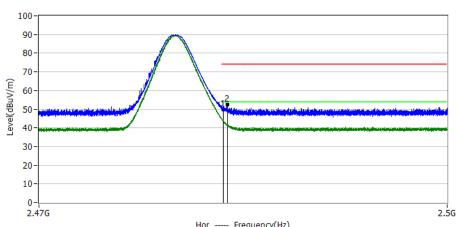
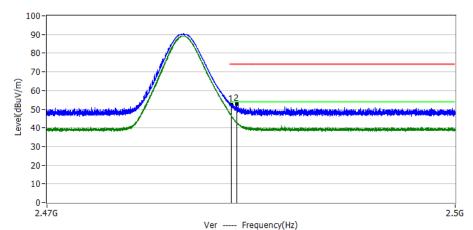


Project: LGT23C062	Test Engineer: Dylan.shi
EUT: smart phone	Temperature: 24.8°C
M/N: UW505	Humidity: 62%RH
Test Voltage: Battery	Test Data: 2023-04-10
Test Mode: DH5 2480	
Note:	



				Hor Frequence	y(HZ)			
No.	Frequency	Reading	Factor	Level	Limit	Margin	Detector	Polar
NO.	riequency	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	i olai
1*	2.4835GHz	15.57	34.13	49.70	74.00	-24.30	PK	Hor
2*	2.4838GHz	18.16	34.13	52.29	74.00	-21.71	PK	Hor



				re	.,(			
No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	2.4835GHz	18.17	34.13	52.30	74.00	-21.70	PK	Ver
2*	2.4839GHz	18.50	34.13	52.63	74.00	-21.37	PK	Ver



# 4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

#### 4.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### 4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

#### For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 – 2407 MHz Upper Band Edge: 2475 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

#### For Hopping Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300– 2403 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 TEST SETUP



The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna termina is 500hm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

#### 4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



## 4.5 TEST RESULTS

For the measurement records, refer to the appendix I.



# 5. NUMBER OF HOPPING CHANNEL

## 5.1 LIMIT

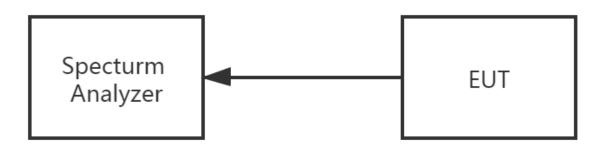
FCC Part 15.247, Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	300KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 300KHz, VBW=300KHz, Sweep time = Auto.

## 5.3 TEST SETUP



## 5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

#### 5.5 TEST RESULTS

For the measurement records <sup>,</sup> refer to the appendix I.



## 6. AVERAGE TIME OF OCCUPANCY

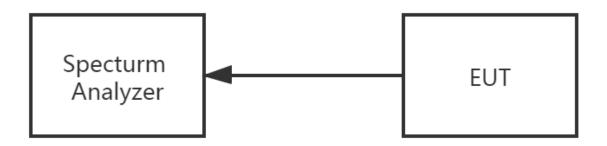
#### 6.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

#### 6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer.
- b. Set RBW =1MHz/VBW =3MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to e. zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- $\tilde{h}$ . Measure the maximum time duration of one single pulse.
- i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 3.37 x 31.6 = 106.6.
- j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 5.06 x 31.6 = 160.
- k. DH1 Packet permit maximum 1600 / 79 / 2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 10.12 x 31.6 = 320.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS Please refer to section 3.1.4 of this report.

#### 6.5 TEST RESULTS

For the measurement records, refer to the appendix I.



## 7. HOPPING CHANNEL SEPARATION MEASUREMEN

#### 7.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 7.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

#### 7.3 TEST SETUP



#### 7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 7.5 TEST RESULTS

For the measurement records <sup>,</sup> refer to the appendix I.



