

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**RFID Time Attendance, Access Control, Data Collection Terminal** 

MODEL No.: 9600-K5, Kaba Terminal 9600

**FCC ID: NVI9600** 

Trademark: N/A

REPORT NO: ES160304014E3

ISSUE DATE: August 31, 2016

Prepared for

Kaba GmbH

Albertistraße 3 Villingen-Schwenningen 78056, Germany

Prepared by EMTEK(SHENZHEN) CO., LTD.

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TRF No: FCC part 15C Page 1 of 24 Report No: ES160304014E3 Ver.1.0



### **VERIFICATION OF COMPLIANCE**

Applicant:	Kaba GmbH
' '	Albertistraße 3 Villingen-Schwenningen 78056, Germany
Manufacturer:	ZKTECO CO.,LTD.  No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City, Guangdong Province, China 523728
Product product:	RFID Time Attendance, Access Control, Data Collection Terminal
Model Number:	9600-K5, Kaba Terminal 9600 (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only difference is model No. for trading purpose. We prepare 9600-K5 for test, and the worst result recorded in the report.)
Trademark:	N/A
File Number:	ES160304014E3
Date of Test:	March4, 2016 to August 31, 2016

#### We hereby certify that:

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15C.

The test results of this report relate only to the tested sample identified in this report.

Date of Test:	March4, 2016 to August 31, 2016
Prepared by :	Hoppingchen
	Hopping Chen/Editor
Wireless Charging Baseiewer :	Toe Xia
	Joe Xia /Supervisor
	×
	2005
Approve & Authorized Signer:	
	Lisa Wang/Manager

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### 1 General Information

### 1.1 Product Description

Characteristics	Description
Data Rate	WIFI: 802.11 b:1,2,5.5,11Mbps; 802.11 g:6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS7;
Modulation:	WIFI: DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n; RFID:ASK
Operating Frequency Range(s):	WIFI: 2412-2462MHz for 802.11b/g; 2412-2462MHz for 802.11n(HT20); RFID: 13.56MHz; 125KHz;
Number of Channels:	WIFI: 11 channels for 802.11b/g; 11 channels for 802.11n(HT20); RFID: 1 channel for 13.56MHz 1 channel for 125kHz
Transmit Power Max:	WIFI: 19.44 dBm for 802.11b; 24.70 dBm for 802.11g; 23.08 dBm for 802.11/n(HT20);
Antenna Type:	FPC antenna for WIFI;
Antenna Gain:	0 dBi for WIFI;
Power supply:	
Temperature Range	-20°C ~ +55°C

Note: for more details, please refer to the User's manual of the EUT.

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

This submittal(s) (test report) is intended for FCC ID: NVI9600 filing to comply with FCC Part 15, Subpart C Rules.

The system with mutil-fuction is compliance with Subpart B is authorized under a DOC procedure

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#### 1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 1.4 Special Accessories

Not available for this EUT intended for grant.

### 1.5 Equipment Modifications

Not available for this EUT intended for grant.

### 1.6 Test Facility

Site Description EMC Lab.

: Accredited by CNAS, 2013.10.29

The certificate is valid until 2016.10.28

The Laboratory has been assessed and proved to be in compliance

with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)

The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2015.4

The Laboratory has been assessed according to the requirements

ISO/IEC 17025.

Accredited by FCC, July 24, 2013

The Certificate Registration Number is 406365.

Accredited by Industry Canada, November 29, 2012 The Certificate Registration Number is 4480A.

