140588	2024/09/13	2025/09/12
The Electro-Mechanics Co.	Horn Antenna	3115	9107-3694	2024/06/06	2027/06/05
Electro-Mechanics Co	Horn Antenna	3116	2026	2023/09/18	2026/09/17
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber Cable 1	F-03-EM236	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
Unknown	Cable	2Y194	0735	2024/05/21	2025/05/20
Unknown	Cable	PNG214	1354	2024/05/21	2025/05/20
Rohde&Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	0735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
Unknown	RF Cable	XH750A-N	J-10M	2024/06/18	2025/06/17
JD	Multiplex Switch Test Control Set	DT7220FSU	DQ77926	2024/06/18	2025/06/17
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/06/18	2025/06/17

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
R&S	Spectrum Analyzer	FSV40	101942	2024/09/20	2025/09/19
BACL	Temperature & Humidity Chamber	BTH-150-40	30145	2024/01/16	2025/01/15
Micro-Tronics	RF Cable	8082135	W1113	2024/06/27	2025/06/26
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2024/05/21	2025/05/20
WEINSCHEL	3dB Attenuator	Unknown	F-03-EM119	2024/06/27	2025/06/26
Unknown	Power Splitter	PD2	2000-600	2024/06/27	2025/06/26
Rohde&Schwarz	Wideband Radio Communication Tester	CMW500	141718	2024/08/06	2025/08/05

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

REQUIREMENTS AND TEST PROCEDURES

Applicable Standard for Part 22 Subpart H

RF Output Power

FCC §22.913

(a)(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.

(d) *Power measurement.* Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB. Power measurements for base transmitters and repeaters must be made in accordance with either of the following:

- (1) A Commission-approved average power technique (*see* FCC Laboratory's Knowledge Database); or
- (2) For purposes of this section, peak transmit power must be measured over an interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Spurious Emissions

FCC §22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

- (1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
- (2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz

Frequency stability

FCC §22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1 - Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10	n/a	n/a

Applicable Standard for Part 24 Subpart E**RF Output Power**

FCC §24.232

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Spurious Emissions

FCC §24.238

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

Frequency stability

FCC §24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Applicable Standard for Part 27

RF Output Power

FCC §27.50

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c)(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(h) The following power limits shall apply in the BRS and EBS:

(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Spurious Emissions

FCC §27.53

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(m)(4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Frequency stability

FCC §27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Method

Transmitter output power, e.r.p. and e.i.r.p

According to CFR Part 2.1046, ANSI C63.26-2015 Section 5.2.5.5 and KDB 971168 D01 Power Meas License Digital Systems v03r01:

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_T - L_C$$

where:

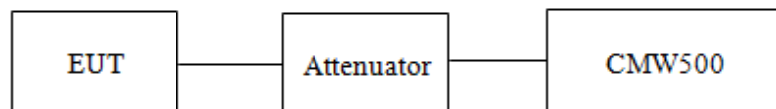
ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup Block:



The RF output of the transmitter was connected to the CMW500 through sufficient attenuation.

Note: the worst path loss (cable loss and attenuator) among the test frequency range was added into plots.

Occupied Bandwidth

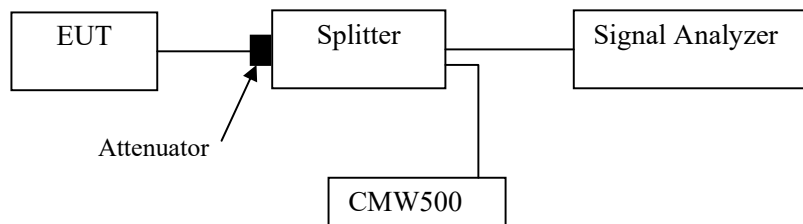
According to ANSI C63.26-2015 Section 5.4.4

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.
- d) Set the detection mode to peak, and the trace mode to max-hold.
- e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
- f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