# 8. BANDWIDTH TEST

## 8.1 LIMIT

FCC Part15 15.247, Subpart C					
Section	Test Item	Limit	FrequencyRange (MHz)	Result	
15.247 (a)(1)	Bandwidth	N/A	2400-2483.5	PASS	

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
   b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.
- 8.3 TEST SETUP



**8.4 EUT OPERATION CONDITIONS** Please refer to section 3.1.4 of this report.

#### 8.5 TEST RESULTS

For the measurement records <sup>,</sup> refer to the appendix I.



# 9. OUTPUT POWER TEST

## 9.1 LIMIT

FCC Part 15.247, Subpart C						
Section	Test Item	Limit	Frequency Range (MHz)	Result		
		1 W or 0.125W				
15.247 (a)(1)&(b)(1)	Output Power	if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm)	2400-2483.5	PASS		

#### 9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

- 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 2) RBW > 20 dB bandwidth of the emission being measured.

3) VBW  $\geq$  RBW.

4) Sweep: Auto.

5) Detector function: Peak.

6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

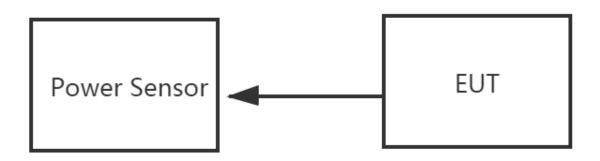
e) A plot of the test results and setup description shall be included in the test report.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DSS bandwidth and shall use a fast-responding diode detector.

#### 9.3 TEST SETUP



9.4 EUT OPERATION CONDITIONS
Please refer to section 3.1.4 of this report.
9.5 TEST RESULTS
For the measurement records <sup>+</sup> refer to the appendix I.



## **10. ANTENNA REQUIREMENT**

#### 10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### 10.2 EUT ANTENNA

The EUT antenna is PIFA antenna. It comply with the standard requirement.



# **APPENDIX I: TEST RESULTS**

#### **Dwell Time**

Conditio n	Mod e	Frequenc y (MHz)	Antenn a	Puls e Time (ms)	Total Dwell Time (ms)	Burst Coun t	Perio d Time (ms)	Limi t (ms)	Verdic t
NVNT	1- DH1	2441	Ant1	0.378	120.20 4	318	31600	400	Pass
NVNT	1- DH3	2441	Ant1	1.634	261.44	160	31600	400	Pass
NVNT	1- DH5	2441	Ant1	2.882	311.256	108	31600	400	Pass
NVNT	2- DH1	2441	Ant1	0.382	119.184	312	31600	400	Pass
NVNT	2- DH3	2441	Ant1	1.635	349.89	214	31600	400	Pass
NVNT	2- DH5	2441	Ant1	2.885	271.19	94	31600	400	Pass
NVNT	3- DH1	2441	Ant1	0.386	120.81 8	313	31600	400	Pass
NVNT	3- DH3	2441	Ant1	1.634	256.53 8	157	31600	400	Pass
NVNT	3- DH5	2441	Ant1	2.884	302.82	105	31600	400	Pass























