Prüfbericht / *Test Report* Nr. / *No.* 5010259831-45730-2e (Edition 4)

Applicant:	Abitron Control Systems GmbH
Type of equipment:	Transceiver Module
Type designation:	CS458TR
Order No.:	81400010
Test standards:	FCC Code of Federal Regulations: CFR 47, Part 90, Section 90.217 Industry Canada Radio Standards Specifications: RSS-119 Issue 11, Section 5.10

Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

Table of Contents

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Web: www.tuev-sued.de

Product Service

1 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation[1]:	CS458TR
Parts[2]:	
Serial number(s):	700182 014735
Manufacturer:	Abitron
Type of equipment:	Transceiver Module
Version:	
FCC ID:	2AC8P-458TR1
Industry Canada ID:	12310A-458TR1
Additional parts/accessories:	

[1] Type designation of the system if EUT consists of more than one part.
[2] Type designations of the parts of the system, if applicable.

Technical data of EUT	
Description:	The UHF FM narrow band semi-duplex radio data module CSxxx-TRT-1 is a R&TTE and RoHS compliant, high performance transceiver designed for use in industrial applications requiring long range, high performance and reliability. All high frequency circuits are enclosed inside a robust housing to provide superior resistance against shock and vibration. A narrow band technique enables high interference rejection and concurrent operation with multiple modules. CSxxx-TRT-1, a narrowband module with 25 kHz channel steps, achieves high TX/RX switchingspeed, making it an ideal RF unit for inclusion in feedback systems. The frequency settings are configurable by the DIP switch to select the frequency channel of the module.
Application frequency range:	450 - 470 MHz
Frequency range:	458.500 – 459.200 MHz
Operating frequency:	458.85 MHz(Channel tested)
Type of modulation:	FSK
Number of RF-channels:	28
Channel spacing:	25 kHz
Designation of emissions[3]:	19k1F1D
Type of antenna:	Wire antenna, gain = 2.15 dBi
Size/length of antenna:	185 mm
Connection of antenna:	☒ detachable ☐ not detachable
Type of power supply:	DC supply
Specifications for power supply:	nominal voltage: 5.0 V minimum voltage: 3.4 V maximum voltage: 12 V

[3] Also known as "Class of Emission".

2 Administrative Data

Application details	
Applicant (full address):	Abitron Control Systems GmbH Wiesnerstr. 20 A-4950 Altheim
Contact person:	Mr. Roland Schöppl
Order number:	81400010
Receipt of EUT:	2014-08-27
Date(s) of test:	2014-08-27 to 2014-09-05; 2015-02-11
Note(s):	

Report details	
Report number:	5010259831-45730-2e
Edition:	4
Issue date:	2015-02-12

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory accreditation:	DAkkS Registration No. D-PL-11321-11-01
FCC test site registration number	90926
Industry Canada test site registration:	3050A-2
Contact person:	Mr. Johann Roidt Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

4 Summary

Summary of test results
The tested sample complies with the requirements set forth in the **Code of Federal Regulations** **CFR 47, Part 90, Section 90.217** of the Federal Communication Commission (FCC) and the **Radio Standards Specifications** **RSS-119 Issue 11, Section 5.10** of Industry Canada (IC).

Personnel involved in this report	
Laboratory Manager:	 Mr. Johann Roidt
Responsible for testing:	 Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl

5 Operation Mode and Configuration of EUT

Operation Mode(s)
The EUT was operated in transmitting and receiving mode on middle channel and receiving mode.

Configuration(s) of EUT
The EUT was configured as stand alone device with a test board. The data input was a TTL signal with 19200 baud.

List of ports and cables

Port	*Description*	*Classification*[4]	*Cable type*	*Cable length*
1	DC supply	dc power	Unshielded	1.5 m
2	Data Input (combined with DC)	signal/control port	Unshielded	1.5 m
3	General Data IO (IO1, IO2, IO3, TX/RX, Dec/Green LED, Tell-Off, DK-Sync, TT Out) [5]	signal/control port	Unshielded	N/A
4	Antenna port (50 Ω)	signal/control port	Shielded	185 mm

List of devices connected to EUT

Item	*Description*	*Type Designation*	*Serial no. or ID*	*Manufacturer*
1	Antenna	---	---	Abitron

List of support devices

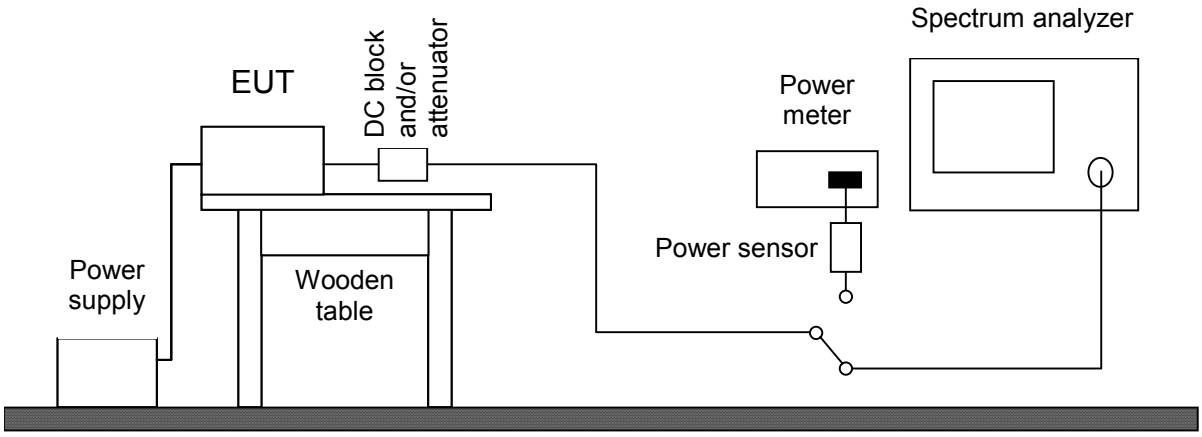
Item	*Description*	*Type Designation*	*Serial no. or ID*	*Manufacturer*
1	HP 1645A	Data Error Analyzer	2407 A 04589	HP

[4] Ports shall be classified as ac power, dc power or signal/control port
[5] For further information about the data port, please refer to integration manual pages 3/14 and 4/14.

6 Measurement Procedures

6.1 Conducted Output Power

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.1046(a) CFR 47 Part 90, Subpart I IC RSS-Gen Issue 4, section 6.12 IC RSS-119 Issue 11, section 5.4
Guide:	CFR 47 Part 2, section 2.1046 / IC RSS-Gen Issue 4
Conducted output power is measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer and/or a power meter with appropriate sensor. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. If a spectrum analyzer is used and no other settings are specified resolution bandwidth shall be selected according to the carrier frequency f_c and set to 10 kHz (150 kHz $\leq f_c <$ 30 MHz), 100 kHz (30 MHz $\leq f_c <$ 1 GHz) or 1 MHz ($f_c \geq$ 1 GHz). The video bandwidth shall be at least three times greater than the resolution bandwidth. The settings used have to be indicated within the appropriate test record(s).	



Test instruments used:

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Spectrum analyzer	FSP30	1666	100063	Rohde & Schwarz
☒	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	Power meter	NRVS	1264	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	1499	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	1034	863828/015	Rohde & Schwarz
☐	DC-block	7006	1636	A2798	Weinschel
☐	Attenuator	4776-10	1638	9412	Narda
☐	Attenuator	4776-20	1639	9503	Narda

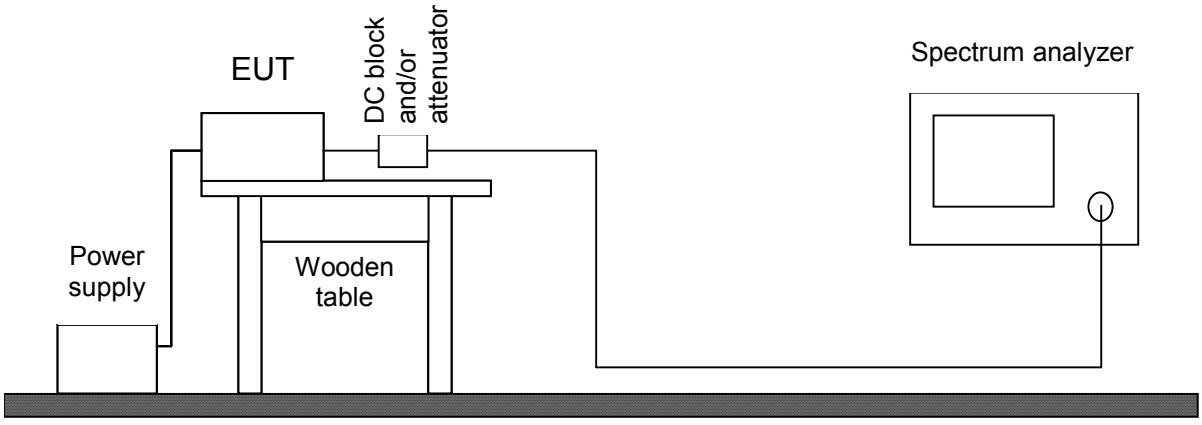
6.2 Bandwidth Measurements

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 90, Subpart I IC RSS-Gen Issue 4, section 6.6 IC RSS-119 Issue 11, section 5.5 ANSI C63.4, annex H.6
Guide:	ANSI C63.4 / IC RSS-Gen Issue 4, section 6.6
Measurement setup:	☒ Conducted: See below ☐ Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.3)

If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.

The analyzer settings are specified by the test description of the appropriate test record(s).



Test instruments used for conducted measurements:

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
☒	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	Power meter	NRVS	1264	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	1499	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	1034	863828/015	Rohde & Schwarz
☐	DC-block	7006	1636	A2798	Weinschel
☐	Attenuator	4776-10	1638	9412	Narda
☐	Attenuator	4776-20	1639	9503	Narda

6.3 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 90, sections 90.210 and 90.217 CFR 47 Part 2, section 2.1053 IC RSS-Gen Issue 4, sections 6.1 and 7.1.2 IC RSS-119 Issue 11, section 5.8
Guide:	ANSI C63.4

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

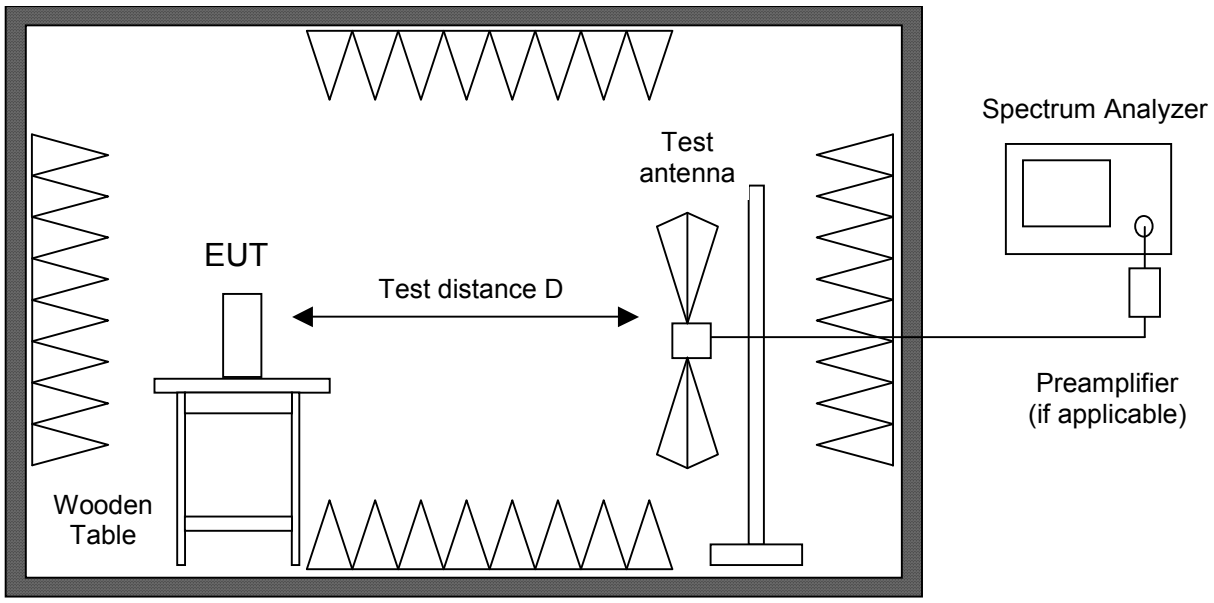
All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.4 for alternative test sites is used (see 6.4). If prescans are recorded in fully anechoic room they are indicated appropriately.



