IIP Radiometer Front End - Version 2
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Stage	*Function*	*G (dB)*	*F (dB)*	*IIP3 (dBm)*	*Model*	*Vendor*	*Unit Cost*
1	Antenna	0.0	0.0	100.0			
2	Cal. Switch	-0.5	0.5	200.0	01-416E30I	Dynatech	
3	Bandpass Filter	-0.5	0.5	13.0	4B120-150(	K&L	
4	Isolator	-0.5	0.5	13.0	9A83	Alcatel Fer	225.00
5	LNA	34.0	0.8	-14.0	AFS3-0100	Miteq	1150.00
6	Pad (improve match)	-3.0	3.0	100.0	BW-S3W2	Mini-Circuit	29.95
	Cable	-1.0	1.0	200.0			
7	Image Reject Filter	-1.0	1.0	13.0	307-1522.5	TTE	417.00
8	RF Amp	19.0	3.8	3.0	ZJL-3G	Mini-Circuit	114.95
9	Power Divider	-3.6	3.6	100.0	ZESC-2-11	Mini-Circuit	71.95
10	Pad (improve match)	-6.0	6.0	100.0	BW-S6W2	Mini-Circuit	29.95
11	Mixer	-7.0	7.0	11.0	ZFM-11	Mini-Circuit	89.95
12	Pad (improve match)	-6.0	6.0	100.0	SAT-6	Mini-Circuit	20.95
13	LO Reject Filter	-1.0	1.0	13.0	SLP-450	Mini-Circuit	34.95
14	GaAs SPST Switch	-1.3	1.3	29.0	ZFSWHA-1	Mini-Circuit	74.95
15	Digital Step Attenuator	-4.0	4.0	10.0	ZFAT-4816	Mini-Circuit	89.95
16	IF Amp	19.0	3.8	11.0	ZFL-500HL	Mini-Circuit	99.95
17	Antialiasing Filter	-1.0	1.0	13.0	K4542-120/	TTE	501.00
18	IF Amp	19.0	3.8	11.0	ZFL-500HL	Mini-Circuit	99.95
	Matched load (reference)						
	Temp sensor						
	Directional Coupler	-1.2	1.2	100.0	ZADC-10-1	Mini-Circuit	49.95
	LO Synthesizer				NS2-	Nova Engir	699.00
	LO pad	-3.0	3.0	100.0	BW-S3W2	Mini-Circuit	29.95
							TOTAL

GNI Analysis for Minimum Attenuation Setting

		Stage			*Cascade*		
Stage	*Function*	*G (dB)*	*F(dB)*	*IIP3 (dBm)*	*G (dB)*	*F (dB)*	*IIP3 (dBm)*
1	Antenna	0.0	0.0	100.0	0.0	0.0	100.0
2	Cal. Switch	-0.5	0.5	200.0	-0.5	0.5	100.0
3	Bandpass Filter	-0.5	0.5	13.0	-1.0	1.0	13.5
4	Isolator	-0.5	0.5	13.0	-1.5	1.5	10.7
5	LNA	34.0	0.8	-14.0	32.5	2.3	-12.5
6	Pad (improve match)	-3.0	3.0	100.0	29.5	2.3	-12.5
	Cable	-1.0	1.0	200.0	28.5	2.3	-12.5
7	Image Reject Filter	-1.0	1.0	13.0	27.5	2.3	-17.3
8	RF Amp	19.0	3.8	3.0	46.5	2.3	-25.3
9	Power Divider	-3.6	3.6	100.0	42.9	2.3	-25.3
10	Pad (improve match)	-6.0	6.0	100.0	36.9	2.3	-25.3
11	Mixer	-7.0	7.0	11.0	29.9	2.3	-28.6
12	Pad (improve match)	-6.0	6.0	100.0	23.9	2.3	-28.6
13	LO Reject Filter	-1.0	1.0	13.0	22.9	2.3	-28.7
14	GaAs SPST Switch	-1.3	1.3	29.0	21.6	2.3	-28.7
15	Digital Step Attenuator	***-4.0***	***4.0***	10.0	17.6	2.4	-28.8
16	IF Amp	19.0	3.8	11.0	36.6	2.4	-28.8

