

TEST REPORT

FCC Sub6 n12 Test for TFGMEIBBCD4 Class II Permissive Change

APPLICANT LG Electronics Inc.

REPORT NO. HCT-RF-2409-FC008-R1

DATE OF ISSUE October 7, 2024

> **Tested by** Jung Ki Lim

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Technical Manager Jong Seok Lee



F-TP22-03(Rev.06)

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T E S T R E P O R T	REPORT NO. HCT-RF-2409-FC008-R1 DATE OF ISSUE October 07, 2024 Additional Model TFGMEIBBCD5, TFGMEIBBCD6, TFGMEIBBCD7, TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCD2
Applicant	LG Electronics Inc. 10, MagokJungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
Product Name Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
Date of Test	May 07, 2024 ~ June 19, 2024
Location of Test	■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi- do, Republic of Korea)
FCC ID	BEJTFGMEIBBCD4
FCC Classification	PCS Licensed Transmitter (PCB)
Test Standard Used	FCC Rule Part(s): §27
Test Results	PASS



REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	September 26, 2024	Initial Release
1	October 07, 2024	Added the Note (Page 21.)

Notice

Content

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

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The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	10, Magok Jungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
FCC ID:	BEJTFGMEIBBCD4
Application Type:	Class II Permissive Change
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 27
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model(s)	TFGMEIBBCD5,TFGMEIBBCD6,TFGMEIBBCD7,TFGMEIBBCD8,
Additional Model(s)	TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC
SCS(kHz):	15
Bandwidth(MHz):	5, 10, 15
Waveform:	CP-OFDM, DFT-S-OFDM
Modulation: DFT-S-OFDM: PI/2 BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM	
	CP-OFDM: QPSK, 16 QAM, 64 QAM, 256 QAM 701.5 MHz – 713.5 MHz (Sub6 n12 (5 MHz))
Tx Frequency:	701.5 MHz = 713.5 MHz (Subb fill (S MHz)) 704.0 MHz = 711.0 MHz (Subb fill (10 MHz))
TXTTequency.	706.5 MHz – 708.5 MHz (Sub6 n12 (15 MHz))
Date(s) of Tests:	May 07, 2024 ~ June 19, 2024
	Radiated : EBR36018942K_#30
Serial number:	Conducted : EBR36018942K_#14,
	EBR36018942K_#30 (Conducted Output Power)
External Antenna	ANT5:86531607
Information	ANT4:86575530
	DUT4:85608774



1.1. MAXIMUM OUTPUT POWER

				EF	RP	El	₹P
Mode	Tx Frequency	Emission	Modulation	External Antenna		Internal Antenna	
(MHz)	(MHz)	Designator	Modulation	Max. Power	Max. Power	Max. Power	Max. Power
				(W)	(dBm)	(W)	(dBm)
		4M56G7D	PI/2 BPSK	0.169	22.29	0.865	29.37
		4M57G7D	QPSK	0.158	21.99	0.830	29.19
Sub6 n12 (5)	701.5 - 713.5	4M58W7D	16 QAM	0.130	21.14	0.658	28.18
		4M59W7D	64 QAM	0.095	19.76	0.469	26.71
		4M57W7D	256 QAM	0.059	17.72	0.310	24.92
		8M97G7D	PI/2 BPSK	0.172	22.35	0.879	29.44
		9M00G7D	QPSK	0.167	22.22	0.877	29.43
Sub6 n12 (10)) 704.0 - 711.0	8M98W7D	16 QAM	0.133	21.23	0.682	28.34
		8M97W7D	64 QAM	0.094	19.73	0.483	26.84
		8M95W7D	256 QAM	0.060	17.78	0.308	24.89
		13M4G7D	PI/2 BPSK	0.175	22.44	0.912	29.60
		13M4G7D	QPSK	0.175	22.42	0.904	29.56
Sub6 n12 (15)	Sub6 n12 (15) 706.5 – 708.5	13M5W7D	16 QAM	0.140	21.46	0.726	28.61
		13M5W7D	64 QAM	0.100	19.99	0.518	27.14
		13M4W7D	256 QAM	0.064	18.03	0.321	25.06



2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a GM Onstar Gen12 ROW with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea**





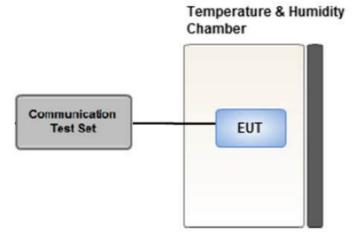
3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- KDB 971168 D01 v03r01 – Section 5.2
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12



3.2 CONDUCTED OUTPUT POWER



Test setup

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.

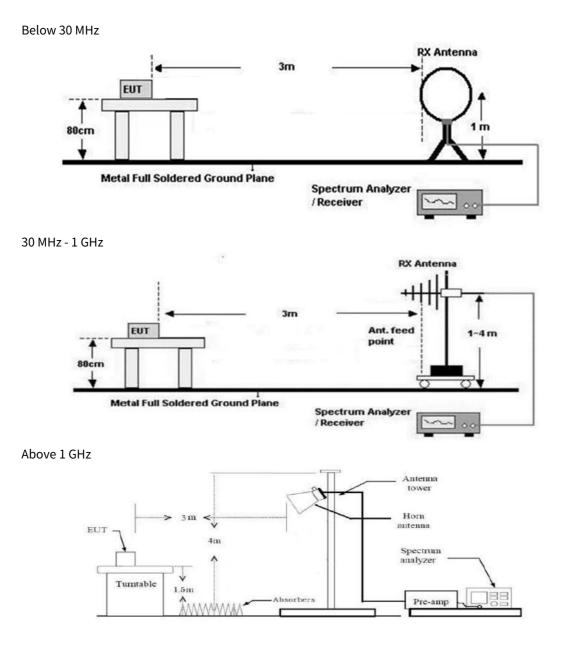


3.3 RADIATED TEST

Test Overview

Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration





3.3.1 RADIATED POWER

Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1 MHz
- 3. VBW \geq 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS

7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".

8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.

9. Trace mode = trace averaging (RMS) over 100 sweeps

10. The trace was allowed to stabilize

Test Note

- 1. The EUT is placed on a turntable, which is 0.8 m above ground plane. (Below 1 GHz)
- 2. The EUT is placed on a turntable, which is 1.5 m above ground plane. (Above 1 GHz)
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 5. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
- 6. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.
- 7. Total(dBµV/m) = Measured Value(dBµV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
- 8. EIRP (dBm)
 - = Total ($dB\mu V/m$) + 20 log D 104.8 (where D is the measurement distance in meters. D=3)
 - = Total (dBµV/m) 95.2(dB)
- 9. ERP(dBm) = EIRP(dBm) 2.15(dB)



3.3.2 RADIATED SPURIOUS EMISSIONS

Test Settings

- 1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
- 2. VBW \geq 3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = Peak
- 6. Trace mode = Max Hold
- 7. The trace was allowed to stabilize
- 8. Test channel : Low/ Middle/ High
- 9. Frequency range : We are performed all frequency to 10th harmonics from 9 kHz.

Test Note

1. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.

The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data

2. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Below 30 MHz

- 1. The loop antenna was placed at a location 3 m from the EUT
- 2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.

4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 5. Distance Correction Factor(0.009 MHz 0.490 MHz) = 40log(3 m/300 m) = 80 dB Measurement Distance : 3 m
- 6. Distance Correction Factor(0.490 MHz 30 MHz) = 40log(3 m/30 m) = -40 dB Measurement Distance : 3 m
- 7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
- 8. EIRP (dBm)

= Total ($dB\mu V/m$) + 20 log D - 104.8 (where D is the measurement distance in meters. D=3) = Total ($dB\mu V/m$) - 95.2(dB)

9. ERP(dBm) = EIRP(dBm) - 2.15(dB)



KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Below 1 GHz

- 1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
- 2. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 5. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
- 7. Total(dB μ V/m) = Measured Value(dB μ V) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
- 8. EIRP (dBm)
 - = Total $(dB\mu V/m)$ + 20 log D 104.8 (where D is the measurement distance in meters. D=3)
 - = Total (dB μ V/m) 95.2(dB)
- 9. ERP(dBm) = EIRP(dBm) 2.15(dB)

Above 1 GHz

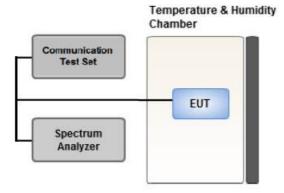
1. The EUT is placed on a turntable, which is 1.5 m above ground plane.

- 2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. Total(dBµV/m) = Measured Value(dBµV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)

- 8. EIRP (dBm)
 - = Total (dB $\mu V/m)$ + 20 log D $\,-\,$ 104.8 (where D is the measurement distance in meters. D=3)
 - = Total (dBµV/m) 95.2(dB)



3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

- 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. Set the measurement interval as follows:
 - .- for continuous transmissions, set to 1 ms,
 - .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- 4. Record the maximum PAPR level associated with a probability of 0.1 %.

② Alternate Procedure for PAPR

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as $\mathsf{P}_{\mathsf{Pk}}.$

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{Avg} . Determine the P.A.R. from:

 $P.A.R_{(dB)} = P_{Pk}_{(dBm)} - P_{Avg(dBm)} (P_{Avg} = Average Power + Duty cycle Factor)$

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Test Settings(Peak Power)

The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW $\geq 3 \times$ RBW.

- 1. Set the RBW \geq OBW.
- 2. Set VBW \geq 3 × RBW.
- 3. Set span $\geq 2 \times OBW$.
- 4. Sweep time $\geq 10 \times (number of points in sweep) \times (transmission symbol period).$
- 5. Detector = peak.
- 6. Trace mode = max hold.
- 7. Allow trace to fully stabilize.
- 8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

- 1. Set span to $2 \times to 3 \times the OBW$.
- 2. Set RBW \geq OBW.
- 3. Set VBW \geq 3 × RBW.
- 4. Set number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
- 5. Sweep time:

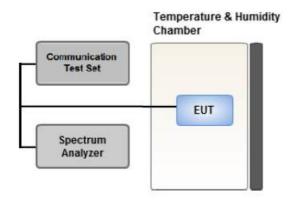
Set \geq [10 × (number of points in sweep) × (transmission period)] for single sweep

(automation-compatible) measurement. The transmission period is the (on + off) time.

- 6. Detector = power averaging (rms).
- 7. Set sweep trigger to "free run."
- 8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
- 9. Use the peak marker function to determine the maximum amplitude level.
- Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.



3.5 OCCUPIED BANDWIDTH.



Test setup

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.

The EUT makes a call to the communication simulator.

