TEST REPORT

Test Report No. : UL-RPT-RP11066287JD11A

Manufacturer	:	Flextronics International Sweden AB
Model No.	:	SR0020-W
FCC ID	:	2AIP8I
Technology	:	UMTS850 Band V
Test Standard(s)	:	FCC Parts 22.913(a)(2) & 22.355

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0.

Date of Issue: 22 June 2016

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Company Signatory:

pp

Steven White
Service Lead, Radio Laboratory,
UL VS LTD

This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its terms of accreditation.

UL VS LTD

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1. Customer Information / Manufacturer Information

1.1. Customer Information

Company Name:	Sirin Labs AG
Address:	Muhlentalstrasse 2 8200 Schaffhausen Switzerland

1.2. Manufacturer Information

Manufacturer Name:	Flextronics International Sweden AB
Address:	Datalinjen 3A SE – 583 30 Linköping Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 22 Subpart H (Public Mobile Services)
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	06 May 2016 to 20 May 2016

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 22.913(a)(2)	Transmitter Effective Radiated Power (ERP)	✓
Part 2.1049	Transmitter Occupied Bandwidth	✓
Part 2.1055/22.355	Transmitter Frequency Stability (Temperature and Voltage Variation)	✓
Key to Results ✓ = Complied ✗ = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-D-2010
Title:	Land Mobile Communications Equipment, Measurements and performance Standards
Reference:	FCC KDB 971168 D01 v02r02, October 17 2014
Title:	Measurement Guidance for Certification of Licensed Digital Transmitters

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	SOLARIN
Model Number:	SR0020-W
Test Sample Serial Number:	0108 *(Conducted Sample #2)*
Test Sample IMEI:	357232070003189
Hardware Version:	TP1
Software Version:	LRC1TA.1.0.2.3
Handset Cover Material:	Technical leather with titanium coating
FCC ID:	2AIP8I

3.2. Description of EUT

The equipment under test was a Mobile device supporting Cellular, WLAN, BT, BTLE, RFID & GPS technologies.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	UMTS850		
Type of Radio Device:	Transceiver		
Mode:	UMTS FDD V		
Modulation Type:	QPSK / 8PSK		
Channel Spacing:	5 MHz		
Power Supply Requirement(s):	Nominal	3.9 V	
	Minimum	3.5 V	
	Maximum	4.4 V	
Maximum Output Power (ERP):	Voice (12.2 kbit/s)	22.5 dBm	
	HSDPA Sub-Test 4	22.9 dBm	
	HSUPA Sub-Test 3	23.3 dBm	
Transmit Frequency Range:	824 to 849 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	4132	826.4
	Middle	4183	836.6
	Top	4233	846.6

3.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Constantly transmitting at full power on bottom, middle and top channels as required.
- Occupied bandwidth, ERP and band edge tests were performed with the EUT in Voice (12.2 kbit/s), HSDPA (Sub-tests 1 to 4) or HSUPA (Sub-tests 1 to 5) modes.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- Connected to a Rohde & Schwarz CMW 500 Universal Radio Communications Tester, operating in UMTS Band V mode.
- Testing for frequency stability and measurements at temperature and voltage extremes was performed using a conducted sample supplied by the customer. Short 4-wire DC flying leads were connected internally to the device in place of the battery, and exited through a hole in the casing. These leads were then extended to a DC power supply for testing purposes.
- For conducted cellular measurements, the RF conducted port was a temporary SMA connector provided by the customer.
- The conducted sample with IMEI 357232070003189 was used for all measurements.
- For the conducted measurements in this report antenna port 2 was used.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Effective Radiated Power (ERP)

Test Summary:

Test Engineer:	David Doyle	**Test Dates:**	18 May 2016 to 20 May 2016
Test Sample IMEI:	357232070003189		

FCC Reference:	Part 22.913(a)(2)
Test Method Used:	KDB 971168 Section 5.1.1 and 5.2.1

Environmental Conditions:

Temperature (°C):	24 to 26
Relative Humidity (%):	34 to 36

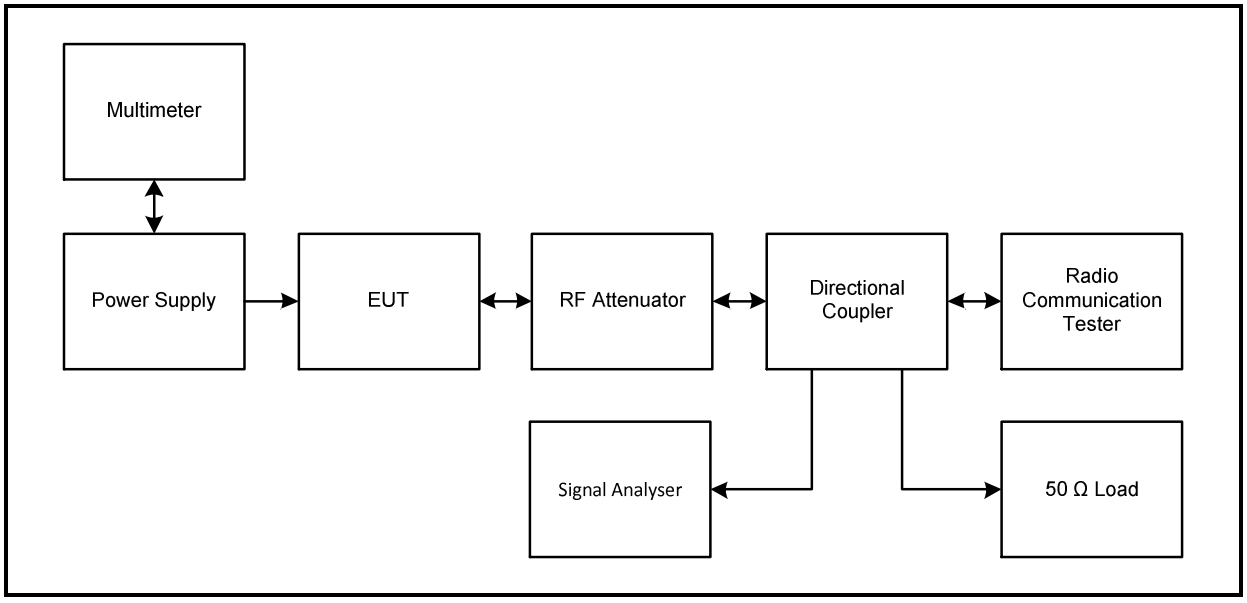
Note(s):

1. The signal analyser was connected to the RF port on the EUT via the coupled port on an RF combiner using suitable attenuation and RF cables. An RF level offset was entered on the signal analyser to compensate for the loss of the combiner, attenuators and RF cables. The through port on the RF coupler was connected to an R&S CMW 500 Radio Communications Tester.
2. The customer stated a maximum antenna gain of -2.96 dBi. As the limit is an E.R.P. limit, the gain in dBi has been converted to dBd. The gain in dBd was calculated as:

   -2.96 dBi – 2.15 dB = -5.1 dBd

3. The antenna gain was added to the conducted output power to obtain the ERP.

Test setup:



Transmitter Effective Radiated Power (ERP) (continued)

Results: Peak ERP / HSDPA and Voice

Modes		HSDPA				Voice			
Sub-test		1	2	3	4	12.2 kbit/s			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
850	4132	21.5	22.8	22.6	22.7	22.5	38.5	15.7	Complied
	4183	21.4	22.9	22.8	22.7	22.3	38.5	15.6	Complied
	4233	21.3	22.9	22.8	22.9	22.2	38.5	15.6	Complied
ßc		**2**	**11**	**15**	**15**				
ßd		**15**	**15**	**8**	**4**				
ΔACK, ΔNACK, ΔCQI		8	8	8	8				

