



FCC Radio Test Report

FCC ID: 2ABAMPLLB

This report concerns (check one): ⊠Original Grant □Class II Change

Project No. : 1608247 Equipment : Pill

Test Model : PB15226 Series Mode : N/A Applicant : Hello Inc.

Address: 438 Shotwell St, San Francisco, CA 94110, USA

Date of Receipt: Aug. 31, 2016

Date of Test: Aug. 31, 2016 ~ Oct. 13, 2016

Issued Date : Oct. 14, 2016
Tested by : BTL Inc.

Testing Engineer : Kush Kac

(Rush Kao)

Technical Manager :

Authorized Signatory

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Declaration

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For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1608247	Original Issue.	Oct. 14, 2016

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1. CERTIFICATION

Equipment : Pill
Brand Name : Hello
Test Model. : PB15226
Series Model : N/A
Applicant : Hello Inc.

Applicant : Hello Inc.

Manufacturer : Jabil Circuit

Address : 10560 Dr. Martin Luther King Jr. St. N., St. Petersburg, FL 33716, United States

Factory : Jabil Circuit (GuangZhou) LTD.

Address : 128, JunCheng Road, Eastern Zone, Guangzhou Economic and Technological

Development District, 510530 Guangdong Province, PRC

Date of Test : Aug. 31, 2016 ~ Oct. 13, 2016

Test Sample : Engineering Sample

Standard(s) : FCC Part15, Subpart C (15.249) / ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1608247) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

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2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15, Subpart C (15.249)			
Standard(s) Section	Test Item	Judgment	Remark
15.207(a)	Conducted Emission	N/A	NOTE(1)
15.205	Restricted Band of Operation	PASS	
15.209 15.249(a)	Radiated Emissions	PASS	
15.215(c)	20dB Bandwidth Test	PASS	

NOTE:

(1)" N/A" denotes test is not applicable to this device.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Radiated emission Test (Below 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Above 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC rules for reference only.

The reported uncertainty of measurement $\mathbf{y} \pm \mathbf{U}$, where expanded uncertainty \mathbf{U} is based on a standard uncertainty multiplied by a coverage factor of $\mathbf{k}=2$, providing a level of confidence of approximately 95%.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cisor} requirement.

A. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15	CISPR	9kHz ~ 150kHz	2.96
(3m)	CISER	150kHz ~ 30MHz	2.74

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
		30MHz ~ 200MHz	V	4.76
CB15	CISPR	30MHz ~ 200MHz	Н	4.28
(3m)	CISER	200MHz ~ 1,000MHz	V	5.08
		200MHz ~ 1,000MHz	Н	4.50

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
		1GHz ~ 6GHz	V	4.48
CB15	CISPR	1GHz ~ 6GHz	Н	4.50
(3m)	CIOPR	6GHz ~ 18GHz	V	4.30
		6GHz ~ 18GHz	Н	4.14

Note: unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) - 150 kHz - 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR} .

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3. GENERAL INFORMATION

3.1 DESCRIPTION OF EUT

Product Name	Pill	
Brand	Hello	
Test Model	PB15226	
Series Model	N/A	
Model Difference	N/A	
Power Source	Battery supplied.	
EUT Power Rating	I/P: DC 3V (1 * CR 2430)	
	Operation Frequency	2466 MHz
	Modulation Technology	GFSK
Product Description	Bit Rate of Transmitter	1 Mbps
	Field Strength	87.94 dBuV/m (AVG Max) 88.11 dBuV/m (Peak Max)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)
01	2466

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Hello	N/A	PCB_Meander- IFA type	N/A	1.4

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3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Note:

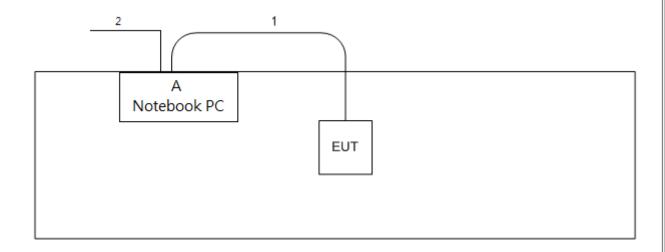
(1) The measurements are performed at the high, middle, low available channels.

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3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 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.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
^	Notabaak DC	ACED	ACER	NI/A	NXMPFTA00143
А	Notebook PC	ACER	V3-371-67HZ	N/A	80598B6600

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	0.8m	USB Cable
2	NO	NO	1.0m	Power Cable
3	NO	NO	1.0m	Power Cable

Note:

(1) The support equipment was authorized by Declaration of Conformity (DOC).

