Pages 1 – 81 of this document are in Exhibit #11aa, and pages 105 – 182 are in Exhibit #11b. Partitioning was necessary in order to facilitate file transfer.

IV) Tests of clause 7, base EUT

IV-A. Clause 7.3.2 Upper threshold for EUTs which implement the LIC procedure, base EUT

The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 7.3.2(b) by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to CW on all 5 carriers, and at level -35.5dBm, which is T_U + U_M + 10dB, where T_U = -51.5dBm from the manufacturer's declarations and the measured emissions bandwidth and U_M is defined in V3.3 (draft) C63.17-2005 as 6dB. The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, otherwise adjustments are as shown on the screenshot following. A trace (yellow) is captured and held at the initial interference setting of -35.5dBm.

The multi-carrier interference generator level is then reduced incrementally in 1dB steps until the base EUT begins to transmit the beacon. A max-hold signal (purple) captures the trace showing when transmissions of the beacon begin. For each 1dB step, the base EUT is powered down while the multi-carrier interference generator is set to the new level. A trace (blue) shows the interference carrier level at the level where transmissions first begin. A marker shows the delta between the -35.5dBm level and the level at which transmissions first begin.

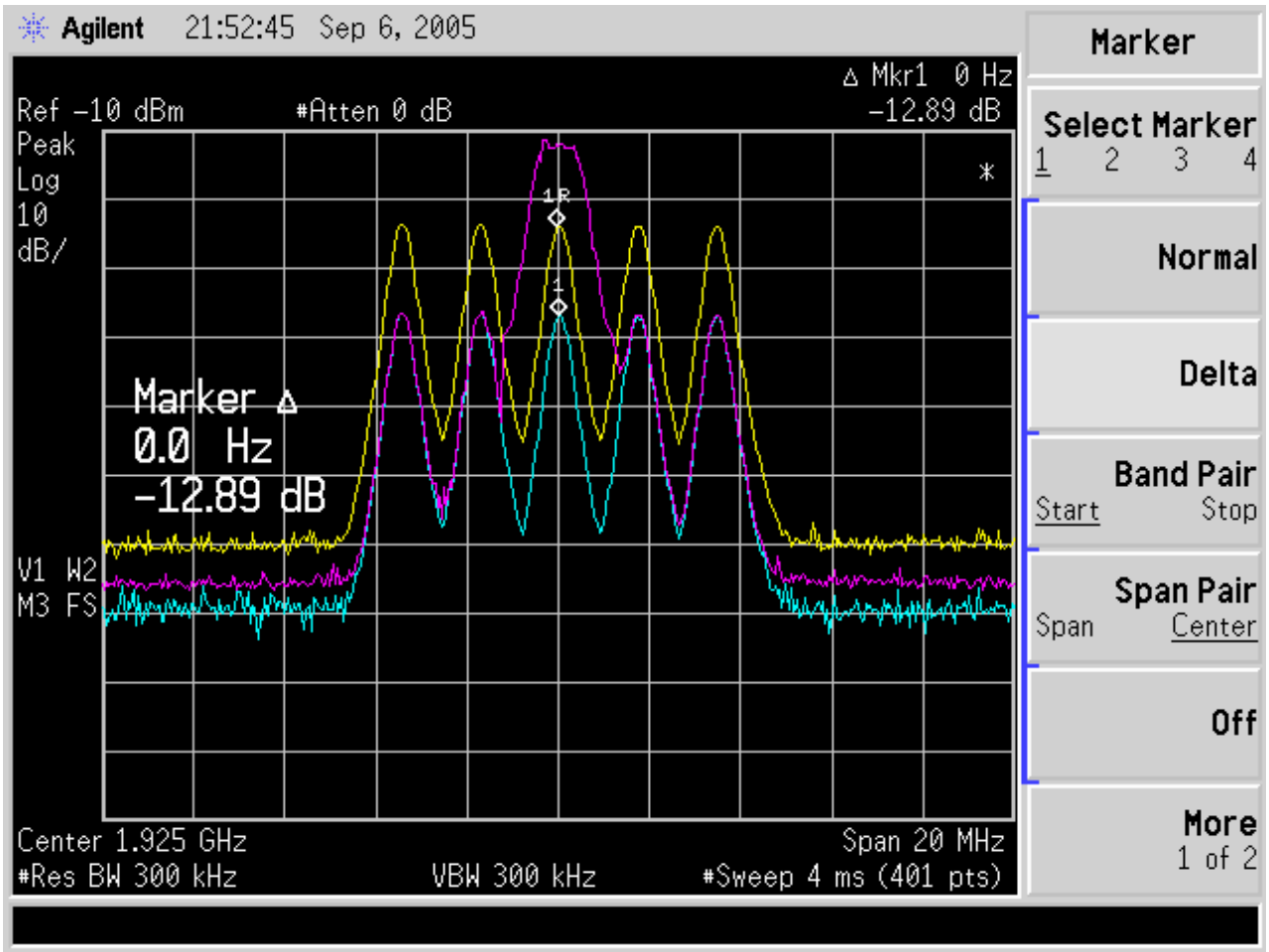

Fig. 49 - Emissions and interference profile spectrum, base EUT, test 7.3.2.

A trace (yellow, 2nd from top, fig. 49) is captured and held at the initial interference level setting of -35.5dBm. Then the multi-carrier interference generator level is reduced incrementally in 1dB steps until the base EUT begins to transmit the beacon. A max-hold signal (purple, top) captures the trace showing when transmissions of the beacon begin. A trace (blue, bottom) shows the interference carrier level at the level where transmissions first begin. A marker shows the delta between the -35.5dBm level and the level at which transmissions first begin. For each 1dB step of reduced interference level, the base EUT is powered down while the multi-carrier interference generator is set to the new level.

The first interference level at which the base EUT transmits is -48.5dBm. The allowed upper limit is $T_U + U_M$ = -45.5dBm, the base EUT passes.

Note that absolute level at the spectrum analyzer and displayed above is a consequence of the relative losses between the EUT port of the combining network and the spectrum analyzer port, relative to the multi-carrier generator port.

IV-B. Clause 7.3.3 Least interfered channel (LIC) procedure test, base EUT

The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 7.3.3 by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document. The multi-carrier interference generator (PXI-5670) is set to CW at $T_U + U_M$ = -45.5dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz.

7.3.3(b). The multi-carrier interference generator is additionally set to generate on f_1 a CW signal of level $T_L + U_M$ +7dB, or -58.5dBm (where $T_L = T_U$ - 20dB) and to generate on f_2 a CW signal of level $T_L + U_M$ = -65.5dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the system's five carriers.

With this interference profile present, apply power to the base EUT and the companion headset. Then press the TALK button on the headset to establish a link, then press again to release the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the base EUT, the base EUT always chooses f_2 for the communications channel.

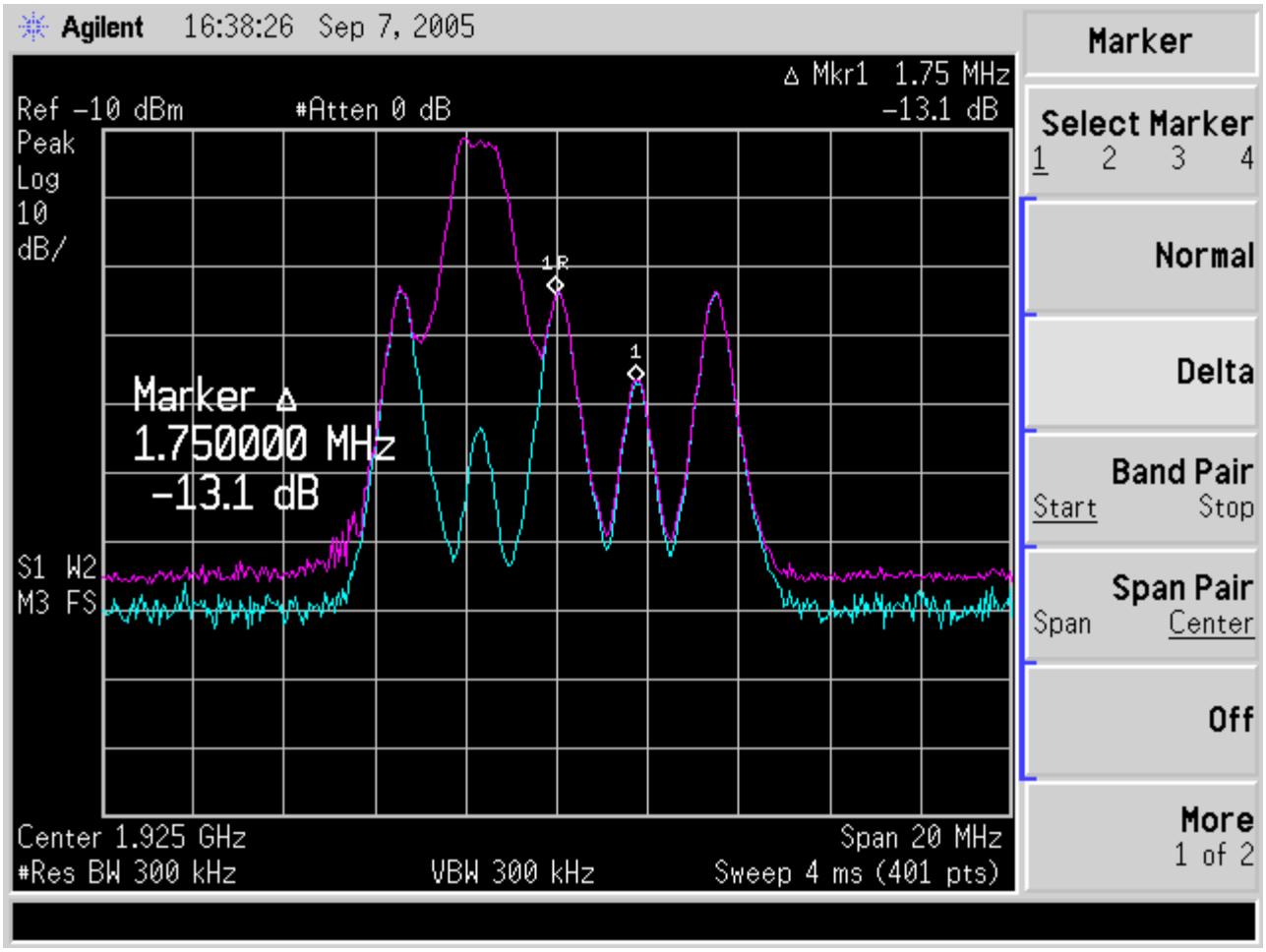

Fig. 50 - Emissions and interference profile spectrum, base EUT, test 7.3.3(b).
A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (blue, bottom) shows the interference profile.

The base EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the requirement of 7.3.3(b) of not transmitting on f_1.

7.3.3(c). Repeat the test of 7.3.3(b), except reverse the levels on f_1 and f_2. That is, the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$, or -65.5dBm and to generate on f_2 a CW signal of level $T_L + U_M$ + 7dB = -58.5dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the base EUT and the companion headset. Then press the TALK button on the headset to establish a communications channel, then press again to release the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the base EUT, the base EUT always chooses f_1 for the communications channel.