Results: RMS ERP / HSDPA and Voice

Modes		HSDPA				Voice			
Sub-test		1	2	3	4	12.2 kbit/s			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
850	4132	15.6	15.0	14.3	14.4	17.0	38.5	21.5	Complied
	4183	15.6	14.9	14.7	14.7	17.0	38.5	21.5	Complied
	4233	15.7	14.9	14.4	14.1	17.0	38.5	21.5	Complied
ßc		**2**	**11**	**15**	**15**				
ßd		**15**	**15**	**8**	**4**				
ΔACK, ΔNACK, ΔCQI		8	8	8	8				

Transmitter Effective Radiated Power (ERP) (continued)

Results: Peak ERP / HSUPA

Modes		HSUPA							
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
850	4132	22.8	21.9	23.0	21.6	22.9	38.5	15.5	Complied
	4183	22.8	21.8	23.3	21.5	23.3	38.5	15.2	Complied
	4233	22.7	21.8	23.3	21.4	23.2	38.5	15.2	Complied
ßc		**10**	**6**	**15**	**2**	**15**			
ßd		**15**	**15**	**9**	**15**	**1**			
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8			

Results: RMS ERP / HSUPA

Modes		HSUPA							
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
850	4132	16.1	15.4	15.9	15.7	15.8	38.5	22.4	Complied
	4183	15.9	15.3	15.8	15.7	15.7	38.5	22.6	Complied
	4233	15.9	15.3	15.8	15.8	15.6	38.5	22.6	Complied
ßc		**10**	**6**	**15**	**2**	**15**			
ßd		**15**	**15**	**9**	**15**	**1**			
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8			

Transmitter Effective Radiated Power (ERP) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
A2845	Attenuator	Radiall	R411.806.121	24325927	Calibrated before use	-
A2844	Attenuator	Radiall	R411.806.121	23404066	Calibrated before use	-
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
M1269	Multimeter	Fluke	179	90250210	13 May 2017	12
S0577	DC Power Supply	TTi	CPX400S	436670	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24
M1802	Signal Generator	Rohde & Schwarz	SMU200A	103607	16 Feb 2018	24

5.2.2. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	David Doyle	**Test Date:**	20 May 2016
Test Sample IMEI:	357232070003189		

FCC Reference:	Part 2.1049
Test Method Used:	KDB 971168 Section 4.2

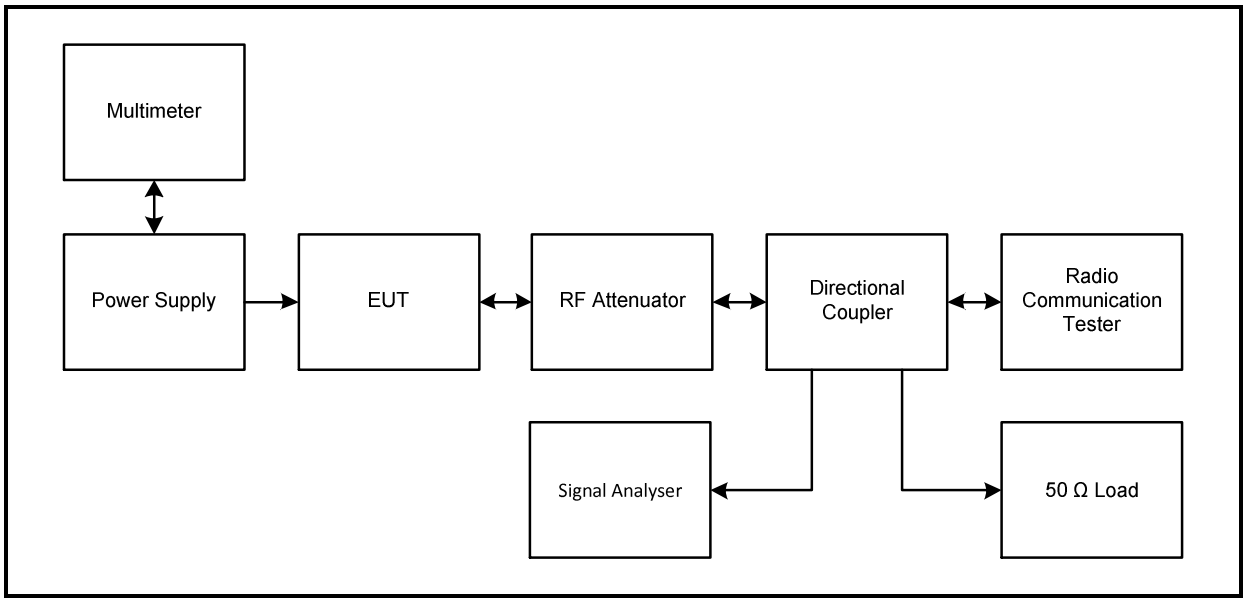
Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	36

