

OUTPUT POWER



XMIT 2019.06.11

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIA	25-Apr-18	25-Apr-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	29-Mar-19	29-Mar-20
Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	5-May-19	5-May-20

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

OUTPUT POWER



TbTx 2018.09.13

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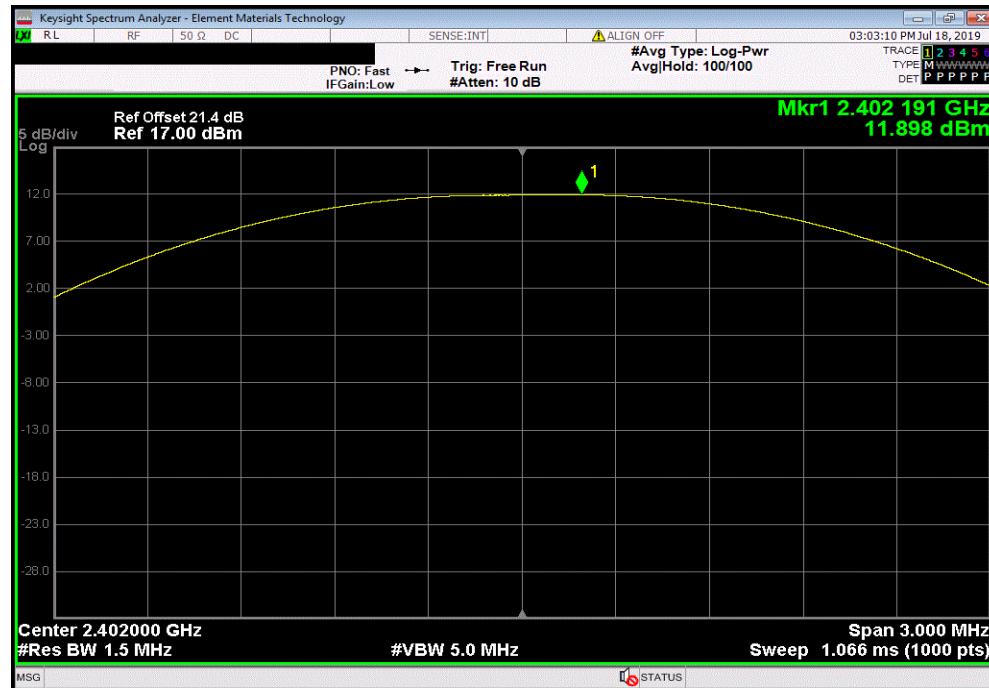
EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order:	ECHN0015								
Serial Number:	Pre-production #1		Date:	17-Jul-19								
Customer:	EchoNous, Inc.		Temperature:	22.5 °C								
Attendees:	None		Humidity:	56.6% RH								
Project:	None		Barometric Pres.:	1015 mbar								
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC	Job Site:	NC0A							
TEST SPECIFICATIONS	Test Method											
FCC 15.247:2019	ANSI C63.10:2013											
COMMENTS	Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.											
DEVIATIONS FROM TEST STANDARD												
None												
Configuration #	1	Signature										
DH5, GFSK			Out Pwr (dBm)	Limit (dBm)	Result							
	Low Channel, 2402 MHz		11.898	21	Pass							
	Mid Channel, 2441 MHz		11.607	21	Pass							
	High Channel, 2480 MHz		11.561	21	Pass							
2DH5, pi/4-DQPSK	Low Channel, 2402 MHz		11.373	21	Pass							
	Mid Channel, 2441 MHz		10.384	21	Pass							
	High Channel, 2480 MHz		11.306	21	Pass							
3DH5, 8-DPSK	Low Channel, 2402 MHz		11.216	21	Pass							
	Mid Channel, 2441 MHz		10.686	21	Pass							
	High Channel, 2480 MHz		11.576	21	Pass							

OUTPUT POWER

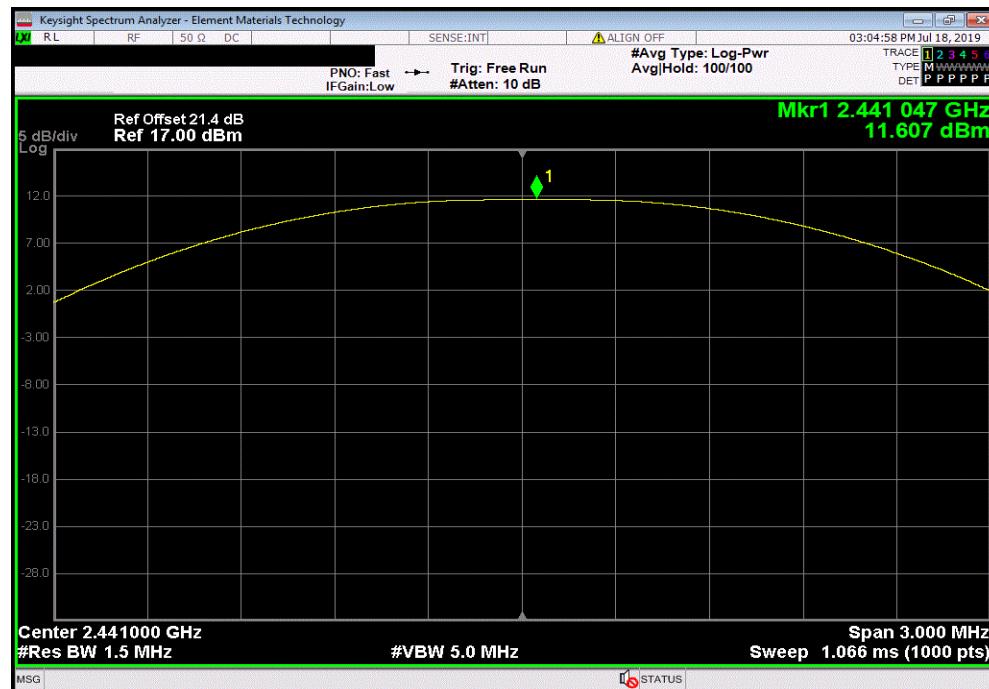


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DH5, GFSK, Low Channel, 2402 MHz				Out Pwr (dBm)	Limit (dBm)	Result
				11.898	21	Pass



DH5, GFSK, Mid Channel, 2441 MHz				Out Pwr (dBm)	Limit (dBm)	Result
				11.607	21	Pass

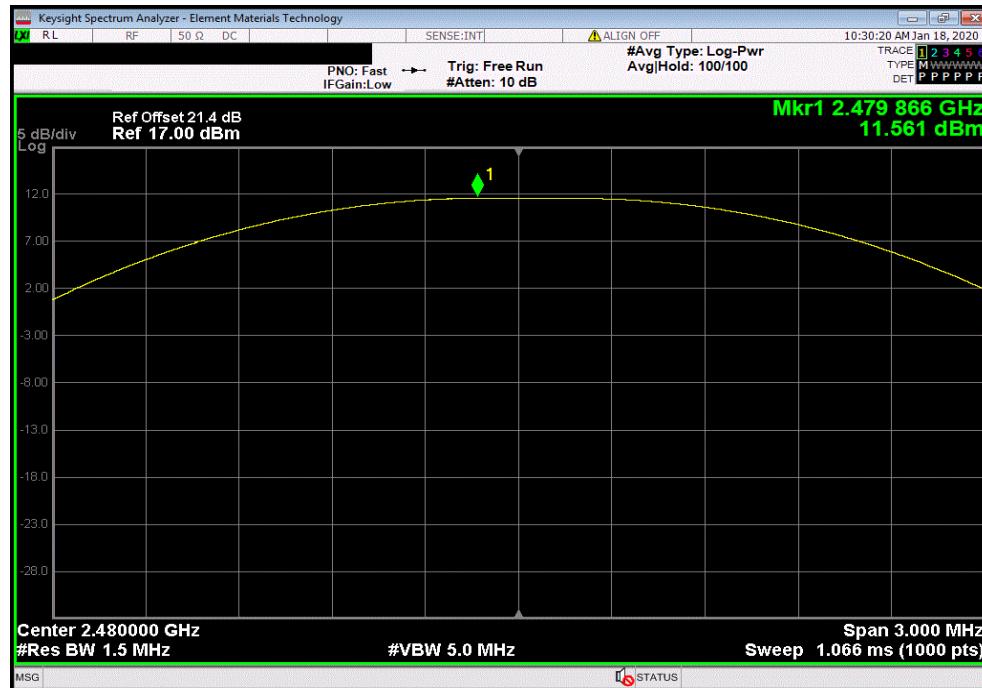


OUTPUT POWER

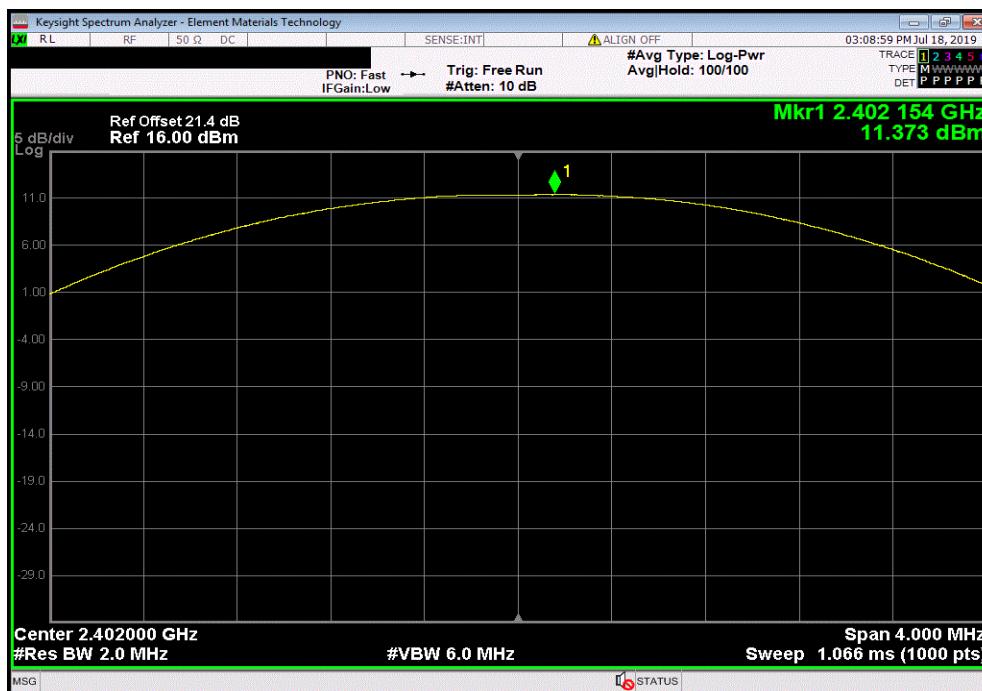


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DH5, GFSK, High Channel, 2480 MHz			Out Pwr (dBm)	Limit (dBm)	Result
			11.561	21	Pass



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz			Out Pwr (dBm)	Limit (dBm)	Result
			11.373	21	Pass

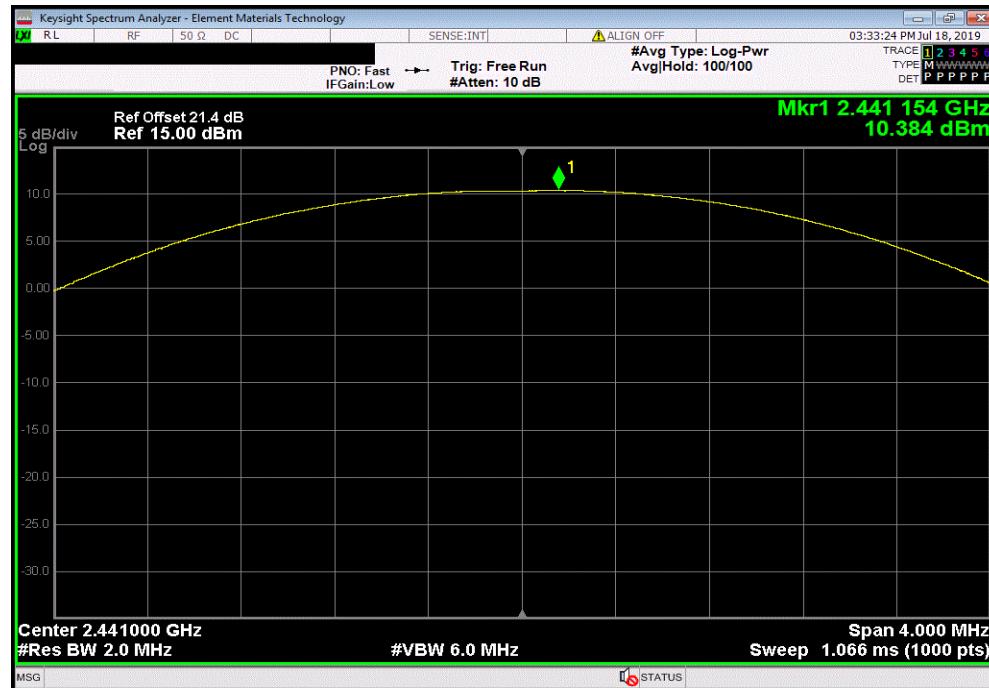


OUTPUT POWER

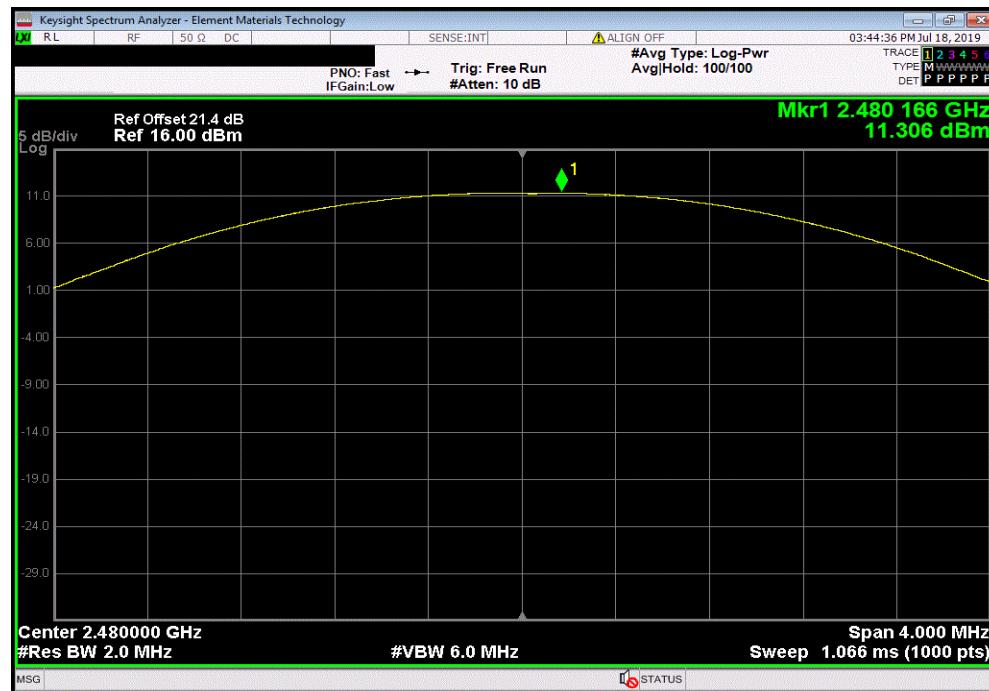


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2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	10.384	21	Pass



2DH5, pi/4-DQPSK, High Channel, 2480 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	11.306	21	Pass

