Prüfbericht-Nr.: *Test report no.:*	CN2126AN(P24-WWAN) 001	**Auftrags-Nr.:** *Order no.*:	238494754	Seite 1 von 20 *Page 1 of 20*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum** *Order date:*	2020-12-02	
Auftraggeber: *Client:*	Tokai Rika Create Corporation 2-3-10, Aoi, Higashi-ku, Nagoya, Aichi 461-0004 Japan			
Prüfgegenstand: *Test item:*	SMARTASSIST-REMOTE(Communication Unit)			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	YSAR03-3G			
Auftrags-Inhalt: *Order content*:	FCC Part 24 Test report			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 24 Subpart E			

Wareneingangsdatum: *Date of sample receipt:*	2020-12-04
Prüfmuster-Nr.: *Test sample no:*	A002947406-002 A002947406-005
Prüfzeitraum: *Testing period:*	2020-12-16 - 2021-02-25
Ort der Prüfung: *Place of testing:*	EMC/RF Taipei Testing Site
Prüflaboratorium: *Testing laboratory:*	Taipei Testing Laboratories
Prüfergebnis*: *Test result*:*	Pass

überprüft von: *reviewed by:*	David Huang	**genehmigt von:** authorized by:	Brenda Chen
Datum: *Date:* 2021-03-04		**Ausstellungsdatum:** *Issue date:* 2021-03-04	
Stellung / *Position:*	David Huang Project Manager	**Stellung** / *Position:*	Brenda Chen Senior Project Manager

Sonstiges / *Other:*

This project is referred to the original module report no. CETECOM TR16-1-0019501T05a.
The only difference is the antenna, so we evaluate and verify E.I.R.P and Radiated Spurious Emissions tests.
The other test results are the same as the original module report.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	2.1046 24.232(c)	Effective Isotropically Radiated Power	Pass
-	2.1055 24.235	Frequency Stability	Not Applicable
-	24.232(d)	Peak to Average Ratio	Not Applicable
-	2.1049	Occupied Bandwidth and 26 dB Bandwidth	Not Applicable
-	2.1051 24.238(a)	Conducted Band Edge	Not Applicable
-	2.1051 24.238(a)	Conducted Spurious Emissions	Not Applicable
5.1.2	2.1053 24.238(a)	Radiated Spurious Emissions	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Contents

HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN2126AN(P24-WWAN) 001	Original Release	2021-03-04

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix A - Test Result of Conducted
Appendix B - Test Result of Radiated Spurious Emissions
Appendix SP - Photographs Test Setup
Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 2
FCC 47CFR Part 24 Subpart E
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
ANSI C63.26-2015

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of k=2 to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.30 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.30 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.54 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.52 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a SMARTASSIST-REMOTE(Communication Unit). It contains a WWAN compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	SMARTASSIST-REMOTE(Communication Unit)
Type Identification	YSAR03-3G
FCC ID	XPY1CGM5NNN

Technical Specification of EUT

Item	EUT information	
Operating Frequency	GSM/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
Modulation	GSM	GMSK
	EDGE	8PSK
	WCDMA	QPSK
Operation Voltage	13Vdc	
Antenna Information	Ceramic Antenna with -0.46 dBi gain	
Accessory Device	Refer to 4.3	

Maximum EIRP and Emission Designator

Item	Band	Value
Maximum EIRP (mW)	GSM/GPSR	792.5
	WCDMA	194.98
Emission Designator	GSM/GPSR	248KGXW
	WCDMA	4M18F9W

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: Test samples make a communication with CMW 500 which makes it possible to control them through a test software installed on a notebook computer.
This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	Sdi 17026_apl.exe

The samples were used as follows:
A002947406-002 for radiated
A002947406-005 for conducted
Full test was applied on all test modes, but only worst case was shown.

