	B U REAU VERITAS
	FCC Test Report (BT-LE)
Report No.:	RF180903E03-1
FCC ID:	NOIDS-S97407
Test Model:	S97407
Received Date:	Sep. 03, 2018
Test Date:	Nov. 20 to Dec. 12, 2018
Issued Date:	May 24, 2019
Applicant:	NETRONIX, INC.
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Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
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Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022
	Iac MRA
	Testing Laboratory 2022
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Release Control Record			
Issue No.	Description	Date Issued	
RF180903E03-1	Original release.	May 24, 2019	



# 1 Certificate of Conformity

Product:	9.7" Digital Signage	
Brand:	SABLE	
Test Model:	S97407	
Sample Status:	ENGINEERING SAMPLE	
Applicant:	NETRONIX, INC.	
Test Date:	Nov. 20 to Dec. 12, 2018	
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.2	
	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 EMC characteristics under the conditions specified in this report.

Prepared by :	Phoenix Huang / Specialist	, Date:	May 24, 2019	
Approved by :	May Chen / Manager	, Date:	May 24, 2019	



# 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)					
FCC Clause	Test Item		Remarks		
15.207	07 AC Power Conducted Emission		Meet the requirement of limit. Minimum passing margin is -14.96dB at 0.20469MHz.		
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 40.70MHz.		
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.		
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.		
15.247(b)	Conducted power	PASS	Meet the requirement of limit.		
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.		
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.		

# 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	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.53 dB
	1GHz ~ 6GHz	5.08 dB
Radiated Emissions above 1 GHz	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

### 2.2 Modification Record

There were no modifications required for compliance.



#### **General Information** 3

#### **General Description of EUT (BT-LE)** 3.1

Product	9.7" Digital Signage	
Brand	SABLE	
Test Model	S97407	
Status of EUT	ENGINEERING SAMPLE	
Dower Supply Dating	3.8Vdc form battery or	
Power Supply Rating	5Vdc from USB interface	
Modulation Type	GFSK	
Modulation Technology DTS		
Transfer Rate	Up to 1Mbps	
Operating Frequency 2.402 ~ 2.480GHz		
Number of Channel 40		
Output Power 0.5929 mW		
Antenna Type Refer to Note		
Antenna Connector Refer to Note		
Accessory Device	NA	
Data Cable Supplied	USB Cable × 1 (Shielded, 1m)	

### Note:

1. Simultaneously transmission condition.

Condition	Technology				
1	WLAN	Bluetooth	NFC		
2	Zigbee	Bluetooth	NFC		
Note: The emiss	Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.				

2. The antennas provided to the EUT, please refer to the following table:

Technology	Brand	Model Name	Ant. Net Gain (dBi)	Frequency Range	Ant. Type	Connector Type	Cable Length (cm)
WLAN	Walsin	RFPCA410603EMAB302	3.74	2.4~2.4835 GHz	PCB	i-pex(MHF)	3
Bluetooth	Walsin	RFPCA221126EMAB301	3.09	2.4~2.4835 GHz	PCB	i-pex(MHF)	26
Zigbee	Walsin	RFPCA410604EMAB301	3.7	2.4~2.4835 GHz	PCB	i-pex(MHF)	4.5
NFC	NA	NA	-	13.56 MHz	PCB Loop	NA	NA
A The FUT work he count is a with a better on faller in table.							

3. The EUT must be supplied w	vith a battery as following	table:
Brand	Model No.	Spec.
TCL	PR-248899G	3.8Vdc, 3035mAh, 11.53Wh



### 4. The EUT was pre-tested under the following modes:

For Radiated Emission test

Pre-test Mode	Description

Mode A Power from USB adapter

Mode B Power from Battery

From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

For AC Power Conducted Emission test			
Pre-test Mode	Description		
Mode C	Power from USB adapter		

Mode D Power from Laptop

From the above modes, the worst case was found in **Mode D**. Therefore only the test data of the mode was recorded in this report.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



