FCC Test Report

Report No.:	RF170831C22A-1
FCC ID:	RID-LT501
Model No.:	LT-501XX, LT-601XX, GM-50XX、GM-51XX、GM-60XX、GM-61XX
Received Date:	Aug. 31, 2017
Test Date:	Nov. 03 ~ Dec. 18, 2017
Issued Date:	Aug. 16, 2018
Applicant:	GlobalSat WorldCom Corporation
Address:	16F., No. 186, Jian Ist Rd., Zhonghe Dist., New Taipei City, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF170831C22A-1	Original release	Aug. 16, 2018

1 Certificate of Conformity

Product:	LoRa Flexible Tracker
Brand:	GlobalSat
Model No.:	LT-501XX, LT-601XX, GM-50XX、GM-51XX、GM-60XX、GM-61XX
Sample Status:	Engineering Sample
Applicant:	GlobalSat WorldCom Corporation
Test Date:	Nov. 03 ~ Dec. 18, 2017
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Aug. 16, 2018

Pettie Chen / Seinor Specialist

Approved by : Bruce Chen , **Date:** Aug. 16, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

Hybrid Mode (125kHz Bandwidth, 64 channels)

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -15.07dB at 2.32396MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Minimum Number of Hopping Channels	N/A	Refer to Note
15.247(a)(2)	500 kHz Minimum Bandwidth	N/A	Refer to Note
15.247(b)(2)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.9dB at 1804.60MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

N/A: Not Applicable

Note: There is no requirement for this type of hybrid system to comply with the 500 kHz minimum bandwidth normally associated with a DTS transmission; and, there is no minimum number of hopping channels associated with this type of hybrid system.

Hybrid Mode (500kHz Bandwidth, 8 channels)

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -14.22dB at 2.21057MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Minimum Number of Hopping Channels	N/A	Refer to Note
15.247(a)(2)	500 kHz Minimum Bandwidth	N/A	Refer to Note
15.247(b)(2)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -7.4dB at 1806.00MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

N/A: Not Applicable

Note: There is no requirement for this type of hybrid system to comply with the 500 kHz minimum bandwidth normally associated with a DTS transmission; and, there is no minimum number of hopping channels associated with this type of hybrid system.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	LoRa Flexible Tracker	
Brand	GlobalSat	
Model	LT-501XX, LT-601XX, GM-50XX、GM-51XX、GM-60XX、GM-61XX	
Model Difference	Refer to note for more details	
Sample Status	Engineering Sample	
Power Supply Rating	3.7Vdc (battery) 5Vdc (host)	
Modulation Type	FSK	
Transfer Rate	21.9kbps	
Operating Frequency	902~928MHz	
Number of Channel	Hybrid Mode (125kHz Bandwidth, 64 channels)	64
	Hybrid Mode (500kHz Bandwidth, 8 channels)	8
Channel Spacing	Hybrid Mode (125kHz Bandwidth, 64 channels)	0.2MHz
	Hybrid Mode (500kHz Bandwidth, 8 channels)	1.6MHz
Output Power	Hybrid Mode (125kHz Bandwidth, 64 channels)	87.096mW
	Hybrid Mode (500kHz Bandwidth, 8 channels)	87.498mW
Antenna Type	PIFA antenna with -3.8dBi gain	
Antenna Connector	NA	
Accessory Device	Refer to note	
Cable Supplied	Refer to note	

Note:

1. This report is prepared for FCC class I permissive change. This report is issued as a supplementary report of BV CPS report no.: RF170831C22-1. Difference compared with the original report is adding models. Due to no effect on any test item, we did not re-test.

2. All models are listed as below. Model: LT-501H was chosen for final test. (New model is marked in boldface.)

Sample	Brand	Model	Difference
A	GlobalSat	LT-501H LT-501E **GM-50L**	Rechargeable battery (500mAh)
B	GlobalSat	LT-501RH LT-501RE **GM-51L**	Replaceable battery (19Ah)
C	GlobalSat	LT-601H LT-601E **GM-60L**	Rechargeable battery (500mAh)
D	GlobalSat	LT-601RH LT-601RE **GM-61L**	Replaceable battery (19Ah)

3. The EUT has following accessories.

Product	Brand	Model	Description
Battery 1	COPPERCELL TECHNOLOGY CO.,LTD	PL503035	Rating: 3.7Vdc, 500mAh
Battery 2	Ultralife	ER34615	Rating: 3.6Vdc, 19Ah
Battery 3	EWT	ER34615	Rating: 3.6Vdc, 19Ah
USB Cable	CHYIYI ENTERPRISE CO., LTD	HTM1-001-100	1m cable without core
Micro USB Cable Holder	GlobalSat	LT-501	-

* Battery 1 was chosen for final test and presented in the test report.

3.2 Description of Test Modes

64 channels are provided for Hybrid Mode (125kHz Bandwidth):

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.3	16	905.5	32	908.7	48	911.9
1	902.5	17	905.7	33	908.9	49	912.1
2	902.7	18	905.9	34	909.1	50	912.3
3	902.9	19	906.1	35	909.3	51	912.5
4	903.1	20	906.3	36	909.5	52	912.7
5	903.3	21	906.5	37	909.7	53	912.9
6	903.5	22	906.7	38	909.9	54	913.1
7	903.7	23	906.9	39	910.1	55	913.3
8	903.9	24	907.1	40	910.3	56	913.5
9	904.1	25	907.3	41	910.5	57	913.7
10	904.3	26	907.5	42	910.7	58	913.9
11	904.5	27	907.7	43	910.9	59	914.1
12	904.7	28	907.9	44	911.1	60	914.3
13	904.9	29	908.1	45	911.3	61	914.5
14	905.1	30	908.3	46	911.5	62	914.7
15	905.3	31	908.5	47	911.7	63	914.9

8 channels are provided for Hybrid Mode (500kHz Bandwidth):

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	903.0	2	906.2	4	909.4	6	912.6
1	904.6	3	907.8	5	911.0	7	914.2

3.2.1 Test Mode Applicability and Tested Channel Detail

Hybrid Mode (125kHz Bandwidth, 64 channels)

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 63	0, 32, 63	FSK

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 63	0, 32, 63	FSK

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 63	0, 32, 63	FSK

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 63	0, 32, 63	FSK

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	25 deg. C, 70% RH	120Vac, 60Hz	Matthew Yang
RE<1G	25 deg. C, 70% RH	120Vac, 60Hz	Luis Lee
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Luis Lee
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Frank Liu

Hybrid Mode (500kHz Bandwidth, 8 channels)

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 7	0, 3, 7	FSK

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 7	0, 3, 7	FSK

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 7	0, 3, 7	FSK

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 7	0, 3, 7	FSK

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	25 deg. C, 70% RH	120Vac, 60Hz	Matthew Yang
RE<1G	25 deg. C, 70% RH	120Vac, 60Hz	Matthew Yang
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Luis Lee
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Frank Liu

3.3 Description of Support Units

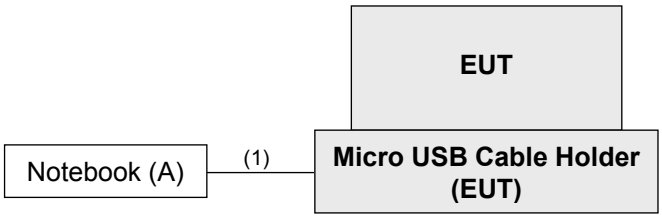
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	S430	MP-2DBFW	PD92230BNHU	-

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB	1	1	-	0	Accessory of EUT

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)
558074 D01 DTS Meas Guidance v04
FCC KDB Publication Number: 453039
ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results (Hybrid Mode (125kHz Bandwidth, 64 channels))

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 17, 2017	Oct. 16, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Dec. 28, 2016	Dec. 27, 2017
			Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Dec. 15, 2016	Dec. 14, 2017
			Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
			Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01960	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 08, 2017	Aug. 07, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 4.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

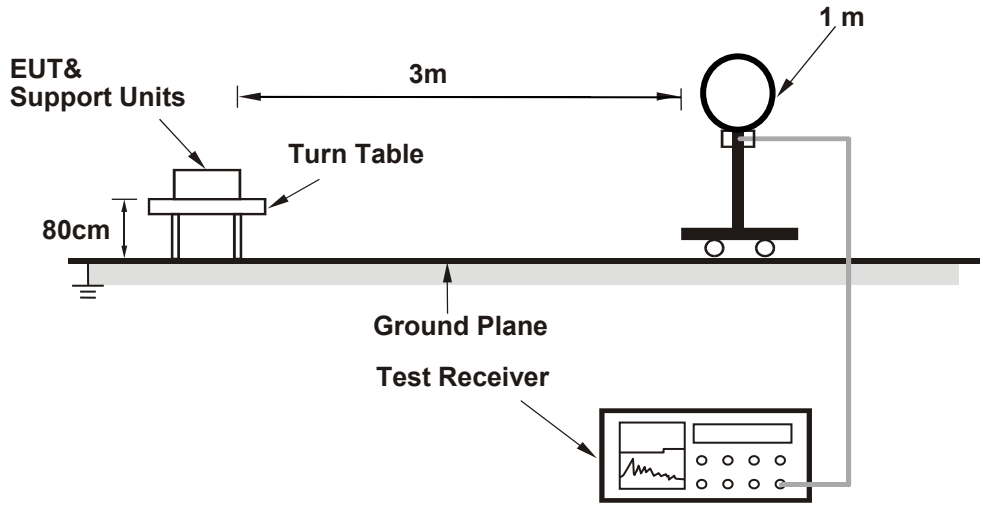
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

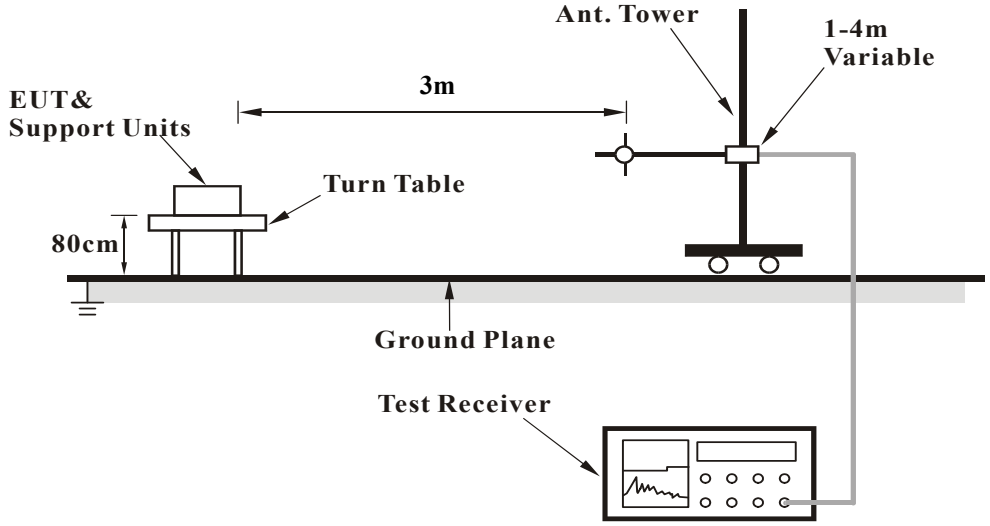
No deviation.