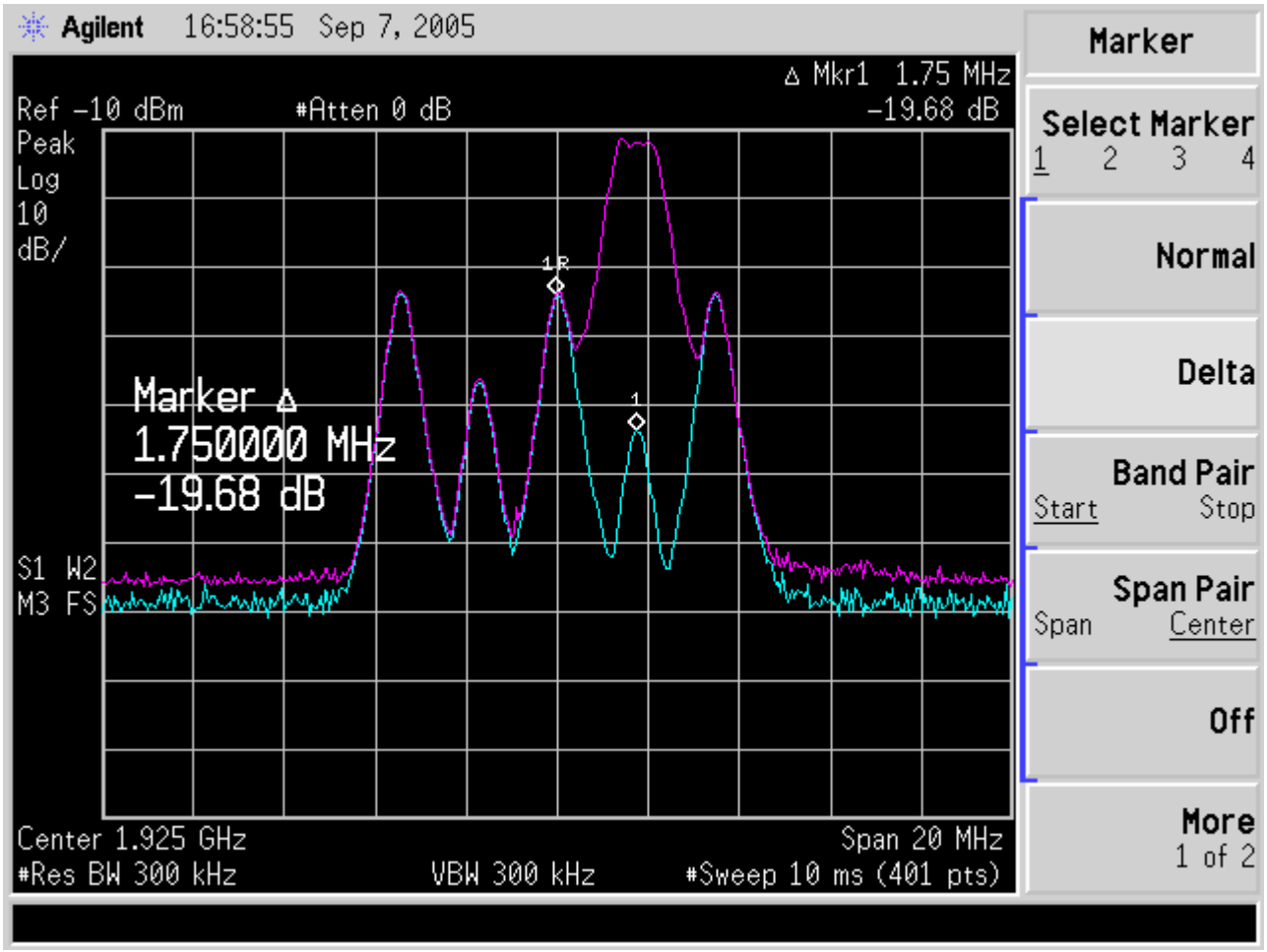

Fig. 51 - Emissions and interference profile spectrum, base EUT, test 7.3.3(c).

The base EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement of 7.3.3(c) that it never transmit on f_2.

7.3.3(d). Repeat the test of 7.3.3(b), except the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$ + 1dB or -44.5dBm and to generate on f_2 a CW signal of level $T_U + U_M$ - 6dB = -51.5dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the base EUT and the companion headset. Then press the TALK button on the headset to establish a communications channel, then press again to release the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the base EUT, the base EUT always chooses f_2 for the communications channel.

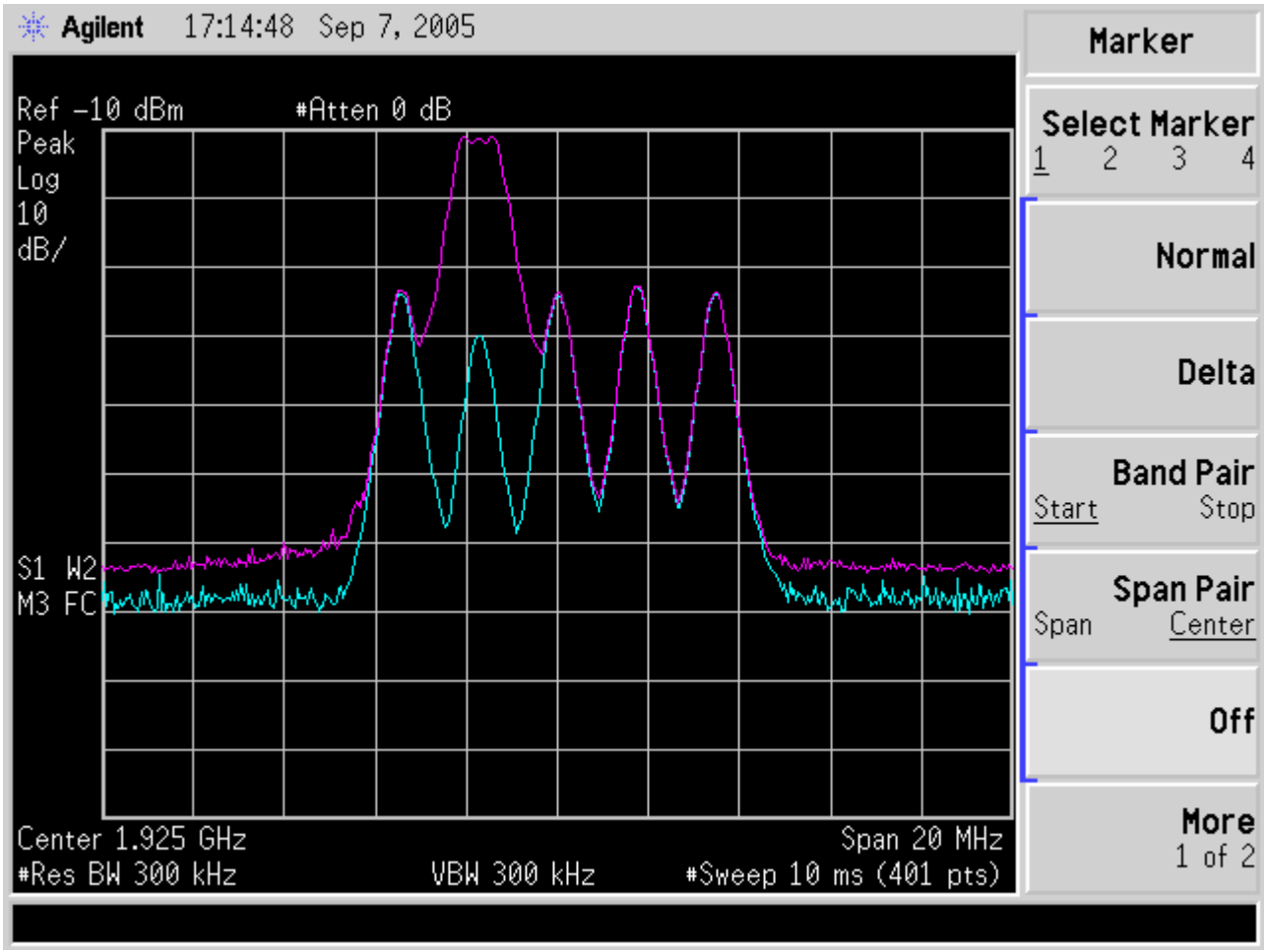

Fig. 52 - Emissions and interference profile spectrum, base EUT, test 7.3.3(d).

The base EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the requirement of 7.3.3(d) that it never transmit on f_1.

7.3.3(e). Repeat the test of 7.3.3(d), except reverse the levels on f_1 and f_2. That is, the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$ - 6dB or -51.5dBm and to generate on f_2 a CW signal of level $T_L + U_M$ +1dB = -44.5dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the base EUT and the companion headset. Then press the TALK button on the headset to establish a communications channel, then press again to release the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the base EUT, the base EUT always chooses f_1 for the communications channel.

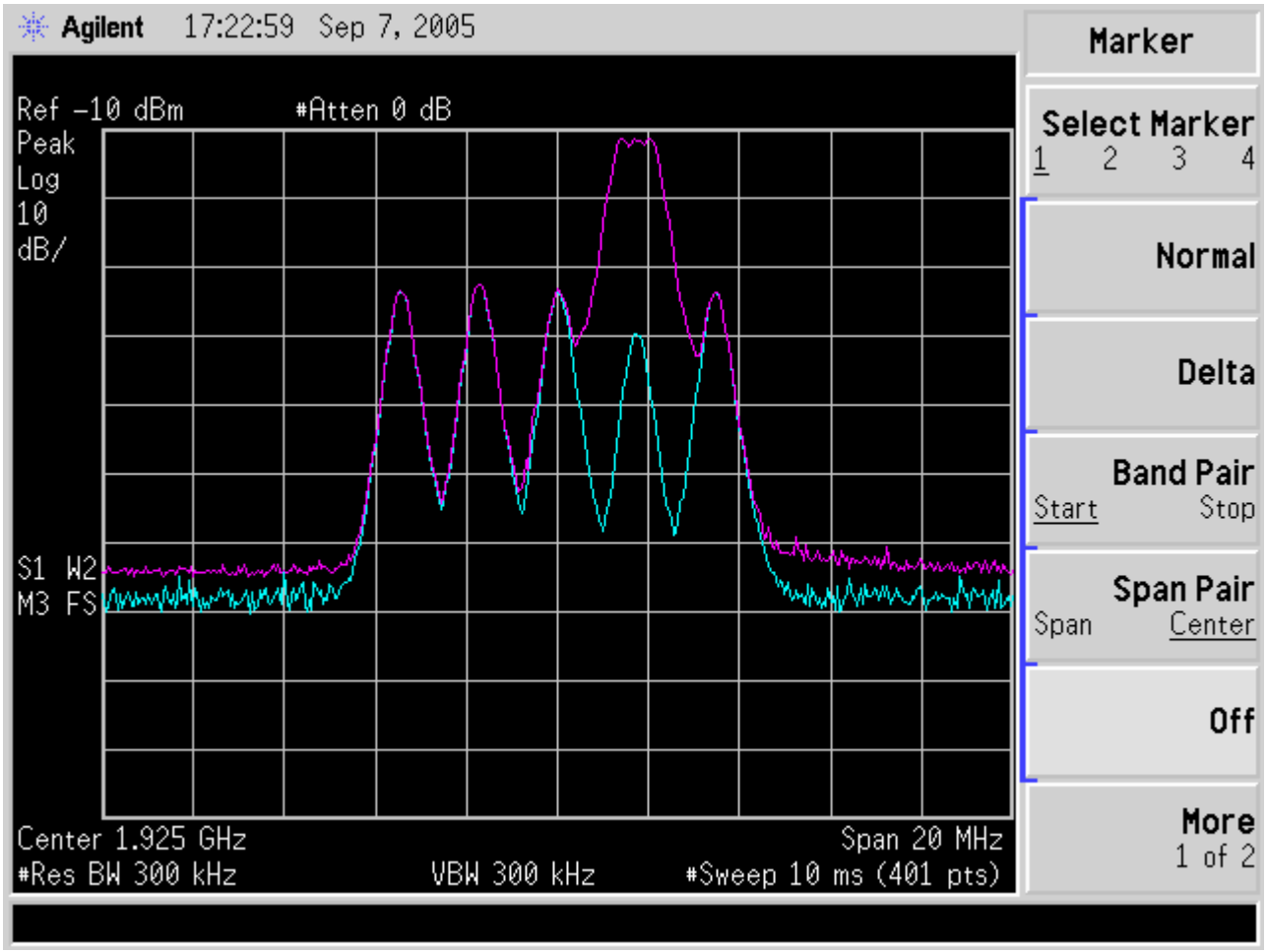

Fig. 53 - Emissions and interference profile spectrum, base EUT, test 7.3.3(e).