Fully or semi anechoic room

Test instruments used:

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☒	Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☐	EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☒	Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐	Preamplifier		R14601	1142	13120026	Advantest
☒	Preamplifier (1 - 8 GHz)		AFS3-00100800-32-LN	1684	847743	Miteq
☐	Preamplifier (0.5 - 8 GHz)		AMF-4D-005080-25-13P	1685	860149	Miteq

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Preamplifier (8 - 18 GHz)		ACO/180-3530	1484	32641	CTT
☐	External Mixer		WM782A	1576	845881/005	Tektronix
☐	Harmonic Mixer Accessories		FS-Z30	1577	624413/003	Rohde & Schwarz
☐	Trilog antenna	Cabin no. 2	VULB 9163	1802	9163-214	Schwarzbeck
☐	Trilog antenna	Cabin no. 3	VULB 9163	1722	9163-188	Schwarzbeck
☐	Trilog antenna	Cabin no. 8	VULB 9163	2058	9163-408	Schwarzbeck
☒	Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒	Horn antenna		3115	1516	9508-4553	EMCO
☐	Horn antenna		3160-03	1010	9112-1003	EMCO
☐	Horn antenna		3160-04	1011	9112-1001	EMCO
☐	Horn antenna		3160-05	1012	9112-1001	EMCO
☐	Horn antenna		3160-06	1013	9112-1001	EMCO
☐	Horn antenna		3160-07	1014	9112-1008	EMCO
☐	Horn antenna		3160-08	1015	9112-1002	EMCO
☐	Horn antenna		3160-09	1265	9403-1025	EMCO
☐	Horn antenna		3160-10	1575	399185	EMCO
☒	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☐	Semi anechoic room		No. 8	2057	---	Albatross

6.4 Radiated Emission at Alternative Test Site

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 90, sections 90.210 and 90.217 CFR 47 Part 2, section 2.1053 IC RSS-Gen Issue 4, sections 6.1 and 7.1.2 IC RSS-119 Issue 11, section 5.8
Guide:	ANSI C63.4

Radiated emission in the frequency range 30 MHz to 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4 for alternative test sites. A linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna") is used. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

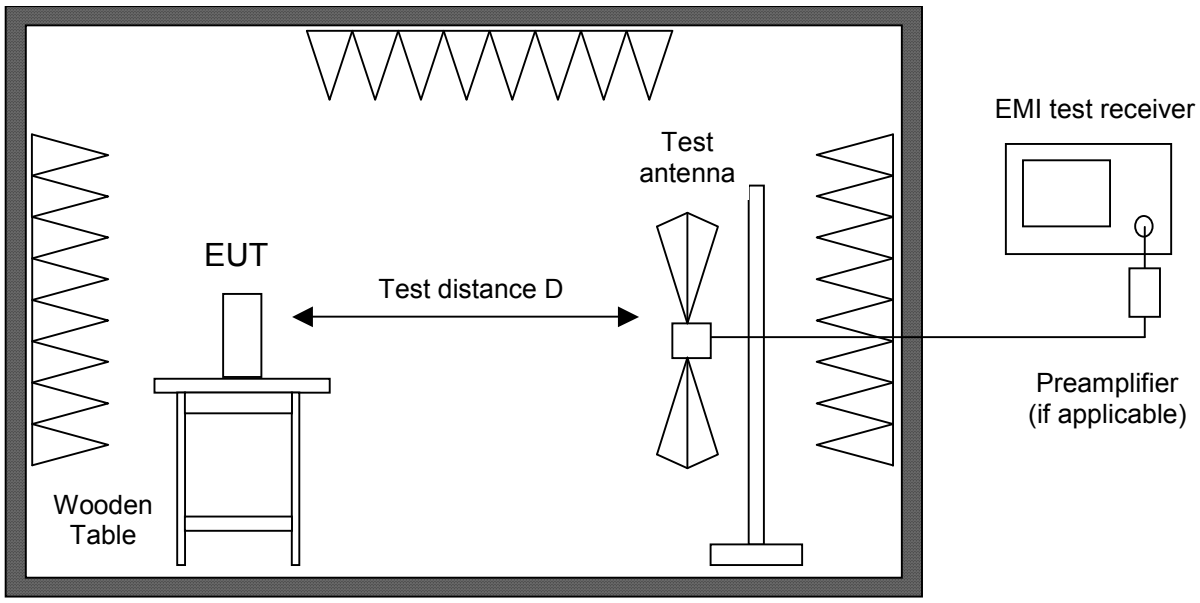
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in fully anechoic room.

If no prescan in a fully anechoic room is used first a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarization for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

In cases where prescans in a fully anechoic room are taken (e. g. if EUT is operating for a short time only or battery is dircharged quickly) final measurements with quasi-peak detector are performed manually at frequencies indicated by prescan with EUT rotating all around and receiving antenna raising and lowering within 1 meter to 4 meters to find the maximum levels of emission.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.



Alternate test site (semi anechoic room)

Test instruments used:

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
	EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☒	EMI test receiver		ESU26	(R&S)	20054	Rohde & Schwarz
☒	Trilog antenna	Cabin no. 8	VULB 9163	2058	9163-408	Schwarzbeck
☒	Semi anechoic room		No. 8	2057	---	Albatross

6.5 Carrier Frequency Stability

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.1055 CFR 47 Part 90, sections 90.213 and 90.217 IC RSS-Gen Issue 4, section 4.7 IC RSS-119 Issue 11, sections 5.3, 5.10 and 5.11
Guide:	ANSI C63.4

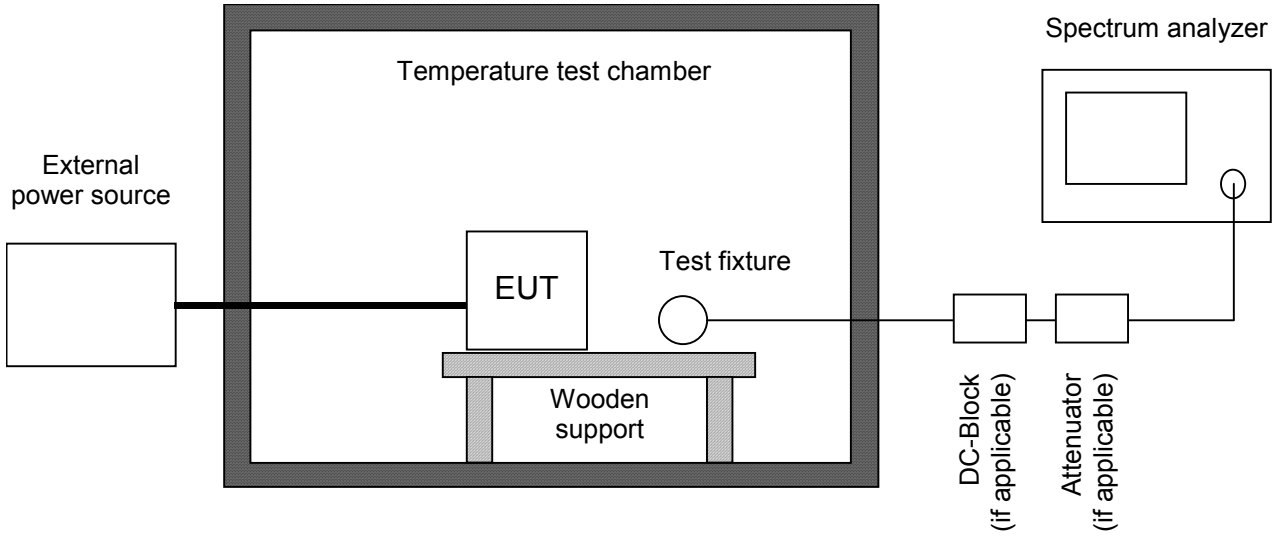
The frequency tolerance of the carrier signal is measured over a temperature variation of -20 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 °C.

If the EUT provides an antenna connector the spectrum analyzer is connected to this port. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). In cases where the EUT does not provide an antenna connector a test fixture is used.

For battery operated equipment, the test is performed using a new battery. Alternatively, an external supply voltage can be used and is at least set to:

- the maximum battery voltage as delivered by a new battery or 115% of the battery nominal voltage
- the battery nominal voltage
- 85% of the battery nominal voltage
- the battery operating end point voltage which shall be specified by the equipment manufacturer

The EUT is operating providing an unmodulated carrier. The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to values appropriate to the shape of the spectrum of the EUT. The frequency counter mode of the spectrum analyzer is used to maximize the accuracy of the measured frequency tolerance.
If an unmodulated carrier is not available a significant and stable point on the spectrum is selected and the span is reduced to a value that delivers an accuracy which shall be better than 1% of the maximum frequency tolerance allowed for the carrier signal. This method may be performed as long as the margin to the frequency tolerance allowed is larger than the uncertainty of the measured frequency tolerance.

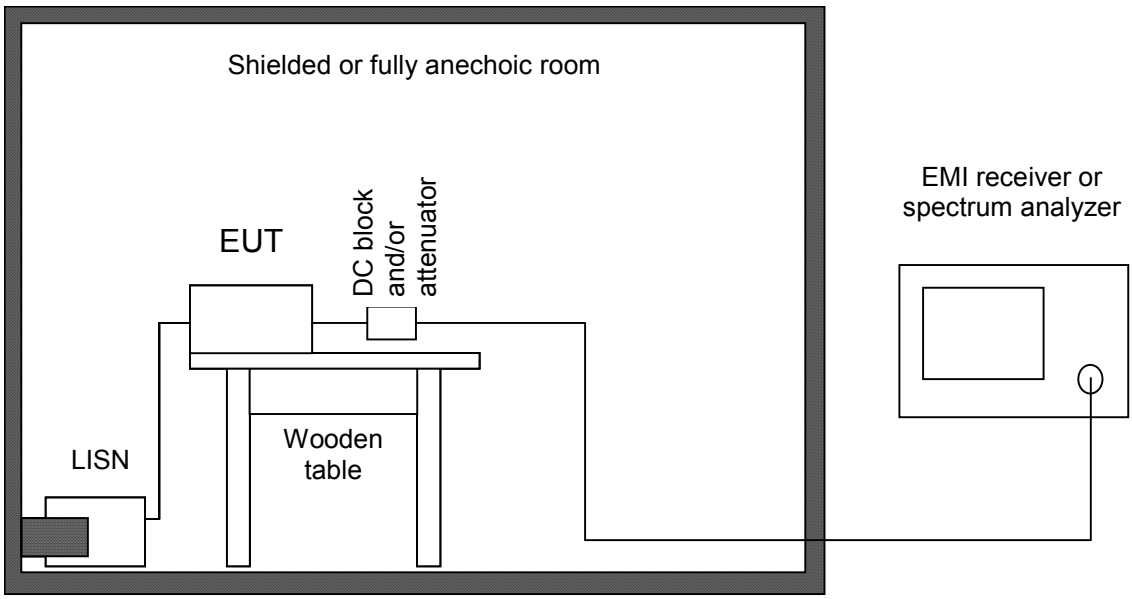


Test instruments used:

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
☒	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	DC-block	7006	1636	A2798	Weinschel
☐	Attenuator	4776-10	1638	9412	Narda
☐	Attenuator	4776-20	1639	9503	Narda
☐	Test probe	TP 01	1628	001	TÜV SÜD PS
☒	Multimeter	21 III	1653	76530546	Fluke
☐	Multimeter	21 III	1654	76381229	Fluke
☐	Multimeter	Fluke 77 III	1975	92370108	Fluke
☐	Multimeter	Fluke 77 IV	1976	93090238	Fluke
☐	Multimeter	Fluke 177	2025	96720024	Fluke
☐	Multimeter	Fluke 177	2026	96720025	Fluke
☐	DC power supply	NGSM 32/10	1267	203	Rohde & Schwarz
☐	Isolating transformer	RT 5A	1127	10387	Grundig
☐	Isolating transformer	RT 5A	1128	10416	Grundig
☒	Temperature test chamber	HT 4010	1271	07065550	Heraeus

6.6 Antenna Power Conduction Emission

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.1051 CFR 47 Part 90, section 90.205 IC RSS-Gen Issue 3, sections 6.2 IC RSS-119 Issue 11, section 5.10
Guide:	ANSI C63.4
The receiver antenna terminal is connected to the spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The power at the antenna terminal is measured in the frequency range as specified in CFR 47 Part 15 section 15.33. The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz). If required, preamplifiers are used. Special care is taken to avoid overload (using appropriate attenuators and filters if necessary).	

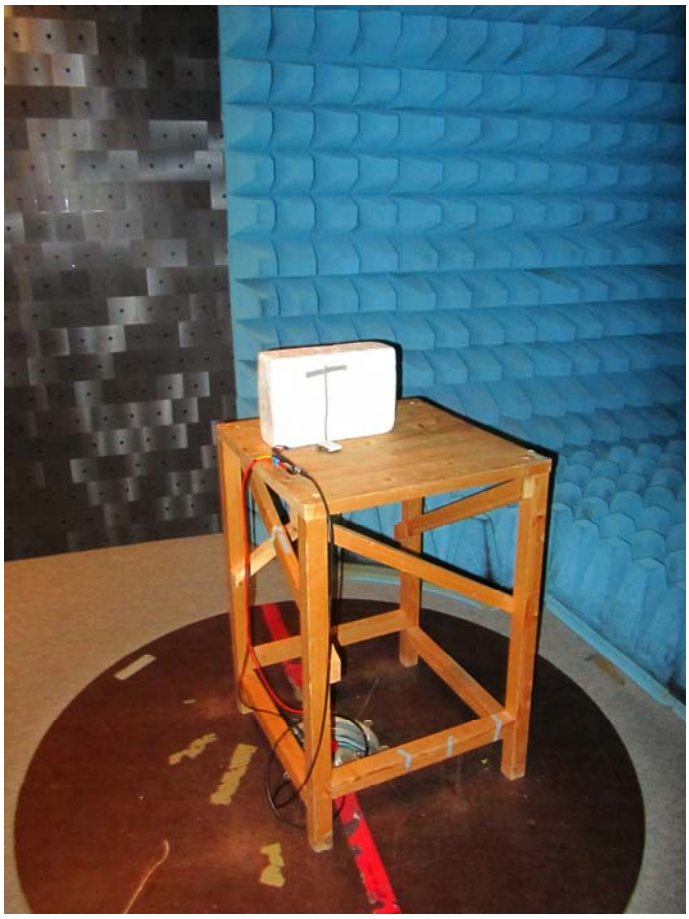


Test instruments used:

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☒	EMI test receiver	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver	ESU8	2044	100232	Rohde & Schwarz
☐	DC-block	7006	1636	A2798	Weinschel
☐	Attenuator	4776-10	1638	9412	Narda
☐	Attenuator	4776-20	1639	9503	Narda
☐	Preamplifier Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐	Preamplifier (1 - 8 GHz)	AFS3-00100800-32-LN	1684	847743	Miteq
☐	Preamplifier (0.5 - 8 GHz)	AMF-4D-005080-25-13P	1685	860149	Miteq
☐	Preamplifier (8 - 18 GHz)	ACO/180-3530	1484	32641	CTT
☐	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Semi anechoic room	No. 8	2057	---	Albatross