Effective Isotropically Radiated Power (EIRP)

☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Available Channel	Tested Channel	Mode	Position
-	GSM	512 to 810	512, 661, 810	GSM / EDGE	H-plane
-	WCDMA	9262 to 9538	9262, 9400, 9538	WCDMA	H-plane

Radiated Spurious Emissions

☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Band	Available Channel	Tested Channel	Mode	Position
-	GSM	512 to 810	512, 661, 810	GSM / EDGE	H-plane
-	WCDMA	9262 to 9538	9262, 9400, 9538	WCDMA	H-plane

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
EIRP	22 °C	66 %	Chunyi
Radiated Spurious Emissions	21.8~22.4 °C	41.3~58 %	Chunyi

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

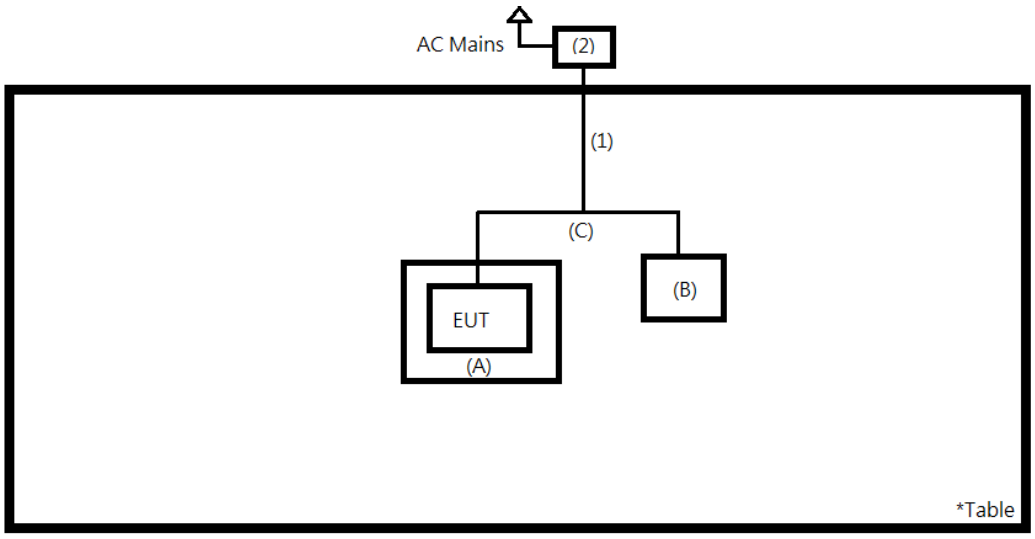
Accessory of EUT

None.

Support Unit

No.	Description	Brand	Model	S/N	Remark
Radiated Test					
A	Iron Plate	YANMAR	-	-	-
B	Remote	YANMAR	YSAR031	-	-
C	Signal Cable	YANMAR	1A8252-51910	-	90 cm shielded cable with core
1	DC Power Cable	TUV	TUV001	-	-
2	DC Power Supply	Gwinstek	GPS-3303	-	180 cm shielded cable with core
Conducted Test					
-	Power Supply	Gwinstek	GPS-3303	GEU915613	-

4.4 Test Setup Diagram



5. Test Results

5.1 Transmitter Requirement & Test Suites

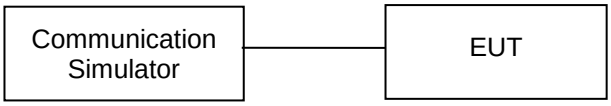
5.1.1 Conducted Output Power and ERP

Limit 2 watt (EIRP)

