FCC DoC
TEST REPORT

for

DC-DC CONVERTER

Model : KQWS SERIES

Brand : DANUBE

Test Report Number:

91117403-D

Issued for

Danube Enterprise Co., Ltd.

A2, No. 255, Fengren Rd., Renwu Shiang, Kaohsiung County 814, Taiwan(R.O.C.)

Issued by

Compliance Certification Services Inc.

Tainan Laboratory

No. 8, Jiu Cheng Ling, Jiaokeng Village, Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.
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Issued Date: February 25, 2010

REVISION HISTORY

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		February 25, 2010		Initial Issue	ALL	Leah Peng

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1. TEST RESULT CERTIFICATION

Product:	DC-DC CONVERTER
Model:	KQWS SERIES
Brand:	DANUBE
Applicant:	Danube Enterprise Co., Ltd.
	A2, No. 255, Fengren Rd., Renwu Shiang, Kaohsiung County 814, Taiwan(R.O.C.)
Manufacturer:	Danube Enterprise Co., Ltd.
	A2, No. 255, Fengren Rd., Renwu Shiang, Kaohsiung County 814, Taiwan(R.O.C.)
Tested:	November 20, 2009 ~ February 4, 2010

EMISSION			
Standard	**Item**	**Result**	**Remarks**
FCC 47 CFR Part 15 Subpart B, ICES-003 Issue 4 ANSI C63.4 : 2003	Conducted (Main Port)	N/A	**No requirement for DC device**
	Radiated	PASS	Meet Class A limit

NOTE: 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
None

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Jeter Wu
Section Manager

Reviewed by:

Eric Huang
Assistant Section Manager

2. EUT DESCRIPTION

Product	DC-DC CONVERTER
Model	KQWS SERIES
Brand	DANUBE
Applicant	Danube Enterprise Co., Ltd.
Manufacturer	Danube Enterprise Co., Ltd.
Housing material	Metal
EUT Type	☒ Engineering Sample. ☐ Product Sample. ☐ Mass Product Sample.
Serial Number	N/A
Received Date	November 17, 2009
Power Source	For model: **KQWS-1205** (I/P :9-18VDC, O/P: 5VDC / 8000mA) For model: **KQWS-1203.**3 (I/P: 9-18VDC, O/P:3.3VDC / 10000mA) For model: **KQWS-4815** (I/P: 36-75VDC, O/P:15VDC / 2667mA)

NOTE:

1. Client consigns three model samples to test (Model Number: **KQWS-1205; KQWS-1203.3; KQWS-4815**). Therefore, the testing Lab. just guarantees the unit, which has been tested.

2. For more details, please refer to the User's manual of the EUT.

KQWS PARTNUMBERS STRUCTURE

Series	Coding scheme	
KQWS Series	KQWv-x1x2THSzzz	KQ=Series Name W=Wide Input Range v=Type of output voltage (S=single output) x1=12V(9~18V ; 9~36V Input voltage) 24V(18~36V ; 18~75V Input voltage) 48V(36~75V Input voltage) x2=Output voltage(03.3~4.5V；05~8.5V； 09~11.5V；12~14.5V；15~18V) T= 4:1 Input voltage HS=With Heat Sink zzz= 0~9，A~Z or blank for market purpose.

3. TEST METHODOLOGY

3.1 DECISION OF FINAL TEST MODE

The EUT was tested together with the above additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration/ mode is as the following:

Test Mode:

1. Full load (model: KQWS-1205)
2. Full load (model: KQWS-1203.3)
3. Full load (model: KQWS-4815)

3.2 EUT SYSTEM OPERATION

1. Setup whole system for test as shown on setup diagram.
2. Turn on power and check function.
3. Start to test.

4. SETUP OF EQUIPMENT UNDER TEST

4.1 DESCRIPTION OF SUPPORT UNITS

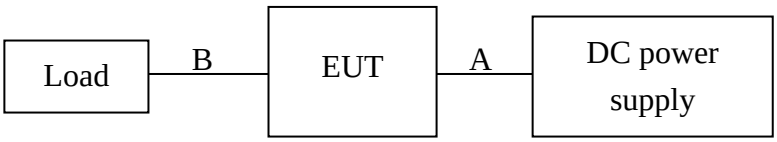
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	DC power supply	LOKO	DPS-5050	DOC	Power cable, unshd, 1.6m

No.	Signal cable description	
A	DC Power Input cable	Unshielded, 0.7m, 1pcs.
B	DC Power Output cable	Unshielded, 0.01m, 1pcs.

