Radio Test Report

FCC ID: MMK2121

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

Issued Date	:	Dec. 23, 2008
Project No.	:	R0812008
Equipment	:	SEARCH LIGHT (433.92MHz Transmitter)
Model Name	:	2121
Applicant	:	Golight Inc.
Address	:	Rt. 3 Box 37B, Culbertson, NE 69024, U. S. A

Tested by:

Neutron Engineering Inc. EMC Laboratory

Data of Test:

Dec. 12, 2008 ~ Dec. 17, 2008

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ilac-MRA TAF Testing Laboratory 0659

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

Equipment :	SEARCH LIGHT (433.92MHz Transmitter)
Trade Name :	GOBEE™
Model No. :	2121
Applicant :	Golight Inc.
Data of Test :	Dec. 12, 2008 ~ Dec. 17, 2008
Test Item :	ENGINEERING SAMPLE
Standards :	FCC Part15, Subpart C / RSS-210: 2004/ 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-R0812008) 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(15.231), Subpart C		
Standard	Test Item	Judgment
15.207	Conducted Emission	N/A **NOTE(1)**
15.209	Radiated Emission	PASS
15.231(a)(1)	Transmitting Time	PASS
15.231(b)	Radiated Emission	PASS **NOTE(2)**
15.231(c)	20dB Occupied Bandwidth Measurement	PASS

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) The EUT is manually operated transmitter, not periodic transmissions.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **OS01(FCC R.N.: 95335)** at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended 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
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	V	2.86	
		30MHz ~ 200MHz	H	2.56	
		200MHz ~ 1,000MHz	V	2.88	
		200MHz ~ 1,000MHz	H	2.98	
OS-02	ANSI	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	SEARCH LIGHT (433.92MHz Transmitter)
Trade Name	GOBEE™
Model No.	2121
OEM Brand/Model No.	N/A
Model Difference	N/A
Product Description	The EUT is a SEARCH LIGHT (433.92MHz Transmitter). Operation Frequency: 433.92 MHz Modulation Type: Pulse Modulation (ASK) Antenna Designation: Helical Antenna Number Of Channel: 1 Transmitting Time: < 5 seconds Associated Receiver: FCC DOC 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.
Power Source	Battery supplied.
Power Supply	DC 3V
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A
EUT Modification(s)	N/A

Note:

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

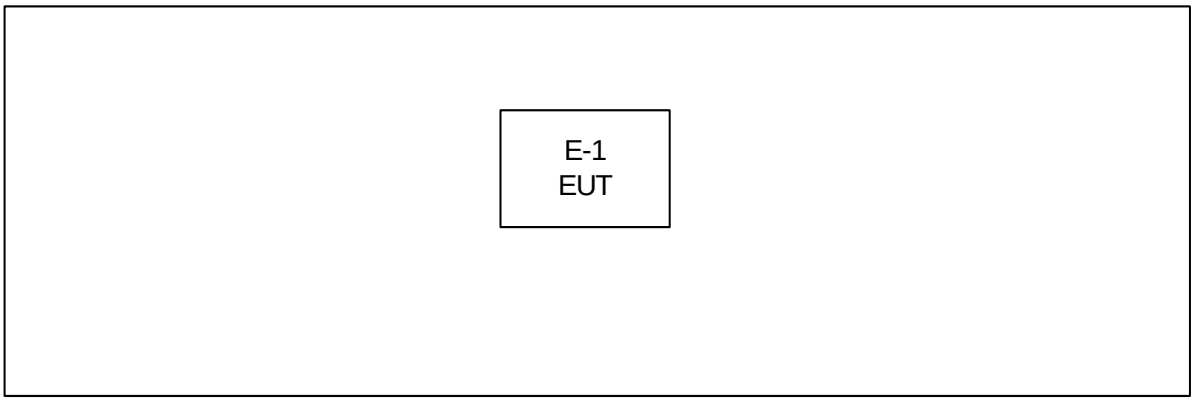
3.2 DESCRIPTION OF TEST MODES

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 Test Mode	Description
Mode 1	TX

For Radiated Test	
Final Test Mode	Description
Mode 1	TX

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	SEARCH LIGHT (433.92MHz Transmitter)	GOBEE™	2121	MMK2121	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
	N/A	N/A	N/A	

Note:

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

4. EMC EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

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

According to 15.231 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental	Field Strength of Fundamental		Field Strength of Spurious	
Frequency (MHz)	uV/meter	dBuV/meter	uV/meter	dBuV/meter
40.66 – 40.70	2250	67.04	225	48.04
70 – 130	1250	61.94	125	41.94
130 – 174	1250 to 3750	61.94 to 71.48	125 to 375	41.94 to 51.48
174 – 260	3750	71.48	75	37.50
260 – 470	3750 to 12500	71.48 to 81.94	375 to 1250	51.48 to 61.94
Above 470	12500	81.94	1250	61.94

Notes:

(1) Emission level in dBuV/m=20 log (uV/m)

(2) Measurement was performed at an antenna to the closed point of EUT distance of meters.