The base EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement of 7.3.3(e) that it never transmit on f_2.

IV-C. Clause 7.3.4 Selected channel confirmation, base EUT

The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 7.3.4 by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document. An example of the monitoring function is shown below, with the multi-carrier interference generator configured to enable the automatic switch from the initial interference profile to the alternate interference profile based on the reception of the trigger signal generated by the headset in the frame prior to the initiation of transmission of the headset companion device and base EUT transmissions of communications channel signals.

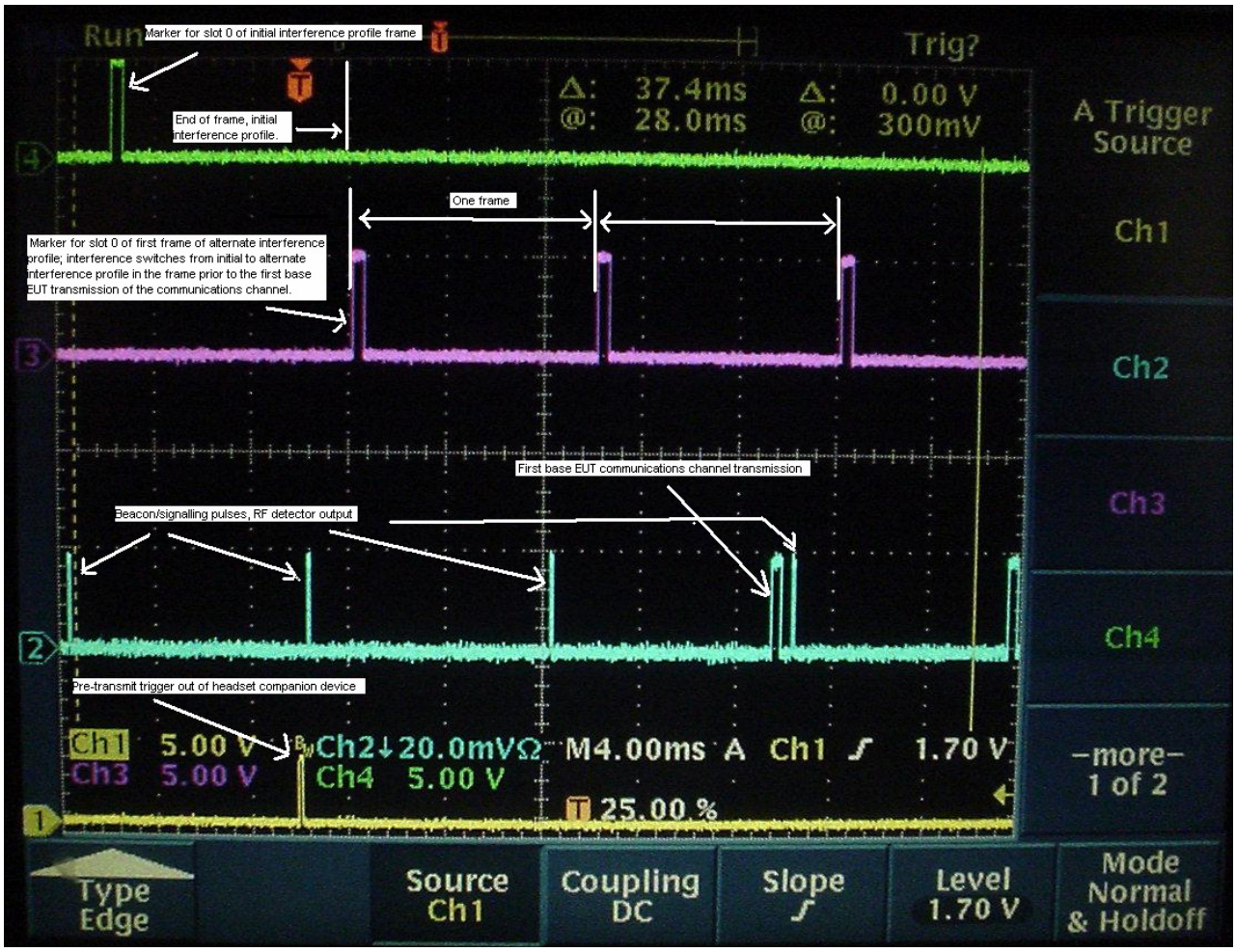

Fig. 54 - Example no-interference-present oscilloscope screenshot showing transition from initial to alternate interference profile in the frame before base EUT transmission of the communications channel. The notes text is best viewed at 150% magnification.

For this example no interference is present, so base does not defer. Green (top) trace is marker for slot 0 of initial interference profile. Purple (2nd from top) trace is marker for alternate interference profile. Blue (3rd from top) trace is output of RF detector, showing beacon and communications channel transmissions. Yellow (bottom) trace is output from the headset, which has the TALK button.

The multi-carrier interference generator (PXI-5670) initial interference profile is then set to CW at $T_U + U_M$ = -45.5dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz, and additionally set to generate on f_1 a CW signal of level $T_U + U_M$, or -45.5dBm and to generate no interference on f_2, here f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the total system's five carriers.

The multi-carrier interference generator (PXI-5670) alternate interference profile is set to CW at $T_U + U_M$ = -45.5dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz, and additionally set to generate no interference

on f_1, and to generate on f_2 a CW signal of level $T_U + U_M$, or -45.5dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the total system's five carriers.

With this interference profile present, apply power to the base EUT and the companion headset. Then press the TALK button on the headset to establish a communications channel. Verify that the base EUT transmits on f_2, then press and release the TALK button on the headset to terminate the communications channel.

The multi-carrier interference generator is then configured to enable the automatic switch from the initial interference profile to the alternate interference profile based on the reception of the trigger signal generated by the headset in the frame prior to the initiation of transmission of the headset companion device and base EUT transmissions of communications channel signals.

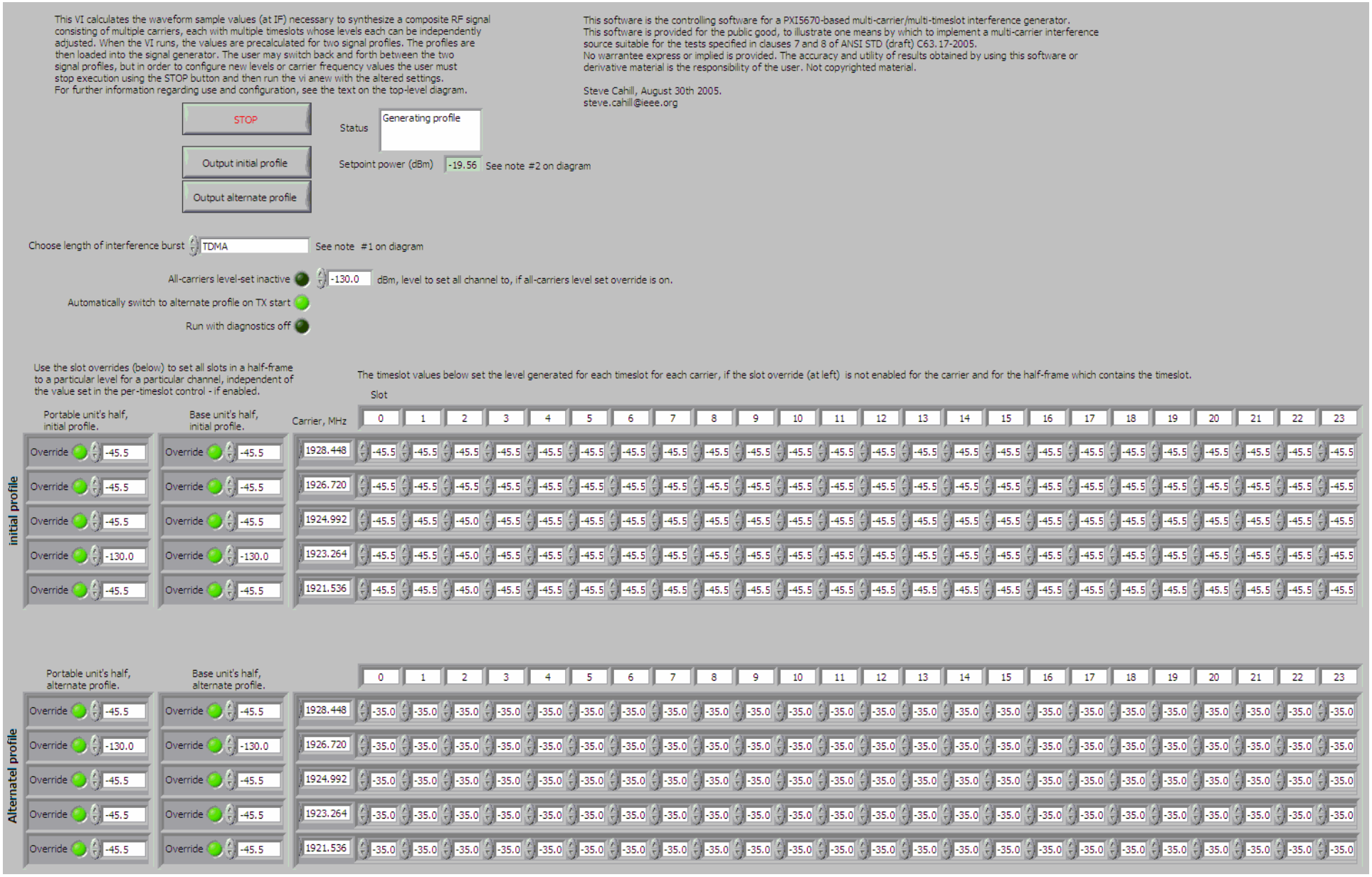

Fig. 55 - Control panel for multi-carrier generator, set for the test of 7.3.4, configured to switch interference profiles when trigger in frame prior to the initiation of control channel transmission is received.