NOTE:
1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.1 CONFIGURATION OF SYSTEM UNDER TEST



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC
Japan	VCCI
Canada	INDUSTRY CANADA
Taiwan	TAF, BSMI
Europe	TÜV NORD

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsemc.com.tw

5.3 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:

Measurement		Frequency	Uncertainty
Power Line Conducted Emission		9kHz~30MHz	±1.80dB
Radiated Emission (10m)	Test Site : OATS-5	30 MHz ~200 MHz	±3.75dB
		200 MHz ~1000 MHz	±2.86dB
	Test Site : OATS-6	30 MHz ~200 MHz	±3.59dB
		200 MHz ~1000 MHz	±3.52dB
	Test Site : OATS-7	30 MHz ~200 MHz	±3.90dB
		200 MHz ~1000 MHz	±3.47dB
Radiated Emission (3m)	Test Site : OATS-5	30 MHz ~200 MHz	±3.62dB
		200 MHz ~1000 MHz	±3.19dB
	Test Site : OATS-6	30 MHz ~200 MHz	±3.48dB
		200 MHz ~1000 MHz	±2.76dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6. EMISSION TEST

6.1 CONDUCTED EMISSION MEASUREMENT

6.1.1 LIMITS

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	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 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

6.1.2 TEST INSTRUMENTS

Conducted Emission room #1				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
L.I.S.N.	Rohde & Schwarz	ESH 3-Z5	840062/021	NOV. 29, 2010
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 16, 2010
BNC COAXIAL CABLE	CCS	BNC50	11	AUG. 26, 2010
Test S/W	e-3 (5.04211c) R&S (2.27)			

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.1.3 TEST PROCEDURES

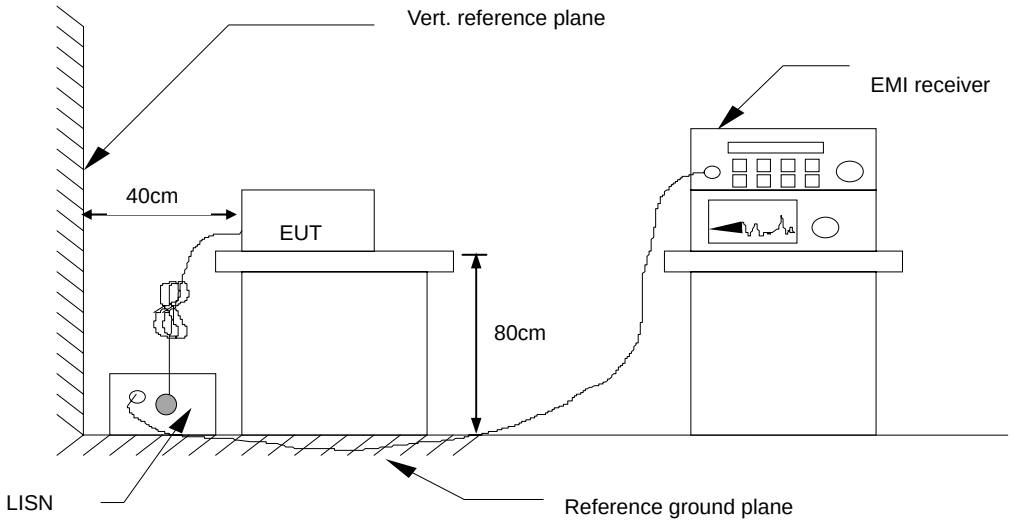
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- The test equipment EUT installed received main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

6.1.4 TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.1.5 DATA SAMPLE

Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Meter Reading (dBuV)	Measured Level (dBuV)	Limits (dBuV)	Over Limits (dBuV)	Detector
x.xx	9.6	0.1	15.7	25.4	46	-20.6	QP

REMARKS： 1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)

2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

6.1.6 TEST RESULTS

NOTE: This EUT has not connection to AC Source directly. No applicability for this test.