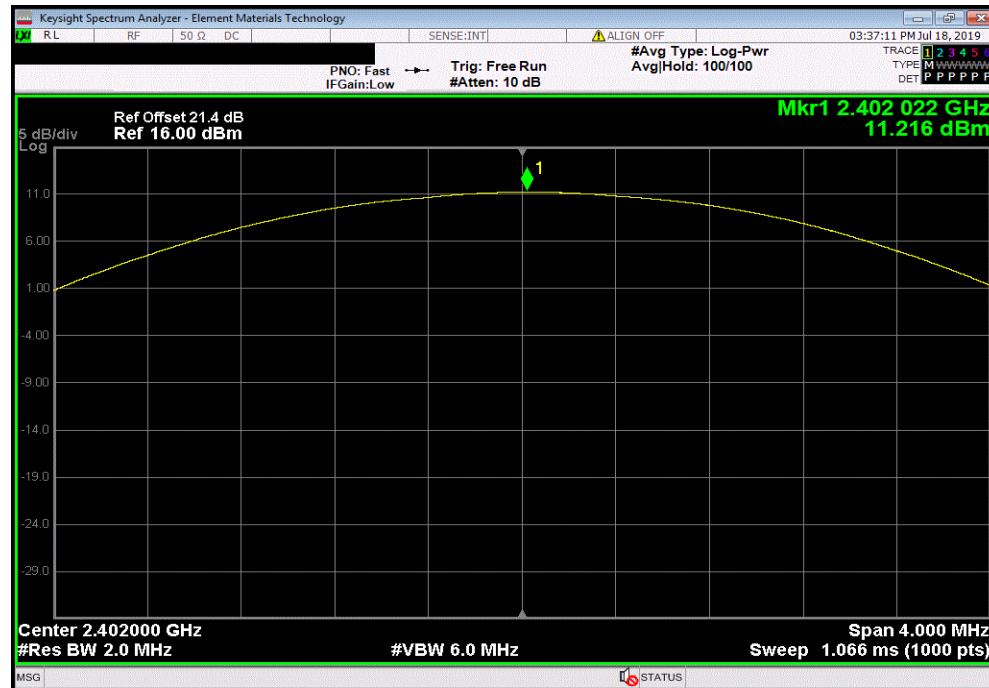


OUTPUT POWER

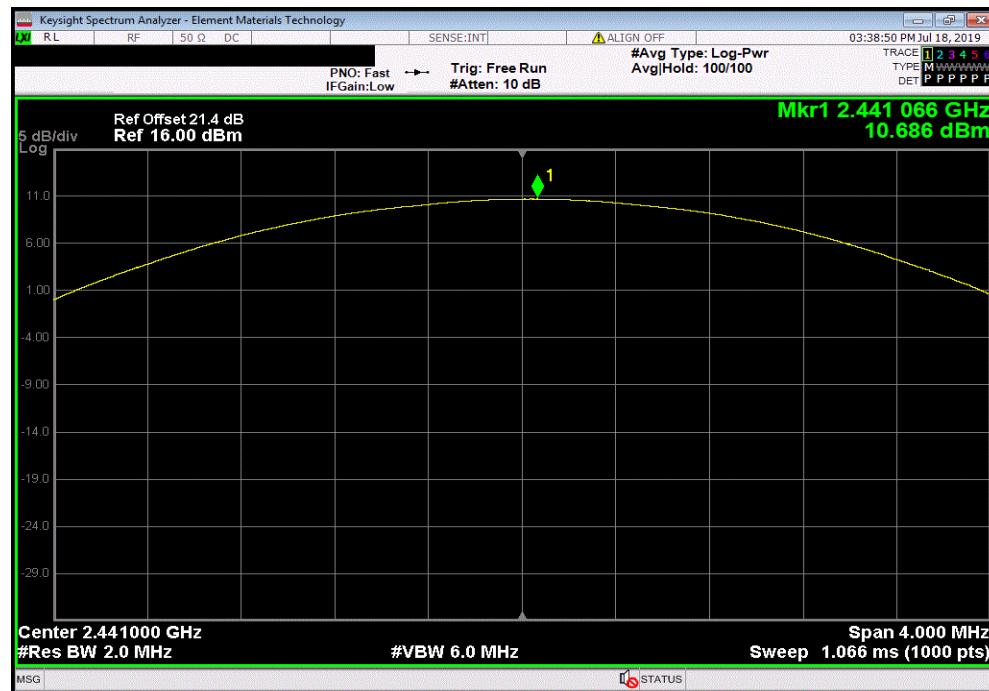


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3DH5, 8-DPSK, Low Channel, 2402 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	11.216	21	Pass



3DH5, 8-DPSK, Mid Channel, 2441 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	10.686	21	Pass

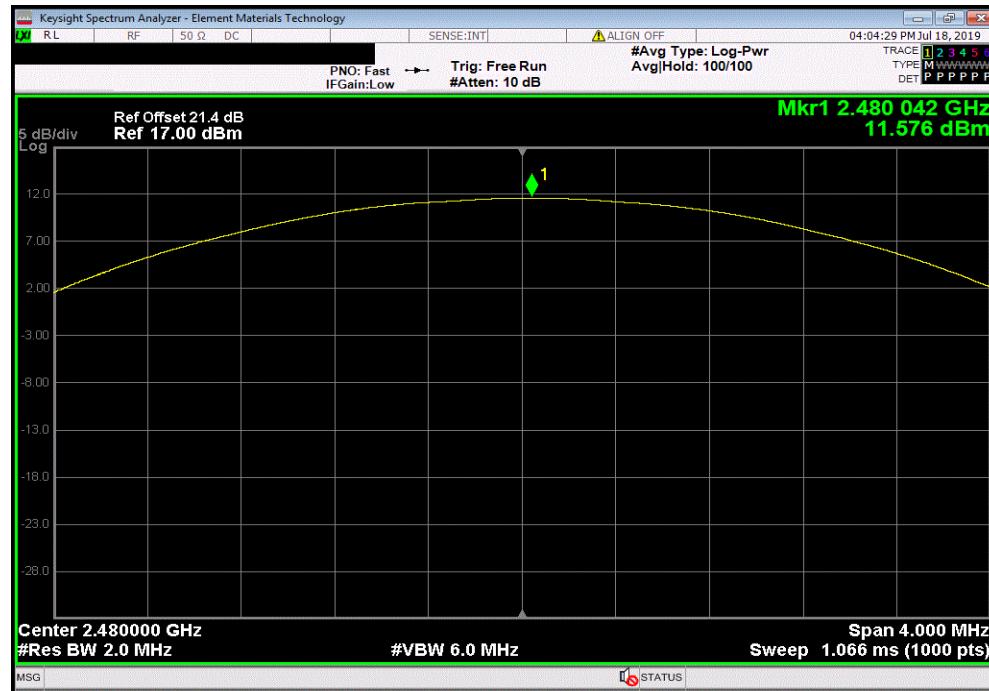


OUTPUT POWER



TbTx 2018.09.13 XMT 2019.06.11

3DH5, 8-DPSK, High Channel, 2480 MHz			Out Pwr (dBm)	Limit (dBm)	Result
			11.576	21	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMIT 2019.06.11

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIA	25-Apr-18	25-Apr-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	29-Mar-19	29-Mar-20
Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	5-May-19	5-May-20

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio. The antenna gain of the EUT was then added to the conducted output power to derive the EIRP values.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



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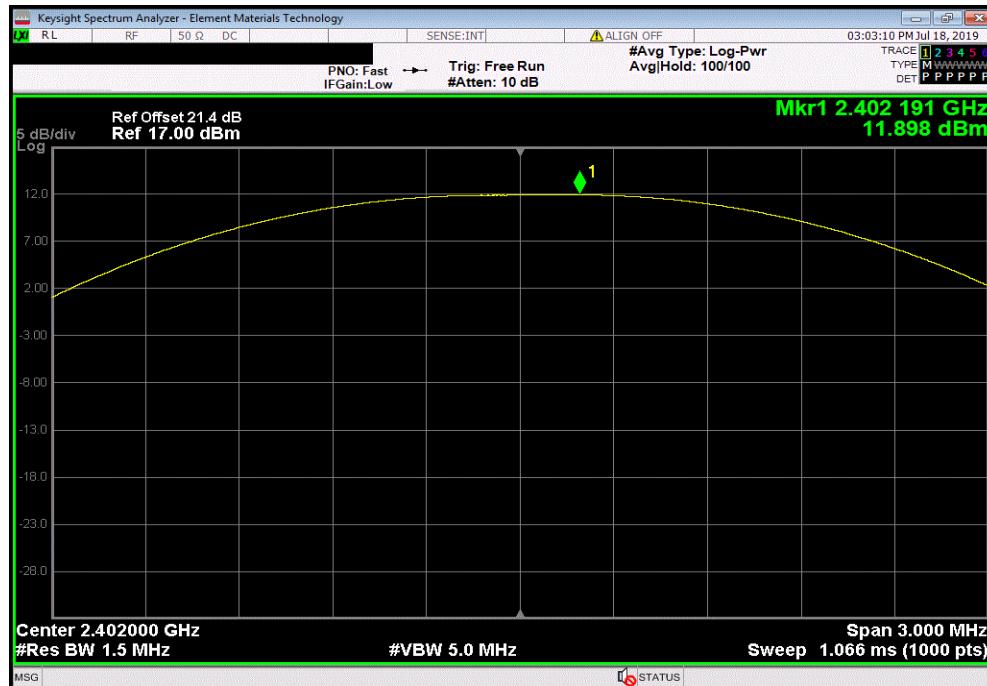
EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order:	ECHN0015			
Serial Number:	Pre-production #1		Date:	17-Jul-19			
Customer:	EchoNous, Inc.		Temperature:	22.5 °C			
Attendees:	None		Humidity:	56.6% RH			
Project:	None		Barometric Pres.:	1015 mbar			
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC	Job Site:	NC0A		
TEST SPECIFICATIONS	Test Method						
FCC 15.247:2019	ANSI C63.10:2013						
COMMENTS	Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.						
DEVIATIONS FROM TEST STANDARD	None						
Configuration #	1	Signature					
			Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
DH5, GFSK							
	Low Channel, 2402 MHz		11.898	-1.29	10.608	27	Pass
	Mid Channel, 2441 MHz		11.607	-1.29	10.317	27	Pass
	High Channel, 2480 MHz		11.561	-1.29	10.271	27	Pass
2DH5, pi/4-DQPSK							
	Low Channel, 2402 MHz		11.373	-1.29	10.083	27	Pass
	Mid Channel, 2441 MHz		10.384	-1.29	9.094	27	Pass
	High Channel, 2480 MHz		11.306	-1.29	10.016	27	Pass
3DH5, 8-DPSK							
	Low Channel, 2402 MHz		11.216	-1.29	9.926	27	Pass
	Mid Channel, 2441 MHz		10.686	-1.29	9.396	27	Pass
	High Channel, 2480 MHz		11.576	-1.29	10.286	27	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

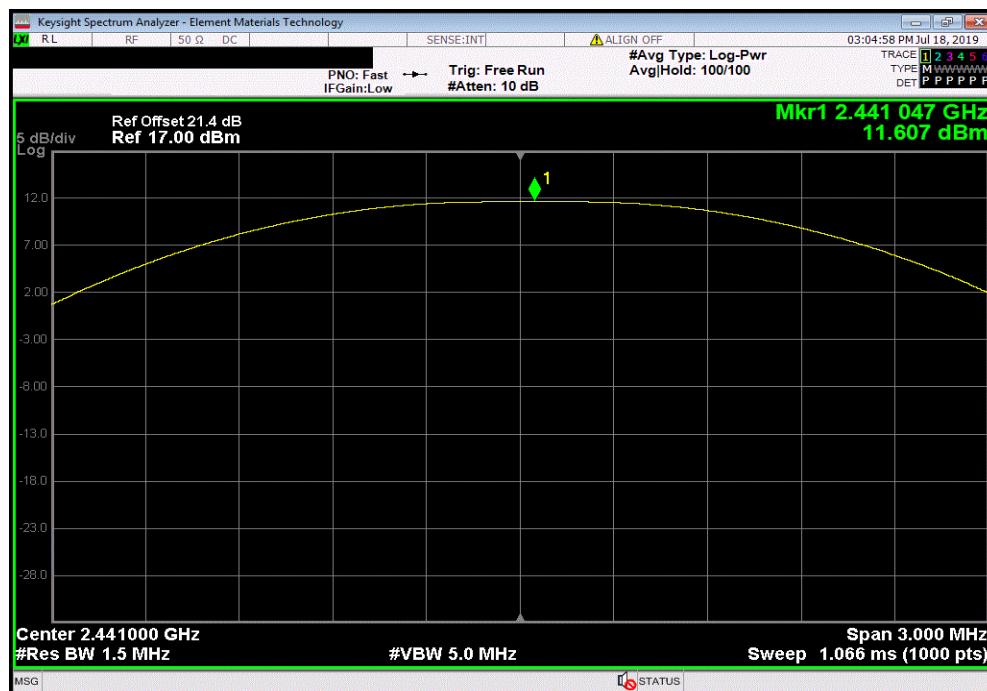


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DH5, GFSK, Low Channel, 2402 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.898	-1.29	10.608	27	Pass	



DH5, GFSK, Mid Channel, 2441 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.607	-1.29	10.317	27	Pass	

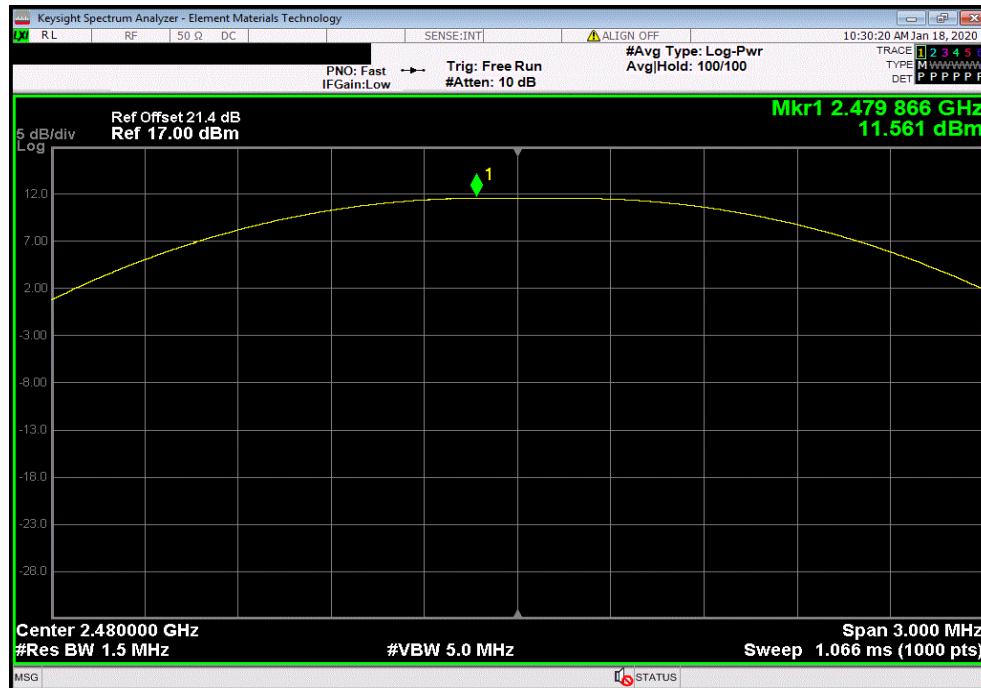


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

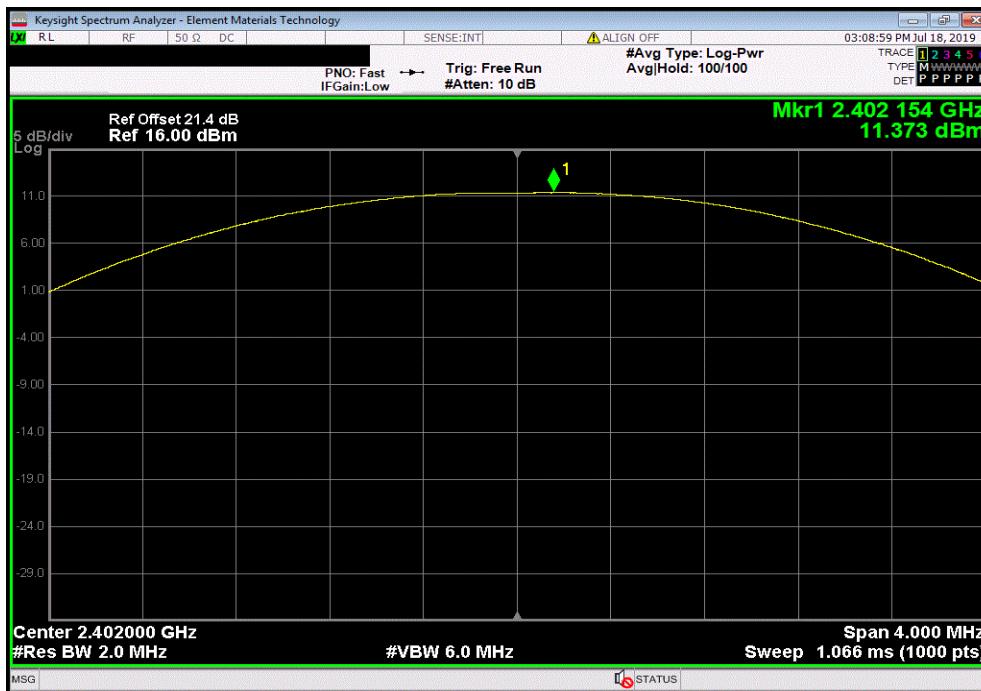


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DH5, GFSK, High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.561	-1.29	10.271	27	Pass	



