

FCC Part 15C Compliance Test Report

Test Report no.:	Salo_FCC_0633_14.doc	Date of Report:	23.08.2006
Number of pages:	15	Customer's Contact person:	Jorma Hanni
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FCC listing no.:	533467		
IC recognition no.:	5385		
Tested devices/ accessories:	Phone RM-198 / Battery BL-5C, AC charger AC-3 and Headset HS-5		
FCC ID:	LJPRM-198	IC:	661E-RM198
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), IC standards RSS-GEN 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:			

Sami Lehtonen, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	20.07.2006
Testing completed	17.08.2006
The customer's contact person	Jorma Hanni
Test Plan referred to	T:\Projects\RM-198\TestPlan_RS\RS_Testplan_RM-198.xls
Notes	
Document name	T:\Projects\RM-198\EMC\Results\FCC\Salo_FCC_0633_14.doc

1.1. EUT and Accessory Information

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

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-198	004400/87/166979/0	1101	-	03.11	11375
Battery	BL-5C	0670400363807M20522CP53571	1.3	-	-	11289
Headset	HS-5	-	-	-	-	11385
AC- Charger	AC-3E	3997915374051202484;0675370	-	-	-	11386

1.2. Summary of Test Results

Bluetooth:

Section in CFR 47	Section in RSS-GEN or RSS-210	Name of the test	Result
15.247(b)(1)	A8.4 (2)	Peak output power	NP
15.247(c)	A8.5	Band edge compliance of RF emissions	PASSED
15.247(c)	A8.5	Spurious RF conducted emissions	NP
15.247(c), 15.209	A8.5	Spurious radiated emissions	PASSED
15.207	7.2.2	AC powerline conducted emissions	PASSED
15.247(a)(1)	A8.1 (1)	20 dB bandwidth	NP
15.247(a)(1)	A8.1 (2)	Carrier frequency separation	NP
15.247(a)(1)(iii)	A8.1 (4)	Number of hopping frequencies	NP
15.247(a)(1)(iii)	A8.1 (4)	Time of occupancy	NP

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.

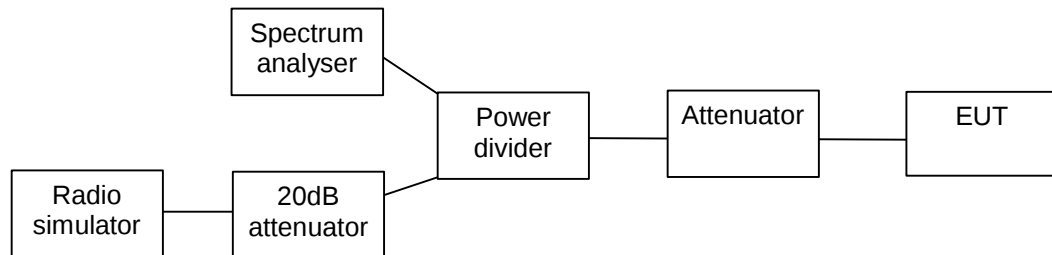
The test was not performed by the TCC Nokia Salo Laboratory.

CONTENTS

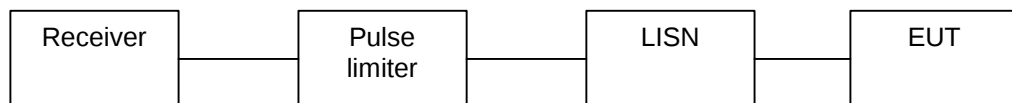
1. Summary for FCC Part 15C Compliance Test Report.....	2
1.1. EUT and Accessory Information	2
1.2. Summary of Test Results	2
2. Test setups.....	4
2.1. Conducted RF test setup	4
2.2. AC powerline conducted emissions test setup.....	4
2.3. Spurious radiated emissions test setup	4
3. Band edge compliance of RF emissions (FCC §15.247(c), RSS-210 A8.5)	5
3.1. Test method and limit.....	5
3.2. Bluetooth Test results	6
4. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 A8.5).....	7
4.1. Test method and limit.....	7
4.2. Bluetooth Test results	8
5. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)	11
5.1. Test method and limit.....	11
5.2. Bluetooth Test results	12
6. Test Equipment.....	14
6.1. Conducted measurements	14
6.2. Radiated measurements	14

