

FCC Part 15C Compliance Test Report

Test Report no.:	Salo_FCC_0525_03.doc	Date of Report:	27.06.2005
Number of pages:	13	Customer's Contact person:	Lasse Vaattovaara
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FCC listing no.:	533467		
IC recognition no.:	5385		
Tested devices/ accessories:	Phone RA-8 / Battery BP-6M, AC-Charger ACP-12 and Headset HS-5		
FCC ID:	PYARA-8	IC:	661V-RA8
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003) and IC standard RSS-210. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document.		
Date and signature for the contents:	27-06-2005		

Tomi Lipponen
Design Engineer, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	14.06.2005
Testing completed	23.06.2005
The customer's contact person	Lasse Vaattovaara
Test Plan referred to	T:\Projects\RA-8\testplans\EMC\TCC\RA-8_EMC_TESTPLAN.xls
Notes	-
Document name	T:\Projects\RA-8\results\emc\FCC\Salo_FCC_0525_03.doc

1.1. EUT and Accessory Information

The EUT is a Bluetooth device. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RA-8	004400/65/171140/8	4102	-	05.20(01)	10634
Battery (Sony)	BP-6M	T-10	-	-	-	10636
AC-Charger	ACP-12	067529439439L474811094951	-	-	-	10587
Headset	HS-5	-	-	-	-	10174

1.2. Summary of Test Results

Bluetooth:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	6.2.2(o)(a3)	Peak output power	NP
15.247(c)	6.2.2 (o)(e1)	Band edge compliance of RF emissions	PASSED
15.247(c)	6.2.2 (o)(e1)	Spurious RF conducted emissions	NP
15.247(c), 15.209	6.2.2 (o)(e1)	Spurious radiated emissions	PASSED
15.207	6.6	AC powerline conducted emissions	NP
15.247(a)(1)	6.2.2(o)(a3)	20 dB bandwidth	NP
15.247(a)(1)	6.2.2(o)(a1)	Carrier frequency separation	NP
15.247(a)(1)(iii)	Amend I(ii)	Number of hopping frequencies	NP
15.247(a)(1)(iii)	Amend I(ii)	Time of occupancy	NP

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

The EUT does not comply with the essential requirements in the standard.

NP

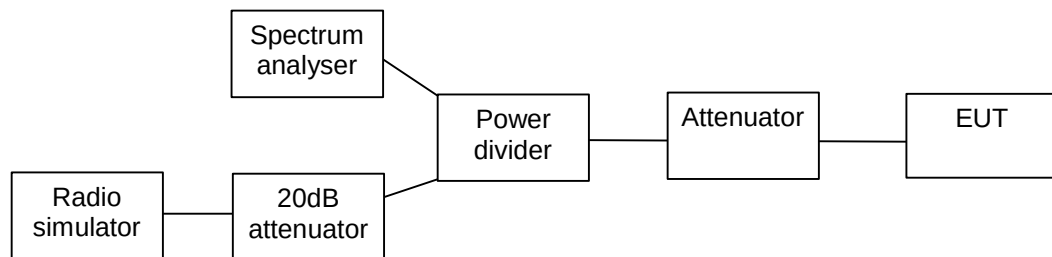
The test was not performed by the TCC Nokia Salo Laboratory.

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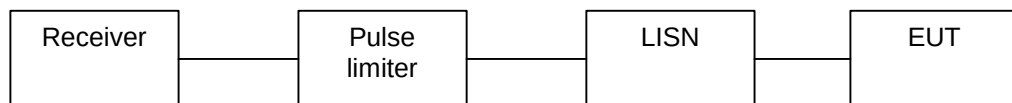
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2. Test setups

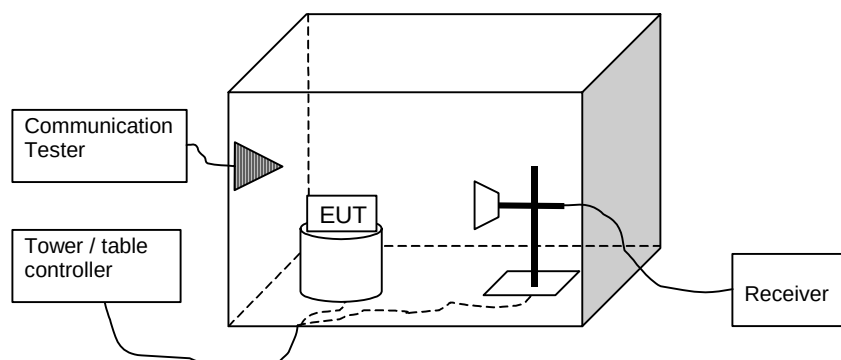
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