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.373	-1.29	10.083	27	Pass	

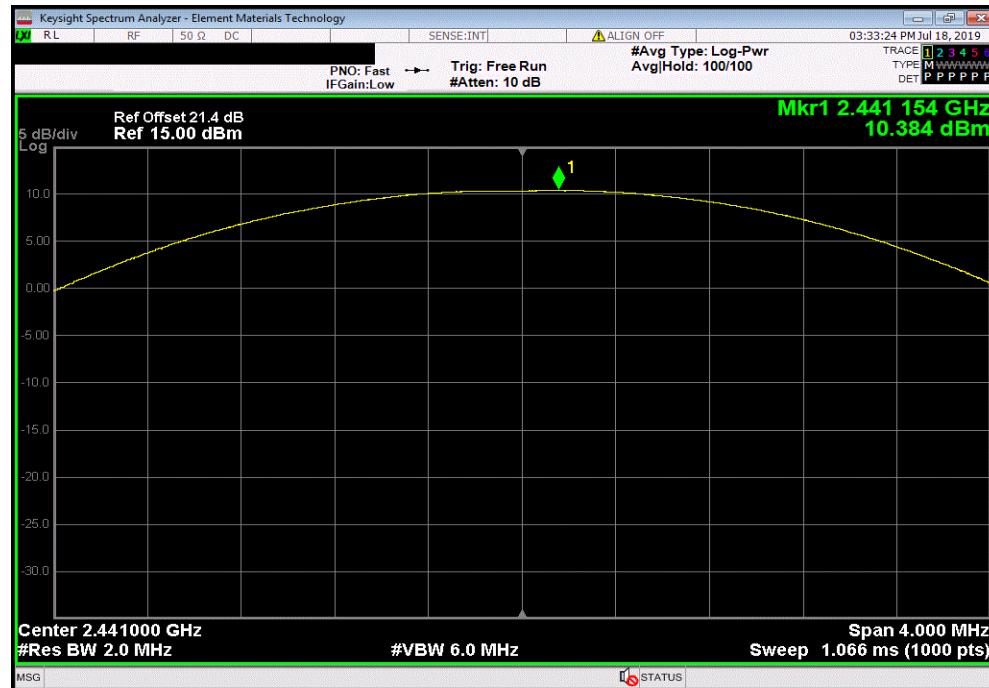


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

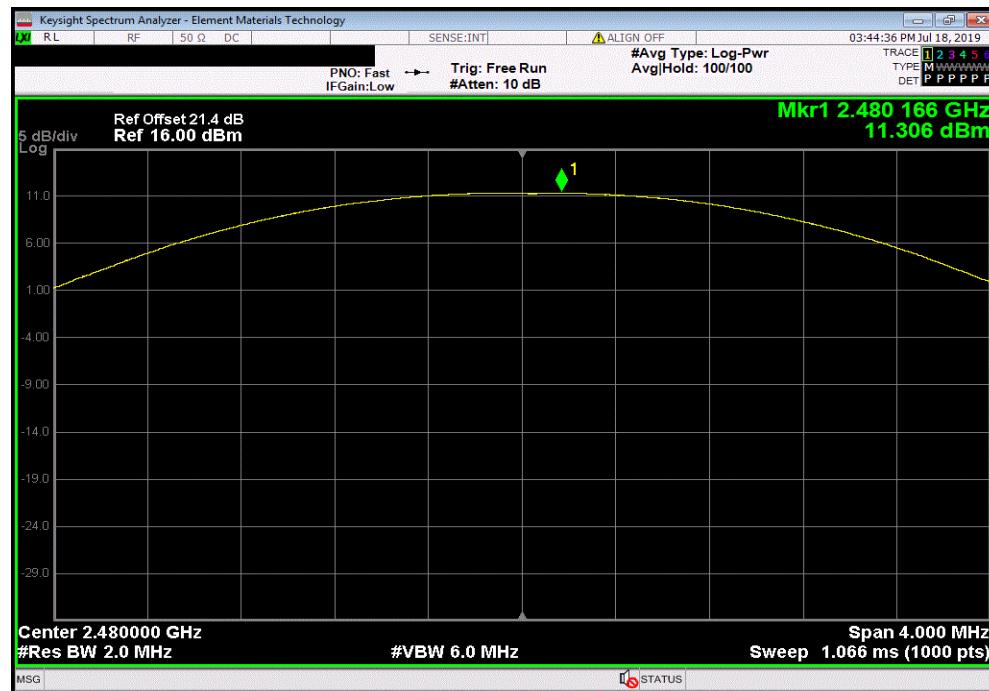


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2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
10.384	-1.29	9.094	27	Pass	



2DH5, pi/4-DQPSK, High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.306	-1.29	10.016	27	Pass	

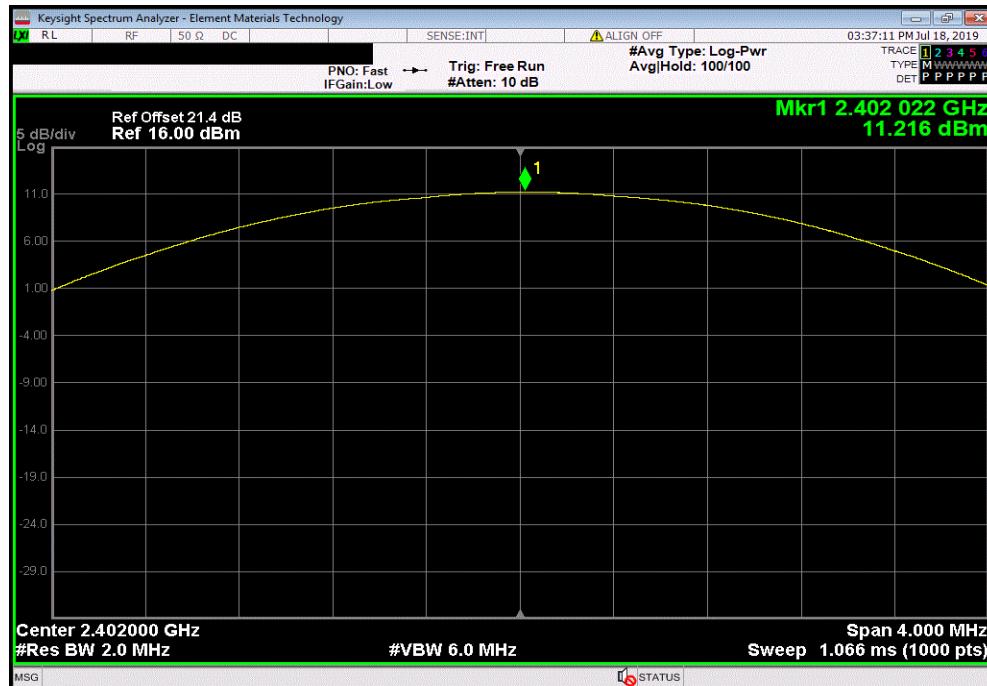


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

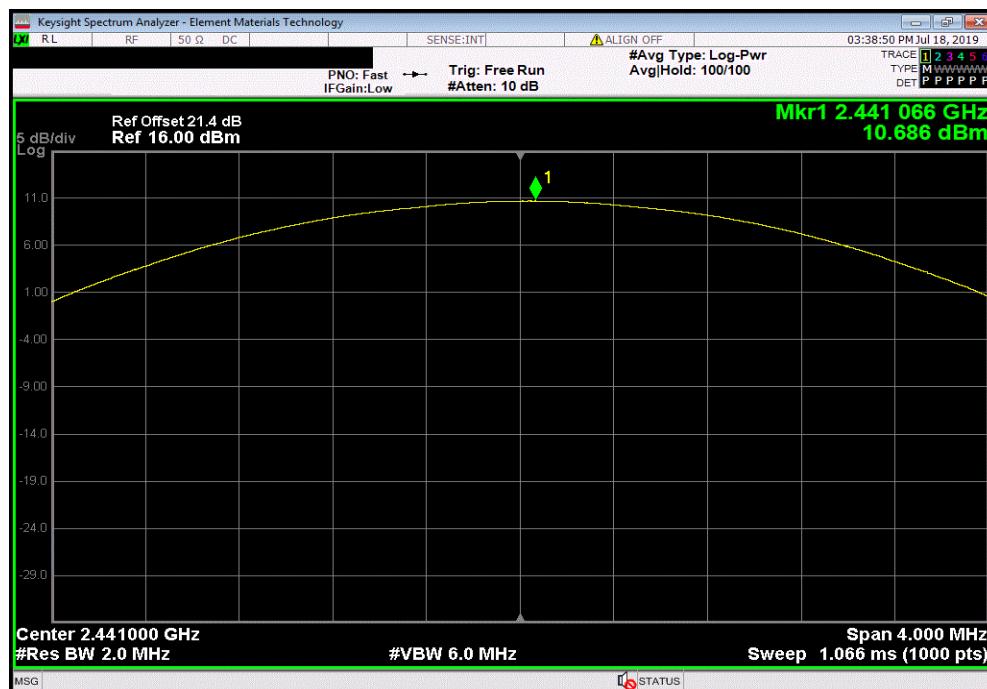


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3DH5, 8-DPSK, Low Channel, 2402 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.216	-1.29	9.926	27	Pass	



3DH5, 8-DPSK, Mid Channel, 2441 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
10.686	-1.29	9.396	27	Pass	

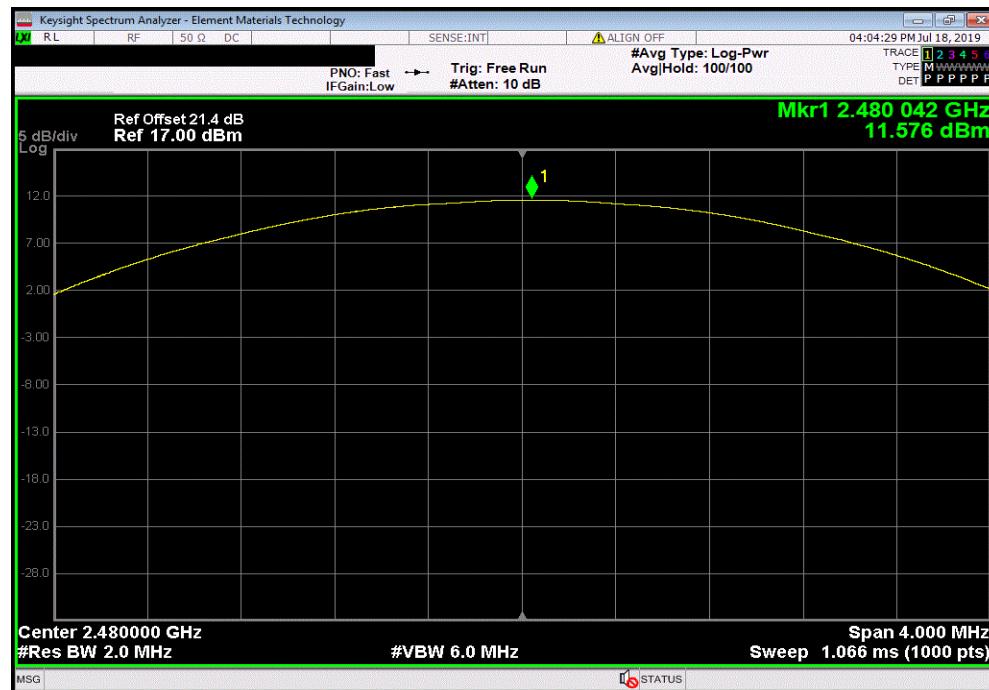


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



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3DH5, 8-DPSK, High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
11.576	-1.29	10.286	27	Pass	



BAND EDGE COMPLIANCE



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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIA	25-Apr-18	25-Apr-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	29-Mar-19	29-Mar-20
Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	5-May-19	5-May-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE



TbTx 2018.09.13

XMI 2019.06.11

EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE	Work Order:	ECHN0015	
Serial Number:	Pre-production #1	Date:	2-Aug-19	
Customer:	EchoNous, Inc.	Temperature:	22.7 °C	
Attendees:	None	Humidity:	61.8% RH	
Project:	None	Barometric Pres.:	1021 mbar	
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC	
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013	
FCC 15.247:2019				
COMMENTS				
Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	1	Signature	 	
		Value (dBc)	Limit ≤ (dBc)	Result
DH5, GFSK, Single Channel				
Low Channel, 2402 MHz		-55.75	-20	Pass
High Channel, 2480 MHz		-64.67	-20	Pass
2DH5, pi/4-DQPSK, Single Channel				
Low Channel, 2402 MHz		-55.32	-20	Pass
High Channel, 2480 MHz		-65.27	-20	Pass
3DH5, 8-DPSK, Single Channel				
Low Channel, 2402 MHz		-55.9	-20	Pass
High Channel, 2480 MHz		-65.21	-20	Pass

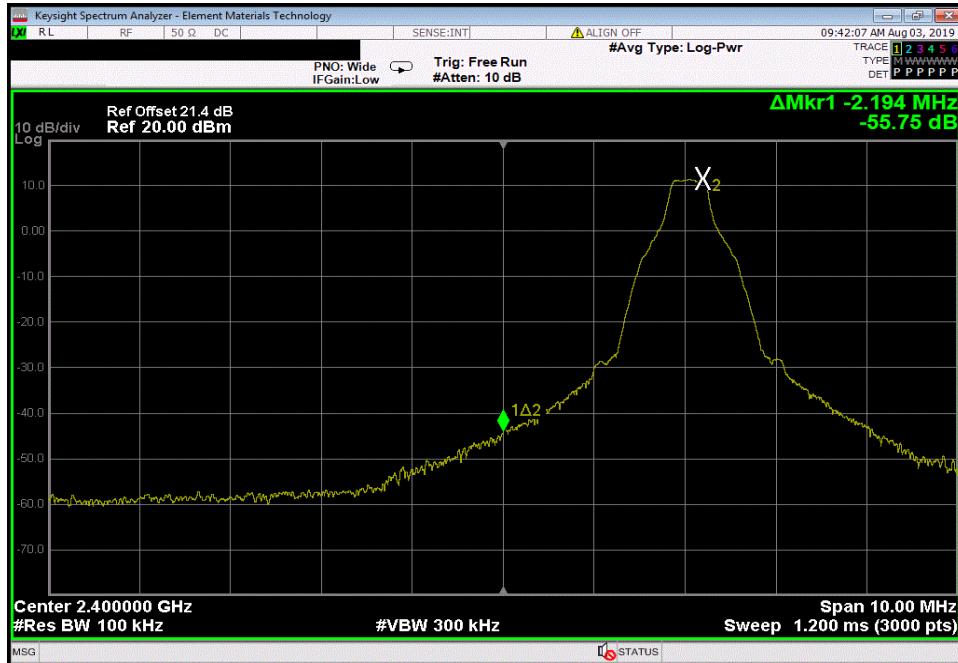
BAND EDGE COMPLIANCE



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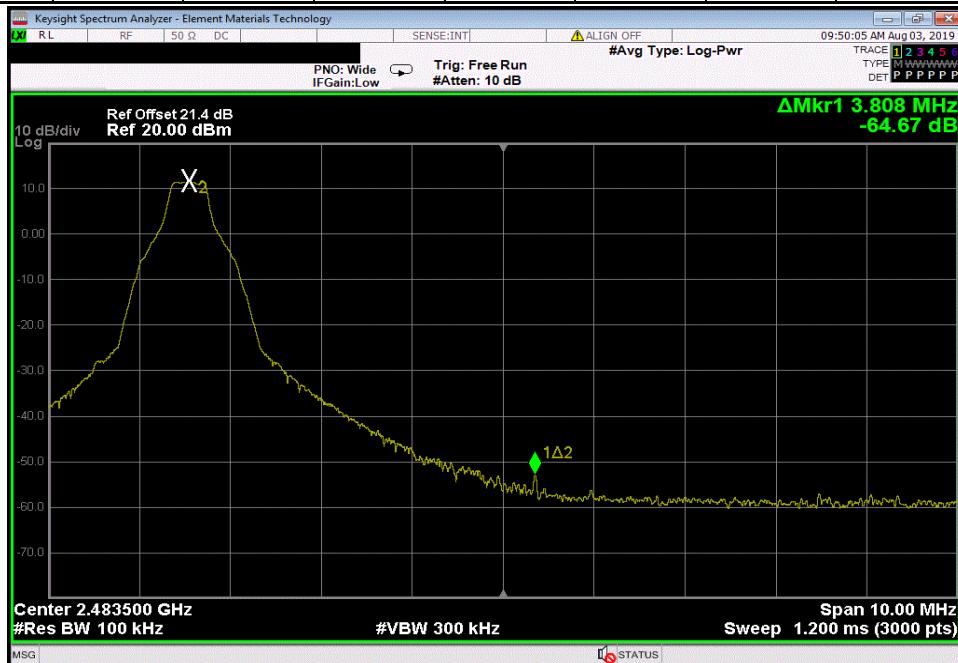
DH5, GFSK, Single Channel, Low Channel, 2402 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-55.75	-20	Pass



DH5, GFSK, Single Channel, High Channel, 2480 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-64.67	-20	Pass



