

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



THxTx 2018.09.13 XMt 2019.06.11

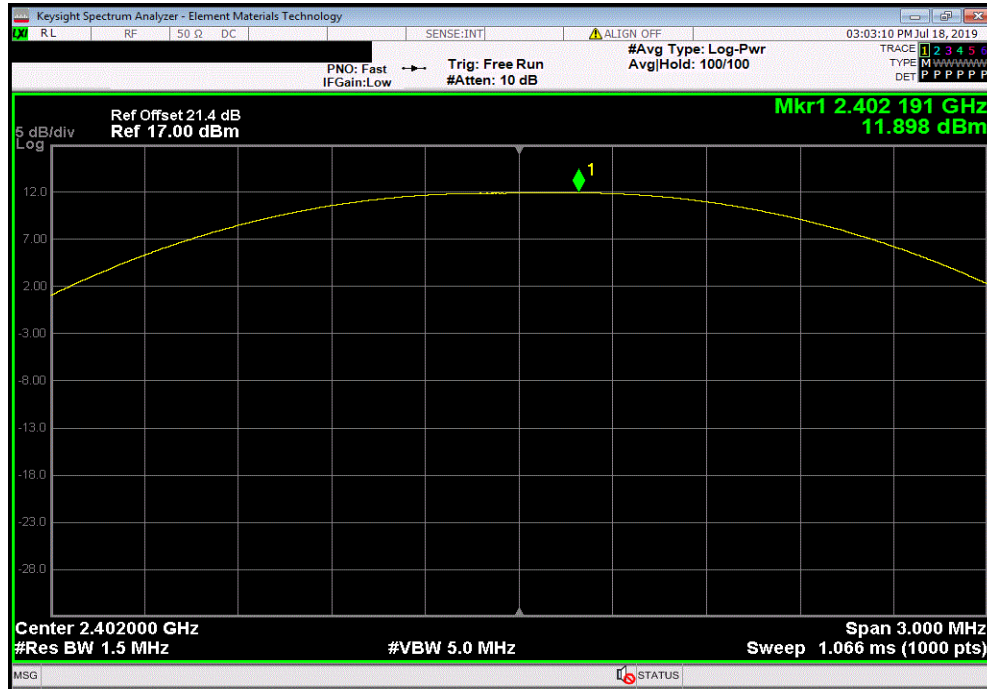
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 17-Jul-19	
Customer: EchoNous, Inc.		Temperature: 22.5 °C	
Attendees: None		Humidity: 56.6% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 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 <i>Brian Fahey</i> <i>Jeff Alcock</i>	
		Out Pwr (dBm)	Limit (dBm)
			Result
DH5, GFSK			
	Low Channel, 2402 MHz	11.898	21
	Mid Channel, 2441 MHz	11.607	21
	High Channel, 2480 MHz	11.561	21
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	11.373	21
	Mid Channel, 2441 MHz	10.384	21
	High Channel, 2480 MHz	11.306	21
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	11.216	21
	Mid Channel, 2441 MHz	10.686	21
	High Channel, 2480 MHz	11.576	21

OUTPUT POWER

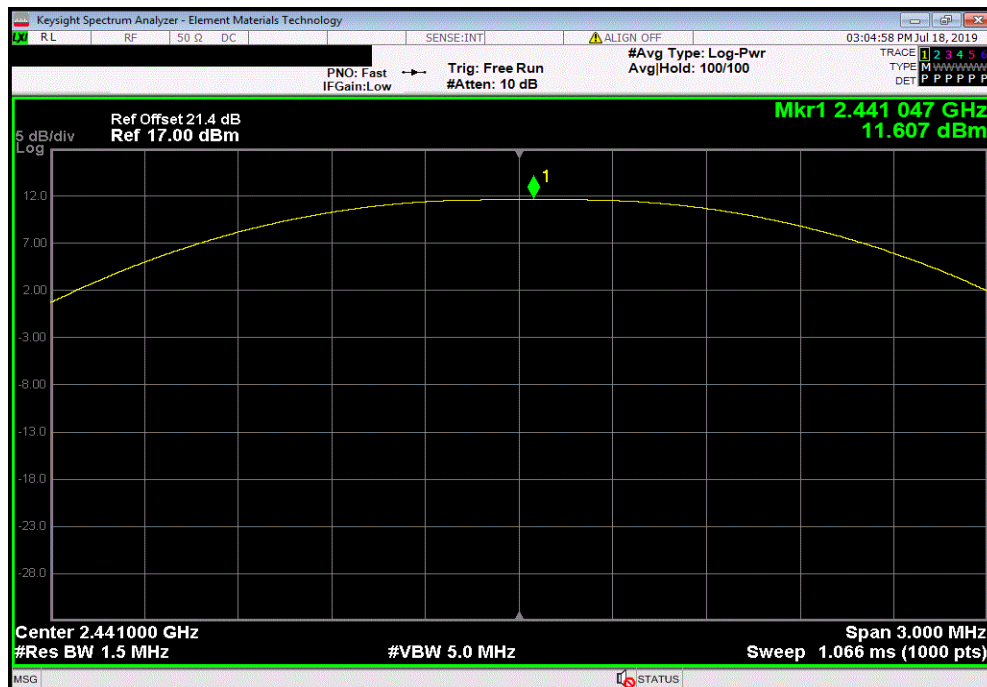


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DH5, GFSK, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				11.898	21	Pass



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

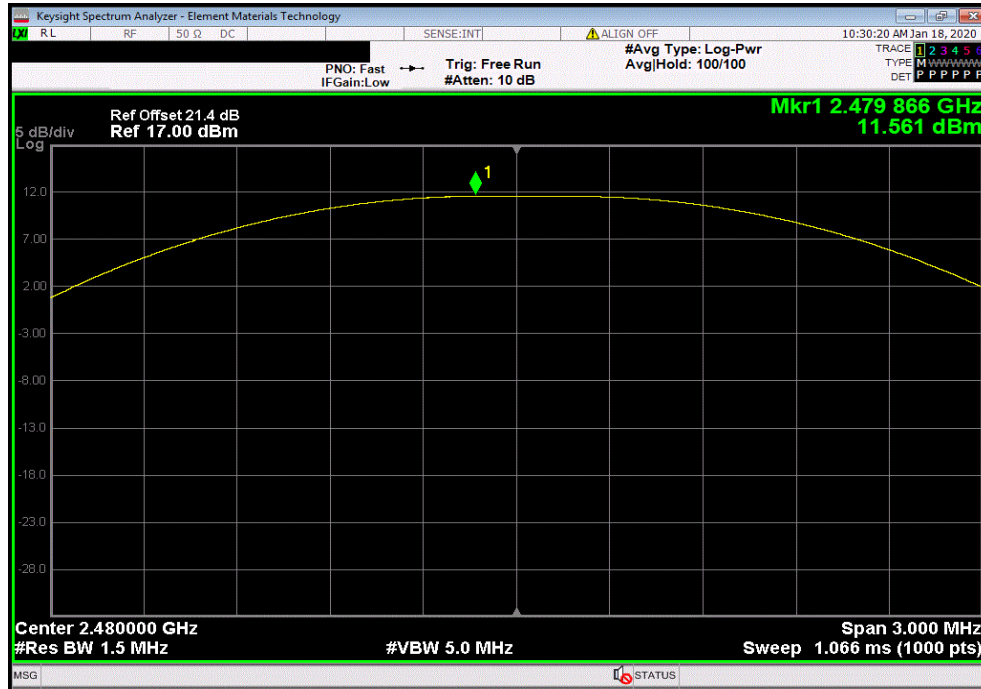


OUTPUT POWER

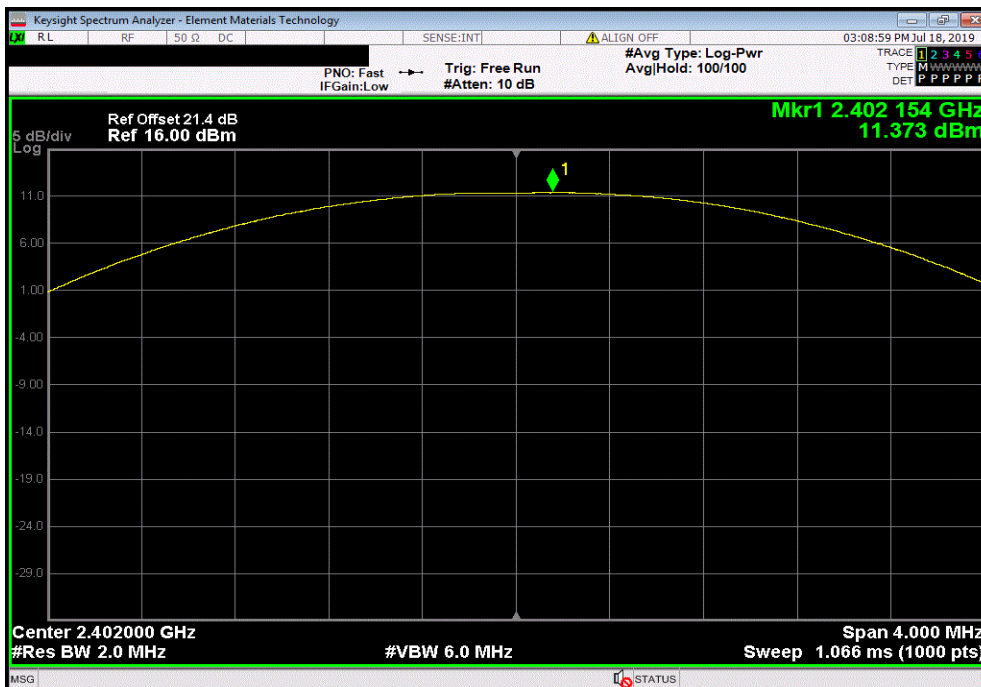


TMTx 2018.09.13 XMI 2019.06.11

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

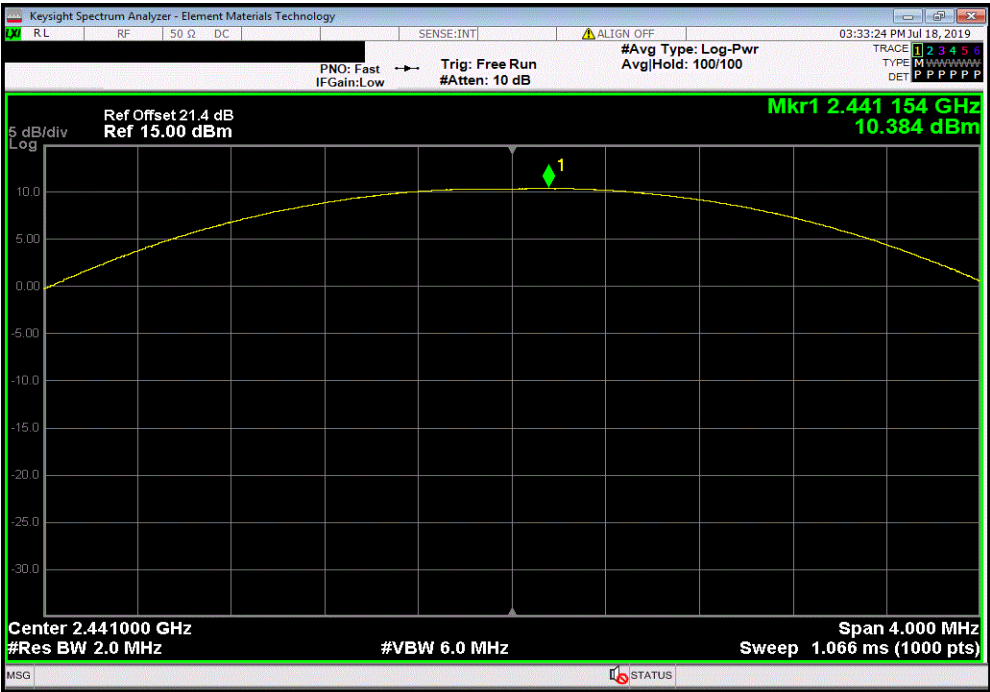


OUTPUT POWER

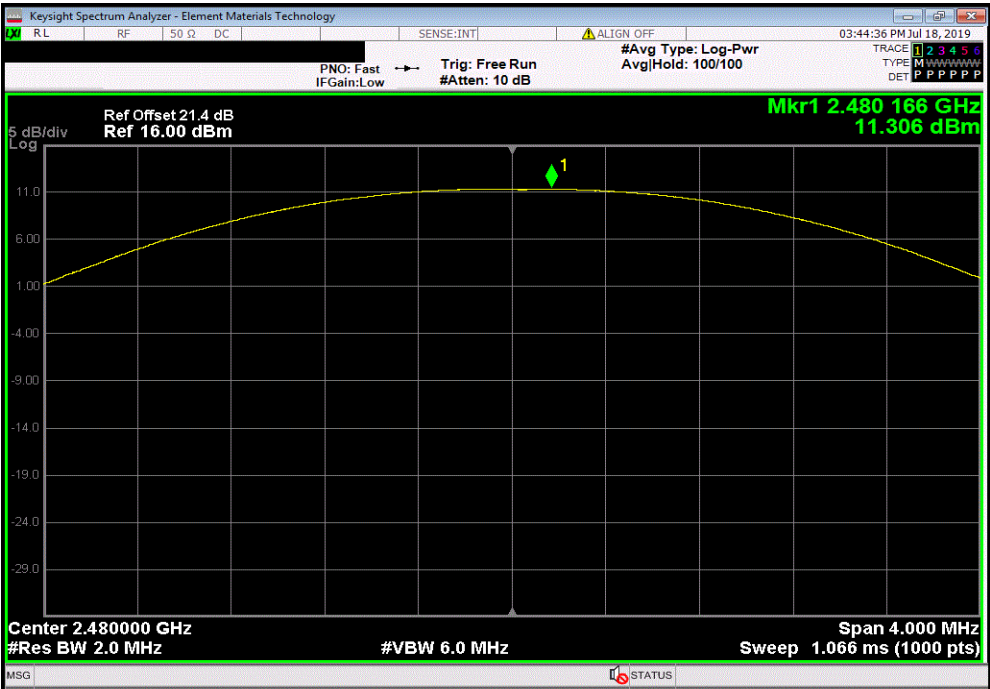


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2DH5, pi/4-DQPSK, Mid Channel, 2441 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				10.384	21	Pass



