

TEST B.2: MAXIMUM CONDUCTED OUTPUT POWER AND ANTENNA GAIN

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(b) and RSS-247 5.4(d)

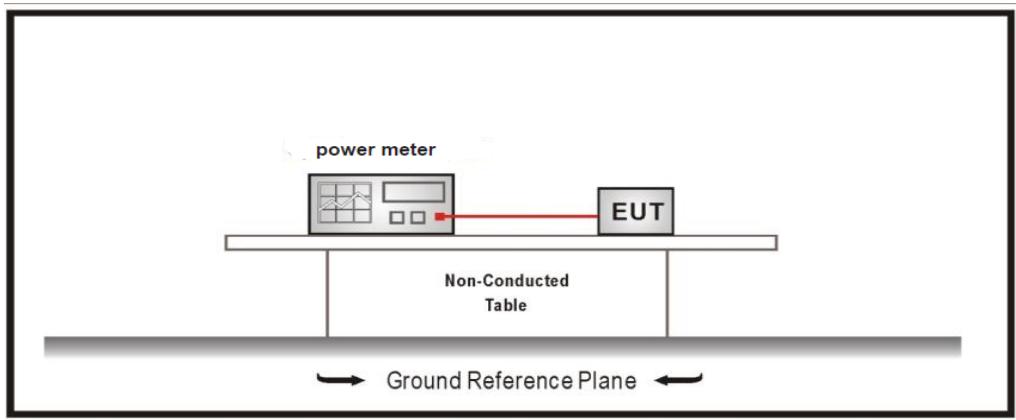
LIMITS

For systems using digital modulation in the 2400 -2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (RSS-247).

TEST SETUP

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power



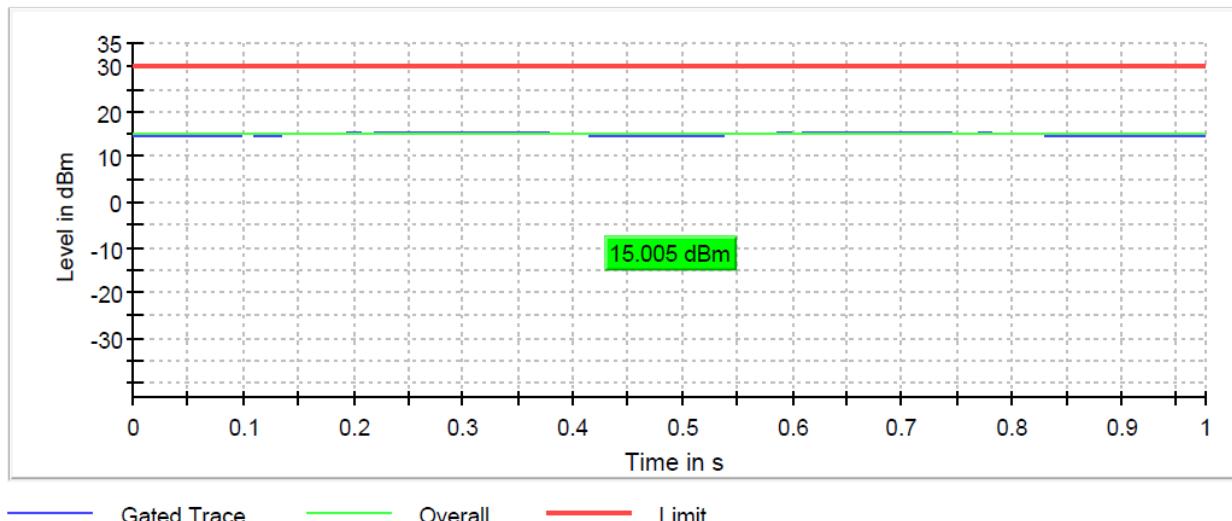
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (b mode)
TEST RESULTS:	PASS

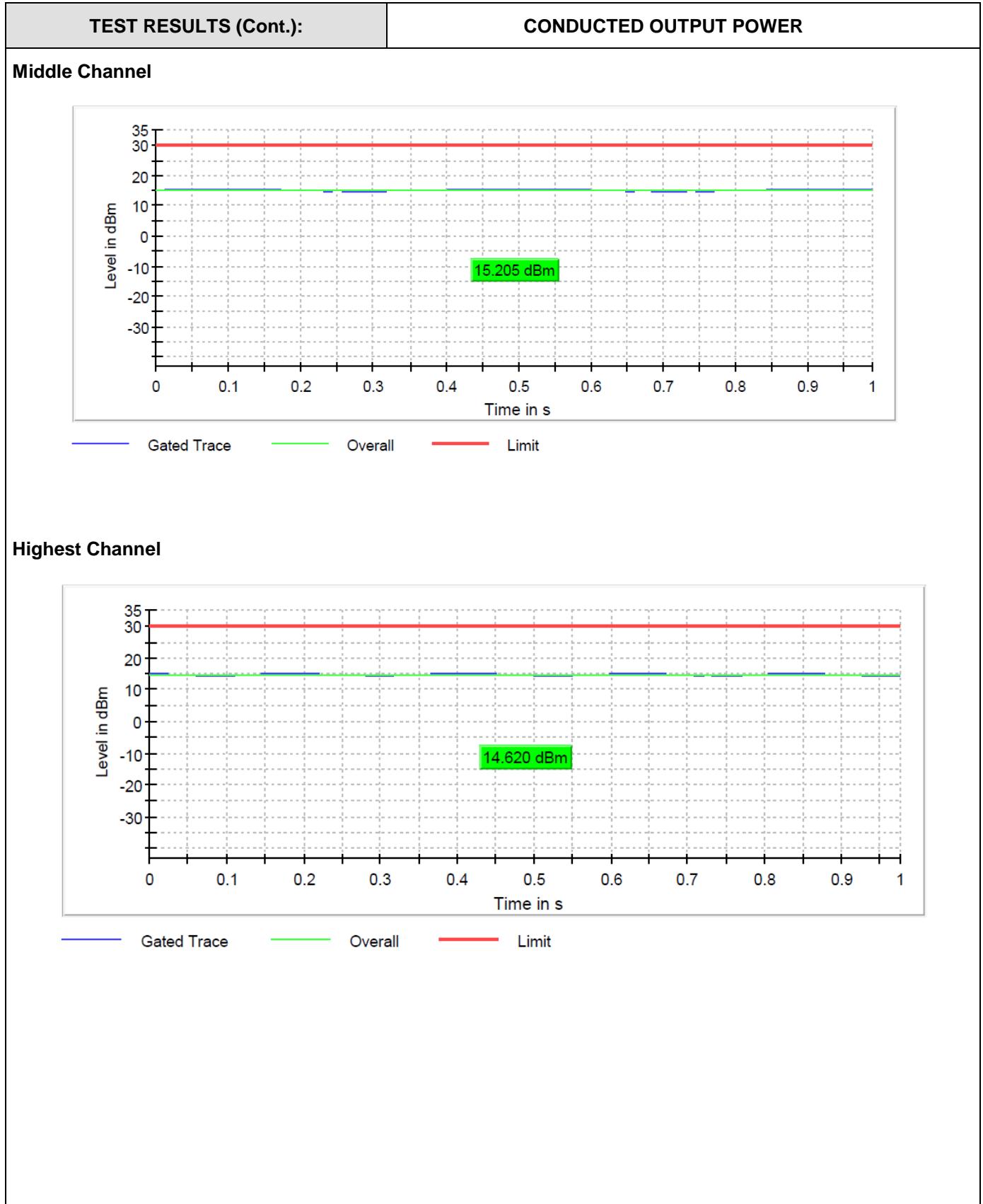
Maximum declared antenna gain: 2.2 dBi

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum conducted power (dBm)	15.0	15.2	14.6
Maximum EIRP power (dBm)	17.2	17.4	16.8
Measurement uncertainty (dB)	<±0.78		

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Lowest Channel





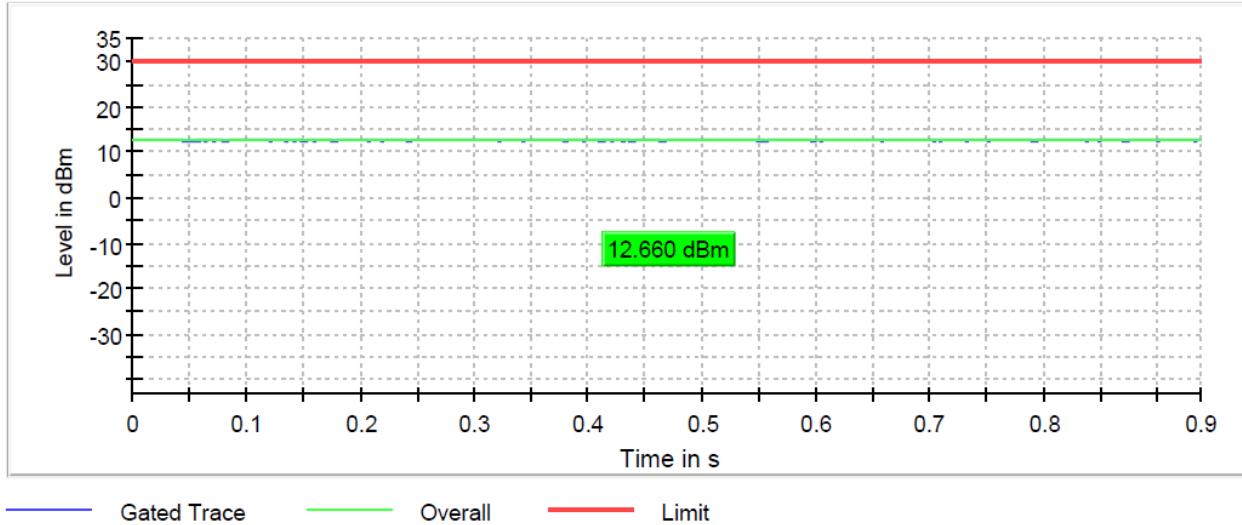
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (g mode)
TEST RESULTS:	PASS

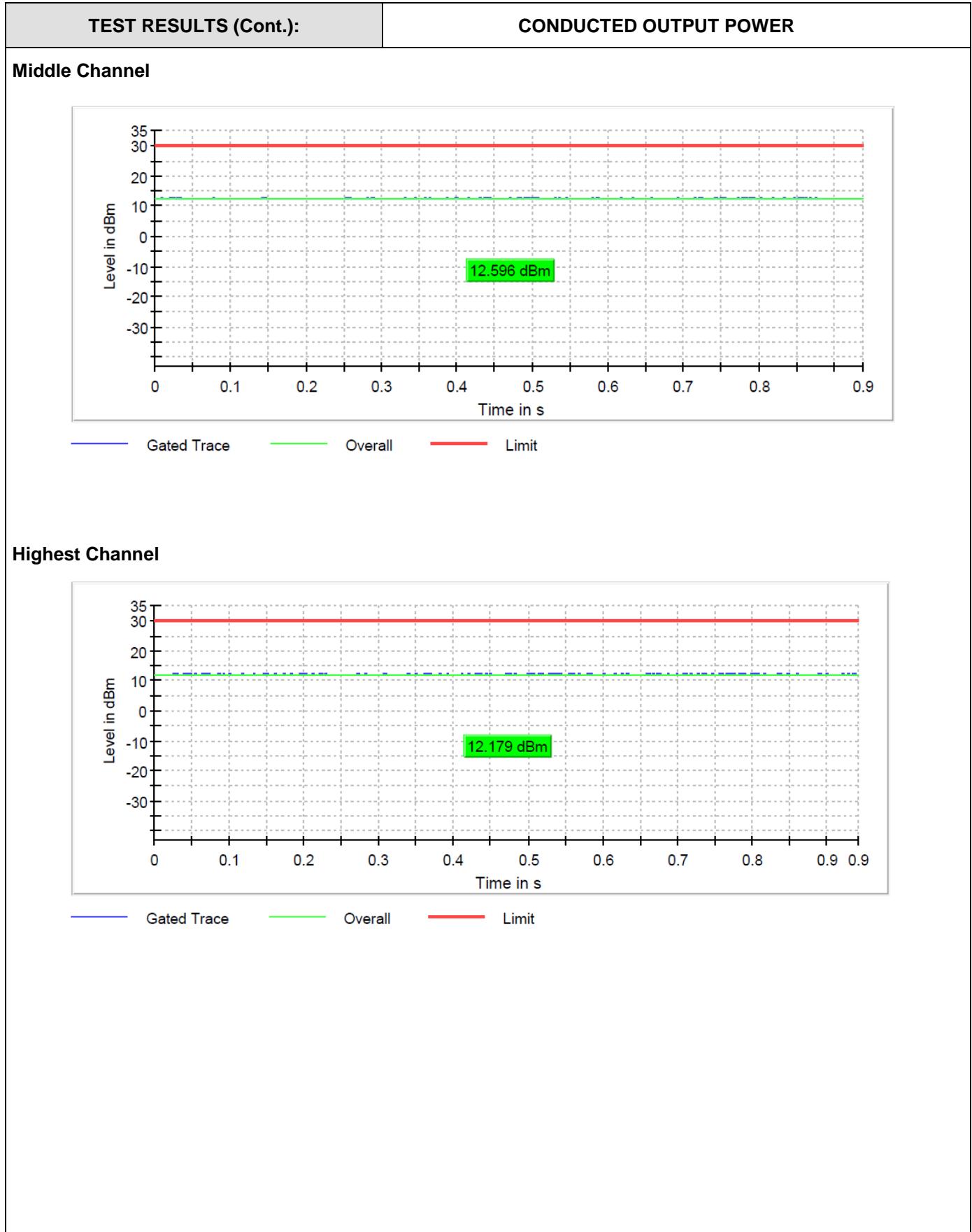
Maximum declared antenna gain: 2.2 dBi

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum conducted power (dBm)	12.7	12.6	12.2
Maximum EIRP power (dBm)	14.9	14.8	14.4
Measurement uncertainty (dB)	<±0.78		

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Lowest Channel





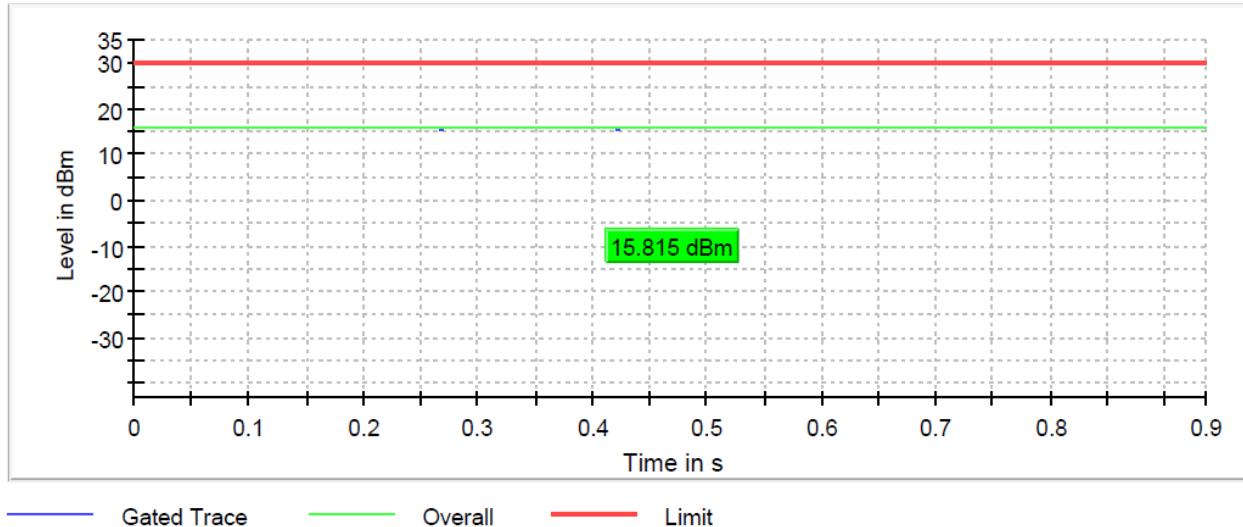
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (n20 mode 20 MHz)
TEST RESULTS:	PASS

Maximum declared antenna gain: 2.2 dBi

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum conducted power (dBm)	15.8	15.8	15.1
Maximum EIRP power (dBm)	18.0	18.0	17.3
Measurement uncertainty (dB)	<±0.78		

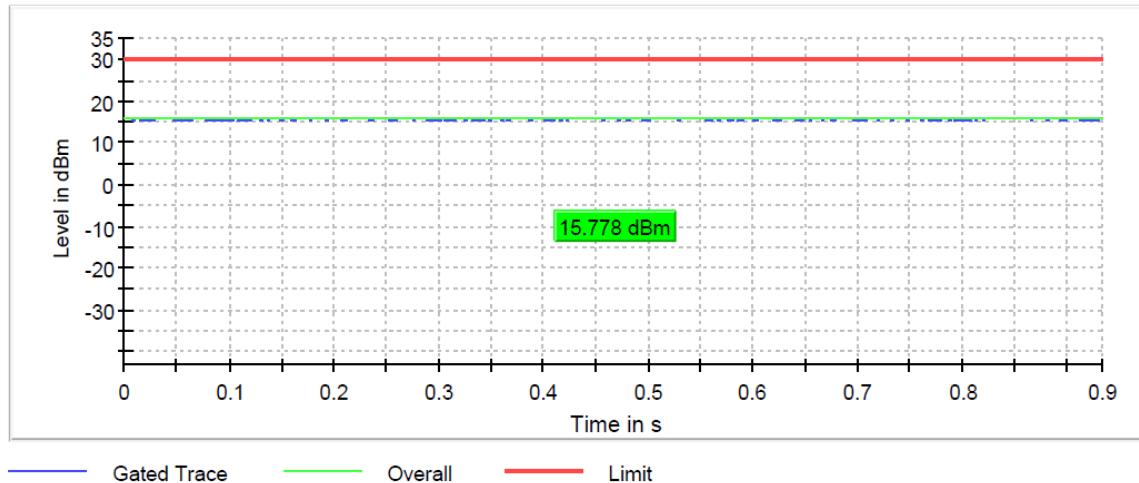
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Lowest Channel

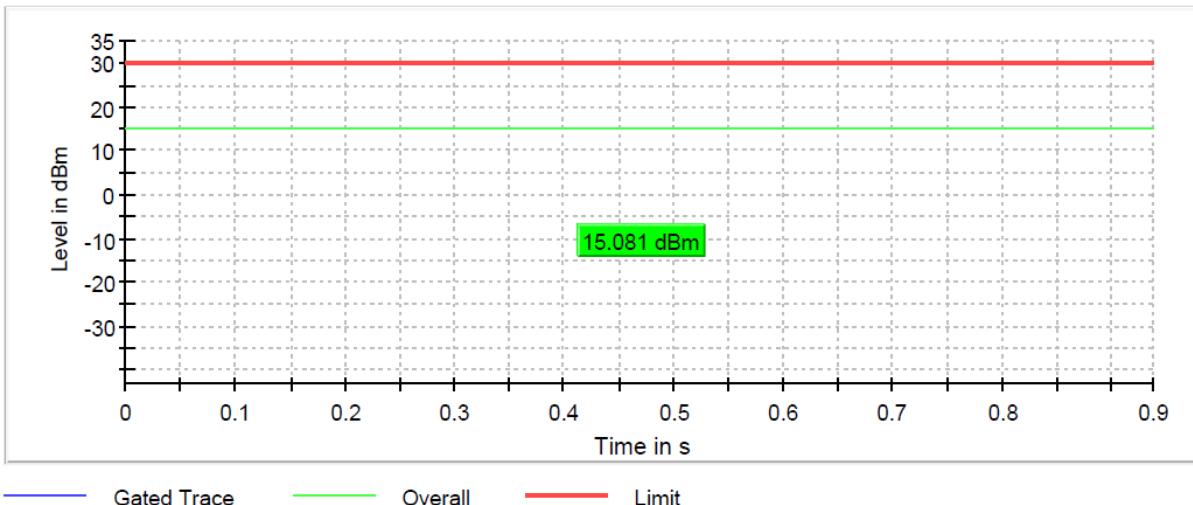


TEST RESULTS (Cont.)

