



Neutron Engineering Inc.

FCC Radio TEST Report

FCC ID: PW3PW3204

This report concerns (check one): ☒ Original Grant ☐ Class II Change

Issued Date : Apr. 12, 2011
Project No. : 1103C346
Equipment : Dialock DT Lite
Model Name : Dialock DT Lite
Applicant : Hafele America Co.
Address : 3901 Cheyenne Drive, Archdale, North Carolina,
United States 27263
Manufacturer : Orient-RFID Technology
Address : 6/F, Yuyi Industrial Building, Shekou Fishing Port,
Wanghai Road, Nanshan District, Shenzhen
518067, PR, China

Tested by:


Neutron Engineering Inc. EMC Laboratory

Date of Receipt: Apr. 01, 2011

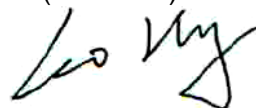
Date of Test:

Apr. 01, 2011 ~ Apr. 12, 2011

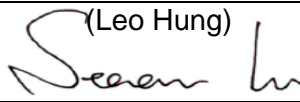
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Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Limitation

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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1. CERTIFICATION

E q u i p m e n t : Dialock DT Lite

Brand Name : Hafele

Model Name : Dialock DT Lite

A p p l i c a n t : Hafele America Co.

F a c t o r y : Orient-RFID Technology

A d d r e s s : 6/F,Yuyi Industrial Building, Shekou Fishing Port, Wanghai Road, Nanshan District, Shenzhen 518067 ,PR,China

Date of Test : Apr. 01, 2011 ~ Apr. 12, 2011

T e s t I t e m : ENGINEERING SAMPLE

S t a n d a r d s : FCC Part15, Subpart C

ANCI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1103C346) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: (Antenna to EUT distance is 3 m)

FCC Part15, Subpart C		
Standard	Test Item	Remark
15.207	Conducted Emission	-
15.35 / 15.205 / 15.209 / 15.225	Radiated Emission	PASS
15.225(e)	Frequency Stability	PASS
15.203	Antenna Requirement	PASS

NOTE:

- (1) " N/A" denotes test is not applicable in this Test Report.
- (2) The EUT used new battery.



2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China. 523792
Neutron's test firm number is 319330

2.2 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:

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

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
DG-CB03	CISPR	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Dialock DT Lite										
Brand Name	Hafele										
Model Name.	Dialock DT Lite										
OEM Brand/Model Name	N/A										
Model Difference	N/A										
Product Description	<p>The EUT is a Dialock DT Lite.</p> <table border="1"> <tr> <td>Operation Frequency:</td><td>13.56MHz</td></tr> <tr> <td>Modulation Type:</td><td>ASK</td></tr> <tr> <td>Number Of Channel</td><td>1CH (13.56MHz)</td></tr> <tr> <td>Antenna Designation:</td><td>Loop ANT</td></tr> <tr> <td>Field Strength</td><td>53.56 dBuV/m @3m</td></tr> </table> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification. Please refer to the User's Manual.</p>	Operation Frequency:	13.56MHz	Modulation Type:	ASK	Number Of Channel	1CH (13.56MHz)	Antenna Designation:	Loop ANT	Field Strength	53.56 dBuV/m @3m
Operation Frequency:	13.56MHz										
Modulation Type:	ASK										
Number Of Channel	1CH (13.56MHz)										
Antenna Designation:	Loop ANT										
Field Strength	53.56 dBuV/m @3m										
Power Source	DC Voltage supplied from Battery										
Power Rating	DC 6.0V										
Connecting I/O Port(s)	Please refer to the User's Manual										
Products Covered	N/A										

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Channel No.	Frequency
1	13.56 MHz



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based 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

For Conducted Test	
Final Test Mode	Description
	" N/A " denotes test is not applicable in this Test Report