6.2 LIMITS OF RADIATED EMISSION MEASUREMENT

CISPR 22

FREQUENCY (MHz)	dBuV/m (At 10m)	
	Class A	Class B
30 ~ 230	40	30
230 ~ 1000	47	37

Maximum permissible level of Radiated Emission measured at 3 meter (Section 15.109)
Class B

FREQUENCY (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m)
30-88	3	100
88-216	3	150
216-960	3	200
Above 960	3	500

Maximum permissible level of Radiated Emission measured at 10 meter (Section 15.109)
Class A

FREQUENCY (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m)
30-88	10	90
88-216	10	150
216-960	10	210
Above 960	10	300

6.2.1 TEST INSTRUMENTS

Open Area Test Site # 7				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TEST RECEIVER	Rohde & Schwarz	ESCS30	100343	DEC. 01, 2010
TYPE N COAXIAL CABLE	SUHNER	RG_214_U/2X	7	NOV. 26, 2010
BILOG ANTENNA	Sunol sciences	JB1	A013105-1	DEC. 10, 2010
Test Software	EMI e-3 / AUDIX (5.04211c)			

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.2.2 TEST PROCEDURES

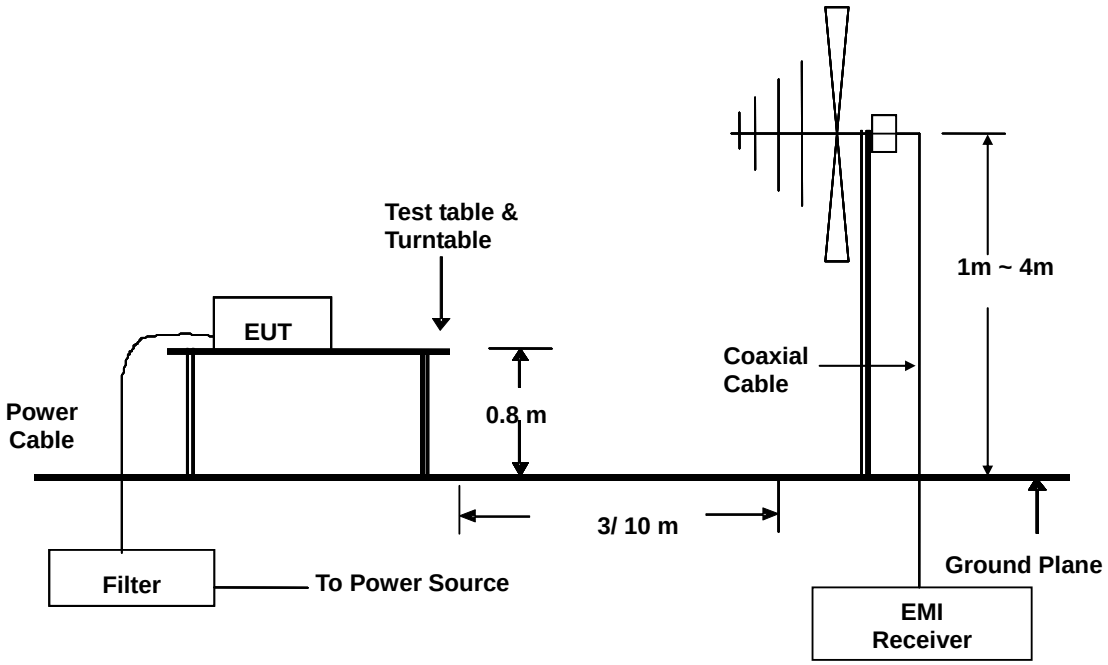
Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- The EUT received main power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- Mains cables, telephone lines or other connections to auxiliary equipment located outside the test shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.
- The antenna was placed at 3/10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst-case condition(s) was recorded.