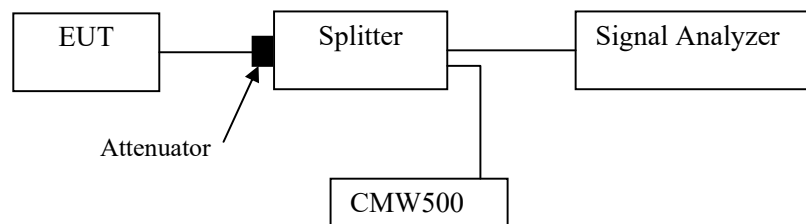
Test Setup Block:



Transmitter unwanted emissions-at antenna terminals

According to ANSI C63.26-2015 Section 5.7.4, KDB 971168 D01 Power Meas License Digital Systems v03r01:

the applicable rule part specifies the reference bandwidth for measuring unwanted emission levels (typically, 100 kHz if the authorized frequency band/block is at or below 1 GHz and 1 MHz if the authorized frequency band/block is above 1 GHz),8 effectively depicting the unwanted emission limit in terms of a power spectral density. In those cases where no reference bandwidth is explicitly specified, the values in the preceding sentence should be used.

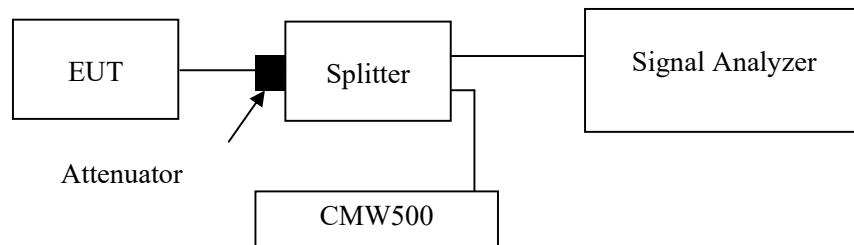
Test Setup Block:

Note: the worst path loss (cable loss and splitter inset loss) among the test frequency range was added into plots.

Transmitter unwanted emissions-Out of band emission

According to ANSI C63.26-2015 Section 5.7.3, KDB 971168 D01 Power Meas License Digital Systems v03r01:

Typically, a measurement (resolution) bandwidth smaller than the reference bandwidth is allowed for measurements within a specified frequency range at the edge of the authorized frequency block/band (e.g., within the first Y MHz outside of the authorized frequency band/block, where the value of Y is specified in the relevant rule part). Some FCC out-of-band emission rules permit the use of a narrower RBW (typically limited to a minimum RBW of 1 % of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth. Beyond the specified frequency range in which this relaxation of the uniform reference bandwidth is permitted, it typically is also acceptable to use a narrower RBW (again limited to a minimum of 1 % of OBW) to increase accuracy, but the measurement result must subsequently be integrated over the full reference bandwidth.

Test Setup Block:

Note: the worst path loss (cable loss and splitter inset loss) among the test frequency range was added into plots.

Frequency stability

According to ANSI C63.26-2015 Section 5.6, KDB 971168 D01 Power Meas License Digital Systems v03r01:

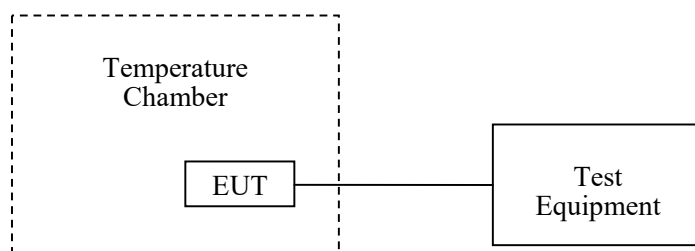
Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

- a) At 10 °C intervals of temperatures between –30 °C and +50 °C at the manufacturer's rated supply voltage, and
- b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the –15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Test Setup Block:

Transmitter unwanted emissions- Radiated Spurious emissions

According to ANSI C63.26-2015 Section 5.5.3:

Test Procedure:

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
 - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - 2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.
- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
- d) Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
- e) Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
- f) Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
- g) For each emission that was detected and measured in the initial test [i.e., in step b) and step c)]:
 - 1) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - 2) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step b) and step c).
 - 3) Record the output power level of the signal generator when equivalence is achieved in step 2).
- h) Repeat step e) through step g) with the measurement antenna oriented in the opposite polarization.
- i) Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
where
$$P_e = \text{equivalent emission power in dBm}$$
$$P_s = \text{source (signal generator) power in dBm}$$

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.
- j) Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from: $\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB}$. If necessary, the antenna gain can be calculated from calibrated antenna factor information
- k) Provide the complete measurement results as a part of the test report.