4.1.5 Test Setup

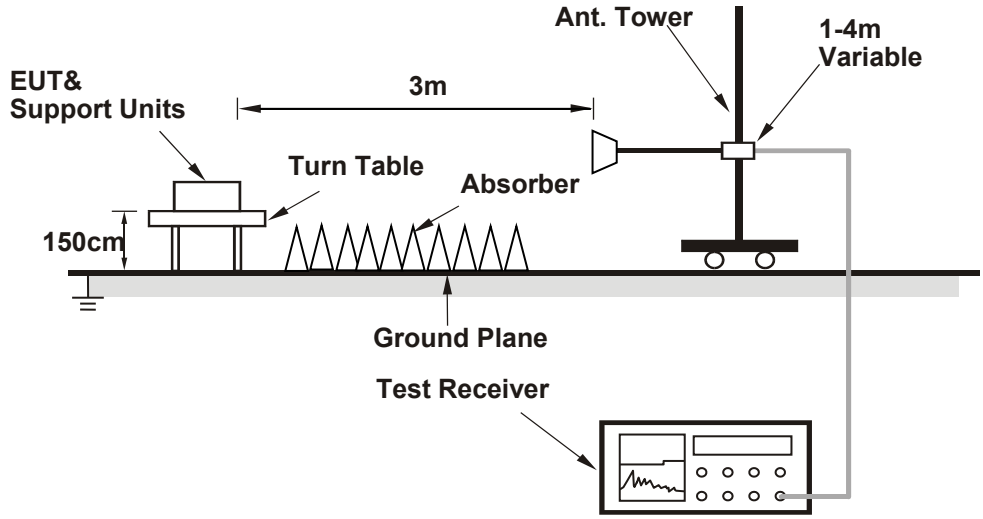
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#902.00	66.0 QP	86.1	-20.1	1.30 H	144	38.1	27.9
2	*902.30	116.1 QP			1.30 H	144	88.1	28.0
3	1804.60	51.5 PK	74.0	-22.5	2.21 H	158	58.8	-7.3
4	**1804.60**	**50.1 AV**	**54.0**	**-3.9**	**2.21 H**	**158**	**57.4**	**-7.3**
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#902.00	65.1 QP	83.9	-18.8	1.49 V	177	37.2	27.9
2	*902.30	113.9 QP			1.49 V	177	85.9	28.0
3	1804.60	47.0 PK	74.0	-27.0	1.55 V	64	54.3	-7.3
4	1804.60	44.7 AV	54.0	-9.3	1.55 V	64	52.0	-7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 32	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*908.70	115.6 QP			1.58 H	129	87.5	28.1
2	1817.40	49.7 PK	74.0	-24.3	1.75 H	165	57.0	-7.3
3	1817.40	48.3 AV	54.0	-5.7	1.75 H	165	55.6	-7.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*908.70	113.0 QP			1.46 V	52	84.9	28.1
2	1817.40	47.4 PK	74.0	-26.6	1.84 V	63	54.7	-7.3
3	1817.40	45.2 AV	54.0	-8.8	1.84 V	63	52.5	-7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 63	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*914.90	115.0 QP			1.48 H	134	86.8	28.2
2	#928.00	57.8 QP	85.0	-27.2	1.48 H	134	29.5	28.3
3	1829.80	51.2 PK	74.0	-22.8	2.03 H	159	58.4	-7.2
4	1829.80	49.2 AV	54.0	-4.8	2.03 H	159	56.4	-7.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*914.90	112.7 QP			1.52 V	176	84.5	28.2
2	#928.00	56.8 QP	82.7	-25.9	1.52 V	176	28.5	28.3
3	1829.80	48.6 PK	74.0	-25.4	1.75 V	63	55.8	-7.2
4	1829.80	46.5 AV	54.0	-7.5	1.75 V	63	53.7	-7.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	21.5 QP	40.0	-18.5	1.00 H	13	37.5	-16.0
2	392.75	22.5 QP	46.0	-23.5	1.49 H	251	32.9	-10.4
3	553.81	23.7 QP	46.0	-22.3	1.24 H	7	31.2	-7.5
4	730.38	28.1 QP	46.0	-17.9	1.24 H	307	31.5	-3.4
5	794.42	31.1 QP	46.0	-14.9	1.00 H	307	33.1	-2.0
6	982.64	29.7 QP	54.0	-24.3	1.99 H	129	28.9	0.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	26.5 QP	40.0	-13.5	1.48 V	297	42.5	-16.0
2	47.36	26.2 QP	40.0	-13.8	1.00 V	63	40.7	-14.5
3	175.43	16.3 QP	43.5	-27.2	1.48 V	143	30.7	-14.4
4	392.75	23.5 QP	46.0	-22.5	1.48 V	6	33.9	-10.4
5	730.38	27.3 QP	46.0	-18.7	2.00 V	150	30.7	-3.4
6	794.42	30.9 QP	46.0	-15.1	2.00 V	14	32.9	-2.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 32	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	20.2 QP	40.0	-19.8	1.00 H	196	36.2	-16.0
2	101.69	21.7 QP	43.5	-21.8	1.49 H	7	39.8	-18.1
3	392.75	22.4 QP	46.0	-23.6	1.99 H	243	32.8	-10.4
4	505.30	23.1 QP	46.0	-22.9	1.49 H	160	31.4	-8.3
5	730.38	27.5 QP	46.0	-18.5	1.00 H	71	30.9	-3.4
6	794.42	30.3 QP	46.0	-15.7	1.49 H	97	32.3	-2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	47.36	23.7 QP	40.0	-16.3	1.00 V	72	38.2	-14.5
2	392.75	22.0 QP	46.0	-24.0	1.51 V	92	32.4	-10.4
3	515.00	25.2 QP	46.0	-20.8	1.00 V	112	33.3	-8.1
4	761.43	28.1 QP	46.0	-17.9	1.51 V	13	30.7	-2.6
5	794.42	30.7 QP	46.0	-15.3	1.51 V	248	32.7	-2.0
6	891.44	33.8 QP	46.0	-12.2	1.51 V	98	34.7	-0.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 63	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	20.6 QP	40.0	-19.4	1.01 H	7	36.6	-16.0
2	161.85	17.0 QP	43.5	-26.5	1.51 H	13	30.6	-13.6
3	392.75	23.0 QP	46.0	-23.0	1.01 H	19	33.4	-10.4
4	447.09	26.2 QP	46.0	-19.8	1.01 H	7	35.5	-9.3
5	738.15	39.6 QP	46.0	-6.4	1.51 H	348	42.7	-3.1
6	792.48	30.3 QP	46.0	-15.7	1.24 H	151	32.4	-2.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	19.4 QP	40.0	-20.6	1.50 V	7	35.4	-16.0
2	53.18	20.6 QP	40.0	-19.4	1.00 V	54	34.9	-14.3
3	392.75	22.4 QP	46.0	-23.6	1.99 V	260	32.8	-10.4
4	625.60	24.3 QP	46.0	-21.7	1.99 V	253	29.6	-5.3
5	792.48	31.6 QP	46.0	-14.4	1.99 V	343	33.7	-2.1
6	893.38	34.2 QP	46.0	-11.8	1.50 V	295	35.0	-0.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1.The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 29, 2016	Nov. 28, 2017
			Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

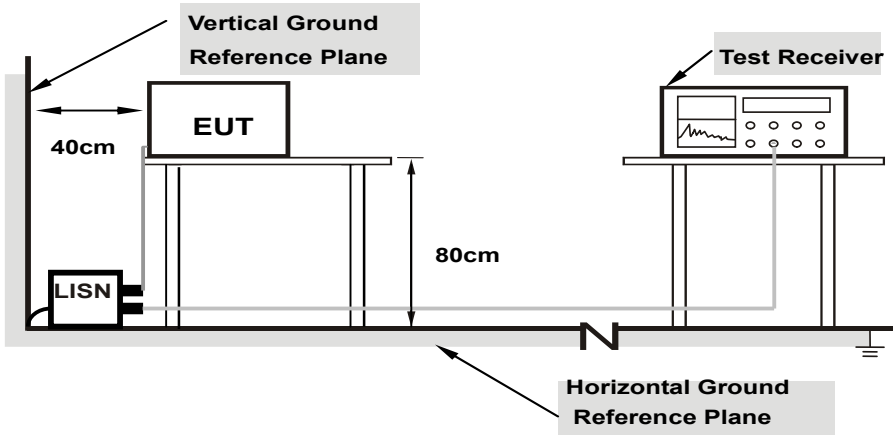
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

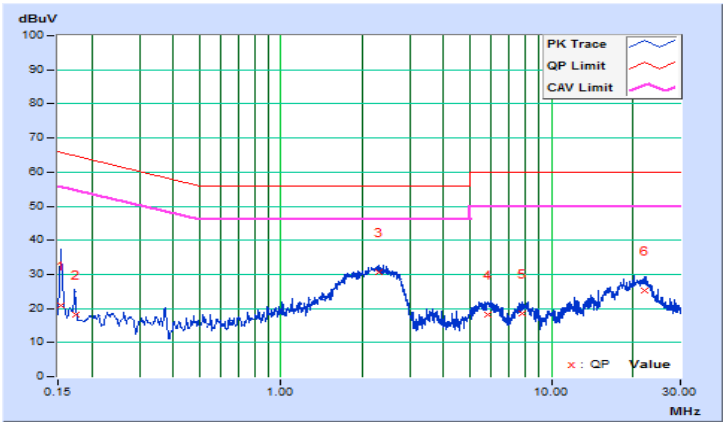
4.2.7 Test Results

Channel	TX Channel 0	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.39	10.39	0.70	20.78	11.09	65.79	55.79	-45.01	-44.70
2	0.17374	10.39	7.73	1.59	18.12	11.98	64.78	54.78	-46.66	-42.80
3	2.30400	10.48	20.14	16.62	30.62	27.10	56.00	46.00	-25.38	-18.90
4	5.79213	10.65	7.69	3.44	18.34	14.09	60.00	50.00	-41.66	-35.91
5	7.76272	10.75	7.87	3.27	18.62	14.02	60.00	50.00	-41.38	-35.98
6	22.00299	11.43	13.73	8.85	25.16	20.28	60.00	50.00	-34.84	-29.72

