

FCC Part 15B Compliance Test Report

Test Report no.:	Tre_FCC_0603_03.doc	Date of Report:	23.1.2006
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FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	Phone RM-178 / Battery BL-4C, Headset HS-5, AC charger AC-3, Memory card MU-25, Laptop IBM Thinkpad T22, AC adapter 02K6543, Printer HP deskjet 1600CC3540A, Digital camera FUJI DS-7, Serial cable for camera, Parallel cable for printer		
FCC ID:	LJPRM-178	IC:	661E-RM178
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 and IC standards RSS-132, RSS-133 and 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:			

Jari Jantunen, System Manager

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	13.1.2006
Testing completed	20.1.2005
The customer's contact person	Jorma Hanni
Test Plan referred to	\\EMC\\TESTPLAN\\
Notes	-
Document name	T:\\Projects\\RM-178\\EMC\\Results\\FCC\\Tre_FCC_0603_03.doc

1.1. EUT and Accessory Information

The EUT is a quadri band (GSM850/900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. GSM bands are tested in idle mode. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-178	004400831736150	200432	-	3.05	40495
Battery	BL-4C	M062C10551661	-	-	-	40498
Headset	HS-5	18	2.0	2.1	-	40463
AC-Charger	AC-3	-	-	-	-	40499
Memory Card	MU-25	-	-	-	-	40501
Data cable	CA-53	-	1.0	1.0	-	40464
Laptop	IBM Thinkpad T22	555V2PT	-	-	-	40201
AC Adapter	02K6543	-	-	-	-	40202
Printer	HP deskjet 1600CC3540A	USB8302546	-	-	-	40077
Digital camera	FUJI DS-7	7102516	-	-	-	40076
Serial cable for camera	-	-	-	-	-	40088
Parallel cable for printer	-	-	-	-	-	40087

1.2. Summary of Test Results

GSM 850:

Section in CFR 47	Section in ICES-003 (RSS-132)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	NP
15.109, a	5.5 (6.6)	Radiated emissions	PASSED

GSM 1900:

Section in CFR 47	Section in ICES-003 (RSS-133)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	NP
15.109, a	5.5 (9)	Radiated emissions	PASSED

Bluetooth:

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

PASSED

FAILED

NP

The EUT complies with the essential requirements in the standard.

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

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

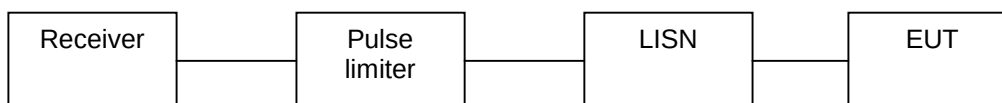
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2. AC powerline conducted emissions (FCC §15.107, ICES-003 section 5.3)

EUT with DUT number	RM-178 DUT 40495
Accessories with DUT numbers	BL-4C DUT 40498, AC-3 DUT 40499, CA-53 DUT 40464, MU-25 DUT 40501, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 49 / 104.0
Date of measurements	19.1.2006
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:

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

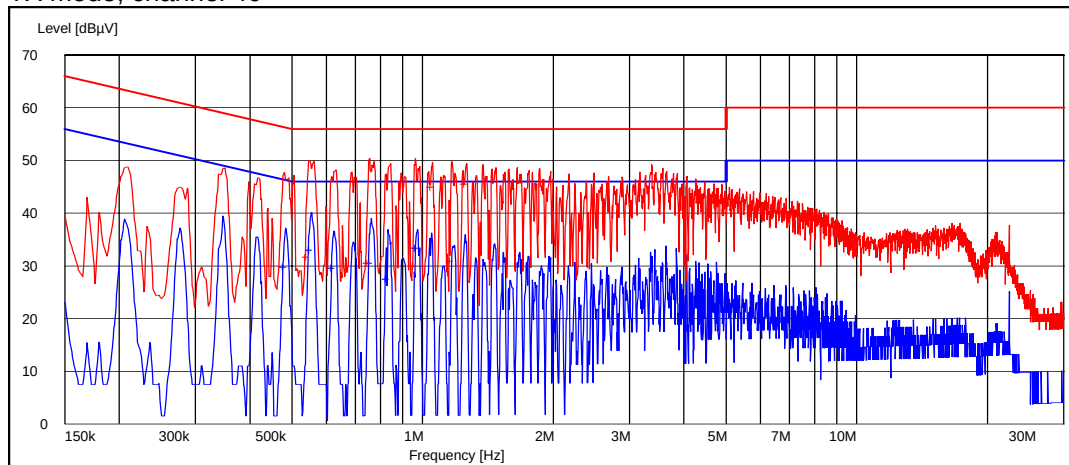
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

