Intermodulation / Linearity test carried out on an SDR-IQ Receiver.

Test Setup:

Two crystal oscillator modules at 20.000 and 24.576MHz are combined throuh 35dB pads for a resultant output of –27dBm per tone. This tone pair is passed throuh a 10dB stepped attenuator into a hybrid combiner where it is mixed with the output of a Rhode and Schwarz signal generator. The combiner adds an additional 3dB attenuation, so the two reference tones are now at levels of –30dBm, -40dBm etc. depending on the stepped attenuator setting.

The SDR-IQ saturates at approximately –20dBm, so a two / three tone input of –30dBm each is therefore very close to maximum. No overloading was seen during this test unless this was deliberately provoked.

For this set of tests, the frequency of the signal generator was set to 16MHz so all frequency components are within the 15MHz HPF response of the SDR-IQ.

The aim was to investigate the level of third order Intermodulation Products at 15.424 and 29.152MHz (2 * 20MHz – 24.576MHz and 2 * 24.576MHz – 20MHz) from the two crystal oscillator derived tones, and investigate how these were affected by the introduction of the third, 16MHz, component with a variable power level.

The SDR-IQ was set for 190kHz, 16384 point FFT resulting in 12Hz resolution, and Blackman Harris window. Fxed Gain setting, at +10dB

Two Tone results alone:

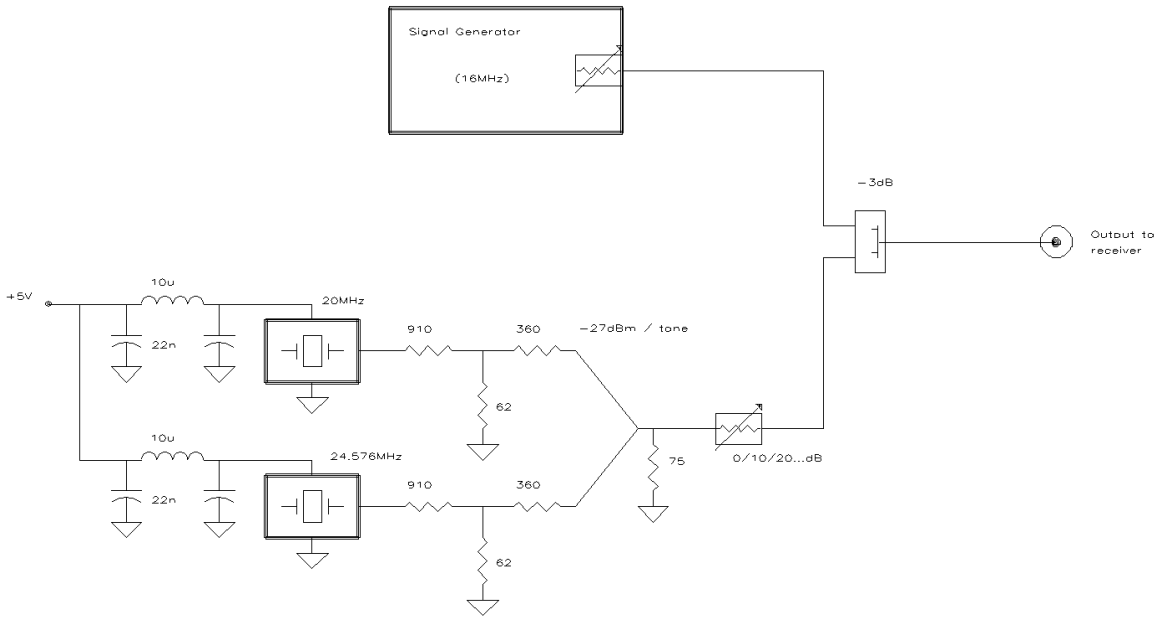
20 + 24.6MHz Level, dBm	16 MHz level	15.424MHz product dBm	29.152MHz product, dBm	
-30	-	-110	-96	
-40	-	-104	-96	
-50	-	-106	-94	
-60	-	-110	-93	

Two Tone 'Intermodulation' products with added 16MHz component

20.2 + 4.6MHz Level, dBm	16 MHz level	15.424MHz product dBm	29.152MHz product, dBm	
-30	-30	-125	-108	
-30	-35	-120	-98	
-30	-40	-114	-96	
-30	-45	-112	-96	

20 + 24.6MHz Level, dBm	16 MHz level	15.424MHz product dBm	29.152MHz product, dBm	
-50	-30	(<-135)	(-130)	
-50	-35	(-130)	(-125)	
-50	-40	(-128)	-120	
-50	-45	-125	-112	
-50	-50	-124	-110	
-50	-55	-113	-96	
-50	-60	-108	-94	
-50	-65	-106	-93	

20 + 24.6MHz Level, dBm	16 MHz level	15.424MHz product dBm	29.152MHz product, dBm	
-70	-55	(-135)	(-130)	
-70	-60	(-129)	-120	
-70	-65	-125	-107	
-70	-70	-120	-108	
-70	-75	(-130)	-110	
-70	-80	-123	-104	


Signal Generator
(16MHz)
-3dB
Output to receiver
+5V
10u
22n
20MHz
910
360
-27dBm / tone
62
10u
22n
24.576MHz
910
360
62
75
0/10/20...dB