2.3. Spurious radiated emissions test setup



3. Band edge compliance of RF emissions (FCC §15.247(c), RSS-210 6.2.2(o)(e1))

EUT with DUT number	RA-8, DUT 10634
Accessories with DUT numbers	BP-6M, DUT 10636; ACP-12, DUT 10587; HS-5, DUT 10174
Operation Voltage V / Hz	110 / 60
Result	PASSED
Remarks	Test was done in flip closed mode.
Temp °C / Humidity RH % / Air Pressure kPa	20 / 50 / 101
Date of measurements	23.06.2005
Measured by	Tomi Lipponen

3.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

Frequency range / MHz	Limit / dBμV/m
Below 2390 and above 2483.5	≤ 54

3.2. Bluetooth Test results

3.2.1 GFSK modulation, PRBS packet type

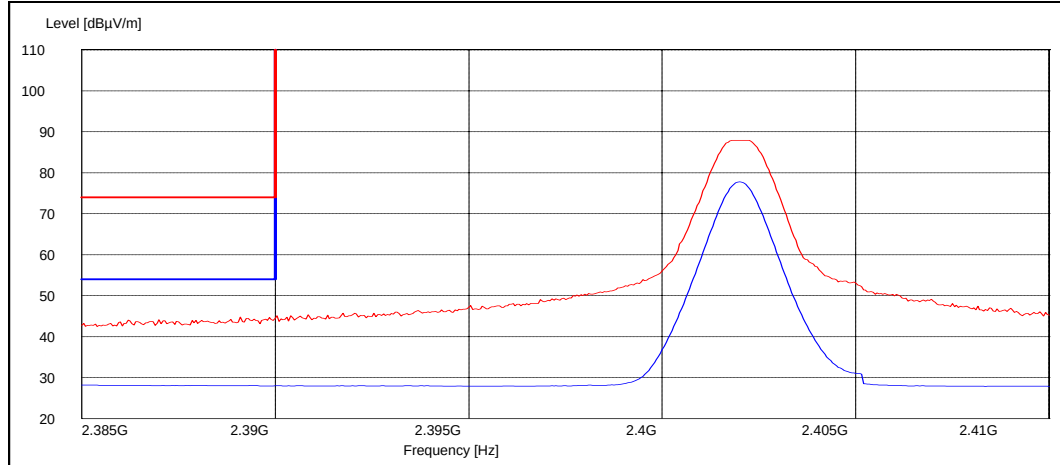
Average (RBW: 1 MHz)

Channel	Level / dBμV/m	Result
0	28.09	PASSED
78	28.74	PASSED
Hopping on, low end	27.93	PASSED
Hopping on, high end	28.42	PASSED

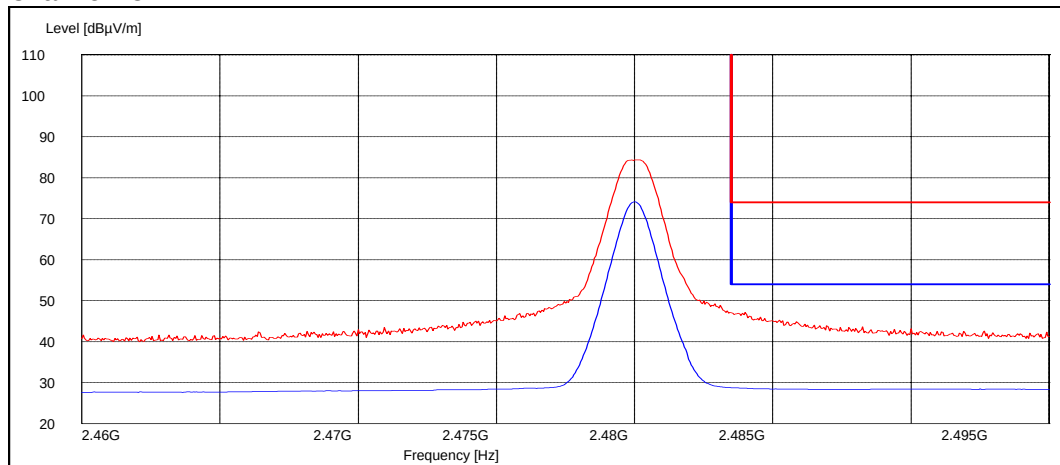
Peak (RBW: 1 MHz)

