

APPENDIX REPORT

Project No.	SHT2105044135EW	Radio Specification	LORA
Test sample No.	YPHT20504411038	Model No.	ASX00026
Start test date	2021-06-29	Finish date	2021-10-11
Temperature	25.6°C	Humidity	37%
Test Engineer	Hailey Chen	Auditor	Xiaodong Zhuo

Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

Appendix A: Peak Output Power

Modulation type	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
CSS	CH-L	1.18	1.17	≤ 30.00	Pass
	CH-M	1.02	0.99		
	CH-H	0.79	0.75		

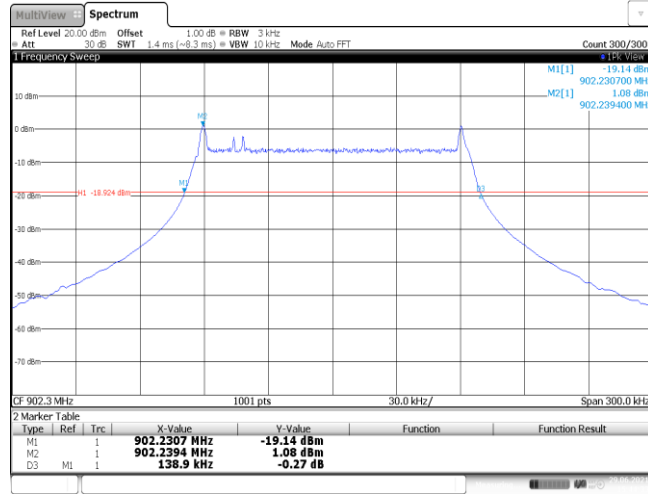
Modulation Type:		CSS
CH-L	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB = RBW 1 MHz Count 300/300 Att 30 dB SWI 4.21 us (~31 ms) = VBW 3 MHz Mode Auto FFT Frequency Sweep M1[1] 11.18 dBm 902.26500 MHz CF 902.3 MHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 29_JUN 2021 15:40:55</p>	
CH-M	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB = RBW 1 MHz Count 300/300 Att 30 dB SWI 4.21 us (~31 ms) = VBW 3 MHz Mode Auto FFT Frequency Sweep M1[1] 11.02 dBm 908.50000 MHz CF 908.5 MHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 29_JUN 2021 15:45:28</p>	
CH-H	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB = RBW 1 MHz Count 300/300 Att 30 dB SWI 4.21 us (~31 ms) = VBW 3 MHz Mode Auto FFT Frequency Sweep M1[1] 0.79 dBm 914.88000 MHz CF 914.9 MHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 29_JUN 2021 15:49:43</p>	

Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
CSS	CH-L	138.90	500	Pass
	CH-M	139.20		
	CH-H	138.60		