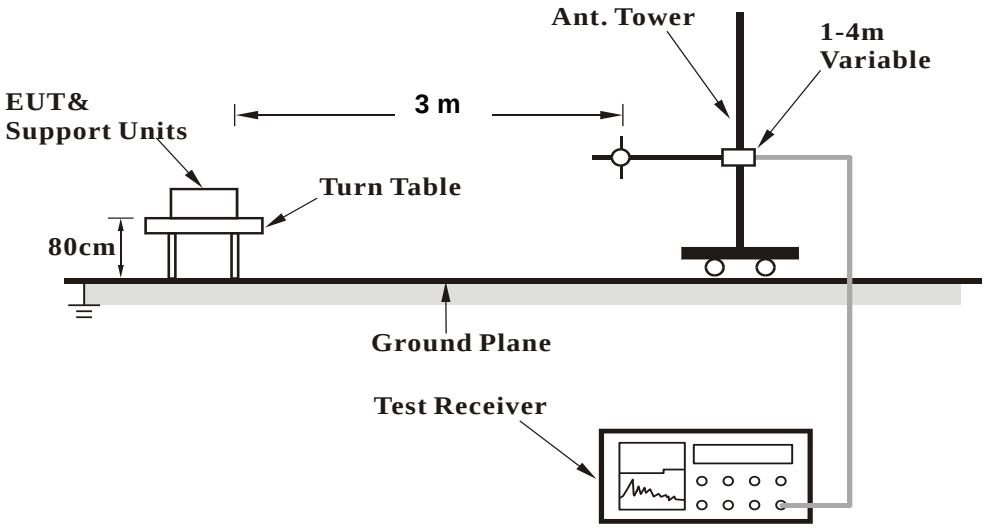
Kind of Test Site Shielded room

Test Setup

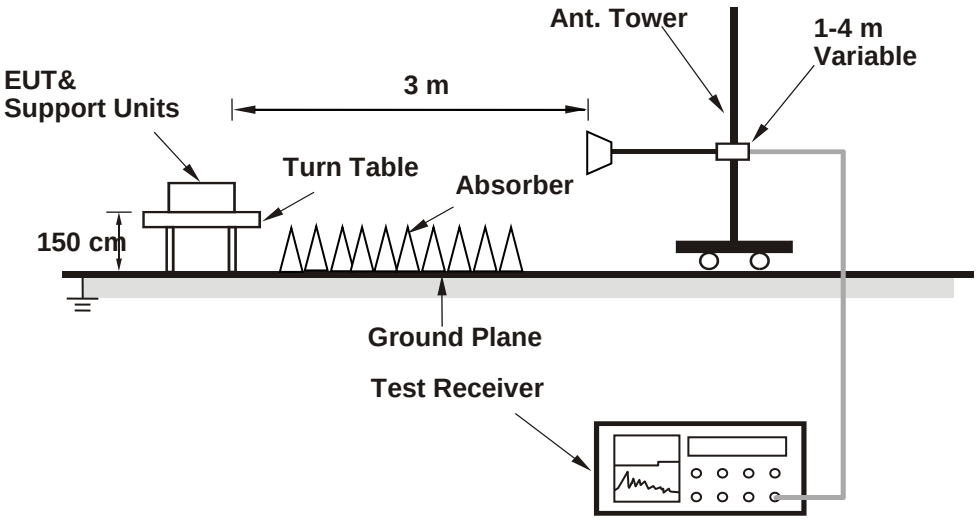
<Conducted Output Power>



<Radiated Emission below or equal to 1 GHz>



<Radiated Emission above 1 GHz>



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101508	2020/3/16	2021/3/15
Receiver	R&S	ESR7	102108	2020/4/22	2021/4/21
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2020/2/14	2021/2/12
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/1	2021/11/30
LF-AMP	Agilent	8447D	2944A10772	2020/2/11	2021/2/9
HF-AMP + AC source	EMCI	EMC051845SE	980633	2020/2/17	2021/2/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2020/4/22	2021/4/21

Test Procedures

Conducted Power Measurement:
The EUT was set up for the maximum power with WWAN link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

EIRP / ERP Measurement:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, and 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.
e. The ERP / EIRP testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

<Conducted Output Power>

GSM1900		Max Burst Average Power (dBm)		
		Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8
GPRS (GMSK)	1 Tx Slot	29.43	29.37	29.45
	2 Tx Slot	29.42	29.36	29.44
	3 Tx Slot	28.59	28.55	28.67
	4 Tx Slot	27.42	27.34	27.46
EDGE (8PSK)	1 Tx Slot	25.97	25.93	26.01
	2 Tx Slot	25.99	25.94	26.01
	3 Tx Slot	25.98	25.91	26.01
	4 Tx Slot	25.97	25.92	26.02

Band	UMTS B5 Average Conducted Power(dBm)		
Tx Channel	4132	4182	4233
Rx Channel	4357	4407	4458
Frequency(MHz)	826.4	836.4	846.6
RMC 12.2K	23.26	23.16	23.08

<EIRP>

GPRS							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	512	1850.2	-16.77	45.74	28.97	788.86	H
	661	1880.0	-17.29	46.20	28.91	778.04	
	810	1909.8	-17.57	46.56	28.99	792.50	
	512	1850.2	-33.47	46.87	13.40	21.88	V
	661	1880.0	-33.77	47.27	13.50	22.39	
	810	1909.8	-33.40	47.52	14.12	25.82	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

