

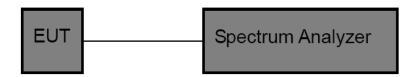
# 3.4. Band Edge and Spurious Emissions (Conducted)

# <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### **Test Configuration**



### Test Procedure

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10<sup>th</sup> harmonic. Sweep = auto, Detector function = peak, Trace = max hold.
- 4. Measure and record the results in the test report.

### Test Mode

Please refer to the clause 2.4.

### Test Result

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### Band Edge Conducted Test & Conducted Spurious Emissions Test

Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Result
		0	2400.00	-53.934	-16.52	PASS
		0	4999.78	-50.730	-16.52	PASS
GFSK	DH5	39	4999.78	-51.112	-16.4	PASS
		70	2483.50	-61.681	-16.91	PASS
		78	1766.08	-47.636	-16.91	PASS
		0	2400.00	-53.251	-17.04	PASS
		0	4999.78	-50.787	-17.04	PASS
π/4DQPSK	2-DH5	39	4999.78	-51.262	-17.32	PASS
		70	2483.50	-62.648	-17.85	PASS
		78	4999.78	-50.385	-17.85	PASS
		0	2400.00	-52.529	-17.01	PASS
		0	4999.78	-51.400	-17.01	PASS
8DPSK	3-DH5	39	4999.78	-51.304	-17.32	PASS
		70	2483.50	-61.697	-16.44	PASS
		78	4999.78	-51.217	-16.44	PASS

Hopping

EN

Modulation	Packet	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Result
GFSK	DH5	2400.00	-54.523	-16.39	PASS
GFSK	DHD	2483.50	-62.633	-16.83	PASS
π/4DQPSK	2-DH5	2400.00	-52.231	-15.61	PASS
11/4DQP3K	2-000	2483.50	-62.039	-16.25	PASS
8DPSK	3-DH5	2400.00	-52.452	-15.74	PASS
ODFOR	5-005	2483.50	-61.417	-16.26	PASS



#### Test plot as follows:

Agilent Spectrum Analyzer - Swept SA	Aglient Spectrum Analyzer - Swept SA
W         RL         RF         S0.9         AC         S99529/T         AU34/UFO         Log-Pur         554713340(227,225)           Center Freq 2.4020000000 GHz         PHO: Wide         →         Trig: Free Run         Avg Type: Log-Pur         Their Participant           Float         Free Run         Avg Type: Log-Pur         Their Participant         Their Participant	III         RL         IF         30.9         AC         SPREINT         AUXIANTO         O         OSS731AMC027,2023           Center Freq 2.4020000000 GH2         PRO: Wide →         Trig: Free Run         Avg Tyre: Loorino         Image Trig: Free Run         Avg Tyre:
Ref Offset 15 dB Mkr3 2.401 995 5 GHz 10 dB/div Ref 15.00 dBm 3.475 dBm	Ref Offset 1.5 dB         Mkr3 2.402 003 0 GHz           10 dB/div         Ref 15.00 dBm           2.964 dBm
Log	5 cm 3
5.00	500 management and
-50	150
35.0	30
36.0	36.0
45.0	45.0
	550
	750
Center 2.4020000 GHz Span 1.500 MHz	Center 2.4020000 GHz Span 1.500 MHz
Center 2.4020000 GHz         Span 1.500 MHz           #Res BW 100 kHz         #VBW 300 kHz         Sweep 1.000 ms (1001 pts)           mol         [status]	#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)
In-Band Reference Level	In-Band Reference Level
GFSK_DH5_Channel 0 Addref Spectrum Analyzer - Swept SA	π/4DQPSK_2-DH5_Channel 0 Agthent Spectrum Analyzer 5 Surget 5A
0     RL 07 1909 AC 0002071 AU\$/AU(7) 000-000-000077,000     Center Freq 2.352500000 GHz → Trig:Free Avg1/eid:100/100 000 000 000     Ficate → Fige:Free Avg1/eid:100/100 000 000	B         FF         S0 ≤ AC         EXPERIT         AU2/RMTD         D0 57523M00272000           Center Freq 2.3525000000 GHz         PN0: Fail         →         Trig: Freq Xin         Avg Type: Log-Pwr         TM0: Figure Fi
Ref Offset 15 dB Mkr2 2.400 000 GHz 10 dB/div Ref 15.00 dBm -53.934 dBm	Ref Offset 15 dB Mkr2 2:400 000 GHz 10 dB/dl/w Ref 15.00 dBm -53.251 dBm
500	
500 / / / / / / / / / / / / / / / / / /	500
350	750
Start 2.30000 GHz         Stop 2.40500 GHz           #Res BW 100 kHz         #VBW 300 kHz         Sweep 10.07 ms (1001 pts)           MsR MOR FROS LL         X         Y         Baction Baction width         Bactorium 24	Start 2.30000 GHz         Stop 2.40500 GHz           #Res BW 100 kHz         #VBW 300 kHz         Sweep 10.07 ms (1001 pts)           ## Mode Tes SqL         ×         Y         Bucton Worth         Bucton Worth
MR RUDE FRC SCL         X         Y         RUNCTION WIDTH         RUNCTION WIDTH           1         1         1         2         2         1         1         6         2         53.5934 dBm         6         6         6         6         6         6         6         6         7         6         53.5934 dBm         6         6         7         6         7         6         7         6         7         6         7         6         7	Iwr Mode TRC SCI         X         Y         Ruction         Ruction worth         Ruction value         A           1         N         1         f         2400 000 GHz         53251 dBm         53251 dBm
11	11
Out Of Band Emission	Out Of Band Emission
GFSK_DH5_Channel 0	m/4DQPSK_2-DH5_Channel 0
O         RL         #F         1939         Acc         000000000000000000000000000000000000	Interface         Streeper         Alstration         0559054Mod 27,203           Center Freq 12.515000000 GHz         Free Part         Avg Type: Log-Pwr         19942 H2           PNO: Fast         Trig: Free Part         Avg Type: Log-Pwr         19942 H2
Ref Offset 15.dll         Mkr1 4.999 8 GHz         Offset 15.dll         Mkr1 4.999 8 GHz           10 dB/div         Ref 15.00 dBm         -50.730 dBm	Ref Offset 15 dB         Mkr1 4.999 8 GHz           10 dB/dlv         Ref 15.00 dBm
10 dBlav Ker 15,00 dBm	
-500	-500 -150
Start 30 MHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (40000 pts)	Start 30 MHz         Stop 25.00 GHz         Stop 25.00 GHz           #Res BW 100 kHz         #VBW 300 kHz         Sweep 2.387 s (40000 pts)           H#R M06 FRC SL         ×         Y         Ruction Machine FRC SL
MER NORE: TRC SL. X. Y RUNCTION RECTON WOTH RANCTION VALUE	Iver Mode TRC:         X         Y         Flanction         Ranction worth         Ranction value         A           1         N         1         f         4.999/9.61/2         450.797.dBm         Flanction
	9 9 10
11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 e was status
Spurious Emission	Spurious Emission
GFSK_DH5_Channel 0	π/4DQPSK_2-DH5_Channel 0