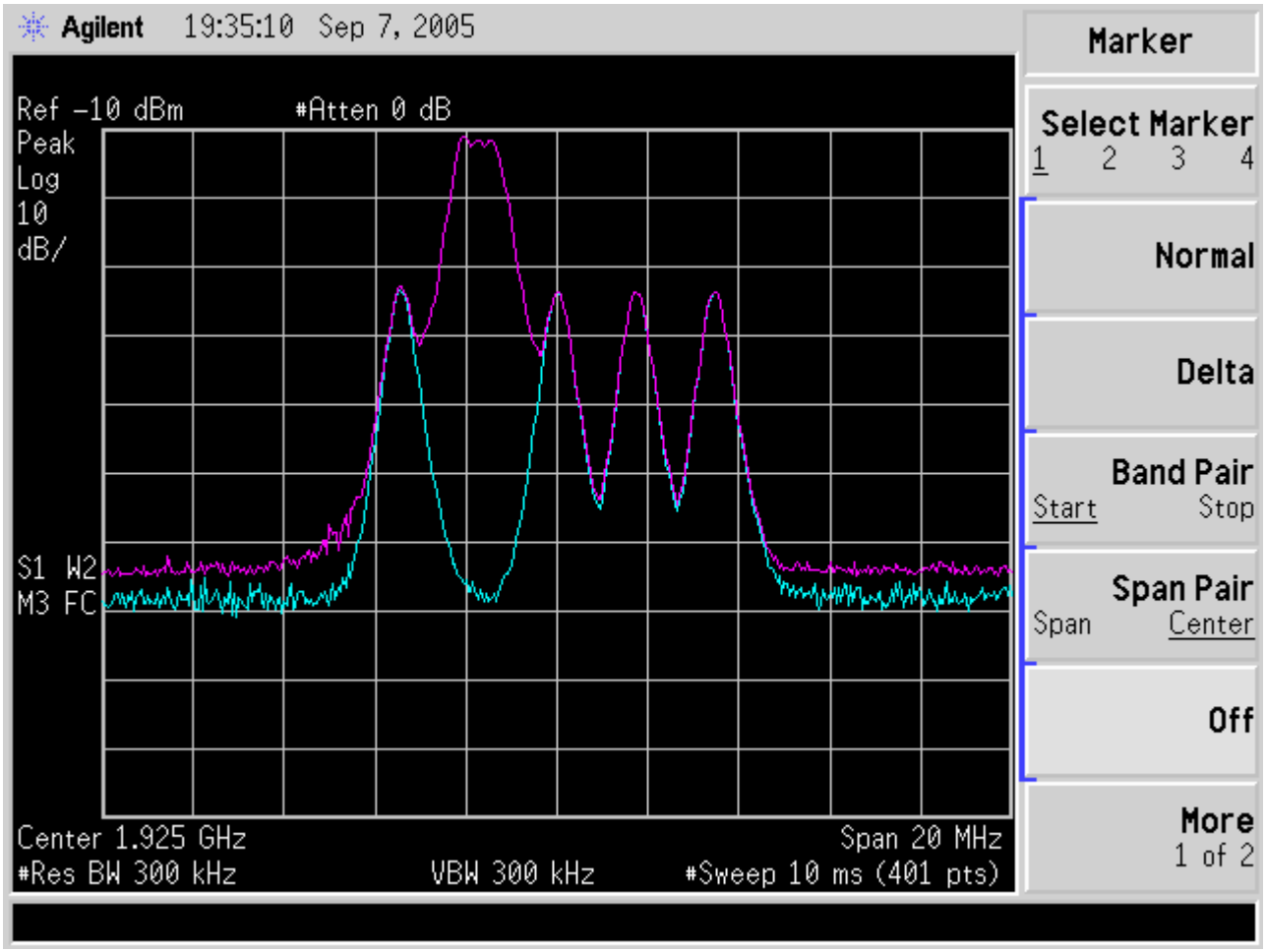

Fig. 56 - Spectrum showing initial interference profile, and transmissions on un-interfered carrier frequency f_2, for 7.3.4(b)

Blue (lower) trace is interference profile, purple (upper) trace is max-hold measurement including communications channel transmit signals.

For 7.3.4(c), cause the base EUT to attempt transmission of the communications channel.

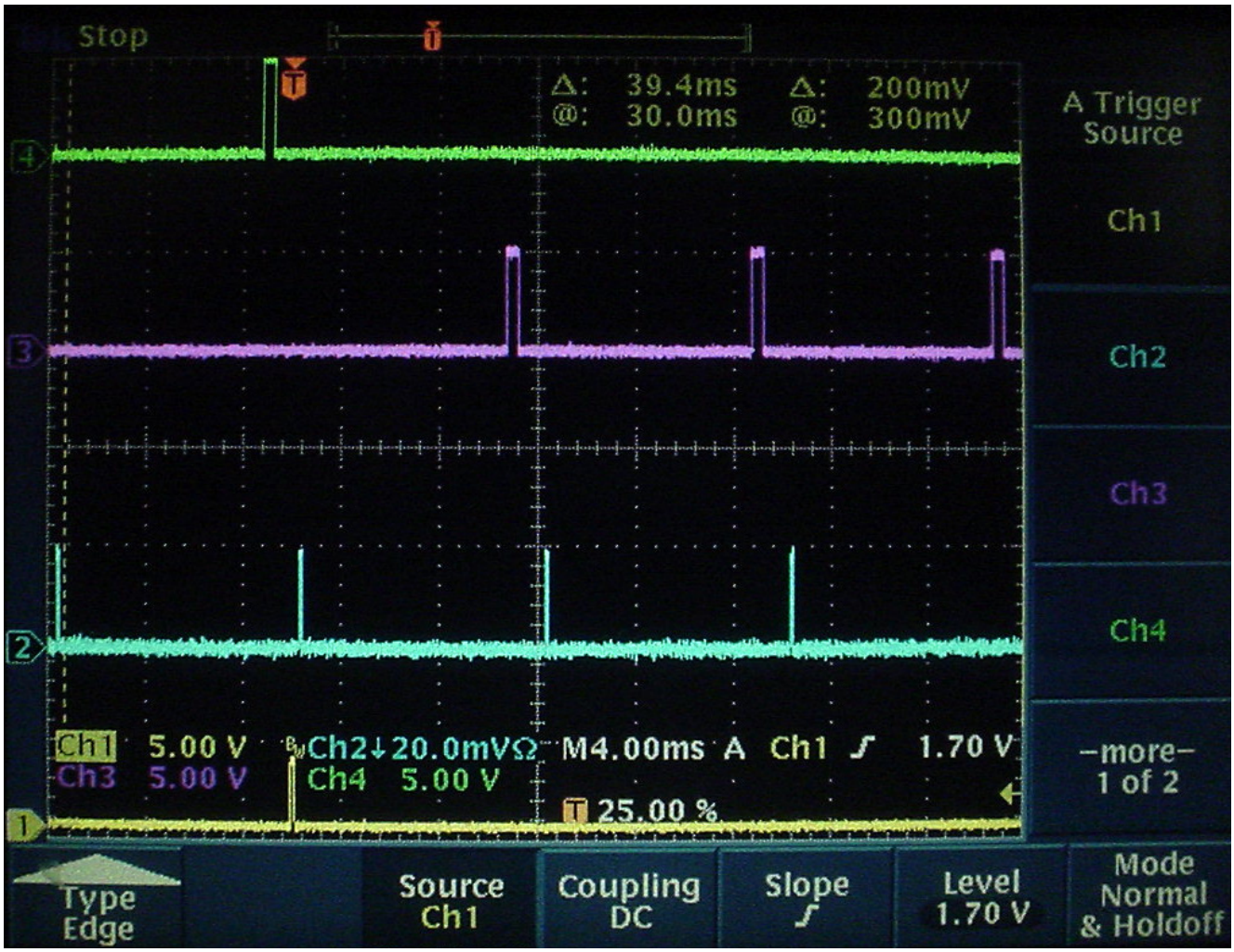

Fig. 57 - Screen shot of oscilloscope showing deferral by base EUT in the case where the interference profile changes in the frame previous to transmission and the selected time and frequency communications channel becomes blocked.

In the top trace we see the marker for the last unblocked frame of the initial interference profile. In the bottom trace we see the headset-generated flag that triggers the multi-carrier generator to switch to the alternate interference profile on the completion of the last frame of the initial interference profile, and marks the frame prior to the headset's transmission to the base requesting the setup of the communications channel. In the 2nd-from-top trace we see the start of the first frame of the alternate interference profile in the frame which would be immediately prior to the first frame in which the base EUT would transmit the communications channel, if the base EUT did not defer; see previous non-deferring example.

We see that, for the case where the selected time/frequency communications channel has gone blocked in the frame previous to the frame for which transmission would begin in the unblocked case, the base does not initiate communications channel transmissions on the blocked time and frequency channel. Instead, the base checks all available time and frequency channels and selects an unblocked timeslot. Beacon transmissions do continue on the blocked timeslot in accordance with the requirement that transmissions cease for control and signaling information only after 30 seconds or less.

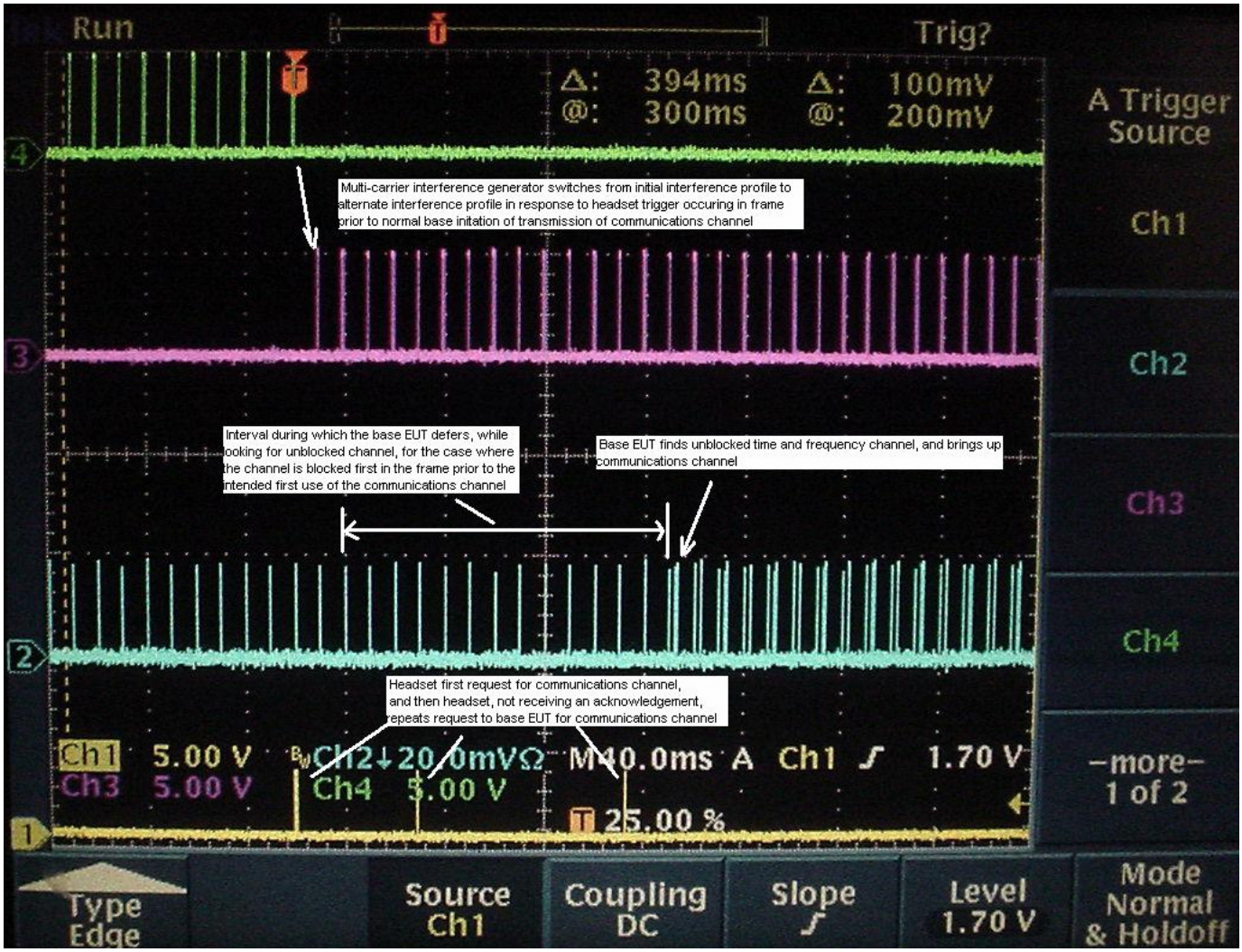

Fig. 58 - Screen shot of oscilloscope showing deferral by base EUT in the case where the interference profile changes in the frame previous to intended transmission and the selected time and frequency communications channel becomes blocked; and then later, transmission on unblocked channel.

