thermal noise					
bw	1.000E+00	Hz			
temp	292.3	DegK (fior lab temp of 66 degF or 19.1 degC)			
Boltzman k=	1.38E-23	joule/degK			
noise power	4.035E-21	watts			
	-1.739E+02	dBm			
Minicircuits ZX60-6013E-S		2 independent chains of 5 of identical amplifiers			
gain	16.2	dB out to 1.x GHz; drops down to 12 dB at 6 GHz.			
noise figure	3.2	dB			
noise factor	2.1				
Tequiv	318.4	degK			
frequency high	6	GHz			
frequency low	0.02	GHz			
P1dB input power at 20 MHz	-2.8	dBm			
P1dB input power at 6 GHz	-6.3	dBm			
12V typical current	0.039	amps			
12V maximum current	0.05	amps			
amplifiers in an output chain	5				
chains	2				
total number of amplifiers	10				
total 12V current (typ)	0.39	amps			
total 12V current (max)	0.5	amps			
power supply					
Accopian A12TN-110					
120 VAC only					
output volts	12	Vdc			
Output current	1	amps			
excess capacity	0.5	amps			
excess capacity per chain	0.25	amps			
amp1 noise factor F	2.1				
Net amp2 noise factor F	2.2				
Net amp3 noise factor F	2.2				
Net amp4 noise factor F	2.2				
Net amp5 noise factor F	2.2				
Tequiv	339.3	degK			
	NF = 0 dB	estimated NF			
bandwidth	1	1	Hz		
input level	-173.9	-173.3	dB/band		
LMR-195 PVC 6ft cable into the spectrum analyzer		0.5	dB loss at 500 MHz		http://www.timesmicrowave.com/cgi-bin/calculate.pl
		0.6	dB loss at 500 MHz from network analyzer		
	theory	theory	measured	measured	
	NF = 0 dB	estimated NF	left output	right output	
amp1 output	-157.7	-157.1			
amp2 output	-141.5	-140.9			
amp3 output	-125.3	-124.7			
amp4 output	-109.1	-108.5			
amp5 output	-92.9	-92.3			
loss due to internal cables	0.5	0.5			from network analyzer of a similar cable
net output level	-93.5	-92.8	-93.788	-94.888	
Hmmm : why are the levels of the lab measurement a few dB off ?					
check spectrum analyzer gain vertical scale calibration					
add in 0.3 dB for error at 50 Mhz test tone; then difference is about 1 to 2 dB					
maybe amplifier gain is not quite the typical value of 16.2 for 500 MHz					
if they were just a few fractions of a dB less gain then have about an exact match.					
close enough for now...					

2013mar10	UPGRADED L Band noise box with LPF and more gain				
thermal noise					
bw	1.000E+00	Hz			
temp	292.3	DegK (fior lab temp of 66 degF or 19.1 degC)			
Boltzman k=	1.38E-23	joule/degK			
noise power	4.035E-21	watts			
	-1.739E+02	dBm			
Minicircuits ZX60-6013E-S		2 independent chains of 5 of identical amplifiers			
gain	16.2	dB out to 1.x GHz; drops down to 12 dB at 6 GHz.			
noise figure	3.2	dB			
noise factor	2.1				
Tequiv	318.4	degK			
frequency high	6	GHz			
frequency low	0.02	GHz			
P1dB input power at 20 MHz	-2.8	dBm			
P1dB input power at 6 GHz	-6.3	dBm			
12V typical current	0.039	amps			
12V maximum current	0.05	amps			
amplifiers in an output chain	5				
chains	2				
total number of amplifiers	10				
total 12V current (typ)	0.39	amps			
total 12V current (max)	0.5	amps			
power supply					
Accopian A12TN-110					
120 VAC only					
output volts	12	Vdc			
Output current	1	amps			
excess capacity	0.5	amps			
excess capacity per chain	0.25	amps			
amp1 noise factor F	2.1				
Net amp2 noise factor F	2.2				
Net amp3 noise factor F	2.2				
Net amp4 noise factor F	2.2				
Net amp5 noise factor F	2.2				
Tequiv	339.3	degK			
	NF = 0 dB	estimated NF			
bandwidth	1	1	Hz		
input level	-173.9	-173.3	dB/band		
LMR-195 PVC 6ft cable into the spectrum analyzer		0.5	dB loss at 500 MHz		http://www.timesmicrowave.com/cgi-bin/calculate.pl
		0.6	dB loss at 500 MHz from network analyzer		
	theory	theory	measured	measured	
	NF = 0 dB	estimated NF	left output	right output	
amp1 output	-157.7	-157.1			
amp2 output	-141.5	-140.9			
amp3 output	-125.3	-124.7			
amp4 output	-109.1	-108.5			
amp5 output	-92.9	-92.3			
loss due to internal cables	0.6	0.6			from network analyzer of a similar cable
net output level	-93.6	-92.9	-93.788	-94.888	
Hmmm : why are the levels of the lab measurement a few dB off ?					
check spectrum analyzer gain vertical scale calibration					
add in 0.3 dB for error at 50 Mhz test tone; then difference is about 1 to 2 dB					
maybe amplifier gain is not quite the typical value of 16.2 for 500 MHz					
if they were just a few fractions of a dB less gain then have about an exact match.					
close enough for now...					
