



Test & Certification Center (TCC) - Dallas

FCC ID: QTKRH-36

Test Report #: WR89.001A

20-Jan-04

Accredited Laboratory
Certificate Number: 1819-01

Ver 2.0

CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: WR89.001A

Terminal device:FCC ID: QTKRH-36, Model: 1100b, Type: RH-36, HW: 0574, SW: 4.11
(Detailed information is listed in section 4).

Originator: J. Torres
Function: TCC - Dallas – EMC
Version/Status: 2.0 / Approved
Location: TCC Directories
Date: 20-Jan-04

Change History:

<i>Version</i>	<i>Date</i>	<i>Status</i>	<i>Handled By</i>	<i>Comments</i>
0.1	05-Jan-04	Draft	J. Torres	
0.2	12 Jan 04	Proposed	Mark Severson	
0.3	15 Jan 04	Reviewed	M. Mobley / N. Walton	
1.0	15 Jan 04	Approved	Alan Ewing	
1.1	20-Jan-04	Proposed / Reviewed	N. Walton	Updated to include HW Version
2.0	20-Jan-04	Approved	Alan Ewing	

Testing laboratory:

Test & Certification Center (TCC) Dallas
Nokia Mobile Phones
6021 Connection Drive
Irving, Texas 75039
U.S.A.

Tel. 972-894-5000

Client:

Nokia Copenhagen
Product Creation Center
Frederikskaj 1790
Copenhagen V
Copenhagen, Denmark

Tel. +4540733772

Date and signatures:

20-Jan-04

For the contents:

Nerina Walton, EMC Engineer
Technical Review

Alan Ewing, General Manager
Manager Review

TABLE OF CONTENTS

1. GENERAL	4
1.1 QUALITY SYSTEM	4
1.2 LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION	4
1.3 OBJECTIVE	6
1.4 TEST SUMMARY	6
2. STANDARDS BASIS	7
3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS	8
3.1 ABBREVIATIONS	8
3.2 ACRONYMS	8
3.3 TERMS	8
4. EQUIPMENT-UNDER-TEST (EUT)	9
4.1 DESCRIPTION OF TESTED DEVICE(S)	9
4.2 PHOTOGRAPH OF TESTED DEVICE(S)	9
5. TEST EQUIPMENT LIST	10
6. RF POWER OUTPUT (RADIATED)	11
6.1 SETUP	11
6.2 PASS/FAIL CRITERIA	11
6.3 DETAILED TEST RESULTS	12
6.4 MEASUREMENT UNCERTAINTY	12
7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)	13
7.1 SETUP	13
7.2 PASS/FAIL CRITERIA	13
7.3 DETAILED TEST RESULTS	13
7.4 MEASUREMENT UNCERTAINTY	13
8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS	14
8.1 SETUP	14
8.2 PASS/FAIL CRITERIA	14
8.3 DETAILED TEST RESULTS	14
8.4 MEASUREMENT UNCERTAINTY	14
9. FIELD STRENGTH OF SPURIOUS RADIATION	15
9.1 SETUP	15
9.2 PASS/FAIL CRITERIA	15
9.3 DETAILED TEST RESULTS	16
9.4 MEASUREMENT UNCERTAINTY	17
10. FREQUENCY STABILITY (TEMPERATURE VARIATION)	18
10.1 SETUP	18
10.2 PASS/FAIL CRITERIA	18
10.3 DETAILED TEST RESULTS	18



Test & Certification Center (TCC) - Dallas

FCC ID: QTKRH-36
Test Report #: WR89.001A
20-Jan-04

Accredited Laboratory
Certificate Number: 1819-01

Ver 2.0

11.	FREQUENCY STABILITY (VOLTAGE VARIATION)	19
11.1	SETUP	19
11.2	PASS/FAIL CRITERIA	19
11.3	DETAILED TEST RESULTS	19

1. GENERAL

1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). TCC - Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

1.2 List of General Information Required for Certification

This list is in accordance with FCC Rules and Regulations, CFR 47, Part 2, and to 22H, 24E, Confidentiality.