EGPRS							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	512	1850.2	-20.25	45.76	25.51	355.63	H
	661	1880.0	-20.73	46.20	25.47	352.37	
	810	1909.8	-21.02	46.57	25.55	358.92	
	512	1850.2	-35.98	46.89	10.91	12.33	V
	661	1880.0	-36.00	47.27	11.27	13.40	
	810	1909.8	-36.11	47.53	11.42	13.87	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

WCDMA_Band II							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
H	9262	1852.4	-22.84	45.74	22.90	194.98	H
	9400	1880.0	-23.52	46.20	22.68	185.35	
	9538	1907.6	-24.26	46.56	22.30	169.82	
	9262	1852.4	-33.89	46.87	12.98	19.86	V
	9400	1880.0	-33.80	47.27	13.47	22.23	
	9538	1907.6	-33.86	47.52	13.66	23.23	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

5.1.2 Radiated Spurious Emissions

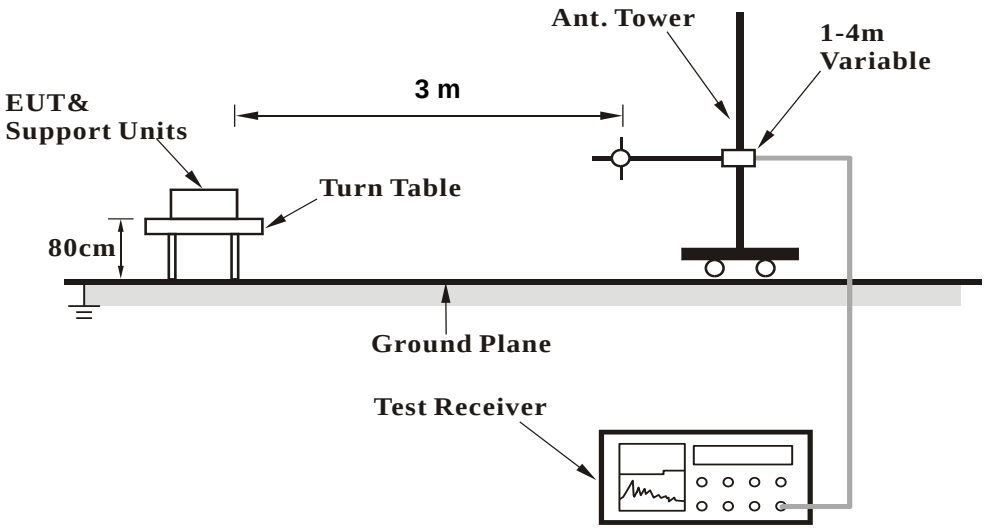
Limit

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.

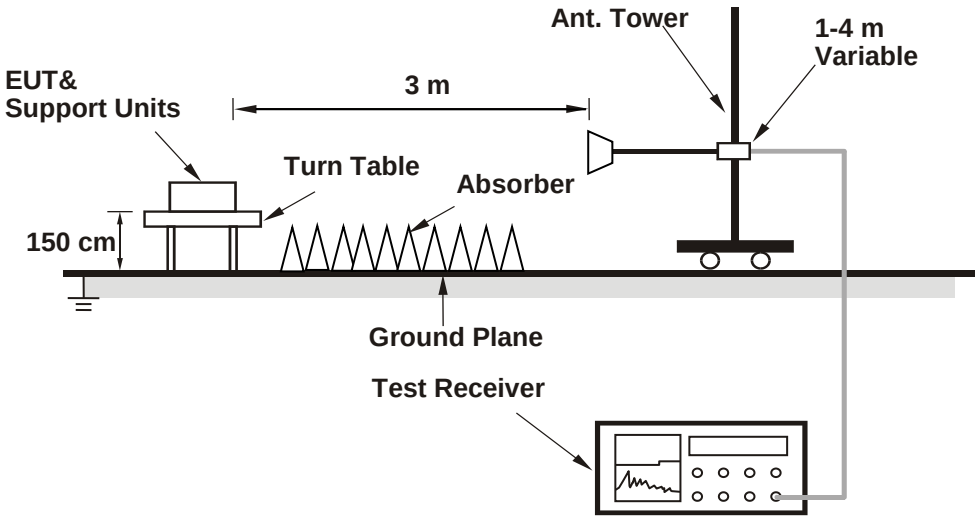
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