Middle Channel



Highest Channel



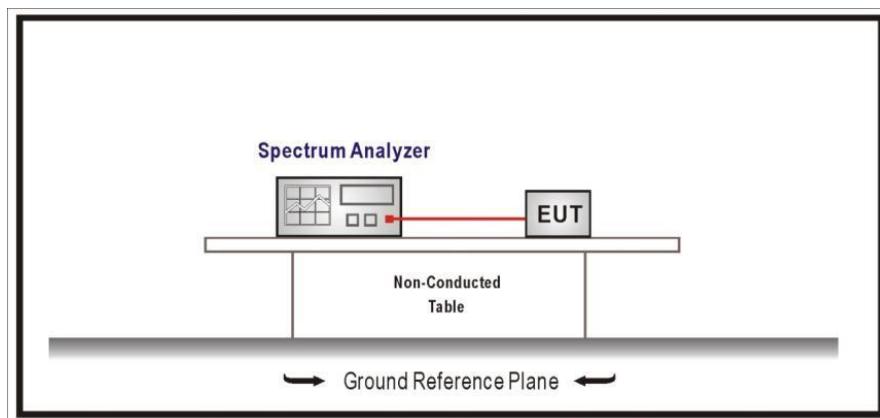
TEST B.3: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(d) and RSS-247 5.5

LIMITS

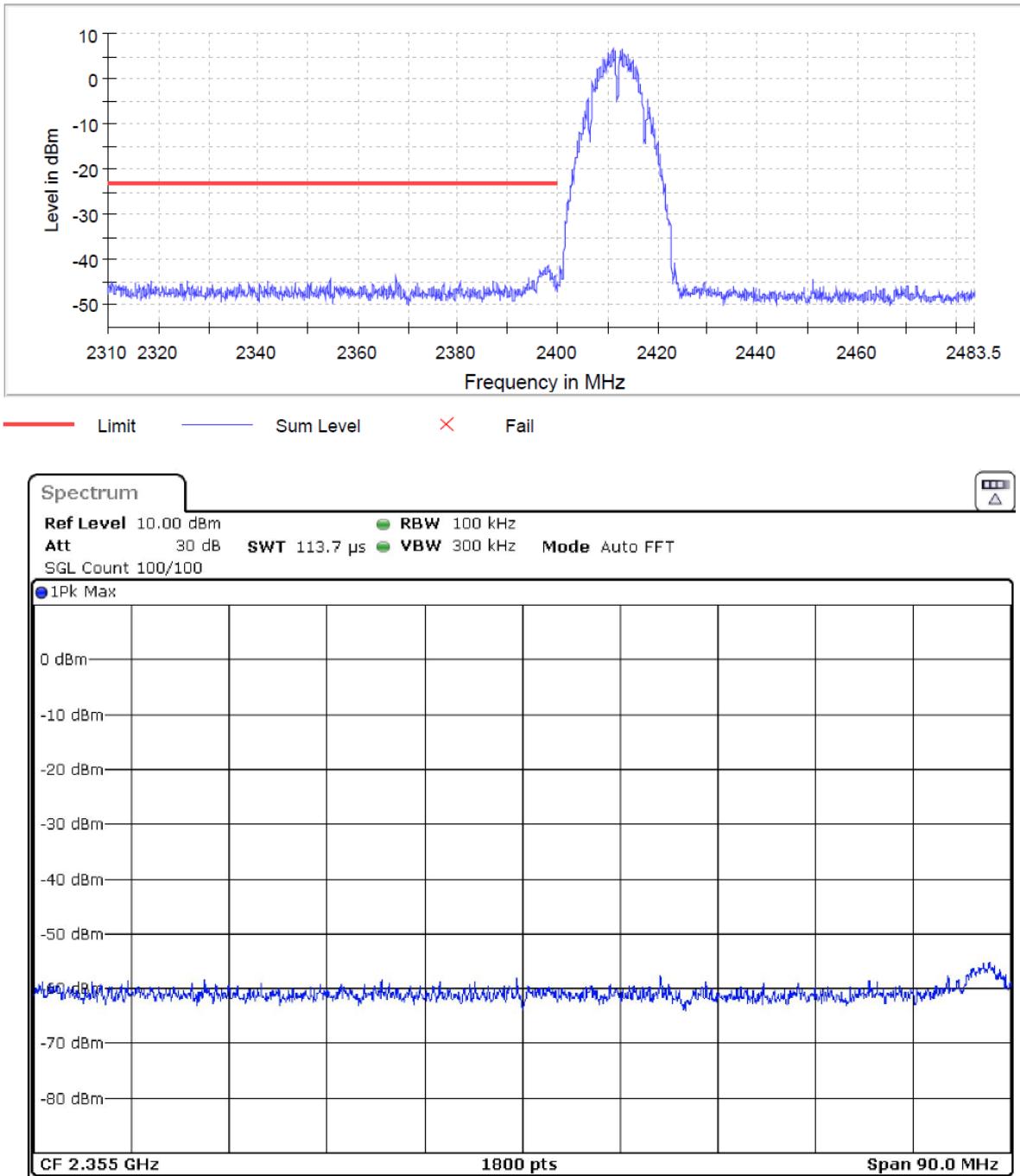
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

TEST SETUP

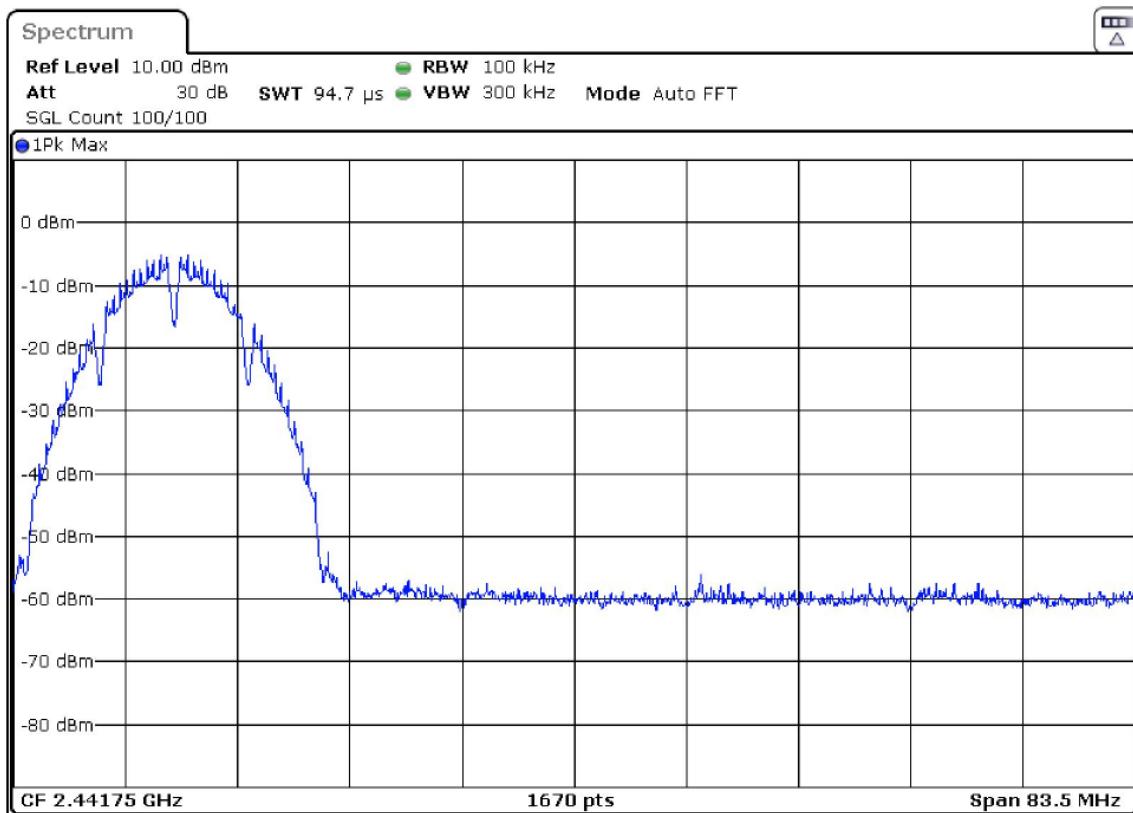


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (b mode)
TEST RESULTS:	PASS

Lowest Channel

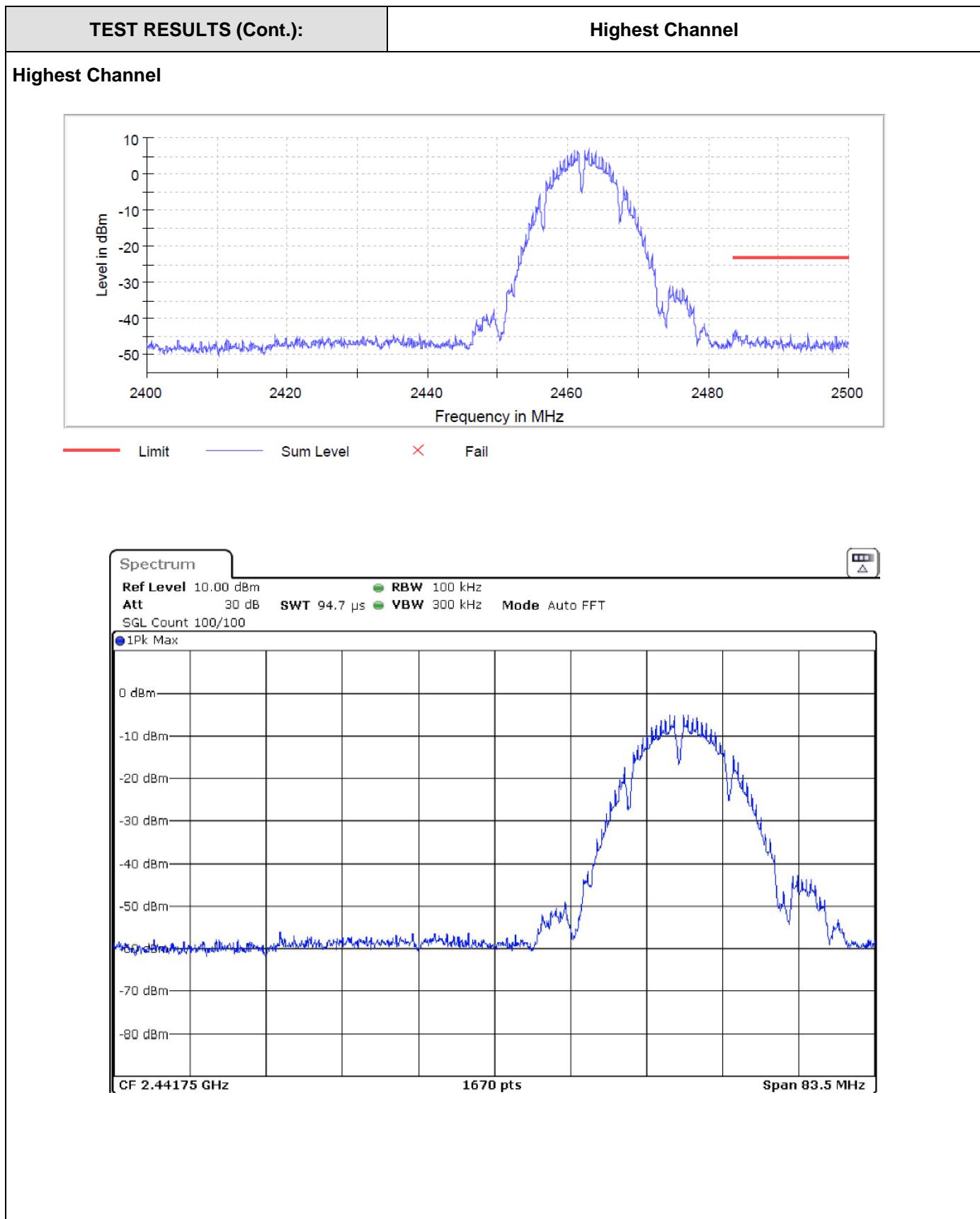


TEST RESULTS (Cont.):

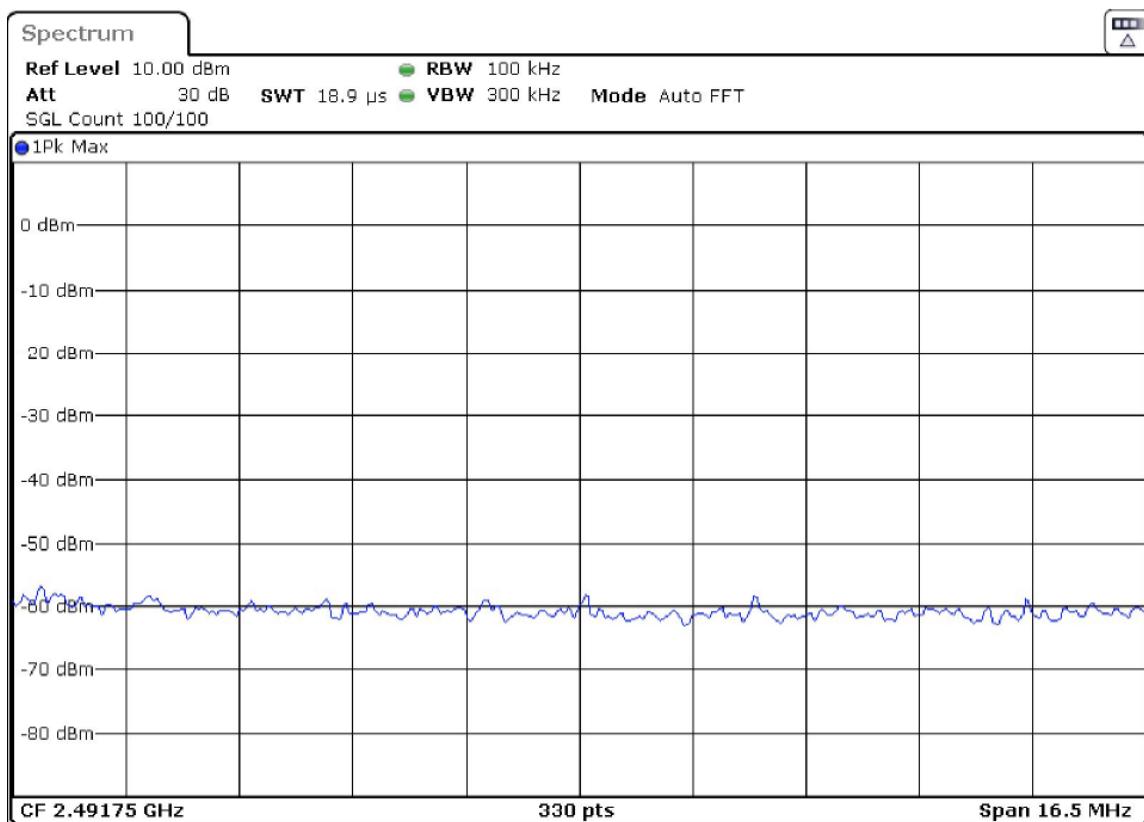


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
Sweep Points	1800	1670
Sweep time	113.672 µs	94.727 µs
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	FFT
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	13 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.49 dB



TEST RESULTS (Cont.):

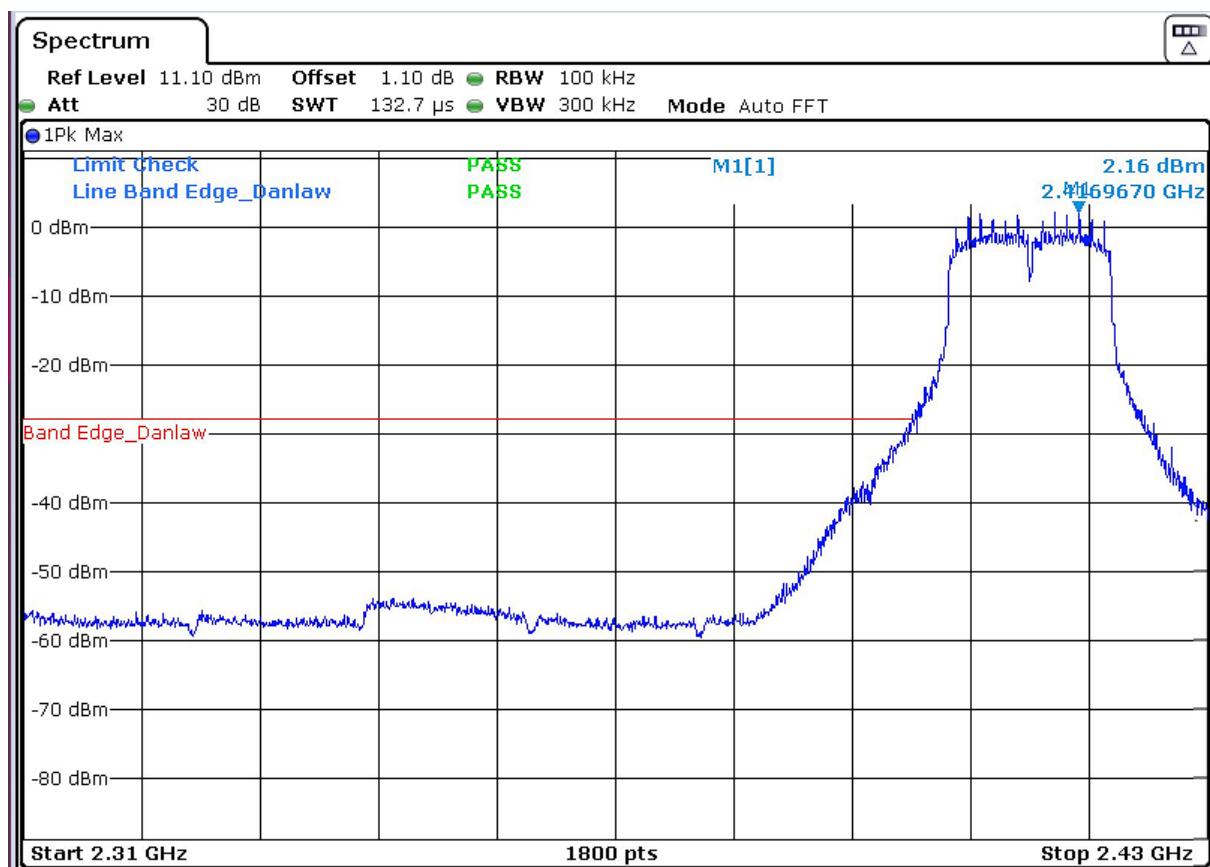


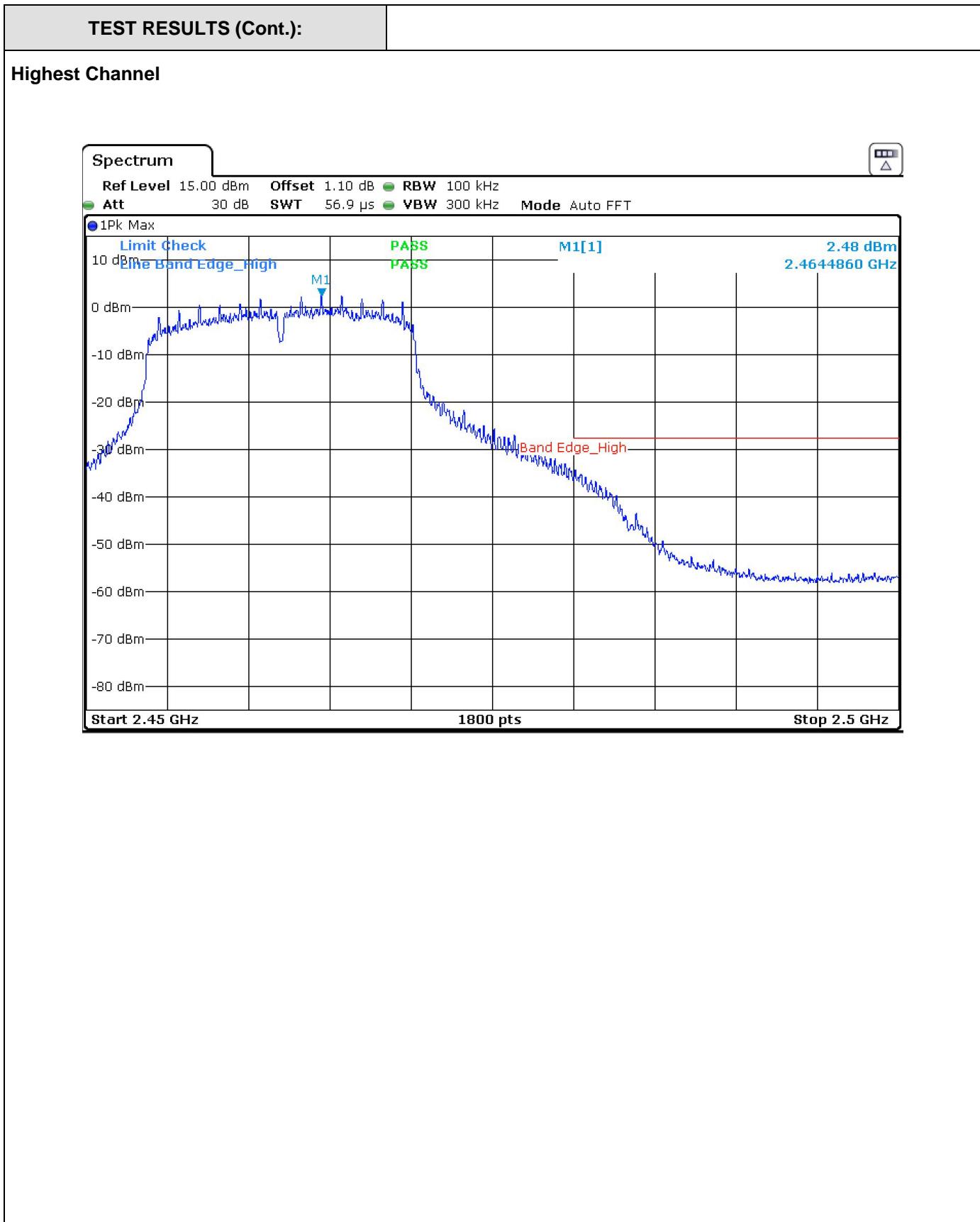
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
Sweep Points	1670	330
Sweep time	94.727 µs	18.945 µs
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	FFT
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	9 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.28 dB	0.00 dB