2013mar09 revisions					
first add VLF-800 low pass filters					
F1dB		800	MHz		
F3dB		1075	MHz		
F20dB		1275	MHz		
Add these at the output of the 3 sealed amps					
F3dB measured		700	MHz		
F6dB measured		1000	MHz		
F10dB measured		1100	MHz		
F20dB measured		1180	MHz		
F30dB measured		1240	MHz		
dBm/Hz measured at 500 MHz		-96	dBm/Hz	a little extra loss due to the additional filter in the path.	

for 2Vpp ADC like on ADC16x250-8 card the full scale gaussian CF=6 input is roughly				-2	dBm
the final output amp should have P1dBoutput at				8	dBm
and must be powered off of the only voltage available which is +12 VDC.					
would like to have the same F3dB of 700 MHz or so thus would like an amplifier of at least that bandwidth					
NF isn't of much concern given that this part will be the 6th in the series and after 80 or so dB gain.					
first pass with filter after the 3 sealed amps and the extra amplifier has too much crud					
out beyond 1 GHz.					
move the filter to just upstream of the final output Amp: doesn't really help and maybe slightly bumpier in low freq ?					
try between amps 4 and 5: same as between amps 3 and 4.					
keep the VLF800 at the output of the 3 sealed amplifiers (between amps 3 and 4)					
Selected Amp					
Cougar	AP1309C				
gain	12.5	dB out to 1.x GHz; drops down to 12 dB at 6 GHz.			
noise figure	2.5	dB			
noise factor	1.8				
Tequiv	227.5	degK			
frequency high	1.3	GHz			
frequency low	0.01	GHz			
P1dB input power at 10 MHz	8.25	dBm			
P1dB input power at 1300 MHz	9.43	dBm			
reverse isolation	19.5	dB			
12V typical current	0.1	amps			
12V maximum current	0.11	amps			
F1dB measured		300	MHz	ignoring 1dB dip at 100 to 150 MHz	
F3dB measured		700	MHz		
F6dB measured		1000	MHz		
F10dB measured		1100	MHz		
F20dB measured		1180	MHz		
F30dB measured		1700	MHz		
dBm/Hz measured at 500 MHz		-84.6	dBm/Hz	right hand output	
		-84.1	dBm/Hz	left hand output	
estimated power in 100 MHz		-4.1			
total power		8.9	dBm	left hand output	
SMA Chunk Filter	model of PAPER's passband				
Measured total power		-0.33	dBm	left hand output	
dBm/Hz measured at 153 MHz (midband)		-81.8	dBm/Hz		
F1dB measured		107	201	MHz	lots of aliasing at Fsample of 200 MHz but this
F3dB measured		104	203.5	MHz	is the best simulation of the actual passband
F6dB measured		102.2	205.2	MHz	I could create from items in the lab
F10dB measured		101	207.5	MHz	
F20dB measured		98	215	MHz	
F30dB measured		86.3	237	MHz	
SLP90 measurements				right hand output via 6ft LMR-195 PVC	
Measured total power		-0.56	dBm		
dBm/Hz measured at 50 MHz (midband)		-79.4	dBm/Hz	est of total	-0.20
F1dB measured		7.8	91	MHz	
F3dB measured		6.1	98.8	MHz	
F6dB measured		4.95	103.5	MHz	
F10dB measured		4.1	107.8	MHz	
F20dB measured		3.13	117.4	MHz	
F30dB measured		2.4	133	MHz	
SLP70 measurements	model for LEDA's passband			left hand output via 6ft LMR-195 PVC	
Measured total power		-1.42	dBm		
dBm/Hz measured at 50 MHz (midband)		-79.4	dBm/Hz	est of total	-1.49
F1dB measured		7	68.8	MHz	
F3dB measured		5.6	71.3	MHz	
F6dB measured		4.6	73.7	MHz	
F10dB measured		3.9	76.8	MHz	
F20dB measured		3.1	87.2	MHz	
F30dB measured		2.4	98.2	MHz	