

FCC Part 15C Compliance Test Report

Test Report no.:	Cph_FCC_0542_11.doc	Date of Report:	17-10-2005
Number of pages:	16	Customer's Contact person:	Ernest Mayer
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FCC listing no.:	99059		
IC recognition no.:	4820 and 4820-1		
Tested devices/ accessories:	Phone; RM-78 (HW: 0504), Battery; BP-6M, AC-Charger; AC-4E, Headset; HS-23, Multi Media Card; MU-16		
FCC ID:	QTKRM-78	IC:	661AD-RM78
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:			

Allan F. Henriksen, Engineer

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	16.10.2005
Testing completed	16.10.2005
The customer's contact person	Ernest Mayer
Test Plan referred to	\\EMC\\TESTPLAN\\
Notes	None
Document name	T:\\Projects\\RM-78\\EMC\\Results\\FCC\\Cph_FCC_0542_11.doc

1.1. EUT and Accessory Information

The EUT is a triple band (GSM900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-78	004400/74/160044/7	0504	-	03.21	29005
Battery	BP-6M	0670467393213 M362110121645	-	-	-	29006
AC-Charger	AC-4E	03/05 071	1.1	1.0	-	29007
Headset	HS-23	GM2750741D	0.6	1.2	0.2	28403
MM Card	MU-16	SDSDM64 ABO4251AJ	-	-	-	29409

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	-
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	-
15.247(c), 15.209	6.2.2 (o)(e1)	Spurious radiated emissions	Passed
15.207	6.6	AC powerline conducted emissions	-
15.247(a)(1)	6.2.2(o)(a3)	20 dB bandwidth	-
15.247(a)(1)	6.2.2(o)(a1)	Carrier frequency separation	-
15.247(a)(1)(iii)	Amend I(ii)	Number of hopping frequencies	-
15.247(a)(1)(iii)	Amend I(ii)	Time of occupancy	-

PASSED
FAILED
NP

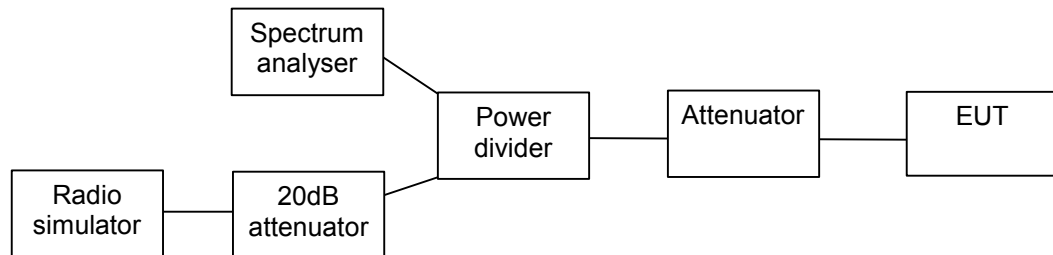
The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Copenhagen Laboratory.

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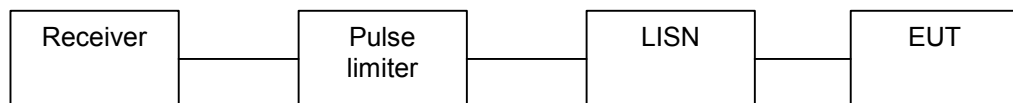
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2. Test setups

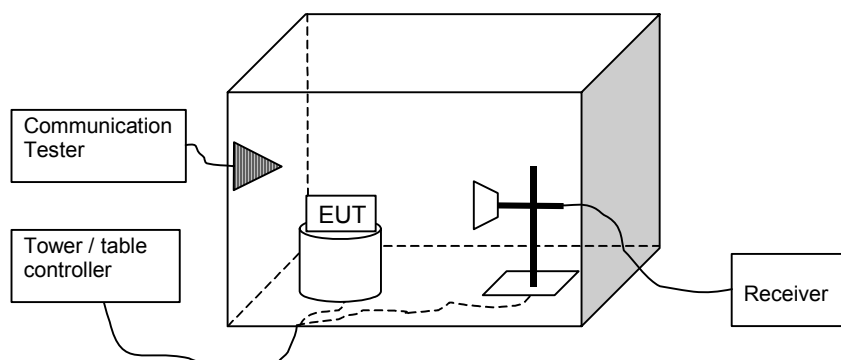
2.1. Conducted RF test setup



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	RM-78 #29005
Accessories with DUT numbers	BP-6M #29006, AC-4E #29007, HS-23 # 28403, MU-16 #29409
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 44 / 1012
Date of measurements	16.10.2005
Measured by	JufoTuhino

