

Test Report No.:
FCC2021-0008-3

RF Test Report

EUT : LC300 LTE CPE

MODEL : LC300,LC300SV,LC300CA , LC300A ,
LC300B , LC300C , LC300D

BRAND NAME : sunvot

CLIENT : Ningbo Sunvot Technology Co., Ltd

Classification Of Test : Commission Test

Vkan Certification & Testing Co., Ltd.



Vkan Certification & Testing Co., Ltd.

Test Report No.: FCC2021-0008-3		Page 2 of 33	
Client		Name : Ningbo Sunvot Technology Co., Ltd Address : Building 3, NO 55 Longtan Shan Road, Beilun Daqi, Ningbo, Zhejiang	
Manufacturer		Name : Ningbo Sunvot Technology Co., Ltd Address : Building 3, NO 55 Longtan Shan Road, Beilun Daqi, Ningbo, Zhejiang	
Equipment Under Test		Name : LC300 LTE CPE Model/Type: LC300, LC300SV, LC300CA, LC300A, LC300B, LC300C, LC300D Trade mark : sunvot Serial NO.: N/A Sample NO.: 1-1	
Date of Receipt.	2021.03.19	Date of Receipt.	2021.03.19~2021.04.27
Test Specification		Test Result	
FCC Part 27, Subpart C, L ANSI C63.26-2015		PASS	
Evaluation of Test Result		The equipment under test was found to comply with the requirements of the standards applied. Issue Date: 2021.04.27	
Tested by: <i>Zhu Yulin</i> <u>Zhu Yu Lin</u> ☐ Name Signature	Reviewed by: <i>Cheng Xiaochuan</i> <u>Cheng Xiao Chuan</u> ☐ Name Signature	Approved by: <i>Dong Sanbi</i> <u>Dong San Bi</u> ☐ Name Signature	
Other Aspects: NONE.			
Abbreviations: OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.			



TABLE OF CONTENTS

RELEASE CONTROL RECORD.....	6
1 SUMMARY OF TEST RESULTS	7
1.1 MEASUREMENT UNCERTAINTY	7
1.2 TEST SITE AND INSTRUMENTS	8
2 GENERAL INFORMATION.....	9
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF SUPPORT UNITS.....	11
2.3 TEST ITEM AND TEST CONFIGURATION.....	12
2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	19
3 TEST TYPES AND RESULTS.....	20
3.1 OUTPUT POWER MEASUREMENT	20
3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT.....	20
3.1.2 TEST PROCEDURES	20
3.1.3 TEST SETUP	21
3.1.4 TEST RESULTS	21
3.2 FREQUENCY STABILITY MEASUREMENT	22
3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT	22
3.2.2 TEST PROCEDURE.....	22
3.2.3 TEST SETUP	22
3.2.4 TEST RESULTS	23
3.3 OCCUPIED BANDWIDTH MEASUREMENT	24
3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT	24
3.3.2 TEST SETUP	24
3.3.3 TEST PROCEDURES	24
3.3.4 TEST RESULTS	24
3.4 PEAK TO AVERAGE RATIO	25
3.4.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT.....	25
3.4.2 TEST SETUP	25
3.4.3 TEST PROCEDURES	25
3.4.4 TEST RESULT.....	25
3.5 BAND EDGE MEASUREMENT.....	26
3.5.1 LIMITS OF BAND EDGE MEASUREMENT	26
3.5.2 TEST SETUP	26
3.5.3 TEST PROCEDURES	27
3.5.4 TEST RESULTS	27
3.6 CONDUCTED SPURIOUS EMISSIONS	28
3.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT.....	28
3.6.2 TEST PROCEDURE.....	28
3.6.3 TEST SETUP	28
3.6.4 TEST RESULTS	28
3.7 RADIATED EMISSION MEASUREMENT	29
3.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT.....	29
3.7.2 TEST PROCEDURES	29
3.7.3 DEVIATION FROM TEST STANDARD	29
3.7.4 TEST SETUP	30
3.7.5 TEST RESULTS	31
4 PHOTOGRAPHS OF THE TEST CONFIGURATION.....	32



5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB33



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2021-0008-3	Original release	Apr. 27, 2021



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50	Maximum Peak Output Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50	Peak to average ratio	PASS	Meet the requirement of limit.
27.53	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53	Radiated Spurious Emissions	PASS	Meet the requirement of limit.