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4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

Fraguency of Emission (MHz)	Conducted Limit (dBµV)		
Frequency of Emission (MHz)	Quasi-peak	Average	
0.15 -0.5	66 to 56*	56 to 46*	
0.50 -5.0	56	46	
5.0 -30.0	60	50	

Note:

- (1) The limit of " * " decreases with the logarithm of the frequency
- (2) The test result calculated as following: Measurement Value = Reading Level + Correct Factor Correct Factor = Insertion Loss + Cable Loss - Amplifier Gain(if use) Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

Receiver Parameters	Setting	
Attenuation	10 dB	
Start Frequency	0.15 MHz	
Stop Frequency	30 MHz	
IF Bandwidth	9 kHz	

4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

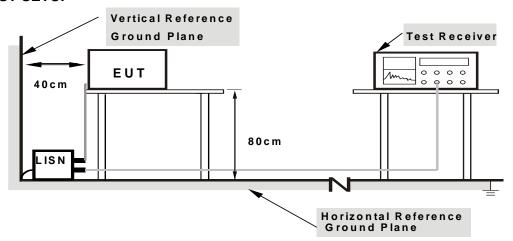
No deviation

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4.1.4 TEST SETUP



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

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting/receiving data or hopping on mode.

4.1.6 EUT TEST CONDITIONS

Temperature: N/A Relative Humidity: N/A Test Voltage: N/A

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of <code>『Note』</code>. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform.In this case, a " * " marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) " N/A" denotes test is not applicable to this device.

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4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/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
960~1000	500	3

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section15.209(a) limit in the table below has to be followed.

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

EDECLIENCY (MHz)	(dBuV/m) (at 3m)		
FREQUENCY (MHz)	PEAK	AVERAGE	
Above 1000	74	54	

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

FCC Part15 (15.249) , Subpart C		
Limit	Frequency Range(MHz)	
Field strength of fundamental 50000 μV/m (94 dBμV/m) @ 3 m	2400-2483.5	
Field strength of harmonics 500 μV/m (54 dBμV/m) @ 3 m	Above 2483.5	

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Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic

Receiver Parameter	Setting		
Attenuation	Auto		
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector		
Start ~ Stop Frequency	90KHz~110KHz for QP detector		
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector		
Start ~ Stop Frequency	490KHz~30MHz for QP detector		
Start ~ Stop Frequency	30MHz~1000MHz for QP detector		

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DUTY CYCLE: TX 2466 MHz (1 Mbps)

Dwell time = ON/ON+OFF

ON: 0.104 x 1 = 0.104 msec

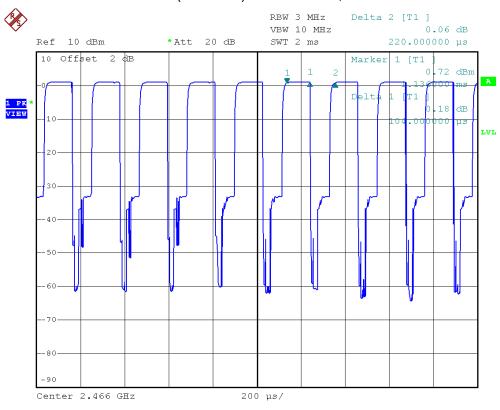
ON+OFF (total time): 0.220 msec

Dwell time: 47.27 %

 $AV = PK + 20 \log(Dwell time)$

AV = PK - 6.51

Total time (ON+OFF) = 0.220 msec; ON = 0.104 msec



Date: 28.JUL.2016 14:27:07

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4.2.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. 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 find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

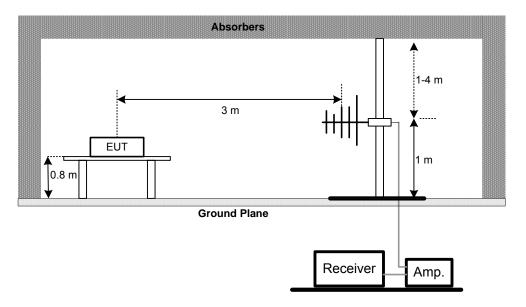
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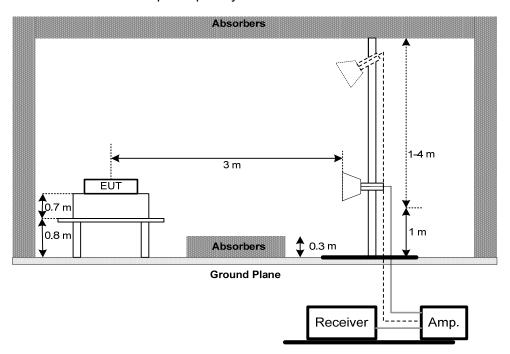