Note(s):

1. Occupied bandwidth (99% bandwidth) was measured using a signal analyser occupied bandwidth function.
2. The signal analyser was connected to the RF port on the EUT via the coupled port on an RF combiner using suitable attenuation and RF cables. An RF level offset was entered on the signal analyser to compensate for the loss of the combiner, attenuators and RF cables. The through port on the RF coupler was connected to an R&S CMW 500 Radio Communications Tester.

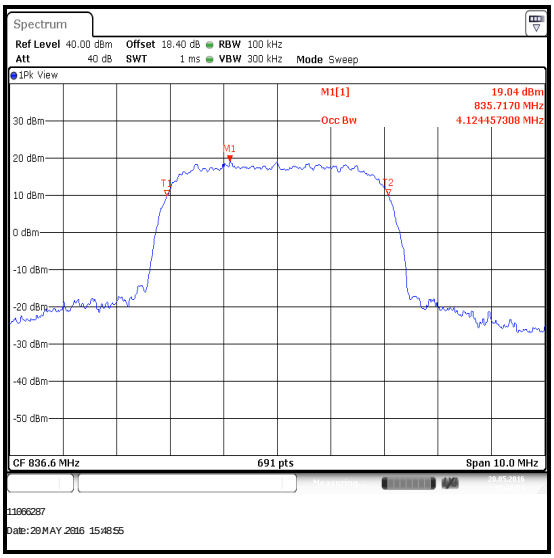
Test setup:



Transmitter Occupied Bandwidth (continued)