Name of Firm EMTEK(SHENZHEN) CO., LTD. Site Location

Bldg 69, Majialong Industry Zone,

Nanshan District, Shenzhen, Guangdong, China

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### 2 System Test Configuration

#### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

#### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

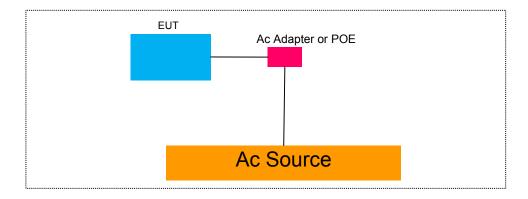
The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

### 2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



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**Table 2-1 Equipment Used in Tested System** 

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	POE	NETGEAR	FS108Pv3	/	3BN1487W815F0	/

#### Note:

(1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

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### 3 Summary of Test Results

FCC Rules	Description Of Test	Result		
§15.207	AC Power Conducted Emission	Pass		
§15.209	Radiated Emission	Pass		

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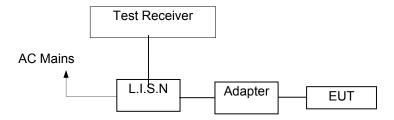


### 4 Conducted Emissions Test

#### 4.1 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured was complete.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Equipment Used

EQUIPMENT	MFR	MODEL	SERIAL	LAST CAL.
TYPE		NUMBER	NUMBER	
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2016
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 28, 2016
50Ω Coaxial Switch	Anritsu	MP59B	M20531	May 29, 2016
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 28, 2016
Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 28, 2016

#### 4.4 Conducted Emission Limit

#### **Conducted Emission**

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies

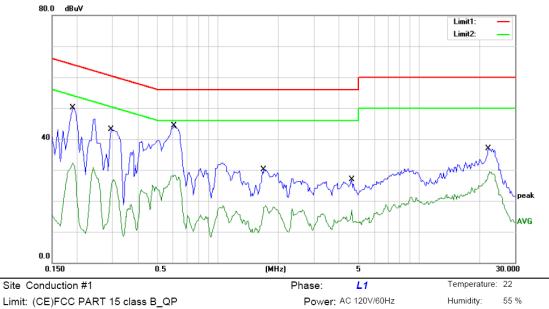
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

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#### 4.5 **Measurement Result**

For Adapter Power Supply



Limit: (CE)FCC PART 15 class B\_QP

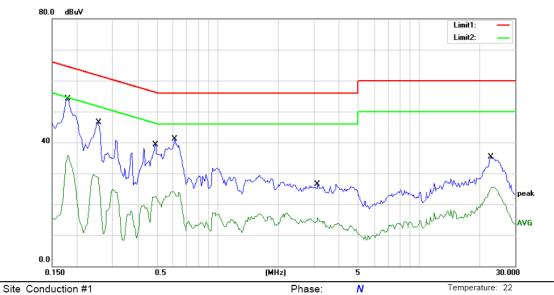
Mode: TX Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBu∀	dB	Detector	Comment
1		0.1900	50.12	0.00	50.12	64.04	-13.92	QP	
2		0.1900	32.27	0.00	32.27	54.04	-21.77	AVG	
3		0.2950	43.10	0.00	43.10	60.38	-17.28	QP	
4		0.2950	26.80	0.00	26.80	50.38	-23.58	AVG	
5	*	0.6011	43.72	0.00	43.72	56.00	-12.28	QP	
6		0.6011	28.39	0.00	28.39	46.00	-17.61	AVG	
7		1.6950	30.09	0.00	30.09	56.00	-25.91	QP	
8		1.6950	18.56	0.00	18.56	46.00	-27.44	AVG	
9		4.6250	26.95	0.00	26.95	56.00	-29.05	QP	
10		4.6250	17.01	0.00	17.01	46.00	-28.99	AVG	
11		22.1750	36.93	0.00	36.93	60.00	-23.07	QP	
12		22.1750	29.42	0.00	29.42	50.00	-20.58	AVG	

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL

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Power: AC 120V/60Hz

Humidity:

Limit: (CE)FCC PART 15 class B\_QP

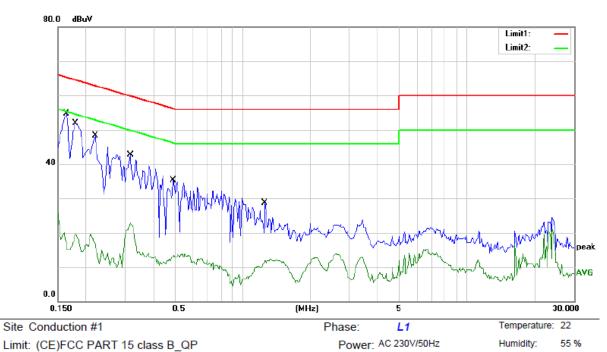
Mode: TX Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBu∀	dB	Detector	Comment
1	*	0.1800	54.14	0.00	54.14	64.49	-10.35	QP	
2		0.1800	35.97	0.00	35.97	54.49	-18.52	AVG	
3		0.2550	46.52	0.00	46.52	61.59	-15.07	QP	
4		0.2550	29.61	0.00	29.61	51.59	-21.98	AVG	
5		0.4900	39.27	0.00	39.27	56.17	-16.90	QP	
6		0.4900	22.51	0.00	22.51	46.17	-23.66	AVG	
7		0.6108	40.98	0.00	40.98	56.00	-15.02	QP	
8		0.6108	24.17	0.00	24.17	46.00	-21.83	AVG	
9		3.1250	26.45	0.00	26.45	56.00	-29.55	QP	
10		3.1250	15.68	0.00	15.68	46.00	-30.32	AVG	
11		22.6750	35.25	0.00	35.25	60.00	-24.75	QP	
12		22.6750	25.58	0.00	25.58	50.00	-24.42	AVG	

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL



### For POE power supply



Limit: (CE)FCC PART 15 class B\_QP

Mode: TX Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBu∨	dB	Detector	Comment
1	*	0.1650	54.69	0.00	54.69	65.21	-10.52	QP	
2		0.1650	25.46	0.00	25.46	55.21	-29.75	AVG	
3		0.1800	51.91	0.00	51.91	64.49	-12.58	QP	
4		0.1800	19.58	0.00	19.58	54.49	-34.91	AVG	
5		0.2200	48.32	0.00	48.32	62.82	-14.50	QP	
6		0.2200	19.15	0.00	19.15	52.82	-33.67	AVG	
7		0.3150	42.63	0.00	42.63	59.84	-17.21	QP	
8		0.3150	22.89	0.00	22.89	49.84	-26.95	AVG	
9		0.4900	35.29	0.00	35.29	56.17	-20.88	QP	
10		0.4900	13.86	0.00	13.86	46.17	-32.31	AVG	
11		1.2600	28.63	0.00	28.63	56.00	-27.37	QP	
12		1.2600	12.37	0.00	12.37	46.00	-33.63	AVG	

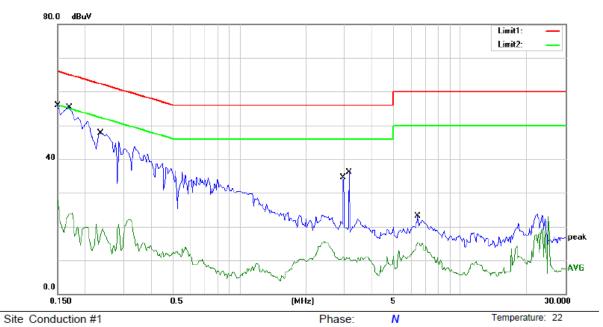
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<sup>\*:</sup>Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jason



Humidity:

55 %



Power: AC 230V/50Hz

Limit: (CE)FCC PART 15 class B\_QP

Mode: TX Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBu∨	dB	dBuV	dBu∀	dB	Detector	Comment
1		0.1500	56.00	0.00	56.00	66.00	-10.00	QP	
2		0.1500	27.61	0.00	27.61	56.00	-28.39	AVG	
3	*	0.1700	55.25	0.00	55.25	64.96	-9.71	QP	
4		0.1700	24.14	0.00	24.14	54.96	-30.82	AVG	
5		0.2350	47.79	0.00	47.79	62.27	-14.48	QP	
6		0.2350	20.63	0.00	20.63	52.27	-31.64	AVG	
7		2.9600	34.45	0.00	34.45	56.00	-21.55	QP	
8		2.9600	13.75	0.00	13.75	46.00	-32.25	AVG	
9		3.1550	36.07	0.00	36.07	56.00	-19.93	QP	
10		3.1550	10.80	0.00	10.80	46.00	-35.20	AVG	
11		6.4200	23.07	0.00	23.07	60.00	-36.93	QP	
12		6.4200	15.31	0.00	15.31	50.00	-34.69	AVG	

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jason

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### **4.6 Conducted Measurement Photo**

We pretest three mode (max load, mid load, min load) for EUT. The worst mode (min load) test data see follow the table.

For Adapter Power supply



For POE power supply



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### 5 Radiated Emission Test

#### 5.1 Measurement Procedure

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measured were complete.
- 5. Use the following receiver/spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW=200Hz for 9KHz to 150KHz,

RBW=9kHz for 150KHz to 30MHz,

RBW=120KHz for 30MHz to 1GHz

 $VBW \ge 3*RBW$ 

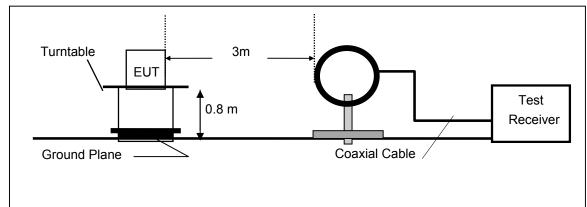
Sweep = auto

Detector function = QP

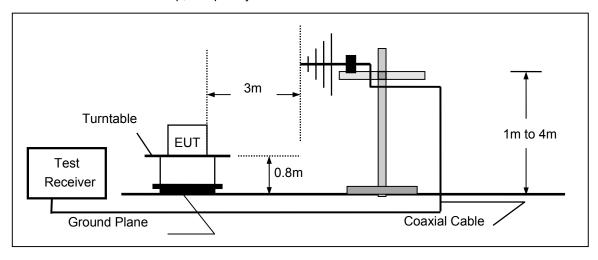
Trace = max hold

### 5.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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### 5.3 Measurement Equipment Used

moacaromont =q	aipinoni oooa			
EQUIPMENT	MFR	MODEL	SERIAL	LAST CAL.
TYPE		NUMBER	NUMBER	
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2016
Pre-Amplifier	HP	8447D	2944A07999	May 28, 2016
Bilog Antenna	Schwarzbeck	VULB9163	142	May 28, 2016
Loop Antenna	ARA	PLA-1030/B	1029	May 28, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 28, 2016
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 28, 2016
Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2016
Cable	Rosenberger	N/A	FP2RX2	May 29, 2016
Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2016
Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2016

### 5.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

	FCC Part 15.209											
	Field Streng		Field Strength Limitation Frequency tion at 3m									
Frequency	Limitation		Meas	urement Dist								
(MHz)	(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								

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15.205 Restricted bands of operation

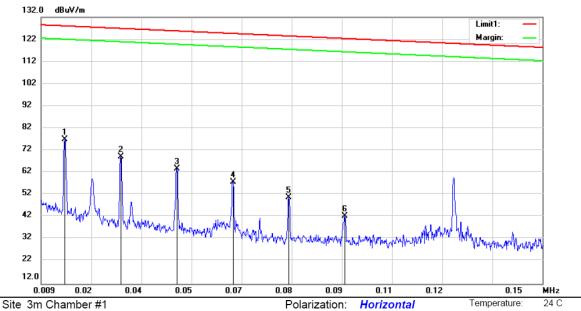
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )

- Remark: 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
  - 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205, and the emissions located in restricted bands also comply with 15.209



### **5.5 Measurement Result**

We pretest three mode (max load, mid load, min load) for EUT. The worst mode (min load) test data see follow the table.