1.2.1 Sub-part 2.1033(c)(1)

Name and Address of Applicant: Nokia Copenhagen, Product Creation Center

Frederikskaj 1790 Copenhagen V, Copenhagen, Denmark

Manufacturer: Nokia Finland, Joensuukatu 7, 24100 Salo, FINLAND

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: QTKRH-36

Model No: 1100b

1.2.3 Sub-part 2.1033(c)(3)

Instruction Manual(s):
Refer to attached EXHIBITS

1.2.4 Sub-part 2.1033(c)(4)

Type of Emission: 256KGXW

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.2 to 848.8
1850.2 to 1909.8

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.933 EDRP, Cellular GSM
1.479 EIRP, PCS GSM

☐ Switchable ☒ Variable ☐ N/A

FCC Grant Note: BC- The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 1.479

1.2.8 Sub-part 2.1033(c)(8)

Voltages & Currents in all elements in final R.F. Stage, including final transistor or solid-state device:

Collector Current, A = per manual

Collector Voltage, Vdc = per manual

Supply Voltage, Vdc = 3.8

1.2.9 Sub-part 2.1033(c)(9)

Tune-up Procedure:
Refer to attached EXHIBITS

1.2.10 Sub-part 2.1033(c)(10)

Circuit Diagram/Circuit Description:

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Refer to attached EXHIBITS

1.2.11 Sub-part 2.1033(c)(11)

Label Information:
Refer to attached EXHIBITS

1.2.12 Sub-part 2.1033(c)(12)

Photographs:
Refer to attached EXHIBITS

1.2.13 Sub-part 2.1033(c)(13)

Digital Modulation Description:
N/A

1.2.14 Sub-part 2.1033(c)(14)

Test and Measurement Data:
FOLLOWS

1.3 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, Part 22, and Part 24.

1.4 Test Summary

Test Results: *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

Test Performed	Reference	Section of Report	Complies / Does not comply / Not Tested
RF Power Output (Radiated)	FCC Part 22.913(a) / 24.232(b)	6	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1), 24.238(a)(b)	7	Not Tested
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	8	Not Tested
Field Strength of Spurious Radiation	FCC Part 2.1053	9	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b), 24.235	10	Not Tested
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2), 24.235	11	Not Tested

2. STANDARDS BASIS

Testing has been carried out in accordance with:

REF.	Code of the standard	Name of the standard
1	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.
2	FCC: CFR 47 Part 2	Code of Federal Regulations (CFR) Title 47, Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations: Subpart J – Equipment Authorization Procedures
3	FCC: CFR 47 Part 22	Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service
4	FCC: CFR 47 Part 24	Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS
5	RSS-132	800 MHz Cellular Telephones Employing New Technologies
6	RSS-133	2 GHz Personal Communications Services, Industry Canada
7	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
8	RSP-100	Radio Equipment Certification Procedure

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

Deviations:

Not Applicable.

3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

3.1 Abbreviations

dB - decibel

dBc - decibels from carrier

dBm - decibels per milliwatt (absolute measurement)

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

3.2 Acronyms

AMPS - Advanced Mobile Phone System

BSS - Base Station Simulator

CDMA - Code Division Multiple Access

EDRP - Effective Dipole Radiated Power

EIRP - Effective Isotropic Radiated Power

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

ERP - Effective Radiated Power

EUT - Equipment under Test

GSM - Global System for Mobile communications

PCS - Personal Communications Services

RF - Radio Frequency

TDMA - Time Division Multiple Access

3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

Cellular - refers to a frequency in the 800MHz band.

PCS - refers to a frequency in the 1900MHz band.