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (g mode)
TEST RESULTS:	PASS

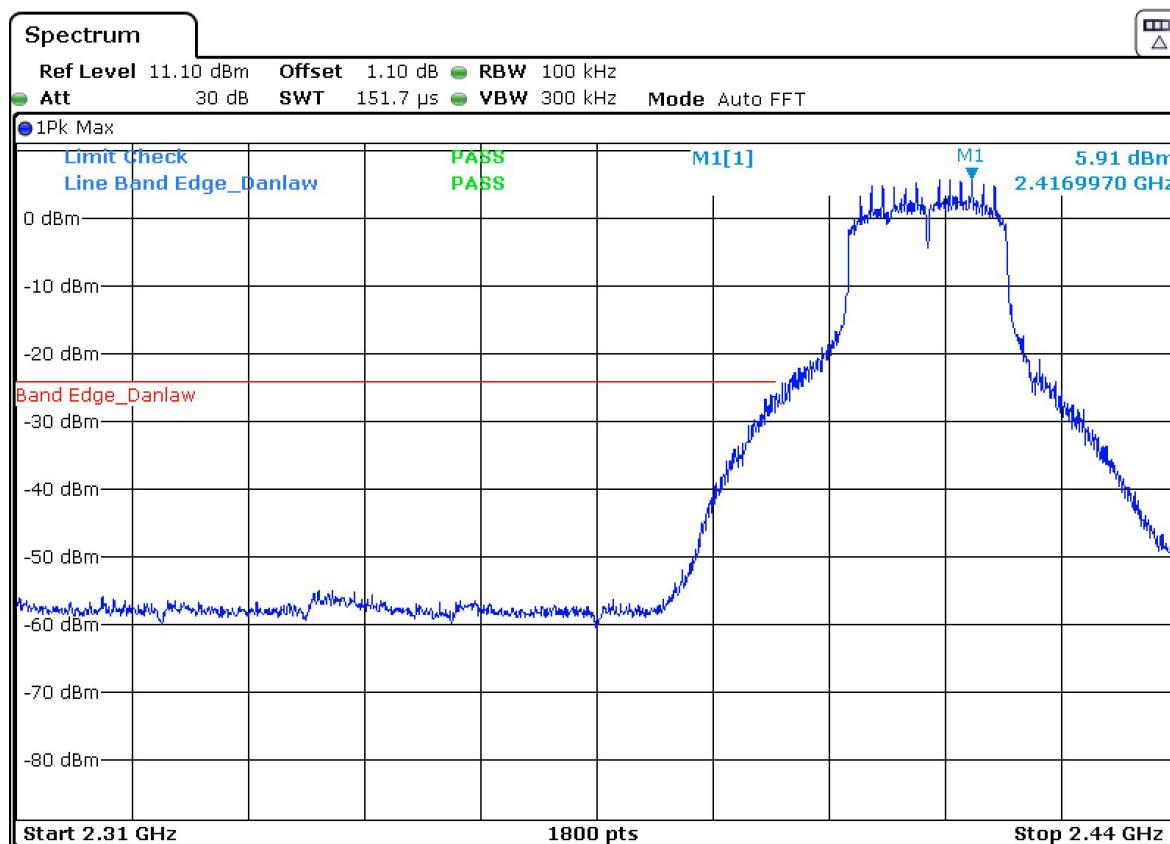
Lowest Channel

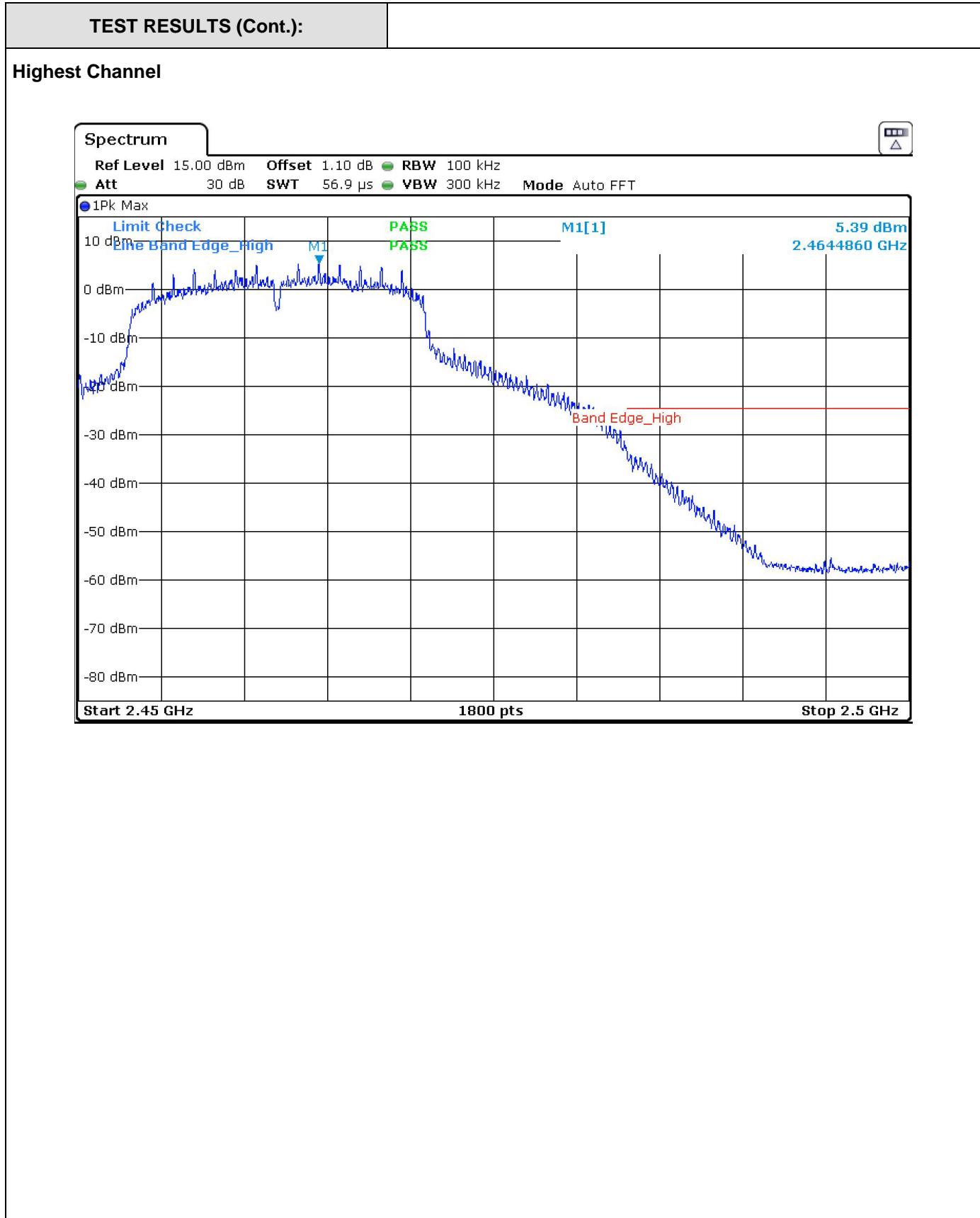




TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (n20 mode)
TEST RESULTS:	PASS

Lowest Channel





TEST B.4: POWER SPECTRAL DENSITY

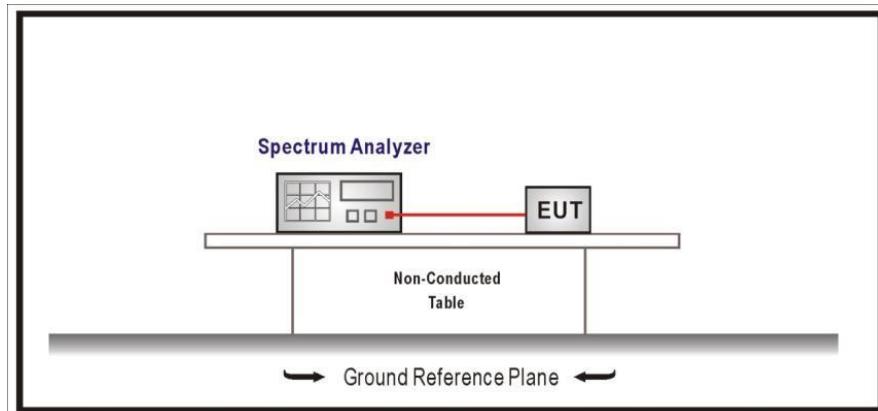
LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(e) and RSS-247 5.2 (b)

LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

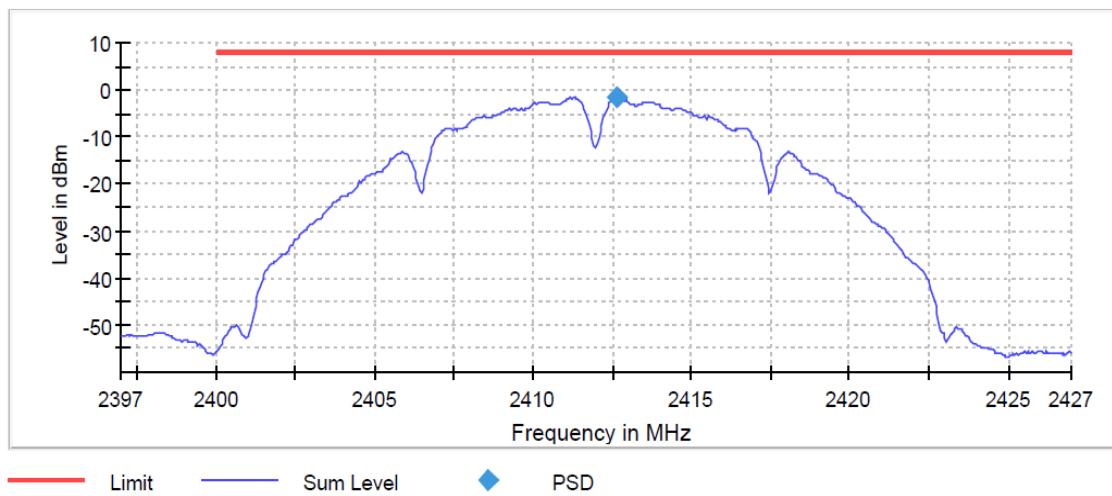
TEST SETUP

For all modes, the maximum power spectral density level in the fundamental emission was measured using the method AVGPSD-1 according to point 10.3. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

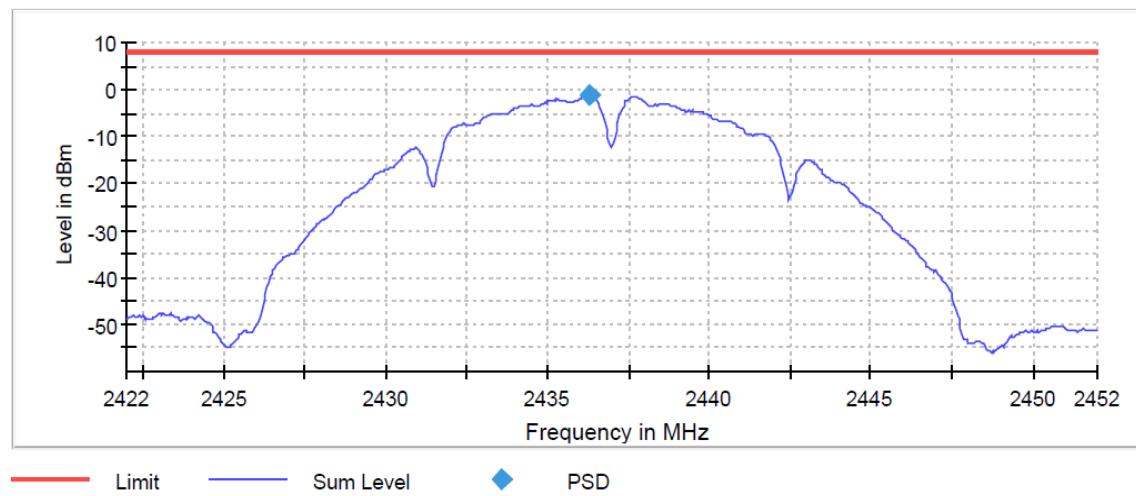


TESTED SAMPLES:	S/01		
TESTED CONDITIONS MODES:	TC#01 (b mode)		
TEST RESULTS:	PASS		
	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Power spectral density (dBm)	-1.577	-1.089	-1.741
Measurement uncertainty (dB)	<±0.78		

Lowes Channel

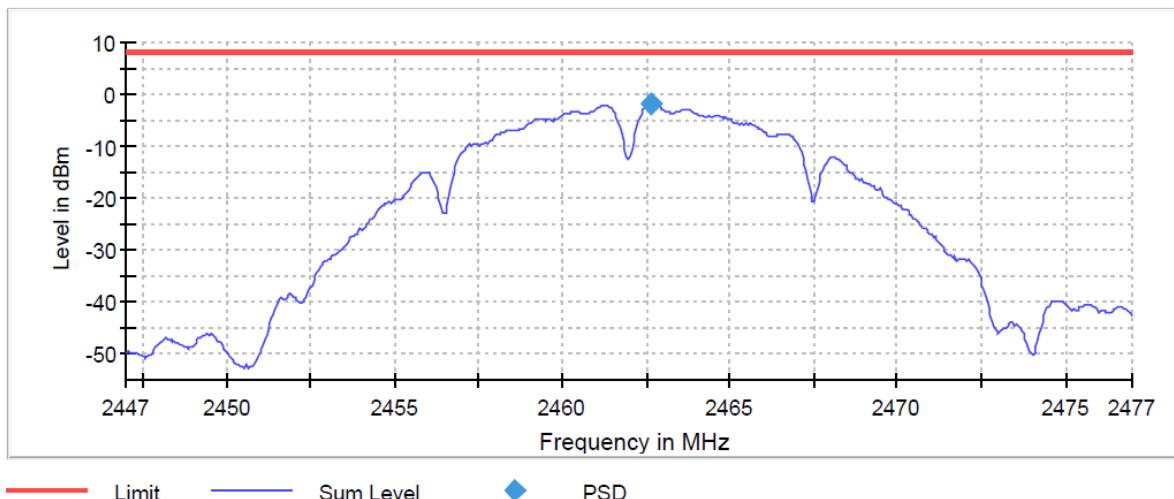


Middle Channel



TEST RESULTS (Cont.):

Highest Channel



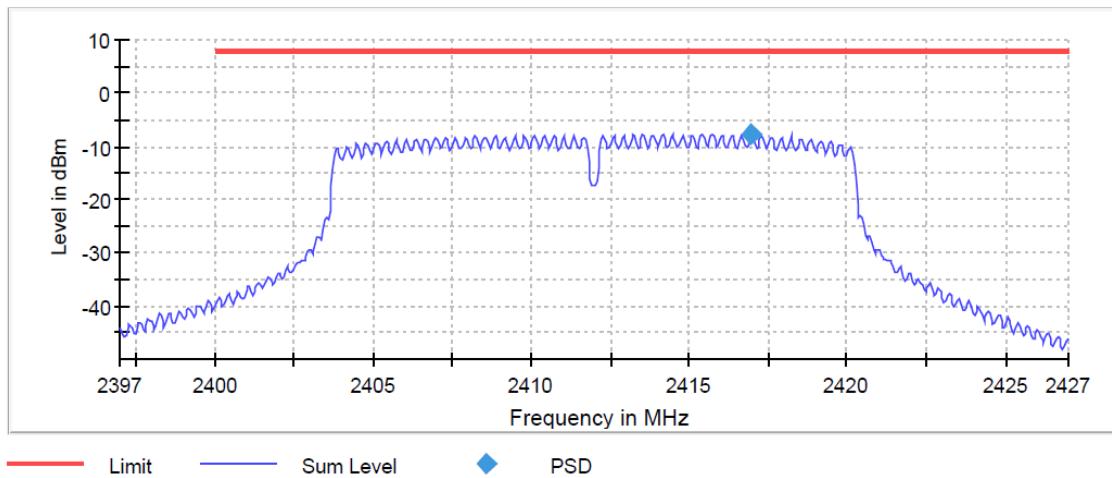
Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39700 GHz	2.42200 GHz	2.44700 GHz
Stop Frequency	2.42700 GHz	2.45200 GHz	2.47700 GHz
Span	30.000 MHz	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
Sweep Points	600	600	600
Sweep time	3.000 s	3.000 s	3.000 s
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	RMS	RMS	RMS
Sweep Count	1	1	1
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	Sweep	Sweep	Sweep
Preamp	off	off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	5 / max.150	5 / max. 150	6 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.43 dB	0.33 dB	0.30 dB

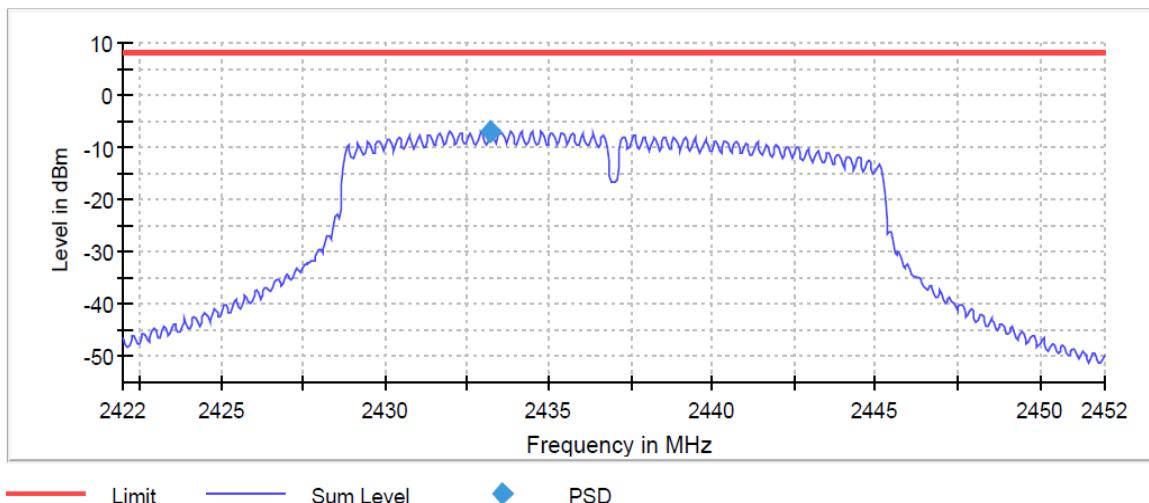
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (g mode)
TEST RESULTS:	PASS

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Power spectral density (dBm)	-7.758	-6.847	-7.453
Measurement uncertainty (dB)	<±0.78		