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

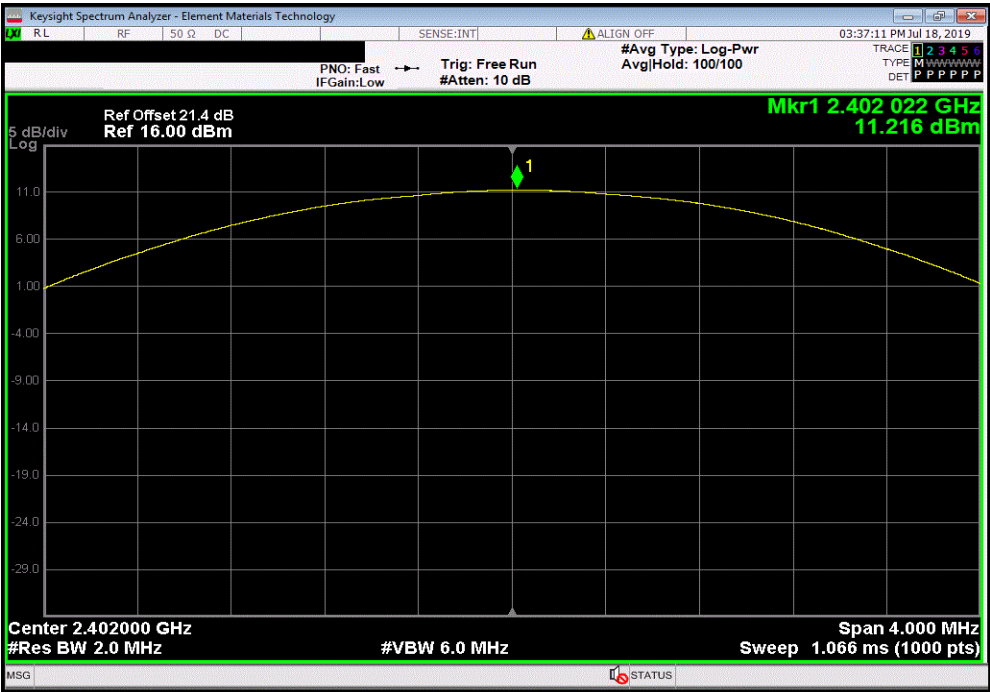


OUTPUT POWER

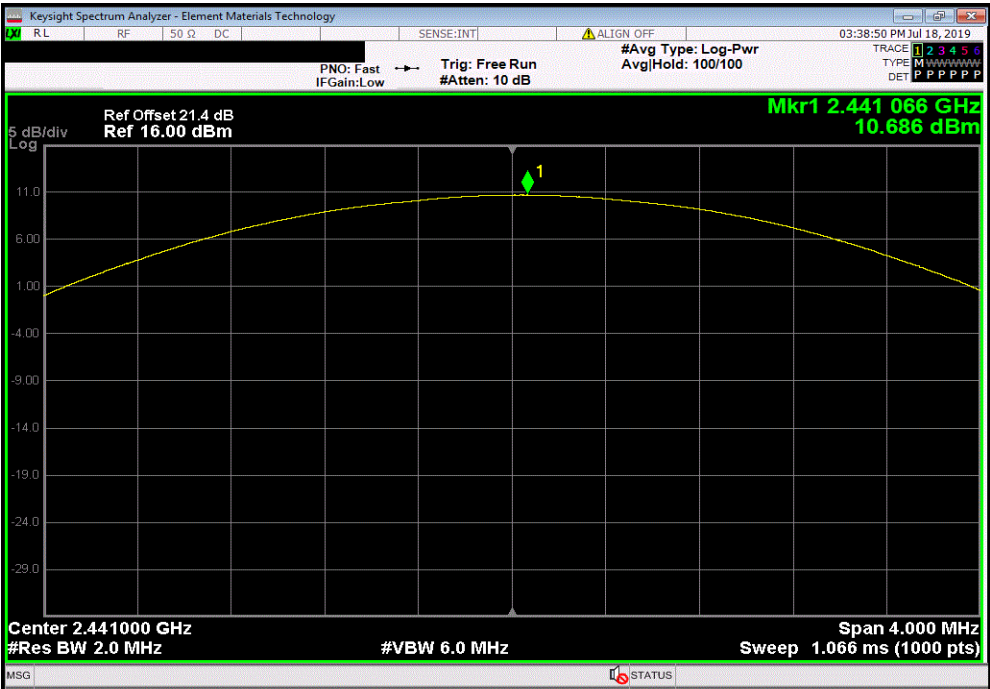


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3DH5, 8-DPSK, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				11.216	21	Pass



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



Keysight Spectrum Analyzer - Element Materials Technology

04:04:29 PM Jul 18, 2019

RL RF 50 Ω DC SENSE:INT ALIGN OFF

PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB #Avg Type: Log-Pwr Avg|Hold: 100/100

TRACE 1 2.345.6
TYPE M W W W W W W W
DET P P P P P P P

Ref Offset 21.4 dB
Ref 17.00 dBm

Mkr1 2.480 042 GHz
11.576 dBm

5 dB/div
Log

Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 4.000 MHz
Sweep 1.066 ms (1000 pts)

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)



THxTx 2018.09.13 XMt 2019.06.11

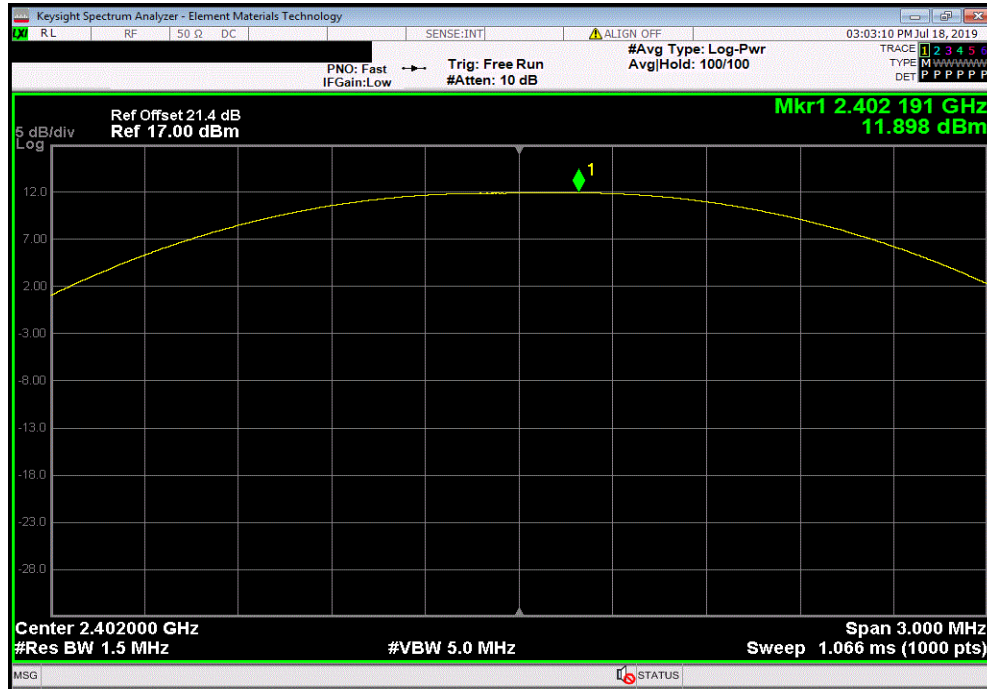
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 17-Jul-19	
Customer: EchoNous, Inc.		Temperature: 22.5 °C	
Attendees: None		Humidity: 56.6% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 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 <i>Brian Fahey</i> <i>Jeff Alcock</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
DH5, GFSK			
	Low Channel, 2402 MHz	11.898	-1.29
	Mid Channel, 2441 MHz	11.607	-1.29
	High Channel, 2480 MHz	11.561	-1.29
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	11.373	-1.29
	Mid Channel, 2441 MHz	10.384	-1.29
	High Channel, 2480 MHz	11.306	-1.29
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	11.216	-1.29
	Mid Channel, 2441 MHz	10.686	-1.29
	High Channel, 2480 MHz	11.576	-1.29