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

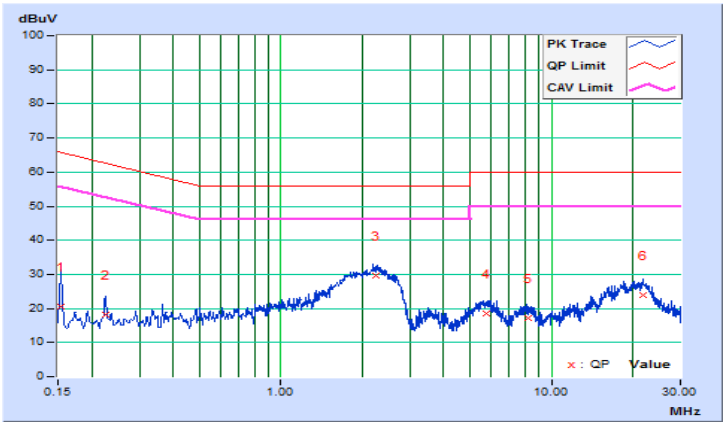


Channel	TX Channel 0	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.15	10.23	1.64	20.38	11.79	65.79	55.79	-45.41	-44.00
2	0.22434	10.16	8.14	2.11	18.30	12.27	62.66	52.66	-44.36	-40.39
3	2.23229	10.25	19.54	15.45	29.79	25.70	56.00	46.00	-26.21	-20.30
4	5.72175	10.40	8.22	3.80	18.62	14.20	60.00	50.00	-41.38	-35.80
5	8.16159	10.50	6.63	2.32	17.13	12.82	60.00	50.00	-42.87	-37.18
6	21.74493	11.01	12.96	8.16	23.97	19.17	60.00	50.00	-36.03	-30.83

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

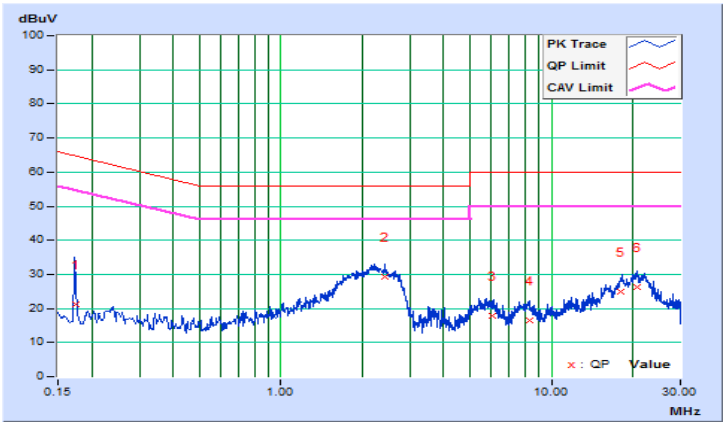


Channel	TX Channel 32	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17374	10.39	10.93	0.21	21.32	10.60	64.78	54.78	-43.46	-44.18
2	2.41591	10.48	18.79	15.02	29.27	25.50	56.00	46.00	-26.73	-20.50
3	6.01500	10.66	7.34	2.96	18.00	13.62	60.00	50.00	-42.00	-36.38
4	8.26325	10.77	5.84	1.27	16.61	12.04	60.00	50.00	-43.39	-37.96
5	17.93268	11.25	13.52	8.92	24.77	20.17	60.00	50.00	-35.23	-29.83
6	20.66186	11.38	14.72	9.59	26.10	20.97	60.00	50.00	-33.90	-29.03

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

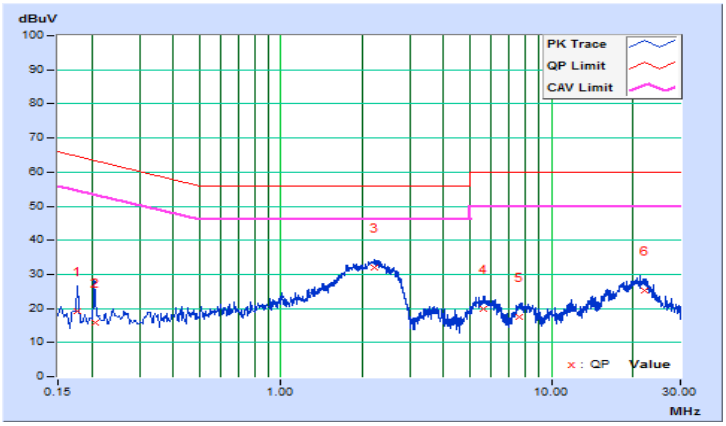


Channel	TX Channel 32	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17605	10.16	8.96	0.94	19.12	11.10	64.67	54.67	-45.55	-43.57
2	0.20511	10.16	5.53	0.14	15.69	10.30	63.40	53.40	-47.71	-43.10
3	2.20889	10.24	21.65	18.13	31.89	28.37	56.00	46.00	-24.11	-17.63
4	5.58436	10.39	9.36	5.24	19.75	15.63	60.00	50.00	-40.25	-34.37
5	7.56727	10.48	7.08	2.88	17.56	13.36	60.00	50.00	-42.44	-36.64
6	22.01081	11.02	14.29	9.37	25.31	20.39	60.00	50.00	-34.69	-29.61

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

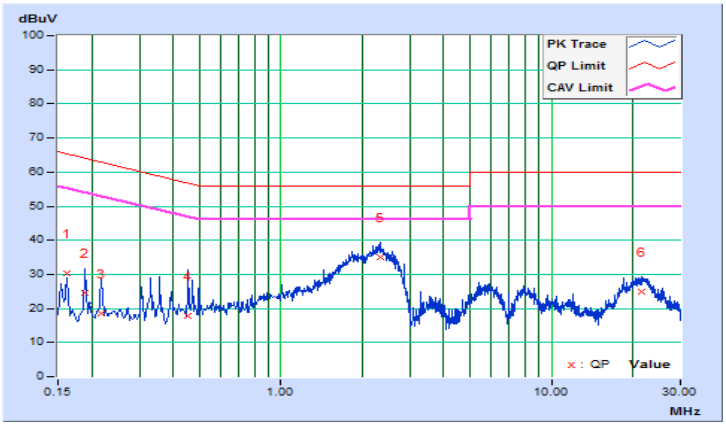


Channel	TX Channel 63	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.39	20.05	2.82	30.44	13.21	65.41	55.41	-34.97	-42.20
2	0.18754	10.39	14.10	1.02	24.49	11.41	64.14	54.14	-39.65	-42.73
3	0.21565	10.39	8.02	1.54	18.41	11.93	62.98	52.98	-44.57	-41.05
4	0.45216	10.41	7.42	2.45	17.83	12.86	56.84	46.84	-39.01	-33.98
5	**2.32396**	**10.48**	**24.65**	**20.45**	**35.13**	**30.93**	**56.00**	**46.00**	**-20.87**	**-15.07**
6	21.44386	11.41	13.49	8.56	24.90	19.97	60.00	50.00	-35.10	-30.03

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

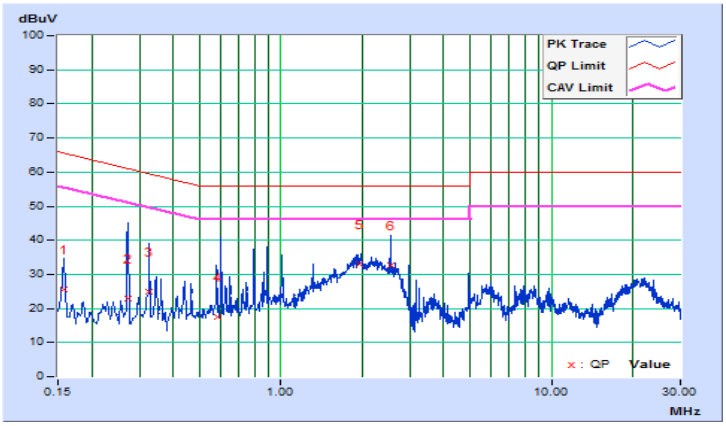


Channel	TX Channel 63	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15719	10.16	15.29	2.05	25.45	12.21	65.61	55.61	-40.16	-43.40
2	0.27120	10.16	12.63	1.82	22.79	11.98	61.08	51.08	-38.29	-39.10
3	0.32357	10.17	14.77	2.75	24.94	12.92	59.61	49.61	-34.67	-36.69
4	0.58077	10.17	7.29	3.57	17.46	13.74	56.00	46.00	-38.54	-32.26
5	1.94134	10.23	22.76	19.18	32.99	29.41	56.00	46.00	-23.01	-16.59
6	2.53993	10.26	22.47	18.71	32.73	28.97	56.00	46.00	-23.27	-17.03

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

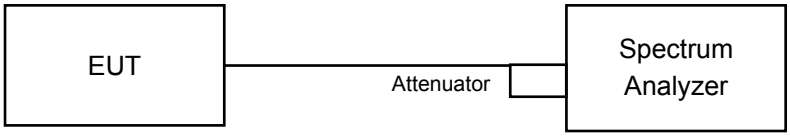


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

There is no minimum number of hopping channels associated with this type of hybrid system.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

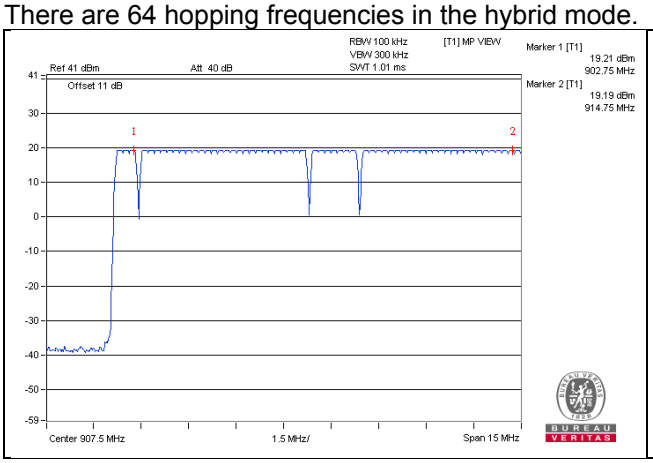
a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
d. Set the SA on View mode and then plot the result on SA screen.
e. Repeat above procedures until all frequencies measured were complete.