4.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz

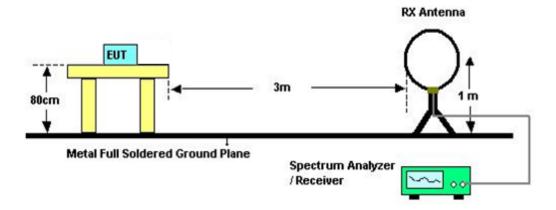


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(C) For radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **4.1.5 unless** otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: DC 3V

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Attachment C.

Remark:

- (1) Measuring frequency range from 30MHz to 1000MHz.
- (2) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

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4.2.9TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:
 - "X" denotes Laid on Table; "Y" denotes Vertical Stand; "Z" denotes Side Stand
- (4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (5) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.

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5. BANDWIDTH TEST

5.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

5.2 DEVIATION FROM STANDARD

No deviation.

5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: DC 3V

5.6 TEST RESULTS

Please refer to the Attachment E.

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6. MEASUREMENT INSTRUMENTS LIST

	Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Trilog-Broadband Antenna	Schwarzbeck	VULB9168-35 2	9168-352	Feb. 04, 2017	
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-546	Nov. 05, 2017	
3	Pre-Amplifier	HP	8447D	2944A08891	Mar. 09 2017	
4	Pre-Amplifier	Agilent	8449B	3008A02331	Jan. 24, 2017	
5	Test Cable	EMCI	EMC8D-NM-N M-8000	150301	Mar. 09, 2017	
6	Test Cable	EMCI	EMC104-SM-S M-2500	150303	Mar. 09, 2017	
7	Test Cable	EMCI	EMC104-NM-S M-1000	150304	Mar. 09, 2017	
8	Test Cable	EMCI	EMC104-SM-S M-5000	150302	Mar. 29, 2017	
9	Test Cable	EMCI	EMC104-SM-S M-800	150305	Mar. 29, 2017	
10	EXA Spectrum Analyzer	Agilent	N9010A	MY52220990	Feb. 24, 2017	
11	EMI Test Receiver	Agilent	N9038A	MY51210215	Jan. 08, 2017	
12	Loop Antenna	EMCO	6502	00042960	Nov. 06. 2016	

		Bandwidth	Measurement		
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 18, 2017

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

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ATTACHMENT A - CONDUCTED EMISSION

Test Mode: N/A

Note: "N/A" denotes test is not applicable to this device.

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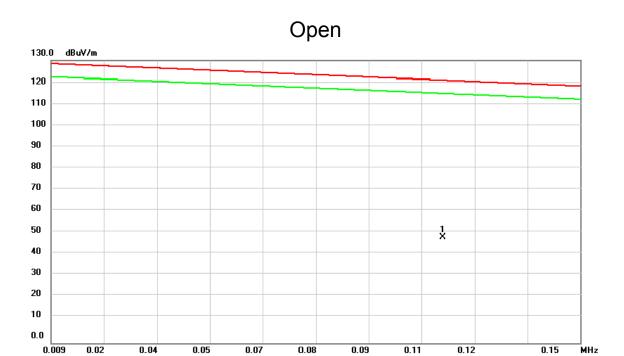
ATTACHMENT B -RADIATED EMISSION (9KHZ TO 30MHZ)

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Test Mode TX Mode_2466 MHz



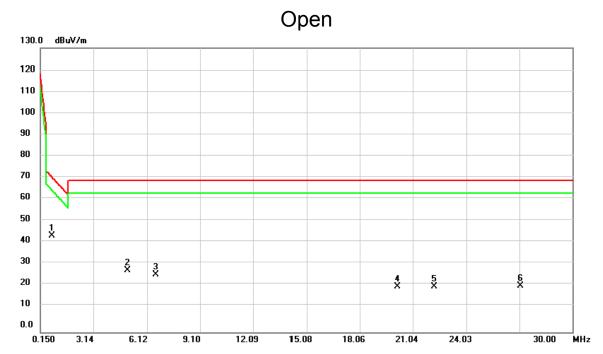
No. Mk.	Freq.	Reading Level		Measure- ment		Margin		
	MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.1135	36.70	12.08	48.78	120.98	-72.20	peak	

