Datasheet QuTech I/Q upconverter F1c

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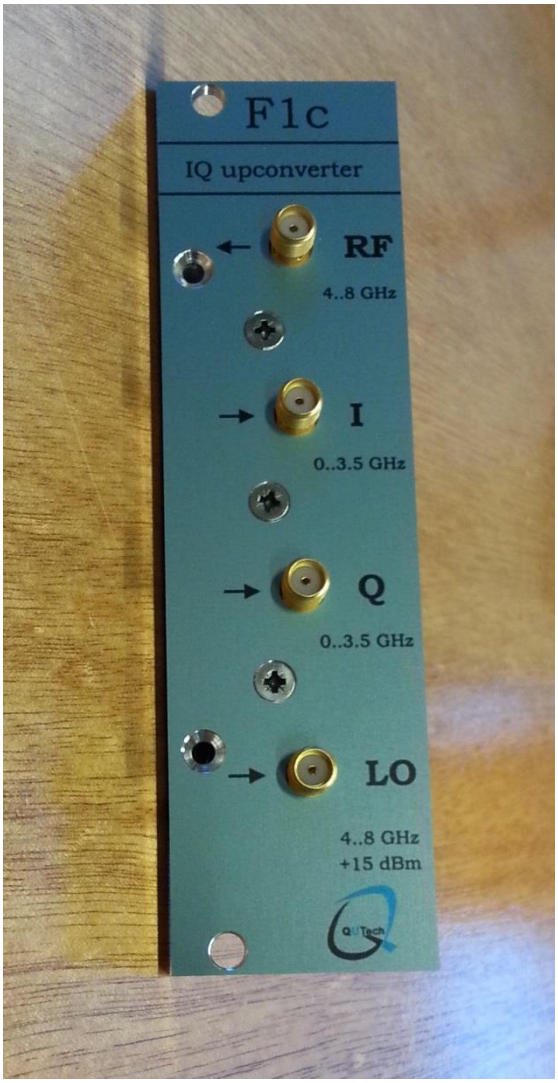

Design

The F1c is a connectorized 4.0 to 8.5 GHz I/Q upconverter built around the Hittite HMC525LC4 MMIC.

The following table shows the specs compared to the Marki mixers (based on datasheets):

	MARKI	MARKI	QuTech
Model	**IQ-0307LXP**	**IQ-0618LXP**	**F1c**
RF-Bandwidth	3…7 GHz	6…18GHz	4…8.5GHz
IF-Bandwidth	DC…500MHz	DC…500MHz	DC…3.5GHz
Conversion Loss	5.5dB (1)	7.5dB	7.5dB
P1dB (input)	+6dBm	+6dBm	+14dBm
IP3 (input)	+16dBm	+16dBm	+25dBm
Image Reject	>22dB	>17dB	>32dB
LO/RF Isolation	>30dB	>35dB	>40dB
Phase Error	3° (1) [<5°]	3° (1) [<6°]	4° (2) [<8°]
Amplitude Imbalance	0.4dB (1)	0.4dB (1)	+/- 0.2dB

Notes:

(1) Marki give typical values. At some frequencies it is (much) worse
(2) The phase error of the Hittite does not meet the spec below 4.5GHz (at 4GHz the error is 8°)