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 Average [dBμV/m]	Limit Peak [dBμV/m]
Below 2390 and above 2483.5	≤ 54	≤ 74

3.2. Bluetooth Test results

3.2.1 Phone slide open

3.2.2 $\pi/4$ -DQPSK modulation, PRBS packet type

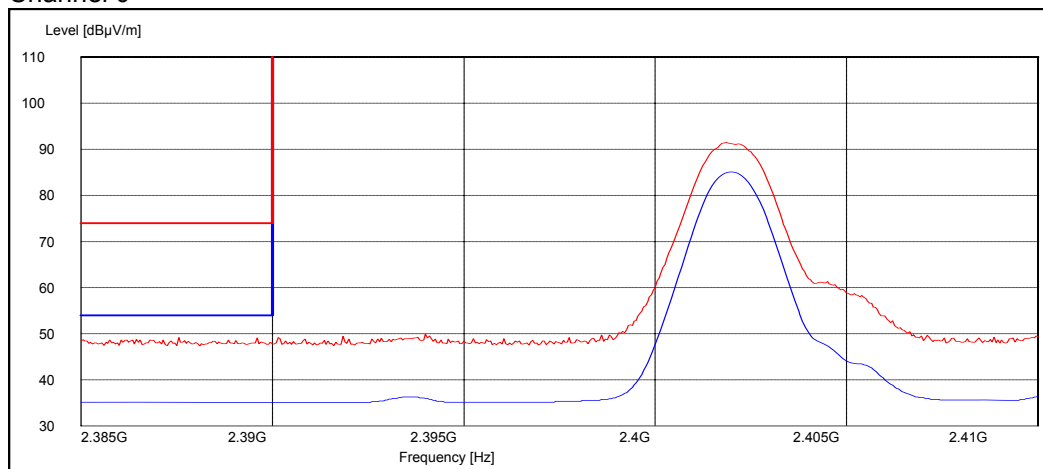
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	35.11	Passed
78	42.83	Passed
Hopping on, low end	34.90	Passed
Hopping on, high end	36.05	Passed

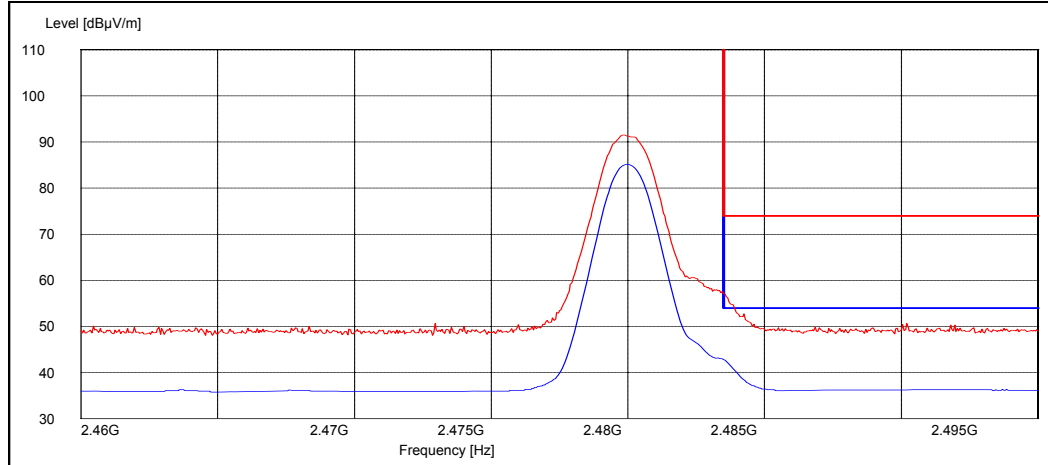
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	48.09	Passed
78	57.14	Passed
Hopping on, low end	49.08	Passed
Hopping on, high end	55.54	Passed