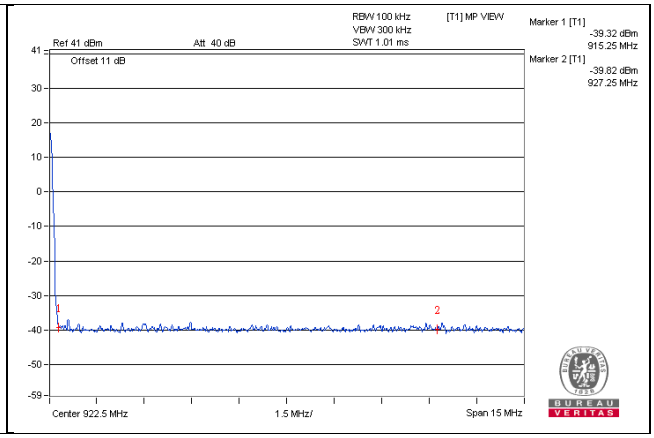
4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 Test Results

There are 64 hopping frequencies in the hybrid mode.



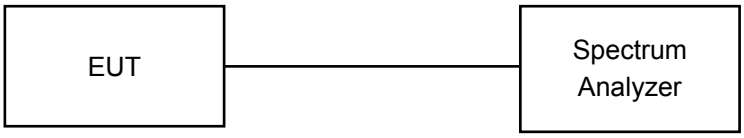


4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

A hybrid system must comply with a 0.4 second/channel maximum dwell time when the hopping function is turned on.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

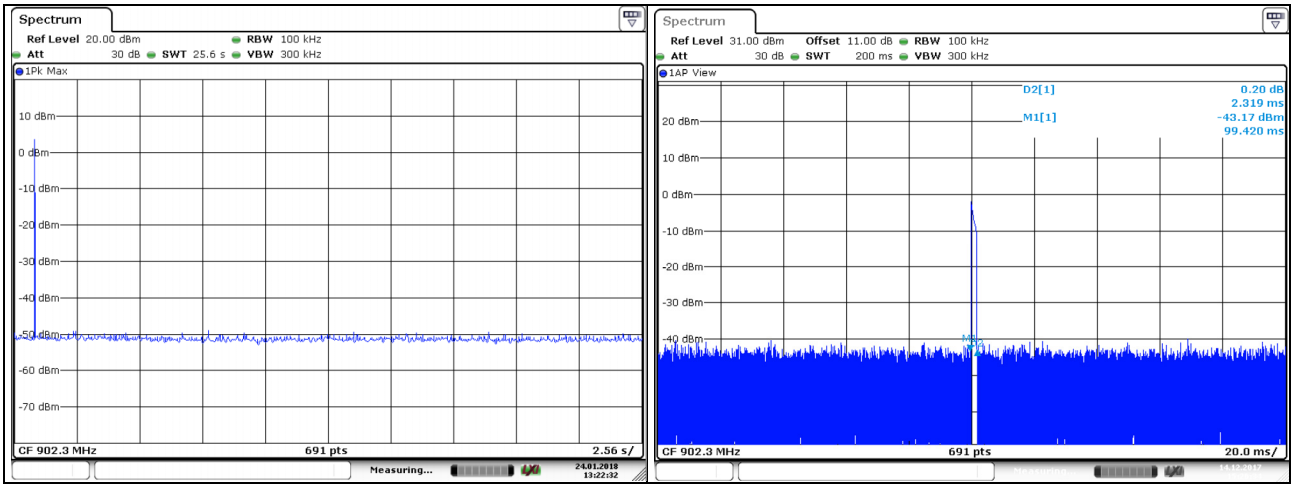
4.4.5 Deviation from Test Standard

No deviation.

4.4.6 Test Results

Number of transmission in a time period	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	2.319	2.9683	400

Note:
1. (1 time / 20 sec) x (64 Hopping x 0.4) x 2.319 = 2.9683.
2. Test plots of the transmitting time slot are shown on following.

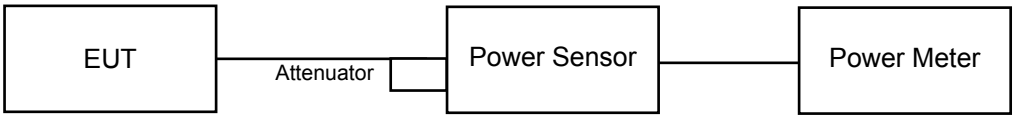


4.5 Conducted Output Power Measurement

4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 902-928 MHz bands: 1 Watt (30dBm)

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Pass / Fail
0	902.3	86.099	19.35	30.00	Pass
32	908.7	86.696	19.38	30.00	Pass
63	914.9	**87.096**	19.40	30.00	Pass

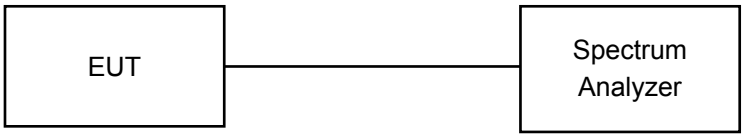
4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

A hybrid system must comply with the power density standard of 8 dBm in any 3 kHz band when the frequency hopping function is turned off

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. Set instrument center frequency to DTS channel center frequency.

b. Set span to at least 1.5 times the OBW.

c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.

d. Set VBW ≥3 x RBW.

e. Detector = power averaging (RMS) or sample detector (when RMS not available).

f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.

g. Sweep time = auto couple.

h. Employ trace averaging (RMS) mode over a minimum of 100 traces.

i. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

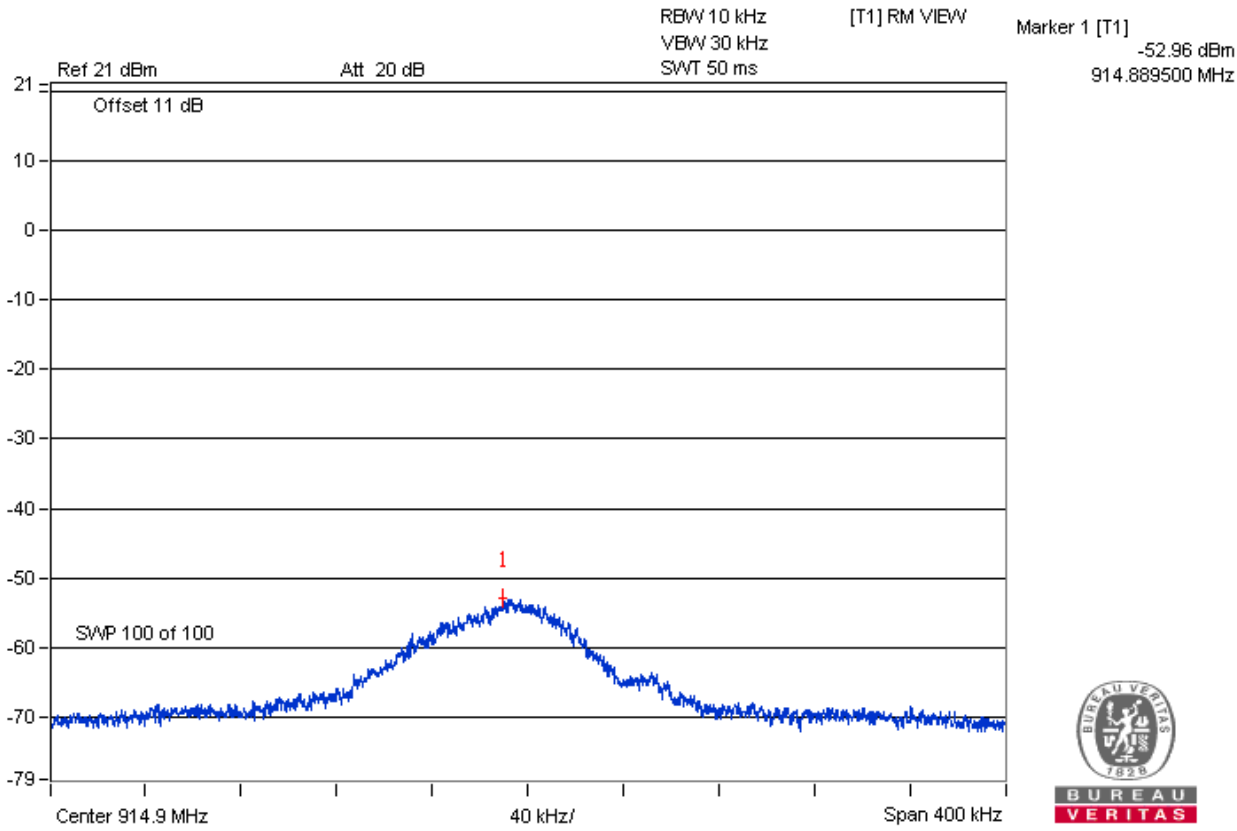
4.6.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	902.3	-57.85	8.00	Pass
32	908.7	-57.57	8.00	Pass
63	914.9	-52.96	8.00	Pass

Spectrum Plot of Worst Value

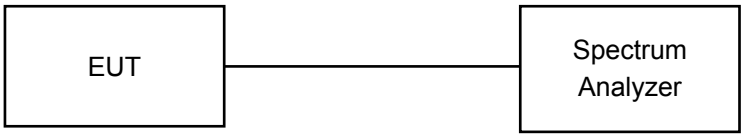


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out Of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

4.7.5 Deviation from Test Standard

No deviation.

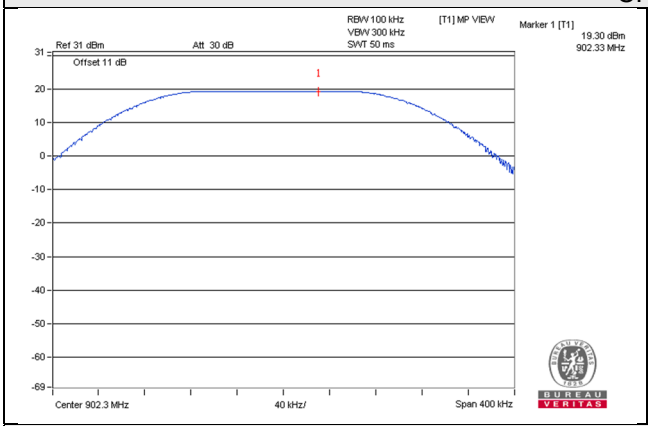
4.7.6 EUT Operating Condition

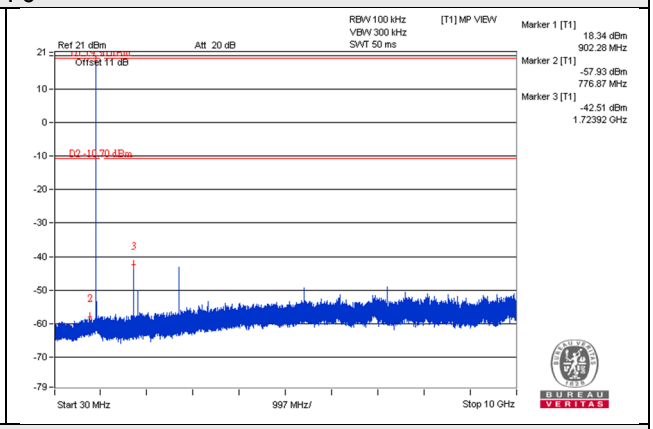
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