TEST DATA AND RESULTS

Spurious Radiated Emissions

Environmental Conditions

Temperature (°C)	24-25	Relative Humidity (%)	50-55
ATM Pressure (kPa):	101	Test engineer:	Anson Su&Karl Xu
Test date:	2024/11/5&2024/11/14		
EUT operation mode:	Transmitting		
Note:	After pre-scan in the X, Y and Z axes of orientation, the worst case z-axis of orientation were recorded.		

Frequency (MHz)	Receiver Reading (dBμV)	Polar (H / V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
GSM 850 (30MHz-10GHz)								
Low Channel								
951.60	32.39	H	-64.1	1.36	0.00	-65.46	-13	52.46
951.60	32.54	V	-61.5	1.36	0.00	-62.86	-13	49.86
1648.40	49.17	H	-58.5	0.90	8.60	-50.80	-13	37.80
1648.40	49.60	V	-58.6	0.90	8.60	-50.90	-13	37.90
Middle Channel								
952.80	32.98	H	-63.5	1.36	0.00	-64.86	-13	51.86
952.80	32.95	V	-61.1	1.36	0.00	-62.46	-13	49.46
1673.20	48.73	H	-58.8	0.90	8.60	-51.10	-13	38.10
1673.20	50.03	V	-58.1	0.90	8.60	-50.40	-13	37.40
High Channel								
954.90	33.47	H	-63.0	1.36	0.00	-64.36	-13	51.36
954.90	33.43	V	-60.6	1.36	0.00	-61.96	-13	48.96
1697.60	48.21	H	-59.4	0.90	8.60	-51.70	-13	38.70
1697.60	50.40	V	-57.7	0.90	8.60	-50.00	-13	37.00
PCS 1900 (30MHz-20GHz)								
Low Channel								
957.80	32.63	H	-63.9	1.36	0.00	-65.26	-13	52.26
957.80	32.71	V	-61.3	1.36	0.00	-62.66	-13	49.66
3704.00	45.15	H	-60.3	1.30	11.00	-50.60	-13	37.60
3704.00	45.13	V	-60.1	1.30	11.00	-50.40	-13	37.40
Middle Channel								
957.80	32.63	H	-63.9	1.36	0.00	-65.26	-13	52.26
957.80	32.71	V	-61.3	1.36	0.00	-62.66	-13	49.66
3760.00	44.96	H	-60.2	1.30	10.70	-50.80	-13	37.80
3760.00	45.03	V	-60.0	1.30	10.70	-50.60	-13	37.60
High Channel								
950.90	33.74	H	-62.8	1.36	0.00	-64.16	-13	51.16
950.90	33.82	V	-60.2	1.36	0.00	-61.56	-13	48.56
3819.60	45.21	H	-59.9	1.30	10.70	-50.50	-13	37.50
3819.60	44.52	V	-60.5	1.30	10.70	-51.10	-13	38.10