6.2.3 TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.2.4 DATA SAMPLE

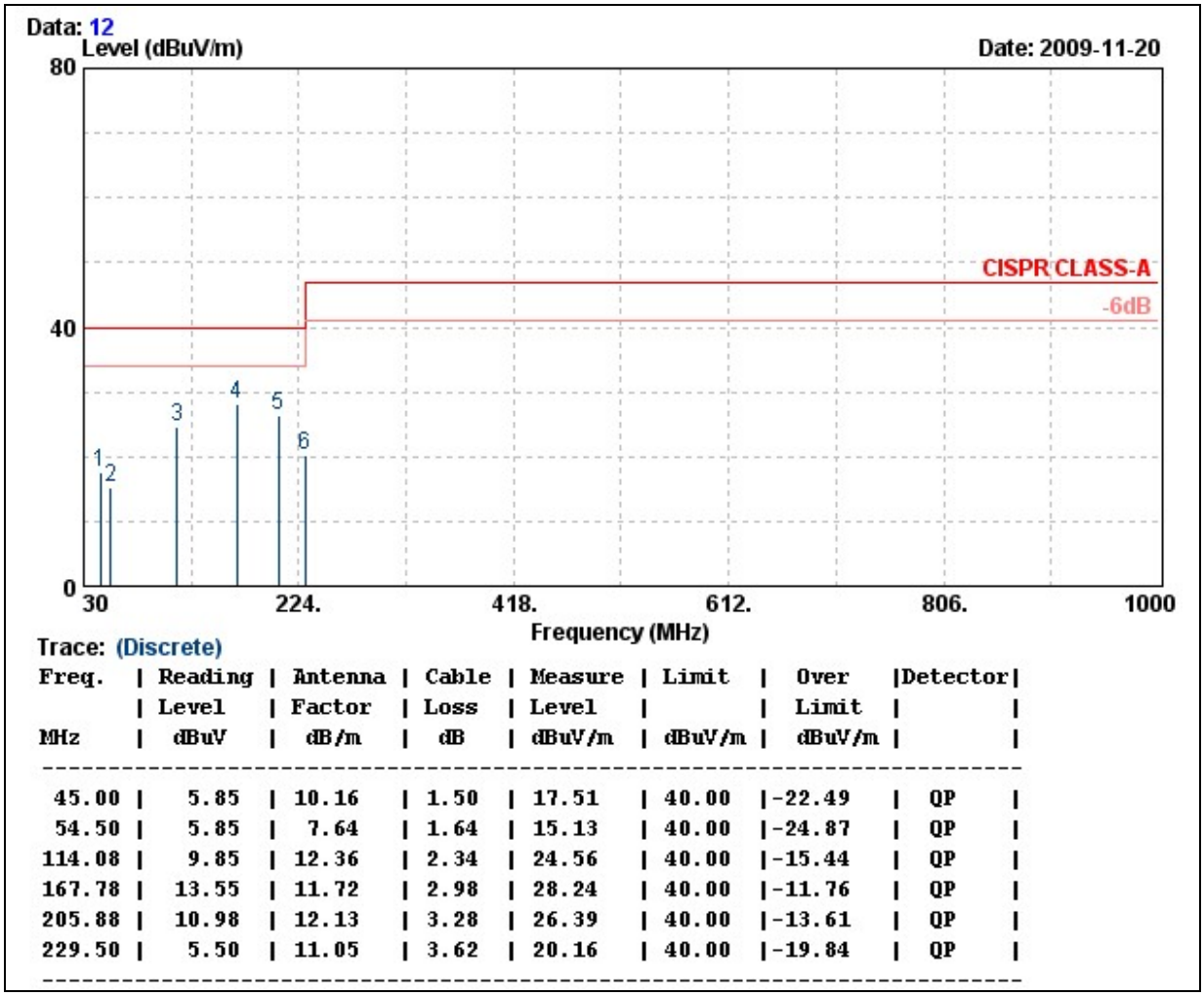
Freq. (MHz)	Reading Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dBuV/m)
xx.xx	14.00	12	0.2	26.2	30	-3.80

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

6.2.5 TEST RESULTS

Model No.	KQWS-1205	Test Mode	Full load
Environmental Conditions	31 ℃, 60 % RH	Resolution Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function:	Quasi-peak.	Tested By	Vision Chang