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1 5% of the 99% occupied bandwidth observed in Step 7



Communication Test Set EUT Spectrum Analyzer

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

Test setup

Test Overview

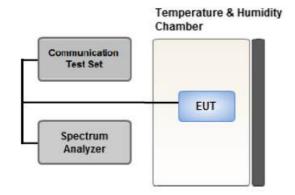
The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

- 1. RBW = 1 MHz
- 2. VBW \geq 3 MHz
- 3. Detector = RMS
- 4. Trace Mode = trace average
- 5. Sweep time = auto
- 6. Number of points in sweep $\geq 2 \times \text{Span} / \text{RBW}$



3.7 BAND EDGE



Test setup

Test Overview

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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of

operation were investigated and the worst case configuration results are reported in this section.

Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW > 1 % of the emission bandwidth
- 4. VBW > 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize



Test Notes

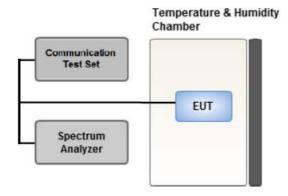
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.) The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.



3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

1. Temperature:

The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.

- 2. Primary Supply Voltage:
 - .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
 - .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter.

Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.



3.9 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported. Mode : SA, NSA
- Worst case : SA

Mode : Internal Antenna, External Antenna (ANT 5, ANT 4, DUT 4)

Worst case : Internal Antenna, External Antenna (ANT 5)

- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- Please refer to the table below.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported.
- (External Antenna Worst case : 15 MHz)

(Internal Antenna Worst case : 15 MHz)

- TFGMEIBBCD4 & additional models were tested and the worst case results are reported. (Worst case : TFGMEIBBCD4)
- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).

All EN-DC mode of operation (=anchor) were investigated and the test results were measured No Peak Found.

The test results which are attenuated more than 20 dB below the permissible value, so it was not reported.

[External Antenna Worst case]					
Test Description	Modulation	RB size	RB offset	Axis	
Effective Radiated Power	PI/2 BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM	See Sec	tion 8.2.1	Only X	
Radiated Spurious and Harmonic Emissions	PI/2 BPSK	See Sec	tion 8.3.1	Only X	

[Internal Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
	PI/2 BPSK,			
	QPSK,			
Effective Radiated Power	16 QAM,	See Section 8.2.2		Z
	64 QAM,			
	256 QAM			
Radiated Spurious and Harmonic Emissions	PI/2 BPSK	See Sec	tion 8.3.2	Y, Z



3.10 WORST CASE(CONDUCTED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.

(Worst case: DFT-S-OFDM)

- Modulation : All Modulation of operation were investigated and the worst case configuration results are reported.

(Worst case: PI/2 BPSK)

- All modes of operation were investigated and the worst case configuration results are reported. Mode: NSA, SA

Worst case: SA

- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.

Please refer to the table below.

- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.

(Worst case : TFGMEIBBCD4)

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth Peak- to- Average Ratio	PI/2 BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM	5, 10, 15	Mid	Full RB	0
		5	Low	1	0
		5	High	1	24
Band Edge	PI/2 BPSK	10	Low	1	0
		10	High	1	51
		45	Low	1	0
		15	High	1	78
		5, 10, 15	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	5, 10, 15	Low, Mid, High	1	1

[Worst case]



4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Controller (Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1542/ 57580623/G	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090001	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C HPF1	TNM System	S5L1	03/12/2025	Annual
RF Switch System	FBSR-04C LNA1	TNM System	S5L4	03/12/2025	Annual
RF Switch System	FBSR-04C HPF2	TNM System	S5L5	03/12/2025	Annual
HIGHPASS FILTER	WHKX10-900-1000- 15000-40SS	WAINWRIGHT INSTRUMENTS	16	07/24/2025	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	12/11/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
Loop Antenna (9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Horn Antenna(1 ~ 18 GHz)	HF907	ROHDE & SCHWARZ	103224	05/07/2026	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
Trilog Broadband Antenna	VULB 9168	Schwarzbeck	1135	08/19/2026	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/19/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	KR01009150	04/18/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/10/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	ROHDE & SCHWARZ	101510	03/28/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/16/2025	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/14/2025	Annual
Signal Analyzer (10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	Annual
Signal Analyzer (5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note: I. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date. 2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).



5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k=2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, <i>k</i> =2)





6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §27.53(g)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	PASS
Frequency stability / variation of ambient temperature	§2.1055, §27.54	Emission must remain in band	PASS

Note:

1. Conducted test were tested using 5G Wireless Tester.

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§27.50(c)(10)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(g)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

Note:

1. Radiateded tests were tested using 5G Wireless Tester.



7. EMISSION DESIGNATOR

GSM Emission Designator

Emission Designator = 249KGXW GSM BW = 249 kHz G = Phase Modulation X = Cases not otherwise covered W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W GSM BW = 249 kHz G = Phase Modulation 7 = Quantized/Digital Info W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W WCDMA BW = 4.17 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D LTE BW = 4.48 MHz G = Phase Modulation 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand

<u>QAM Modulation</u> Emission Designator = 4M48W7D LTE BW = 4.48 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand

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8. TEST DATA

8.1 Conducted Output Power

Bandwidth	SCS(kHz)	OFDM	Modulation	RB	RB	Max.Average Power (dBm)										
Danuwiutii	3C3(KI12)	2.2.1	Modulation	Size	Offset	140300	141500	142700								
						701.5 MHz	707.5 MHz	713.5 MHz								
			pi/2 BPSK	1	1	23.72	23.58	23.41								
				1	13	23.55	23.51	23.31								
				1	23	23.53	23.38	23.30								
				12	0	23.17	23.07	22.89								
				12	7	23.59	23.48	23.32								
		DFT-s		12	13	23.05	22.92	22.80								
				25	0	23.14	23.02	22.84								
				1	1	23.73	23.55	23.40								
	15			1	13	23.58	23.45	23.33								
5 MHz	15			1	23	23.50	23.39	23.23								
			QPSK	12	0	22.70	22.57	22.41								
				12	7	23.60	23.49	23.32								
								_	_	_	_	12	13	22.56	22.46	22.33
				25	0	22.62	22.52	22.34								
			16 QAM	1	1	22.67	22.55	22.40								
			64 QAM	1	1	21.23	21.11	20.91								
		_	256 QAM	1	1	19.28 19.25		19.02								
		СР	QPSK	1	1	22.23	22.11	21.90								

F-TP22-03 (Rev. 06)



Donduidth	SCS(141-)	OFDM	Madulation	RB	RB	Max.A	verage Power	(dBm)								
Bandwidth	SCS(kHz)	OFDM	Modulation	Size	Offset	140800	141500	142200								
						704.0 MHz	707.5 MHz	711.0 MHz								
				1	1	23.65	23.60	23.46								
				1	26	23.53	23.54	23.33								
			pi/2 BPSK	1	50	23.41	23.41	23.27								
				25	0	23.17	23.12	22.94								
				25	14	23.53	23.54	23.39								
				25	27	23.01	23.00	22.83								
				50	0	23.08	23.08	22.91								
				1	1	23.61	23.56	23.42								
10 MHz	15	DFT-s		1	26	23.49	23.46	23.30								
T0 MHZ	15			1	50	23.39	23.37	23.25								
			QPSK	25	0	22.66	22.63	22.46								
				25	14	23.56	23.56	23.37								
			-						-			25	27	22.51	22.48	22.34
				50	0	22.58	22.57	22.41								
			16 QAM	1	1	22.60	22.59	22.42								
			64 QAM	1	1	21.16	21.17	20.96								
			256 QAM	1	1	19.21	19.16	19.02								
	CP QPSK		1	1	22.11	22.20	21.99									



Donduidth	SCS([41-)	OFDM	Madulation	RB	RB	Max.A	verage Power	(dBm)		
Bandwidth	SCS(kHz)	OFDM	Modulation	Size	Offset	141300	141500	141700		
						706.5 MHz	707.5 MHz	708.5 MHz		
				1	1	23.82	23.88	23.81		
				1	40	23.65	23.71	23.73		
			pi/2 BPSK		1	77	23.55	23.62	23.59	
				36	0	23.30	23.33	23.29		
						36	22	23.70	23.74	23.73
							36	43	23.13	23.19
				75	0	23.19	23.24	23.20		
				1	1	23.83	23.86	23.82		
15 MU-	15	DFT-s		1	40	23.66	23.66	23.62		
15 MHz	15			1	77	23.55	23.58	23.56		
			QPSK	36	0	22.79	22.81	22.79		
				36	22	23.69	23.75	23.71		
				36	43	22.64	22.70	22.66		
				75	0	22.71	22.76	22.72		
			16 QAM	1	1	22.80	22.84	22.83		
		64 QAM	1	1	21.38	21.42	21.36			
			256 QAM	1	1	19.49	19.43	19.39		
		СР	QPSK	1	1	22.45	22.37	22.41		



8.2 EFFECTIVE RADIATED POWER

8.2.1 External Antenna

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level	A.F+C.L+D.F (dB/m)	Total (dBµV/m)	Pol	Limit W	EF	RP dBm	Size	RB Offset
	[SCS (kHz)]		(dBμV) 90.10	28.99	119.09	V	vv			Size	Unset
		PI/2 BPSK	90.10		119.09			0.149	21.74		
		QPSK	90.00	28.99	118.99	V		0.146	21.64		
701.5		16-QAM	89.05	28.99	118.04	V		0.117	20.69	1	23
		64-QAM	87.48	28.99	116.47	V		0.082	19.12		
		256-QAM	85.62	28.99	114.61	V		0.053	17.26		
		PI/2 BPSK	90.30	28.99	119.29	V		0.157	21.94		
	Sub6 n12/	QPSK	90.05	28.99	119.04	V		0.148	21.69		
707.5	5 MHz	16-QAM	88.97	28.99	117.96	V	< 3.00	0.115	20.61	1	23
	[15 kHz]	64-QAM	87.65	28.99	116.64	V		0.085	19.29		
		256-QAM	85.84	28.99	114.83	V		0.056	17.48		
		PI/2 BPSK	90.60	29.04	119.64	V		0.169	22.29		
		QPSK	90.30	29.04	119.34	V		0.158	21.99		
713.5		16-QAM	89.45	29.04	118.49	V		0.130	21.14	1	1
		64-QAM	88.07	29.04	117.11	V	0.095	0.095	19.76		
		256-QAM	86.03	29.04	115.07	V		0.059	17.72		



