

DASTEK EMC Lab

204, Chuge-Ri, Yangji-Myeon, Yongin -Shi, Kyounggi-Do, Korea

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FCC TEST REPORT

APPLICANT : **WOOJU Communication Co., Ltd.**
EUT Type : **X-DVR**
Model Name : **WDVR-430B**
Serial No : **N/A**
Manufacturer Name : **WOOJU Communication Co., Ltd.**
Address & Country : **446-3, Nonhyun-Dong, Namdong-Ku, Inchon, Korea**
Rule Part(s): : **FCC 15 Subpart B**
Equipment Class : **Class B**

This device has been shown to be capable of compliance with the applicable technical standard as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992 with the following remarks

(Note codes): (#37)

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Report No: DAC02-K0474

Issued Date : August 19, 2002



In-Young, Chung.

Manager EMC Dept

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Scope

Measurement and determination of electromagnetic emissions(EMI) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Company Name : WOOJU Communication Co., Ltd.
446-3,Nonhyun-Dong,Namdong-Ku, Inchon, Korea
Attention: : Dong-Moon, Lim

FCC ID: : QFMWDVR430B00
Class: : Class B
EUT Type : X-DVR
Model Name : WDVR-430B
Trade Name : WOOJU Communication Co., Ltd.
Rule Part(s) : FCC Part 15 Subpart B
Test Procedure : ANSI C-63.4 (1992)
Date of Test(s) : Aug 07, 2002
Place of Tests : Dastek EMC Lab, in Korea.
Test Report No : DAC02-K0474



Introduction

These measurement tests were conducted at *Dastek EMC Laboratory* facility in Korea. The site address is 204 Chuge-Ri, Yangji-Myeon, Yongin-City, Kyunggi-Do, Korea. *Dastek EMC Laboratory* is a company that has started the July of 1981, for manufacturing of EMI noise filters and EMI Test and diverging service.

The area of test site is located at 54 Kilometers (33miles) southeast from seoul International Airport, 42 Kilometers (26miles) south-southeast from central seoul where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing devices manufacturers.

The detailed description of the measurement facility was found to be in compliance with the requirements of section 2.948 according to ANSI C63.4 on November 02, 2000(Registration Number:90547).



Product Information

Equipment Description

The Equipment under Test (EUT) is the X-DVR of WOOUJ Communication Co., Ltd.

Model Name: WDVR-430B

Serial Number : N/A

1. EUT Specification.

| | | WDVR-430B |
|---------------------------|--------------------|------------------------------------|
| Video | Input | 4ch(BNC), NTSC/PAL |
| Audio | Input | 1ch(RCA) |
| Display | Speed | 30fps(4ch) |
| | Split Screen | 1, 4 |
| Recording | Speed | 30fps(4ch) |
| | Resolution | 320 x 240(2k) |
| | Compression Method | MPEG I, II |
| | Mode | Motion Detection, Schedule, Sensor |
| Playback | Display | 1, 4 |
| | Search Mode | Data, Time, channel |
| Monitor | Output | N/A |
| Control (optional) | Sensor Input | 4 points |
| | Relay Output | 2 points |
| Network | Transmission Speed | Real - Time |
| | Remote View | Via client software |
| | Media | Support Dynamic IP |
| Others | Watch Dog | Self Recover |
| | O/S | Support Windows 98 Se |

Description of Tests

Conducted Emissions

The line conducted facility is located inside a 4.6(m)x6.5(m)x2.5(m) shielded room. A wooden table 80cm high is located on one side of the shielded room; desktop EUTs are placed on top of this table.

The rear of the EUT is placed a minimum of 40cm from the shielded room wall.

The side of the EUT is 1m from the LISN, which is bonded to the shielded room wall Via a 1-foot wide bonding strap.

The LISN is isolated from the other filtered power via an additional filter to ensure that RFI from the auxiliary instrumentation(scopes, etc.) does not influence the readings.