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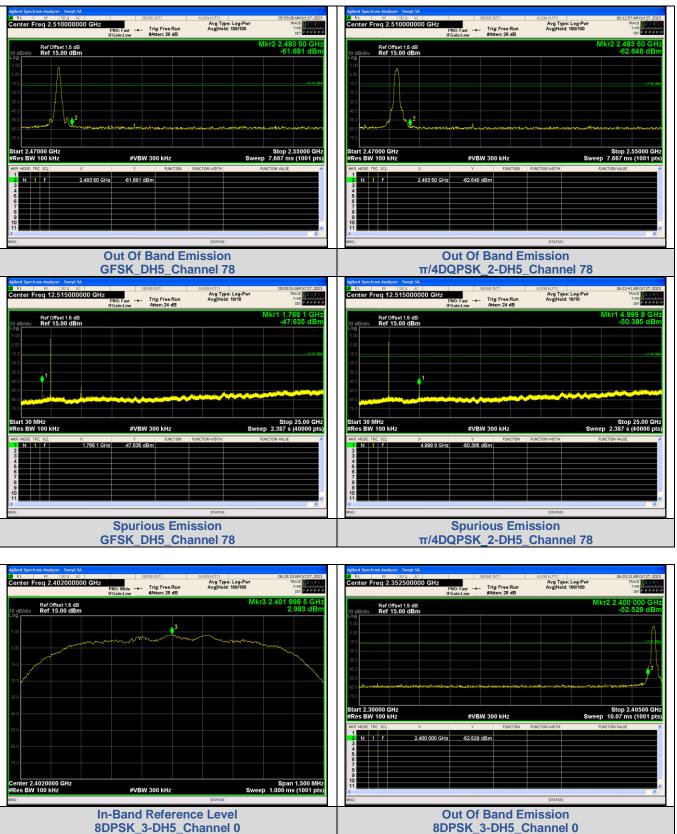