Freq	Mod/		Measured	A.F+C.L+D.F	Total		Limit		RP	RB	
(MHz)	Bandwidth	Modulation	Level	(dB/m)	(dBµV/m)	Pol		W W dDm		Size Offset	
	[SCS (kHz)]		(dBµV)				W	W	dBm	Size	Offset
		PI/2 BPSK	90.52	29.01	119.53	V		0.165	22.18		
		QPSK	90.47	29.01	119.48	V		0.163	22.13		
704.0		16-QAM	89.44	29.01	118.45	v		0.129	21.10	1	50
		64-QAM	88.05	29.01	117.06	v		0.094	19.71		
		256-QAM	86.02	29.01	115.03	V		0.059	17.68		
		PI/2 BPSK	90.60	28.99	119.59	V		0.168	22.24		
	Sub6 n12/	QPSK	90.57	28.99	119.56	V		0.167	22.21		
707.5	10 MHz	16-QAM	89.59	28.99	118.58	V	< 3.00	0.133	21.23	1	50
	[15 kHz]	64-QAM	88.02	28.99	117.01	v		0.093	19.66		
		256-QAM	86.10	28.99	115.09	V		0.060	17.74		
		PI/2 BPSK	90.67	29.03	119.70	V		0.172	22.35		
		QPSK	90.54	29.03	119.57	v		0.167	22.22		
711.0		16-QAM	89.55	29.03	118.58	v		0.133	21.23	1	26
		64-QAM	88.05	29.03	117.08	v		0.094	19.73		
		256-QAM	86.10	29.03	115.13	V		0.060	17.78		



Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBµV/m)	Pol	Limit W	Ef W	RP dBm	Size	RB Offset
		PI/2 BPSK	90.79	12.33	119.79	v		0.175	22.44		
		QPSK	90.75	12.37	119.75	V		0.174	22.40		
706.5		16-QAM	89.75	13.37	118.75	V		0.138	21.40	1	77
		64-QAM	88.34	14.78	117.34	V		0.100	19.99		
		256-QAM	86.38	16.74	115.38	V	-	0.064	18.03		
		PI/2 BPSK	90.79	12.34	119.78	V		0.175	22.43		
	Sub6 n12/	QPSK	90.78	12.35	119.77	V		0.175	22.42		
707.5	15 MHz	16-QAM	89.82	13.31	118.81	V	< 3.00	0.140	21.46	1	77
	[15 kHz]	64-QAM	88.34	14.79	117.33	V		0.100	19.98		
		256-QAM	86.28	16.85	115.27	V		0.062	17.92		
		PI/2 BPSK	90.76	12.35	119.77	V		0.175	22.42		
		QPSK	90.74	12.37	119.75	V		0.174	22.40		
708.5		16-QAM	89.71	13.40	118.72	V		0.137	21.37	1	77
		64-QAM	88.19	14.92	117.20	V	V	0.097	19.85		
		256-QAM	86.21	16.90	115.22	V		0.061	17.87		





8.2.2 Internal Antenna

Freq	Mod/ Bandwidth	Modulation	Measured Level	A.F+C.L+D.F	Total	Pol	Limit	EF	RP		RB
(MHz)	[SCS (kHz)]		(dBµV)	(dB/m)	(dBµV/m)		W	W	dBm	Size	Offset
		PI/2 BPSK	97.73	28.99	126.72	Н		0.865	29.37		
		QPSK	97.55	28.99	126.54	Н		0.830	29.19		
701.5		16-QAM	96.54	28.99	125.53	Н		0.658	28.18	1	12
		64-QAM	95.07	28.99	124.06	Н		0.469	26.71		
		256-QAM	93.28	28.99	122.27	н		0.310	24.92		
		PI/2 BPSK	97.53	28.99	126.52	н		0.827	29.17		
	Sub6 n12/	QPSK	97.51	28.99	126.50	Н		0.823	29.15		
707.5	5 MHz	16-QAM	96.42	28.99	125.41	Н	< 3.00	0.640	28.06	1	1
	[15 kHz]	64-QAM	94.88	28.99	123.87	Н		0.449	26.52		
		256-QAM	92.85	28.99	121.84	Н		0.282	24.49		
	-	PI/2 BPSK	96.89	29.04	125.93	Н		0.722	28.58		
		QPSK	96.85	29.04	125.89	Н		0.715	28.54		
713.5		16-QAM	95.68	29.04	124.72	Н	1	0.546	27.37	1	1
		64-QAM	94.30	29.04	123.34	Н		0.398	25.99		
		256-QAM	92.31	29.04	121.35	н		0.251	24.00		

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Freq	Mod/ Bandwidth	Modulation	Measured Level	A.F+C.L+D.F Total	Pol	Limit Pol		ERP		RB		
(MHz)	[SCS (kHz)]		(dBµV)			W	W	dBm	Size	Offset		
		PI/2 BPSK	97.73	29.01	126.74	н		0.869	29.39			
		QPSK	97.71	29.01	126.72	н		0.865	29.37			
704.0		16-QAM	96.60	29.01	125.61	н		0.670	28.26	1	26	
		64-QAM	95.12	29.01	124.13	н		0.476	26.78			
		256-QAM	93.23	29.01	122.24	Н		0.308	24.89			
		PI/2 BPSK	97.80	28.99	126.79	Н		0.879	29.44			
	Sub6 n12/	QPSK	97.79	28.99	126.78	н		0.877	29.43			
707.5	10 MHz	16-QAM	96.70	28.99	125.69	н	< 3.00	0.682	28.34	1	1	
	[15 kHz]	64-QAM	95.20	28.99	124.19	н		0.483	26.84			
		256-QAM	93.24	28.99	122.23	Н		0.308	24.88			
		PI/2 BPSK	97.47	29.03	126.50	Н		0.822	29.15			
		QPSK	97.45	29.03	126.48	Н		0.819	29.13			
711.0		16-QAM	96.41	29.03	125.44	Н		0.644	28.09	1	1	
		64-QAM	94.95	29.03	123.98	Н	Н	· 0.	0.460	0.460 26.63		
		256-QAM	93.00	29.03	122.03	Н		0.294	24.68			



Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit		RP.		RB
	[SCS (kHz)]		(dBµV)				W	W	dBm	Size	Offset
		PI/2 BPSK	97.95	29.00	126.95	Н		0.912	29.60		
		QPSK	97.91	29.00	126.91	н		0.904	29.56		
706.5		16-QAM	96.96	29.00	125.96	Н		0.726	28.61	1	1
		64-QAM	95.46	29.00	124.46	н		0.514	27.11		
		256-QAM	93.41	29.00	122.41	н		0.321	25.06		
		PI/2 BPSK	97.94	28.99	126.93	Н		0.909	29.58		
	Sub6 n12/	QPSK	97.92	28.99	126.91	Н	_	0.904	29.56		
707.5	15 MHz	16-QAM	96.94	28.99	125.93	Н	< 3.00	0.722	28.58	1	1
	[15 kHz]	64-QAM	95.43	28.99	124.42	н		0.510	27.07		
		256-QAM	93.40	28.99	122.39	н		0.320	25.04		
		PI/2 BPSK	97.93	29.01	126.94	н	_	0.910	29.59		
		QPSK	97.86	29.01	126.87	н	_	0.895	29.52		
708.5		16-QAM	96.80	29.01	125.81	н	_	0.702	28.46	1	1
		64-QAM	95.48	29.01	124.49	н		0.518	27.14		
		256-QAM	93.40	29.01	122.41	Н		0.321	25.06		

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8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 External Antenna

NR Band:	<u>N12</u>
Bandwidth:	<u>15 MHz</u>
Modulation:	PI/2 BPSK
Distance:	<u>3 meters</u>
SCS:	15 kHz

Ch	Freq (MHz)	Measured Level (dBµV)	A.F+C.L+D.F+H.P.F -A.G (dB/m)	Total (dBµV/m)	Pol	Result (dBm)		RB	
			(ub/m)					Size	Offset
	1 413.00	55.55	-18.05	37.50	V	-57.70	-13.00	1	77
	2 119.50	68.43	-13.50	54.93	V	-40.27	-13.00		
140300	2 826.00	52.54	-11.48	41.06	۷	-54.14	-13.00		
(706.5)	3 532.50	53.93	-8.06	45.87	V	-49.33	-13.00		
	4 239.00	50.20	-5.21	44.99	٧	-50.21	-13.00		
_	4 945.50	48.50	-3.57	44.93	۷	-50.27	-13.00		
	1 415.00	54.74	-17.98	36.76	۷	-58.44	-13.00	1	77
	2 122.50	68.44	-13.50	54.94	٧	-40.26	-13.00		
141500	2 830.00	52.29	-11.43	40.86	۷	-54.34	-13.00		
(707.5)	3 537.50	51.63	-7.97	43.66	۷	-51.54	-13.00		
	4 245.00	50.19	-5.14	45.05	۷	-50.15	-13.00		
	4 952.50	48.36	-3.62	44.74	٧	-50.46	-13.00		
	1 417.00	55.45	-17.92	37.53	۷	-57.67	-13.00	1	77
	2 125.50	67.70	-13.53	54.17	٧	-41.03	-13.00		
142700	2 834.00	51.60	-11.43	40.17	۷	-55.03	-13.00		
(708.5)	3 542.50	55.02	-7.97	47.05	۷	-48.15	-13.00		
	4 251.00	49.59	-5.06	44.53	۷	-50.67	-13.00		
	4 959.50	48.75	-3.49	45.26	٧	-49.94	-13.00		



8.3.2 Internal Antenna

NR Band:	<u>N12</u>
Bandwidth:	15 MHz
Modulation:	PI/2 BPSK
Distance:	3 meters
SCS:	<u>15 kHz</u>

			A.F+C.L+D.F+H.P.F			_			RB
Ch	Freq (MHz)	Measured Level (dBµV)	-A.G	Total (dBµV/m)	Pol	Result	Limit (dBm)	Size	Offset
		(F - /	(dB/m)			(abiii)	(abiii)	SIZC	onset
	1 413.00	67.43	-18.05	49.38	Н	-45.82	-13.00		
	2 119.50	59.50	-13.50	46.00	V	-49.20	-13.00		
140300	2 826.00	53.26	-11.48	41.78	Н	-53.42	-13.00	1	1
(706.5)	3 532.50	51.82	-8.06	43.76	Н	-51.44	-13.00	1	1
	4 239.00	55.12	-5.21	49.91	V	-45.29	-13.00		
	4 945.50	49.68	-3.57	46.11	Н	-49.09	-13.00		
	1 415.00	66.75	-17.98	48.77	Н	-46.43	-13.00		
	2 122.50	60.21	-13.50	46.71	V	-48.49	-13.00		
141500	2 830.00	53.34	-11.43	41.91	Н	-53.29	-13.00		1
(707.5)	3 537.50	52.79	-7.97	44.82	Н	-50.38	-13.00	1	1
	4 245.00	54.11	-5.14	48.97	V	-46.23	-13.00		
	4 952.50	49.19	-3.62	45.57	Н	-49.63	-13.00		
	1 417.00	67.11	-17.92	49.19	Н	-46.01	-13.00		
	2 125.50	59.45	-13.53	45.92	V	-49.28	-13.00		
142700	2 834.00	53.71	-11.43	42.28	Н	-52.92	-13.00	1	1
(708.5)	3 542.50	52.47	-7.97	44.50	Н	-50.70	-13.00	1	1
	4 251.00	53.13	-5.06	48.07	Н	-47.13	-13.00		
	4 959.50	49.32	-3.49	45.83	Н	-49.37	-13.00		



8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)	
			BPSK			4.02	
			QPSK			4.51	
	5 MHz		16-QAM	25		5.56	
			64-QAM			5.93	
			256-QAM			6.45	
		BPSK			3.95		
			QPSK			4.56	
Sub6 n12	10 MHz	707.5	707.5	16-QAM	50	0	5.57
			64-QAM			6.05	
			256-QAM			6.62	
-			BPSK			4.03	
	15 MHz		QPSK			4.59	
			16-QAM	75		5.45	
			64-QAM			5.96	
			256-QAM			6.60	

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 60 ~ 74.



