

FCC TEST REPORT

Test report On Behalf of Universal Physicians, LLC For FH Emergency Device - V1-4G Model No.: FH-V1-4G

FCC ID: 2AJG4-FH-V1-4G

- Prepared for :
 Universal Physicians, LLC

 7747 Supreme Street NW, North Canton,Ohio United States 44720
- Prepared By : Shenzhen Tongzhou Testing Co.,Ltd 1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China

Date of Test: 2021/1/20 - 2021/2/4

Date of Report: 2021/2/5

Report Number: TZ210101925-E1

The test report apply only to the specific sample(s) tested under stated test conditions It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



TEST RESULT CERTIFICATION

Applicant's name:	Universal Physicians, LLC
Address:	7747 Supreme Street NW, North Canton, Ohio United States 44720
Manufacture's Name:	SHENZHEN SMARTI-TECH LIMITED
Address:	1103/A,Dong Fang Xin Di Building,Nanshan District,Shenzhen,China
Product description	
Trade Mark	FastHelp
Product name:	FH Emergency Device - V1-4G
Model and/or type reference .:	FH-V1-4G
Standards	FCC Rules and Regulations Part 22 & Part 24 ANSI C63.26:2015

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Date of Test	
Date (s) of performance of tests::	2021/1/20 - 2021/2/4
Date of Issue	2021/2/5
Test Result	Pass

2

Testing Engineer

Anna Hu

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Authorized Signatory :

(Andy Zhang)



Revision History

Revision	Issue Date	Revisions	Revised By
000	2021/2/5	Initial Issue	Andy Zhang



Contents

1	TEST STANDARDS	6
2	SUMMARY	7
	2.1 PRODUCT DESCRIPTION	7
	2.2 HOST SYSTEM CONFIGURATION LIST AND DETAILS	
	2.3 SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)	
	2.3.1 GENERAL DESCRIPTION	
	2.4 NORMAL ACCESSORY SETTING	
	2.5 EUT CONFIGURATION 2.6 RELATED SUBMITTAL(S) / GRANT (S)	
	2.7 MODIFICATIONS	
3	TEST ENVIRONMENT	10
	3.1 Test Facility	
	3.2 Environmental conditions	
	3.3 TEST DESCRIPTION	
	3.4 EQUIPMENT USED DURING THE TEST	
	3.5 MEASUREMENT UNCERTAINTY	
4	DESCRIPTION OF TEST MODES	14
5	TEST CONDITIONS AND RESULTS	14
J		
	5.1 OUTPUT POWER	
	5.1.1 CONDUCTED OUTPUT POWER	
	5.1.2 RADIATED OUTPUT POWER	
	5.2 PEAK-TO-AVERAGE RATIO 5.2.1 MEASUREMENT METHOD	-
	5.2.1 MEASUREMENT METHOD 5.2.2 PROVISIONS APPLICABLE	-
	5.2.3 MEASUREMENT RESULT	
	5.3.1 MEASUREMENT METHOD	-
	5.3.2 PROVISIONS APPLICABLE	
	5.3.3 MEASUREMENT RESULT	
	5.4 BAND EDGE	
	5.4.1 MEASUREMENT METHOD	
	5.4.2 PROVISIONS APPLICABLE	
	5.4.3 MEASUREMENT RESULT	
	5.5 SPURIOUS EMISSION	
	5.5.1 CONDUCTED SPURIOUS EMISSION	
	5.5.2 RADIATED SPURIOUS EMISSION	
	5.5.2.4 MEASUREMENT RESULT	
	5.6 FREQUENCY STABILITY	
	5.6.1 MEASUREMENT METHOD	
	5.6.2 PROVISIONS APPLICABLE	
	5.6.3 MEASUREMENT RESULT	
6	TEST SET UP PHOTOS OF THE EUT	16
U U		



7	EXTERNAL PHOTOS OF THE EUT	46
8	INTERNAL PHOTOS OF THE EUT	46



1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 2: FREQUENCY ALLOCĂ-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

FCC Part 22 Subpart H: PRIVATE LAND MOBILE RADIO SERVICES.

FCC Part 24 Subpart E: PUBLIC MOBILE SERVICES

ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

ANSI C63.26-2015: IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

FCCKDB971168D01 Power Meas License Digital Systems



2 SUMMARY

2.1 Product Description

EUT	: FH Emergency Device - V1-4G
Model Number	: FH-V1-4G
Model Declaration	: N/A
Test Model	: FH-V1-4G
Power Supply	: DC 3.7V by battrery
Hardware version	: A01_MB_V1.0
Software version	: A01_MB_V1.0
Sample ID	: TZ210101925–2#
GSM	
GSM FCC Operation Frequency	. GSM850(UL: 824 – 849 MHz/DL: 869 – 894 MHz) . GSM1900(UL: 1850 –1910 MHz/DL: 1930 – 1990 MHz)
Channel Separation	: 0.2MHz
Modulation Technology	: GMSK
Antenna Type And Gain	Internal Antenna : GSM850: -0.65 dBi PCS1900: 0.90 dBi
E-UTRA	
E-UTRA FCC Operation Frequency	 ☑ FDD Band 2 (UL: 1850 – 1910 MHz/DL: 1930 – 1990 MHz) ☑ FDD Band 4 (UL: 1710 – 1755 MHz/DL: 2110 – 2155 MHz) ☑ FDD Band 7 (UL: 2500 – 2570 MHz/DL: 2620 – 2690 MHz) ☑ FDD Band 12(UL: 699 – 716 MHz/DL: 729 – 746 MHz) ☑ FDD Band 17(UL: 704 – 716 MHz/DL: 746– 756 MHz) ☑ FDD Band 25(UL: 1850 – 1915 MHz/DL: 1930 – 1995 MHz)
Channel Separation	: 0.1 MHz
Modulation Technology	: OFDM (16QAM, QPSK)
Antenna Type And Gain	Internal Antenna FDD Band 2: 0.90 dBi, FDD Band 4: 0.50 dBi, FDD Band 7: -1.0 dBi, FDD Band 12: -10.0 dBi, FDD Band 17: -10.0 dBi, FDD Band 25: 0.70 dBi

Note: Antenna position refer to EUT Photos.



GSM Card Slot :

	Maximum ERP/EIRP (dBm)	Max. Conducted Power (dBm)	Max. Average Burst Power (dBm)
GSM 850	27.21	32.28	32.07
PCS 1900	25.85	30.23	29.94



2.2 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate

2.3 Short description of the Equipment under Test (EUT)

2.3.1 General Description

EUT is subscriber equipment in the LTE/GSM system. Frequency bands Shows in section 2.1.

2.4 Normal Accessory setting

Fully charged battery was used during the test.

2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

supplied by the manufacturer

 \bigcirc - supplied by the lab

•	SWITCH POWER ADAPTER	Model:	FX2U-050100U
		Input:	100-240Vac 50/60Hz 0.4A max
		Output:	5Vdc, 1.0A

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AJG4-FH-V1-4G filing to comply with FCC Part 22 and FCC Part 24 Rules.

2.7 Modifications

No modifications were implemented to meet testing criteria.