(3) Fundamental frequency shall not be located within the Restricted Bands specified in provision of 15.205.

(4) If spurious frequency which falls within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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

Notes:

As shown in 15.35(b), 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 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3176	Jul. 24, 2009
2	Test Cable	N/A	10M_OS01	N/A	Oct. 20, 2009
3	Test Cable	N/A	3M_OS01	N/A	Oct. 08, 2009
4	Pre-Amplifier	Anritsu	MH648A(OS 01)	M09961	Oct. 08, 2009
5	Positioning Controller (OS01)	MF	MF7802	N/A	N/A
6	Turn Table	Chance Most	CMTB-1.5	N/A	N/A
7	EMI Test Receiver	R&S	ESCI	100082	Mar. 23, 2009
8	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009
9	Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-546	May 27, 2009
10	Microwave Pre_amplifier	Agilent	8449B	3008A02331	Jan. 15, 2009
11	Microflex Cable	NA	NA	1m	Sep. 15, 2009
12	Microflex Cable	NA	NA	10M	Feb. 20, 2009

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

4.1.3 TEST PROCEDURE

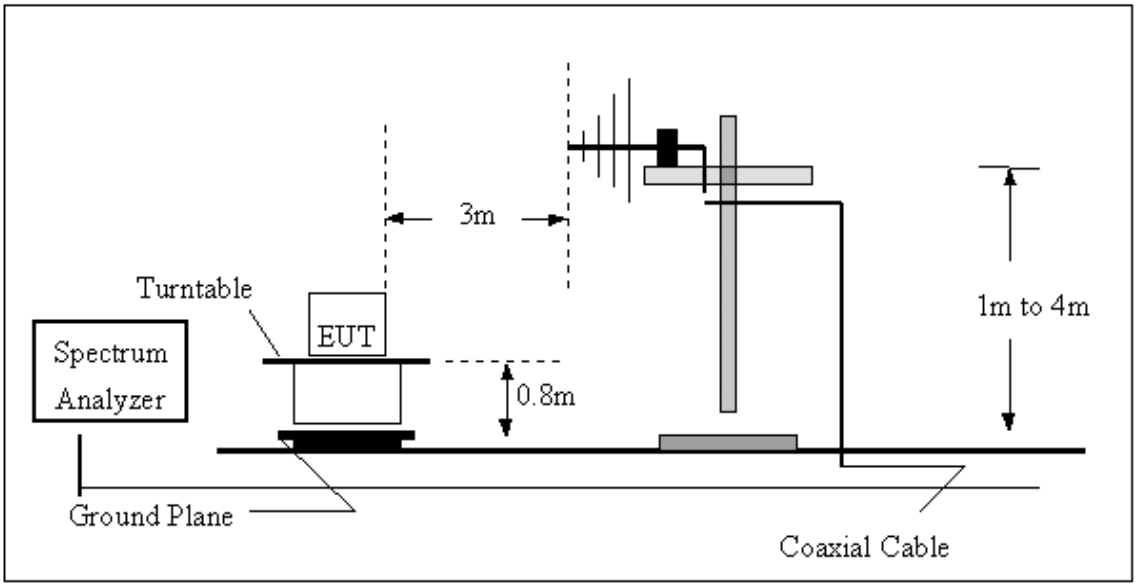
a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. 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.
d. The initial step in collecting conducted 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.
e. 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