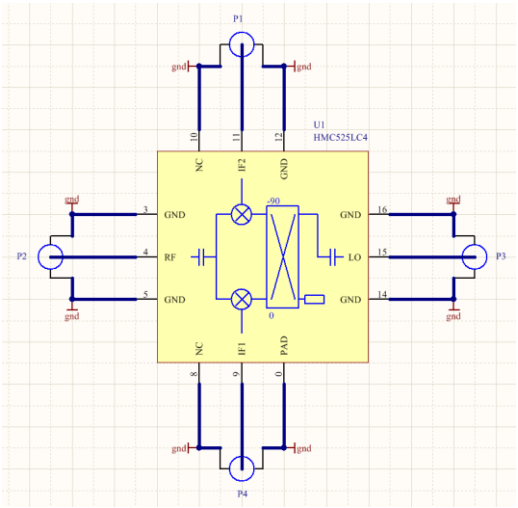

Figure 1 The F1c schematic

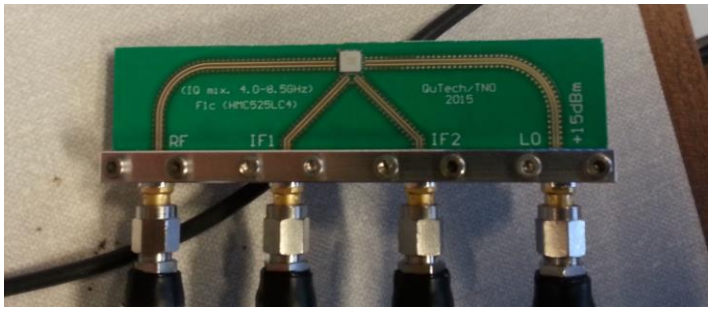

Figure 2 The F1c board

Test and Measurement results

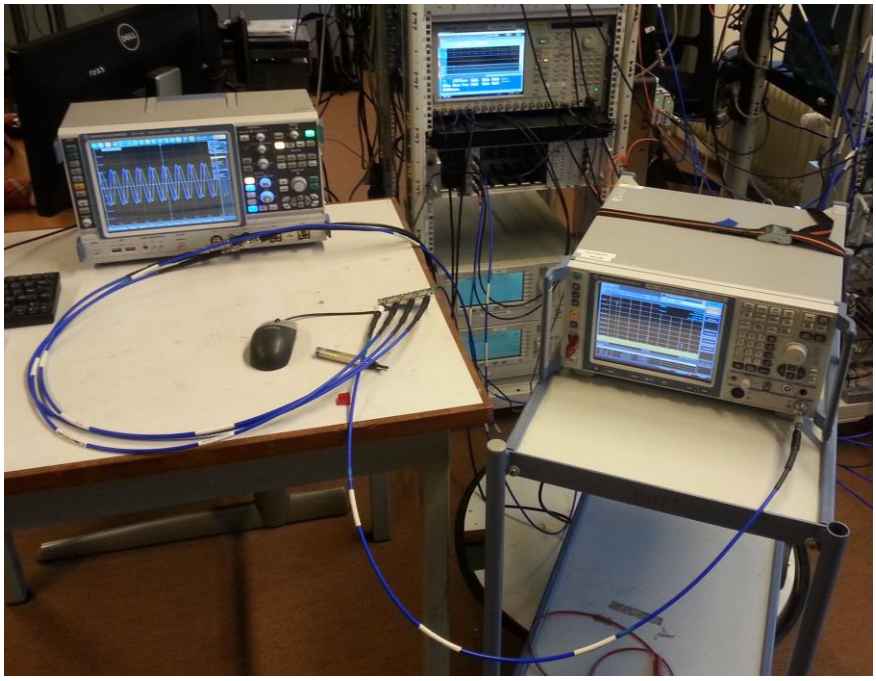

Figure 3: Photo of the test setup.

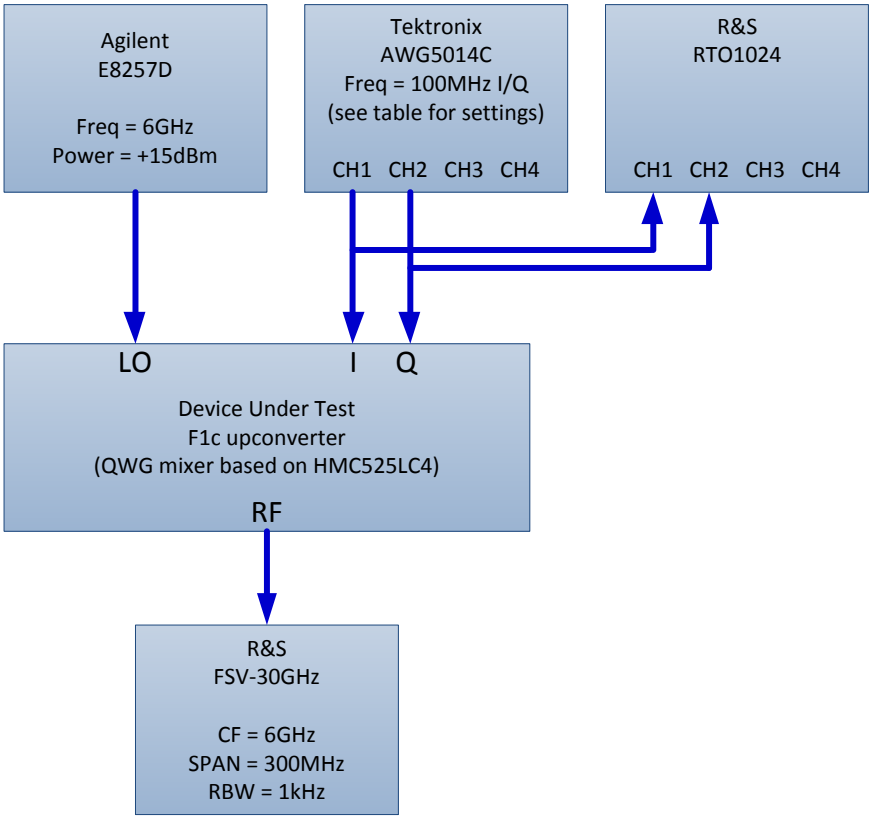

Figure 4: Block diagram of test setup.