8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
			BPSK			4.5638
			QPSK			4.5721
	5 MHz		16-QAM	25		4.5756
			64-QAM			4.5897
			256-QAM			4.5742
			BPSK	50		8.9673
		707.5	QPSK			8.9984
Sub6 n12	10 MHz		16-QAM		0	8.9771
			64-QAM		_	8.9648
		-	256-QAM			8.9497
-			BPSK			13.434
			QPSK			13.432
	15 MHz		16-QAM	75		13.465
			64-QAM			13.455
			256-QAM			13.420

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 45 ~ 59.



Band	Band Width (MHz)	Frequenc y (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		701.5	4.0609	30.200	-70.613	-40.413	
	5	707.5	3.7588	30.200	-70.318	-40.118	
		713.5	7.9985	30.815	-70.447	-39.632	
SubC		704.0	9.9312	30.815	-69.942	-39.127	
Sub6 n12	10	707.5	8.2882	30.815	-70.218	-39.403	-13.00
1112		711.0	9.4043	30.815	-69.966	-39.151	
		706.5	9.6770	30.815	-69.856	-39.041	
15	15 707.5 8.2891	8.2891	30.815	-70.255	-39.440		
		708.5	3.8271	30.200	-70.544	-40.344	

8.6 CONDUCTED SPURIOUS EMISSIONS

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 96 ~ 104.

2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

3. Factor(dB) = Cable Loss + Attenuator + Splitter

Frequency Range (GHz)	Factor [dB]
0.03 - 1	27.494
1 – 5	30.200
5 - 10	30.815
10 – 15	31.340
15 – 20	31.713
Above 20	32.355

8.7 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 75 ~ 95.



8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

BandWidth:
Voltage(100 %):

Deviation Limit:

<u>5 MHz</u> <u>13.500 VDC</u> <u>Emission must remain in band</u>

Test. Frequncy (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
	100%	+20(Ref)	707 500 003	0.0	0.000 000	0.000
	100%	-30	707 500 005	1.9	0.000 000	0.003
	100%	-20	707 500 003	0.6	0.000 000	0.001
	100%	-10	707 500 002	-1.0	0.000 000	-0.001
	100%	0	707 500 001	-1.9	0.000 000	-0.003
707.5	100%	+10	707 500 000	-3.0	0.000 000	-0.004
	100%	+30	707 500 008	4.9	0.000 001	0.007
-	100%	+40	707 499 998	-5.2	-0.000 001	-0.007
	100%	+50	707 500 006	2.8	0.000 000	0.004
	85%	+20	707 499 998	-5.1	-0.000 001	-0.007
	115%	+20	707 500 006	3.4	0.000 000	0.005



BandWidth:	<u>10 MHz</u>
Voltage(100 %):	13.500 VDC
Deviation Limit:	Emission must remain in band

Test. Frequncy (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
	100%	+20(Ref)	707 499 999	0.0	0.000 000	0.000
	100%	-30	707 499 997	-1.6	0.000 000	-0.002
	100%	-20	707 499 996	-2.4	0.000 000	-0.003
	100%	-10	707 500 003	4.3	0.000 001	0.006
	100%	0	707 500 005	5.7	0.000 001	0.008
707.5	100%	+10	707 500 004	5.2	0.000 001	0.007
	100%	+30	707 500 003	4.6	0.000 001	0.006
	100%	+40	707 500 003	4.1	0.000 001	0.006
-	100%	+50	707 500 003	3.7	0.000 001	0.005
	85%	+20	707 499 996	-3.0	0.000 000	-0.004
	115%	+20	707 500 004	5.1	0.000 001	0.007



BandWidth:	15 MHz
Voltage(100 %):	13.500 VDC
Deviation Limit:	Emission must remain in band

Test. Frequncy (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
	100%	+20(Ref)	707 499 997	0.0	0.000 000	0.000
-	100%	-30	707 499 994	-3.4	0.000 000	-0.005
	100%	-20	707 499 993	-4.1	-0.000 001	-0.006
	100%	-10	707 500 001	4.0	0.000 001	0.006
	100%	0	707 500 000	2.7	0.000 000	0.004
707.5	100%	+10	707 500 000	2.3	0.000 000	0.003
-	100%	+30	707 499 999	1.5	0.000 000	0.002
-	100%	+40	707 499 998	0.7	0.000 000	0.001
	100%	+50	707 499 997	-0.1	0.000 000	0.000
	85%	+20	707 499 994	-3.3	0.000 000	-0.005
	115%	+20	707 500 000	2.1	0.000 000	0.003



Report No. HCT-RF-2409-FC008-R1

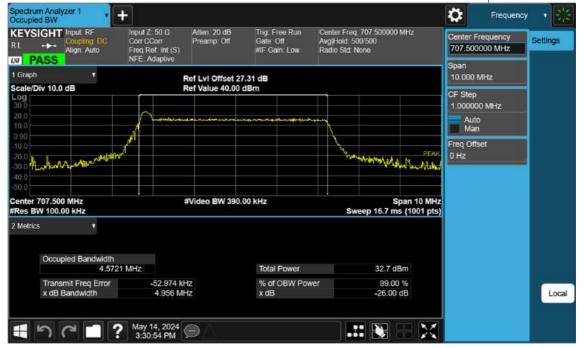
9. TEST PLOTS





Sub6 n12. Occupied Bandwidth Plot (5M BW Ch.141500 BPSK_RB25_0)

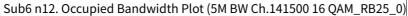




Sub6 n12. Occupied Bandwidth Plot (5M BW Ch.141500 QPSK_RB25_0)











Sub6 n12. Occupied Bandwidth Plot (5M BW Ch.141500 64 QAM_RB25_0)





Sub6 n12. Occupied Bandwidth Plot (5M BW Ch.141500 256 QAM_RB25_0)





Sub6 n12. Occupied Bandwidth Plot (10M BW Ch.141500 BPSK_RB50_0)

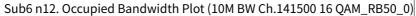


Cocupied BW KEYSIGHT Input RF Coupling Align Aul		rr Preamp Off	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq. 707.500000 MH Avg Hold: 500/500 Radio Std: None	z	Frequency Center Frequency 707.500000 MHz	Settings
Graph v Grale/Div 10.0 dB	NFE: Ada	Ref LvI Offset 27 Ref Value 40.00				Span 20.000 MHz	
20.0 10.0	- Jun		annen lastrastrastrastrastrastrastrastrastrastr	my		CF Step 2.000000 MHz Auto Man	
0.00 10.0 20.0 30.0 40.0 50.0	mount			howwwww		Freq Offset 0 Hz	
enter 707.50 MHz Res BW 200.00 kHz		#Video BW 820.	00 kHz	Span Sweep 1.00 ms (1	20 MHz 1001 pts)		
2 Metrics	width 8.9984 MHz		Total Power	30.8 dBm			
	Error -17	78.44 kHz 672 MHz	% of OBW Pov x dB	ver 99.00 %			Loc

Sub6 n12. Occupied Bandwidth Plot (10M BW Ch.141500 QPSK_RB50_0)









Center Frequency 707.500000 MHz	a suursuu ta: None 7	Center Freq. 7 Avg[Hold: 500 Radio Std: No	g: Free Run ste: Off - Gain: Low	en: 20 dB amp: Off		Corr Fred	put RF oupling DC lign: Auto	
20.000 MHz CF Step			3	vi Offset 27.3 alue 40.00 dB			т В	Braph ale/Div 10.0 d
2.000000 MHz Auto Man		~~		an and the	she on an	Ţ		0.0
Freq Offset D Hz		henned				onfund	proposanto	00 0.0 0.0 0.0 0.0 0.0
	Span 20 MHz Sweep 1.00 ms (1001 pts)	Swee	z	eo BW 820.00	#Vi			nter 707.50 N es BW 200.00
	29.4 dBm		otal Power			1 648 MHz	▼ d Bandwidtl 8.9	fetrics Occupi
	99.00 %	ver	of OBW Pov		-184.60 kHz 9.644 MHz		t Freq Error	Transn

Sub6 n12. Occupied Bandwidth Plot (10M BW Ch.141500 64 QAM_RB50_0)



EYSIGHT Input RF Coupling DC Align: Auto	Input Z 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive	Atten: 20 dB Preamp: Off	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 707 500000 MHz AvglHold: 500/500 Radio Std: None	Center Frequency 707.500000 MHz	Settings
Graph v ale/Div 10.0 dB		Ref LvI Offset 27 Ref Value 40.00 d			Span 20.000 MHz CF Step	
99 0.0 0.0	parainen	merina	an and a start and the start		2.000000 MHz Auto Man	
00 0.0 0.0 0.0 0.0 0.0	work			PEAK	Freq Offset 0 Hz	
enter 707.50 MHz les BW 200.00 kHz		#Video BW 820.0	00 kHz	Span 20 MHz Sweep 1.00 ms (1001 pts		
Metrics v Occupied Bandwidth 8.94	h 497 MHz		Total Power	27.6 dBm		
Transmit Freq Error x dB Bandwidth	-189.38 kH		% of OBW Pow x dB	ver 99.00 % -26.00 dB		Loc

Sub6 n12. Occupied Bandwidth Plot (10M BW Ch.141500 256 QAM_RB50_0)