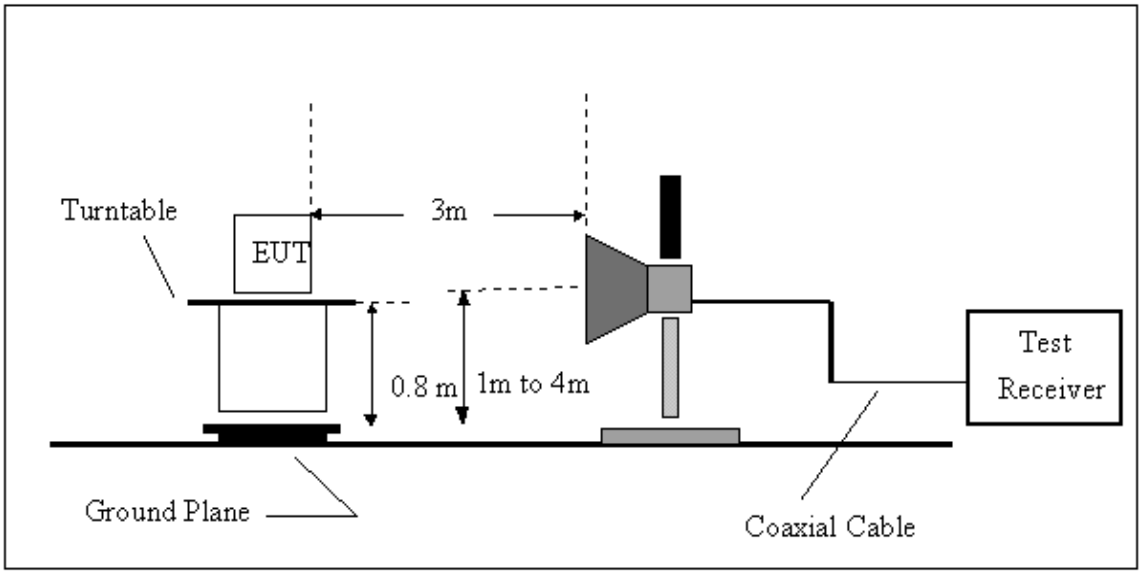
No deviation

4.1.5 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



4.1.6 EUT OPERATING CONDITIONS

4.1.7 TEST RESULTS (BETWEEN30 – 1000 MHz)

EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity :	58%
Test Power ：	DC 3V		
Test Mode ：	TX		
The following table lists worst case data from TX with various orthogonal planes on the EUT antenna.			

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
105.66	V	Peak	38.22	- 6.80	31.42	43.50	- 12.08	
125.01	V	Peak	33.15	- 5.07	28.08	43.50	- 15.42	
144.99	V	Peak	27.67	- 3.92	23.75	43.50	- 19.75	
286.03	V	Peak	26.32	- 2.00	24.32	46.00	- 21.68	
297.09	V	Peak	27.25	- 1.82	25.43	46.00	- 20.57	
435.04	V	Peak	26.95	2.86	29.81	46.00	- 16.19	
109.54	H	Peak	38.08	- 6.18	31.90	43.50	- 11.60	
125.04	H	Peak	30.62	- 5.06	25.56	43.50	- 17.94	
144.27	H	Peak	30.45	- 3.94	26.51	43.50	- 16.99	
161.05	H	Peak	27.47	- 3.91	23.56	43.50	- 19.94	
242.99	H	Peak	27.00	- 3.88	23.12	46.00	- 22.88	
296.71	H	Peak	26.62	- 1.82	24.80	46.00	- 21.20	

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 measure-ment didn't perform。

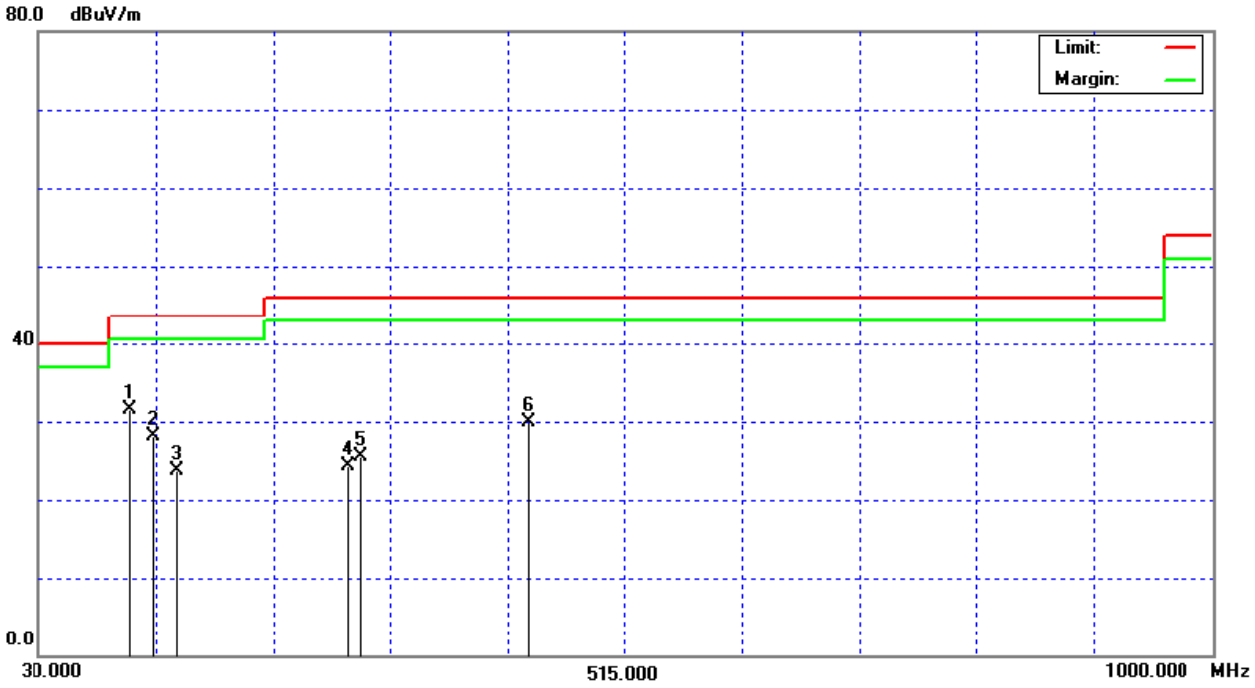
(3) Measuring frequency range from 30MHz to 1000MHz。