The excess power cord from the EUT is folded back and forth to form a 30-40cm non-inductive bundle. All interconnecting cables more than 1 meter were shortened

by

non-inductive bundling (serpentine fashion) to a 1 meter length.

Sufficient time for the EUT, support equipment, and test equipment was allowed in Order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EMI from the EUT.

The spectrum was scanned from 450KHz to 30MHz with 20 msec sweep time.

The frequency producing the maximum level was reexamined using Quasi-Peak adapter.

The detector function was set to CISPR quasi-peak mode.

The bandwidth of the receiver was set to 9KHz.

The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EMI emission.

Each emission was maximized by: switching power lines, varying the mode of operation

or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission.



Photographs of the worst-case emission can be seen in Appendix C.

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EMI.

Appropriate precaution was taken to ensure that all EMI from the EUT were maxi and azimuth with respect to the antenna were noted for each Frequency found.

The spectrum was scanned from 30 to 200 MHz using biconical antenna and 200 to 1000 MHz using log-periodic antenna.

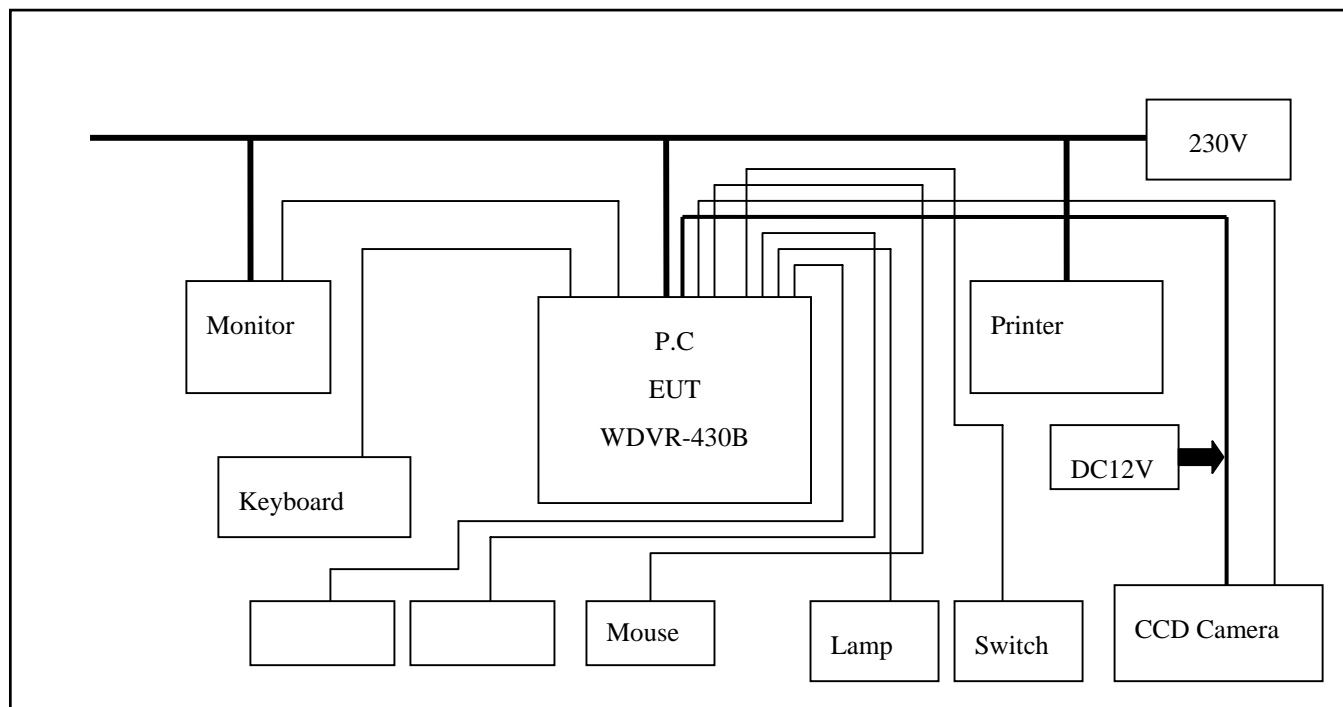
Final measurements were made outdoors at 10-meter test range using biconical and log periodic antennas. The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2-meter area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using Quasi Peak Adapter. The detector function was set to CISPR quasi peak mode and the bandwidth of the receiver was set to 100KHz or 1MHz depending on the frequency or type of signal.