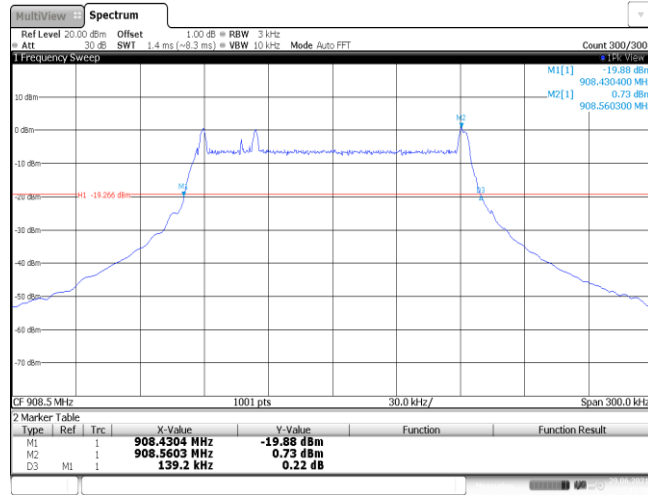
Modulation Type: CSS

CH-L



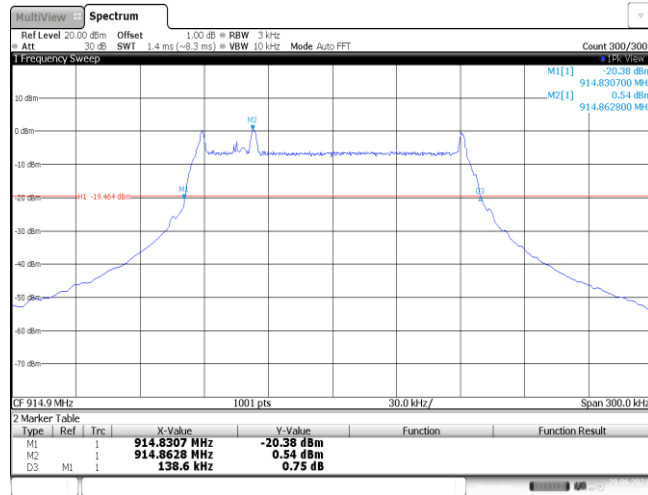
Date: 29_JUN 2021 15:44:93

CH-M



Date: 29_JUN 2021 15:47:29

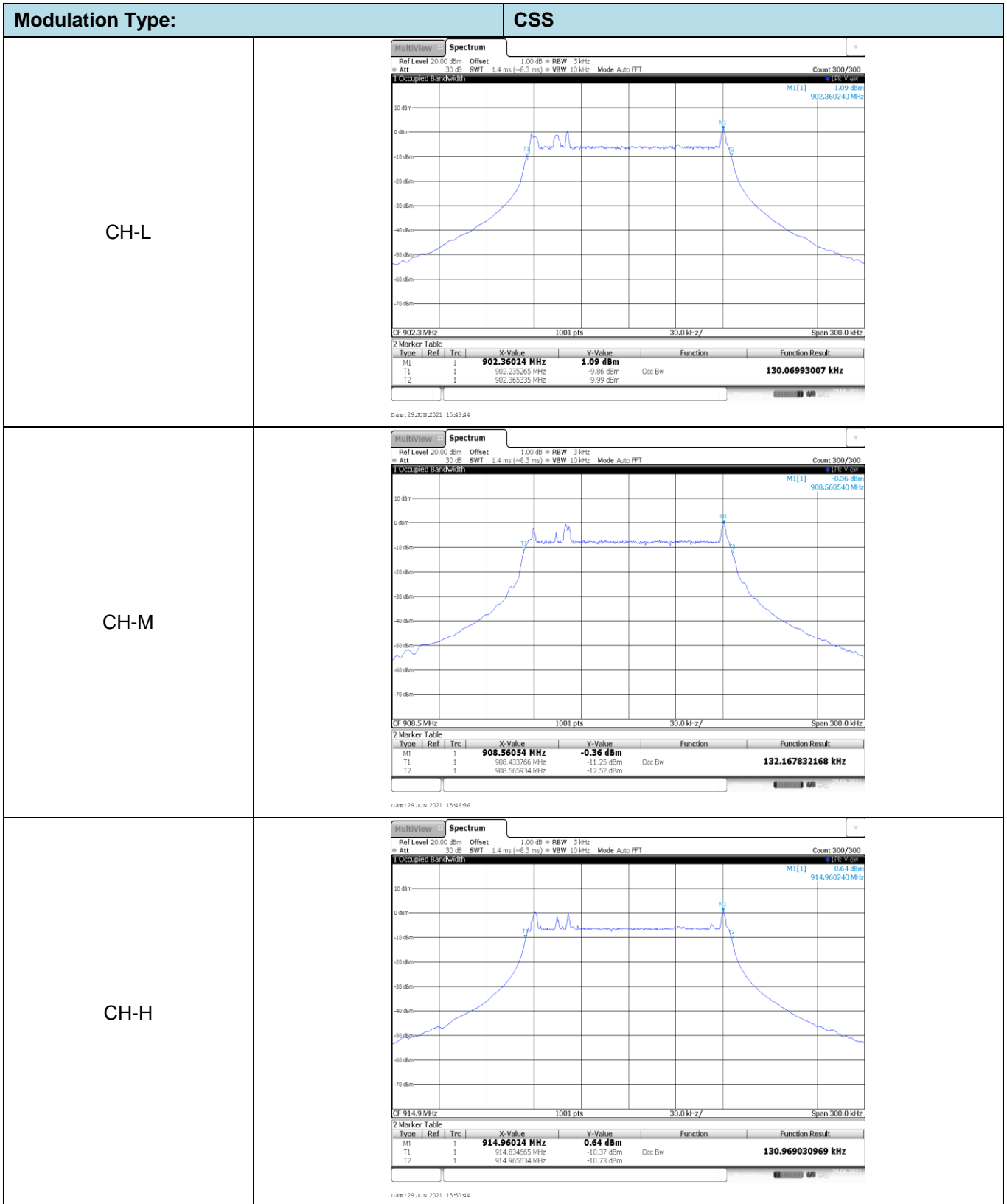
CH-H



Date: 29_JUN 2021 15:51:49

Appendix C: 99% Occupied Bandwidth