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。

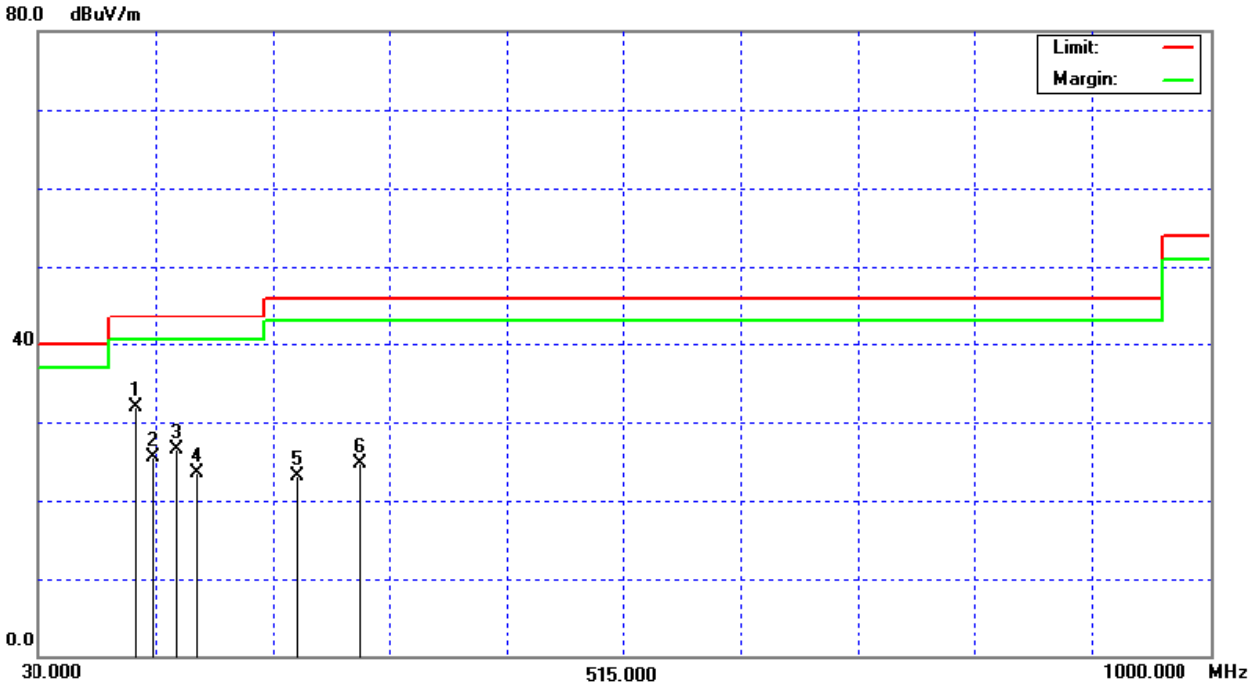
(5) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle)

(6) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

Vertical



Horizontal



4.1.8 TEST RESULTS (BETWEEN30 – 5000 MHz)

EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity：	58%
Test Power ：	DC 3V		
Test Mode ：	TX		
The following table lists worst case data from TX with various orthogonal planes on the EUT antenna.			
About the duty cycle correction factor calculated, please refer to the next page (Table-1).			

Freq. (MHz)	F/S	Ant.Pol. H/V	Reading (dBuV)	Ant./CL CF(dB)	Duty Cycle CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Safe Margins (dBuV/m)	Note
433.92	F	V	74.62	2.83	- 10.60	77.45	66.85	100.83	80.83	- 13.98	
867.86	S	V	41.80	12.03	- 10.60	53.83	43.23	80.83	60.83	- 17.60	
1301.74	S	V	48.56	- 6.28	- 10.60	42.28	31.68	74.00	54.00	- 22.32	
2169.60	S	V	52.89	- 3.16	- 10.60	49.73	39.13	80.83	60.83	- 21.70	

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 measure-ment didn't perform。

(3) Measuring frequency range from 30MHz to 5000MHz。"F" denotes fundamental frequency; "S" denotes spurious Frequency。

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。

(5) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle)

(6) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity :	58%
Test Power ：	DC 3V		
Test Mode ：	TX		
The following table lists worst case data from TX with various orthogonal planes on the EUT antenna.			
About the duty cycle correction factor calculated, please refer to the next page (Table-1).			