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	UNCERTAINTY
Effective Radiated Power	$\pm 1.19\text{dB}$
Frequency Stability	$\pm 39.27\text{Hz}$
Radiated emissions	$\pm 3.55\text{dB}$
Conducted emissions	$\pm 1.407\text{ dB}$
Occupied Channel Bandwidth	$\pm 0.624\text{KHz}$
Band Edge Measurements	$\pm 0.684\text{dB}$
Peak to average ratio	$\pm 0.4\text{dB}$

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test Firm:

CVC Testing Technology Co., Ltd.

No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangdong, China

Test Firm Registration Number: 937273



1.2 TEST SITE AND INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Manufacturer	Cal. Due
EMI Test Receiver	ESCI	100857	R&S	2021-12-08
EMI Test Receiver	ESR3	102394	R&S	2022-03-05
LISN	NSLK 8127	8127644	SCHWARZBECK	2021-09-04
LISN	NSLK 8128	8128-316	SCHWARZBECK	2021-09-04
LISN	NSLK 8129	8129-268	SCHWARZBECK	2022-03-05
Plus Limiter (#1)	VTSD 9561 F-N	00515	SCHWARZBECK	2022-03-05
Plus Limiter (#2)	VTSD 9561	9561-F017	SCHWARZBECK	2021-10-09
Impedance Stabilization Network	ISN T800	27095	TESEQ	2021-09-04
Impedance Stabilization Network	NTFM8158	8158-0092	SCHWARZBECK	2021-06-09
ImpedanceStabilizationNetwork	NTFM8131	#184	SCHWARZBECK	2021-06-09
Voltage Probe	TK9420	9420-499	SCHWARZBECK	2022-03-05
Power Divider	4901.17.B	22643830	HUBER+SUHNE R	2021-11-08
Video Signal Generator	GV-798+	151064920001	PROMAX	2021-07-21
AudioSignalGenerator	GAG-810	EK871591	GW	2021-12-11
Shielding Room(#1)	GP1A	002	LEINING	2024-08-08
Shielding Room(#2)	GP1A	/	LEINING	2024-08-08
EMI Test Receiver	N9038A-508	MY532290079	Agilent	2022-03-05
EMI Test Receiver	ESR7	102235	R&S	2022-03-05
EMI Test Receiver	N9038A-508	MY53290078	Agilent	2022-03-05
Spectrum Analyzer	N9010B	MY57470323	KEYSIGHT	2022-03-05
Radio Communication Test	CMW500	156686	R&S	2021-12-25
Broadband Antenna(3m)	VULB 9163	9163-530	SCHWARZBECK	2021-07-11
Loop Antenna	HLA 6121	540046	TESEQ	2021-06-28
Loop Antenna	FMZB1513	1513-170	SCHWARZBECK	2022-03-05
Monopole antenna	HFH2-Z6E	101317	R&S	2021-12-11
Waveguide Horn Antenna	BBHA9120B	602	SCHWARZBECK	2022-03-05
Waveguide Horn Antenna	HF906	360306/008	R&S	2022-03-05
Semi-Anechoic Chamber(3m)	FACT-4	ST08035	ETS	2024-12-12
Preamplifier	SCU-01F	100298	Rohde&Schwarz	2021.5.19
Preamplifier	SCU-18F	100799	Rohde&Schwarz	2021.5.19
Signal&Spectrum Analyzer	FSV 40	101898	Rohde&Schwarz	2021.5.19
Signal&Spectrum Analyzer	FSVA 3044	101013	Rohde&Schwarz	2021.5.19