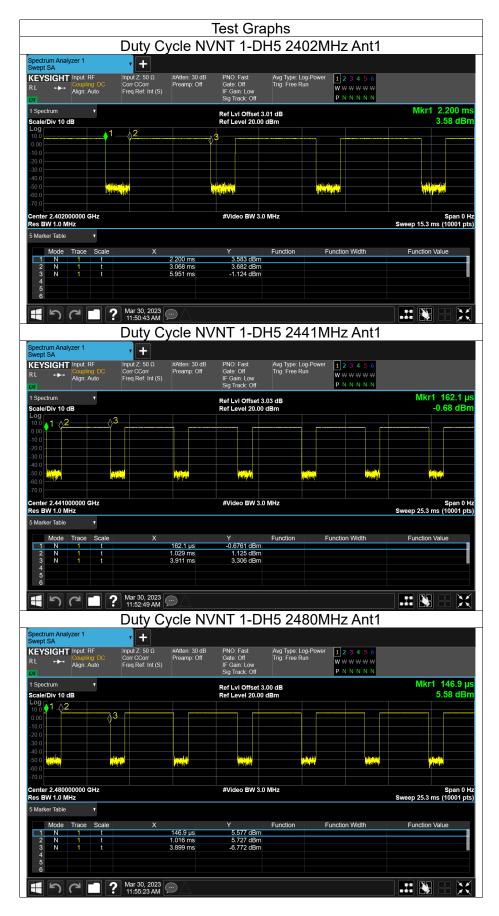




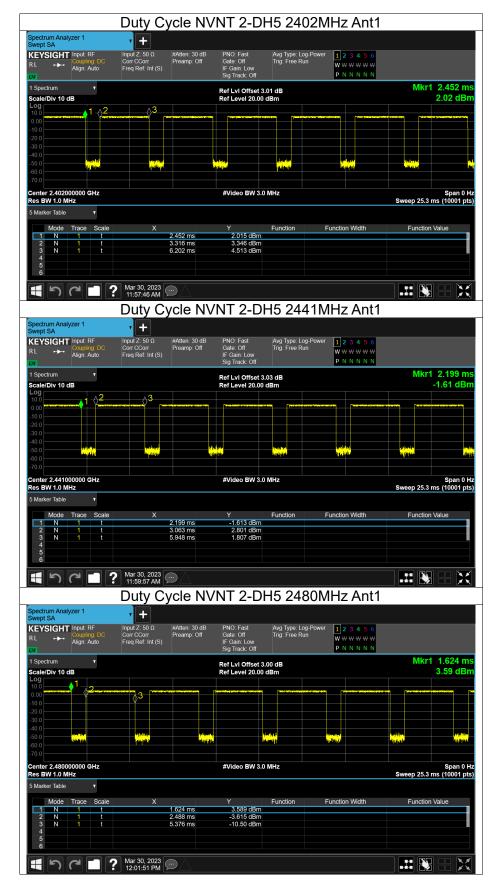
# Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	1-DH5	2402	Ant1	76.86	1.14	0.35
NVNT	1-DH5	2441	Ant1	76.89	1.14	0.35
NVNT	1-DH5	2480	Ant1	76.84	1.14	0.35
NVNT	2-DH5	2402	Ant1	76.96	1.14	0.35
NVNT	2-DH5	2441	Ant1	76.96	1.14	0.35
NVNT	2-DH5	2480	Ant1	76.98	1.14	0.35
NVNT	3-DH5	2402	Ant1	77.06	1.13	0.35
NVNT	3-DH5	2441	Ant1	77.04	1.13	0.35
NVNT	3-DH5	2480	Ant1	77.03	1.13	0.35















# Maximum Peak Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH5	2402	Ant1	7.39	21	Pass
NVNT	1-DH5	2441	Ant1	4.97	21	Pass
NVNT	1-DH5	2480	Ant1	6.21	21	Pass
NVNT	2-DH5	2402	Ant1	6.74	21	Pass
NVNT	2-DH5	2441	Ant1	4.45	21	Pass
NVNT	2-DH5	2480	Ant1	5.59	21	Pass
NVNT	3-DH5	2402	Ant1	6.8	21	Pass
NVNT	3-DH5	2441	Ant1	4.57	21	Pass
NVNT	3-DH5	2480	Ant1	5.74	21	Pass



# -20dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH5	2402	Ant1	1.035	Pass
NVNT	1-DH5	2441	Ant1	1.02	Pass
NVNT	1-DH5	2480	Ant1	0.958	Pass
NVNT	2-DH5	2402	Ant1	1.284	Pass
NVNT	2-DH5	2441	Ant1	1.303	Pass
NVNT	2-DH5	2480	Ant1	1.323	Pass
NVNT	3-DH5	2402	Ant1	1.292	Pass
NVNT	3-DH5	2441	Ant1	1.31	Pass
NVNT	3-DH5	2480	Ant1	1.294	Pass