Freq. (MHz)	F/S	Ant.Pol. H/V	Reading (dBuV)	Ant./CL CF(dB)	Duty Cycle CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Safe Margins (dBuV/m)	Note
433.93	F	H	86.07	2.83	- 10.60	88.90	78.30	100.83	80.83	- 2.53	
867.86	S	H	48.40	12.03	- 10.60	60.43	49.83	80.83	60.83	- 11.00	
1301.82	S	H	49.11	-6.28	- 10.60	42.83	32.23	74.00	54.00	- 21.77	
2169.58	S	H	51.88	-3.16	- 10.60	48.72	38.12	80.83	60.83	- 22.71	

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 measure-ment didn't perform。

(3) Measuring frequency range from 30MHz to 5000MHz。"F" denotes fundamental frequency; "S" denotes spurious Frequency。

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。

(5) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle)

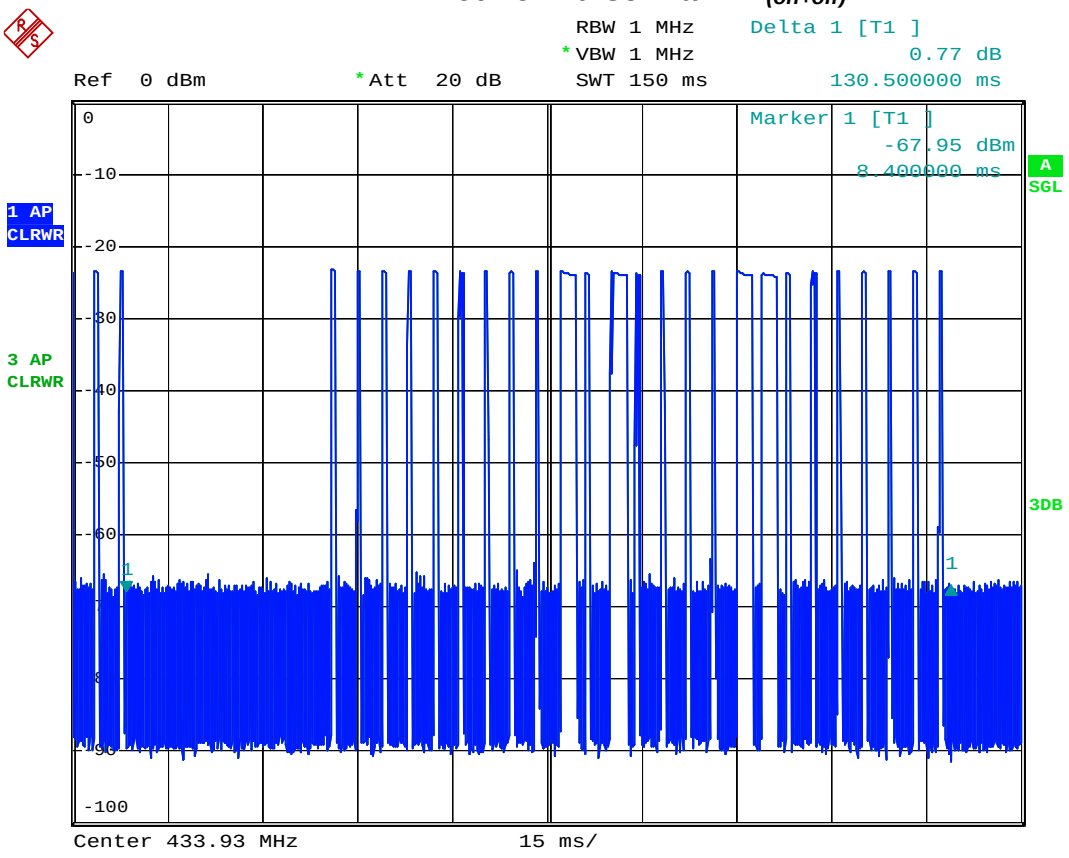
(6) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