3 TEST ENVIRONMENT

3.1 Test Facility

FCC

Designation Number: CN1275 Test Firm Registration Number: 167722 Shenzhen Tongzhou Testing Co.,Ltd has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA

Certificate Number: 5463.01 Shenzhen Tongzhou Testing Co.,Ltd has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

IC

ISED#: 22033 CAB identifier: CN0099 Shenzhen Tongzhou Testing Co.,Ltd has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

3.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C	
Humidity:	30-60 %	
Atmospheric pressure:	950-1050mbar	



3.3 Test Description

PCS 1900:

Test Item	FCC Rule No.	Requirements	Judgement	
Effective (Isotropic)	2.1046,	EIRP ≤ 2W(33dBm)	Pass	
Radiated Power	24.232(c)		1 435	
Bandwidth	2.1049	OBW: No limit.	Pass	
Bandwidth	24.238(a)	EBW: No limit.	F 855	
Band Edges	2.1051,	-13dBm	Pass	
Band Edges	24.238(a)	- TSubin	F a 55	
Spurious Emission at	2.1051,	-13dBm	Pass	
Antenna Terminals	24.238(a)	- ISUDIII	F d 5 5	
Field Strength of	2.1053,	-13dBm	Pass	
Spurious Radiation	24.238(a)	- ISUDIII	F d 5 5	
	0.4055	the fundamental emission stays		
Frequency Stability	2.1055,	within the authorized frequency	Pass	
	24.235	block.		
Peak to average ratio	24.232(d)	<13dB	Pass	

GSM850:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	2.1046, 22.913(a)	ERP ≤ 7W(38.5dBm)	Pass
Occupied Bandwidth	2.1049	OBW: No limit.	Pass
Emission Bandwidth	22.917(b)	EBW: No limit.	Pass
Band Edges Compliance	2.1051, 22.917(a)(b)	-13dBm	Pass
Spurious Emission at Antenna Terminals	2.1051, 22.917	-13dBm	Pass
Field Strength of Spurious Radiation	2.1053, 22.917	-13dBm	Pass
Frequency Stability	2.1055, 22.355	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass
Peak to average ratio	2.1046, 2.913(a)	<13dB	Pass



3.4 Equipment Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2021/1/4	2022/1/3
2	Power Sensor	Agilent	U2021XA	MY5365004	2021/1/4	2022/1/3
3	Power Meter	Agilent	U2531A	TW53323507	2021/1/4	2022/1/3
4	Wideband Antenna	schwarzbeck	VULB 9163	958	2019/11/16	2022/11/15
5	Horn Antenna	schwarzbeck	9120D-1141	1574	2019/11/16	2022/11/15
6	EMI Test Receiver	R&S	ESCI	100849/003	2021/1/4	2022/1/3
7	Controller	MF	MF7802	N/A	N/A	N/A
8	Amplifier	schwarzbeck	BBV 9743	209	2021/1/4	2022/1/3
9	Amplifier	Tonscend	TSAMP- 0518SE		2021/1/4	2022/1/3
10	RF Cable(below 1GHz)	HUBER+SUHNE R	RG214	N/A	2021/1/4	2022/1/3
11	RF Cable(above 1GHz)	HUBER+SUHNE R	RG214	N/A	2021/1/4	2022/1/3
12	Artificial Mains	ROHDE & SCHWARZ	ENV 216	101333-IP	2021/1/4	2022/1/3
12	EMI Test Software	ROHDE & SCHWARZ	ESK1	V1.71	N/A	N/A
14	RE test software	Tonscend	JS32-RE	V2.0.2.0	N/A	N/A
15	Test Software	Tonscend	JS1120-2	V2.5.77.0418	N/A	N/A
16	UNIVERSAL RADIO COMMUNICATION	R&S	CMW500	101855	2021/1/4	2022/1/3
17	Horn Antenna	A-INFO	LB-180400- KF	J211020657	2019/11/16	2022/11/15
18	Pre-amplifier	CDSI	PAP-1840	17021	2020/03/24	2021/03/23

3.5 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltd is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.70 dB	(1)
Radiated Emission	18-40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occupied Bandwidth	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.



4 DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMW 500)to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band. ***Note: GSM 850, GSM 1900 mode have been tested during the test.

The worst condition was recorded in the test report if no other modes test data.

5 TEST CONDITIONS AND RESULTS

5.1 OUTPUT POWER

5.1.1 CONDUCTED OUTPUT POWER

5.1.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM 850, GSM 1900,)at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

5.1.1.2 MEASUREMENT RESULT



Mode	Frequency (MHz)	Reference Power	Peak Power	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power (dBm)	Peak to Average Ratio
	824.2	33	32.28	32.00	-9	23.00	0.29
GSM850	836.6	33	32.05	31.80	-9	22.80	0.25
	848.8	33	32.20	32.07	-9	23.07	0.12

Mode	Frequency (MHz)	Reference	Peak Power	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)	Peak to Average Ratio
	1850.2	30	30.27	30.02	-9	21.02	0.25
GSM1900	1880	30	30.20	29.91	-9	20.91	0.29
	1909.8	30	30.26	29.99	-9	20.99	0.27



5.1.2 RADIATED OUTPUT POWER

5.1.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-E-2016 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.

2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.

3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. TheARpl is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl

4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.

5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.

6. The EUT is then put into continuously transmitting mode at its maximum power level.

7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.

8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).

9. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi...

5.1.2.2 PROVISIONS APPLICABLE

Mode	FCC Part Section(s)	Nominal Peak Power		
GSM/GPRS 850	22.913(a)(2)	<=38.45dBm (7W). ERP		
GSM/GPRS 1900	24.232(c)	<=33dBm (2W). EIRP		



5.1.2.3 Measurement Result

	Radiated Power (ERP) for GSM 850										
		Res	Result								
Mode	Frequency	Max. Peak ERP	Polarization	Conclusion							
		(dBm)	Of Max. E.R.P								
	824.2	27.24	Horizontal	Pass							
	836.6	25.69	Horizontal	Pass							
GSM -	848.8	27.37	Horizontal	Pass							
GOM	824.2	23.25	Vertical	Pass							
	836.6	22.92	Vertical	Pass							
	848.8	22.90	Vertical	Pass							

	Radiated Power (E.I.R.P) for GSM1900										
		Re									
Mode	Frequency	Frequency Max. Peak ERP		Conclusion							
		(dBm)	Of Max. E.I.R.P								
	1850.2	24.24	Horizontal	Pass							
	1880.0	24.38	Horizontal	Pass							
GSM	1909.8	23.03	Horizontal	Pass							
GOIM	1850.2	20.71	Vertical	Pass							
	1880.0	21.56	Vertical	Pass							
	1909.8	21.26	Vertical	Pass							

Note: Above is the worst mode data.



5.2 PEAK-TO-AVERAGE RATIO

5.2.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = PPk (dBm) - PAvg (dBm).

5.2.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.



5.2.3 MEASUREMENT RESULT

Modes	Max Peak to Average Ratio(dB)	Upper limit(dB)	Result						
GSM850	0.29	13	Pass						
PCS1900	0.29	13	Pass						
Note: refer to section of 5.1.1.2.									



5.3 OCCUPIED BANDWIDTH

5.3.1 MEASUREMENT METHOD

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

5.3.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

5.3.3 MEASUREMENT RESULT

Band	Channel	Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Limit(kHz)	Verdict
GSM850	128	247.9	319		PASS
GSM850	190	248.0	320		PASS
GSM850	251	252.5	316		PASS
GSM1900	512	242.5	310		PASS
GSM1900	661	248.3	310		PASS
GSM1900	810	247.9	322		PASS



GSM850-824.2-@26dB and 99PCT Bandwidth

	um Analyzer - Occu											
Center F	RF 50 Ω req 824.200			Ce		E:PULSE req: 824.200			NAUTO/NOR	F 09:36:36 Al Radio Std:		Frequency
<u>e critor r</u>					, Trig: Free Run Avg Hold: 100/100 #Atten: 18 dB				100/100	Radio Device: BTS		
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-55.0												
Center 8	24.2 MHz									Sp	an 1 MHz	
#Res BW	5.1 kHz				#VE	3W 15 kH	z			Sweep	CF Step 100.000 kHz	
Occur	pied Bandy	width				Total P	ower		38.2	dBm		<u>Auto</u> Mar
			.94 I	kHz								Freq Offse
Transr	Transmit Freg Error 1.182 I					OBW P	ower		99	.00 %		он
x dB B	x dB Bandwidth 319.1 H			1 kHz	(Hz x dB				-26.00 dB			
MSG												
									-Volume -			

