

FCC Part 15B Compliance Test Report

Test Report no.:	Tre_FCC_0808_04.doc	Date of Report:	18.2.2007
Number of pages:	15	Customer's Contact person:	Alison Kingston
Testing laboratory:	TCC Nokia Tampere Laboratory P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880	Customer:	Nokia Corporation Nokia House Summit Avenue, Southwood FARNBOROUGH HAMPSHIRE GU14 0NG UK Tel. +44 1252 866000 Fax. +44 1252 866001
FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RM-236 / Battery BL-6F, AC charger AC-5E, Audio adapter AD-54, Headset HS-45, Data cable CA-101, 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:	QFXRM-236	IC:	661Z-RM236
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 (Issue 2, September 2005), RSS-133 (Issue 3, June 2005) and RSS-210 (Issue 7, June 2007). 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	27.11.2007
Testing completed	2.1.2007
The customer's contact person	Alison Kingston
Test Plan referred to	T:\Projects\
Notes	-
Document name	T:\Projects\RM-235\EMC\Results\FCC\Tre_FCC_0749_06.doc

1.1. EUT and Accessory Information

The EUT is a 4-band (GSM850/900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. GSM bands are tested in idle mode. Bluetooth is are tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
GSM phone	RM-235	004401011432032	4500	-	0.67EE	41330
GSM phone	RM-235	004401011431695	4500	-	0.130EE	41344
Battery	BL-6F	-	-	-	-	41333
AC Charger	AC-5E	-	-	-	-	41334
Audio adapter	AD-54	-	-	-	-	41335
Headset	HS-45	-	-	-	-	41336
Data cable	CA-101	-	1	1	-	41063
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	PASSED
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	PASSED
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

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 Tampere Laboratory.

The test results of QFXRM-235 are re-used for certification of the QFXRM-236. The table above indicates the results, which will be re-used.

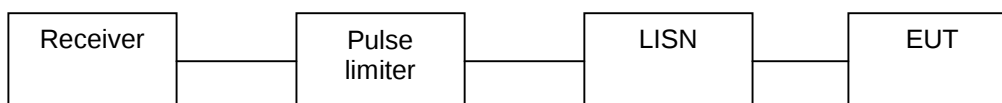
CONTENTS

1. Summary for FCC Part 15B Compliance Test Report.....	2
1.1. EUT and Accessory Information	2
1.2. Summary of Test Results.....	3
2. AC powerline conducted emissions (FCC §15.107, ICES-003 section 5.3).....	5
2.1. Test setup	5
2.2. Test method and limit.....	5
2.3. GSM 850 Test results	6
2.4. GSM 1900 Test results	7
2.5. Bluetooth Test results	8
3. Radiated emissions (FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)	9
3.1. Test setup	9
3.2. Test method and limit.....	9
3.3. GSM 850 Test results	10
3.4. GSM 1900 Test results	11
3.5. Bluetooth Test results	12
4. Test equipment	14
4.1. Conducted measurements	14
4.2. Radiated measurements	14

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

EUT with DUT number	RM-235 DUT 41330 and 41344 (WLAN)
Accessories with DUT numbers	BL-6F DUT 41333, AC-5E DUT 41334, AD-54 DUT 41335, HS-45 DUT 41336, CA-101 DUT 41063, 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	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 40-42 / 101.7-104.8
Date of measurements	11.12.2007 and 2.1.2008
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:

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

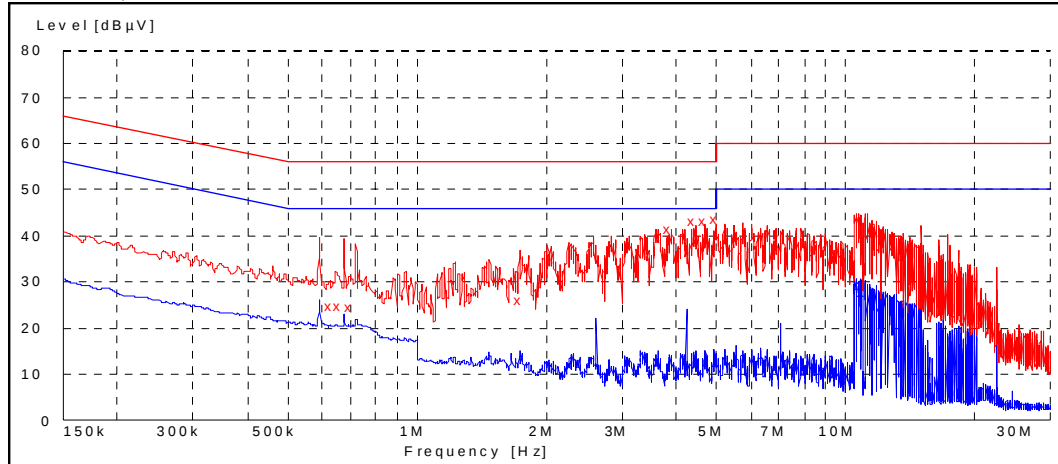
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

