SAS-2 6G Transmitter Device Common Mode Voltage Measurements

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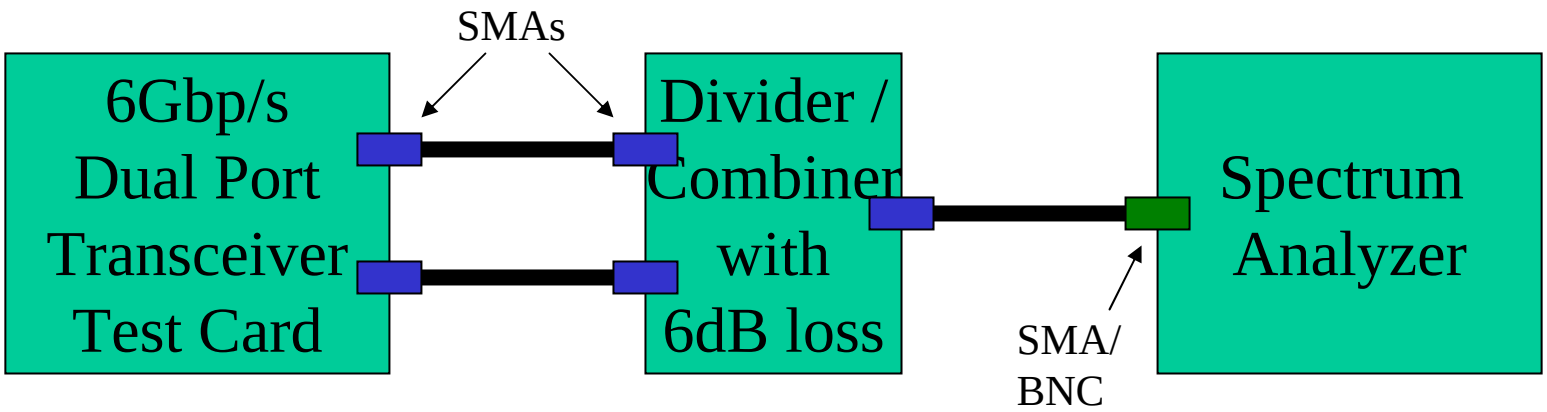
Test Setup

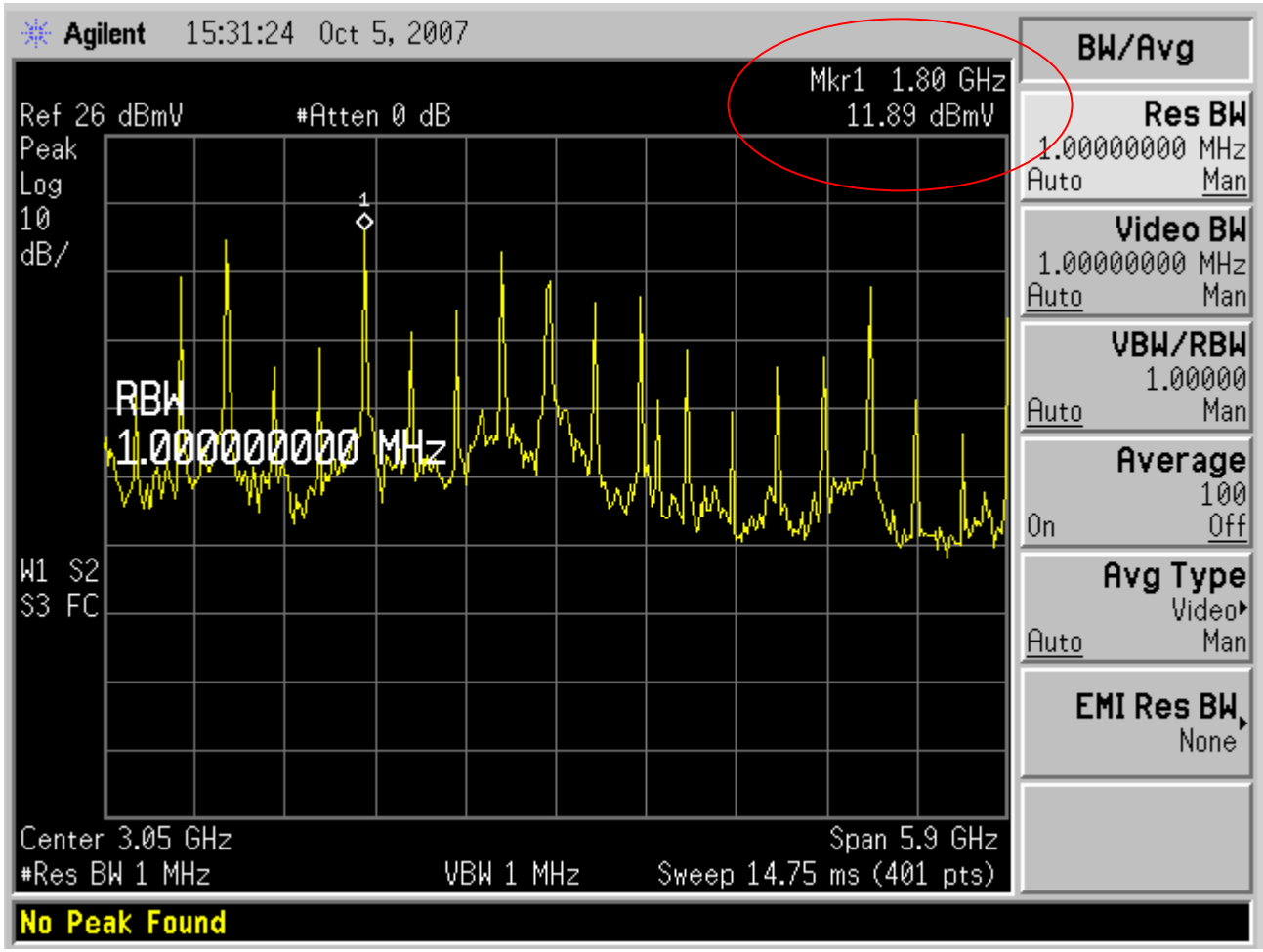


Each transceiver was set to transmit 1200mV differential at 6Gbit/s with no emphasis.

The reference level of Spectrum Analyzer was set to 26dmV.

6dB was added to all measurements (note: a 0dB combiner has been ordered to remove this requirement).