EYSIGHT Input. RF Coupling: DC Align: Auto		20 dB Trig Free Run np: Off Gate: Off #IF Gain: Low	Center Freq: 707 500000 MHz Avg Hold: 500/500 Radio Std: None	Center Frequency 707.500000 MHz Span	Settings
Graph ▼ ale/Div 10.0 dB		Offset 27.31 dB ue 40.00 dBm	- 1945 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947	30.000 MHz CF Step	
99				3.000000 MHz	
0.0	mon			Auto Man	
0.0			PEAK	Freq Offset 0 Hz	
nter 707.50 MHz	#Video	BW 1.2000 MHz	Span 30 MHz		
es BW 300.00 kHz	11623557		Sweep 1.00 ms (1001 pts)		
Vetrics v Occupied Bandwidth 13.4	34 MHz	Total Power	31.5 dBm		
Transmit Freq Error	-380.70 kHz	% of OBW Por			-
x dB Bandwidth	14.32 MHz	x dB	-26.00 dB		Loc

Sub6 n12. Occupied Bandwidth Plot (15M BW Ch.141500 BPSK_RB75_0)



EYSIGHT Input. RF Coupling DC Align: Auto		n: 20 dB Trig: Free Run Imp: Off Gate Off #IF Gain: Low	Center Freq. 707.500000 MHz Avg Hold: 500/500 Radio Std: None	Center Frequency 707.500000 MHz	Settings
Graph v cale/Div 10.0 dB	Ref Lv	l Offset 27.31 dB lue 40.00 dBm		Span 30.000 MHz	
og 0.0 0.0		and what any fear the second second second second		CF Step 3.000000 MHz Auto	
0.0 00 0.0 0.0	w		hand the Manage and	Freq Offset	
00 lindreally and from the second					
enter 707.50 MHz tes BW 300.00 kHz	#Video	9 BW 1.2000 MHz	Span 30 MH Sweep 1.00 ms (1001 pt		
Metrics T Occupied Bandwidth 13.432	MHz	Total Power	31.2 dBm		
	-378.22 kHz	% of OBW Pov	wer 99.00 %		

Sub6 n12. Occupied Bandwidth Plot (15M BW Ch.141500 QPSK_RB75_0)



	Frequency	707 500000 MHz	Center Freq. 707 5000	Trig. Free Run	Atten: 20 dB	t Z. 50 Q	+	and DE	CCUPIED BW
Settings	Center Frequency 707.500000 MHz	00/500	Avg Hold: 500/500 Radio Std: None	Gate: Off #IF Gain: Low	Preamp: Off	CCorr Ref: int (S)	Corr Fred	Soupling: DC Vign: Auto	L ++++
	Span 30.000 MHz		1		Ref LvI Offset 27 Ref Value 40.00 d		NFE		Graph
	CF Step 3.000000 MHz								og 0.0
	Auto Man			hometerme	manna		-		20.0
	Freq Offset 0 Hz		troutunaben				ont	and a farm	0.00 10.0 20.0 30.0 <mark>קארייראר</mark> אי
		Span 30 MHz		MHż	Video BW 1.200				40.0 50.0 enter 707.50
		eep 1.00 ms (1001 pts)	Sweep 1.00	9739.5				kHz	Res BW 300.0
		30.2 dBm	30.2	Total Power			n 465 MHz	ed Bandwidth	Metrics Occup
		99.00 %		% of OBW Pov	z	-359.18 kl		it Freq Error	Trans

Sub6 n12. Occupied Bandwidth Plot (15M BW Ch.141500 16 QAM_RB75_0)



VSIGHT Input. RF Coupling DC Align Auto	Input Z 50 Ω Corr CCorr Freq Ref: Int (S) NFE: Adaptive	Atten: 20 dB Preamp: Off	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq. 707 5000 Avg[Hold: 500/500 Radio Std: None	00 MHz	Center Frequency 707.500000 MHz Span	Settings
Graph ▼ ale/Div 10.0 dB		Ref LvI Offset 27 Ref Value 40.00				30.000 MHz	
		Nel Value 40.00 (CF Step 3.000000 MHz	
0.0	pourono	un de la constante	warden after the Re	~		Auto Man	
00 0.0 0.0 0.0 0.0	uninter			hor much was fine	PEAK	Freq Offset 0 Hz	
nter 707.50 MHz es BW 300.00 kHz		#Video BW 1.200	00 MHz	Sweep 1.00	Span 30 MHz ms (1001 pts)		
Netrics Y	th						
	.455 MHz		Total Power		dBm		
Transmit Freq Erro x dB Bandwidth	r -366.20 k 14.39 M		% of OBW Pov x dB		00 % 00 dB		Loc

Sub6 n12. Occupied Bandwidth Plot (15M BW Ch.141500 64 QAM_RB75_0)



	ioupling DC Jign Auto	Corr C Freq I		Atten: 20 dB Preamp: Off	Trig: Free Run Gate: Off #IF Gain: Low	Avg Hold: 50 Radio Std: 10		Center Fr 707.5000 Span		Settings
Graph cale/Div 10.0 dl	r B			ef Lvi Offset 27 of Value 40.00 (30.000 N CF Step	lHz	
0 g 10 0 20 0								3.000000) MHz	
10.0		r		in a strategy and the state of the	hhteen			Auto Man		
20.0	,	AND				haventhy	endressenterson	 Freq Offs 0 Hz	et	
40.0 50.0										
enter 707.50 Mi Res BW 300.00			#\	ideo BW 1.200	00 MHz	Sw	Span 30 eep 1.00 ms (100			
Metrics Occupie	• ed Bandwidth									
		0 MHz			Total Power		27.7 dBm			
	it Freq Error ndwidth		-363.63 kHz 14.34 MHz		% of OBW Pov x dB	ver	99.00 % -26.00 dB			Loc

Sub6 n12. Occupied Bandwidth Plot (15M BW Ch.141500 256 QAM_RB75_0)



	pupling DC	Input Z 50 Ω Corr CCorr Freq Ref. Int (S)	Atten: 20 dB Preamp: Off	Trig: Free Run #F Gain: Low	Center Freq: 707 500000 MHz Counts: 2.00 M/2.00 Mpt Radio Std: None	Ref Level Offset 27.31 dB	Y Scale
etrics	-	2 Graph				On	Attenuatio
		Gaussia				-	Signal Pai
Average Po		100 %					
	22.97 dBm						
	50.40 % at 0 dB	. 10 %					
10.0 %	1.90 dB						
1.0 %	3.56 dB	1%					
0.1 %	4.02 dB						
0.01 %	4.56 dB	0.1%					
0.001 %	4.68 dB		1				
0.0001 %	4.74 dB	0.01 %					
-	4.76 dB	0.001 %					
Peak	27.73 dBm						
		0.0001 % 0.00 dB Info BW 5	.0000 MHz		20.0	0 dB	Loca

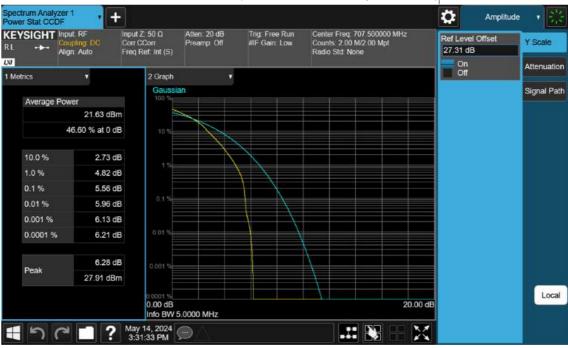
Sub6 n12. PAR Plot (5M BW Ch.141500 BPSK_RB25_0)



	oupling. DC	Input Z: 50 Ω Corr CCorr Freq Ref. Int (S)	Atten: 20 dB Preamp: Off	Trig: Free Run #IF Gain: Low	Center Freq: 707 500000 MHz Counts: 2.00 M/2.00 Mpt Radio Std: None	Ref Level Offset 27.31 dB	Y Scale
etrics		2 Graph				On Off	Attenuatio
		Gaussi					Signal Pa
Average P		100 %					
	22.59 dBm						
	49.34 % at 0 dE	10 %					
10.0 %	2.28 dE						
1.0 %	4.16 dE	3					
0.1 %	4.51 dB						
0.01 %	4.90 dE	0.1 %					
0.001 %	4.98 dE	3					
0.0001 %	5.06 dE	B 0.01 %					
2000 C	5.24 dE	3 0.001 %					
Peak	27.83 dBm	n					
		0.0001 % 0.00 dB Info BW 5	5.0000 MHz		20.00) dB	Loca

Sub6 n12. PAR Plot (5M BW Ch.141500 QPSK_RB25_0)





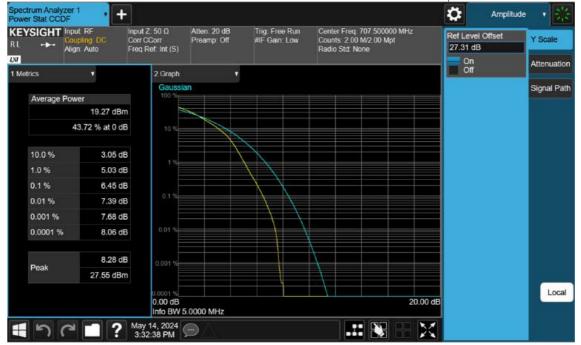
Sub6 n12. PAR Plot (5M BW Ch.141500 16 QAM_RB25_0)





Sub6 n12. PAR Plot (5M BW Ch.141500 64 QAM_RB25_0)





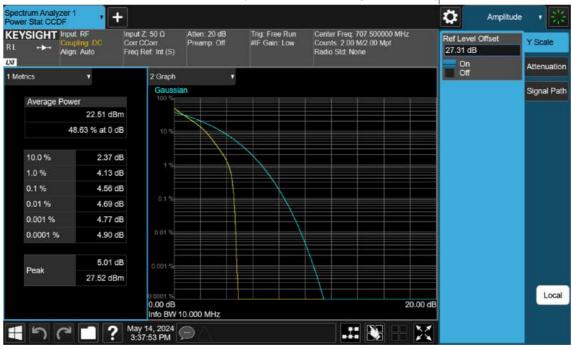
Sub6 n12. PAR Plot (5M BW Ch.141500 256 QAM_RB25_0)





Sub6 n12. PAR Plot (10M BW Ch.141500 BPSK_RB50_0)





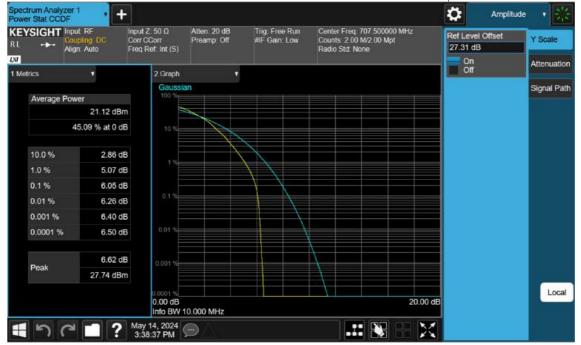
Sub6 n12. PAR Plot (10M BW Ch.141500 QPSK_RB50_0)





