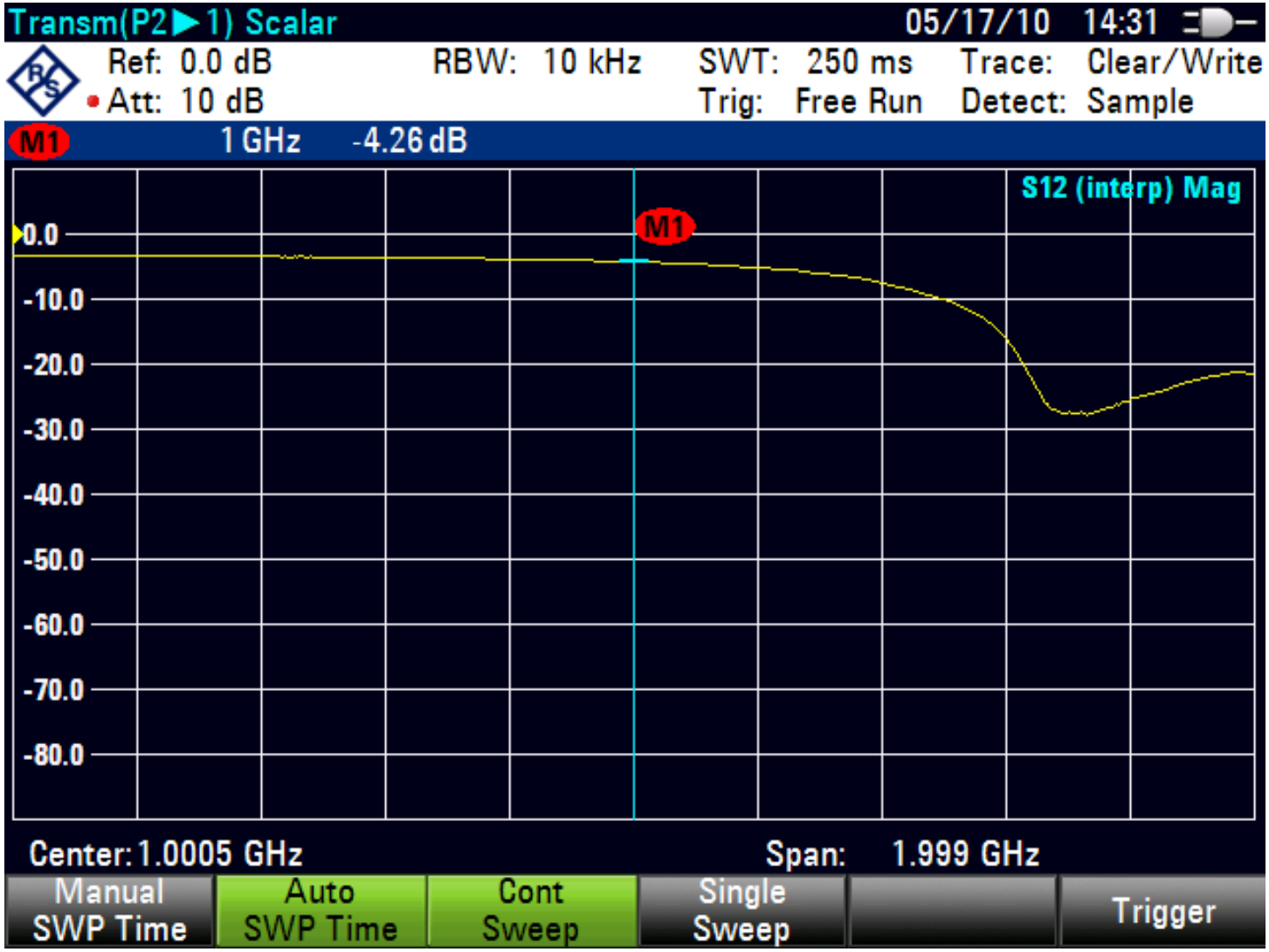
May 17, 2010

Introduction

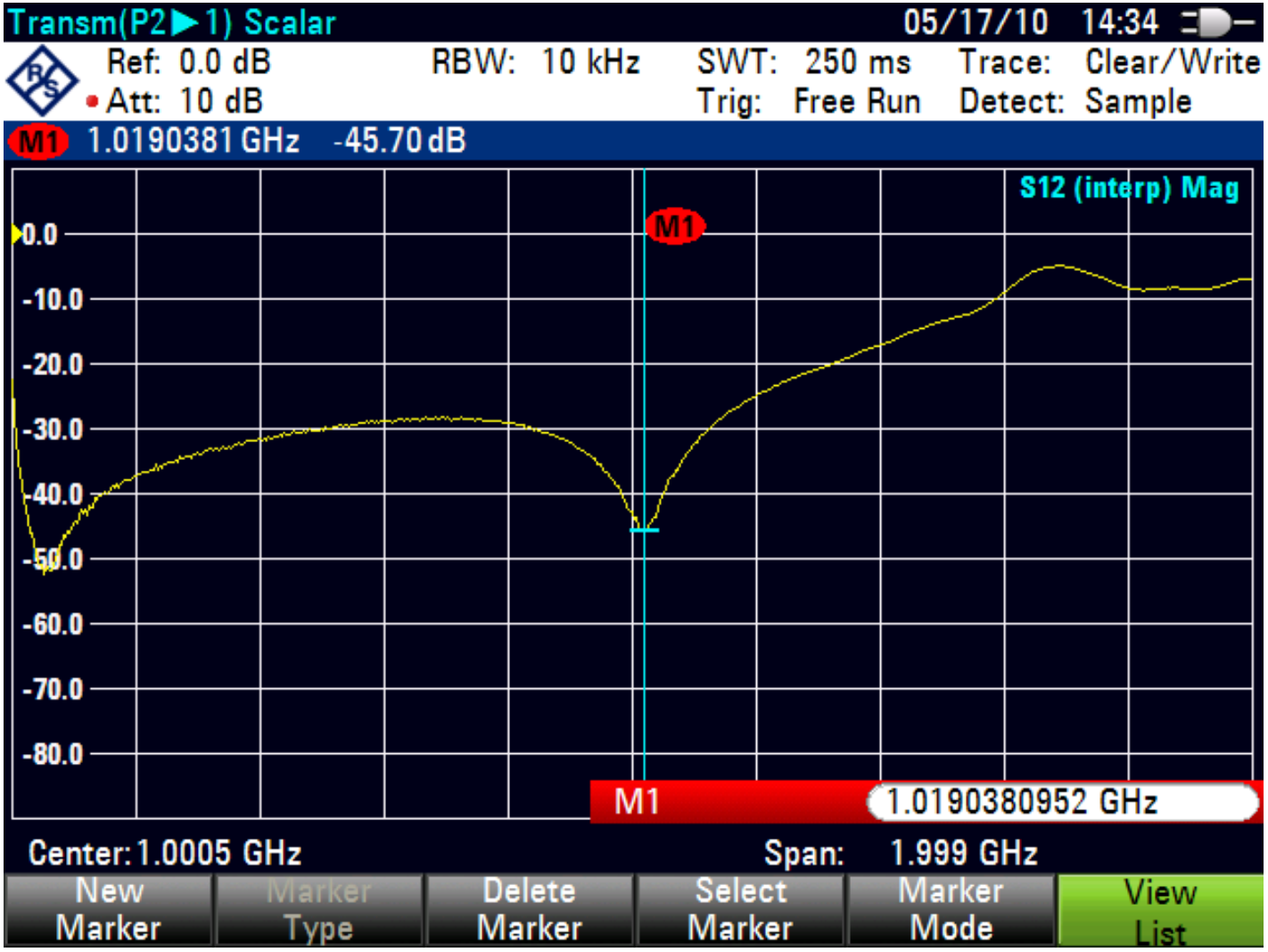
The following waveforms measure ‘insertion loss’ and ‘isolation’ on a standard (randomly chosen) ‘house quality’ 1 GHz 2-way splitter. All measurements were taken with a Rohde & Schwarz FSH818 Spectrum analyzer & tracking generator, with test lead and adaptor losses ‘normalized’ to the 0 dB reference line, therefore the *loss values* shown on the diagrams are the precise (accuracy better than .1 dB) insertion loss and/or isolation values. The horizontal (frequency) axis is from 0 to 2 GHz.

Some measurements were made out of the 0 to 1 GHz range (the spec’d range of the splitter); principally to demonstrate the effect of using a standard 1 GHz splitter(s) in the TVRO L-band frequencies, which I sometimes find during headend testing.