# 3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



# 3.2.1 Test Mode Applicability and Tested Channel Detail

		APPLICA	BLE TO			DESCRIPTION
ONFIGURE MODE	RE≥1G	RE<1G	PLC A	PCM		DESCRIPTION
-	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		r from Laptop er from USB adapter
ere		Emission above 1GHz 8	<b>RE&lt;1G:</b> Radiated	Emission be	elow 1GHz	
	edge Measur Power Line (	ement Conducted Emission	APCM: Antenna F	ort Conduct	ted Measurer	ment
te: The EUT h	ad been pre-t	ested on the positioned	of each 3 axis. The worst			
1GHz) an	d X-plane (al	oove 1GHz).				
odiated En	siaaian Ta					
	hission le	<u>st (Above 1GHz):</u>				
			mine the worst-case		•	
		nodulations, data ra	tes and antenna por	ts (if EUT	with anter	nna diversity
architect	,	s) was (were) select	ed for the final test a	s listed h	elow	
		TESTED CHANNEL			ATE (Mbps)	1
AVAILADL		TESTED CHANNEL		DATARA	1	
0.4	- 20	0 40 00	OFOK		1	
adiated En	n has been available r		GFSK mine the worst-case tes and antenna por		•	
Adiated Er Pre-Scar between architecti Followinţ	nission Te n has been available r ure). g channel(s	st (Below 1GHz): conducted to detern nodulations, data ra	nine the worst-case	ts (if EUT is listed b	with anter	
adiated Er Pre-Scar between architecti Followinţ	nission Te n has been available r ure).	st (Below 1GHz): conducted to detern nodulations, data ra	nine the worst-case tes and antenna por	ts (if EUT is listed b	with anter	
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adiated Er Pre-Scar between architecti Following AVAILABL 0 t	nission Te n has been available r ure). g channel(s <b>E CHANNEL</b> o 39	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE	ts (if EUT is listed b	with anter elow. ATE (Mbps)	
<ul> <li>Adiated Er</li> <li>Pre-Scar</li> <li>between</li> <li>architecti</li> <li>✓ Following</li> <li>AVAILABL</li> <li>0 t</li> </ul>	nission Te n has been available r ure). g channel(s <b>E CHANNEL</b> o 39	st (Below 1GHz): conducted to detern nodulations, data ra ) was (were) select TESTED CHANNEL	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE	ts (if EUT is listed b	with anter elow. ATE (Mbps)	
Adiated Er Are-Scar between architecti Following AVAILABL 0 t Power Line	nission Te n has been available r ure). g channel(s c CHANNEL o 39 Conducte	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0 d Emission Test:	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE	ts (if EUT is listed b DATA RA	with anter elow. ATE (Mbps)	nna diversity
AvaiLABL Over Line Pre-Scar between architectri AvaiLABL 0 t Power Line Pre-Scar between	nission Te n has been available r ure). g channel(s c CHANNEL o 39 Conducte n has been available r	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0 d Emission Test: conducted to detern	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE GFSK	ts (if EUT is listed bo DATA RA mode fro	with anter elow. ATE (Mbps) 1 m all possi	nna diversity
Adiated Er Pre-Scar between architectr Following AVAILABL 0 t Power Line Pre-Scar between architectr	nission Te n has been available r ure). g channel(s c CHANNEL o 39 Conducte n has been available r ure).	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0 d Emission Test: conducted to detern nodulations, data ra	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE GFSK mine the worst-case tes and antenna por	ts (if EUT Is listed b DATA RA Mode fro ts (if EUT	with anter elow. ATE (Mbps) 1 m all possi with anter	nna diversity
<ul> <li>Adiated Er</li> <li>Pre-Scar</li> <li>between</li> <li>architecti</li> <li>Following</li> <li>AVAILABL</li> <li>0 t</li> <li>Pre-Scar</li> <li>between</li> <li>architecti</li> <li>Pre-Scar</li> <li>between</li> <li>architecti</li> <li>Following</li> </ul>	nission Te n has been available r ure). g channel(s c CHANNEL o 39 Conducte n has been available r ure). g channel(s	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0 d Emission Test: conducted to detern nodulations, data ra	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE GFSK mine the worst-case tes and antenna por ed for the final test a	ts (if EUT DATA RA Mode fro ts (if EUT	with anter elow. ATE (Mbps) 1 m all possi with anter elow.	nna diversity
Radiated Er         Image: Architectral percentile of the second architectral percentile of the second of the se	nission Te n has been available r ure). g channel(s c CHANNEL o 39 Conducte n has been available r ure).	st (Below 1GHz): conducted to detern nodulations, data ra s) was (were) select TESTED CHANNEL 0 d Emission Test: conducted to detern nodulations, data ra	mine the worst-case tes and antenna por ed for the final test a MODULATION TYPE GFSK mine the worst-case tes and antenna por	ts (if EUT DATA RA Mode fro ts (if EUT	with anter elow. ATE (Mbps) 1 m all possi with anter	nna diversity