Table - 1

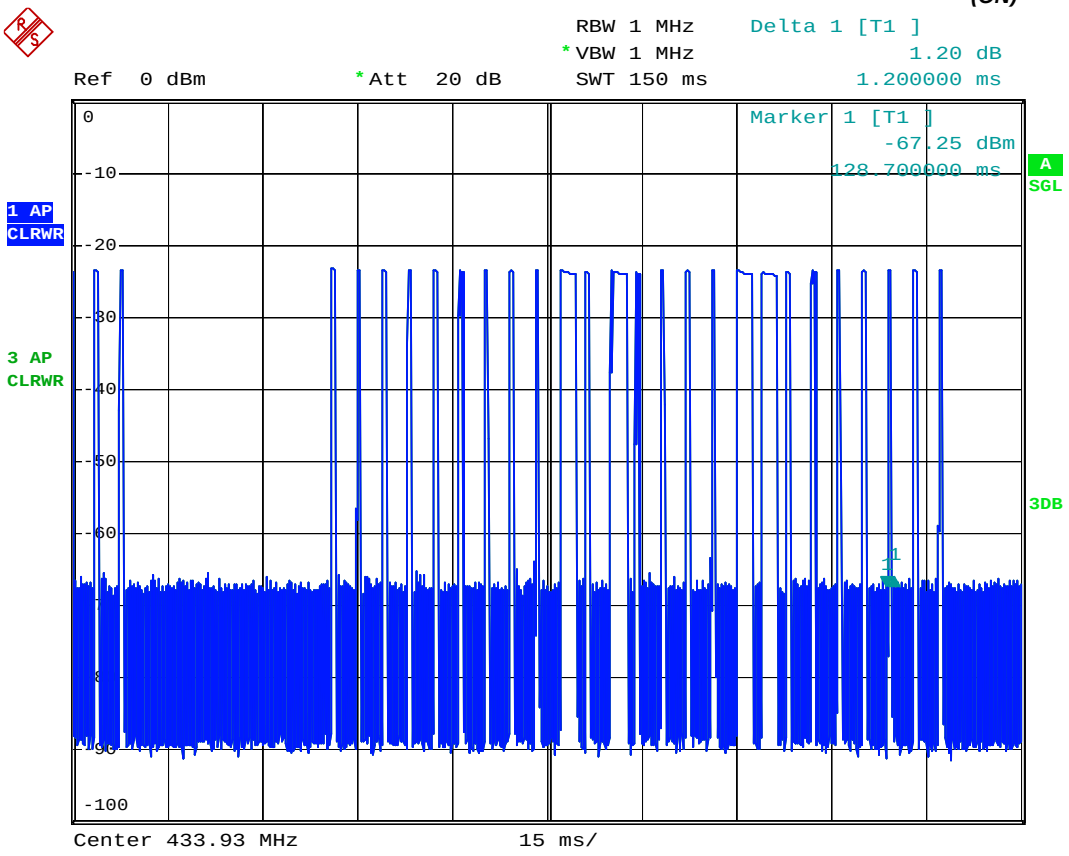
Duty Cycle Correction Factor Calculated			
EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity :	58%
Test Power ：	DC 3V		

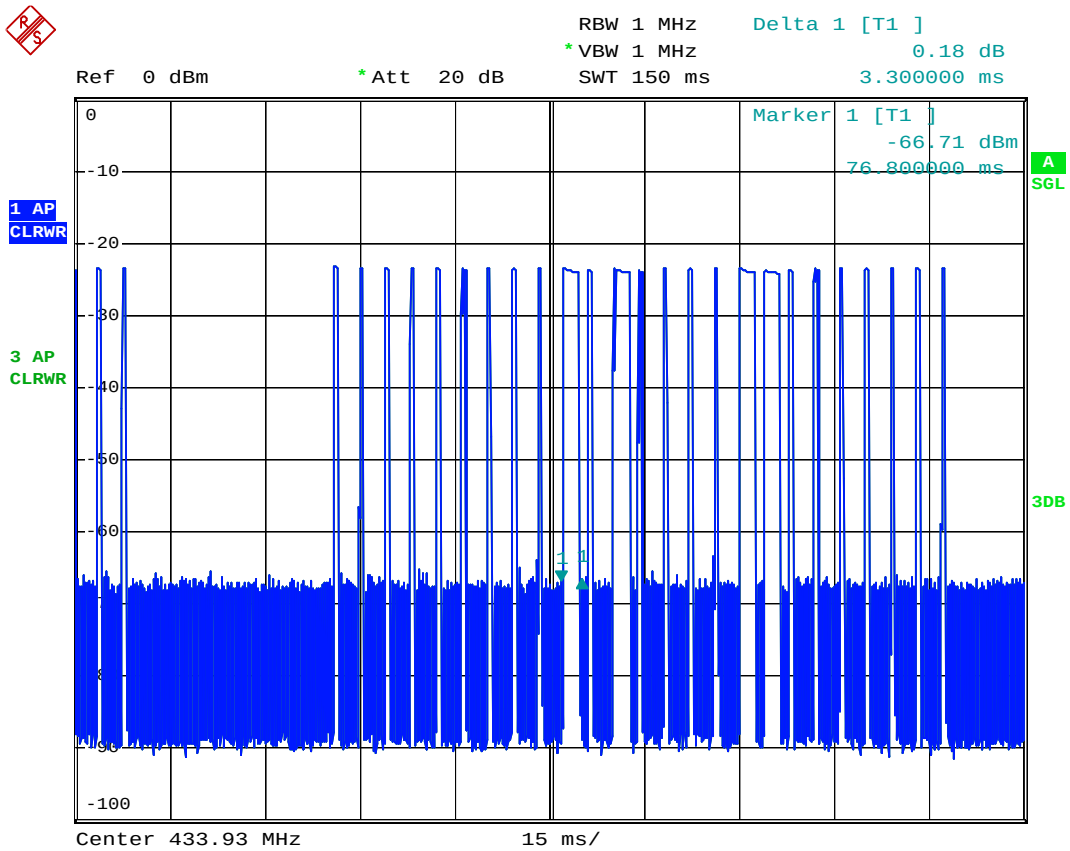
Frequency (MHz)	Pulse Train $T_{(on+off)}$ (ms)	Total Duration of EUT at active state($T_{(on)}$) (ms)	Factor = 20 log[$T_{(on)}$/ $T_{(on+off)}$]
433.9	130.5 ms	(1.2ms*21) +(3.3 ms*4)	-10.6 dB