2. Test setups

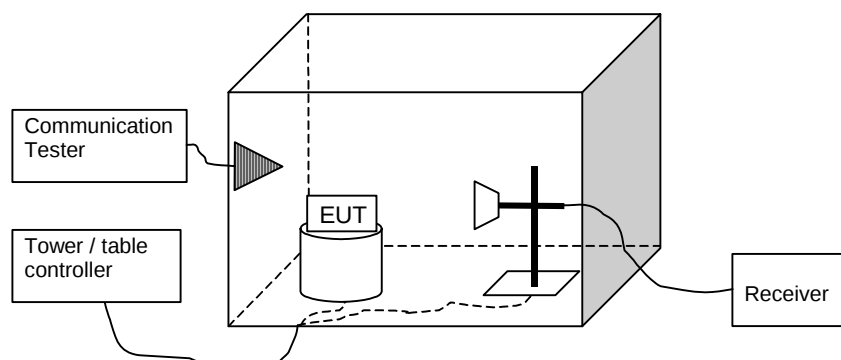
2.1. Conducted RF test setup



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 A8.5)

EUT with DUT number	RM-198, DUT 11375
Accessories with DUT numbers	BL-5C, DUT 11289; AC-3E, DUT 11386; HS-5, DUT 11385
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Flip open / Flip close
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 55 / 101.9
Date of measurements	17.08.2006
Measured by	Sami Lehtonen

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 8DPSK modulation, PRBS packet type

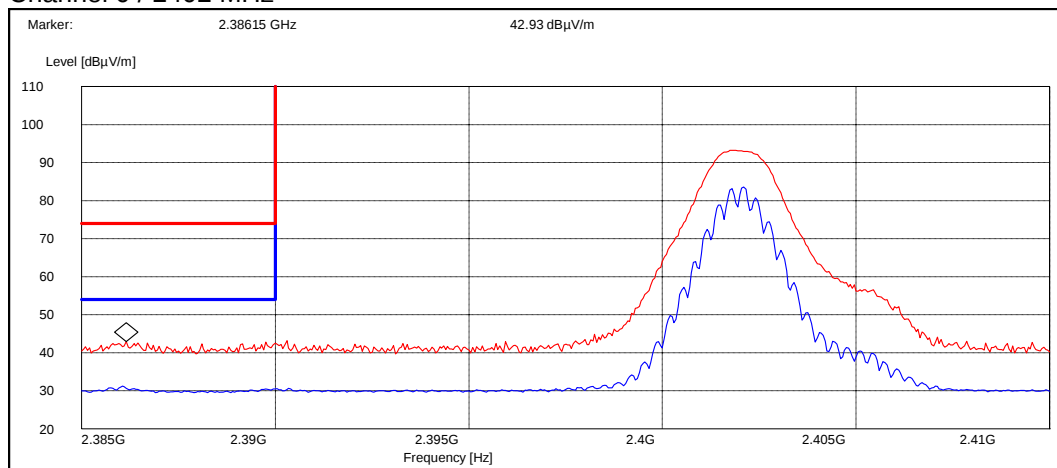
Average (RBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
0 / 2402	31.22	PASSED
78 / 2480	38.71	PASSED

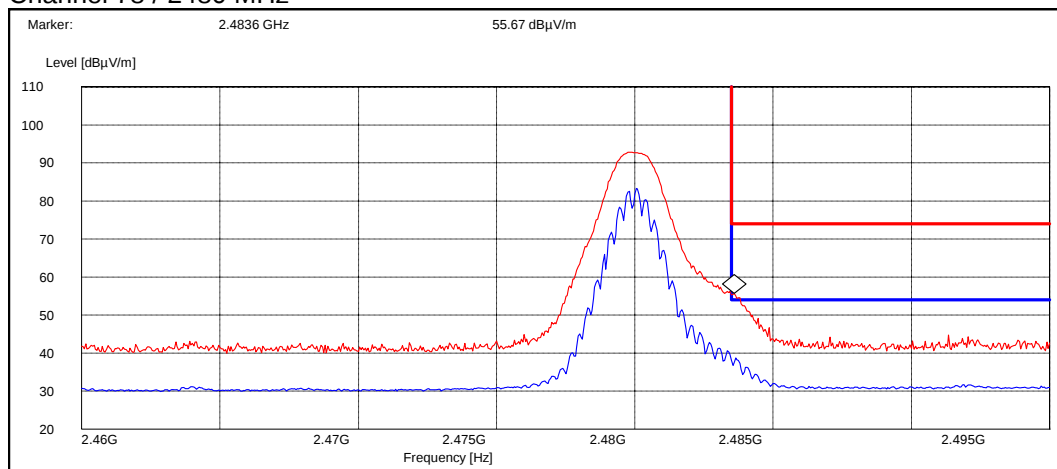
Peak (RBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
0 / 2402	42.93	PASSED
78 / 2480	55.67	PASSED