Results: Voice / 12.2 kbit/s

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4124.457

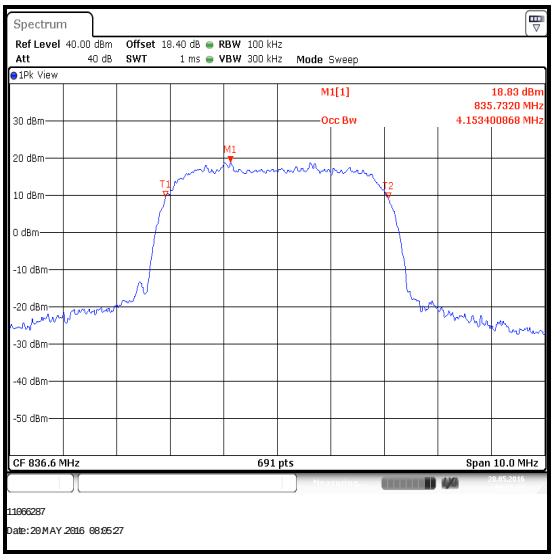


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 1

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

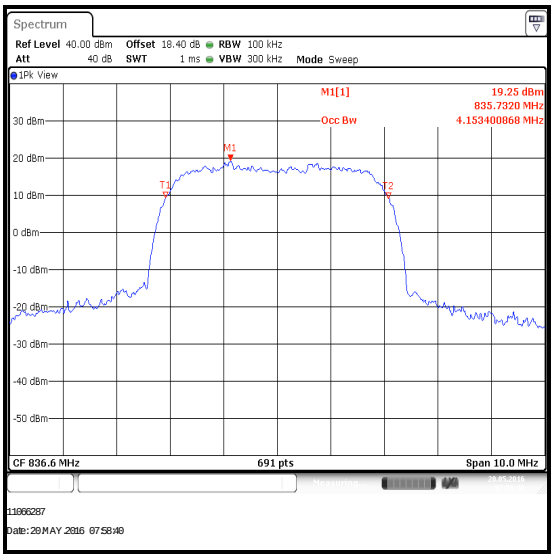


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 2

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

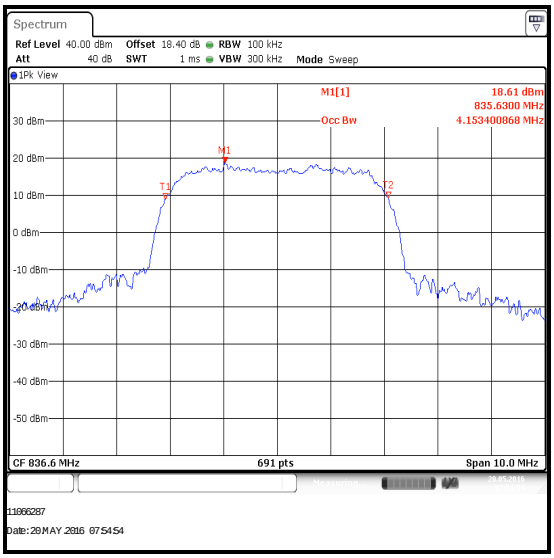


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 3

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

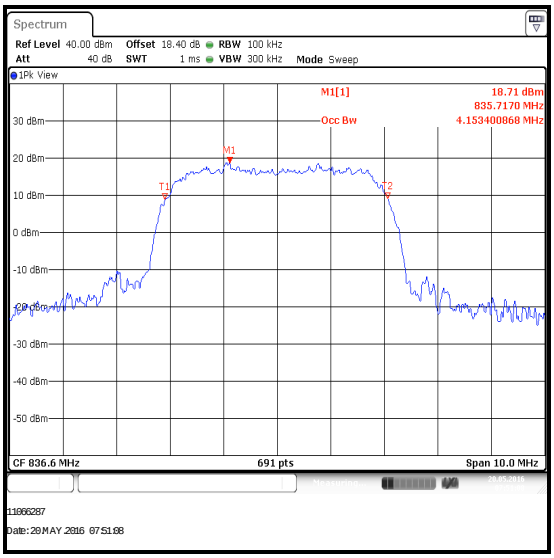


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 4

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

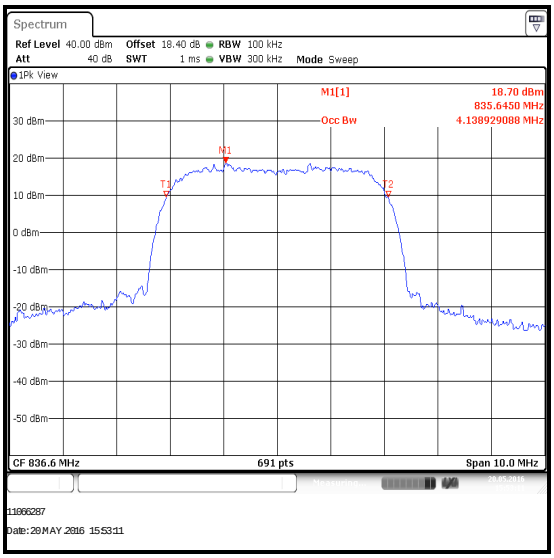


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 1

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4138.929

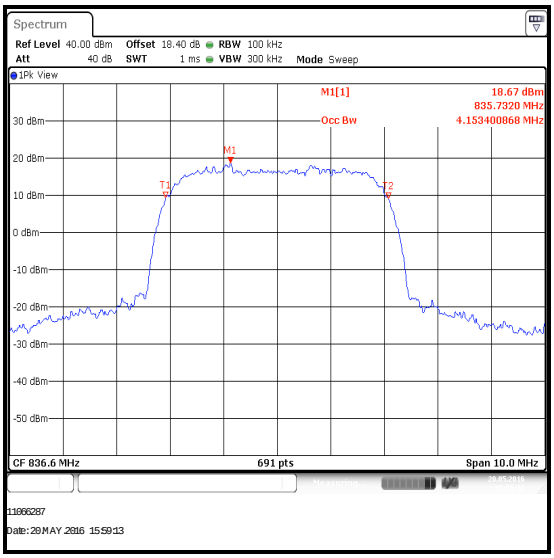


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 2

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

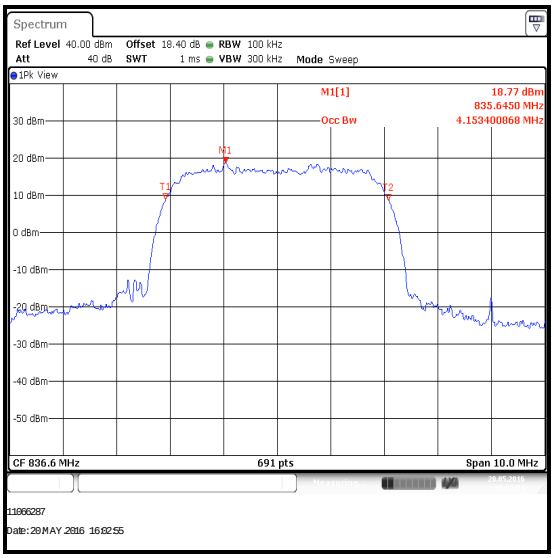


