TCC
Nokia

FINAS
Finnish Accreditation Service
T117 (EN ISO/IEC 17025)

FCC Part 22/24 Compliance Test Report

Test Report no.:	Salo_FCC_0517_06.doc	Date of Report:	28.04.2005
Number of pages:	10	Customer's Contact person:	Timo Seppälä
Testing laboratory:	TCC Nokia Salo Laboratory P.O. Box 86 Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	Client:	Nokia Corporation P.O. Box 86 Joensuunkatu 7 FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 44277
FCC listing no.: IC recognition no.:	533467 5385		
Tested devices/ accessories:	**Phone RA-4 / Battery BP-6M, AC-Charger ACP-12 and Headset HS-5**		
FCC ID:	PYARA-4	IC:	661V-RA4
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Parts 22 and 24, TIA-603-B-2002 and IC standards RSS-132 and RSS-133. 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:	28-04-2005		

Kai Uusitalo
Senior Design Engineer, EMC

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

1. Summary for FCC Part 22/24 Compliance Test Report

Date of receipt	27.04.2005
Testing completed	27.04.2005
The customer's contact person	Timo Seppälä
Test Plan referred to	T:\Projects\RA-4\changedocs\hw\RAE-6_RA-4_HW_PA_ RF9250E4.1_RF9250E5.1.doc
Notes	Tests was done because of HW change. New PA: RF9250E5.1.
Document name	T:\Projects\RA-4\results\emc\FCC\Salo_FCC_0517_06.doc

1.1. EUT and Accessory Information

The EUT is a dual band (GSM850/1900) mobile phone. The EUT is tested with maximum rated TX power, modulated with pseudo random bit sequence (PRBS9).

Product	Type	SN	HW	MV	SW	DUT
Phone	RA-4	004400/57/163235/3	5300	-	04.53(00)	10554
Battery	BP-6M	80670467VVVVVVL221110000465	-	-	-	10555
AC charger	ACP-12	06752943943 49J493120295910	-	-	-	10458
Headset	HS-5	-	-	-	-	10282

1.2. Summary of Test Results

GSM 850:

Section in CFR 47	Section in RSS-132	Name of the test	Result
§2.1046(a), 22.913(a)	4.4	Conducted RF output power	-
§22.913(a)	4.4, 6.4	Radiated RF output power	-
§2.1049(h)	4.2	99 % occupied bandwidth	-
§22.917(a)	4.5	Band edge compliance	PASSED
§22.917(a), §2.1051	4.5	Spurious emissions at antenna terminals	-
§22.917(a), §2.1053	4.5	Spurious radiated emissions	PASSED
§2.1055(a)	4.3, 6.3	Frequency stability, temperature variation	-
§2.1055(d)	4.3, 6.3	Frequency stability, voltage variation	-

GSM 1900:

Section in CFR 47	Section in RSS-133	Name of the test	Result
§2.1046(a)	6.2	Conducted RF output power	-
§24.232(b)	6.2	Radiated RF output power	-
§2.1049(h)	5.6	99 % occupied bandwidth	-
§24.238(a)	6.3	Band edge compliance	PASSED
§24.238(a), §2.1051	6.3	Spurious emissions at antenna terminals	-
§24.238(a), §2.1053	6.3	Spurious radiated emissions	PASSED
§2.1055(a)	7	Frequency stability, temperature variation	-
§2.1055(d)	7	Frequency stability, voltage variation	-

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 Salo Laboratory.

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

CONTENTS

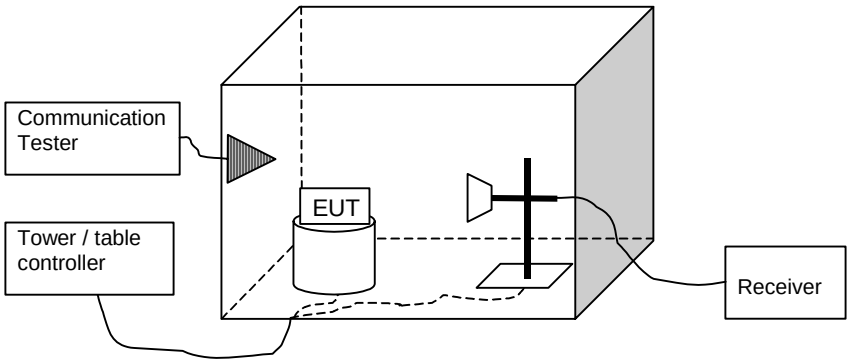
TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