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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.8064	32.31	11.92	44.23	70.98	-26.75	peak	
2		5.0750	16.98	11.40	28.38	69.54	-41.16	peak	
3		6.6272	15.26	11.37	26.63	69.54	-42.91	peak	
4		20.2090	10.02	10.96	20.98	69.54	-48.56	peak	
5		22.2681	10.24	10.59	20.83	69.54	-48.71	peak	
6		27.0746	11.41	9.73	21.14	69.54	-48.40	peak	

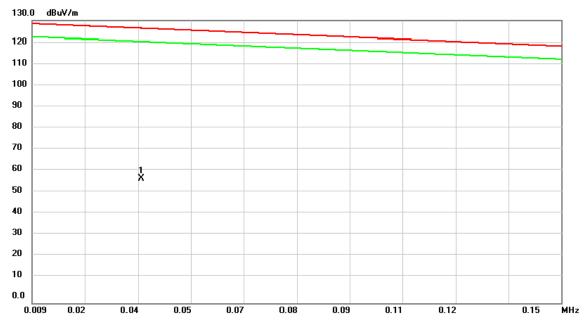
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Test Mode TX Mode_2466 MHz

Close



No. Mk.	Freq.	Reading Level		Measure- ment		Margin		
	MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.0380	43.20	14.20	57.40	126.43	-69.03	peak	

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Test Mode TX Mode_2466 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	1.2842	27.98	11.87	39.85	66.72	-26.87	peak	
2		3.1350	19.91	11.12	31.03	69.54	-38.51	peak	
3		6.3887	15.28	11.37	26.65	69.54	-42.89	peak	
4		13.0152	12.08	11.21	23.29	69.54	-46.25	peak	
5		19.4630	9.98	11.02	21.00	69.54	-48.54	peak	
6		24.0594	9.79	10.27	20.06	69.54	-49.48	peak	

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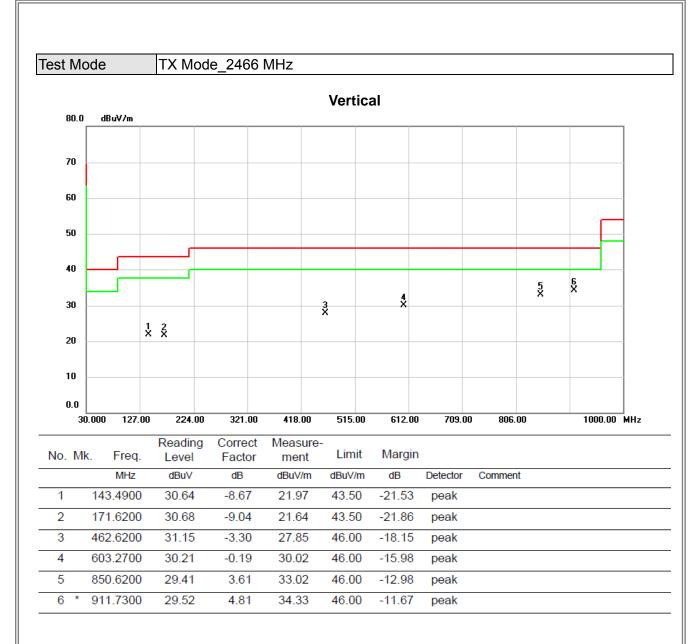


ATTACHMENT C -RADIATED EMISSION (30MHZ TO 1000MHZ)

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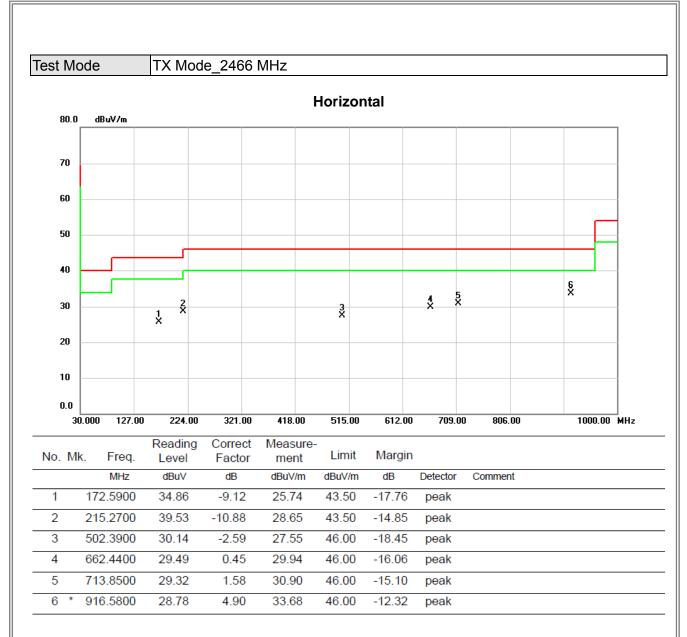