Sub6 n12. PAR Plot (10M BW Ch.141500 16 QAM_RB50_0)





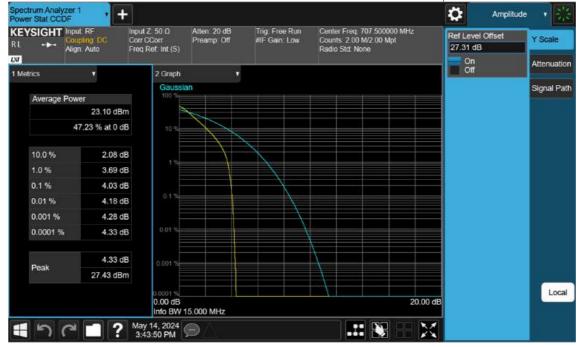
Sub6 n12. PAR Plot (10M BW Ch.141500 64 QAM_RB50_0)





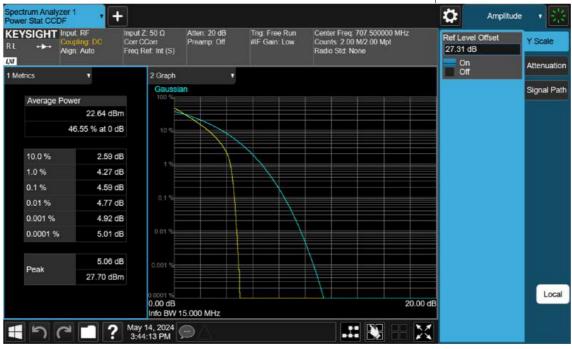
Sub6 n12. PAR Plot (10M BW Ch.141500 256 QAM_RB50_0)





Sub6 n12. PAR Plot (15M BW Ch.141500 BPSK_RB75_0)





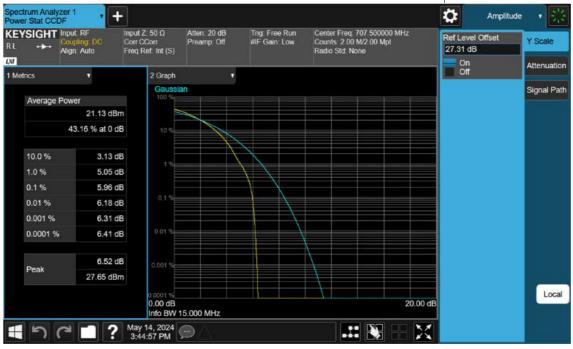
Sub6 n12. PAR Plot (15M BW Ch.141500 QPSK_RB75_)





Sub6 n12. PAR Plot (15M BW Ch.141500 16 QAM_RB75_0)





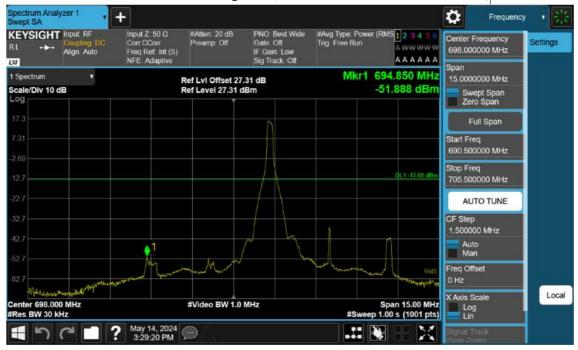
Sub6 n12. PAR Plot (15M BW Ch.141500 64 QAM_RB75_0)





Sub6 n12. PAR Plot (15M BW Ch.141500 256 QAM_RB75_0)





Sub6 n12. Lower Band Edge Plot (5M BW Ch.140300 BPSK_RB1_Offset 0)





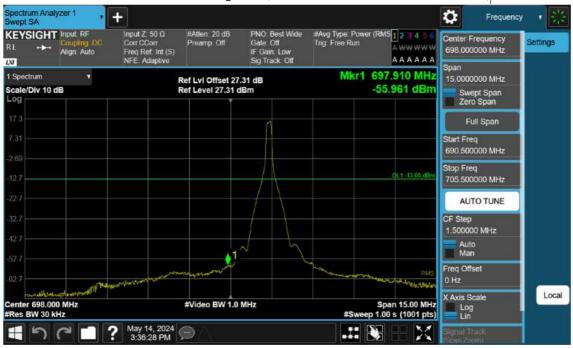




Align Auto Fr	orr CCorr Preamp: Off req Ref: Int (S) FE: Adaptive	PNO Best Wide Gate: Off IF Gain: Low Sig Track: Off		A A A A Span
Spectrum v cale/Div 10 dB	Ref Lvi Offset 27 Ref Level 27.31		Mkr1 696.004 -42.901	4.0000000 MHz
7.3				Full Span
31				Start Freq 693.000000 MHz
2.7			DL1-1	13 (0) dBm 5top Freq 697.000000 MHz
				AUTO TUNE
2.7		~	1 	CF Step 400.000 kHz Auto
2.7				Freq Offset 0 Hz
enter 695.000 MHz Res BW 100 kHz	#Video BW 300	0 kHz	Span 4.0 #Sweep ~1.01 s (10	







Sub6 n12. Lower Band Edge Plot (10M BW Ch.140800 BPSK_RB1_Offset 0)





Sub6 n12. Lower Band Edge Plot (10M BW Ch.140800 BPSK_RB50_Offset 0)



KEYSIGHT Input RF R L +++ Coupling DC Align Auto	Input Z 50 Ω Corr CCorr Freq Ref: Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Powe Trig: Free Run	er (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Frequency 695.000000 MHz Span	Settings
Spectrum v scale/Div 10 dB		ef Lvi Offset 27. ef Level 27.31 d		Mkr1	694.908 MHz -39.698 dBm	4.00000000 MHz Swept Span Zero Span	
17.3						Full Span	
2.69						Start Freq 693.000000 MHz	
12.7					DL 1 -13 00 dBm	Stop Freq 697.000000 MHz	
						AUTO TUNE	
32.7					RMS	CF Step 400.000 kHz	
12.7 52.7	- and a state of the second		and the second data of the secon		- distriction of the second	Auto Man	
32.7						Freq Offset 0 Hz	
enter 695.000 MHz Res BW 100 kHz		#Video BW 300	kHz	#Sweer	Span 4.000 MHz 5~1.01 s (1001 pts)	X Axis Scale Log Lin	Lo
	May 14, 2024 3:36:07 PM					Signal Track (Span Zoom)	

Sub6 n12. Lower Extended Band Edge Plot (10M BW Ch.140800 BPSK_RB50_0)



Align Auto Fre	ut Z 50 Ω #Atten 20 dB rr CCorr Preamp: Off eq Ref: Int (S) E: Adaptive	PNO:Best Wide #Avg Gate:Off Trig:I IF Gain:Low Sig Track:Off	Type: Power (RMS123456 Free Run A WWWW A A A A A A	090.000000 MHZ	Settings
Spectrum v sale/Div 10 dB	Ref LvI Offset 2 Ref Level 27.31		Mkr1 695.105 MHz -50.031 dBm	10.0000000 1111 12	
		Th.		Full Span	
31				Start Freq 690.500000 MHz	
2.7			DL1 -13 60 dBm	Stop Freq 705.500000 MHz	
2.7				AUTO TUNE	
2.7				CF Step 1.500000 MHz	
27		2 41		Auto Man	
2.7 ungenharing prosperited by market plate	all man and and	a china	San Maria Water State San State San State San	Freq Offset 0 Hz	
enter 698.000 MHz es BW 30 kHz	#Video BW 1	.0 MHz	Span 15.00 MHz #Sweep 1.00 s (1001 pts)		Loc

Sub6 n12. Lower Band Edge Plot (15M BW Ch.141300 BPSK_RB1_Offset 0)



KEYSIGHT L +++ Coupling DC Align Auto		samp. Off	PNO: Best Wide Gate Off IF Gain Low Sig Track: Off	#Avg Type: Pow Trig: Free Run	ver (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Frequency 698.000000 MHz Span	Dennings
Spectrum cale/Div 10 dB og		vi Offset 27.31 Level 27.31 dBn		Mkr1	697.955 MHz -40.543 dBm	15.0000000 MHz Swept Span Zero Span	
						Full Span	
.31					RMS	Start Freq 690.500000 MHz	
2.7					DL1 -13 00 dBm	Stop Freq 705.500000 MHz	
						AUTO TUNE	
2.7		1				CF Step 1.500000 MHz	
2.7						Auto Man	
2.7						Freq Offset 0 Hz	
enter 698.000 MHz Res BW 150 kHz	#Vi	deo BW 470 kH	łz	#Swe	Span 15.00 MHz ep 1.00 s (1001 pts)	X Axis Scale Log Lin	Lot
501	May 14, 2024 93:42:11 PM	<u>A</u>				Signal Track (Span Zoom)	

Sub6 n12. Lower Band Edge Plot (15M BW Ch.141300 BPSK_RB75_Offset 0)



KEYSIGHT Input. RF RL +++ Coupling DC Align: Auto	Input Z 50 0 Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Best Wide Gate Off IF Gain Low Sig Track. Off	#Avg Type: Powe Tng: Free Run	er (RMS 1 2 3 4 5 6 A WWWWW A A A A A A A	Center Frequency 695.000000 MHz Span	Setting
Spectrum v Scale/Div 10 dB		Ref LvI Offset 27. Ref Level 27.31 d		Mkr1	696.068 MHz -42.050 dBm	4.00000000 MHz Swept Span Zero Span	
17.3						Full Span	
2.69						Start Freq 693.000000 MHz	
12.7					DL1-13.00 dBm	Stop Freq 697.000000 MHz	
						AUTO TUNE	
32.7				▲ 1	RMS	CF Step 400.000 kHz	
42.7		-				Auto Man	
62.7						Freq Offset 0 Hz	
enter 695.000 MHz Res BW 100 kHz		#Video BW 300	kHz	#Sweer	Span 4.000 MHz 5~1.01 s (1001 pts)	X Axis Scale Log Lin	Lo
1 h C 1	? May 14, 2024 3:42:28 PM	\square				Signal Track	

Sub6 n12. Lower Extended Band Edge Plot (15M BW Ch.141300 BPSK_RB75_0)