2. Band edge compliance

(FCC §22.917(a), 24.238(a), RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RA-4, DUT 10554
Accessories with DUT numbers	BP-6M, DUT 10555; ACP-12, DUT 10458; HS-5, DUT 10282
Operation Voltage V / Hz	115 / 60
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	20 / 50 / 101
Date of measurements	27.04.2005
Measured by	Tomi Lipponen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to FCC rules part 22 and 24 and IC standards RSS-132 and RSS-133.

Limits for band edge compliance measurements

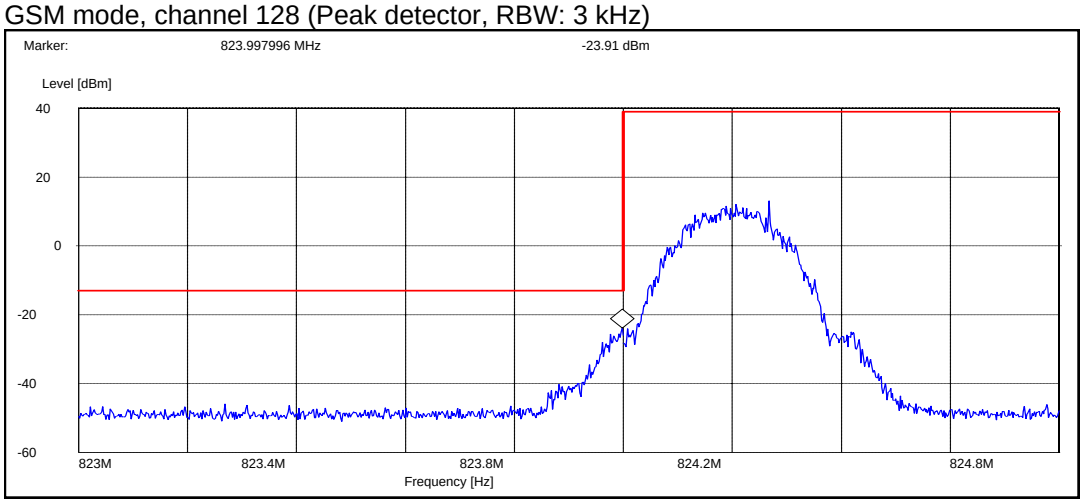
Operation band	Frequency range / MHz	Limit / dBm
GSM 850	Below 824 and above 849	-13
GSM 1900	Below 1850 and above 1910	-13