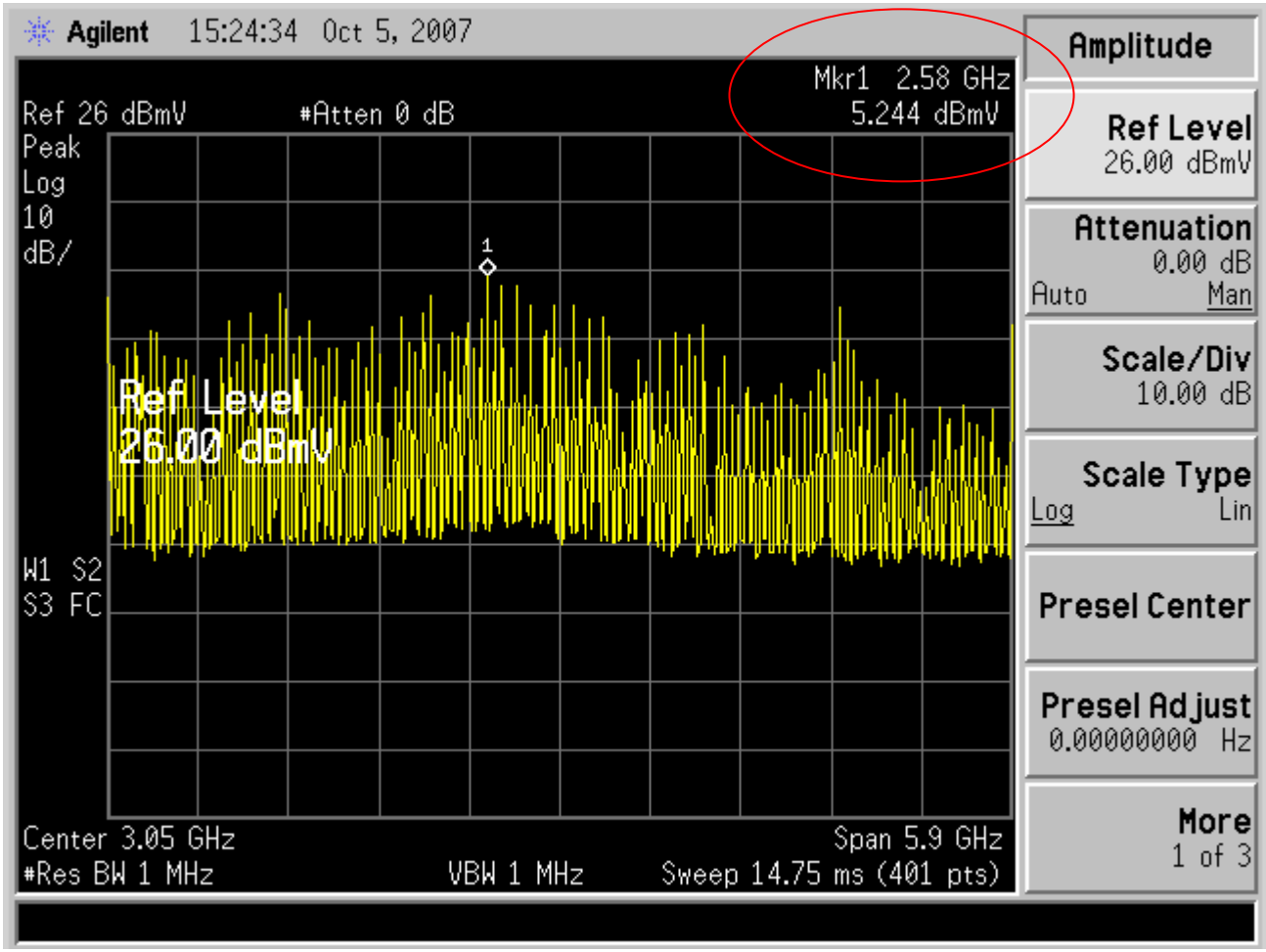
All connectors are SMA/BNC. There where no SAS connectors in this setup.



Transceiver Vendor 1, Port 1

Pattern = SAS CJTPAT; Peak amplitude = 17.89dBmV (=11.89+6)

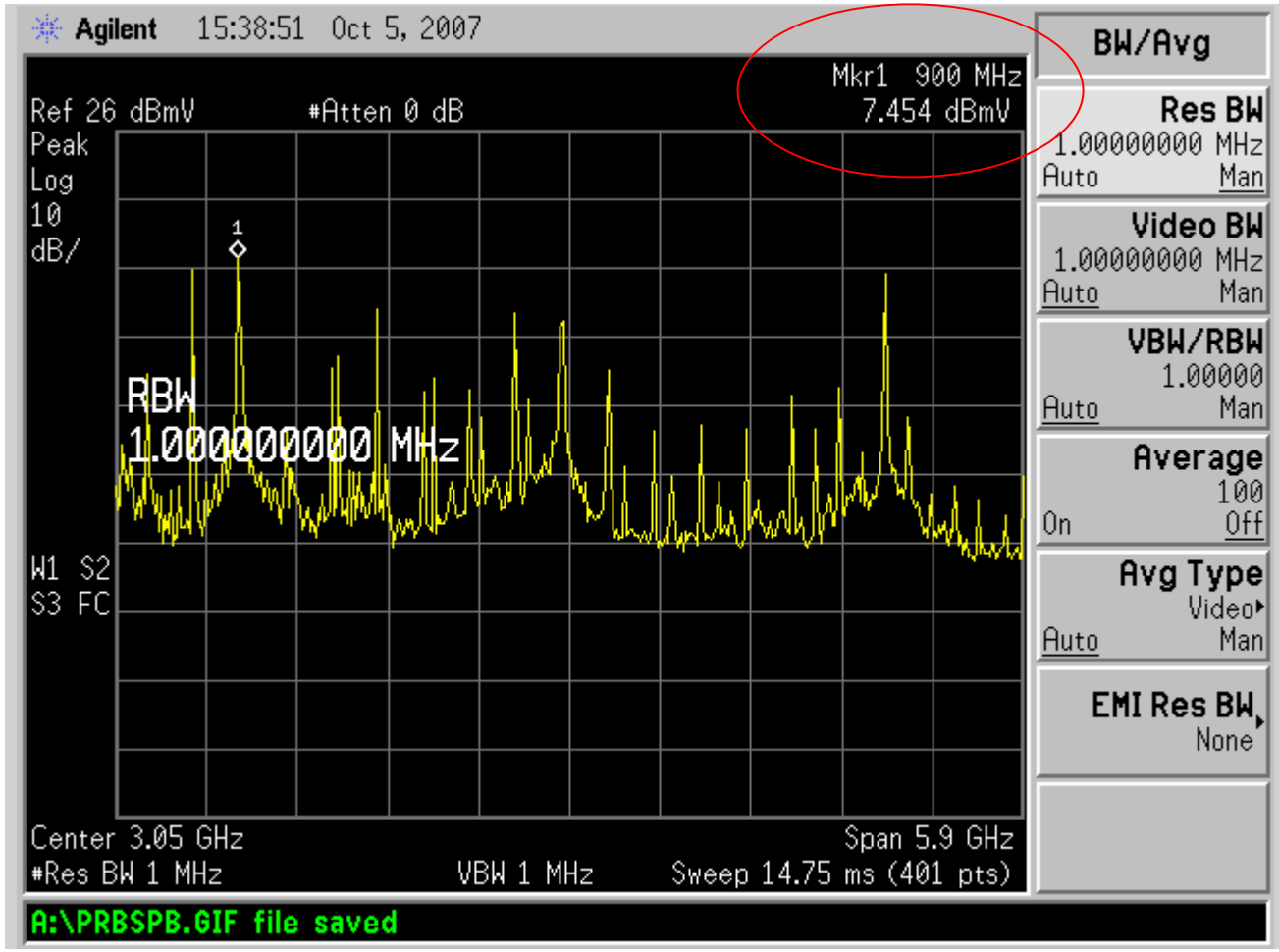
ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



Transceiver Vendor 1, Port 1

Pattern = PRBS7; Peak amplitude = 11.244dBmV (=5.244+6)