17	Antialiasing Filter	-1.0	1.0	13.0	35.6	2.4	-29.9
18	IF Amp	19.0	3.8	11.0	54.6	2.4	-31.0

Est. Receiver Temp.	215.8	degK	assuming min. atten.
Est. 1dB Comp. (input)	-46.0	dBm	assuming 15 dB down from IIP3, min atten.
Output at 1dB Comp.:	8.6	dBm	assuming min. atten.
kTB at input yields:	-42.4	dBm	at output, assuming B=50 MHz, min. atten.

GNI Analysis for "Optimum" Attenuation Setting

		Stage			*Cascade*		
Stage	***Function***	***G (dB)***	***F(dB)***	***IIP3 (dBm)***	***G (dB)***	***F (dB)***	***IIP3 (dBm)***
1	Antenna	0.0	0.0	100.0	0.0	0.0	100.0
2	Cal. Switch	-0.5	0.5	200.0	-0.5	0.5	100.0
3	Bandpass Filter	-0.5	0.5	13.0	-1.0	1.0	13.5
4	Isolator	-0.5	0.5	13.0	-1.5	1.5	10.7
5	LNA	34.0	0.8	-14.0	32.5	2.3	-12.5
6	Pad (improve match)	-3.0	3.0	200.0	29.5	2.3	-12.5
	Cable	-1.0	1.0	100.0	28.5	2.3	-12.5
7	Image Reject Filter	-1.0	1.0	13.0	27.5	2.3	-17.3
8	RF Amp	19.0	3.8	3.0	46.5	2.3	-25.3
9	Power Divider	-3.6	3.6	100.0	42.9	2.3	-25.3
10	Pad (improve match)	-6.0	6.0	11.0	36.9	2.3	-32.8
11	Mixer	-7.0	7.0	100.0	29.9	2.3	-32.8
12	Pad (improve match)	-6.0	6.0	13.0	23.9	2.3	-32.9
13	LO Reject Filter	-1.0	1.0	29.0	22.9	2.3	-32.9
14	GaAs SPST Switch	-1.3	1.3	10.0	21.6	2.3	-32.9
15	Digital Step Attenuator	***-16.0***	***16.0***	11.0	5.6	3.0	-32.9
16	IF Amp	19.0	3.8	13.0	24.6	3.7	-32.9
17	Antialiasing Filter	-1.0	1.0	11.0	23.6	3.7	-33.0
19	IF Amp	19.0	3.8	11.0	42.6	3.7	-33.0

Est. Receiver Temp.	397.2	degK	assuming opt. atten.
Est. 1dB Comp. (input)	-48.0	dBm	assuming 15 dB down from IIP3, opt. atten.
Output at 1dB Comp.:	-5.4	dBm	assuming opt. atten.
kTB at input yields:	-54.4	dBm	at output, assuming B=50 MHz, opt. atten.

Tuning Analysis for 125-175 MHz IF

LO (MHz)	***RF (MHz)***	***IF (MHz)***	***Image (MHz)***	
	1438.0	175.0	1088.0	
1263	1413.0	150.0	1113.0	
	1388.0	125.0	1138.0	Image Rej. Filter is -40 dB @ 1145
	1427.0	175.0	1077.0	Top end of ITU-protected band
1252	1402.0	150.0	1102.0	
	1377.0	125.0	1127.0	
	1377.0	175.0	1027.0	
1202	1352.0	150.0	1052.0	
	1327.0	125.0	1077.0	
	1327.0	175.0	977.0	Image getting close to 900 MHz LM
1152	1302.0	150.0	1002.0	