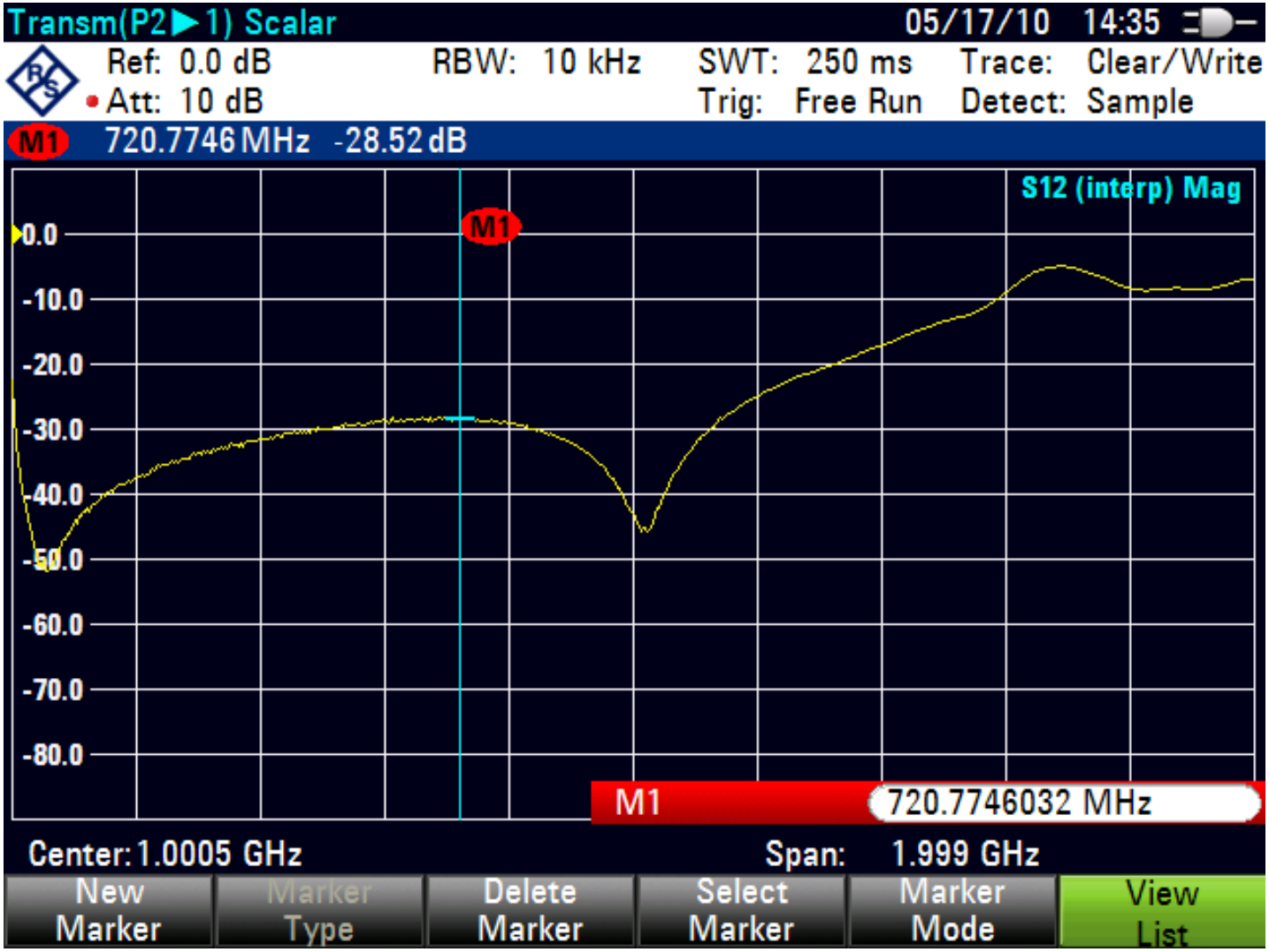


Insertion loss from splitter input to output leg, with the other leg terminated. Insertion loss at 1 GHz is 4.26 dB.