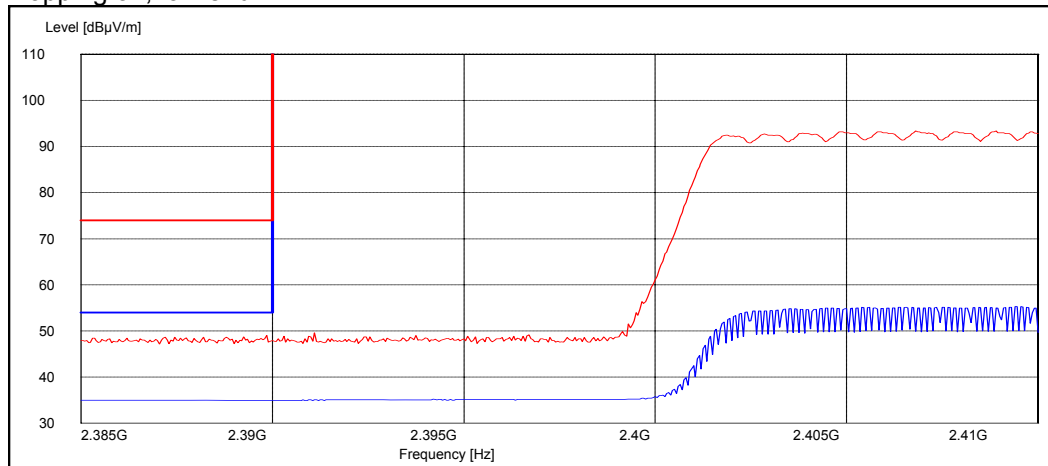
Channel 0



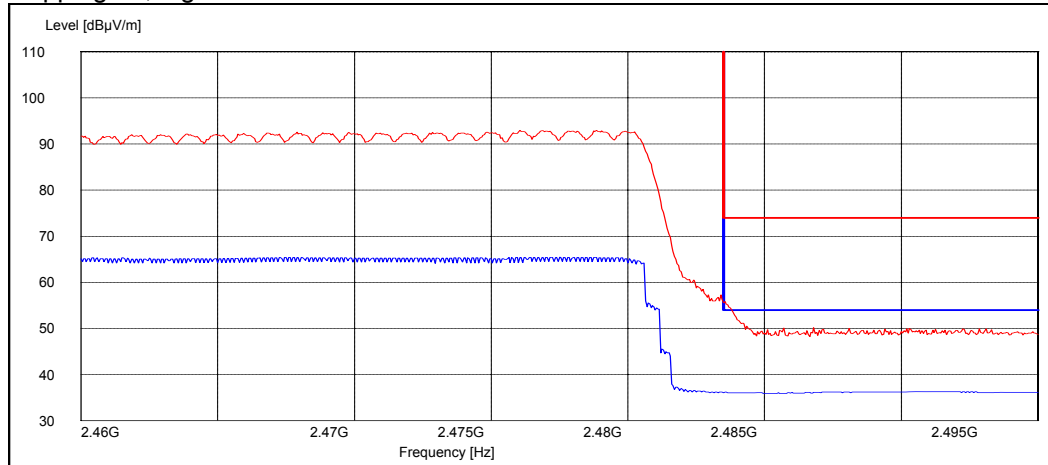
Channel 78



Hopping on, low end



Hopping on, high end



3.2.3 Phone slide closed

3.2.4 $\pi/4$ -DQPSK modulation, PRBS packet type

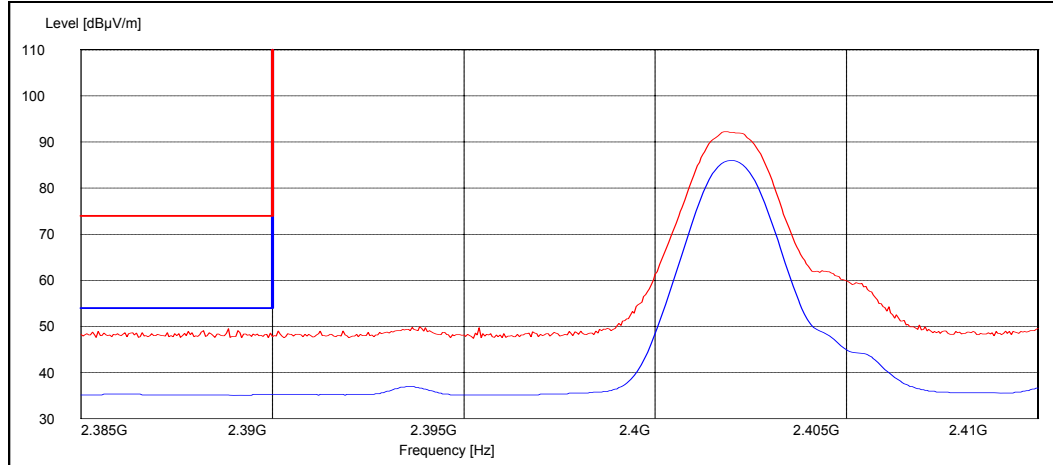
Average (RBW: 1 MHz)