# 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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1

# Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Frank Chuang
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen



# 3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

Ref 31 dBm	A# 30 d8	RBW 10 MHz VBW 10 MHz SWT 100 ms	(T1) MP VEW	
Offset 11 dB				
0-				
o				
o				
0-				
0				
2.6 A				
0-				
0-				
0				
0-				
Center 2.48 GHz	10	ms/		VERITAS



# 3.4 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.

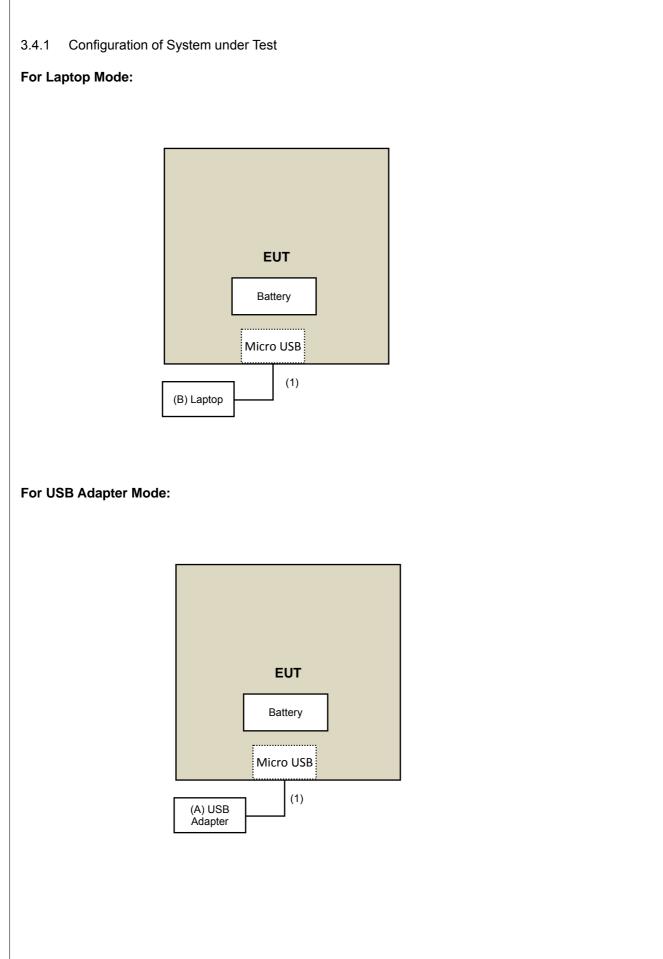
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
Α.	USB Adapter	ASUS	EXA1205UA	NA	NA	Provided by Lab
В.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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

	ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
I	1.	Micro USB to USB Cable	1	1	Yes	0	Supplied by client







# 3.5 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) KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10-2013

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



# 4 Test Types and Results

### 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 20dB 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 20dB under any condition of modulation.