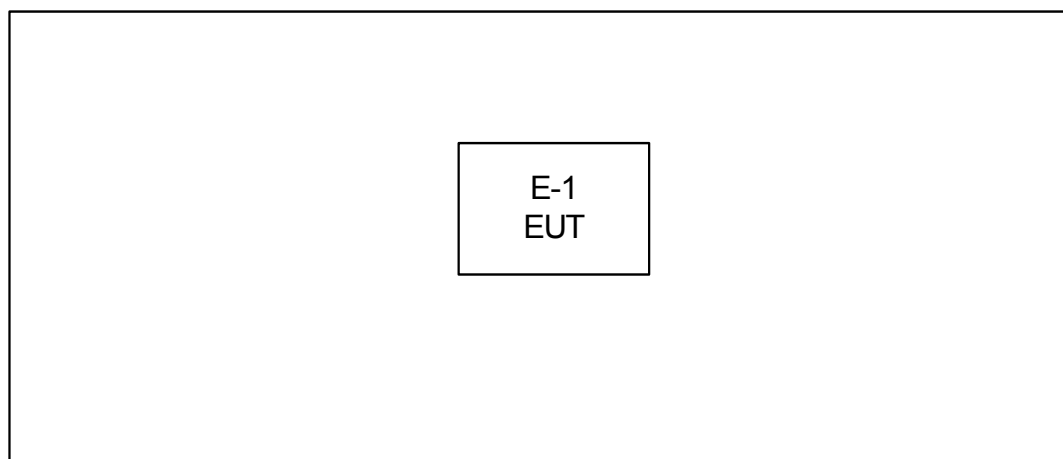
For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode

Note:

(1) The EUT used the new battery



3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





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.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Dialock DT Lite	Hafele	Dialock DT Lite	PW3PW3204	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in m in 『Length』 column.



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2011
2	LISN	Rolf Heine	NNB-2-16Z	99044	May.26.2011
3	50Ω Terminator	SHX	TF2-3G-A	08122901	May.26.2011
4	Transient Limiter	Agilent	11947A	3107A03668	May.26.2011
5	Test Cable	N/A	C-06_C03	N/A	Nov.15.2011
6	EMI TEST RECEIVER	R&S	ESCS30	8333641017	May.26.2011

Remark: " N/A " denotes No Model Name. , Serial No. or No Calibration specified.

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

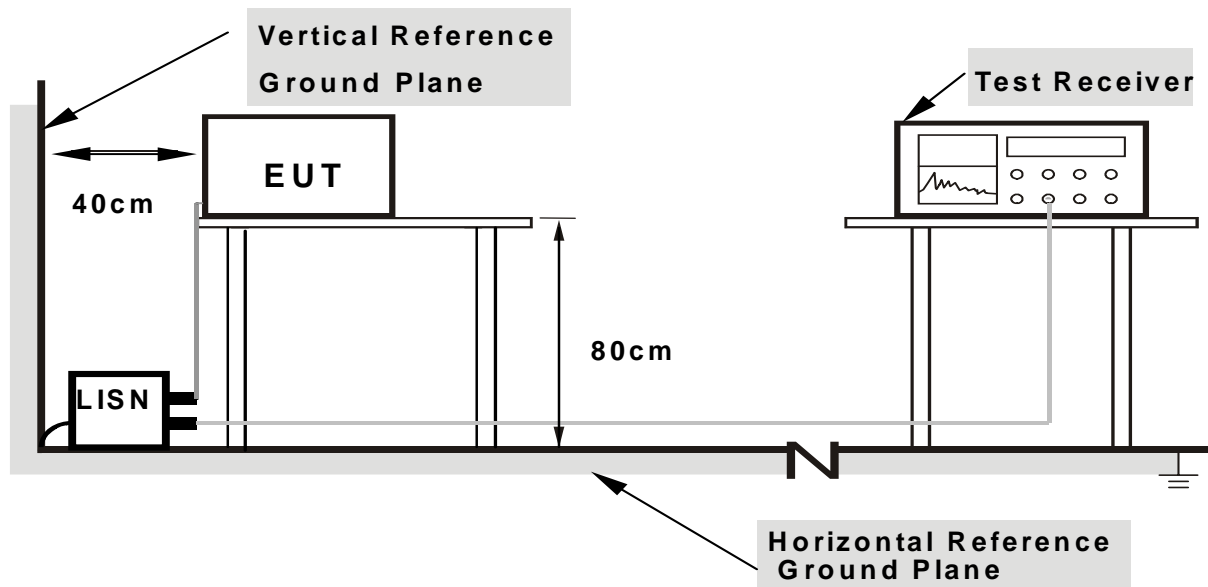
4.1.3 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 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

4.1.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting mode.