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. Bluetooth Test results

TX mode, channel 40



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.546693	31.60	N	PASSED
0.754309	30.50	N	PASSED
0.961924	30.00	N	PASSED
1.054609	44.90	N	PASSED
1.169539	31.00	N	PASSED
1.262224	45.50	N	PASSED

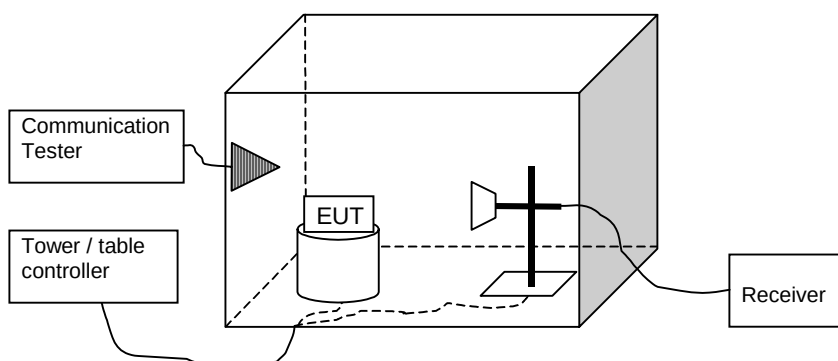
Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.483667	29.80	N	PASSED
0.554108	33.10	N	PASSED
0.624549	29.60	N	PASSED
0.761723	30.60	N	PASSED
0.832164	27.50	N	PASSED
0.973046	33.40	N	PASSED

3. Radiated emissions GSM 850/1900 RX + FM radio on (FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)

EUT with DUT number	RM-178 DUT 40495
Accessories with DUT numbers	BL-4C DUT 40498, AC-3 DUT 40499, HS-5 DUT 40463, MU-25 DUT 40501
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	FM radio on
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 104.0
Date of measurements	19-20.1.2005
Measured by	Jari Jantunen

3.1. 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:

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

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

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

Frequency range [MHz]	Quasi peak limit [dBμV/m]	Average limit [dBμV/m]	Peak limit [dBμV/m]
30 - 230	40	-	-
230 - 1000	47	-	-
Above 1000	-	54	74

3.3. GSM 850 Test results

RX mode, channel 128

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U_{RX} [dBμV]	A_{TOT} [dB]	Polarisation	Result
3476.800000	40.30	103.51	45.10	-4.80	HORIZONTAL	PASSED
6953.600000	53.90	495.45	52.40	1.50	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U_{RX} [dBμV]	A_{TOT} [dB]	Polarisation	Result
3476.800000	26.40	20.89	31.20	-4.80	HORIZONTAL	PASSED
6953.600000	39.60	95.50	38.10	1.50	VERTICAL	PASSED

RX mode, channel 190

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U_{RX} [dBμV]	A_{TOT} [dB]	Polarisation	Result
30.000000	21.70	12.16	47.30	-25.60	VERTICAL	PASSED
85.410621	15.40	5.89	52.30	-36.90	VERTICAL	PASSED
106.613427	21.60	12.02	56.70	-35.10	HORIZONTAL	PASSED
120.701804	19.00	8.91	53.00	-34.00	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U_{RX} [dBμV]	A_{TOT} [dB]	Polarisation	Result
3526.552104	38.30	82.22	43.10	-4.80	HORIZONTAL	PASSED
7052.606212	49.30	291.74	49.10	0.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3526.052104	25.10	17.99	29.90	-4.80	HORIZONTAL	PASSED
7052.606212	33.40	46.77	33.20	0.20	VERTICAL	PASSED