4.1.2 Test Instruments				
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150317	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019

### 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 966 Chamber No. 3.
- 3. The CANADA Site Registration No. is 20331-1
- 4. Loop antenna was used for all emissions below 30 MHz.
- 5. Tested Date: Dec. 11 to 12, 2018



# 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 detects 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.

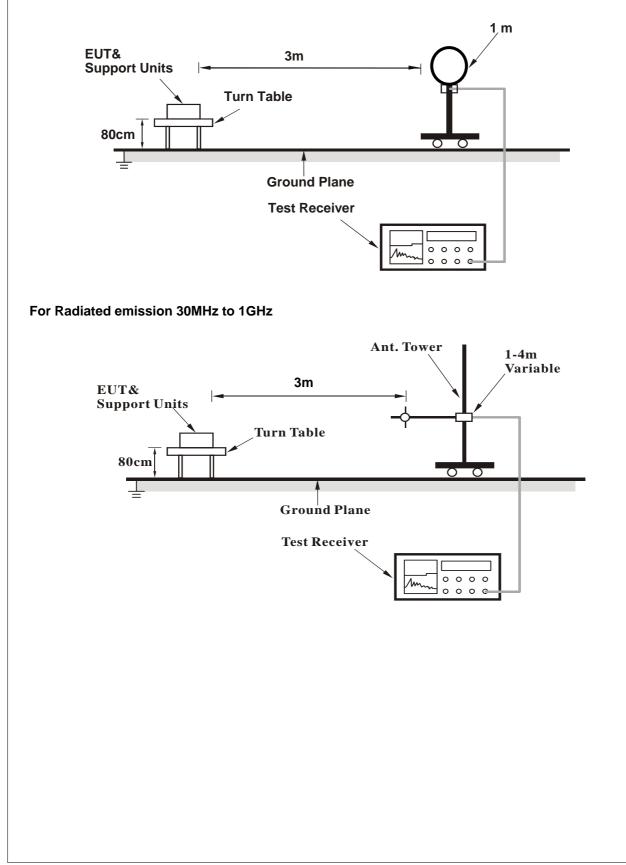
### 4.1.4 Deviation from Test Standard

No deviation.

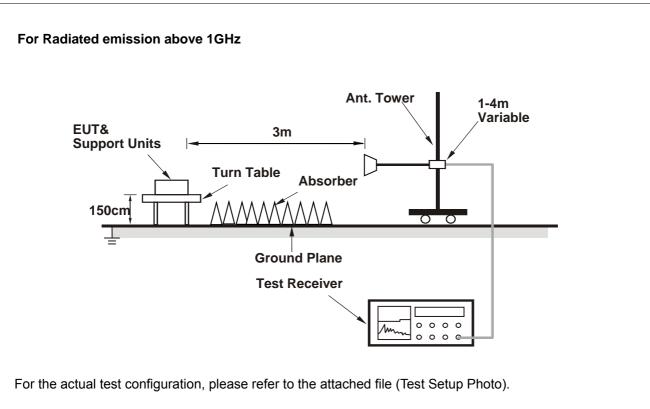


# 4.1.5 Test Setup

### For Radiated emission below 30MHz







- 4.1.6 EUT Operating Conditions
- a. Placed the EUT on the testing table.
- b. Controlling software (HyperTerminal paste command) has been activated to set the EUT on specific status.