Aglent Spectrum Analyzer - Swept SA	Aglent Spectrum Analyzer - Swept SA UR RL RF 150 g. AC SERVERIM ALIONAUTO 06:00084M0rt27,2023
OIL         RF         S0 ≤         AC         S9962301         ALDRAUTO         ALDRAUTO         S550 (1940/027), 2023           Center Freq 2.4410000000 GHz         PN0: Wide         →         Trig: Free Nun         Avg Type: Log-Pwr         THROIT 27, 2023           PN0: Wide         →         Trig: Free Nun         Avg Type: Log-Pwr         THROIT 27, 2023           PN0: Wide         →         Trig: Free Nun         Avg Type: Log-Pwr         THROIT 27, 2023	MIR         IP         SS3         AC         SSDEEINT         ALSNUNTO         DE BIODRANGC 27, 2023           Center Freq 2.4410000000 GHZ         PHO: Wide         →-         Trig:Free Run         Avg Tye:Log-Pur         PHO: Rung         PHO: Rung           Fig.Free Run         Avg Heid: 100/100         Center Free Rung         Avg Heid: 100/100         PHO: Rung
Ref Offset 1.5 dB Mkr3 2.440 994 0 GHz	Ref Offset 1.5 dB Mkr3 2.440 998 5 GHz
10 dB/div Ref 15.00 dBm 5.600 dBm	10 dB/div Ref 15.00 dBm 2.07 / GBM
500	500
500	500
-450	450
	450
0.680	46.0
.75.0	-350
Center 2.4410000 GHz Span 1.500 MHz	Center 2.4410000 GHz Span 1.500 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) US0 [STATUS]	#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) Mod [STATUS]
In-Band Reference Level	In-Band Reference Level
GFSK_DH5_Channel 39 Agtent Spectrum Analyzer - Swept 5A	T/4DQPSK_2-DH5_Channel 39
Center Freq 12.515000000 GHz PR0: Fast → Trig: Free Run Avg Type: Log-Pwr Trick: 12 at 25 Avg Type: Log-Pwr Trick: 12 at 25 Avg Type: Log-Pwr Trick: 12 at 25 Trick: 12 at 25 Trig: Free Run Avg Type: Log-Pwr Trick: 12 at 25 PR0: Fast → Trig: Free Run Avg Type: Log-Pwr Trick: 12 at 25 Trick: 12 at 25 T	PR         PF         PF
IFGaintlow Atten: 24 dB Deformation Atten: 24 dB Mkr1 4.999 8 GHz	IFGaint.ow Atten: 24 dB MKr1 4.999 8 GHz
10 dB/dr Ref 15:00 dBm -51.112 dBm	10 dB/div Ref 15.00 dBm -51.262 dBm
5.00	500
Start 30 MHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (40000 pts)	Start 30 MHz Stop 25.00 GHz #VBW 300 kHz Sweep 2.387 s (40000 pts)
#Res BW 100 kHz         #VBW 300 kHz         Sweep 2.387 s (40000 pts)           MR MORE IRC SCL         X         Y         RACTON WDTH         RACTON VALUE           IN 1         I         I         S1112 dBm         RACTON VALUE	#Res BW 100 kHz         #VBW 300 kHz         Sweep 2.387 \$ (40000 pts)           MR NOSE TRC SQL         X         Y         RANCTON         RANCTON WOTH         RANCTON WOTH         RANCTON WULL         N           N         1<
2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	2 4
5 6 6 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 6 7 9
	8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10
K STATUS	C STATUS
Spurious Emissions	Spurious Emissions
GFSK_DH5_Channel 39 Agtent Spectrum Analyzer - Swept SA	π/4DQPSK_2-DH5_Channel 39 Attent Spectrum Analyzer - Swept SA
RL 05 500 AC 0552-47M0027.2023     Center Freq 2.480000000 GHz     PR0: Wide → Trig: Free Run Avg1piel.tog-Purr 100000     PR0: Wide → Trig: Free Run Avg1pield: 100/100     Tree	01 RL 8F 1909 ac 966E9.01 AU3NAUTO 061238.M007.27,2023 Center Freq 2.480000000 GHz PHO: Wide → Trig: Free Run Avgiteide: 100100 1100
Ref Offset 1.5 dB Mkr3 2.480 169 5 GHz	IFGaincl.ow #Atten: 26 dB Mkr3 2.479 998 5 GHz
10 dBdviv Ref 15.00 dBm 3.097 dBm	10 dB/div Ref 15.00 dBm 2.147 dBm
500	500
3.00	
30	
36.0	-36.0
45.0	450
65.0	85.0
46.0	46.0
750	75.0
Center 2.4800000 GHz Span 1.500 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	Center 2.4800000 GHz Span 1.500 MHz Span 1.500 MHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)
#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) una	#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) MIG [STATUS]
In-Band Reference Level	In-Band Reference Level
GFSK_DH5_Channel 78	π/4DQPSK_2-DH5_Channel 78

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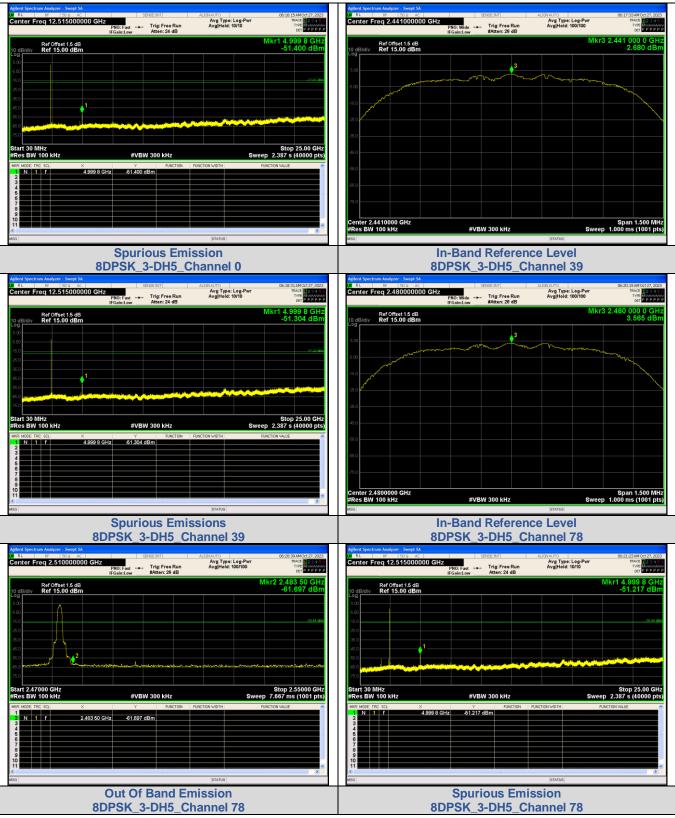
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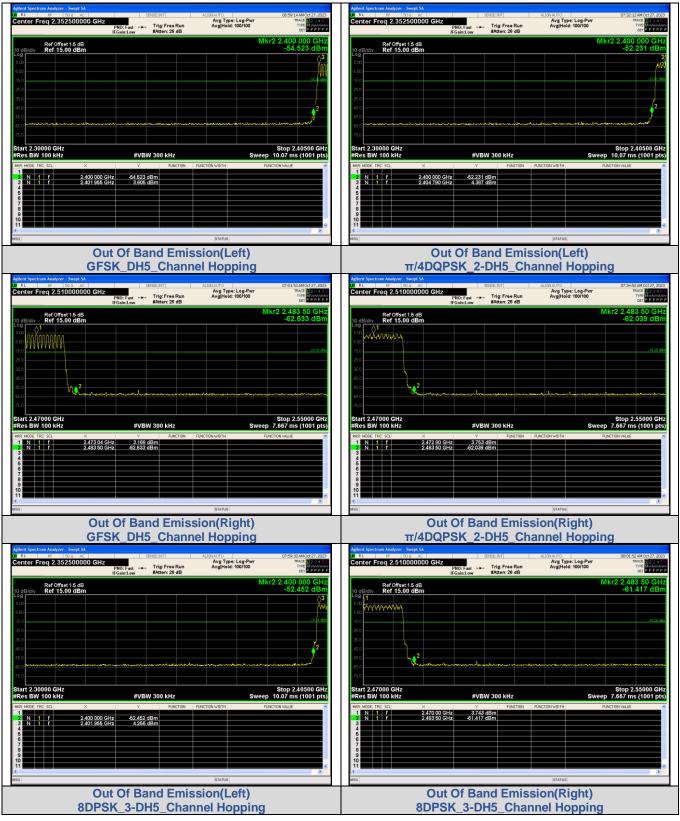
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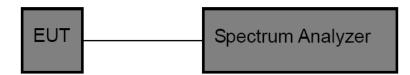