RX mode, channel 251

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3575.200000	40.70	108.39	45.30	-4.60	VERTICAL	PASSED
7150.400000	53.30	462.38	50.70	2.60	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3575.200000	27.00	22.39	31.60	-4.60	VERTICAL	PASSED
7150.400000	37.70	76.74	35.10	2.60	VERTICAL	PASSED

3.4. GSM 1900 Test results

RX mode, channel 512

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3860.000000	44.20	162.18	46.50	-2.30	HORIZONTAL	PASSED
7720.000000	51.20	363.08	47.00	4.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3860.000000	29.20	28.84	31.50	-2.30	HORIZONTAL	PASSED
7720.000000	33.90	49.55	29.70	4.20	VERTICAL	PASSED

RX mode, channel 661

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
30.200000	15.00	5.62	40.70	-25.70	VERTICAL	PASSED
34.909619	18.00	7.94	46.10	-28.10	VERTICAL	PASSED
42.483567	11.10	3.59	42.50	-31.40	VERTICAL	PASSED
84.708216	15.70	6.10	52.60	-36.90	VERTICAL	PASSED
112.706413	22.60	13.49	57.10	-34.50	VERTICAL	PASSED
121.282766	24.50	16.79	58.60	-34.10	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3919.841683	44.60	169.82	46.60	-2.00	HORIZONTAL	PASSED
7840.181363	50.40	331.13	45.80	4.60	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3919.839679	29.50	29.85	31.50	-2.00	HORIZONTAL	PASSED
7840.181363	35.20	57.54	30.60	4.60	VERTICAL	PASSED

RX mode, channel 810

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3980.000000	43.40	147.91	45.10	-1.70	HORIZONTAL	PASSED
7960.000000	49.30	291.74	44.50	4.80	VERTICAL	PASSED

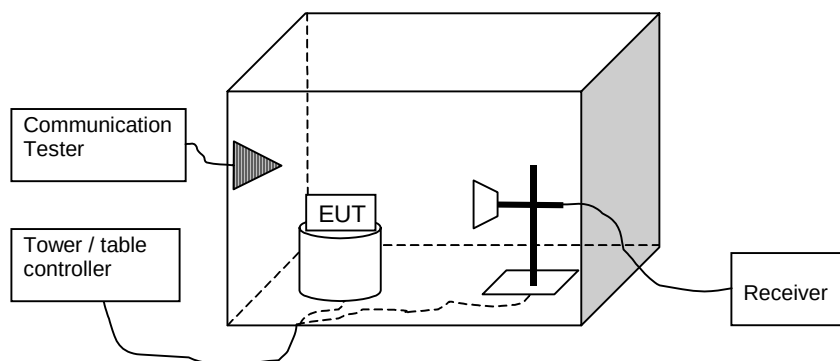
Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3980.000000	29.40	29.51	31.10	-1.70	HORIZONTAL	PASSED
7960.000000	34.20	51.29	29.40	4.80	VERTICAL	PASSED

4. Radiated emissions, Bluetooth TX + computer peripherals (FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)

EUT with DUT number	RM-178 DUT 40495
Accessories with DUT numbers	BL-4C DUT 40498, AC-3 DUT 40499, CA-53 DUT 40464, MU-25 DUT 40501, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Bluetooth TX on
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 104.0
Date of measurements	19-20.1.2005
Measured by	Jari Jantunen

4.1. Test setup



4.2. 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:

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

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

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

Frequency range [MHz]	Quasi peak limit [dBμV/m]	Average limit [dBμV/m]	Peak limit [dBμV/m]
30 - 230	40	-	-
230 - 1000	47	-	-
Above 1000	-	54	74

4.3. Bluetooth Test results

TX mode, channel 0

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	40.60	107.15	40.90	-0.30	HORIZONTAL	PASSED
7206.000000	42.80	138.04	39.80	3.00	VERTICAL	PASSED
9608.000000	46.60	213.80	37.30	9.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	27.60	23.99	27.90	-0.30	HORIZONTAL	PASSED
7206.000000	30.20	32.36	27.20	3.00	HORIZONTAL	PASSED
9608.000000	33.50	47.32	24.20	9.30	VERTICAL	PASSED