<Radiated Emissions below or equal to 1 GHz>



<Radiated Emissions above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Refer to 5.1.1 Test Instruments

Test Procedures

a. Substitution mothod is used for E.I.R.P. measurement. In the semi-anechoic chamber, EUT placed on the 0.8m (below or equal to 1 GHz) and/or 1.5m (above 1 GHz) height of turn table, rotated the table around horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the turn table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.
c. E.I.R.P. = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. E.R.P. can be calculated from E.I.R.P. by subtracting the gain of dipole, E.R.P. = E.I.R.P – 2.15 dB.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. Testing was carried out within frequency range 30 MHz to the tenth harmonic.
3. All modes of operation were investigated and the worst-case emissions are reported.
4. The ERP / EIRP testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

Test Results

Please refer to Appendix B.

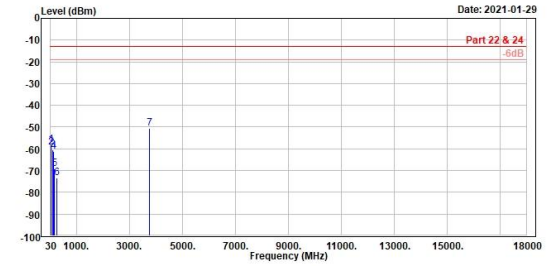
Appendix A: Test Results of Radiated Spurious Emissions

GPRS1900 Link Mode, 30MHz ~ 10th Harmonics

EGPRS_Channel 661

Horizontal

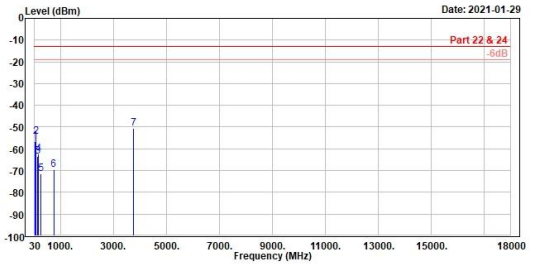
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	33.59	-58.30	-65.46	7.16	-13.00	-45.30	Peak	
2	47.95	-59.32	-64.93	5.61	-13.00	-46.32	Peak	
3	95.96	-60.56	-58.37	-2.19	-13.00	-47.56	Peak	
4	144.07	-61.29	-61.79	0.50	-13.00	-48.29	Peak	
5	179.96	-69.04	-67.84	-1.20	-13.00	-56.04	Peak	
6	275.99	-73.28	-71.57	-1.71	-13.00	-60.28	Peak	
7	3760.00	-50.49	-49.58	-0.91	-13.00	-37.49	Peak	

Vertical

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322

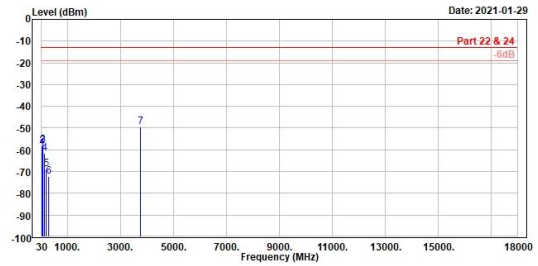


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	40.19	-56.67	-52.61	-4.06	-13.00	-43.67	Peak	
2	83.93	-54.24	-52.18	-2.06	-13.00	-41.24	Peak	
3	144.07	-63.42	-66.55	3.13	-13.00	-50.42	Peak	
4	179.96	-62.31	-64.21	1.90	-13.00	-49.31	Peak	
5	276.09	-71.61	-74.45	2.84	-13.00	-58.61	Peak	
6	750.13	-69.40	-77.74	8.34	-13.00	-56.40	Peak	
7	3760.00	-50.68	-50.16	-0.52	-13.00	-37.68	Peak	

