

Prüfbericht-Nr.: Test Report No.:	60356613 003	Auftrags-Nr.: Order No.:	168126583	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	07.08.2019	
Auftraggeber: Client:	Telit Communications S.p.A., Viale Stazione di Prosecco 5/b, 34010, Trieste, Italy			
Prüfgegenstand: Test item:	Data Terminal Module			
Bezeichnung / Typ-Nr.: Identification / Type No.:	ME310G1-WW			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 2	RSS-132 Issue 3 RSS-133 Issue 6 RSS-Gen Issue 5		
Wareneingangsdatum: Date of receipt:	12.11.2019	Refer to Photo Documentation		
Prüfmuster-Nr.: Test sample No.:	A001027661-005			
Prüfzeitraum: Testing period:	24.03.2020 - 15.05.2020			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
16.05.2020 Lin Lin / Senior Project Manager		16.05.2020 Winnie Hou / Technical Certifier		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other: FCC ID: RI7ME310G1WW; IC: 5131A-ME310G1WW This report is for GPRS/EGPRS operation.				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

TEST SUMMARY

5.1.1 RF POWER OUTPUT

RESULT: Pass

5.1.2 OCCUPIED BANDWIDTH AND 26DB BANDWIDTH

RESULT: Pass

5.1.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

RESULT: Pass

5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE

RESULT: Pass

5.1.5 FIELD STRENGTH OF SPURIOUS RADIATION

RESULT: Pass

5.1.6 FREQUENCY STABILITY

RESULT: Pass

5.1.7 PEAK TO AVERAGE RATIO

RESULT: Pass

CONTENTS

1.	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS	4
1.2	TEST STANDARD(S)	4
2.	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	TEST DATE	5
2.3	LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
2.4	TRACEABILITY	7
2.5	CALIBRATION	7
2.6	LOCATION OF ORIGINAL DATA	7
2.7	STATUS OF FACILITY USED FOR TESTING.....	7
3.	GENERAL PRODUCT INFORMATION	8
3.1	GENERAL DESCRIPTION	8
3.2	RATING AND SYSTEM DETAILS	8
3.3	INDEPENDENT OPERATION MODES	9
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	9
3.5	SUBMITTED DOCUMENTS.....	9
4.	TEST SET-UP AND OPERATION MODES	10
4.1	PRINCIPLE OF CONFIGURATION SELECTION	10
4.2	TEST OPERATION AND TEST SOFTWARE.....	10
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	11
4.5	TEST SETUP DIAGRAM	11
5.	TEST RESULTS	12
5.1	ESSENTIAL REQUIREMENTS	12
5.1.1	RF POWER OUTPUT.....	12
5.1.2	OCCUPIED BANDWIDTH AND 26DB BANDWIDTH	13
5.1.3	SPURIOUS EMISSIONS AT ANTENNA TERMINALS	14
5.1.4	SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE.....	15
5.1.5	FIELD STRENGTH OF SPURIOUS RADIATION.....	16
5.1.6	FREQUENCY STABILITY	17
5.1.7	PEAK TO AVERAGE RATIO.....	18
6.	SYSTEM MEASUREMENT UNCERTAINTY	19
7.	LIST OF TABLES	19

1. GENERAL REMARKS

1.1 COMPLEMENTARY MATERIALS

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of GPRS/EGPRS

Appendix B: Test Results of Field Strength of Spurious Radiation for GPRS/EGPRS operation

Appendix C: Photographs of the Test Set-Up

1.2 TEST STANDARD(S)

Applied Rules: 47 CFR FCC Part 22
47 CFR FCC Part 24
47 CFR FCC Part 2

Test Method: KDB 971168 D01
ANSI C63.26

RSS-132 Issue 3
RSS-133 Issue 6
RSS-Gen Issue 5

2. TEST SITES

2.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

(FCC Registration No.: 694916 & IC Registration Number: 25069)

