

FCC Part 15B Compliance Test Report

Test Report no.:	FCC15B_RM-978_01	Date of Report:	07-Mar-2014
Number of pages:	13	Customer's Contact person:	Juha Paukku
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-978 / Battery BL-5H / Charger AC-20E Pihong / Headset WH-108 / Charging data cable CA-190CD / Headset WH-208 / Laptop IBM Thinkpad T40, AC adapter 02K6543, Printer HP deskjet 1600CC3540A, Parallel cable for printer		
FCC ID:	PDNRM-978	IC:	661R-RM978
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart B, ANSI C63.4 (2003), ICES-003, CISPR 22, RSS-132 (Issue 2, September 2005), RSS-133 (Issue 5, February 2009). 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:			

Jari Jantunen, System Manager, EMC

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	16-Jan-2014
Testing completed	27-Jan-2014
The customer's contact person	Juha Paukku
Test Plan referred to	T:\Projects\RM-977\TestPlan\RS_testplan_RM-977.xlsm
Notes	-
Document name	T:\Projects\RM-977\EMC\FCC15B_RM-977_10.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:

GSM/WCDMA/WLAN/Bluetooth

The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-977	00442476801315	2205	-	1052.0000.1351.10049	43133
Phone	RM-977	004402476801331	2205	-	1052.0000.1351.10049	43141
Battery	BL-5H		LGC V3.0			43134
Battery	BL-5H LGC	4955403494010105372;0670699	V3.0 PWB ver 2.0	-	-	43139
Charger	AC-20E Phihong	-	-	-	-	43135
Headset	WH-108					43136
Headset	WH-108	2376171	-	-	-	43142
Charging data cable	CA-190CD	0730456246628	-	-	-	42977
Laptop	IBM Thinkpad T40	99ARTGD	-	-	-	41868
AC Adapter	02K6543	-	-	-		40202
Printer	HP deskjet 1600CC3540A	USB8302546	-	-	-	40077
Parallel cable for printer	-	-	-	-	-	40087

1.2. Summary of Test Results

GSM850:

Section in CFR 47	Section in ICES-003 (RSS-132)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	-
15.109, a	5.5 (4.6)	Radiated emissions	PASSED

WCDMA 850 (Band V):

Section in CFR 47	Section in ICES-003 (RSS-132)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	-
15.109, a	5.5 (4.6)	Radiated emissions	-

GSM1900:

Section in CFR 47	Section in ICES-003 (RSS-133)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	PASSED
15.109, a	5.5 (6.6)	Radiated emissions	PASSED

WCDMA 1900 (Band II):

Section in CFR 47	Section in ICES-003 (RSS-133)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	-
15.109, a	5.5 (6.6)	Radiated emissions	-

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 Laboratory.

The test results of PDNRM-977 are re-used for certification of the PDNRM-978.

The table above indicates the results, which will be re-used.

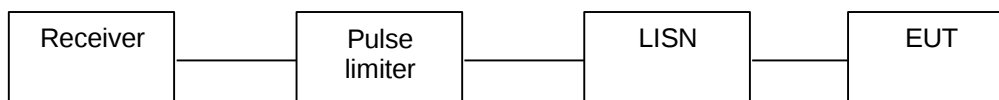
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2. AC powerline conducted emissions (FCC §15.107, ICES-003 section 5.3)

EUT with DUT number	RM-977, DUT 43141
Accessories with DUT numbers	BL-5H LGC, DUT 43139 ; WH-108, DUT 43142 ; CA-190CD, DUT 42977 ; IBM Thinkpad T40 DUT 41868, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 38 / 100.6
Date of measurements	27-Jan-2014
Measured by	Jari Jantunen

2.1. Test Setup



2.2. Test method and limit

The measurement is made according to ANSI C63.4-2003 as follows:

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

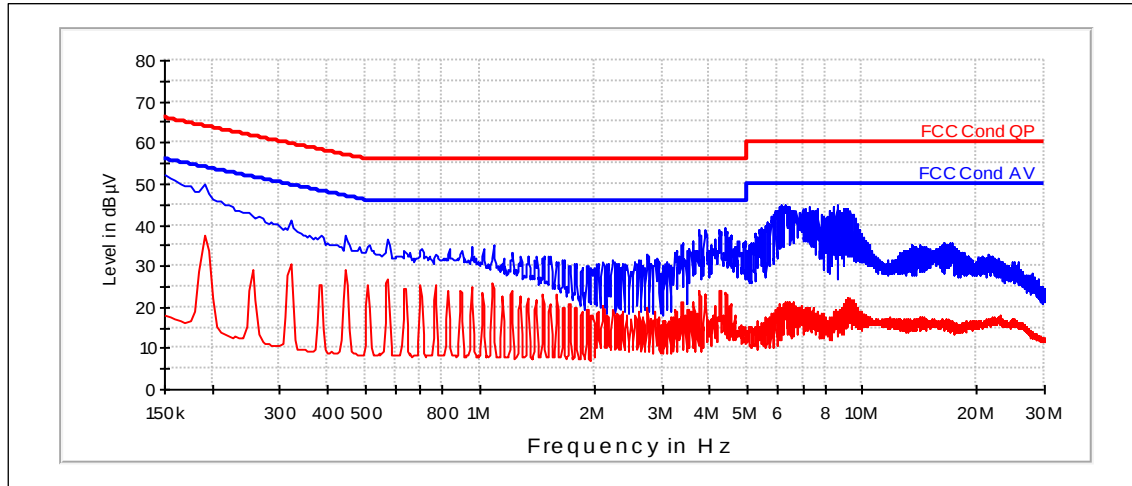
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dBμV]	Average limit [dBμV]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

2.3. GSM 1900 Test results

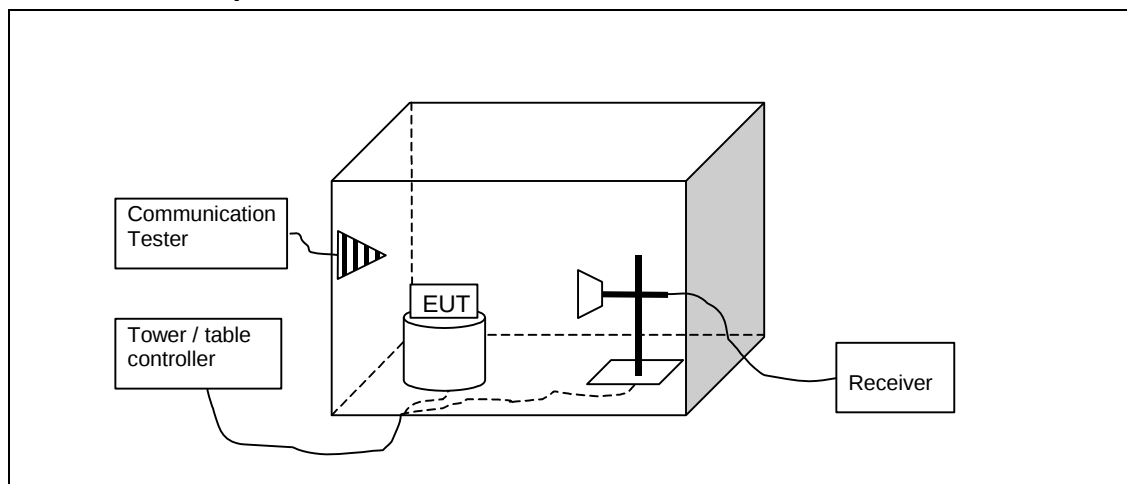
Channel 661 / 1880.0 MHz



3. Radiated emissions (FCC §15.109, ICES-003 section 5.5, RSS-132 4.6, RSS-133 6.6)

EUT with DUT number	RM-977, DUT 43133
Accessories with DUT numbers	BL-5H, DUT 43134 ; AC-20E Pihong, DUT 43135 ; WH-108, DUT 43136
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 47 / 101
Date of measurements	23-Jan-2014
Measured by	Hannu Söderholm

3.1.1 Test setup



3.2. Test method and limit

The measurement is made according to ANSI C63.4-2003as follows:

The measurement is performed in the Semi-Anechoic Chamber with conducting metal floor.

The measurement distance is 3 m.

The EUT is placed on a nonconductive plate at 80 cm height.