EUT, support equipment and interconnecting cables were reconfigured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8 meter high nonmetallic 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EMI emission. The turntable containing the system was rotated: the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C.

Support Equipment Used

| Product | Model | Serial N/A | Manufacture | Remark |
|------------|-----------|----------------|-------------------------------|--------|
| Computer | DA-586A | DA1398105 | JEWO Informations Co., Ltd. | |
| Monitor | CPG17P(T) | P060H2JKA01862 | SAMSUNG Electronics Co., Ltd. | |
| Mouse | P801 | 35461 | KYE SYSTEMS | |
| Mouse | M-U48a | LZC11052374 | LOGITECH | |
| Mouse | OK-720 | N/A | A-FOUR TECH | |
| CCD Camera | CN-120 | N/A | NEOCOM | |
| Keyboard | SEM-DT35 | 3V022992 | hyunju computer | |
| Printer | EPSON460 | N/A | EPSON | |
| | | | | |

Distance : 3.0m



Test Result

Conducted Emission

| Frequency(MHz) | Level(dBuV) | Lines | Factor | Limit(dBuV) | Margin(dBuV) |
|----------------|-------------|-------|--------|-------------|--------------|
| 0.48 | 34.00 | H | | 48.00 | 14.00 |
| 0.52 | 30.50 | H | | 48.00 | 17.50 |
| 0.92 | 30.00 | N | | 48.00 | 18.00 |
| 10.05 | 29.00 | N | | 48.00 | 19.00 |
| | | | | | |
| | | | | | |

Conducted Emissions Test Result

Pass

Fail

Notes:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. The test graph 11 page
3. Lines : H :Line's Name, N :Neutral.