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

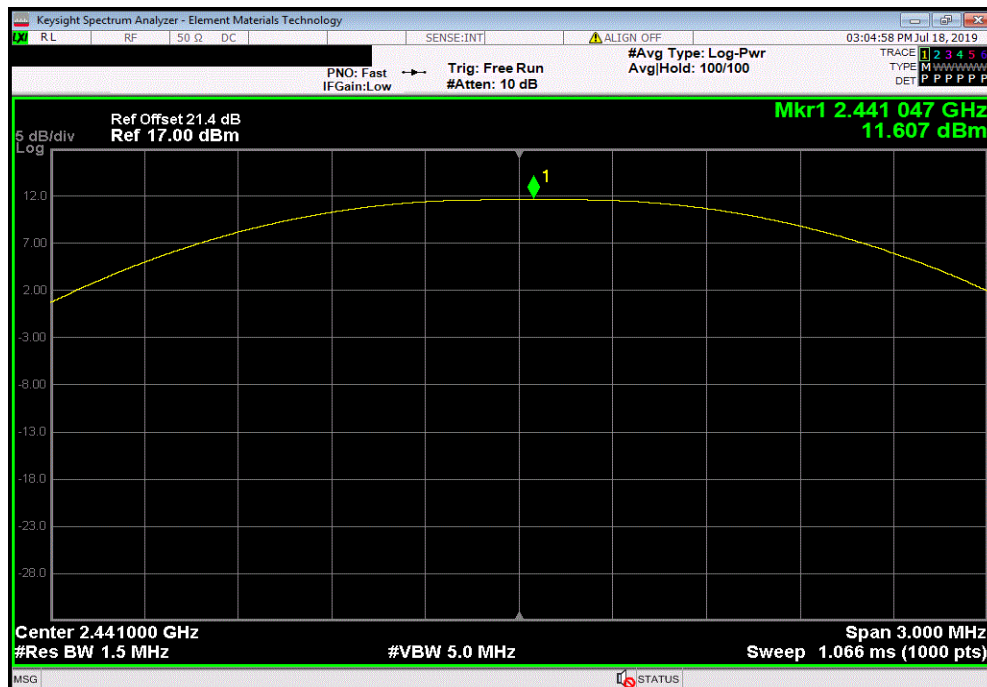


TMTx 2018.09.13 XMI 2019.06.11

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	

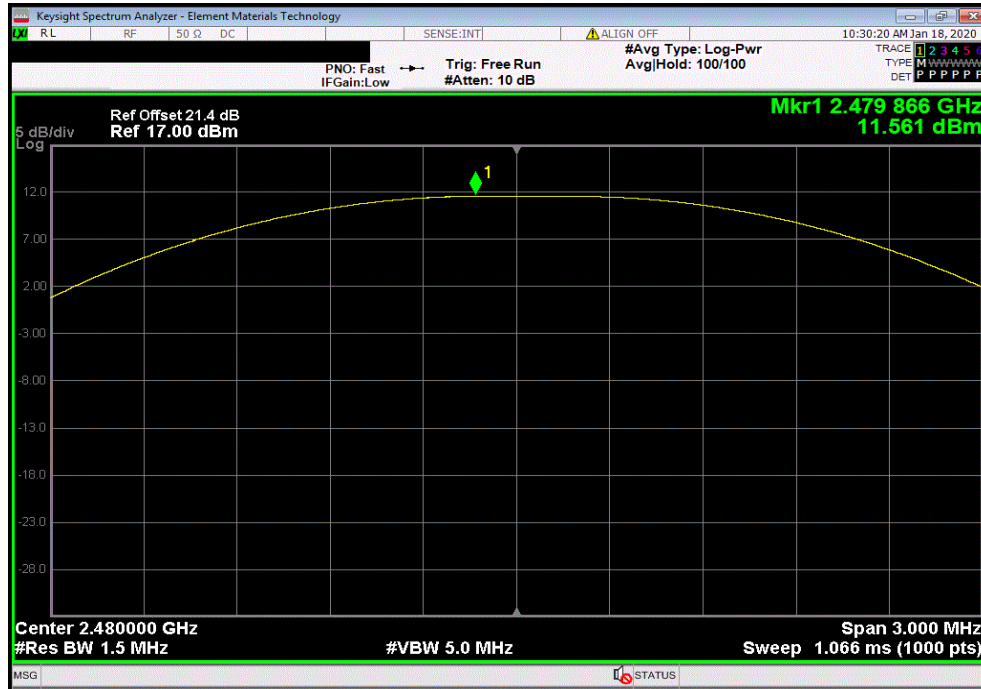


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

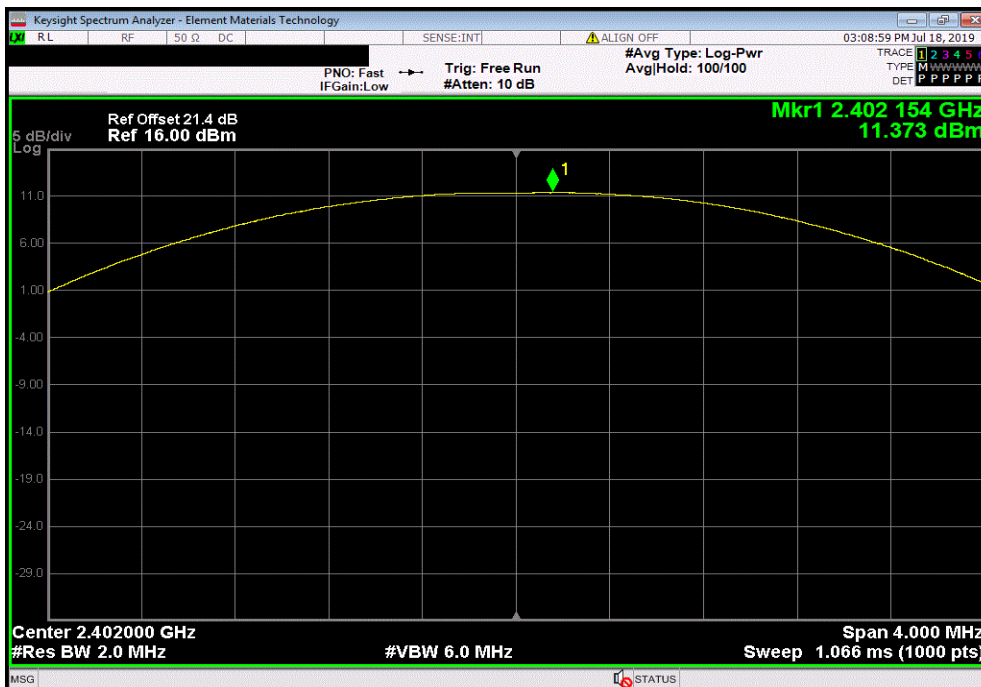


TMTx 2018.09.13 XMI 2019.06.11

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		

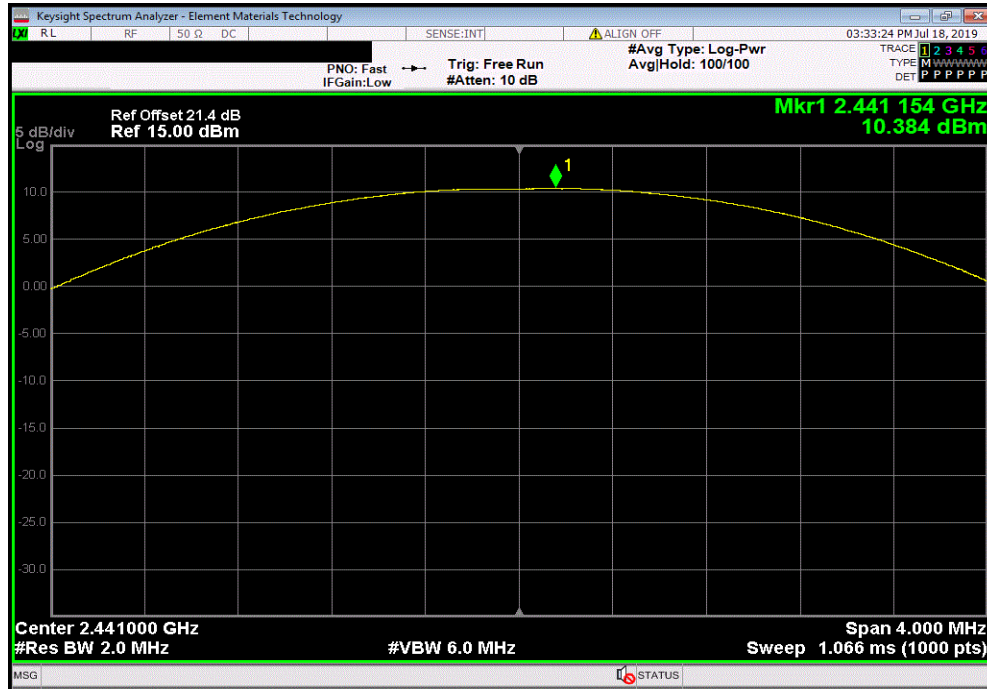


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

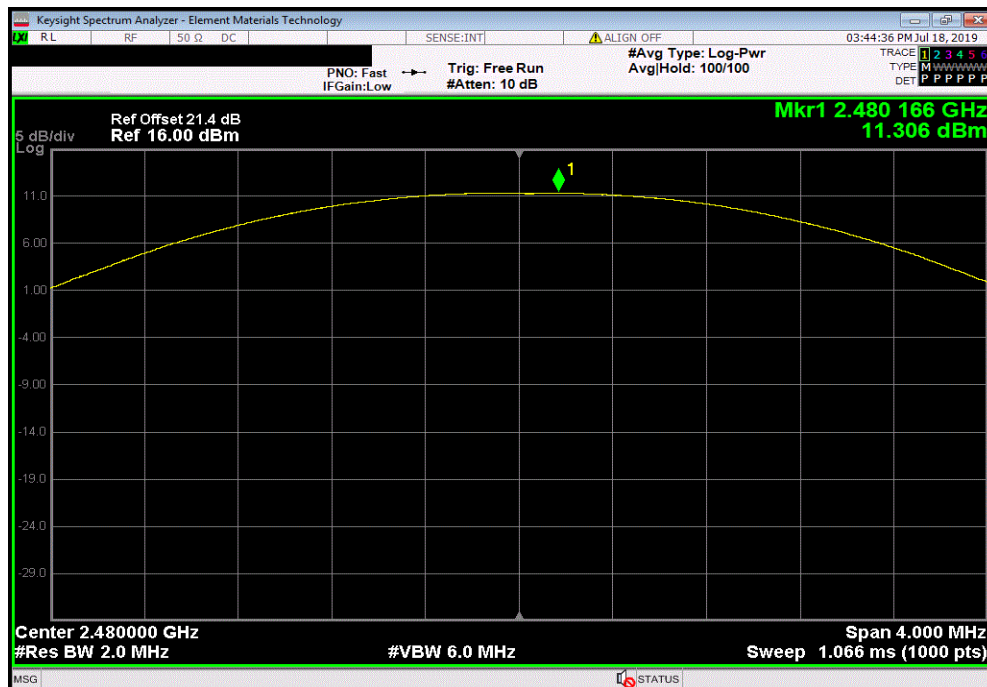


TMTx 2018.09.13 XMI 2019.06.11

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	

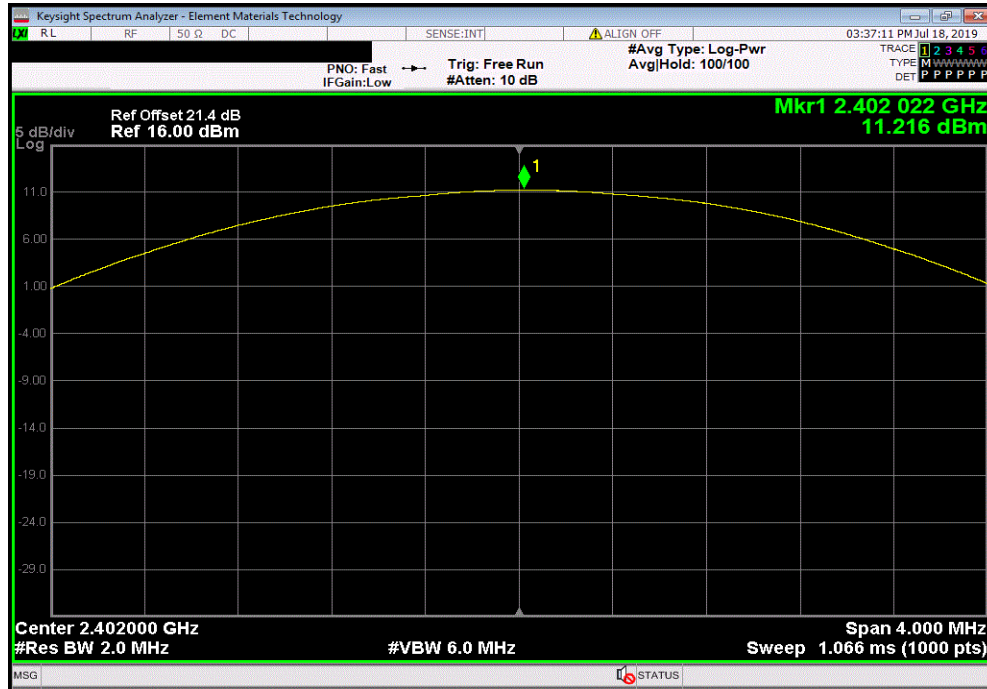


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

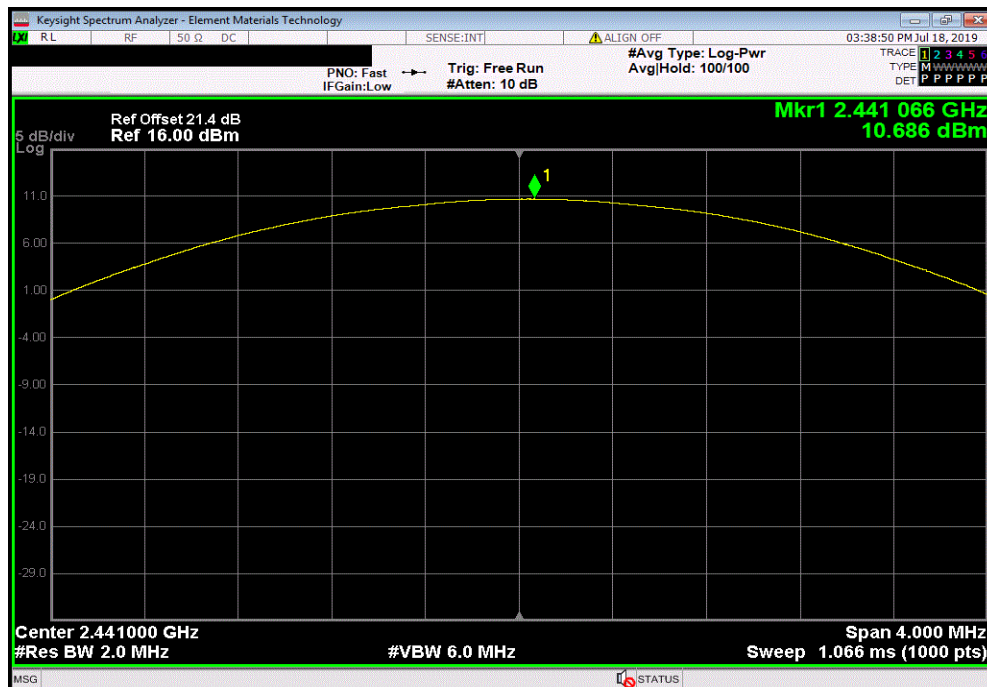


TMTx 2018.09.13 XMI 2019.06.11

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	

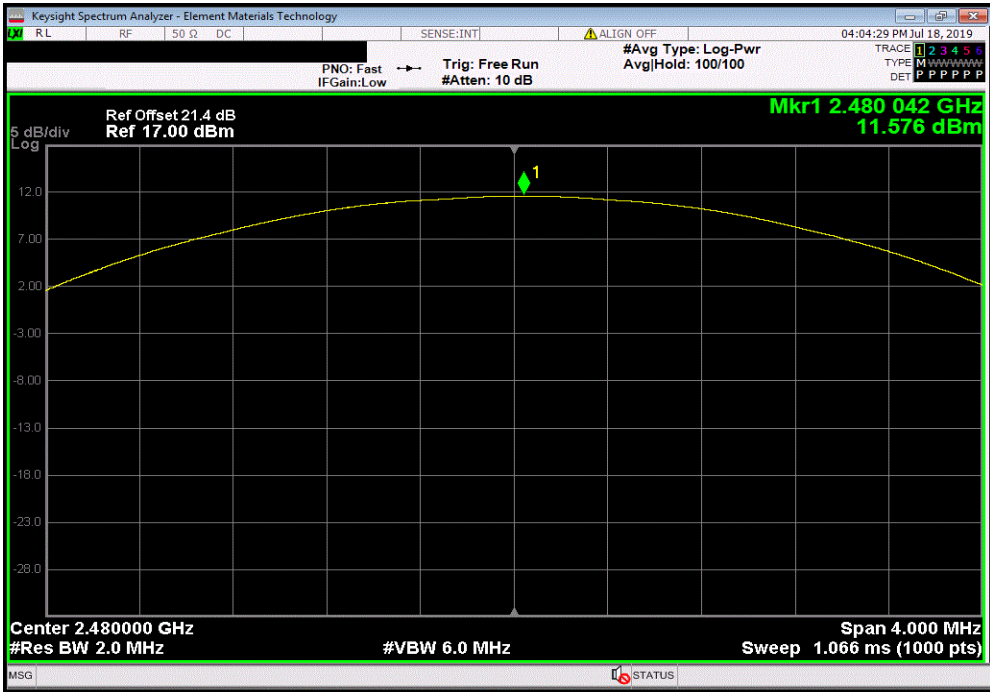


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TMTx 2018.09.13 XMt 2019.06.11

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	



0

BAND EDGE COMPLIANCE



XMHt 2019.06.11

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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



THxTx 2018.09.13 XMt 2019.06.11

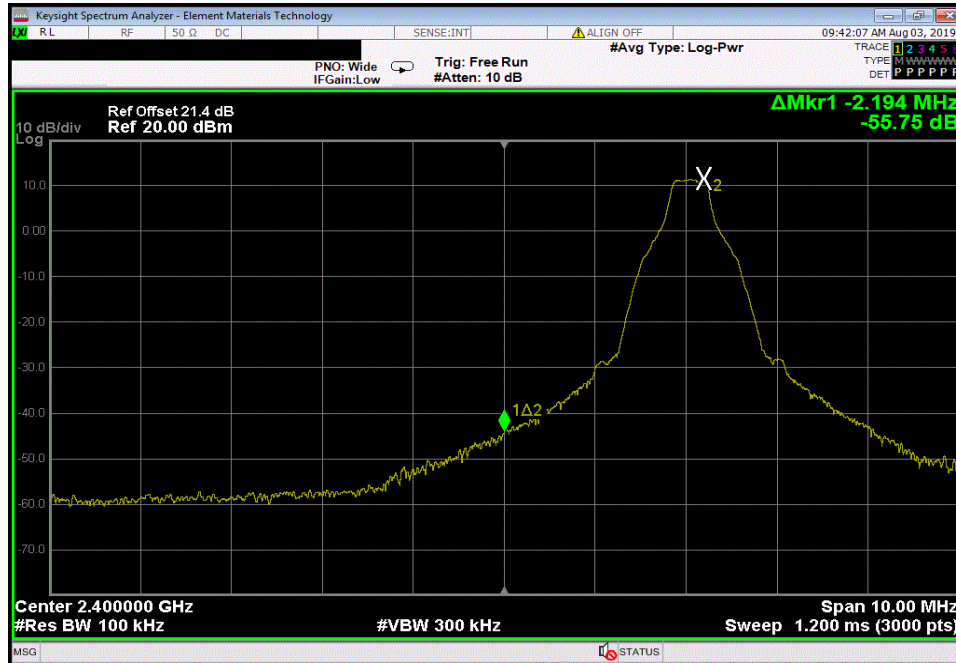
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 2-Aug-19	
Customer: EchoNous, Inc.		Temperature: 22.7 °C	
Attendees: None		Humidity: 61.8% RH	
Project: None		Barometric Pres.: 1021 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 3.7 VDC	
		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 <i>Brian Fahey</i> <i>Jeff Alcock</i>	
		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

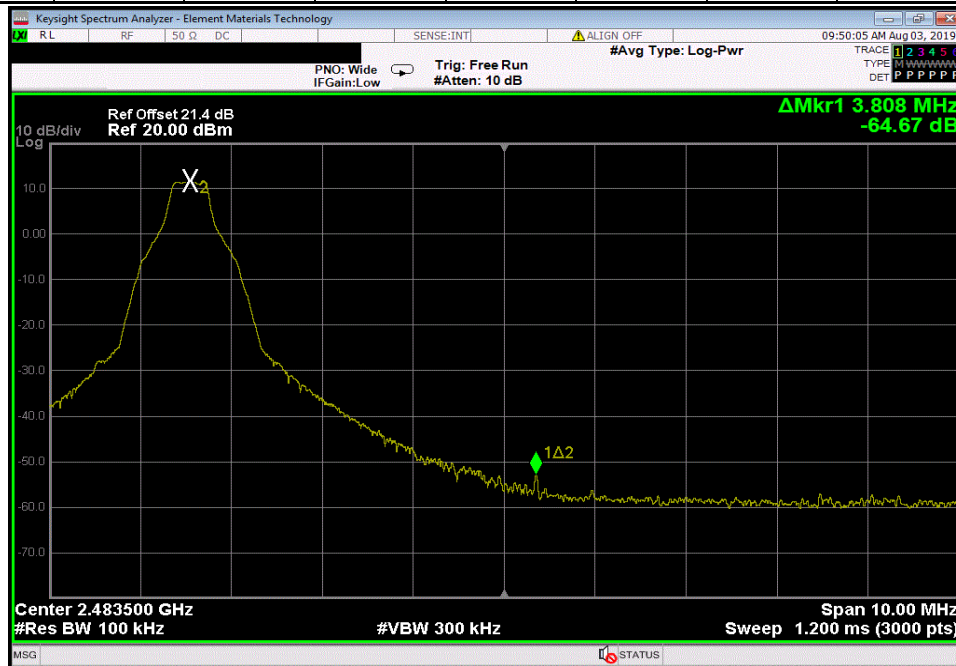


TMTx 2018.09.13 XMt 2019.06.11

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

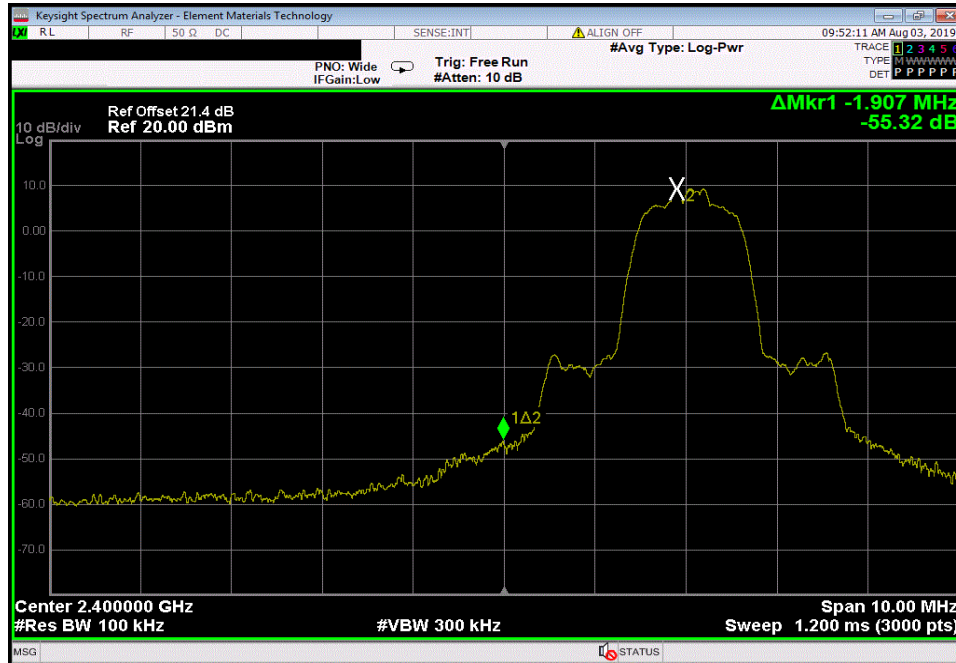


BAND EDGE COMPLIANCE

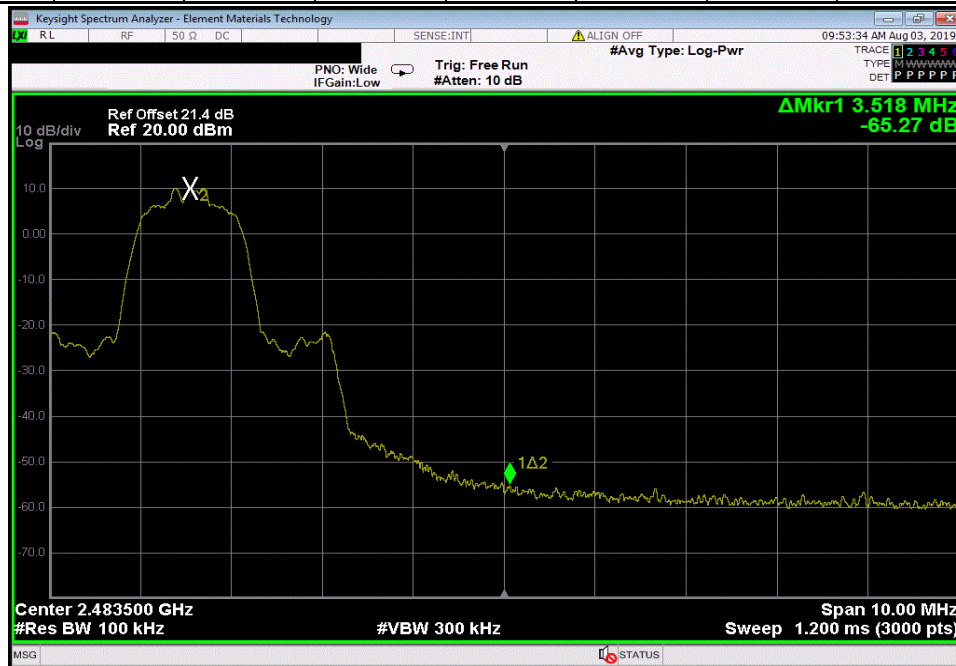


TMTx 2018.09.13 XMt 2019.06.11

2DH5, pi/4-DQPSK, Single Channel, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.32	-20	Pass



