

SPURIOUS CONDUCTED EMISSIONS



XMR 2017.02.08

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	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	1/21/2015	1/21/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AUY	6/27/2016	6/27/2017
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017

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 listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

Because the reference level was taken with an RMS detector, the attenuation requirement is -30 dBc.


In accordance with power settings stated herein, the power applied to each antenna is different. The approximate output power for each antenna is listed below.

- Yagi antenna: ≈ 24 dBm
- Dipole antenna: ≈ 30 dBm

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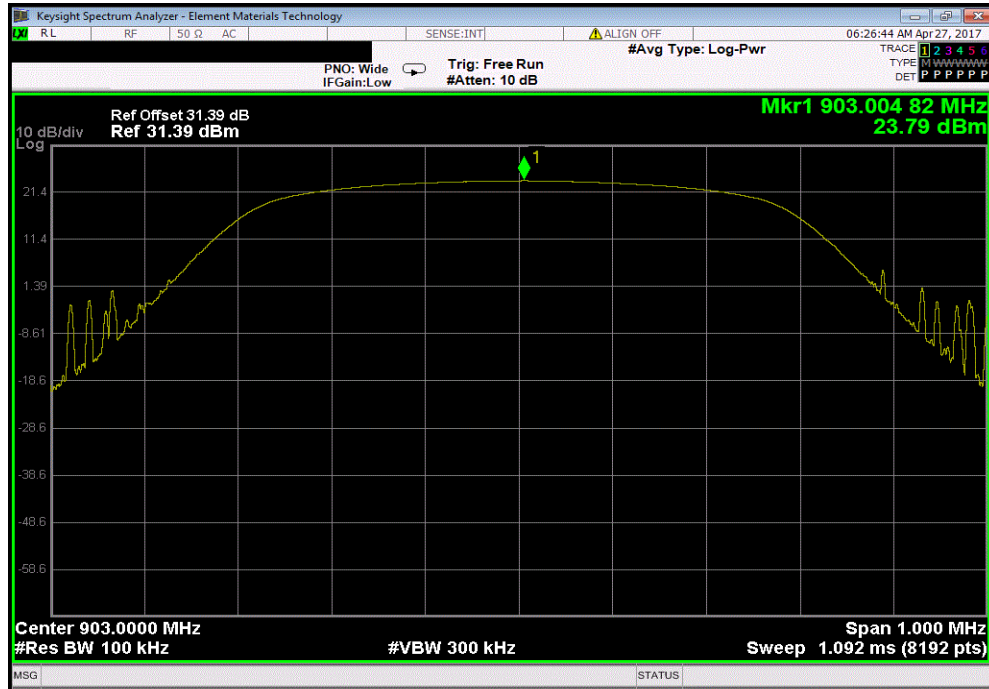
EUT: XB1301			Work Order: PECK0002		
Serial Number: 17			Date: 04/26/17		
Customer: APANA Inc			Temperature: 22.9 °C		
Attendees: None			Humidity: 41.6% RH		
Project: None			Barometric Pres.: 1017 mbar		
Tested by: Brandon Hobbs		Power: 5 VDC Nominal via 110VAC/60Hz	Job Site: EV06		
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2017		ANSI C63.10:2013			
COMMENTS					
The power level settings for the Yagi (12dBi) antenna data listed below are as follows: DAC = 4000, MXG = 8. The power level settings for the Dipole antenna data listed below are as follows: DAC = 4000, MXG = 12. All measurements were made at -20°C per client's request. Power limit for the Yagi antenna was lowered to accommodate for an antenna gain greater than 6dBi. A termination was placed on the unused antenna port while under test.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature 			
		Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Yagi Antenna					
Port A					
500 kHz Bandwidth					
Spreading Factor 7					
Low Channel 903 MHz		Fundamental	N/A	N/A	N/A
Low Channel 903 MHz		30 MHz - 12.5 GHz	-61.12	-30	Pass
Low Channel 903 MHz		12.5 GHz - 25 GHz	-52.34	-30	Pass
Mid Channel 914.2 MHz		Fundamental	N/A	N/A	N/A
Mid Channel 914.2 MHz		30 MHz - 12.5 GHz	-66.08	-30	Pass
Mid Channel 914.2 MHz		12.5 GHz - 25 GHz	-52.53	-30	Pass
High Channel 927.5 MHz		Fundamental	N/A	N/A	N/A
High Channel 927.5 MHz		30 MHz - 12.5 GHz	-61.26	-30	Pass
High Channel 927.5 MHz		12.5 GHz - 25 GHz	-52.43	-30	Pass
Port B					
500 kHz Bandwidth					
Spreading Factor 7					
Low Channel 903 MHz		Fundamental	N/A	N/A	N/A
Low Channel 903 MHz		30 MHz - 12.5 GHz	-58.63	-30	Pass
Low Channel 903 MHz		12.5 GHz - 25 GHz	-51.64	-30	Pass
Mid Channel 914.2 MHz		Fundamental	N/A	N/A	N/A
Mid Channel 914.2 MHz		30 MHz - 12.5 GHz	-63.24	-30	Pass
Mid Channel 914.2 MHz		12.5 GHz - 25 GHz	-52.19	-30	Pass
High Channel 927.5 MHz		Fundamental	N/A	N/A	N/A
High Channel 927.5 MHz		30 MHz - 12.5 GHz	-61.22	-30	Pass
High Channel 927.5 MHz		12.5 GHz - 25 GHz	-50.77	-30	Pass
Dipole Antenna					
Port A					
500 kHz Bandwidth					
Spreading Factor 7					
Low Channel 903 MHz		Fundamental	N/A	N/A	N/A
Low Channel 903 MHz		30 MHz - 12.5 GHz	-65.56	-30	Pass
Low Channel 903 MHz		12.5 GHz - 25 GHz	-56.91	-30	Pass
Mid Channel 914.2 MHz		Fundamental	N/A	N/A	N/A
Mid Channel 914.2 MHz		30 MHz - 12.5 GHz	-65.32	-30	Pass
Mid Channel 914.2 MHz		12.5 GHz - 25 GHz	-57.52	-30	Pass
High Channel 927.5 MHz		Fundamental	N/A	N/A	N/A
High Channel 927.5 MHz		30 MHz - 12.5 GHz	-60.52	-30	Pass
High Channel 927.5 MHz		12.5 GHz - 25 GHz	-56.86	-30	Pass
Port B					
500 kHz Bandwidth					
Spreading Factor 7					
Low Channel 903 MHz		Fundamental	N/A	N/A	N/A
Low Channel 903 MHz		30 MHz - 12.5 GHz	-63.93	-30	Pass
Low Channel 903 MHz		12.5 GHz - 25 GHz	-56.63	-30	Pass
Mid Channel 914.2 MHz		Fundamental	N/A	N/A	N/A
Mid Channel 914.2 MHz		30 MHz - 12.5 GHz	-66.45	-30	Pass
Mid Channel 914.2 MHz		12.5 GHz - 25 GHz	-56.79	-30	Pass
High Channel 927.5 MHz		Fundamental	N/A	N/A	N/A
High Channel 927.5 MHz		30 MHz - 12.5 GHz	-65.77	-30	Pass
High Channel 927.5 MHz		12.5 GHz - 25 GHz	-56.55	-30	Pass

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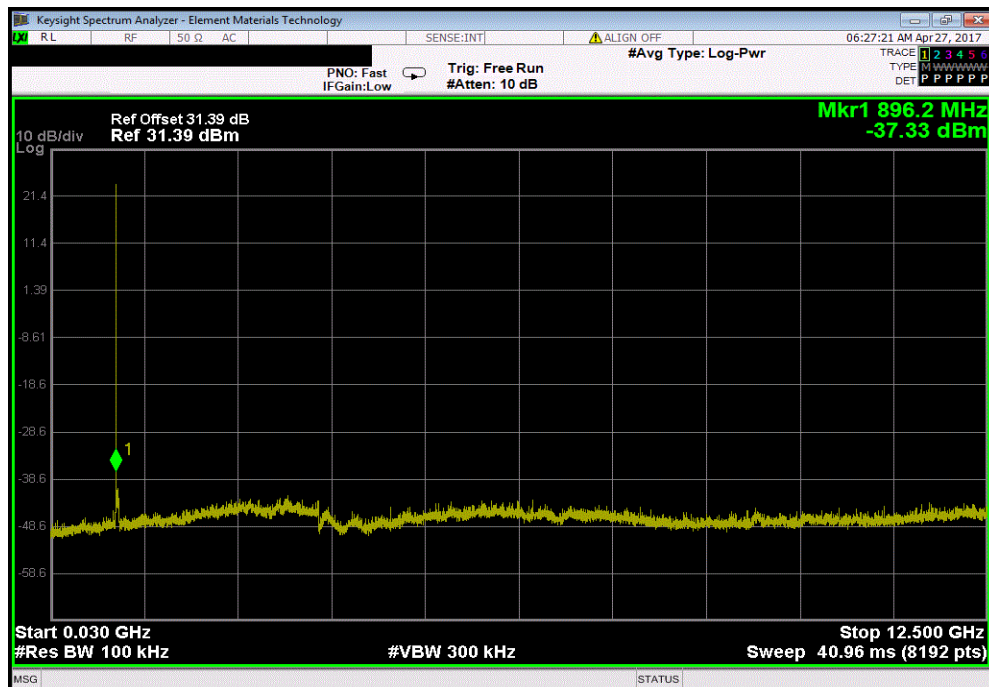


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Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-61.12		-30	Pass	