Channel	Level / dBμV/m	Result
0	44.50	PASSED
78	47.05	PASSED
Hopping on, low end	44.50	PASSED
Hopping on, high end	47.31	PASSED

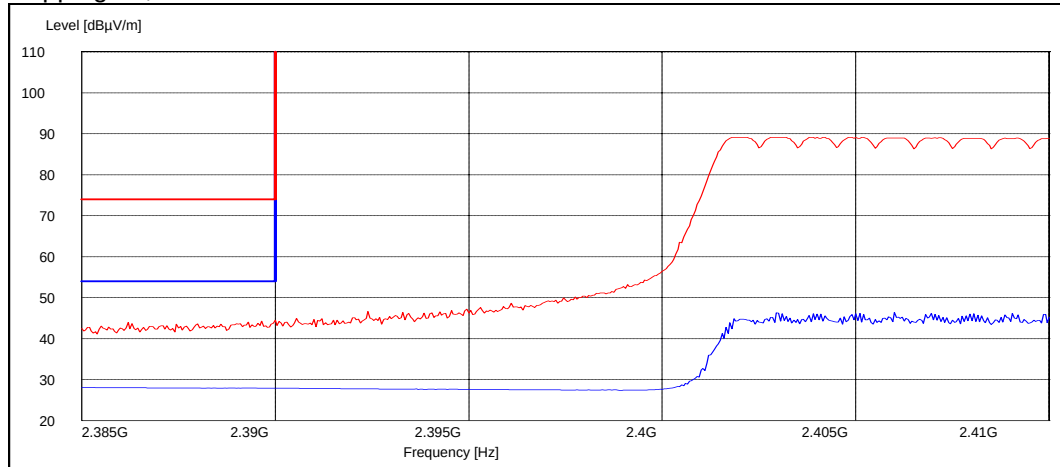
Channel 0



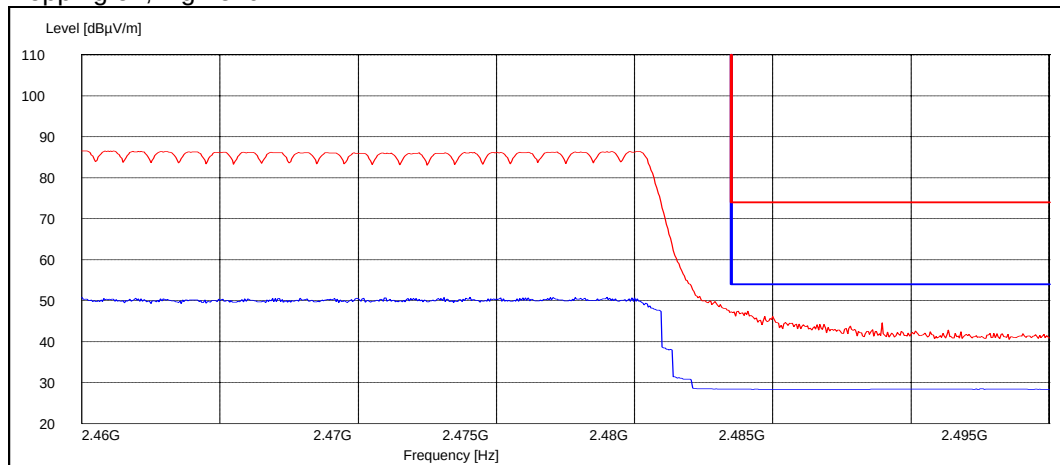
Channel 78



Hopping on, low end



Hopping on, high end



4. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 6.2.2(o)(e1))

EUT with DUT number	RA-8, DUT 10634
Accessories with DUT numbers	BP-6M, DUT 10636; ACP-12, DUT 10587; HS-5, DUT 10174
Operation Voltage V / Hz	110 / 60
Result	PASSED
Remarks	Test was done both in flip open and flip closed mode.
Temp °C / Humidity RH % / Air Pressure kPa	20 / 50 / 101
Date of measurements	23.06.2005
Measured by	Tomi Lipponen

4.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E [\mu V/m] = U_{RX} + A_{CORRECTIONS}$$

Where U_{RX} is receiver reading and $A_{CORRECTIONS}$ is combined correction factor including cable loss, antenna factor and preamplifier gain ($A_{CORRECTIONS} = L_{CABLES} + AF - G_{PREAMP}$).

