



NVLAP LAB CODE 200707-0



# FCC PART 15.227 EMI MEASUREMENT AND TEST REPORT

For

**Kong Shing Plastic Manufactory Ltd.**

10th Floor, Silver Tech Tower, 26 Cheung Lee Street,  
Chai Wan, Hong Kong

**FCC ID: QTX01062007000033**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> Radio Control Light Up Car
<b>Test Engineer:</b>	Cinderallar Chen <i>cinderallar chen</i>
<b>Report No.:</b>	RSZ07061402
<b>Test Date:</b>	2007-06-20 to 2007-07-18
<b>Report Date:</b>	2007-07-19
<b>Reviewed By:</b>	EMC Manager: Boni Baniqued <i>Boni Baniqued</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratory Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

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## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
OBJECTIVE .....	3
RELATED SUBMITTAL(S)/GRANT(S) .....	3
TEST METHODOLOGY .....	3
TEST FACILITY .....	3
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>4</b>
JUSTIFICATION .....	4
EUT EXERCISE SOFTWARE .....	4
SPECIAL ACCESSORIES .....	4
SCHEMATICS AND BLOCK DIAGRAM.....	4
EQUIPMENT MODIFICATIONS .....	4
CONFIGURATION OF TEST SETUP .....	5
BLOCK DIAGRAM OF TEST SETUP .....	5
<b>SUMMARY OF TEST RESULTS .....</b>	<b>6</b>
<b>§15.203 - ANTENNA REQUIREMENT.....</b>	<b>7</b>
STANDARD APPLICABLE .....	7
<b>§15.205, §15.209, §15.227(A) - RADIATED EMISSIONS TEST .....</b>	<b>8</b>
STANDARD APPLICABLE .....	8
MEASUREMENT UNCERTAINTY .....	8
EUT SETUP.....	8
EMI TEST RECEIVER SETUP.....	9
TEST EQUIPMENT LIST AND DETAILS.....	9
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	9
TEST RESULTS SUMMARY .....	9
TEST DATA .....	10
<b>§15.227(B) – OUT OF BAND EMISSIONS .....</b>	<b>12</b>
STANDARD APPLICABLE .....	12
TEST EQUIPMENT LIST AND DETAILS.....	12
TEST DATA .....	12
<b>§15.227- DUTY CYCLE.....</b>	<b>14</b>
LIMIT .....	14
TEST EQUIPMENT LIST AND DETAILS.....	14
TEST PROCEDURE .....	14
TEST DATA .....	14

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Kong Shing Plastic Manufactory Ltd.*'s product, model number: *QK033* or the "EUT" as referred to in this report is a *Radio Control Light Up Car*. The EUT is measured approximately 11.0 cm L x 11.0 cm W x 5.6 cm H. rated input voltage: DC 9V battery.

*\* The test data gathered are from production sample, serial number: 0706028 provided by the manufacturer, we received EUT on 2007-06-14.*

### Objective

This Type approval report is prepared on behalf of *Kong Shing Plastic Manufactory Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, sec 15.203, 15.205, 15.209 and sec 15.227.

### Related Submittal(s)/Grant(s)

No Related Submittals.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratory Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratory Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>

## **SYSTEM TEST CONFIGURATION**

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### **Justification**

The system was configured for testing in a typical fashion (as normally used by a typical user).

### **EUT Exercise Software**

N/A.

### **Special Accessories**

The special accessories were supplied by Bay Area Compliance Laboratory Corp. (Shenzhen).

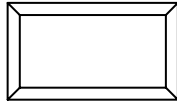
### **Schematics and Block Diagram**

Please refer to the Exhibit D.