7 Photographs Taken During Testing

Test setup for radiated emission measurement (fully anechoic room)



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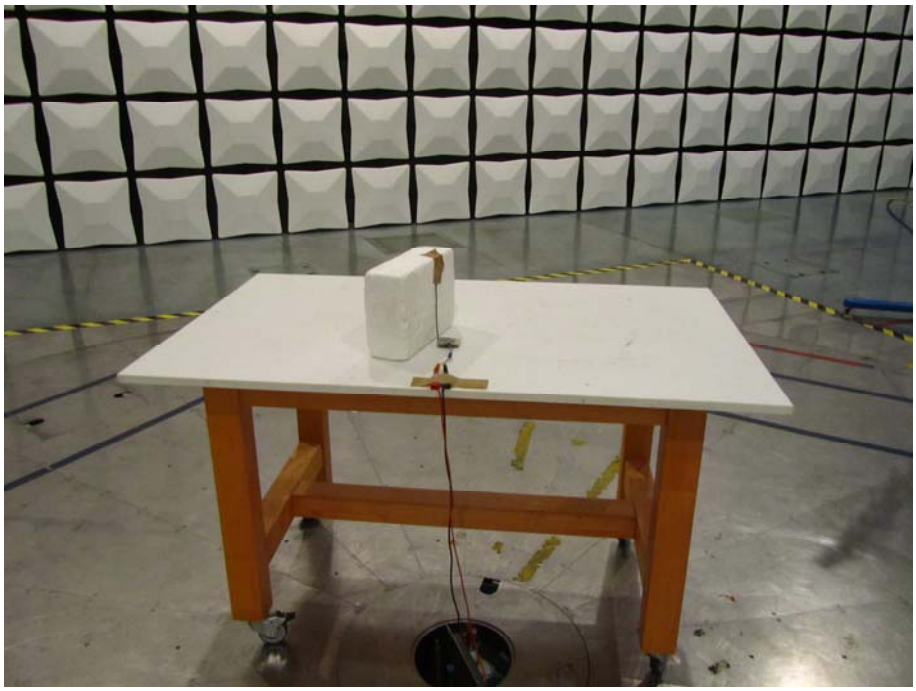
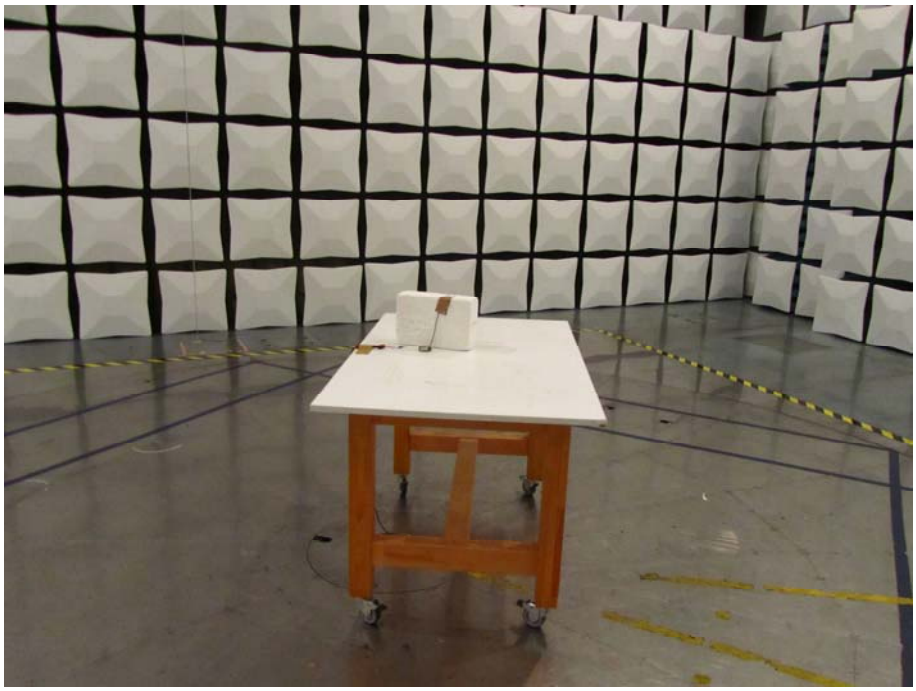
Test setup for radiated emission measurement (alternate test site)



Test setup for radiated emission measurement (alternate test site) - continued -



8 Test Results for Transmitter

FCC CFR 47 Parts 2 and 90			
Section(s)	*Test*	*Page*	*Result*
90.217 2.1046(a)	Conducted output power	28	Test passed
90.217(a)	Spectrum mask	30	Test passed
2.202(a), 90.217(a)	Occupied bandwidth	32	Recorded
2.201, 2.202	Class of emission	36	Calculated
2.1051 90.205	Conducted emission 25 MHz to 5 GHz	37	Test passed
2.1053 90.210, 90.217	Radiated emission 25 MHz to 5 GHz	39	Test passed
2.1055 90.213, 90.217	Carrier frequency stability	39	Test passed
2.1093	RF exposure requirement	45	Test passed

IC RSS-Gen Issue 4			
Section(s)	*Test*	*Page*	*Result*
6.12	Transmitter output power (conducted)	28	Test passed
6.6	Occupied Bandwidth	32	Recorded
4.7	Transmitter frequency stability	32	Test passed
9	Designation of emissions	36	Calculated
3.2	Exposure of Humans to RF Fields	46	Exempted from SAR and RF evaluation

IC RSS-119 Issue 11			
Section(s)	*Test*	*Page*	*Result*
5.4	Transmitter output power (conducted)	28	Test passed
5.5, 5.10	Spectrum mask	30	Test passed
5.10	Unwanted emissions – conducted 25 MHz to 5 GHz	37	Test passed
5.8, 5.10	Unwanted emissions – radiated 25 MHz to 5 GHz	39	Test passed
5.3, 5.10, 5.11	Transmitter frequency stability	32	Test passed

8.1 Conducted Output Power

Rules and specifications:	CFR 47 Part 90, section 90.217 CFR 47 Part 2, section 2.1046(a) IC RSS-119 Issue 11, section 5.4 IC RSS-Gen Issue 4, section 6.12
Guide:	CFR 47 Part 2, section 2.1046 / IC RSS-Gen Issue 4
Description:	Except as noted herein, transmitters used as stations licensed below 800 MHz on any frequency listed in subparts B and C of this part or licensed on a business category channel above 800 MHz wich have an output power not exceeding 120 mW (20.79 dBm) are excempt from the technical requirements set out in subpart, but must instead comply with the following. Conducted output power shall be measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.
Measurement procedure:	Conducted Output Power (6.1)

Comment:	
Date of test:	2014-08-27
Test site:	Unshielded room

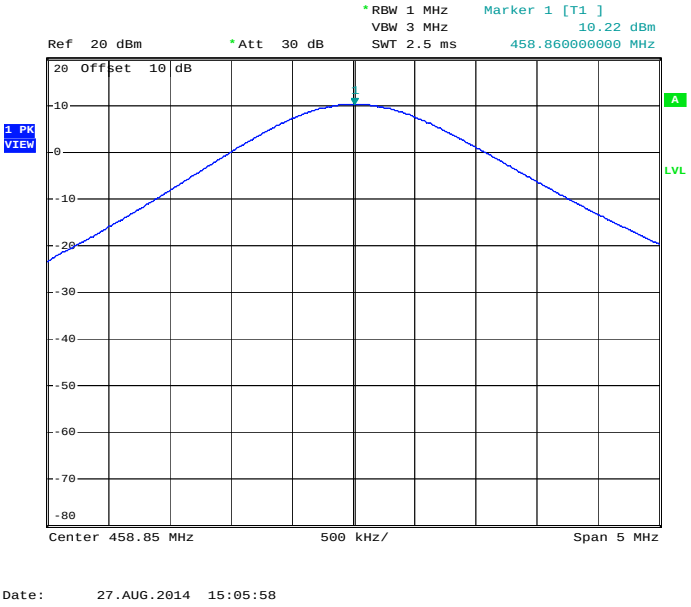
Test Result:	Test passed

Antenna gain: 2.15 dBi

Mode	Frequency (MHz)	Power Type	Reading (dBm)	Correction (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
	458.9	PEP	10.2	0.0	10.2	20.8	**10.6**

Note 1: If applicable, PEP (peak envelope power) and RMS values are measured using a power meter with appropriate sensor.
Note 2: If applicable, peak or average values are measured using a spectrum analyzer with resolution and video bandwidth set to: RBW = 1 MHz, VBW = 3 MHz
Note 3: If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Carrier power:



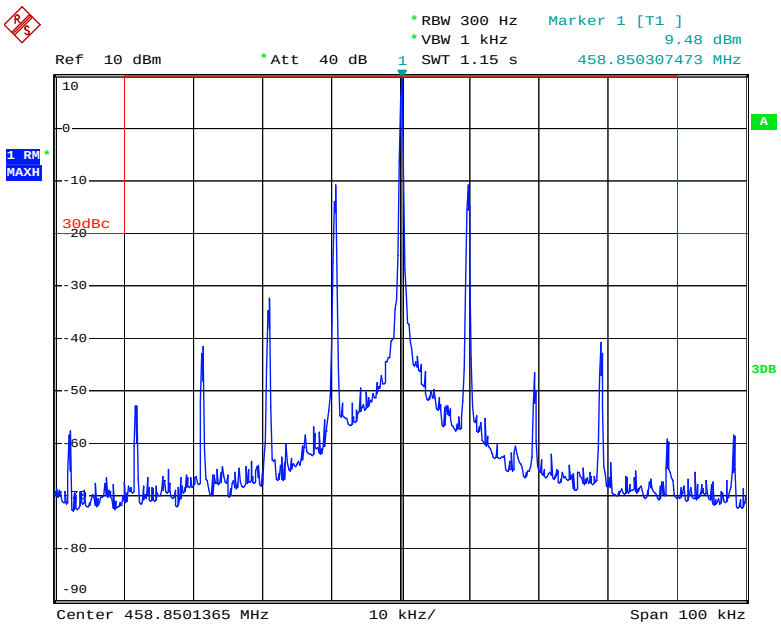
8.2 Spectrum Mask

Rules and specifications:	CFR 47 Part 90, section 90.217(a) IC RSS-119, Issue 11, sectinons 5.5 and 5.10
Guide:	ANSI C63.4 IC RSS-Gen Issue 4, section 6.6
Description:	For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
Measurement procedure:	Bandwidth Measurements (6.2)

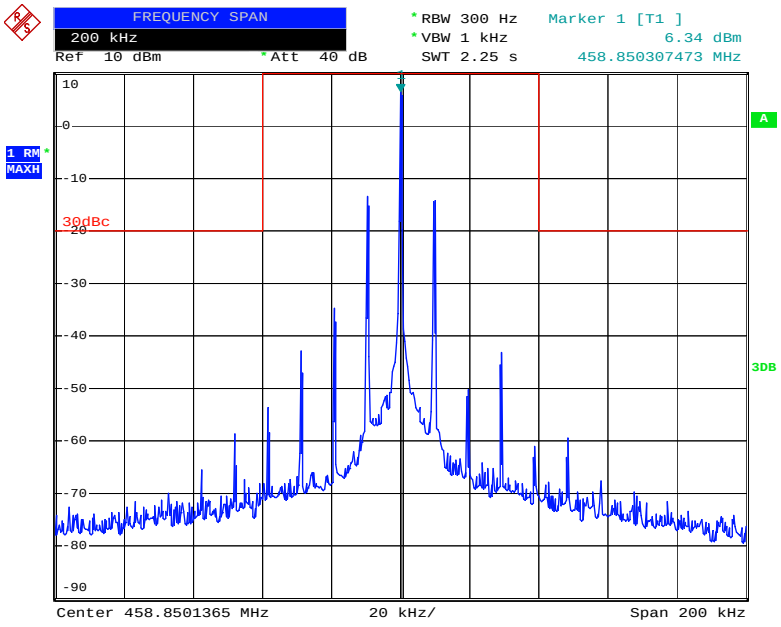
Comment:	
Date of test:	2015-02-11
Test site:	Fully anechoic room, cabin no. 2

Test Result:	Test passed

Spectrum mask:



Date: 11.FEB.2015 17:39:30



Date: 11.FEB.2015 17:40:04

Test Result:	Test passed

8.3 Occupied Bandwidth

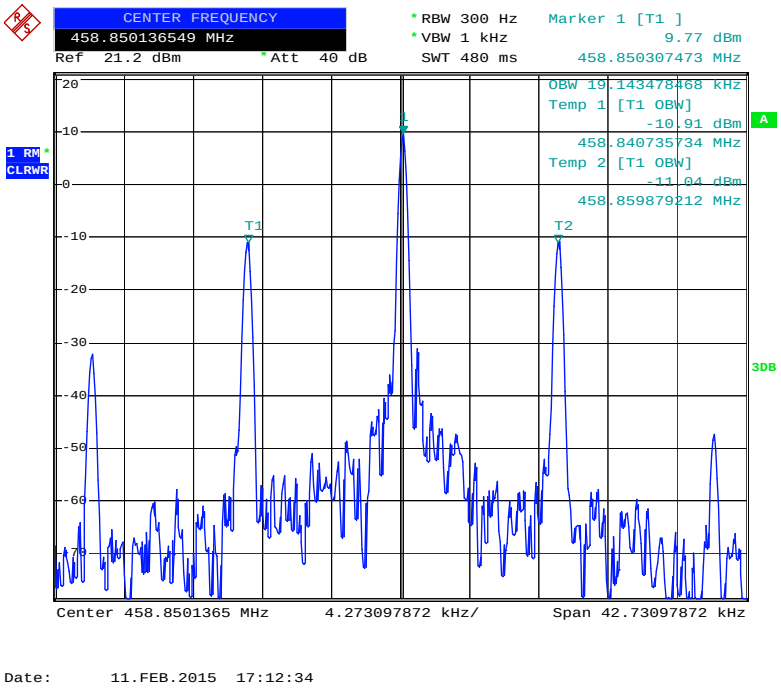
<table>
<tr><td>Rules and specifications:</td><td colspan="2">CFR 47 par 90, section 217(a)
CFR 47 Part 2, sections 2.202(a)
ANSI C63.4, annex H.6</td></tr>
<tr><td>Guide:</td><td colspan="2">ANSI C63.4</td></tr>
<tr><td>Description:</td><td colspan="2">The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.
The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier.
The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:</td></tr>
<tr><td></td><td>Fundamental frequency</td><td>Minimum resolution bandwidth</td></tr>
<tr><td></td><td>9 kHz to 30 MHz</td><td>1 kHz</td></tr>
<tr><td></td><td>30 MHz to 1000 MHz</td><td>10 kHz</td></tr>
<tr><td></td><td>1000 MHz to 40 GHz</td><td>100 kHz</td></tr>
<tr><td></td><td colspan="2">The video bandwidth shall be at least three times greater than the resolution bandwidth.</td></tr>
<tr><td>Measurement procedure:</td><td colspan="2">Bandwidth Measurements (6.2)</td></tr>
</table>

Comment:	
Date of test:	2014-08-27
Test site:	Fully anechoic room, cabin no. 2

TÜV SÜD Product Service GmbH
Äußere Frühlingstraße 45
94315 Straubing
Germany

Phone: +49 9421 5522-0
Fax: +49 9421 5522-99
Web: www.tuev-sued.de

Occupied Bandwidth (99 %):



Occupied Bandwidth (99 %):	**19.14 kHz**

Occupied Bandwidth (continued)

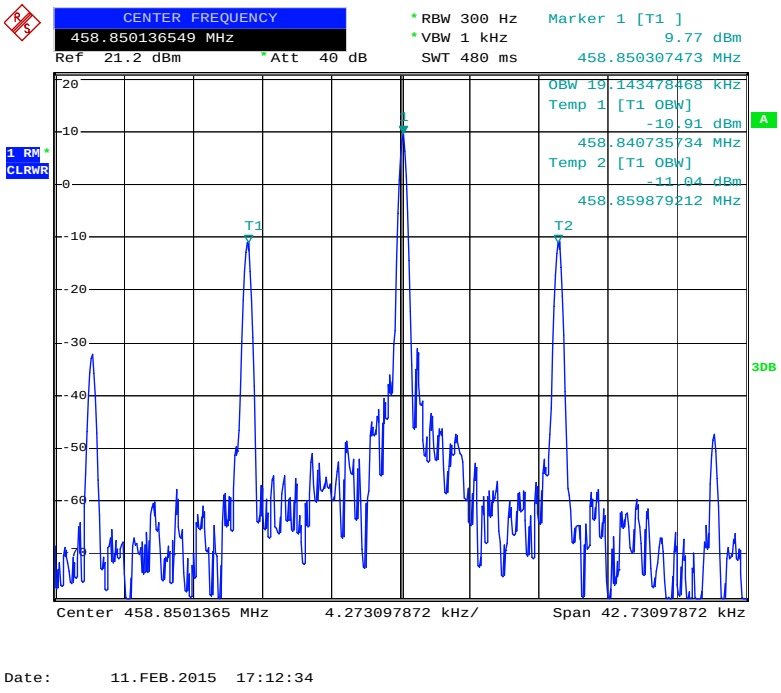
Rules and specifications:	IC RSS-Gen Issue 4, section 6.6
Guide:	IC RSS-Gen Issue 4, section 6.6
Description:	If not specified in the applicable RSS the occupied bandwidth is measuredas the 99% emission bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.
Measurement procedure:	Bandwidth Measurements (6.2)

Comment:	
Date of test:	2015-02-11
Test site:	Fully anechoic room, cabin no. 2

TÜV SÜD Product Service GmbH
Äußere Frühlingstraße 45
94315 Straubing
Germany

Phone: +49 9421 5522-0
Fax: +49 9421 5522-99
Web: www.tuev-sued.de

Occupied Bandwidth (99 %):



Occupied Bandwidth (99 %):	**19.14 kHz**

8.4 Designation of Emissions

Rules and specifications:	CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 4, sections 9
Guide:	ANSI C63.4 / TRC-43

Type of modulation:	Binary Frequency Shift Keying (FSK)

B_n = Necessary Bandwidth	B_n = 3.86D + 0.27B (for 0.03 < 2D/R < 1.0)
D = Peak deviation	D = 3.6 kHz
B = Modulation rate	B = 19.2 kbps
Calculation:	$B_n = 3.86 \cdot (3.6\ kHz) + 0.27 \cdot (19.6\ kHz) = 19.08\ kHz$

Designation of Emissions:	**19K1F1D**

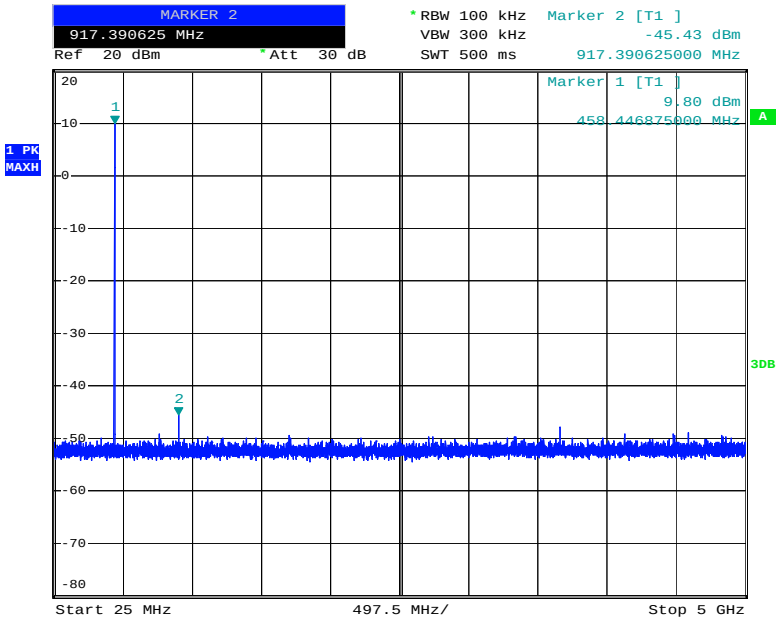
8.5 Conducted Emission Measurement 25 MHz to 5 GHz

Rules and specifications:	CFR 47, Part 90, section 90.205 CFR 47, Part 2, section 2.1051 IC RSS-119 Issue 11, section 5.10
Guide:	ANSI C63.4
Limit:	For equipment designed to operate with a 25 kHz channel bandwidth the sum of the bandwidth occupied by by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
Measurement procedures:	Antenna Power Conduction Emission (6.1)

Comment:	
Date of test:	2014-09-04
Test site:	Unshielded room

Test Result:	Test passed

Conducted emissions:



Date: 4.SEP.2014 13:29:31

8.6 Radiated Emission Measurement 25 MHz to 5 GHz

Rules and specifications:	CFR 47, Part 90, sections 90.210 and 90.217 CFR 47, Part 2, section 2.1053 IC RSS-119, Issue 11, sections 5.8 and 5.10
Guide:	ANSI C63.4 TIA/EIA-603
Limit:	For equipment designed to operate with a 25 kHz channel bandwidth the sum of the bandwidth occupied by by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.3)

Comment: Date of test: Test site:	All radiated power emission values are calculated to e.i.r.p. values. 2014-08-27 Fully anechoic room, cabin no. 2
Test distance:	3 meters

Test Result:	Test passed

Test Result:	Test passed

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBm)	Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
458.850	vertical	Peak	-24.2	31.1	6.9	20.8	**13.9**
874.333	horizontal	Peak	-105.4	38.6	-66.8	-23.1	43.7
2756.000	horizontal	Peak	-93.8	51.2	-42.6	-23.1	19.6
3212.000	vertical	Peak	-94.6	53.9	-40.7	-23.1	17.7

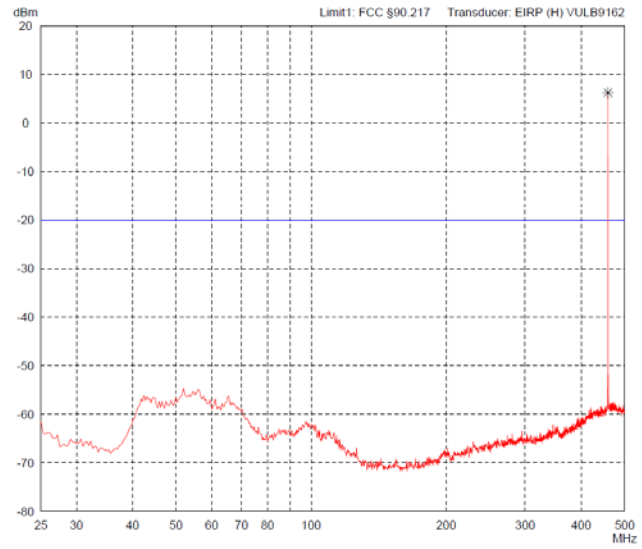
All other emissions show more than 10 dB margin to the limit.

Sample calculation of final values:

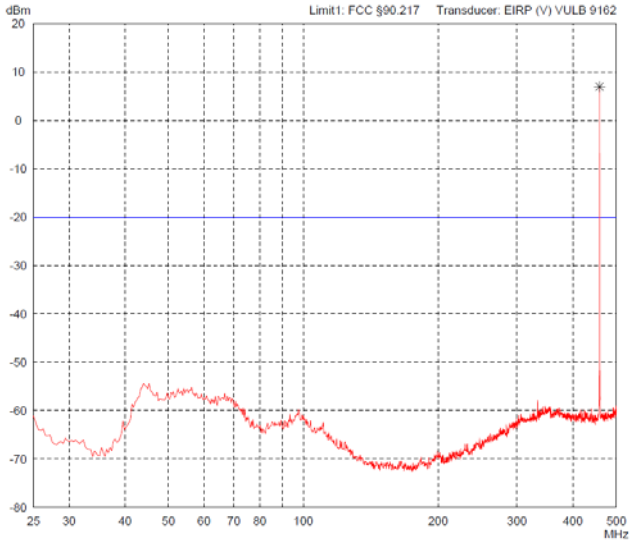
Final Value (dBm) = Reading Value (dBm) + Correction Factor (dB)

Plots of measurements:

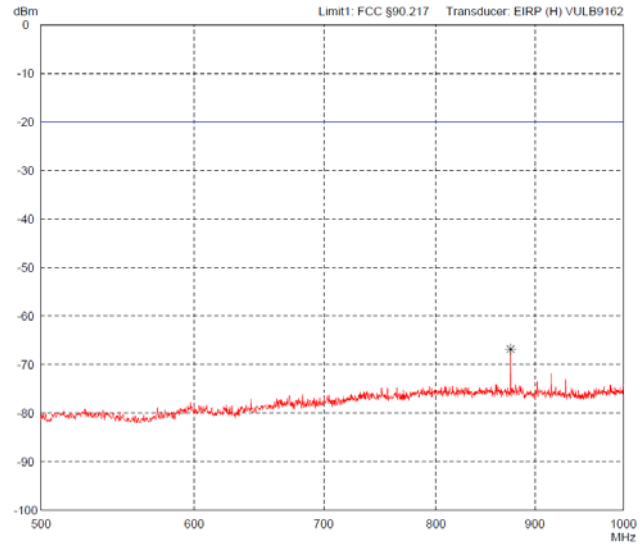
Horizontal Polarisation

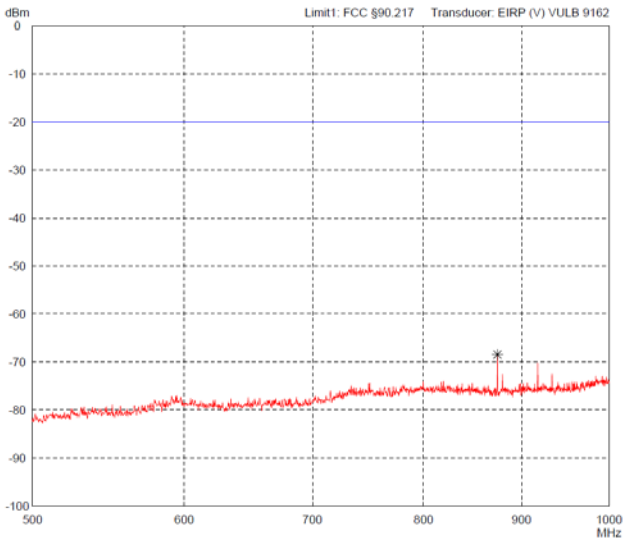


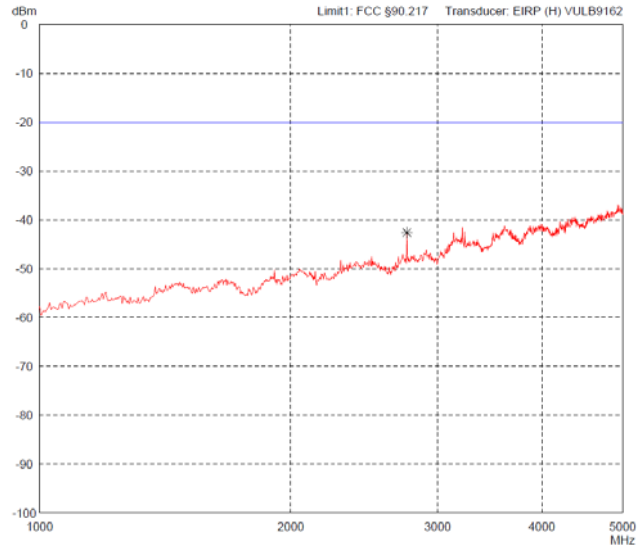
Vertical Polarisation

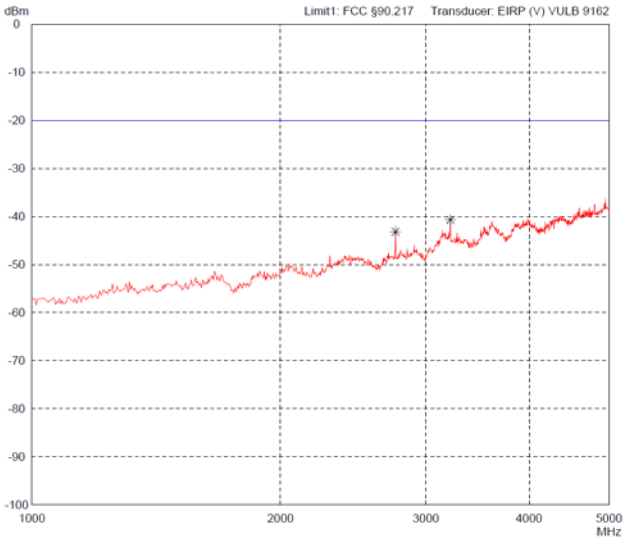


Horizontal Polarisation	Vertical Polarisation







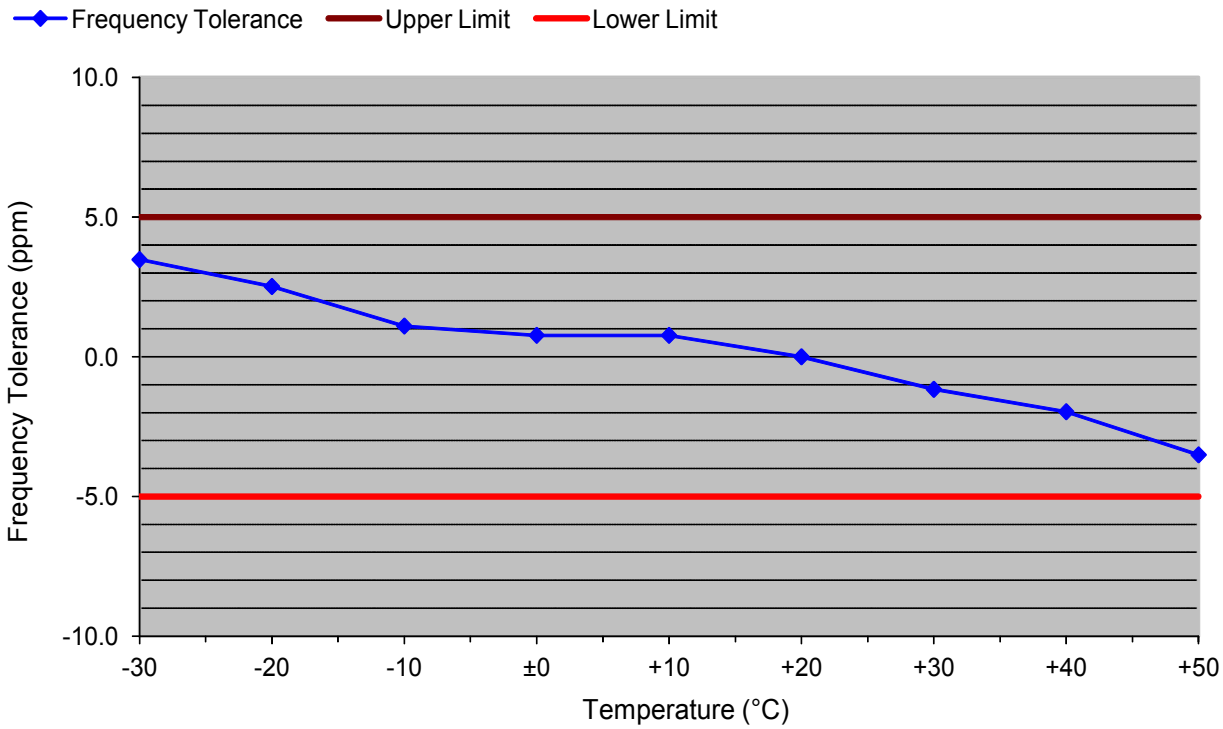


8.7 Carrier Frequency Stability

Rules and specifications:	CFR 47 Part 90, sections 90.213 and 90.217 CFR 47 Part 2, section 2.1055 IC RSS-Gen Issue 4, section 4.7 IC RSS-119 Issue 11, sections 5.3, 5.10 and 5.11
Guide:	ANSI C63.4
Limit:	The frequency tolerance of the carrier signal shall be maintained within (±5 ppm) of the carrier frequency under nominal conditions.
Temperature range: Voltage range:	-30°C to +50°C (at normal supply voltage) 85% to 115% of the rated supply voltage (at a temperature of +20°C)
Measurement procedure:	Carrier Frequency Stability (6.5)

Comment:	
Date of test:	2014-08-28

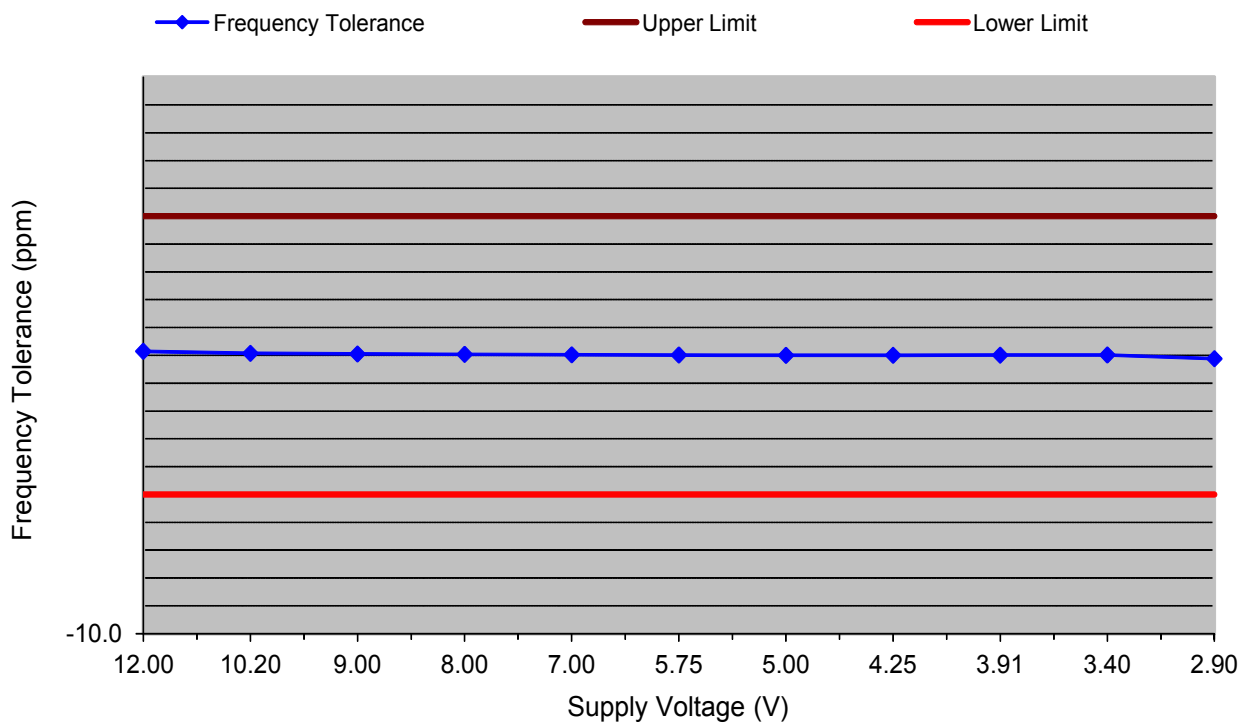
8.7.1 Carrier Frequency Stability vs. Temperature



Supply voltage: 5 V Nominal frequency: 458.847436 MHz

Temperature (°C)	Frequency (MHz)	Frequency Tolerance (Hz)	Frequency Tolerance (ppm)	Upper Limit (ppm)	Lower Limit (ppm)	Margin (ppm)
-30	458.849033	1597	3.5	+5.0	-5.0	1.5
-20	458.848591	1155	2.5	+5.0	-5.0	2.5
-10	458.847941	505	1.1	+5.0	-5.0	3.9
±0	458.847789	353	0.8	+5.0	-5.0	4.2
+10	458.847789	353	0.8	+5.0	-5.0	4.2
+20	458.847436	0	0.0	+5.0	-5.0	5.0
+30	458.846902	-534	-1.2	+5.0	-5.0	3.8
+40	458.846534	-902	-2.0	+5.0	-5.0	3.0
+50	458.845826	-1610	-3.5	+5.0	-5.0	**1.5**

8.7.2 Carrier Frequency Stability vs. Supply Voltage



Temperature: +20 °C
Nominal frequency: 458.847128 MHz
Battery End Point: 2.80 V

Supply Voltage (V)	Frequency (MHz)	Frequency Tolerance (Hz)	Frequency Tolerance (ppm)	Upper Limit (ppm)	Lower Limit (ppm)	Margin (ppm)
12.00	458.847195	67	0.1	+5.0	-5.0	**4.9**
10.20	458.847161	33	0.1	+5.0	-5.0	4.9
9.00	458.847151	23	0.1	+5.0	-5.0	4.9
8.00	458.847144	16	0.0	+5.0	-5.0	5.0
7.00	458.847137	9	0.0	+5.0	-5.0	5.0
5.75	458.847133	5	0.0	+5.0	-5.0	5.0
5.00	458.847128	0	0.0	+5.0	-5.0	5.0
4.25	458.847130	2	0.0	+5.0	-5.0	5.0
3.91	458.847131	3	0.0	+5.0	-5.0	5.0
3.40	458.847135	7	0.0	+5.0	-5.0	5.0
2.90	458.847073	-55	-0.1	+5.0	-5.0	4.9

8.8 RF exposure requirement

Rules and specifications:	CFR 47 Part 1, section 1.1307(b)(1) CFR 47 Part 2, section 2.1093
Guide:	OET Bulletin 65, Edition 97-01
Limits:	Limits for general population / uncontrolled exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time (minutes)
0.3 - 1.34	614	1.63	(100)*	30
1.34 - 30	824 / f	2.19 / f	(180 / f²)*	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	---	---	f/1500	30
1500 - 100000	---	---	1.0	30

f = frequency in MHz
* Plane-wave equivalent power density

RF exposure			Declared by applicant	Measured
Prediction [6]:	S	= P G / 4 π R²		
Where:	S	= Power density		
	P	= Power input of antenna		
	G	= Power gain of the antenna relativ to an isotropic radiator		
	R	= Distance to the center of radiation of the antenna		
Maximum output power:	P	= 10.2 dBm =10.5 mW		☒
Antenna gain:	G	= 1.64	☒	
Prediction distance:	R	= 20 cm		
Power density at 20 cm:	**S**	**= 3.43 µW/cm²**		
Limit	**S_{lim}**	**= 305.9 µW/cm²**		

Test Result:	Test passed

[6] MPE Prediction of MPE according to equation from page 19 of OET Bulletin 65, Ed. 97-01

8.9 Exposure of Humans to RF Fields

Rules and specifications:	IC RSS-Gen Issue 4, section 3.2
Guide:	IC RSS-102 Issue 4, section 2.5

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☒ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP = **10.2 dBm = 10.5 mW**			☒	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☒ the numerical antenna gain: G = **1.64**; $EIRP = G \cdot CP \Rightarrow EIRP$ = **17.2 mW**		☒		
☒ Radiated measurement in dBm: EIRP = **6.9 dBm**; $EIRP$ = **4.9 mW**			☒	
with: Distance between the antennas in m: D = **3 m**			☒	
☐ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ =				
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = **17.2 mW**				

Exposure of Humans to RF Fields (continued)	Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is				
☐ less than or equal to 20 cm ☒ greater than 20 cm		☒		
Transmitting device is				
☐ in the vicinity of the human head ☐ body-worn		☐		
SAR evaluation				
SAR evaluation is required if the separation distance between the user and the device is less than or equal to 20 cm.				
☐ The device operates from 3 kHz up to 1 GHz inclusively and its source-based time-averaged output power is less than, or equal to 200 mW for General Public Use and 1000 mW for Controlled Use.				☐
☐ The device operates above 1 GHz up to 2.2 GHz inclusively and its source-based time-averaged output power is less than, or equal to 100 mW for General Public Use and 500 mW for Controlled Use.				☐
☐ The device operates above 2.2 GHz up to 3 GHz inclusively and its source-based time-averaged output power is less than, or equal to 20 mW for General Public Use and 100 mW for Controlled Use.				☐
☐ The device operates above 3 GHz up to 6 GHz inclusively and its source-based time-averaged output power) is less than, or equal to 10 mW for General Public Use and 50 mW for Controlled Use.				☐
☐ SAR evaluation is documented in test report no.				
RF exposure evaluation				
RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm.				
☒ The device operates below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W.				☒
☐ The device operates at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.				☐
☐ RF exposure evaluation is documented in test report no.				