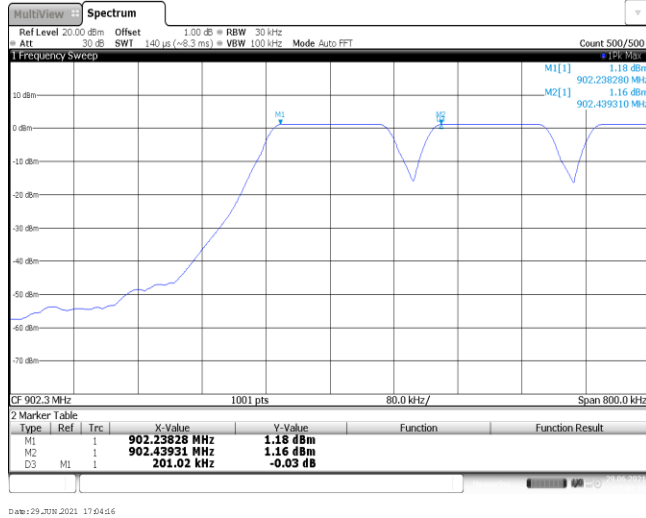
Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
CSS	CH-L	0.13	-	Pass
	CH-M	0.13		
	CH-H	0.13		



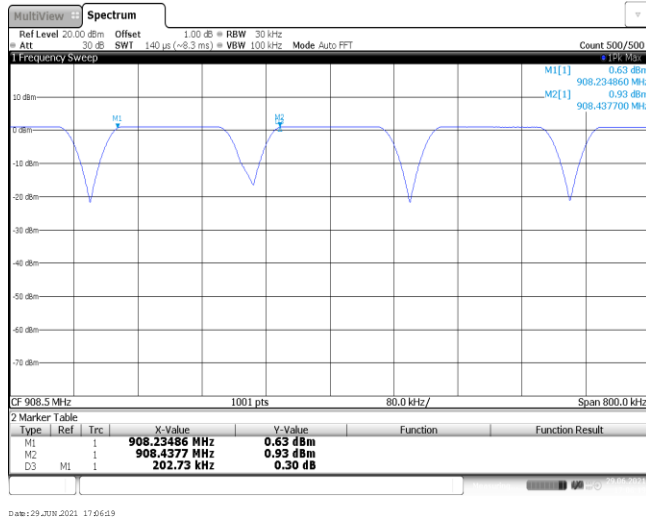
Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
CSS	CH-L	0.2	≥ 139.20	Pass
	CH-M	0.2	≥ 139.20	Pass
	CH-H	0.2	≥ 139.20	Pass