### **Equipment Modifications**

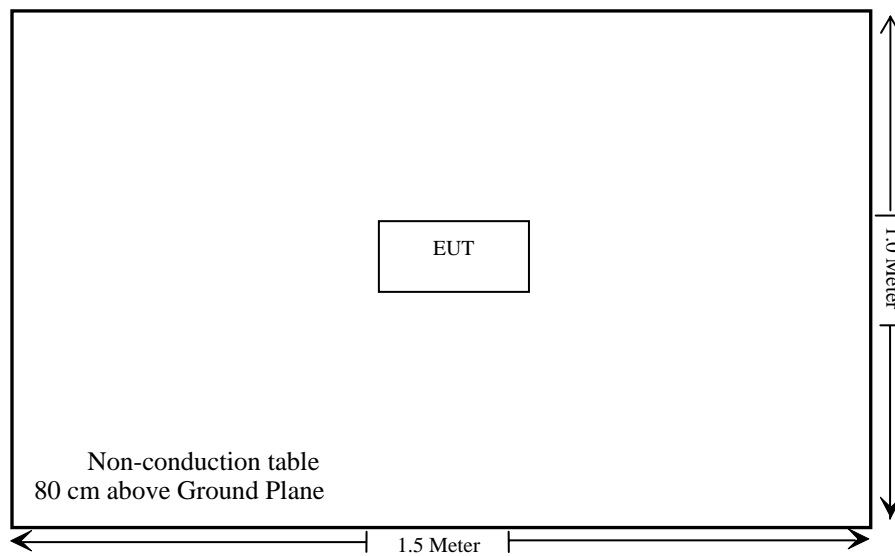
Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

## Configuration of Test Setup



EUT

## Block Diagram of Test Setup



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**SUMMARY OF TEST RESULTS**

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FCC Rules	Description of Test	Result
§15.203	Antenna requirement	Compliant
§15.205	Restricted Band of operation	Compliant
§15.209	Radiated Emissions Limit	Compliant
§15.227(a)	Field Strength	Compliant
§15.227(b)	Out of band emissions	Compliant

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## **§15.203 - ANTENNA REQUIREMENT**

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### **Standard Applicable**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

This product has a permanent antenna, fulfill the requirement of this section.

**Result:** Compliant.

## §15.205, §15.209, §15.227(a) - RADIATED EMISSIONS TEST

### Standard Applicable

According to §15.227 (a), The field strength if any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters.

(b), the field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

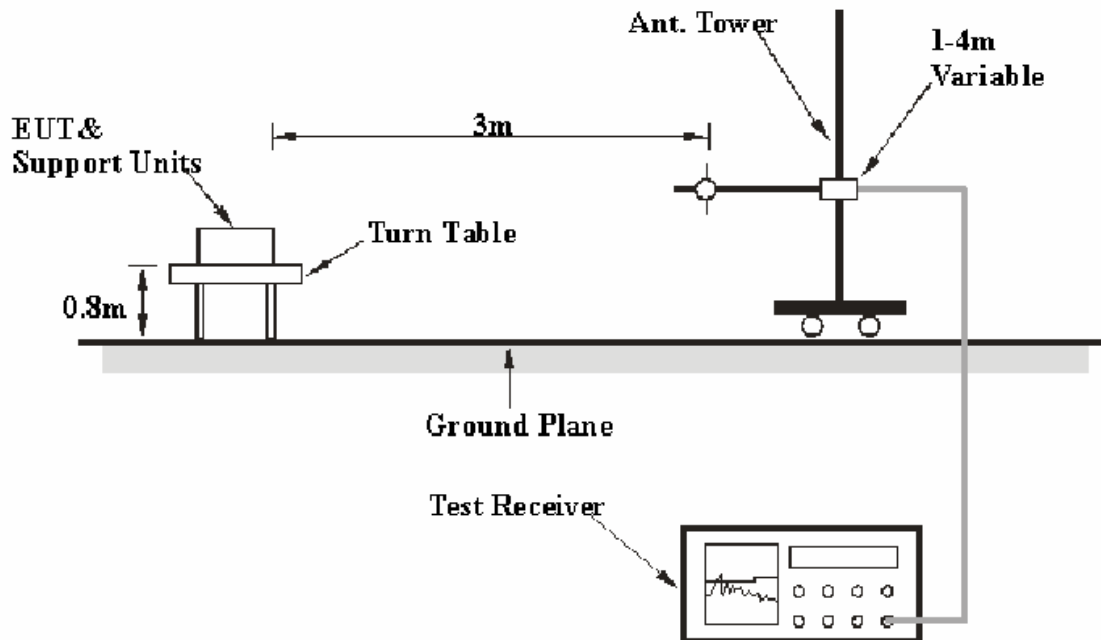
### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is  $\pm 4.0$  dB.