4. EQUIPMENT-UNDER-TEST (EUT)

The results in this report relate only to the items listed below:

4.1 Description of Tested Device(s):

Test Performed	Mode of Operation	Date of Receipt	Condition of Sample	Item	Identifying Information
FCC Part 2.1053, FCC Part 22.913(a), FCC Part 24.232(b)(c)	GSM 850 GSM 1900	18-Dec-03	Operational	Phone	FCC ID: QTKRH-36 Type: RH-36 HW: 0574 SW: 4.11 IMEI: 01027400/325131/0
FCC Part 2.1053, FCC Part 22.913(a), FCC Part 24.232(b)(c)	GSM 850 GSM 1900	18-Dec-03	Operational	Battery	Type: BL-5C Other: 3.7V

4.2 Photograph of Tested Device(s):



5. TEST EQUIPMENT LIST

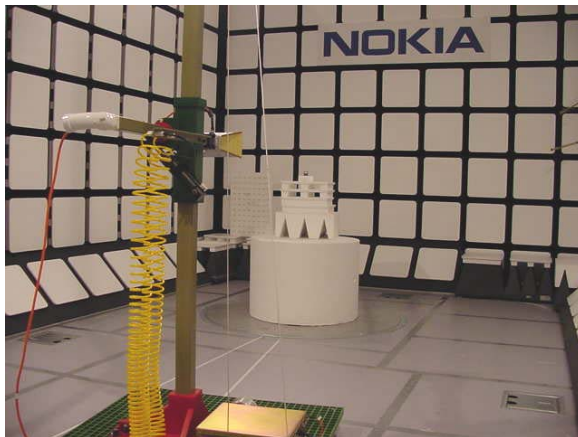
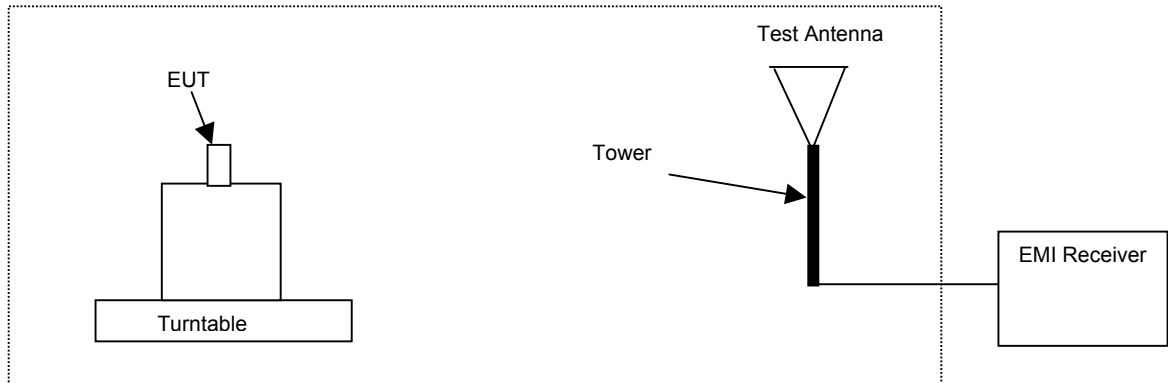
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

Section of Report	NMP#	Test Equipment	Mfr. #	Model #	Calibration Due Date	Calibration Interval
6, 9	2680	Spectrum Analyzer	Agilent	E7405A	24-Nov-04	12 months
6, 9	2664/2665	EMI Receiver	Agilent	8546A / 85460A	03-Mar-04/ 03-Mar-04	12 months
6, 9	1472	Biconilog Antenna	ETS	3142B	28-Jan-04	12 months
6, 9	2858	Horn Antenna	EMCO	3115	15-Aug-04	12 months
6, 9	0064	Horn Antenna	EMCO	3115	02-Apr-04	12 months
6, 9	2671	Signal Generator	Agilent	83630B	04-Nov-04	12 months
6, 9	2846	Turntable and Tower Controller	Sunol	SC99V	N/A	N/A
6, 9	2625	Base Station	R&S	CMU200	12-Jan-04	12 months
9	0001	RF Preamplifier	Agilent	HP8449B	04-Aug-04	12 months
6	2283	Spectrum Analyzer	Agilent	8593EM	12-Jun-04	12 months
6	2549	Power Meter	Agilent	E4418	17-Oct-04	12 months
6	2672	Power Sensor	Agilent	E9304A	02-Oct-04	12 months
6	2853/2854	Tunable Dipole	Schwarzbeck	D-69250	N/A	N/A

6. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a), 24.232(b)(c)

6.1 Setup



6.2 Pass/Fail Criteria

Band	FCC Limit (dBm)
Cellular	38.5 (EDRP)
PCS	33.0 (EIRP)

6.3 Detailed Test Results

Test Technician / Engineer	J. Torres
Date of Measurement	05-Jan-04, 09-Jan-04
Temperature	22 to 26 °C
Humidity	16 to 35 %RH
Test Result	Complies with FCC Part 22.913(a) and FCC Part 24.232(b)

Note: measurements were performed with 3MHz RBW/VBW.

Cellular Band, GSM 850

Channel	Freq Max (MHz)	EDRP EMI (mW)	EDRP EMI (dBm)	Pol.
128	824.3	524	27.2	V
190	836.6	645	28.1	V
251	848.8	933	29.7	V

PCS Band, GSM 1900

Channel	Freq Max (MHz)	EIRP EMI (mW)	EIRP EMI (dBm)	Pol.
512	1850.2	1479	31.7	V
661	1880.0	1288	31.1	V
810	1909.7	1000	30.0	V

6.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 2.4dB for 800 to 2000 MHz.

7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

Specification: FCC Part 2.1049(c)(1), 24.238(a)(b)

7.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call.

7.2 Pass/Fail Criteria

Occupied Bandwidth, Out of Band

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular 800, Low Channel	< 824	-13
Cellular 800, High Channel	> 849	-13
PCS 1900, Low Channel	< 1850	-13
PCS 1900, High Channel	> 1910	-13

Occupied Bandwidth, In Band

No pass/fail, these plots are used to determine the emission designators.

7.3 Detailed Test Results

TEST NOT PERFORMED

7.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

8.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

8.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular / PCS	30 – 20000 *	-13

* Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

8.3 Detailed Test Results

TEST NOT PERFORMED

8.4 Measurement Uncertainty

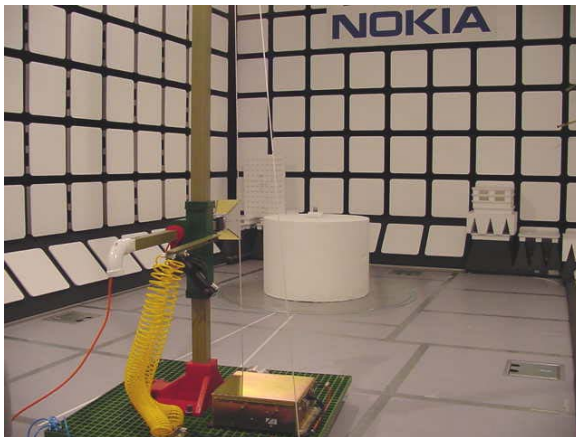
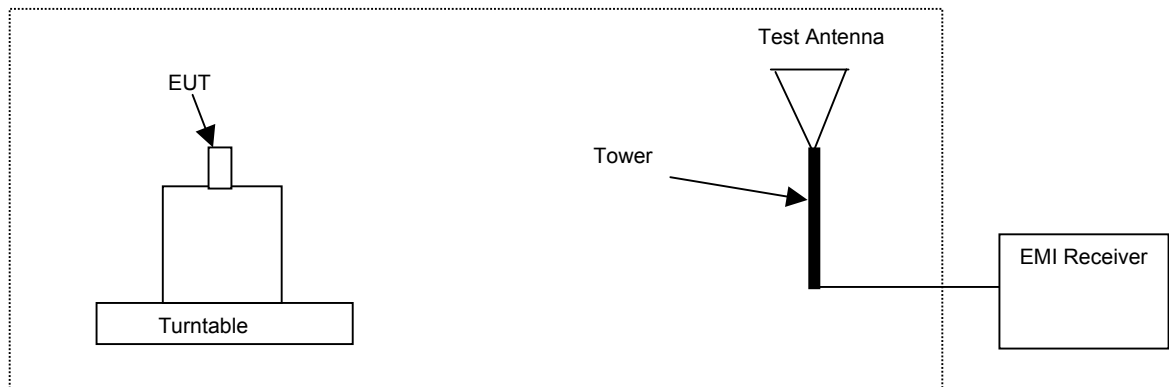
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

9. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

9.1 Setup

Test equipment set-up.