GSM850-836.6-@26dB and 99PCT Bandwidth

			lyzer - Occ												
(X) RL Cent	· .	RF	50 Ω 36 600	AC COF	RREC			E:PULSE req: 836.60	000		GN AUTO/NOR	F 09:37:45 AM Radio Std:		F	requency
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0	ccup	pied	Band	width				Total F	٥v	ver	38.6	i dBm		<u>Auto</u> Man	
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MSG											I S STATUS	5			



GSM850-848.8-@26dB and 99PCT Bandwidth

	um Analyzer - Occup									
Center Fr	RF 50 Ω req 848.8000		REC		E:PULSE req: 848.8000		IGN AUTO/NO F	F 09:38:21 Af Radio Std:		Frequency
			⊶ ain:Low	Trig: Fre #Atten: 1		Avg Hold	: 100/100	Radio Dev	ice: BTS	
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Center 84 #Res BW	18.8 MHz			#VE	3W 15 kH	z			an 1 MHz 36.8 ms	CF Step 100.000 kHz
Occup	bied Bandw	/idth			Total Po	wer	38.3	3 dBm		Auto Man
		252	.51 k	Hz						Freq Offset
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x dB B	andwidth		315.7	kHz	x dB		-26.	00 dB		
MSG							I statu:	s		

GSM1900-1850.2-@26dB and 99PCT Bandwidth

Agilent Spectrum An												
				Ce		E:PULSE req: 1.85020	0000 GHz		ORF 10:00:23 AN Radio Std:		F	requency
					ig: Fre tten: 1		Avg Ho	d: 100/100	Radio Dev	ice: BTS		
10 dB/div	Ref Offset 2 Ref 35.00											
25.0 15.0					n^	Mun war with my	4 m					Center Freq 0200000 GHz
-5.00		Mart	- Nord	1.14								
-15.0 -25.0 -35.0 -45.0 -45.0	HINN PORT	V ^{arVV} *0_13							North March and Charles	and the the		
-55.0 Center 1.85 G #Res BW 5.1	Hz				#VE	3W 15 kH			Spa	an 1 MHz 36.8 ms		CF Step 100.000 kHz
Occupied	l Bandv	vidth		Total Power 30.					.5 dBm		<u>Auto</u>	Man
		242	.48 I	kHz								Freq Offset
Transmit F	Transmit Freq Error 633					OBW P	ower	9	99.00 %			0 Hz
x dB Band	width		310.3	3 kHz		x dB		-20	6.00 dB			
MSG								I o stat	гиз			



GSM1900-1880-@26dB and 99PCT Bandwidth

	Spectrum	n Analyzer - Occ									
(X) RL	er Fre	RF 50 Ω				ISE:PULSE Freg: 1.88000		IGN AUTO/NO R	F 09:41:53A Radio Std		Frequency
0011		<u>q 1.00000</u>			Trig: Fr #Atten:	ee Run 18 dB	Avg Hold	: 100/100	Radio Dev	ice BTS	
			#16	sain:Low	watten.				Radio Dev		
10 dE	/div	Ref Offset									
25.0											Center Freq
15.0					LANG AND	www.	*				1.880000000 GHz
5.00				المهر	ΥΥ· -		1 W				
-5.00											
-15.0			July may	v. T			- ny	Ale Arriva			
-25.0			en an					ንየላ	WWW		
-35.0	ഫി പത്തി	when the way							N	MANIL LAN	
-45.0										•	
	er 1.8 BW 5				#\	/BW 15 kH	Iz			an 1 MHz 36.8 ms	CF Step
									<u> </u>		100.000 kHz Auto Man
0	ccupi	ed Band				Total P	ower	36.2	2 dBm		
	248.25 kHz										
Tr	ansmi	it Freq Erre	or	-27	73 Hz	OBW P	ower	99	9.00 %		0 Hz
x I	x dB Bandwidth 309.5					z x dB -26			00 dB		
100									_		
MSG								STATU:	2		

GSM1900-1909.8-@26dB and 99PCT Bandwidth

Agilent Spectrum	Analyzer - Occ RF 50 Ω		REC	SEN	5E:PULSE	🔥 AL	IGN AUTO/NO R	RF 09:42:51 AN	4 Feb 01, 2021		
Center Free	q 1.90980	0000 GH		Center	Freq: 1.90980 Se Run	0000 GHz Avg Hold	I: 100/100	Radio Std:	None	FI FI	requency
		#IFC	Gain:Low	#Atten:			Radio Dev	ice: BTS			
10 dB/div	Ref Offset: Ref 35.00										
Log 25.0				10.0	010b0 .						Center Freq
15.0					and the second second	Yes .					9800000 GHz
5.00			/مربعي	V		"h					
-5.00		- m/	N			hy hy	1. Mrs.				
-15.0			h.				M hip me				
-35.0	harrow	γn N						M WWWWWWW	n		
-15.0 -25.0 -35.0 -45.0	hannal.							M.M. Mary	աստությունը։		
-55.0											
Center 1.91	l GHz							Spa	an 1 MHz		0.5.01
#Res BW 5	.1 kHz			#V	BW 15 kH	IZ		Sweep	36.8 ms		CF Step 100.000 kHz
Occupie	ed Band	width			Total P	ower	36.5	36.5 dBm			Man
		247	.87 k	κHz							Freq Offset
Transmit	t Freq Erre	or	2.057	' kHz	OBW P	ower	99	9.00 %			0 Hz
x dB Bar	ndwidth	kHz	x dB -2			-26.00 dB					
100								-			
MSG							uo statu:	5			



5.4 BAND EDGE

5.4.1 MEASUREMENT METHOD

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration

2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.

4. Span was set large enough so as to capture all out of band emissions near the band edge.

5. RBW>1% of the emission bandwidth, VBW >=3 x RBW, Detector=RMS, Number of points>=2 x Span/RBW,

Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

5.4.2 PROVISIONS APPLICABLE

As Specified in FCC rules of 22.917(a), 24.238(a)and KDB 971168 D1 V03R01.

5.4.3 MEASUREMENT RESULT



GSM1900-Voice-1850.2@Pass

Agilent Spectrum Analyzer	Swept SA				
	50 Ω AC CORREC 9950000 GHz PNO: Wide ↔	SENSE:PULSE → Trig: Free Run #Atten: 18 dB	ALIGN AUTO/NORF #Avg Type: RMS Avg Hold: 100/100	09:46:08 AM Feb 01, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWWWW DET IA N N N N	Frequency
Ref Offse 10 dB/div Ref 30.0		#Atten: 18 dB	Mkr1 1.	849 996 0 GHz -18.510 dBm	Auto Tun
20.0 10.0			water and a second s	here we have a second s	Center Fre 1.849950000 G⊦
-10.0		Allow Ward Control		19.00 dBm	Start Fre 1.849450000 G⊦
-40.0 -50.0 -60.0	with get and proceeding and the second				Stop Fre 1.850450000 GF
Start 1.8494500 GI #Res BW 3.9 kHz	lz #VBV	V 11 kHz*	Sweep 8	op 1.8504500 GHz 1.60 ms (2001 pts)	CF Ste 100.000 kł Auto Ma
MKR MODE TRC SCL 1 N 1 f 2 - - - 3 - - - 4 - - - 5 - - - 6 - - -	* 1.849 996 0 GHz	-18.510 dBm	FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 0 ⊦
7 8 9 10 11 <				 >	
MSG					