1277.0	125.0	1027.0	RF getting close to BPF edge

Tot. Cost	*Fl (MHz)*	*Fh (MHz)*	*V (V)*	*I (mA)*	*Comments*
	1200	1800			On-hand
225.00	1350	1850			18dB rev. iso., 1.3:1 VSWR
1150.00	1000	2000	15	125	
29.95	0	18000			VSWR 1.2:1
					Connects antenna unit and downconverter
417.00	1345	1700			-40dB@1145, -30dB@1850
114.95	20	3000	12	45	
71.95	10	2000			
59.90	0	18000			VSWR 1.2:1
179.90	1	2000			Level 7, IF=(5,600)MHz
41.90	0	1500			VSWR 1.3:1
69.90	0	400			-40dB@(750,1800)MHz
149.90	0	2500			-8V ctrl., 10 ns to switch *on hand*
179.90	10	1000	5	12	(4,28)dB via 3b-TTL
199.90	10	500	15	110	*on hand*
1002.00	110	190			
199.90	10	500	15	110	*on hand*
					On-hand
49.95	1000	1700			
1398.00	1000	1500			
59.90	0	18000			VSWR 1.2:1
5599.90					

Stage			*Cascade*		
G	*F*	*IIP3 (mW)*	*G*	*F*	*IIP3 (mW)*
1	1	1E+10	1	1	10000000000
0.891251	1.122018	1E+20	0.891251	1.122018	9999999999
0.891251	1.122018	19.95262	0.794328	1.258925	22.38721134
0.891251	1.122018	19.95262	0.707946	1.412538	11.83725063
2511.886	1.202264	0.039811	1778.279	1.698244	0.055968249
0.501187	1.995262	1E+10	891.2509	1.698803	0.055968249
0.794328	1.258925	1E+20	707.9458	1.699094	0.055968249
0.794328	1.258925	19.95262	562.3413	1.69946	0.01874463
79.43282	2.398833	1.995262	44668.36	1.701947	0.00298341
0.436516	2.290868	1E+10	19498.45	1.701976	0.00298341
0.251189	3.981072	1E+10	4897.788	1.702129	0.00298341
0.199526	5.011872	12.58925	977.2372	1.702948	0.001380773
0.251189	3.981072	1E+10	245.4709	1.705999	0.001380773
0.794328	1.258925	19.95262	194.9845	1.707053	0.001357709
0.74131	1.348963	794.3282	144.544	1.708843	0.001357257
0.398107	2.511886	10	57.54399	1.719303	0.001331142
79.43282	2.398833	12.58925	4570.882	1.743612	0.001323092

0.794328	1.258925	19.95262	3630.781	1.743668	0.001015339
79.43282	2.398833	12.58925	288403.2	1.744054	0.000785364

Stage			***Cascade***		
G	***F***	***IIP3 (mW)***	***G***	***F***	***IIP3 (mW)***
1	1	1E+10	1	1	10000000000
0.891251	1.122018	1E+20	0.891251	1.122018	9999999999
0.891251	1.122018	19.95262	0.794328	1.258925	22.38721134
0.891251	1.122018	19.95262	0.707946	1.412538	11.83725063
2511.886	1.202264	0.039811	1778.279	1.698244	0.055968249
0.501187	1.995262	1E+20	891.2509	1.698803	0.055968249
0.794328	1.258925	1E+10	707.9458	1.699094	0.055968249
0.794328	1.258925	19.95262	562.3413	1.69946	0.01874463
79.43282	2.398833	1.995262	44668.36	1.701947	0.00298341
0.436516	2.290868	1E+10	19498.45	1.701976	0.00298341
0.251189	3.981072	12.58925	4897.788	1.702129	0.000530785
0.199526	5.011872	1E+10	977.2372	1.702948	0.000530785
0.251189	3.981072	19.95262	245.4709	1.705999	0.000517336
0.794328	1.258925	794.3282	194.9845	1.707053	0.000517253
0.74131	1.348963	10	144.544	1.708843	0.000512088
0.025119	39.81072	12.58925	3.630781	1.977348	0.000509095
79.43282	2.398833	19.95262	288.4032	2.362618	0.000509048
0.794328	1.258925	12.58925	229.0868	2.363516	0.00050318
79.43282	2.398833	12.58925	18197.01	2.369622	0.000498614

<-- Not recommended

MHz

Recommended H-I band coverage

Recommended for continuous coverage

MR band

Extended tuning range possible