The fundamental data was measured in average and peak detection mode: set the VBW AVE on, then record the data.

### EUT Setup



The radiated emission tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.227 limits.



## EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated from 27 to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

<i><b>Frequency Range</b></i>	<i><b>RBW</b></i>	<i><b>Video B/W</b></i>
Below 30 MHz	10 kHz	30 kHz
30 – 1000 MHz	100 kHz	300 kHz

## Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
HP	Amplifier	HP8447E	1937A01046	2006-11-15	2007-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2006-08-14	2007-08-14
ETS	Passive Loop Antenna	6512	00029604	2006-08-25	2007-08-25

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Amp.} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Amp.}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.227, with the worst margin reading of:

**17.0 dB at 30.071665 MHz in the Vertical polarization.**

**Test Data****Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Cinderallar Chen on 2007-06-20.

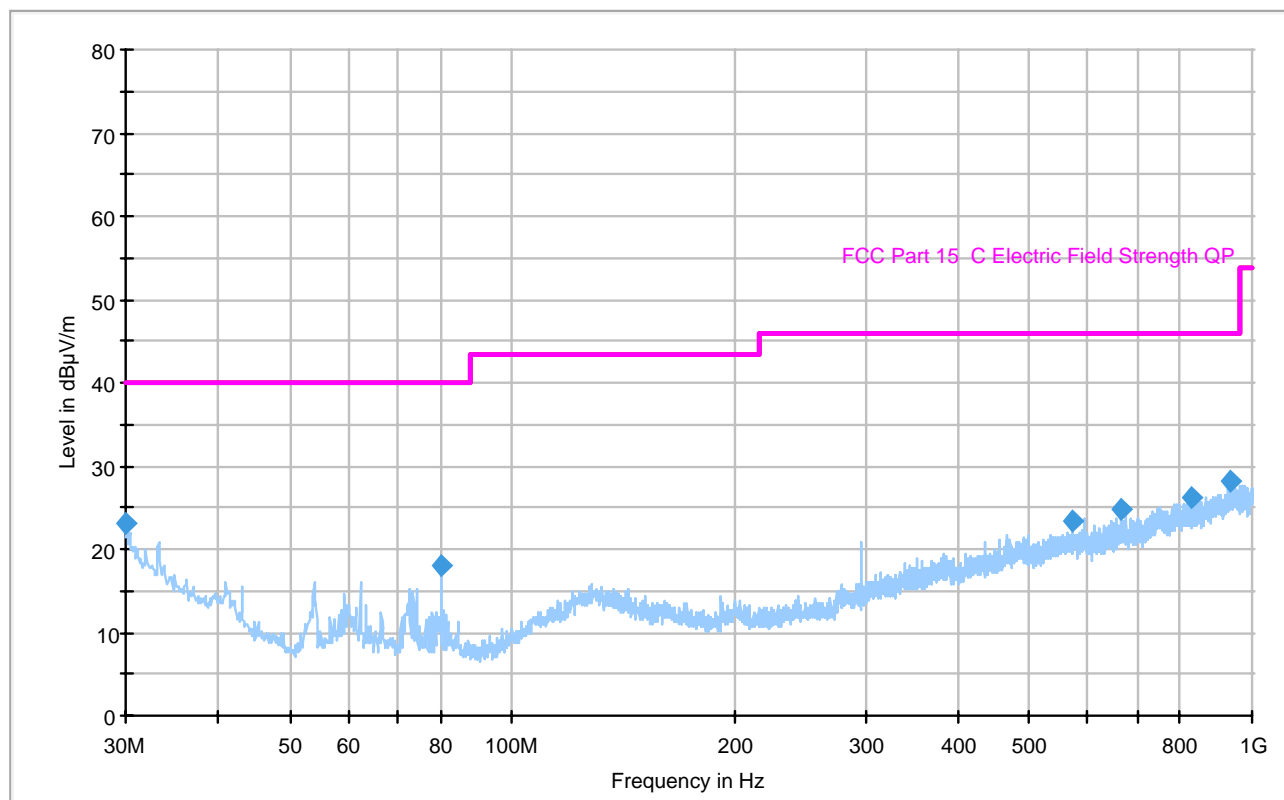
Test mode: Transmitting

Indicated		Table Angle Deg.	Antenna		Correction Factor			Corr. Amp. (dBμV/m)	FCC PART 15.227 & 15.209		
Freq. (MHz)	Reading (dBμV)		Height (m)	Detector PK/AV	Antenna Factor (dB/m)	Cable Loss (dB)	Amplifier Gain (dB)		Limit (dBμV/m)	Margin (dB)	Remarks
27.145	45.10	153	1.0	PK	31.9	0.5	26.8	50.7	100	49.3	Fundamental