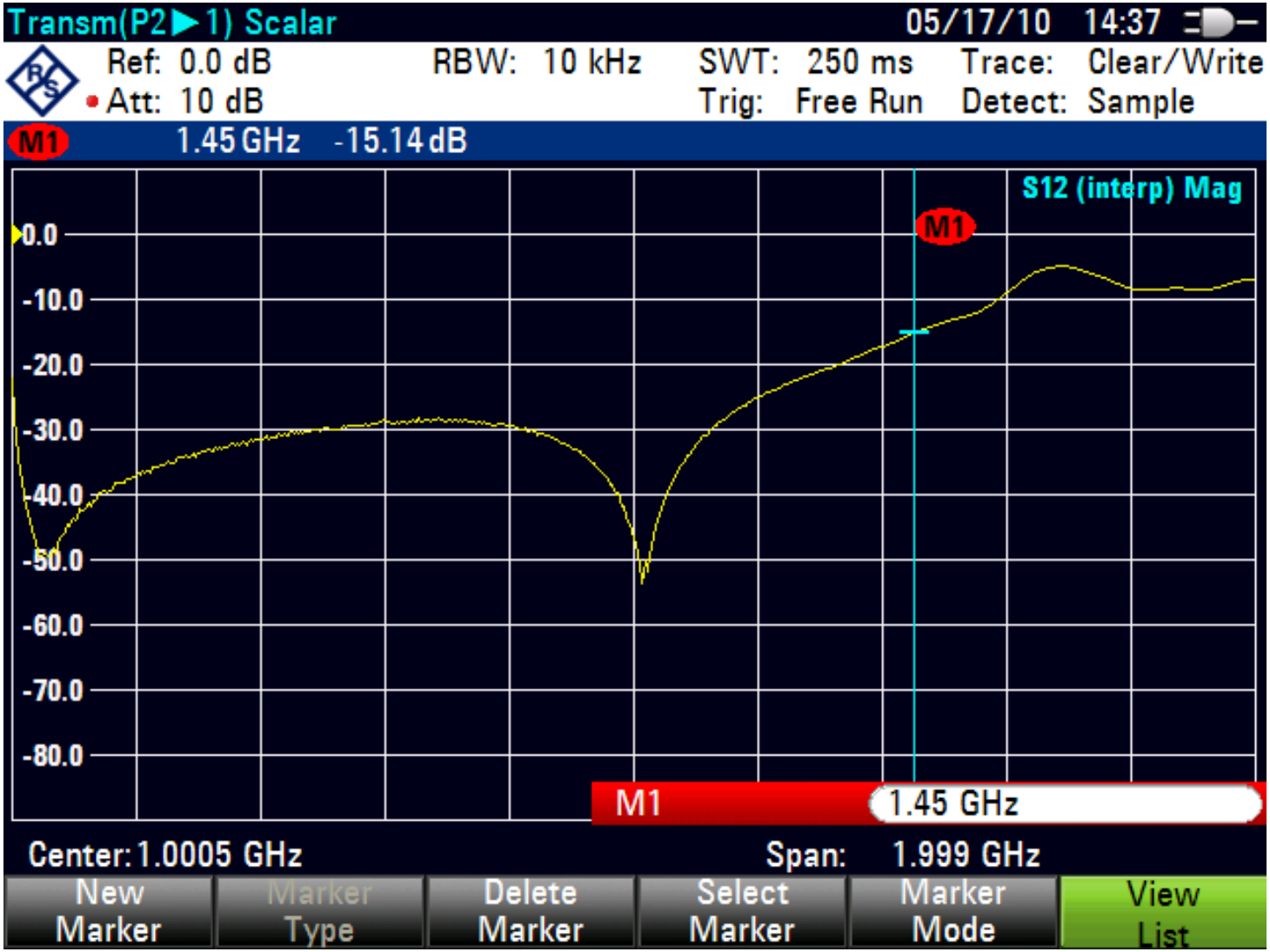
Same setup as the first waveform. The insertion loss at 1.45 GHz is 8.66 dB (top end of L-band frequencies). The insertion loss from 1 GHz to 1.45 GHz has doubled!