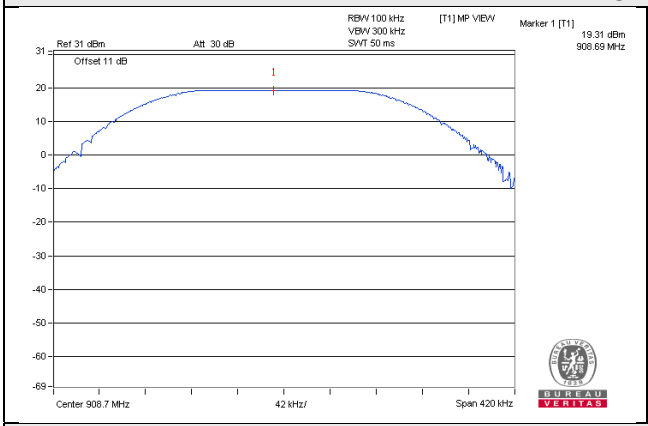
The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

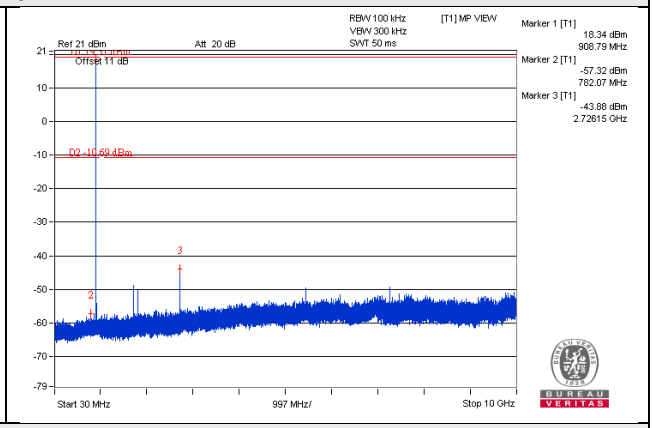
CH 0



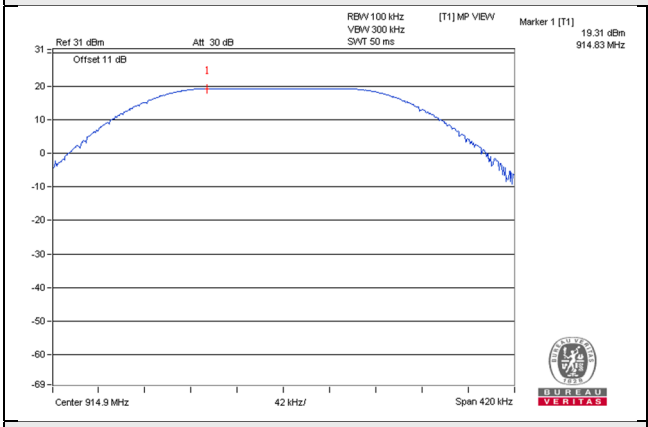


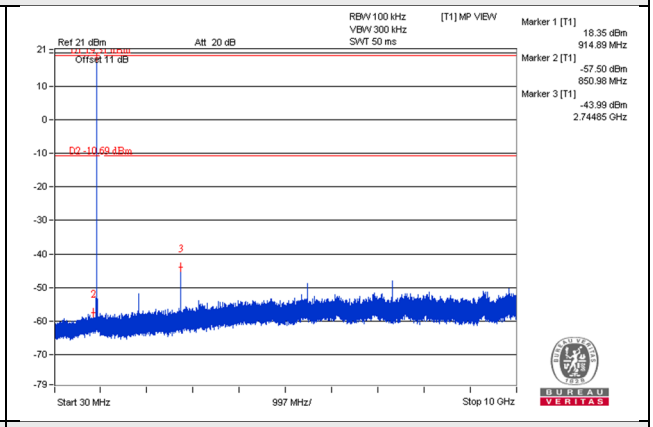
CH 32



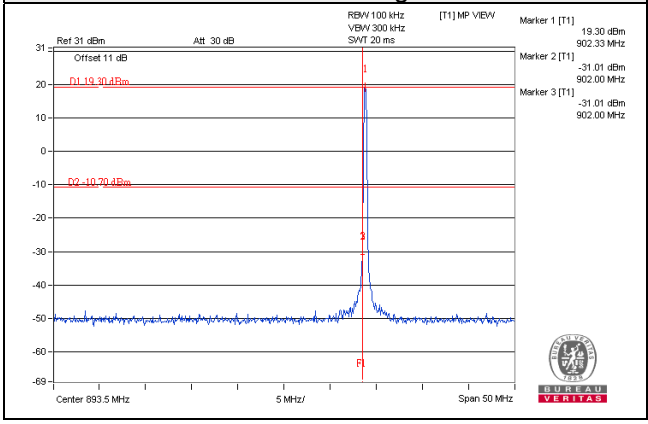


CH 63

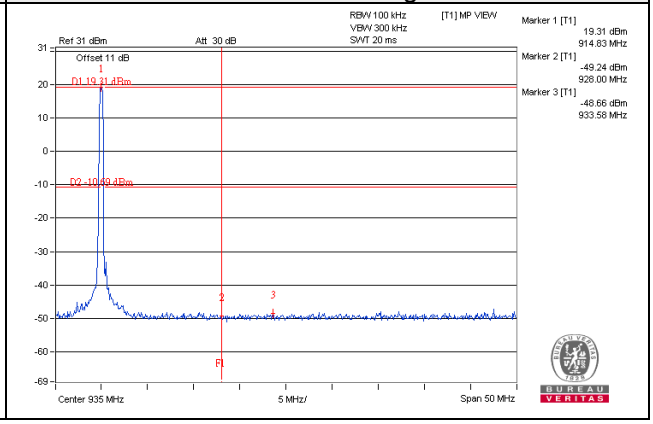




CH 0 Band edge



CH 63 Band edge



5 Test Types and Results (Hybrid Mode (500kHz Bandwidth, 8 channels))

5.1 Radiated Emission and Bandedge Measurement

5.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.

5.1.2 Test Instruments

Same as 4.1.2.

5.1.3 Test Procedures

Same as 4.1.3.

5.1.4 Deviation from Test Standard

No deviation.

5.1.5 Test Setup

Same as 4.1.5.

5.1.6 EUT Operating Conditions

Same as 4.1.6.

5.1.7 Test Results

Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#902.00	57.9 QP	83.5	-25.6	1.43 H	219	30.0	27.9
2	*903.00	113.5 QP			1.43 H	219	85.5	28.0
3	1806.00	48.7 PK	74.0	-25.3	2.81 H	155	56.0	-7.3
4	**1806.00**	**46.6 AV**	**54.0**	**-7.4**	**2.81 H**	**155**	**53.9**	**-7.3**
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#902.00	58.1 QP	80.7	-22.6	1.54 V	187	30.2	27.9
2	*903.00	110.7 QP			1.54 V	187	82.7	28.0
3	1806.00	46.5 PK	74.0	-27.5	2.23 V	148	53.8	-7.3
4	1806.00	43.9 AV	54.0	-10.1	2.23 V	148	51.2	-7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*907.80	113.2 QP			1.49 H	215	85.1	28.1
2	1815.60	47.0 PK	74.0	-27.0	1.77 H	54	54.3	-7.3
3	1815.60	45.3 AV	54.0	-8.7	1.77 H	54	52.6	-7.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*907.80	107.0 QP			1.59 V	180	78.9	28.1
2	1815.60	44.1 PK	74.0	-29.9	2.45 V	172	51.4	-7.3
3	1815.60	42.2 AV	54.0	-11.8	2.45 V	172	49.5	-7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 7	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK) Average (AV)
FREQUENCY RANGE	30MHz ~ 10GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*914.20	114.1 QP			1.51 H	215	85.9	28.2
2	#928.00	58.3 QP	84.1	-25.8	1.51 H	215	30.0	28.3
3	1828.40	47.0 PK	74.0	-27.0	1.63 H	53	54.2	-7.2
4	1828.40	44.1 AV	54.0	-9.9	1.63 H	53	51.3	-7.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*914.20	113.4 QP			1.43 V	173	85.2	28.2
2	#928.00	59.3 QP	83.4	-24.1	1.43 V	173	31.0	28.3
3	1828.40	44.9 PK	74.0	-29.1	2.41 V	163	52.1	-7.2
4	1828.40	41.3 AV	54.0	-12.7	2.41 V	163	48.5	-7.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz worst-case data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	20.3 QP	40.0	-19.7	2.00 H	156	36.3	-16.0
2	392.75	22.8 QP	46.0	-23.2	2.00 H	48	33.2	-10.4
3	522.76	25.3 QP	46.0	-20.7	1.01 H	7	33.3	-8.0
4	606.20	25.0 QP	46.0	-21.0	2.00 H	7	30.7	-5.7
5	792.48	30.5 QP	46.0	-15.5	1.51 H	13	32.6	-2.1
6	996.22	29.6 QP	54.0	-24.4	1.51 H	16	28.6	1.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.18	25.9 QP	40.0	-14.1	1.50 V	188	40.2	-14.3
2	175.43	15.6 QP	43.5	-27.9	1.50 V	6	30.0	-14.4
3	392.75	22.1 QP	46.0	-23.9	1.50 V	87	32.5	-10.4
4	493.66	25.4 QP	46.0	-20.6	1.50 V	189	34.0	-8.6
5	720.68	28.5 QP	46.0	-17.5	1.00 V	338	32.2	-3.7
6	794.42	30.0 QP	46.0	-16.0	1.50 V	200	32.0	-2.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	20.1 QP	40.0	-19.9	1.50 H	203	36.1	-16.0
2	148.26	14.5 QP	43.5	-29.0	1.00 H	217	28.2	-13.7
3	392.75	22.3 QP	46.0	-23.7	1.00 H	189	32.7	-10.4
4	608.14	24.1 QP	46.0	-21.9	1.50 H	276	29.8	-5.7
5	792.48	29.7 QP	46.0	-16.3	1.99 H	63	31.8	-2.1
6	992.34	29.2 QP	54.0	-24.8	1.99 H	142	28.3	0.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	59.01	21.0 QP	40.0	-19.0	1.51 V	1	35.6	-14.6
2	392.75	22.9 QP	46.0	-23.1	1.00 V	7	33.3	-10.4
3	495.60	24.4 QP	46.0	-21.6	1.51 V	58	32.8	-8.4
4	522.76	24.5 QP	46.0	-21.5	1.51 V	227	32.5	-8.0
5	794.42	29.8 QP	46.0	-16.2	1.00 V	19	31.8	-2.0
6	885.62	29.9 QP	46.0	-16.1	2.00 V	7	30.9	-1.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 7	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	19.5 QP	40.0	-20.5	2.00 H	319	35.5	-16.0
2	113.34	22.5 QP	43.5	-21.0	1.50 H	100	39.3	-16.8
3	392.75	22.0 QP	46.0	-24.0	2.00 H	234	32.4	-10.4
4	629.48	24.5 QP	46.0	-21.5	1.50 H	16	29.8	-5.3
5	794.42	29.9 QP	46.0	-16.1	1.01 H	335	31.9	-2.0
6	992.34	28.8 QP	54.0	-25.2	1.50 H	165	27.9	0.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	20.0 QP	40.0	-20.0	1.50 V	7	36.0	-16.0
2	134.68	14.1 QP	43.5	-29.4	1.00 V	317	28.8	-14.7
3	392.75	22.7 QP	46.0	-23.3	1.50 V	196	33.1	-10.4
4	592.62	23.2 QP	46.0	-22.8	1.00 V	311	29.5	-6.3
5	695.46	24.8 QP	46.0	-21.2	1.50 V	7	29.1	-4.3
6	794.42	30.0 QP	46.0	-16.0	1.00 V	59	32.0	-2.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

5.2 Conducted Emission Measurement

5.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.2.2 Test Instruments

Same as 4.2.2.