Limit: ( RE)FCC PART 15.247(9K-30M)

Mode: 125K TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0156	56.56	20.54	77.10	128.02	-50.92	QP			
2		0.0314	48.38	20.69	69.07	126.88	-57.81	QP			
3		0.0472	42.76	20.95	63.71	125.74	-62.03	QP			
4		0.0630	37.14	20.58	57.72	124.60	-66.88	QP			
5		0.0786	30.46	20.27	50.73	123.48	-72.75	QP			
6		0.0944	21.87	20.59	42.46	122.34	-79.88	QP			

Power: AC 120V/60Hz

Humidity:

Operator: csl

53 %

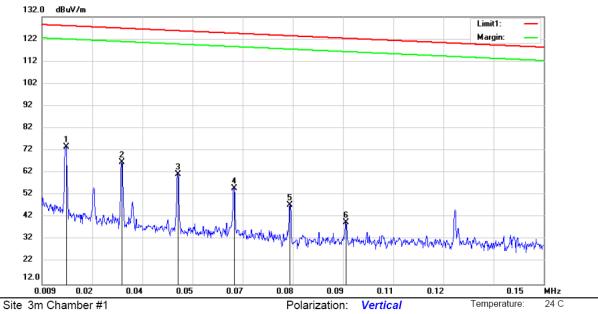
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<sup>\*:</sup>Maximum data x:Over limit !:over margin



Humidity:

53 %



Power: AC 120V/60Hz

Limit: ( RE)FCC PART 15.247(9K-30M)

Mode:125K TX

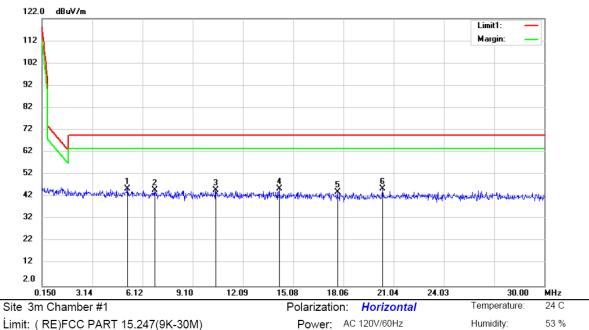
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0156	53.24	20.54	73.78	128.02	-54.24	QP			
2		0.0314	46.09	20.69	66.78	126.88	-60.10	QP			
3		0.0472	40.53	20.95	61.48	125.74	-64.26	QP			
4		0.0630	34.50	20.58	55.08	124.60	-69.52	QP			
5		0.0786	27.40	20.27	47.67	123.48	-75.81	QP			
6		0.0944	19.18	20.59	39.77	122.34	-82.57	QP			

\*:Maximum data x:Over limit !:over margin Operator: csl

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Limit: ( RE)FCC PART 15.247(9K-30M)

Mode: 125K TX

Note:

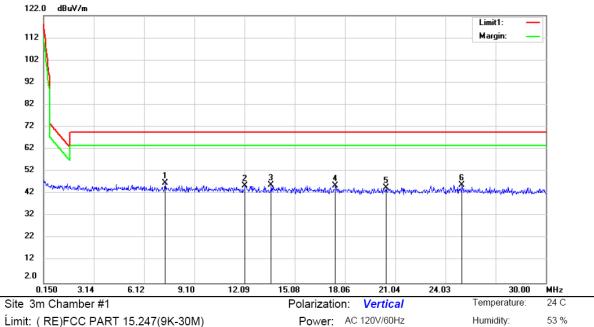
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		5.2244	25.33	20.33	45.66	69.50	-23.84	QP			
2		6.8364	24.68	20.28	44.96	69.50	-24.54	QP			
3		10.4780	24.92	20.14	45.06	69.50	-24.44	QP			
4		14.2392	25.75	19.87	45.62	69.50	-23.88	QP			
5		17.7017	24.62	19.62	44.24	69.50	-25.26	QP			
6	*	20.3883	26.34	19.44	45.78	69.50	-23.72	QP			