Lowest Channel

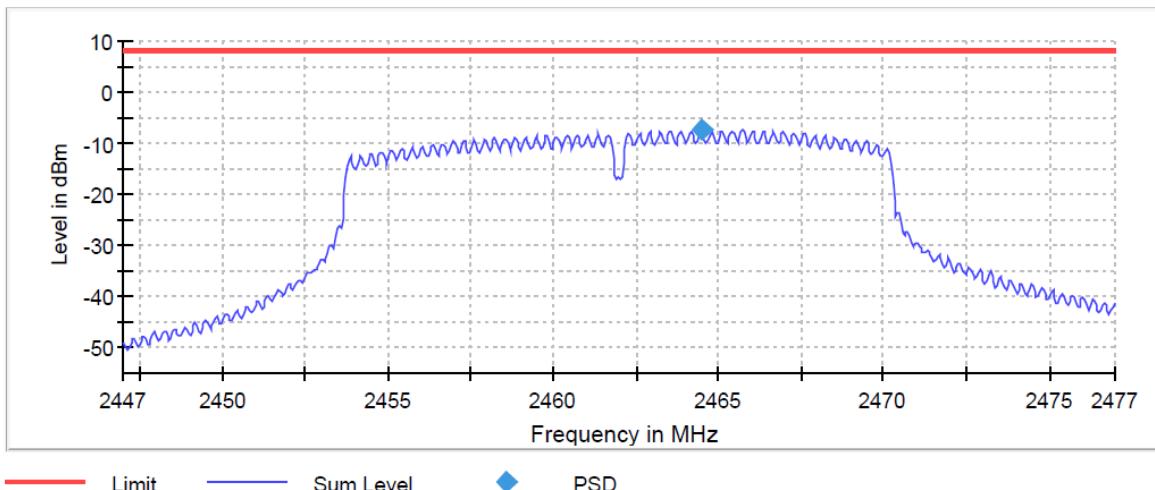


Middle Channel



TEST RESULTS (Cont.):

Highest Channel



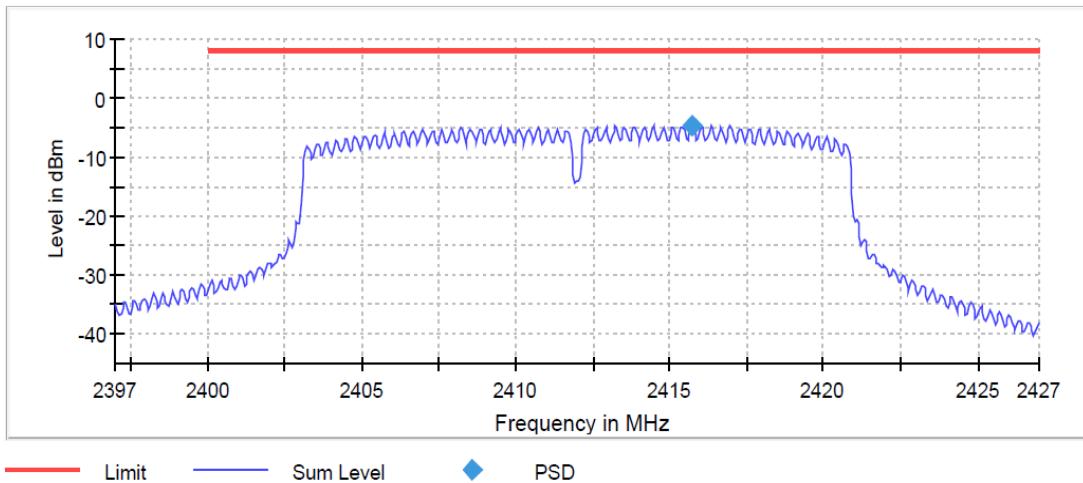
Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39700 GHz	2.42200 GHz	2.44700 GHz
Stop Frequency	2.42700 GHz	2.45200 GHz	2.47700 GHz
Span	30.000 MHz	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
Sweep Points	600	600	600
Sweep time	3.000 s	3.000 s	3.000 s
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	RMS	RMS	RMS
Sweep Count	1	1	1
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	Sweep	Sweep	Sweep
Preamplifier	off	off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	5 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.39 dB	0.37 dB	0.29 dB

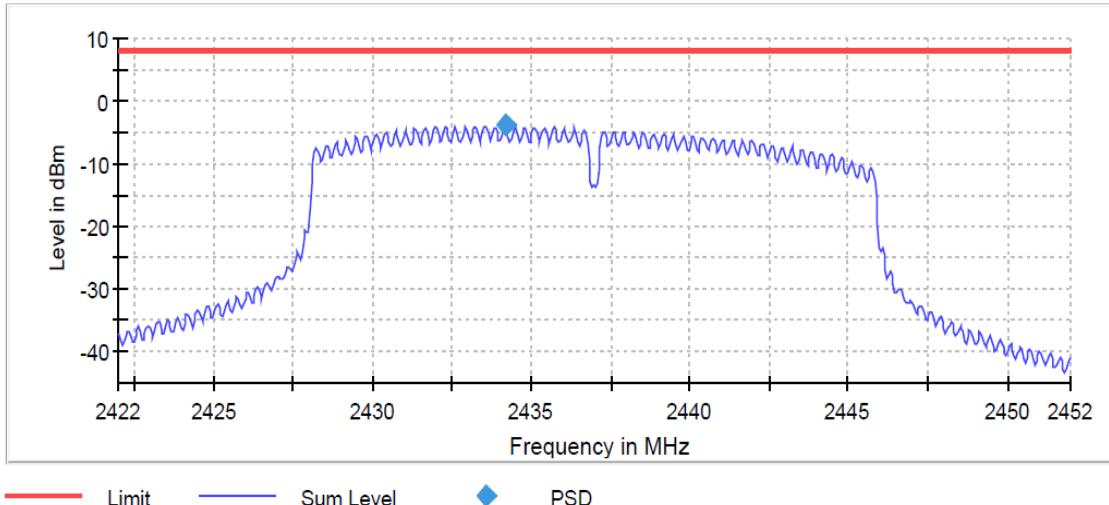
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (n20 mode)
TEST RESULTS:	PASS

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Power spectral density (dBm)	-4.625	-3.903	-4.914
Measurement uncertainty (dB)	<±0.78		

Lowest Channel

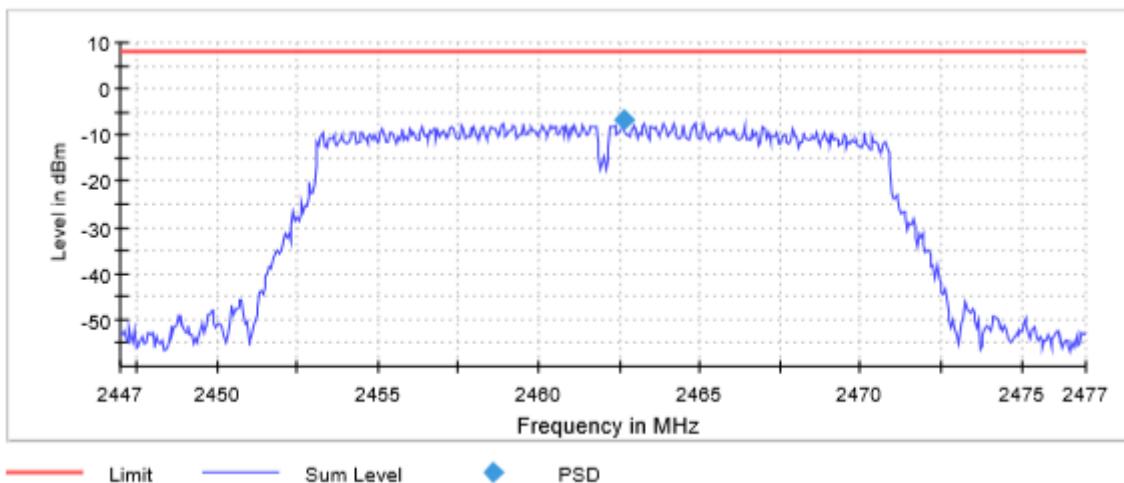


Middle Channel



TEST RESULTS (Cont.):

Highest Channel



Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39700 GHz	2.42200 GHz	2.44700 GHz
Stop Frequency	2.42700 GHz	2.45200 GHz	2.47700 GHz
Span	30.000 MHz	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
Sweep Points	600	600	600
Sweep time	3.000 s	3.000 s	3.000 s
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	RMS	RMS	RMS
Sweep Count	1	1	1
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	Sweep	Sweep	Sweep
Preamplifier	off	off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	5 / max. 150	6 / max. 150	87 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.27 dB	0.39 dB	0.33 dB

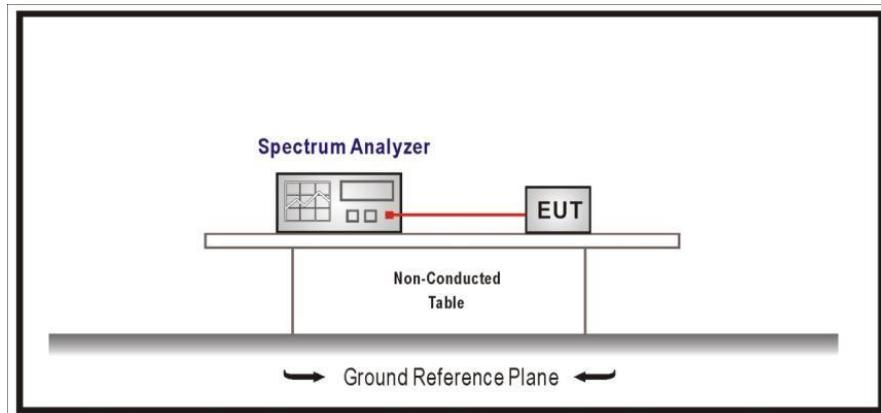
TEST B.5: EMISSION LIMITATIONS CONDUCTED (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(d) and RSS-247 5.5

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

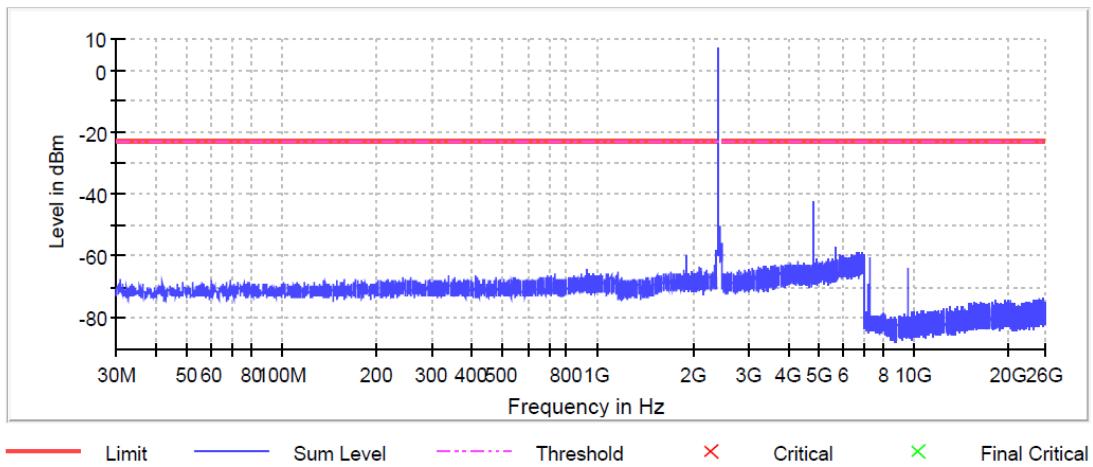
TEST SETUP	
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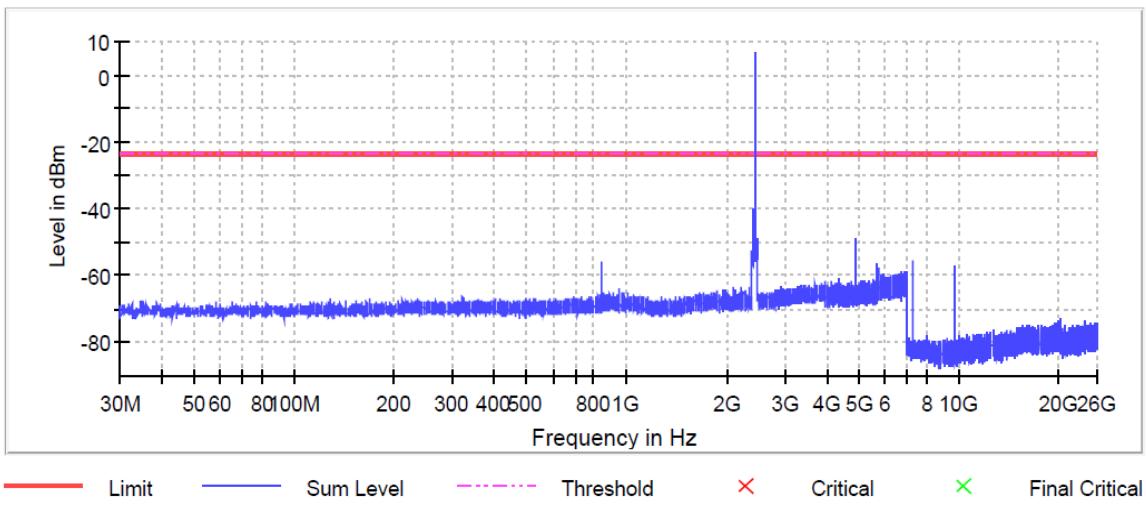
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (b mode)
TEST RESULTS:	PASS

No spurious signal was detected at 20dB below the limit or above for low, mid and high channels.

Lowest Channel

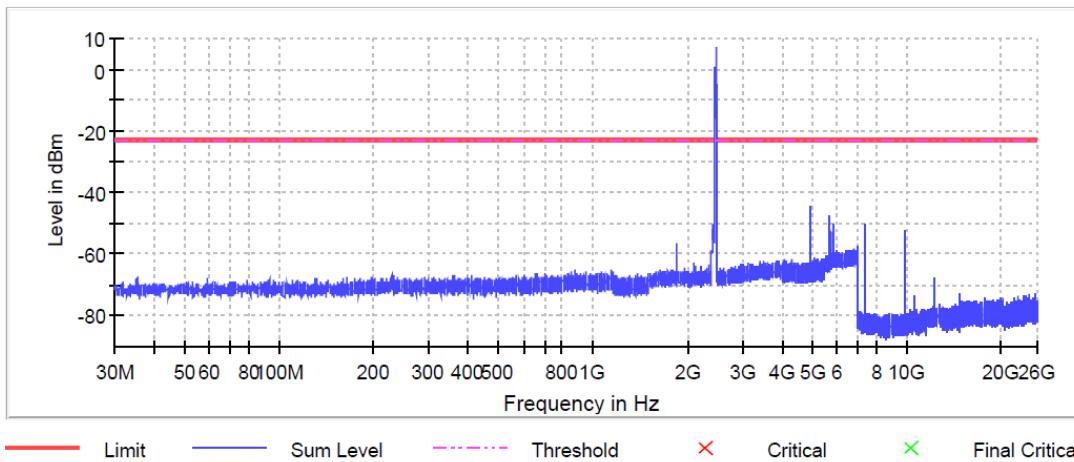


Middle Channel



TEST RESULTS (Cont.):

Highest Channel



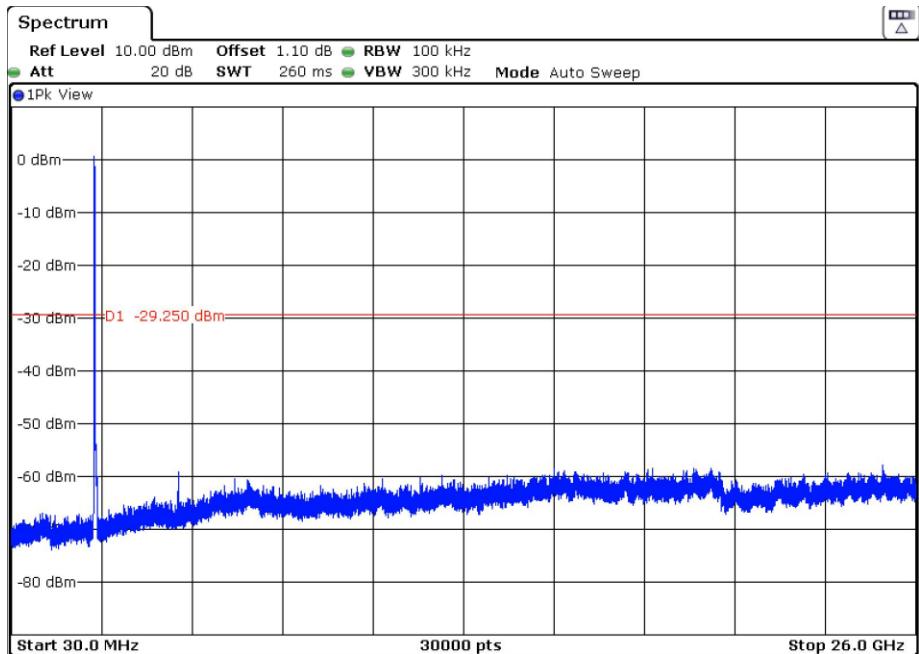
Measurement Settings

Setting	Instrument Value
Start Frequency	30.000 MHz
Stop Frequency	26 GHz
RBW	100.000 kHz
VBW	300.000 kHz
Sweep Points	29400
Sweep time	29.400 ms
Reference Level	-10.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
Sweep Count	30
Filter	3 dB
Trace Mode	Max Hold
Sweep type	Sweep
Preamplifier	off
Stable mode	Trace
Stable value	1.00 dB
Run	2 / max. 40
Stable	1 / 1
Max Stable Difference	0.00 dB

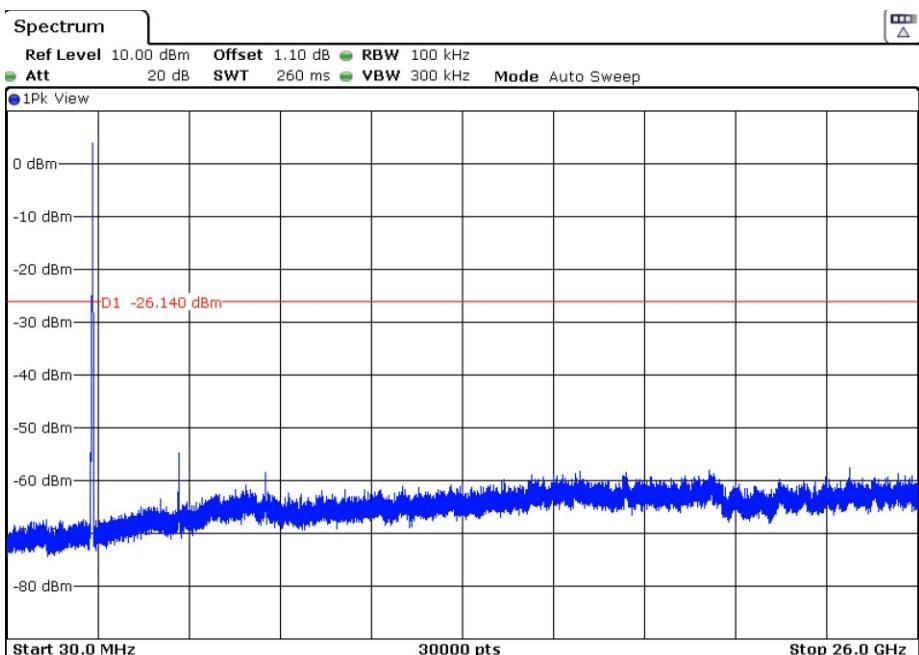
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (g mode)
TEST RESULTS:	PASS

No spurious signal was detected at 20dB below the limit or above for low, mid and high channels.