TX mode, channel 40

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.000000	40.60	107.15	41.30	-0.70	HORIZONTAL	PASSED
7347.193387	45.60	190.55	41.30	4.30	HORIZONTAL	PASSED
9768.000000	46.20	204.17	37.70	8.50	HORIZONTAL	PASSED
17991.487976	56.10	638.26	34.10	22.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.000000	27.90	24.83	28.60	-0.70	HORIZONTAL	PASSED
7348.693387	31.70	38.46	27.30	4.40	HORIZONTAL	PASSED
9768.000000	32.80	43.65	24.30	8.50	VERTICAL	PASSED
17994.987976	43.40	147.91	21.30	22.10	HORIZONTAL	PASSED

TX mode, channel 78

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4960.000000	40.50	105.93	40.60	-0.10	VERTICAL	PASSED
7440.000000	44.20	162.18	39.80	4.40	VERTICAL	PASSED
9920.000000	47.20	229.09	38.00	9.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4960.000000	28.30	26.00	28.40	-0.10	HORIZONTAL	PASSED
7440.000000	31.80	38.90	27.40	4.40	HORIZONTAL	PASSED
9920.000000	33.80	48.98	24.60	9.20	VERTICAL	PASSED

5. Test Equipment

5.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37610	Spectrum analyzer	FSU	R&S	15C,22/24
TM37678	Radio communication tester	CMU-200	R&S	15C,22/24
	Attenuator 10 dB	6251.17.A	Huber+Suhner AG	15C,22/24
TM22901	Step attenuator 110dB	8496A	Agilent	15C,22/24
TM37499	Power splitter	11667A	Agilent	15C,22/24
	Temperature chamber	VT4002	Vötsch	15C,22/24
TM38112	DC power supply	6632A	Agilent	15C,22/24
TM38111	Multimeter	34401A	Agilent	15C,22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C
TM37773	Radio communication tester	CMU-200	R&S	15B,15C
TM38631	Signal generator	83640L	Agilent	15B,15C
TM38114	DC power supply	6632A	Agilent	15B,15C
TM22835	Multimeter	87	Fluke	15B,15C
TM30600	Pulse Limiter	ESH3-Z2	R&S	15B,15C
TM26490	LISN 50 µH	ESH3-Z5/	R&S	15B,15C
TM30636	LISN 50 µH	L2-16/	PMM	15B,15C

5.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	15B,15C, 22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C, 22/24
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	15B,15C, 22/24
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	15B,15C, 22/24
TM37516	Biconilog antenna	HL562	R&S	15B,15C, 22/24
TM26496	Double ridged waveguide antenna	3115	EMCO	15B,15C, 22/24
TM39158	Horn antenna	3116	EMCO	15B,15C, 22/24
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	15B,15C, 22/24
TM37501	Dipole antenna	3125-870	EMCO	22/24
TM37502	Dipole antenna	3125-1880	EMCO	22/24
TM37773	Radio communication tester	CMU-200	R&S	15B,15C, 22/24
TM38631	Signal generator	83640L	Agilent	15B,15C, 22/24
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	15B,15C, 22/24
	High pass filter	WHK2010-10SS	Trilithic	15B,15C, 22/24
	Low pass filter	WLK1750-10SS	Trilithic	15B,15C, 22/24
TM26511	Tunable notch filter	WRCA870	Wainwright	22/24
TM38215	Tunable notch filter	WRCD1850/1910-0.2/40	Wainwright	22/24
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30	Wainwright	15C
TM30642	Turntable controller	HD-100	Deisel	15B,15C, 22/24
TM26500	Turntable	DS412	Deisel	15B,15C, 22/24
TM38842	Antenna mast controller	2090	EMCO	15B,15C, 22/24
TM38843	Antenna mast	2075	EMCO	15B,15C, 22/24
TM38114	DC power supply	6632A	Agilent	15B,15C, 22/24
TM22835	Multimeter	87	Fluke	15B,15C, 22/24