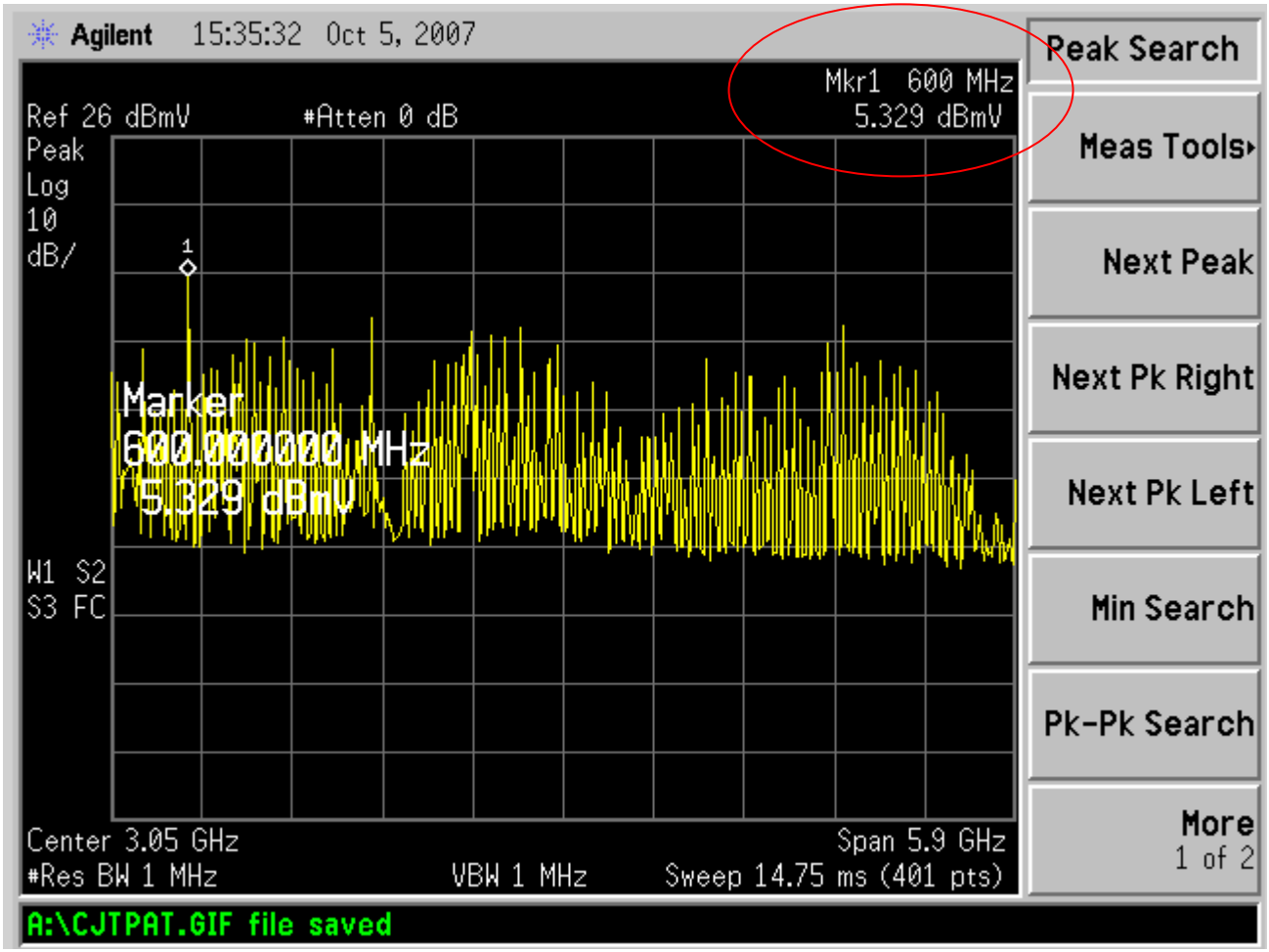
ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



Transceiver Vendor 1, Port 2

Pattern = SAS CJTPAT; Peak amplitude = 13.454dBmV (=7.454+6)

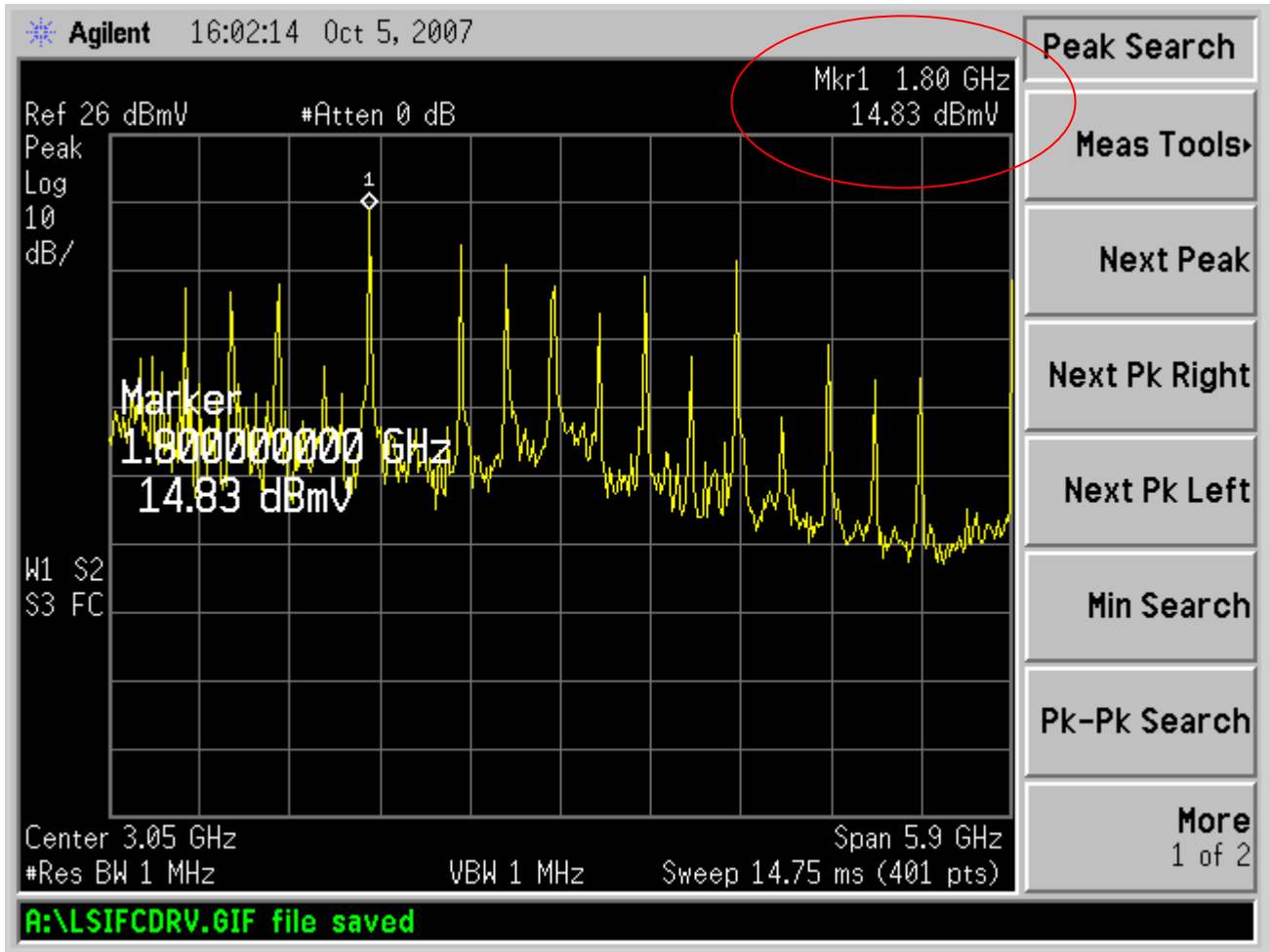
ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



Transceiver Vendor 1, Port 2

Pattern = PRBS7; Peak amplitude = 11.329dBmV (=5.329+6)