# 3.5. 20dB Bandwidth

Limit

N/A

# **Test Configuration**



### **Test Procedure**

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. OCB and 20dB Spectrum Setting:
  - (1) Set RBW =  $1\% \sim 5\%$  occupied bandwidth.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

# **Test Mode**

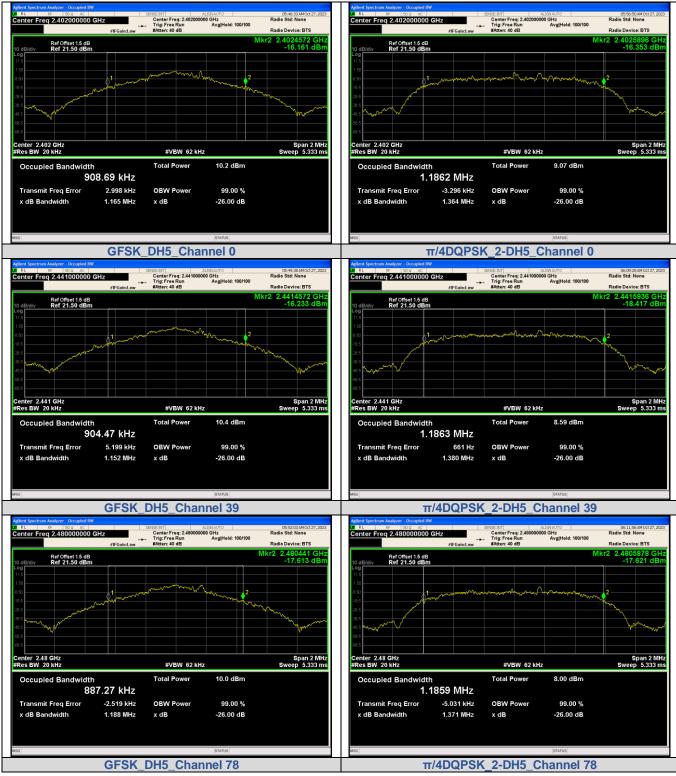
Please refer to the clause 2.4.

# Test Result

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
	2402	0.90869	1.028	0.685
GFSK	2441	0.90447	0.9868	0.658
	2480	0.88727	0.9888	0.659
	2402	1.1862	1.300	0.867
π/4-DQPSK	2441	1.1863	1.284	0.856
	2480	1.1859	1.292	0.861
	2402	1.1801	1.275	0.850
8-DPSK	2441	1.1790	1.291	0.861
	2480	1.1658	1.271	0.847

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Ref Offset 1.5 dB 10 dB/div Ref 21.50 dBm Log		Radio Device: BTS	Center Freq 2.441000000	#IFGain:Low	Center Freq: 2.4410000 Trig: Free Run #Atten: 40 dB	Avg Hold: 100/100	06:16:52 AM Oct 27, 2023 Radio Std: None Radio Device: BTS kr2 2,4415918 GH2
115 150 150 150 155 155 155 155		-16.793 dBm	Ref Offset 15 dB         Cog           10 dB/div         Ref 21.50 dBm         Cog           115         -         -         -           10 dB/div         -         -         -         -           115         -		m		-15.885 dBm
Center 2.402 GHz #Res BW 20 kHz	#VBW 62 kHz	Span 2 MHz Sweep 5.333 ms	Center 2.441 GHz #Res BW 20 kHz		#VBW 62 kH;	z	Span 2 MHz Sweep 5.333 ms
Occupied Bandwidth 1.1801 MHz	Total Power 9.30 dBm		Occupied Bandwidth	790 MHz	Total Power	9.33 dBm	
Transmit Freq Error 1.396 kHz x dB Bandwidth 1.353 MHz	OBW Power 99.00 % x dB -26.00 dB		Transmit Freq Error x dB Bandwidth	2.419 kHz 1.356 MHz	OBW Power x dB	99.00 % -26.00 dB	
MSG	STATUS		MSG			STATUS	
8DPSK	_3-DH5_Channel 0			8DPSK_3	B-DH5_Cha	annel 39	
Addend Spectrum Audyrer, Discopied INV 21 Current Prog 2:480000000 GH2 Efficiency Ref Offset 15 dB 10 dB/dlv Ref 21:50 dBm 10 dB/dlv Ref 21:50 dBm 10 dB/dlv Ref 21:50 dBm Complete Complete Compl	AUSPLANTO Center Freg: 2.4000000 GHz Trig: Freg: 74 Sum Autor: 40 dB #VBW: 62 kHz Total Power 10.2 dBm	DL39384400427 2023 Raide Set: Hene Raide Device: BTS VKr22 2.4805812 GHz -17.222 dBm			Void		
Transmit Freq Error -1.553 kHz x dB Bandwidth 1.357 MHz	OBW Power 99.00 % x dB -26.00 dB						

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#### 20dB Bandwidth:

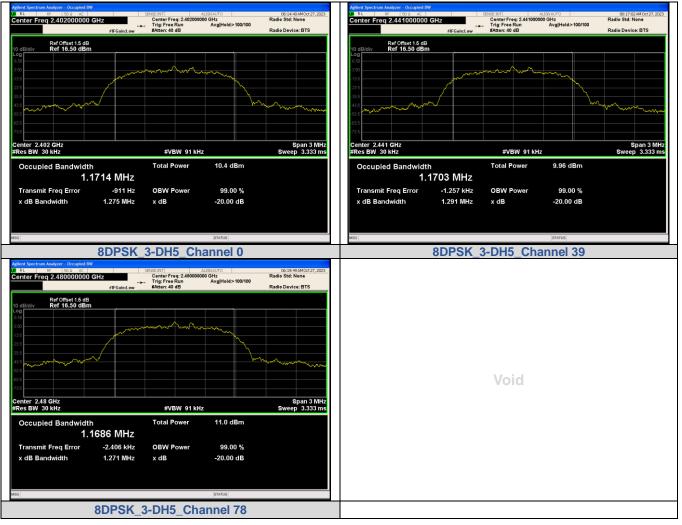


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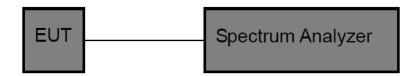
#### **Channel Separation** 3.6.

Limit

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)

Test Item	Limit	Frequency Range (MHz)
Channel Separation	>25kHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

# **Test Configuration**



### **Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

- 2. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

# **Test Mode**

Please refer to the clause 2.4.

### Test Result

Test Mode	Frequency (MHz)	Carrier Frequencies Separation (MHz)	Limit (MHz)	Verdict
GFSK	Hop_2441	1.0012	0.685	Pass
π/4-DQPSK	Hop_2441	1.0015	0.867	Pass
8-DPSK	Hop_2441	1.0243	0.861	Pass

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Test plot as follows:

glent Spectrum Analyzer - Swept SA RL RF 50.0 AC enter Freq 2.440500000 GHz	SENSE:INT A PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB	ALIGNAUTO D6:53:23 AM Oct 2 Avg Type: Log-Pwr TRACE T Avg Hold: 100/100 TVP	3456 Center Freq 2.440500000 G	PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB	ALIGNAUTO 07:26:19:AMOCI Avg Type: Log-Pwr TRACE Avg Hold: 100/100 TYPE Det P
Ref Offset 1.5 dB 0 dB/div Ref 15.00 dBm		ΔMkr1 1.001 2 -0.00	MHz 7 dB Log Log Ref 0ffset 1.5 dB Ref 15.00 dBm		ΔMkr1 1.001 5 -0.16
	-X2		500 WWWWWWWWWWW	amine and the second and a second	122 h- Usen want have generated and
50 50 50 50 50					
Senter 2.440500 GHz Res BW 100 kHz		Span 3.000	.75.0		Span 3.00
0	#VBW 300 kHz	Sweep 1.333 ms (1000	0 MHz 0 pts) Center 2.440500 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 1.333 ms (100
16	#VBW 300 kHz	Sweep 1.333 ms (1000	MHz 0 pts) #Res BW 100 kHz #so	#VBW 300 kHz π/4DQPSI	STATUS
30 glent Spectrum Analyzer - Swept SA	GFSK	BTATUB         07:53:57 AMORIZ           Avg Type: Leg-Pwr         TRACI P           Avg[Hold: 100/100         1110	9 pts) #Res BW 100 kHz Wsc) 7 2000		STATUS
el Ilent Spectrum Analyzer - Swept SA Rt Pre 1500 oc enter Freq 2.440500000 GHz Ref Offset 15 dB	CFSK SPERMT 2 PHO: Wide ↔ Trig: Free Run Freaint.ew #Atten: 30 dB	STATUS ALISYAUTO 0753:57AMOCI2 Avg Type: Log-Pwr THACI D	#Res BW 100 kHz           #ssi           #ssi		STATUS
60 Fit. Fit. Fit. Fit. Fit. Fit. Fit. Fit.	CFSK SPERMT 2 PHO: Wide ↔ Trig: Free Run Freaint.ew #Atten: 30 dB	рталия) Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr 40,434 40,434 40,434	#Res BW 100 kHz           #ssi           #ssi		STATUS
so Binit Spectrum Analyzer - Swept SA Fits — IPA - 1959 - 25 enter Freq 2.440500000 GHz Ref Offset 1.5 dB o dB/div Ref 15.60 dBm	CFSK SPERMT 2 PHO: Wide ↔ Trig: Free Run Freaint.ew #Atten: 30 dB	рталия) Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr Avg Type: Log-Perr 40,434 40,434 40,434	#Res BW 100 kHz           Wool           Wool	π/4DQPSI	STATUS



# 3.7. Number of Hopping Channel

Limit

### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

Section	Test Item	Limit
15.247 (a)(iii) RSS-247 5.1 d	Number of Hopping Channel	≥15

# **Test Configuration**



### **Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

2. Spectrum Setting:

(1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

### Test Mode

Please refer to the clause 2.4.