GPRS_Channel 661

Horizontal

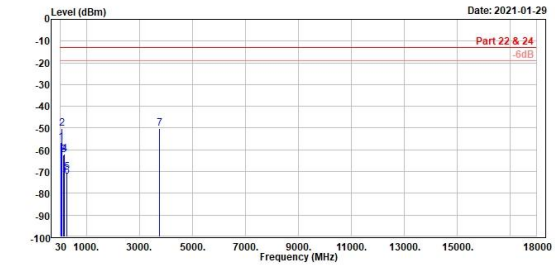
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	32.23	-59.50	-66.56	7.06	-13.00	-46.50	Peak	
2	47.95	-58.03	-63.64	5.61	-13.00	-45.03	Peak	
3	84.13	-57.97	-55.22	-2.75	-13.00	-44.97	Peak	
4	143.88	-61.43	-61.93	0.50	-13.00	-48.43	Peak	
5	191.99	-68.64	-65.02	-3.62	-13.00	-55.64	Peak	
6	282.39	-72.31	-70.85	-1.46	-13.00	-59.31	Peak	
7	3760.00	-49.27	-48.36	-0.91	-13.00	-36.27	Peak	

Vertical

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	47.85	-56.74	-53.90	-2.84	-13.00	-43.74	Peak	
2	84.03	-50.11	-48.06	-2.05	-13.00	-37.11	Peak	
3	143.98	-62.50	-65.62	3.12	-13.00	-49.50	Peak	
4	179.96	-62.08	-63.98	1.90	-13.00	-49.08	Peak	
5	252.23	-70.44	-73.51	3.07	-13.00	-57.44	Peak	
6	275.99	-72.06	-74.91	2.85	-13.00	-59.06	Peak	
7	3760.00	-50.23	-49.71	-0.52	-13.00	-37.23	Peak	

WCDMA Band II Link Mode, 30MHz ~ 10th Harmonics

Channel 9400

Horizontal

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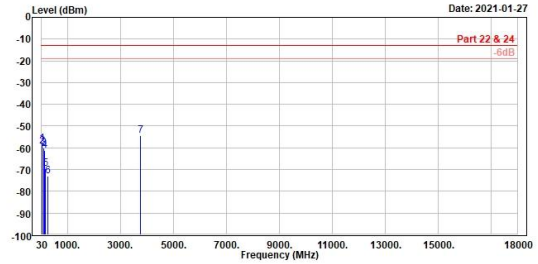

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	32.62	-58.25	-65.34	7.09	-13.00	-45.25	Peak	
2	47.95	-59.23	-64.84	5.61	-13.00	-46.23	Peak	
3	95.96	-60.21	-58.02	-2.19	-13.00	-47.21	Peak	
4	143.98	-61.36	-61.86	0.50	-13.00	-48.36	Peak	
5	179.96	-69.72	-68.52	-1.20	-13.00	-56.72	Peak	
6	276.09	-72.97	-71.27	-1.70	-13.00	-59.97	Peak	
7	3760.00	-54.23	-53.32	-0.91	-13.00	-41.23	Peak	

Vertical

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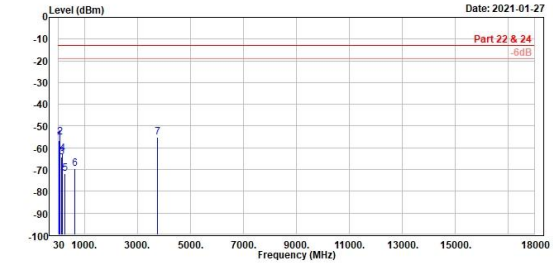

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Note
	MHz	dBm	dBm	dB	dBm	dB		
1	47.95	-56.68	-53.86	-2.82	-13.00	-43.68	Peak	
2	83.93	-55.00	-52.94	-2.06	-13.00	-42.00	Peak	
3	143.98	-64.08	-67.20	3.12	-13.00	-51.08	Peak	
4	179.96	-62.75	-64.65	1.90	-13.00	-49.75	Peak	
5	276.19	-71.97	-74.81	2.84	-13.00	-58.97	Peak	
6	646.44	-69.49	-77.49	8.00	-13.00	-56.49	Peak	
7	3760.00	-55.20	-54.68	-0.52	-13.00	-42.20	Peak	