

TEST REPORT

Test Report No.: 1-2403-01-10/10-A



Testing Laboratory

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Accredited Test Laboratory:

The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio Satellite Communications

Applicant

Sagem Wireless
2 rue du Petit Albi
95801 Cergy Pontoise Cedex/France
Phone: +33-(0)1-58-11-91-0
Fax: +86 574 27960000
Contact: Xinni Yang
e-mail: Xinni.yang@sagemwireless.com.cn
Phone: +86 574 27960929

Manufacturer

Sagem Wireless
2 rue du Petit Albi
95801 Cergy Pontoise Cedex/France

Test Standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: GSM Mobile Phone
Model name: Cosy 2G
FCC ID: M9HCOSY2G
IC: N/A
Frequency [MHz]: 13.56 MHz
Power supply: 3.9 V DC by Li-ion battery
Temperature range: -20 °C to +50 °C



Test performed:

Test Report authorised:

2010-08-03 Daniel Muyunga

2010-08-03 i.A.
Michael Berg

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2 General Information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2010-06-24
Date of receipt of test item:	2010-06-24
Start of test:	2010-07-05
End of test:	2010-07-15
Person(s) present during the test:	-/-

3 Test standard/s

Test Standard	Version	Test Standard Description
47 CFR Part 15	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices

4 Test Environment

Temperature:	T _{nom}	+20 °C during room temperature tests
	T _{max}	+50 °C during high temperature test
	T _{min}	-20 °C during low temperature test
Relative humidity content:		43 %
Air pressure:		not relevant for this kind of testing
Power supply:	V _{nom}	3.9 V DC by Li-ion battery
	V _{max}	4.485 V
	V _{min}	3.315 V

5 Test item

Kind of test item	:	GSM Mobile Phone
Type identification	:	Cosy 2G
S/N serial number	:	IMEI: 352330040008000
HW hardware status	:	V0x
SW software status	:	EA,R05
Frequency Band [MHz]	:	13.553 MHz – 13.567 MHz
Type of Modulation	:	NON
Number of channels	:	1
Antenna	:	Internal
Power Supply	:	3.9 V DC by Li-ion battery
Temperature Range	:	-20°C to +50 °C

6 Test Laboratories sub-contracted

None

7 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 7, Annex 2.6	Passed	2010-08-03	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results (max.)
§ 15.35 (c)/ RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	☐	☐	☒	☐	complies
§ 15.225 (a)/ RSS-210 Issue 7 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.209/ RSS-210 Issue 7 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.225 (e)/ RSS-210 Issue 7 Annex 2.6	Frequency tolerance	Nominal	Extreme	☒	☐	☐	☐	complies
		Extreme	Nominal	☒	☐	☐	☐	

Note: NA = Not Applicable; NP = Not Performed

8 RF measurement testing

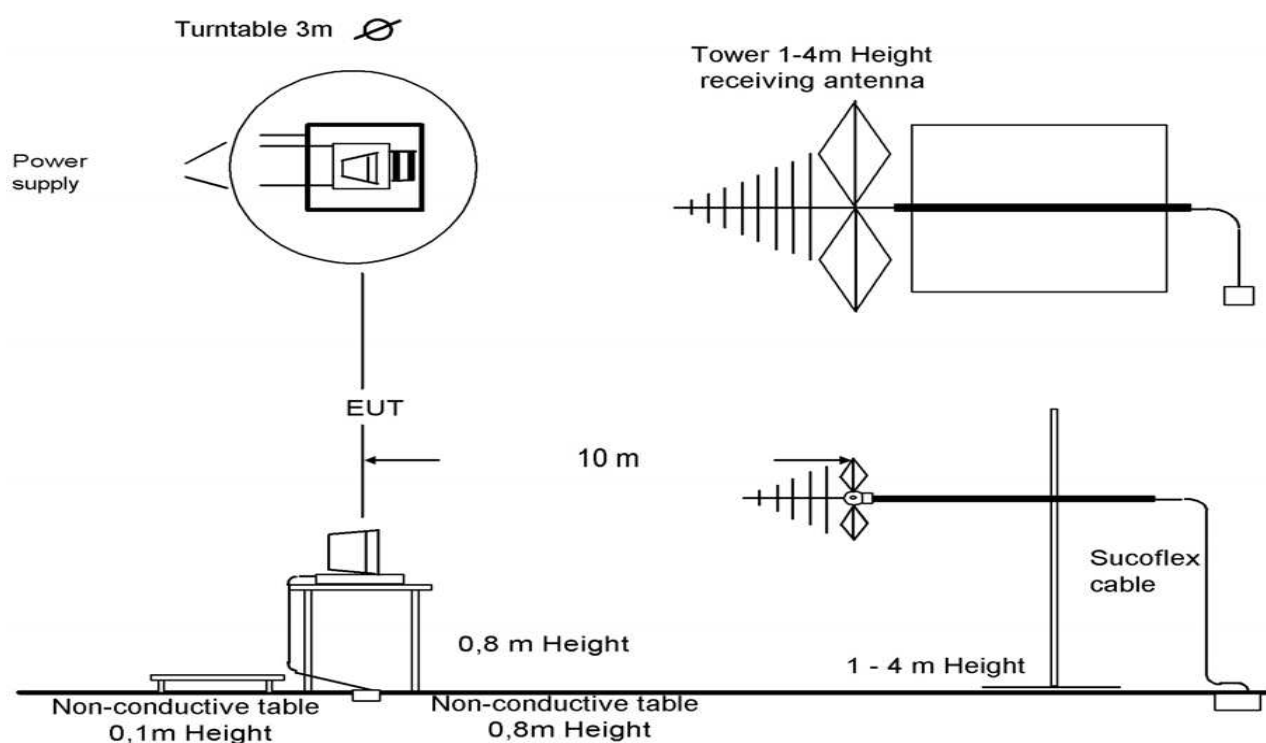
8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



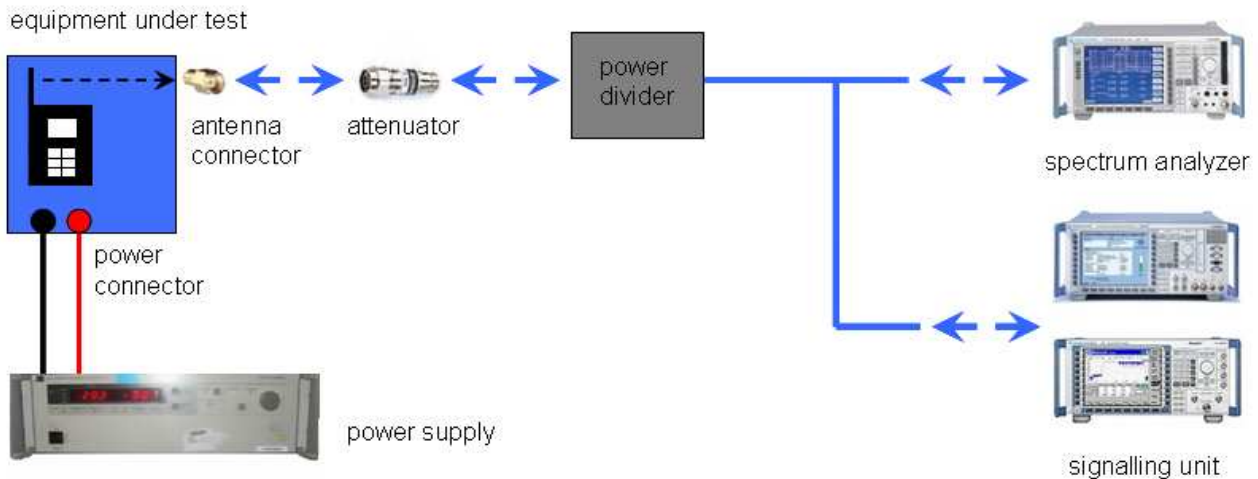
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

9 Measurement Results

9.1 Timing of the transmitter

Measurement:

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.35 (c)	RSS-GEN Issue 2 Section 4.5
Timing of the transmitter	
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.	

Result: The result of the measurement is not applicable.