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:

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

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

CISPR 22 and FCC Part 15 Class B limits (3 m measurement distance)

Frequency range [MHz]	Quasi peak limit [dB μ V/m]	Average limit [dB μ V/m]	Peak limit [dB μ V/m]
30 - 230	40	-	-
230 – 1000	47	-	-
1000 - 3000	-	50	70
Above 3000	-	54	74

3.3. GSM850 test results

RX mode, channel 128 / 869.2 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3475.6	37.13	71.854	45.52	-8.39	36.9	74	PASSED
6953.1	46.61	214.092	47.36	-0.75	27.4	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3475.6	24.34	16.484	32.73	-8.39	29.7	54	PASSED
6953.1	33.82	49.091	34.57	-0.75	20.2	54	PASSED

RX mode, channel 190 / 881.6 MHz

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
30	31	35.473	56.97	-25.97	9	40	PASSED
36.163	29.16	28.705	57.86	-28.7	10.8	40	PASSED
42.034	24.31	16.421	55.46	-31.15	15.7	40	PASSED

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7836.071	45.91	197.515	43.08	2.83	28.1	74	PASSED
7842.087	45.79	194.85	42.95	2.84	28.2	74	PASSED
7849.401	46.36	207.85	43.51	2.85	27.6	74	PASSED
7862.223	46.02	199.963	43.09	2.93	28	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7836.071	32.92	44.264	30.09	2.83	21.1	54	PASSED
7842.087	32.86	43.969	30.02	2.84	21.1	54	PASSED
7849.401	32.99	44.602	30.14	2.85	21	54	PASSED
7862.223	33.07	45.004	30.14	2.93	20.9	54	PASSED

RX mode, channel 251 / 893.8 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3575.6	37.05	71.17	45.52	-8.47	37	74	PASSED
7152	45.02	178.258	44.61	0.41	29	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3575.6	24.44	16.663	32.91	-8.47	29.6	54	PASSED
7152	31.23	36.446	30.82	0.41	22.8	54	PASSED

3.4. GSM1900 test results

RX mode, channel 512 / 1930.2 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3858.2	37.55	75.457	45.27	-7.72	36.4	74	PASSED
7720.6	45.25	182.915	43.09	2.16	28.8	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3858.2	24.82	17.408	32.54	-7.72	29.2	54	PASSED
7720.6	32.23	40.87	30.07	2.16	21.8	54	PASSED

RX mode, channel 661 / 1960.0 MHz

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
30	27.48	23.656	53.45	-25.97	12.5	40	PASSED
34.823	27.29	23.155	55.45	-28.16	12.7	40	PASSED
39.862	27.8	24.556	57.97	-30.17	12.2	40	PASSED
82.035	11.4	3.714	47.97	-36.57	28.6	40	PASSED

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7828.758	46.04	200.332	43.23	2.81	28	74	PASSED
7835.269	46.19	203.868	43.37	2.83	27.8	74	PASSED
7844.593	45.68	192.221	42.84	2.84	28.3	74	PASSED
7860.016	46.14	202.838	43.22	2.92	27.9	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7828.758	32.83	43.803	30.02	2.81	21.2	54	PASSED
7835.269	32.87	43.99	30.05	2.83	21.1	54	PASSED
7844.593	32.91	44.188	30.07	2.84	21.1	54	PASSED
7860.016	33.03	44.802	30.11	2.92	21	54	PASSED

RX mode, channel 810 / 1989.8 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3978.5	38.35	82.728	45.39	-7.04	35.6	74	PASSED
7958.2	45.65	191.69	42.46	3.19	28.3	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3978.5	25.17	18.143	32.21	-7.04	28.8	54	PASSED
7958.2	33.23	45.867	30.04	3.19	20.8	54	PASSED

3.5. GSM1900 test results, Data configuration

RX mode, channel 512 / 1930.2 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3860.6	37.56	75.501	45.27	-7.71	36.4	74	PASSED
7720.2	45.94	198.061	43.78	2.16	28.1	74	PASSED

Average

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3860.6	24.79	17.35	32.5	-7.71	29.2	54	PASSED
7720.2	32.19	40.691	30.03	2.16	21.8	54	PASSED

RX mode, channel 661 / 1960.0 MHz

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
39.329	32.92	44.274	62.88	-29.96	7.1	40	PASSED
54.02	30.07	31.875	68.07	-38	9.9	40	PASSED
99.979	26.37	20.811	61.82	-35.45	13.6	40	PASSED
133.046	28.79	27.514	63.49	-34.7	11.2	40	PASSED
157.273	32.18	40.635	67.98	-35.8	7.8	40	PASSED
200.18	34.13	50.898	71.7	-37.57	5.9	40	PASSED
225.202	29.97	31.503	66.57	-36.6	10	40	PASSED
250.221	44.29	163.832	80.29	-36	2.7	47	PASSED
800.952	34.93	55.783	60.74	-25.81	12.1	47	PASSED
900.842	38.02	79.653	62.72	-24.7	9	47	PASSED