### 4.1.7 Test Results

#### Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

	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	2390.00	54.0 PK	74.0	-20.0	1.29 H	329	56.4	-2.4		
2	2390.00	42.1 AV	54.0	-11.9	1.29 H	329	44.5	-2.4		
3	*2402.00	92.6 PK			1.36 H	324	94.9	-2.3		
4	*2402.00	91.4 AV			1.36 H	324	93.7	-2.3		
5	4804.00	50.1 PK	74.0	-23.9	1.13 H	226	48.1	2.0		
6	4804.00	44.8 AV	54.0	-9.2	1.13 H	226	42.8	2.0		
	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO. FREQ. (MHz) EMISSION LIMIT (MHz) (dBuV/m)										
NO.	-	EMISSION LEVEL	LIMIT	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)		
<b>NO.</b>	-	EMISSION LEVEL	LIMIT	MARGIN	ANTENNA HEIGHT	TABLE ANGLE	RAW VALUE	FACTOR		
	(MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	FACTOR (dB/m)		
1	(MHz) 2390.00	EMISSION LEVEL (dBuV/m) 54.1 PK	LIMIT (dBuV/m) 74.0	MARGIN (dB) -19.9	ANTENNA HEIGHT (m) 3.12 V	TABLE ANGLE (Degree) 360	RAW VALUE (dBuV) 56.5	FACTOR (dB/m) -2.4		
1 2	(MHz) 2390.00 2390.00	EMISSION LEVEL (dBuV/m) 54.1 PK 41.6 AV	LIMIT (dBuV/m) 74.0	MARGIN (dB) -19.9	ANTENNA HEIGHT (m) 3.12 V 3.12 V	TABLE           ANGLE           (Degree)           360           360	RAW VALUE (dBuV) 56.5 44.0	FACTOR (dB/m) -2.4 -2.4		
1 2 3	(MHz) 2390.00 2390.00 *2402.00	EMISSION LEVEL (dBuV/m) 54.1 PK 41.6 AV 91.3 PK	LIMIT (dBuV/m) 74.0	MARGIN (dB) -19.9	ANTENNA HEIGHT (m) 3.12 V 3.12 V 3.12 V	TABLE           ANGLE           (Degree)           360           360           360	RAW VALUE (dBuV) 56.5 44.0 93.6	FACTOR (dB/m) -2.4 -2.4 -2.3		

### **REMARKS**:

4804.00

6

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

-9.8

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)

2.71 V

72

42.2

2.0

3. The other emission levels were very low against the limit.

54.0

4. Margin value = Emission Level – Limit value

44.2 AV

5. " \* ": Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2440.00	92.7 PK			1.34 H	344	95.2	-2.5
2	*2440.00	92.0 AV			1.34 H	344	94.5	-2.5
3	4880.00	49.7 PK	74.0	-24.3	1.17 H	243	47.8	1.9
4	4880.00	44.3 AV	54.0	-9.7	1.17 H	243	42.4	1.9
5	7320.00	59.9 PK	74.0	-14.1	1.13 H	189	52.0	7.9
6	7320.00	49.1 AV	54.0	-4.9	1.13 H	189	41.2	7.9
		ANTENNA		/ & TEST DI	STANCE: V	ERTICAL A	Т 3 М	
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	*2440.00	91.6 PK			3.08 V	360	94.1	-2.5
2	*2440.00	90.2 AV			3.08 V	360	92.7	-2.5

-24.1

-9.8

-13.2

-4.0

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2.72 V

2.72 V

2.34 V

2.34 V

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)

79

79

78

78

48.0

42.3

52.9

42.1

1.9

1.9

7.9

7.9

3

4

5 6

**REMARKS**:

4880.00

4880.00

7320.00

7320.00

49.9 PK

44.2 AV

60.8 PK

50.0 AV

5. " \* ": Fundamental frequency.

74.0

54.0

74.0

54.0

3. The other emission levels were very low against the limit.

4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 39	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2480.00	92.5 PK			1.32 H	334	95.1	-2.6
2	*2480.00	91.5 AV			1.32 H	334	94.1	-2.6
3	2483.50	53.8 PK	74.0	-20.2	1.32 H	334	56.4	-2.6
4	2483.50	41.7 AV	54.0	-12.3	1.32 H	334	44.3	-2.6
5	4960.00	49.6 PK	74.0	-24.4	1.18 H	228	47.5	2.1
6	4960.00	44.4 AV	54.0	-9.6	1.18 H	228	42.3	2.1
7	7440.00	59.6 PK	74.0	-14.4	1.11 H	186	51.5	8.1
8	7440.00	48.9 AV	54.0	-5.1	1.11 H	186	40.8	8.1
		ANTENNA	POLARITY	& TEST DI	STANCE: V	ERTICAL A	Т 3 М	
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	*2480.00	91.1 PK			3.13 V	360	93.7	-2.6
2	*2480.00	89.9 AV			3.13 V	360	92.5	-2.6
3	2483.50	53.6 PK	74.0	-20.4	3.13 V	360	56.2	-2.6
4	2483.50	41.2 AV	54.0	-12.8	3.13 V	360	43.8	-2.6
5	4960.00	49.6 PK	74.0	-24.4	2.77 V	87	47.5	2.1
6	4960.00	44.0 AV	54.0	-10.0	2.77 V	87	41.9	2.1
7	7440.00	60.3 PK	74.0	-13.7	2.29 V	88	52.2	8.1
8	7440.00	49.6 AV	54.0	-4.4	2.29 V	88	41.5	8.1