Wept SA KEYSIGHT Input. RF Coupling: DC Align: Auto	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO: Best Close Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pow Trig: Free Run	er (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Frequency 716.050000 MHz Span	cy Settings
Spectrum v cale/Div 10 dB		Ref Lvi Offset 27. Ref Level 27.31 di		Mkr1	716.000 1 MHz -19.708 dBm	Span 100.000000 kHz Swept Span Zero Span	
						Full Span	
.31						Start Freq 716.000000 MHz	
2.7					DL1 -13 00 dBm	Stop Freq 716.100000 MHz	
2.7					RMS	AUTO TUNE	
2.7						CF Step 10.000 kHz	
2.7						Auto Man	
2.7						Freq Offset 0 Hz	
art 716.00000 MHz tes BW 30 kHz		#Video BW 100	kHz		Stop 716.10000 MHz ep 1.00 s (1001 pts)	X Axis Scale Log Lin	Loc
501	? May 14, 2024 3:34:32 PM	\square			N X	Signal Track (Span Zoom)	

Sub6 n12. Upper Band Edge Plot (5M BW Ch.142700 BPSK_RB1_Offset 24)_1



EYSIGHT Input. RF Coupling: DC Align: Auto	Input Z: 50 Ω Corr CCorr Freq Ref: Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Best Wide Gate Off IF Gain: Low Sig Track: Off	#Avg Type: P Trig: Free Ru	ower (RMS <mark>123456</mark> n A WWWWW A A A A A A	Center Frequ 717.050000	Dettill
Spectrum v cale/Div 10 dB		Ref LvI Offset 27. Ref Level 27.31 d		Mkr1	716.100 0 MHz -20.125 dBm	Span 1.90000000 Swept Sj Zero Spa	pan
						Full Sp	an
						Start Freq 716.100000	MHz
2.7 - 1					0L1 -13.00 dBm	Stop Freq 718.000000	MHz
						AUTO T	UNE
27						CF Step 190.000 kHz	
2.7			-1		RMS	Auto Man	
2.7						Freq Offset 0 Hz	
art 716.1000 MHz es BW 100 kHz		#Video BW 300	kHz	#Sv	Stop 718.0000 MHz veep 1.00 s (1001 pts)		
501	May 14, 2024 3:34:50 PM	\square			A CONTRACTOR OF A CONTRACTOR O	Signal Track	

Sub6 n12. Upper Band Edge Plot (5M BW Ch.142700 BPSK_RB1_Offset 24)_2









RL +++ Coupling DC CAlign Auto F	nput Z 50 Ω #Atten: 20 dB Corr CCorr Preamp: Off Freq Ref: Int (S) NFE: Adaptive	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (Trig: Free Run	RMS 1 2 3 4 5 6 A WW WWW A A A A A A A	Center Frequency 719.000000 MHz Span	Settings
Spectrum v cale/Div 10 dB	Ref Lvi Offset 2 Ref Level 27.31			17.020 MHz 36.607 dBm	4.00000000 MHz Swept Span Zero Span	
				_	Full Span	1
/.31					Start Freq 717.000000 MHz	
				QL1-13.00 dBm	Stop Freq 721.000000 MHz	
				_	AUTO TUNE	
127				RMS	CF Step 400.000 kHz	
52.7					Auto Man	
12.7					Freq Offset 0 Hz	
enter 719.000 MHz Res BW 100 kHz	#Video BW 30	0 kHz	#Sweep ~	Span 4.000 MHz 1.01 s (1001 pts)	X Axis Scale Log Lin	Los
501?	May 14, 2024				Signal Track (Span Zoom)	1

Sub6 n12. Upper Extended Band Edge Plot (5M BW Ch.142700 BPSK_RB25_0)



EYSIGHT Input. RF Coupling: DC Align: Auto	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE. Adaptive	#Atten: 20 dB Preamp: Off	PNO Best Close Gate Off IF Gain Low Sig Track Off	#Avg Type: Po Trig: Free Rur	wer (RMS123456 AWWWWW AAAAAA	Center Frequency 716.050000 MHz Span	Setting
Spectrum v cale/Div 10 dB		ef Lvi Offset 27.3 ef Level 27.31 dB		Mkr1	716.000 2 MHz -19.973 dBm	100.000000 kHz Swept Span Zero Span	
						Full Span	
/.31						Start Freq 716.000000 MHz	1
12.7					DL1-13.00 dBm	Stop Freq 716.100000 MHz	
22.7					RMS	AUTO TUNE	1
32.7						CF Step 10.000 kHz	1
52.7						Auto Man	
32.7						Freq Offset 0 Hz	
tart 716.00000 MHz Res BW 30 kHz		#Video BW 100 k	Hz	#Sw	Stop 716.10000 MHz reep 1.00 s (1001 pts)	X Axis Scale Log Lin	La
	May 14, 2024 3:40:52 PM	ÐA			Concession of the local division of the loca	Signal Track (Snen Zoom)	1

Sub6 n12. Upper Band Edge Plot (10M BW Ch.142200 BPSK_RB1_Offset 51)_1



	ut RF Ipling DC In Auto	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: P Trig: Free Ru	ower (RMS <mark>123456</mark> n AWWWWW A A A A A A A		Frequency 0000 MHz	Settings
Spectrum cale/Div 10 dB	•		Ref LvI Offset 27. Ref Level 27.31 d		Mkr1	716.100 0 MHz -19.648 dBm	1.9000 Sw	0000 MHz ept Span ro Span	
7.3							F	ull Span	
31							Start Fre 716.10	eq 0000 MHz	
1						DL 1 -13 60 dBm	Stop Fre 718.00	eq 0000 MHz	
27							AU	TO TUNE	
27	human						CF Step 190.00	SARAN S	
27							Aut Ma		
2.7						RMS	Freq Off 0 Hz	set	
art 716.1000 MH les BW 100 kHz	z		#Video BW 300	kHz	#Sv	Stop 718.0000 MHz veep 1.00 s (1001 pts)	X Axis S Log	9	Loc
50	7?	May 14, 2024 3:41:10 PM	\square			and the second se	Signal T		

Sub6 n12. Upper Band Edge Plot (10M BW Ch.142200 BPSK_RB1_Offset 51)_2



L +++ Coupling DC C Align Auto F	nput Z 50 Ω #Atten: 20 dB Corr CCorr Preamp: Off Freq Ref: Int (S) NFE: Adaptive	PNO Best Wide #Avg Ty Gate Off Trig Fre IF Gain Low Sig Track Off	pe: Power (RMS 1 2 3 4 5 6 e Run A WWWWW A A A A A A	Center Frequency 716.000000 MHz Span	Settings
Spectrum v cale/Div 10 dB	Ref Lvi Offset 27 Ref Level 27.31	.51 05	Mkr1 717.320 MHz -30.106 dBm	15.0000000 MHz Swept Span Zero Span	
7.3				Full Span	
31				Start Freq 708.500000 MHz	
2.7			DL1-13.00 dBm	Stop Freq 723.500000 MHz	
		1		AUTO TUNE	
2.7		Am	~_	CF Step 1.500000 MHz	
2.7			RMS	Auto Man	
2.7				Freq Offset 0 Hz	
enter 716.000 MHz tes BW 100 kHz	#Video BW 300) kHz	Span 15.00 MHz #Sweep 1.00 s (1001 pts)	X Axis Scale Log	Loc

Sub6 n12. Upper Band Edge Plot (10M BW Ch.142200 BPSK_RB50_Offset 0)



KEYSIGHT Input: RF Coupling: DC Align: Auto		⊀Atten: 20 dB Preamp: Off	PNO Best Wide Gate Off IF Gain Low Sig Track: Off	#Avg Type: Powe Trig: Free Run	ar (RMS <mark>123456</mark> A WW WW W A A A A A A A	Center Frequency 719.000000 MHz Span	Settings
Spectrum v cale/Div 10 dB		f Lvi Offset 27.31 f Level 27.31 dB		Mkr1	717.320 MHz -30.348 dBm	4.00000000 MHz Swept Span Zero Span	
						Full Span	
.31						Start Freq 717.000000 MHz	
2.7					0L1-13 00 dBm	Stop Freq 721.000000 MHz	
2.7						AUTO TUNE	
27					RMS	CF Step 400.000 kHz	
52.7						Auto Man	
32.7						Freq Offset 0 Hz	
enter 719.000 MHz Res BW 100 kHz	#	Video BW 300 kl	Hz	#Sween	Span 4.000 MHz ~1.01 s (1001 pts)	X Axis Scale Log Lin	Lo
	May 14, 2024 3:40:30 PM					Signal Track (Span Zoom)	

Sub6 n12. Upper Extended Band Edge Plot (10M BW Ch.142200 BPSK_RB50_0)



New your and the second s	E: Adaptive	IF Gain: Low Sig Track: Off		AAAA	Center Frequency 716.050000 MHz Span	Settings
Spectrum v sale/Div 10 dB	Ref LvI Offset 27 Ref Level 27.31 d		Mkr1 716.005 -25.76		Span 100.000000 kHz Swept Span Zero Span	
7.3					Full Span	
31					Start Freq 716.000000 MHz	1
2.7				-13.00 dBm	Stop Freq 716.100000 MHz	
2.7 1				RMS	AUTO TUNE	
27					CF Step 10.000 kHz	
27					Auto Man	
2.7					Freq Offset 0 Hz	
art 716.00000 MHz Ses BW 30 kHz	#Video BW 100	kHz	Stop 716.10 #Sweep 1.00 s (1		X Axis Scale Log Lin	Loc

Sub6 n12. Upper Band Edge Plot (15M BW Ch.141700 BPSK_RB1_Offset 78)_1





Sub6 n12. Upper Band Edge Plot (15M BW Ch.141700 BPSK_RB1_Offset 78)_2



L +++ Coupling DC Align: Auto	Input Z: 50 Q #Atten: 20 dB Corr CCorr Preamp: Off Freq Ref: Int (S) NFE: Adaptive	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type. Power (RMS12345 Trig: Free Run A WW WW A A A A A	710.000000 MHZ
Spectrum ▼ cale/Div 10 dB	Ref LvI Offset 27 Ref Level 27.31		Mkr1 721.760 MH -35.534 dBr	Z 15.0000000 MHz
7.3				Full Span
31				Start Freq 708.500000 MHz
2.7			DL1 -13 00 dE	Stop Freq 723.500000 MHz
				AUTO TUNE
27		nna	RM RM	CF Step 1.500000 MHz
2.7				Auto Man
2.7				Freq Offset 0 Hz
enter 716.000 MHz Res BW 150 kHz	#Video BW 47	0 kHz	Span 15.00 M #Sweep 1.00 s (1001 pt	Hz X Axis Scale

Sub6 n12. Upper Band Edge Plot (15M BW Ch.141700 BPSK_RB75_Offset 0)