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 3

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

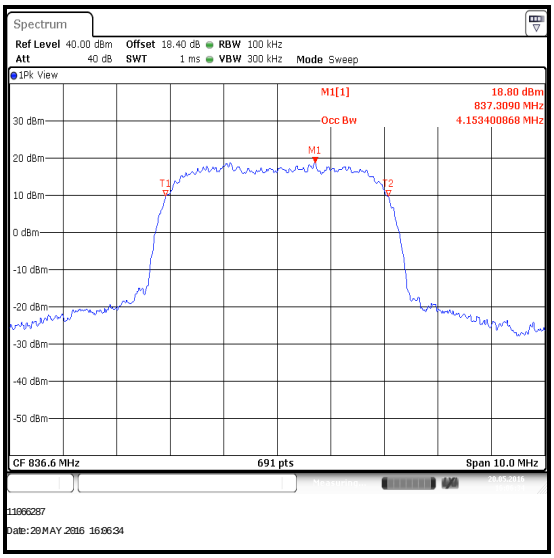


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 4

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4153.401

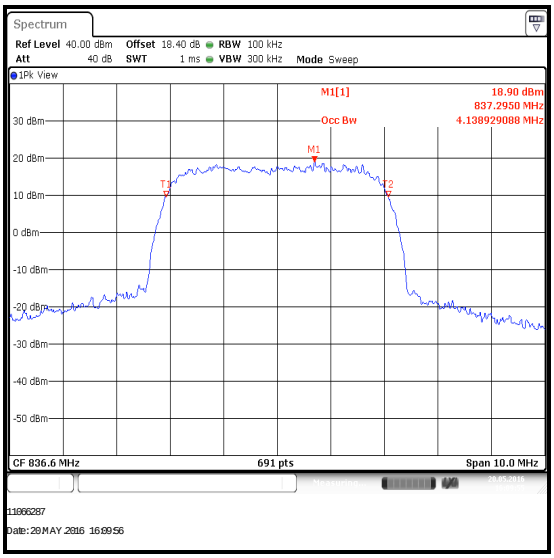


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 5

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4138.929



Middle Channel

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
A2845	Attenuator	Radiall	R411.806.121	24325927	Calibrated before use	-
A2844	Attenuator	Radiall	R411.806.121	23404066	Calibrated before use	-
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
M1269	Multimeter	Fluke	179	90250210	13 May 2017	12
S0577	DC Power Supply	TTi	CPX400S	436670	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24
M1802	Signal Generator	Rohde & Schwarz	SMU200A	103607	16 Feb 2018	24

5.2.3. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineer:	Stefan Ho	**Test Date:**	09 May 2016
Test Sample IMEI:	357232070003189		