2DH5, pi/4-DQPSK, Single Channel, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-65.27	-20	Pass

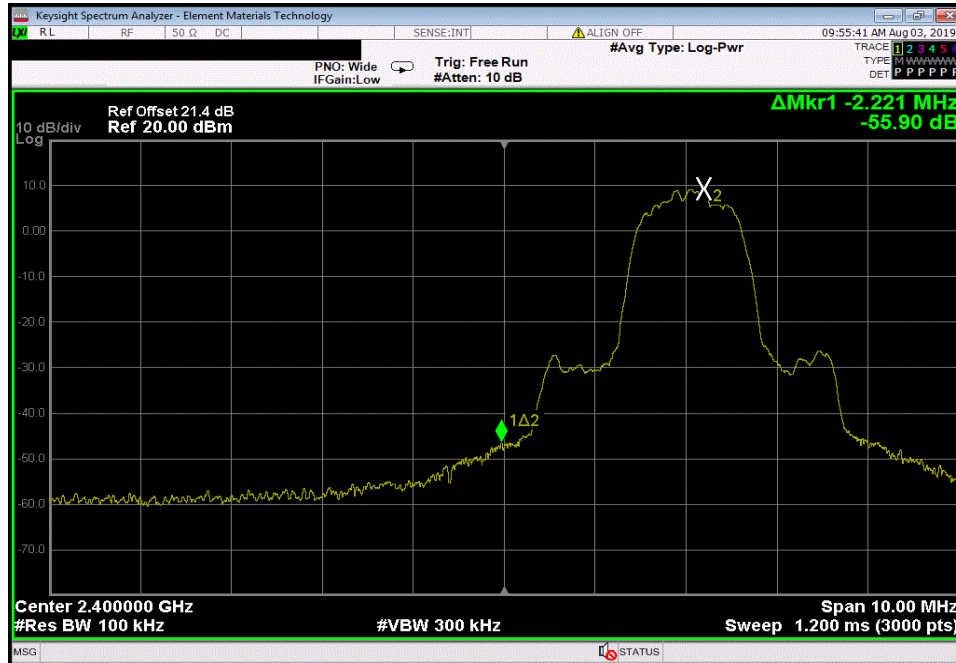


BAND EDGE COMPLIANCE

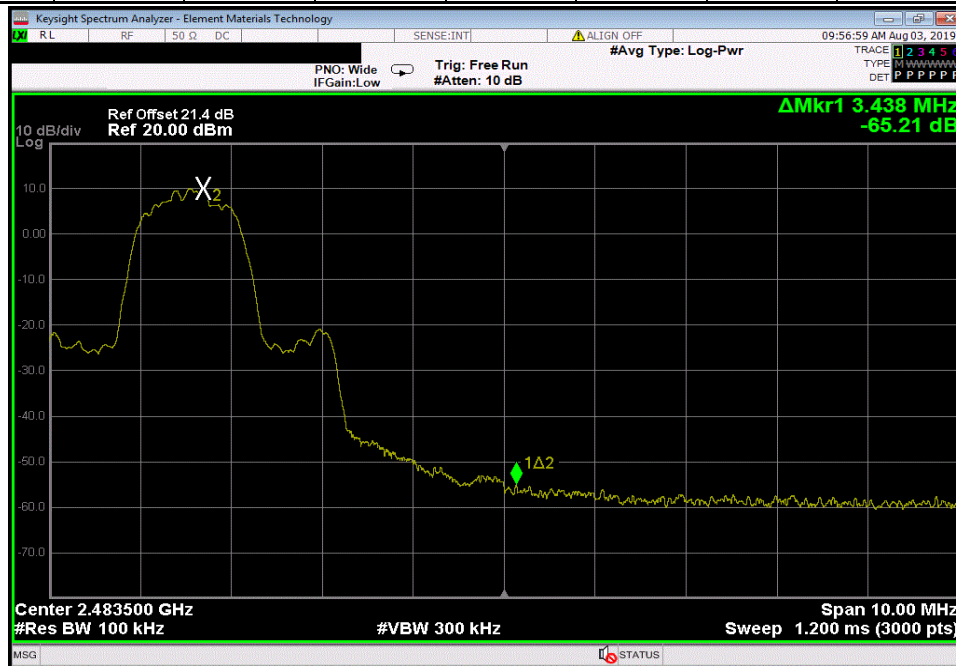


TMTx 2018.09.13 XMt 2019.06.11

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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BAND EDGE COMPLIANCE - HOPPING MODE



THxTx 2018.09.13 XMt 2019.06.11

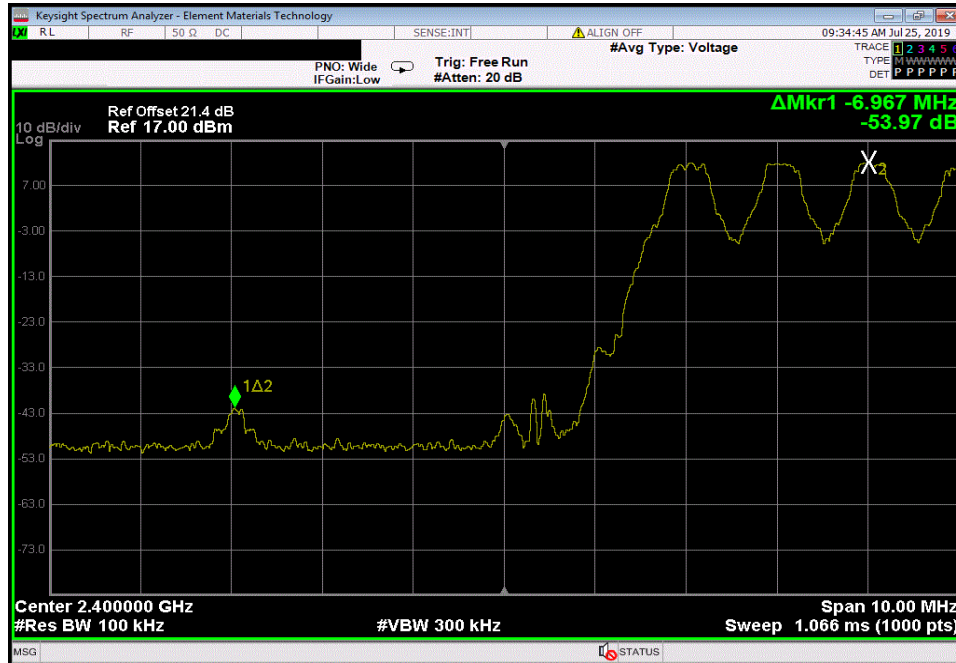
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 1-Aug-19	
Customer: EchoNous, Inc.		Temperature: 22.6 °C	
Attendees: None		Humidity: 47.7% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 3.7 VDC	
		Job Site: NC0A	
TEST SPECIFICATIONS			
FCC 15.247:2019		Test Method	
		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 <i>Brian Fahey</i> <i>Jeff Alcock</i>	
		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

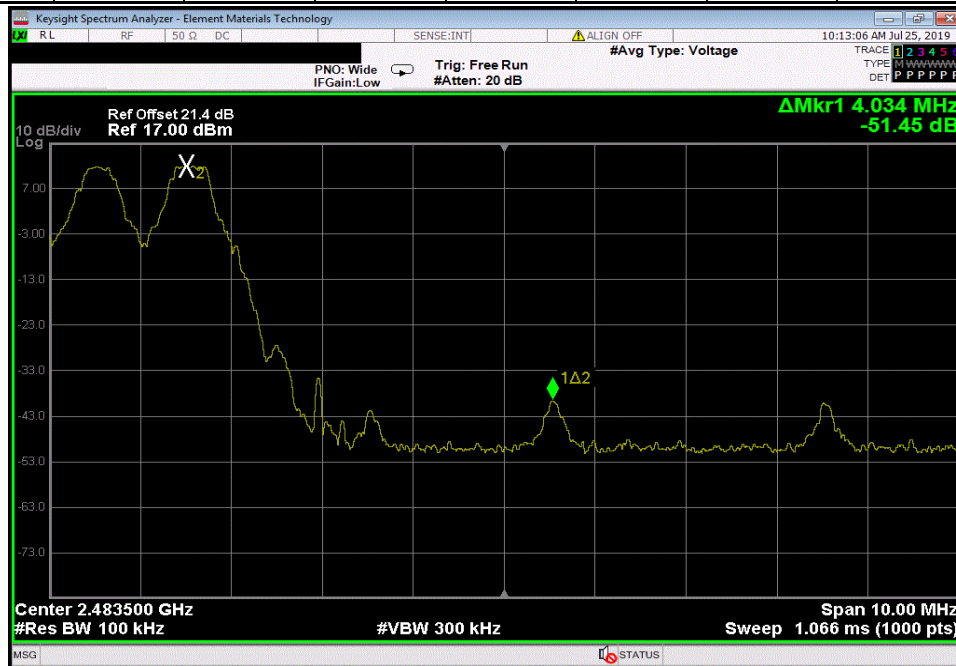


TMTx 2018.09.13 XMI 2019.06.11

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

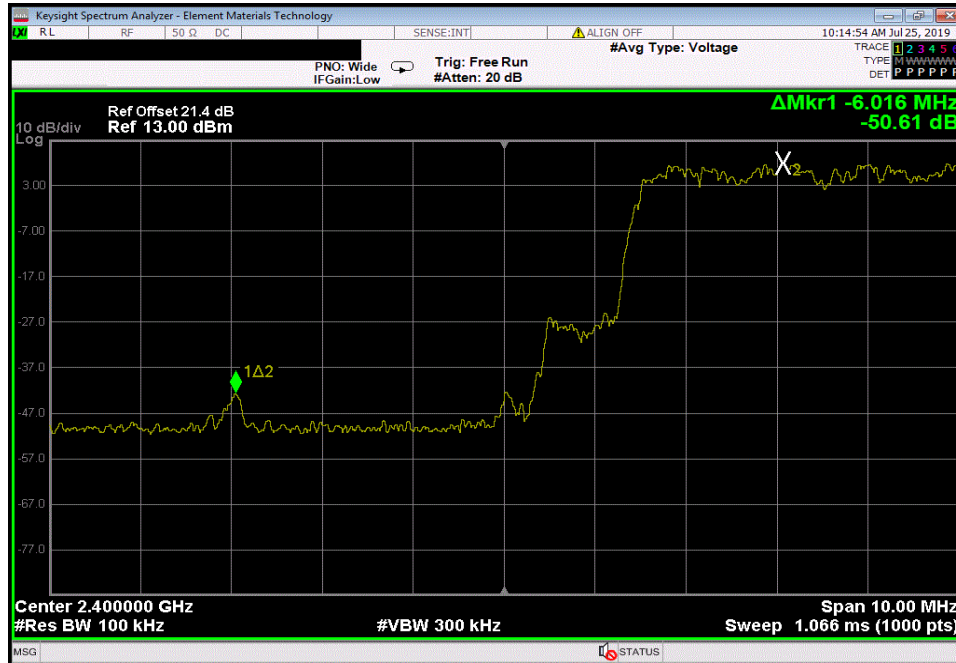


BAND EDGE COMPLIANCE - HOPPING MODE

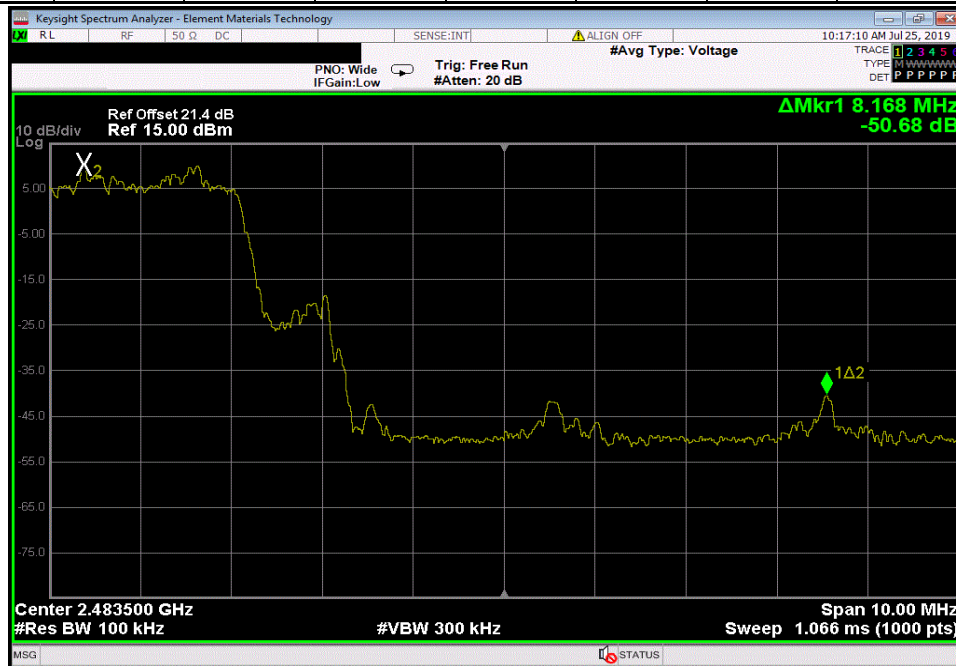


TMTx 2018.09.13 XMt 2019.06.11

2DH5, pi/4-DQPSK, Hopping Mode, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.61	-20	Pass



2DH5, pi/4-DQPSK, Hopping Mode, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.68	-20	Pass