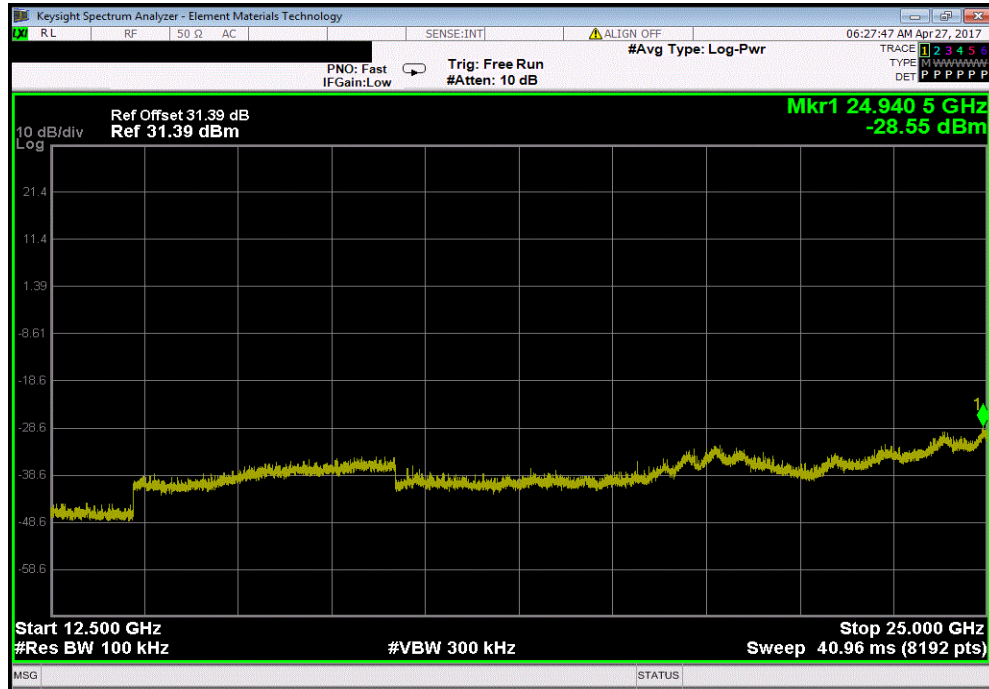


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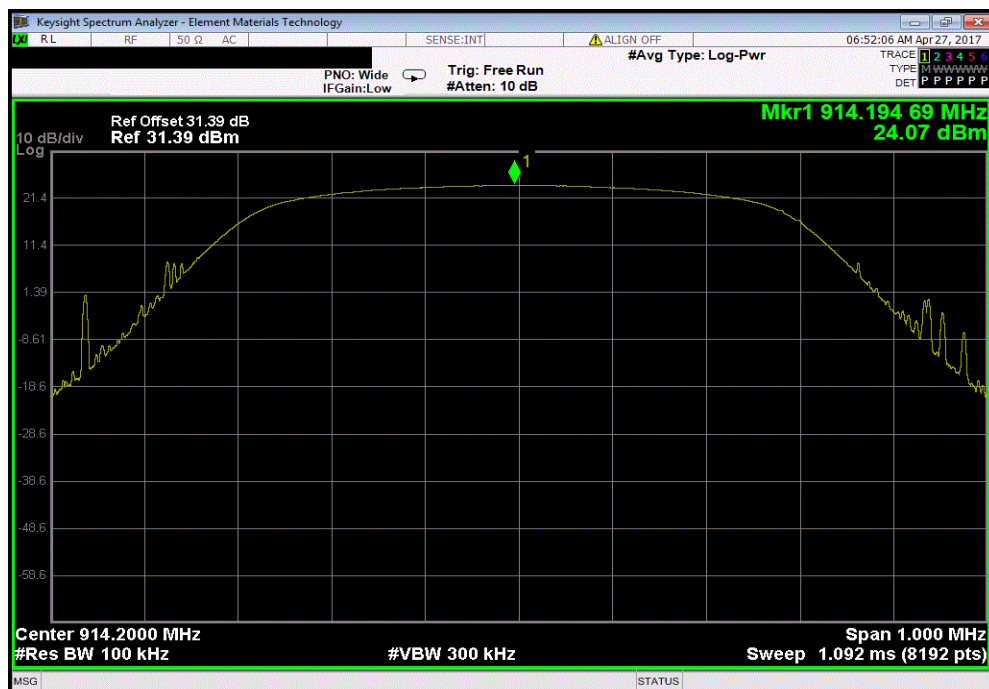


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Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.34	-30	Pass	



Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

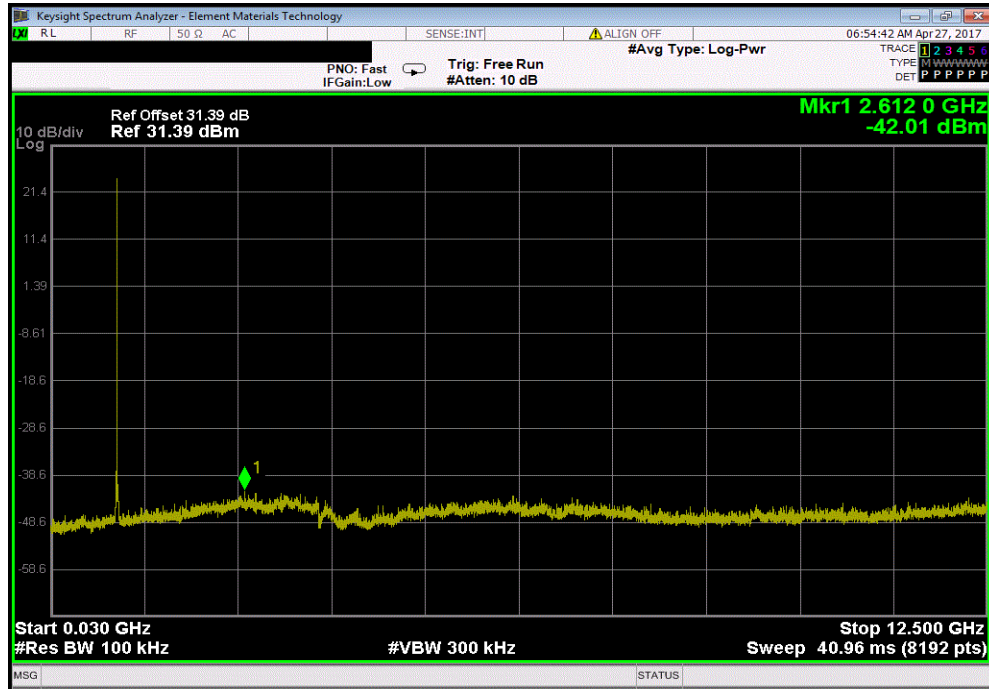


SPURIOUS CONDUCTED EMISSIONS

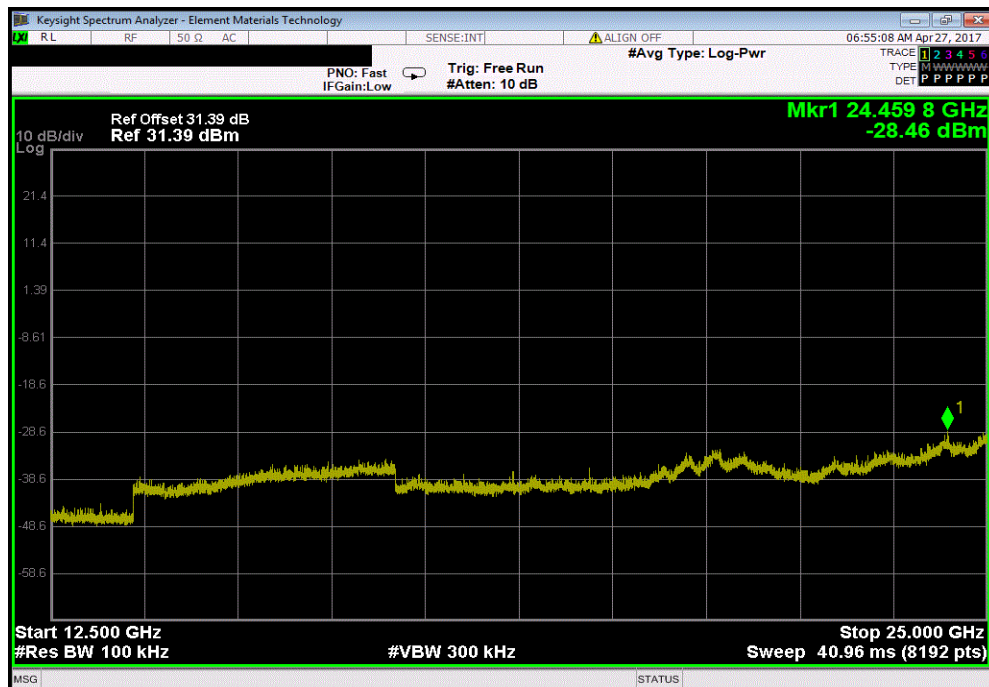


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Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-66.08	-30	Pass	



Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.53	-30	Pass	

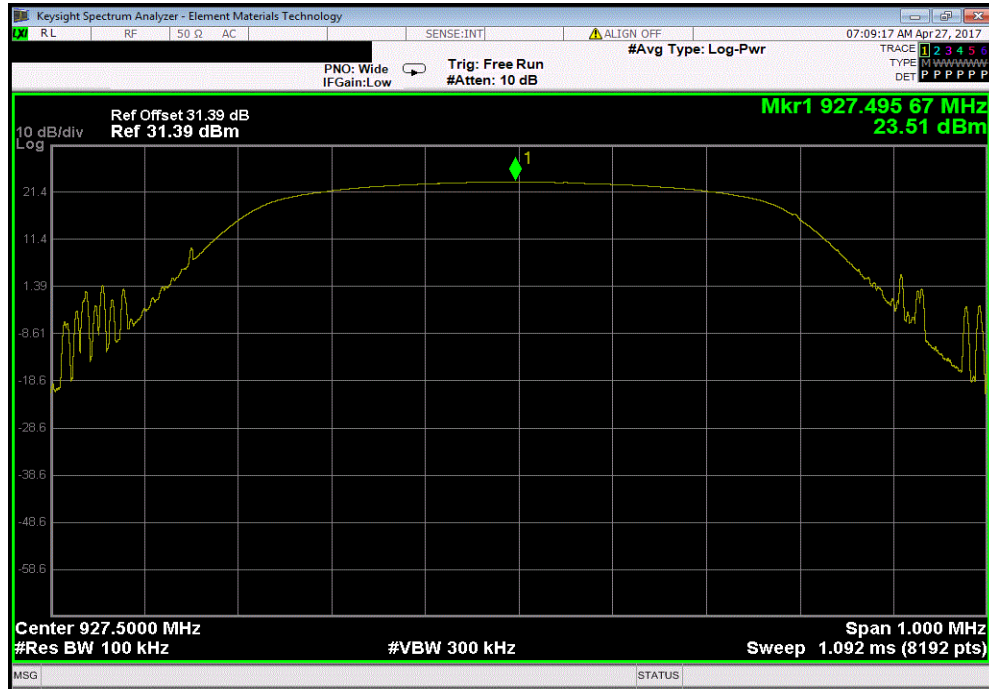


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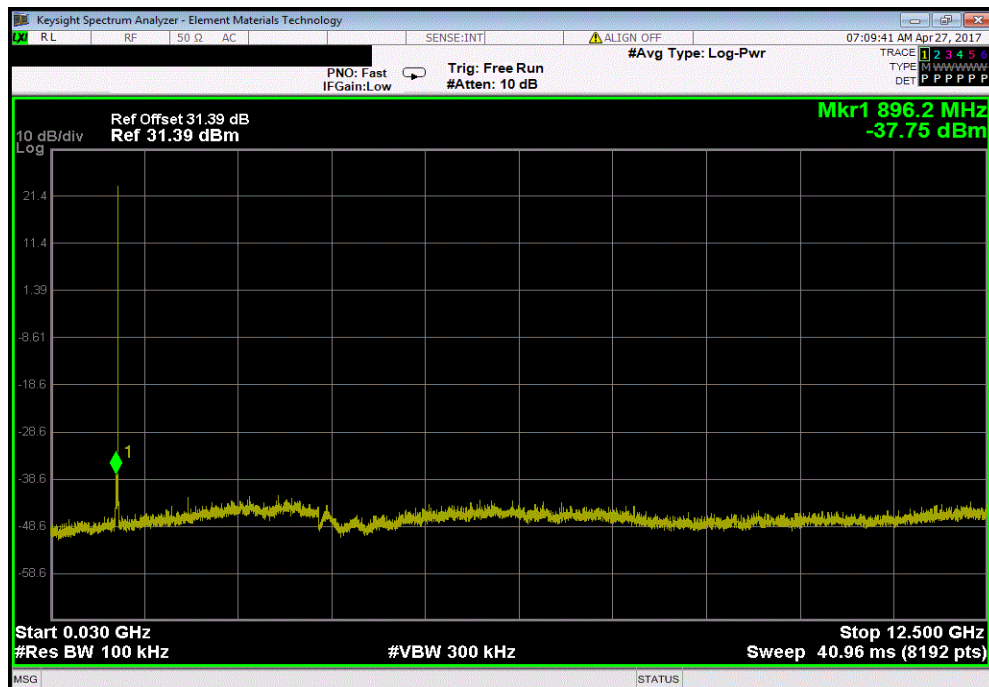


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Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental		N/A	N/A	N/A		



Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz		-61.26	-30	Pass		



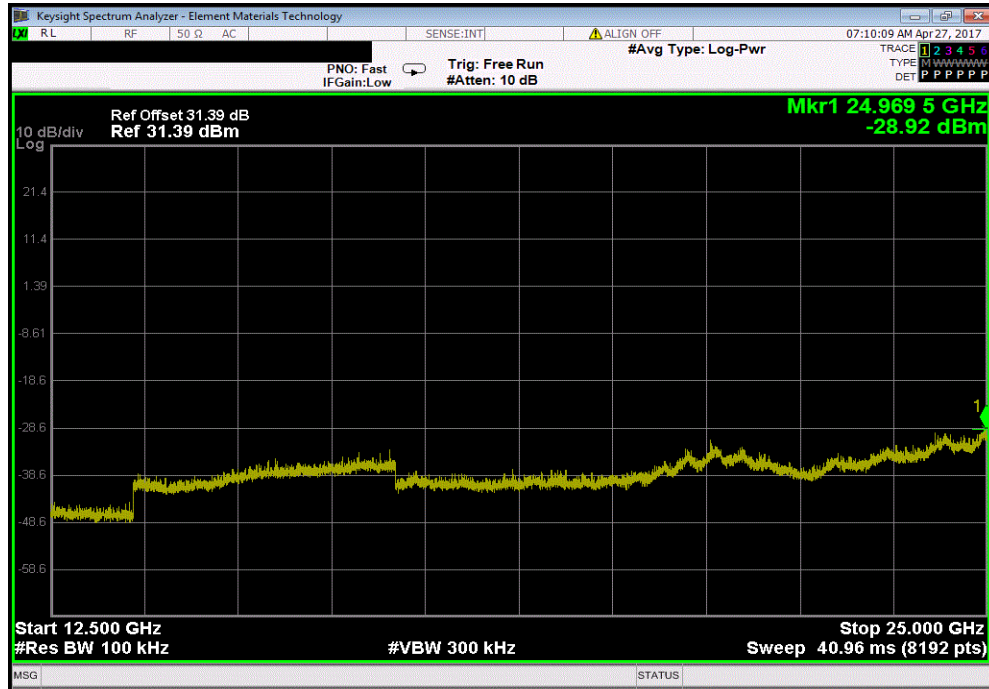
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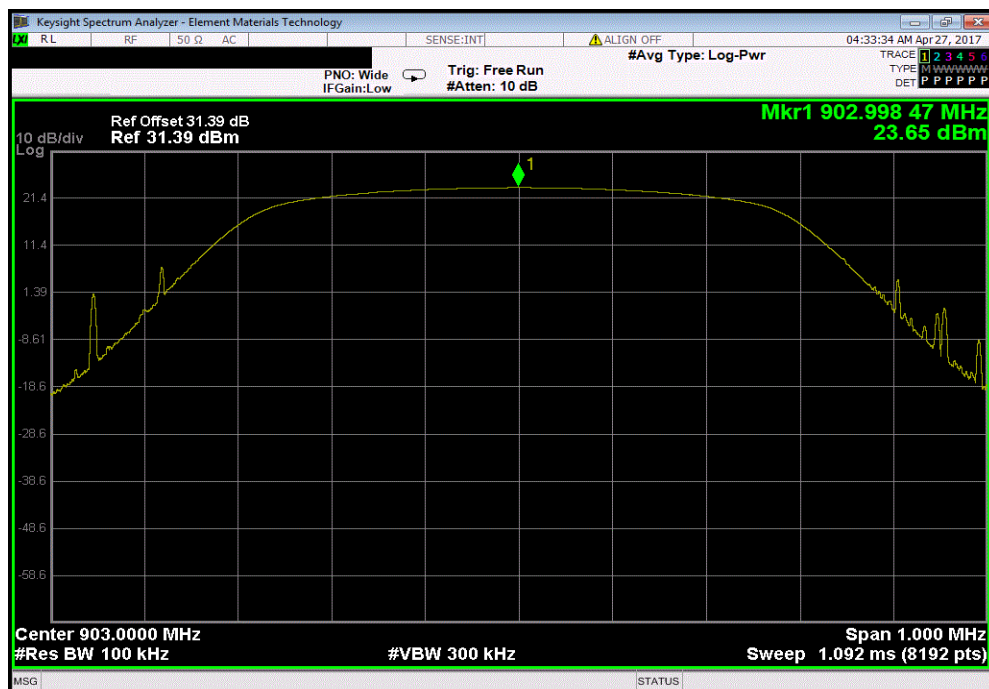
Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz

Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	-52.43	-30	Pass



Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz

Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	N/A	N/A	N/A

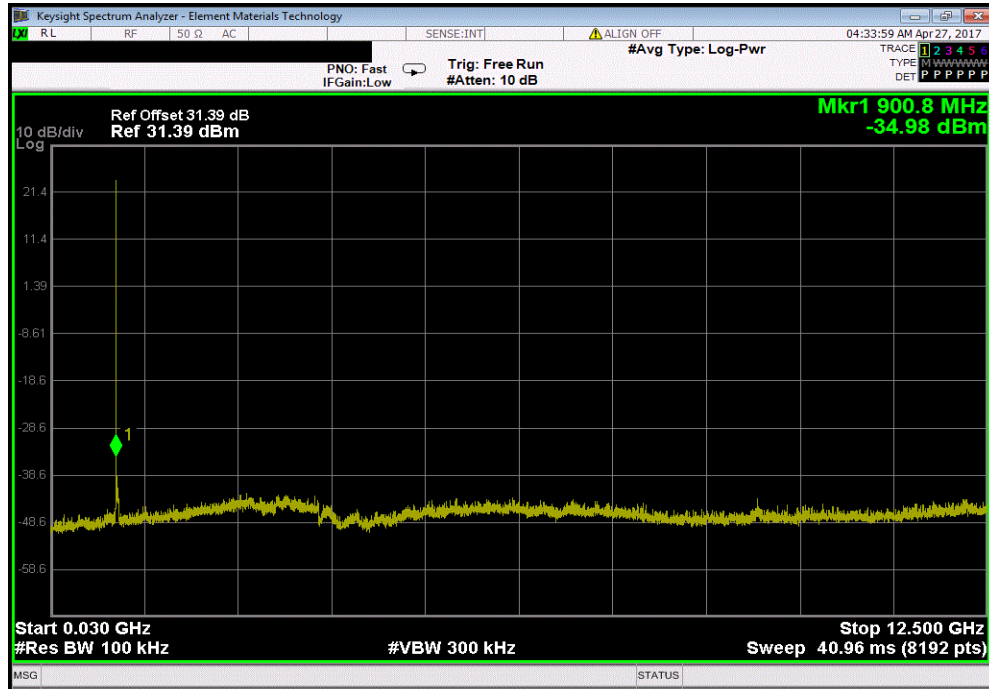


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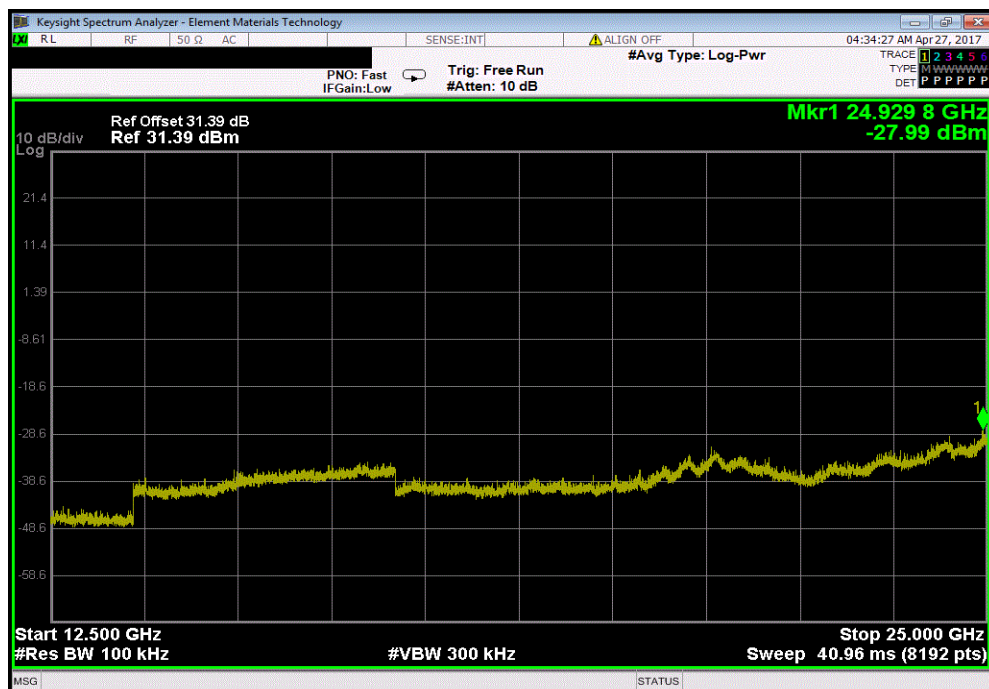