Radiated Emissions

Distant: 3.0m

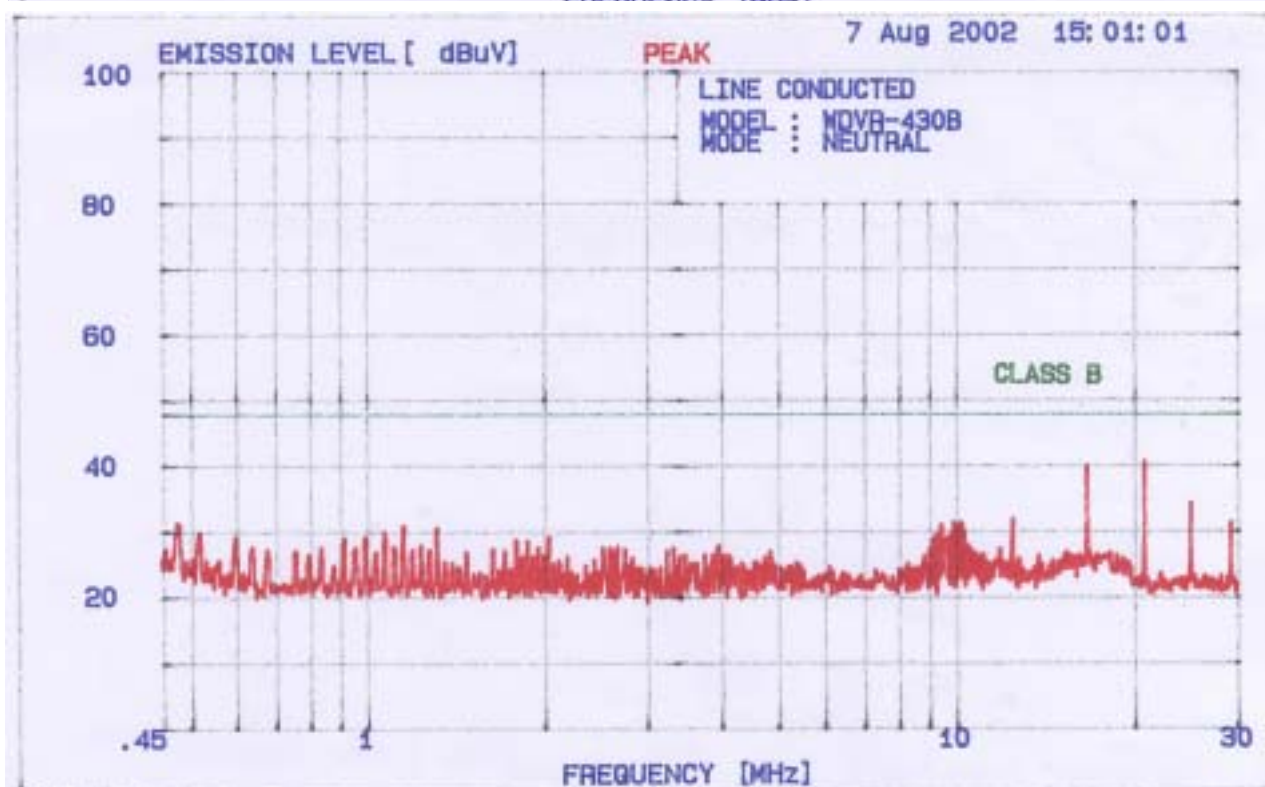
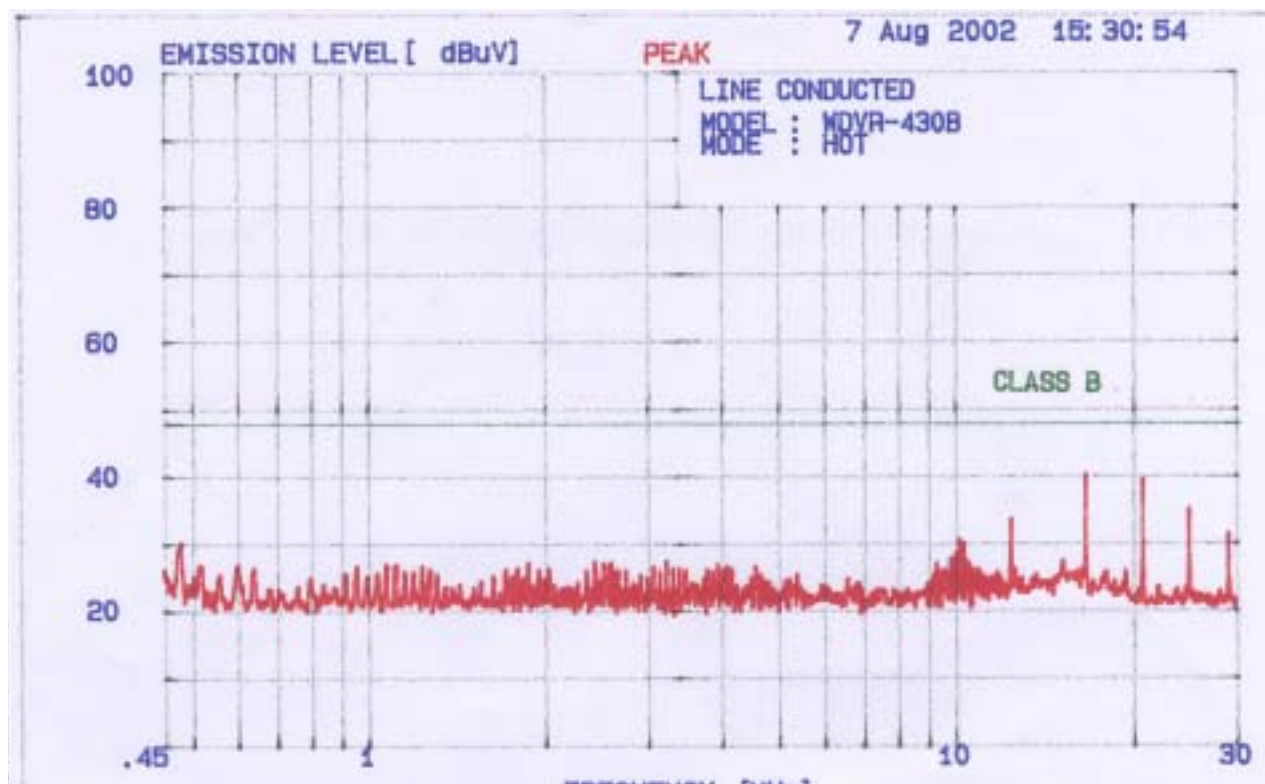
| Frequency | Level | Pole | Factors(dBuv) | | Emission | Limit | Margin |
|-----------|--------|------|---------------|-------|---------------|--------|--------|
| (MHz) | (dBuV) | H/N | Ant | Cable | Level(dBuV/m) | (dBuV) | (dBuV) |
| 85.90 | 25.00 | V | 7.86 | 2.22 | 35.08 | 40.00 | 4.92 |
| 57.27 | 27.00 | V | 5.97 | 1.84 | 34.82 | 40.00 | 5.18 |
| 400.90 | 17.00 | V | 15.71 | 5.51 | 38.22 | 46.00 | 7.78 |
| 200.45 | 23.00 | H | 8.62 | 3.60 | 35.23 | 43.50 | 8.27 |
| 143.18 | 22.00 | H | 10.21 | 2.95 | 35.16 | 43.50 | 8.34 |
| 214.77 | 21.00 | H | 9.48 | 3.78 | 34.26 | 43.50 | 9.24 |