Lowest Channel

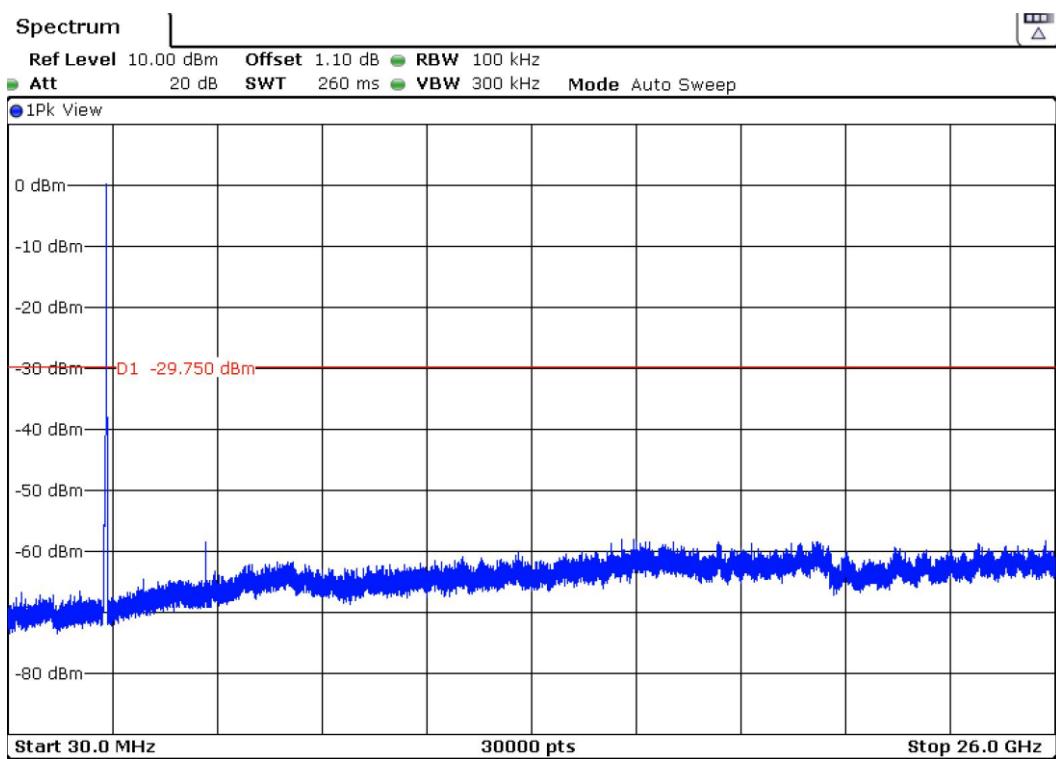


Middle Channel



TEST RESULTS (Cont.):	
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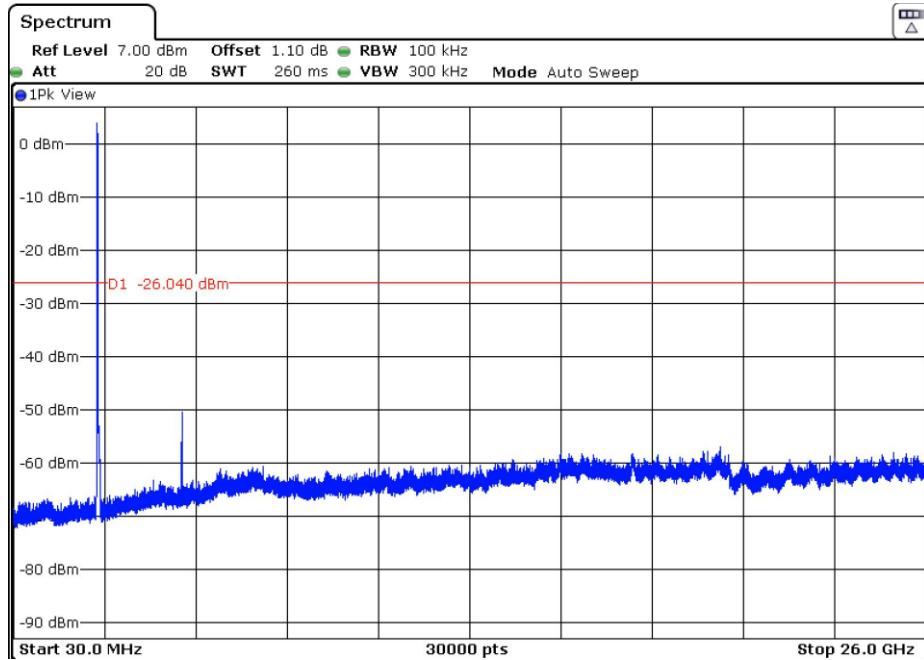
Highest Channel



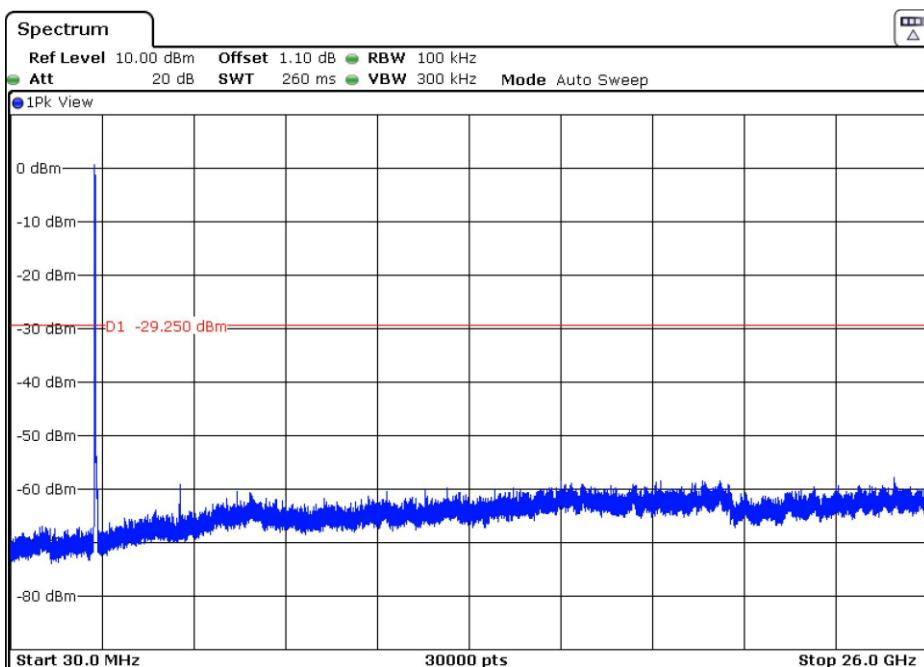
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (N20 mode)
TEST RESULTS:	PASS

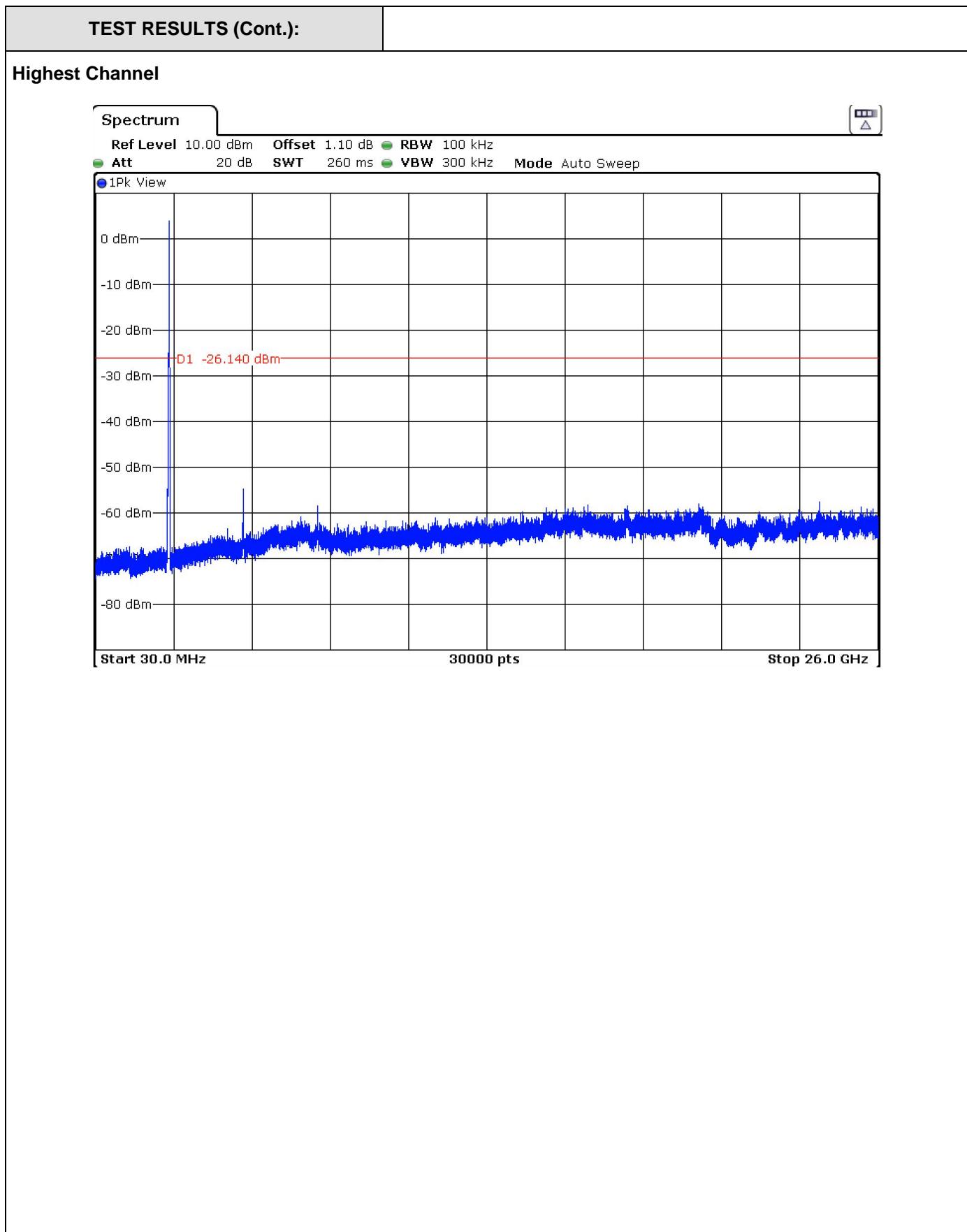
No spurious signal was detected at 20dB below the limit or above for low, mid and high channels.

Lowest Channel



Middle Channel





TEST B.6: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247	
	Test standard:	Part 15 Subpart C §15.247(d) and RSS-247 5.5	

LIMITS

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and at 1m for the frequency range 1-40 GHz (1 GHz-18 GHz and 18 GHz-40 GHz Double ridge horn antennas).

For radiated emissions in the range 1-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

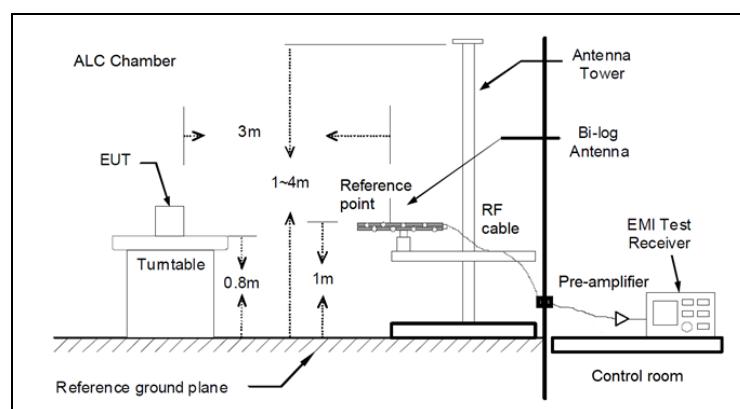
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

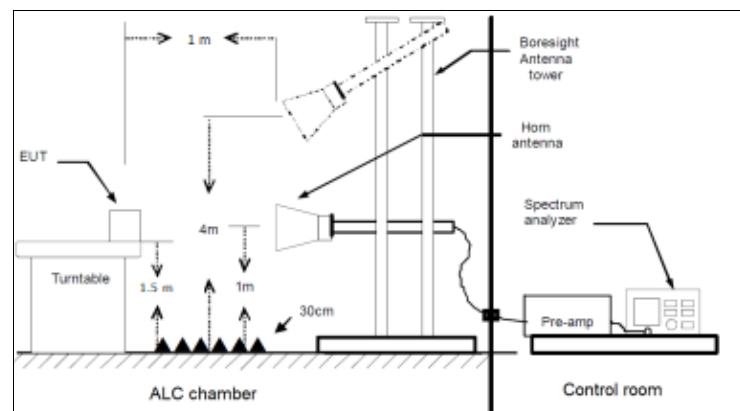
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)

Radiated measurements Setup f < 1 GHz



Radiated measurements setup f > 1 GHz



TESTED SAMPLES:	S/03
TESTED CONDITIONS MODES:	TC#01 (b mode)
TEST RESULTS:	PASS

Frequency range 30 MHz – 1000 MHz

The spurious emissions below 1 GHz do not depend on the operating channel and mode selected in the EUT.

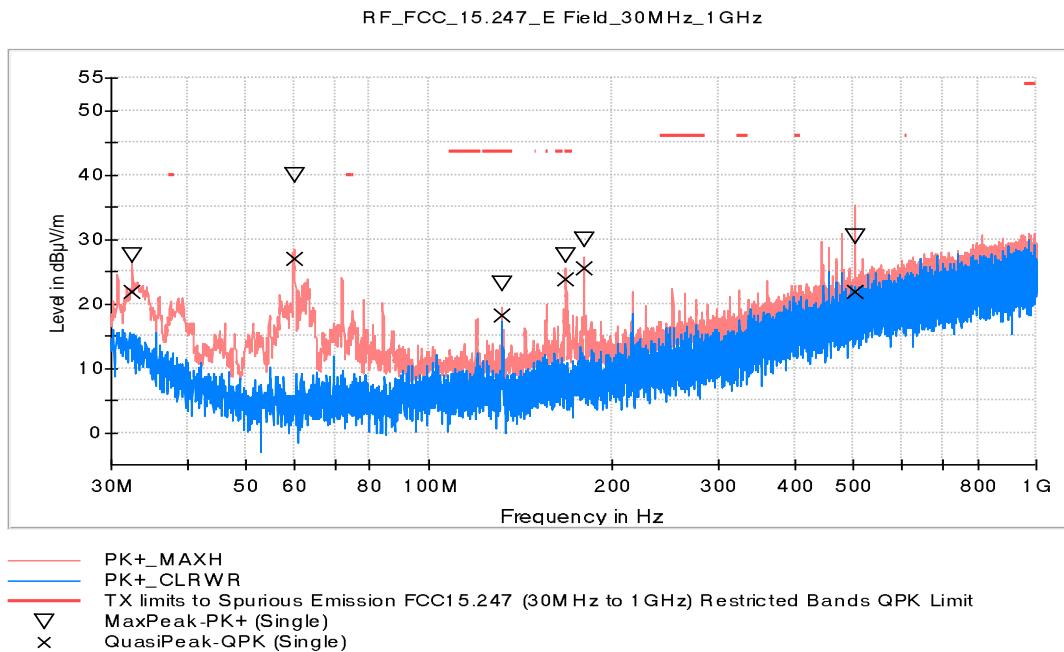
The results in the following plots and tables show the maximum measured levels in the 30-1000 MHz range. b mode was selected as worst case.

Frequency range 1 GHz – 26 GHz

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.5 GHz. (see next plots).

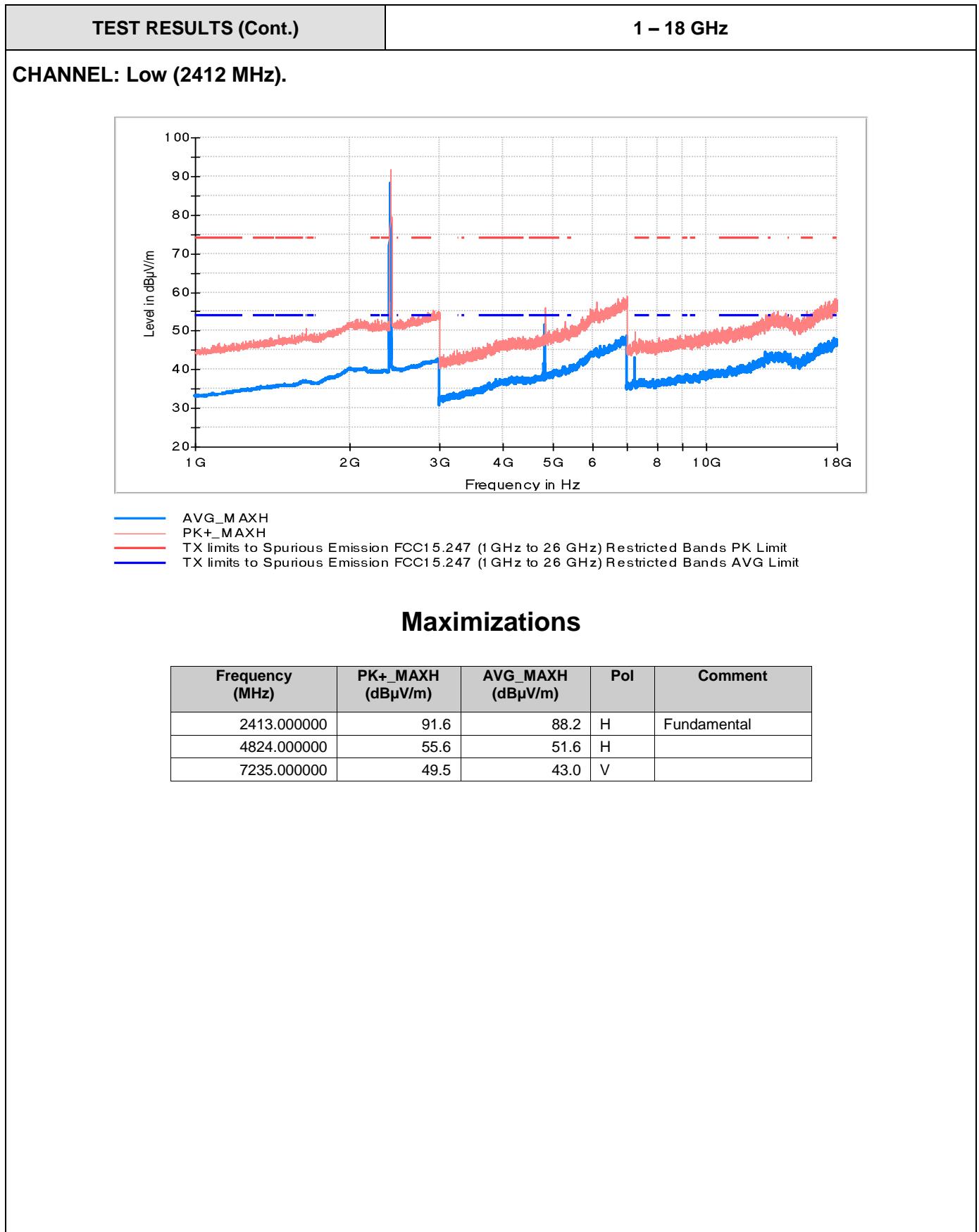
TEST RESULTS (Cont.)	30 MHz – 1 GHz
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CHANNEL: Middle (2437 MHz).



Result Table_Single

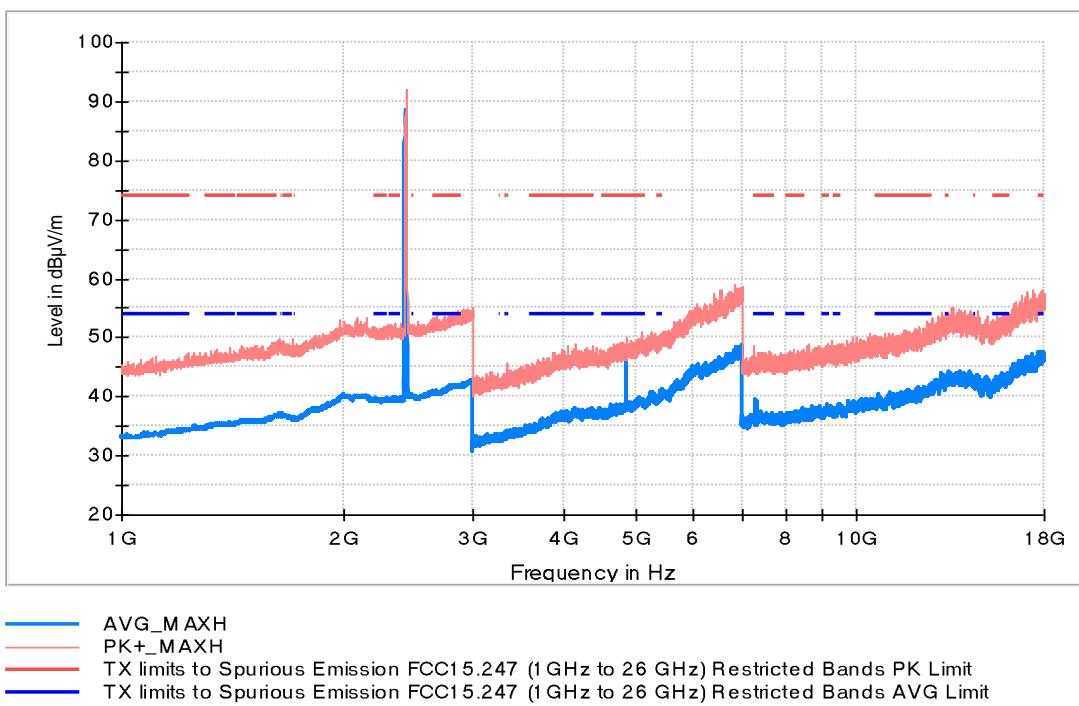
Frequency (MHz)	MaxPeak (dB μ V/m)	QuasiPeak (dB μ V/m)	Pol
32.473500	27.3	21.9	V
59.973000	39.9	26.9	V
131.995500	23.1	18.2	V
168.031000	27.4	23.7	H
180.010500	29.9	25.5	H
504.039000	30.3	21.7	H



TEST RESULTS (Cont.)