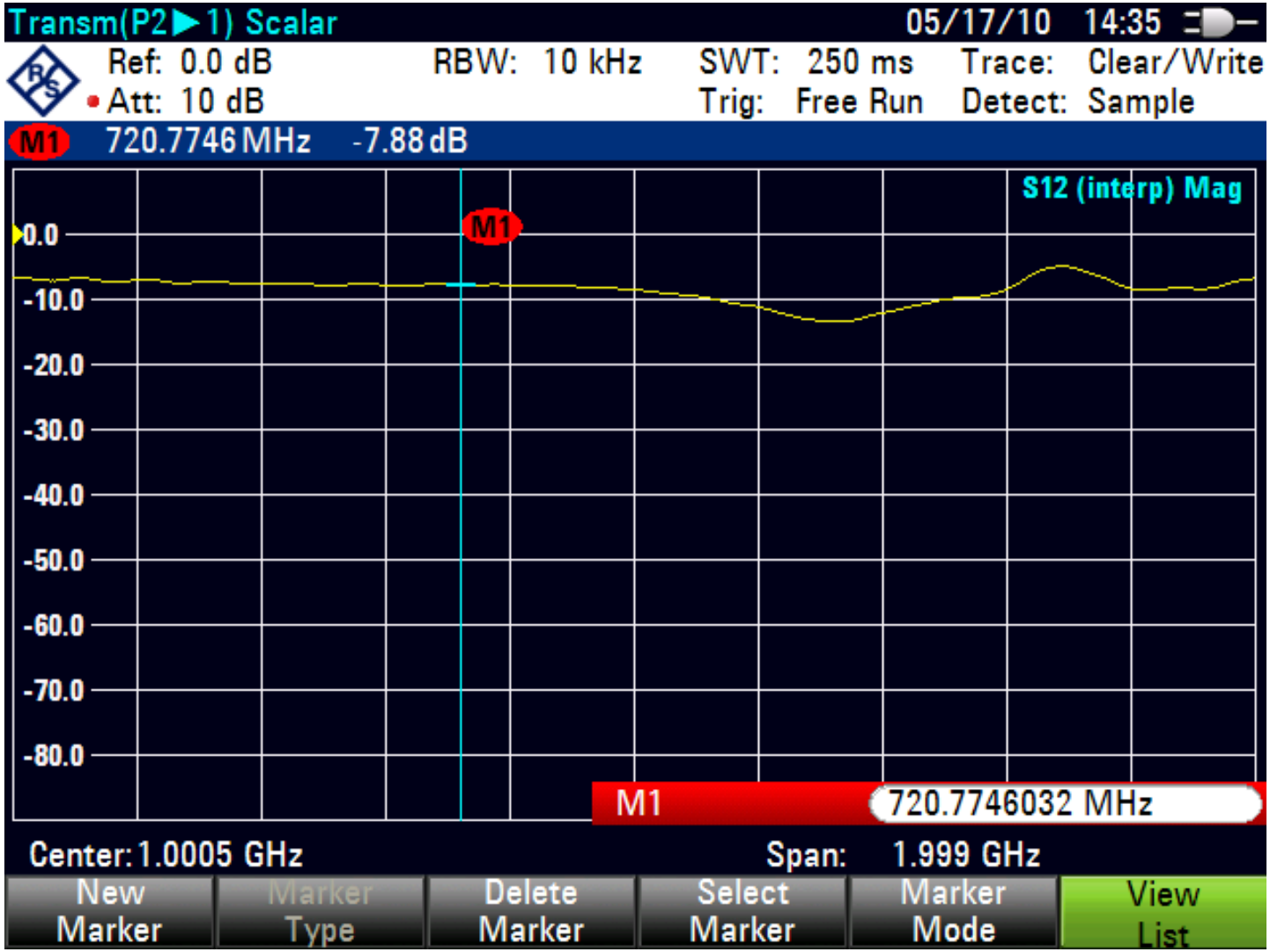
Output port-to-port isolation with the input port properly terminated. Isolation at 1 GHz is 45.7 dB.



Output port-to-port isolation with the input port properly terminated.
The worst-case isolation from 0 to 1 GHz is 28.5 dB at 720 MHz.



Output port-to-port isolation with the input port properly terminated. The isolation at the high-end L-band frequency is only 15.14 dB!. Both in terms of insertion loss and port-to-port isolation, a 1 GHz house splitter is a poor choice for use at L-band frequencies.



This final waveform shows the effect on port-to-port isolation when the input port has a poor impedance match. The isolation value at 720 MHz is now only 7.88 dB, as compared to 28.5 dB, where the input has a good 75 ohm match.