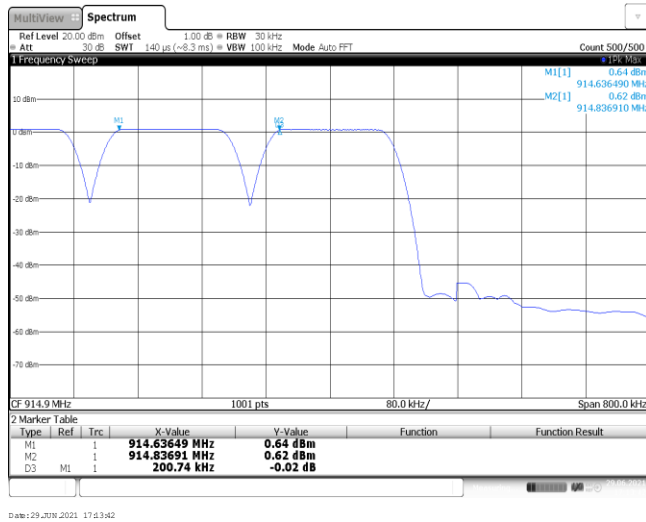
CH-L



CH-M

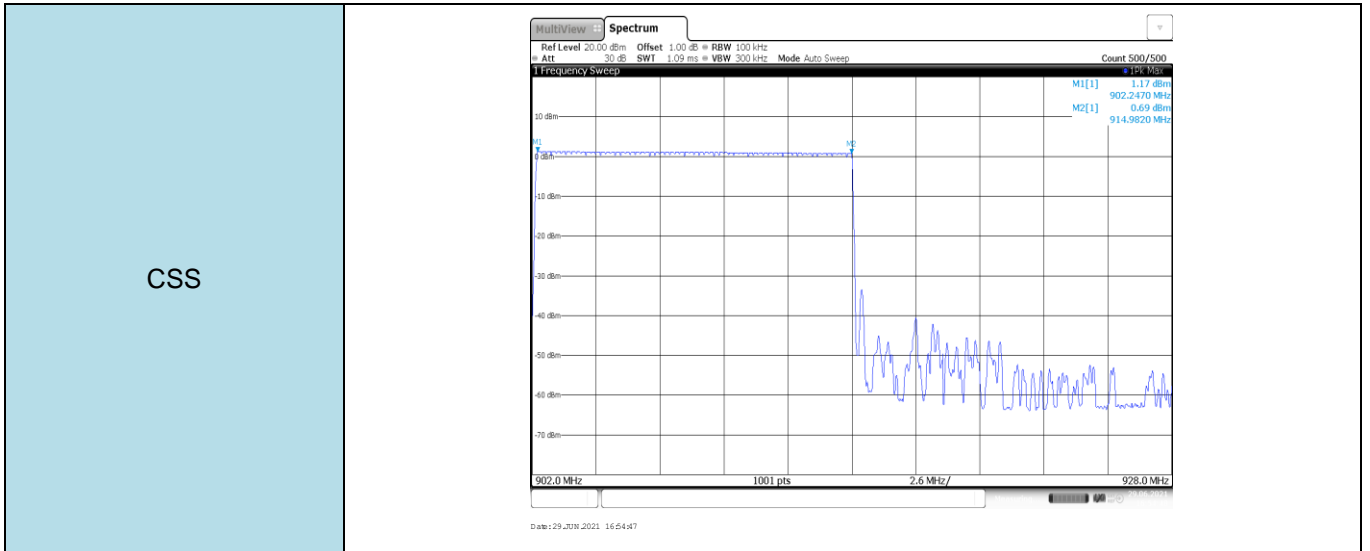


CH-H



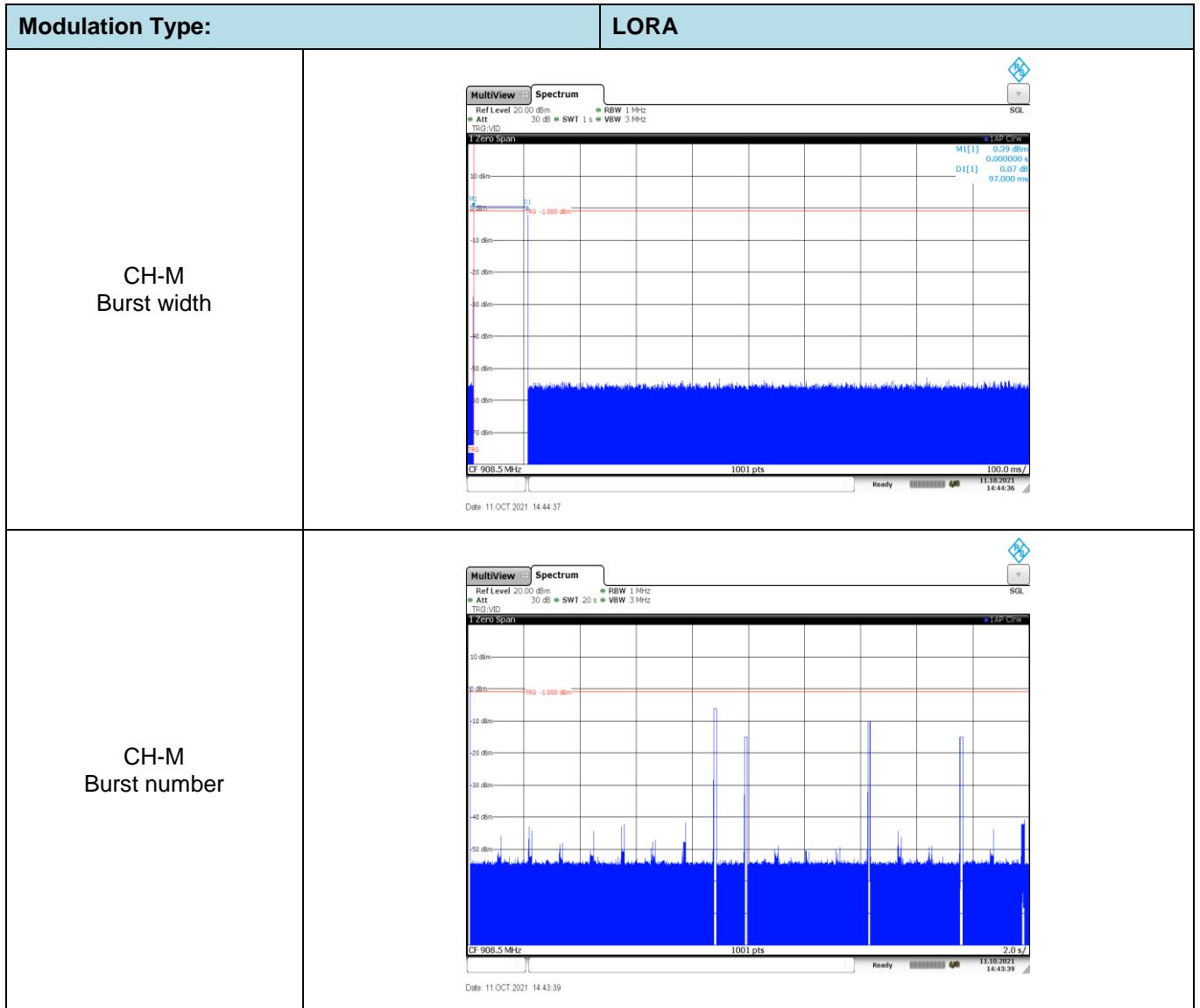
Appendix E: Hopping Channel Number

Modulation type	Channel number	Limit	Result
CSS	64	≥50	Pass



Appendix F: Dwell Time

Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
CSS	CH-M	97.000	1	0.097	≤ 0.400	Pass



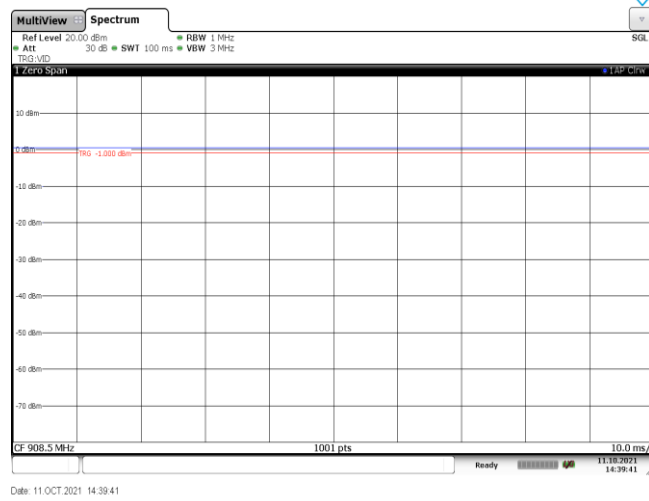
Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculate Formula