FCC Reference:	Parts 2.1055 & 22.355
Test Method Used:	KDB 971168 Section 9.0, ANSI TIA-603-D Section 2.2.2 and FCC Part 2.1055
Test Mode:	RMC

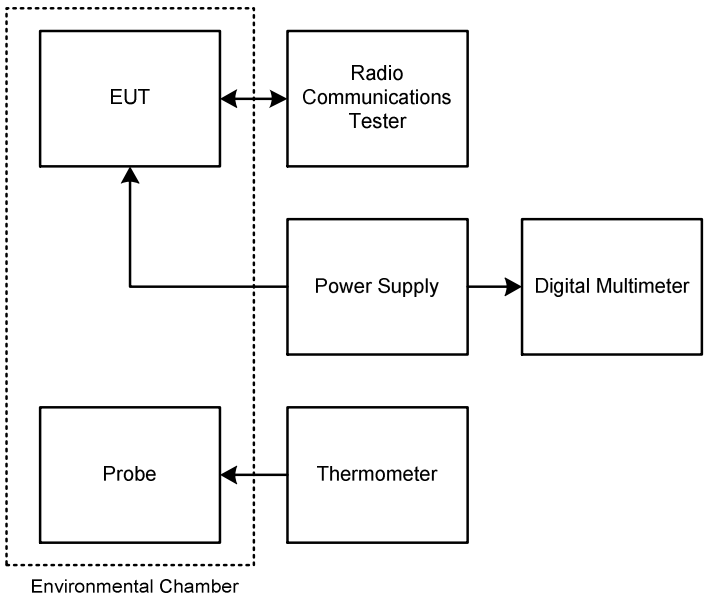
Environmental Conditions:

Ambient Temperature (°C):	24
Ambient Relative Humidity (%):	35

Note(s):

1. A dummy battery was placed on the EUT and the dummy battery cables connected to a bench power supply set to the nominal battery voltage of 3.9 V.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

Test setup:



Transmitter Frequency Stability (Temperature Variation) (continued)

Results: Middle Channel (836.6 MHz)

Temperature (ºC)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.600005	5	0.0060	2.5	2.4940	Complied
-20	836.599995	5	0.0060	2.5	2.4940	Complied
-10	836.600004	4	0.0048	2.5	2.4952	Complied
0	836.599996	4	0.0048	2.5	2.4952	Complied
10	836.600005	5	0.0060	2.5	2.4940	Complied
20	836.599998	2	0.0024	2.5	2.4976	Complied
30	836.599996	4	0.0048	2.5	2.4952	Complied
40	836.600002	2	0.0024	2.5	2.4976	Complied
50	836.600005	5	0.0060	2.5	2.4940	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	02 Apr 2017	12
M1859	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145920	12 Jun 2016	12
M1674	Environmental Chamber	Espec Corporation	SU-241	92013139	Calibrated before use	-
M1249	Thermometer	Fluke	52II	88800049	27 May 2016	12
S021	Dual DC power supply	Thurlby Thandar Instruments	CPX200	061034	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	21 Apr 2017	12

5.2.4. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineer:	Stefan Ho	**Test Date:**	06 May 2016
Test Sample IMEI:	357232070003189		

FCC Reference:	Parts 2.1055 & 22.355
Test Method Used:	KDB 971168 Section 9.0, ANSI TIA-603-D Section 2.2.2 and FCC Part 2.1055
Test Mode:	RMC

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	33

Note(s):

1. A dummy battery was placed on the EUT and the dummy battery cables connected to a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Results: Middle Channel (836.6 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.5	836.599996	4	0.0048	2.5	2.4952	Complied
4.4	836.600005	5	0.0060	2.5	2.4940	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	02 Apr 2017	12
M1859	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145920	12 Jun 2016	12
S021	Dual DC power supply	Thurlby Thandar Instruments	CPX200	061034	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	26 May 2016	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Output Power	824 to 849 MHz	95%	±1.13 dB
Frequency Stability	824 to 849 MHz	95%	±23 Hz
Occupied Bandwidth	824 to 849 MHz	95%	±3.92 %

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version

--- END OF REPORT ---