Channel 0 / 2402 MHz



Channel 78 / 2480 MHz



4. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 A8.5)

EUT with DUT number	RM-198, DUT 11375
Accessories with DUT numbers	BL-5C, DUT 11289; AC-3E, DUT 11386; HS-5, DUT 11385
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Flip open
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 55 / 101.9
Date of measurements	17.08.2006
Measured by	Sami Lehtonen

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 GFSK modulation, PRBS packet type

Channel 0 / 2402 MHz

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
4804.000000	44.30	164.06	43.60	0.70	VERTICAL	PASSED
7206.000000	46.30	206.54	43.40	2.90	HORIZONTAL	PASSED

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
4804.000000	31.40	37.15	30.70	0.70	HORIZONTAL	PASSED
7206.000000	32.70	43.15	29.80	2.90	VERTICAL	PASSED

Channel 40 / 2442 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
32.083367	15.60	6.03	31.80	-16.20	VERTICAL	PASSED
38.095391	14.60	5.37	33.40	-18.80	VERTICAL	PASSED
82.624850	14.10	5.07	41.30	-27.20	HORIZONTAL	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
4848.693387	44.50	167.88	43.10	1.40	VERTICAL	PASSED
7386.767535	46.00	199.53	42.20	3.80	VERTICAL	PASSED
7621.234469	46.00	199.53	41.70	4.30	VERTICAL	PASSED
17988.983968	55.20	575.44	36.10	19.10	HORIZONTAL	PASSED

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
4849.193387	31.80	38.90	30.40	1.40	VERTICAL	PASSED
7383.267535	33.70	48.42	29.90	3.80	VERTICAL	PASSED
17991.483968	42.70	136.46	23.50	19.20	HORIZONTAL	PASSED

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	43.80	154.88	43.80	0.00	HORIZONTAL	PASSED
7440.000000	46.50	211.35	42.50	4.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4960.000000	31.20	36.31	31.20	0.00	VERTICAL	PASSED
7440.000000	33.00	44.67	29.00	4.00	VERTICAL	PASSED

4.2.2 8DPSK modulation, PRBS packet type

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	44.20	162.18	43.50	0.70	HORIZONTAL	PASSED
7206.000000	45.70	192.75	42.80	2.90	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	31.30	36.73	30.60	0.70	VERTICAL	PASSED
7206.000000	32.70	43.15	29.80	2.90	HORIZONTAL	PASSED

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
37.595391	14.60	5.37	33.20	-18.60	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4845.687375	44.10	160.32	42.80	1.30	VERTICAL	PASSED
7287.567134	46.60	213.80	43.50	3.10	VERTICAL	PASSED
12526.048096	51.20	363.08	40.60	10.60	VERTICAL	PASSED
13306.621242	51.20	363.08	39.00	12.20	HORIZONTAL	PASSED
15353.207415	52.40	416.87	35.80	16.60	HORIZONTAL	PASSED
15871.749499	54.10	506.99	36.20	17.90	HORIZONTAL	PASSED
16189.872745	54.60	537.03	35.90	18.70	VERTICAL	PASSED
17957.413828	54.70	543.25	35.90	18.80	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4843.687375	31.60	38.02	30.30	1.30	VERTICAL	PASSED
7282.567134	32.90	44.16	29.80	3.10	VERTICAL	PASSED
12520.048096	38.30	82.22	27.70	10.60	VERTICAL	PASSED
13308.121242	38.50	84.14	26.30	12.20	HORIZONTAL	PASSED
15352.207415	39.60	95.50	23.00	16.60	HORIZONTAL	PASSED
15872.249499	41.00	112.20	23.10	17.90	HORIZONTAL	PASSED
16182.872745	41.90	124.45	23.20	18.70	VERTICAL	PASSED
17957.913828	42.30	130.32	23.50	18.80	VERTICAL	PASSED

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	42.50	133.35	42.50	0.00	VERTICAL	PASSED
7440.000000	45.70	192.75	41.70	4.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4960.000000	30.70	34.28	30.70	0.00	VERTICAL	PASSED
7440.000000	33.00	44.67	29.00	4.00	VERTICAL	PASSED

5. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-198, DUT 11375
Accessories with DUT numbers	BL-5C, DUT 11289; AC-3E, DUT 11386 , HS-5 DUT 11385
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Flip open
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 45 / 101.2
Date of measurements	16.8.2006
Measured by	Sami Lehtonen

5.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-GEN 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.