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	LC300 LTE CPE	
MODEL NAME	LC300	
ADDITIONAL MODEL	LC300SV, LC300CA , LC300A , LC300B , LC300C , LC300D	
FCC ID	2AZGN-LC300-202103	
POWER SUPPLY	DC 48V POE Supply	
MODULATION TECHNOLOGY	LTE	QPSK, 16QAM
FREQUENCY RANGE	LTE Band 4 Channel Bandwidth: 1.4MHz	1710.7MHz ~ 1754.3MHz
	LTE Band 4 Channel Bandwidth: 3MHz	1711.5MHz ~ 1753.5MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~ 1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715.0MHz ~ 1750.0MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~ 1747.5MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720.0MHz ~ 1745.0MHz
	LTE Band 7 Channel Bandwidth: 5MHz	2502.5MHz ~ 2567.5MHz
	LTE Band 7 Channel Bandwidth: 10MHz	2505.0MHz ~ 2565.0MHz
	LTE Band 7 Channel Bandwidth: 15MHz	2507.5MHz ~ 2562.5MHz
	LTE Band 7 Channel Bandwidth: 20MHz	2510.0MHz ~ 2560.0MHz
	LTE Band 38 Channel Bandwidth: 5MHz	2572.5MHz ~ 2617.5MHz
	LTE Band 38 Channel Bandwidth: 10MHz	2575.0MHz ~ 2615.0MHz
	LTE Band 38 Channel Bandwidth: 15MHz	2577.5MHz ~ 2612.5MHz
	LTE Band 38 Channel Bandwidth: 20MHz	2580.0MHz ~ 2610.0MHz
ANTENNA TYPE	LTE Band 4	External PCB antenna with 4 dBi gain
	LTE Band 7	External PCB antenna with 7 dBi gain



	LTE Band 38	External PCB antenna with 7 dBi gain
HW VERSION	V1.0	
SW VERSION	V1.0	
ACCESSORY DEVICE	Refer to note as below	
DATA CABLE	LAN cable: non-shielded, detachable, 1.45meter	

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following POE port from WiFi Router packaged with this CPE:
DC 48V.
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
4. Additional models (see about table) are identical with the test model LC300SV, LC300CA, LC300A, LC300B, LC300C, LC300D except the color of the appearance and model name for trading purpose.
5. Please refer to the EUT photo document (Reference No.: FCC2021-0008) for detailed product photo.
6. The EUT have MIMO function, provides 2 completed transmitter and 4 receiver.



2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
N/A	N/A	N/A	N/A	N/A	N/A		
Support Cable							
NO	Description	Quantity (Number)	Length (cm)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



2.3 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case in ERP and radiated emission was found when positioned on X-plane. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + LAN Cable + Router + Adaptor + LTE link

LTE BAND 4 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
FREQUENCY STABILITY	19957 to 20393	19957, 20393	1.4MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	19965 to 20385	19965, 20385	3MHz	QPSK, 16QAM	15 RB / 0 RB Offset
	19975 to 20375	19975, 20375	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20000 to 20350	20000, 20350	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
	20025 to 20325	20025, 20325	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
	20050 to 20300	20050, 20300	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
OCCUPIED BANDWIDTH	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15 RB / 0 RB Offset
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					6 RB / 0 RB Offset
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					15 RB / 0 RB Offset
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					75 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					100 RB / 0 RB Offset
BAND EDGE	19957 to 20393	19957	1.4MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 5 RB Offset



		20393	1.4MHz	QPSK	6 RB / 0 RB Offset
					1 RB / 0 RB Offset
					1 RB / 5 RB Offset
					6 RB / 0 RB Offset
	19965 to 20385	19965	3MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 14 RB Offset
					15 RB / 0 RB Offset
		20385	3MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 14 RB Offset
					15 RB / 0 RB Offset
	19975 to 20375	19975	5MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
					25 RB / 0 RB Offset
		20375	5MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
					25 RB / 0 RB Offset
	20000 to 20350	20000	10MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					50 RB / 0 RB Offset
		20350	10MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					50 RB / 0 RB Offset

BAND EDGE	20025 to 20325	20025	15MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 74 RB Offset
					75 RB / 0 RB Offset
		20325	15MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 74 RB Offset
					75 RB / 0 RB Offset
	20050 to 20300	20050	20MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 99 RB Offset
					100 RB / 0 RB Offset
		20300	20MHz	QPSK	1 RB / 0 RB Offset
					1 RB / 99 RB Offset
					100 RB / 0 RB Offset
CONDCUDED EMISSION	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
RADIATED EMISSION	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK	1 RB / 0 RB Offset
	19965 to 20385	20175	3MHz	QPSK	1 RB / 0 RB Offset
	19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
	20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
	20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
	20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset



LTE BAND 7 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 12 RB Offset
					1 RB / 24 RB Offset
					12 RB / 0 RB Offset
					12 RB / 6 RB Offset
					12 RB / 13 RB Offset
					25 RB / 0 RB Offset
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
					1 RB / 49 RB Offset
					25 RB / 0 RB Offset
					25 RB / 12 RB Offset
					25 RB / 25 RB Offset
					50 RB / 0 RB Offset
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 38 RB Offset
					1 RB / 74 RB Offset
					38 RB / 0 RB Offset
					38 RB / 18 RB Offset
					38 RB / 37 RB Offset
					75 RB / 0 RB Offset
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					1 RB / 99 RB Offset
					50 RB / 0 RB Offset
					50 RB / 25 RB Offset
					50 RB / 50 RB Offset
					100 RB / 0 RB Offset
FREQUENCY STABILITY	20775 to 21425	20775, 21100, 21425	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK,16QAM	75 RB / 0 RB Offset
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK,16QAM	100 RB / 0 RB Offset
OCCUPIED BANDWIDTH	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
BAND EDGE	20775 to 21425	20775	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
		21425	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
					1 RB / 0 RB Offset
	20800 to 21400	20800	10MHz	QPSK, 16QAM	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
		20800	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					50 RB / 0 RB Offset



		21400	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					50 RB / 0 RB Offset
	20825 to 21375	20825	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 74 RB Offset
					75 RB / 0 RB Offset
		21375	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 74 RB Offset
					75 RB / 0 RB Offset
	20850 to 21350	20850	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 99 RB Offset
					100 RB / 0 RB Offset
		21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 99 RB Offset
					100 RB / 0 RB Offset
CONDCUDED EMISSION	20775 to 21425	20775, 21100, 21425	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK,16QAM	1 RB / 0RB Offset
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
RADIATED EMISSION	20775 to 21425	20775, 21100, 21425	5MHz	QPSK	1 RB / 0 RB Offset
	20800 to 21400	21100	10MHz	QPSK	1 RB / 0RB Offset
	20825 to 21375	21100	15MHz	QPSK	1 RB / 0 RB Offset
	20850 to 21350	21100	20MHz	QPSK	1 RB / 0 RB Offset

LTE BAND 38 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 12 RB Offset
					1 RB / 24 RB Offset
					12 RB / 0 RB Offset
					12 RB / 6 RB Offset
					12 RB / 13 RB Offset
					25 RB / 0 RB Offset
	37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
					1 RB / 49 RB Offset
					25 RB / 0 RB Offset
					25 RB / 12 RB Offset
					25 RB / 25 RB Offset
					50 RB / 0 RB Offset
	37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 38 RB Offset
					1 RB / 74 RB Offset
					38 RB / 0 RB Offset
					38 RB / 18 RB Offset
					38 RB / 37 RB Offset
					75 RB / 0 RB Offset
	37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
					1 RB / 99 RB Offset



					50 RB / 0 RB Offset
					50 RB / 25 RB Offset
					50 RB / 50 RB Offset
					100 RB / 0 RB Offset
FREQUENCY STABILITY	37775 to 38225	37775, 38000, 38225	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
	37800 to 38200	37800, 38000, 38200	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
	37825 to 38175	37825, 38000, 38175	15MHz	QPSK,16QAM	75 RB / 0 RB Offset
	37850 to 38150	37850, 38000, 38150	20MHz	QPSK,16QAM	100 RB / 0 RB Offset
OCCUPIED BANDWIDTH	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
	37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
	37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM	75 RB / 0 RB Offset
BAND EDGE	37775 to 38225	37775	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 24 RB Offset
		38225	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
					1 RB / 0 RB Offset
	37800 to 38200	37800	10MHz	QPSK, 16QAM	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
		38200	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 49 RB Offset
	37825 to 38175	37825	15MHz	QPSK, 16QAM	50 RB / 0 RB Offset
					1 RB / 0 RB Offset
		38175	15MHz	QPSK, 16QAM	1 RB / 74 RB Offset
					75 RB / 0 RB Offset
	37850 to 38150	37850	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 99 RB Offset
		38150	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
					1 RB / 0 RB Offset
CONDCUDED EMISSION	37775 to 38225	37775, 38000, 38225	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	37800 to 38200	37800, 38000, 38200	10MHz	QPSK,16QAM	1 RB / 0RB Offset
	37825 to 38175	37825, 38000, 38175	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
	37850 to 38150	37850, 38000, 38150	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
RADIATED EMISSION	37775 to 38225	37775, 38000, 38225	5MHz	QPSK	1 RB / 0 RB Offset
	37800 to 38200	38000	10MHz	QPSK	1 RB / 0RB Offset