BAND EDGE COMPLIANCE - HOPPING MODE

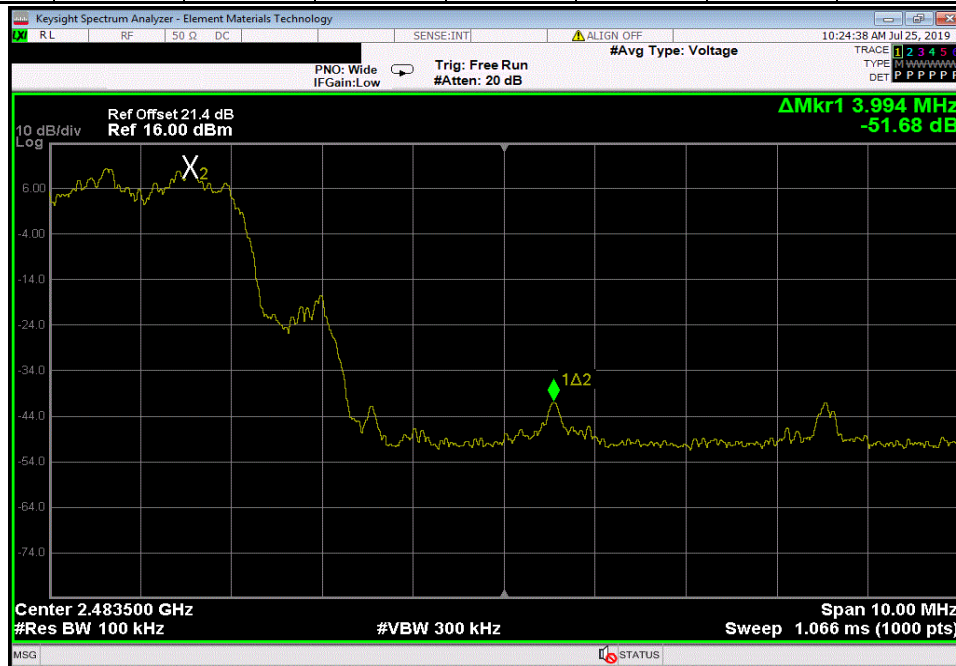


TMTx 2018.09.13 XMI 2019.06.11

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



OCCUPIED BANDWIDTH



XMI 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 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



THxTx 2018.09.13 XMt 2019.06.11

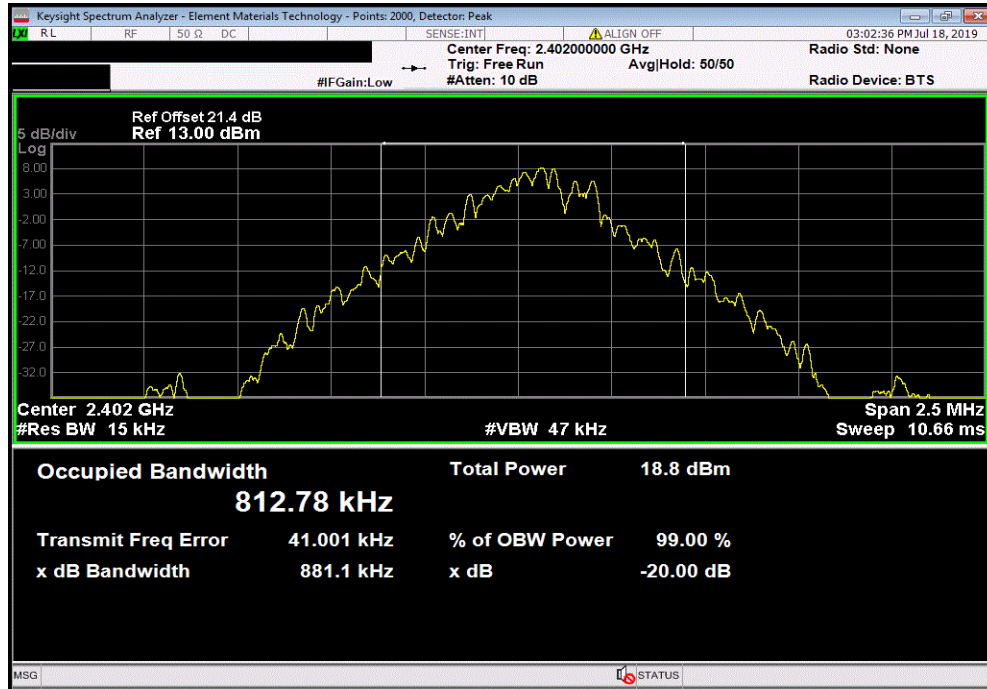
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 17-Jul-19	
Customer: EchoNous, Inc.		Temperature: 22.5 °C	
Attendees: None		Humidity: 56.9% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 3.7 VDC	
		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 <i>Brian Fahey</i> <i>Jeff Alcock</i>	
		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