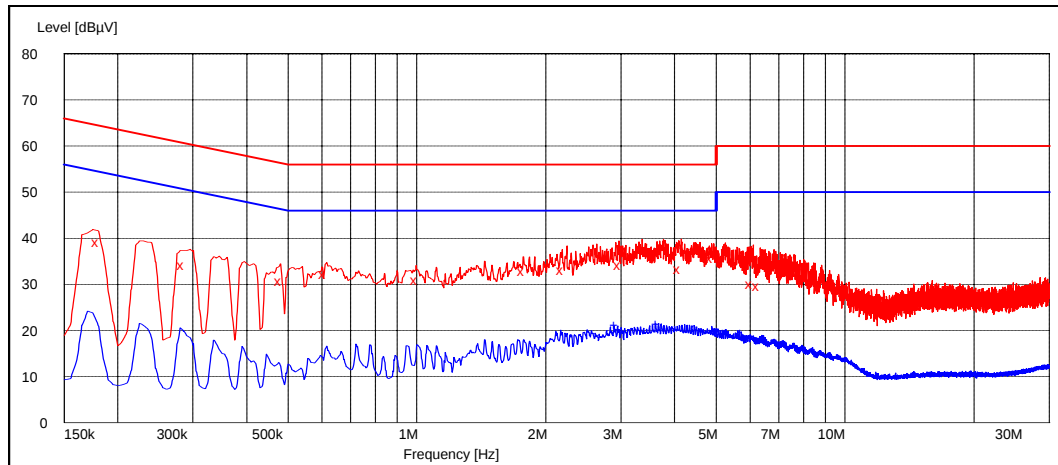
CISPR 22 Class B limits

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

5.2. Bluetooth Test results

5.2.1 GFSK modulation, PRBS packet type

Channel 40 / 2442 MHz



Quasi peak (RBW: 9 kHz)

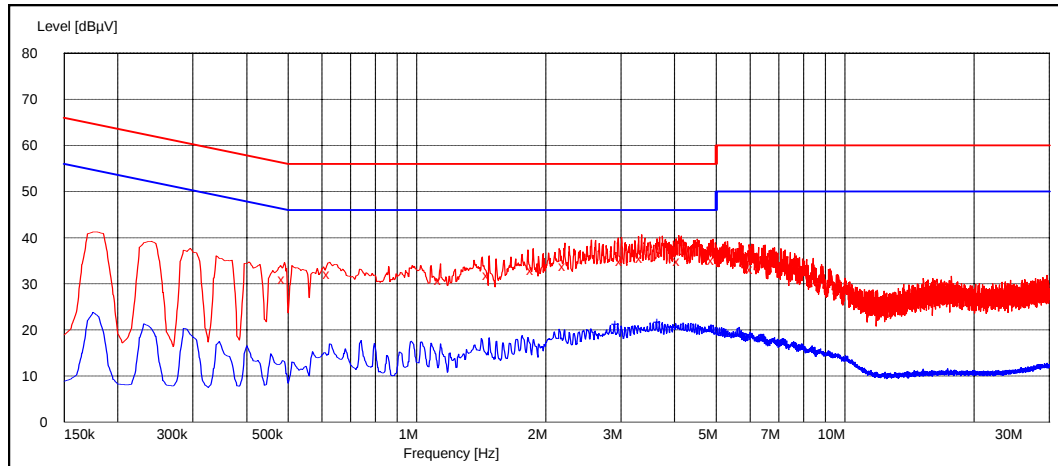
Frequency [MHz]	U [dBμV]	Line	Result
0.180000	39.30	L1	PASSED
0.285000	34.30	L1	PASSED
0.480000	30.80	N	PASSED
0.610000	32.30	N	PASSED
1.000000	31.00	N	PASSED
1.775000	32.80	N	PASSED
2.195000	33.00	L1	PASSED
2.985000	34.20	L1	PASSED
4.110000	33.40	L1	PASSED
4.890000	35.60	N	PASSED
6.065000	30.00	N	PASSED
6.290000	29.70	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
2.925000	21.20	N	PASSED
3.655000	21.40	N	PASSED

5.2.2 8DPSK modulation, PRBS packet type

Channel 40 / 2442 MHz



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.490000	31.00	N	PASSED
0.625000	32.10	N	PASSED
1.135000	30.80	L1	PASSED
1.475000	32.00	L1	PASSED
1.870000	33.00	L1	PASSED
2.220000	33.90	L1	PASSED
3.015000	35.00	L1	PASSED
3.355000	35.70	L1	PASSED
4.095000	35.00	L1	PASSED
4.930000	35.20	N	PASSED
6.070000	33.20	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
2.950000	21.30	N	PASSED
3.690000	21.80	N	PASSED