\*:Maximum data x:Over limit !:over margin Operator: csl

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Operator: csl



Limit: ( RE)FCC PART 15.247(9K-30M)

Mode: 125K TX

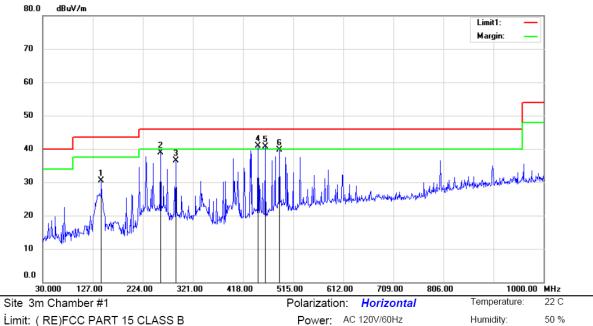
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	7.3737	26.51	20.27	46.78	69.50	-22.72	QP			
2		12.1198	25.51	20.02	45.53	69.50	-23.97	QP			
3		13.6721	25.94	19.91	45.85	69.50	-23.65	QP			
4		17.4930	25.88	19.63	45.51	69.50	-23.99	QP			
5		20.5077	25.29	19.44	44.73	69.50	-24.77	QP			
6		25.0150	26.69	19.29	45.98	69.50	-23.52	QP			

\*:Maximum data x:Over limit !:over margin

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Limit: ( RE)FCC PART 15 CLASS B

Mode:TX 125K

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		143.4900	46.94	-16.47	30.47	43.50	-13.03	QP			
2		257.9500	49.33	-10.48	38.85	46.00	-7.15	QP			
3		288.0200	45.83	-9.35	36.48	46.00	-9.52	QP			
4	*	447.1000	47.38	-6.51	40.87	46.00	-5.13	QP			
5	ļ	460.6800	47.24	-6.60	40.64	46.00	-5.36	QP			
6		488.8100	45.64	-5.93	39.71	46.00	-6.29	QP			

\*:Maximum data Operator: Vern x:Over limit !:over margin

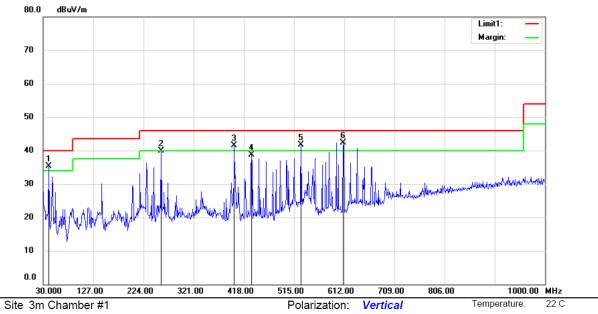
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Humidity:

Operator: Vern

50 %



Power: AC 120V/60Hz

Limit: ( RE)FCC PART 15 CLASS B

Mode:TX 125K

Note:

No.	MI	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	ļ	40.6700	47.95	-12.55	35.40	40.00	-4.60	QP			
2		257.9500	50.30	-10.48	39.82	46.00	-6.18	QP			
3	ļ	399.5700	48.45	-7.01	41.44	46.00	-4.56	QP			
4		432.5500	45.18	-6.54	38.64	46.00	-7.36	QP			
5	ļ	528.5800	46.88	-5.23	41.65	46.00	-4.35	QP			
6	*	610.0600	46.01	-3.68	42.33	46.00	-3.67	QP			

\*:Maximum data x:Over limit !:over margin

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