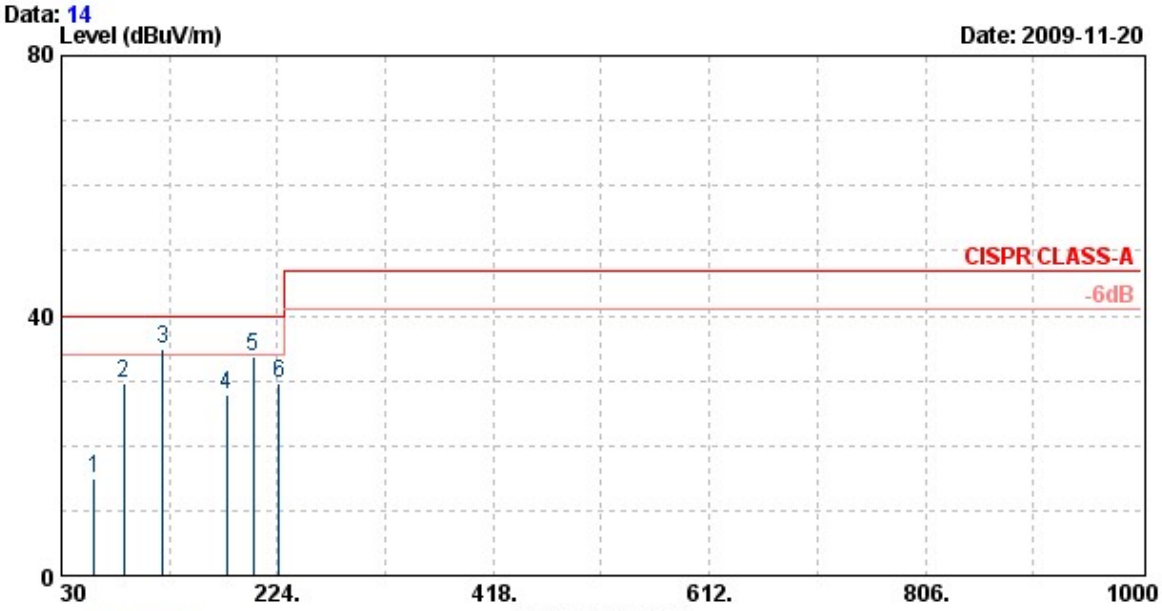
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
45.00	5.85	10.16	1.50	17.51	40.00	-22.49	QP
54.50	5.85	7.64	1.64	15.13	40.00	-24.87	QP
114.08	9.85	12.36	2.34	24.56	40.00	-15.44	QP
167.78	13.55	11.72	2.98	28.24	40.00	-11.76	QP
205.88	10.98	12.13	3.28	26.39	40.00	-13.61	QP
229.50	5.50	11.05	3.62	20.16	40.00	-19.84	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

Model No.	KQWS-1205	**Test Mode**	Full load
Environmental Conditions	31 ℃, 60 % RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Vision Chang



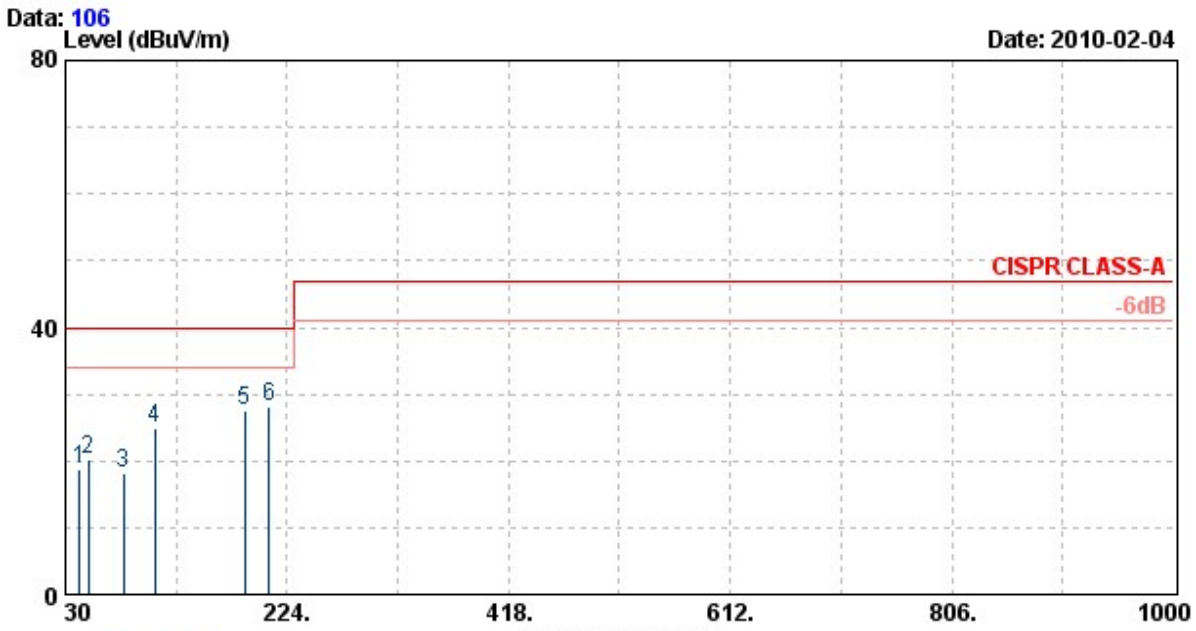
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
59.50	5.85	7.28	1.69	14.82	40.00	-25.18	QP
86.30	19.78	7.78	1.96	29.52	40.00	-10.48	QP
120.83	18.89	13.42	2.42	34.73	40.00	-5.27	QP
178.63	13.58	11.08	3.08	27.74	40.00	-12.26	QP
202.45	18.12	12.43	3.24	33.79	40.00	-6.21	QP
225.65	15.21	10.88	3.56	29.66	40.00	-10.34	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