GSM1900-Voice-1909.8@Pass

Agilent Spectrum Analyzer - Swept SA					
RL RF 50 Ω AC Center Freq 1.91005000	00 GHz	#Avg Type:	RMS TRAC	4 Feb 01, 2021 E 1 2 3 4 5 6 E M MM/MM/	Frequency
Ref Offset 27 dB 10 dB/div Ref 30.00 dBm	IFGain:Low #Atten: 18	dB	Mkr1 1.910 003		Auto Tune
20.0 10.0 0.00	here the second se				Center Freq 1.910050000 GHz
-10.0	<u>``\</u> `	HANNA AN		-13.00 dBm	Start Freq 1.909550000 GHz
-40.0		with which is a second s	hangalana ang ang ang ang ang ang ang ang ang	lanuluapa kula	Stop Freq 1.910550000 GHz
Start 1.9095500 GHz #Res BW 3.9 kHz	#VBW 11 kHz*		Stop 1.9105 weep 81.60 ms (MON WIDTH	2001 pts)	CF Step 100.000 kHz <u>Auto</u> Man
2 3 4 5 6	10 003 0 GHz -17.320 dE				Freq Offset 0 Hz
7 8 9 10 11				v	
MSG			STATUS		



GSM850-Voice-824.2@Pass

agilent Spectrum Analyzer - Swe			
a RL RF 50 Ω Center Freq 823.950	AC CORREC SENSE:PULSE 0000 MHZ PNO: Wide → Trig: Free Run	ALIGN AUTO/NO RF 09:48:10 AM Feb 01, 2021 #Avg Type: RMS TRACE 1 2 3 4 5 6 Avg Hold: 100/100 TYPE M WWWWW	Frequency
Ref Offset 27	dB	Mkr1 823.987 0 MHz -16.375 dBm	Auto Tun
20.0 10.0 0.00		with any the first of the first	Center Fre 823.950000 Mi
-10.0	1 where the second		Start Fr 823.450000 M
-40.0 -50.0 -60.0	antered and the second of the		Stop Fr 824.450000 M
tart 823.4500 MHz Res BW 3.9 kHz	#VBW 11 kHz*	Stop 824.4500 MHz Sweep 81.60 ms (2001 pts)	CF St 100.000 k
Max Model The Sec. Max Max<	823.987 0 MHz -16.375 dBm		Freq Off 0
G		I STATUS	

GSM850-Voice-848.8@Pass

Agilent Spectrum Analyzer - Swept	SA				
RL RF 50 Ω Center Freq 849.0500		SENSE:PULSE	ALIGN AUTO/NOR #Avg Type: RMS Avg Hold: 100/100	F 09:48:31 AM Feb 01, 2021 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 27 di 10 dB/div Ref 30.00 dB		#Atten: 18 dB		TYPE MUMUU DET A NNNNN 849.000 0 MHz -23.929 dBm	Auto Tune
20.0 10.0 0.00	ANT AND ANT AND				Center Freq 849.050000 MHz
-10.0 -20.0 -30.0		Mar Marine Walk		-13.00 dDm	Start Freq 848.550000 MHz
-40.0			Han the start and the start of the second star	⁴⁷⁴ torrowithtatic hurteren articles	Stop Freq 849.550000 MHz
Start 848.5500 MHz #Res BW 3.9 kHz	#VBW	11 kHz*	S	top 849.5500 MHz 1.60 ms (2001 pts)	CF Step 100.000 kHz <u>Auto</u> Man
1 N 1 f 2 3 -	849.000 0 MHz	-23.929 dBm			Freq Offset 0 Hz
7 8 9 10 11 <				×	
MSG					



5.5 SPURIOUS EMISSION

5.5.1 CONDUCTED SPURIOUS EMISSION

5.5.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT. 1. The level of the carrier and the various conducted spurious and harmonic frequency is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channelswere chosen to conducted emissions testing.

Typical Channels	Typical Channels for testing of GSM 850										
Channel	Frequency (MHz)										
128	824.2										
190	836.6										
251	848.8										

Typical Channels	Typical Channels for testing of PCS 1900									
Channel	Frequency (MHz)									
512	1850.2									
661	1880.0									
810	1909.8									



5.5.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

5.5.1.3 MEASUREMENT RESULT

Pass



GSM850-824.2-Voice@30mHz-1GHz@Pass

Agilent Spe		lyzer - Swe	pt SA								
(X/RL Center	Freg 5	50 Ω 15 000	AC COF	RREC	SENS	E:PULSE	<u>∧</u> ∧ Atata Atata Ata	.IGN AUTO/NOF pe: RMS	TRA	CE 1 2 3 4 5 6	Frequency
10 dB/div	Ref	Offset 27 35.00 c	P IF	NO: Fast Gain:Low	Trig: Fre #Atten: 2		Avg Holo	d: 100/100 M	۔ 1 kr1 785	44 MHz	Auto Tune
25.0 15.0 5.00											Center Fred 515.000000 MHz
-5.00 -15.0 -25.0									1	-13.00 dBm	Start Free 30.000000 MHz
-35.0		ing and a second se	ing ik her bis bis ing s								Stop Frec 1.000000000 GH;
Start 30 #Res B\	N 1.0 N		×	#VE	BW 3.0 MHz			Sweep 1.	333 ms (2	0000 GHz 20001 pts)	CF Step 97.000000 MH: <u>Auto</u> Mar
1 N 2 3 4 5 6	1 f			4 MHz	-27.777 di						Freq Offse 0 Hz
7 8 9 10 11					III						
MSG								K STATU	s		

GSM850-824.2-Voice@1GHz-9GHz@Pass

Agilent Spe		alyzer - Swe	pt SA										
Center	Freq :	50 Ω 5.00000	0000 GI			SE:PULS		#Avg T	LIGN AUTO/N ype: RMS Id: 100/100	IORF 09:37	07 AM Feb 01, 2 TRACE 1 2 3 4 TYPE MWWW	456	Frequency
10 dB/div		Offset 27	dB	'NO: Fast Gain:Low			<u>.</u>				510 8 G	Hz	Auto Tune
10.0 0.00											-13.00	HdBm	Center Freq 5.000000000 GHz
-20.0 -30.0	a alta da ta di i		1		ile a second					h, laine ka aktor (ta a		<u>Albaic</u>	Start Freq 1.000000000 GHz
-50.0													Stop Freq 9.000000000 GHz
Start 1. #Res B	N 1.0 I	MHz	×		BW 3.0 MH		FUNC		Sweep	13.33 m	p 9.000 G s (20001 p Notion value	ots)	CF Step 800.000000 MHz <u>Auto</u> Man
1 N 2 3 4 5 6 7 8 9 9 10 11			2.510	8 GHz	-24.178 (Freq Offset 0 Hz
MSG									Ц_оsta	TUS			L



GSM850-836.6-Voice@30mHz-1GHz@Pass

Agilent Spec	ctrum An	alyzer - Swe	ept SA											
KRL Center	Freq :	00.00	0000 MH2			NSE:PUL		#Avg T	LIGN AUTO/N ype: RMS Id: 100/100	ORF 0	TRA	M Feb 01, 202 CE 1 2 3 4 5 PE MWWWW	6	Frequency
10 dB/div		Offset 27	dB	NO: Fast Gain:Low	#Atten:		•				₀ 887.	77 MH: 31 dBn	N Z	Auto Tune
25.0 15.0 5.00														Center Fred 515.000000 MHz
-5.00 -15.0 -25.0						+					•	-13.00 dB		Start Fred 30.000000 MH2
-35.0 ++++++++++++++++++++++++++++++++++++	i i i i i i i i i i i i i i i i i i i	h di ni contra di dina pr												Stop Fred 1.000000000 GH:
Start 30 #Res BV	N 1.0 I	MHz	×	#VE	3W 3.0 MF	Iz	FUN		Sweep '	1.333	ms (2	0000 GH: 0001 pts	9	CF Step 97.000000 MH: uto Mar
1 N 2 3 4 5 7 7 8 9 10 11				7 MHz	-26.731	dBm	FUNC							Freq Offsel 0 Hz
MSG									Гю sta	TUS				