Address: No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China

2.2 TEST DATE

Date of test: 24.03.2020 - 02.04.2020

2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
Raido Spectrum Testing				
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166305	20.09.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101475	20.09.2020
Vector Signal Generator	Rohde & Schwarz	SMBV100A	263466	20.09.2020
Signal Generator	Rohde & Schwarz	SMB100A	181041	17.12.2020
High Speed Power Supply	KEITHLEY	2303	4080052	17.12.2020
RF Control Unit	Tonscend	JS0806-1	19H8060192	N/A
Field Strength of Spurious Radiation				
Signal Generator	Rohde & Schwarz	SMB100A	180840	20.08.2020
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	165339	20.08.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101440	21.08.2020
System Controller Interface	Rohde & Schwarz	SCI-100	S10010036	N/A
Filterbank	Rohde & Schwarz	GSM	100811	21.08.2020
OSP	Rohde & Schwarz	OSP 120	102041	N/A
OSP	Rohde & Schwarz	OSP 150	101385	17.12.2020
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320030	20.08.2020
Amplifier	Rohde & Schwarz	SCU-18F	180079	20.08.2020

Amplifier	Rohde & Schwarz	SCU40A	100450	20.09.2020
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	192	02.09.2020
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	02.09.2020
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	02.09.2020
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19066	02.09.2020
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	02.09.2020
Double Ridged Broadband Horn Antenna (1 – 18 GHz)	Schwarzbeck	BBHA 9120 D	01760	02.09.2020
Broadband Horn Antenna (15 – 40 GHz)	Schwarzbeck	BBHA 9170	00862	02.09.2020
Test software	Rohde & Schwarz	EMC32 (V10.40.00)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NW9P2	N/A
3m Fully Anechoic Chamber	Albatross	FAC-3m	APC17151-FAC	06.07.2020

2.4 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. GENERAL PRODUCT INFORMATION

3.1 GENERAL DESCRIPTION

The EUT is wireless module which supports GPRS/EGPRS, NB-IoT and eMTC wireless technology. For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 RATING AND SYSTEM DETAILS

Table 2: Rating of EUT

General Information of EUT	Description
Kind of Equipment:	Data Terminal Module
Type Designation:	ME310G1-WW
FCC ID:	RI7ME310G1WW
IC:	5131A-ME310G1WW
Hardware Version:	0.0
Software Version:	M0C.200001
Type of Equipment:	Single Module
Antenna:	External Antenna
Operating Voltage:	DC 3.8V
Operating Temperature Range:	-40°C ~ +85°C

Table 3: Technical Specification of EUT

Characteristic	Description
Operated Modes:	GPRS, EGPRS
Operational Frequency Band(s):	GSM 850, PCS 1900
Nominal RF Output Power:	GSM 850: 33 dBm ± 2dB PCS 1900: 30 dBm ± 2dB
Power Class:	GSM 850: Class 4 PCS 1900: Class 1
Modulation Type:	GMSK(GPRS/EGPRS), 8PSK(EGPRS)
Antenna Type:	External Antenna The EUT doesn't have antenna, The adapter and antenna used for testing in this report is the after-market accessory
Antenna Gain:	2.14 dBi
Extreme Voltage:	DC 3.2 ~ 4.5V
Extreme Temperature:	-40 ~ +85 °C

Table 4: Operating Frequency Range and Channel Bandwidth of EUT

Frequency Band(s)	Frequency Range	
	Transmitting f_{UL} (MHz)	Receiving f_{DL} (MHz)
GSM 850	824 ~ 849	869 ~ 894
PCS 1900	1850 ~ 1910	1930 ~ 1990

3.3 INDEPENDENT OPERATION MODES

The basic operation modes are:

- A. On, communication link established, Transmitting
 - 1) GPRS/EGPRS GMSK operating
 - i. Low channel
 - ii. Middle channel
 - iii. High channel
 - 2) EGPRS 8PSK operating
 - i. Low channel
 - ii. Middle channel
 - iii. High channel
- B. On, communication link established, Receiving
 - 1) GPRS/EGPRS operating
- C. Idle
- D. Off

3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS

Refer to the Circuit Diagram.