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Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-58.63	-30	Pass	



Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-51.64	-30	Pass	

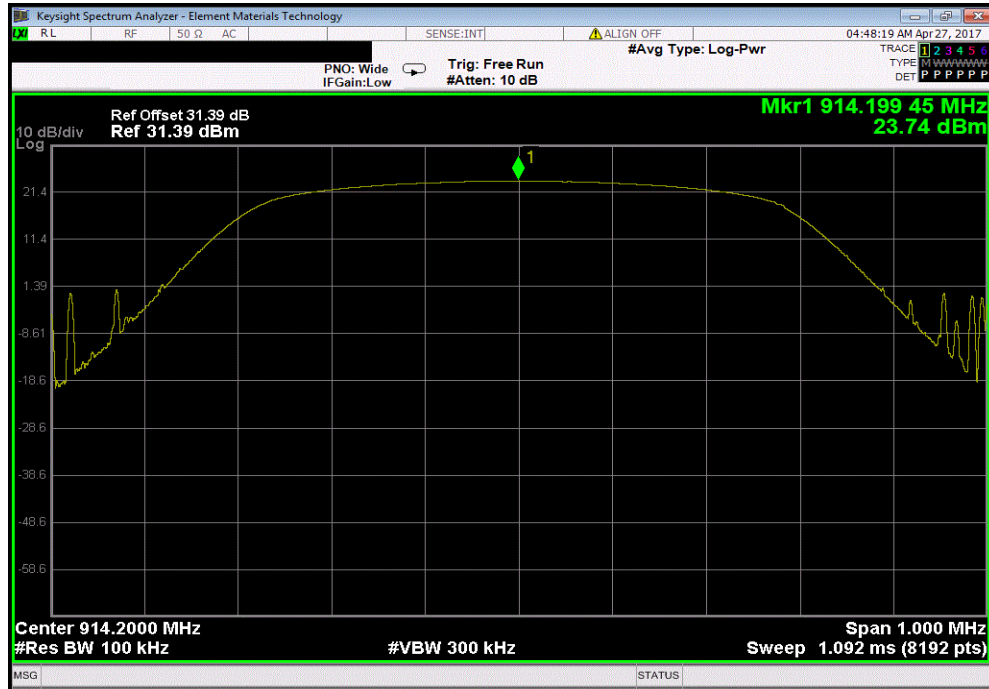


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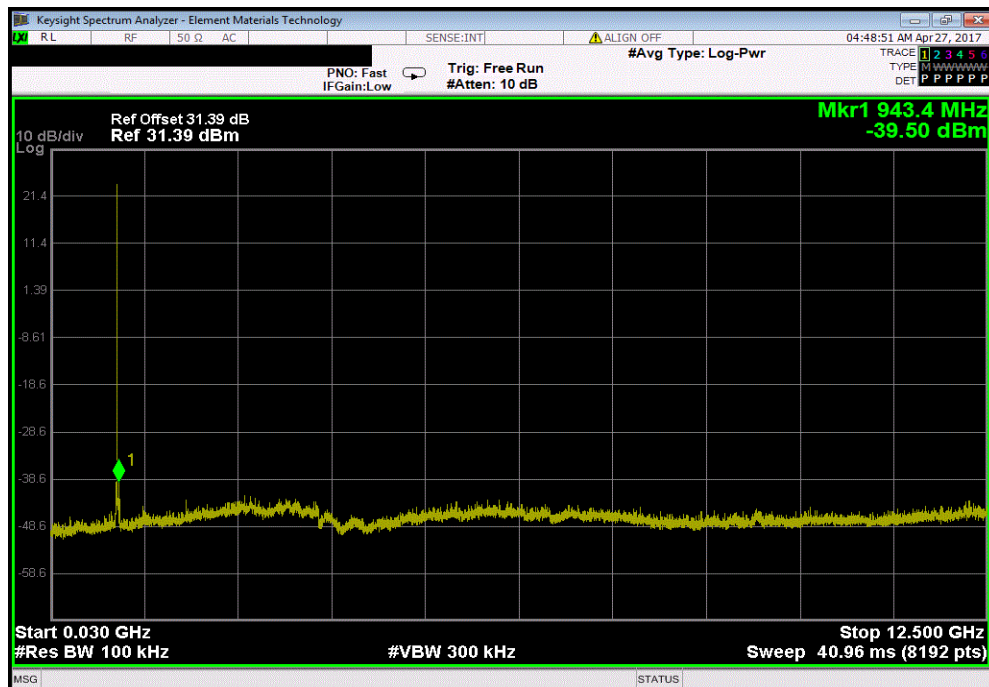


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Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental		N/A	N/A	N/A		



Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz		-63.24	-30	Pass		

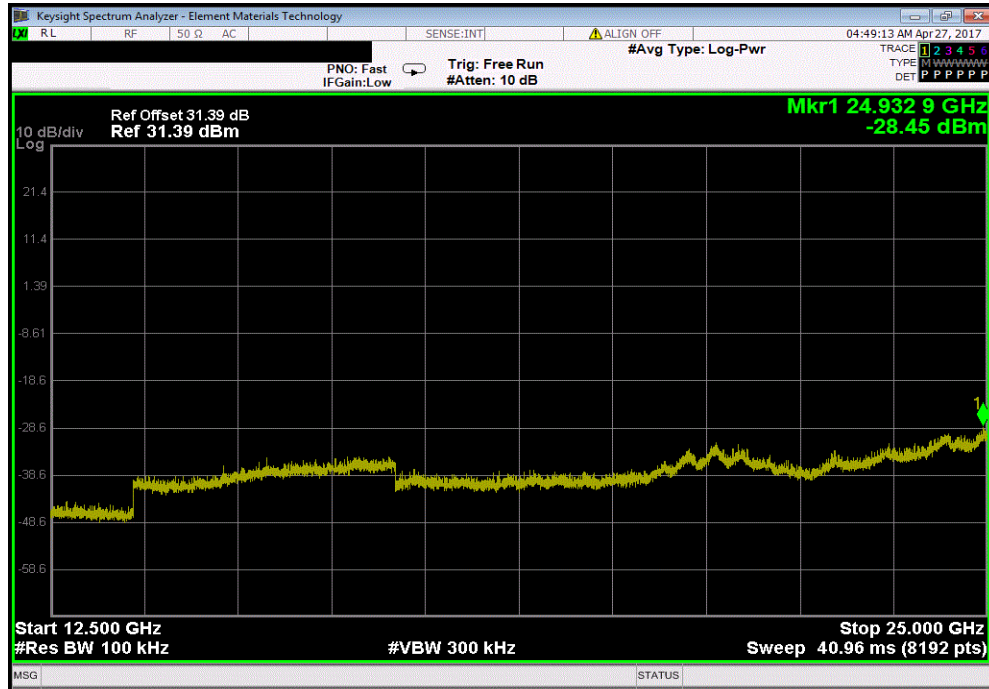


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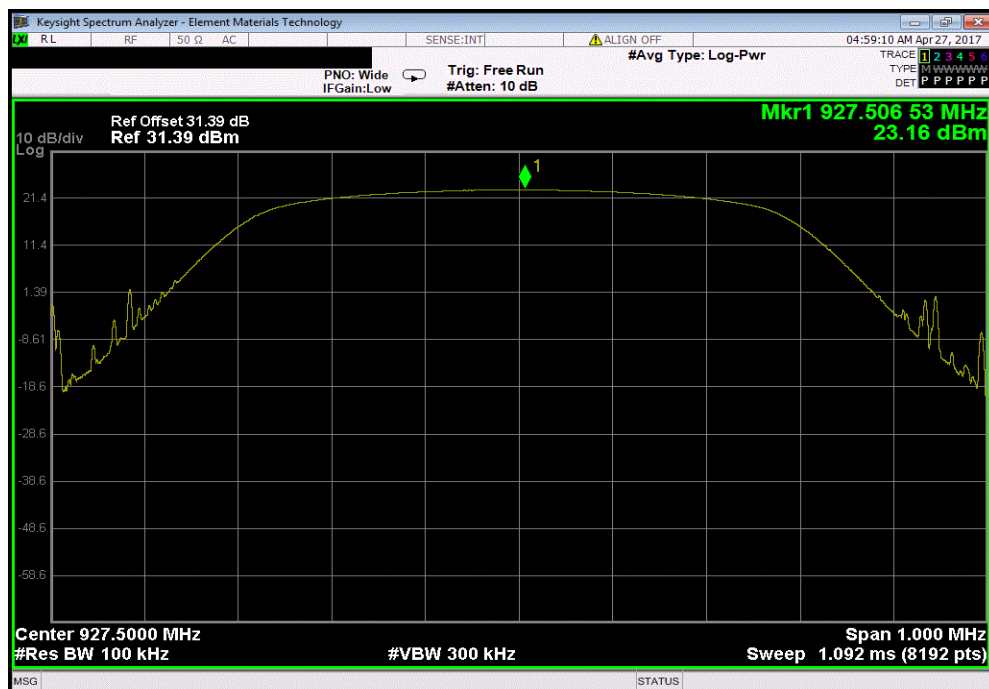


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Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.19	-30	Pass	



Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

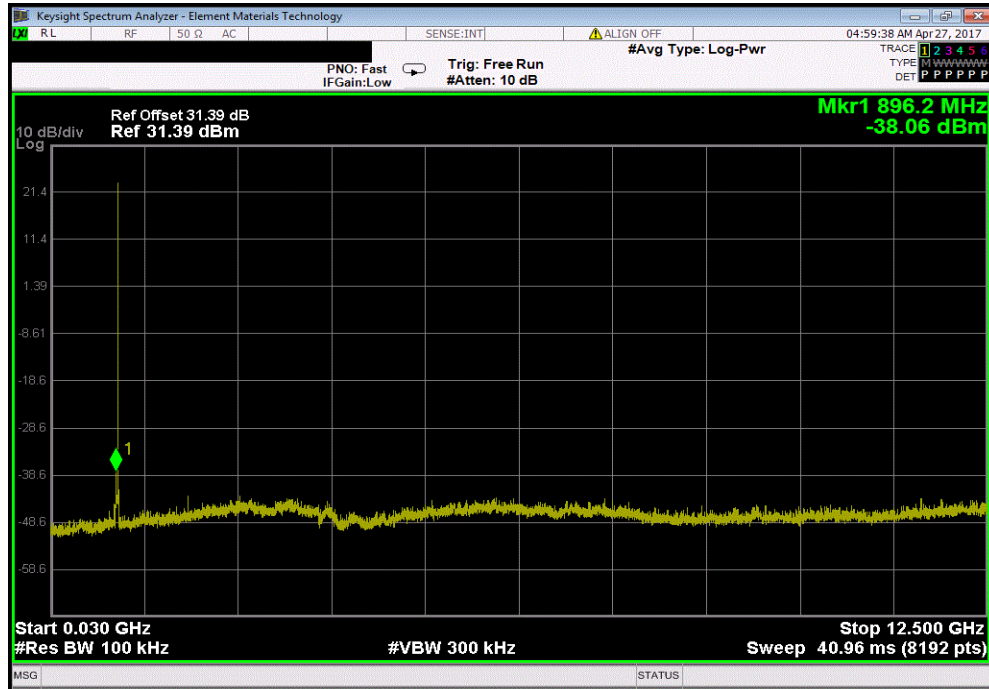


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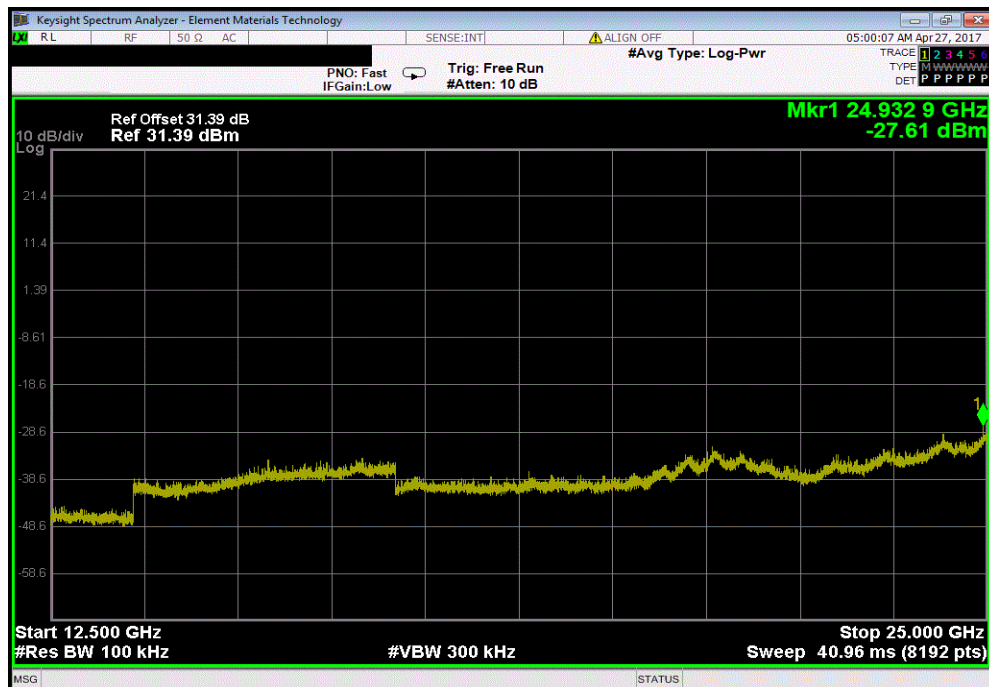


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Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-61.22	-30	Pass	



Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-50.77	-30	Pass	

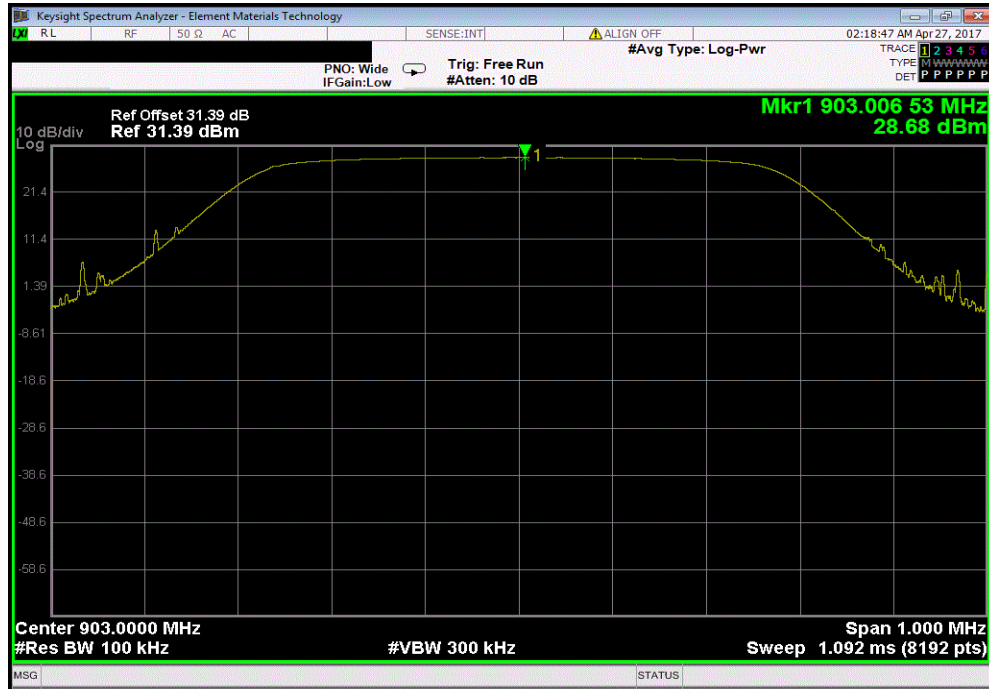


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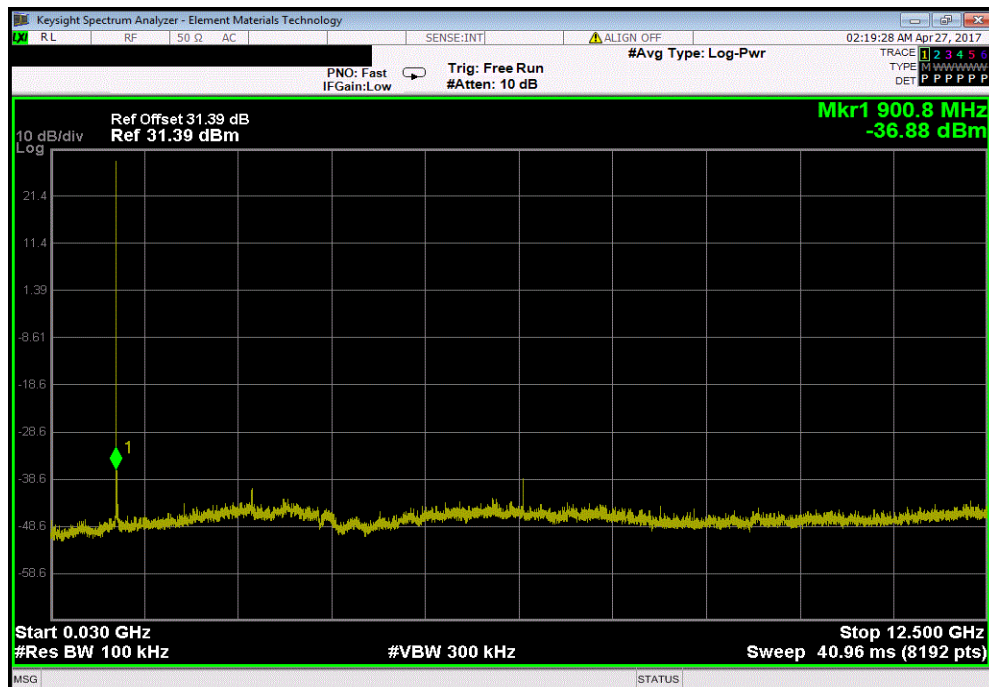


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Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-65.56		-30	Pass	