GSM850-836.6-Voice@1GHz-9GHz@Pass

	rum Analyzer - S	wept SA								
Center F	RF 50	000000 GH	z	SENSE:		#Avg Typ	e: RMS	TRA	M Feb 01, 2021 CE 1 2 3 4 5 6 PE M WWWWW	Frequency
10 dB/div	Ref Offset 2 Ref 20.00	IFG 27 dB	10:Fast ↔ Sain:Low	, Trig: Free #Atten: 24		Avg Hold:		r1 5.30	B 0 GHz 77 dBm	Auto Tune
10.0 0.00									-13.00 dBm	Center Freq 5.000000000 GHz
-20.0 -30.0	i a sa al ki a kara di ang di ki ang						ada galangi Jibuya sa kalan	a deservation of the second		Start Freq 1.000000000 GHz
-50.0 -60.0 -70.0										Stop Freq 9.000000000 GHz
Start 1.00 #Res BW	1.0 MHz	×		V 3.0 MHz			weep 13	.33 ms (2	.000 GHz 0001 pts) IN VALUE	CF Step 800.000000 MHz <u>Auto</u> Man
1 N 2 3 4 5 6	1 f	5.308 (0 GHz	-23.877 dB	m					Freq Offset 0 Hz
7 8 9 10 11 <				nn						
MSG								5		



GSM850-848.8-Voice@30mHz-1GHz@Pass

Agilen		trum	Ana	ılyzer	- Swe	ept S	A																	
Cen		Ero	RF		50 Ω	A	_	CORR	EC		7	SENS	E:PULS	8			GN AUT e: RM		F 09:	38:39 A TRA	M Feb O			Frequency
Cell			ч -	, IJ.	000		UW	PN	D: Fas ain:Lo	st ⊶ w		g: Freetten: 2		1			100/1	00		TY D	PE MW ET P N	NNN NNN	Ň	Auto Tune
10 dE	3/div			Offs 35.														MI		857. 22.2				Auto Tune
Log 25.0																							1	Center Freq
15.0								+					-										ł	515.000000 MHz
5.00 -5.00																								04 - 4 F
-15.0	_		+			-		+					+							•1=	-13	3.00 dBn	2	Start Freq 30.000000 MHz
-25.0 -35.0	adi di sili		ulu,		Hilling			ke ti	a ta	i nati	بديابيا	h j skopisti	les, in	Upphil	Hereby to the second	, Jacobiane de la compositione de la Compositione de la compositione de la					nei duit	н.		
-45.0													-										╢	Stop Freq 1.000000000 GHz
-55.0																								
Star #Re:									#	VBW	/ 3.0	MHz	:			S	wee	p 1.3		op 1.0 ns (2				CF Step 97.000000 MHz
MKR 1	MODE	TRC	SCL f				× 857	7.85	MHz	2	-22.1	Y 204 di	Bm	FUN	CTION	FUN	NCTION '	WIDTH		FUNCTI	ON VALI	JE	Ĩ	<u>Auto</u> Mar
2 3 4																						_		Freq Offset
5	_																							0 Hz
7 8 9																								
10 11																						_		
KSG																	(0	STATUS	5			>		

GSM850-848.8-Voice@1GHz-9GHz@Pass

	oectrum	Ana	lyzer - Swe	pt SA													
Cente	r Fre	RF q 5	50 Ω .00000	0000 G			SENSE			#Avg	Туре	IN AUTO/NO E: RMS 100/100	RF 09:38	TRAC	4 Feb 01, 202)E 1 2 3 4 5 PE MWWWW	6	Frequency
10 dB/d			Offset 27 20.00 d	dB	PNO: Fast FGain:Lov		Atten: 24							.646	6 4 GH	N Z	Auto Tune
Log 10.0															-13.00 dB		Center Freq 5.000000000 GHz
-20.0 -30.0	U polo se do s			n Turku utariki Turku utariki	in distribution of		in the state of th						lict of the second second	(ilipulat			Start Freq 1.000000000 GHz
-50.0																	Stop Freq 9.000000000 GHz
Start 1 #Res E	3W 1.	0 M			#V	/BW 3.	0 MHz		FUN	TION		weep 1:	3.33 m	s (2	.000 GH: 0001 pts	5)	CF Step 800.000000 MHz Auto Man
1 N 2 3 4 5 6 7 8 9 10 11		f			6 4 GHz	-2:	3.468 dE	3m									Freq Offset 0 Hz
MSG												K STATU	IS				



GSM1900-1850.2-Voice@30mHz-1GHz@Pass

	um Analyzer - Sw								
Center F	RF 50 Ω req 515.000	0000 MHz		NSE:PULSE	#Avg Typ	e: RMS		4 Feb 01, 2021 E 1 2 3 4 5 6 E MWWWWW	Frequency
10 dB/div	Ref Offset 27 Ref 20.00 (IFGain: 7 dB		ree Run 24 dB	Avg Hold		⊳ kr1 423.		Auto Tune
								-13.00 dBm	Center Freq 515.000000 MHz
-20.0				ilita esta farra den bias Esta parte tem temper	(ma vite) za jujedzavie 1900 na post presenej za 2000 rok				Start Freq 30.000000 MHz
-50.0 -60.0 -70.0									Stop Freq 1.000000000 GHz
Start 30.0 #Res BW	1.0 MHz	· · ·	#VBW 3.0 MH			weep 1.3	333 ms (2		CF Step 97.000000 MHz Auto Mar
1 N 2 3 4 5 6 7		423.53 MI	Hz -27.561				FUNCTI		Freq Offset 0 Hz
8 9 10 11 <									
MSG							6		

GSM1900-1850.2-Voice@1GHz-7GHz@Pass

Agilent Spect	rum Ana	alyzer - Swe	pt SA									
(X) RL Center F	RF req 4	50 Ω 1.00000	0000 GH			E:PULSE	#Avg	ALIGN AU Type: RN Iold: 100/	1S	TRA	M Feb 01, 2021 CE 1 2 3 4 5 6 PE M WWWWWW	Frequency
10 dB/div		Offset 27 5 35.00 d	dB	NO: Fast • Gain:Low	#Atten: 2		Avgir	1010. 100/		r1 2.69	6 5 GHz 62 dBm	Auto Tune
25.0												Center Freq 4.000000000 GHz
-5.00 -15.0 -25.0	bla ats ta W	والمراجع		1	the second second second second second		المتعلم في إلى ال	alout at at 1	e hurba a fait		-13.00 dBm	Start Freq 1.000000000 GHz
-35.0 -45.0 -55.0												Stop Freq 7.000000000 GHz
Start 1.00 #Res BW	1.0 N		×		W 3.0 MHz	F	UNCTION	Swee	<u> </u>	.67 ms (2	.000 GHz 0001 pts) INVALUE	CF Step 600.000000 MHz <u>Auto</u> Man
1 N 2 3 3 5 6 7 8 9 9 9 10 11 (2.696	5 GHz	-23.762 d	Bm						Freq Offset 0 Hz
MSG								ų.	STATUS	5		



GSM1900-1850.2-Voice@7GHz-13.6GHz@Pass

Agilent Spectr	um Analyzer -	Swept SA								
Center F		0000000		SENSE		#Avg	ALIGN AUTO/NO Type: RMS old: 100/100	TR	AM Feb 01, 2021 ACE 1 2 3 4 5 6 TYPE M WAAWAAA	
10 dB/div	Ref Offset Ref 20.0	1 1 27 dB	PNO: Fast ← FGain:Low	#Atten: 24				1 13.19	3 44 GHz 806 dBm	Auto Tune
10.0 0.00									-12 09 dBm	Center Freq 10.300000000 GHz
-20.0 -30.0					افراد الافراد ورواً: برد برد المعالم وروا		Lyrun and Safetyikk Joyan	an the state of th		Start Freq 7.000000000 GHz
-50.0 -60.0 -70.0										Stop Frec 13.60000000 GHz
Start 7.00 #Res BW	1.0 MHz	×	#VB	W 3.0 MHz		ICTION	Sweep 1	2.00 ms (3.600 GHz (20001 pts)	
1 N 1 2 3 4 5 6 7 7 8 9 10 11			44 GHz	-23.806 dB						Freq Offset