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

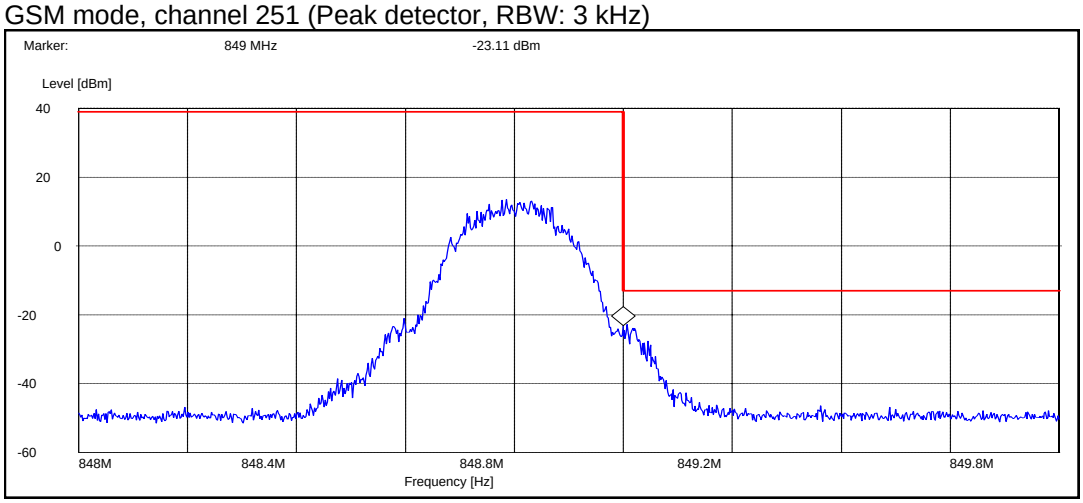
2.3. GSM 850 Test results

Operation mode (TX on)	Channel	Level / dBm
GSM	128	-23.91
GSM	251	-23.11

GSM mode, channel 128 (Peak detector, RBW: 3 kHz)



GSM mode, channel 251 (Peak detector, RBW: 3 kHz)

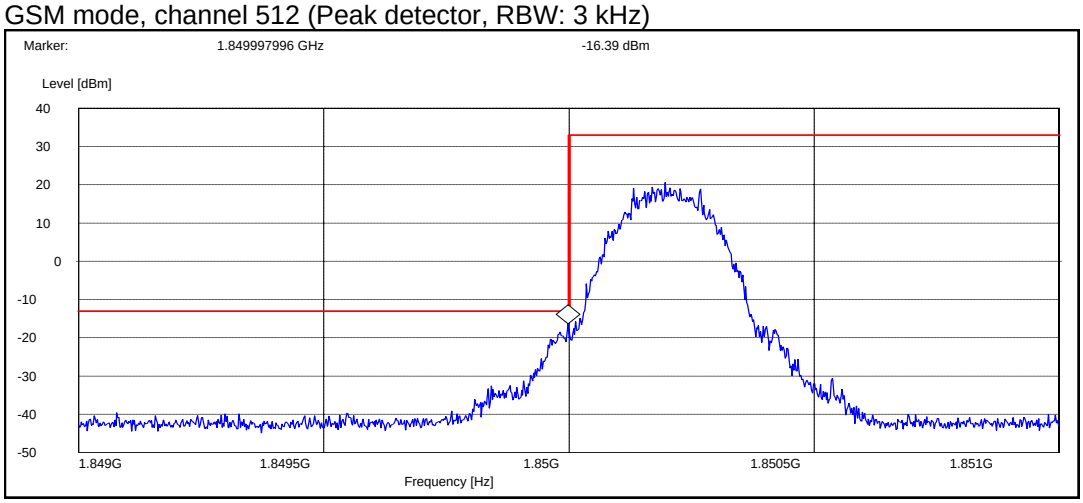


TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

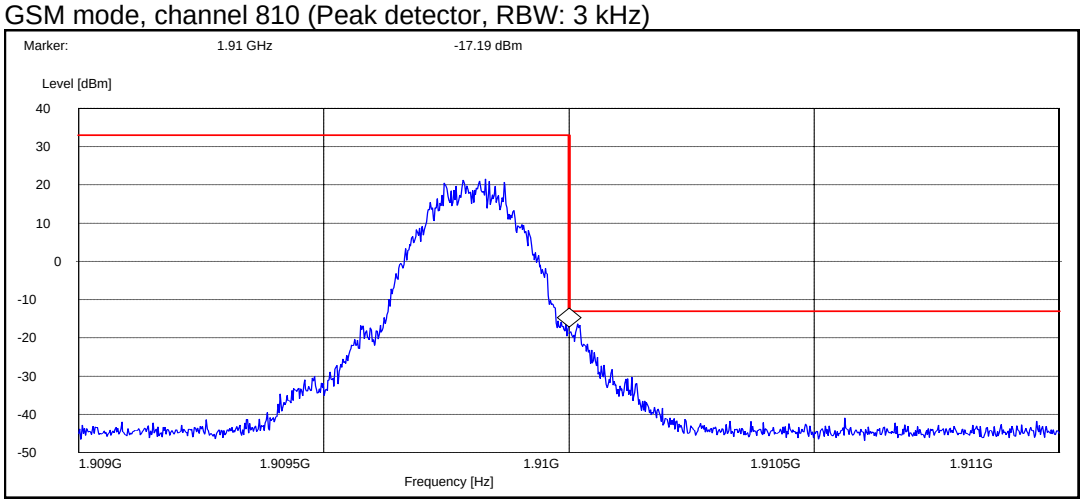
2.4. GSM 1900 Test results

Operation mode (TX on)	Channel	Level / dBm
GSM	512	-16.39
GSM	810	-17.19

GSM mode, channel 512 (Peak detector, RBW: 3 kHz)