Model No.	KQWS-1203.3	Test Mode	Full load
Environmental Conditions	25.1 ℃, 54 % RH	Resolution Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function:	Quasi-peak.	Tested By	Vision Chang



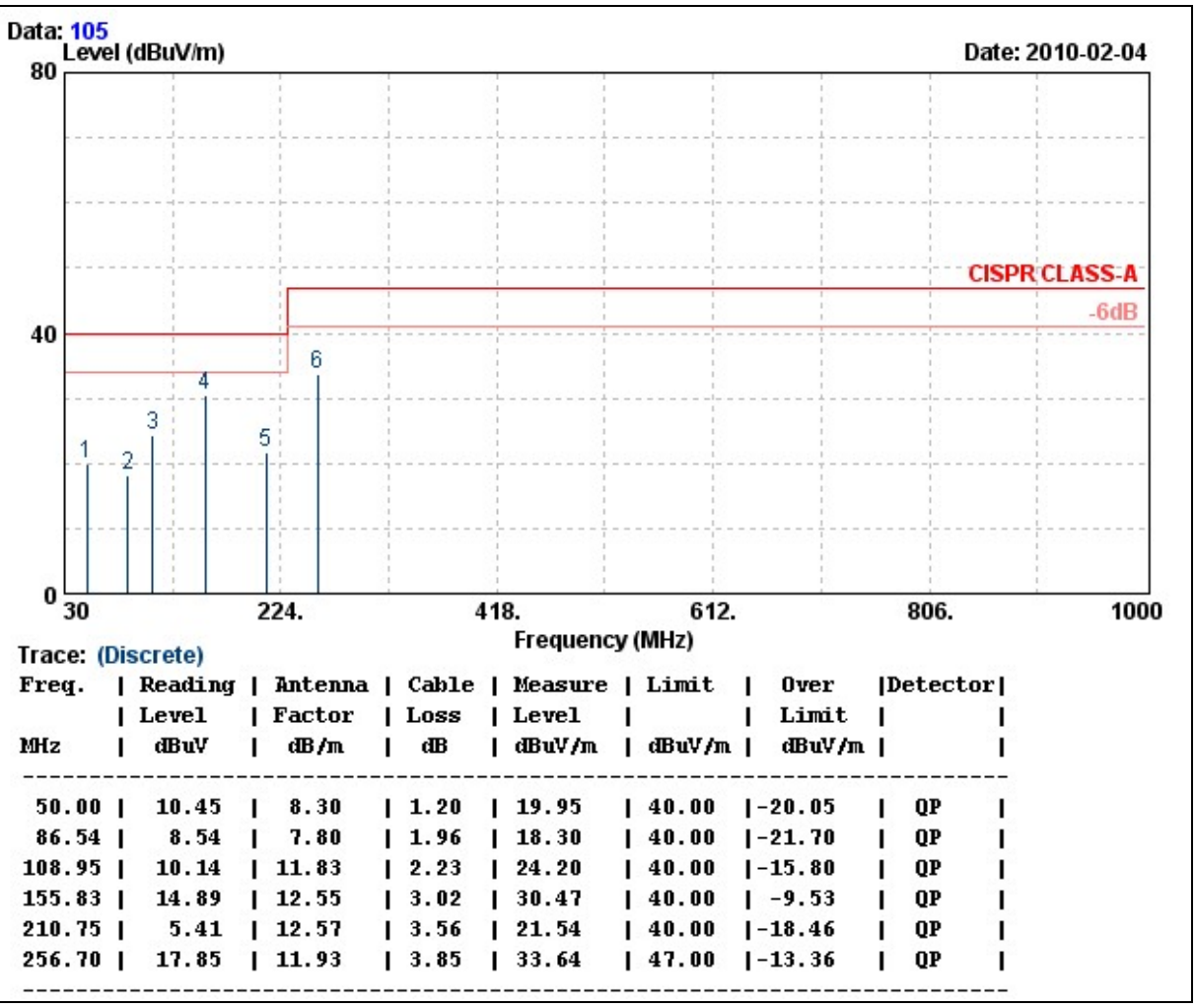
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
42.15	6.45	11.28	1.16	18.89	40.00	-21.11	QP
50.50	10.85	8.30	1.20	20.35	40.00	-19.65	QP
80.54	8.55	7.80	1.90	18.25	40.00	-21.75	QP
108.65	10.87	11.83	2.23	24.93	40.00	-15.07	QP
186.54	12.74	11.61	3.22	27.57	40.00	-12.43	QP
208.45	11.85	12.61	3.55	28.01	40.00	-11.99	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