9.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limit (dBm)
Cellular / PCS	30 – 20000*	-13

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

9.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres
Date of Measurement	08-Jan-04 to 09-Jan-04
Temperature	23 to 25°C
Humidity	22 to 37 %RH
Test Result	Complies with FCC Part 2.1053

Note: 30MHz to 1GHz were performed with 1MHz RBW/VBW; 1GHz to 3GHz were performed with 1MHz RBW/VBW; 3GHz to 6GHz were performed with 3MHz RBW/VBW; 6GHz to 18GHz were performed with 1MHz RBW/VBW.

Cellular Band, GSM 850

EDRP Value for Channel 190: 28.1 dBm

Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
1673.2	-36.4	-64.5	-13.0	H
1673.2	-23.6	-51.7	-13.0	V
2509.8	-38.8	-66.9	-13.0	H
2509.8	-29.5	-57.6	-13.0	V
3346.4	-31.5	-59.6	-13.0	H
3346.4	-32.0	-60.1	-13.0	V
4183.0	-27.5	-55.6	-13.0	H
4183.0	-27.3	-55.4	-13.0	V
5019.6	-25.5	-53.6	-13.0	H
5019.6	-25.8	-53.9	-13.0	V
5856.2	-22.7	-50.8	-13.0	H
5856.2	-23.1	-51.2	-13.0	V
6692.8	-42.1	-70.2	-13.0	H
6692.8	-42.9	-71.0	-13.0	V
7529.4	-40.3	-68.4	-13.0	H
7529.4	-39.5	-67.6	-13.0	V
8366.0	-37.7	-65.8	-13.0	H
8366.0	-38.3	-66.4	-13.0	V

PCS Band, GSM 1900**EIRP Value for Channel 661:****31.1 dBm**

Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
3760.0	-28.6	-59.7	-13.0	H
3760.0	-32.2	-63.3	-13.0	V
5640.0	-29.0	-60.1	-13.0	H
5640.0	-33.9	-65.0	-13.0	V
7520.0	-39.3	-70.4	-13.0	H
7520.0	-40.3	-71.4	-13.0	V
9400.0	-36.0	-67.1	-13.0	H
9400.0	-36.9	-68.0	-13.0	V
11280.0	-34.2	-65.3	-13.0	H
11280.0	-34.4	-65.5	-13.0	V
13160.0	-31.0	-62.1	-13.0	H
13160.0	-30.7	-61.8	-13.0	V
15040.0	-29.7	-60.8	-13.0	H
15040.0	-29.7	-60.8	-13.0	V
16920.0	-26.6	-57.7	-13.0	H
16920.0	-28.0	-59.1	-13.0	V

9.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 5.2dB for 30-300MHz; +/- 5.2dB for 300-1000MHz, +/- 5.6dB for 1-6GHz and +/-6.8 for 6-18GHz.

10. FREQUENCY STABILITY (TEMPERATURE VARIATION)

Specification: FCC Part 2.1055(a)(1)(b), 24.235

10.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

10.2 Pass/Fail Criteria

Not Applicable

10.3 Detailed Test Results

TEST NOT PERFORMED

11. FREQUENCY STABILITY (VOLTAGE VARIATION)

Specification: FCC Part 2.1055(d)(1)(2), 24.235

11.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

11.2 Pass/Fail Criteria

Not Applicable

11.3 Detailed Test Results

TEST NOT PERFORMED