Frequency (MHz)	Receiver Reading (dBμV)	Polar (H / V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
WCDMA Band 2 (30MHz-20GHz)								
Low Channel								
951.60	32.39	H	-64.1	1.36	0.00	-65.46	-13	52.46
951.60	32.44	V	-61.6	1.36	0.00	-62.96	-13	49.96
3704.80	45.48	H	-59.9	1.30	11.00	-50.20	-13	37.20
3704.80	44.87	V	-60.4	1.30	11.00	-50.70	-13	37.70
Middle Channel								
952.00	32.92	H	-63.6	1.36	0.00	-64.96	-13	51.96
952.00	33.08	V	-61.0	1.36	0.00	-62.36	-13	49.36
3760.00	44.67	H	-60.5	1.30	10.70	-51.10	-13	38.10
3760.00	44.96	V	-60.1	1.30	10.70	-50.70	-13	37.70
High Channel								
950.80	33.48	H	-63.0	1.36	0.00	-64.36	-13	51.36
950.80	33.61	V	-60.4	1.36	0.00	-61.76	-13	48.76
3815.20	44.87	H	-60.3	1.30	10.70	-50.90	-13	37.90
3815.20	46.33	V	-58.7	1.30	10.70	-49.30	-13	36.30
WCDMA Band 5 (30MHz-10GHz)								
Low Channel								
953.70	32.61	H	-63.9	1.36	0.00	-65.26	-13	52.26
953.70	32.76	V	-61.3	1.36	0.00	-62.66	-13	49.66
1652.80	49.19	H	-58.4	0.90	8.60	-50.70	-13	37.70
1652.80	50.08	V	-58.1	0.90	8.60	-50.40	-13	37.40
Middle Channel								
957.10	33.14	H	-63.4	1.36	0.00	-64.76	-13	51.76
957.10	33.38	V	-60.7	1.36	0.00	-62.06	-13	49.06
1672.80	48.11	H	-59.5	0.90	8.60	-51.80	-13	38.80
1672.80	49.47	V	-58.7	0.90	8.60	-51.00	-13	38.00
High Channel								
959.90	33.67	H	-62.8	1.36	0.00	-64.16	-13	51.16
959.90	33.89	V	-60.2	1.36	0.00	-61.56	-13	48.56
1693.20	47.40	H	-60.2	0.90	8.60	-52.50	-13	39.50
1693.20	48.81	V	-59.3	0.90	8.60	-51.60	-13	38.60

Frequency (MHz)	Receiver Reading (dBμV)	Polar (H / V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
LTE Band 2 (30MHz-20GHz)								
QPSK 1.4MHz Bandwidth_RB1#0, Low Channel								
955.20	32.31	H	-64.2	1.36	0.00	-65.56	-13	52.56
955.20	32.27	V	-61.8	1.36	0.00	-63.16	-13	50.16
3701.40	45.54	H	-59.9	1.30	11.00	-50.20	-13	37.20
3701.40	45.19	V	-60.1	1.30	11.00	-50.40	-13	37.40
QPSK 1.4MHz Bandwidth_RB1#0, Middle Channel								
954.70	32.43	H	-64.1	1.36	0.00	-65.46	-13	52.46
954.70	32.37	V	-61.7	1.36	0.00	-63.06	-13	50.06
3760.00	44.26	H	-60.9	1.30	10.70	-51.50	-13	38.50
3760.00	44.44	V	-60.6	1.30	10.70	-51.20	-13	38.20
QPSK 1.4MHz Bandwidth_RB1#0, High Channel								
956.00	33.68	H	-62.8	1.36	0.00	-64.16	-13	51.16
956.00	33.75	V	-60.3	1.36	0.00	-61.66	-13	48.66
3818.60	45.25	H	-59.9	1.30	10.70	-50.50	-13	37.50
3818.60	45.22	V	-59.8	1.30	10.70	-50.40	-13	37.40
LTE Band 5 (30MHz-10GHz)								
QPSK 1.4MHz Bandwidth_RB1#0, Low channel								
957.30	32.22	H	-64.3	1.36	0.00	-65.66	-13	52.66
957.30	32.16	V	-61.9	1.36	0.00	-63.26	-13	50.26
1649.40	48.36	H	-59.3	0.90	8.60	-51.60	-13	38.60
1649.40	50.51	V	-57.7	0.90	8.60	-50.00	-13	37.00
QPSK 1.4MHz Bandwidth_RB1#0, Middle channel								
959.60	32.63	H	-63.9	1.36	0.00	-65.26	-13	52.26
959.60	32.58	V	-61.5	1.36	0.00	-62.86	-13	49.86
1673.00	47.44	H	-60.1	0.90	8.60	-52.40	-13	39.40
1673.00	50.15	V	-58.0	0.90	8.60	-50.30	-13	37.30
QPSK 1.4MHz Bandwidth_RB1#0, High channel								
958.40	33.42	H	-63.1	1.36	0.00	-64.46	-13	51.46
958.40	33.51	V	-60.5	1.36	0.00	-61.86	-13	48.86
1696.60	47.66	H	-59.9	0.90	8.60	-52.20	-13	39.20
1696.60	49.33	V	-58.8	0.90	8.60	-51.10	-13	38.10