9 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 1, 2014
☐	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	October 1, 2014
☒	CFR 47 Part 90	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	October 1, 2014
☒	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 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
☐	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 9 kHz to 40 GHz	June 7, 2009 (published on September 15, 2009)
☒	RSS-Gen	Radio Standards Specification RSS-Gen Issue 4 containing General Requirements for Compilance of Radio Apparatus, published by Industry Canada	November 2014
☒	RSS-119	radio Standards Specification RSS-119 Issue 2 for Radio Transmitters and Redeivers Operating in the Land Mobile and Fixed Services in the Frequency Range 27.41 – 960 MHz	June 2011
☐	RSS-210	Radio Standards Specification RSS-210 Issue 8 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	December 2010
☐	RSS-310	Radio Standards Specification RSS-310 Issue 3 for Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	December 2010
☒	RSS-102	Radio Standards Specification RSS-102 Issue 4: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), published by Industry Canada	March 2010, footnote 13 updated December 2010

☐	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 5 (Information Technology Equipment (ITE) - Limits and methods of measurement), published by Industry Canada	August 2012
☒	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, “Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement”	1997
☐	CAN/CSA CISPR 22-10	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (Adopted IEC CISPR 22:2008, sixth edition, 2008-09)	2010
☒	TIA/EIA-603 Revision C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	August 17, 2004
☒	TRC-43	Designation of Emissions, Class of Station and Nature of Service, published by Industry Canada	November 2012

10 Test Equipment List with Calibration Data

Type	*Inv.-No.*	*Type Designation*	*Serial Number*	*Manufacturer*	*Calibration Organization*	*Last Calibration*	*Next Calibration*
EMI test receiver	R&S	ESHS10	862970/001	Rohde & Schwarz	Rohde & Schwarz	10/2013	10/2014
EMI test receiver	1711	ESPI7	836914/0002	Rohde & Schwarz	Rohde & Schwarz	11/2012	11/2014
EMI test receiver	R&S	ESU26	100504	Rohde & Schwarz	Rohde & Schwarz	07/2013	01/2015
Spectrum analyser	1666	FSP30	100063	Rohde & Schwarz	Rohde & Schwarz	05/2014	11/2015
Preamplifier	1684	AFS3-00100800-32-LN	847743	MITEQ	TÜV SÜD PS-EMC-STR	10/2013	04/2015
Preamplifier	1716	CPA9231A	3557	Schaffner EMC Systems	TÜV SÜD PS-EMC-STR	04/2014	04/2016
Preamplifier	*2076*	*AFS3-00100800-32-LN*	1344017	MITEQ			
Detector negative	*1581*	*8473D*	01492	Hewlett Packard		see note 3	
V-network	1059	ESH3-Z5	894785/005	Rohde & Schwarz	Rohde & Schwarz	08/2013	08/2015
Double ridged waveguide horn antenna	1516	3115	9508-4553	EMCO Elektronik	Seibersdorf Laboratories	11/2012	11/2014
TRILOG Broadband Antenna	2058	VULB 9163	9163-408	Schwarzbeck	Rohde & Schwarz	06/2014	12/2015
TRILOG Broadband Antenna	2256	VULB 9162	9162-048	Schwarzbeck	Schwarzbeck	09/2013	03/2015
Multimeter	1653	21 III	76530546	Fluke	ZMK	11/2012	11/2014
Temperature test chamber	*1271*	*HT 4010*	07065550	Heraeus	TÜV SÜD PS-EMC-STR	06/2013	06/2015

Note 1: No calibration required.
Note 2: Not calibrated separately but with the whole test system when recording calibration data.
Note 3: No calibration required. Devices are checked before use.
Note 4: No calibration required. Devices are checked by calibrated equipment during test.

11 Test Site Calibration

Test site:	Fully anechoic room, cabin No. 2
Date of test:	2014-03-20
Operator:	M. Steindl
Transmitter antenna:	25 MHz – 1.5 GHz: Trilog antenna Schwarzbeck VULB 9162, inv. No. 1802 1.5 GHz – 6 GHz: Horn antenna EMCO 3115, inv. No. 1516
Signal source:	R&S SMB100A, inv. No. 2027
Receiving antenna:	Trilog antenna Schwarzbeck VULB 9162, inv. No. 2256
Test receiver:	R&S FSP 30, inv. No. 1666
Comment:	

11.1 Horizontal polarisation

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
25	9.68	-16.34	-6.66	-36.47	29.81
28	9.63	-13.38	-3.75	-30.71	26.96
30	9.56	-12.30	-2.74	-30.04	27.30
32	9.56	-11.84	-2.28	-29.01	26.73
34	9.58	-11.74	-2.16	-27.92	25.76
36	9.55	-11.72	-2.17	-27.67	25.50
38	9.58	-11.69	-2.11	-28.69	26.58
40	9.55	-11.63	-2.08	-33.86	31.78
42	9.56	-11.50	-1.94	-38.56	36.62
44	9.57	-11.30	-1.73	-37.83	36.10
46	9.52	-11.01	-1.49	-36.20	34.71
48	9.52	-10.65	-1.13	-35.98	34.84
50	9.52	-10.17	-0.65	-36.51	35.86
52	9.48	-9.52	-0.04	-36.87	36.83
54	9.51	-8.77	0.74	-36.75	37.49
56	9.53	-9.28	0.25	-37.15	37.40
58	9.56	-8.89	0.67	-35.55	36.22
60	9.52	-7.66	1.86	-32.96	34.83
62	9.53	-6.55	2.98	-31.35	34.32
64	9.52	-5.38	4.14	-30.72	34.86
66	9.46	-4.22	5.24	-29.98	35.22
68	9.45	-3.01	6.44	-28.28	34.72
70	9.44	-1.82	7.62	-25.81	33.42
72	9.43	-0.80	8.63	-23.02	31.66
74	9.39	-0.16	9.23	-20.97	30.20
76	9.41	0.27	9.68	-19.57	29.25
78	9.42	0.32	9.74	-18.65	28.38
80	9.42	0.08	9.50	-18.59	28.08
82	9.40	-0.45	8.95	-19.36	28.31
84	9.38	-0.82	8.56	-20.45	29.01
86	9.30	-1.20	8.10	-21.26	29.36
88	9.28	-1.50	7.78	-21.59	29.37
90	9.27	-1.74	7.53	-21.32	28.85
92	9.28	-1.91	7.37	-21.53	28.90
94	9.30	-2.10	7.20	-22.52	29.71
96	9.32	-2.16	7.16	-23.43	30.58
98	9.33	-2.22	7.11	-23.73	30.84
100	9.34	-2.20	7.14	-23.35	30.49
105	9.26	-1.84	7.42	-20.61	28.02
110	9.20	-1.19	8.01	-20.80	28.81

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
115	9.20	-0.13	9.07	-17.46	26.53
120	9.26	1.15	10.41	-14.82	25.23
125	9.23	2.27	11.50	-13.07	24.57
130	9.19	3.05	12.24	-10.66	22.90
135	9.20	3.45	12.65	-9.77	22.42
140	9.27	4.45	13.72	-8.67	22.39
145	9.25	4.98	14.23	-7.92	22.16
150	9.17	5.37	14.54	-7.46	22.00
155	9.18	5.53	14.71	-7.78	22.49
160	9.22	5.49	14.71	-6.98	21.68
165	9.20	5.69	14.89	-7.54	22.43
170	9.11	5.90	15.01	-7.13	22.14
175	9.02	5.89	14.91	-7.12	22.03
180	9.08	5.86	14.94	-7.59	22.53
185	9.15	5.65	14.80	-8.49	23.28
190	9.12	4.99	14.11	-8.78	22.90
195	9.05	5.06	14.11	-10.00	24.11
200	9.00	5.67	14.67	-10.48	25.15
205	9.03	5.98	15.01	-8.93	23.94
210	8.99	6.16	15.15	-9.33	24.49
215	8.98	6.18	15.16	-9.59	24.75
220	8.99	6.11	15.10	-10.11	25.21
225	8.94	5.90	14.84	-10.34	25.18
230	8.91	5.84	14.75	-11.42	26.17
235	8.89	5.86	14.75	-10.84	25.59
240	8.93	5.84	14.77	-11.21	25.98
245	8.91	5.90	14.81	-11.61	26.42
250	8.90	6.07	14.97	-10.91	25.88
255	8.89	6.22	15.11	-11.44	26.55
260	8.93	6.48	15.41	-11.35	26.76
265	8.89	6.67	15.56	-11.27	26.84
270	8.84	6.72	15.56	-11.09	26.65
275	8.84	6.73	15.57	-11.57	27.14
280	8.89	6.65	15.54	-11.73	27.26
285	8.86	6.57	15.43	-11.37	26.80
290	8.78	6.66	15.44	-12.28	27.71
295	8.81	6.81	15.62	-11.97	27.59
300	8.84	7.00	15.84	-11.44	27.29
305	8.89	7.04	15.93	-11.83	27.76
310	8.83	7.09	15.92	-11.52	27.44
315	8.79	7.06	15.85	-11.50	27.35
320	8.79	7.00	15.79	-11.70	27.49
325	8.83	6.97	15.80	-11.92	27.71
330	8.78	6.99	15.77	-12.00	27.77

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
335	8.75	6.92	15.67	-12.38	28.05
340	8.80	6.84	15.64	-13.11	28.74
345	8.77	6.72	15.49	-13.04	28.54
350	8.71	6.72	15.43	-13.64	29.06
355	8.66	6.89	15.55	-13.69	29.23
360	8.70	7.08	15.78	-12.10	27.88
365	8.70	6.95	15.65	-12.81	28.46
370	8.69	7.18	15.87	-13.25	29.12
375	8.68	7.31	15.99	-13.03	29.02
380	8.62	7.37	15.99	-13.40	29.39
385	8.58	7.38	15.96	-13.78	29.74
390	8.54	7.39	15.93	-14.10	30.04
395	8.60	7.37	15.97	-14.22	30.20
400	8.63	7.35	15.98	-14.73	30.71
405	8.59	7.32	15.91	-14.92	30.84
410	8.59	7.37	15.96	-15.41	31.37
415	8.64	7.41	16.05	-15.99	32.04
420	8.65	7.40	16.05	-15.91	31.97
425	8.59	7.44	16.03	-16.41	32.44
430	8.58	7.42	16.00	-16.90	32.90
435	8.61	7.48	16.09	-16.48	32.57
440	8.59	7.61	16.20	-16.75	32.95
445	8.53	7.76	16.29	-16.89	33.18
450	8.53	7.93	16.46	-16.60	33.07
455	8.63	8.06	16.69	-16.93	33.62
460	8.61	8.07	16.68	-17.16	33.84
465	8.55	8.00	16.55	-17.52	34.07
470	8.53	8.00	16.53	-17.44	33.96
475	8.52	7.96	16.48	-17.54	34.02
480	8.44	7.91	16.35	-17.49	33.85
485	8.43	7.91	16.34	-17.18	33.52
490	8.50	7.90	16.40	-17.09	33.49
495	8.57	7.95	16.52	-16.98	33.50
500	8.57	7.97	16.54	-16.98	33.52
505	8.46	7.99	16.45	-16.65	33.10
510	8.45	7.98	16.43	-17.43	33.86
515	8.51	7.94	16.45	-17.16	33.60
520	8.50	7.90	16.40	-16.98	33.38
525	8.38	7.86	16.24	-17.64	33.88
530	8.39	7.88	16.27	-17.32	33.59
535	8.45	8.00	16.45	-17.07	33.52
540	8.43	8.14	16.57	-17.29	33.86
545	8.33	8.21	16.54	-17.04	33.57
550	8.33	8.23	16.56	-16.77	33.32

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
555	8.38	8.25	16.63	-16.94	33.57
560	8.34	8.25	16.59	-16.67	33.26
565	8.29	8.22	16.51	-16.94	33.45
570	8.35	8.14	16.49	-17.02	33.51
575	8.42	7.96	16.38	-17.50	33.87
580	8.36	7.80	16.16	-17.98	34.14
585	8.27	7.69	15.96	-17.86	33.82
590	8.31	7.76	16.07	-18.54	34.61
595	8.37	7.82	16.19	-18.67	34.86
600	8.34	7.82	16.16	-18.27	34.42
605	8.23	7.74	15.97	-18.84	34.81
610	8.24	7.64	15.88	-18.92	34.80
615	8.31	7.65	15.96	-18.16	34.12
620	8.27	7.78	16.05	-18.53	34.59
625	8.21	7.91	16.12	-18.46	34.58
630	8.26	7.92	16.18	-17.79	33.97
635	8.30	7.95	16.25	-18.40	34.65
640	8.18	8.04	16.22	-18.66	34.88
645	8.16	8.10	16.26	-18.37	34.63
650	8.25	8.09	16.34	-19.00	35.34
655	8.25	8.16	16.41	-19.23	35.64
660	8.12	8.28	16.40	-19.11	35.51
665	8.14	8.32	16.46	-19.61	36.06
670	8.19	8.35	16.54	-19.60	36.14
675	8.26	8.33	16.59	-19.47	36.06
680	8.19	8.33	16.52	-19.74	36.26
685	8.18	8.37	16.55	-19.72	36.27
690	8.19	8.48	16.67	-19.55	36.22
695	8.24	8.58	16.82	-19.36	36.18
700	8.19	8.58	16.77	-19.70	36.46
705	8.24	8.53	16.77	-19.66	36.43
710	8.32	8.49	16.81	-19.47	36.28
715	8.29	8.45	16.74	-19.58	36.31
720	8.21	8.36	16.57	-20.12	36.69
725	8.18	8.23	16.41	-20.33	36.75
730	8.26	8.09	16.35	-20.46	36.81
735	8.21	8.01	16.22	-21.13	37.35
740	8.14	7.92	16.06	-21.18	37.23
745	8.16	7.88	16.04	-21.35	37.40
750	8.14	7.94	16.08	-21.77	37.85
755	8.14	7.97	16.11	-21.37	37.47
760	8.09	8.02	16.11	-21.61	37.72
765	8.15	8.07	16.22	-21.89	38.11
770	8.16	8.16	16.32	-21.45	37.77