GSM1900-1850.2-Voice@13.6GHz-20GHz@Pass

			alyzer - S												
LXI RI		RF			CORREC		SENSE	E:PULSE		ALIGN Type:			M Feb 01, 2021 CE 1 2 3 4 5		Frequency
Cen	ter F	req	10.800	500000	PNO: F IFGain:	ast ↔ Low	Trig: Free #Atten: 24				00/100	TY	PE MWWWWW ET P N N N N	₩ -	
	B/div		f Offset: f 20.00								Mkr1		84 GHz 94 dBm		Auto Tune
Log 10.0														╢	Center Freq
0.00												_ 1_	-13.00 dBn		16.80000000 GHz
-20.0	المتألفين	indicate at the	and a state of the state	1	ويتعالم العرابي والم			Standborger Ladie	التصبيبان الما	الروافا					Start Freq
-30.0 -40.0														1	13.60000000 GHz
-50.0 -60.0														ł	Stop Freq
-70.0															20.00000000 GHz
	t 13.0 s BW					#VBW	3.0 MHz					.00 ms (2	.000 GHz 0001 pts		CF Step 640.000000 MHz Auto Man
1	MODE T	RC SC 1 f		× 19.0)27 84 GH	lz	-18.394 dE		UNCTION	FUNC	TION WIDTH	FUNCTI	DN VALUE		Hatto Mari
2 3 4 5															Freq Offset 0 Hz
6 7 8															
9 10 11															
MSG							IIII				I STATUS				



GSM1900-1880-Voice@30mHz-1GHz@Pass

Agilent Spectrum Analyzer - Sy	wept SA				
x RL RF 50: Center Freq 515.00	0000 MHz PNO: Fast	SENSE:PULSE	ALIGN AUTO/NO #Avg Type: RMS Avg Hold: 100/100	RF 09:41:57 AM Feb 01, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET IP N N N N	Frequency
Ref Offset 2 10 dB/div Ref 20.00		#Atten: 24 dB	М	kr1 918.91 MHz -27.693 dBm	Auto Tun
10.0 0.00				-13.00 dBm	Center Fre 515.000000 M⊢
-20.0 -30.0	ter an anna an a				Start Fre 30.000000 MH
-50.0					Stop Fre 1.000000000 GF
Start 30.0 MHz #Res BW 1.0 MHz MKR MODE TRO SCL	#VB	W 3.0 MHz	Sweep 1.	Stop 1.0000 GHz 333 ms (20001 pts)	CF Ste 97.000000 Mi <u>Auto</u> Mi
1 N 1 f 2 - - - - 3 - - - - - 4 -	918.91 MHz	-27.693 dBm			Freq Offs 0 F
8 9 10 10 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1		ill.	I STATU		

GSM1900-1880-Voice@1GHz-7GHz@Pass

Agilent Spect											
Center F	RF req 4.0	50 Q		RREC		E:PULSE	#Avg Typ		TRAC	E123456	Frequency
10 dB/div		fset 27 5.00 d	l⊧ dB	NO: Fast ↔ Gain:Low	#Atten: 24		Avg Hold		r1 2.55	et P NNNN B 5 GHz 47 dBm	Auto Tune
25.0											Center Freq 4.000000000 GHz
-5.00			1=	i dagi sa setelakan				و مراجع م	and a start the start	-13.00 dBm	Start Freq 1.000000000 GHz
-35.0 -45.0 -55.0											Stop Freq 7.000000000 GHz
Start 1.00 #Res BW	1.0 MH	Iz	×	#VB	W 3.0 MHz			weep 10	.67 ms (2	.000 GHz 0001 pts)	CF Step 600.000000 MHz <u>Auto</u> Mar
1 N 2 3 4 5 6	1 f		2.558	5 GHz	-23.447 di	3m				i	Freq Offset 0 Hz
7 8 9 10 11										v	
MSG									3		



GSM1900-1880-Voice@13.6GHz-20GHz@Pass

		ectru	m An	alyzer - Sv	wept SA														
ເ <mark>೫</mark> ℝ Cen		Fre	RF eq	50 t 16.800			Hz		SENSE			#Avg	Туре	IN AUTO/NC IN AUTO/NC IN AUTO/NC IN AUTO/NC	ORF (TRA	M Feb 01, 20 CE 1 2 3 4 /PE M WWW	56	Frequency
10 d	B/div	•		Offset 2			0: Fast ain:Low		#Atten: 24		•					, 9.060	16 GH	N N	Auto Tune
Log 10.0 0.00 -10.0																1_	-13.00 (Center Fred 16.800000000 GHz
-20.0 -30.0 -40.0	****		1			(http://www.							, 11 11 11						Start Fred 13.600000000 GHz
-50.0 -60.0 -70.0																			Stop Frec 20.000000000 GHz
Star #Re	s B	W 1	1.0	MHz			#V	вw	3.0 MHz					•	6.00) ms (2	0.000 GI 20001 p		CF Step 640.000000 MHz Auto Mar
■KF 1 2 3 4 5 6 7 8 9 10 11 <					× 19.0	060 16	GHZ		-18.000 dE	3m	FUNC					FUNCT	ION VALUE		Freq Offset
MSG														K STAT	US				

GSM1900-1880-Voice@7GHz-13.6GHz@Pass

Agilent Spec		er - Swept SA								
LXI RL	RF	50Ω AC		SENS	E:PULSE	AL AL#			M Feb 01, 2021 CE 1 2 3 4 5 6	Frequency
Center	Freq 10.	30000000	PNO: Fast	井 Trig: Fre	e Run	Avg Hold		TY	PE M WANNAMA	
			IFGain:Low	#Atten: 2	4 dB			C	ET P N N N N N	
	Pof Off	set 27 dB					Mkr1		16 GHz	Auto Tune
10 dB/div).00 dBm						-23.3	89 dBm	
Log										
10.0										Center Freq
0.00										10.300000000 GHz
-10.0									-13.00 - 10 m	
-20.0									♦ '	Otherst Error
-30.0	والمناط ومراجع	a have designed as a state of the	الاستعادالي المحمداة	بالألام المعلم والمراج ومأطلاته	La Lundar	and the state of the state				Start Freq
-40.0										7.000000000 GHz
-50.0										Stop Freq
-60.0										13.60000000 GHz
-70.0										
Start 7.0								Oten 47	600 OU-	
#Res BV		7	#\/F	W 3.0 MHz		s	ween 12		.600 GHz 0001 pts)	CF Step 660.000000 MHz
			#VL					· ·		Auto Man
MKR MODE	TRC SCL	42.2	853 16 GHz	-23.389 dl		INCTION FU	NCTION WIDTH	FUNCTI	ON VALUE	
2		10.0		-23.389 0	200					
3 4										Freq Offset
5										0 Hz
6										
8										
9										
11									~	
<					÷		•			
MSG								5		



GSM1900-1909.8-Voice@30mHz-1GHz@Pass

Agilent S	Spectru	m Ana	lyzer - S	wept SA	l											
Cente	er Fro	_{RF} eq 5	50 15.00		MH	RREC		SENSE	::PULSE		¥Avg Typ	GN AUTO/N e: RMS : 100/100	ORF 09:43	TRACE TYPE	eb 01, 2021 1 2 3 4 5 6 MWWWW	Frequency
10 dB/	/div		Offset 2 20.00		IF	Gain:Low		#Atten: 24	l dB			N	/lkr1 9 -28	42.8	7 MHz dBm	Auto Tune
Log - 10.0 - 0.00 -															-13.00 dBm	Center Fred 515.000000 MH:
-20.0 - -30.0 -		aji ya ka kati										a pinaki a Maraki a p		aningi pinta	1	Start Free 30.000000 MH
-50.0 — -60.0 — -70.0 —																Stop Fre 1.000000000 GH
Start #Res	BW 1	1.0 N			×	#V	BW :	3.0 MHz		FUNCTIO		weep '	1.333 m		<u> </u>	CF Ste 97.000000 MH uto Ma
1 N 2 3 4 5 6 7 8		f				7 MHz		-28.091 dE								Freq Offse 0 H
9 10 11 <								nui				I o sta	TUS			