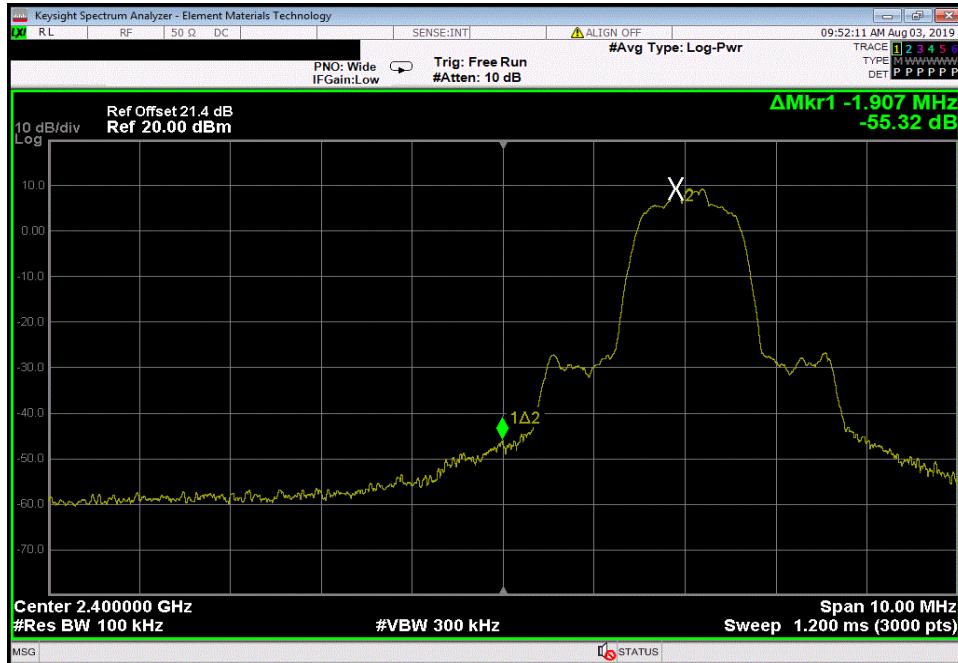
BAND EDGE COMPLIANCE



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2DH5, pi/4-DQPSK, Single Channel, Low Channel, 2402 MHz

	Value (dBc)	Limit \leq (dBc)	Result
	-55.32	-20	Pass



2DH5, pi/4-DQPSK, Single Channel, High Channel, 2480 MHz

	Value (dBc)	Limit \leq (dBc)	Result
	-65.27	-20	Pass



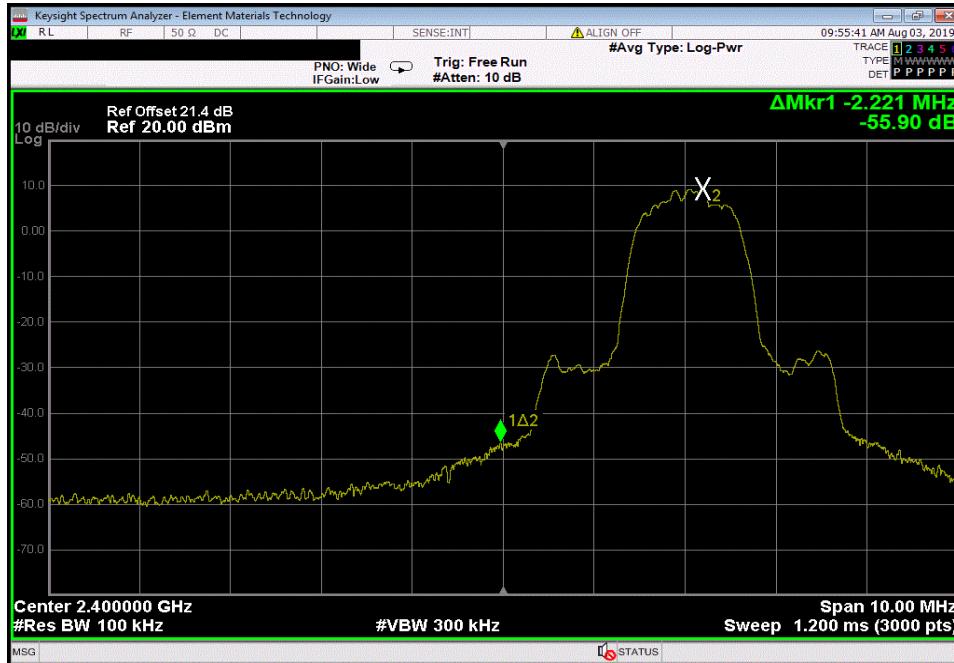
BAND EDGE COMPLIANCE



TbTx 2018.09.13 XMT 2019.06.11

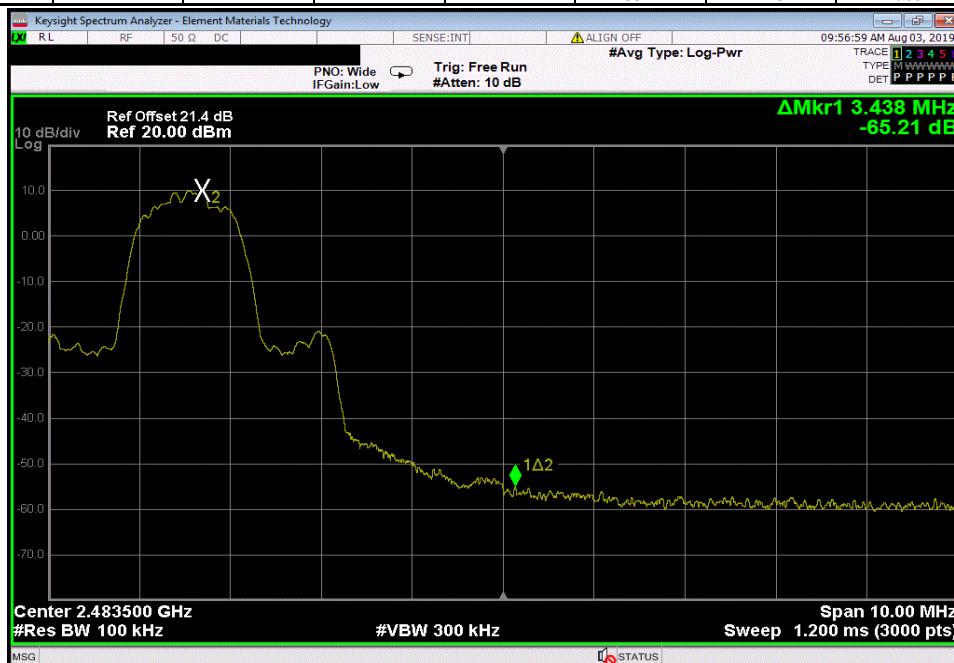
3DH5, 8-DPSK, Single Channel, Low Channel, 2402 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-55.9	-20	Pass



3DH5, 8-DPSK, Single Channel, High Channel, 2480 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-65.21	-20	Pass



BAND EDGE COMPLIANCE - HOPPING MODE



XMit 2019.06.11

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Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
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The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE - HOPPING MODE



TbTx 2018.09.13

XMI 2019.06.11

EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order:	ECHN0015	
Serial Number:	Pre-production #1		Date:	1-Aug-19	
Customer:	EchoNous, Inc.		Temperature:	22.6 °C	
Attendees:	None		Humidity:	47.7% RH	
Project:	None		Barometric Pres.:	1017 mbar	
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC	Job Site:	NC0A
TEST SPECIFICATIONS	Test Method				
FCC 15.247:2019	ANSI C63.10:2013				
COMMENTS	Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.				
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Value (dBc)	Limit ≤ (dBc)	Result
DH5, GFSK, Hopping Mode					
Low Channel, 2402 MHz			-53.97	-20	Pass
High Channel, 2480 MHz			-51.46	-20	Pass
2DH5, pi/4-DQPSK, Hopping Mode					
Low Channel, 2402 MHz			-50.61	-20	Pass
High Channel, 2480 MHz			-50.68	-20	Pass
3DH5, 8-DPSK, Hopping Mode					
Low Channel, 2402 MHz			-51.9	-20	Pass
High Channel, 2480 MHz			-51.68	-20	Pass

BAND EDGE COMPLIANCE - HOPPING MODE



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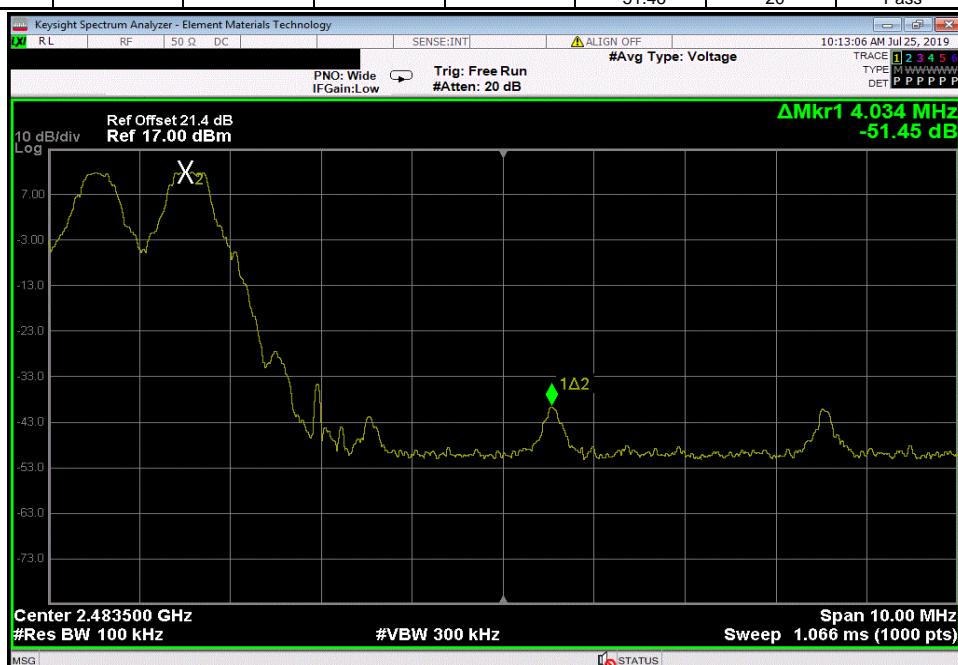
DH5, GFSK, Hopping Mode, Low Channel, 2402 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-53.97	-20	Pass



DH5, GFSK, Hopping Mode, High Channel, 2480 MHz

	Value (dBc)	Limit ≤ (dBc)	Result
	-51.46	-20	Pass



BAND EDGE COMPLIANCE - HOPPING MODE



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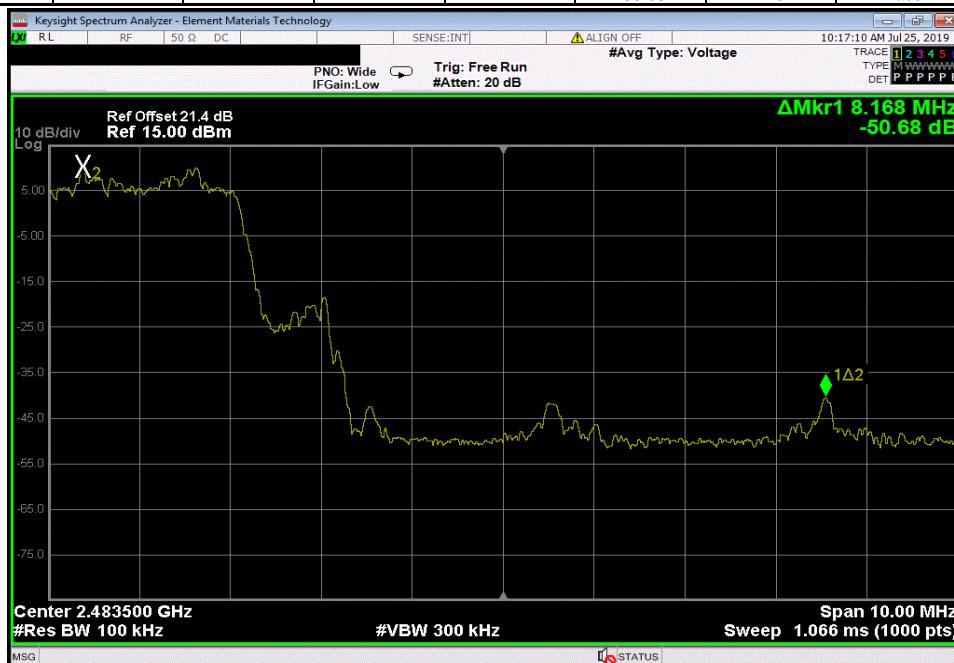
2DH5, pi/4-DQPSK, Hopping Mode, Low Channel, 2402 MHz

	Value (dBc)	Limit \leq (dBc)	Result
	-50.61	-20	Pass



2DH5, pi/4-DQPSK, Hopping Mode, High Channel, 2480 MHz

	Value (dBc)	Limit \leq (dBc)	Result
	-50.68	-20	Pass

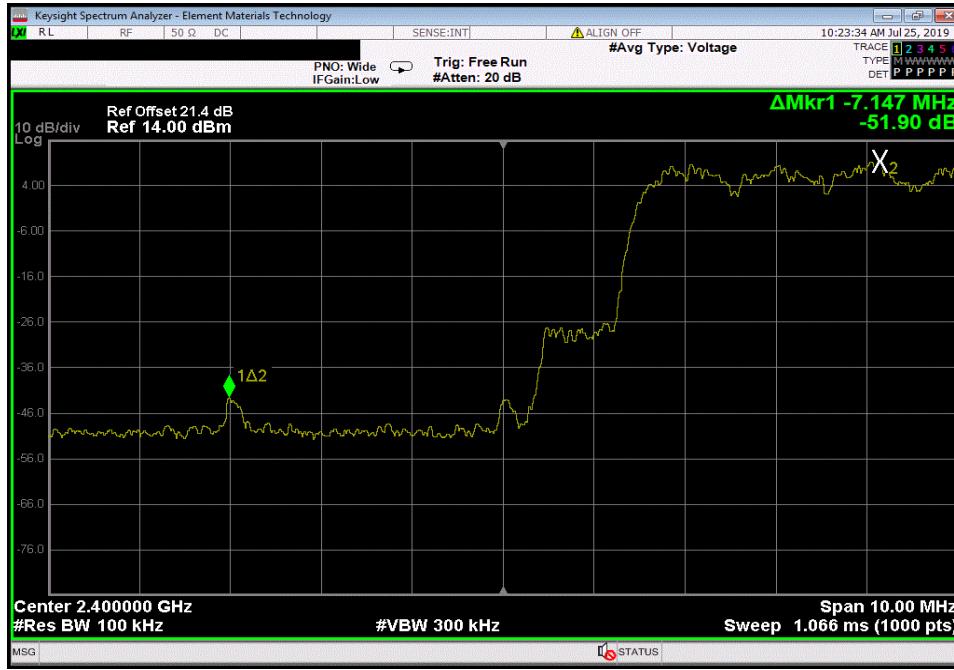


BAND EDGE COMPLIANCE - HOPPING MODE

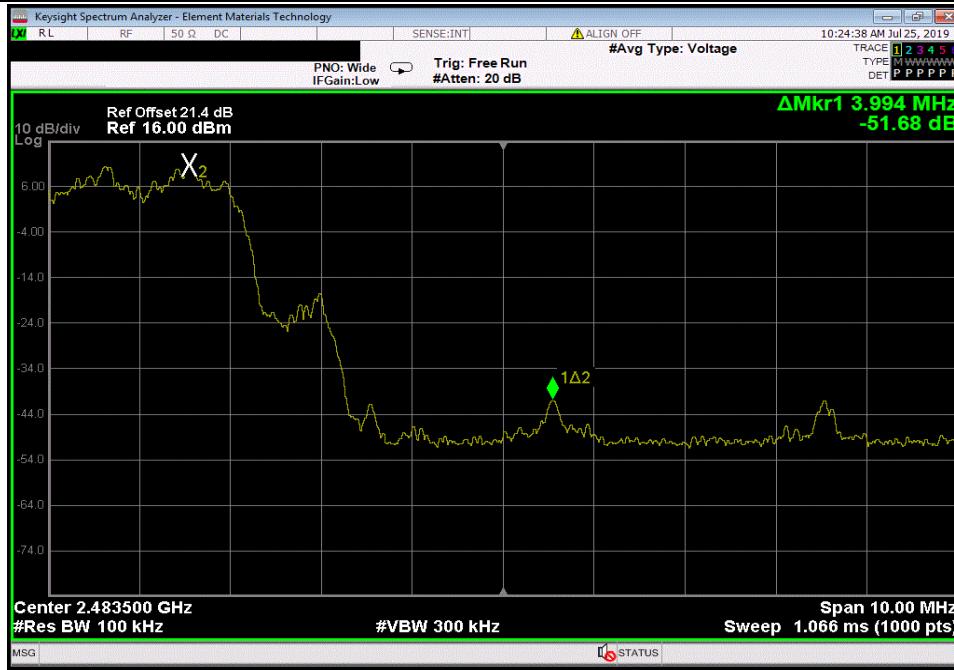


TbTx 2018.09.13 XMT 2019.06.11

3DH5, 8-DPSK, Hopping Mode, Low Channel, 2402 MHz			
Value (dBc)	Limit ≤ (dBc)	Result	
-51.9	-20	Pass	