Radiated Emissions Test Result**Pass****Fail**

Notes:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. Detail date : 12 Page
3. Pole : H :Horizontal, V :Vertical.
4. It is highest Level point (6point)

Conducted Emission Data



Radiated Emission Data

Radiated Emission test data Sheet

***** DASTEK Co., Ltd. DASTEK EMC TEST SITE *****

INTERFERENCE RADIATION TEST REPORT

according to : ANSI-C63.4 1992

Applicant : WOOJU Communication Co., Ltd.
 MODEL NUMBER : WDVR-430B
 SERIAL NUMBER : N/A
 POWER SOURCE : 230V
 DATE TESTED : 07-Aug-02
 FILE NUMBER :
 REGULATION : FCC PART15 CLASS B
 ANT.PAD [dB] :
 DISTANCE [m] : 3.0 (m)

| No | FREQ [MHz] | ANT | READING LEVEL [dBuV] | Pole H/V | ANT FACTOR [dB] | CABLE LOSS [dB] | AMP GAIN [dB] | EMISSION LEBEL [dBuV/m] | LIMIT | MARGIN [dB] |
|----|---------------|-------|----------------------------|-------------|--------------------|-----------------------|---------------------|-------------------------------|-------|----------------|
| 1 | 57.27 | BILOG | 27.00 | V | 5.97 | 1.84 | 0.00 | 34.82 | 40.00 | 5.18 |
| 2 | 85.90 | BILOG | 25.00 | V | 7.86 | 2.22 | 0.00 | 35.08 | 40.00 | 4.92 |
| 3 | 143.18 | BILOG | 22.00 | H | 10.21 | 2.95 | 0.00 | 35.16 | 43.50 | 8.34 |
| 4 | 167.20 | BILOG | 19.00 | V | 8.88 | 3.27 | 0.00 | 31.16 | 43.50 | 12.34 |
| 5 | 186.13 | BILOG | 16.00 | V | 8.48 | 3.46 | 0.00 | 27.94 | 43.50 | 15.56 |
| 6 | 200.45 | BILOG | 23.00 | H | 8.62 | 3.60 | 0.00 | 35.23 | 43.50 | 8.27 |
| 7 | 214.77 | BILOG | 21.00 | H | 9.48 | 3.78 | 0.00 | 34.26 | 43.50 | 9.24 |
| 8 | 257.72 | BILOG | 17.00 | V | 11.78 | 4.28 | 0.00 | 33.06 | 46.00 | 12.94 |
| 9 | 300.67 | BILOG | 17.00 | V | 12.82 | 4.70 | 0.00 | 34.52 | 46.00 | 11.48 |
| 10 | 329.31 | BILOG | 15.00 | V | 13.71 | 4.88 | 0.00 | 33.58 | 46.00 | 12.42 |
| 11 | 372.26 | BILOG | 15.00 | V | 14.95 | 5.22 | 0.00 | 35.17 | 46.00 | 10.83 |
| 12 | 400.90 | BILOG | 17.00 | V | 15.71 | 5.51 | 0.00 | 38.22 | 46.00 | 7.78 |