Frequency (MHz)	Receiver Reading (dBμV)	Polar (H / V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
LTE Band 12 (30MHz-10GHz)								
QPSK 1.4MHz Bandwidth_RB1#0, Low channel								
953.60	32.13	H	-64.4	1.36	0.00	-65.76	-13	52.76
953.60	32.02	V	-62.0	1.36	0.00	-63.36	-13	50.36
1399.40	47.30	H	-60.4	0.80	7.90	-53.30	-13	40.30
1399.40	47.80	V	-60.6	0.80	7.90	-53.50	-13	40.50
QPSK 1.4MHz Bandwidth_RB1#0, Middle channel								
951.10	32.71	H	-63.8	1.36	0.00	-65.16	-13	52.16
951.10	32.75	V	-61.3	1.36	0.00	-62.66	-13	49.66
1415.00	47.53	H	-60.2	0.80	7.90	-53.10	-13	40.10
1415.00	48.20	V	-60.2	0.80	7.90	-53.10	-13	40.10
QPSK 1.4MHz Bandwidth_RB1#0, High channel								
958.00	33.28	H	-63.2	1.36	0.00	-64.56	-13	51.56
958.00	33.32	V	-60.7	1.36	0.00	-62.06	-13	49.06
1430.60	48.06	H	-59.6	0.80	7.90	-52.50	-13	39.50
1430.60	48.75	V	-59.6	0.80	7.90	-52.50	-13	39.50
LTE Band 13 (30MHz-10GHz)								
QPSK 5MHz Bandwidth_RB1#0, Low channel								
954.40	32.05	H	-64.5	1.36	0.00	-65.86	-13	52.86
954.40	31.96	V	-62.1	1.36	0.00	-63.46	-13	50.46
1559.00	49.61	H	-58.0	0.90	8.60	-50.30	-40	10.30
1559.00	51.49	V	-56.7	0.90	8.60	-49.00	-40	9.00
QPSK 5MHz Bandwidth_RB1#0, High channel								
951.60	32.94	H	-63.6	1.36	0.00	-64.96	-13	51.96
951.60	32.98	V	-61.1	1.36	0.00	-62.46	-13	49.46
1569.00	48.15	H	-59.5	0.90	8.60	-51.80	-40	11.80
1569.00	50.71	V	-57.5	0.90	8.60	-49.80	-40	9.80

Frequency (MHz)	Receiver Reading (dBμV)	Polar (H / V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
LTE Band 41 (30MHz-27GHz)								
QPSK 5MHz Bandwidth_RB1#0, Low channel								
957.70	33.15	H	-63.4	1.36	0.00	-64.76	-25	39.76
957.70	33.09	V	-61.0	1.36	0.00	-62.36	-25	37.36
4997.00	47.03	H	-56.3	1.50	9.80	-48.00	-25	23.00
4997.00	45.71	V	-56.9	1.50	9.80	-48.60	-25	23.60
QPSK 5MHz Bandwidth_RB1#0, Middle channel								
959.90	33.36	H	-63.1	1.36	0.00	-64.46	-25	39.46
959.90	33.27	V	-60.8	1.36	0.00	-62.16	-25	37.16
5186.00	50.64	H	-56.3	1.50	9.80	-48.00	-25	23.00
5186.00	57.75	V	-56.9	1.50	9.80	-48.60	-25	23.60
QPSK 5MHz Bandwidth_RB1#0, High channel								
958.60	33.74	H	-62.8	1.36	0.00	-64.16	-25	39.16
958.60	33.82	V	-60.2	1.36	0.00	-61.56	-25	36.56
5375.00	51.20	H	-51.6	1.70	10.50	-42.80	-25	17.80
5375.00	52.70	V	-50.0	1.70	10.50	-41.20	-25	16.20

Note:

Absolute Level = Reading Level + Substituted Factor

Substituted Factor contains: Substituted Level - Cable loss+ Antenna Gain

Margin = Limit-Absolute Level

RF Conducted data

Please refer to Annex "Appendix B1~B4" for detail test data.

EUT PHOTOGRAPHS

Please refer to the attachment 2401Y99438E-RF External photo and 2401Y99438E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401Y99438E-RFF Test Setup photo.

******* END OF REPORT *******