3DH5, 8-DPSK, Hopping Mode, High Channel, 2480 MHz			
Value (dBc)	Limit ≤ (dBc)	Result	
-51.68	-20	Pass	





XMit 2019.06.11

OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIA	25-Apr-18	25-Apr-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	29-Mar-19	29-Mar-20
Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	5-May-19	5-May-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The 20 dB occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

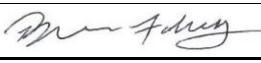
OCCUPIED BANDWIDTH



element

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XMi 2019.06.11

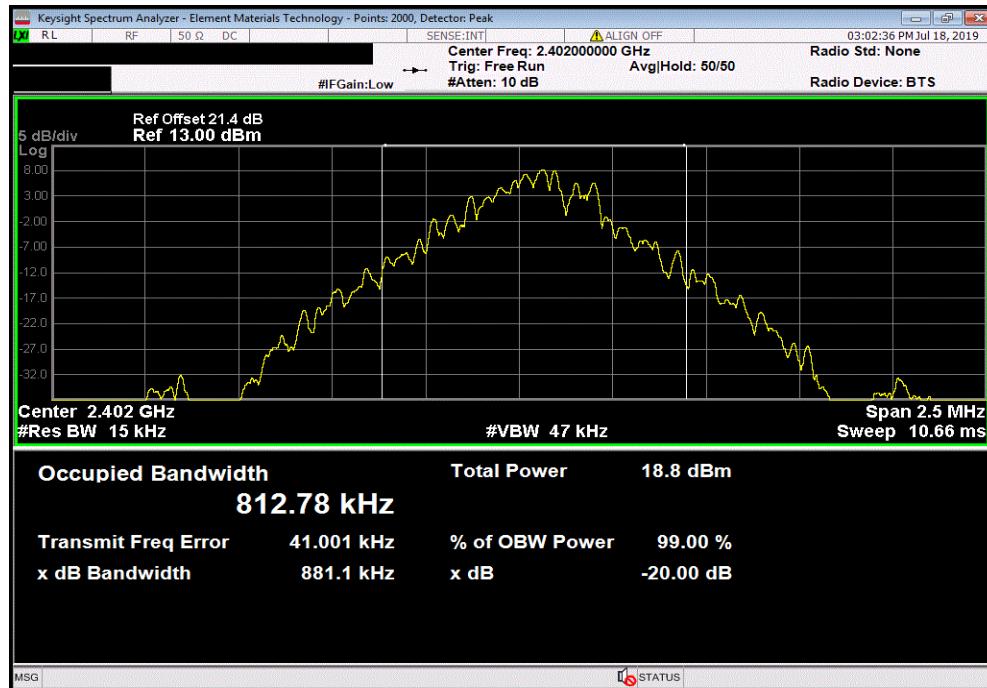
EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE	Work Order:	ECHN0015			
Serial Number:	Pre-production #1	Date:	17-Jul-19			
Customer:	EchoNous, Inc.	Temperature:	22.5 °C			
Attendees:	None	Humidity:	56.9% RH			
Project:	None	Barometric Pres.:	1015 mbar			
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC			
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013			
FCC 15.247:2019						
COMMENTS	Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.					
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature	 			
		Value	Limit (<)	Result		
DH5, GFSK						
	Low Channel, 2402 MHz	881.099 kHz	1.5 MHz	Pass		
	Mid Channel, 2441 MHz	880.771 kHz	1.5 MHz	Pass		
	High Channel, 2480 MHz	880.964 kHz	1.5 MHz	Pass		
2DH5, pi/4-DQPSK						
	Low Channel, 2402 MHz	1.257 MHz	1.5 MHz	Pass		
	Mid Channel, 2441 MHz	1.257 MHz	1.5 MHz	Pass		
	High Channel, 2480 MHz	1.266 MHz	1.5 MHz	Pass		
3DH5, 8-DPSK						
	Low Channel, 2402 MHz	1.26 MHz	1.5 MHz	Pass		
	Mid Channel, 2441 MHz	1.258 MHz	1.5 MHz	Pass		
	High Channel, 2480 MHz	1.261 MHz	1.5 MHz	Pass		

OCCUPIED BANDWIDTH

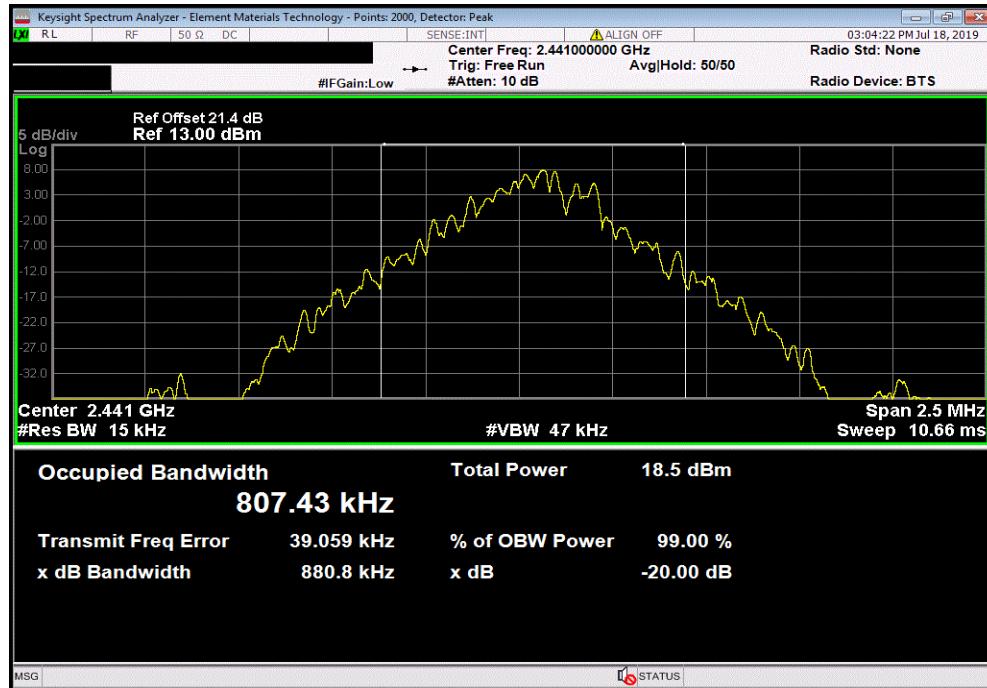


TbTx 2018.09.13 XMI 2019.06.11

DH5, GFSK, Low Channel, 2402 MHz			Value	Limit (≤)	Result
			881.099 kHz	1.5 MHz	Pass



DH5, GFSK, Mid Channel, 2441 MHz			Value	Limit (≤)	Result
			880.771 kHz	1.5 MHz	Pass

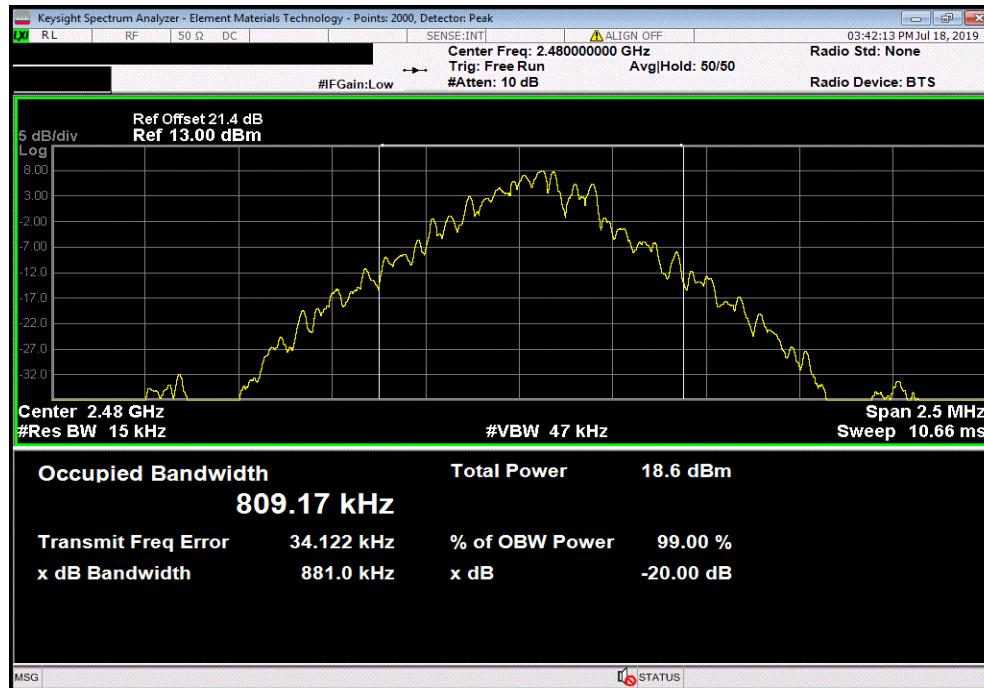


OCCUPIED BANDWIDTH

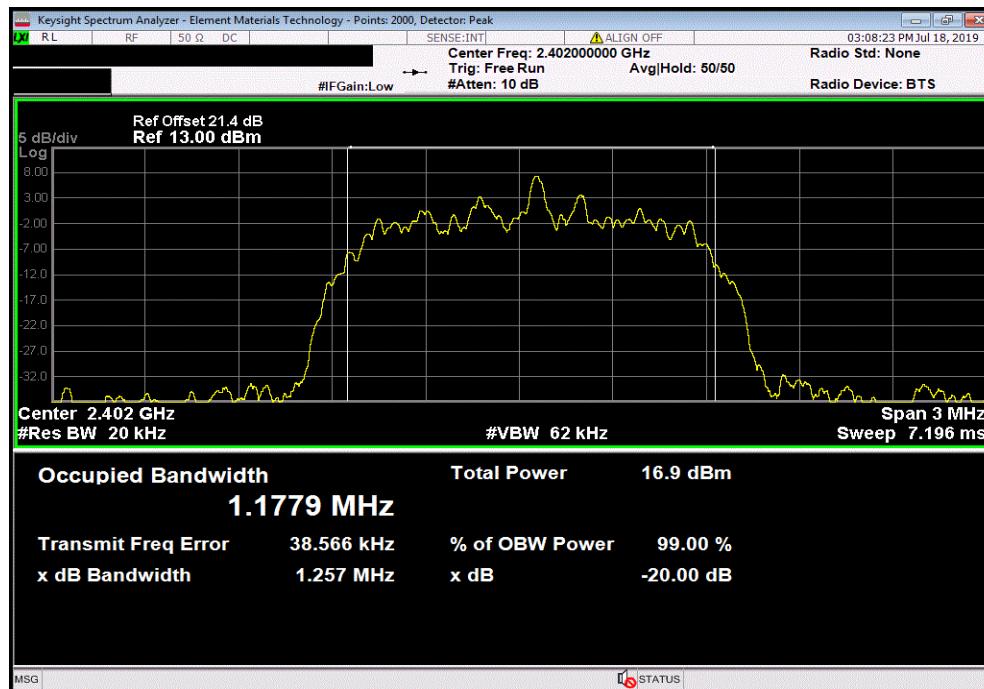


TbTx 2018.09.13 XMI 2019.06.11

DH5, GFSK, High Channel, 2480 MHz			Value	Limit (≤)	Result
			880.964 kHz	1.5 MHz	Pass



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz			Value	Limit (≤)	Result
			1.257 MHz	1.5 MHz	Pass

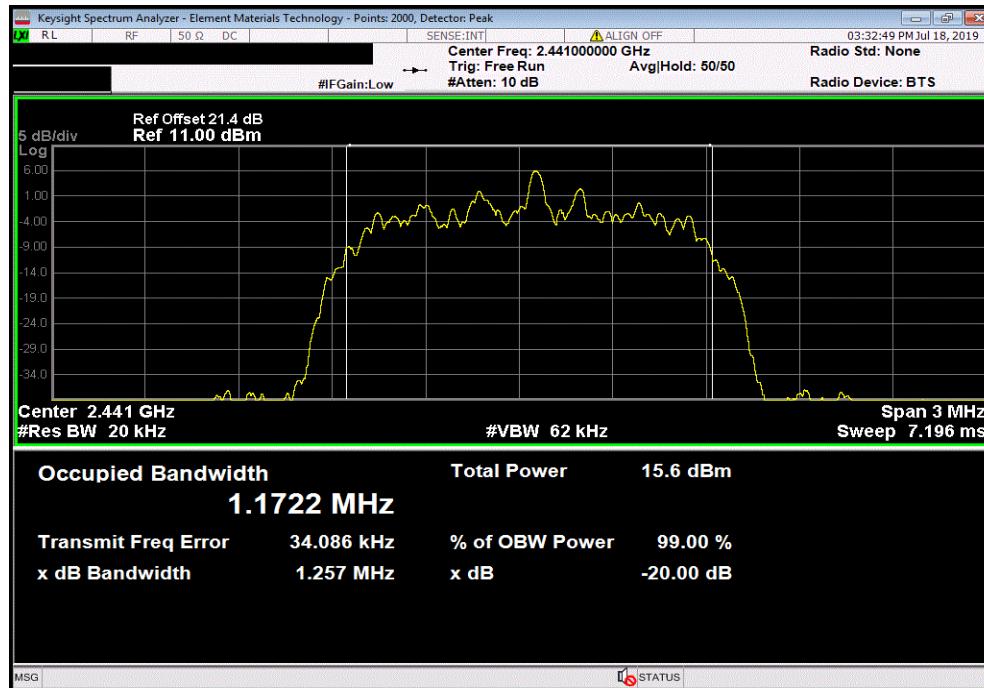


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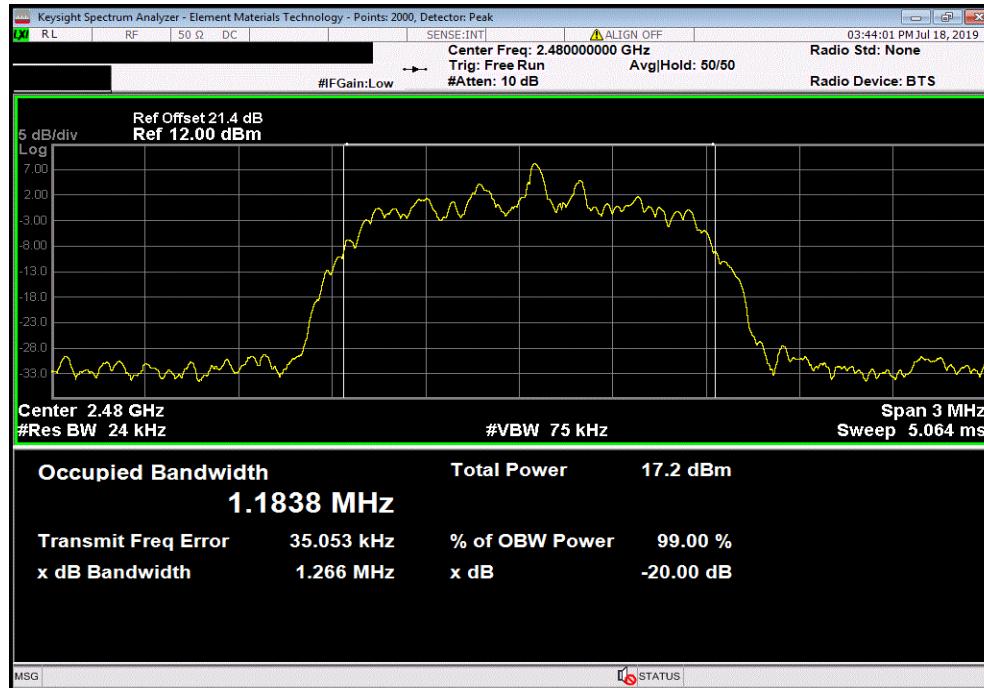


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2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz			Value	Limit (≤)	Result
	1.257 MHz	1.5 MHz	Pass		



2DH5, pi/4-DQPSK, High Channel, 2480 MHz			Value	Limit (≤)	Result
	1.266 MHz	1.5 MHz	Pass		