3.5 SUBMITTED DOCUMENTS

- | | |
|---|--|
| ☒ User Manual | ☒ Rating Label |
| ☒ Circuit Diagram | ☒ PCB Layout |
| ☒ Block Diagram | ☒ Photo Document |
| ☒ Schematics | ☒ Parts List |

4. TEST SET-UP AND OPERATION MODES

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedure in KDB 971168 D01 and ANSI C63.26.

Table 5: List of Frequencies under Test

Operation bands	TX/RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM 850	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2MHz	881.6MHz	893.8MHz
PCS 1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0MHz	1909.8MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2MHz	1960.0MHz	1989.8MHz

Table 6: Test Environments

Environment Parameter	Selected Values During Tests		
	Temperature (°C)	Voltage (V) DC	Relative Humidity (%)
Normal (NTNV)	24	3.8	51%
HTHV	85 °C	4.5	---
LTHV	-40 °C	4.5	---
HTLV	85 °C	3.2	---
LTLV	-40 °C	3.2	---

Table 7: Test Configurations

Frequency Bands	Modulation	
	GMSK	8PSK
GSM 850/PCS1900 GPRS	Δ	-
GSM 850/PCS1900 EGPRS	Δ	Δ

4.3 Special Accessories and Auxiliary Equipment

Table 8: Cables used during test

Port	Quantity	Length (m)	Connector	Type of Cable
USB	1	1.2	USB	USB cable, shielding

Table 9: Auxiliary Equipment used during test

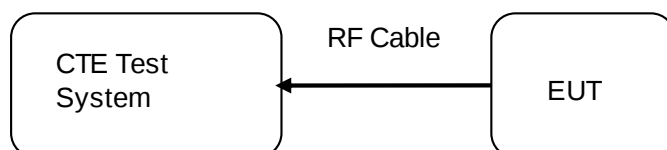
Name	Model	Manufacturer	S/N
Evaluation Kit	EVK2	Telit	N/A
LTE Magnetic Antenna	T-AT305 Frequency Range: 700-960 MHz / 1710- 2700 MHz Omnidirectional antenna Gain: 2.14 dBi (Max.) Cable: RG 174mm 2500	ATEL-CAB	N/A

4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Equipment Configuration for Transmitter Conducted Measurement



5. TEST RESULTS

5.1 ESSENTIAL REQUIREMENTS

5.1.1 RF POWER OUTPUT

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3
		47 CFR FCC Part 24	RSS-133 Issue 6
		47 CFR FCC Part 2	RSS-Gen Issue 5
Limits	:	Operating band	FCC Limit
		GSM 850	ERP 7 watts
		PCS 1900	EIRP 2 watts
Test procedure	:	Clause 5.2.4.2 of ANSI C63.26	
Kind of test site	:	Shielding Room	
		ISED Limit	ERP 11.5 watts
			EIRP 2 watts

TEST SETUP

Date of testing	:	24.03.2020 - 15.05.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	23 °C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_T$$

where

ERP or EIRP: effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , e.g. dBm)

P_{Meas} : measured transmitter output power, in dBm

G_T : gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Refer to attached Appendix A for details of test results.

5.1.2 OCCUPIED BANDWIDTH AND 26DB BANDWIDTH**RESULT:****Pass**

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3
		47 CFR FCC Part 24	RSS-133 Issue 6
		47 CFR FCC Part 2	RSS-Gen Issue 5
Test requirement	:	Section 2.1049 of 47 CFR FCC Part 2 Clause 6.7 of RSS-Gen Issue 5	
Limits	:	No limit	
Test procedure	:	Section 5.4.3 of ANSI C63.26 ☒ Conducted measurements ☐ Radiated measurements	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A for details of test results.