KEYSIGHT Input R Couplin Align: A	DC Corr CCorr		PNO Best Wide Gate Off IF Gain Low Sig Track Off	#Avg Type: Powe Trig: Free Run	er (RMS <mark>123456</mark> A WWWWW A A A A A A A	Center Frequency 719,000000 MHz	Settings
Spectrum cale/Div 10 dB		Ref LvI Offset 27 Ref Level 27.31 d		Mkr1	720.004 MHz -36.154 dBm	Span 4.00000000 MHz Swept Span Zero Span	
						Full Span	
.31						Start Freq 717.000000 MHz	
2.7					DL 1 -13 00 dBm	Stop Freq 721.000000 MHz	
						AUTO TUNE	
27				1	RMS	CF Step 400.000 kHz	
2.7	1704000					Auto Man	
2.7						Freq Offset 0 Hz	
enter 719.000 MHz Res BW 100 kHz		#Video BW 300	kHz	#Sweep	Span 4.000 MHz	X Axis Scale Log Lin	Los
50	May 14, 202 3:46:50 PM	4				Signal Track (Span Zoom)	

Sub6 n12. Upper Extended Band Edge Plot (15M BW Ch.141700 BPSK_RB75_0)



Spectru Swept S	im Anal SA	yzer 1		÷					0	Frequency	1
KEYS RL	IGHT	Input I Coupli Align: /	ng DC	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Fast Gate Off IF Gain Low Sig Track Off	#Avg Type: Po Trig: Free Rur	wer (RMS <mark>123456</mark> A WW WW W A A A A A A		requency 0000 GHz	Settings
og	Div 10 (ів 2	•		Ref Level 10.00	dBm	Mk	r1 4.060 9 GHz -70.613 dBm	9.97000 Swe	000 GHz pt Span Span	
0.00 10.0 20.0	Y								Fu	ll Span	
30.0									Start Fre 30.0000		
50.0 60.0 70.0			و المحد المحد		2		الم الم الم الم	RMS في الأريافي التي التي التي	Stop Fre 10.0000	1 00000 GHz	
80.0 - Start 30) MHz				#Video BW 3.0			Stop 10.000 GHz	AUT	O TUNE	
	W 1.0	MHZ	•				Sweep	~18.7 ms (20001 pts)	CF Step 997.000	000 MHz	
	Mode	Trace	Scale	x	Y	Function	Function Width	Function Value	Auto Man		
1 2 3	N N	1	f	4.060 9 GHz 699.5 MHz	-70.61 dBm -3.574 dBm				Freq Offs 0 Hz	et	
4 5 6									X Axis Se Log Lin	ale	Loc
	ょ	3		May 14, 2024 3:29:42 PM	ÐA				Signal Tr		

Sub6 n12. Conducted Spurious Plot _ (140300ch_5MHz_BPSK_RB 1_1)





Sub6 n12. Conducted Spurious Plot _ (141500ch_5MHz_BPSK_RB 1_1)





Sub6 n12. Conducted Spurious Plot _ (142700ch_5MHz_BPSK_RB 1_1)





Sub6 n12. Conducted Spurious Plot _ (140800ch_10MHz_BPSK_RB 1_1)



Spectru		yzer 1		+					0	Frequency	• 🐝
REYS	SIGHT	Input. I Coupli Align: /	ng DC	Input Z: 50 0 Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Rui	wer (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Fr 5.01500 Span	equency 0000 GHz	Settings
1 Spect Scale/ Log	Div 10 (ів 2			Ref Level 10.00	dBm	Mk	r1 8.288 2 GHz -70.218 dBm	9.97000 Swe	000 GHz pt Span Span	
-10.0									Fu	II Span	
-30.0 -40.0									Start Free 30.0000	2 H	
-50.0 -60.0 -70.0					الميانينيني	سيرالحرم	المتحافظ المتعادية	RMS	Stop Free 10.0000	1 00000 GHz	
-80.0 55 Start 3	0 MHz				#Video BW 3.0			Stop 10.000 GHz	Contraction of the	O TUNE	
#Res E 5 Marki	er Table	MHz	۲				Sweep	~18.7 ms (20001 pts)	CF Step 997.000	000 MHz	
	Mode	Trace	Scale		Y	Function	Function Width	Function Value	Man		
1 2 3	z z	1	f	8.288 2 GHz 703.0 MHz	-70.22 dBm -4.191 dBm				Freq Offs 0 Hz	et	
4 5 6									X Axis Sc Log Lin	ale	Local
-	ょ	C		? May 14, 2024 3:39:27 PM	ÐA.				Signal Tri ISom Zoo		

Sub6 n12. Conducted Spurious Plot _ (141500ch_10MHz_BPSK_RB 1_1)



Spectro	um Anal SA	yzer 1		÷					0	Frequency	• • •
KEYS RL M	SIGHT	Coupli Align	ng DC	Input Z: 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Fast Gate Ott IF Gain Low Sig Track: Otf	#Avg Type, Po Trig: Free Run	wer (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Fr 5.01500 Span	equency 0000 GHz	Settings
Spec	trum						Mk	r1 9.404 3 GHz	9.97000	000 GHz	
cale/	Div 10	dB 2			Ref Level 10.00	dBm		-69.966 dBm	Swe	pt Span Span	
10.0									Fu	li Span	
30.0 40.0									Start Free 30.0000	2 B	
50.0 60.0 70.0					Marine Marine	ور المراجع	مستحش		Stop Free 10.0000	1 00000 GHz	
80.0 Start 3	0 MHz			and the second	#Video BW 3.0			Stop 10.000 GHz	AUT	O TUNE	
Res E	3W 1.0	MHz					Sweep	~18.7 ms (20001 pts)	CF Step	nasees a	
i Mark	er Table									000 MHz	
	Mode	Trace	Scale	x	Y	Function	Function Width	Function Value	Auto Man		
1 2 3	N N	1	f	9.404 3 GHz 706.5 MHz	-69.97 dBm -4.313 dBm				Freq Offs 0 Hz	et	
4 5 6									X Axis So Log Lin	ale	Loc
	ょ	3		May 14, 2024 3:41:32 PM	\square				Signal Th ISonn Zon		

Sub6 n12. Conducted Spurious Plot _ (142200ch_10MHz_BPSK_RB 1_1)



vept SA			+	100000000000000000000000000000000000000				\$	Frequency	
EYSIGH 	1. Soundin	ng DC	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Fast Gate Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Rur	wer (RMS <mark>123456</mark> A WW WW W A A A A A A	5.015	Frequency 000000 GHz	Settings
Spectrum ale/Div 10	dB	×		Ref Level 10.00	dBm	N	lkr2 699.5 MHz -4.012 dBm	S	00000 GHz wept Span ero Span	
0.0									Full Span	
0.0								Start F 30.00	req 0000 MHz	
).0).0).0			المراجع والاحتار والمراجع	بالم المعرفة المراجع	وورافيه أفرياني	مردن الارالي المراجع المريا	- 	Stop F 10.00	req 0000000 GHz	
art 30 MHz es BW 1.0				#Video BW 3.0			Stop 10.000 GHz ~18.7 ms (20001 pts)	Al CF Ste		
farker Table								997.0	00000 MHz	
Mode 1 N 2 N 3	Trace 1 1	Scale f	X 9.677 0 GHz 699.5 MHz	Y -69.86 dBm -4.012 dBm	Function	Function Width	Function Value	Freq C 0 Hz	1014	
4 5 6								X Axis	og	Lor
5	3		May 14, 2024 3:43:11 PM	\mathbb{D}			N N	Signal	Track	U.

Sub6 n12. Conducted Spurious Plot _ (141300ch_15MHz_BPSK_RB 1_1)



Spectrum Ana Swept SA	lyzer 1		÷					\$	Frequency	1 2
KEYSIGH RL ↔→	Coupli Align: /	ng DC	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO Fast Gate Off IF Gain Low Sig Track: Off	#Avg Type: Po Trig: Free Rur	wer (RMS <mark>123456</mark> A WWWW W A A A A A A	Center Fi 5.01500 Span	equency 0000 GHz	Settings
Spectrum cale/Div 10	dB	•		Ref Level 10.00	dBm	Mk	r1 8.289 1 GHz -70.255 dBm	9.97000 Swe	000 GHz pt Span Span	
0.00								Fu	ll Span	
30.0 40.0								Start Fre 30.0000		
50.0 30.0 70.0				سمسم	وروار المراجع	-	A RMS	Stop Free 10.0000	1 00000 GHz	
80.0 itart 30 MHz				#Video BW 3.0			Stop 10.000 GHz		O TUNE	
Res BW 1.0 i Marker Table						Sweep	~18.7 ms (20001 pts)	CF Step 997.000	000 MHz	
Mode	Trace	Scale	x	Y	Function	Function Width	Function Value	Auto Man		
1 N 2 N 3	1	f	8.289 1 GHz 700.5 MHz	-70.25 dBm -4.808 dBm				Freq Offs 0 Hz	et	
4 5 6								X Axis So Log Lin	ale	Loc
5	3		May 14, 2024 3:45:47 PM	\mathbb{D}				Signal Tr		

Sub6 n12. Conducted Spurious Plot _ (141500ch_15MHz_BPSK_RB 1_1)



KEYSIGH RL ++-	T Input F Couplin Align: /	ig DC	Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Rur	ower (RMS <mark>123456</mark> A WWWWW A A A A A A	Center Fre 5.015000 Span		Settings
Spectrum	dB 2			Ref Level 10.00	dBm	Mk	r1 3.827 1 GHz -70.544 dBm	9.970000	t Span	
								Full	Span	
20.0								Start Freq 30.00000	0 MHz	
50.0 60.0 70.0			and and a second second	1-	مهدوان المراجع	المساحستان بالمسحب	RMS	Stop Freq 10.00000	0000 GHz	
80.0 Start 30 MHz Res BW 1.0	ML			#Video BW 3.0		Suran	Stop 10.000 GHz ~18.7 ms (20001 pts)	AUTO CF. Step	TUNE	
i Marker Table		•				Sweep	~18.7 ms (20001 pts)	997.0000	00 MHz	
Mode	Trace	Scale	x	Y	Function	Function Width	Function Value	Auto Man		
1 N 2 N 3	1	f	3.827 1 GHz 701.5 MHz	-70.54 dBm -4.684 dBm				Freq Offse 0 Hz	t	
4 5 6								X Axis Sca Log Lin	le	Loc
15	2	72	May 14, 2024 3:47:51 PM	\mathbb{D}				Signal Tra		

Sub6 n12. Conducted Spurious Plot _ (141700ch_15MHz_BPSK_RB 1_1)



10. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2409-FC008-P