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 850 Test results

RX mode, channel 190 / 881.6 MHz



Quasi peak (RBW: 9 kHz)

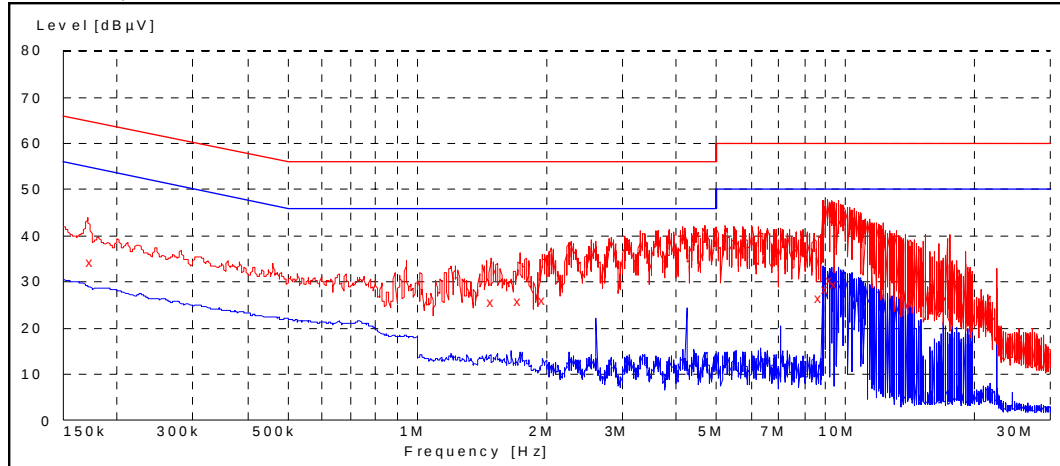
Frequency [MHz]	U [dBμV]	Line	Result
0.625000	24.70	L1	PASSED
0.660000	24.60	L1	PASSED
0.700000	24.40	N	PASSED
1.740000	26.10	N	PASSED
3.890000	41.50	N	PASSED
4.430000	43.00	L1	PASSED
4.705000	43.10	L1	PASSED
4.965000	43.60	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
10.860000	28.50	L1	PASSED
10.935000	27.00	N	PASSED

2.4. GSM 1900 Test results

RX mode, channel 661 / 1960.0 MHz

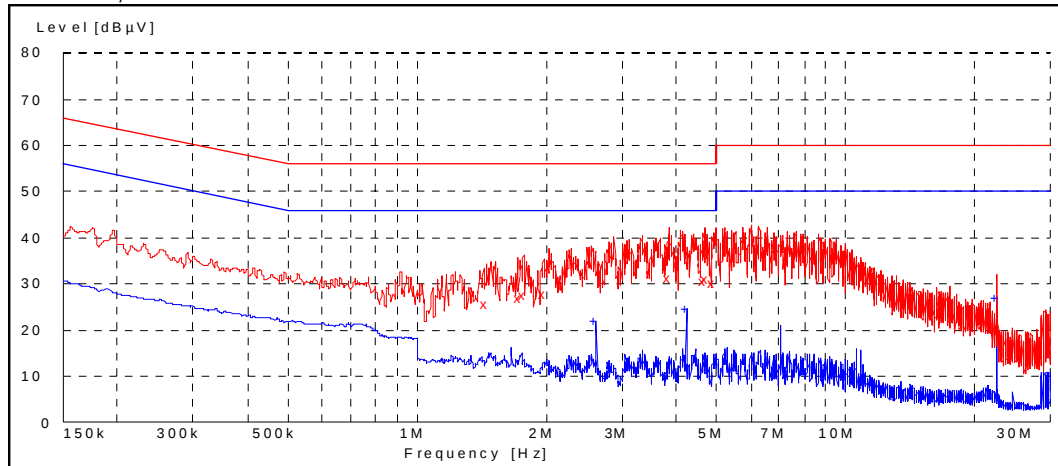


Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.175000	34.40	N	PASSED
1.510000	25.60	N	PASSED
1.730000	25.90	N	PASSED
1.970000	26.00	N	PASSED
8.805000	26.40	N	PASSED
9.055000	28.50	L1	PASSED
9.270000	30.40	L1	PASSED
9.535000	29.60	L1	PASSED