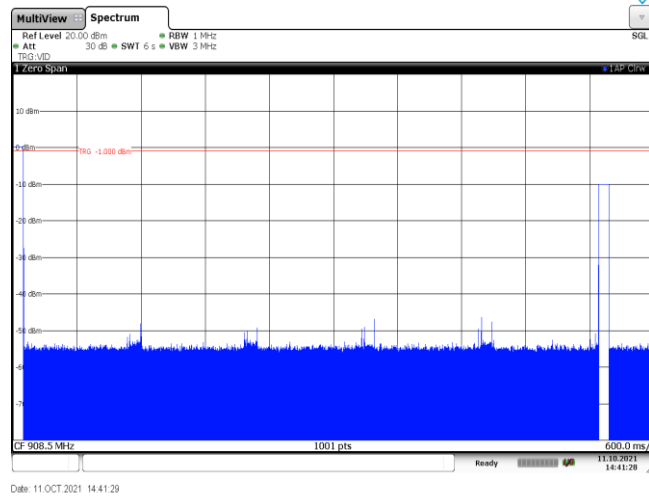
$$DCCF=20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$$

Modulation type	Test Frequency (MHz)	T _{on time} for single burst [ms]	T _{period} [ms]	Burst Quantity	DCCF [dB]
CSS	908.5	1.00	100	2	-33.98

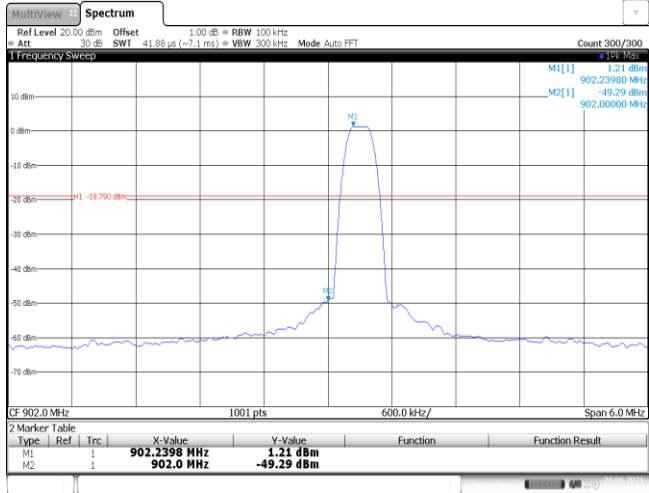
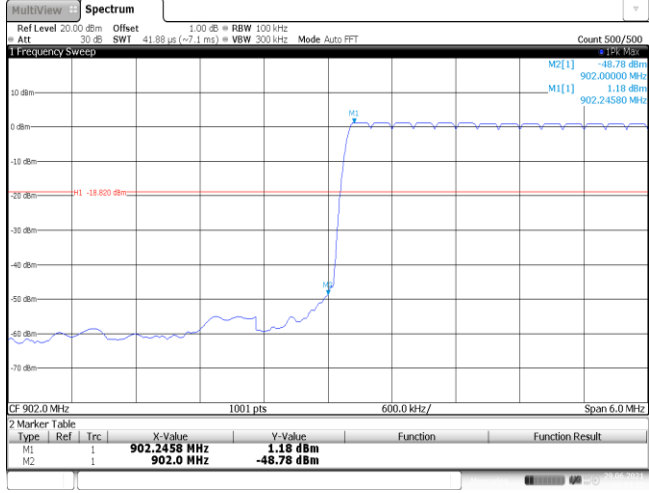
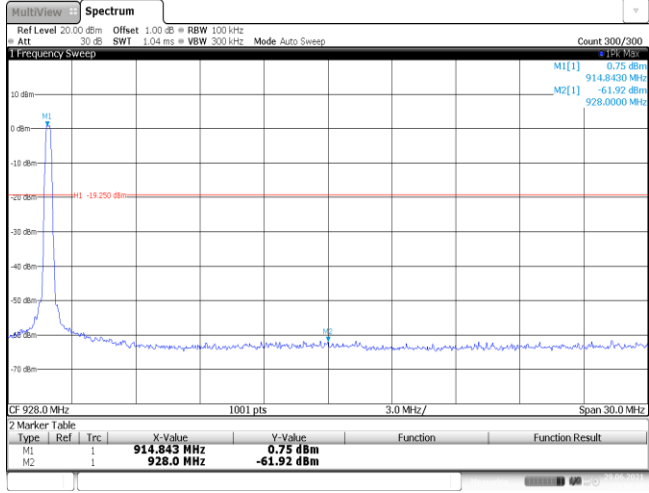
Burst Quantity