# **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.



### **Below 1GHz Data:**

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

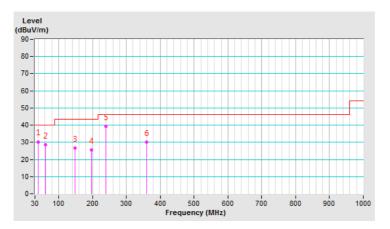
	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)			
1	39.88	30.3 QP	40.0	-9.7	1.50 H	268	39.9	-9.6			
2	60.97	28.6 QP	40.0	-11.4	1.00 H	166	38.0	-9.4			
3	148.28	26.7 QP	43.5	-16.8	1.00 H	263	34.8	-8.1			
4	196.20	25.5 QP	43.5	-18.0	1.50 H	163	36.2	-10.7			
5	240.03	39.1 QP	46.0	-6.9	2.00 H	246	48.4	-9.3			
6	359.97	30.1 QP	46.0	-15.9	2.00 H	297	35.8	-5.7			

# **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. Margin value = Emission Level Limit value
- 4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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

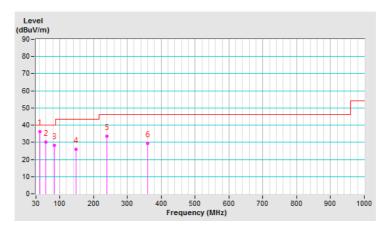
	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	NO. FREQ. (MHz) EMISSION LEVEL (dBuV/m)		MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)			
1	40.70	36.1 QP	40.0	-3.9	1.50 V	9	45.5	-9.4		
2	58.75	30.2 QP	40.0	-9.8	1.50 V	272	39.2	-9.0		
3	84.21	28.2 QP	40.0	-11.8	1.50 V	170	42.1	-13.9		
4	148.13	25.8 QP	43.5	-17.7	1.50 V	310	33.9	-8.1		
5	240.04	33.5 QP	46.0	-12.5	2.00 V	162	42.8	-9.3		
6	360.00	29.2 QP	46.0	-16.8	2.00 V	35	34.9	-5.7		

### **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. Margin value = Emission Level Limit value
- 4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.





# 4.2 Conducted Emission Measurement

# 4.2.1 Limits of Conducted Emission Measurement

	Conducted	Limit (dBuV)		
Frequency (MHz)	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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

### Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in Conduction 1.

3 Tested Date: Nov. 20, 2018

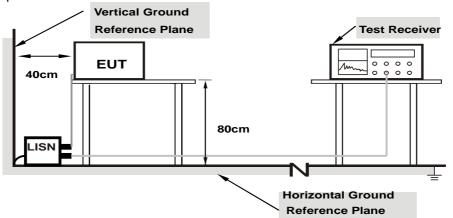


### 4.2.3 Test Procedures

- 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.

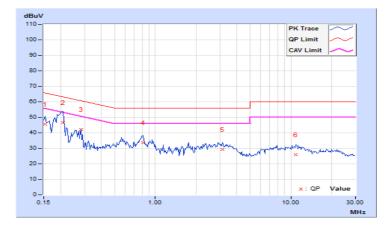


# 4.2.7 Test Results

Phase	9	Lir	ne (L)		I	Detector Function Quasi-Peak (QF Average (AV)				/
	From	Corr.	Readin	g Value	Emiss	sion Level	Lir	nit	Mar	gin
No	Freq.	Factor	[dB	(uV)] [dB		3 (uV)]	[dB (	(uV)]	(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.02	35.39	22.18	45.41	32.20	65.79	55.79	-20.38	-23.59
2	0.20859	10.04	36.49	27.88	46.53	37.92	63.26	53.26	-16.73	-15.34
3	0.28281	10.05	31.99	20.54	42.04	30.59	60.73	50.73	-18.69	-20.14
4	0.81016	10.10	23.50	11.15	33.60	21.25	56.00	46.00	-22.40	-24.75
5	3.13281	10.21	18.87	13.44	29.08	23.65	56.00	46.00	-26.92	-22.35
6	10.89844	10.58	15.34	10.20	25.92	20.78	60.00	50.00	-34.08	-29.22