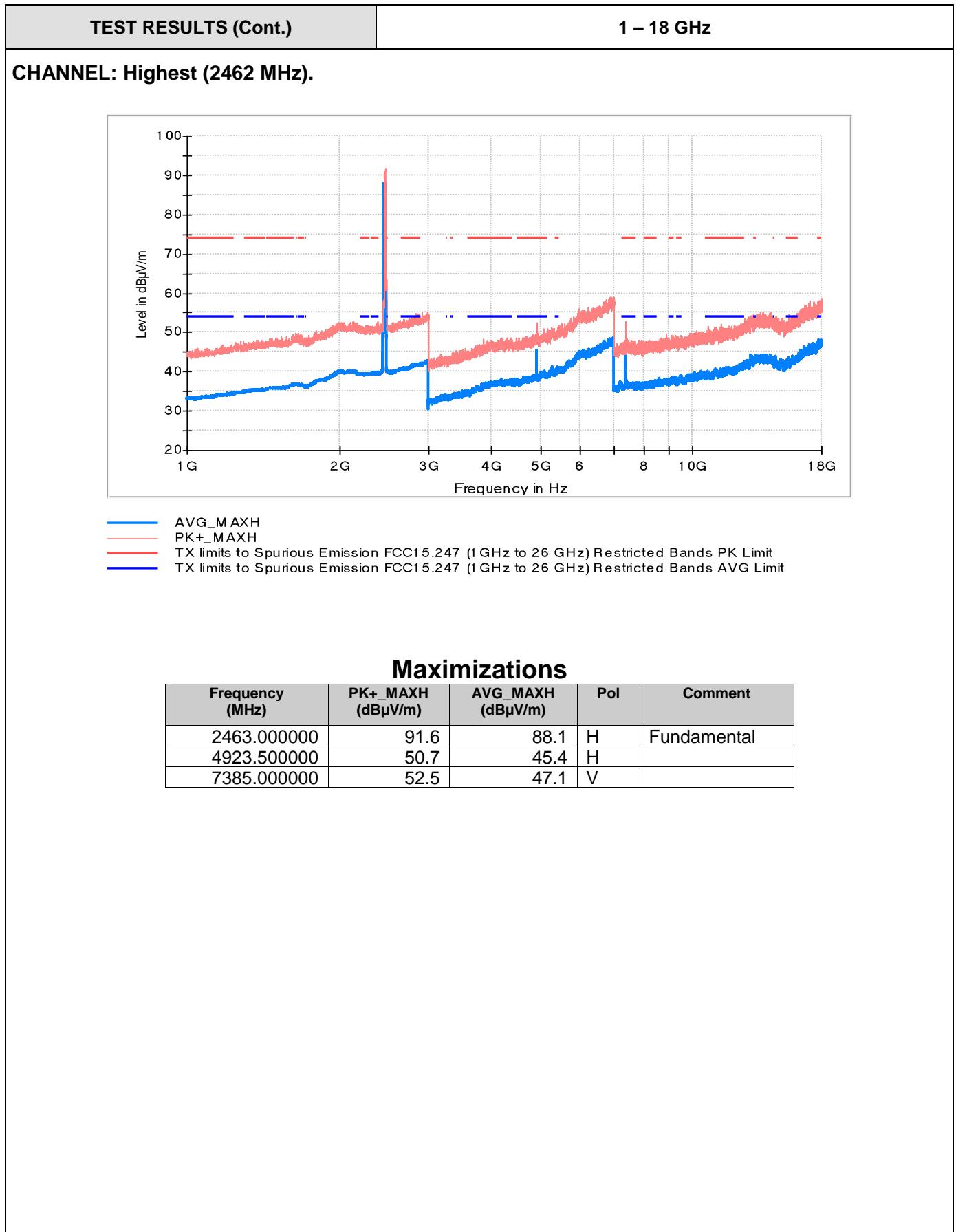
1 – 18 GHz

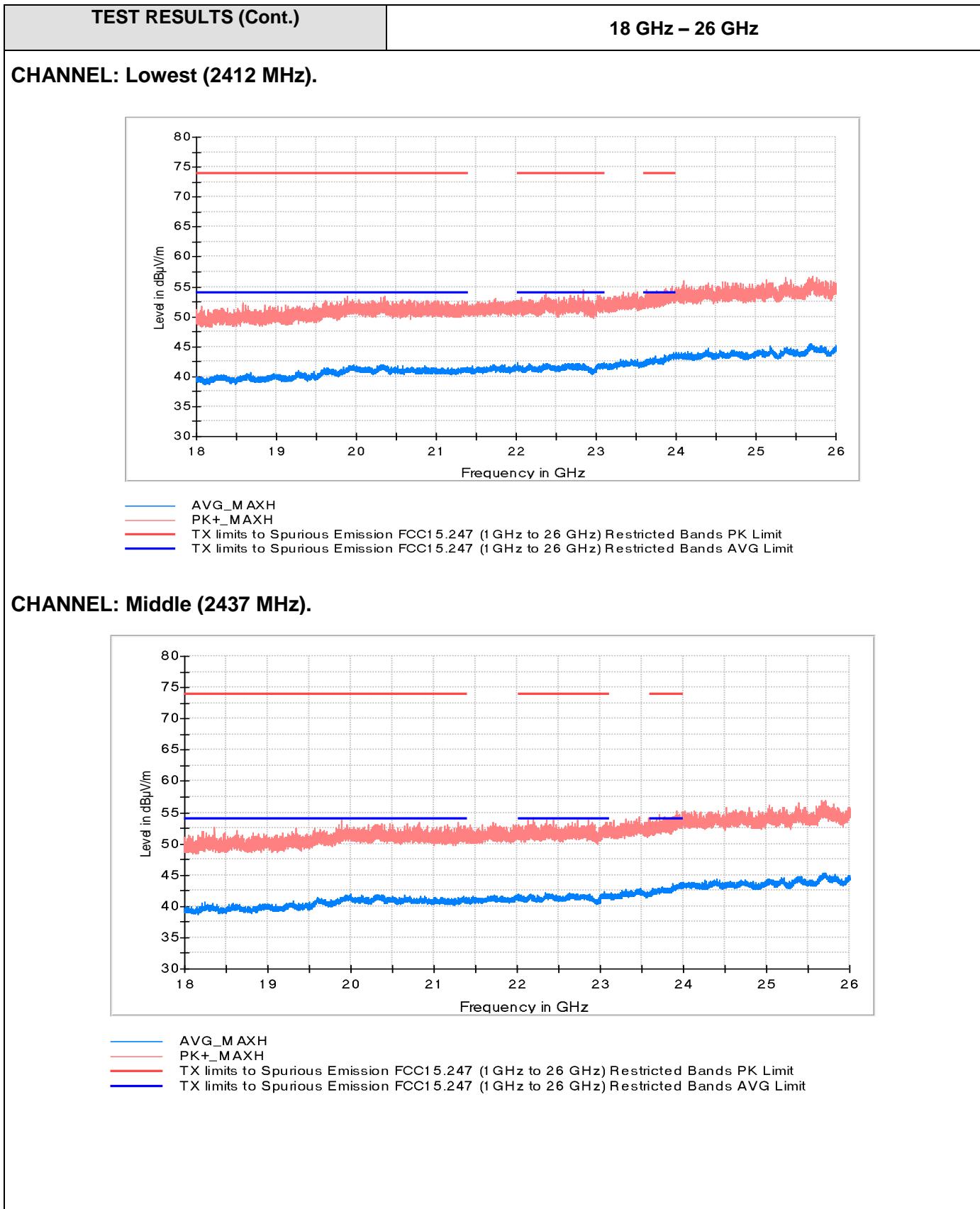
CHANNEL: Middle (2437 MHz).

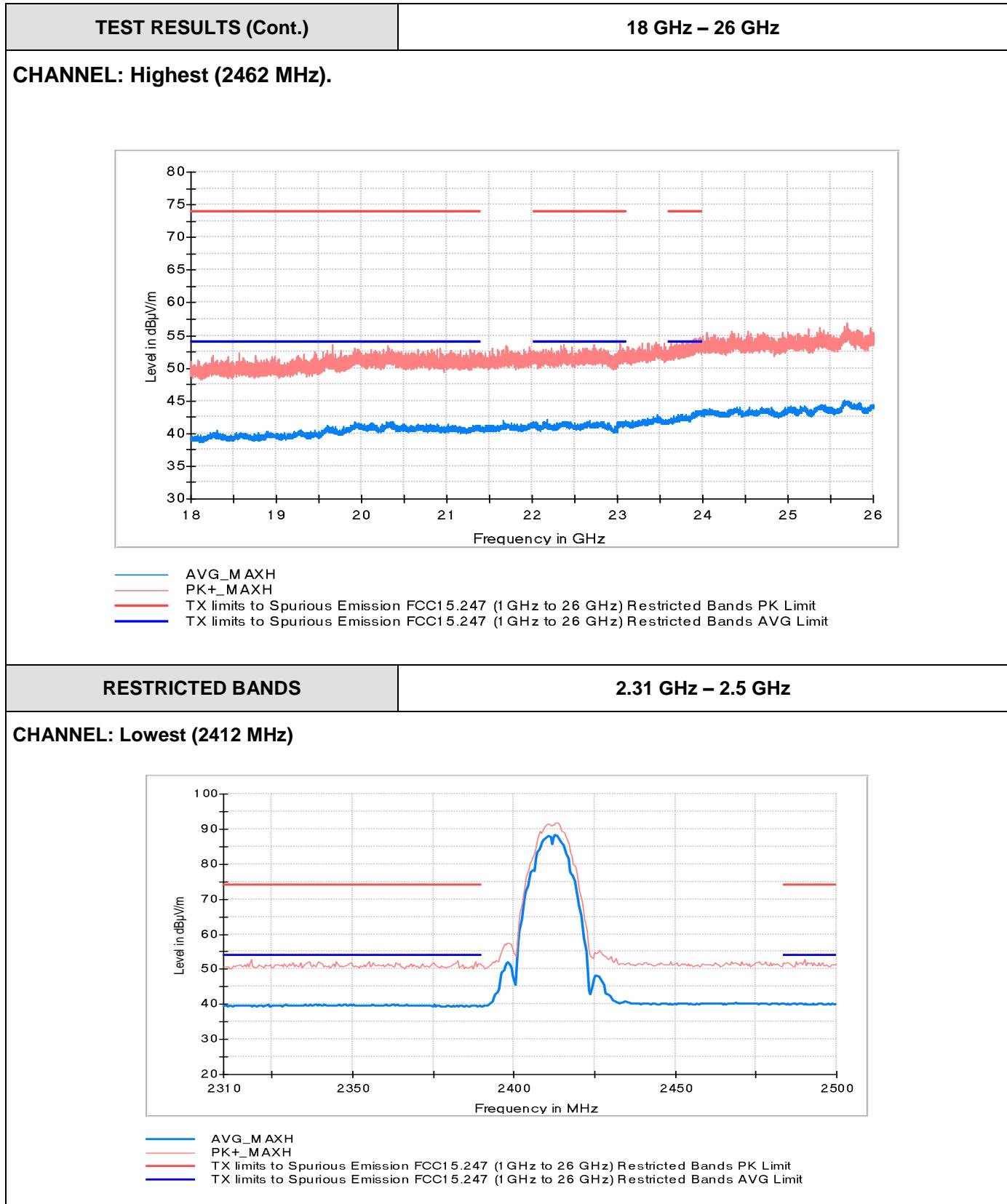


Maximizations

Frequency (MHz)	PK+_MAXH (dB μ V/m)	AVG_MAXH (dB μ V/m)	Pol	Comment
2436.000000	92.1	88.6	H	Fundamental
4873.500000	50.2	45.7	H	
7309.000000	46.1	39.4	V	



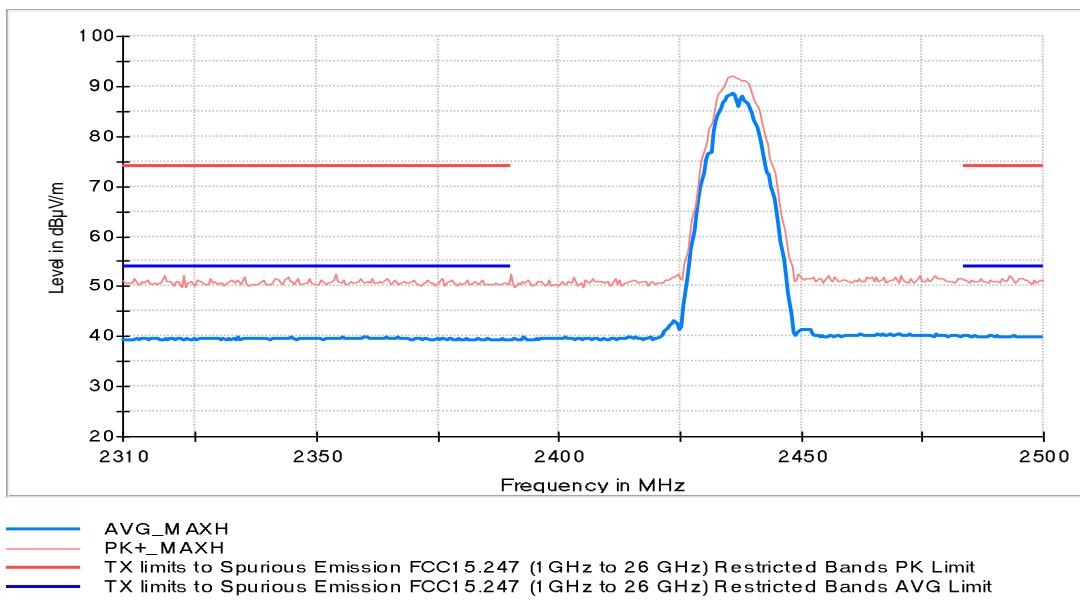




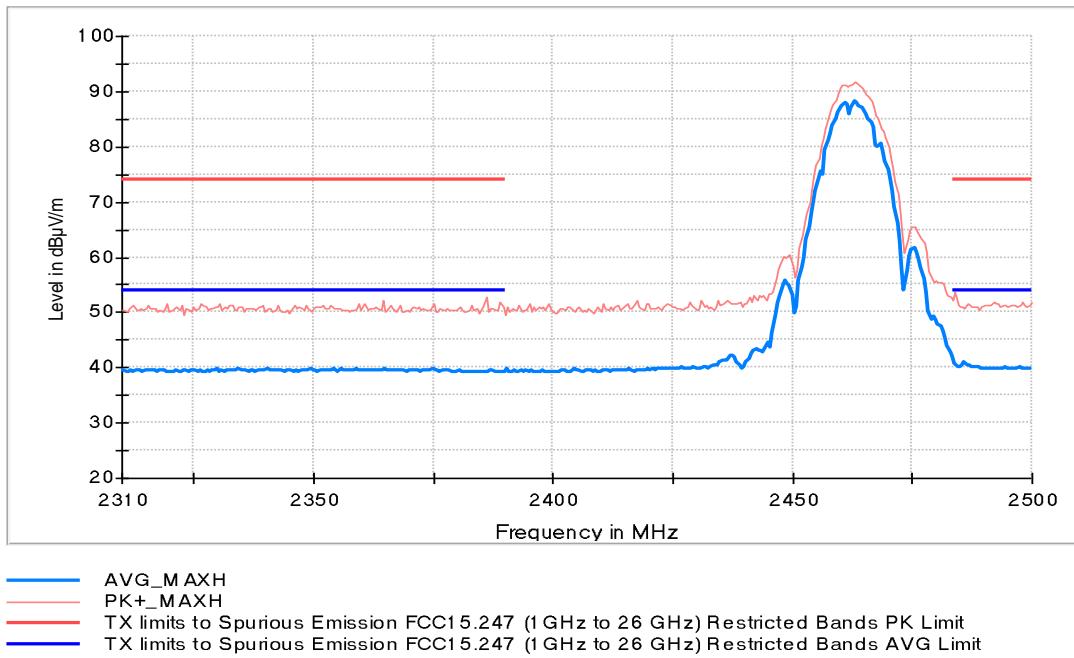
TEST RESULTS (Cont.)

2.31 GHz – 2.5 GHz

CHANNEL: Middle (2437 MHz)



CHANNEL: Highest (2462 MHz)



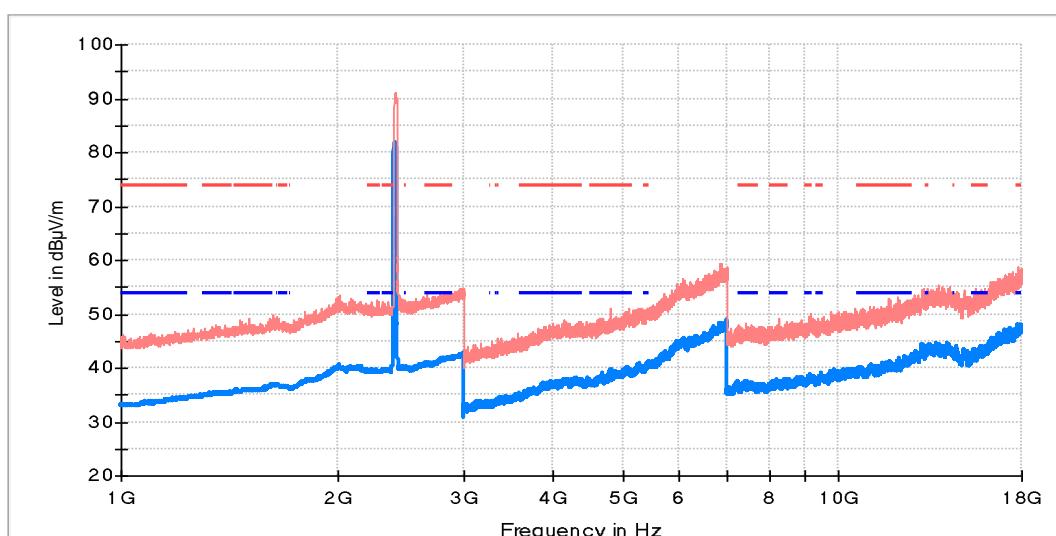
TESTED SAMPLES:	S/03
TESTED CONDITIONS MODES:	TC#02 (g mode)
TEST RESULTS:	PASS

Frequency range 1 GHz – 26 GHz

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.5 GHz. (see next plots).