### **Test Result**

Test Mode	Channel Number	Limit	Verdict
GFSK	79	≥15	Pass
π/4-DQPSK	79	≥15	Pass
8-DPSK	79	≥15	Pass

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Test plot as follows:

Addent Spectrum Analyzer         Swept SA         SPECEPIT         ALISYAUTO         DISSUED ANOLTZ, 2023           UR         RF         89         90         AC         SPECEPIT         ALISYAUTO         DISSUED ANOLTZ, 2023           Center Freq 2.414750000 GHz         FRO: Free Run         Avg Type: Log-Pwr         Titact H2 3 4 5 5           FRO: Free Run         Avg Type: Log-Pwr         Titact H2 3 4 5 5           FRO: Free Run         Avg Type: Log-Pwr         Titact H2 3 4 5 5	Aginet Syschure Analyzer - Swept SA.         SPREERIT         ALSWARTO         0729-134Moct27.2023           Center Freq 2.441750000 GHz         PHO: Fast → Trig: Free Run         Avg Type: Log-Pur         Time II 2015 EFF           Freq 2.441750000 GHz         PHO: Fast → Trig: Free Run         Avg Type: Log-Pur         Time II 2015 EFF
If Gain/Law         #Atten: 26 dB         Comparison           10 dBldiv         Ref Offset 15 dB         Image: Comparison of the second sec	Ref Orfset 1.5 dB         Oct III A DB           10 dB/dl         Ref 1.00 dB           500
Start 2.40000 GHz Stop 2.48350 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (1001 pts) woj	Start 2.40000 GHz Stop 2.48350 GHz #Res BW 100 KHz #VBW 300 kHz Sweep 8.000 ms (1001 pts) wdg
Atlent Spectrum Analyzer - Swept SA	Hopping Plot π/4DQPSK
Bit Iso         Ito Iso <t< th=""><th>Void</th></t<>	Void
Hopping Plot 8DPSK	

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# 3.8. Dwell Time

Limit

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

Section	Test Item	Limit
15.247 (a)(iii) RSS-247 5.1 d	Average Time of Occupancy	0.4 sec

# **Test Configuration**



### **Test Procedure**

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. Spectrum Setting:
  - (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
  - (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
  - (3) Sweep Time is more than once pulse time.
  - Set the center frequency on any frequency would be measure and set the frequency span to (4)

zero.

- (5) Measure the maximum time duration of one single pulse.
- (6) Set the EUT for packet transmitting.

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### **Test Mode**

Please refer to the clause 2.4.



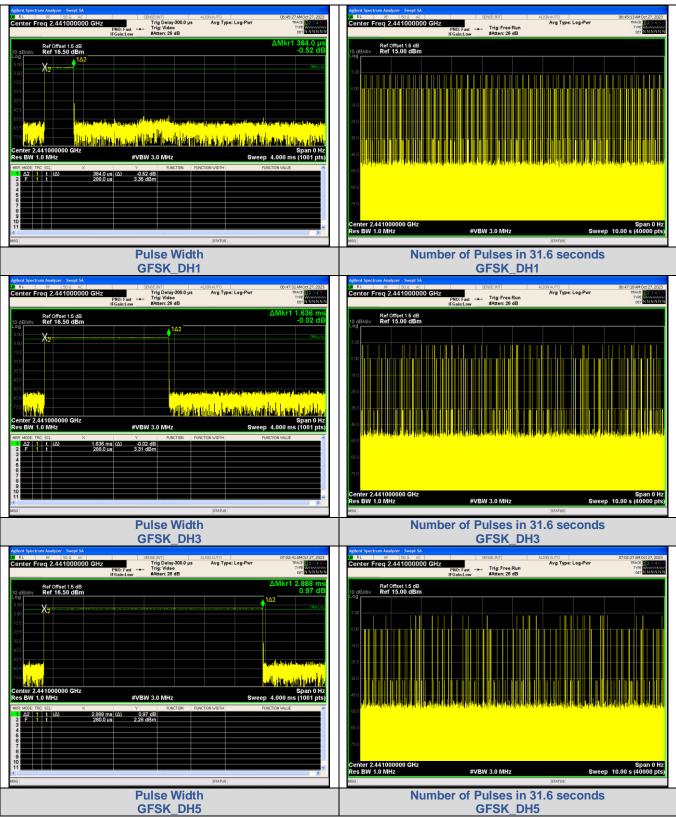
#### **Test Result**

Test Mode	Channel	Frequency (MHz)	Pulse Time (ms)	Number of Pulses in 31.6 seconds	Total of Dwell (ms)	Period Time (ms)	Limit (second)	Verdict
	DH1	2441	0.3840	100	122.9	31.60		
GFSK	DH3	2441	1.636	56	261.8	31.60	≤0.40	Pass
	DH5	2441	2.888	33	308.1	31.60		
T T	2DH1	2441	0.3920	99	125.4	31.60		
π	2DH3	2441	1.640	48	262.4	31.60	≤0.40	Pass
/4-DQPSK	2DH5	2441	2.888	34	308.1	31.60		
	3DH1	2441	0.3920	101	125.4	31.60		
8-DPSK	3DH3	2441	1.640	44	262.4	31.60	≤0.40	Pass
	3DH5	2441	2.840	42	302.9	31.60		

Note: 1DH1/2DH1/3DH1 Total of Dwell = Pulse Time\*(1600/2)\*31.6/79 1DH3/2DH3/3DH3 Total of Dwell = Pulse Time\*(1600/4)\*31.6/79 1DH5/2DH5/3DH5 Total of Dwell = Pulse Time\*(1600/6)\*31.6/79



Test plot as follows:



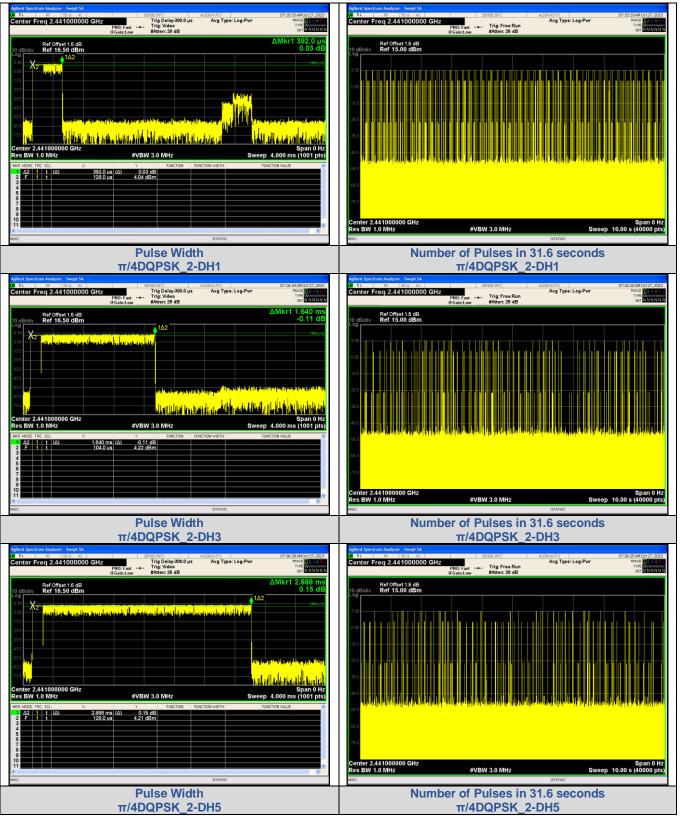
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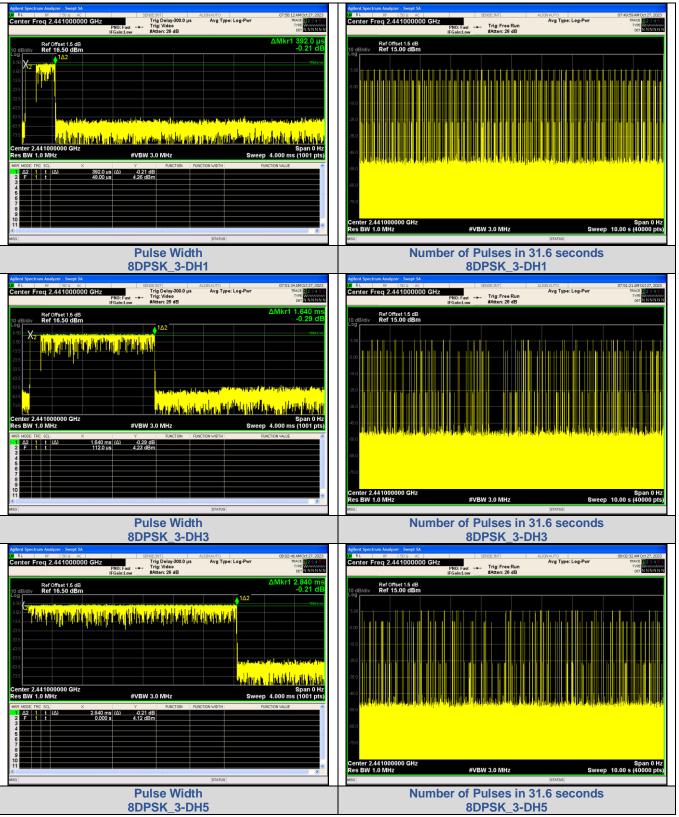
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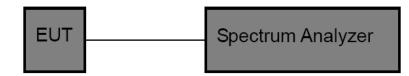
# 3.9. Peak Output Power

<u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1)

Section	Test Item	Limit	Frequency Range (MHz)
FCC CFR 47 Part15.247 (b)(1)	Maximum Conducted Output Power	Hopping Channels≥75, Power <1W(30dBm); Others <125mW(21dBm)	2400~2483.5

# **Test Configuration**



### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

- 2. Spectrum Setting:
  - (1) Set RBW > 20dB Bandwidth.
  - (2) Set VBW ≥ RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.
  - (6) Span = Approximately five times the 20dB bandwidth, centered on a hopping channel.

### Test Mode

Please refer to the clause 2.4.

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### Test Result

Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	FCC Limit (dBm)	Verdict
	2402	3.613	≤30	Pass
GFSK	2441	3.278	≤30	Pass
	2480	3.227	≤30	Pass
π/4-DQPSK	2402	3.977	≤30	Pass
	2441	4.144	≤30	Pass
	2480	3.651	≤30	Pass
8-DPSK	2402	4.933	≤30	Pass
	2441	4.630	≤30	Pass
	2480	5.518	≤30	Pass

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RL RF 50.2 AC Avg Type: Log-Pwr AvgHold: 100/100 r Freq 2.441000000 GHz Avg Type: Log-Pwr AvgHold: 100/100 ++- Trig: Free Run #Atten: 26 dB ++- Trig: Free Run #Atten: 26 dB Ref Offset 1.5 dB Ref 16.50 dBm 3.613 dF Ref Offset 1.5 dB Ref 16.50 dBm 3 278 **♦**<sup>1</sup> ۵ nter 2.402000 GHz es BW 3.0 MHz Span 5.000 MH #Sweep 1.000 ms (1001 pts enter 2.441000 GHz Res BW 3.0 MHz Span 5.000 MHz ep 1.000 ms (1001 pts #VBW 3.0 MHz #VBW 3.0 MHz **Peak Output Power** Peak Output Power GFSK\_Channel 0 **GFSK\_Channel 39** nter Freq 2.480000000 G Avg Type: Log-Pwr Avg|Hold: 100/100 er Freq 2.402000000 GH Avg Type: Log-Pwr Avg|Hold: 100/100 t → Trig: Free Run #Atten: 26 dB st →→ Trig:Free Run w #Atten:26 dB Ref Offset 1.5 dB Ref 16.50 dBm Ref Offset 1.5 dB Ref 16.50 dBm 3.227 **♦**<sup>1</sup> Span 5.000 MH #Sweep 1.000 ms (1001 pts nter 2.402000 GHz tes BW 3.0 MHz nter 2.480000 GHz es BW 3.0 MHz Span 5.000 MHz #Sweep 1.000 ms (1001 pts #VBW 3.0 MHz #VBW 3.0 MHz **Peak Output Power Peak Output Power GFSK\_Channel 78** π/4DQPSK\_Channel 0 nter Freq 2.441000000 GH: Avg Type: Log-Pwr Avg|Hold: 100/100 nter Freq 2.480000000 GH: Avg Type: Log-Pwi Avg|Hold: 100/100 PNO: Fast ---- Trig: Free Run Conclusion #Atten: 26 dB NO: Fast --- Trig: Free Run Gain:Low #Atten: 26 dB PPPPP Ref Offset 1.5 dB Ref 16.50 dBm 40 750 GI 4.144 dB Ref Offset 1.5 dB Ref 16.50 dBm 79 870 0 3.651 d **♦**<sup>1</sup> er 2.441000 GHz BW 3.0 MHz Span 5.000 MHz #Sweep 1.000 ms (1001 pts Span 5.000 MH #Sweep 1.000 ms (1001 pts nter 2.480000 GHz es BW 3.0 MHz #VBW 3.0 MHz #VBW 3.0 MHz **Peak Output Power Peak Output Power** π/4DQPSK\_Channel 39 π/4DQPSK\_Channel 78