GSM1900-1909.8-Voice@1GHz-7GHz@Pass

Agilent	Spectr															_
Cent	er Fi	req		50 Ω)000	AC 0000		z]	E:PULSE		#Avg Typ	e: RMS	TF	AM Feb 01, 2021 RACE 1 2 3 4 5 6	Frequency
		Bo	F 0.95a	ot 27	d۵		IO: Fast ain:Lov		, Trig: Fre #Atten: 2			Avg Hold			TYPE MWWWW DET P NNNNN 87 3 GHz	Auto Tune
10 dB. Log r	Ref Offset 27 dB -23.543 dBm -23.543 dBm															
25.0 - 15.0 -																Center Freq 4.000000000 GHz
5.00 - -5.00 - -15.0 =								∡ 1=							-13.00 dBm	Start Freq
-25.0	a and a line	لير الرو							and a start of the	فالقارب والقا	أدادين					1.00000000 GHz
-35.0 = -45.0 = -55.0 =																Stop Freq 7.000000000 GHz
Start #Res	BW	1.0	MHz				#V	/BW	3.0 MHz				-	0.67 ms	7.000 GHz (20001 pts)	CF Step 600.000000 MHz Auto Man
MKR MI	ODE TF	ic sci f			X 3	.187 3	3 GHz		Y -23.543 d		FUNC	TION FU	NCTION WIDT	H FUNC	TION VALUE	Man
2 3 4 5 6																Freq Offset 0 Hz
8 9 10																
11															<u>×</u>	
MSG													K STAT	us		р



GSM1900-1909.8-Voice@7GHz-13.6GHz@Pass

Center Freq 10.30000000 GHz Trig: Free Run #Avg Type: RMS Trig: Gree Run #Avg Type: RMS Trig: Gree Run AvgHold: 100/100 Trig: Free Run #Avg Type: RMS Muthows Auto Tune Center Frequency 100	Agilent Spectr	um Analyz	zer - Swept SA									
Ref Offset 27 dB Mkr1 13.303 33 GHz Auto Tune 10 dB/div Ref 20.00 dBm 22.945 dBm Center Freq 10 dB/div Ref 20.00 dBm 22.945 dBm Center Freq 10 dB/div Ref 20.00 dBm 22.945 dBm Center Freq 10 dB/div Ref 20.00 dBm 22.945 dBm Center Freq 10 dB/div Ref 20.00 dBm 22.945 dBm 22.945 dBm 10 dB/div Ref 20.00 dBm 22.945 dBm 22.945 dBm 200	Center F			00 GHz				#Avg T	/pe: RMS	TRA	CE 1 2 3 4 5 6	
100	10 dB/div			IFGain:Lo						13.303	33 GHz	-
-200 -200	10.0 0.00											
-60.0 - <td>-30.0</td> <td></td> <td></td> <td>e kalista metye</td> <td>n patrika dan kasa partika ka</td> <td>and the fishers that</td> <td></td> <td></td> <td>na an an adata an the sa at the</td> <td>u in an an</td> <td></td> <td></td>	-30.0			e kalista metye	n patrika dan kasa partika ka	and the fishers that			na an an adata an the sa at the	u in an		
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 12.00 ms (20001 pts) 660.000000 MHz 1 N 1 f 13.303 33 GHz -22.945 dBm 600.0000 MHz 1 N 1 f 13.303 33 GHz -22.945 dBm Function wight Function water Function function function water Function function function function water Function functin functin function function function functin function function fu	-60.0											
1 N 1 f 13.303 33 GHz -22.945 dBm 2 - - - - 3 - - - - 3 - - - - 4 - - - - 5 - - - - 6 - - - - 7 - - - - 9 - - - - 10 - - - - 11 - - - -	#Res BW	1.0 MH			/BW 3.0 N	1Hz	FUNC		· ·	2.00 ms (2	20001 pts)	660.000000 MHz
	1 N 1 2 3 4 5 6 7 8 9 10						FUNC		GNCHON WIDTH			

GSM1900-1909.8-Voice@13.6GHz-20GHz@Pass

Agilent S	Spectru		yzer - Sw	vept SA												
(XI RL Cente	ar Er	RF	50 s 6.800					SENSE	:PULSE	#A		GN AUTO/NOF e: RMS		M Feb 01, 202		Frequency
	21 1 1		0.000		PN	0: Fast ain:Low		ig: Free tten: 24				100/100	T' I		N N	Auto Tune
10 dB/	div		Offset 2 20.00										19.060 -17.5	48 GH 69 dBr		
10.0				-						_					-	Center Freq
0.00																16.800000000 GHz
-10.0					-					-			→ ¹ -	-13.00 dE	m	
-20.0	iles des.	بالم مددي	يلدن بستعادين		و بينور معيان		le l					مراجع الله ومالية. مرجع مرجع الله ومالية ال				Start Freq
-30.0 -40.0 -																13.600000000 GHz
-50.0																
-60.0															4	Stop Freq
-70.0															-	20.00000000 GHz
Start #Res						#VE	SW 3.0	MHz			S	weep 16	Stop 20 6.00 ms (2	0.000 GH 20001 pt	5)	CF Step 640.000000 MHz Auto Man
		SCL		X 19 (060 48	GHz	-17	Y .569 dE		UNCTION	FUN	ICTION WIDTH	FUNCT	ION VALUE		<u>Auto</u> Man
23				10.0	,00 40		-11		2111		+					Freq Offset
4	-										-				=	0 Hz
6 7	+					_					-					
8	+					_					-					
<u>10</u> 11	+					_					-					
<	-					- 1		Ш	-		-			>		
MSG												Ko statu	S			



5.5.2 RADIATED SPURIOUS EMISSION

5.5.2.1 MEASUREMENT METHOD

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

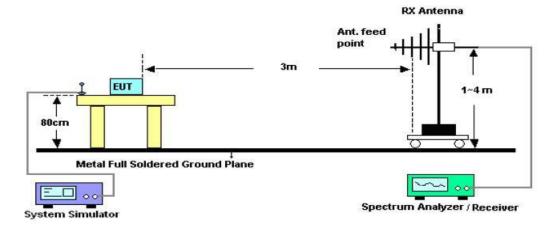
5.5.2.2 TEST SETUP



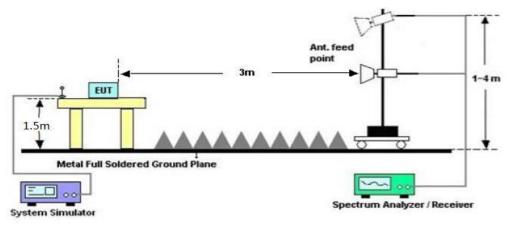
3m RX Antenna B0cm Metal Full Soldered Ground Plane System Simulator System Simulator

Radiated Emission Test-Setup Frequency Below 30MHz

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



5.5.2.3 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum,
 the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least
 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at



least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out. **Note:** only result the worst condition of each test mode:



5.5.2.4 MEASUREMENT RESULT

GSM 850:

	The Worst Test Results for Channel 251/848.8 MHz										
Frequency	Emission Level	Limits	Margin	Comment							
(MHz)	(dBm)	(dBm)	(dB)								
1697.24	-58.13	-13	45.13	Horizontal							
3394.82	-42.63	-13	29.63	Horizontal							
5092.55	-51.87	-13	38.87	Horizontal							
1697.26	-41.35	-13	28.35	Vertical							
3394.92	-49.45	-13	36.45	Vertical							
5092.59	-44.97	-13	31.97	Vertical							

PCS 1900:

	The Worst Test Results for Channel 661/1880.0 MHz										
Frequency	Emission Level	Limits	Margin	Comment							
(MHz)	(dBm)	(dBm)	(dB)	Comment							
3759.78	-55.46	-13	42.46	Horizontal							
7519.71	-38.26	-13	25.26	Horizontal							
11279.66	-50.92	-13	37.92	Horizontal							
3759.64	-38.13	-13	25.13	Vertical							
7519.75	-50.76	-13	37.76	Vertical							
11279.76	-46.79	-13	33.79	Vertical							

RESULT: PASS

Note:

1. Margin = Limit - Emission Level

2. Below 30MHZ no Spurious found and Above is the worst mode data.



5.6 FREQUENCY STABILITY

5.6.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

- 1 Measure the carrier frequency at room temperature.
- 2 Subject the EUT to overnight soak at -10° C.