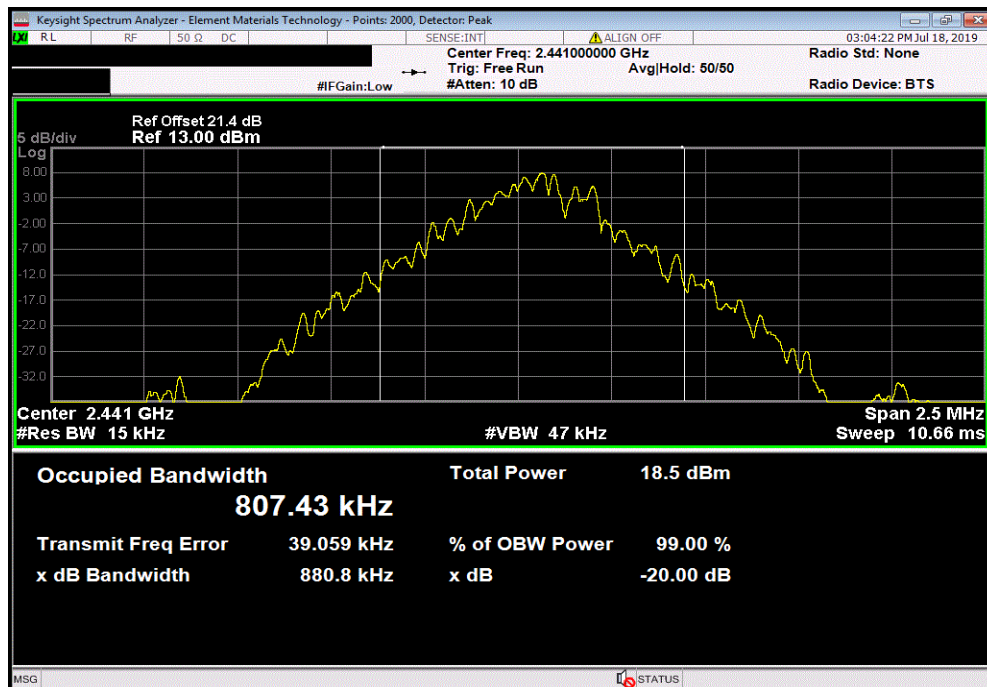


TMTx 2018.09.13 XMI 2019.06.11

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

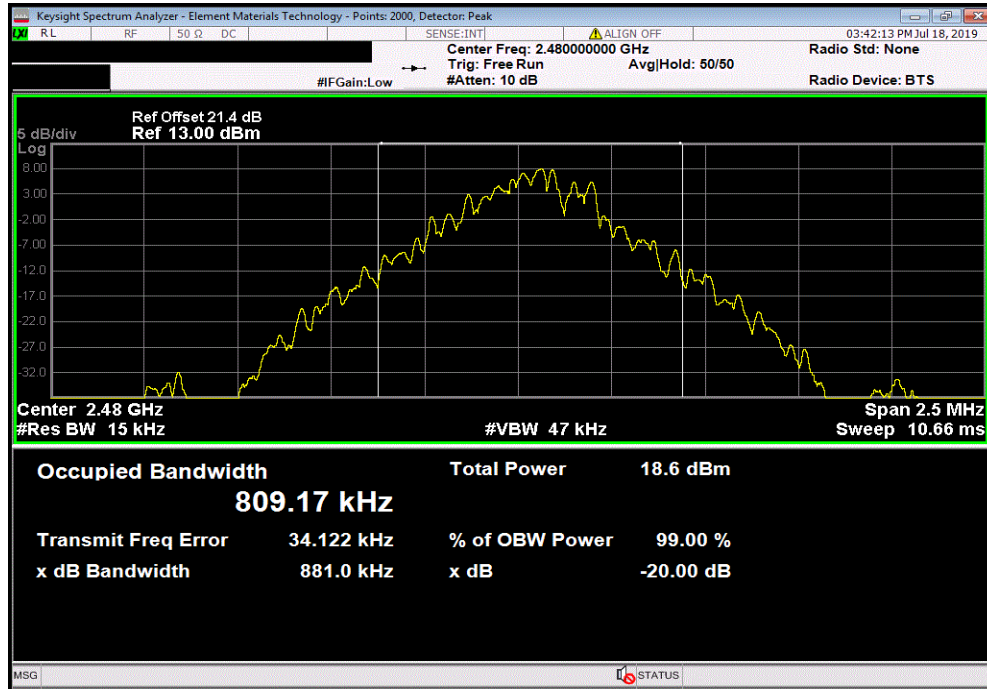


OCCUPIED BANDWIDTH

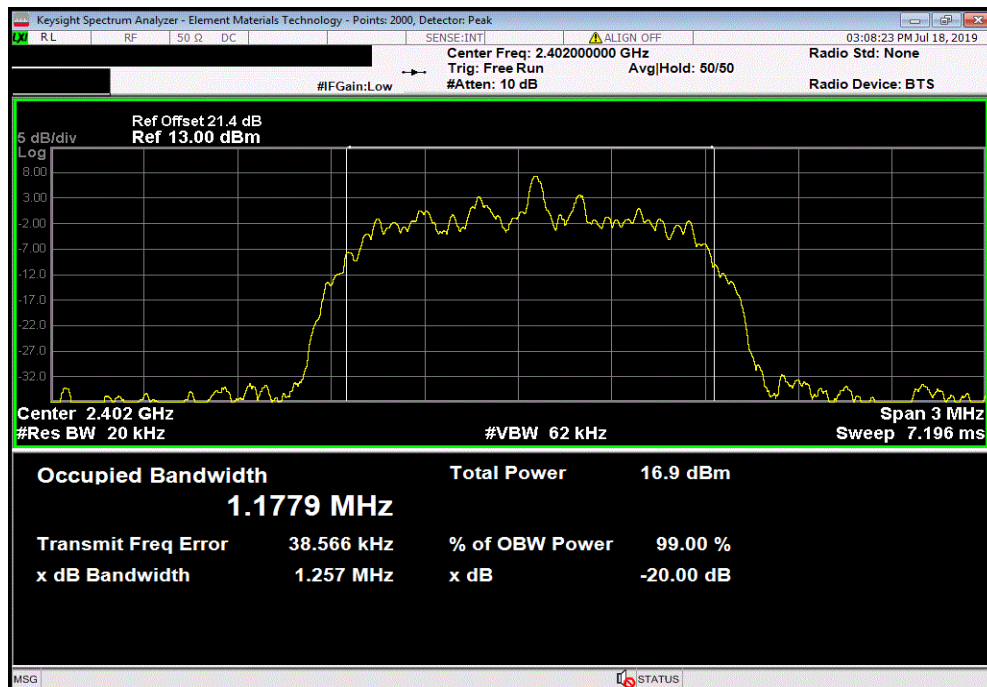


TMTx 2018.09.13 XMI 2019.06.11

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	

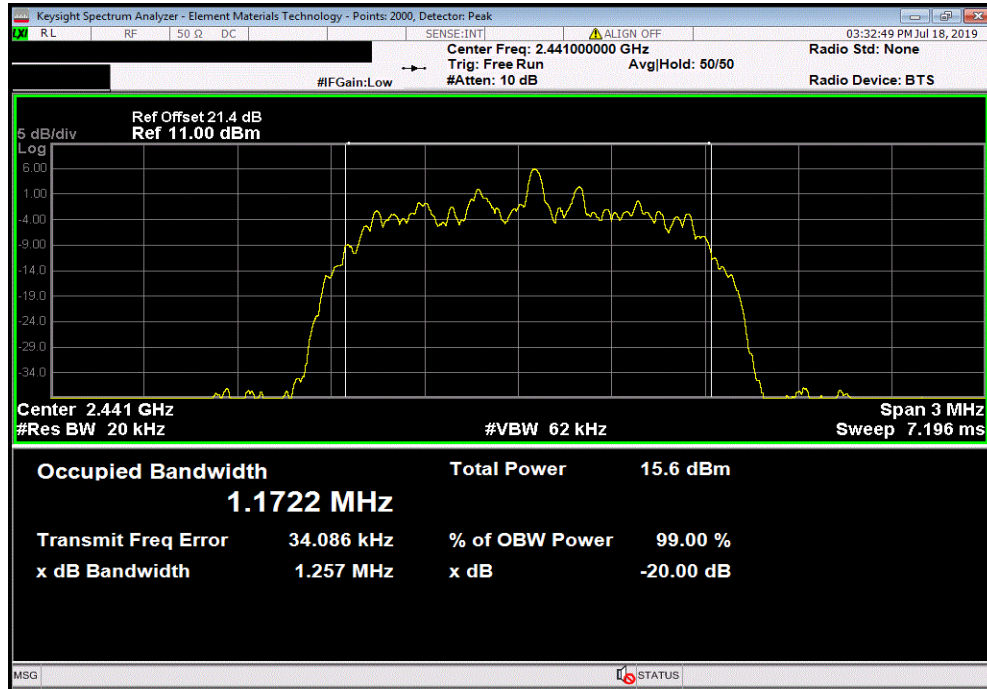


OCCUPIED BANDWIDTH

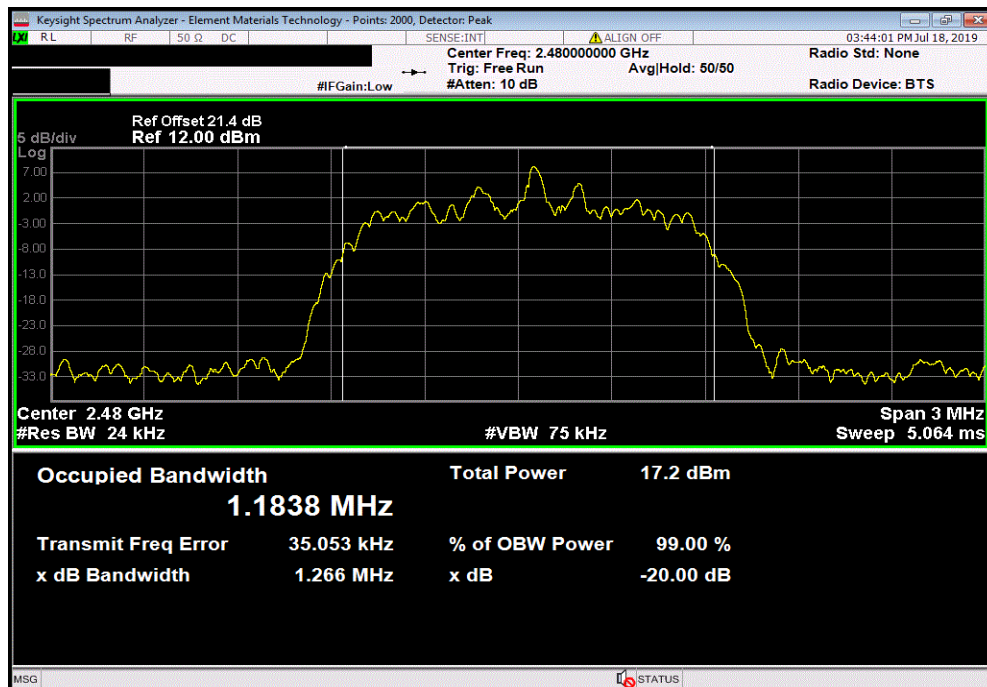


TMTx 2018.09.13 XMI 2019.06.11

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

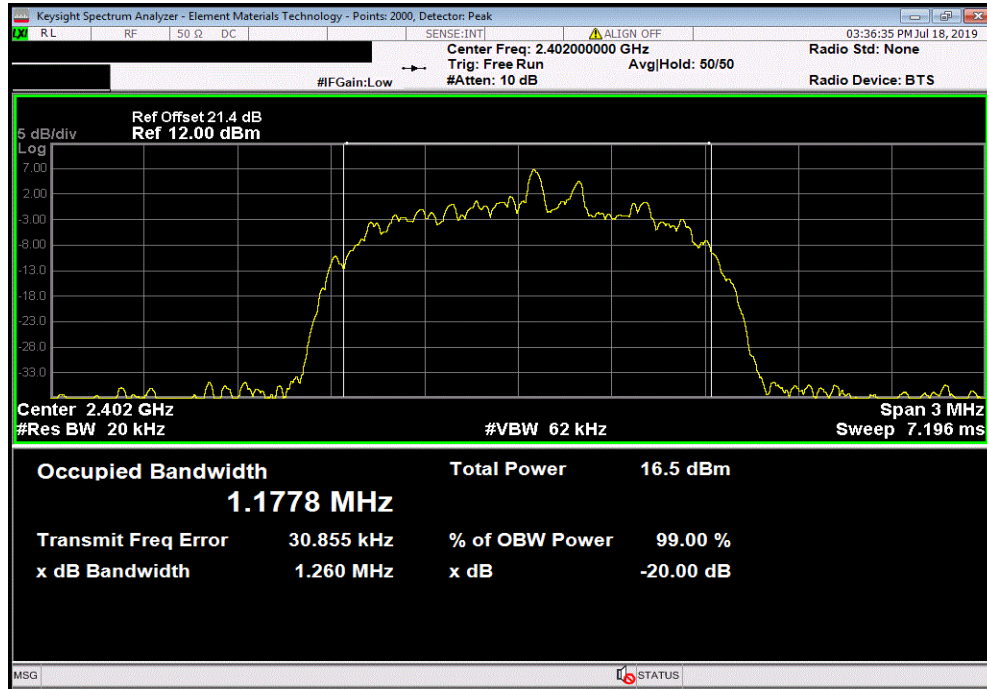


OCCUPIED BANDWIDTH

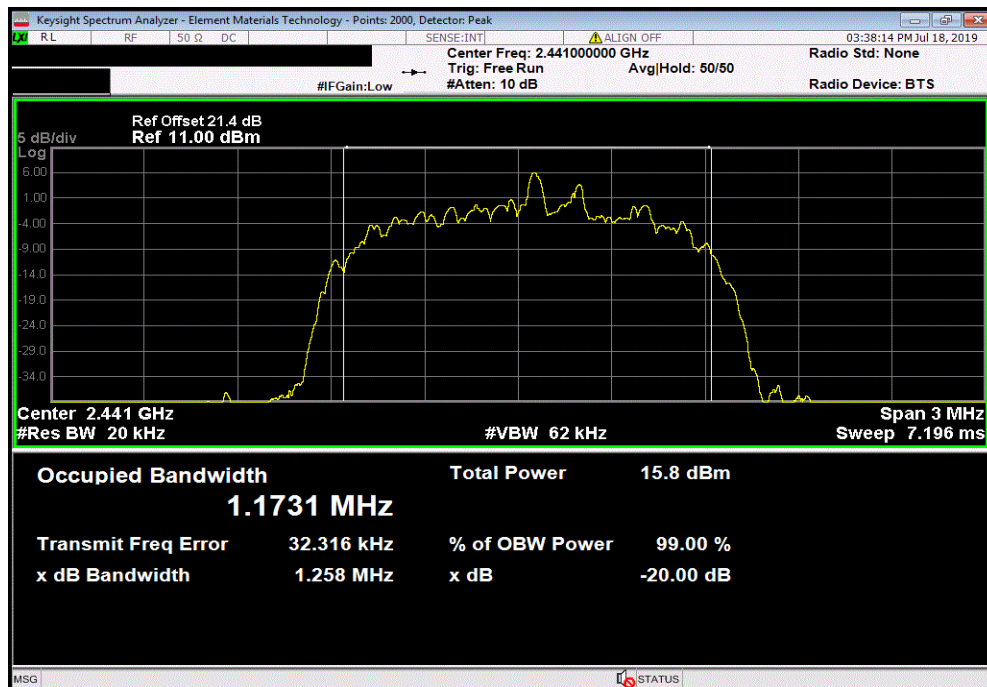


TMTx 2018.09.13 XMt 2019.06.11

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

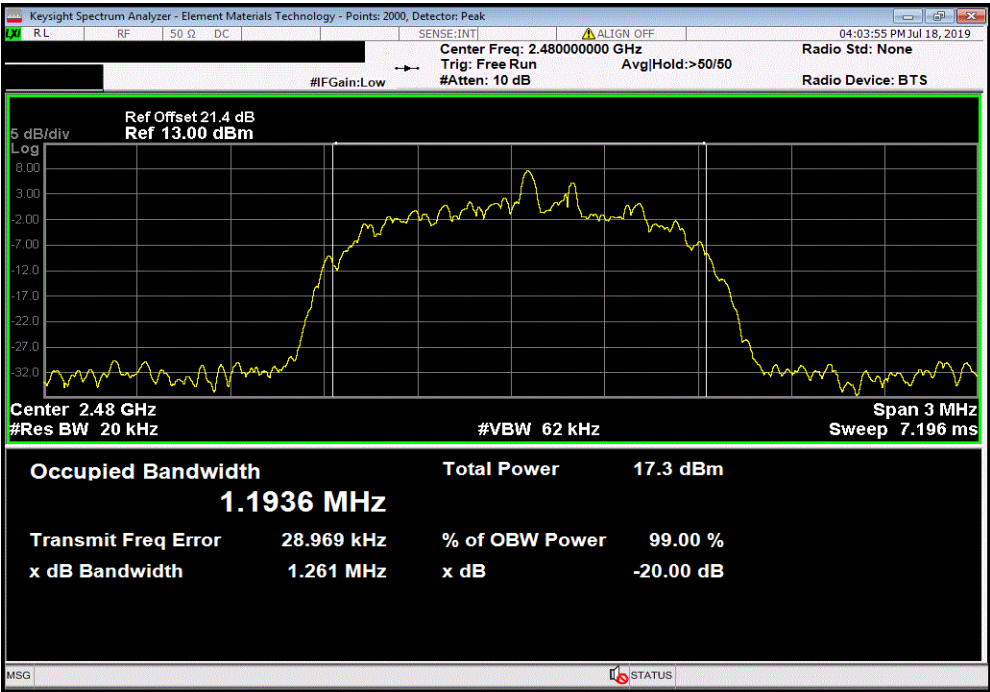


OCCUPIED BANDWIDTH



TMTx 2018.09.13 XMI 2019.06.11

3DH5, 8-DPSK, High Channel, 2480 MHz						
				Value	Limit (<)	Result
				1.261 MHz	1.5 MHz	Pass



SPURIOUS CONDUCTED EMISSIONS



XMM 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 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



THxTx 2018.09.13 XMt 2019.06.11

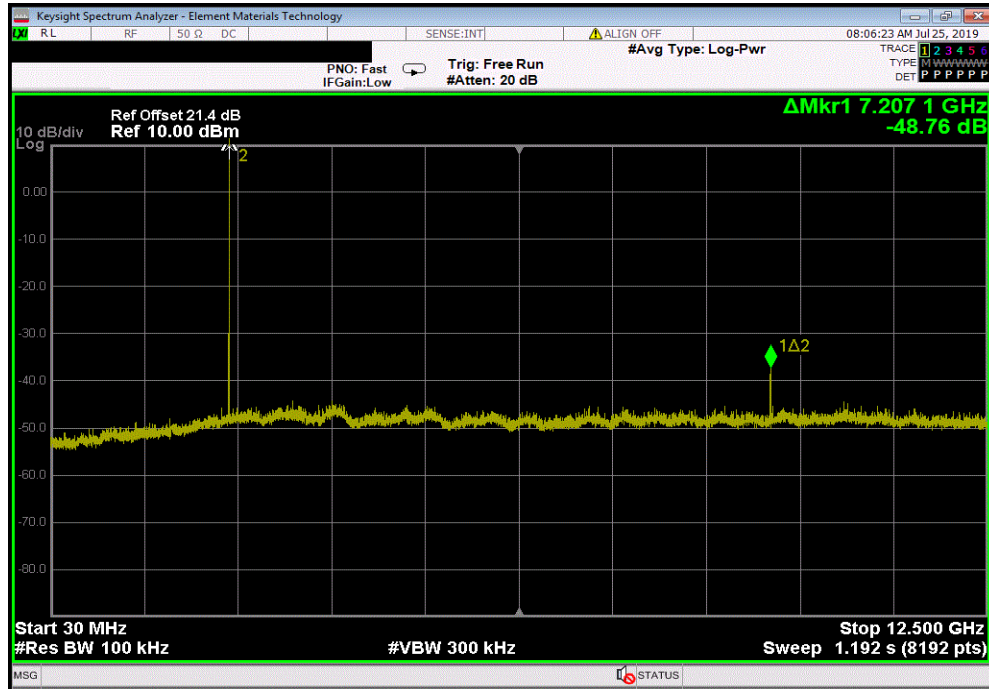
EUT: Thor Radio Module AC WLAN and Bluetooth and BLE		Work Order: ECHN0015	
Serial Number: Pre-production #1		Date: 24-Jul-19	
Customer: EchoNous, Inc.		Temperature: 22.1 °C	
Attendees: None		Humidity: 52.5% RH	
Project: None		Barometric Pres.: 1028 mbar	
Tested by: Brian Fahey and Jeff Alcock		Power: 3.7 VDC	
Job Site: NC0A			
TEST SPECIFICATIONS			
FCC 15.247:2019		Test Method	
		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 <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
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23759.31
	Mid Channel, 2441 MHz	30 MHz - 12.5 GHz	7322.76
	Mid Channel, 2441 MHz	12.5 GHz - 25 GHz	24906.91
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	7441.5
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	23753.2
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	7207.05
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24713.1
	Mid Channel, 2441 MHz	30 MHz - 12.5 GHz	1463.03
	Mid Channel, 2441 MHz	12.5 GHz - 25 GHz	24703.94
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	7441.5
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	23678.43
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	1396.04
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23505.98
	Mid Channel, 2441 MHz	30 MHz - 12.5 GHz	1339.71
	Mid Channel, 2441 MHz	12.5 GHz - 25 GHz	24020.27
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	7439.98
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	24093.52