Plot For Pulse Train: $T_{(on+off)}$



Plot For Total Duration of EUT at active state: $T_{(ON)}$





4.2 20dB OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSL-6	100257	Jul. 02, 2009

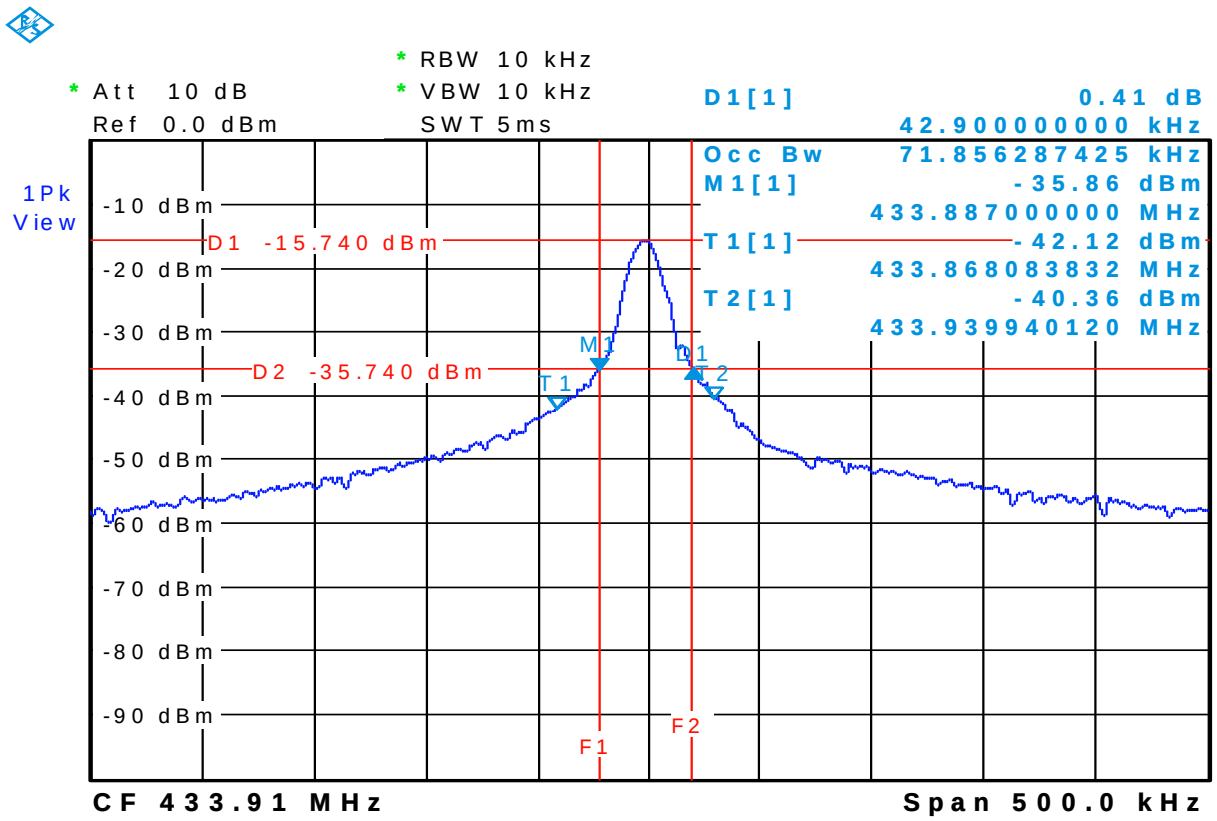
Remark: ” N/A” denotes No Model No. / Serial No. and No Calibration specified.