Field Strength of Fundamental Emission Average					
Freq. (MHz)	Peak measurement @3m (dBμV/m)	Duty Cycle Correction (dB)	Corrected Amp. (dBμV/m)	FCC 15.227 Limit(dBμV/m)	Result
27.145	50.7	-2.68	48.02*	80	Compliant

According to CFR47 Part 15.35, the limit on the radio frequency emissions as measured using instrumentation with peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

\* Adjusted by Duty Cycle = - 2.68 dB

**30-1000 MHz**

Frequency (MHz)	Quasi-Peak (dBμV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Corr. (dB)	Limit (dBμV/m)	Margin (dB)
30.071665	23.0	101.0	V	83.0	-5.6	40.0	17.0
932.012825	28.3	310.0	V	0.0	0.3	46.0	17.7
827.576075	26.3	150.0	H	131.0	-1.5	46.0	19.7
667.112700	24.8	101.0	H	153.0	-4.0	46.0	21.2
79.991875	18.0	320.0	V	325.0	-18.6	40.0	22.0
569.832025	23.4	115.0	H	85.0	-5.6	46.0	22.6

## §15.227(b) – OUT OF BAND EMISSIONS

### Standard Applicable

According to §15.227(b), the field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29
HP	Amplifier	HP8447E	1937A01046	2006-11-15	2007-11-15
HP	Preamplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2006-08-14	2007-08-14

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Data

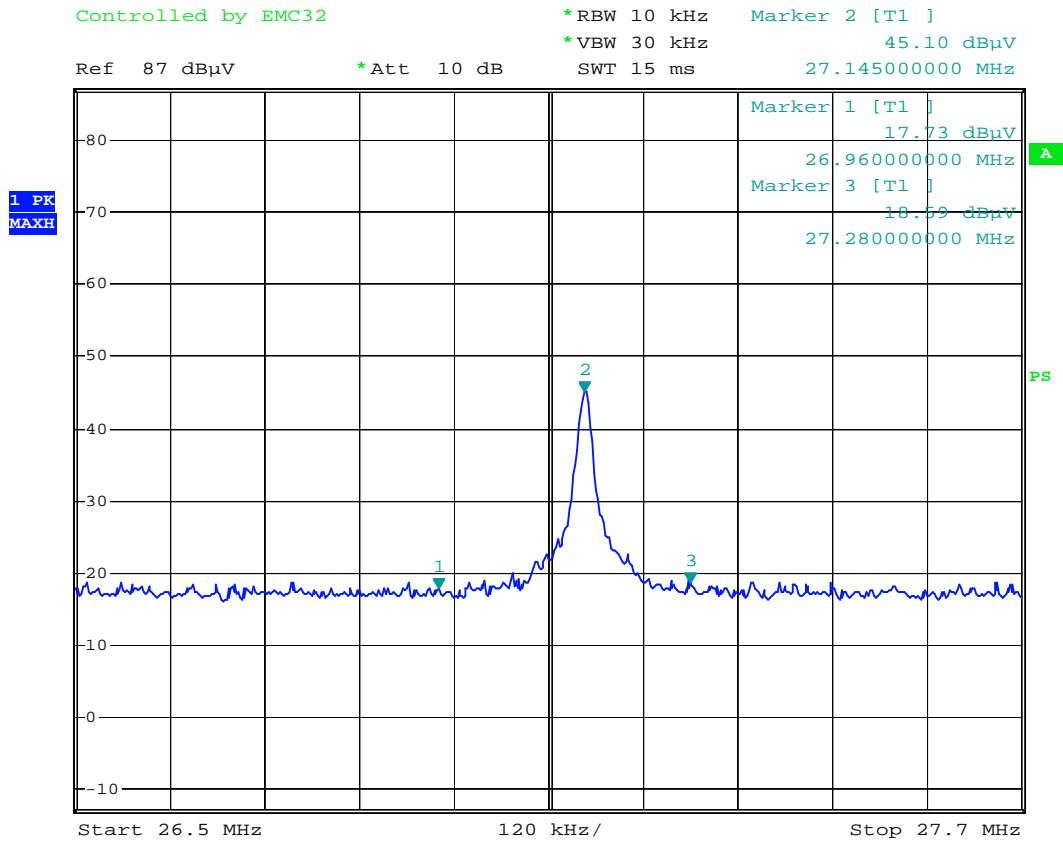
#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