GSM mode, channel 810 (Peak detector, RBW: 3 kHz)



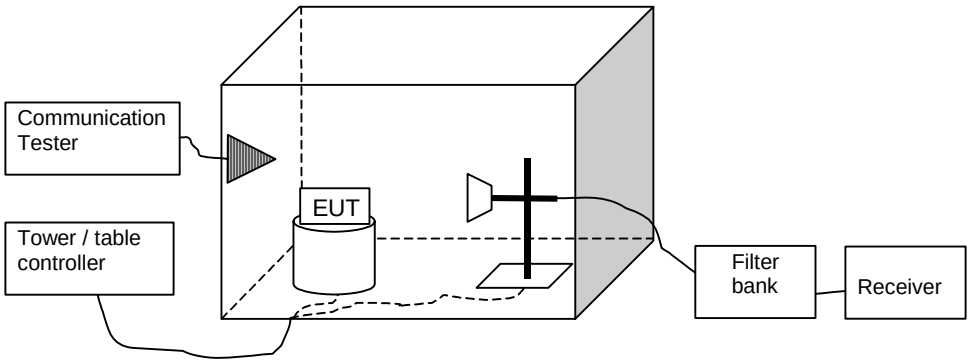
TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

3. Spurious radiated emissions

(FCC §22.917(a), §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RA-4, DUT 10554
Accessories with DUT numbers	BP-6M, DUT 10555; ACP-12, DUT 10458; HS-5, DUT 10282
Operation Voltage V / Hz	115 / 60
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	20 / 50 / 101
Date of measurements	27.04.2005
Measured by	Tomi Lipponen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to TIA-603-B-2002 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.

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

The emissions less than 20 dB below the permissible value are reported.
The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST\_TX\_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P\ [dBm] = P_{MEAS} + A_{CORRECTIONS}$$

Where P_{MEAS} is receiver reading in dBm and $A_{CORRECTIONS}$ is combined correction factor including cable loss, preamplifier gain and substitution correction ($A_{CORRECTIONS} = L_{CABLES} - G_{PREAMP} + A_{SUBST}$).

Limits for spurious radiated emissions measurements

Operation band	Frequency range / MHz	Limit / dBm
GSM 850	30 - 8500	-13
GSM 1900	30 - 18000	-13

3.3. GSM 850 Test results

GSM mode, channel 190

Frequency / MHz	Level / dBm	Level / µW	$A_{CORRECTION}$ / dB	Polarisation	Result
1673.143287	-47.90	0.01622	2.10	HORIZONTAL	PASSED
2509.820641	-39.80	0.10471	4.90	VERTICAL	PASSED
3346.189379	-43.10	0.04898	4.40	VERTICAL	PASSED

3.4. GSM 1900 Test results

GSM mode, channel 661

Frequency / MHz	Level / dBm	Level / µW	$A_{CORRECTION}$ / dB	Polarisation	Result
3760.023046	-31.00	0.79433	8.10	HORIZONTAL	PASSED
5640.282565	-48.20	0.01514	10.50	HORIZONTAL	PASSED
5645.294589	-50.60	0.00871	10.40	VERTICAL	PASSED

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

4. Test Equipment

4.1. 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
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

4.2. 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
2004	Relay Switch Unit	RSU	R&S	22/24, 15C, 15B
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
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

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

Eq. No	Equipment	Type	Manufacturer	Used in
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	Biconial 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	GPIB 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
2398	Horn antenna	HF906	R&S	22/24, 15C
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B

TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220