-20dB Bandwidt	h NVNT 2-DH5 24	402MHz Ant1
Spectrum Analyzer 1 Occupied BW		
KEYSIGHT         Input: RF         Input: Z: 50 Ω         Atten: 30 dB           RL         →         Coupling: DC         Corr CCorr         Preamp: Off           Atten:         Atten:         Atten:         Atten:         Atten:         Atten:	Trig: Free Run Center Freq: 2.40 Gate: Off Avg Hold: 100/10 #IF Gain: Low Radio Std: None	2000000 GHz )
1 Graph v Scale/Div 10.0 dB	Ref Lvi Offset 3.01 dB Ref Value 23.01 dBm	Mkr3 2.402632000 GHz -16.30 dBm
Log 13.0 3.01 6.99 A 2		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
6.99 -170 -270 -370		
-47.0 -57.0 -67.0		
Center 2.402000 GHz #Res BW 30.000 kHz	#Video BW 100.00 kHz	Span 2 MHz Sweep 2.67 ms (10001 pts)
2 Metrics v	Mea	sure Trace Trace 1
Occupied Bandwidth 1.1826 MHz Transmit Freq Error -9.404 kHz		Power         11.9 dBm           OBW Power         99.00 %
x dB Bandwidth 1.284 MHz	x dB	-20.00 dB
	h NVNT 2-DH5 24	HATMHZ ANTT
Occupied BW         Τ           KEYSIGHT         Input: RF         Input Z: 50 Ω         Atten: 30 dB	Trig: Free Run Center Freq: 2.44	1000000 GHz
RL ↔ Coupling. DC Corr CCorr Preamp: Off Align: Auto Freq Ref: Int (S)	Gate: Off Avg Hold: 100/100 #IF Gain: Low Radio Std: None	
1 Graph Scale/Div 10.0 dB Log	Ref LvI Offset 3.03 dB Ref Value 23.03 dBm	Mkr3 2.441644000 GHz -19.31 dBm
13.0 3.03 6.07 7.0 2		
-17.0 -27.0 -37.0		
-47.0 -57.0 -67.0		
Center 2.441000 GHz #Res BW 30.000 kHz	#Video BW 100.00 kHz	Span 2 MHz Sweep 2.67 ms (10001 pts)
2 Metrics v	Mea	sure Trace 1
Occupied Bandwidth 1.1952 MHz Transmit Freq Error -7.331 kHz		Power         9.69 dBm           OBW Power         99.00 %
x dB Bandwidth 1.303 MHz	x dB	-20.00 dB
E 5 C 2 Mar 30, 2023 C 4		
Spectrum Analyzer 1	h NVNT 2-DH5 24	180MHZ Ant1
Occupied BW         T           KEYSIGHT         Input RF         Input Z 50 Ω           RL         Coupling: DC         Corr CCorr           Align: Auto         Freq Ref. Int (S)	Trig: Free Run Gate: Off Avg Hold: 100/10 #IF Gain: Low Radio Std: None	0000000 GHz
1 Graph v Scale/Div 10.0 dB	Ref Lvi Offset 3.00 dB Ref Value 23.00 dBm	Mkr3 2.480654000 GHz -20.30 dBm
Log 13.0 3.00	1	
-7.00 -17.0 -27.0		3
-37.0		
-67.0 Center 2.480000 GHz #Res BW 30.000 kHz	#Video BW 100.00 kHz	Span 2 MHz Sweep 2.67 ms (10001 pts)
2 Metrics v		sure Trace 1
Occupied Bandwidth 1.1884 MHz	Total	Power 10.2 dBm
Transmit Freq Error         -7.881 kHz           x dB Bandwidth         1.323 MHz	% of x dB	OBW Power 99.00 % -20.00 dB