Channel	E [dBμV/m]	Result
0	35.38	Passed
78	43.27	Passed
Hopping on, low end	35.12	Passed
Hopping on, high end	36.05	Passed

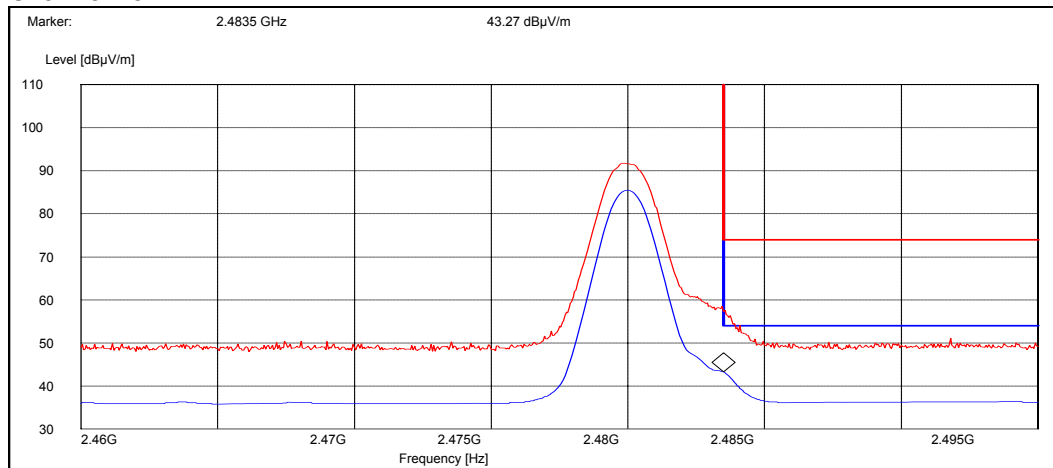
Peak (RBW: 1 MHz)

Channel	E [dBμV/m]	Result
0	48.59	Passed
78	57.28	Passed
Hopping on, low end	49.10	Passed
Hopping on, high end	57.14	Passed