Model No.	KQWS-1203.3	**Test Mode**	Full load
Environmental Conditions	25.1 ℃, 54 % RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Vision Chang



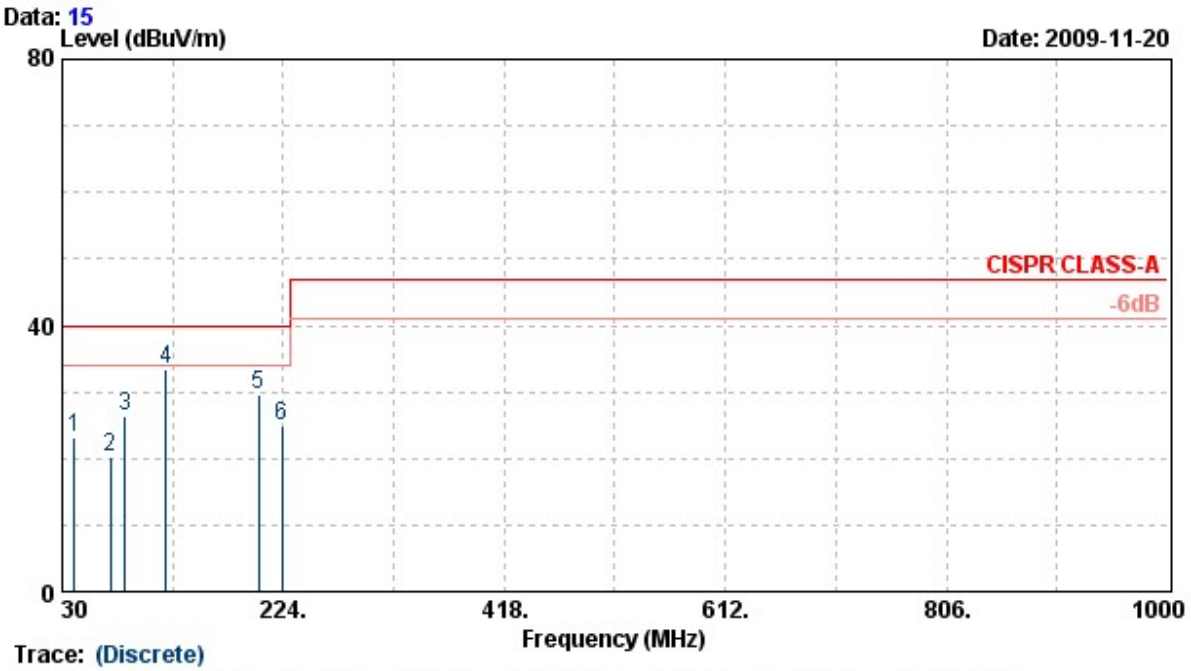
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
50.00	10.45	8.30	1.20	19.95	40.00	-20.05	QP
86.54	8.54	7.80	1.96	18.30	40.00	-21.70	QP
108.95	10.14	11.83	2.23	24.20	40.00	-15.80	QP
155.83	14.89	12.55	3.02	30.47	40.00	-9.53	QP
210.75	5.41	12.57	3.56	21.54	40.00	-18.46	QP
256.70	17.85	11.93	3.85	33.64	47.00	-13.36	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

Model No.	KQWS-4815	**Test Mode**	Full load
Environmental Conditions	31 ℃, 60 % RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Vision Chang