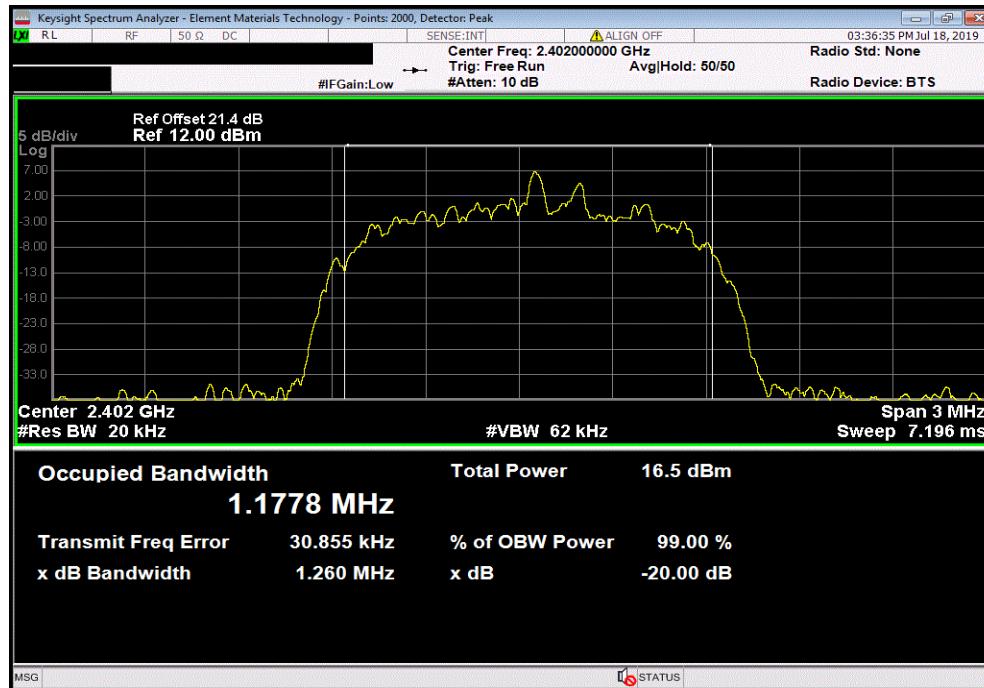


OCCUPIED BANDWIDTH

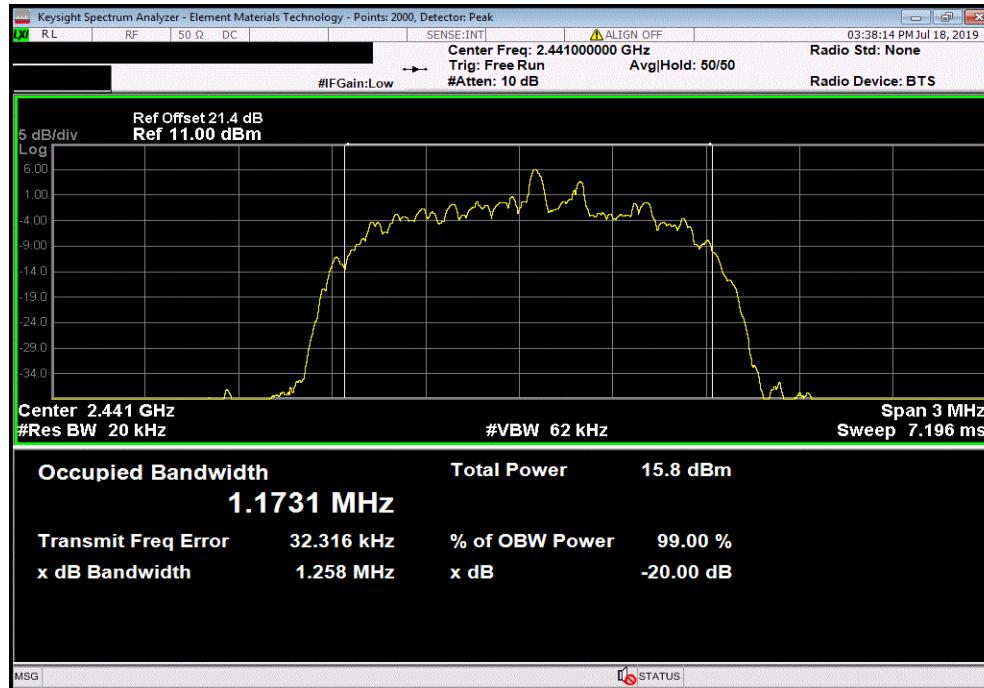


TbTx 2018.09.13 XMI 2019.06.11

3DH5, 8-DPSK, Low Channel, 2402 MHz			Value	Limit (≤)	Result
			1.26 MHz	1.5 MHz	Pass



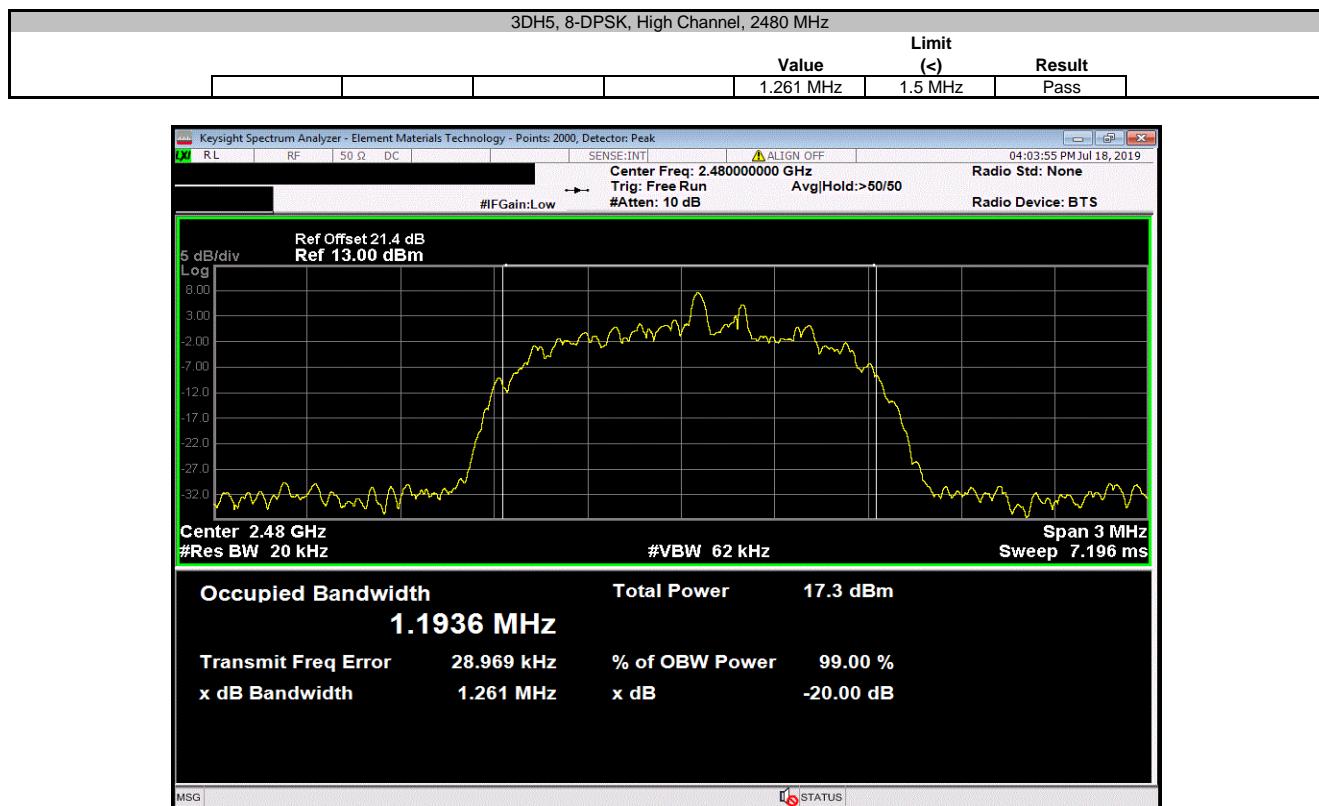
3DH5, 8-DPSK, Mid Channel, 2441 MHz			Value	Limit (≤)	Result
			1.258 MHz	1.5 MHz	Pass



OCCUPIED BANDWIDTH



TbTx 2018.09.13 XMI 2019.06.11



SPURIOUS CONDUCTED EMISSIONS



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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIA	25-Apr-18	25-Apr-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	29-Mar-19	29-Mar-20
Attenuator	Fairview Microwave	SA4014-20	TKV	18-Jan-19	18-Jan-20
Block - DC	Fairview Microwave	SD3379	AMU	18-Jan-19	18-Jan-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	5-May-19	5-May-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS



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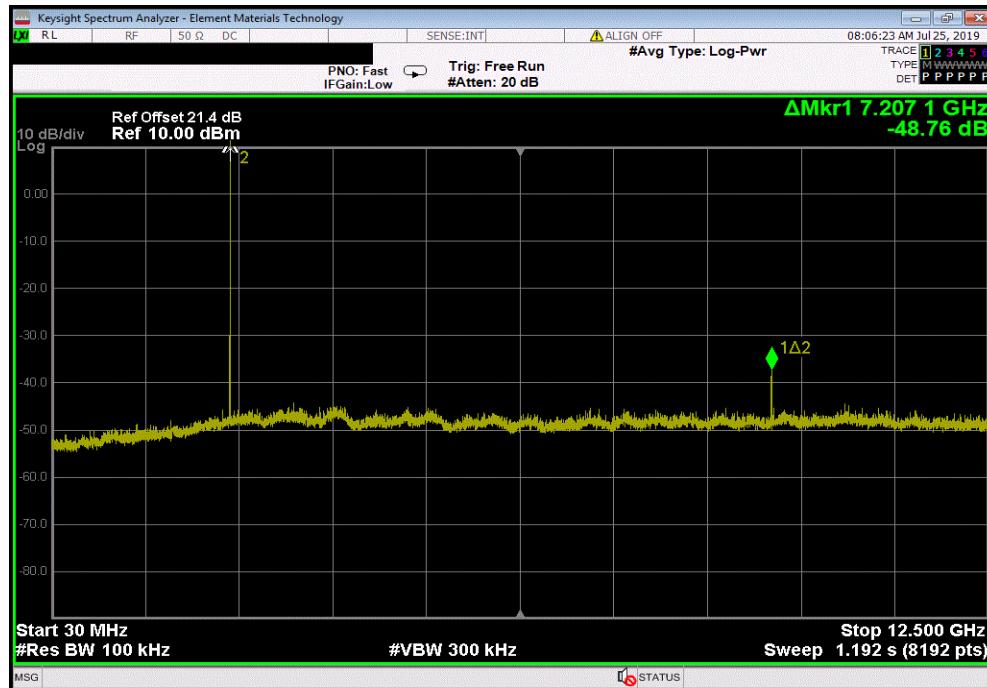
EUT:	Thor Radio Module AC WLAN and Bluetooth and BLE	Work Order:	ECHN0015			
Serial Number:	Pre-production #1	Date:	24-Jul-19			
Customer:	EchoNous, Inc.	Temperature:	22.1 °C			
Attendees:	None	Humidity:	52.5% RH			
Project:	None	Barometric Pres.:	1028 mbar			
Tested by:	Brian Fahey and Jeff Alcock	Power:	3.7 VDC			
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013			
FCC 15.247:2019						
COMMENTS						
Reference level offset: RF measurement cable, 20 dB attenuator, and DC Block = 21.4 dBm.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
		<i>Brian Fahey</i>	<i>Jeff Alcock</i>			
		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
DH5, GFSK						
Low Channel, 2402 MHz		30 MHz - 12.5 GHz	7207.05	-48.76	-20	Pass
Low Channel, 2402 MHz		12.5 GHz - 25 GHz	23759.31	-53.09	-20	Pass
Mid Channel, 2441 MHz		30 MHz - 12.5 GHz	7322.76	-51.62	-20	Pass
Mid Channel, 2441 MHz		12.5 GHz - 25 GHz	24906.91	-53.02	-20	Pass
High Channel, 2480 MHz		30 MHz - 12.5 GHz	7441.5	-47.53	-20	Pass
High Channel, 2480 MHz		12.5 GHz - 25 GHz	23753.2	-54.34	-20	Pass
2DH5, pi/4-DQPSK						
Low Channel, 2402 MHz		30 MHz - 12.5 GHz	7207.05	-52.53	-20	Pass
Low Channel, 2402 MHz		12.5 GHz - 25 GHz	24713.1	-51.59	-20	Pass
Mid Channel, 2441 MHz		30 MHz - 12.5 GHz	1463.03	-51.41	-20	Pass
Mid Channel, 2441 MHz		12.5 GHz - 25 GHz	24703.94	-49.3	-20	Pass
High Channel, 2480 MHz		30 MHz - 12.5 GHz	7441.5	-53.08	-20	Pass
High Channel, 2480 MHz		12.5 GHz - 25 GHz	23678.43	-52.06	-20	Pass
3DH5, 8-DPSK						
Low Channel, 2402 MHz		30 MHz - 12.5 GHz	1396.04	-53.7	-20	Pass
Low Channel, 2402 MHz		12.5 GHz - 25 GHz	23505.98	-51.51	-20	Pass
Mid Channel, 2441 MHz		30 MHz - 12.5 GHz	1339.71	-51.03	-20	Pass
Mid Channel, 2441 MHz		12.5 GHz - 25 GHz	24020.27	-48.41	-20	Pass
High Channel, 2480 MHz		30 MHz - 12.5 GHz	7439.98	-53.33	-20	Pass
High Channel, 2480 MHz		12.5 GHz - 25 GHz	24093.52	-51.93	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

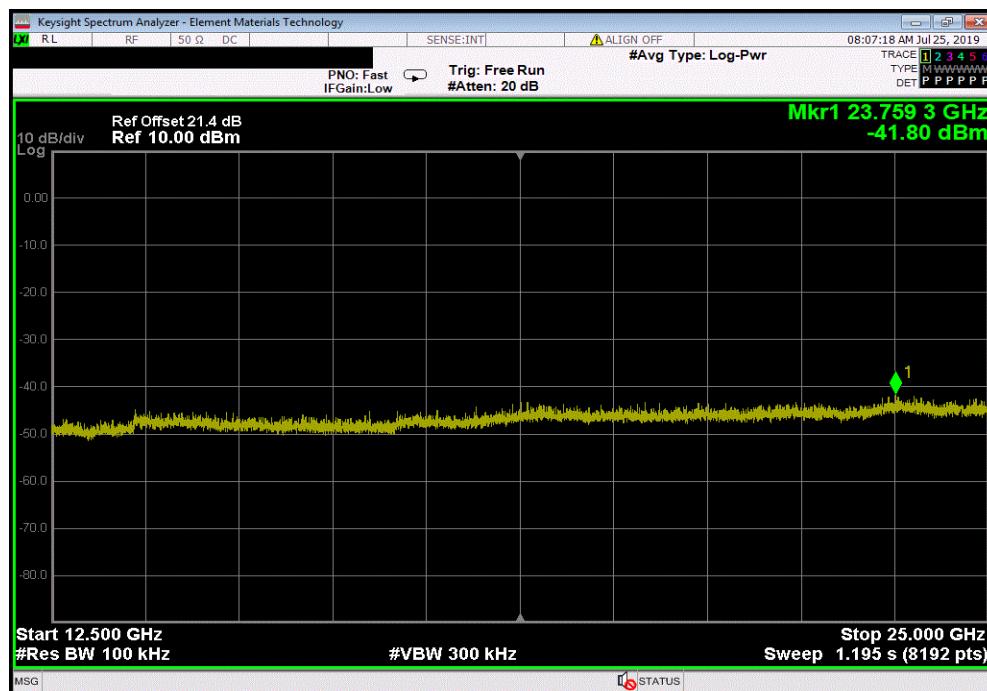


TbTx 2018.09.13 XMT 2019.06.11

DH5, GFSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7207.05	-48.76	-20	Pass



DH5, GFSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	23759.31	-53.09	-20	Pass