TEST RESULTS (Cont.)	1 – 18 GHz
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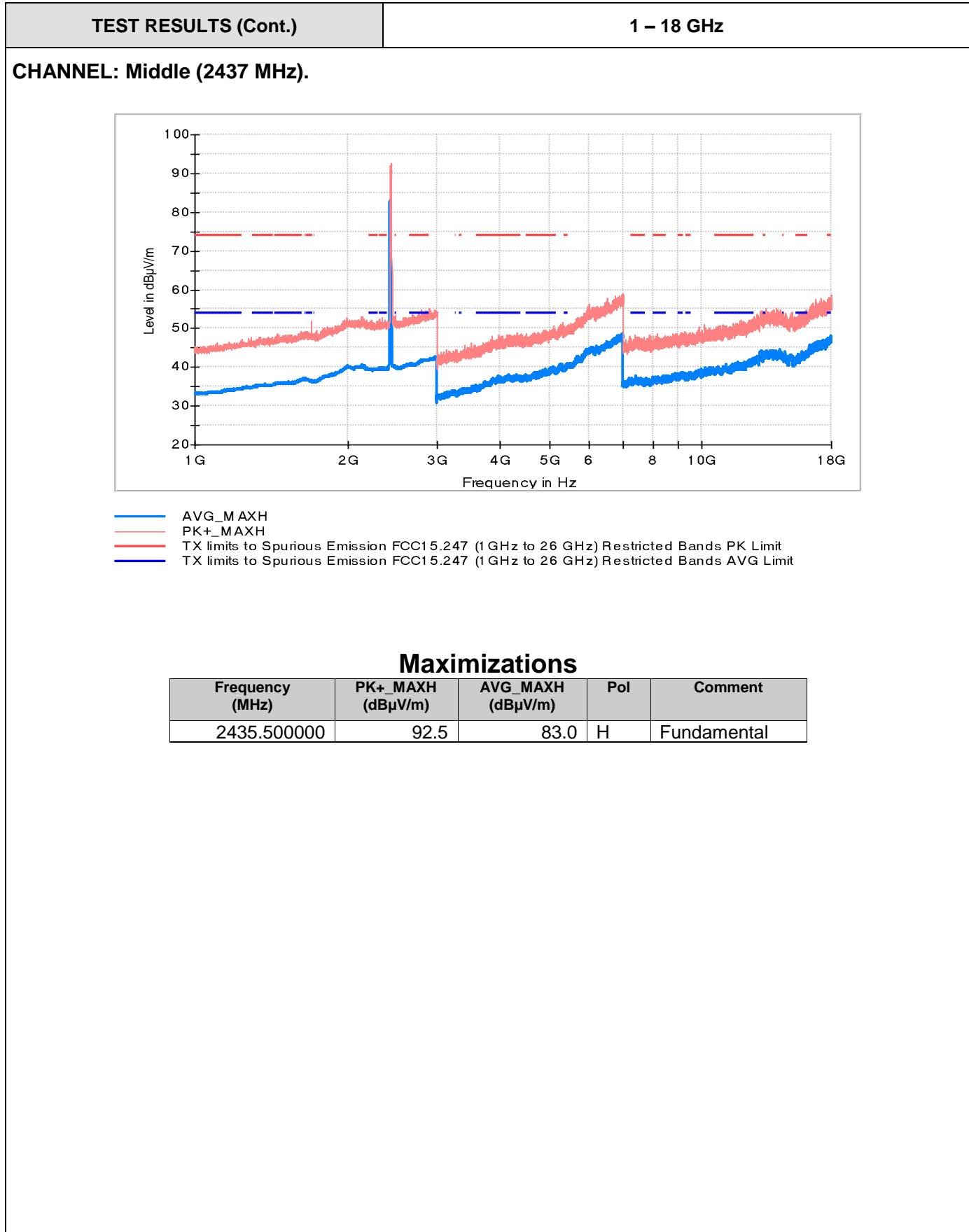
CHANNEL: Low (2412 MHz).

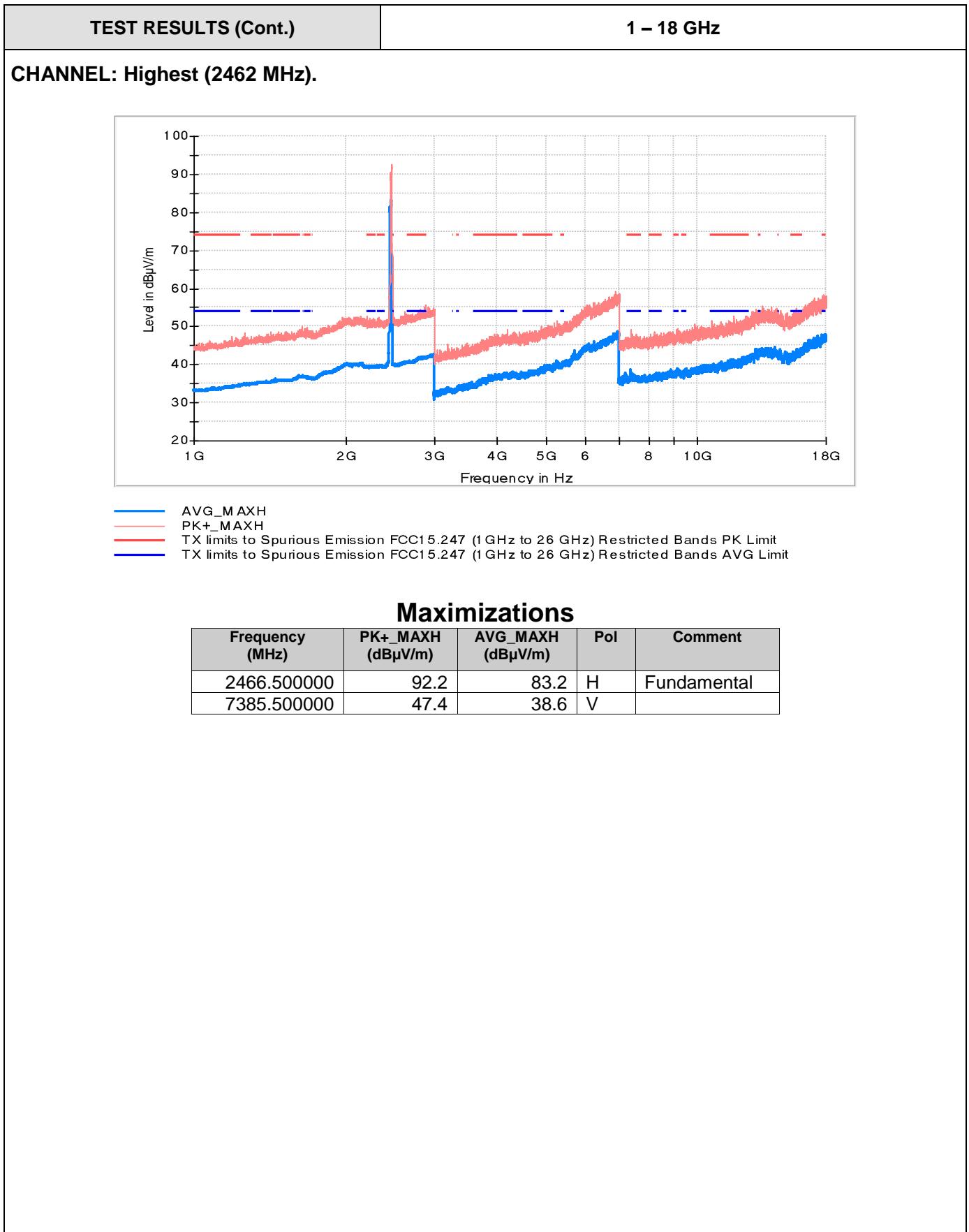


- AVG_M AXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit
- PK+_MAXH(1)@ RE0104_HR_1GHz-18GHz_Low_2412_gmode

Maximizations

Frequency (MHz)	PK+_MAXH (dB μ V/m)	AVG_MAXH (dB μ V/m)	Pol	Comment
2412.000000	89.3	79.9	H	Fundamental

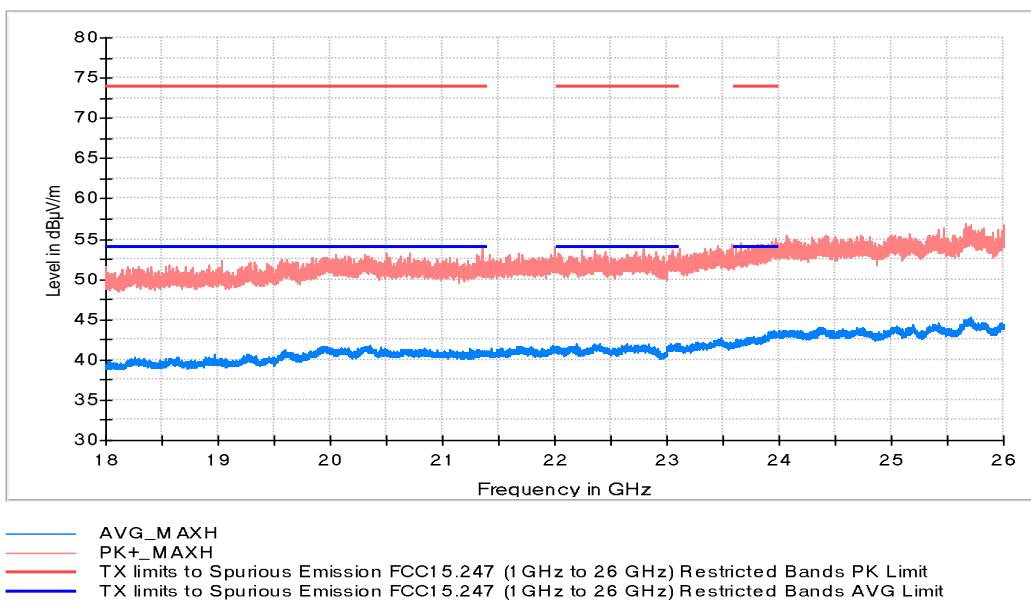




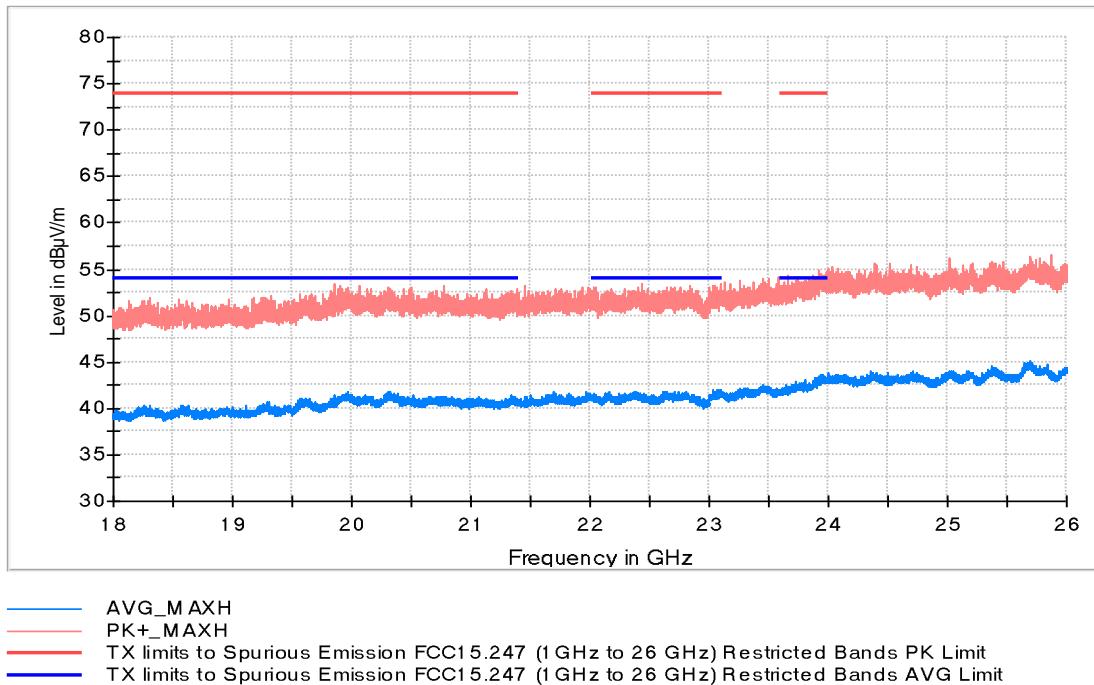
TEST RESULTS (Cont.)

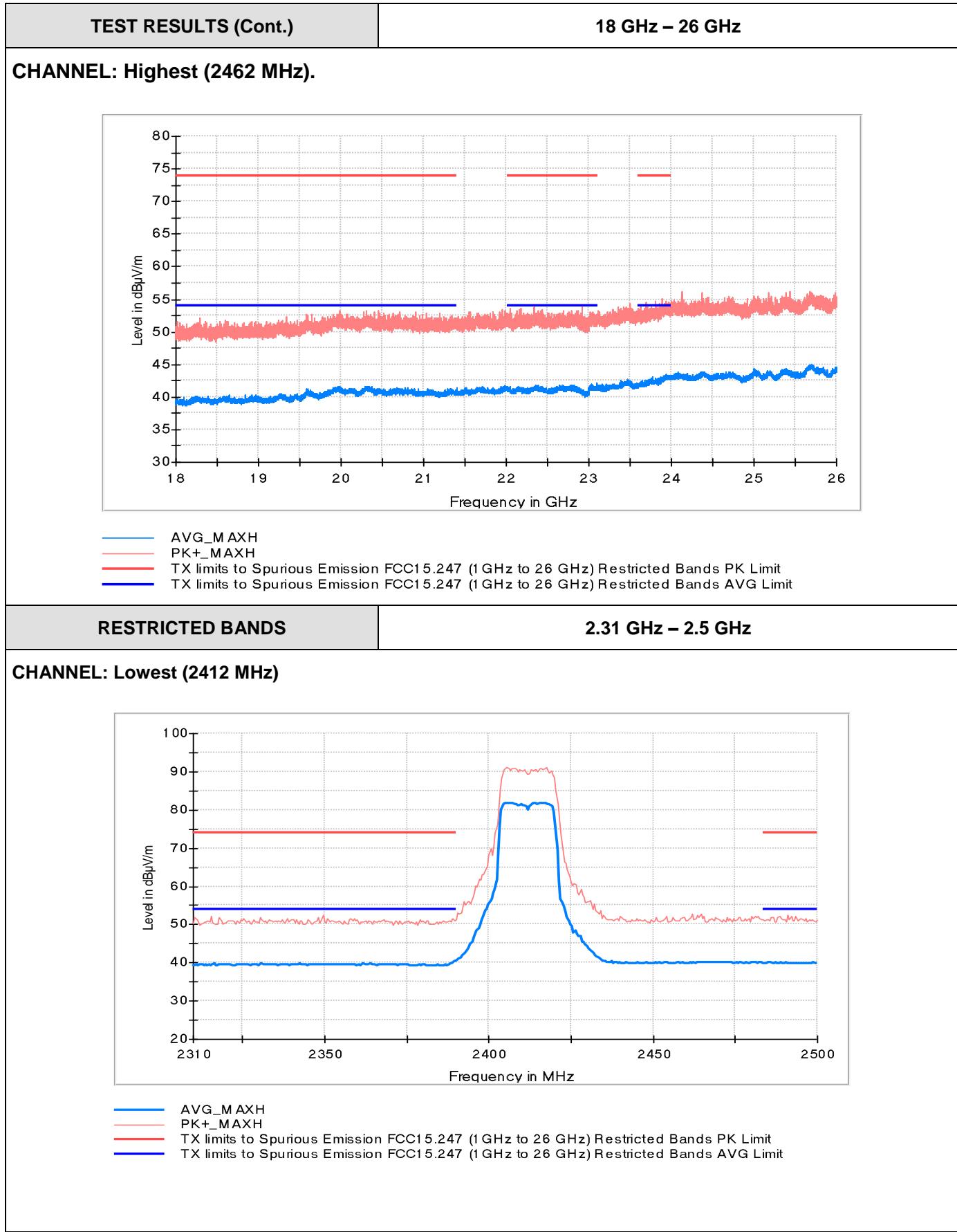
18 GHz – 26 GHz

CHANNEL: Lowest (2412 MHz).



CHANNEL: Middle (2437 MHz).

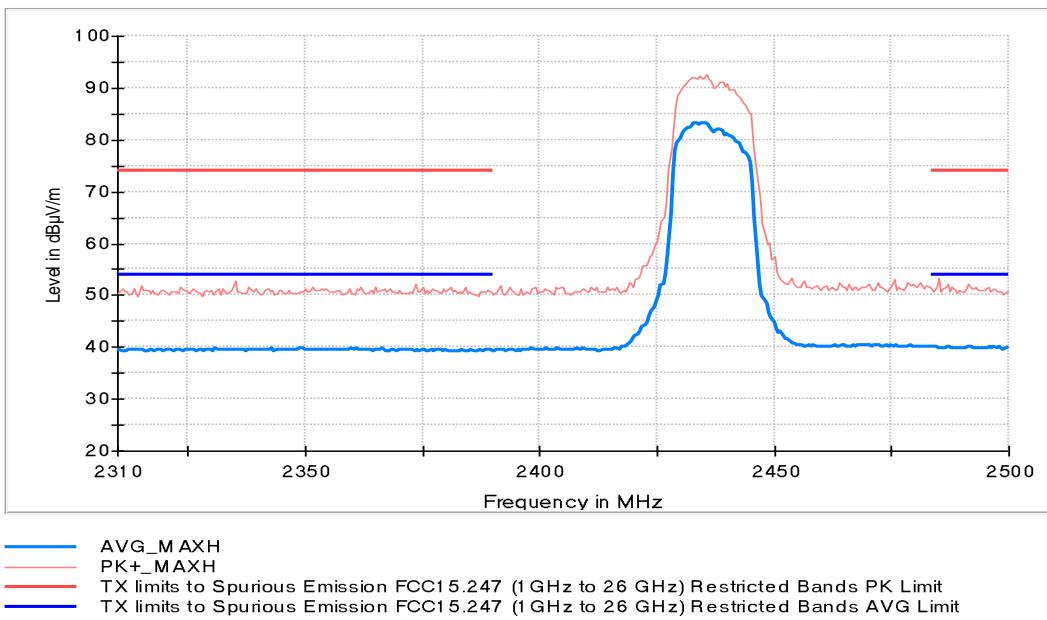




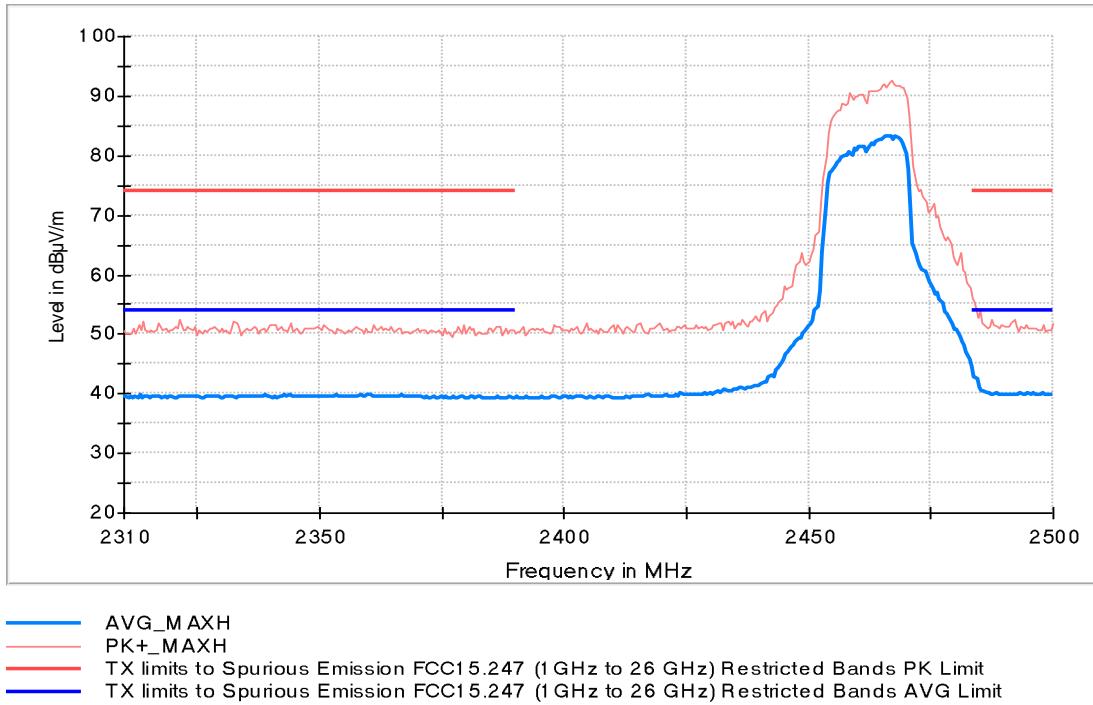
TEST RESULTS (Cont.)