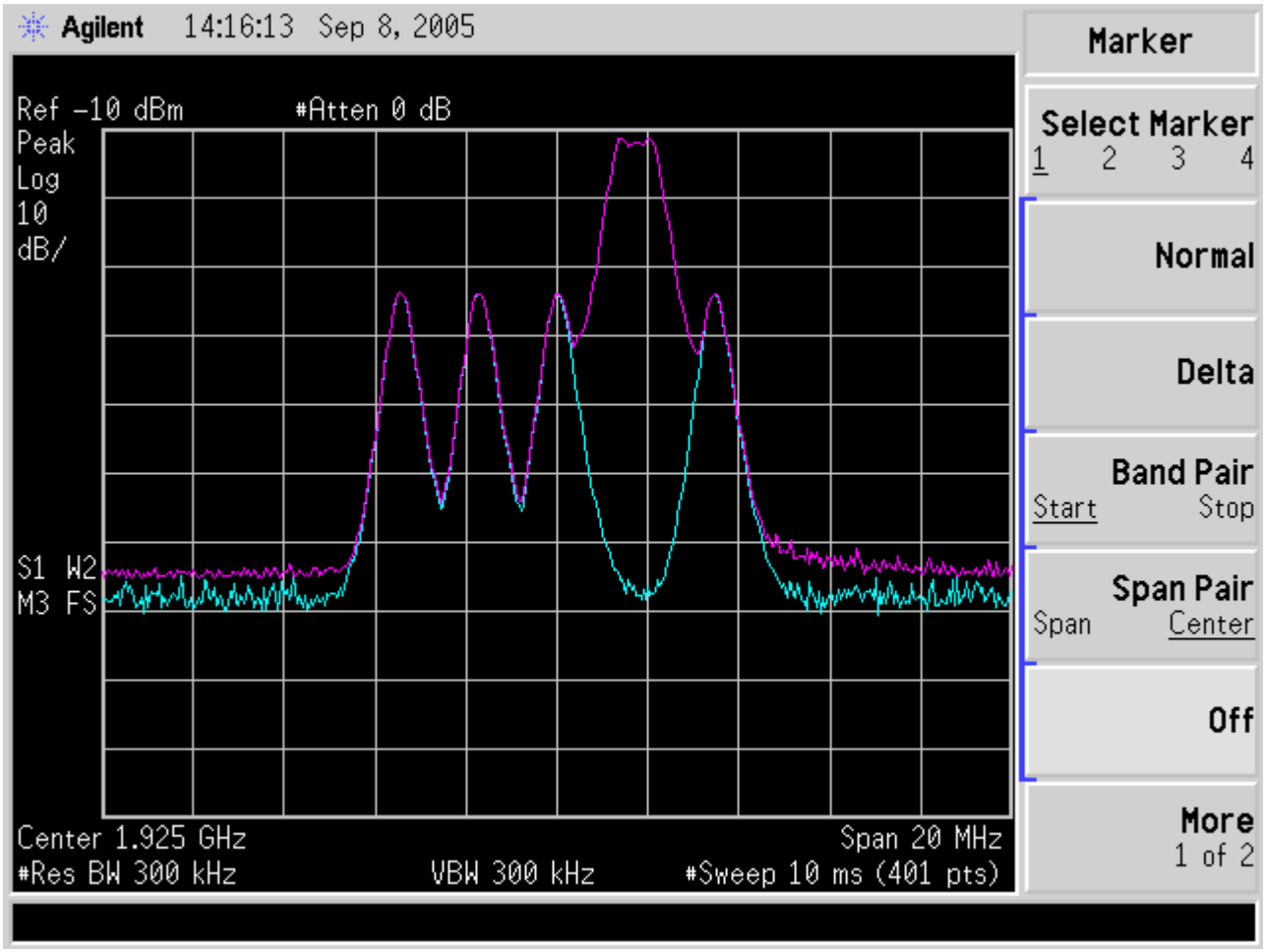

Fig. 59 - Spectrum showing alternate interference profile, and transmissions on un-interfered carrier frequency f_1, after 7.3.4(c).

The base EUT defers in response to the blocking of the intended time and frequency channel occurring first in the frame previous to the base EUT's intended transmission of the communications channel, and so passes the requirements.

IV-D. Clause 7.5 Reaction time and monitoring interval, base EUT

The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 7.5(c) by means of test configuration #3, **With companion device and interference blocking, base EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to interference pulse transmissions of 50uS length, synchronized with the frame and slot timing of the base EUT, on all 5 carriers, and at level -45.5dBm, which is $T_U + U_M$.

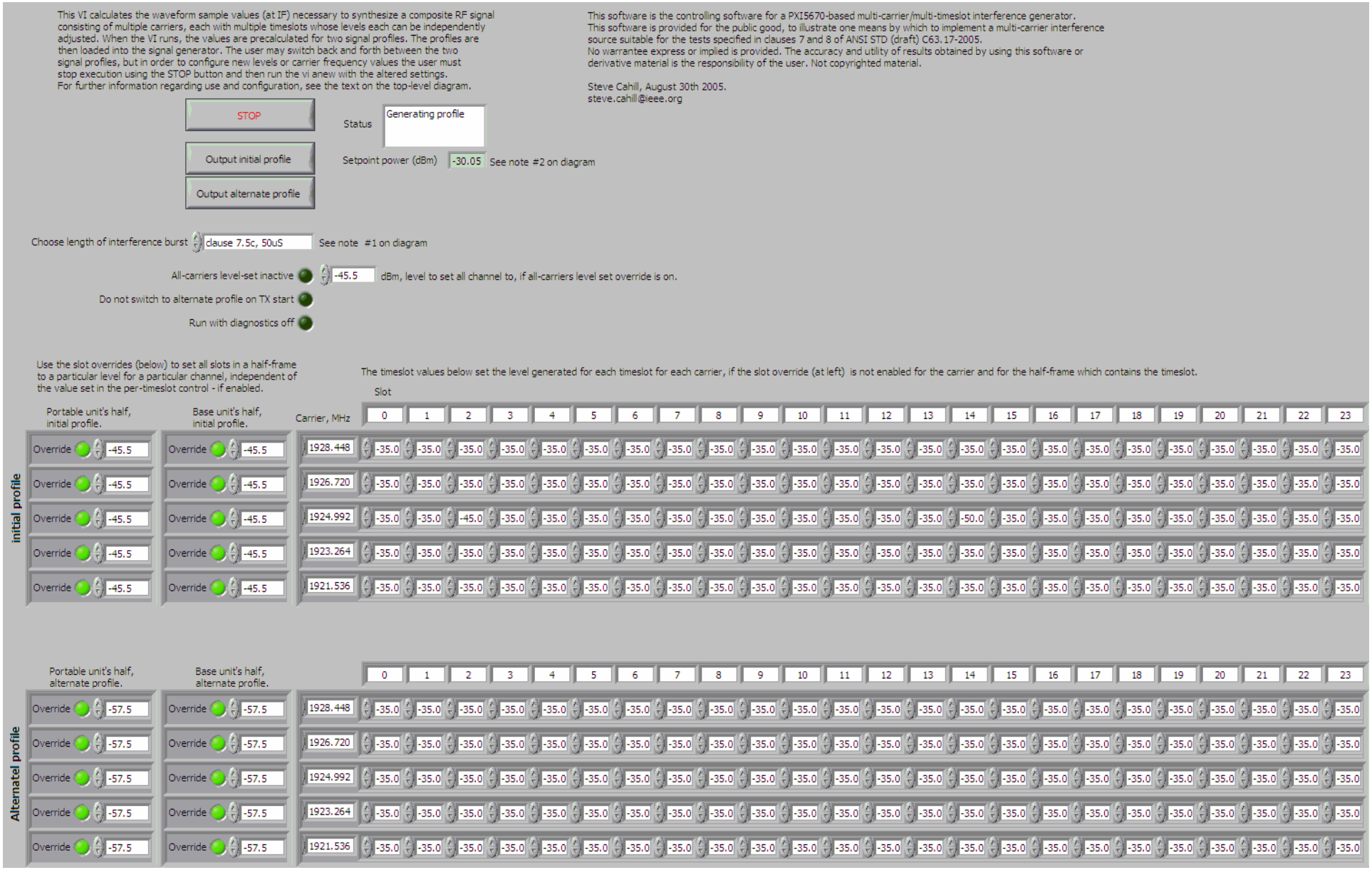

Fig. 60 - Control panel for multi-carrier interference generator, set to 50uS pulses in all timeslots on all carriers, for the test of 7.5(c).

Two interference profiles are loaded; one with all pulses at -45.5dBm, $T_U + U_M$, and the other at -57.5dBm, $T_U - U_M$. The first profile is used to demonstrate deferral for pulses 50uS long above the threshold, and the second profile is used to demonstrate non-deferral for 50uS pulses below the threshold.