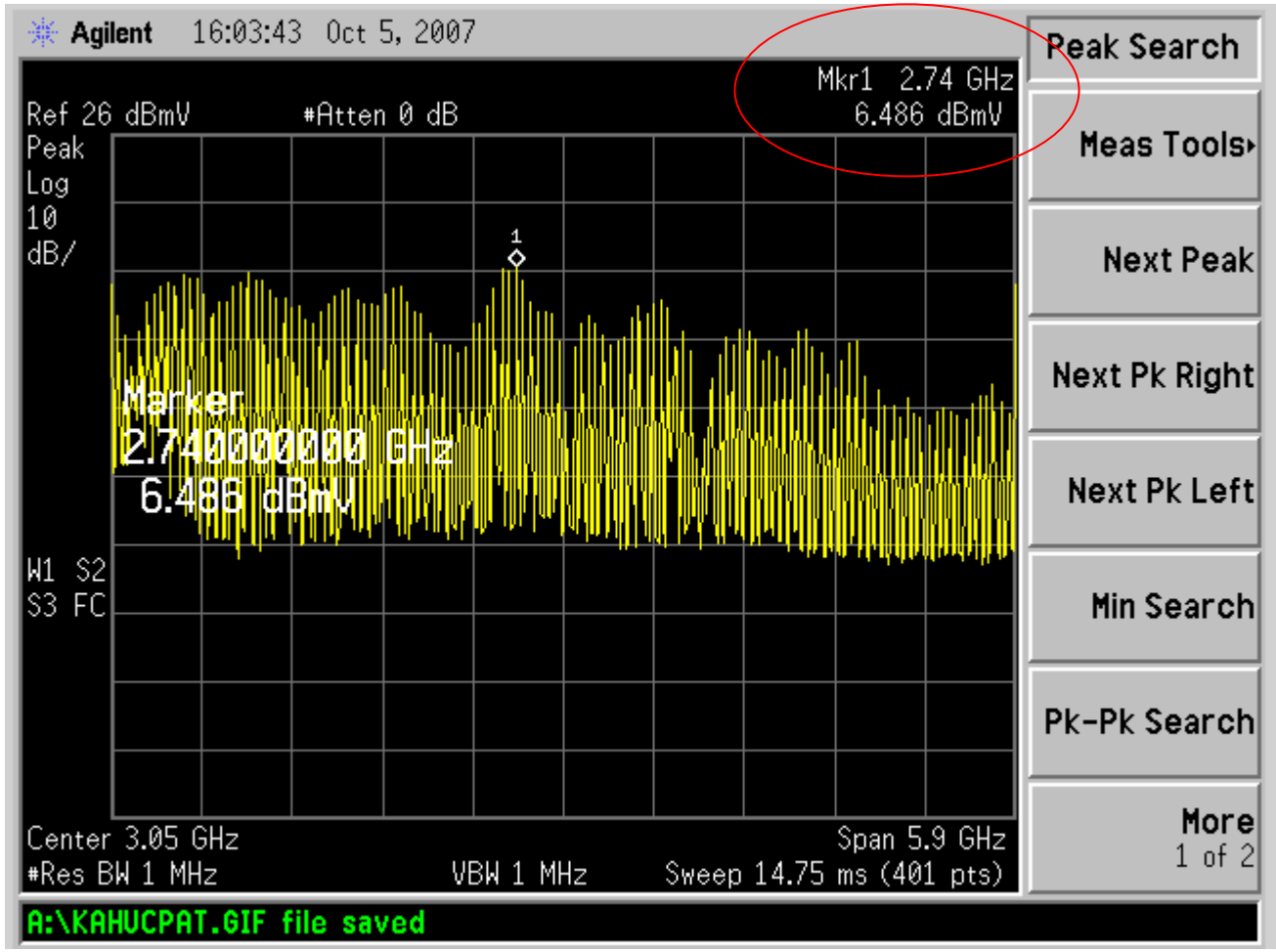
ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



Transceiver Vendor 2, Port 1

Pattern = SAS CJTPAT; Peak amplitude = 20.83dBmV (=14.83+6)

ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



Transceiver Vendor 2, Port 1

Pattern = PRBS7; Peak amplitude = 12.486dBmV (=6.486+6)

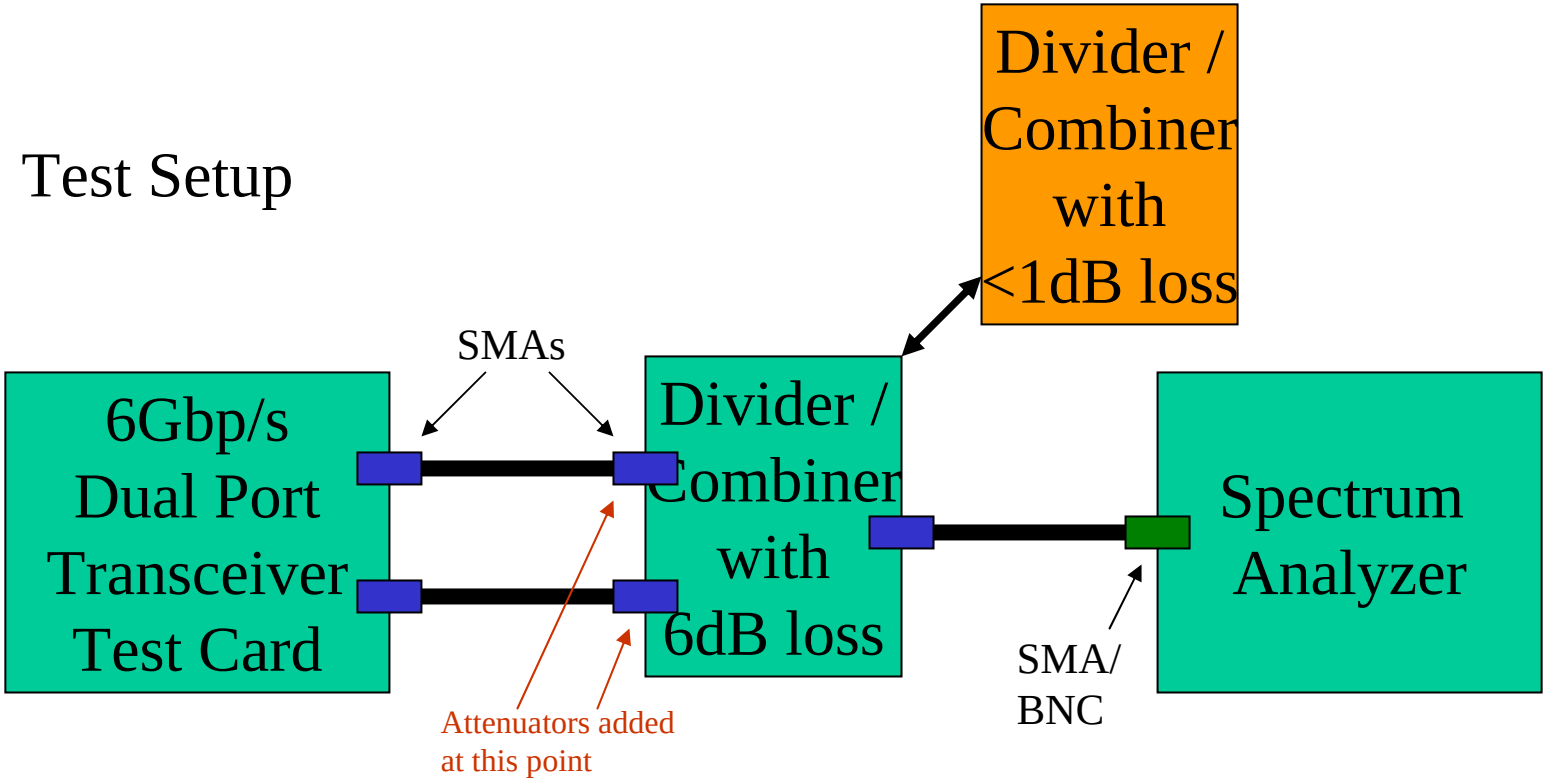
ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)

Observations:

The amplitudes of the spectrums of the three transceivers that where measured in the manner described on page one tended to be flat rather than rising from 100mhz to 6Ghz.

A flat limit of 26dBmV was met by this sample of transceivers when measured in this manner.