Limits for spurious radiated emissions measurements (3 m measurement distance)

Frequency range / MHz	Limit / $\mu\text{V/m}$	Limit / $\text{dB}\mu\text{V/m}$	Detector
30 – 88	100	40	Quasi peak
88 – 216	150	43.5	Quasi peak
216 – 960	200	46	Quasi peak
960 – 1000	500	54	Quasi peak
Above 1000	500	54	Average
Above 1000	5000	74	Peak

4.2. Bluetooth Test results

4.2.1 GFSK modulation, PRBS packet type

Channel 0, flip closed

Peak (RBW: 1 MHz)

Frequency / MHz	Level / $\text{dB}\mu\text{V/m}$	Level / $\mu\text{V/m}$	$A_{\text{CORRECTION}}$ / dB	Polarisation	Result
4804.000000	40.60	107.15	-4.40	VERTICAL	PASSED
7206.000000	47.40	234.42	-1.00	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / $\text{dB}\mu\text{V/m}$	Level / $\mu\text{V/m}$	$A_{\text{CORRECTION}}$ / dB	Polarisation	Result
4804.000000	28.60	26.92	-4.40	VERTICAL	PASSED
7206.000000	36.80	69.18	-1.00	VERTICAL	PASSED

Channel 40, flip closed

Quasi peak (RBW: 120 kHz)

Frequency / MHz	Level / $\text{dB}\mu\text{V/m}$	Level / $\mu\text{V/m}$	$A_{\text{CORRECTION}}$ / dB	Polarisation	Result
30.000000	23.90	15.67	-13.60	VERTICAL	PASSED
37.695391	24.50	16.79	-18.80	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency / MHz	Level / $\text{dB}\mu\text{V/m}$	Level / $\mu\text{V/m}$	$A_{\text{CORRECTION}}$ / dB	Polarisation	Result
2441.883768	86.90	22 130.95	-7.40	VERTICAL	PASSED
2472.945892	81.30	11 614.49	-6.90	HORIZONTAL	PASSED
4887.767535	38.40	83.18	-4.10	VERTICAL	PASSED
7242.478958	41.50	118.85	-0.80	HORIZONTAL	PASSED
7251.009018	42.70	136.46	-0.70	VERTICAL	PASSED
7804.607214	43.20	144.54	0.70	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
2441.883768	79.40	9 332.54	-7.40	VERTICAL	PASSED
2472.945892	74.00	5 011.87	-6.90	HORIZONTAL	PASSED
4883.767535	26.50	21.13	-4.10	VERTICAL	PASSED
7237.978958	28.80	27.54	-0.80	HORIZONTAL	PASSED
7256.009018	29.20	28.84	-0.70	VERTICAL	PASSED

Channel 78, flip closed

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	41.60	120.23	-3.90	VERTICAL	PASSED
7440.000000	42.20	128.82	0.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	30.20	32.36	-3.90	VERTICAL	PASSED
7440.000000	33.10	45.19	0.00	VERTICAL	PASSED

Channel 0, flip open

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4804.000000	40.90	110.92	-4.40	VERTICAL	PASSED
7206.000000	51.40	371.54	-1.00	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4804.000000	28.30	26.00	-4.40	VERTICAL	PASSED
7206.000000	40.50	105.93	-1.00	VERTICAL	PASSED

Channel 40, flip open

Quasi peak (RBW: 120 kHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
37.695391	21.00	11.22	-18.80	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
2441.883768	85.90	19 724.23	-7.40	HORIZONTAL	PASSED
2473.245491	80.50	10 592.54	-6.90	HORIZONTAL	PASSED
4884.269539	40.70	108.39	-4.10	VERTICAL	PASSED
4920.833667	38.70	86.10	-4.00	HORIZONTAL	PASSED
7325.651303	49.80	309.03	-0.50	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
2441.883768	78.20	8 128.31	-7.40	HORIZONTAL	PASSED
2473.245491	71.70	3 845.92	-6.90	HORIZONTAL	PASSED
4883.269539	26.60	21.38	-4.10	VERTICAL	PASSED
4913.333667	25.60	19.05	-4.10	HORIZONTAL	PASSED
7325.651303	37.70	76.74	-0.50	VERTICAL	PASSED