*The testing was performed by Cinderallar Chen on 2007-07-02.*

Indicated		Table Angle Degree	Antenna Height (m)	Detector PK/AV/QP	Correction Factor				Corr. Amp. (dBμV/m)	FCC PART 15.227 & 15.209	
Freq. (MHz)	Reading (dBμV)				Antenna Factor (dB/m)	Cable Loss (dB)	Duty Cycle (dB)	Pre-Amp. Gain (dB)		Limit (dBμV/m)	Margin (dB)
27.28	18.59	153	1.0	QP	31.9	0.5	0	26.8	24.19	49.5	25.31
26.96	17.73	246	1.0	QP	31.9	0.5	0	26.8	23.33	49.5	26.17

Plot of Test Data is presented hereinafter as reference.



Radio Control Light Up Car M/N:QK033 bandedge

Date: 2.JUL.2007 16:21:07

## §15.227- DUTY CYCLE

### Limit

Nil (No dedicated limit specified in the Rules).

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	ESCI	100224	2006-11-07	2007-11-07

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

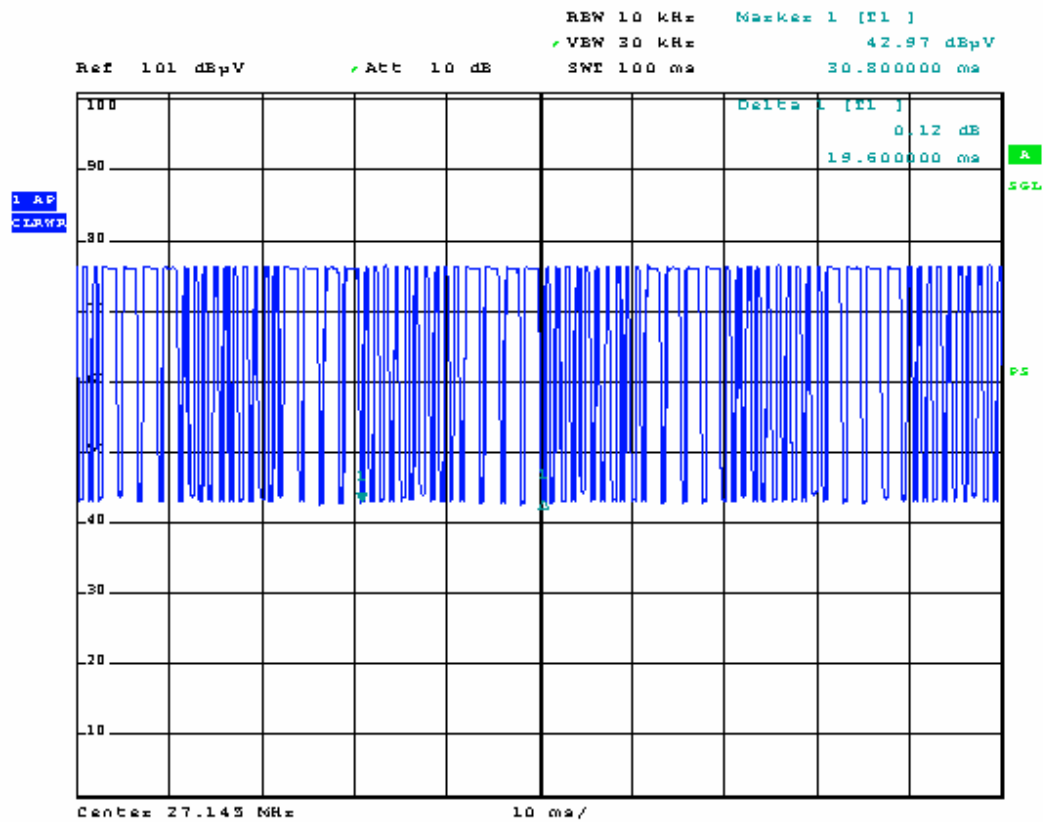
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100kHz, Span=0Hz, Adjust Sweep=100ms.
5. Repeat above procedures until all frequency measured were complete.