	37825 to 38175	38000	15MHz	QPSK	1 RB / 0 RB Offset
	37850 to 38150	38000	20MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. Only the worst case was shown in test report.



TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	23deg. C, 62%RH	DC 48V POE Supply	Zhu Yu Lin
FREQUENCY STABILITY	23deg. C, 62%RH	DC 40.8V/48V/55.2V	Zhu Yu Lin
OCCUPIED BANDWIDTH	23deg. C, 62%RH	DC 48V POE Supply	Zhu Yu Lin
BAND EDGE	23deg. C, 62%RH	DC 48V POE Supply	Zhu Yu Lin
CONDCUDED EMISSION	23deg. C, 62%RH	DC 48V POE Supply	Zhu Yu Lin
RADIATED EMISSION	25deg. C, 63.6%RH	DC 48V POE Supply	Zhu Yu Lin



2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

KDB 971168 D01 Power Meas License Digital Systems v03

ANSI C63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.



3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 699-716 MHz bands are limited to 3 watts ERP.

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

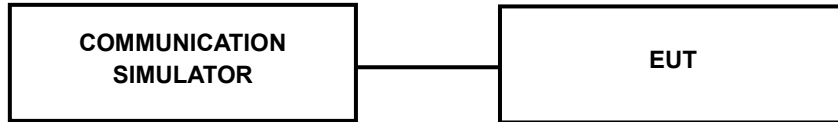
3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM & GPRS, 5MHz for WCDMA mode and 10MHz for LTE mode.
- b. $EIRP = \text{Reading (dBm)} + \text{RF cable loss (dB)} + \text{Antenna Gain (dBi)}$
- c. $E.R.P = E.I.R.P - 2.15 \text{ dB}$

CONDUCTED POWER MEASUREMENT:

- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP**EIRP / ERP Measurement / Conducted Power Measurement****3.1.4 TEST RESULTS****Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix A**

Note: Band4:Total directional gain (dBi) = ANT gain (dBi) + array gain (dB)
=4+10 log(2)=7.01 dBi

Band7:Total directional gain (dBi) = ANT gain (dBi) + array gain (dB)
=7+10 log(2)=10.01 dBi

Band38:Total directional gain (dBi) = ANT gain (dBi) + array gain (dB)
=7+10 log(2)=10.01 dBi

Array gain = 10 log(N_{ANT})

Total Conducted Power =10log(ANT0 Conducted Power+ANT2 Conducted Power)
ANT0,ANT2 The unit mW.

Total EIRP = Total Conducted Power+ Total directional gain (dBi)