401 - 1000 MHz : MORE THAN 20dB BELOW LIMIT
 MISSION LEVEL = READING LEVEL + ANTENNA FACTOR
 CABLE LOSS- AMP GAIN + ANTENNA PAD



Ki-Wang, Kim Test Engineer



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Sample Calculations (Radiated)

$$\text{dBuV} = 20 \log_{10}(\text{uV/m})$$

$$\text{uV} = 10^{\frac{(\text{dBuV}/20)}{20}}$$

EX 1.

@ 162.03 MHz

Class A limit = 43.50 dBuV (Distant 10m)

Emission Level (dBuV) = Level + Factors [Ant + Cable] (dBuV)

$$26.81 \text{ (dBuV)} = 9.20 + 15.27 + 2.34 \text{ (dBuV)}$$

Margin (dBuV) = Limit - Emission Level (dBuV)

$$16.69 \text{ (dBuV)} = 43.50 - 26.81$$

Test Equipment

| <u>Test Equipment</u> | <u>Model</u> |
|---------------------------------|-------------------------|
| Test Receiver (9KHz-30MHz) | Rhode & Schwarz ESH2 |
| Test Receiver (20-1000MHz) | Rhode & Schwarz ESV |
| Spectrum Analyzer | Hewlett-Packard 8568B |
| Spectrum Analyzer | Hewlett-Packard 8591A |
| Quasi Peak Adapter | Hewlett-Packard 85605A |
| RF Preselector | Hewlett-Packard 85685A |
| RF Amplifier | Hewlett-Packard 8447D |
| Controller | Hewlett-Packard 98580bB |
| Signal Generator | Hewlett-Packard 8657A |
| Color Plotter | Hewlett-Packard 7440A |
| Color Plotter | Hewlett-Packard 7550B |
| Printer | Hewlett-Packard 2235D |
| Printer | Hewlett-Packard 2225D |
| Absorbing Clamp | Rhode & Schwarz MDS-21 |
| Biconical Antenna (30-200MHz) | EMCO 3104 |
| Biconical Antenna (30-300MHz) | Schwarzbeck BBA-9106 |
| Log Periodic Antenna (200-1GHz) | EMCO 3146 |
| Log Periodic Antenna (300-1GHz) | Schwarzbeck UHALP-9107 |
| Biolog Antenna | Schaffner CLB6112 |
| VHF Dipole Antenna | Schwarzbeck VHA 9103 |
| UHF Dipole Antenna | Schwarzbeck UHA 9105 |
| VHF Precision Dipole Antenna | Schwarzbeck VHAP |
| UHF Precision Dipole Antenna | Schwarzbeck UHAP |
| Passive Loop Antenna (1K-30MHz) | EMCO 6509 |
| Active Loop Antenna (1K-30MHz) | EMCO 6507 |
| Passive Rod Antenna (1K-30MHz) | EMCO 3303 |
| Active Rod Antenna (30Hz-50MHz) | EMCO 3301B |
| LISN | Rhode & Schwarz ESH2-Z5 |
| LISN | Rhode & Schwarz ESH3-Z5 |