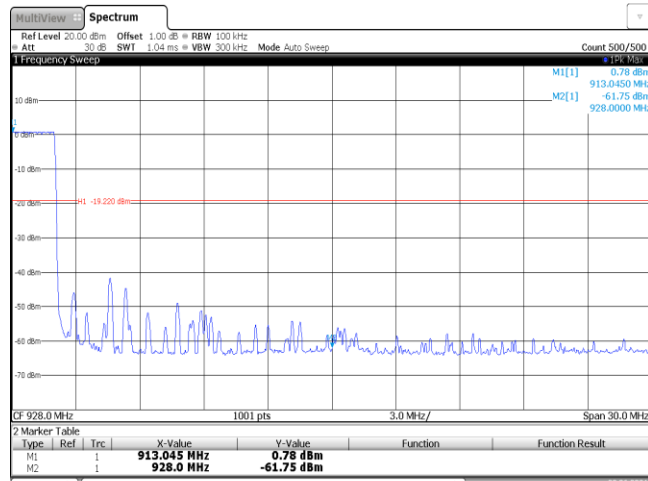
T_{on time} for single burst



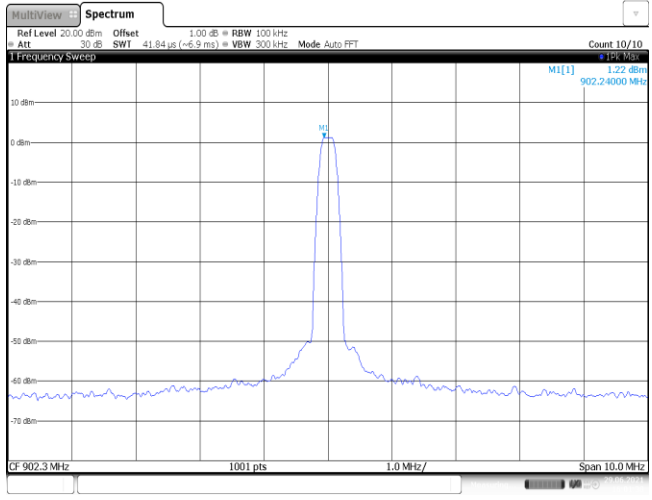
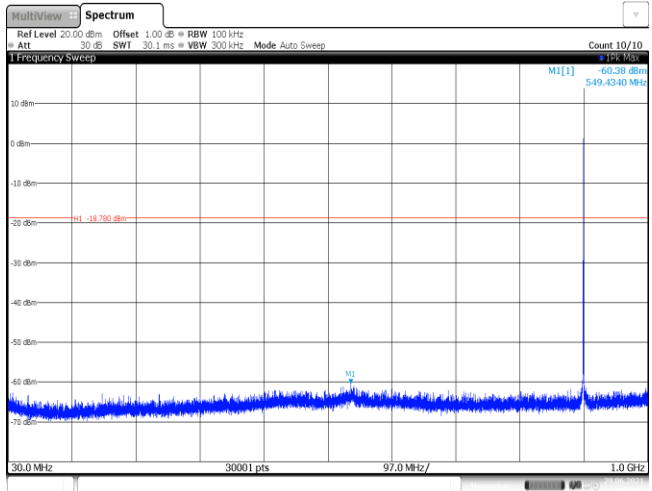
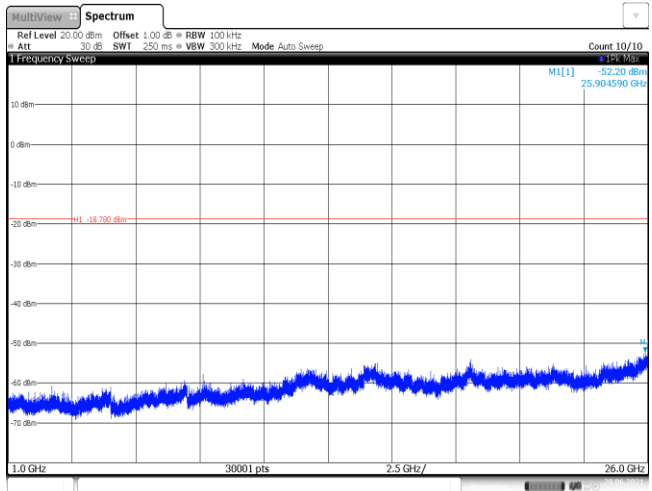
Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	CSS																					
<p>CH-L No hopping mode</p>	 <p>2 Marker Table</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>902.2398 MHz</td> <td>1.21 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>902.0 MHz</td> <td>-49.29 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 29_JUN 2021 15:59:21</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		902.2398 MHz	1.21 dBm			M2	1		902.0 MHz	-49.29 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																		
M1	1		902.2398 MHz	1.21 dBm																				
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<p>CH-L Hopping mode</p>	 <p>2 Marker Table</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>902.2458 MHz</td> <td>1.18 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>902.0 MHz</td> <td>-48.78 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 29_JUN 2021 16:43:22</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		902.2458 MHz	1.18 dBm			M2	1		902.0 MHz	-48.78 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																		
M1	1		902.2458 MHz	1.18 dBm																				
M2	1		902.0 MHz	-48.78 dBm																				
<p>CH-H No hopping mode</p>	 <p>2 Marker Table</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>914.843 MHz</td> <td>0.75 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>928.0 MHz</td> <td>-61.92 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 29_JUN 2021 15:56:47</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		914.843 MHz	0.75 dBm			M2	1		928.0 MHz	-61.92 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																		
M1	1		914.843 MHz	0.75 dBm																				
M2	1		928.0 MHz	-61.92 dBm																				