Channel 1 of the AWG has been used as the I-channel and Channel 2 as the Q-channel.
These two 100MHz signals are being mixed to a 6GHz LO.

Parameters (amplitude, phase and offset) have been manually tuned on Ch2 of the AWG.
to optimize LO-feedthrough and sideband suppression.

Table 1: AWG5014 detailed settings

	CH1	CH2
Wave	Sine	Sine
IF Frequency	100MHz	100MHz
Amplitude	1.000Vpp	1.053Vpp
Offset	-0.004V	+0.002V
Phase shift	0.0 deg	86.6 deg
Filter	No filter	No filter

For the settings above the spectrum measured is:

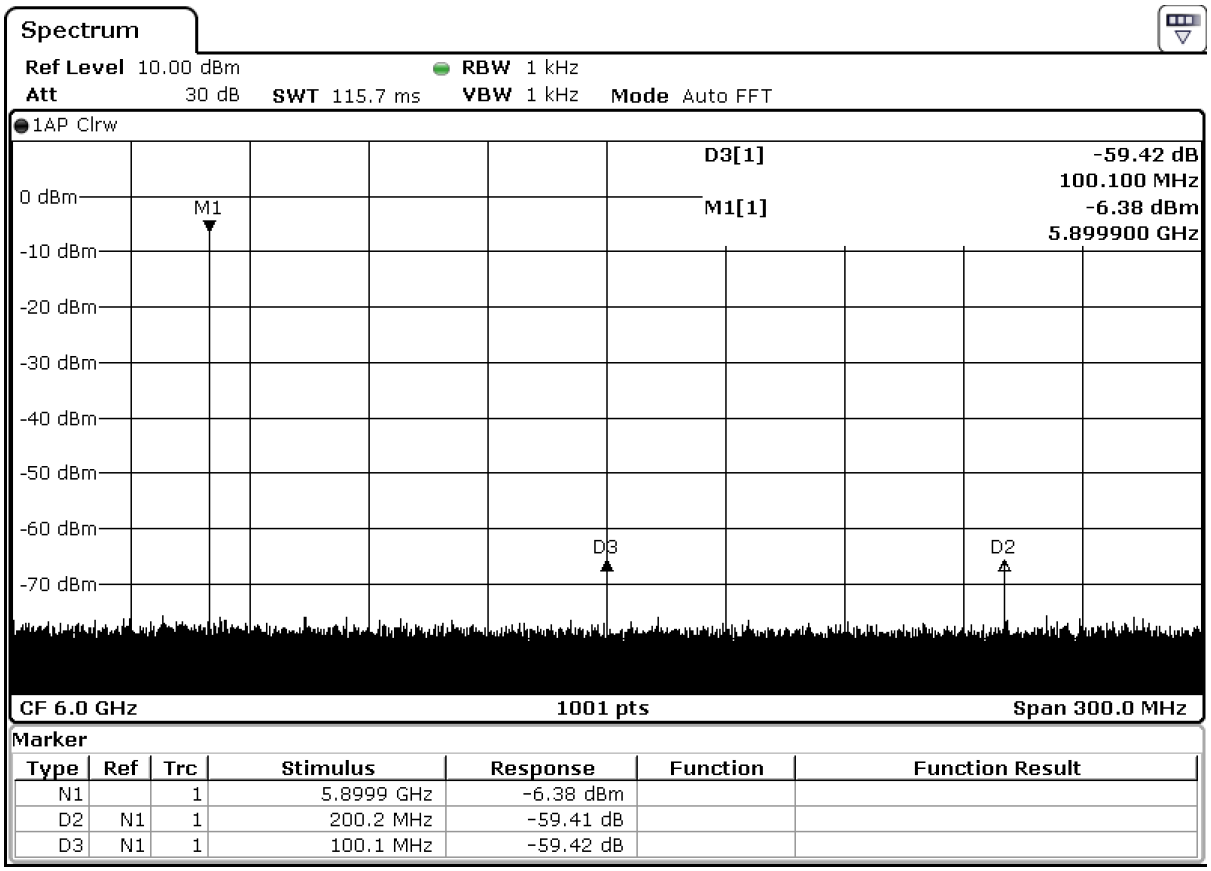

Figure 5: Measured spectrum (M1 = LSB = wanted signal, D3 = LO leakage, D2 = USB leakage).