

FCC Part 15B Compliance Test Report

Test Report no.:	FCC15B_RM-640_22	Date of Report:	04-Aug-2010
Number of pages:	11	Customer's Contact person:	Vivian Kill-Tollnek
Testing laboratory:	TCC Nokia Copenhagen Laboratory Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934	Customer:	Nokia Corporation Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934
FCC listing no.:	99059		
IC recognition no.:	661AL-1		
Tested devices/ accessories:	Phone RM-640 / Battery BL-5CT / AC-Charger AC-8E / Headset WH-102 / Laptop Lenovo T61 / Data cable CA-101		
FCC ID:	PPIRM-640	IC:	661U-RM640
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. 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:			

Christian Andersen, System Specialist, EMC

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	03-Jun-2010
Testing completed	23-July-2010
The customer's contact person	Vivian Kill-Tollnek
Test Plan referred to	T:\Projects\RM-640\TestPlan\RS_testplan_RM-640_PC.xls
Notes	-
Document name	T:\Projects\RM-640\EMC\FCC15B_RM-640_22.docx

1.1. EUT and Accessory Information

The EUT is a 8-band (GSM850/900/1800/1900 and WCDMA Band I/II(1900)/V(850)/VIII) mobile phone with GPRS, EGPRS, Bluetooth and WLAN. The EUT is tested with maximum rated TX power, modulated with pseudo random bit sequence (PRBS9).

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-640	004402/13/036944/4	0210	-	re 5.04	24273
Battery	BL-5CT	3820669492155081024;0670555	-	-	-	24252
AC-Charger	AC-8E	4090499301040501991;0675387	-	-	-	24248
Headset	WH-102	06943239431A4102160	-	-	-	24247
Laptop	Lenovo T61	1S7665D71L3W8321	-	-	-	24950
Data cable	CA-101	07306442806701303080	-	-	-	25020

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	PASSED
15.109, a	5.5 (4.6)	Radiated emissions	PASSED

PASSED
FAILED
NP

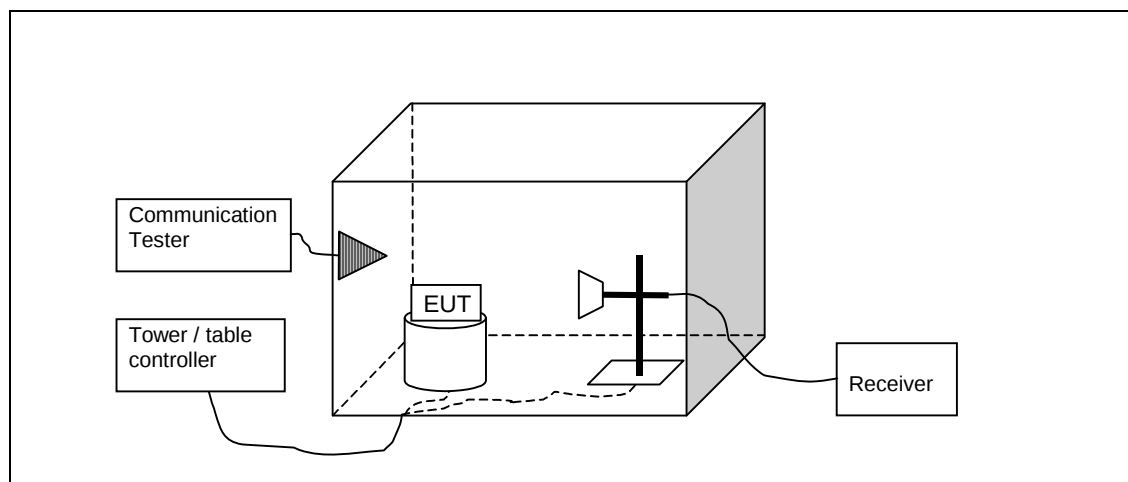
The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Laboratory.

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2. Radiated emissions (FCC §15.109, ICES-003 section 5.5)

EUT with DUT number	RM-640, DUT 24273
Accessories with DUT numbers	BL-5CT, DUT 24252 ; AC-8E, DUT 24248 ; WH-102, DUT 24247 ; T61, DUT 24950 ; CA-101, DUT 25020 ;
Operation Voltage [V] / [Hz]	115 V / 60 Hz
Results	PASSED
Remarks	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 54 / 100
Date of measurements	22-Jul-2010
Measured by	Ruben Hansen



2.1. 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 ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$).