### Test Data

Duty cycle=  $[10 \times (10.76 - 10.04) \text{ ms} + 4 \times (8.6 - 6.8) \text{ ms}] / 19.6 \text{ ms} \times 100\% = 73.47\%$

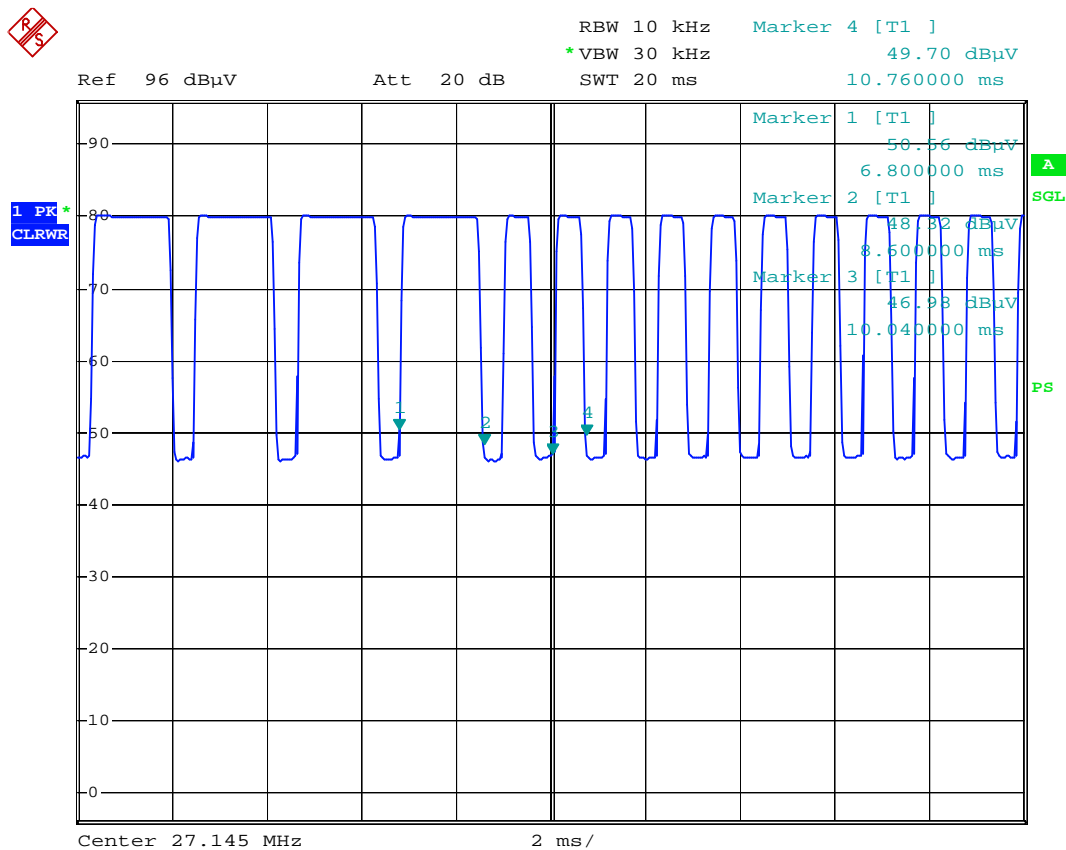
Duty cycle factor =  $20 \lg (0.7347) = -2.68 \text{ dB}$ .

This factor will be applied to correct the final reading for the peak measurement.



kongshing M/N:QK033 dutycycle1

Date: 19.JUL.2007 11:51:06



KONG SHING M/N:QK033 duty cycle2

Date: 18.JUL.2007 11:03:52

**END OF REPORT**