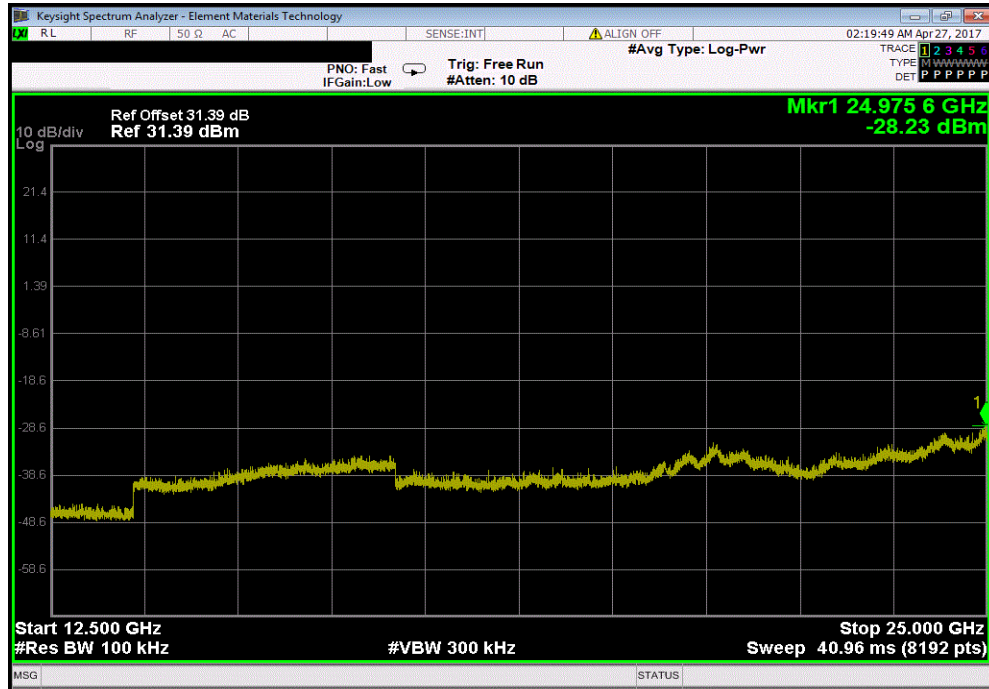


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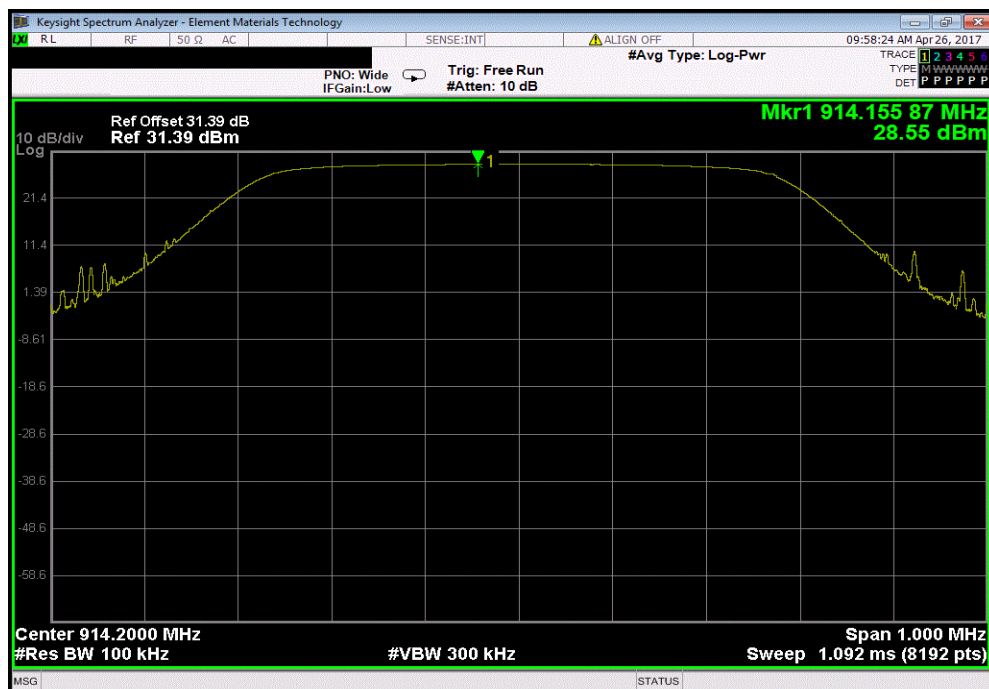


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Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.91	-30	Pass	



Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

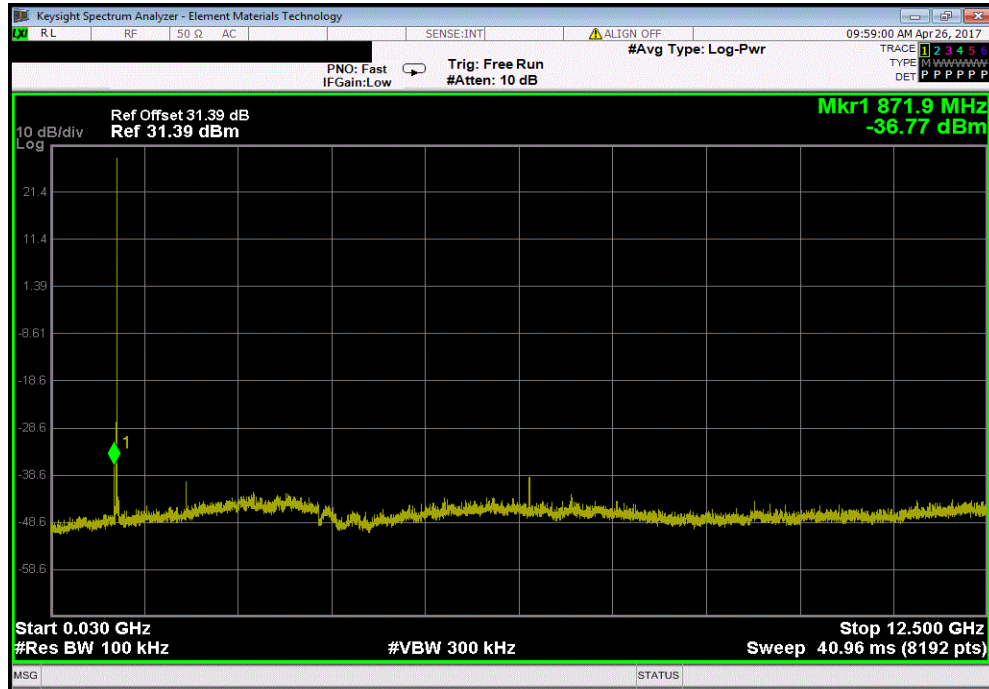


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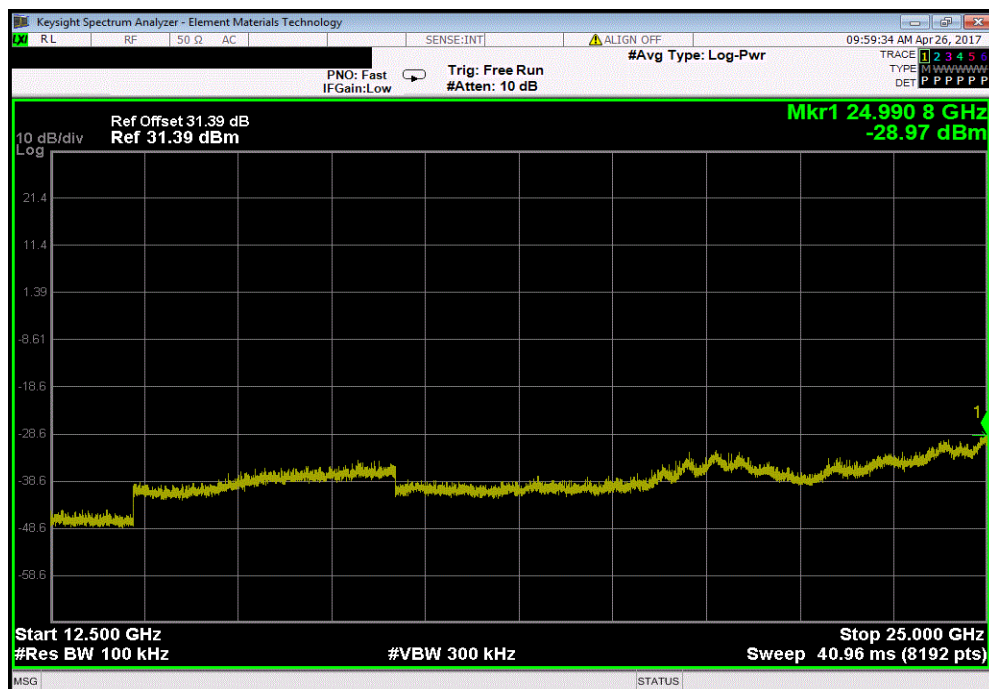


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Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-65.32	-30	Pass	



Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-57.52	-30	Pass	

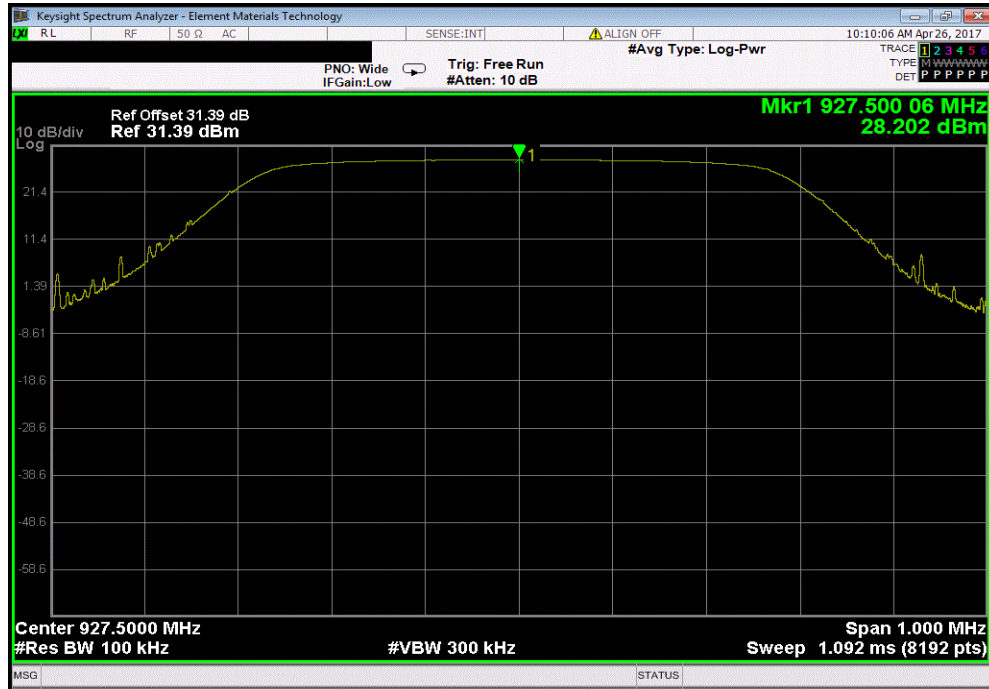


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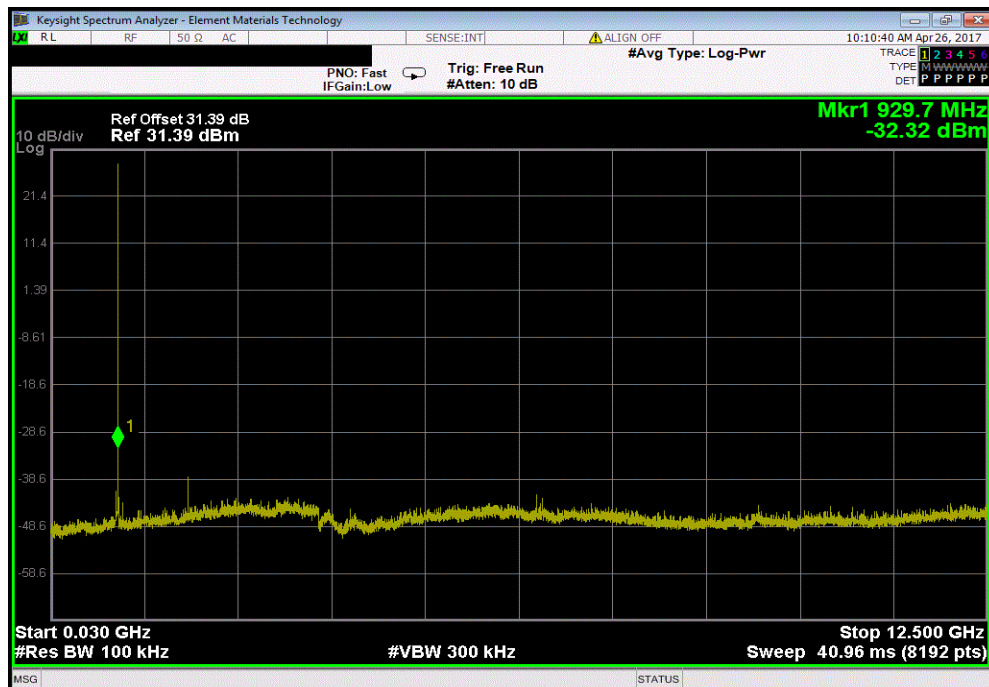