4.2.2 TEST RESULTS

EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity：	58%
Test Power ：	DC 3V		
Test Mode ：	TX		

Frequency (MHz)	20dB Bandwidth (KHz)	Maximum Limit (KHz)	Result
433.9200	42.9	1084.8	PASS

Note:
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.



5. TIMING TESTING

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 LIMITS

According to 15.231(a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.1.2 MEASURING INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009

5.1.3 TEST PROCEDURE

a. The transmitter was used antenna to receive and measure the release time in peak hold mode.
b. Spectrum Setting:
RBW= 100 KHz, VBW=100 KHz, Sweep time = 10 s.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in normal mode.

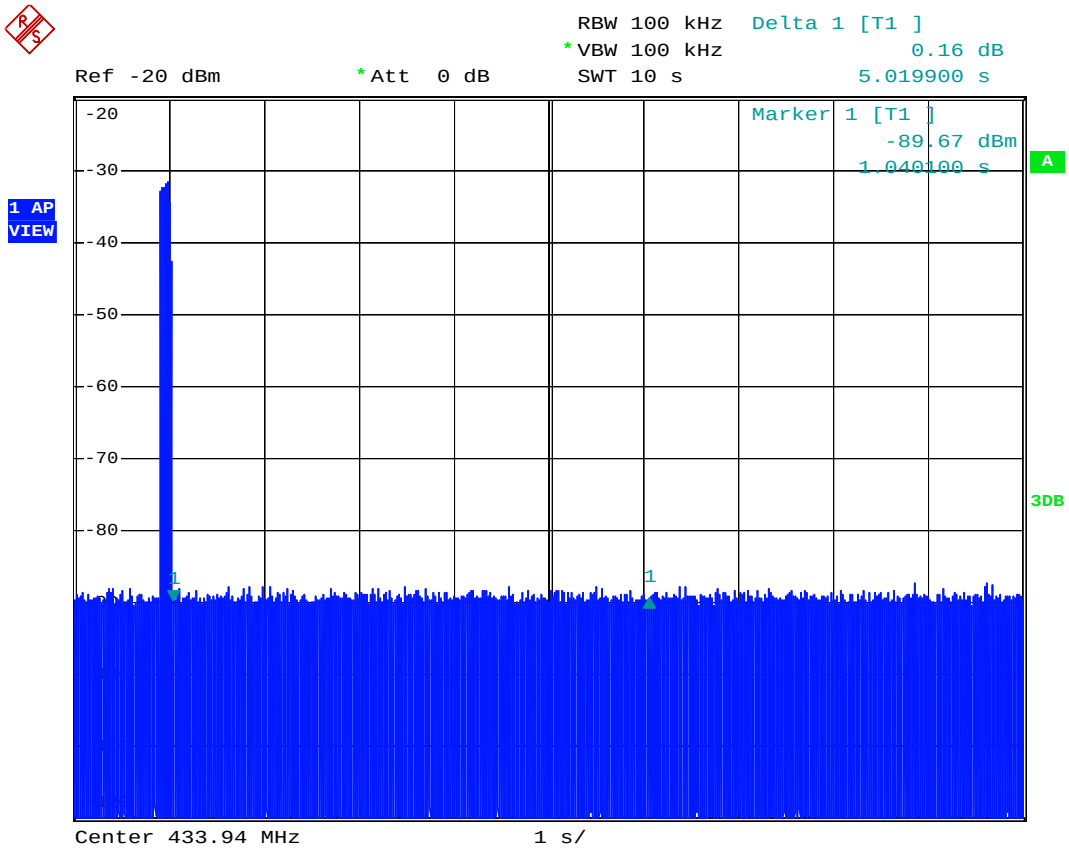
5.1.6 TEST RESULTS

EUT：	SEARCH LIGHT (433.92MHz Transmitter)	Model No. ：	2121
Temperature：	15°C	Relative Humidity :	58%
Test Power ：	DC 3V		
Test Mode ：	TX		

Frequency (MHz)	Pulse Train $T_{(on+off)}$ (ms)	Release Time (Second)	Result
433.9200	130.5 ***Note(1)***	<< 5 ***Note(2)***	PASS

Note:
(1)Please refer to ***Section 4, Table 1: Duty Cycle Correction Factor Calculated*** of the test report.
(2)The EUT is a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Release Time



6. EUT TEST PHOTO

Radiated Measurement Photos

Radiated Measurement Photos