5.2.3 Test Procedures

Same as 4.2.3.

5.2.4 Deviation from Test Standard

No deviation.

5.2.5 Test Setup

Same as 4.2.5.

5.2.6 EUT Operating Conditions

Same as 4.1.6.

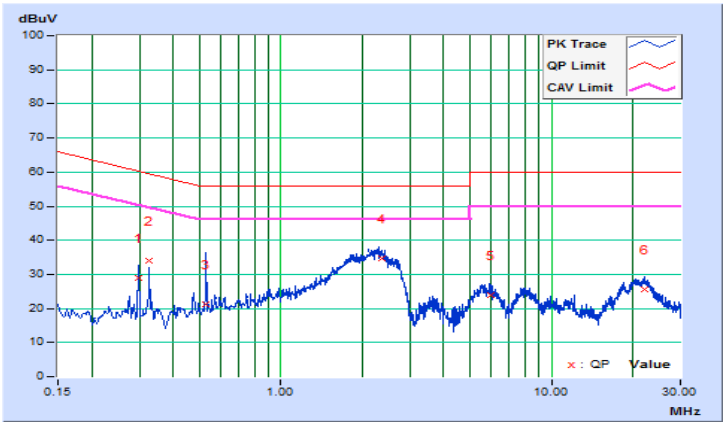
5.2.7 Test Results

Channel	TX Channel 0	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.29662	10.40	18.56	1.72	28.96	12.12	60.34	50.34	-31.38	-38.22
2	0.32357	10.40	23.46	3.27	33.86	13.67	59.61	49.61	-25.75	-35.94
3	0.52682	10.41	10.72	3.27	21.13	13.68	56.00	46.00	-34.87	-32.32
4	2.35133	10.48	24.12	20.41	34.60	30.89	56.00	46.00	-21.40	-15.11
5	5.94462	10.65	13.26	8.71	23.91	19.36	60.00	50.00	-36.09	-30.64
6	22.02254	11.43	14.20	9.46	25.63	20.89	60.00	50.00	-34.37	-29.11

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

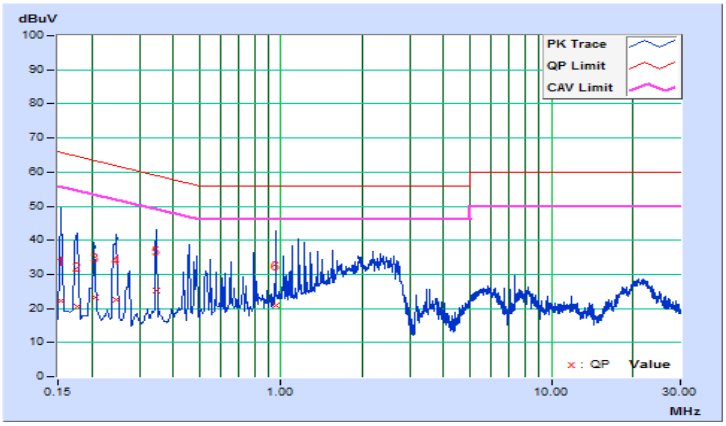


Channel	TX Channel 0	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.15	12.05	2.07	22.20	12.22	65.79	55.79	-43.59	-43.57
2	0.17605	10.16	10.41	1.04	20.57	11.20	64.67	54.67	-44.10	-43.47
3	0.20511	10.16	13.23	1.32	23.39	11.48	63.40	53.40	-40.01	-41.92
4	0.24472	10.16	12.26	1.79	22.42	11.95	61.93	51.93	-39.51	-39.98
5	0.34560	10.17	15.18	4.48	25.35	14.65	59.07	49.07	-33.72	-34.42
6	0.95309	10.19	10.63	7.30	20.82	17.49	56.00	46.00	-35.18	-28.51

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

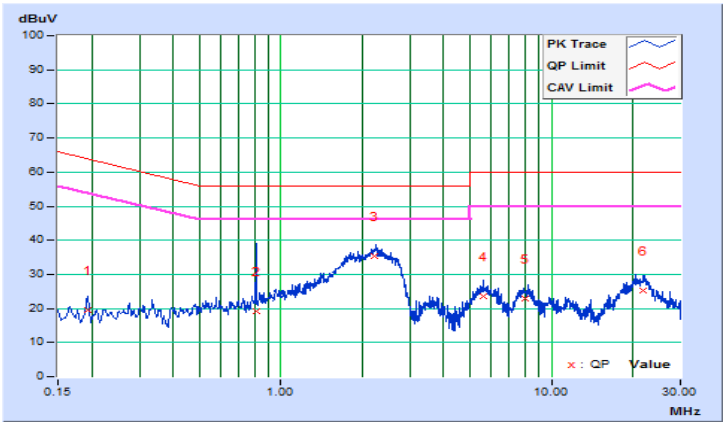


Channel	TX Channel 3	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19255	10.39	9.07	1.28	19.46	11.67	63.93	53.93	-44.47	-42.26
2	0.80945	10.42	8.72	5.20	19.14	15.62	56.00	46.00	-36.86	-30.38
3	2.20889	10.47	24.80	21.06	35.27	31.53	56.00	46.00	-20.73	-14.47
4	5.58436	10.64	13.00	8.89	23.64	19.53	60.00	50.00	-36.36	-30.47
5	7.96997	10.76	12.24	7.76	23.00	18.52	60.00	50.00	-37.00	-31.48
6	21.69801	11.42	13.90	8.97	25.32	20.39	60.00	50.00	-34.68	-29.61

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

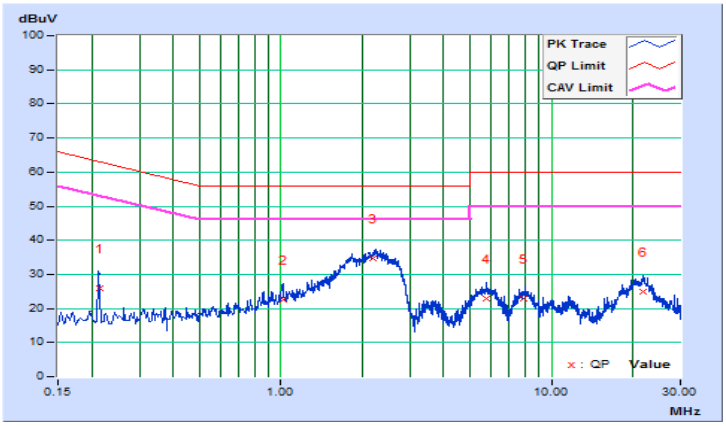


Channel	TX Channel 3	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21282	10.16	15.92	1.66	26.08	11.82	63.09	53.09	-37.01	-41.27
2	1.01799	10.19	12.34	8.28	22.53	18.47	56.00	46.00	-33.47	-27.53
3	2.17998	10.24	24.48	21.02	34.72	31.26	56.00	46.00	-21.28	-14.74
4	5.73346	10.40	12.41	8.49	22.81	18.89	60.00	50.00	-37.19	-31.11
5	7.86052	10.49	12.27	7.79	22.76	18.28	60.00	50.00	-37.24	-31.72
6	21.74102	11.01	14.03	9.17	25.04	20.18	60.00	50.00	-34.96	-29.82

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

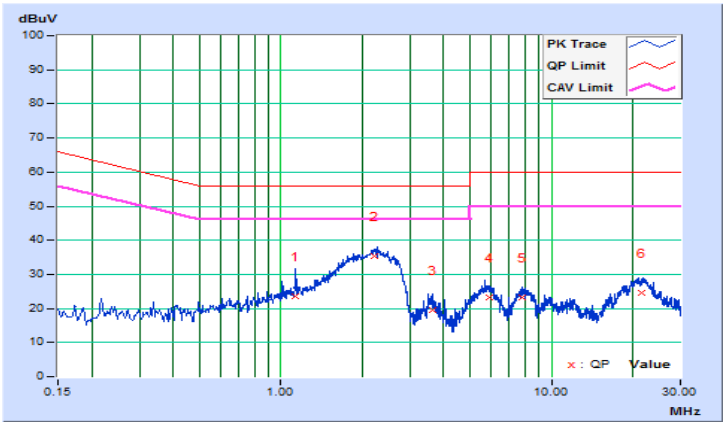


Channel	TX Channel 7	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	1.12519	10.43	13.18	9.65	23.61	20.08	56.00	46.00	-32.39	-25.92
2	**2.21057**	**10.47**	**24.86**	**21.31**	**35.33**	**31.78**	**56.00**	**46.00**	**-20.67**	**-14.22**
3	3.61817	10.54	8.94	4.04	19.48	14.58	56.00	46.00	-36.52	-31.42
4	5.86251	10.65	12.52	8.30	23.17	18.95	60.00	50.00	-36.83	-31.05
5	7.76668	10.75	12.62	8.24	23.37	18.99	60.00	50.00	-36.63	-31.01
6	21.42822	11.41	13.29	8.51	24.70	19.92	60.00	50.00	-35.30	-30.08