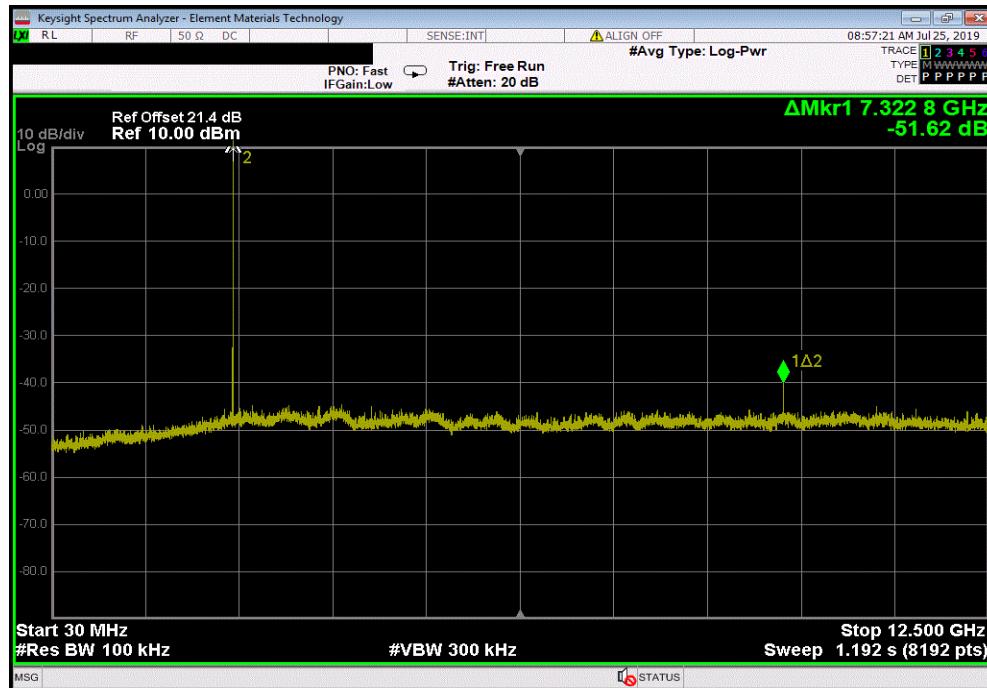


SPURIOUS CONDUCTED EMISSIONS

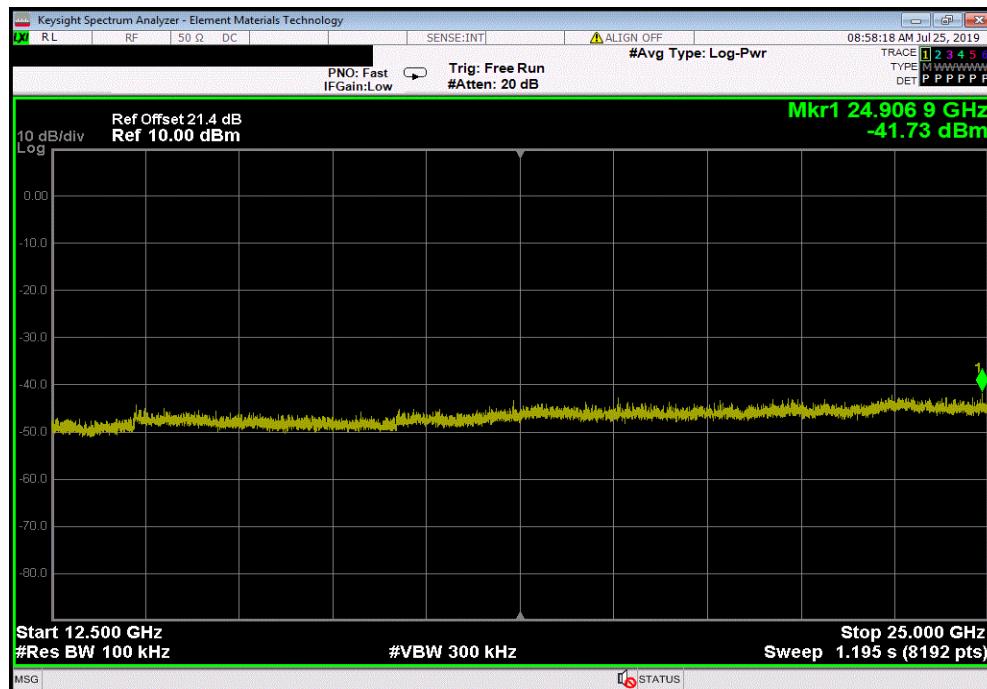


TbTx 2018.09.13 XMI 2019.06.11

DH5, GFSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7322.76	-51.62	-20	Pass



DH5, GFSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24906.91	-53.02	-20	Pass

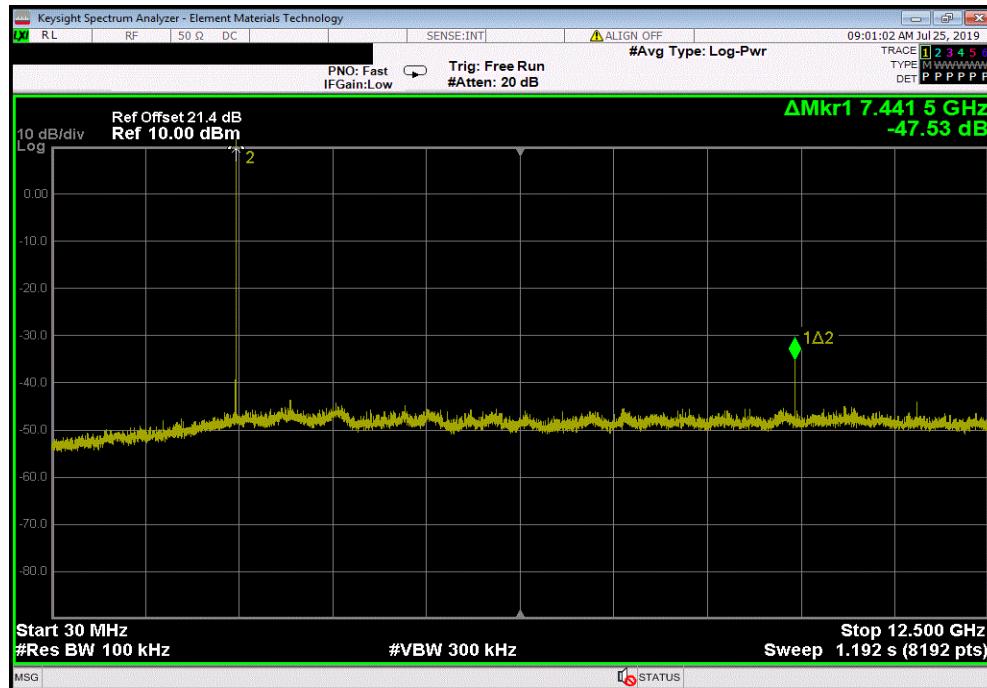


SPURIOUS CONDUCTED EMISSIONS

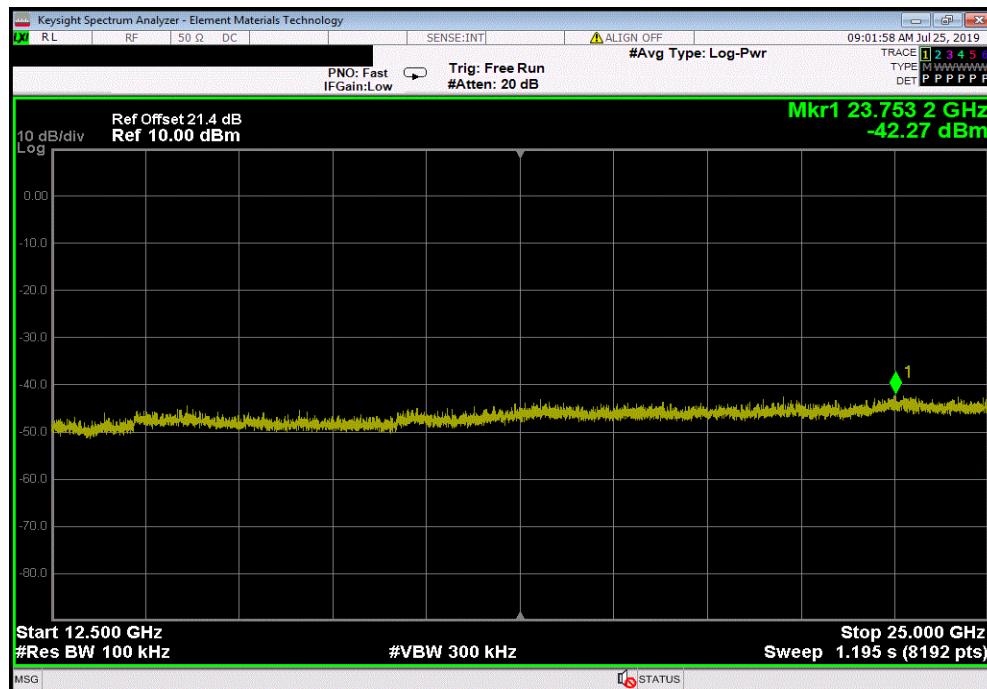


TbTx 2018.09.13 XMI 2019.06.11

DH5, GFSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7441.5	-47.53	-20	Pass



DH5, GFSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	23753.2	-54.34	-20	Pass

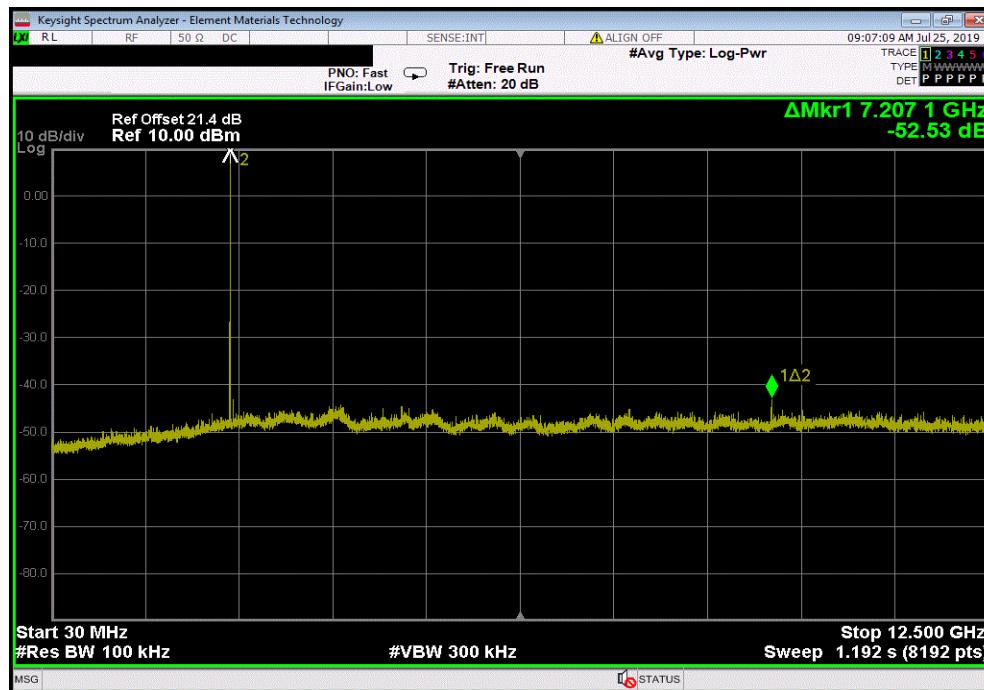


SPURIOUS CONDUCTED EMISSIONS

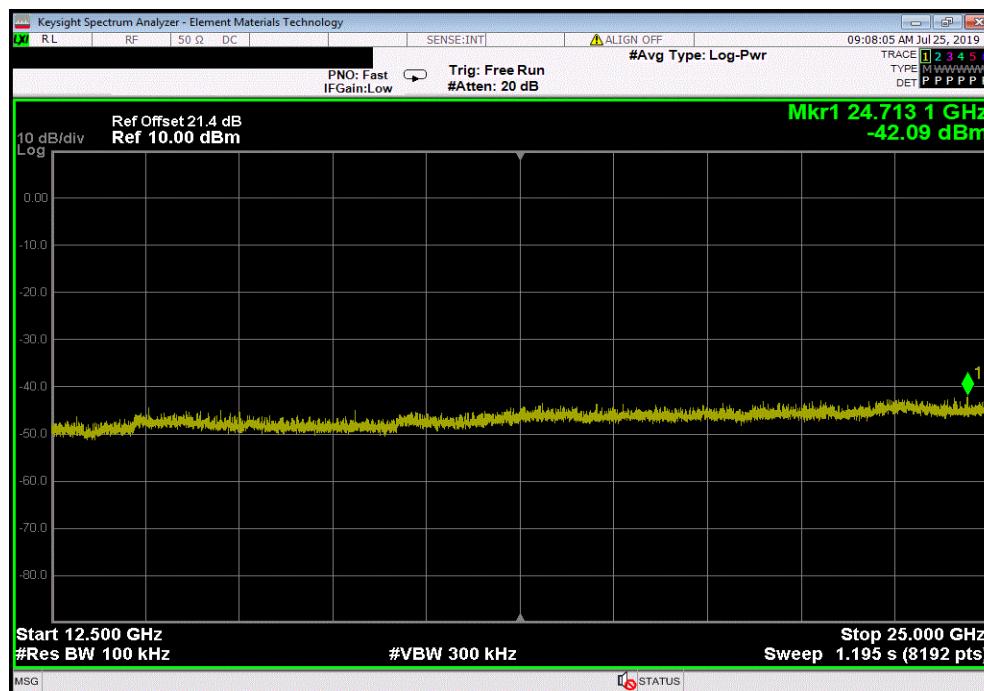


TbTx 2018.09.13 XMT 2019.06.11

2DH5, pi/4-DQPSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7207.05	-52.53	-20	Pass



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24713.1	-51.59	-20	Pass

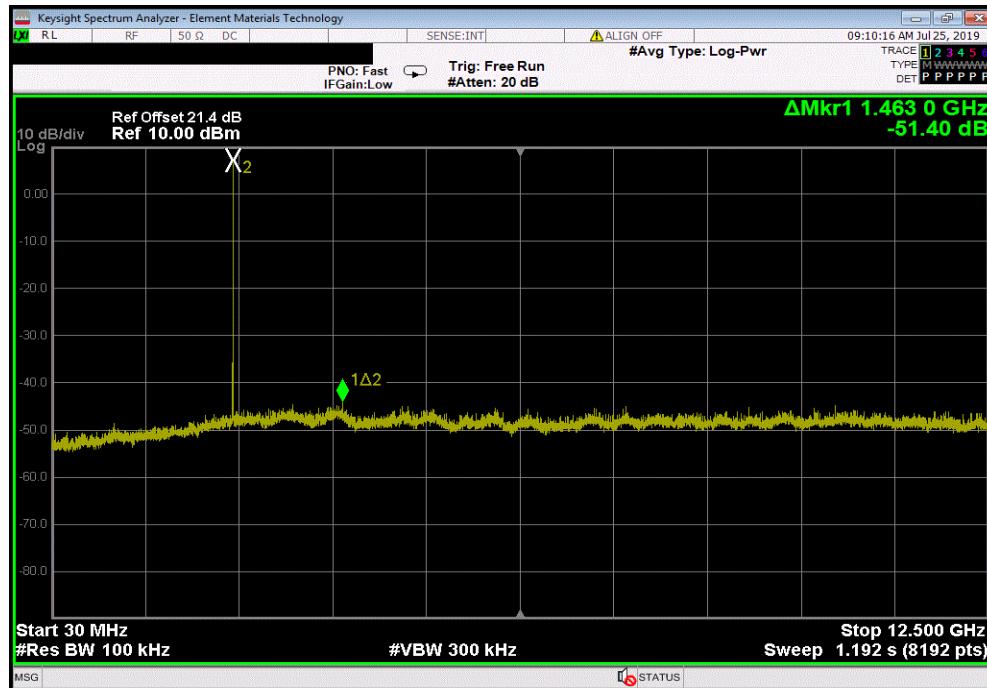


SPURIOUS CONDUCTED EMISSIONS

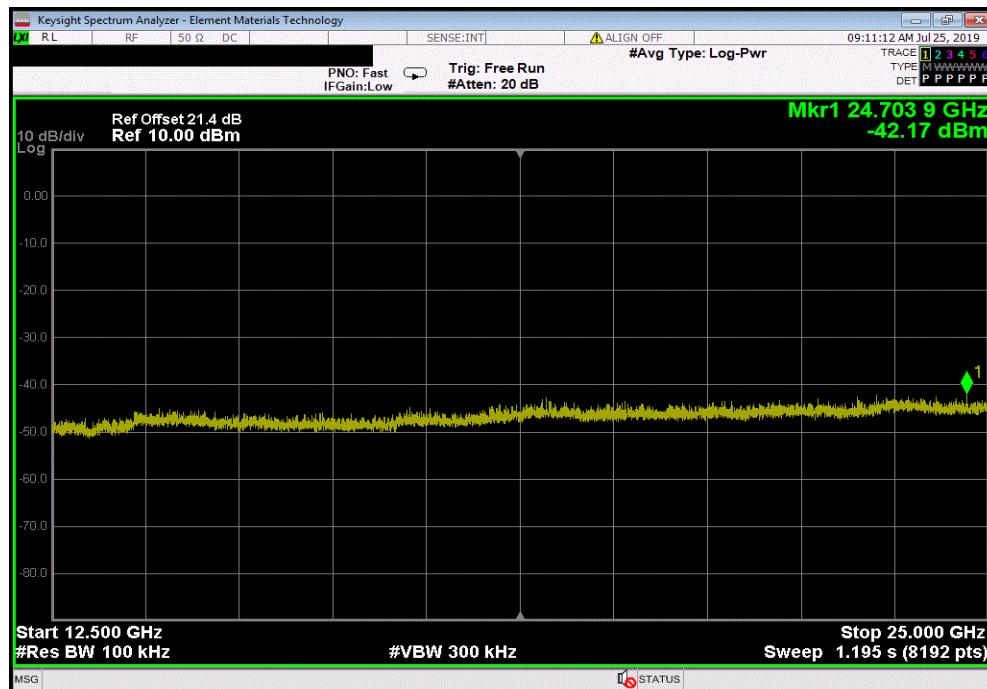


TbTx 2018.09.13 XM1 2019.06.11

2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit \leq (dBc)	Result
30 MHz - 12.5 GHz	1463.03	-51.41	-20	Pass