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7830.658	46.18	203.634	43.37	2.82	27.8	74	PASSED
7842.683	46.2	204.221	43.36	2.84	27.8	74	PASSED
7844.693	45.8	194.984	42.96	2.84	28.2	74	PASSED
7854.407	45.47	187.737	42.59	2.88	28.5	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
7830.658	32.81	43.692	30	2.82	21.2	54	PASSED
7842.683	32.83	43.818	29.99	2.84	21.2	54	PASSED
7844.693	32.91	44.223	30.07	2.84	21.1	54	PASSED
7854.407	32.91	44.208	30.03	2.88	21.1	54	PASSED

RX mode, channel 810 / 1989.8 MHz

Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3978.7	37.84	77.983	44.88	-7.04	36.2	74	PASSED
7958.3	46.55	212.594	43.36	3.19	27.4	74	PASSED

Average

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Margin	Limit [dBμV/m]	Results
3978.7	25.15	18.101	32.19	-7.04	28.8	54	PASSED
7958.3	33.2	45.719	30.01	3.19	20.8	54	PASSED

4. Test Equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15B
TM30600	Impulse limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 μ H	ESH3-Z5	R&S	15C, 15B
TM26491	LISN 50 μ H	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum Analyzer	FSU26	R&S	22/24/27, 15C, 15E
TM23007	Oscilloscope	TDS684B	Tektronix	15E
TM22806	Battery	BAT 20/E	Fiskars	15C, 15B
TM22805	UPS	PS 20/1.2	Fiskars	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
-	Temperature test chamber	VT 4002	Vötsch	22/24/27
2001	Bluetooth tester	CBT	R&S	15C, 15B
2009	LISN 50 μ H	ENV216	R&S	15C, 15B
2010	LISN 50 μ H	ENV216	R&S	15C, 15B
2012	Power splitter	11667B	Agilent	22/24/27, 15C
2013	Attenuator	8493C	Agilent	22/24/27, 15C
2014	Attenuator	8493C	Agilent	22/24/27, 15C
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2021	Communication Tester	CMW500	R&S	22/24/27
2022	Communication Tester	CMU200	R&S	22/24/27
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer display unit	ESAI-D	R&S	15B/15C
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
TM37678	Communication Tester	CMU200	R&S	22/24/27, 15B
TM38845	Receiver	ESIB 26	R&S	22/24/27, 15C, 15E, 15B
-	Antenna	HL562	R&S	22/24/27, 15C, 15E, 15B
-	Turntable	2188	EMCO	22/24/27, 15C, 15E, 15B
-	Turntable controller	2090	EMCO	22/24/27, 15C, 15E, 15B
-	RF system panel	OSP130	R&S	22/24/27, 15C, 15E, 15B
-	Mini mast	2075-2	ETS Lindgren	22/24/27, 15C, 15B
TM38843	Mini mast	2075	Emco	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	Emco	22/24/27, 15C, 15B
TM30643	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
TM30644	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C, 15B
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	Miteq	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	Miteq	22/24/27, 15C, 15B
TM30599	Semi anechoic chamber	UNKNOWN	TDK	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	-	22/24/27, 15C, 15E, 15B
TM38066	High pass filter	WHKX3.0/18G-12SS	Wainwright	22/24/27, 15C, 15E, 15B
2028	High pass filter	WHKX 1.0/15G-12SS	Wainwright	22/24/27, 15C, 15E, 15B
TM37545	Tunable notch filter	800.0/960.0-0.2/40-8SSK	Wainwright	22
TM26512	Tunable notch filter	WRCD1850/1910-0.2/40-10SSK	Wainwright	24
-	Band reject filter	WRCG1877/1883-1870/1890-40/6EE	Wainwright	24
-	Band reject filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
TM23892	Controller	G-1000SDX	Yaesu	22/24/27, 15C, 15E
2001	Bluetooth tester	CBT	R&S	15C, 15B
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27
2021	Communication Tester	CMW500	R&S	22/24/27
2025	Antenna	HFH2-Z2	R&S	15C
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B
2052	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C, 15B, 15E
-	Antenna	QSH18S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E