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

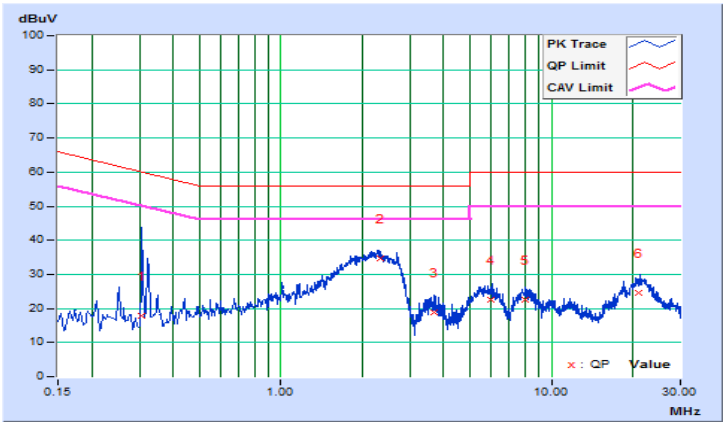


Channel	TX Channel 7	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.30374	10.17	7.51	1.07	17.68	11.24	60.14	50.14	-42.46	-38.90
2	2.32396	10.25	24.46	20.40	34.71	30.65	56.00	46.00	-21.29	-15.35
3	3.66900	10.31	8.67	3.87	18.98	14.18	56.00	46.00	-37.02	-31.82
4	5.96460	10.41	12.28	7.87	22.69	18.28	60.00	50.00	-37.31	-31.72
5	7.95436	10.49	12.12	7.60	22.61	18.09	60.00	50.00	-37.39	-31.91
6	20.89255	10.99	13.56	8.05	24.55	19.04	60.00	50.00	-35.45	-30.96

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

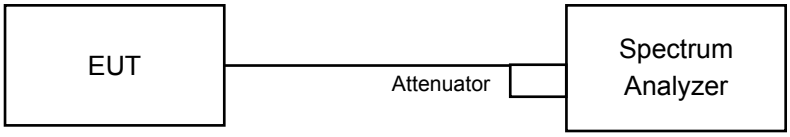


5.3 Number of Hopping Frequency Used

5.3.1 Limits of Hopping Frequency Used Measurement

There is no minimum number of hopping channels associated with this type of hybrid system.

5.3.2 Test Setup



5.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.3.4 Test Procedure

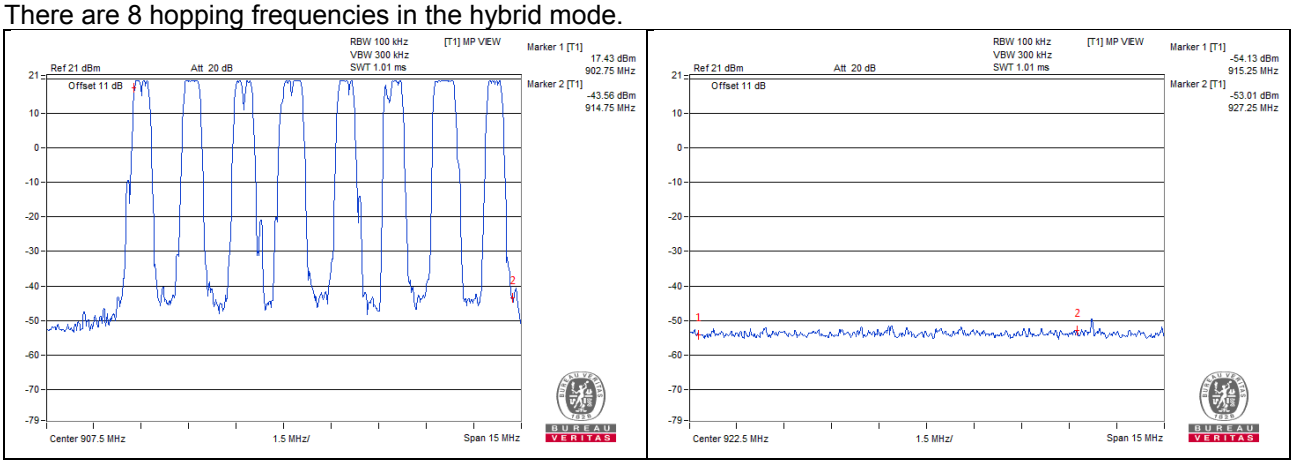
a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
d. Set the SA on View mode and then plot the result on SA screen.
e. Repeat above procedures until all frequencies measured were complete.

5.3.5 Deviation fromTest Standard

No deviation.

5.3.6 Test Results

There are 8 hopping frequencies in the hybrid mode.

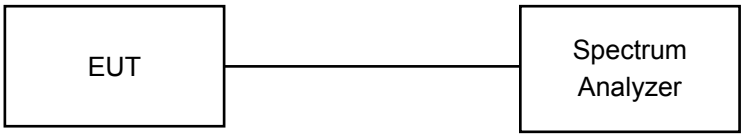


5.4 Dwell Time on Each Channel

5.4.1 Limits of Dwell Time on Each Channel Measurement

A hybrid system must comply with a 0.4 second/channel maximum dwell time when the hopping function is turned on.

5.4.2 Test Setup



5.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.4.4 Test Procedures

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

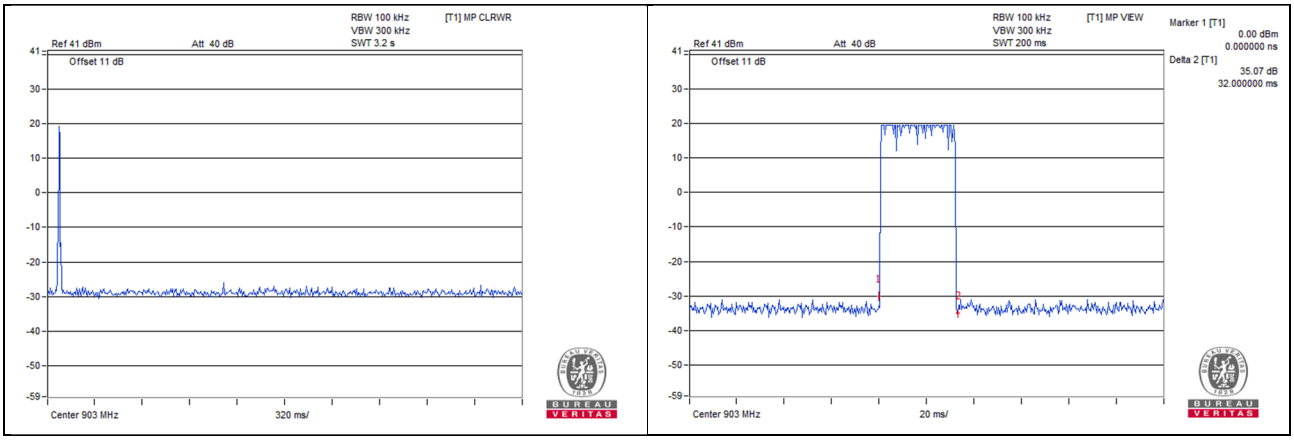
5.4.5 Deviation from Test Standard

No deviation.

5.4.6 Test Results

Number of transmission in a time period	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	32	5.12	400

Note:
1. (1 time / 20 sec) x (8 Hopping x 0.4) x 32 = 5.12.
2. Test plots of the transmitting time slot are shown on following.

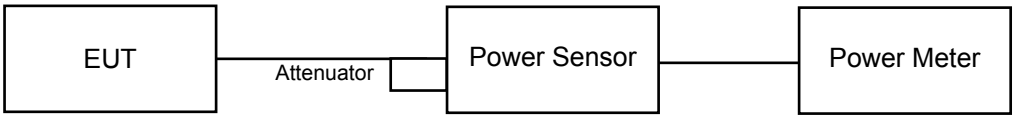


5.5 Conducted Output Power Measurement

5.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 902-928 MHz bands: 1 Watt (30dBm)

5.5.2 Test Setup



5.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.5.4 Test Procedure

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

5.5.5 Deviation from Test Standard

No deviation.

5.5.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

5.5.7 Test Results

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Pass / Fail
0	903.0	86.696	19.38	30.00	Pass
3	907.8	86.099	19.35	30.00	Pass
7	914.2	**87.498**	19.42	30.00	Pass

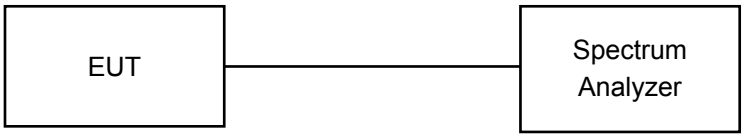
5.6 Power Spectral Density Measurement

5.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

A hybrid system must comply with the power density standard of 8 dBm in any 3 kHz band when the frequency hopping function is turned off

5.6.2 Test Setup



5.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.6.4 Test Procedure

a. Set instrument center frequency to DTS channel center frequency.

b. Set span to at least 1.5 times the OBW.

c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.

d. Set VBW ≥3 x RBW.

e. Detector = power averaging (RMS) or sample detector (when RMS not available).

f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.

g. Sweep time = auto couple.

h. Employ trace averaging (RMS) mode over a minimum of 100 traces.

i. Use the peak marker function to determine the maximum amplitude level.

5.6.5 Deviation from Test Standard

No deviation.