9.2 Field Strength of the Fundamental

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Span:	Wide enough to capture all emissions
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part SUBCLAUSE § 15.231 (b)		RSS-210 Issue 7 Section A1.1.2 / 2.7 Table 4
Fundamental Frequency (MHz)	Field strength of Fundamental (μV/m)	Measurement distance (m)
13.553 to 13.567	15848 μV/m (84 dBμV/m)	30
	158489 μV/m (104 dBμV/m)	10 (Recalculated acc. to FCC part15.31 (f2))

Result:

TEST CONDITIONS		MAXIMUM POWER (dBμV/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T _{nom} = 23 °C	V _{nom} = V DC	25.01	45.01
Measurement uncertainty		±3dB	

Result: The result of the measurement is passed.

9.3 Field Strength of the Harmonics and Spurious

Measurement:

Measurement parameter	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Span:	9 kHz to 1 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
SUBCLAUSE § 15.209		
Field strength of the harmonics and spurious.		
Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBμV/m)	30
30 – 88	100 (40 dBμV/m)	3
88 – 216	150 (43.5 dBμV/m)	3
216 – 960	200 (46 dBμV/m)	3

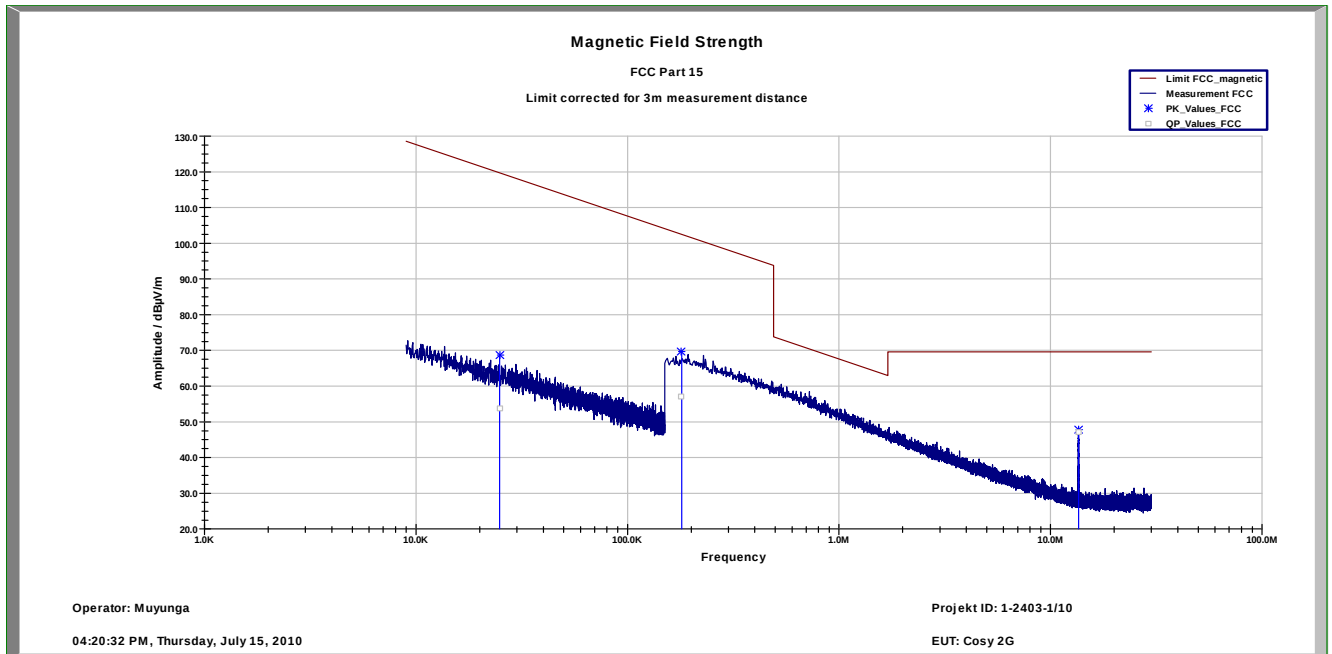
Result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
50.948850	10.0	15000.000	120.000	132.0	V	303.0	13.3	20.0	30.0	Pass
56.986650	10.8	15000.000	120.000	182.0	V	268.0	12.4	19.2	30.0	Pass
87.408300	8.0	15000.000	120.000	330.0	V	236.0	10.2	22.0	30.0	Pass
560.948550	15.9	15000.000	120.000	200.0	H	50.0	19.7	20.1	36.0	Pass
732.131250	20.2	15000.000	120.000	100.0	V	263.0	23.2	15.8	36.0	Pass
906.030600	22.2	15000.000	120.000	293.0	V	232.0	25.2	13.8	36.0	Pass

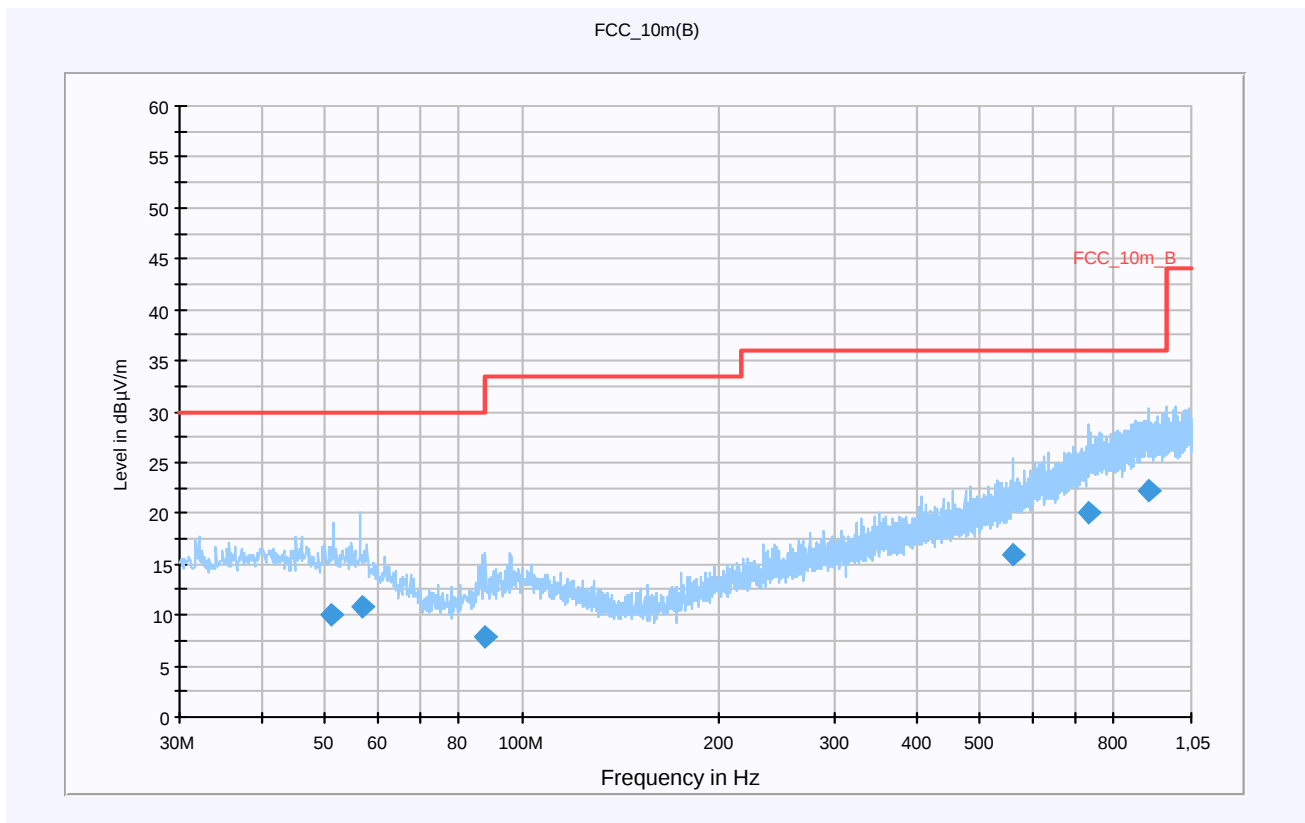
Result: The result of the measurement is passed.