2.5. Bluetooth Test results

TX mode, channel 40 / 2442 MHz



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
1.460000	25.50	N	PASSED
1.745000	26.90	N	PASSED
1.775000	27.40	L1	PASSED
1.975000	27.70	L1	PASSED
3.870000	31.10	L1	PASSED
4.670000	30.70	N	PASSED
4.745000	30.90	L1	PASSED
4.910000	30.10	L1	PASSED

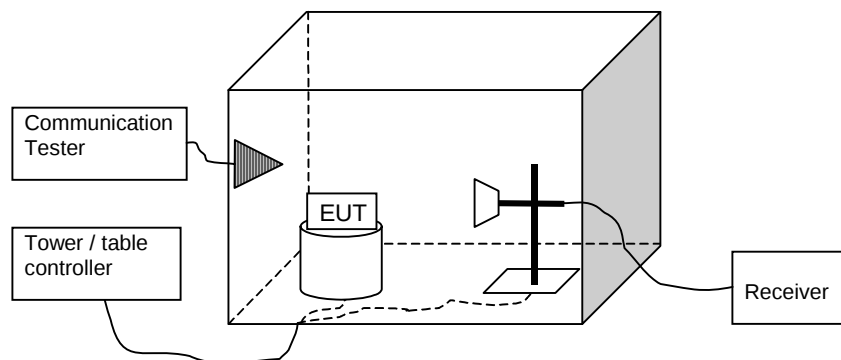
Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
2.625000	22.00	N	PASSED
4.240000	24.40	N	PASSED
22.500000	27.00	L1	PASSED

3. Radiated emissions (FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)

EUT with DUT number	RM-235 DUT 41330 and 41344 (WLAN)
Accessories with DUT numbers	BL-6F DUT 41333, AC-5E DUT 41334, AD-54 DUT 41335, HS-45 DUT 41336, CA-101 DUT 41063, 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	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20-22 / 47-51 / 101.7-104.8
Date of measurements	14-20.12.2007 and 2.1.2008
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 / 869.2 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3476.800000	39.20	91.20	44.50	-5.3	HORIZONTAL	PASSED
6953.600000	43.50	149.62	41.90	1.6	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3476.800000	26.10	20.18	31.40	-5.3	HORIZONTAL	PASSED
6953.600000	30.80	34.67	29.20	1.6	HORIZONTAL	PASSED

RX mode, channel 190 / 881.6 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
49.919439	16.50	6.68	51.70	-35.2	VERTICAL	PASSED
348.598597	14.40	5.25	45.70	-31.3	HORIZONTAL	PASSED
501.202004	37.80	77.62	65.80	-28.0	VERTICAL	PASSED
645.890581	25.20	18.20	50.40	-25.2	VERTICAL	PASSED
698.798798	27.40	23.44	51.80	-24.4	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
1260.521042	33.70	48.42	52.60	-18.9	VERTICAL	PASSED
1483.459920	23.40	14.79	40.10	-16.7	VERTICAL	PASSED

RX mode, channel 251 / 893.8 MHz

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
3575.200000	40.40	104.71	45.30	-4.9	HORIZONTAL	PASSED
7150.400000	42.40	131.83	40.00	2.4	HORIZONTAL	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
3575.200000	26.40	20.89	31.30	-4.9	HORIZONTAL	PASSED
7150.400000	29.10	28.51	26.70	2.4	HORIZONTAL	PASSED

3.4. GSM 1900 Test results

RX mode, channel 512 / 1930.2 MHz

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
3860.000000	40.60	107.15	43.30	-2.7	HORIZONTAL	PASSED
7720.000000	42.90	139.64	39.20	3.7	HORIZONTAL	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
3860.000000	27.60	23.99	30.30	-2.7	HORIZONTAL	PASSED
7720.000000	30.60	33.88	26.90	3.7	HORIZONTAL	PASSED

RX mode, channel 661 / 1960.0 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
501.402004	35.60	60.26	63.60	-28.0	VERTICAL	PASSED
649.800601	25.20	18.20	50.30	-25.1	VERTICAL	PASSED
659.518637	26.20	20.42	51.00	-24.8	VERTICAL	PASSED
696.794790	30.30	32.73	54.80	-24.5	VERTICAL	PASSED
828.257315	23.80	15.49	46.30	-22.5	HORIZONTAL	PASSED
897.495591	35.80	61.66	57.80	-22.0	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
1205.910822	30.00	31.62	49.60	-19.6	VERTICAL	PASSED
1261.021042	29.90	31.26	48.80	-18.9	VERTICAL	PASSED
1294.589178	34.30	51.88	52.60	-18.3	VERTICAL	PASSED
1325.651303	31.60	38.02	50.20	-18.6	VERTICAL	PASSED