2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit \leq (dBc)	Result
12.5 GHz - 25 GHz	24703.94	-49.3	-20	Pass

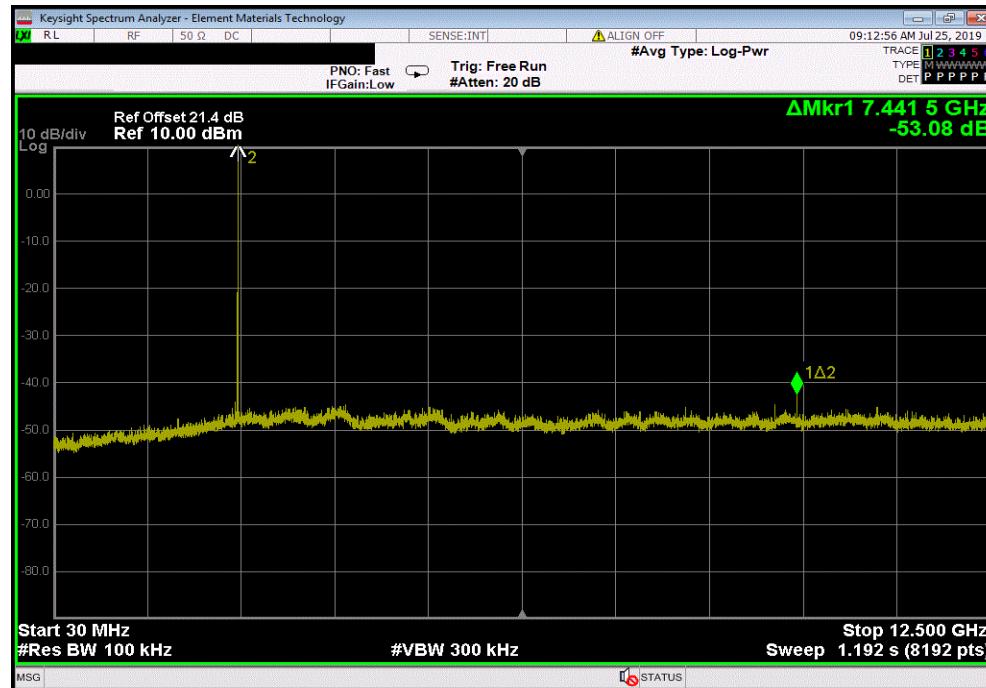


SPURIOUS CONDUCTED EMISSIONS

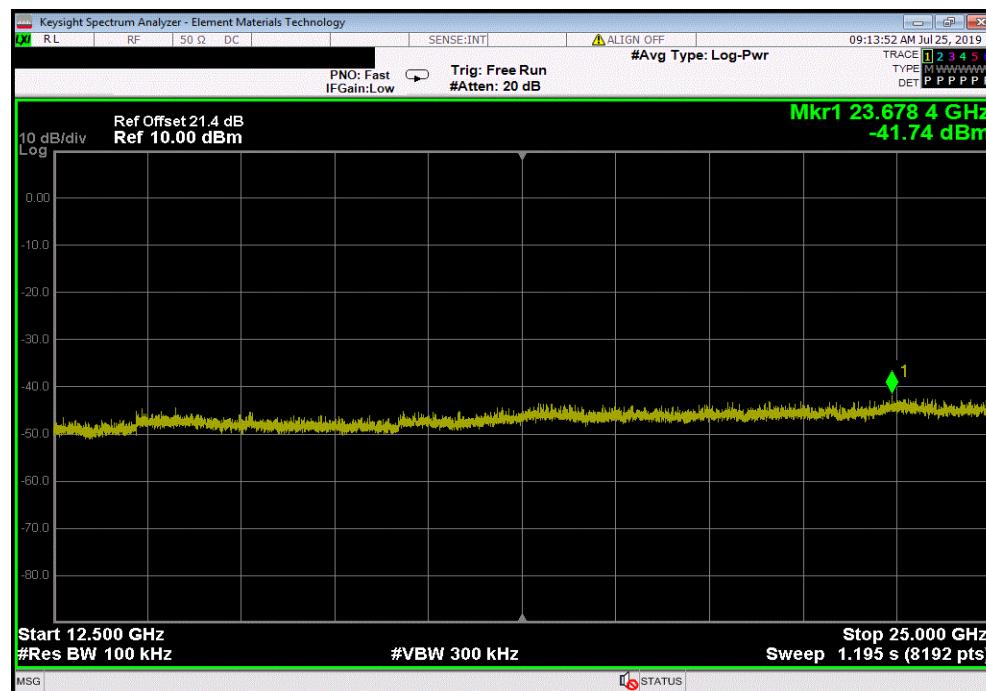


TbTx 2018.09.13 XMT 2019.06.11

2DH5, pi/4-DQPSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7441.5	-53.08	-20	Pass



2DH5, pi/4-DQPSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	23678.43	-52.06	-20	Pass

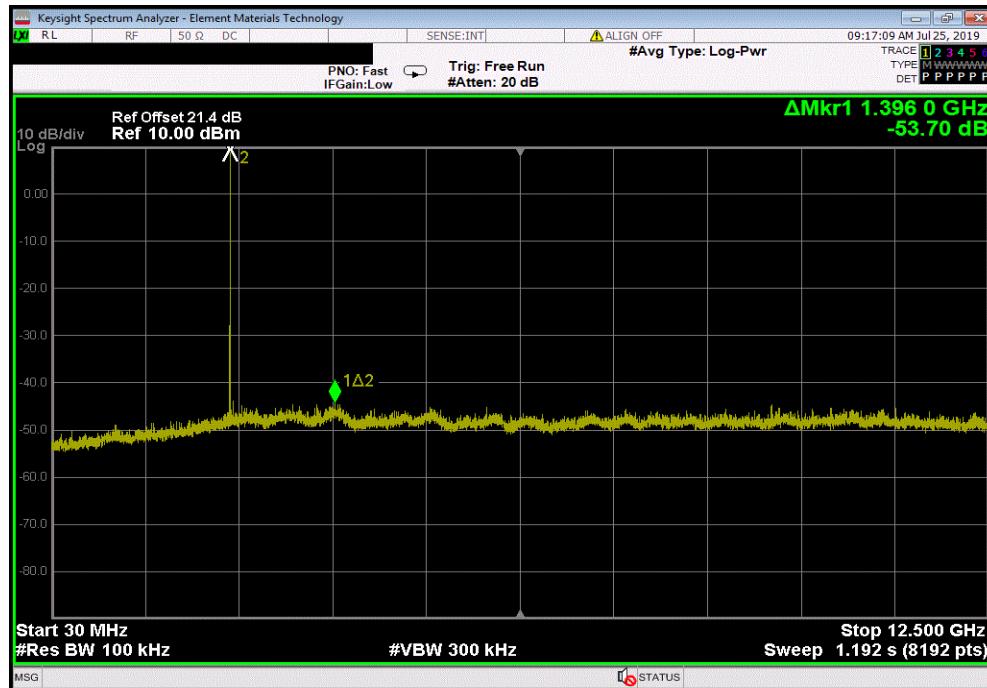


SPURIOUS CONDUCTED EMISSIONS

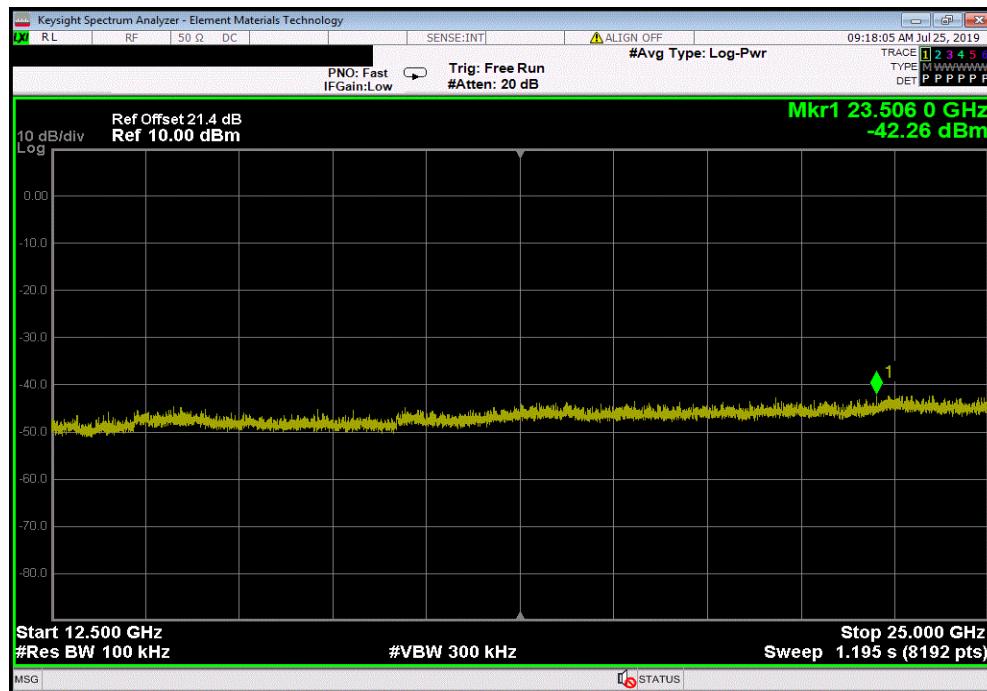


TbTx 2018.09.13 XMI 2019.06.11

3DH5, 8-DPSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit \leq (dBc)	Result
30 MHz - 12.5 GHz	1396.04	-53.7	-20	Pass



3DH5, 8-DPSK, Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit \leq (dBc)	Result
12.5 GHz - 25 GHz	23505.98	-51.51	-20	Pass

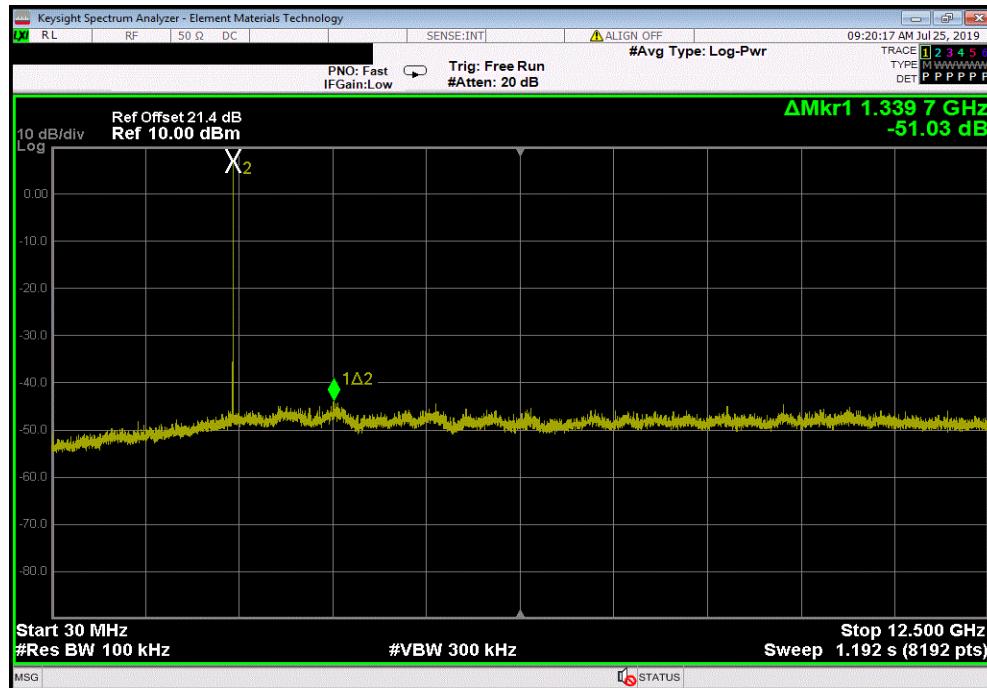


SPURIOUS CONDUCTED EMISSIONS

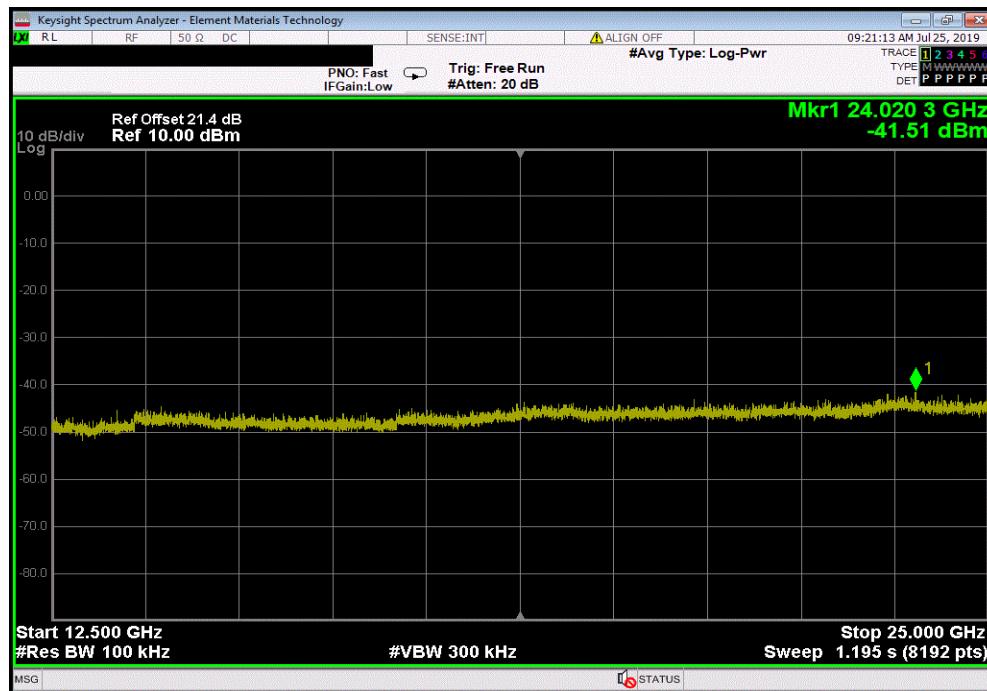


TbTx 2018.09.13 XM1 2019.06.11

3DH5, 8-DPSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	1339.71	-51.03	-20	Pass



3DH5, 8-DPSK, Mid Channel, 2441 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24020.27	-48.41	-20	Pass

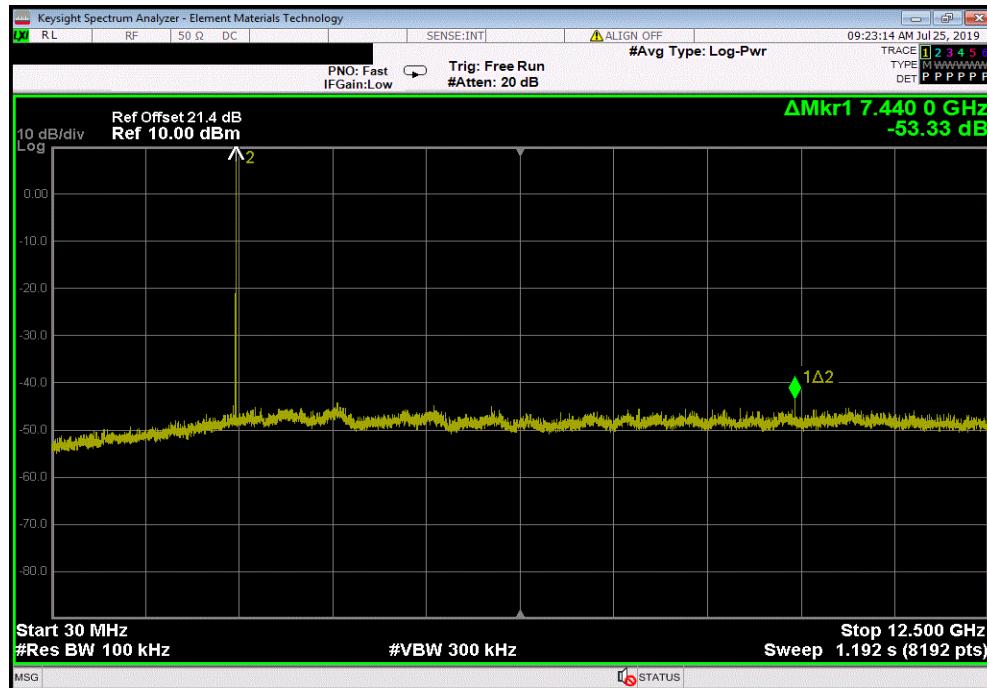


SPURIOUS CONDUCTED EMISSIONS



TbTx 2018.09.13 XMT 2019.06.11

3DH5, 8-DPSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7439.98	-53.33	-20	Pass



3DH5, 8-DPSK, High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24093.52	-51.93	-20	Pass