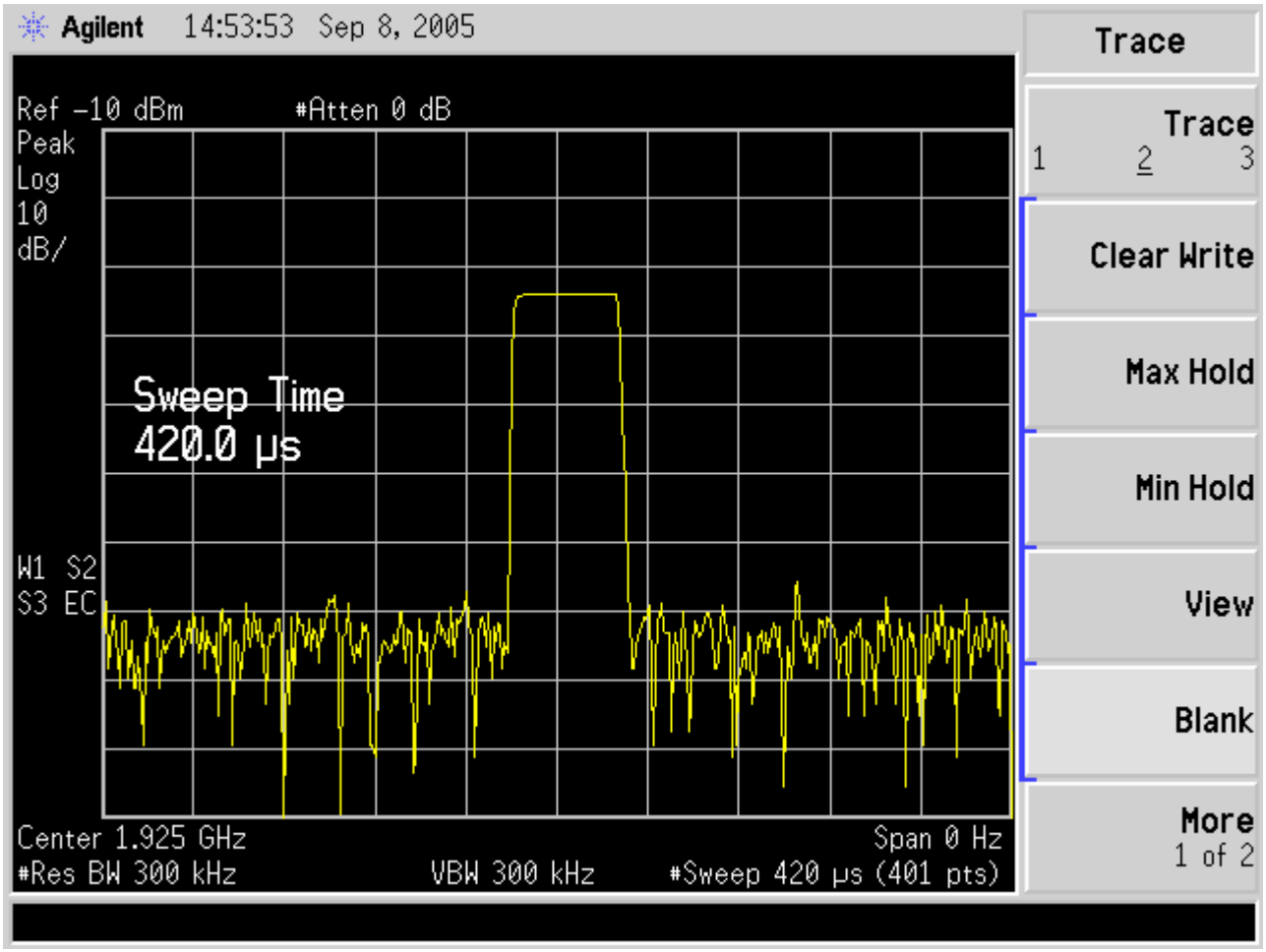

Fig. 61 - Interference pulse, one frame shown, for the test of 7.5(c).

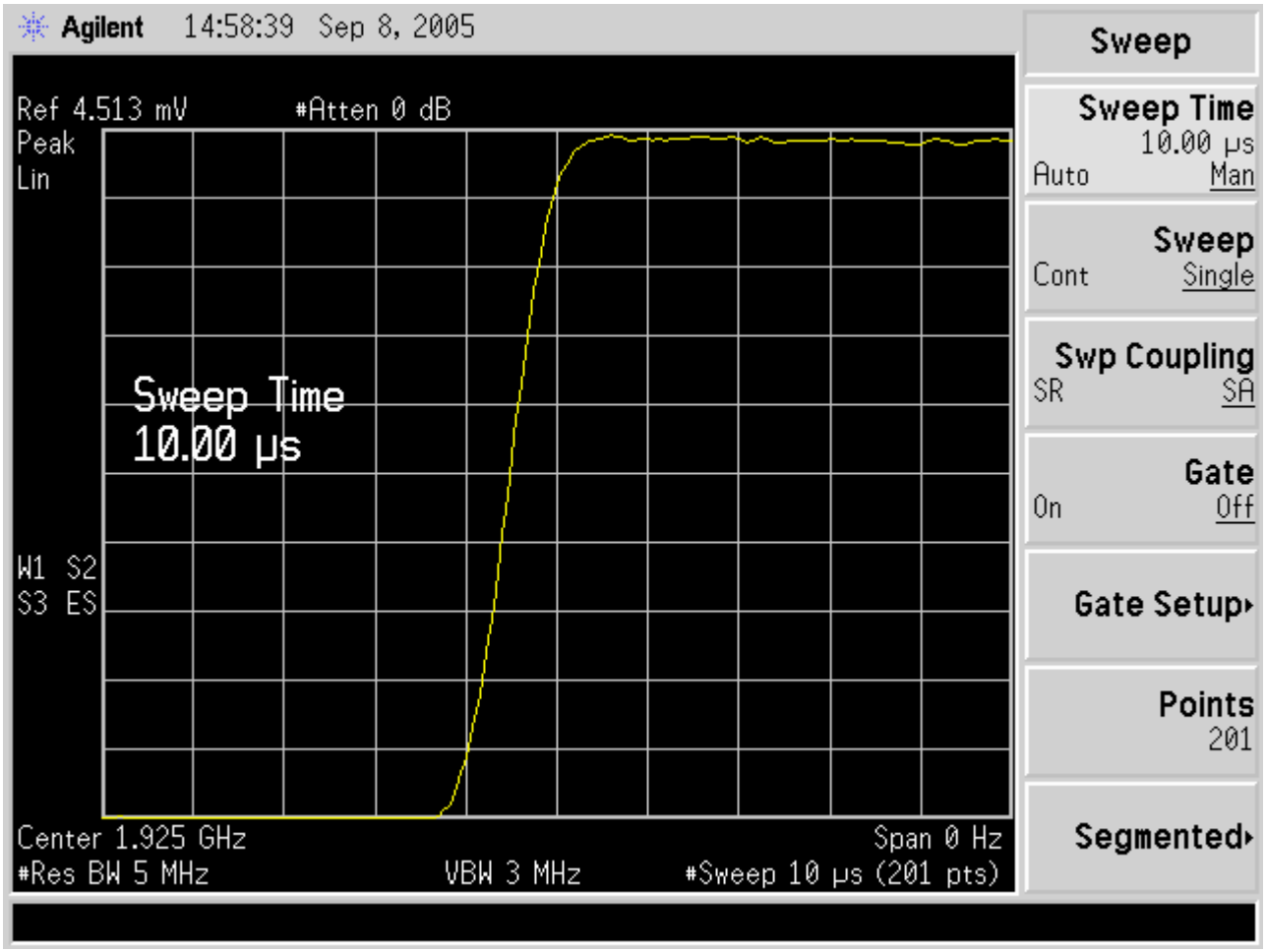

Fig. 62 - Rise time of interference pulse, per the requirements of 7.5 for less than 1uS for 10% to 90% transition.

Spectrum analyzer is set to linear response and the reference level adjusted so that 10% and 90% scale points can be observed. Fall time (not shown) is symmetrical.

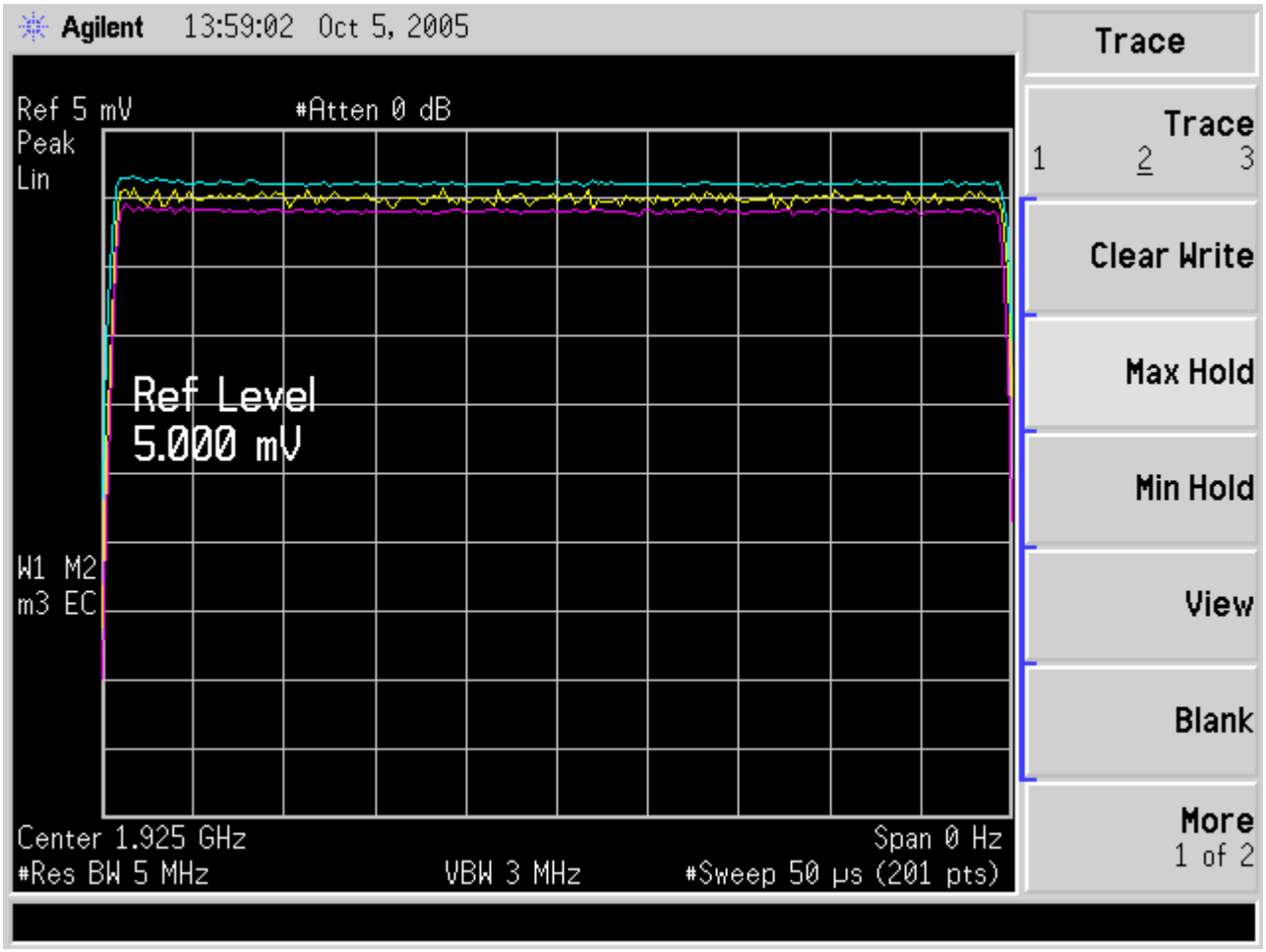

Fig. 63 – 50uS interference pulse for 7.5(c), duration and amplitude variation over the duration of the 50 uS pulse and over multiple pulses. Spectrum analyzer is set to linear response.

The requirement of 7.5 is for the pulse to be of constant amplitude (+/-5%) during the pulse. The top trace is a max-hold over 60 seconds, the bottom trace is a min-hold over 60 seconds, and the center trace is one pulse; total scale displayed is approximately 110% of the pulse amplitude. Pulse length is just under 50uS to ensure that the worst-case (minimum pulse length) test condition is exceeded. Note that the level as is measured by the spectrum analyzer connected to its port on the splitter/combiner interface to the EUT, and not as at the EUT.