-20dB Bandwidth	NVNT 3-DH	5 2402MHz A	Ant1
Spectrum Analyzer 1 Occupied BW			
KEYSIGHT         Input: RF         Input: Z: 50 Ω         Atten: 30 dB           RL         ↔         Coupling: DC         Corr CCorr         Preamp: Off           Align: Auto         Freq Ref: Int (S)         Freq mp: Off         Preamp: Off	Trig: Free Run Center F Gate: Off Avg Holc #IF Gain: Low Radio St	Freq: 2.402000000 GHz J: 100/100 Id: None	
1 Graph v Scale/Div 10.0 dB	Ref LvI Offset 3.01 dB Ref Value 23.01 dBm		Mkr3 2.402637000 GHz -17.97 dBm
		, <del>1</del>	
-6.99 -17.0 -27.0			~3
-37.0 -47.0 -57.0			
-67.0 Center 2.402000 GHz	#Video BW 100.00 kHz		Span 2 MHz
#Res BW 30.000 kHz 2 Metrics v			Sweep 2.67 ms (10001 pts)
Occupied Bandwidth		Measure Trace Trac	e 1
1.1893 MHz Transmit Freq Error -8.922 kHz		Total Power % of OBW Power	12.1 dBm 99.00 %
x dB Bandwidth 1.292 MHz		x dB	-20.00 dB
		5 0444141	
-20dB Bandwidth	NVNT 3-DH	5 2441MHz A	Ant1
KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Coupling: DC Corr Corr Preamp: Off	Gate: Off Avg Hold	Freq: 2.441000000 GHz d: 100/100	
RL → Align: Auto Freq Ref: Int (S)	#IF Gain: Low Radio St	td: None	Mkr3 2.441644000 GHz
1 Graph V Scale/Div 10.0 dB Log	Ref LvI Offset 3.03 dB Ref Value 23.03 dBm		-19.55 dBm
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~3
-17.0 -27.0 -37.0			
47.0 -57.0 -67.0			
Center 2.441000 GHz #Res BW 30.000 kHz	#Video BW 100.00 kHz		Span 2 MHz Sweep 2.67 ms (10001 pts)
2 Metrics v			
Occupied Bandwidth 1.2150 MHz		Measure Trace Trac Total Power	9.60 dBm
Transmit Freq Error-11.468 kHzx dB Bandwidth1.310 MHz		% of OBW Power x dB	99.00 % -20.00 dB
-20dB Bandwidth	NVNT 3-DH	5 2480MHz A	
Spectrum Analyzer 1			
KEYSIGHT         Input: RF         Input: Z: 50 Ω         Atten: 30 dB           RL         Align: Auto         Freq Ref: Int (S)         Preamp: Off	Trig: Free Run Center F Gate: Off Avg Holo #IF Gain: Low Radio St	Freq: 2.480000000 GHz d: 100/100 td: None	
1 Graph v Scale/Div 10.0 dB	Ref LvI Offset 3.00 dB Ref Value 23.00 dBm		Mkr3 2.480636000 GHz -17.10 dBm
	h		
-7.00 -17.0 -27.0			~ 13
-37.0 -47.0 -57.0			
-67.0 Center 2.480000 GHz #Res BW 30.000 kHz	#Video BW 100.00 kHz		Span 2 MHz Sweep 2.67 ms (10001 pts)
2 Metrics			
Occupied Bandwidth		Measure Trace Trac Total Power	e 1 11.1 dBm
1.2029 MHz       Transmit Freq Error     -11.220 kHz       x dB Bandwidth     1.294 MHz		% of OBW Power x dB	99.00 % -20.00 dB



# Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	1-DH5	2402	Ant1	0.892
NVNT	1-DH5	2441	Ant1	0.897
NVNT	1-DH5	2480	Ant1	0.902
NVNT	2-DH5	2402	Ant1	1.184
NVNT	2-DH5	2441	Ant1	1.207
NVNT	2-DH5	2480	Ant1	1.201
NVNT	3-DH5	2402	Ant1	1.211
NVNT	3-DH5	2441	Ant1	1.22
NVNT	3-DH5	2480	Ant1	1.217