RX mode, channel 810 / 1989.8 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3980.000000	42.40	131.83	45.00	-2.6	VERTICAL	PASSED
7960.000000	43.80	154.88	39.60	4.2	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3980.000000	28.00	25.12	30.60	-2.6	HORIZONTAL	PASSED
7960.000000	31.20	36.31	27.00	4.2	HORIZONTAL	PASSED

3.5. Bluetooth Test results

TX mode, channel 0 / 2402 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	42.80	138.04	44.60	-1.8	VERTICAL	PASSED
7206.000000	42.30	130.32	39.70	2.6	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	30.00	31.62	31.80	-1.8	VERTICAL	PASSED
7206.000000	29.70	30.55	27.10	2.6	VERTICAL	PASSED

TX mode, channel 40 / 2442 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
270.040481	30.80	34.67	52.20	-21.4	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4961.931864	39.90	98.86	41.20	-1.3	HORIZONTAL	PASSED
7283.067134	43.50	149.62	40.50	3.0	HORIZONTAL	PASSED
7336.667335	43.70	153.11	40.60	3.1	VERTICAL	PASSED
7409.313627	43.60	151.36	39.90	3.7	HORIZONTAL	PASSED
7420.333667	43.70	153.11	40.00	3.7	HORIZONTAL	PASSED
17923.839679	53.40	467.74	33.90	19.5	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4967.431864	27.60	23.99	28.80	-1.2	HORIZONTAL	PASSED
7286.067134	30.40	33.11	27.40	3.0	HORIZONTAL	PASSED
7333.667335	30.10	31.99	27.00	3.1	VERTICAL	PASSED
7408.813627	30.70	34.28	27.00	3.7	HORIZONTAL	PASSED
7417.333667	30.80	34.67	27.10	3.7	HORIZONTAL	PASSED
17916.839679	40.50	105.93	20.90	19.6	HORIZONTAL	PASSED

TX mode, channel 78 / 2480 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4960.000000	40.00	100.00	41.30	-1.3	HORIZONTAL	PASSED
7440.000000	43.30	146.22	39.70	3.6	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4960.000000	27.50	23.71	28.80	-1.3	HORIZONTAL	PASSED
7440.000000	30.60	33.88	27.00	3.6	HORIZONTAL	PASSED

4. Test equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30597	Power splitter	11667A	Agilent	22/24/27, 15C
TM37499	Power splitter	11667A	Agilent	22/24/27, 15C
TM38111	Multimeter	34401A	Agilent	22/24/27, 15C
TM38112	DC power supply	6632A	Agilent	22/24/27, 15C
TM22901	Attenuator	8496A	Agilent	22/24/27, 15C
TM30636	Artificial mains net	L2-16	PMM	15C, 15B
TM37678	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM37773	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM30600	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum analyzer	FSU	R&S	22/24/27, 15C
TM22835	Multimeter	87	Fluke	15C, 15B
TM37500	Microwave switch system	7116-MSW	Keithley	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	Transmatic	22/24/27, 15C, 15B
	Temperature chamber	VT4002	Vötsch	22/24/27, 15C
2058	EMI Test receiver	ESPC	R&S	15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
2002	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	22/24/27, 15C, 15B
TM38845	EMI receiver	ESI 40	R&S	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	22/24/27, 15C, 15B
TM37516	Biconilog antenna	HL562	R&S	22/24/27, 15C, 15B
TM26496	Double ridged waveguide antenna	3115	EMCO	22/24/27, 15C, 15B
TM39158	Horn antenna	3116	EMCO	22/24/27, 15C, 15B
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	22/24/27, 15C, 15B
TM37501	Dipole antenna	3125-870	EMCO	22/24/27
TM37502	Dipole antenna	3125-1880	EMCO	22/24/27
TM37773	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM38631	Signal generator	83640L	Agilent	22/24/27, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24/27, 15C, 15B
TM26511	Tunable notch filter	WRCA870	Wainwright	22/24/27
TM38215	Tunable notch filter	WRCD1850/1910-0.2/40	Wainwright	22/24/27
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30	Wainwright	15C
TM30642	Mast/Turntable controller	HD-100	Deisel	22/24/27, 15C, 15B
TM26500	Turntable	DS412	Deisel	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	EMCO	22/24/27, 15C, 15B
TM38843	Antenna mast	2075	EMCO	22/24/27, 15C, 15B
TM38114	DC power supply	6632A	Agilent	22/24/27, 15C, 15B
TM38323	Preamplifier	PA-02 18-26 GHz	EMC Automation	22/24/27, 15C, 15B
TM37678	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
TM22638	Power supply	OL63743-901	Transformativ	22/24/27, 15C, 15B
TM23892	Yaesu controller	G-1000SDX	Yaesu	22/24/27, 15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
2002	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B