SPURIOUS CONDUCTED EMISSIONS

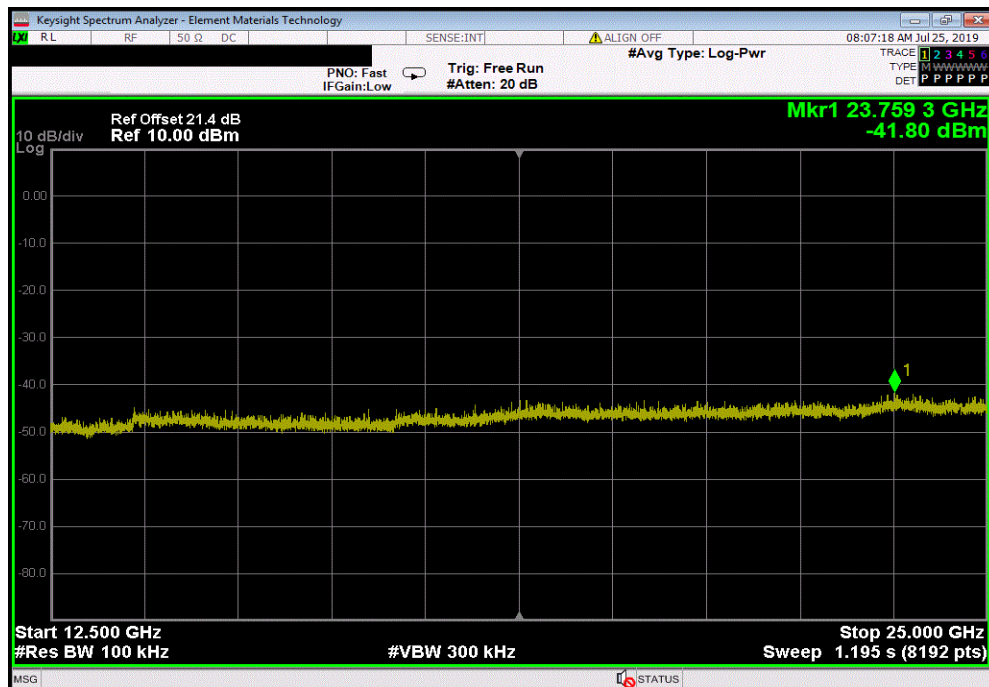


TMTx 2018.09.13 XMI 2019.06.11

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	

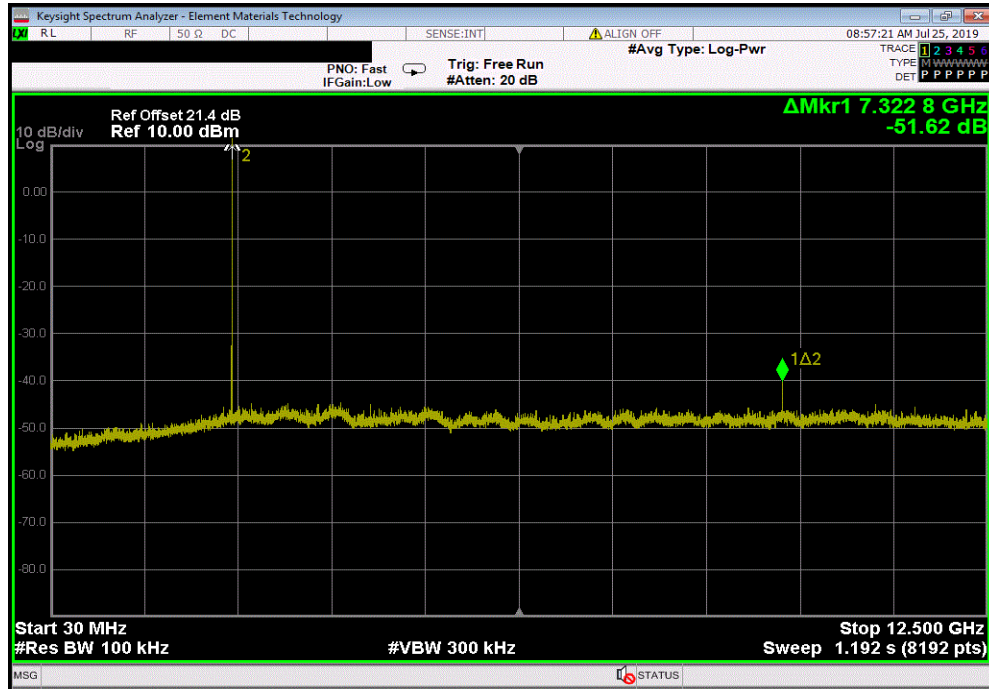


SPURIOUS CONDUCTED EMISSIONS

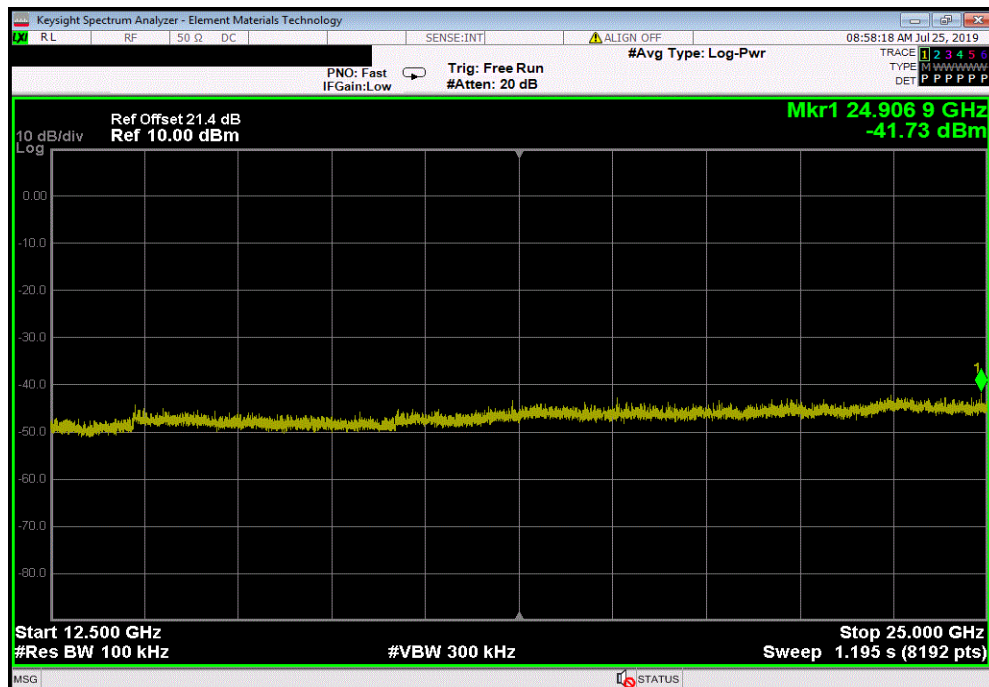


TMTx 2018.09.13 XMI 2019.06.11

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	

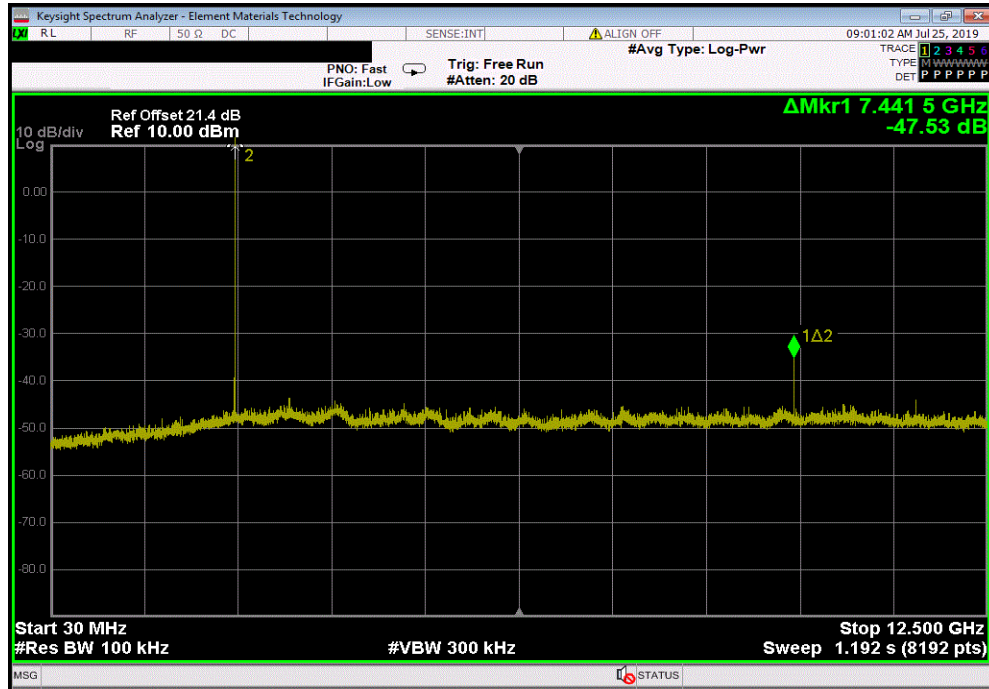


SPURIOUS CONDUCTED EMISSIONS

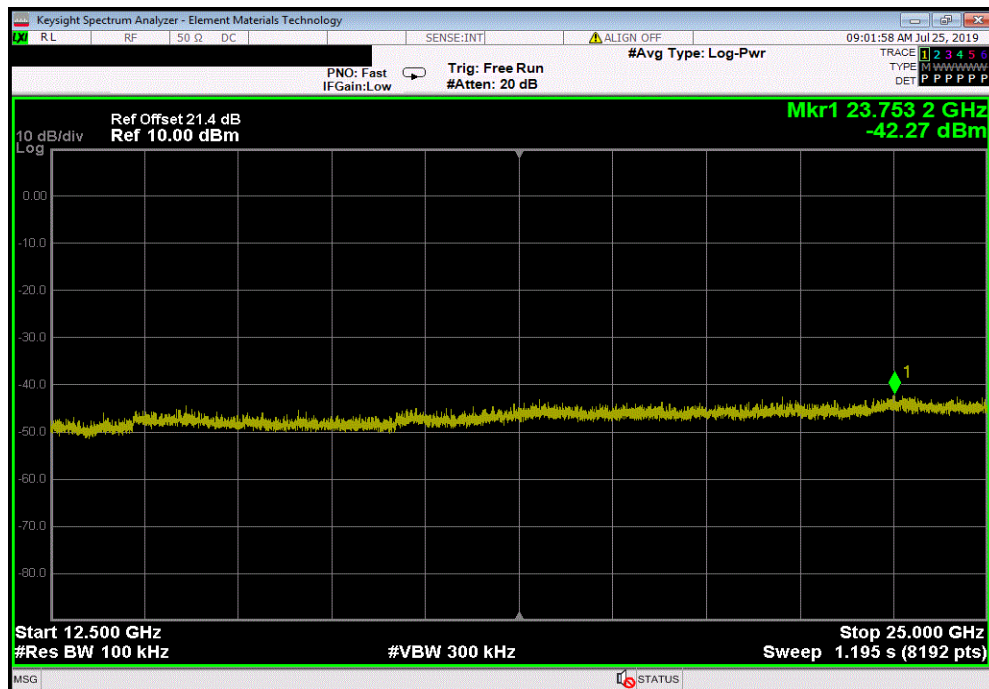


TMTx 2018.09.13 XMI 2019.06.11

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	

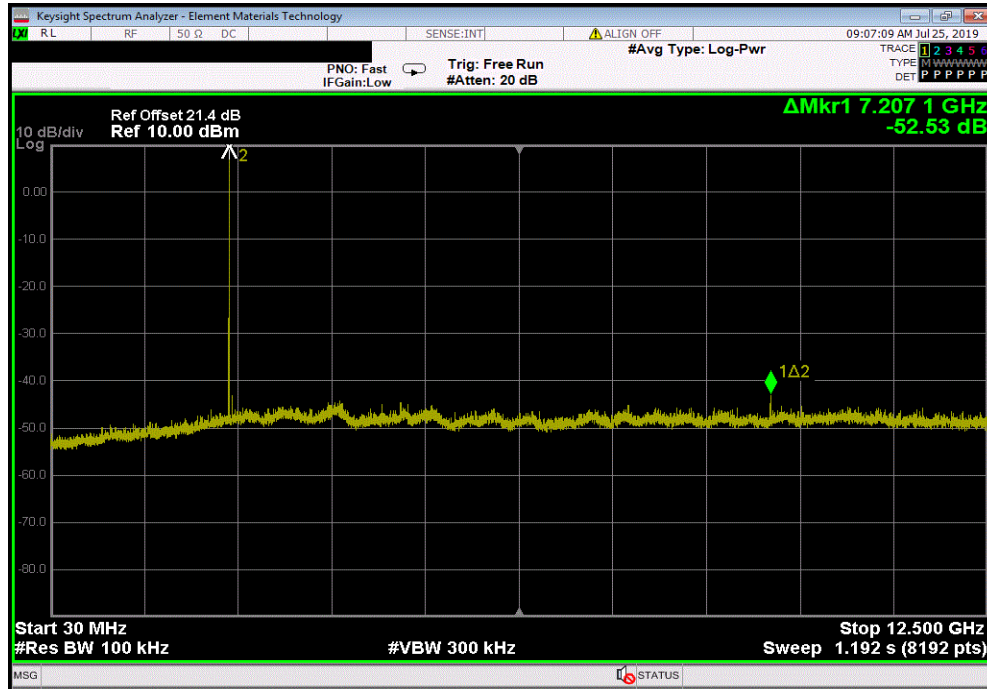


SPURIOUS CONDUCTED EMISSIONS

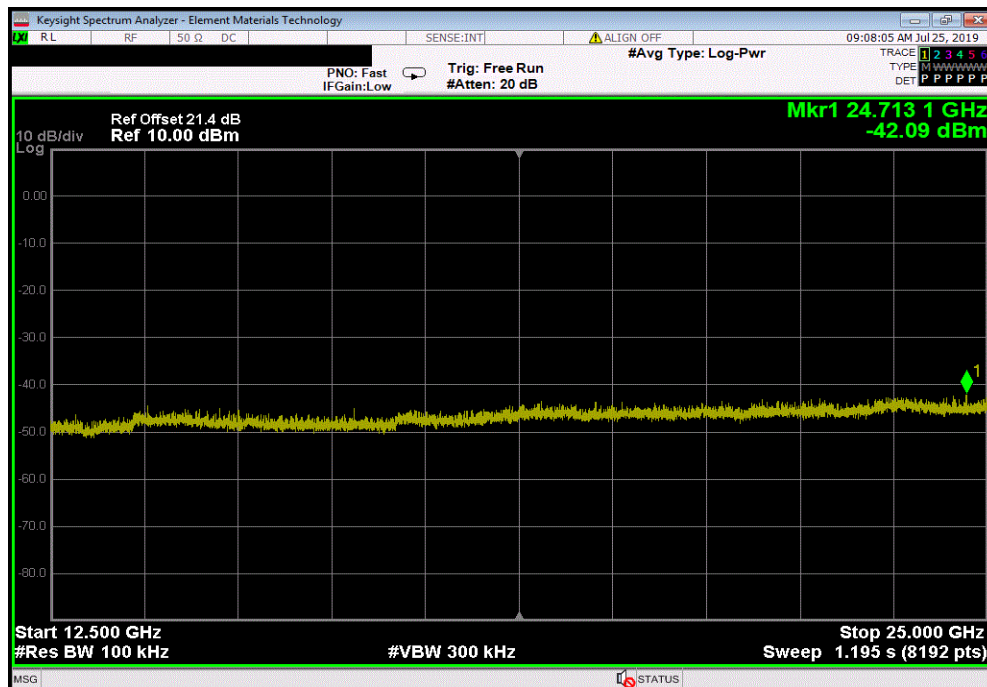


TMTx 2018.09.13 XMI 2019.06.11

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	

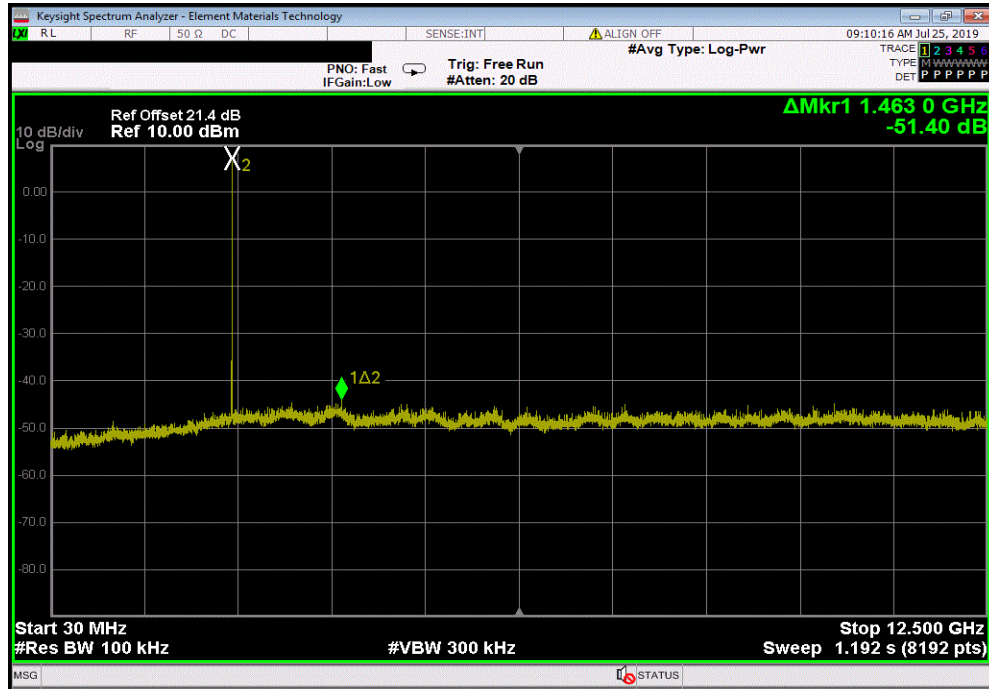


SPURIOUS CONDUCTED EMISSIONS

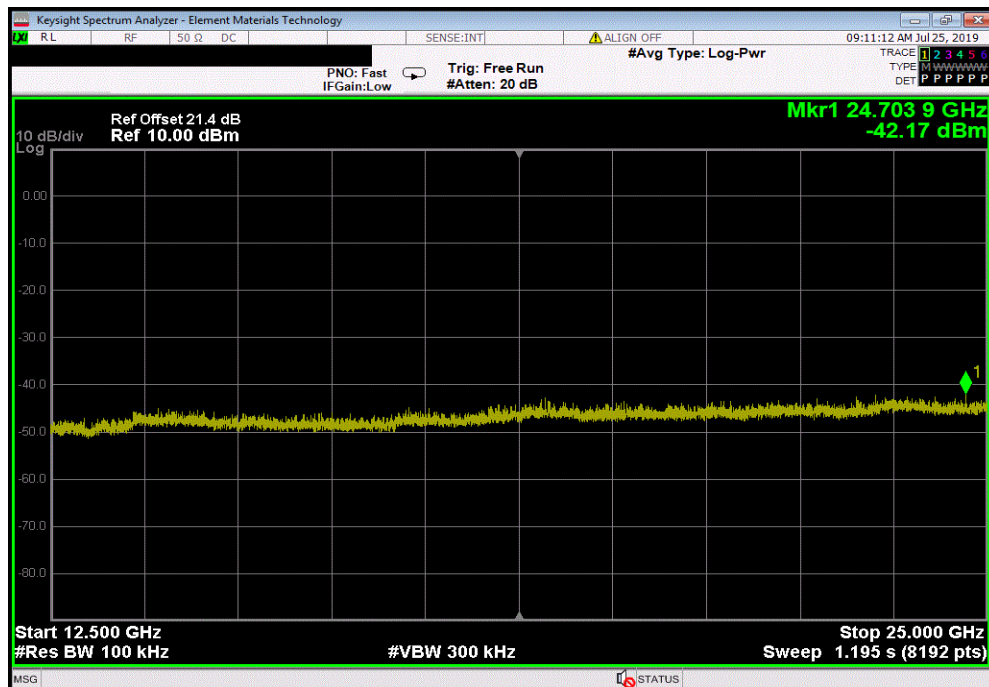