4.1.7 TEST RESULTS

EUT :	Dialock DT Lite	Model Name. :	Dialock DT Lite
Temperature :	---	Relative Humidity :	---
Pressure :	---	Test Power :	---
Test Mode :	" N/A " denotes test is not applicable in this Test Report.		

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of『Note 』. 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 in this Test Report.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (Frequency Range 30MHz-1000MHz)

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500
FCC Part 15.225(a)/(b)/(c)				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
13.553 – 13.567	15,848	30 m	15,848*100	124
13.567 – 13.710	334	30 m	334*100	90.5
13.110 – 13.410 13.710 – 14.010	106	30 m	106*100	80.5

Notes:

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d_2/d_1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30 uV/m$



4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
2	Bi-log Antenna	Schwarbeck	VULB9160	9160-3232	May.26.2011
3	Horn Antenna	ETS	3115	00075789	May.12.2011
4	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170340	Dec.15.2011
5	Amplifier	HP	8447D	2944A09673	May.26.2011
6	Amplifier	Agilent	8449B	3008A02274	May.26.2011
7	Amplifier	EMC	EMC2654045	980039	Aug.12.2011
8	Test Receiver	R&S	ESCI	100895	May.26.2011
9	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011
10	Test Cable	N/A	C-01_CB03	N/A	Jul.05.2011
11	Test Cable	HUBER+SUHNER	SUCOFLEX_8 m	313794/4	Apr.11.2012
12	Controller	CT	SC100	N/A	N/A

Remark: " N/A" denotes No Model Name. / Serial No. and No Calibration specified.

4.2.3 TEST PROCEDURE

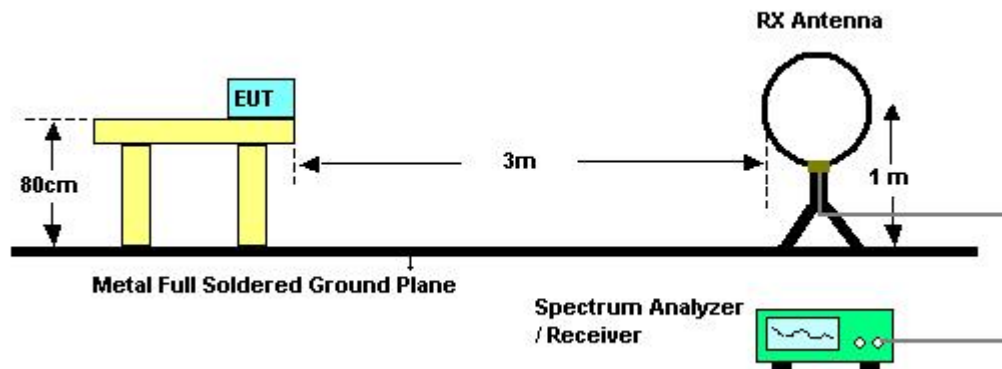
- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
- The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.4 DEVIATION FROM TEST STANDARD