5.1.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

RESULT:
Pass

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3
		47 CFR FCC Part 24	RSS-133 Issue 6
		47 CFR FCC Part 2	RSS-Gen Issue 5
Limits	:	Operating band	FCC Limit
		PCS 1900	< - 13 dBm /1MHz
			< - 13 dBm /100kHz
		GSM 850	@ < 1GHz
			< - 13 dBm /1MHz
			@ > 1GHz
Test procedure	:	Clause 5.7.4 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:

$$\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [43 + 10 \log(P_{\text{Meas}})] = -13 \text{ dBm}$$

Refer to attached Appendix A for details of test results.

5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE

RESULT:
Pass

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3
		47 CFR FCC Part 24	RSS-133 Issue 6
		47 CFR FCC Part 2	RSS-Gen Issue 5
Limits	:	Operating band	FCC Limit
		PCS 1900	< - 13 dBm /1%EBW
		GSM 850	< - 13 dBm /1%EBW
Test procedure	:	Clause 5.7.3 of ANSI C63.26	ISED Limit
Kind of test site	:	Shielding Room	< - 13 dBm / 1%OBW

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:

$$\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [43 + 10 \log(P_{\text{Meas}})] = -13 \text{ dBm}$$

$$\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [50 + 10 \log(P_{\text{Meas}})] = -20 \text{ dBm}$$

Refer to attached Appendix A for details of test results.

5.1.5 FIELD STRENGTH OF SPURIOUS RADIATION

RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 2	RSS-132 Issue 3 RSS-133 Issue 6 RSS-Gen Issue 5
Limits	:	Operating band PCS 1900	FCC Limit ISED Limit < - 13 dBm /1MHz < - 13 dBm /1MHz
		GSM 850	< - 13 dBm /100kHz @ < 1GHz < - 13 dBm / 100 kHz @ > 1GHz
Test procedure	:	Clause 5.5 of ANSI C63.26	
Kind of test site	:	3m Semi Anechoic Room	

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	23 °C
Relative humidity	:	48%
Atmospheric pressure	:	101.0 kPa

The limit calculation:

$$\text{Limit} = \text{PMeas (dBm)} - [43 + 10 \log(\text{PMeas})] = -13 \text{ dBm}$$

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in this report. The measurement is performed for all operational modes and both antenna polarization, only the data of the worst mode is recorded in this report.

Refer to attached Appendix B for details of test results.

5.1.6 FREQUENCY STABILITY

RESULT:

Pass

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3
		47 CFR FCC Part 24	RSS-133 Issue 6
		47 CFR FCC Part 2	RSS-Gen Issue 5
Limits	:	Operating band	FCC Limit
		PCS 1900	Within authorized bands
		GSM 850	2.5 ppm
Test procedure	:	Clause 5.6.3 of ANSI C63.26	ISED Limit
Kind of test site	:	Shielding Room	2.5 ppm

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☒ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A for details of test results.

5.1.7 PEAK TO AVERAGE RATIO**RESULT:****Pass**

Test standard	:	47 CFR FCC Part 22	RSS-132 Issue 3	
		47 CFR FCC Part 24	RSS-133 Issue 6	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		PCS 1900	PAR ≤ 13 dB	PAR ≤ 13 dB
		GSM 850	PAR ≤ 13 dB	PAR ≤ 13 dB
Test procedure	:	Clause 5.2.6 of ANSI C63.26		
Kind of test site	:	Shielding Room		

TEST SETUP

Date of testing	:	24.03.2020 - 02.04.2020
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
	:	☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A for details of test results.

6. SYSTEM MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 10: System Measurement Uncertainty

Items		Extended Uncertainty
RE	Radiated emission 9 kHz - 30 MHz	±3.97 dB
	Radiated emission 30 MHz - 1 GHz	±4.30 dB
Remark: 95% Confidence Levels, K=2.		

7. LIST OF TABLES

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Rating of EUT	8
Table 3: Technical Specification of EUT	8
Table 4: Operating Frequency Range and Channel Bandwidth of EUT.....	9
Table 5: List of Frequencies under Test.....	10
Table 6: Test Environments.....	10
Table 7: Test Configurations.....	10
Table 8: Cables used during test.....	11
Table 9: Auxiliary Equipment used during test.....	11
Table 10: System Measurement Uncertainty	19