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	Peak limit [dB $\mu\text{V/m}$]
30 - 230	40	-	-
230 - 1000	47	-	-
Above 1000	-	54	74

2.2. GSM850 Test results

RX mode, channel 128 / 869.2 MHz

Average(RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U_{RX} [dB μV]	A_{TOT} [dB]	Polarisation	Result
3476.1	23.76	15.415	26.58	-2.82	HORIZONTAL	PASSED
6952.6	43.67	152.598	33.76	9.91	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U_{RX} [dB μV]	A_{TOT} [dB]	Polarisation	Result
3476.1	36.76	68.841	39.58	-2.82	HORIZONTAL	PASSED
6952.6	56.11	638.631	46.2	9.91	VERTICAL	PASSED

RX mode, channel 190 / 881.6 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U_{RX} [dB μV]	A_{TOT} [dB]	Polarisation	Result
35.355	11.69	3.842	26.37	-14.68	VERTICAL	PASSED
45.309	25.34	18.486	46.58	-21.24	VERTICAL	PASSED
65.53	16.05	6.348	43.24	-27.19	HORIZONTAL	PASSED
70.704	7.37	2.335	33.35	-25.98	HORIZONTAL	PASSED

RX mode, channel 190 / 881.6 MHz

Average(RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3942.188	25.38	18.567	26.38	-1	HORIZONTAL	PASSED
7059.416	34.89	55.495	24.18	10.71	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3942.188	38.58	84.918	39.58	-1	HORIZONTAL	PASSED
7059.416	48.1	254.097	37.39	10.71	VERTICAL	PASSED

RX mode, channel 251 / 893.8 MHz

Average(RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3573.6	23.96	15.771	26.11	-2.15	HORIZONTAL	PASSED
7149.7	35.51	59.601	24.86	10.65	HORIZONTAL	PASSED

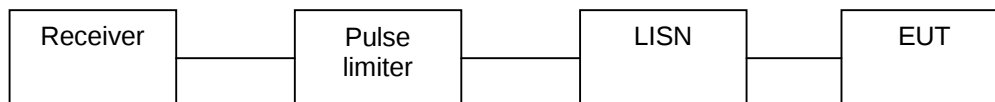
Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3573.6	37.19	72.335	39.34	-2.15	HORIZONTAL	PASSED
7149.7	48.05	252.493	37.4	10.65	HORIZONTAL	PASSED

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

EUT with DUT number	RM-640, DUT 24273
Accessories with DUT numbers	BL-5CT, DUT 24252 ; AC-8E, DUT 24248 ; WH-102, DUT 24247 ; T61, DUT 24950 ; CA-101, DUT 25020 ;
Operation Voltage [V] / [Hz]	115 V / 60 Hz
Results	PASSED
Remarks	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 54 / 100
Date of measurements	22-Jul-2010
Measured by	Ruben Hansen

3.1. Test setup



3.2. 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:

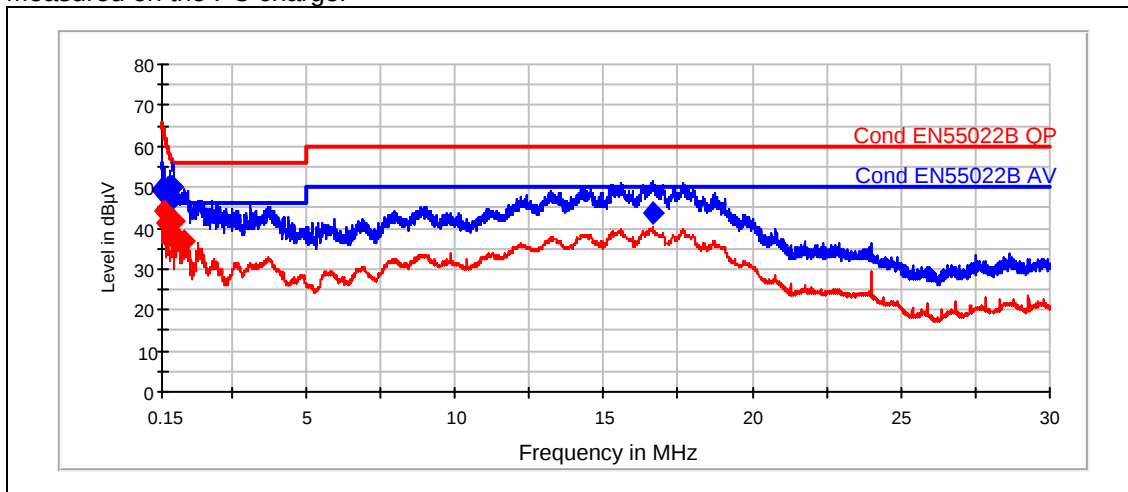
$$U [dB\mu V] = U_{RX} + A_{TOT}$$

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

Measured on the PC charger



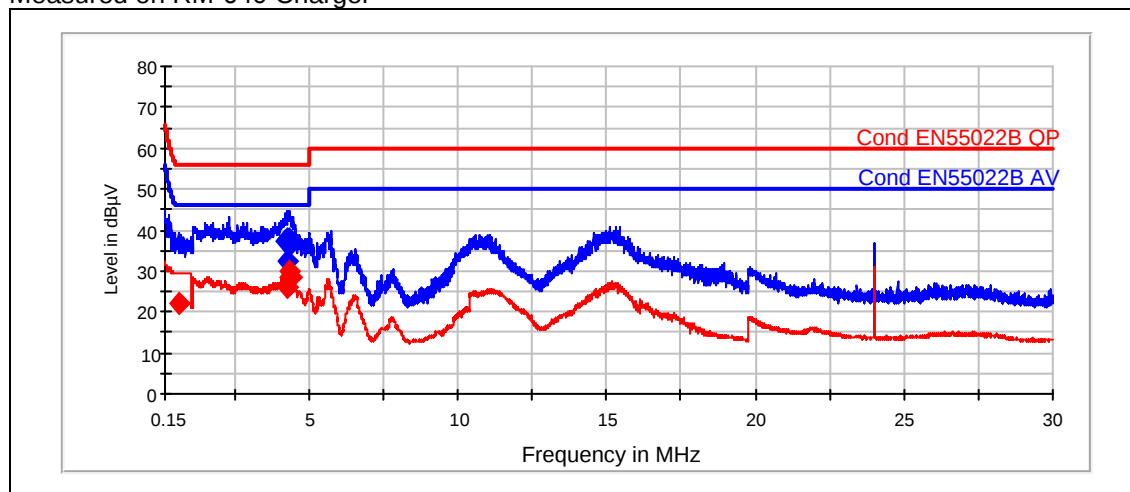
Quasi peak

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.155	49.21	10	L1	16.53	PASSED
0.165	49.44	10	L1	15.81	PASSED
0.48	50.18	10	N	6.14	PASSED
0.5	47.03	10	N	9	PASSED
0.515	49.83	10	N	6.2	PASSED
16.64	43.63	10	N	16.4	PASSED

Average

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.205	44.09	10	N	9.31	PASSED
0.295	41.21	10	N	9.18	PASSED
0.5	37.96	10	N	8	PASSED
0.525	41.63	10	N	4.4	PASSED
0.715	37.29	10	N	8.7	PASSED
0.905	36.86	10	N	9.1	PASSED

Measured on RM-640 Charger



Quasi peak

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
4.225	37.25	10	N	18.7	PASSED
4.26	37.58	10	N	18.4	PASSED
4.28	32.48	10	N	23.5	PASSED
4.305	37.02	10	N	19	PASSED
4.315	37.83	10	N	18.2	PASSED
4.345	36.13	10	N	19.9	PASSED

Average

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.61	22.26	10	L1	23.7	PASSED
4.28	25.95	10	N	20.1	PASSED
4.305	28.56	10	N	17.4	PASSED
4.315	28.53	10	N	17.5	PASSED
4.355	29.88	10	N	16.1	PASSED
4.385	28.39	10	N	17.6	PASSED

4. Test Equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15C, 15B
13513	Pulse Limiter	ESH3Z2	Rohde&Schwarz	15C, 15B
13666	Receiver	ESPC	Rohde&Schwarz	15C, 15B
13935	LISN	ESH3-Z5	Rohde&Schwarz	15C, 15B
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
19171	Communication Tester	CMU200	Rohde&Schwarz	15C, 15B
11386	DC Power Supply	HP6632A	Hewlett Packard	22/24/27, 15C, 15B
19678	Spectrum Analyzer	FSP	Rohde&Schwarz	22/24/27, 15C, 15B
16601	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
19625	Climatic Chamber	VT4002EMC	Vötsch	22/24/27, 15C, 15B
13357	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
19116	Power splitter	-	various	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
18792	Mast/turntable controller	2090	ETS-EMCO	22/24/27, 15C, 15B
18416	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
13077	Power Supply	EA-3016	-	22/24/27, 15C, 15B
15742	Programmable Relay Switching System	-----	Pickering	22/24/27, 15C, 15B
20078	Relay 2x6 Chnl μ Wave Mux	10-785B-522	Pickering	22/24/27, 15C, 15B
14021	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B
-	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B
17644	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
16948	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
16949	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
18861	Receiver	EMI Test Receiver 20Hz-26,5GHz ESI	Rohde&Schwarz	22/24/27, 15C, 15B
18860	Antenna	HL562	Rohde&Schwarz	22/24/27, 15C, 15B
18773	Anechoic chamber	RFD-100	ETS-Lindgren	22/24/27, 15C, 15B
18774	Anechoic chamber	RFSD-F/A-100	ETS-Lindgren	22/24/27, 15C, 15B
19151	High Pass Filter	WHJS3000-10SS	Wainwright	22/24/27, 15C, 15B
13937	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright Instruments	22/24/27, 15C, 15B
13936	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright Instruments	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
14114	Highpass Filter	WHK1000-12SS	Wainwright Instruments	22/24/27, 15C, 15B
14188	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright	22/24/27, 15C, 15B
14187	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B
16633	Band reject filter	WRCD1880.0-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B
19587	Band reject filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	22/24/27, 15C, 15B
20115	Band reject filter	-	Wainwright	22/24/27, 15C, 15B
20114	Band reject filter	WRCG1737/1743-1733/1747-40/6SS	Wainwright	22/24/27, 15C, 15B
20116	Band reject filter	WRCG832/83/-825/845-40/5SS	Wainwright	22/24/27, 15C, 15B
20698	Antenna	BBHA 9120 D	SCHWARZBECK	22/24/27, 15C, 15B
19966	Antenna	HFH2-Z2	Rohde&Schwarz	15C, 15B
13799	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
15191	Turntable Contoller Unit	G-800SDX	YAESU	22/24/27, 15C, 15B
14900	Antenna Controller	HD100	HD GmbH	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B