The base EUT is powered up with the interference conditions of 7.5(c) present.

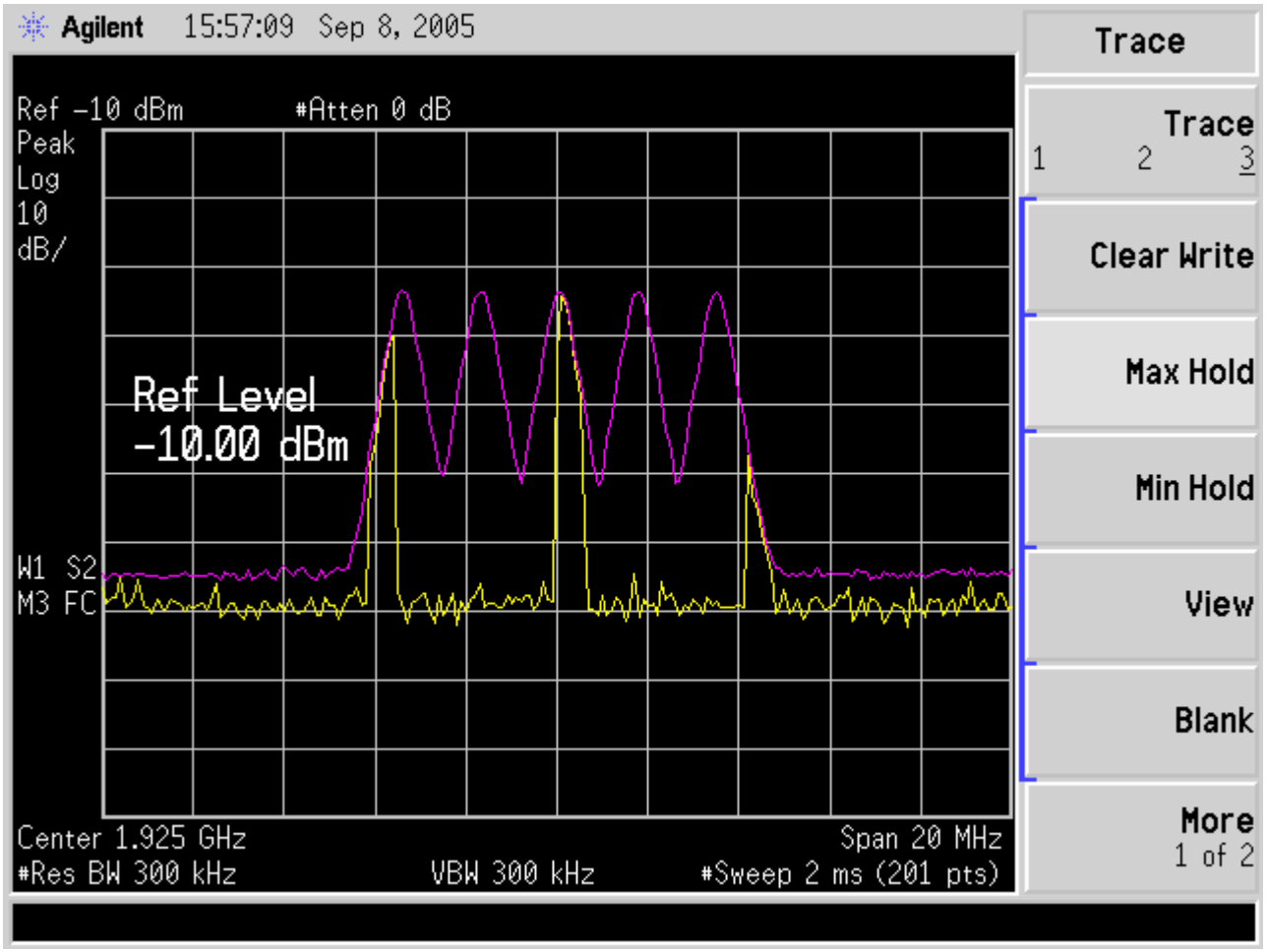

Fig. 64 - Transmit spectrum of 50uS interference pulses in each timeslot for each carrier, with base EUT deferring due to interference pulses of $T_U + U_M$.

The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, otherwise adjustments are as shown on the screenshot. The purple (top trace) shows the max-hold capture of many pulses as the spectrum analyzer sweeps in free-run, unsynchronized with respect to the multi-carrier generator. The yellow (bottom) trace shows a single sweep of the spectrum analyzer, sweeping past active interference pulses.

No transmissions from the base EUT are observed.

The multi-carrier interference generator is then switched to the alternate interference profile, with pulses of level T_U - U_M, or -57.5dBm.

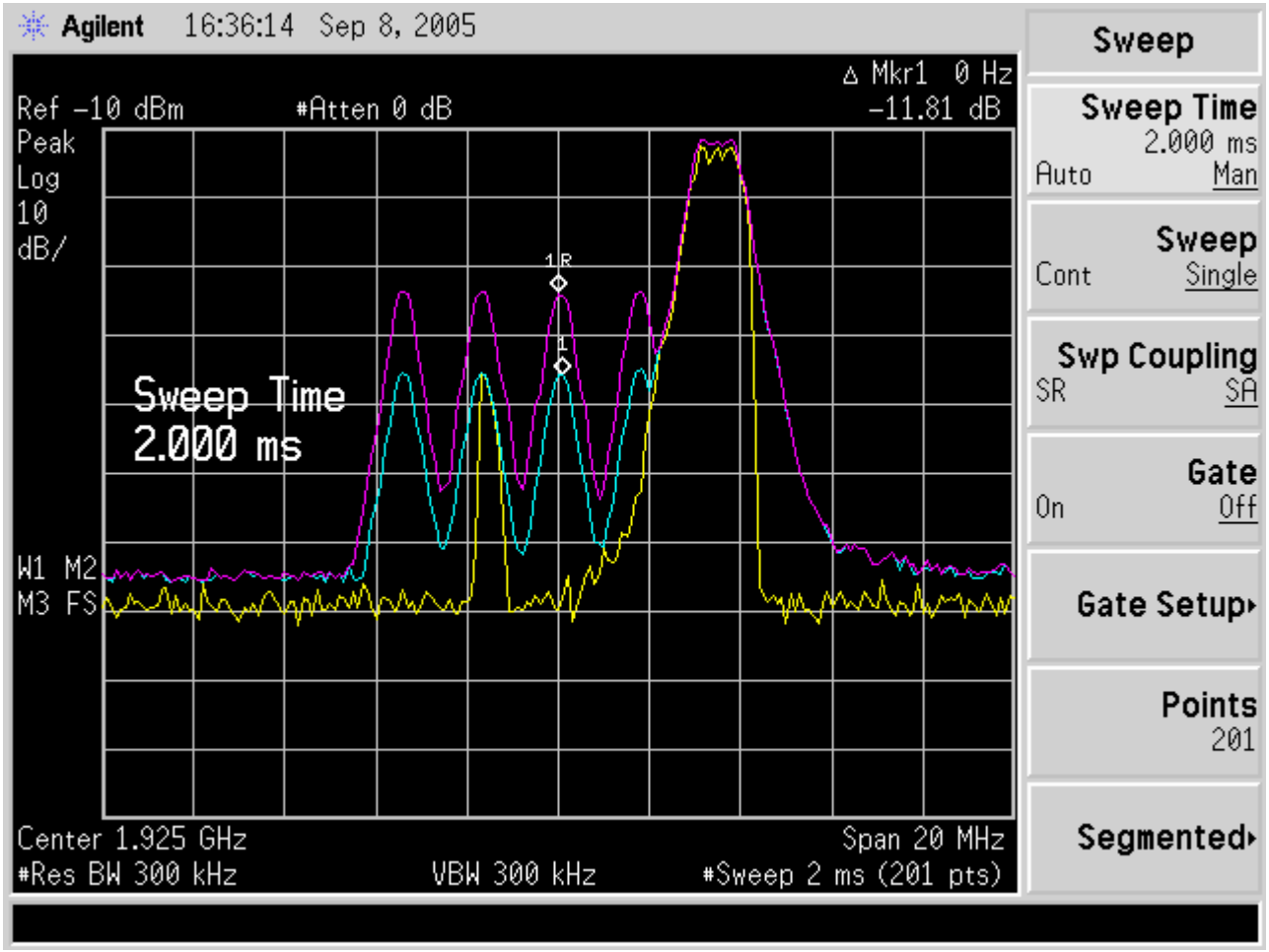

Fig. 65 - Transmit spectrum of 50uS interference pulses, with base EUT no longer deferring with interference pulses of level T_U - U_M.

The purple (top) trace is the max-hold capture over multiple sweeps of the initial T_U + U_M interference spectrum, and then the transmission of the base EUT when the interference level is dropped to T_U - U_M. The blue (middle) trace is a max-hold capture of the interference and the transmission when the interference is set to T_U - U_M. The yellow (lowest) trace is a single sweep of the spectrum with the interference at T_U - U_M and base transmission active. Proper transmission at T_U - U_M is shown in order to validate functionality.

The base EUT is to not transmit when pulses of 50uS length are present at T_U + U_M. The base EUT defers, and so meets the requirements of 7.5(c)

7.5(d) repeats the deferral test of 7.5(c), except that the transmit pulse length is reduced to 35uS (the allowed longer of the alternatives 35uS and 35*((1.25/B)^0.5), where B = 1.48MHz) and the level is allowed to increase to $T_U + U_M$ + 6dB, or -39.5dBm.