Plots of the measurements

Plot 1: 9 kHz – 30 MHz; Part 15.209 Magnetics, Measurement distance 3m
Transmit frequency 13.56 MHz

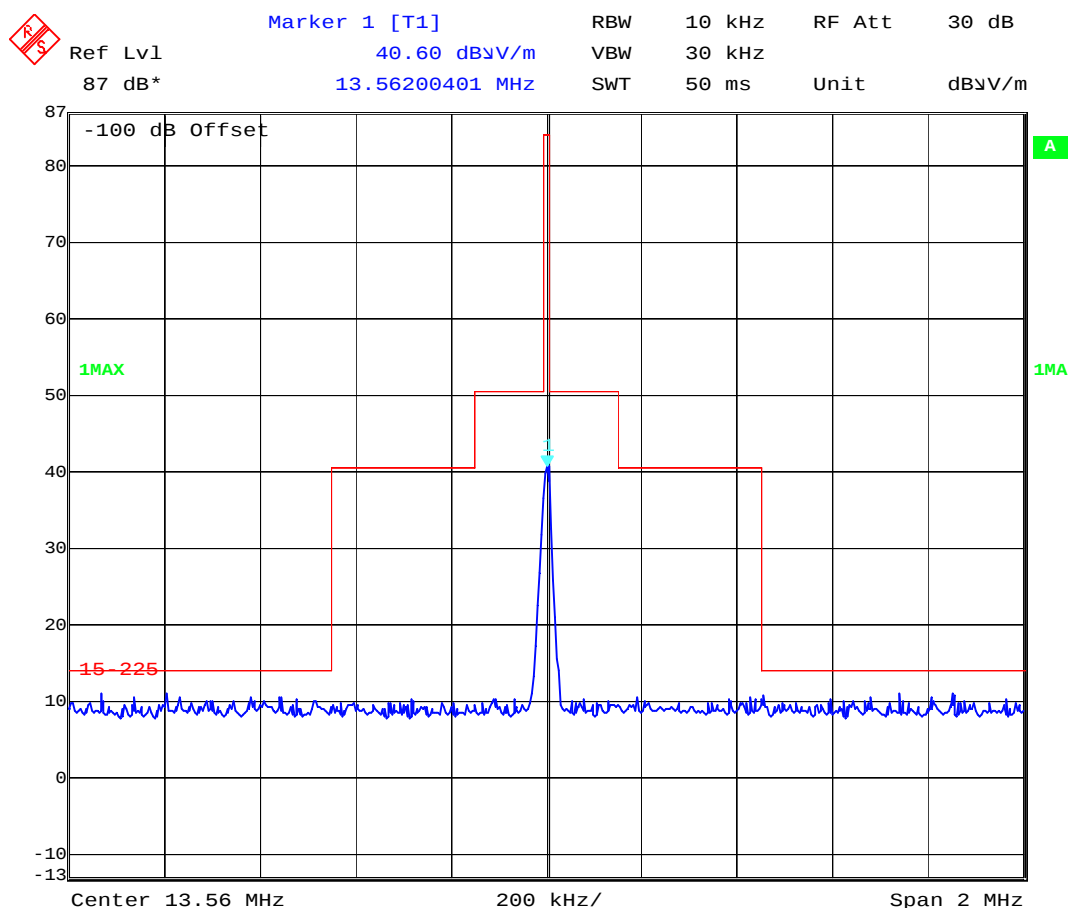


Plot 2: 30 MHz – 1000 MHz
Transmit frequency 13.56 MHz



Plot 3: Spectrum mask part 15.225 (a,b,c,d)

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)



Date: 15.JUL.2010 08:54:19

RBW /VBW = 10/30 kHz

The transmitter holds the requirements of FCC 15.225 (a,b,c and d)

9.4 Frequency Tolerance

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 Hz
Video bandwidth:	3*RBW
Span:	Wide enough to capture emission
Trace-Mode:	Max hold

Limits:

FCC	IC
SUBCLAUSE § 15.225	RSS-210 Issue 7 Annex 2.6
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.	

Result: The result of the measurement is passed.

Frequency tolerance								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz			MHz		
T (°C)	Frequency	result	Power voltage	Frequency	result	F [MHz]	Detector	Level [µV/m]
-20°	13.560 328	Pass	3.3	13.560 268	Pass			
-10°	13.560 332	Pass	3.5	13.560 298	Pass			
0°	13.560 270	Pass	3.7	13.560 240	Pass			
10°	13.560 262	Pass	3.9	13.560 244	Pass			
20°	13.560 244	Pass	4.1	13.560 270	Pass			
30°	13.560 234	Pass	4.3	13.560 304	Pass			
40°	13.560 212	Pass	4.5	13.560 332	Pass			
50°	13.560 228	Pass						
Measurement uncertainty			±100 Hz					

9.5 AC Line Conducted

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to transmit mode and Idle mode, where the worst case is documented in the report. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

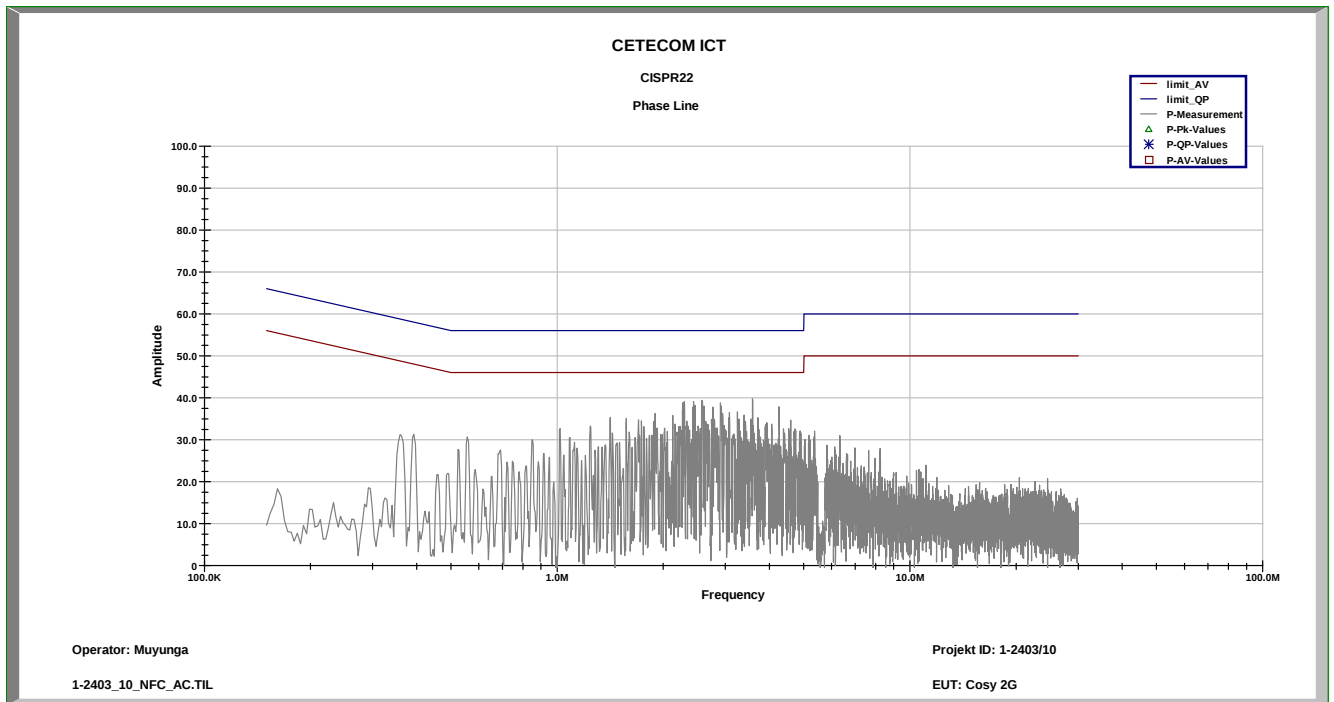
Limits:

FCC		IC	
CFR Part 15.107(a)		ICES-003, Issue 4	
TX Spurious Emissions Conducted < 30 MHz			
Frequency (MHz)	Quasi-Peak (dBμV/m)	Average (dBμV/m)	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30.0	60	50	