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Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-60.52		-30	Pass	

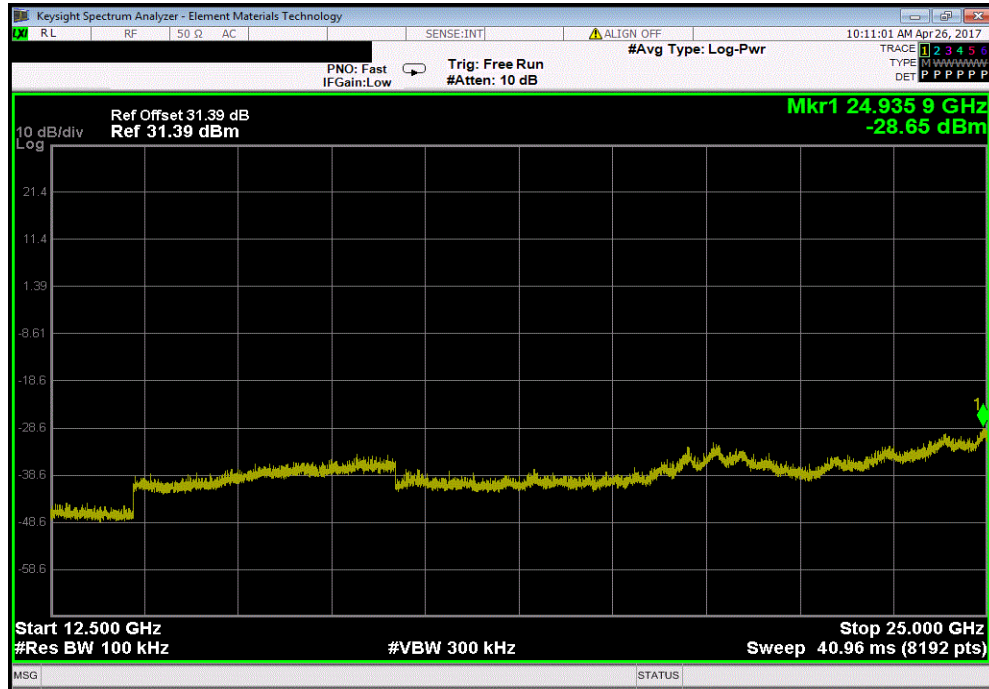


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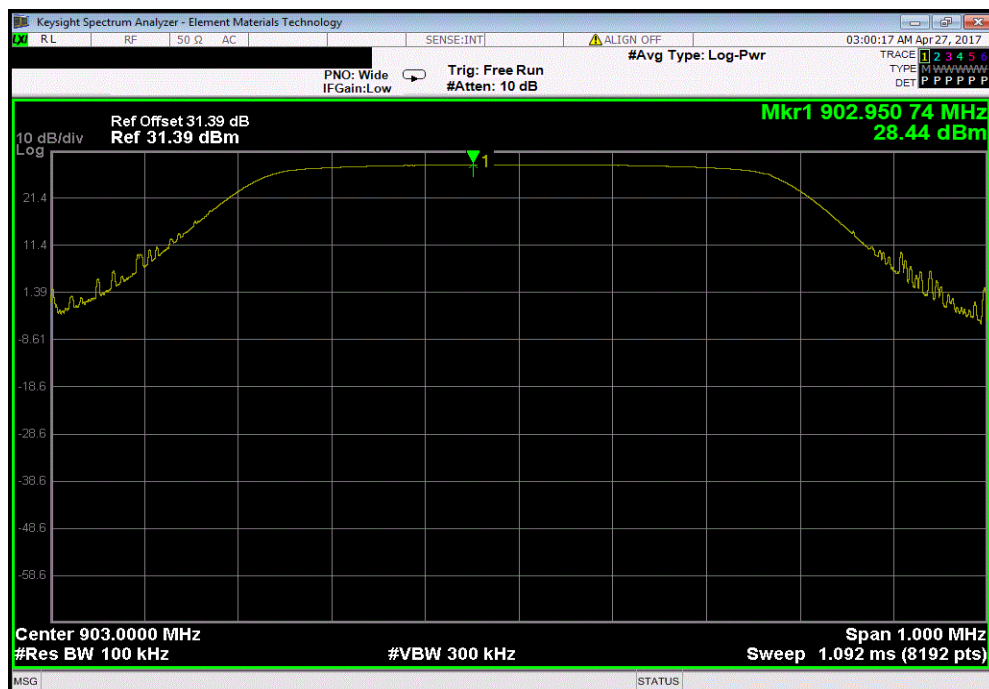


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Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.86	-30	Pass	



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

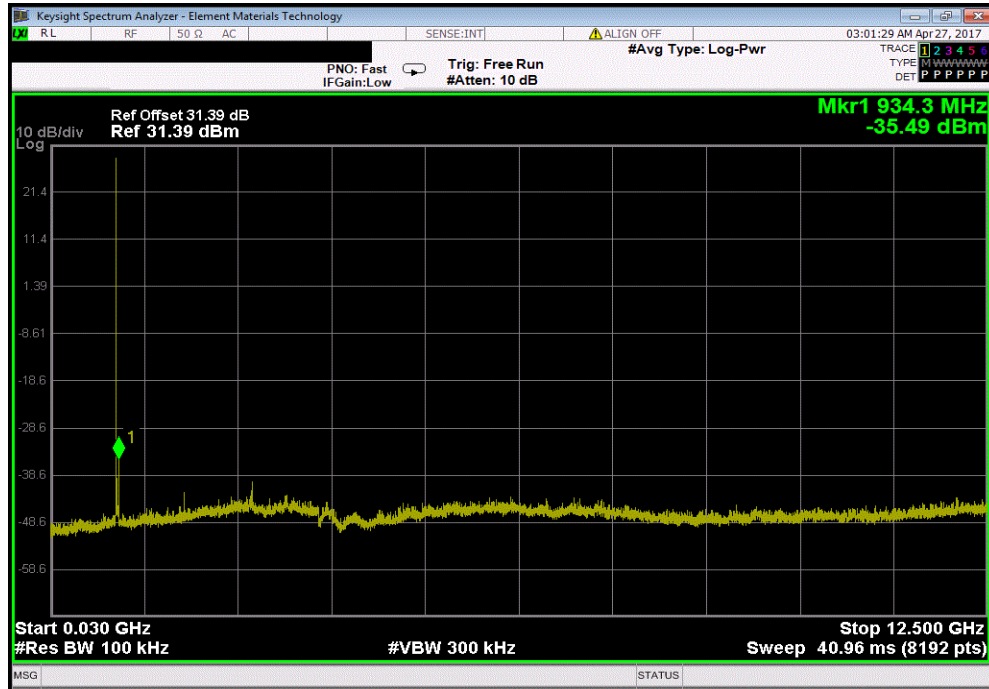


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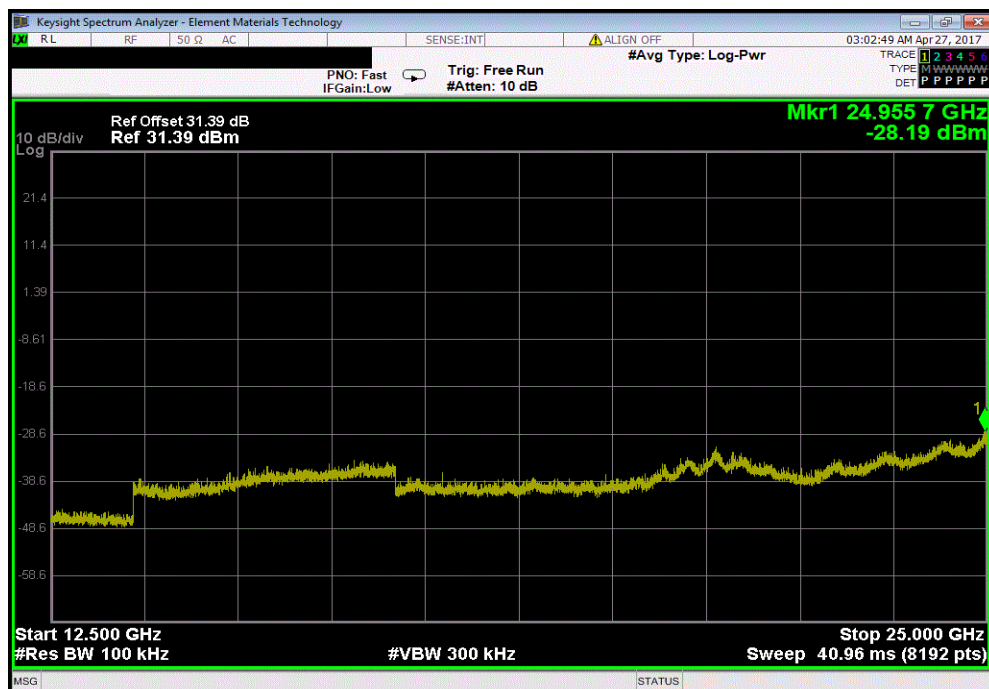


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Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-63.93	-30	Pass	