TMTx 2018.09.13 XMI 2019.06.11

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

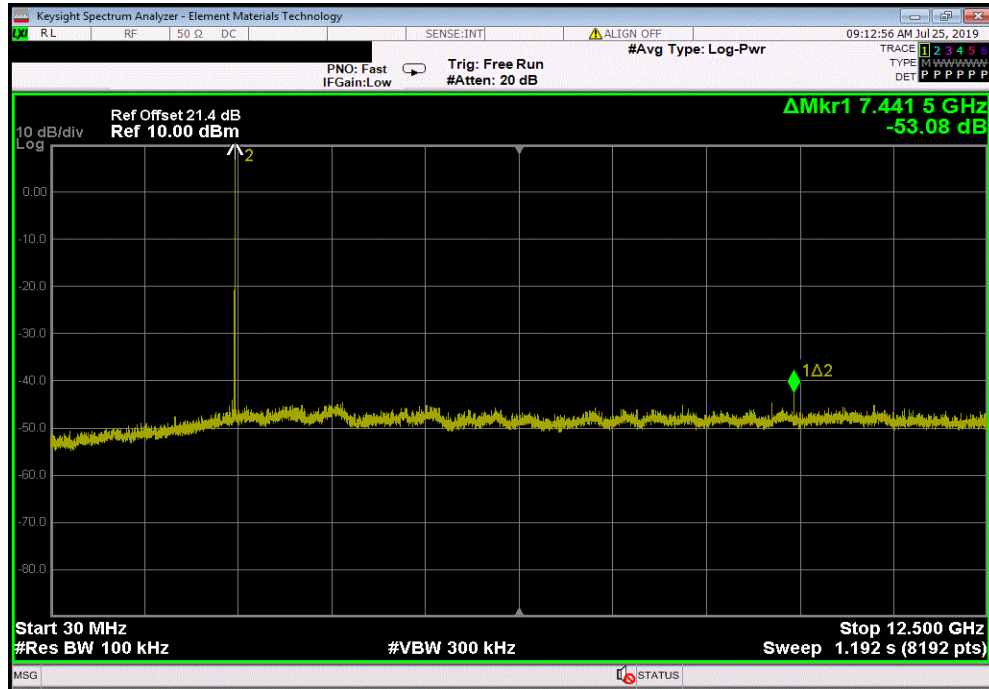


SPURIOUS CONDUCTED EMISSIONS

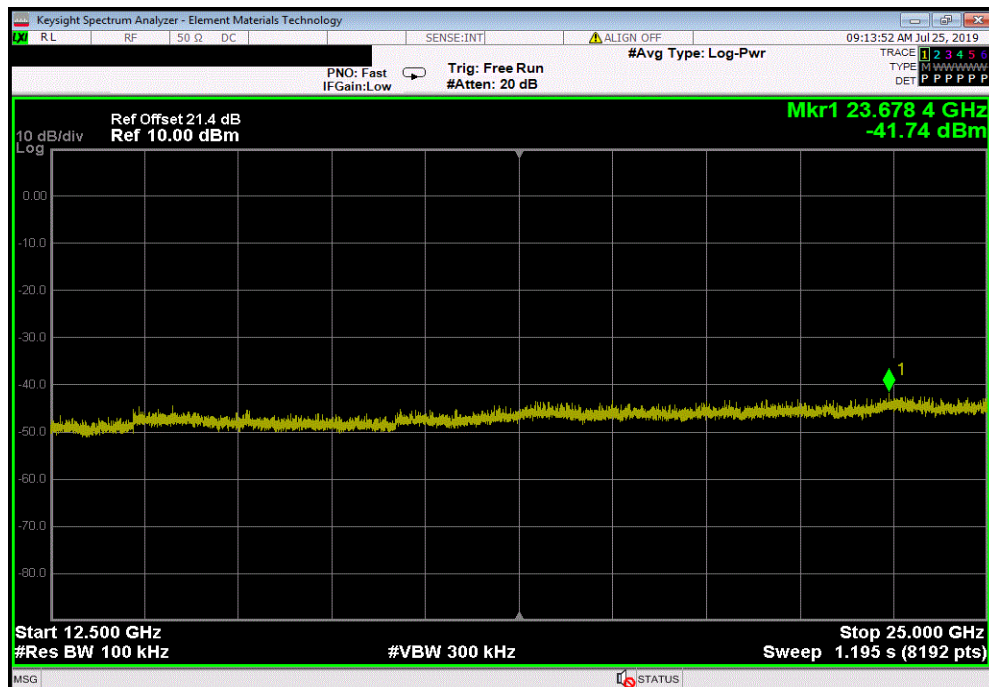


TMTx 2018.09.13 XMI 2019.06.11

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	

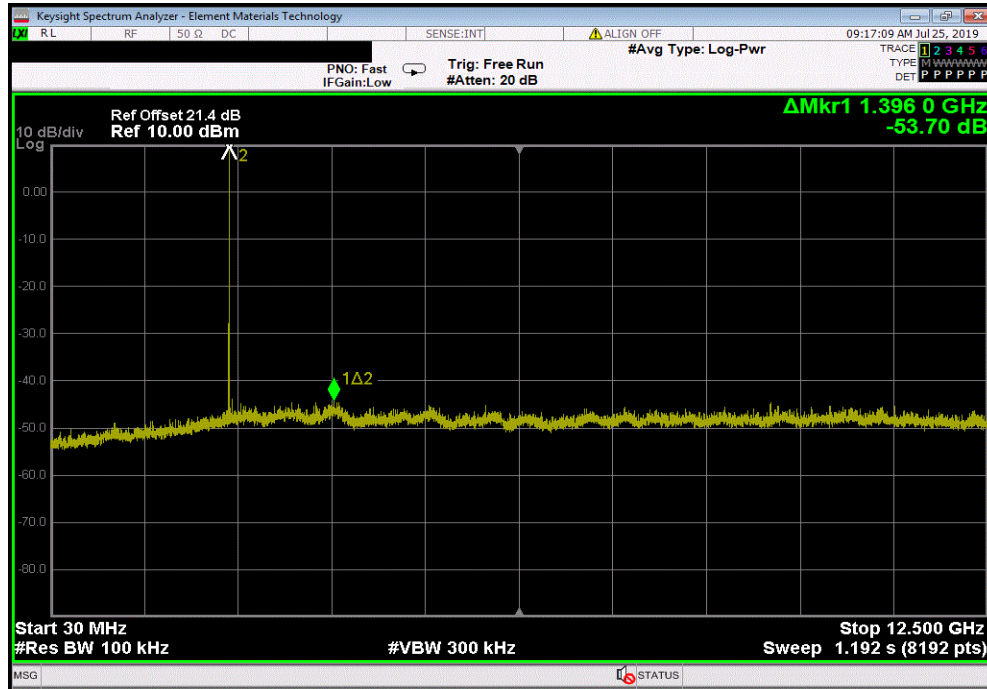


SPURIOUS CONDUCTED EMISSIONS

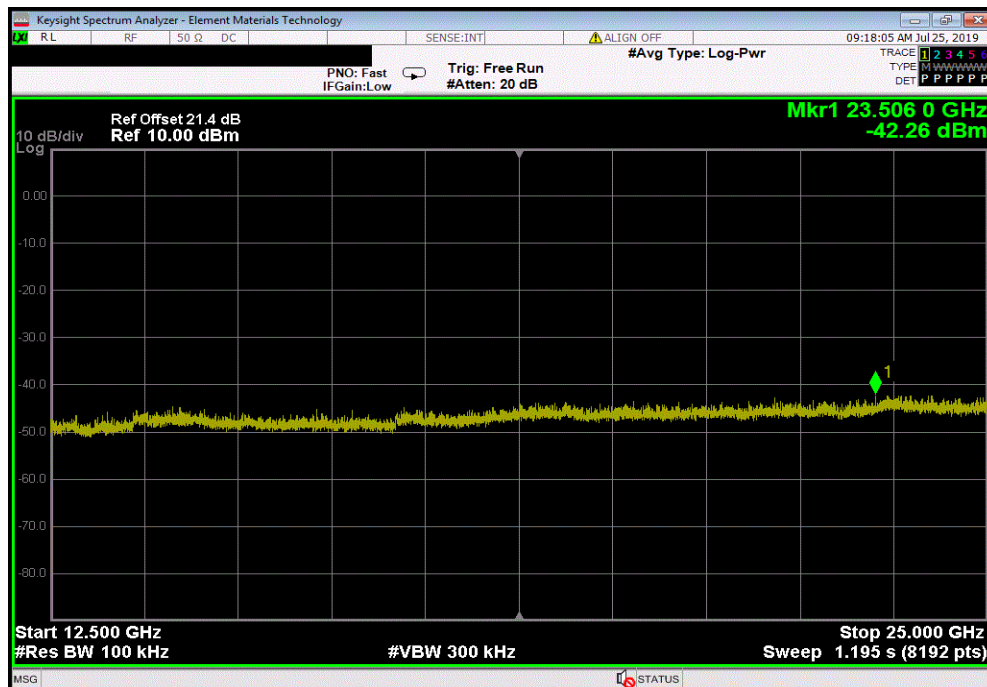


TMTx 2018.09.13 XMt 2019.06.11

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

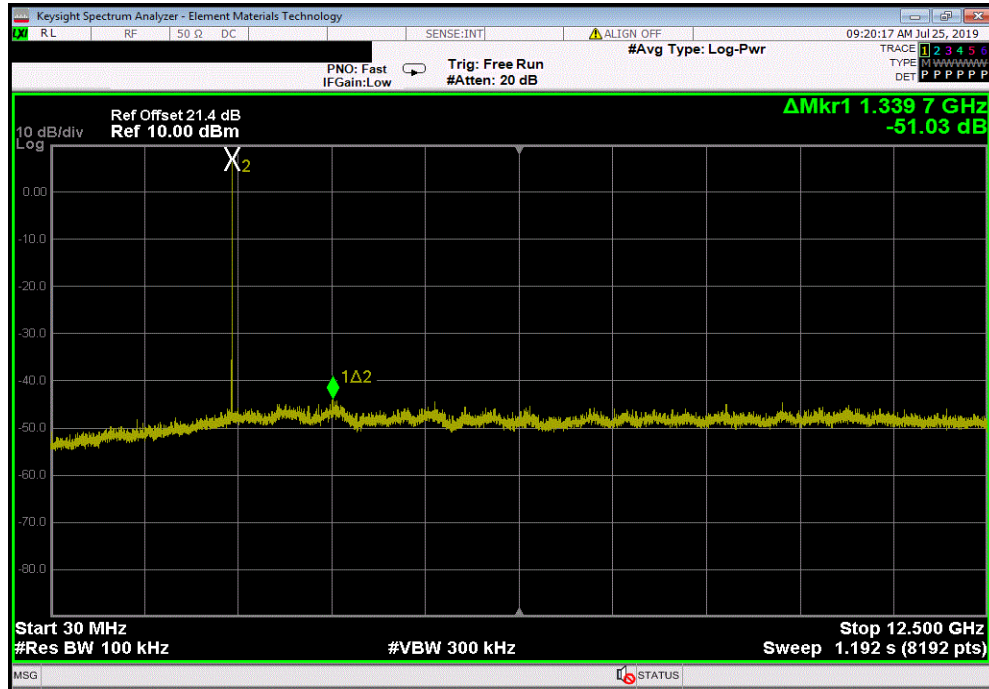


SPURIOUS CONDUCTED EMISSIONS

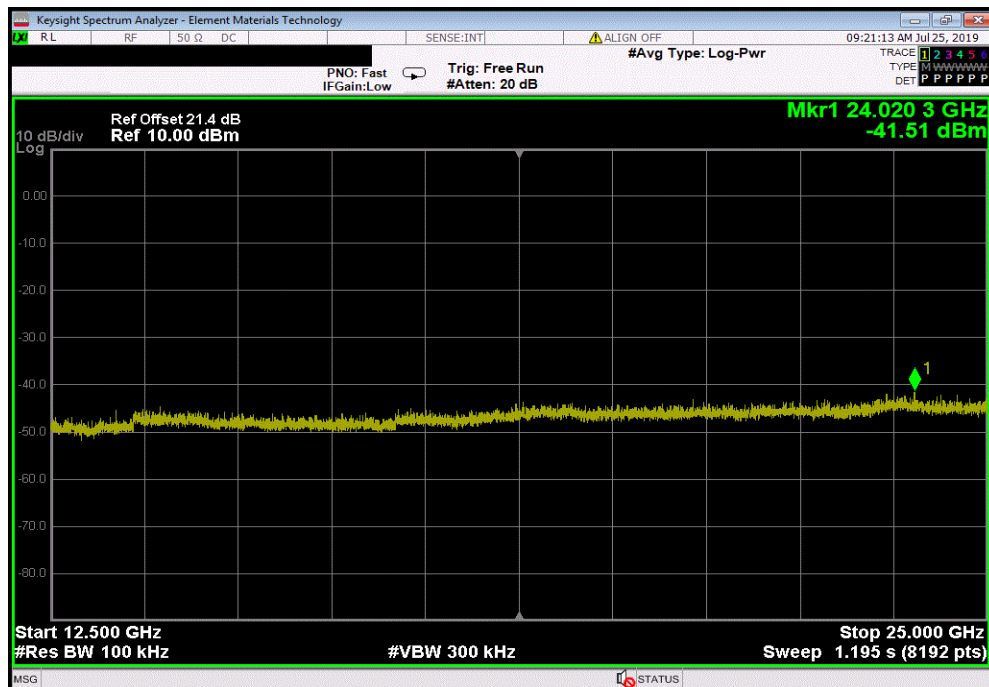


TMTx 2018.09.13 XMI 2019.06.11

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	

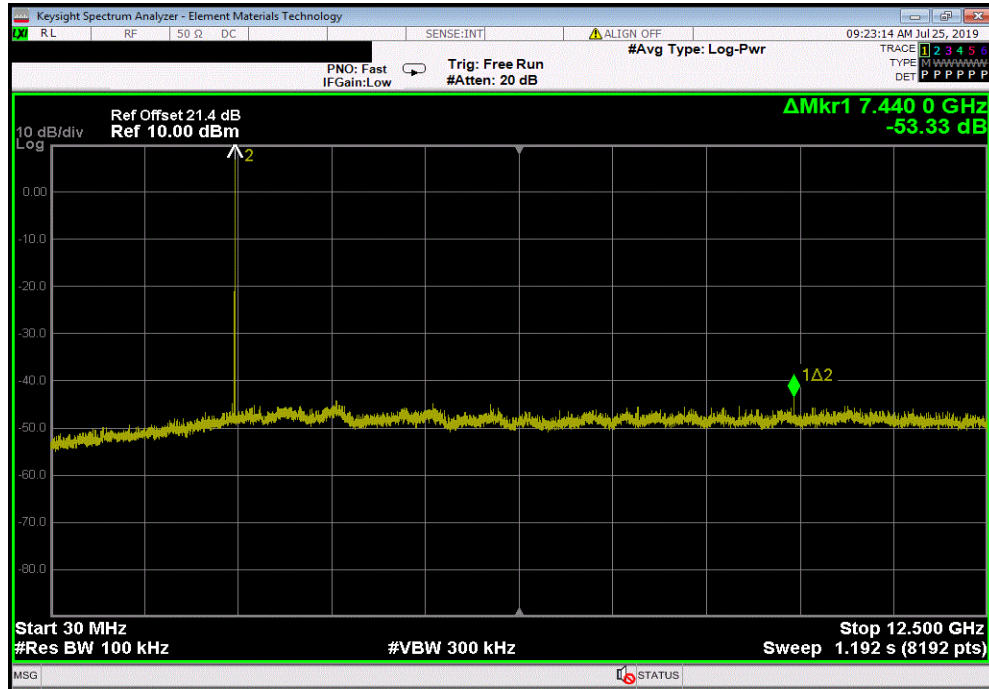


SPURIOUS CONDUCTED EMISSIONS



TMTx 2018.09.13 XMI 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	