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

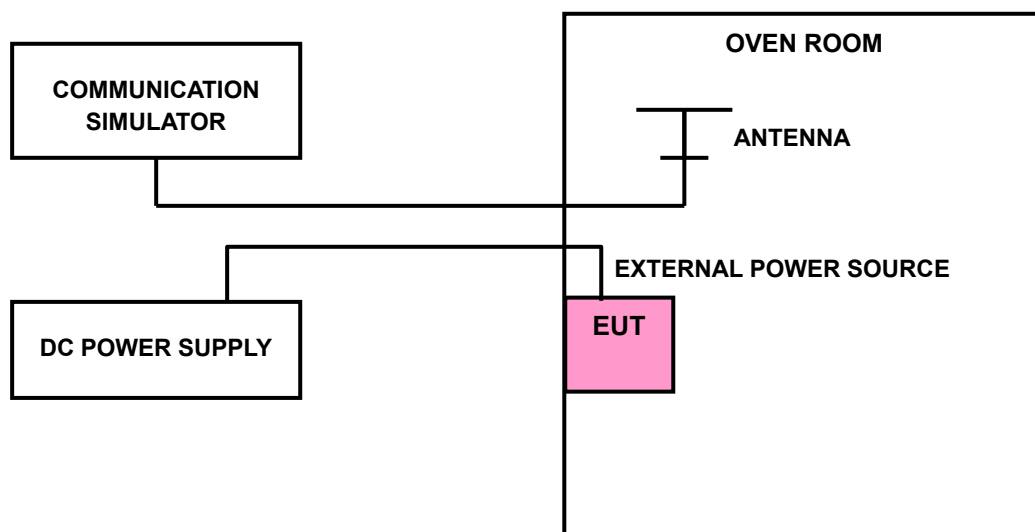
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

3.2.3 TEST SETUP





3.2.4 TEST RESULTS

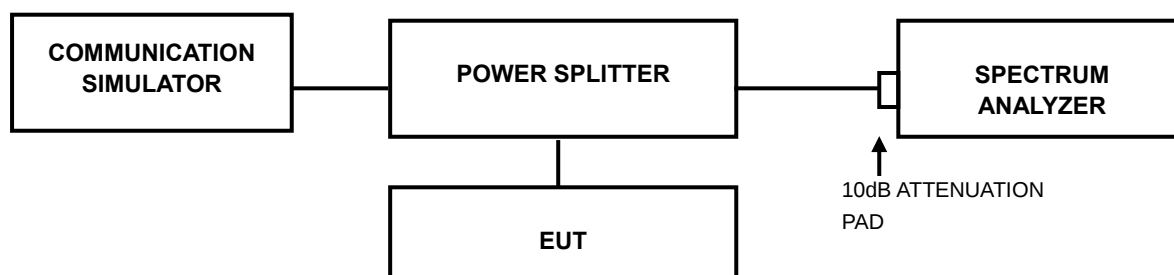
Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix F