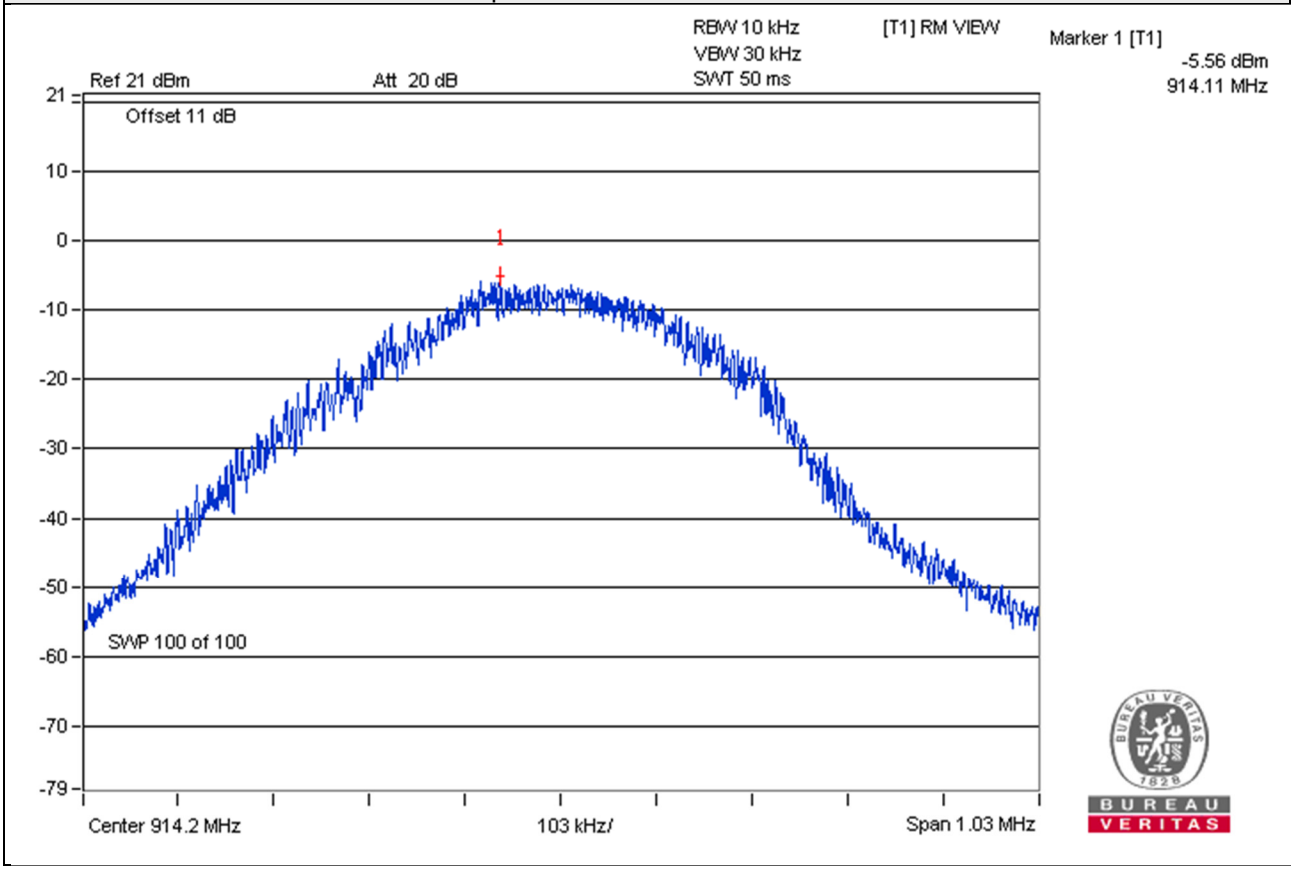
5.6.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

5.6.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	903.0	-7.91	8.00	Pass
3	907.8	-5.77	8.00	Pass
7	914.2	-5.56	8.00	Pass

Spectrum Plot of Worst Value

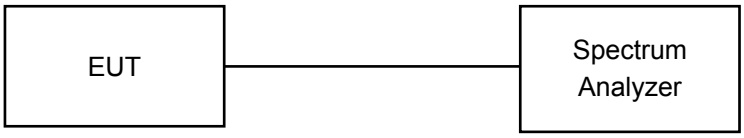


5.7 Conducted Out of Band Emission Measurement

5.7.1 Limits of Conducted Out Of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.7.2 Test Setup



5.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

5.7.5 Deviation from Test Standard

No deviation.

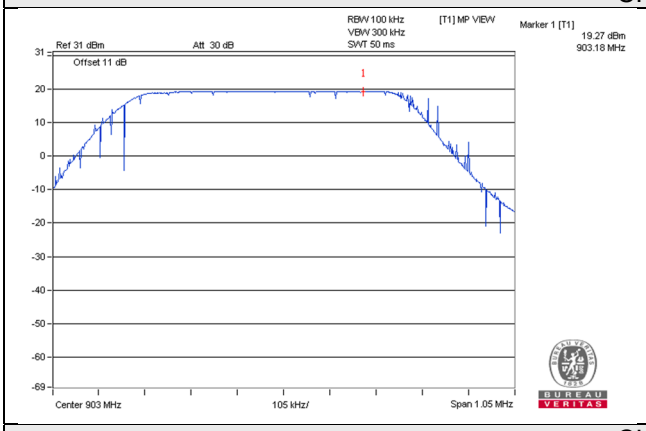
5.7.6 EUT Operating Condition

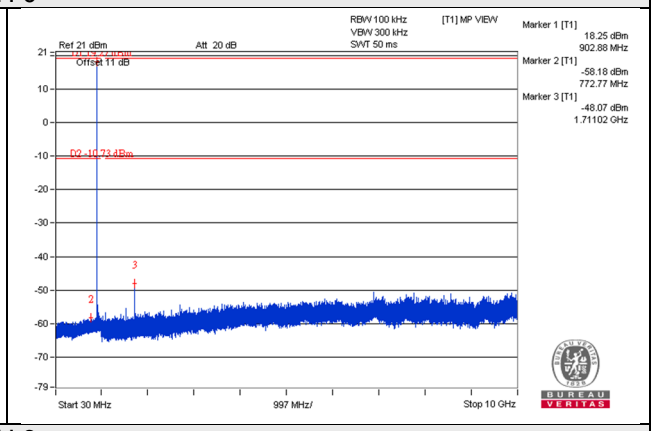
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

5.7.7 Test Results

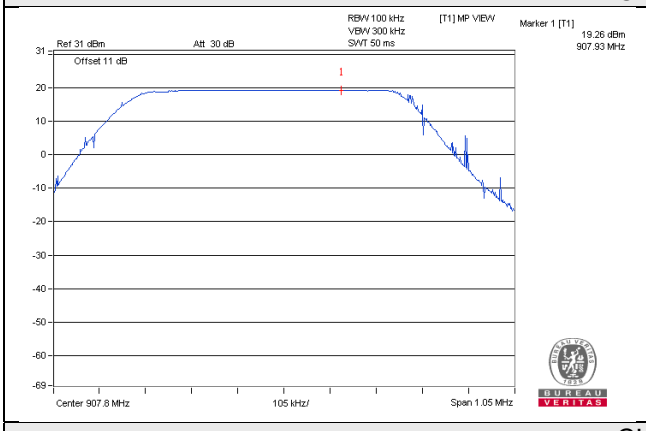
The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

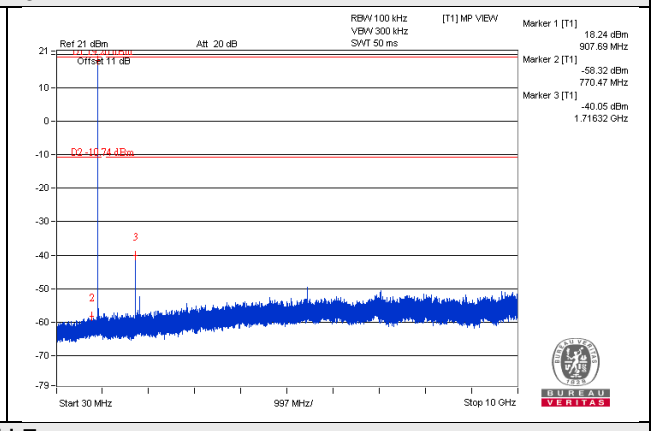
CH 0



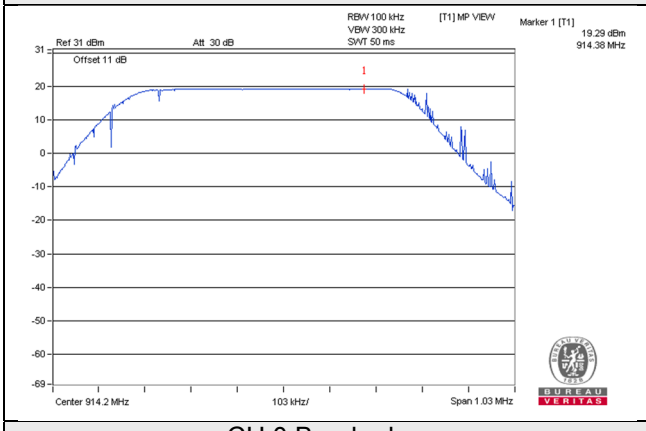


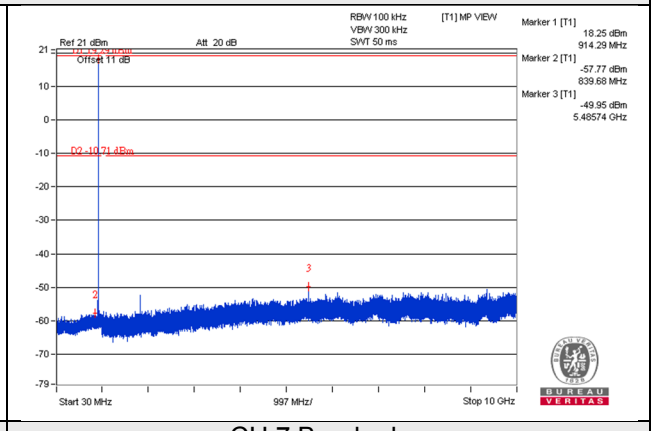
CH 3



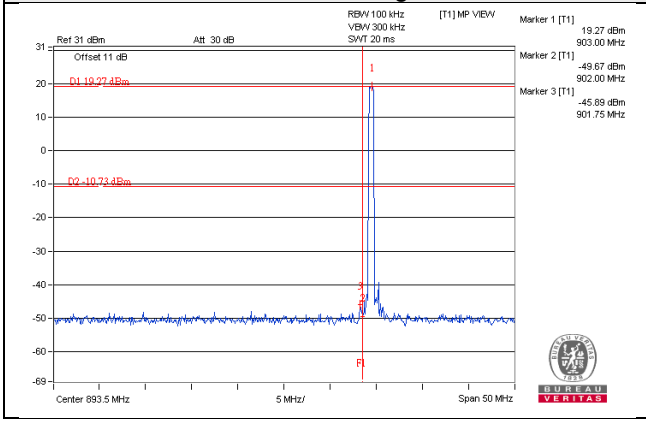


CH 7

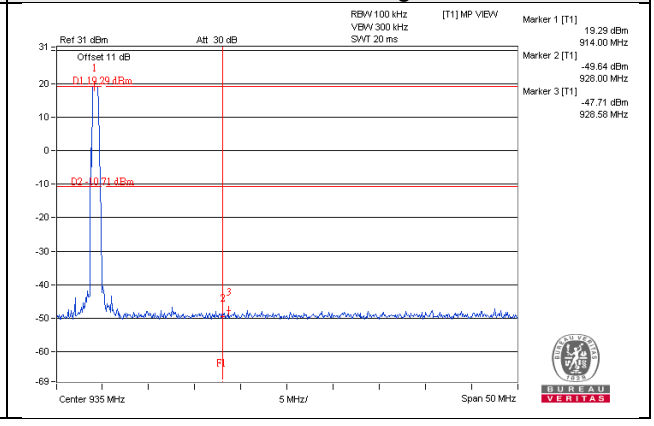




CH 0 Band edge



CH 7 Band edge



6 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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