Test Setup

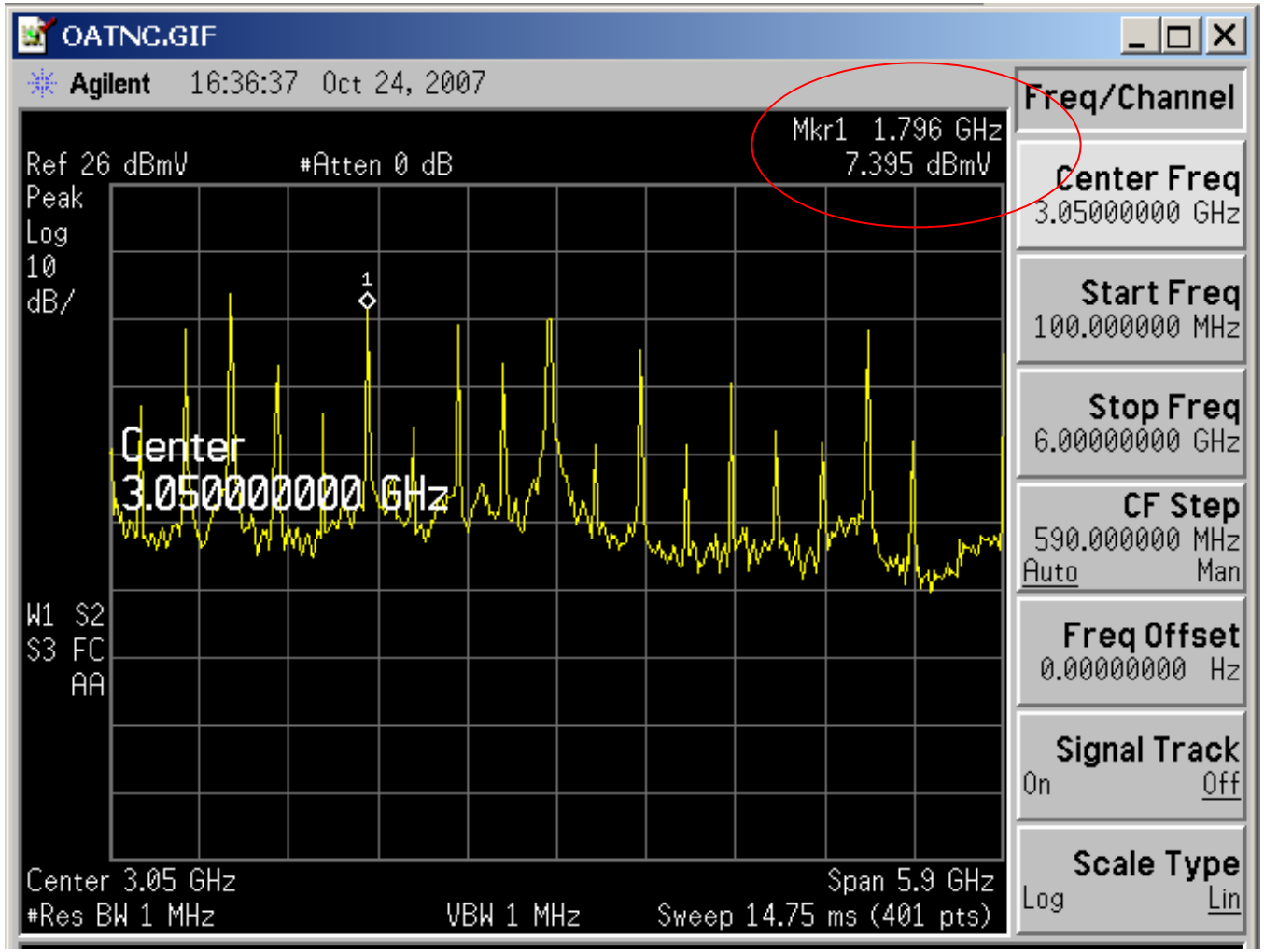


Each transceiver was set to transmit 1200mV differential at 6Gbit/s with no emphasis.

The reference level of Spectrum Analyzer was set to 26dmV.

Measurements where made with a 6-6.5dB divider/combiner and a <1dB divider/combiner.

All connectors are SMA/BNC.

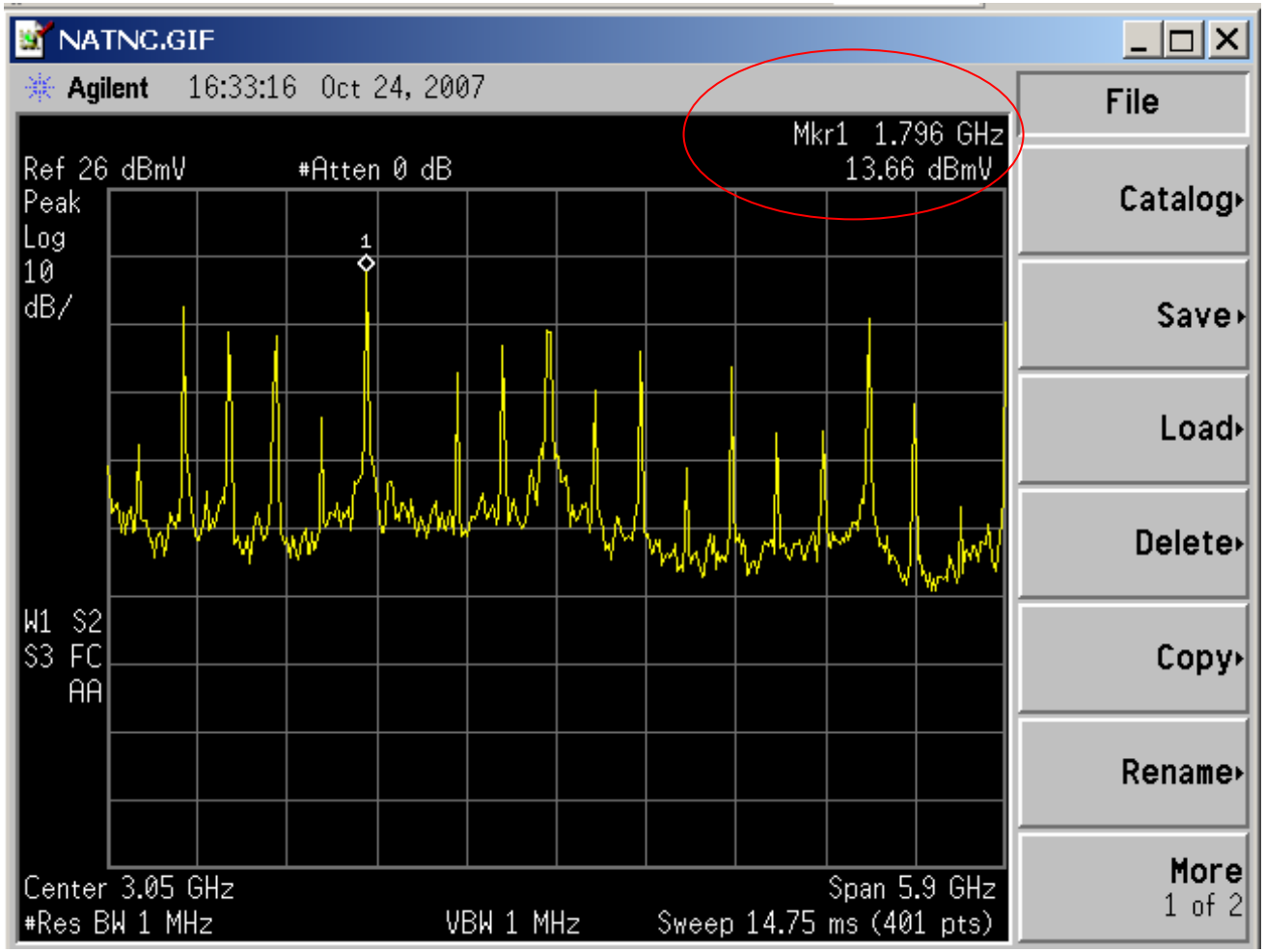


Combiner/Divider with 6dB loss

Transceiver Vendor 1, Port 3 (note: different transceiver from last time)

Pattern = SAS CJTPAT; Peak amplitude = 13.796BmV (=7.395+6)

ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)