### 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



Phase			Neutral (N)			Detector Function			Quasi-Peak (QP) / Average (AV)		
Ггод		Corr.	Reading Value		Emission Level		Lir	_imit Mar		gin	
No	Freq.	Factor	[dB (	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	9.93	36.15	23.99	46.08	33.92	66.00	56.00	-19.92	-22.08	
2	0.20469	9.94	38.52	18.91	48.46	28.85	63.42	53.42	-14.96	-24.57	
3	0.25938	9.95	36.47	21.00	46.42	30.95	61.45	51.45	-15.03	-20.50	
4	0.79453	9.98	23.71	13.47	33.69	23.45	56.00	46.00	-22.31	-22.55	
5	3.50391	10.10	16.97	11.53	27.07	21.63	56.00	46.00	-28.93	-24.37	
6	10.70313	10.41	15.35	10.39	25.76	20.80	60.00	50.00	-34.24	-29.20	
Pemerko:											

### **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 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

# 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. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\ge$  3 x RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission
- 4.3.5 Deviation from Test Standard

No deviation.

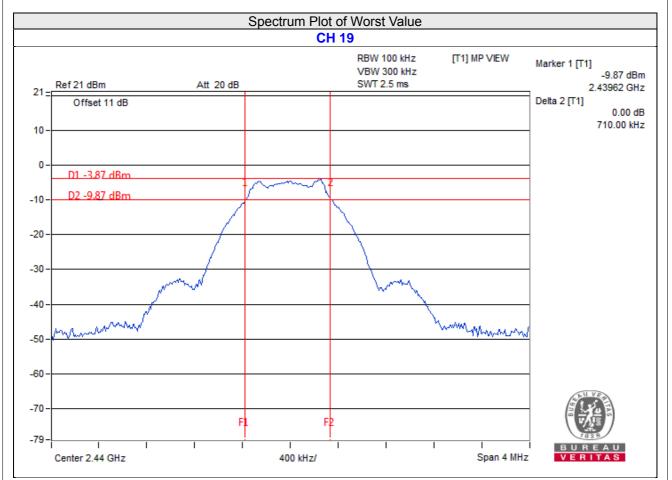
### 4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



# 4.3.7 Test Results

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.73	0.5	Pass
19	2440	0.71	0.5	Pass
39	2480	0.72	0.5	Pass



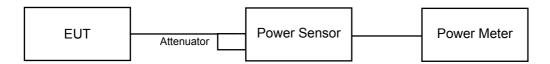


### 4.4 Conducted Output Power Measurement

### 4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 4.4.5 Deviation from Test Standard

No deviation.

### 4.4.6 EUT Operating Conditions

Same as Item 4.3.6.



# 4.4.7 Test Results

### FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	0.5929	-2.27	30	Pass
19	2440	0.5483	-2.61	30	Pass
39	2480	0.4989	-3.02	30	Pass

# FOR AVERAGE POWER

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	0.5546	-2.56
19	2440	0.5058	-2.96
39	2480	0.456	-3.41

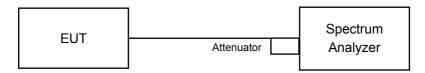


# 4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

### 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

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \le \text{RBW} \le 100 \text{ kHz}$ .
- d. Set the VBW  $\geq$  3 × RBW.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