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

3.3.2 TEST SETUP



3.3.3 TEST PROCEDURES

- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.4 TEST RESULTS

Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix C

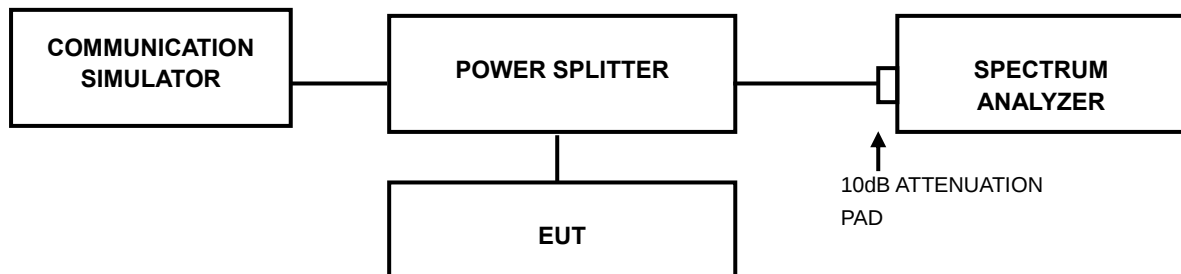


3.4 PEAK TO AVERAGE RATIO

3.4.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.4.4 TEST RESULT

Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix B

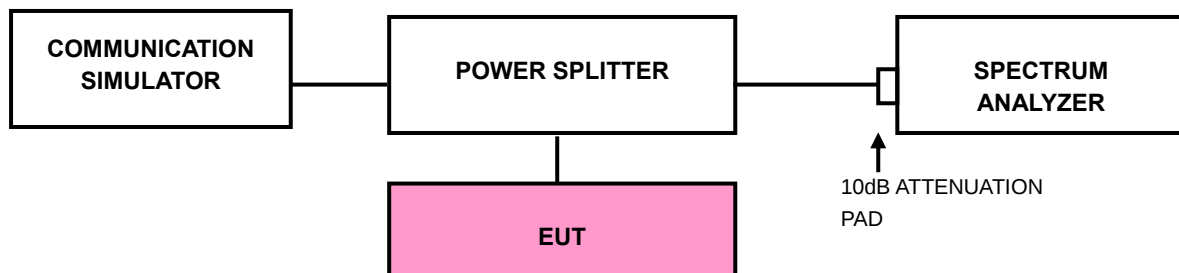
3.5 BAND EDGE MEASUREMENT

3.5.1 LIMITS OF BAND EDGE MEASUREMENT

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

3.5.2 TEST SETUP





3.5.3 TEST PROCEDURES

- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz)
- d. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- e. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 5MHz)
- f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 10MHz)
- g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 300kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 15MHz)
- h. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 20MHz)
- i. Record the max trace plot into the test report.

3.5.4 TEST RESULTS

Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix D

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.6 CONDUCTED SPURIOUS EMISSIONS

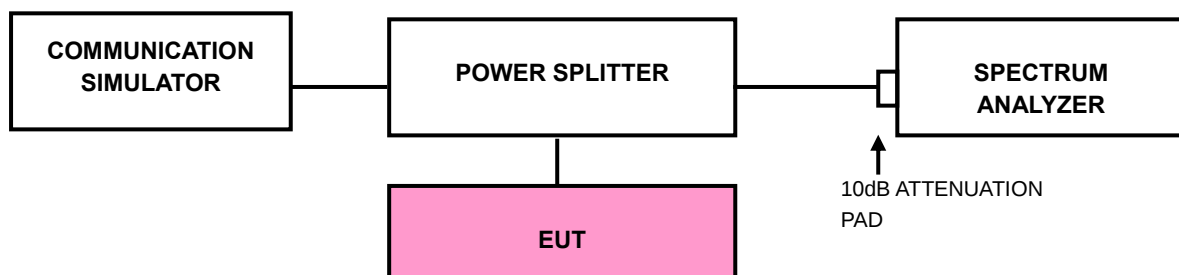
3.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

3.6.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at middle operational frequency range.
- b. Measuring frequency range is from 30 MHz to 19.1GHz for LTE Band 4 and 30 MHz to 9GHz for LTE Band 12. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

3.6.3 TEST SETUP



3.6.4 TEST RESULTS

Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix E



3.7 RADIATED EMISSION MEASUREMENT

3.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

3.7.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}.$

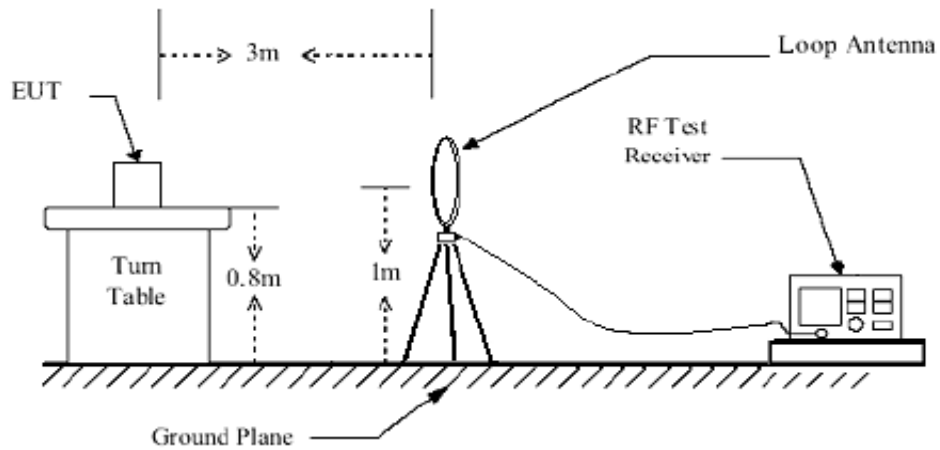
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.7.3 DEVIATION FROM TEST STANDARD