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Adlent Spectrum Andyzer, Swedt SA Center Fréq 2.402000000 GHz PN0:Fest Fréquences and the set of the set o	ALISIAUTO 06:14:46 AM Oct 27, 2023 Avg Type: Log-Pwr Those 02:27, 2023 Avg[Held: 100/100 Two Pwr Parts of the text of text	Agilent Spectrum Analyzer - Swept SA Og RL RF 50.9 AC Center Freq 2.441000000 GHz	SBNSE:INT PNO: Fast Trig: Free Run IFGain:Low #Atten: 26 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 100/100	06:17:09 AM Oct 27, 2023 TRACE 2 3 4 5 6 TYPE DET P P P P P
Ref Offset 1.5 dB 10 dB/div Ref 16.50 dBm	Mkr1 2.401 860 GHz 4.933 dBm	Ref Offset 1.5 dB 10 dB/div Ref 16.50 dBm		MI	(r1 2.440 825 GHz 4.630 dBm
6:50		Log	1		
3.50		-3.50 manter and a second and a second secon	ng-1999 and 1999 and 1	Wenter and an and a second and a	mar and a second second
-13.5		-13.5			
-23.6		-23.5			
-33 6		-33.5			
43.5		-43.5			
-53.6		-53.5			
-63.6		-63.6			
-735		-73.5			
Center 2.402000 GHz	Span 5.000 MHz #Sweep 1.000 ms (1001 pts)	Center 2.441000 GHz			Span 5.000 MHz
#Res BW 3.0 MHz #VBW 3.0 MHz	#Sweep 1.000 ms (1001 pts)	#Res BW 3.0 MHz	#VBW 3.0 MHz	STATUS	p 1.000 ms (1001 pts)
Peak Output Pe	ower		Peak Output P	ower	
8DPSK_Chanr	nel O		8DPSK_Chanr	nel 39	
Addent Spectrum Analyzer - Swept SA V Rt lever Storo acc Sector Sector Freq 2.480000000 GHz PNO: Fast	ALIGNALITO 06:19:56 AM Oct 27, 2023 Avg Type: Log-Pwr 104:02 [[2:25 AM Oct 27, 2023 Avg]Heid: 100/100 TYPE (2:25 AM Oct 27, 2023 Avg]Heid: 100/100 type [2:25 AM Oct 27, 2023				
Ref Offset 1.5 dB 10 dB/div Ref 16.50 dBm	Mkr1 2.480 025 GHz 5.518 dBm				
6-50 1					
3.50					
-13.5					
-23.6			Void		
-33.6			Volu		
-43.5					
-53.5					
63.5					
-73.6					
Center 2.480000 GHz #Res BW 3.0 MHz #VBW 3.0 MHz	Span 5.000 MHz #Sweep 1.000 ms (1001 pts)				
#Res BW SU WHZ #VBW SU WHZ	#Sweep 1.000 ms (1001 pts)				
Peak Output Pe 8DPSK_Chann					

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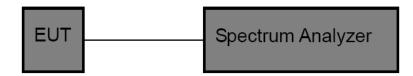


# 3.10. Duty Cycle

# <u>Limit</u>

None, for report purposes only.

# **Test Configuration**



# Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.

Spectrum Setting:
 Set analyzer center frequency to test channel center frequency.
 Set the span to 0Hz.
 Set the RBW to 10MHz.
 Set the VBW to 10MHz.
 Detector: Peak.
 Sweep time: Auto.

Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

### Test Mode

Please refer to the clause 2.4.

### Test Result

Test Mode	Frequency (MHz)	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)	1/T Minimum VBW (kHz)	Final Setting for VBW (kHz)
	2402	2.882	3.726	77.35	0.35	1
GFSK	2441	2.882	3.726	77.35	0.35	1
	2480	2.884	3.728	77.36	0.35	1
	2402	2.870	3.712	77.30	0.35	1
π/4-DQPSK	2441	2.870	3.712	77.30	0.35	1
	2480	2.890	3.712	77.84	0.35	1
	2402	2.890	3.712	77.84	0.35	1
8-DPSK	2441	2.890	3.712	77.84	0.35	1
	2480	2.890	3.712	77.84	0.35	1

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# 3.11. Antenna Requirement

# **Requirement**

### FCC CFR Title 47 Part 15 Subpart C Section 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i)

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### Test Result

The directional gain of the antenna is less than 6dBi, please refer to the EUT internal photographs antenna photo.