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading “dBm” [dB]
775	8.04	8.20	16.24	-21.44	37.69
780	7.97	8.31	16.28	-22.18	38.46
785	7.96	8.41	16.37	-21.81	38.18
790	7.96	8.52	16.48	-21.50	37.98
795	7.92	8.56	16.48	-21.85	38.33
800	7.98	8.57	16.55	-21.78	38.33
805	8.04	8.53	16.57	-21.89	38.46
810	8.00	8.56	16.56	-22.01	38.58
815	7.94	8.66	16.60	-21.88	38.48
820	7.99	8.75	16.74	-21.86	38.59
825	8.02	8.65	16.67	-22.08	38.75
830	7.96	8.56	16.52	-22.00	38.52
835	7.92	8.50	16.42	-21.99	38.41
840	7.88	8.49	16.37	-22.15	38.52
845	7.91	8.51	16.42	-22.25	38.67
850	7.83	8.46	16.29	-22.22	38.51
855	7.79	8.41	16.20	-22.32	38.52
860	7.81	8.38	16.19	-22.55	38.73
865	7.81	8.37	16.18	-22.66	38.84
870	7.79	8.38	16.17	-22.40	38.57
875	7.79	8.40	16.19	-22.37	38.56
880	7.86	8.36	16.22	-22.84	39.06
885	7.90	8.29	16.19	-22.39	38.58
890	7.88	8.26	16.14	-22.28	38.42
895	7.87	8.27	16.14	-22.38	38.52
900	7.89	8.32	16.21	-22.13	38.34
905	7.90	8.35	16.25	-22.17	38.43
910	7.83	8.33	16.16	-22.34	38.50
915	7.86	8.33	16.19	-22.01	38.20
920	7.88	8.33	16.21	-22.16	38.37
925	7.81	8.38	16.19	-22.41	38.60
930	7.80	8.43	16.23	-22.03	38.26
935	7.82	8.50	16.32	-21.98	38.29
940	7.88	8.59	16.47	-22.35	38.82
945	7.81	8.66	16.47	-22.22	38.69
950	7.76	8.70	16.46	-21.86	38.32
955	7.77	8.71	16.48	-22.27	38.75
960	7.77	8.73	16.50	-22.23	38.73
965	7.73	8.74	16.47	-22.32	38.79
970	7.72	8.77	16.49	-22.29	38.78
975	7.81	8.76	16.57	-22.33	38.90
980	7.83	8.75	16.58	-22.35	38.92
985	7.76	8.73	16.49	-22.51	38.99
990	7.71	8.74	16.45	-22.43	38.88

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
995	7.80	8.74	16.54	-22.47	39.00
1000	7.84	8.74	16.58	-22.68	39.26
1050	7.59	8.07	15.66	-25.09	40.75
1100	7.76	8.04	15.80	-25.60	41.40
1150	7.68	8.60	16.28	-25.38	41.67
1200	7.54	8.69	16.23	-26.33	42.56
1250	7.61	8.55	16.16	-26.03	42.20
1300	7.53	8.21	15.74	-25.95	41.70
1350	7.63	8.88	16.51	-25.49	42.00
1400	7.48	9.12	16.60	-27.87	44.47
1450	7.49	8.85	16.34	-28.55	44.89
1500	8.14	1.87	10.01	-25.29	35.31
1550	8.14	1.87	10.01	-25.95	35.96
1600	8.09	2.18	10.27	-27.02	37.29
1650	8.15	2.18	10.33	-26.15	36.47
1700	8.16	2.53	10.69	-25.04	35.73
1750	8.04	2.53	10.57	-25.97	36.54
1800	7.97	2.78	10.75	-26.93	37.68
1850	7.96	2.78	10.74	-26.11	36.85
1900	7.96	3.09	11.06	-25.18	36.24
1950	7.92	3.09	11.01	-26.19	37.20
2000	7.98	3.44	11.42	-26.99	38.41
2050	8.04	3.44	11.49	-26.27	37.76
2100	8.00	3.82	11.82	-25.41	37.24
2150	7.94	3.82	11.76	-26.44	38.21
2200	7.99	3.82	11.81	-26.93	38.74
2250	8.02	4.15	12.17	-25.99	38.16
2300	7.96	4.15	12.11	-25.42	37.53
2350	7.92	4.35	12.27	-26.41	38.69
2400	7.88	4.48	12.35	-26.81	39.16
2450	7.91	4.48	12.38	-25.89	38.27
2500	7.83	4.63	12.46	-25.45	37.91
2550	7.79	4.63	12.41	-26.50	38.92
2600	7.81	4.76	12.57	-26.74	39.31
2650	7.81	4.76	12.57	-25.82	38.39
2700	7.79	4.84	12.63	-25.51	38.14
2750	7.79	4.84	12.63	-26.08	38.71
2800	7.86	4.96	12.82	-26.23	39.05
2850	7.90	4.96	12.86	-25.19	38.04
2900	7.88	5.07	12.95	-24.84	37.79
2950	7.87	5.07	12.94	-25.27	38.21
3000	7.89	5.01	12.90	-25.28	38.18
3050	7.90	5.01	12.92	-24.63	37.55
3100	7.83	4.99	12.82	-24.48	37.30

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
3150	7.86	4.99	12.85	-25.13	37.98
3200	7.88	5.07	12.94	-25.35	38.29
3250	7.81	5.07	12.88	-24.75	37.62
3300	7.80	5.16	12.96	-24.69	37.65
3350	7.82	5.16	12.98	-25.46	38.44
3400	7.88	5.16	13.04	-25.79	38.83
3450	7.81	5.30	13.11	-25.48	38.58
3500	7.76	5.30	13.06	-25.25	38.31
3550	7.77	5.38	13.16	-25.94	39.10
3600	7.77	5.50	13.27	-26.03	39.30
3650	7.73	5.50	13.23	-25.71	38.94
3700	7.72	5.56	13.27	-25.38	38.65
3750	7.81	5.56	13.36	-25.85	39.22
3800	7.83	5.64	13.47	-25.88	39.35
3850	7.76	5.64	13.40	-25.42	38.83
3900	7.71	5.82	13.53	-25.21	38.74
3950	7.80	5.82	13.62	-25.51	39.13
4000	7.84	5.95	13.79	-25.50	39.29
4050	7.59	6.16	13.76	-25.00	38.76
4100	7.76	6.00	13.76	-25.93	39.70
4150	7.68	6.00	13.68	-26.10	39.78
4200	7.54	6.32	13.87	-28.19	42.06
4250	7.61	6.64	14.25	-28.93	43.18
4300	7.53	6.91	14.44	-27.98	42.42
4350	7.63	7.26	14.89	-26.18	41.07
4400	7.48	7.26	14.74	-26.17	40.91
4450	7.49	7.85	15.34	-27.86	43.20
4500	7.38	8.07	15.45	-29.37	44.82
4550	7.39	8.29	15.68	-28.58	44.26
4600	7.33	8.61	15.94	-28.60	44.54
4650	7.33	8.61	15.94	-30.05	45.99
4700	7.37	8.87	16.24	-29.44	45.69
4750	7.22	8.33	15.55	-28.61	44.15
4800	7.24	8.85	16.08	-28.08	44.17
4850	7.09	8.63	15.73	-29.94	45.66
4900	7.08	8.63	15.71	-30.98	46.69
4950	7.12	8.47	15.59	-30.83	46.42
5000	7.03	8.41	15.44	-31.73	47.17
5050	7.11	8.62	15.72	-32.99	48.72
5100	6.98	8.95	15.93	-31.53	47.46
5150	6.94	9.29	16.22	-30.39	46.62
5200	6.83	9.58	16.40	-30.64	47.05
5250	6.73	9.70	16.43	-30.83	47.27
5300	6.79	9.70	16.50	-31.99	48.49

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading “dBm” [dB]
5350	6.73	9.51	16.25	-33.30	49.55
5400	6.73	9.54	16.28	-33.74	50.02
5450	6.68	9.77	16.45	-33.40	49.86
5500	6.61	9.72	16.33	-33.82	50.15
5550	6.60	9.72	16.32	-33.36	49.68
5600	6.59	9.71	16.30	-32.65	48.95
5650	6.57	9.76	16.33	-32.86	49.19
5700	6.55	9.84	16.38	-34.19	50.57
5750	6.50	10.05	16.55	-34.66	51.20
5800	6.46	10.05	16.51	-34.69	51.19
5850	6.41	10.26	16.67	-34.51	51.18
5900	6.45	10.21	16.65	-35.15	51.80
5950	6.45	9.95	16.40	-35.32	51.72
6000	6.38	9.67	16.06	-34.23	50.29

11.2 Vertical polarisation

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
25	9.68	-16.34	-6.66	-37.84	31.18
28	9.63	-13.38	-3.75	-29.99	26.24
30	9.56	-12.30	-2.74	-29.39	26.65
32	9.56	-11.84	-2.28	-28.40	26.12
34	9.58	-11.74	-2.16	-26.37	24.21
36	9.55	-11.72	-2.17	-26.20	24.03
38	9.58	-11.69	-2.11	-28.11	26.00
40	9.55	-11.63	-2.08	-30.91	28.83
42	9.56	-11.50	-1.94	-36.03	34.09
44	9.57	-11.30	-1.73	-40.47	38.74
46	9.52	-11.01	-1.49	-38.24	36.76
48	9.52	-10.65	-1.13	-36.49	35.36
50	9.52	-10.17	-0.65	-36.53	35.88
52	9.48	-9.52	-0.04	-36.56	36.52
54	9.51	-8.77	0.74	-36.36	37.10
56	9.53	-9.28	0.25	-36.76	37.01
58	9.56	-8.89	0.67	-35.65	36.32
60	9.52	-7.66	1.86	-33.59	35.45
62	9.53	-6.55	2.98	-31.73	34.71
64	9.52	-5.38	4.14	-30.87	35.01
66	9.46	-4.22	5.24	-30.42	35.66
68	9.45	-3.01	6.44	-29.30	35.74
70	9.44	-1.82	7.62	-27.17	34.78
72	9.43	-0.80	8.63	-24.80	33.43
74	9.39	-0.16	9.23	-22.74	31.97
76	9.41	0.27	9.68	-20.97	30.65
78	9.42	0.32	9.74	-19.81	29.54
80	9.42	0.08	9.50	-19.55	29.05
82	9.40	-0.45	8.95	-20.01	28.96
84	9.38	-0.82	8.56	-21.18	29.73
86	9.30	-1.20	8.10	-22.14	30.24
88	9.28	-1.50	7.78	-22.68	30.45
90	9.27	-1.74	7.53	-22.40	29.92
92	9.28	-1.91	7.37	-22.65	30.02
94	9.30	-2.10	7.20	-23.64	30.84
96	9.32	-2.16	7.16	-24.48	31.64
98	9.33	-2.22	7.11	-24.66	31.77
100	9.34	-2.20	7.14	-24.13	31.27
105	9.26	-1.84	7.42	-21.17	28.58
110	9.20	-1.19	8.01	-21.04	29.04

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
115	9.20	-0.13	9.07	-17.69	26.76
120	9.26	1.15	10.41	-15.03	25.44
125	9.23	2.27	11.50	-13.53	25.03
130	9.19	3.05	12.24	-11.01	23.25
135	9.20	3.45	12.65	-9.68	22.33
140	9.27	4.45	13.72	-8.31	22.03
145	9.25	4.98	14.23	-7.34	21.58
150	9.17	5.37	14.54	-6.72	21.26
155	9.18	5.53	14.71	-7.05	21.77
160	9.22	5.49	14.71	-6.18	20.89
165	9.20	5.69	14.89	-6.71	21.60
170	9.11	5.90	15.01	-6.17	21.18
175	9.02	5.89	14.91	-6.15	21.06
180	9.08	5.86	14.94	-6.48	21.42
185	9.15	5.65	14.80	-7.41	22.20
190	9.12	4.99	14.11	-7.60	21.71
195	9.05	5.06	14.11	-8.70	22.82
200	9.00	5.67	14.67	-9.04	23.72
205	9.03	5.98	15.01	-7.39	22.40
210	8.99	6.16	15.15	-7.82	22.97
215	8.98	6.18	15.16	-8.34	23.50
220	8.99	6.11	15.10	-8.80	23.90
225	8.94	5.90	14.84	-9.02	23.87
230	8.91	5.84	14.75	-10.10	24.85
235	8.89	5.86	14.75	-9.64	24.39
240	8.93	5.84	14.77	-10.16	24.94
245	8.91	5.90	14.81	-10.84	25.66
250	8.90	6.07	14.97	-10.53	25.50
255	8.89	6.22	15.11	-11.52	26.62
260	8.93	6.48	15.41	-11.75	27.16
265	8.89	6.67	15.56	-11.68	27.24
270	8.84	6.72	15.56	-11.76	27.32
275	8.84	6.73	15.57	-12.47	28.03
280	8.89	6.65	15.54	-12.94	28.47
285	8.86	6.57	15.43	-12.75	28.18
290	8.78	6.66	15.44	-14.09	29.53
295	8.81	6.81	15.62	-14.30	29.93
300	8.84	7.00	15.84	-14.22	30.06
305	8.89	7.04	15.93	-14.97	30.90
310	8.83	7.09	15.92	-14.89	30.81
315	8.79	7.06	15.85	-15.06	30.91
320	8.79	7.00	15.79	-15.27	31.07
325	8.83	6.97	15.80	-15.61	31.41
330	8.78	6.99	15.77	-15.71	31.49