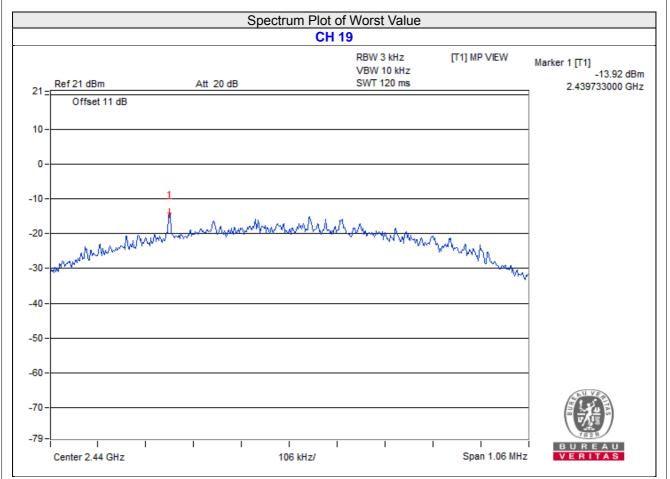
### 4.5.6 EUT Operating Condition

Same as Item 4.3.6.



# 4.5.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2402	-14.32	8	Pass
19	2440	-13.92	8	Pass
39	2480	-15.41	8	Pass



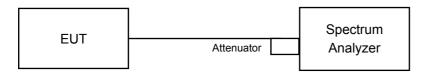


# 4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 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

# MEASUREMENT PROCEDURE REF

- 1. Set the RBW = 100 kHz.
- 2. Set the VBW ≥ 300 kHz.
- 3. Detector = peak.
- 4. Sweep time = auto couple.
- 5. Trace mode = max hold.
- 6. Allow trace to fully stabilize.
- 7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

### MEASUREMENT PROCEDURE OOBE

- 1. Set RBW = 100 kHz.
- 2. Set VBW ≥ 300 kHz.
- 3. Detector = peak.
- 4. Sweep = auto couple.
- 5. Trace Mode = max hold.
- 6. Allow trace to fully stabilize.
- 7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

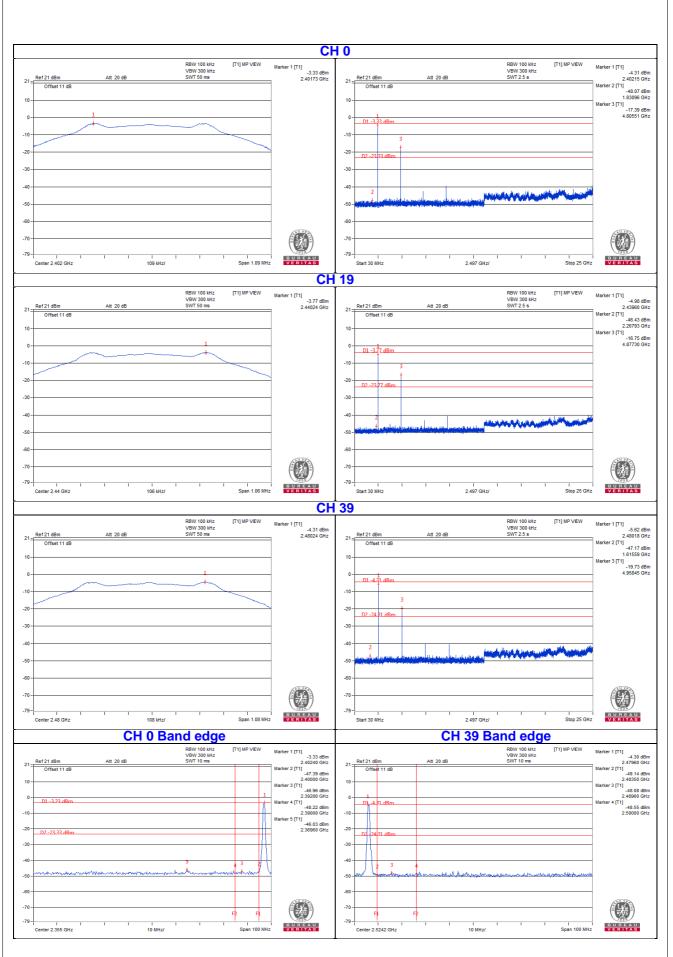
4.6.6 EUT Operating Condition

Same as Item 4.3.6.

### 4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.







# 5 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 according to ISO/IEC 17025.

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

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

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