6. Test Equipment

6.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1742	EMI Test Receiver	ESMI	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1872	Thermo- Hygrograph	00.02520.150700	Lambrecht	15C, 15B
1916	Radio Communication tester	CMTA84	R&S	15C, 15B
2039	Power Supply	PL330QMD	THURLBY	15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2068	CDN-Antenna line	S1	NMP	15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
2111	Multimeter	TX3	Tektronix	15C, 15B
2156	Digital Radio Communication Tester	CMU200	R&S	15C, 15B
2206	Signal generator	SMX	R&S	15C, 15B
2335	GPIB Switch 2 to 1	-	National Instruments	15C, 15B
2347	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2352	Spectrum Analyzer	FSP	R&S	22/24, 15C
2359	Temperature Test system	VT4002	Vötsch Industrietechnik	22/24
2360	Serial Bus Converter	Serial 488A	IO Tech	22/24
2362	Power Supply	NGPX 70/5	R&S	22/24
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

6.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1748	Log. per. Antenna	HL025	R&S	22/24, 15C
1749	Log. per. Antenna	HL025	R&S	22/24, 15C
1875	Thermo- Hygrograph	00.02520.150700	Lambrecht	22/24, 15C, 15B
1917	Radio Communication tester	CMTA84	R&S	22/24, 15C, 15B
1933	Precision half-wave dipole antennas	HZ-13	R&S	22/24, 15C
1938	Precision half-wave dipole antennas	HZ-12	R&S	22/24, 15C
2006	Radiation Reference Source	VSQ	MEB	22/24, 15C, 15B
2009	Signal generator	SMP 22	R&S	22/24, 15C, 15B
2019	Multimeter	34401A	HP	22/24, 15C, 15B
2027	Coupling and Decoupling Network	M2 (modified) DC1	MEB	22/24, 15C, 15B
2028	Coupling and Decoupling Network	M3 (modified) DC2	MEB	22/24, 15C, 15B
2029	Power Supply	PL330	THURLBY	22/24, 15C
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22/24, 15C, 15B
2047	Band Reject Filter	WRCC1800/2000-0.2-10SS	Wainwright	22/24, 15C, 15B
2051	High Pass Filter	4HC1700-1-KK	R&S	22/24, 15C
2057	Log. per. Antenna	HL025	R&S	22/24, 15C
2109	Power Supply	PL330QMD	THURLBY	22/24, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
2110	Multimeter	34401A	HP	22/24, 15C, 15B
2112	Multimeter	TX3	Tektronix	22/24, 15C, 15B
2116	Controller	EMCO MODEL 2090	ETS	22/24, 15C, 15B
2133	Power Meter	NRVS	R&S	22/24, 15C
2134	Power Sensor	NRV-Z32	R&S	22/24, 15C
2135	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2138	Ultra Broadband Antenna	HL562	R&S	22/24, 15C, 15B
2140	Biconical Antenna	EMCO93110B	EMCO	22/24, 15C
2142	Log.-per.-dipol Antenna	3146	EMCO	22/24, 15C
2144	Attenuator	6803.17B	Huber-Suhner	22/24, 15C, 15B
2150	High Pass Filter	F-15041	RLC ELECTRONICS	22/24, 15C
2176	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2180	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2188	Preamplifier	AFS4-00100300-20-23P-6	MITEQ	22/24, 15C, 15B
2330	EMI Test receiver	ESIB26	R&S	22/24, 15C, 15B
2334	GPB Switch 2 to 1	-	National Instruments	22/24, 15C, 15B
2348	Yaesu controller	G-1000DXC	YAESU	22/24, 15C, 15B
2349	Computer controller (Yaesu)	GS-232B	YAESU	22/24, 15C, 15B
2350	Preamplifier	AMF-6D-020180-29-20P	MITEQ	22/24, 15C
2361	Anechoic chamber	3 meter semi/full anechoic chamber	Euroshield	22/24, 15C, 15B
2398	Horn antenna	HF906	R&S	22/24, 15C
2363	Band Reject Filter	WRCG 832/838-825/845/5SS	Wainwright	22/24
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	22/24
2365	Relay Switch Unit	TS-RSP	R&S	22/24, 15C, 15B
2366	Relay Switch Unit	TS-RSP	R&S	22/24, 15C, 15B
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B