3 With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4 Repeat the above measurements at 10° C increments from -10° C to $+50^{\circ}$ C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

5 Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

6 Subject the EUT to overnight soak at +50℃.

7 With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8 Repeat the above measurements at 10° C increments from +50°C to -10°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

9 At all temperature levels hold the temperature to +/- 0.5° during the measurement procedure.

5.6.2 PROVISIONS APPLICABLE

5.6.2.1 FOR HAND CARRIED BATTERY POWERED EQUIPMENT

According to the ANSI/TIA-603-E-2016, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.2VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.



5.6.2.2 FOR EQUIPMENT POWERED BY PRIMARY SUPPLY VOLTAGE

According to the ANSI/TIA-603-E-2016,the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 20°C.



5.6.3 MEASUREMENT RESULT

Pass

For GSM

Test Band=GSM850/GSM1900

	Voltage											
Band	Channel	Voltage	Temperature	Deviation	Deviation	Limit	Verdict					
Danu	Channel	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	Verdict					
GSM850	128	VL	TN	11.65	0.0139	2.5	PASS					
GSM850	128	VN	TN	8.42	0.0101	2.5	PASS					
GSM850	128	VH	TN	13.29	0.0159	2.5	PASS					
GSM850	190	VL	TN	7.72	0.0092	2.5	PASS					
GSM850	190	VN	TN	11.28	0.0135	2.5	PASS					
GSM850	190	VH	TN	8.09	0.0097	2.5	PASS					
GSM850	251	VL	TN	8.74	0.0105	2.5	PASS					
GSM850	251	VN	TN	7.06	0.0084	2.5	PASS					
GSM850	251	VH	TN	10.72	0.0128	2.5	PASS					
GSM1900	512	VL	TN	13.71	0.0073	2.5	PASS					
GSM1900	512	VN	TN	11.85	0.0063	2.5	PASS					
GSM1900	512	VH	TN	13.23	0.0070	2.5	PASS					
GSM1900	661	VL	TN	26.13	0.0139	2.5	PASS					
GSM1900	661	VN	TN	22.14	0.0118	2.5	PASS					
GSM1900	661	VH	TN	27.85	0.0148	2.5	PASS					
GSM1900	810	VL	TN	27.32	0.0145	2.5	PASS					
GSM1900	810	VN	TN	26.28	0.0140	2.5	PASS					
GSM1900	810	VH	TN	24.95	0.0133	2.5	PASS					

			Те	emperature			
Band		Voltage	Temperature	Deviation	Deviation	Limit	Verdict
Dallu	Channel	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	verdict
GSM850	128	VN	-30	9.86	0.0118	2.5	PASS
GSM850	128	VN	-20	8.33	0.0100	2.5	PASS
GSM850	128	VN	-10	11.14	0.0133	2.5	PASS
GSM850	128	VN	0	8.09	0.0097	2.5	PASS
GSM850	128	VN	10	11.15	0.0133	2.5	PASS
GSM850	128	VN	20	8.4	0.0100	2.5	PASS
GSM850	128	VN	30	10.28	0.0123	2.5	PASS
GSM850	128	VN	40	10.56	0.0126	2.5	PASS
GSM850	128	VN	50	9.67	0.0116	2.5	PASS
GSM850	190	VN	-30	10.11	0.0121	2.5	PASS
GSM850	190	VN	-20	13.25	0.0158	2.5	PASS
GSM850	190	VN	-10	8.09	0.0097	2.5	PASS
GSM850	190	VN	0	10.25	0.0123	2.5	PASS
GSM850	190	VN	10	7.63	0.0091	2.5	PASS
GSM850	190	VN	20	8.5	0.0102	2.5	PASS



			Те	emperature			
David	Ohannal	Voltage	Temperature	Deviation	Deviation	Limit) (a mali a t
Band	Channel	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	Verdict
GSM850	190	VN	30	9.8	0.0117	2.5	PASS
GSM850	190	VN	40	9.91	0.0119	2.5	PASS
GSM850	190	VN	50	9.96	0.0119	2.5	PASS
GSM850	251	VN	-30	9.54	0.0114	2.5	PASS
GSM850	251	VN	-20	7.8	0.0093	2.5	PASS
GSM850	251	VN	-10	7.76	0.0093	2.5	PASS
GSM850	251	VN	0	11.27	0.0135	2.5	PASS
GSM850	251	VN	10	6.44	0.0077	2.5	PASS
GSM850	251	VN	20	6.9	0.0083	2.5	PASS
GSM850	251	VN	30	6.41	0.0077	2.5	PASS
GSM850	251	VN	40	12.4	0.0148	2.5	PASS
GSM850	251	VN	50	8.93	0.0107	2.5	PASS
GSM1900	512	VN	-30	12.38	0.0066	2.5	PASS
GSM1900	512	VN	-20	10.61	0.0056	2.5	PASS
GSM1900	512	VN	-10	8.04	0.0043	2.5	PASS
GSM1900	512	VN	0	9.98	0.0053	2.5	PASS
GSM1900	512	VN	10	8.28	0.0044	2.5	PASS
GSM1900	512	VN	20	7.04	0.0037	2.5	PASS
GSM1900	512	VN	30	9.33	0.0050	2.5	PASS
GSM1900	512	VN	40	13.14	0.0070	2.5	PASS
GSM1900	512	VN	50	10.81	0.0058	2.5	PASS
GSM1900	661	VN	-30	24.51	0.0130	2.5	PASS
GSM1900	661	VN	-20	26.2	0.0139	2.5	PASS
GSM1900	661	VN	-10	25.4	0.0135	2.5	PASS
GSM1900	661	VN	0	24.45	0.0130	2.5	PASS
GSM1900	661	VN	10	26.27	0.0140	2.5	PASS
GSM1900	661	VN	20	25.5	0.0136	2.5	PASS
GSM1900	661	VN	30	26.86	0.0143	2.5	PASS
GSM1900	661	VN	40	23.29	0.0124	2.5	PASS
GSM1900	661	VN	50	27.73	0.0148	2.5	PASS
GSM1900	810	VN	-30	26.09	0.0139	2.5	PASS
GSM1900	810	VN	-20	22.72	0.0121	2.5	PASS
GSM1900	810	VN	-10	25.43	0.0135	2.5	PASS
GSM1900	810	VN	0	21.74	0.0116	2.5	PASS
GSM1900	810	VN	10	26.73	0.0142	2.5	PASS
GSM1900	810	VN	20	27.9	0.0148	2.5	PASS
GSM1900	810	VN	30	29.44	0.0157	2.5	PASS
GSM1900	810	VN	40	31.7	0.0169	2.5	PASS
GSM1900	810	VN	50	26.58	0.0141	2.5	PASS



6 Test Set up Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

7 External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

8 Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.