2.31 GHz – 2.5 GHz

CHANNEL: Middle (2437 MHz)

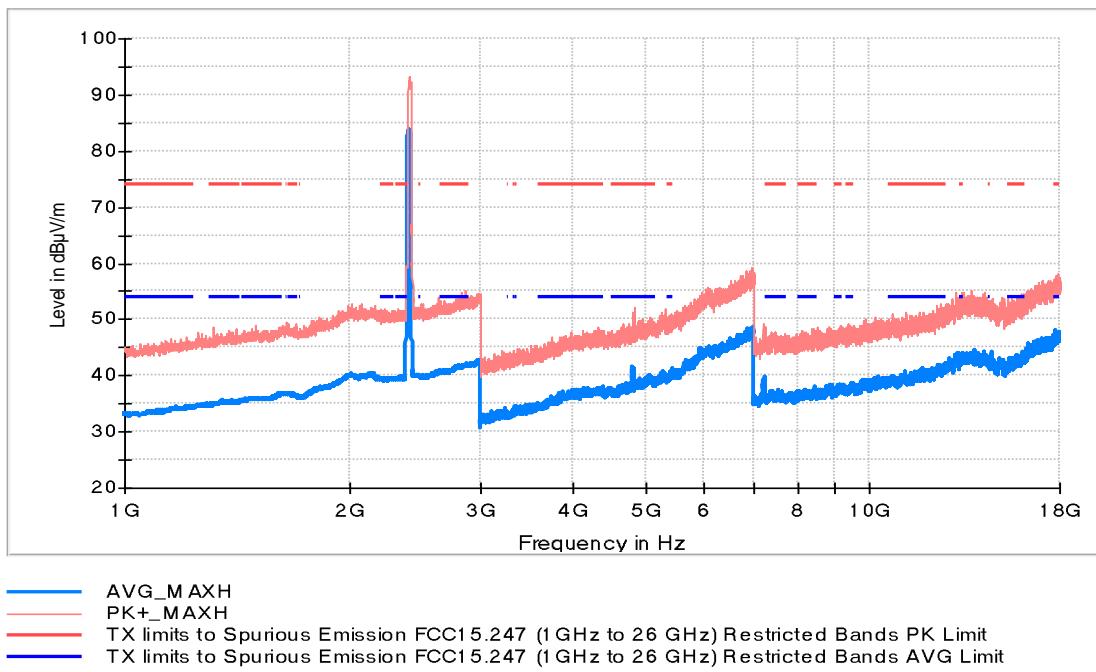


CHANNEL: Highest (2462 MHz)



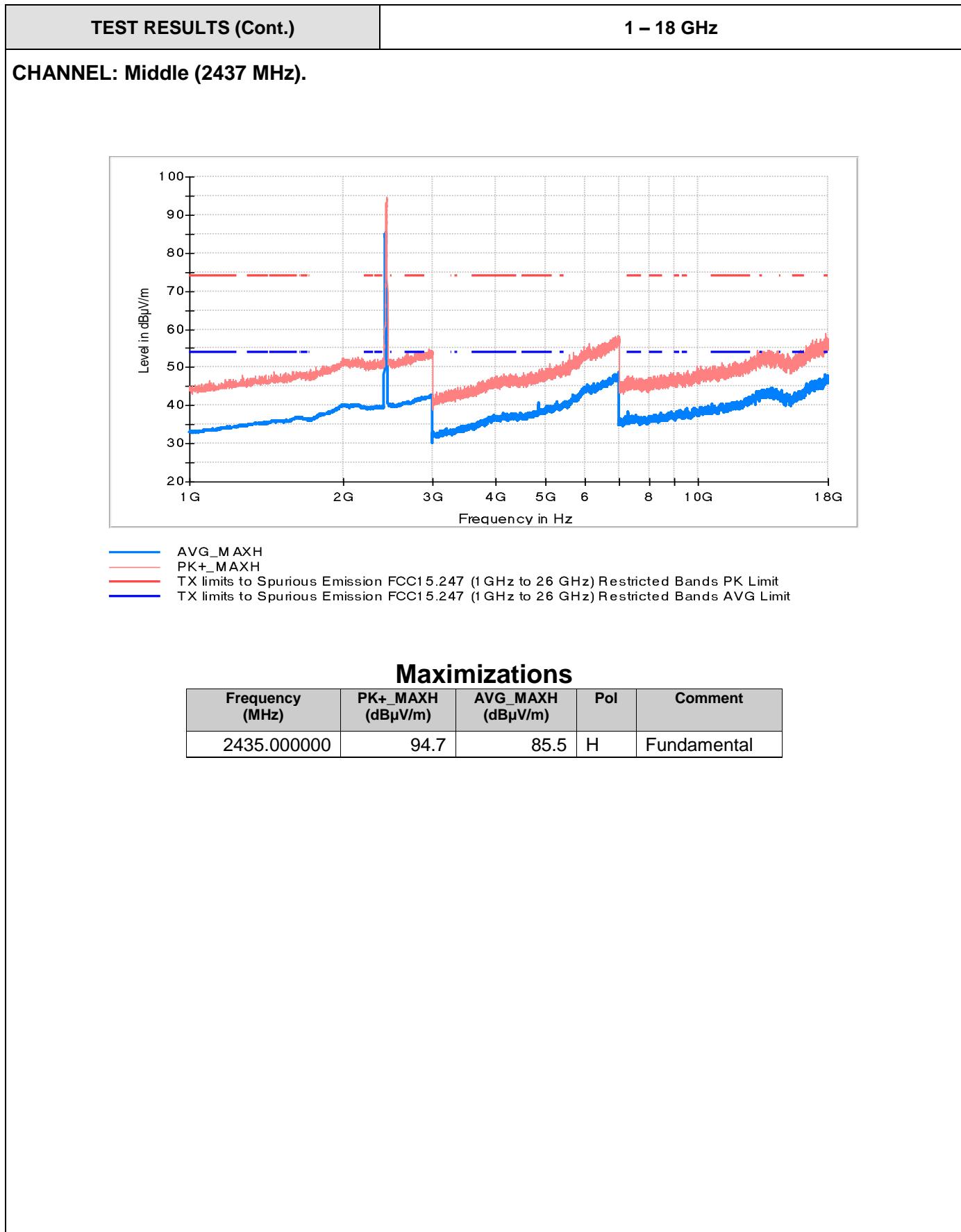
TESTED SAMPLES:	S/03
TESTED CONDITIONS MODES:	TC#03 (n20 mode)
TEST RESULTS:	PASS
Frequency range 1 GHz – 26 GHz	
The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.5 GHz. (see next plots).	
TEST RESULTS (Cont.)	1 – 18 GHz

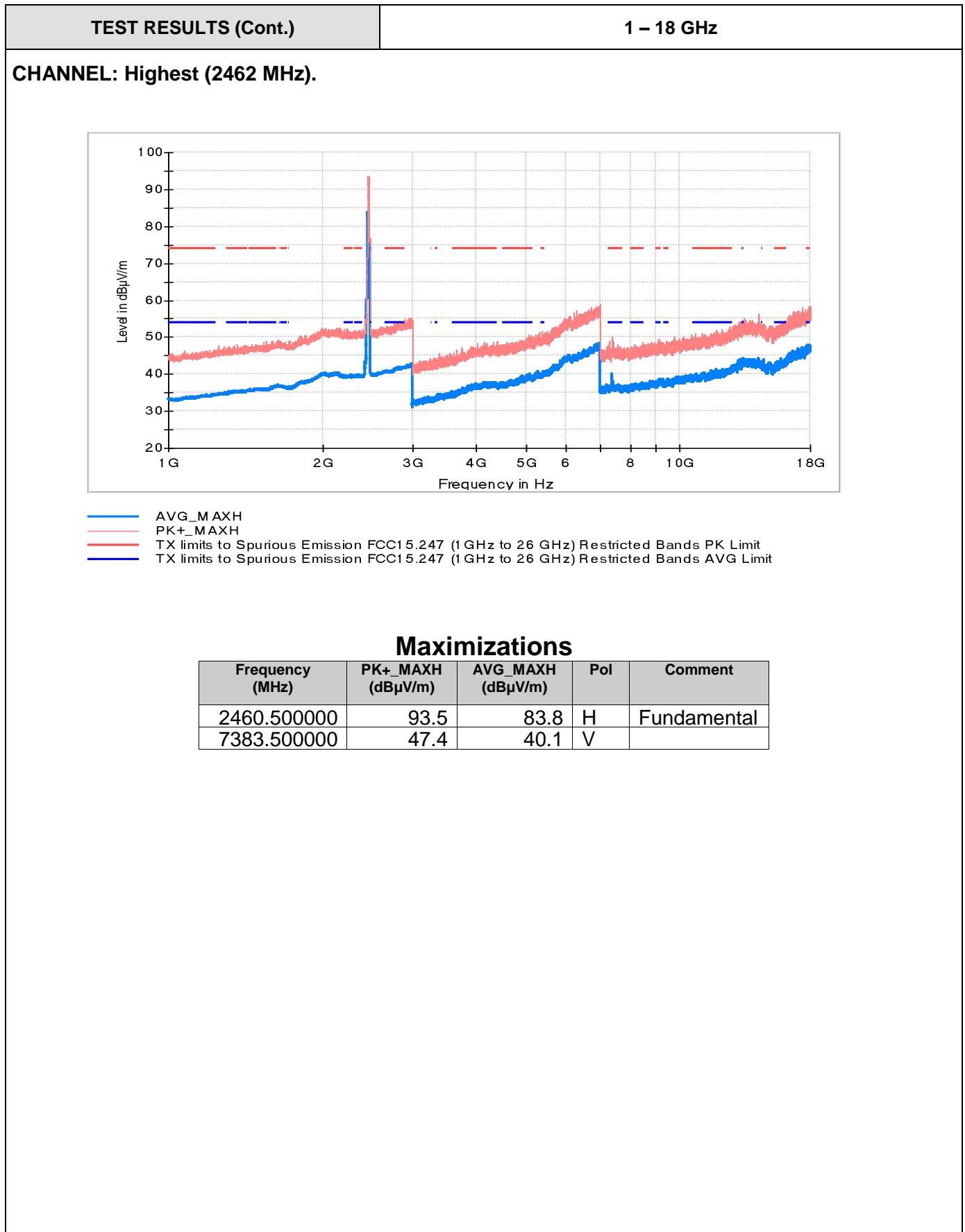
CHANNEL: Low (2412 MHz).

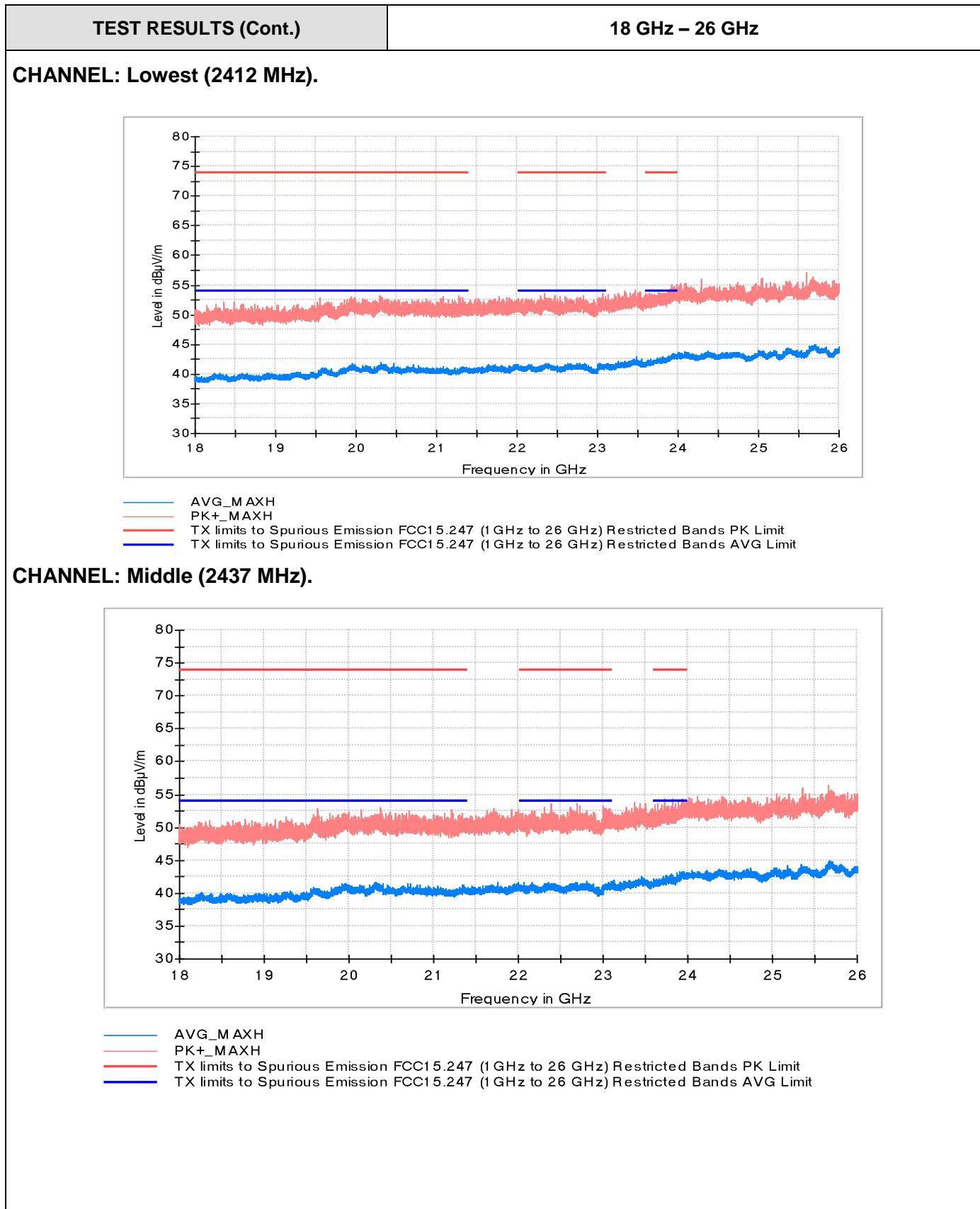


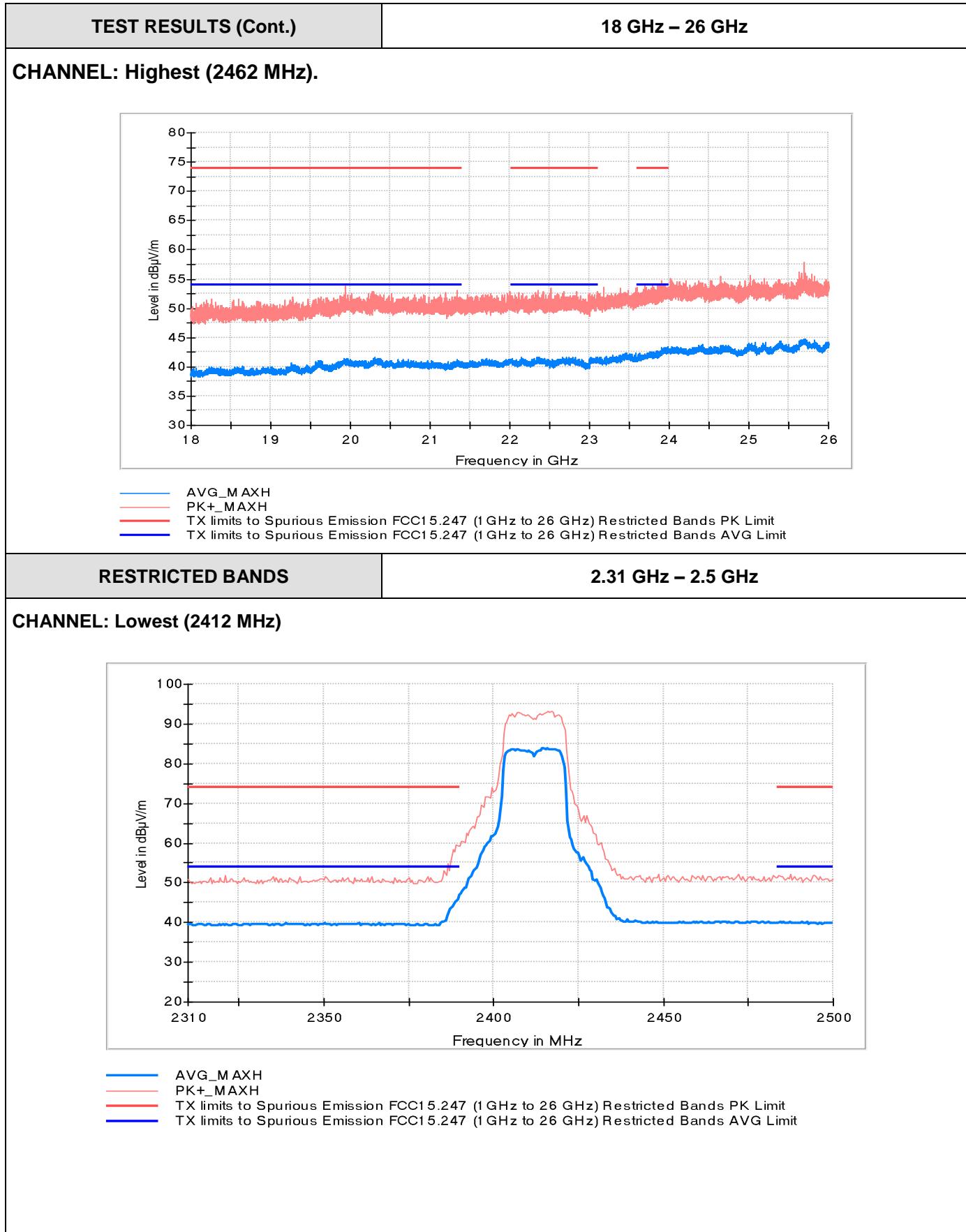
Maximizations

Frequency (MHz)	PK+_MAXH (dB μ V/m)	AVG_MAXH (dB μ V/m)	Pol	Comment
2416.000000	93.4	83.7	H	Fundamental
4825.000000	52.1	40.5	H	
7221.500000	49.2	38.3	V	





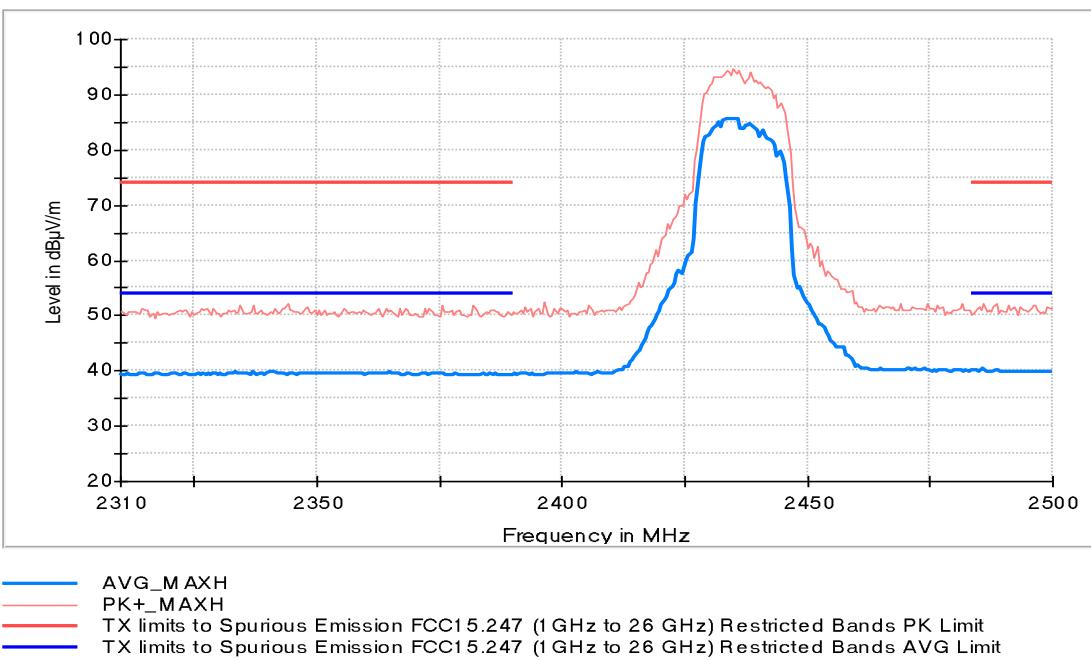




TEST RESULTS (Cont.)

2.31 GHz – 2.5 GHz

CHANNEL: Middle (2437 MHz)



CHANNEL: Highest (2462 MHz)