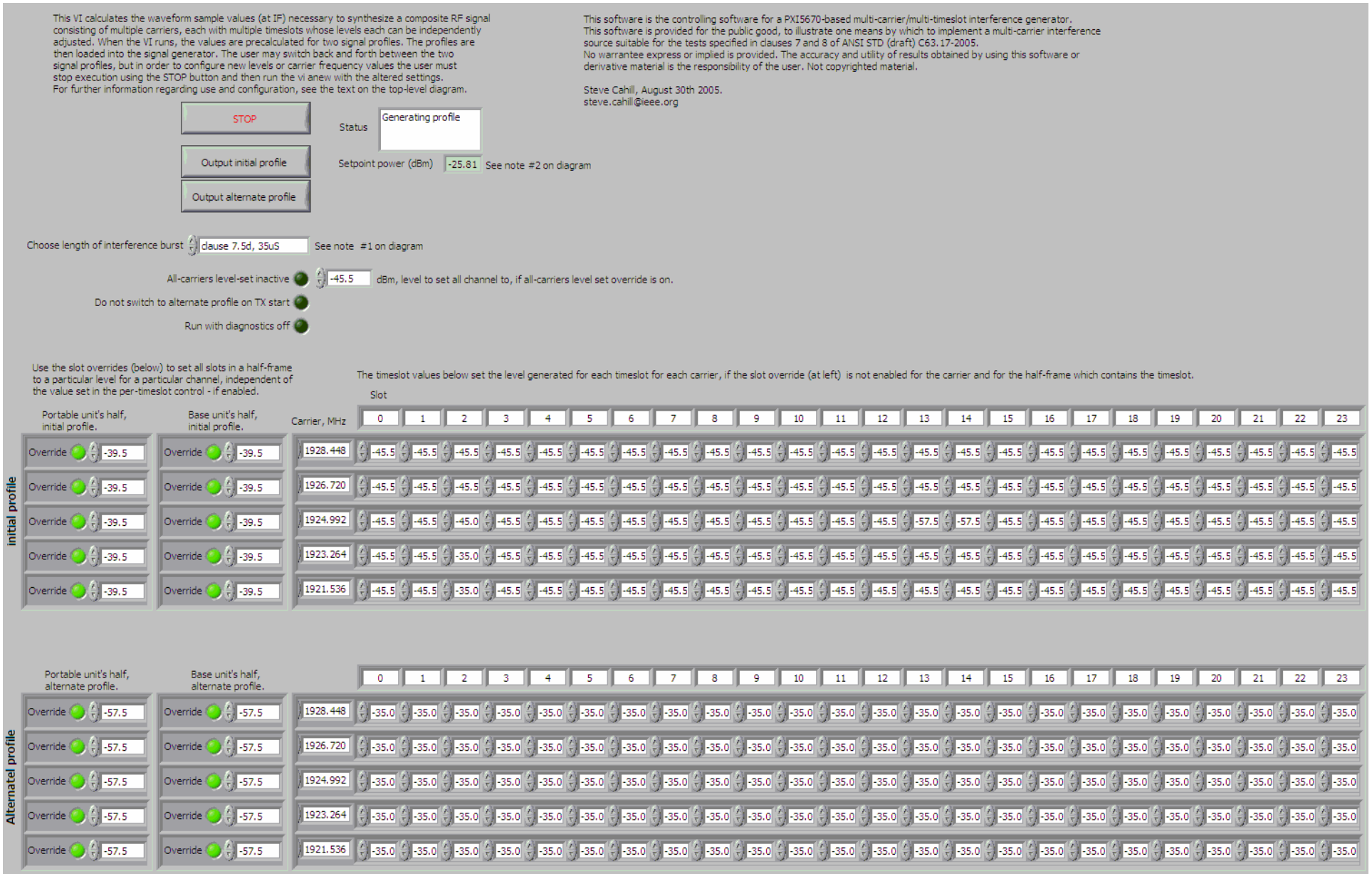

Fig. 66 - The control panel for the multi-carrier interference generator configured to make the interference profile required for 7.5(d).

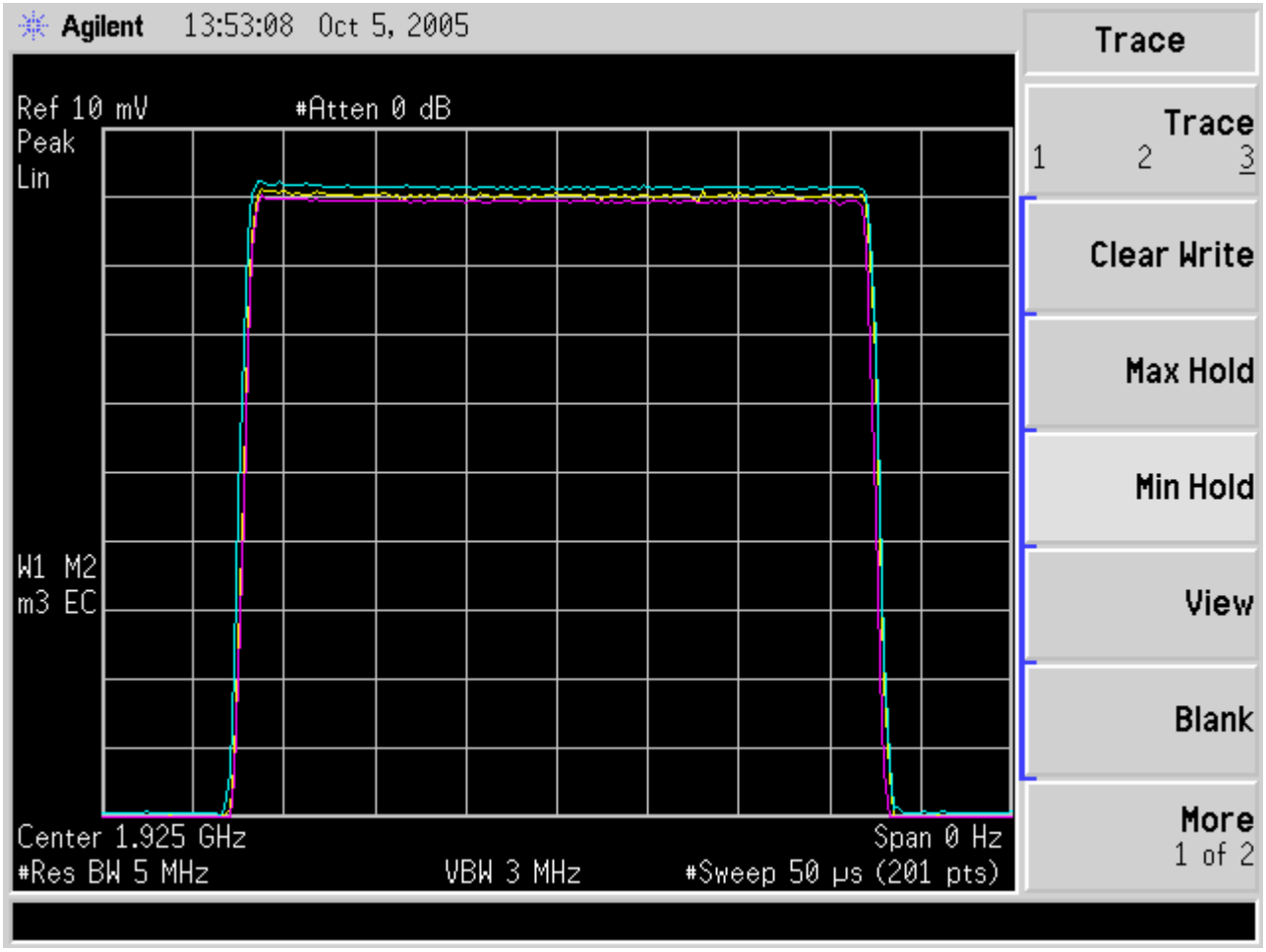

Fig. 67 - 35uS interference pulse for 7.5(d), duration and amplitude variation over the duration of the pulse and over multiple pulses. Spectrum analyzer is set to linear response.

Per-timeslot interference pulse as required for 7.5(d). Note the 6dB increase in level relative to the requirement of 7.5(c), though again level is measured by the spectrum analyzer connected to its port on the splitter/combiner interface to the EUT, and not as at the EUT.

The base unit is then powered up with the conditions of 7.5(d) present.

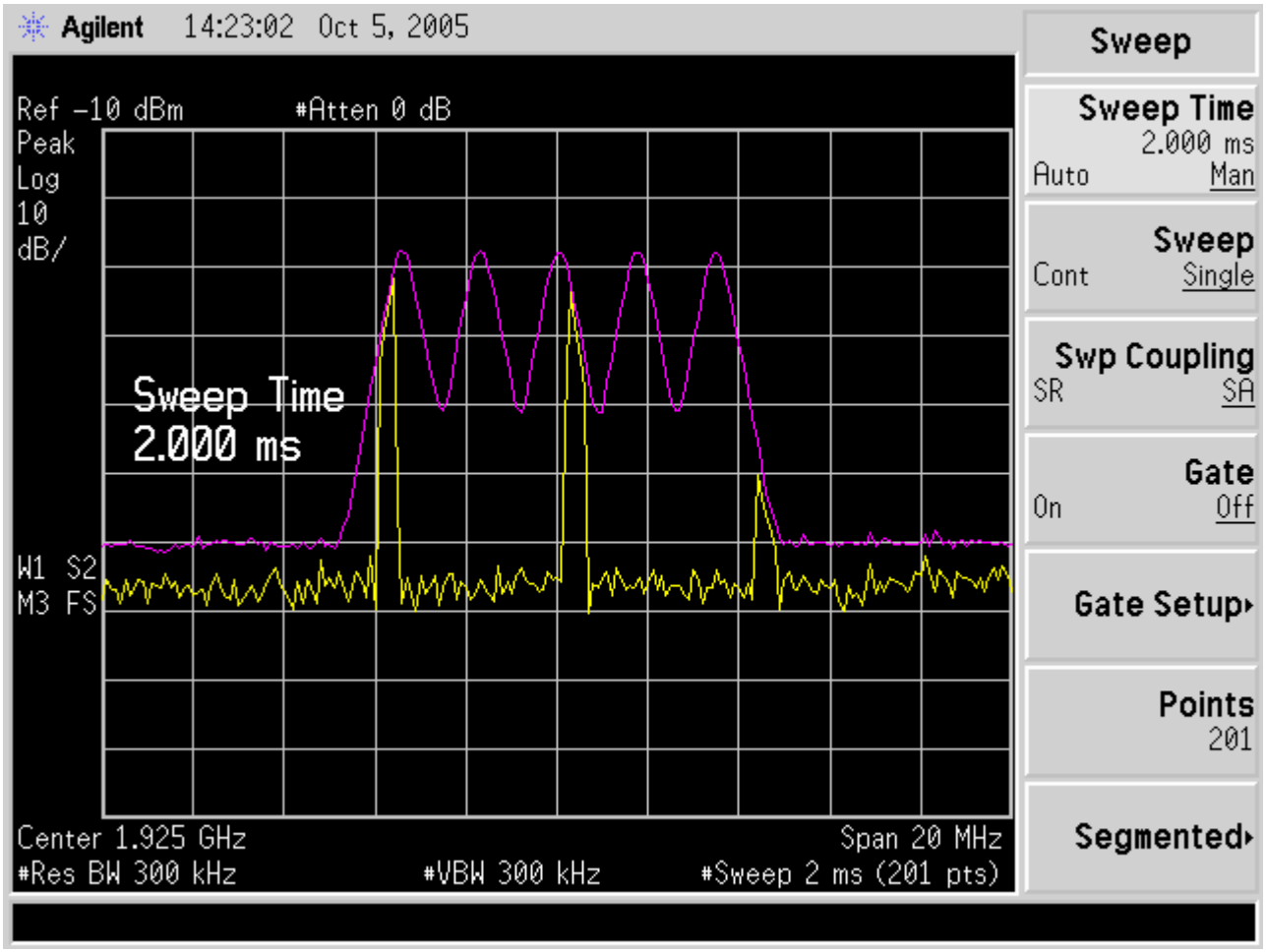

Fig. 68 - Transmit spectrum of 35uS interference pulses in each timeslot for each carrier, with base EUT deferring due to interference pulses of $T_U + U_M$ + 6dB.

The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, otherwise adjustments are as shown on the screenshot. The purple (top trace) shows the max-hold capture of many pulses as the spectrum analyzer sweeps in free-run, unsynchronized with respect to the multi-carrier generator. The yellow (bottom) trace shows a single sweep of the spectrum analyzer, sweeping past active interference pulses.

No transmissions from the base EUT are observed; the base EUT is required to defer when pulses of 35uS are present at level $T_U + U_M$ + 6dB, the base EUT does defer, and so passes the requirement of 7.5(d).

NOTE: Pages 1 – 81 are in Exhibit #11aa, and pages 105–182 are in Exhibit #11b. The document was partitioned for ease of transfer.