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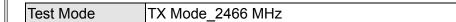


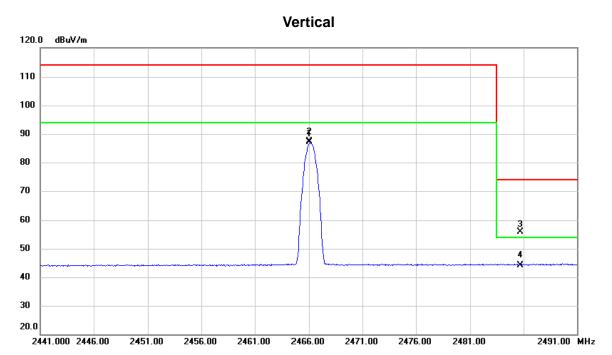
ATTACHMENT D -RADIATED EMISSION (ABOVE 1000MHZ)	

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No.	Mk	c. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2466.000	56.03	31.24	87.27	114.00	-26.73	peak	
2	*	2466.000	55.91	31.24	87.15	94.00	-6.85	AVG	
3		2485.690	24.47	31.32	55.79	74.00	-18.21	peak	
4		2485.690	12.73	31.32	44.05	54.00	-9.95	AVG	

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1000.000 3550.00

6100.00

8650.00

11200.00

Vertical 120.0 dBuV/m 110 90 80 70 40 30 20.0

No	. N	Лk.	Freq.	_	Correct Factor	Measure- ment	Limit	Margin		
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		49	932.000	59.72	-11.31	48.41	74.00	-25.59	peak	
2	*	49	932.000	56.43	-11.31	45.12	54.00	-8.88	AVG	

13750.00

16300.00

18850.00

21400.00

26500.00 MHz

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Horizontal 120.0 dBuV/m 110 100 90 80 70 60 X 50 40 30 20.0 2441.000 2446.00 2451.00 2456.00 2461.00 2466.00 2471.00 2476.00 2481.00 2491.00 MHz

No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2466.000	56.87	31.24	88.11	114.00	-25.89	peak	
2 *	2466.000	56.70	31.24	87.94	94.00	-6.06	AVG	
3	2485.997	24.59	31.32	55.91	74.00	-18.09	peak	
4	2485.997	13.56	31.32	44.88	54.00	-9.12	AVG	

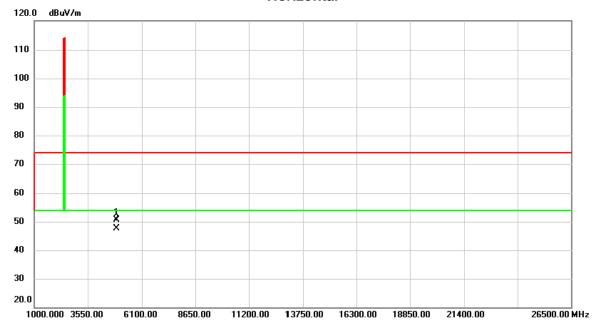
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Horizontal



No.	Mk	. Freq.		Correct Factor	Measure- ment		Margin		
		MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4932.000	62.02	-11.31	50.71	74.00	-23.29	peak	
2	*	4932.000	58.90	-11.31	47.59	54.00	-6.41	AVG	

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ATTACHMENT E - BANDWIDTH

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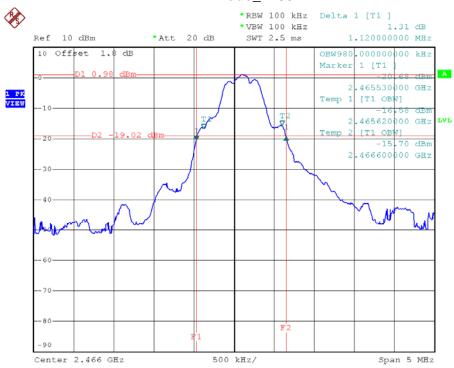




Test Mode: TX Mode_2466 MHz

Frequency	20dB Bandwidth	99% Occupied BW
(MHz)	(MHz)	(MHz)
2466	1.12	0.98

TX Mode_2466 MHz



Date: 25.JUL.2016 14:06:32

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