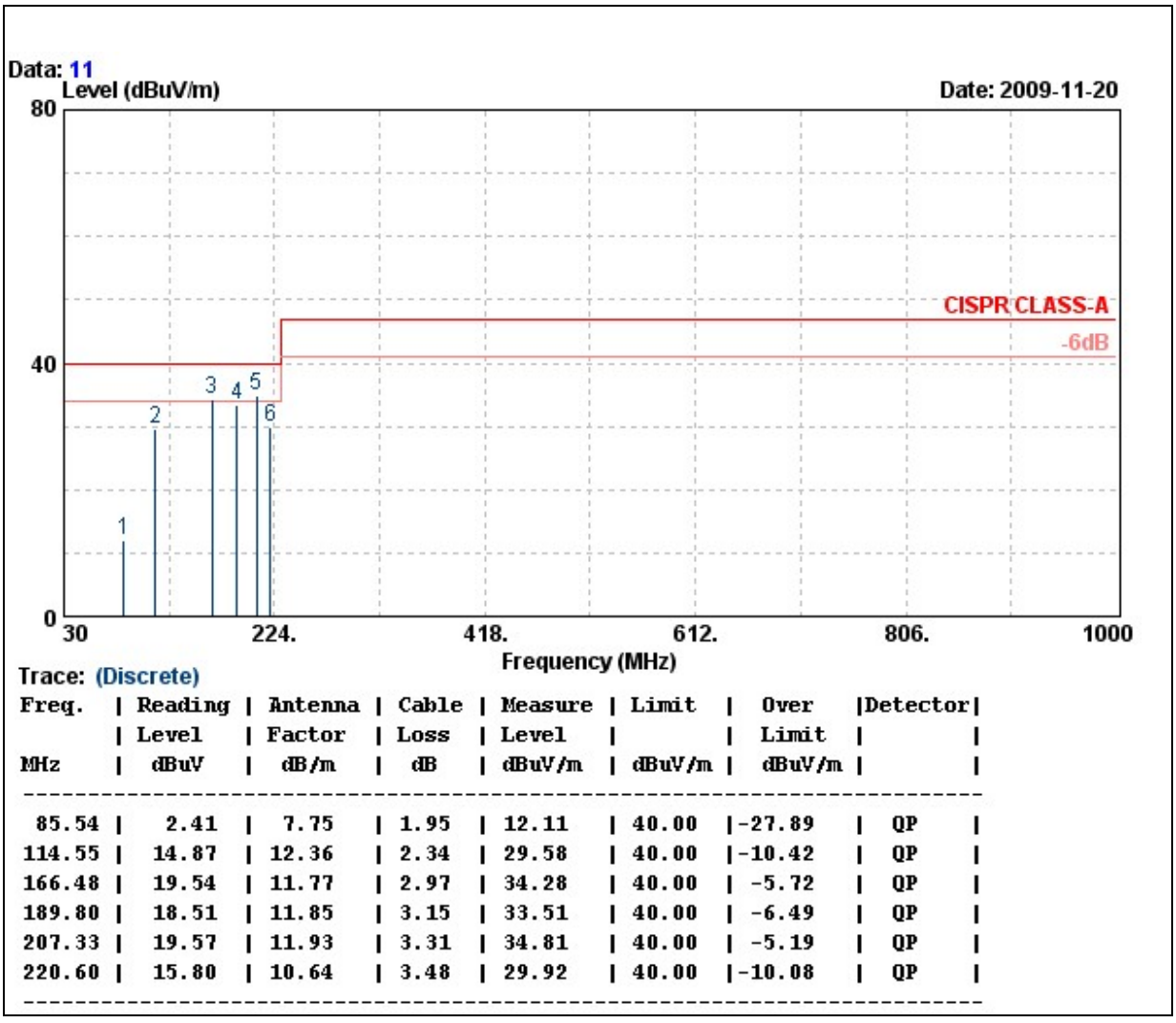
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
40.98	9.12	12.73	1.34	23.19	40.00	-16.81	QP
72.08	10.58	7.72	1.82	20.12	40.00	-19.88	QP
85.18	16.54	7.75	1.95	26.24	40.00	-13.76	QP
120.80	17.54	13.42	2.42	33.38	40.00	-6.62	QP
202.15	13.98	12.53	3.23	29.74	40.00	-10.26	QP
222.90	10.54	10.76	3.52	24.82	40.00	-15.18	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

Model No.	KQWS-4815	**Test Mode**	Full load
Environmental Conditions	31 ℃, 60 % RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Vision Chang



Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
85.54	2.41	7.75	1.95	12.11	40.00	-27.89	QP
114.55	14.87	12.36	2.34	29.58	40.00	-10.42	QP
166.48	19.54	11.77	2.97	34.28	40.00	-5.72	QP
189.80	18.51	11.85	3.15	33.51	40.00	-6.49	QP
207.33	19.57	11.93	3.31	34.81	40.00	-5.19	QP
220.60	15.80	10.64	3.48	29.92	40.00	-10.08	QP

REMARKS： 1.Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2.Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)

7 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST

END OF REPORT