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
335	8.75	6.92	15.67	-16.12	31.79
340	8.80	6.84	15.64	-16.83	32.46
345	8.77	6.72	15.49	-16.75	32.25
350	8.71	6.72	15.43	-17.28	32.70
355	8.66	6.89	15.55	-17.01	32.56
360	8.70	7.08	15.78	-15.85	31.63
365	8.70	6.95	15.65	-16.50	32.15
370	8.69	7.18	15.87	-16.57	32.44
375	8.68	7.31	15.99	-15.80	31.79
380	8.62	7.37	15.99	-15.64	31.63
385	8.58	7.38	15.96	-15.48	31.44
390	8.54	7.39	15.93	-15.37	31.31
395	8.60	7.37	15.97	-15.07	31.04
400	8.63	7.35	15.98	-15.16	31.14
405	8.59	7.32	15.91	-14.89	30.81
410	8.59	7.37	15.96	-14.96	30.92
415	8.64	7.41	16.05	-15.17	31.22
420	8.65	7.40	16.05	-14.78	30.83
425	8.59	7.44	16.03	-15.01	31.04
430	8.58	7.42	16.00	-15.23	31.23
435	8.61	7.48	16.09	-14.61	30.71
440	8.59	7.61	16.20	-14.73	30.93
445	8.53	7.76	16.29	-14.76	31.05
450	8.53	7.93	16.46	-14.31	30.77
455	8.63	8.06	16.69	-14.44	31.13
460	8.61	8.07	16.68	-14.47	31.15
465	8.55	8.00	16.55	-14.71	31.27
470	8.53	8.00	16.53	-14.69	31.21
475	8.52	7.96	16.48	-14.98	31.46
480	8.44	7.91	16.35	-15.20	31.55
485	8.43	7.91	16.34	-15.18	31.52
490	8.50	7.90	16.40	-15.42	31.82
495	8.57	7.95	16.52	-15.60	32.12
500	8.57	7.97	16.54	-15.81	32.35
505	8.46	7.99	16.45	-15.64	32.09
510	8.45	7.98	16.43	-16.48	32.91
515	8.51	7.94	16.45	-16.28	32.73
520	8.50	7.90	16.40	-16.24	32.64
525	8.38	7.86	16.24	-16.94	33.18
530	8.39	7.88	16.27	-16.76	33.03
535	8.45	8.00	16.45	-16.73	33.19
540	8.43	8.14	16.57	-17.20	33.77
545	8.33	8.21	16.54	-17.16	33.70
550	8.33	8.23	16.56	-17.10	33.65

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
555	8.38	8.25	16.63	-17.50	34.14
560	8.34	8.25	16.59	-17.41	34.01
565	8.29	8.22	16.51	-17.79	34.30
570	8.35	8.14	16.49	-17.95	34.44
575	8.42	7.96	16.38	-18.59	34.97
580	8.36	7.80	16.16	-19.21	35.37
585	8.27	7.69	15.96	-19.14	35.10
590	8.31	7.76	16.07	-19.80	35.87
595	8.37	7.82	16.19	-19.83	36.02
600	8.34	7.82	16.16	-19.17	35.32
605	8.23	7.74	15.97	-19.53	35.50
610	8.24	7.64	15.88	-19.53	35.41
615	8.31	7.65	15.96	-18.81	34.77
620	8.27	7.78	16.05	-19.16	35.22
625	8.21	7.91	16.12	-19.00	35.12
630	8.26	7.92	16.18	-18.33	34.51
635	8.30	7.95	16.25	-18.89	35.14
640	8.18	8.04	16.22	-18.99	35.22
645	8.16	8.10	16.26	-18.42	34.68
650	8.25	8.09	16.34	-18.80	35.14
655	8.25	8.16	16.41	-18.87	35.28
660	8.12	8.28	16.40	-18.63	35.03
665	8.14	8.32	16.46	-19.02	35.48
670	8.19	8.35	16.54	-18.95	35.49
675	8.26	8.33	16.59	-18.80	35.39
680	8.19	8.33	16.52	-19.09	35.61
685	8.18	8.37	16.55	-19.11	35.66
690	8.19	8.48	16.67	-19.00	35.67
695	8.24	8.58	16.82	-18.86	35.68
700	8.19	8.58	16.77	-19.24	36.01
705	8.24	8.53	16.77	-19.31	36.07
710	8.32	8.49	16.81	-19.22	36.03
715	8.29	8.45	16.74	-19.44	36.18
720	8.21	8.36	16.57	-20.04	36.61
725	8.18	8.23	16.41	-20.34	36.76
730	8.26	8.09	16.35	-20.59	36.95
735	8.21	8.01	16.22	-21.36	37.58
740	8.14	7.92	16.06	-21.42	37.48
745	8.16	7.88	16.04	-21.59	37.63
750	8.14	7.94	16.08	-22.02	38.10
755	8.14	7.97	16.11	-21.54	37.64
760	8.09	8.02	16.11	-21.62	37.74
765	8.15	8.07	16.22	-21.81	38.03
770	8.16	8.16	16.32	-21.40	37.72

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading “dBm” [dB]
775	8.04	8.20	16.24	-21.50	37.75
780	7.97	8.31	16.28	-22.26	38.54
785	7.96	8.41	16.37	-21.86	38.22
790	7.96	8.52	16.48	-21.58	38.06
795	7.92	8.56	16.48	-21.98	38.46
800	7.98	8.57	16.55	-21.91	38.46
805	8.04	8.53	16.57	-21.87	38.44
810	8.00	8.56	16.56	-21.88	38.45
815	7.94	8.66	16.60	-21.77	38.37
820	7.99	8.75	16.74	-21.86	38.60
825	8.02	8.65	16.67	-22.13	38.80
830	7.96	8.56	16.52	-21.93	38.45
835	7.92	8.50	16.42	-21.79	38.21
840	7.88	8.49	16.37	-21.94	38.31
845	7.91	8.51	16.42	-22.07	38.49
850	7.83	8.46	16.29	-21.94	38.23
855	7.79	8.41	16.20	-21.78	37.98
860	7.81	8.38	16.19	-21.83	38.01
865	7.81	8.37	16.18	-21.92	38.11
870	7.79	8.38	16.17	-21.69	37.86
875	7.79	8.40	16.19	-21.74	37.93
880	7.86	8.36	16.22	-22.25	38.48
885	7.90	8.29	16.19	-21.95	38.13
890	7.88	8.26	16.14	-21.97	38.12
895	7.87	8.27	16.14	-22.23	38.37
900	7.89	8.32	16.21	-22.18	38.39
905	7.90	8.35	16.25	-22.35	38.60
910	7.83	8.33	16.16	-22.47	38.63
915	7.86	8.33	16.19	-22.12	38.31
920	7.88	8.33	16.21	-22.37	38.58
925	7.81	8.38	16.19	-22.85	39.04
930	7.80	8.43	16.23	-22.51	38.74
935	7.82	8.50	16.32	-22.34	38.65
940	7.88	8.59	16.47	-22.68	39.15
945	7.81	8.66	16.47	-22.80	39.27
950	7.76	8.70	16.46	-22.67	39.13
955	7.77	8.71	16.48	-23.07	39.55
960	7.77	8.73	16.50	-22.90	39.40
965	7.73	8.74	16.47	-23.09	39.57
970	7.72	8.77	16.49	-23.28	39.77
975	7.81	8.76	16.57	-23.45	40.02
980	7.83	8.75	16.58	-23.50	40.07
985	7.76	8.73	16.49	-23.73	40.21
990	7.71	8.74	16.45	-23.78	40.23

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading "dBm" [dB]
995	7.80	8.74	16.54	-23.84	40.38
1000	7.84	8.74	16.58	-23.94	40.52
1050	7.59	8.07	15.66	-25.27	40.93
1100	7.76	8.04	15.80	-25.11	40.91
1150	7.68	8.60	16.28	-24.70	40.99
1200	7.54	8.69	16.23	-25.64	41.88
1250	7.61	8.55	16.16	-26.98	43.15
1300	7.53	8.21	15.74	-27.85	43.60
1350	7.63	8.88	16.51	-26.41	42.92
1400	7.48	9.12	16.60	-26.85	43.45
1450	7.49	8.85	16.34	-27.48	43.83
1500	7.38	8.07	15.45	-27.95	43.40
1550	7.39	8.29	15.68	-29.66	45.34
1600	7.33	8.61	15.94	-28.80	44.74
1650	7.33	8.61	15.94	-27.96	43.90
1700	7.37	8.87	16.24	-28.31	44.56
1750	7.22	8.33	15.55	-28.94	44.49
1800	7.24	8.85	16.08	-29.66	45.75
1850	7.09	8.63	15.73	-31.73	47.46
1900	7.08	8.63	15.71	-31.38	47.10
1950	7.12	8.47	15.59	-29.98	45.57
2000	7.03	8.41	15.44	-29.26	44.70
2050	7.11	8.62	15.72	-30.84	46.57
2100	6.98	8.95	15.93	-32.49	48.42
2150	6.94	9.29	16.22	-33.07	49.30
2200	6.83	9.58	16.40	-32.18	48.58
2250	6.73	9.70	16.43	-30.88	47.31
2300	6.79	9.70	16.50	-31.02	47.51
2350	6.73	9.51	16.25	-32.26	48.51
2400	6.73	9.54	16.28	-34.05	50.33
2450	6.68	9.77	16.45	-32.49	48.94
2500	6.61	9.72	16.33	-32.11	48.44
2550	6.60	9.72	16.32	-32.92	49.24
2600	6.59	9.71	16.30	-35.05	51.35
2650	6.57	9.76	16.33	-34.98	51.31
2700	6.55	9.84	16.38	-33.82	50.21
2750	6.50	10.05	16.55	-33.18	49.72
2800	6.46	10.05	16.51	-33.45	49.96
2850	6.41	10.26	16.67	-33.85	50.53
2900	6.45	10.21	16.65	-35.40	52.06
2950	6.45	9.95	16.40	-36.13	52.54
3000	6.38	9.67	16.06	-35.93	51.99
3050	6.05	9.67	15.72	-36.35	52.08
3100	6.28	9.45	15.73	-36.31	52.03

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading “dBm” [dB]
3150	6.41	9.57	15.98	-37.36	53.34
3200	6.37	9.62	15.99	-37.28	53.28
3250	6.03	9.67	15.70	-36.99	52.68
3300	6.08	9.67	15.75	-36.72	52.47
3350	5.87	9.73	15.60	-38.01	53.61
3400	6.02	9.78	15.80	-38.09	53.89
3450	5.96	9.89	15.84	-39.49	55.34
3500	6.01	9.90	15.91	-39.49	55.41
3550	5.93	9.90	15.83	-37.93	53.77
3600	6.31	10.03	16.34	-37.55	53.89
3650	6.30	9.98	16.27	-38.70	54.98
3700	6.32	9.80	16.13	-40.09	56.22
3750	5.92	9.64	15.56	-39.60	55.16
3800	5.52	9.64	15.16	-40.00	55.16
3850	5.98	9.39	15.37	-40.39	55.76
3900	6.05	9.38	15.43	-40.52	55.95
3950	5.98	9.47	15.45	-40.45	55.91
4000	6.17	9.68	15.86	-40.67	56.53
4050	6.33	9.84	16.17	-39.45	55.61
4100	5.82	10.16	15.98	-40.05	56.03
4150	4.95	10.32	15.28	-41.01	56.28
4200	4.81	10.42	15.23	-42.40	57.64
4250	4.62	10.61	15.23	-42.64	57.86
4300	5.76	10.71	16.47	-40.84	57.31
4350	5.87	10.71	16.58	-40.46	57.04
4400	5.55	10.83	16.38	-41.64	58.02
4450	5.51	10.91	16.42	-41.64	58.05
4500	5.45	10.92	16.37	-41.59	57.96
4550	5.54	10.90	16.44	-42.02	58.46
4600	5.33	10.90	16.23	-43.19	59.42
4650	5.14	10.99	16.13	-42.94	59.07
4700	5.18	10.84	16.02	-43.98	60.00
4750	4.99	10.79	15.79	-43.30	59.09
4800	5.01	10.77	15.78	-43.86	59.65
4850	5.08	10.77	15.85	-43.74	59.59
4900	5.21	10.84	16.06	-44.05	60.10
4950	5.27	10.86	16.13	-44.39	60.52
5000	5.27	10.83	16.10	-44.07	60.17
5050	5.09	10.83	15.92	-45.54	61.46
5100	5.02	10.83	15.85	-45.56	61.42
5150	5.05	10.79	15.84	-45.85	61.69
5200	4.84	10.71	15.55	-45.16	60.71
5250	4.75	10.71	15.46	-45.29	60.75
5300	4.63	10.78	15.40	-45.67	61.07

Frequency [MHz]	Transmit signal P_{tx} [dBm]	TX antenna gain (isotropic) [dBi]	True transmit signal P_{true} [dBm]	Analyzer reading P_{site} [dBm]	Correction for reading “dBm” [dB]
5350	4.58	10.78	15.36	-46.00	61.36
5400	4.80	10.75	15.54	-46.17	61.72
5450	4.91	10.75	15.66	-45.64	61.30
5500	4.69	10.78	15.46	-46.71	62.18
5550	4.77	10.78	15.55	-46.14	61.69
5600	4.67	10.78	15.45	-47.26	62.70
5650	4.52	10.93	15.45	-46.18	61.63
5700	4.62	11.21	15.83	-45.82	61.65
5750	4.46	11.21	15.67	-46.70	62.37
5800	4.46	11.38	15.84	-46.27	62.11
5850	4.62	11.38	16.00	-45.48	61.48
5900	4.49	11.44	15.92	-47.02	62.94
5950	4.45	11.44	15.89	-47.21	63.10
6000	4.43	11.34	15.77	-47.91	63.69

12 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	2014-10-01	M. Steindl	First Edition
2	2014-11-10	M. Steindl	RF exposure added
3	2014-11-28	J. Roidt	
4	2015-02-12	J. Roidt, M. Steindl	Correction of normative references; receiver tests and conductive AC emissions removed, since not applicable; updated to 19.2 kbps data rate.