CH-H
Hopping mode



Date: 29_JUN 2021 16:38:04

Test Item:	Spurious Emission	Modulation type:	CSS
<p>CH-L Reference level</p>	 <p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 41.84 μs (-6.9 ms) VBW 300 kHz Mode Auto FFT Count 10/10 M1[1] 1.22 dBm 902.24000 MHz CF 902.3 MHz 1001 pts 1.0 MHz/ Span 10.0 MHz Date: 29_JUN 2021 16:01:38</p>		
<p>CH-L 30MHz~1000MHz</p>	 <p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -60.38 dBm 549.4340 MHz M1 -18.780 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 29_JUN 2021 16:05:16</p>		
<p>CH-L 1GHz~26GHz</p>	 <p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -52.20 dBm 25.904590 GHz M1 -18.780 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 29_JUN 2021 16:06:04</p>		

<p style="text-align: center;">CH-M Reference level</p>	
<p style="text-align: center;">CH-M 30MHz~1000MHz</p>	
<p style="text-align: center;">CH-M 1GHz~26GHz</p>	

<p>CH-H Reference level</p>	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 41.84 μs (-45.9 ms) VIEW 300 kHz Mode Auto FFT Count 10/10 1 Frequency Sweep M1[1] 0.75 dBm 914.85000 MHz CF 914.9 MHz 1001 pts 1.0 MHz/ Span 10.0 MHz Date: 29 JUN 2021 15:53:05</p>
<p>CH-H 30MHz~1000MHz</p>	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 30.1 ms VIEW 300 kHz Mode Auto Sweep Count 10/10 1 Frequency Sweep M1[1] -60.83 dBm 550.4680 MHz H1 -19.250 dBm M1 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 29 JUN 2021 15:54:40</p>
<p>CH-H 1GHz~26GHz</p>	<p>MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 250 ms VIEW 300 kHz Mode Auto Sweep Count 10/10 1 Frequency Sweep M1[1] -32.51 dBm 25.532990 GHz H1 -19.250 dBm M1 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 29 JUN 2021 15:55:17</p>

-----End of Report-----