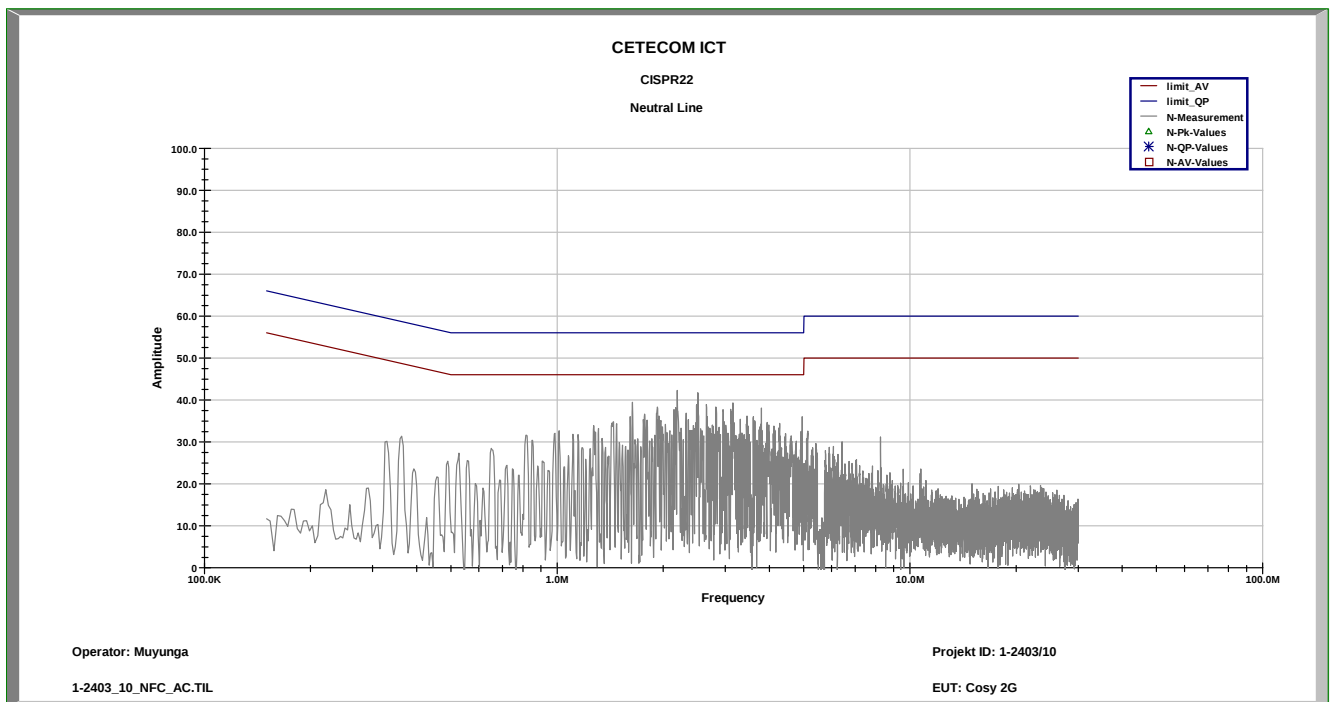
*Decreases with the logarithm of the frequency

Result: The result of the measurement is passed.

Plot 4: 9 kHz to 30 MHz / Phase Line NFC



Plot 5: 9 kHz to 30 MHz / Neutral Line NFC



10 Test equipment and ancillaries used for tests

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012
12	19	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3697	300001605	Ve	30.06.2010	30.06.2012
13	n. a.	Isolating Transformer	913501	Erfi		300001205	ne		
14	4	Radiocom. Analyzer	CMTA 54	R&S	894043/010	300001175	NK!	06.06.2007	
15	9	Signal Generator 0.1-4320 MHz, AM/FM/PHIM/Puls Mod.	SMHU	R&S	894055/005	300001190	Ve	05.01.2010	05.01.2013
16	10	Signal Generator 0.1-2000 MHz	SMH	R&S	864219/033	300001410	Ve		
17	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013
18	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04590	300001041	Ve	08.01.2009	08.01.2012
19	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.05.2011
20	n. a.	Audio Analyzer 2Hz - 300 kHz	UPD	R&S	841074/009	300001236	k	08.01.2010	08.01.2012
21	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
22	n. a.	Signal Analyzer 20Hz-26.5GHz-150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678	Ve	06.01.2009	06.01.2011
23	n. a.	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	vIK!	04.06.2009	04.06.2011

Annex A Photographs of the Test Set-up

Photo documentation:

Photo 1:

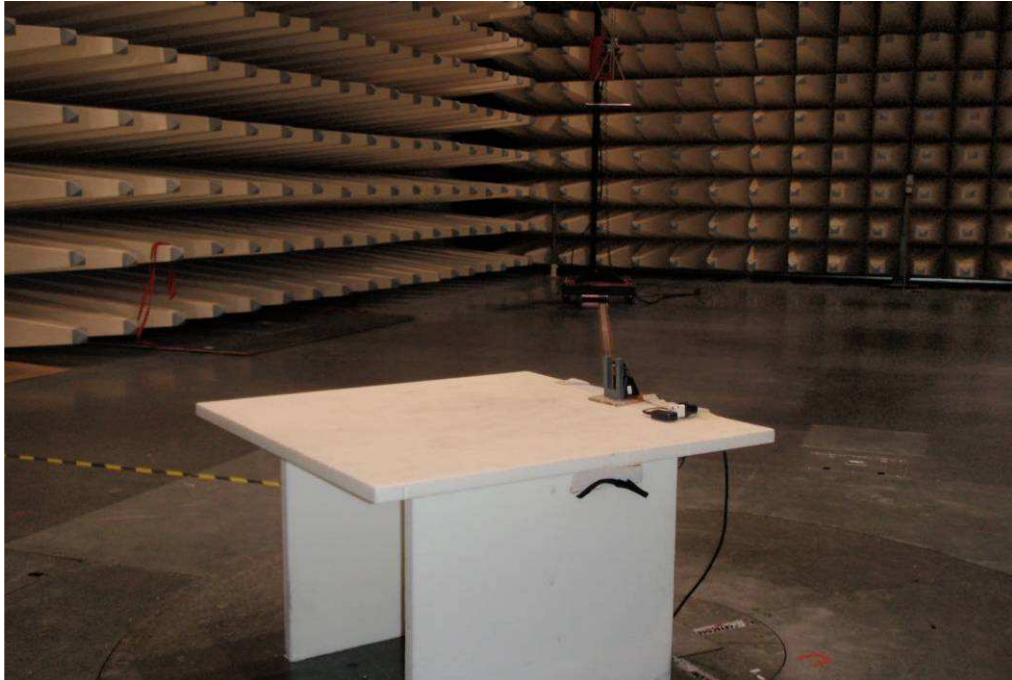


Photo 2:

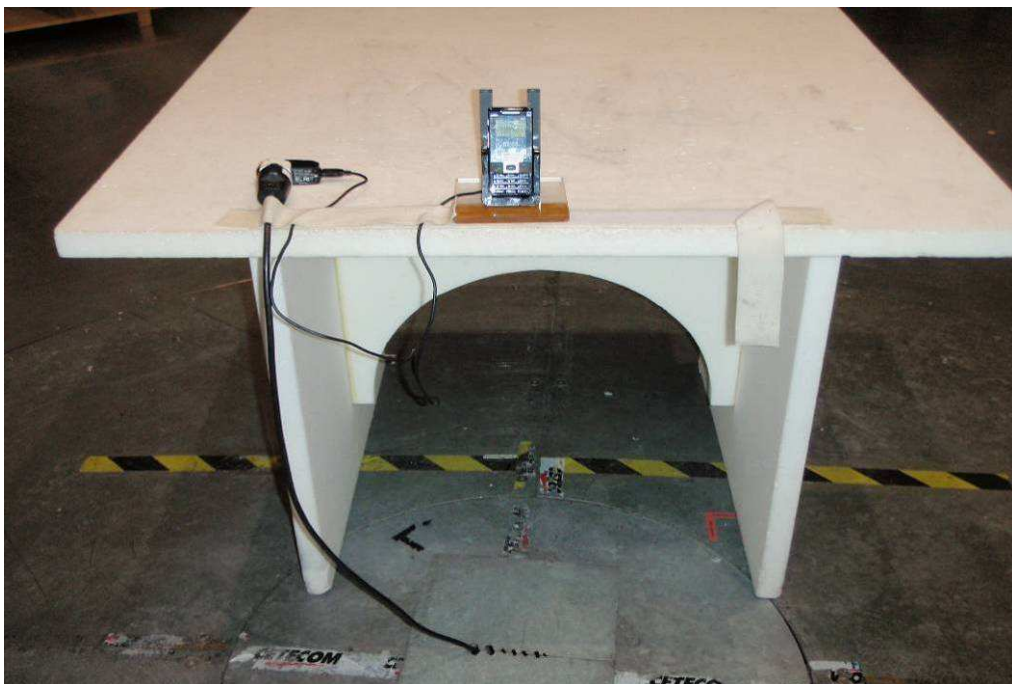


Photo 3:



Annex A External Photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:



Photo 7:



Photo 8:



Photo 9:



Photo 10:



Photo 11:



Photo 12:



Photo 13:



Photo 14:



Photo 15:



Annex B Internal Photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:

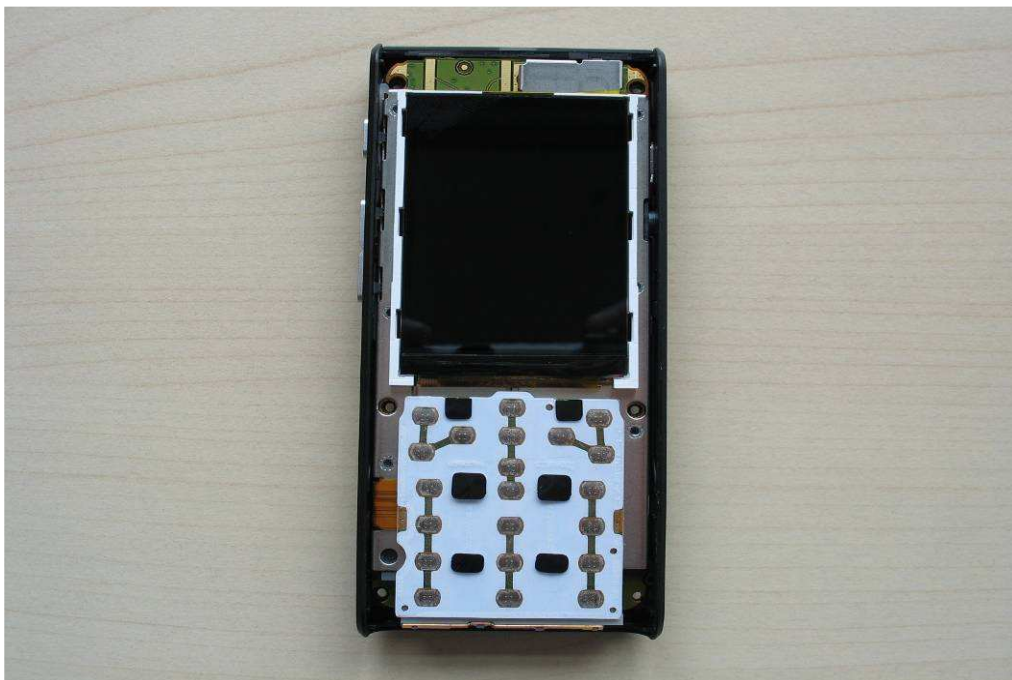
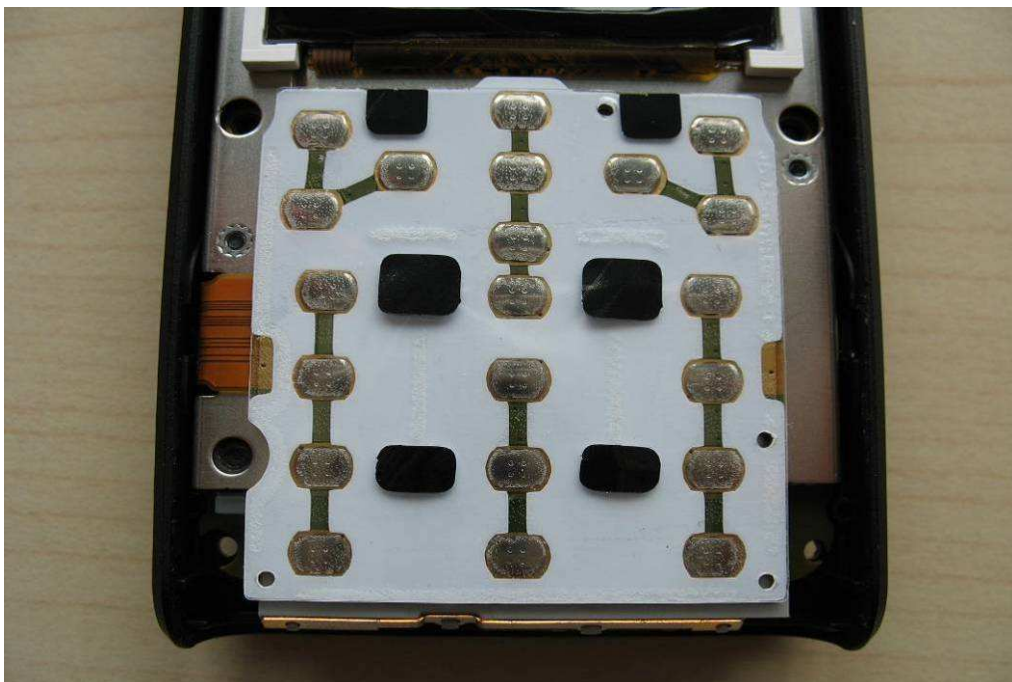


Photo 5:



Photo 6:



A photograph of the internal chassis of a mobile phone. The black plastic frame contains a silver battery with the text "09105 01379" and "21821600530" printed on it. A SIM card is inserted into a slot on the left. Various connectors, including a gold-plated USB port and a circular camera lens, are visible. The device is resting on a light-colored wooden surface.

Photo 9:



Photo 10:

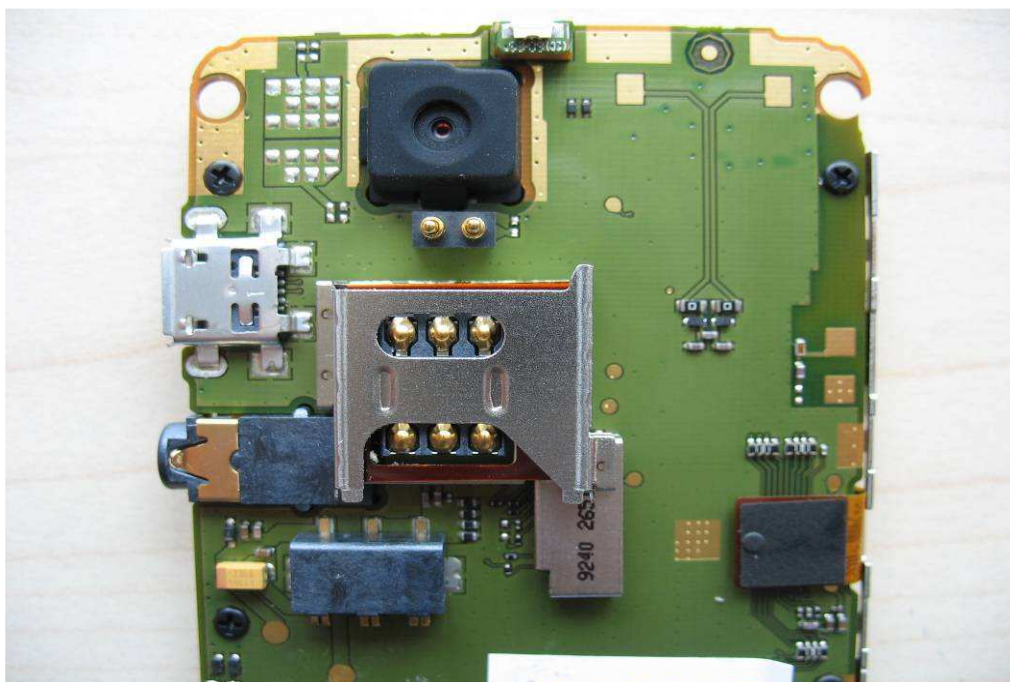


Photo 11:



Photo 12:

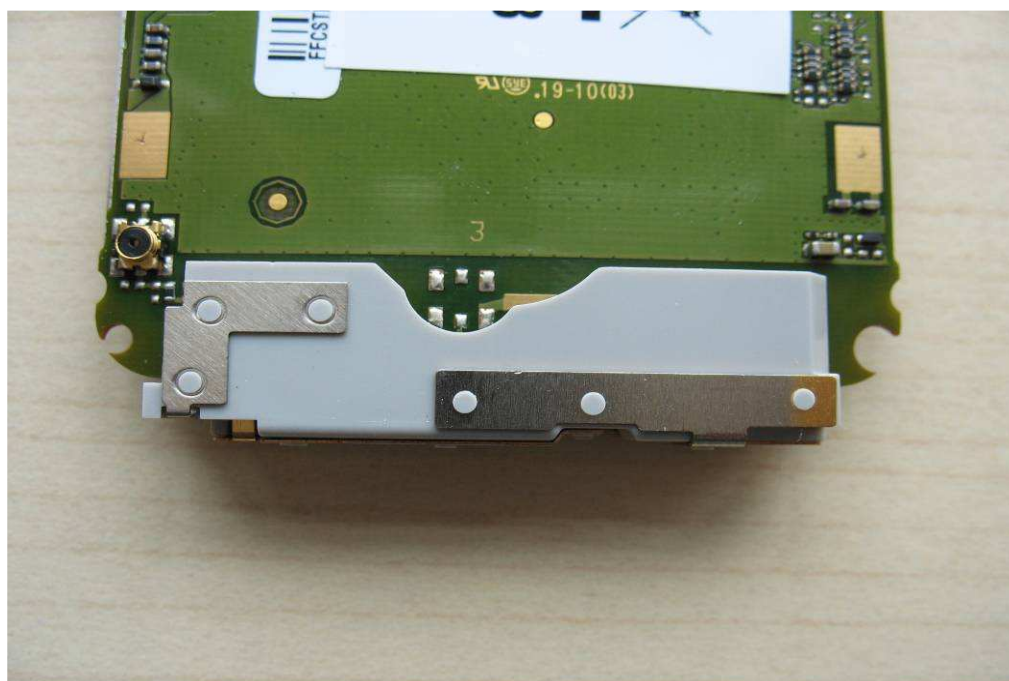


Photo 13:



Photo 14:



Photo 15:



Photo 16:

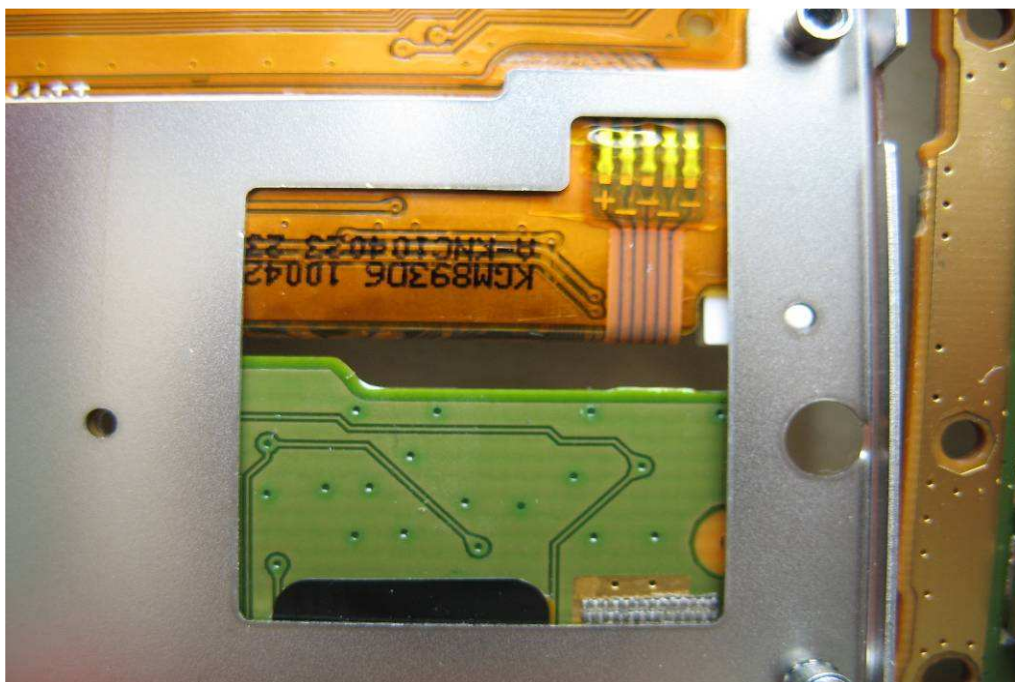


Photo 17:

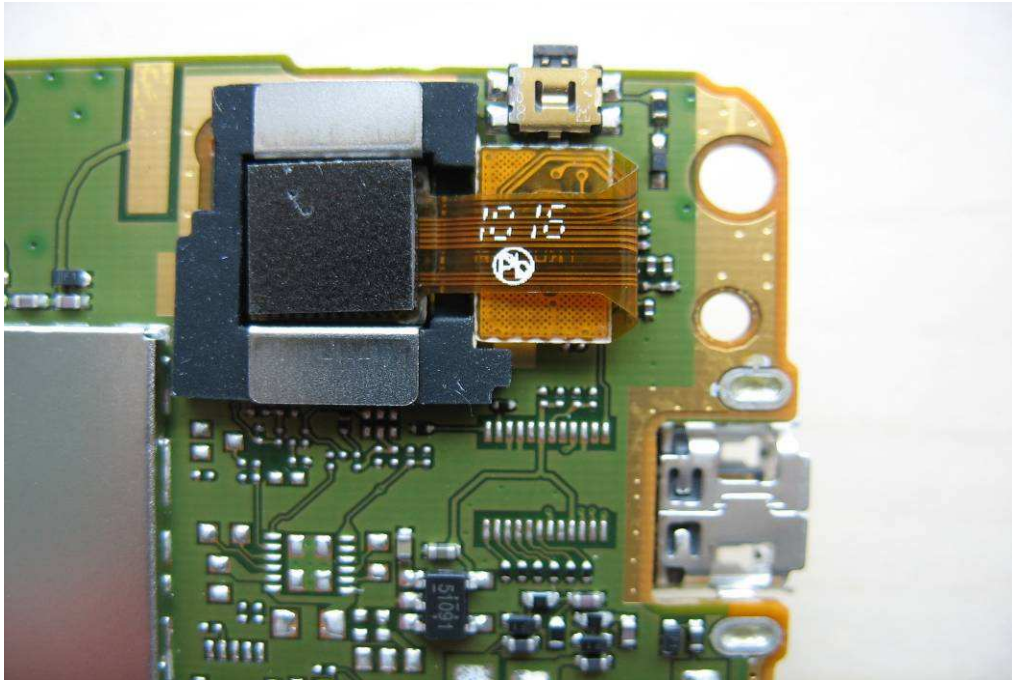
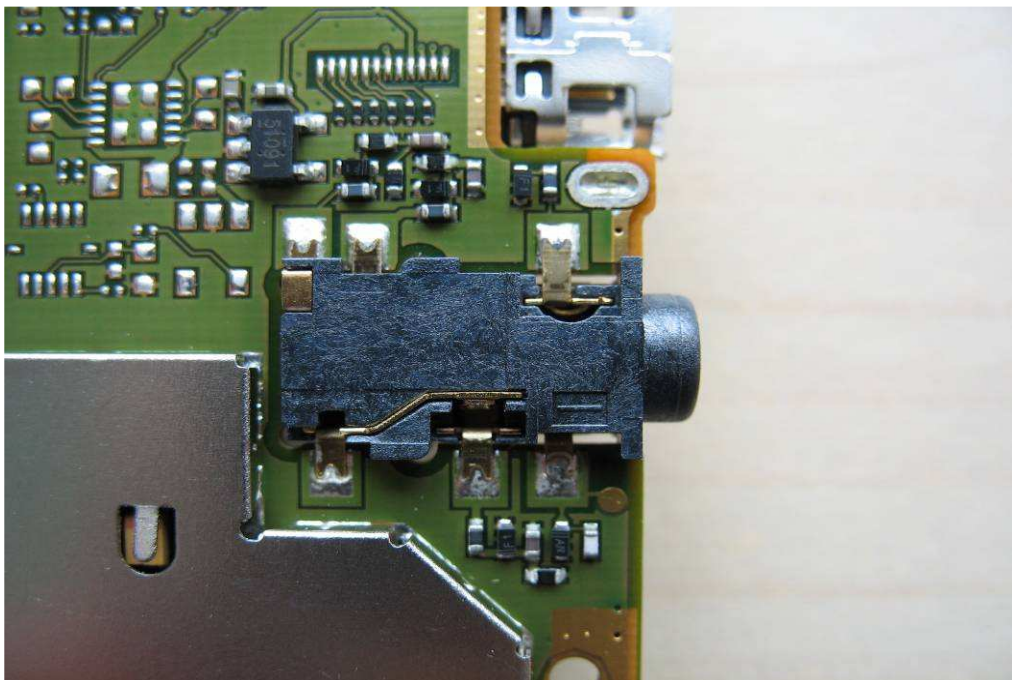