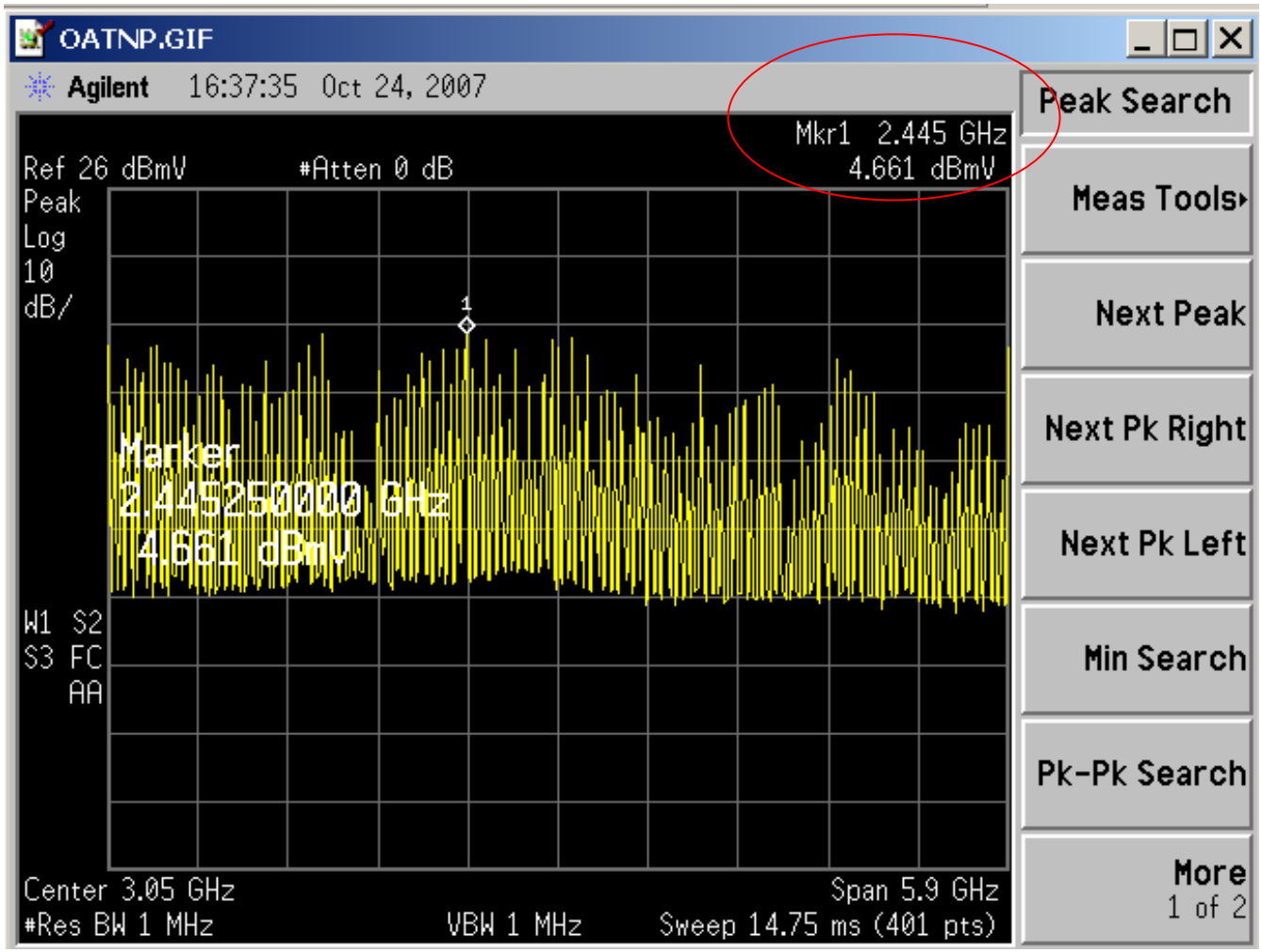


New combiner/divider with <1dB loss

Transceiver Vendor 1, Port 3 (note: different transceiver from last time)

Pattern = SAS CJTPAT; Peak amplitude = 13.66dbmV (vs. 13.796BmV)

ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)

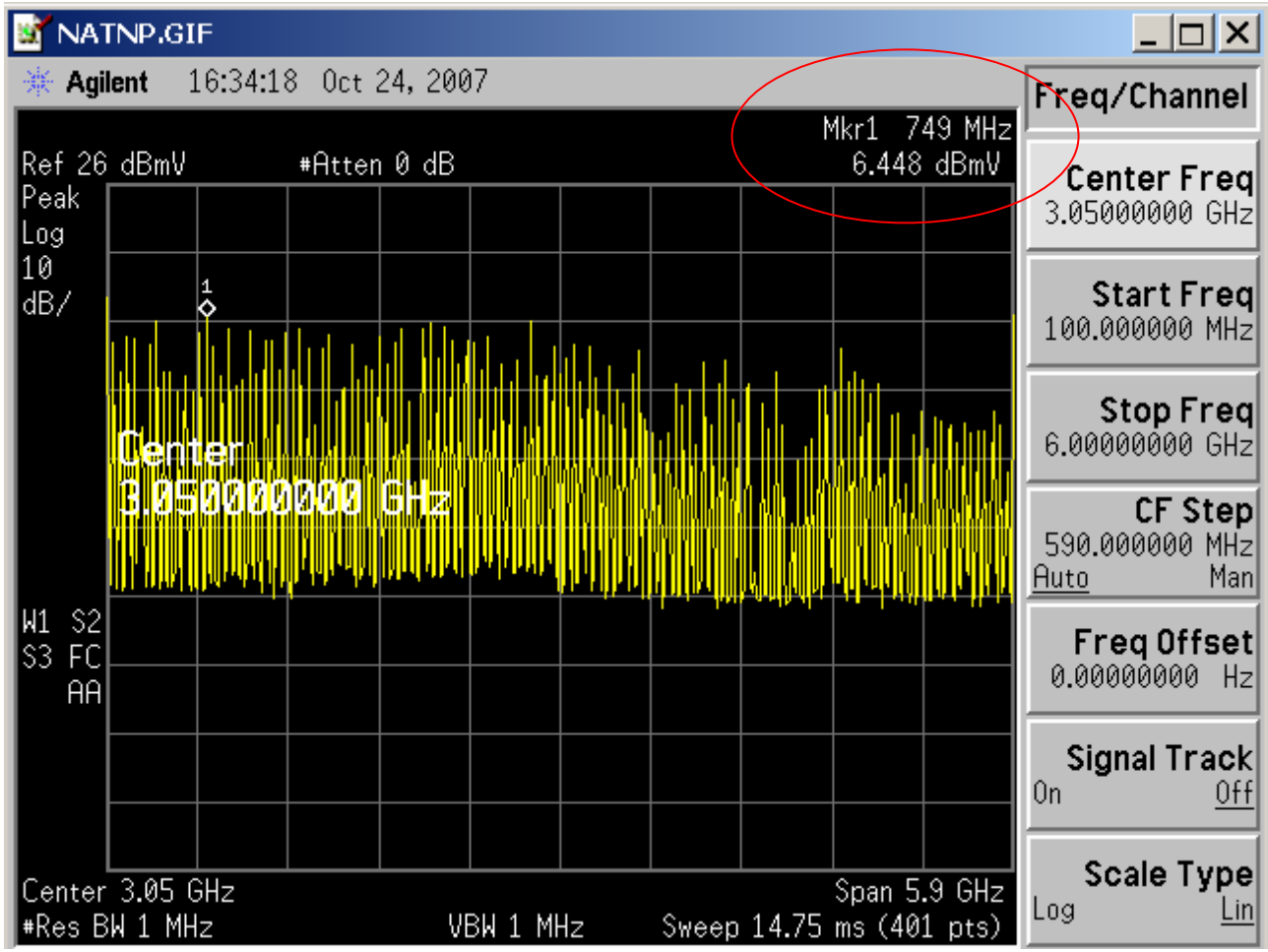


Combiner/Divider with 6dB loss

Transceiver Vendor 1, Port 3 (note: different transceiver from last time)

Pattern = PBRS7; Peak amplitude = 10.661BmV (=4.661+6)

ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)



New combiner/divider with <1dB loss

Transceiver Vendor 1, Port 3 (note: different transceiver from last time)