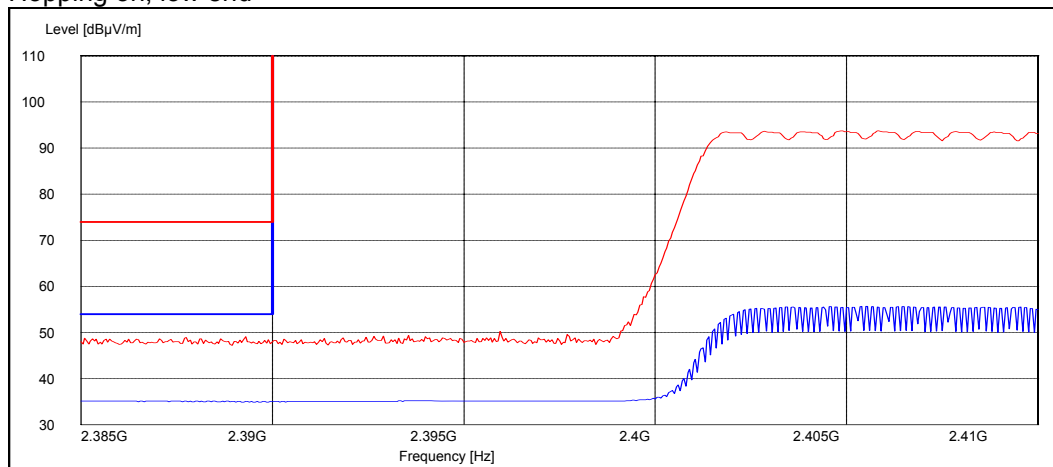
Channel 0



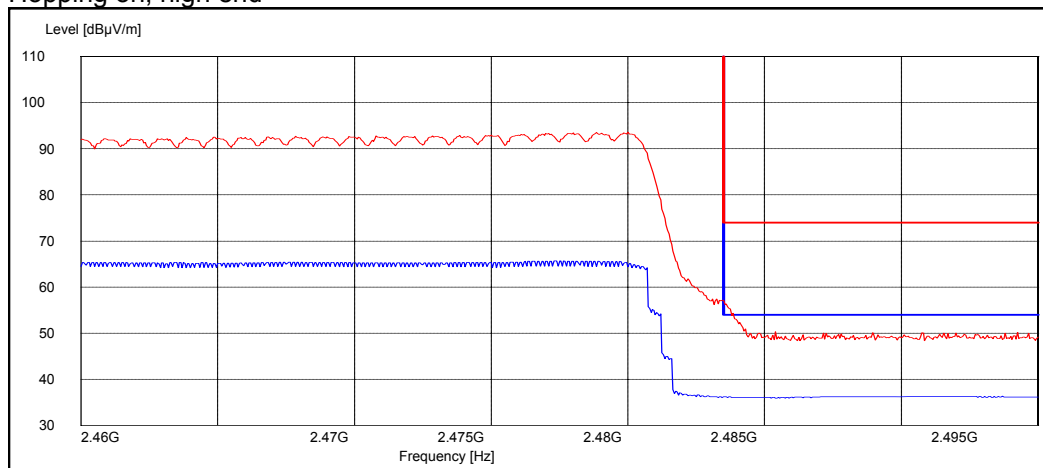
Channel 78



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	RM-78 #29005
Accessories with DUT numbers	BP-6M #29006, AC-4E #29007, HS-23 # 28403, MU-16 #29409
Operation Voltage [V] / [Hz]	230/50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	20 / 44 1012
Date of measurements	16.10.2005
Measured by	JufoTuohino

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:

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

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

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [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 Phone slide open

4.2.2 $\pi/4$ -DQPSK modulation, PRBS packet type

Channel 0

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
4804.000000	44.04	159.22	36.14	7.90	VERTICAL	Passed
7206.000000	38.84	87.50	26.34	12.50	HORIZONTAL	Passed

Channel 39

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
37.795391	18.70	8.61	34.40	-15.70	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
2787.073146	50.40	331.13	39.30	11.10	HORIZONTAL	Passed
2904.811623	52.20	407.38	40.00	12.20	VERTICAL	Passed
4882.265531	42.74	137.09	34.64	8.10	VERTICAL	Passed
12409.315631	44.44	166.72	25.24	19.20	VERTICAL	Passed
14484.963928	47.94	249.46	25.54	22.40	VERTICAL	Passed
17865.223447	54.44	527.23	26.04	28.40	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
2785.073146	37.80	77.62	26.80	11.00	HORIZONTAL	Passed
2901.811623	39.00	89.13	27.00	12.00	VERTICAL	Passed
4882.265531	28.14	25.53	20.04	8.10	VERTICAL	Passed
12404.815631	31.64	38.19	12.34	19.30	VERTICAL	Passed
14484.963928	34.54	53.33	12.14	22.40	VERTICAL	Passed
17865.723447	41.64	120.78	13.24	28.40	HORIZONTAL	Passed

Channel 78

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
4960.000000	44.24	162.93	35.94	8.30	VERTICAL	Passed
7440.000000	39.24	91.62	26.34	12.90	VERTICAL	Passed

4.2.3 Phone slide closed Passed

4.2.4 $\pi/4$ -DQPSK modulation, PRBS packet type

Channel 0

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
4804.000000	42.64	135.52	34.74	7.90	HORIZONTAL	Passed
7206.000000	39.24	91.62	26.74	12.50	HORIZONTAL	Passed

Channel 39

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
38.095391	18.40	8.32	34.30	-15.90	VERTICAL	Passed
109.158717	15.50	5.96	37.70	-22.20	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
2897.299599	51.50	375.84	39.70	11.80	VERTICAL	Passed
2906.309619	51.90	393.55	39.80	12.10	VERTICAL	Passed
4881.765531	42.94	140.28	34.84	8.10	HORIZONTAL	Passed
12405.817635	44.24	162.93	24.94	19.30	HORIZONTAL	Passed
17881.267535	54.24	515.23	25.54	28.70	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
2901.299599	38.90	88.10	26.90	12.00	VERTICAL	Passed
2905.309619	39.20	91.20	27.00	12.20	VERTICAL	Passed
4881.765531	28.14	25.53	20.04	8.10	HORIZONTAL	Passed
17885.267535	41.34	116.68	12.64	28.70	HORIZONTAL	Passed

Channel 78

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
4960.000000	44.04	159.22	35.74	8.30	HORIZONTAL	Passed
7440.000000	40.04	100.46	27.14	12.90	HORIZONTAL	Passed