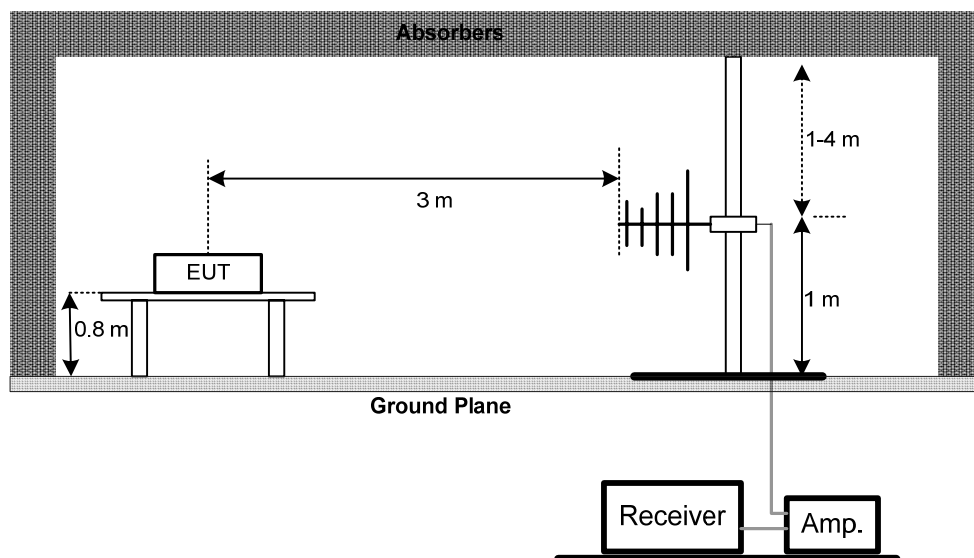
No deviation

4.2.5 TEST SETUP

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



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



4.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



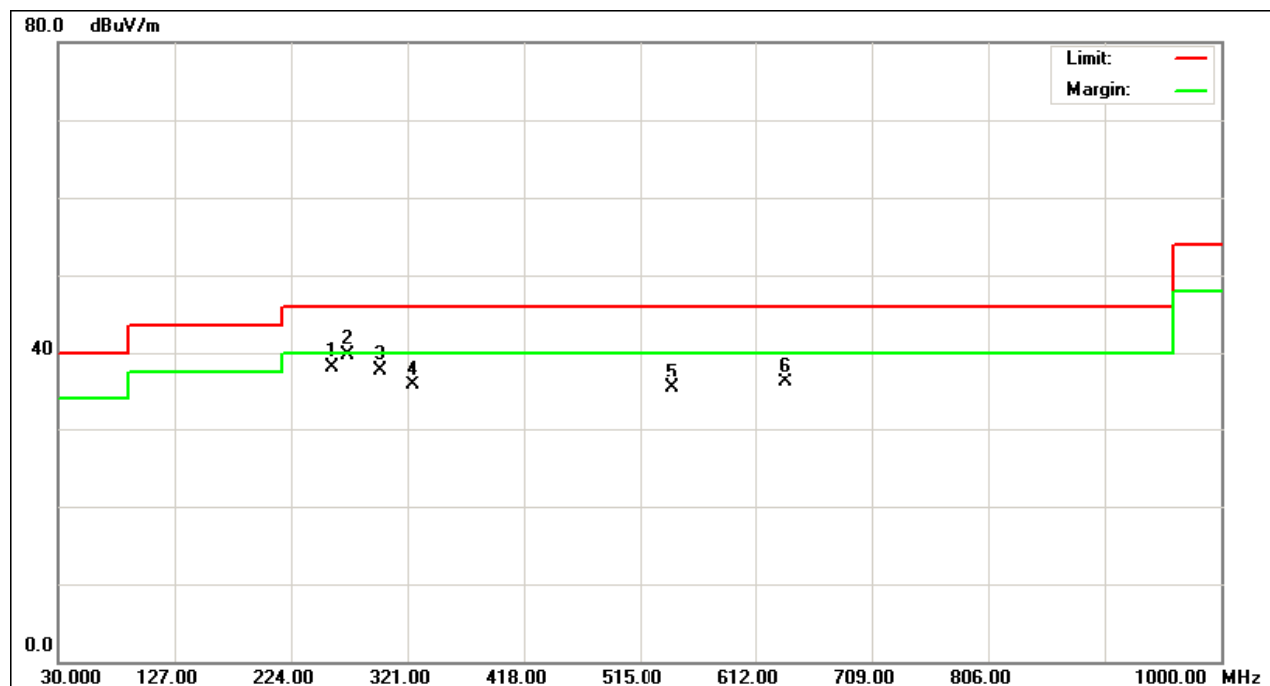
4.2.7 TEST RESULTS- FCC Part 15.209

E.U.T :	Dialock DT Lite	Model Name. :	Dialock DT Lite
Temperature :	23 °C	Relative Humidity :	51 %
Test Voltage :	DC 6V		
Test Mode :	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Detector/Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit-3m (dBuV/m)	Safe Margins (dBuV/m)	Note
257.95	V	Peak	52.08	- 14.00	38.08	46.00	- 7.92	
270.56	V	Peak	52.93	- 13.25	39.68	46.00	- 6.32	
298.69	V	Peak	49.71	- 12.07	37.64	46.00	- 8.36	
324.88	V	Peak	47.08	- 11.46	35.62	46.00	- 10.38	
542.16	V	Peak	41.11	- 5.79	35.32	46.00	- 10.68	
637.22	V	Peak	39.61	- 3.57	36.04	46.00	- 9.96	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz ◦
- (2) 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 ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦



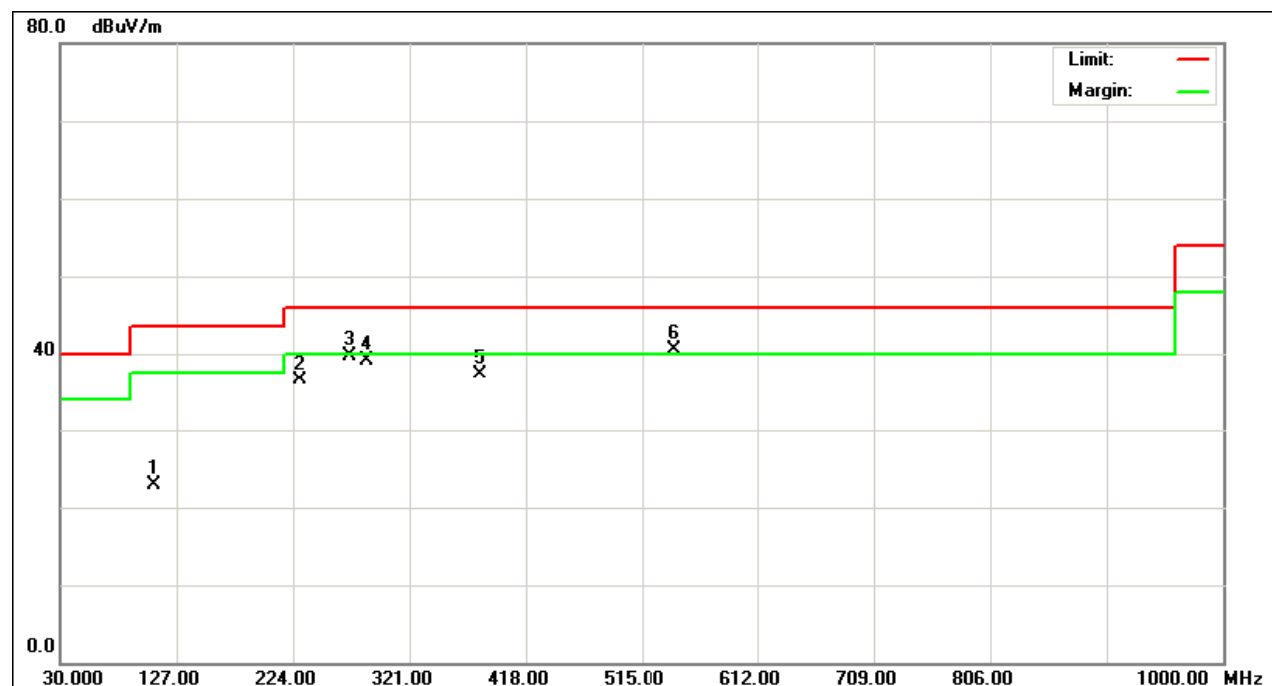


E.U.T :	Dialock DT Lite	Model Name. :	Dialock DT Lite
Temperature :	23 °C	Relative Humidity :	51 %
Test Voltage :	DC 6V		
Test Mode :	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit-3m (dBuV/m)	Safe Margins (dBuV/m)	Note
108.57	H	Peak	41.22	- 18.36	22.86	43.50	- 20.64	
229.82	H	Peak	52.08	- 15.61	36.47	46.00	- 9.53	
270.56	H	Peak	52.94	- 13.25	39.69	46.00	- 6.31	
285.11	H	Peak	51.48	- 12.34	39.14	46.00	- 6.86	
380.17	H	Peak	47.05	- 9.74	37.31	46.00	- 8.69	
542.16	H	Peak	46.36	- 5.79	40.57	46.00	- 5.43	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz ◦
- (2) 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 ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦





4.2.8 TEST RESULTS- FCC Part 15.225

E.U.T :	Dialock DT Lite	Model Name. :	Dialock DT Lite
Temperature :	23 °C	Relative Humidity :	51 %
Test Voltage :	DC 6V		
Test Mode :	TX Mode		

Freq. (MHz)	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit-3m (dBuV/m)	Safe Margins (dBuV/m)	Note
0.02	Peak	76.32	24.01	100.33	119.77	- 19.45	
0.04	Peak	62.38	23.29	85.67	116.49	- 30.82	
0.06	Peak	70.11	22.13	92.24	111.57	- 19.33	
0.25	Peak	61.01	20.41	81.42	99.75	- 18.34	
1.27	Peak	31.05	19.57	50.62	65.55	- 14.92	
13.56	Peak	35.91	17.65	53.56	124.00	- 70.44	F
26.34	Peak	22.12	16.74	38.86	69.54	- 30.68	

Remark :

- (1) Spectrum Setting:
 9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
 150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
 30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) 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 ◦
- (3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.
- (4) Emission level (dBuV/m) = 20 log Emission level (uV/m).
 Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
- (5) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦
- (6) Measuring frequency range from 9KHz to the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.



4.3 FREQUENCY STABILITY MEASUREMENT

4.3.1 FREQUENCY STABILITY Limits

FCC Part 15.225(e)

the frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a temperature variation of -20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.3.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

Remark: " N/A" denotes No Model No. / Serial No. and No Calibration specified.

4.3.3 TEST PROCEDURE

- The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.
After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- At room temperature (25±5°C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.



4.3.6 TEST RESULTS

E.U.T :	Dialock DT Lite	Model Name. :	Dialock DT Lite
Temperature :	24 °C	Relative Humidity :	56 %
Test Voltage :	DC 6V		
Test Mode :	TX Mode		

Frequency Stability Versus Environmental Temperature						
	Temperature (°C)	Voltage (Vdc)	Frequency (MHz)	Freq Error (KHz)	Limit (KHz)	Results
	20	6V	13.56160			
0 min	50	6V	13.56168	0.080	+/- 1.356	PASS
	-20	6V	13.56150	-0.100	+/- 1.356	PASS
2 min	50	6V	13.56250	0.900	+/- 1.356	PASS
	-20	6V	13.56070	-0.900	+/- 1.356	PASS
5 min	50	6V	13.56170	0.100	+/- 1.356	PASS
	-20	6V	13.56144	-0.160	+/- 1.356	PASS
10 min	50	6V	13.56165	0.050	+/- 1.356	PASS
	-20	6V	13.56141	-0.190	+/- 1.356	PASS

Frequency Stability Versus Input Voltage						
Temperature (°C)	Voltage (Vdc)		Frequency (MHz)	Freq Error (KHz)	Limit (KHz)	Results
20	V-nom	6	13.56160			
20	V-min	5.1	13.5616	0.003	+/- 1.356	PASS
20	V-max	6.9	13.5616	0.003	+/- 1.356	PASS



5. EUT TEST PHOTO

Radiated Measurement Photos