Pattern = SAS CJTPAT; Peak amplitude = 6.448dBmV

(6.448dBmV is not equal to 10.661dBmV)

ResBw = 1Mhz, VideoBw = 1Mhz, VBW/RBW=1, Ref = 26dBmV, Span = 5.9G (100Mhz – 6Ghz)

Specification new combiner/divider

MODEL NO	FREQ RANGE		INSERTION LOSS (dB MAX)	ISOLATION (dB MIN)	VSWR IN (MAX)	VSWR OUT (MAX)	AMPLITUDE BALANCE (dB MAX)	PHASE BALANCE (DEG MAX)	INPUT POWER (WATTS MAX)	Outline
DMS285	.5-1	GHz	0.7	6	2.00:1	2.00:1	0.2	1	10	1
	1-1.5	GHz	0.5	10	1.70:1	1.50:1	0.2	1	10	-
	1.5-2	GHz	0.5	15	1.60:1	1.40:1	0.2	1	10	-
	2-4	GHz	0.4	20	1.50:1	1.30:1	0.2	1	10	-
	4-8	GHz	0.5	17	1.50:1	1.40:1	0.2	1.5	10	-
	8-15	GHz	0.8	15	1.70:1	1.50:1	0.3	2	10	-
	15-16	GHz	0.8	15	1.70:1	1.60:1	0.3	3	10	-
	16-18	GHz	0.9	14	1.80:1	1.90:1	0.4	4	10	-
	18-20	GHz	1.1	7	2.00:1	2.00:1	0.4	4	10	-

Better phase balance
Similar amplitude balance
Broadband (20G>4G)

http://www.technicalresearch.com/Catalog/detail.php?g=18&model_no=DMS285

Specification old combiner/divider

Specifications

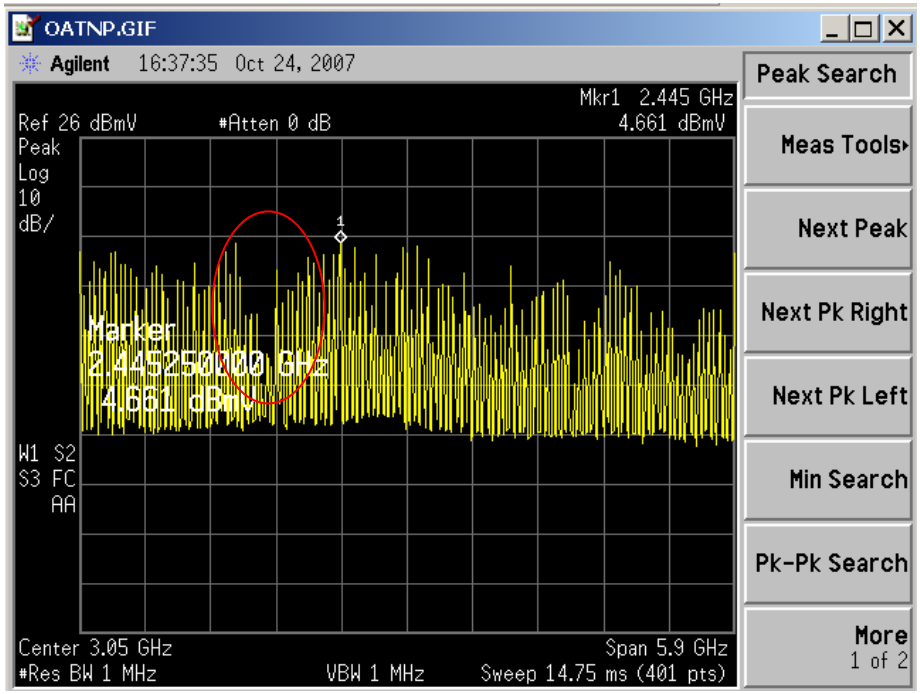
NOMINAL IMPEDANCE: 50 Ω
FREQUENCY RANGE: dc to 4.0 GHz
INSERTION LOSS: 6 dB nominal, 6.5 dB maximum (Between input and either output)
MAXIMUM INPUT POWER: 1.0 watt CW (Input connector only)

AMPLITUDE & PHASE TRACKING (Maximum):

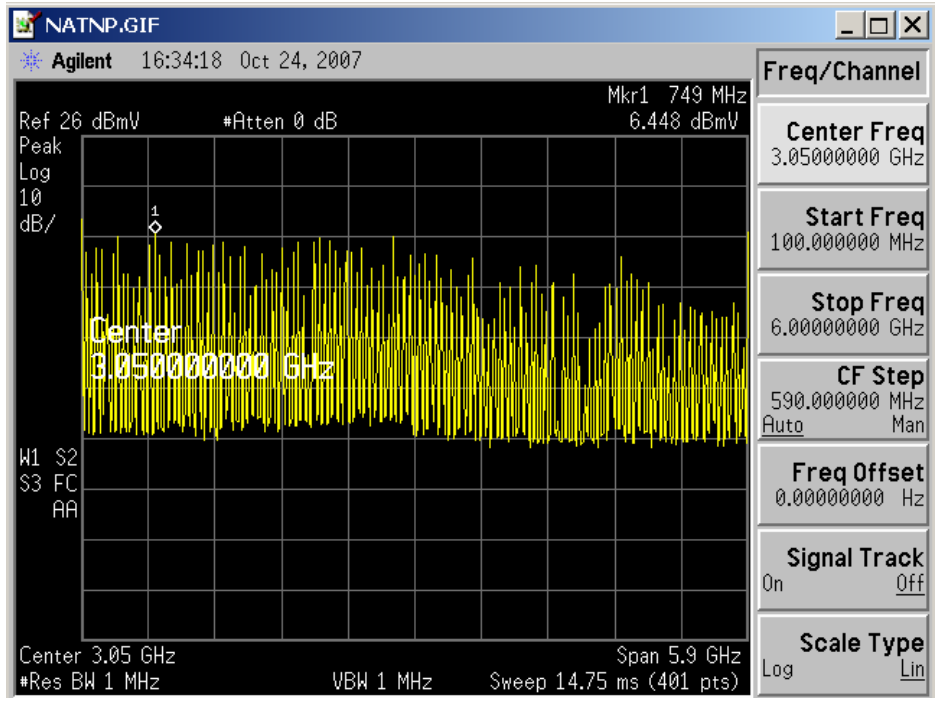
Frequency (GHz)	Tracking	
	Amplitude	Phase
dc - 4.0	<0.2 dB	<4°

MAXIMUM SWR:

Frequency (GHz)	Output*	Input
dc -4	1.15	1.25

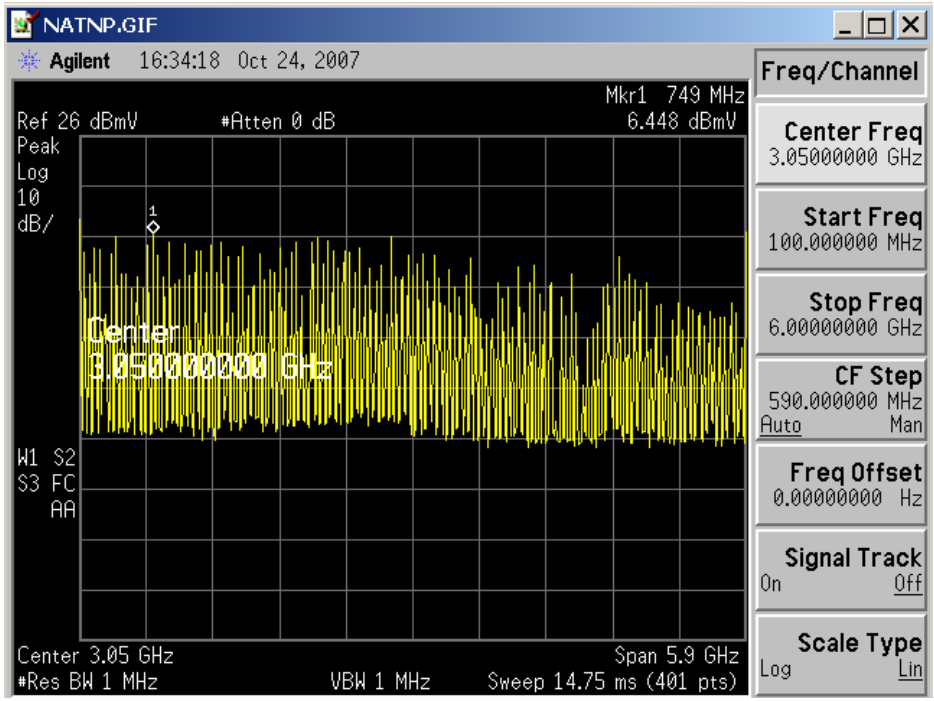


Old combiner/divider

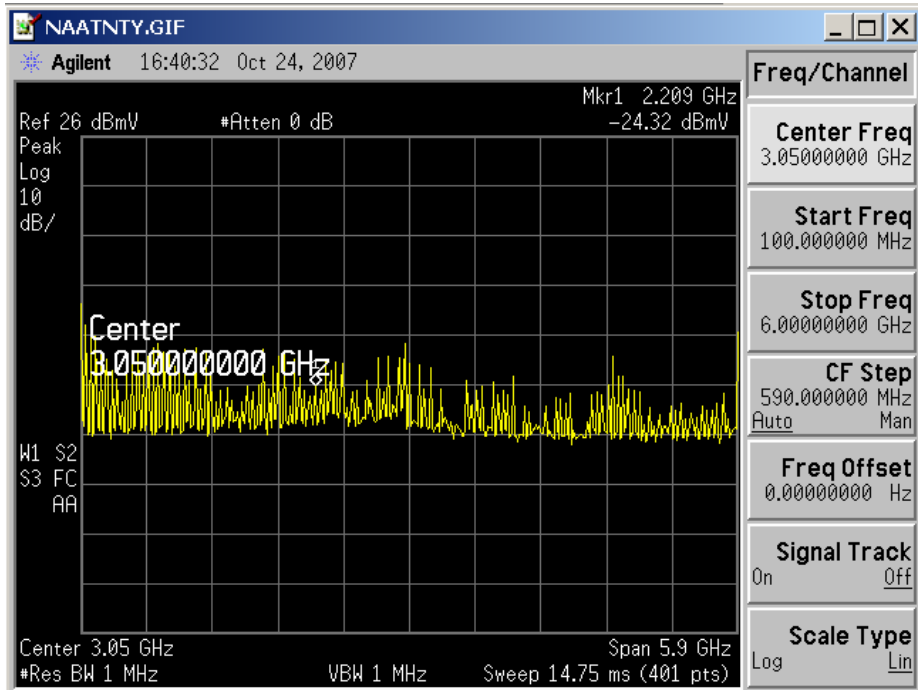


New combiner/divider

Plot with new combiner/divider has more spectral energy below 3G. Dip in spectral content around 1.5G with old combiner/divider. However, new combiner/divider indicates peak power is at a different frequency with lower overall peak amplitude.

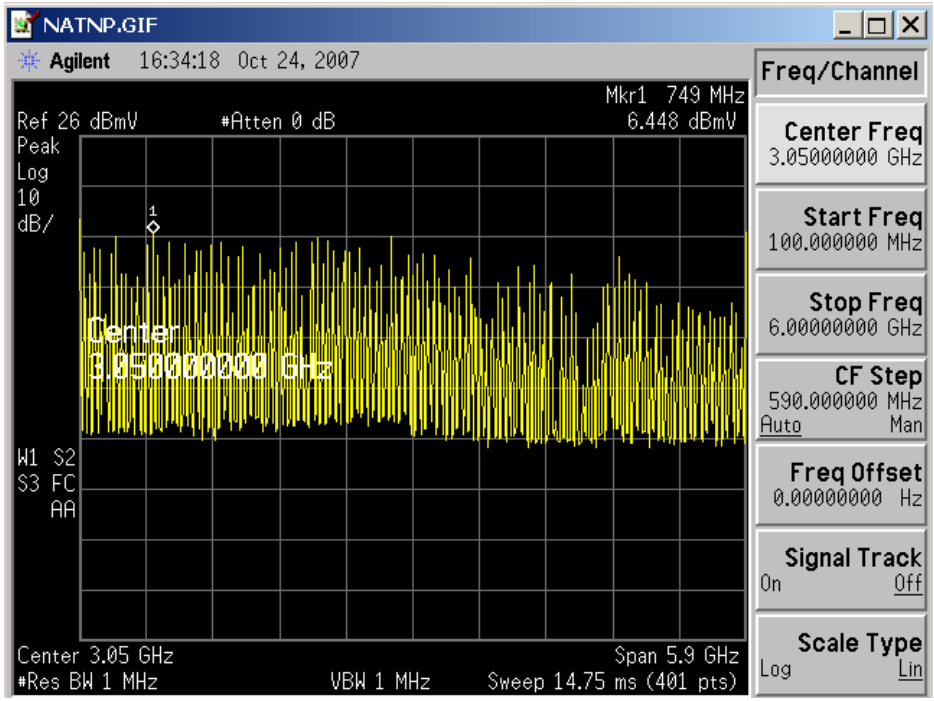


New combiner/divider

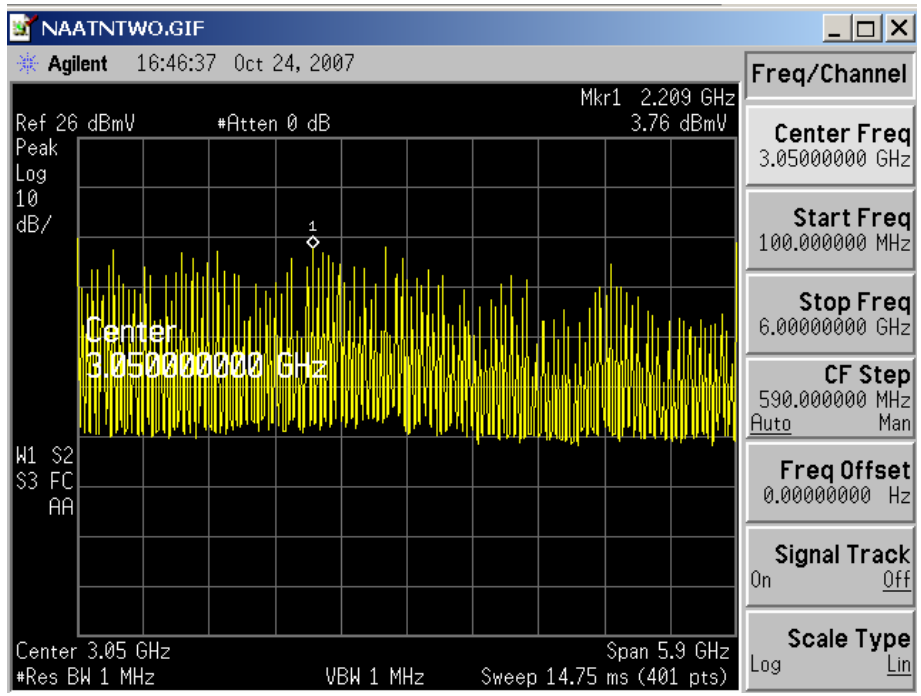


New combiner/divider with 20dB attenuators added.

Measurement hit noise floor of instrument



New combiner/divider



New combiner/divider with 2dB attenuators added.

Peak slightly different.
6.448dBmV is ~ to 5.67dBmV

Observations:

A flat limit of 26dBmV was still met.

If we chose to measure CMV with this method we will have to specify the combiner/divider, as it effects the result.

I was unable to measure CMV with a DSO. I will try to get this done by 11/1/07.