5. Test Equipment

5.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15B,15C
13513	Pulse Limiter 9KHz-30MHz	ESH3Z2	Rohde&Schwarz	15B,15C
13666	EMI Test Reciever 9KHz-2,5GHz	ESPC	Rohde&Schwarz	15B,15C
13935	Two Lines Artificial Mains Network	ESH3-Z5	Rohde&Schwarz	15B,15C
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15B,15C
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15B,15C
19171	Universal Radio Communication Tester	CMU200	Rohde&Schwarz	15B,15C
11386	System DC Power Supply	HP6632A	Hewlett Packard	22.24
11487	Network analyzer 300KHz-3,0GHz	HP8753A	Hewlett Packard	22.24
11584	Spectrum analyzer 50Hz-6,5GHz	HP8561B	Hewlett Packard	22.24
13134	Tracking generator	HP85645A	Hewlett Packard	22.24
13302	Spectrum Analyzer 9KHz-12.8GHz	HP8596E	Hewlett Packard	22.24
13371	Temperature Chamber	S-1,2C	Thermotron	22.24
13524	Digital Radiocomm. Tester	CMD55	Rohde&Schwarz	22.24
14807	S - Parameter Test Set 300KHz-6GHz	HP85047A	Hewlett Packard	22.24
15859	Digital Radio Communication Test Set	4201S	Wavetek	22.24
17277	Multimeter Digital 6 1/2 Digit	AT34401A	Agilent Technologies	22.24
17796	Radio Communication Test Set	4400M	Wavetek	22.24
19374	Resonant Dipole Antenna 850MHz SMA m Conn.	-	NMP Cph	22.24
19375	Resonant Dipole Antenna 1900MHz SMA m Conn.	-	NMP Cph	22.24
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15B,15C

5.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
14020	Programmable Relay Switching System	-	Pickering	15B,15C,22,24
18792	Multi Device Controller	2090	ETS-EMCO	15B,15C,22,24
13829	Turntable Controller	4630-100	Comtest	15B,15C,22,24
14963	RF Preamplifier 100MHz-4GHz (Metal Chassis)	AFS3-00100400	Miteq/NMP Cph	15B,15C,22,24
13668	BiLog Antenna 30-2000MHz	BiLog-CBL6112A	Chase	15B,15C,22,24
18861	EMI Test Receiver 20Hz-26,5GHz	ESI	Rohde&Schwarz	15B,15C,22,24
12679	Dual Log Periodic Antenna 1-18 GHz	HL025	Rohde&Schwarz	15B,15C,22,24
18860	Ultra Broadband Antenna	HL562	Rohde&Schwarz	15B,15C,22,24

Eq. No	Equipment	Type	Manufacturer	Used in
	Ultralog 30-3000MHz			
18773	Shielded Chamber	RFD-100	ETS-Lindgren	15B,15C,22,24
18774	Shielded Chamber	RFSD-F/A-100	ETS-Lindgren	15B,15C,22,24
18324	High Pass Filter 3GHz SMA f Conn	WHJS3000-10SS	Wainwright	15B,15C,22,24
14114	Highpass Filter 1000MHz-4500MHz	WHK1000-12SS	Wainwright	15B,15C,22,24
13918	Highpass Filter 2000-4000MHz 50OHM SMA Conn	WHKS2000-10SS	Wainwright Instruments	15B,15C,22,24
13937	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40-6SS	Wainwright Instruments	15B,15C,22,24
13936	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40-10SS	Wainwright Instruments	15B,15C,22,24
13917	Highpass Filter 1000-3000MHz 50OHM SMA Conn	WHKS1000-10SS	Wainwright Instruments	15B,15C,22,24
14188	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40-6SS	Wainwright	15B,15C,22,24
14187	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40-10SS	Wainwright	15B,15C,22,24
16633	Ultra Stable Notch Filter 1880,0MHz	WRCD1880.0-0.2/40-10SS	Wainwright	15B,15C,22,24
18323	Band reject filter 1947-1953MHz 40dB	WRCG1947/1953-1940/1960-40/6SS	Wainwright	15B,15C,22,24
15190	Infra Red Remote Control Unit	4630	Emco	22,24,15B,15C
14993	EMI Test Receiver 9KHz-2750MHz	ESCS30	Rohde&Schwarz	22,24,15B,15C
15191	Turntable Contoller Unit	G-800SDX	YAESU	22,24,15B,15C
14900	Antenna Controller	HD100	HD GmbH	22,24,15B,15C