Channel 78, flip open

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	41.30	116.14	-3.90	VERTICAL	PASSED
7440.000000	46.40	208.93	0.00	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	29.40	29.51	-3.90	VERTICAL	PASSED
7440.000000	35.20	57.54	0.00	VERTICAL	PASSED

5. Test Equipment

5.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1742	EMI Test Receiver	ESMI	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1872	Thermo- Hygrograph	00.02520.150700	Lambrecht	15C, 15B
1916	Radio Communication tester	CMTA84	R&S	15C, 15B
2039	Power Supply	PL330QMD	THURLBY	15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2068	CDN-Antenna line	S1	NMP	15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
2111	Multimeter	TX3	Tektronix	15C, 15B
2156	Digital Radio Communication Tester	CMU200	R&S	15C, 15B
2206	Signal generator	SMX	R&S	15C, 15B
2335	GPIB Switch 2 to 1	-	National Instruments	15C, 15B
2347	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2352	Spectrum Analyzer	FSP	R&S	22/24, 15C
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

5.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1748	Log. per. Antenna	HL025	R&S	22/24, 15C
1749	Log. per. Antenna	HL025	R&S	22/24, 15C
1875	Thermo- Hygrograph	00.02520.150700	Lambrecht	22/24, 15C, 15B
1917	Radio Communication tester	CMTA84	R&S	22/24, 15C, 15B
1933	Precision half-wave dipole antennas	HZ-13	R&S	22/24, 15C
1938	Precision half-wave dipole antennas	HZ-12	R&S	22/24, 15C
2004	Relay Switch Unit	RSU	R&S	22/24, 15C, 15B
2006	Radiation Reference Source	VSQ	MEB	22/24, 15C, 15B
2009	Signal generator	SMP 22	R&S	22/24, 15C, 15B
2019	Multimeter	34401A	HP	22/24, 15C, 15B
2027	Coupling and Decoupling Network	M2 (modified) DC1	MEB	22/24, 15C, 15B
2028	Coupling and Decoupling Network	M3 (modified) DC2	MEB	22/24, 15C, 15B
2029	Power Supply	PL330	THURLBY	22/24, 15C
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22/24, 15C, 15B
2047	Band Reject Filter	WRCC1800/2000-0.2-10SS	Wainwright	22/24, 15C, 15B
2051	High Pass Filter	4HC1700-1-KK	R&S	22/24, 15C
2057	Log. per. Antenna	HL025	R&S	22/24, 15C
2109	Power Supply	PL330QMD	THURLBY	22/24, 15C, 15B
2110	Multimeter	34401A	HP	22/24, 15C, 15B
2112	Multimeter	TX3	Tektronix	22/24, 15C, 15B
2116	Controller	EMCO MODEL 2090	ETS	22/24, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
2133	Power Meter	NRVS	R&S	22/24, 15C
2134	Power Sensor	NRV-Z32	R&S	22/24, 15C
2135	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2138	Ultra Broadband Antenna	HL562	R&S	22/24, 15C, 15B
2140	Biconial Antenna	EMCO93110B	EMCO	22/24, 15C
2142	Log.-per.-dipol Antenna	3146	EMCO	22/24, 15C
2144	Attenuator	6803.17B	Huber-Suhner	22/24, 15C, 15B
2150	High Pass Filter	F-15041	RLC ELECTRONICS	22/24, 15C
2176	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2180	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2188	Preamplifier	AFS4-00100300-20-23P-6	MITEQ	22/24, 15C, 15B
2330	EMI Test receiver	ESIB26	R&S	22/24, 15C, 15B
2334	GPIB Switch 2 to 1	-	National Instruments	22/24, 15C, 15B
2348	Yaesu controller	G-1000DXC	YAESU	22/24, 15C, 15B
2349	Computer controller (Yaesu)	GS-232B	YAESU	22/24, 15C, 15B
2350	Preamplifier	AMF-6D-020180-29-20P	MITEQ	22/24, 15C
2398	Horn antenna	HF906	R&S	22/24, 15C
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B