Photo 18:



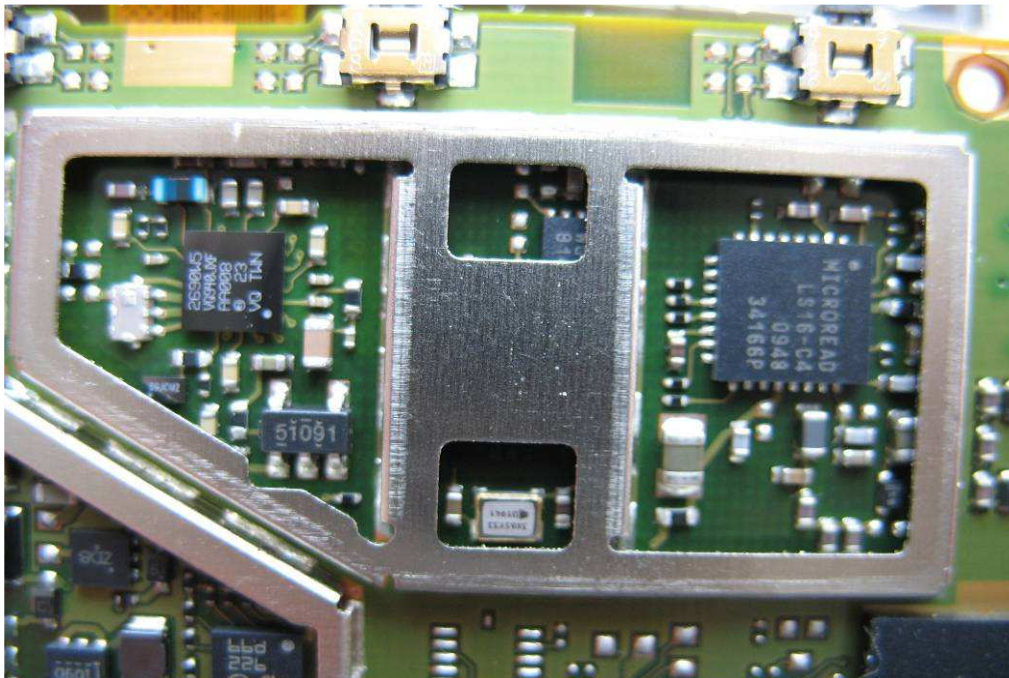


Photo 21:

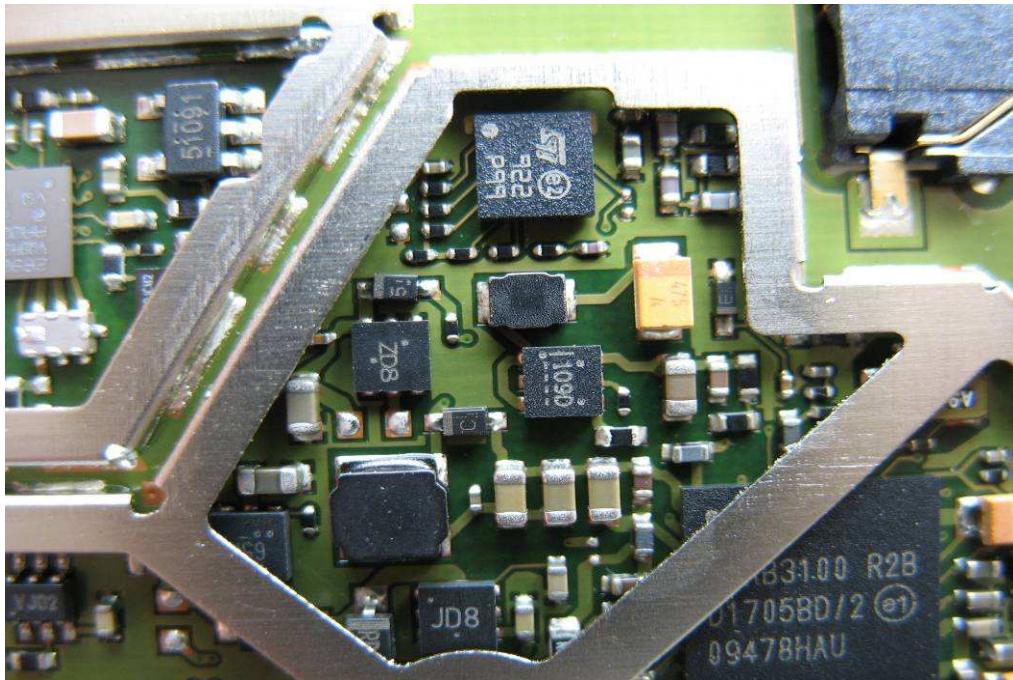


Photo 22:

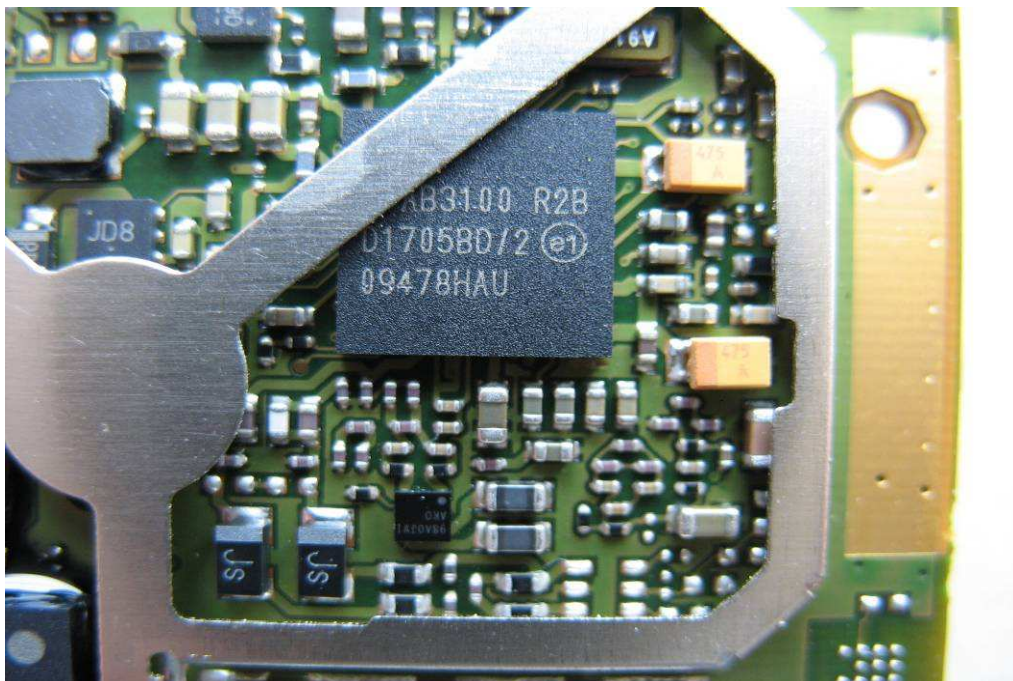


Photo 23:

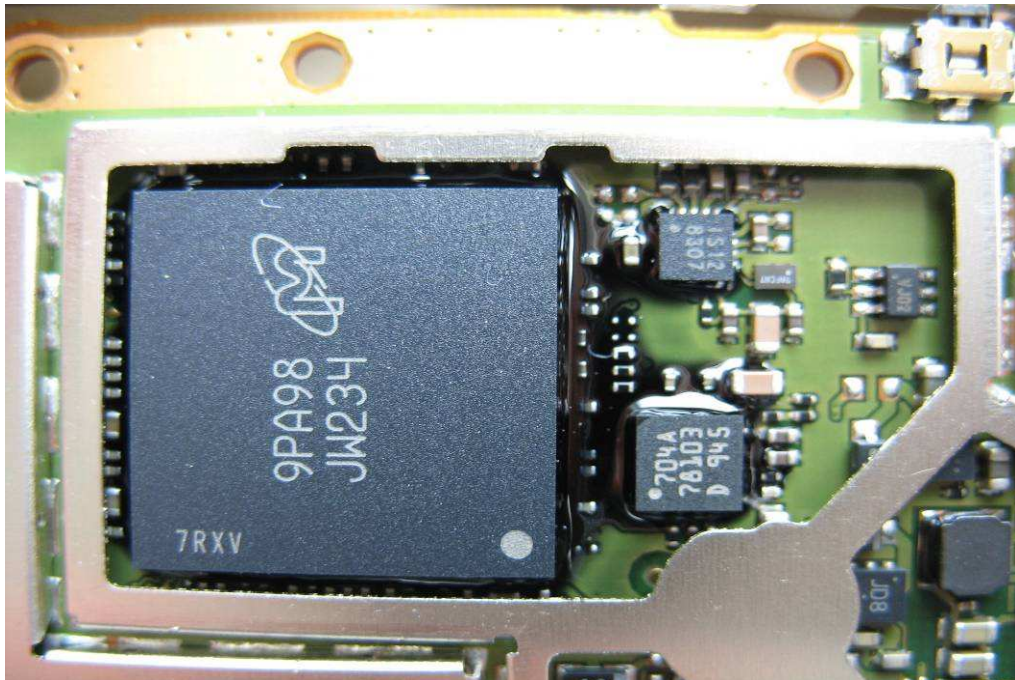


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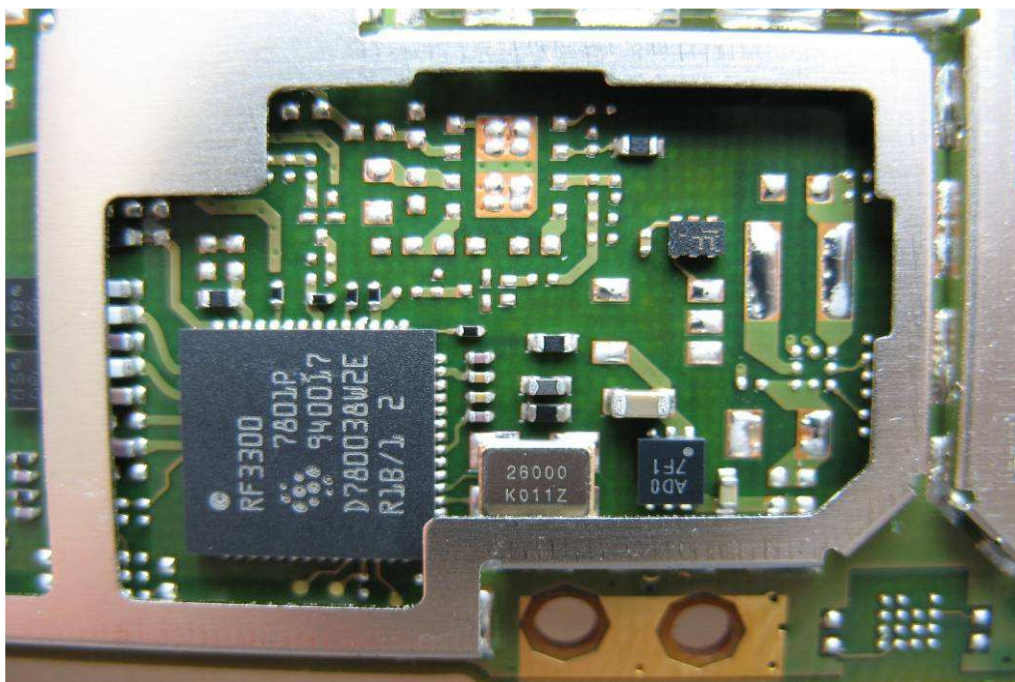


Photo 25:

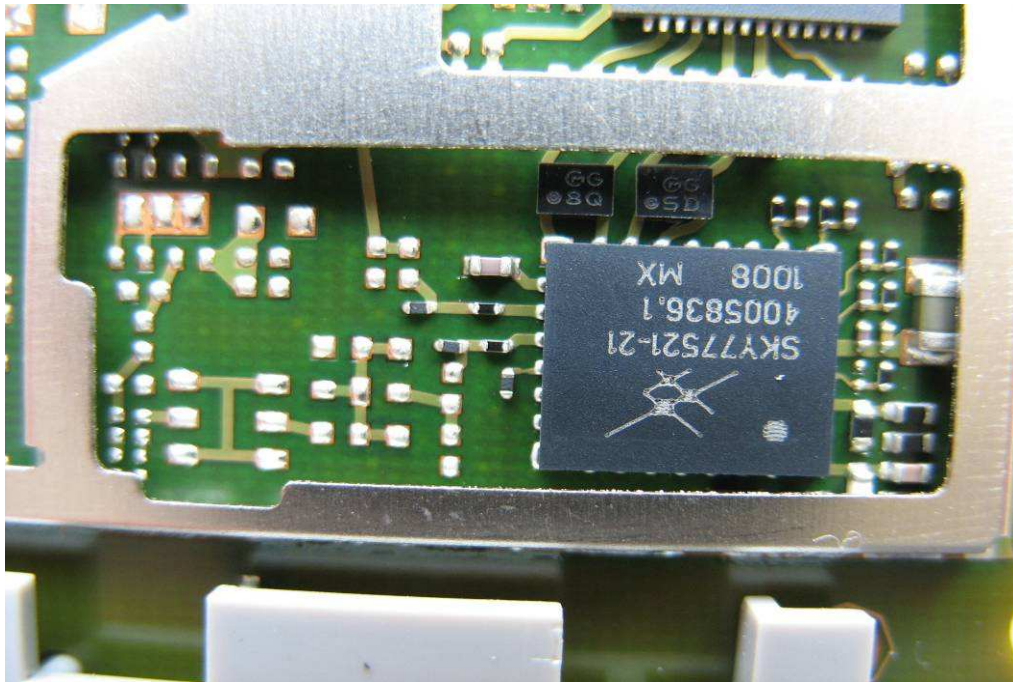
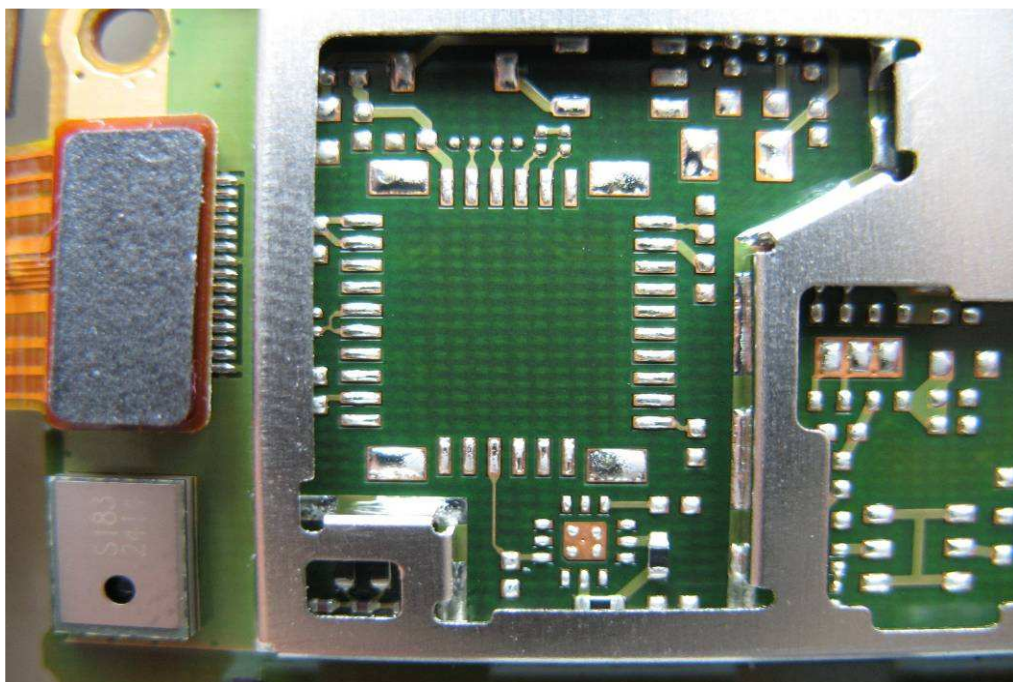


Photo 26:



Annex C Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-08-03

Annex D Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software