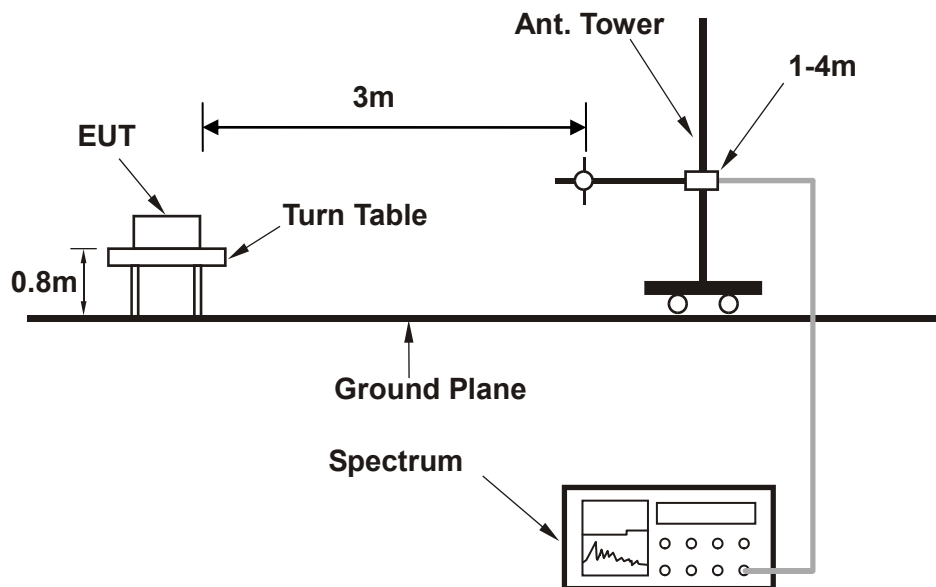
No deviation

3.7.4 TEST SETUP

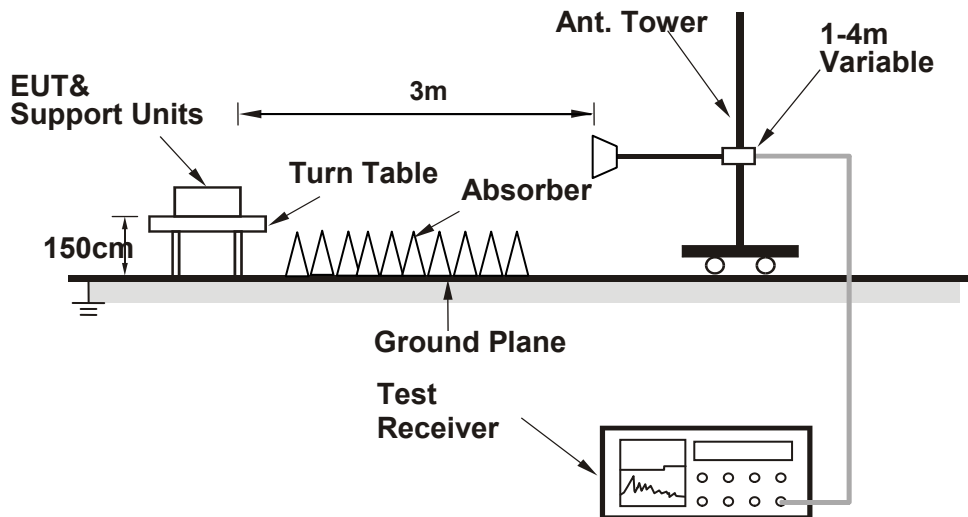
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.7.5 TEST RESULTS

Refer to attached Part 27 Band4/Band7/Band38 Test Data Appendix G

Note: For the test results, the EUT had been tested with all conditions. But only the worst case(MIMO Mode) was shown in test report.



4 PHOTOGRAPHS OF THE TEST CONFIGURATION



5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.



Important

- (1) The test report is valid with the official seal of the laboratory and the signatures of Test engineer, Author and Reviewer simultaneously.
- (2) The test report is invalid if altered.
- (3) Any photocopies or part photocopies in the test report are forbidden without the written permission from the laboratory.
- (4) Objections to the test report must be submitted to the laboratory within 15 days.
- (5) Generally, commission test is responsible for the tested samples only.

Address of the laboratory:

Vkan Certification & Testing Co., Ltd.

Address:

No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, China

Post Code : 510663 Tel : 020-32293888

FAX : 020-32293889 E-mail : office@cvc.org.cn

---END---