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.63	-30	Pass	

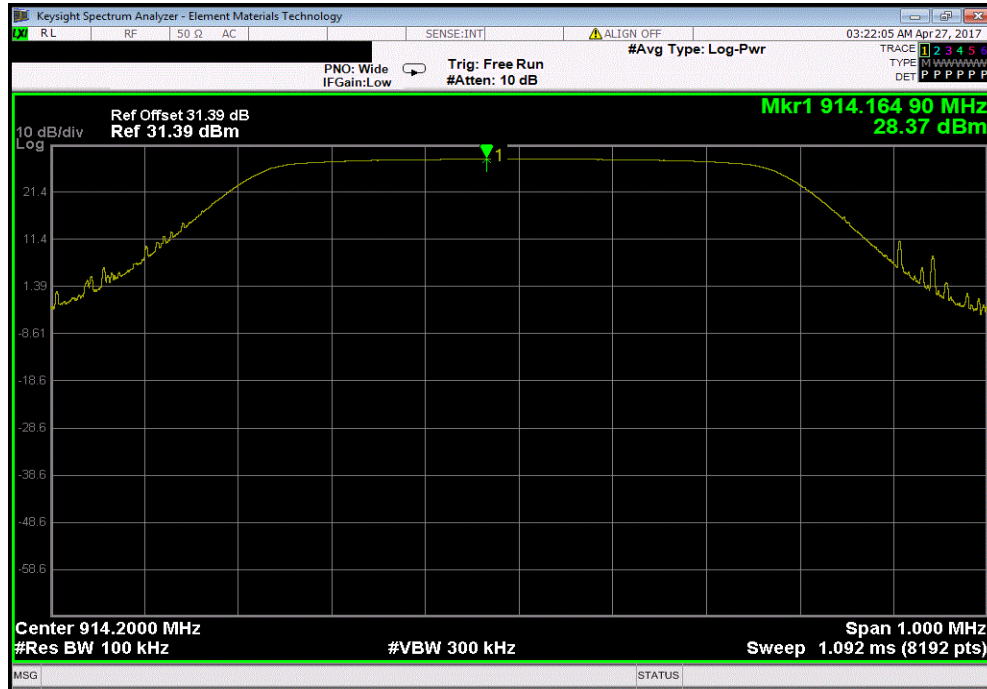


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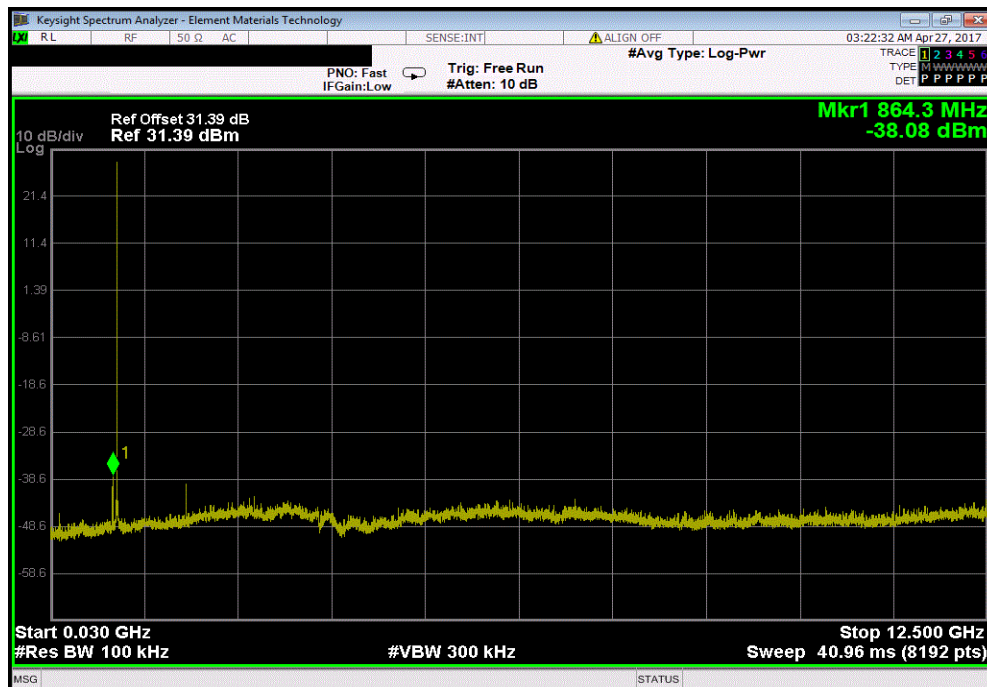


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Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)		Result
Fundamental		N/A		N/A		N/A



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)		Result
30 MHz - 12.5 GHz		-66.45		-30		Pass

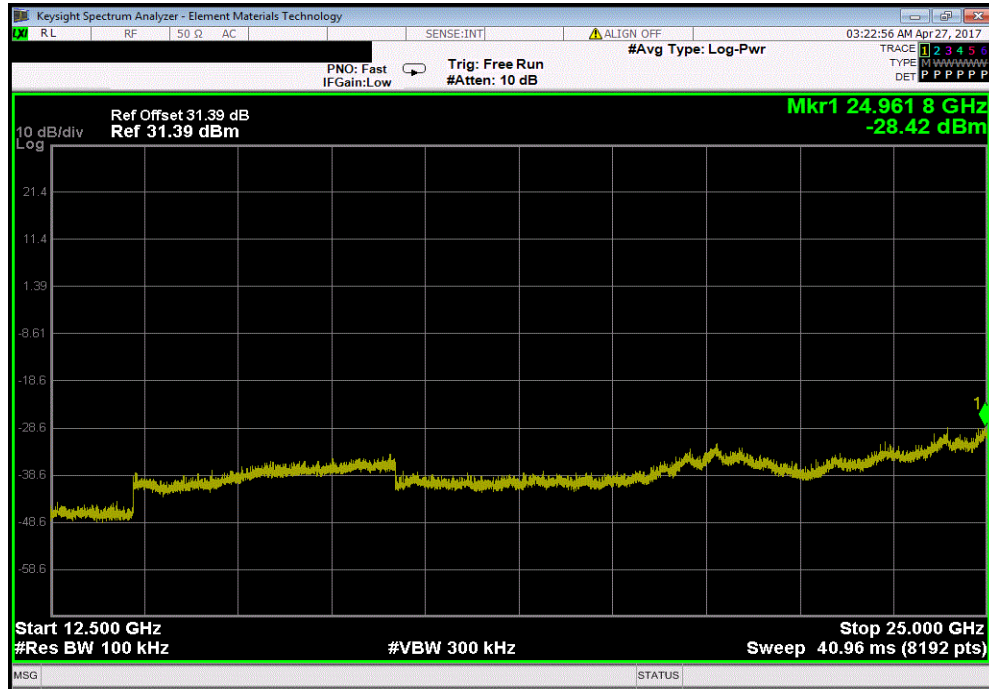


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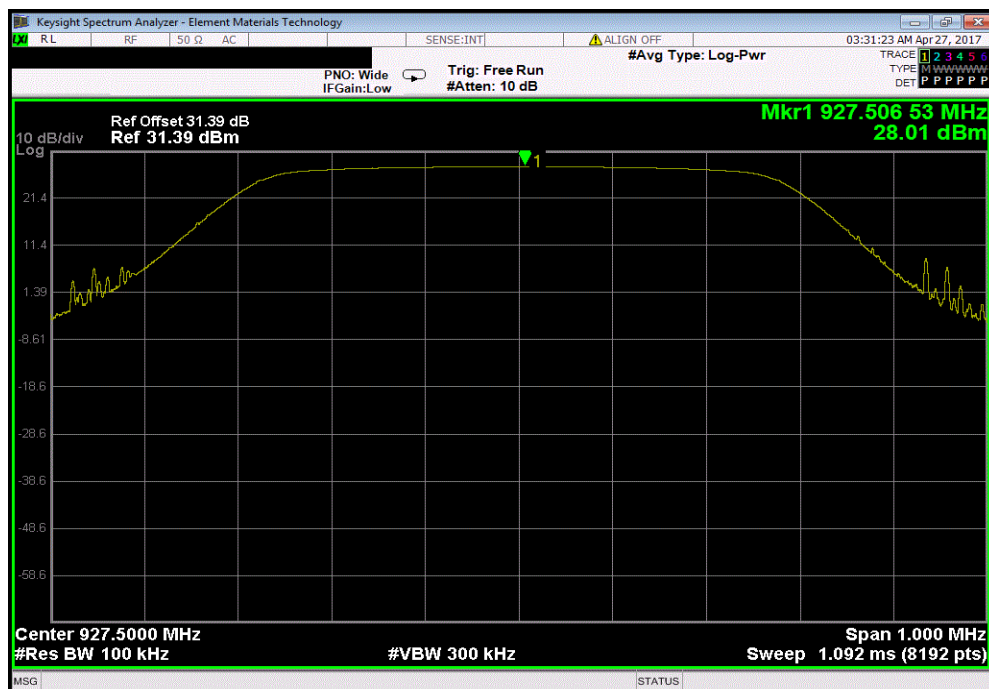


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Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.79	-30	Pass	



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

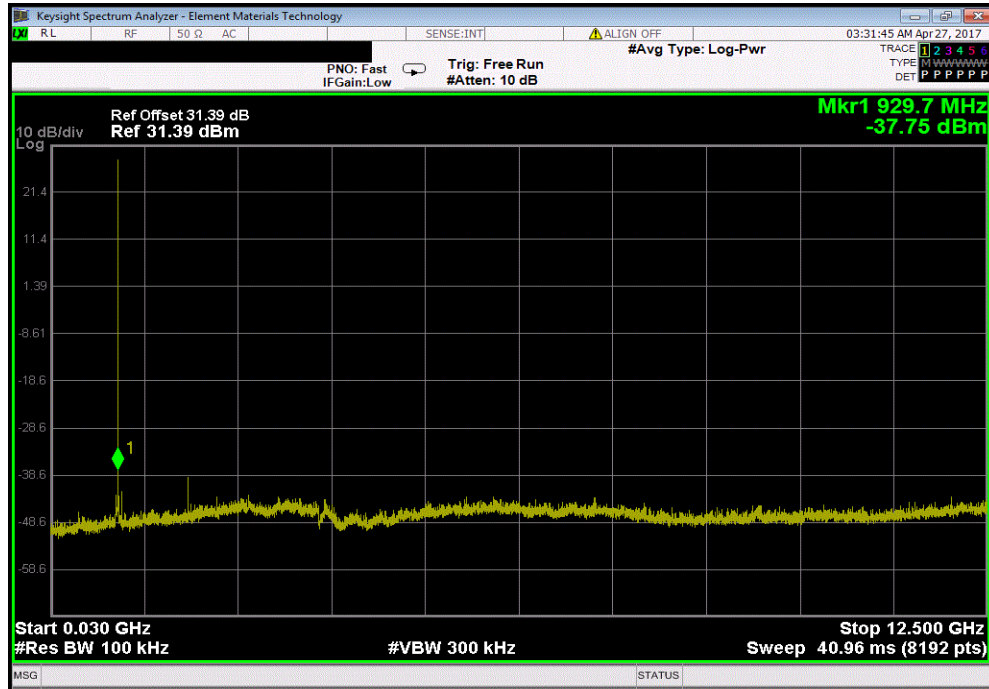


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Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-65.77	-30	Pass	



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.55	-30	Pass	

