# DFS Test Report

Product Name ： WIRELESS-N NETWORK MINI PCI ADAPTER

Model No. ： IWAVEPORT WLM200NX

Applicant ： Compex Systems Pte Ltd

Address ： 135 Joo Seng Road, #08-01 PM Industrial Building

Singapore 368363

Date of Receipt ： 2008/10/27

Report No. ： 08B005S

Issued Date ： 2009/1/21

Version ： V1.0

# Test Result for DFS

Issued Date : 2009/1/21
Report No.: 08B005S

QuieTek

| | | |
|---|---|---|
| Product Name | : | WIRELESS-N NETWORK MINI PCI ADAPTER |
| Applicant | : | Compex Systems Pte Ltd |
| Address | : | 135 Joo Seng Road, #08-01 PM Industrial Building Singapore 368363 |
| Manufacturer | : | Compex Systems Pte Ltd |
| Model No. | : | IWAVEPORT WLM200NX |
| Trade Name | : | COMPEX |
| Applicable Standard | : | ETSI EN 301 893 V1.4.1 (2007-07) |
| Test Result | : | Pass |
| Description for Test | : | None |

| Test Item | Test Result |
|---|---|
| Dynamic Frequency Selection (DFS) | ☒ Pass ☐ Fail |

Roy Wang

( Roy Wang / Manager )

Rita Hsu

(Rita Hsu / Engineer )

# Dynamic Frequency Selection (DFS) Test

## General Information

The UUT operates in the following bands:

1. 5250-5350 MHz
2. 5470-5725 MHz

**The UUT is a Client Device that does not have radar detection capability, and ad-hoc function.** The highest gain antenna assembly utilized with the EUT has a maximum gain of 2 dBi in 5GHz frequency band. The 50-ohm Tx/Rx antenna port is connected to the test system to perform conducted tests. TPC is not required since the maximum EIRP is less than 500mW (27dBm).

The UUT utilizes 802.11a/b/g/n **IP based** architecture. Two nominal channel bandwidth, 20 MHz and 40MHz are implemented.

The master device is a Cisco Aironet 802.11a/g/n Access Point. The DFS software installed in the master device is Cisco IOS Releases 12.3(11) JA.

The test set-up is using **Set-up B** which UUT is a RLAN device operating in slave mode without Radar Interference Detection function.

The UUT is a client device without radar detection, therefore the interference threshold level is not required.

## Test Equipment

Dynamic Frequency Selection (DFS) / SR-7

| Instrument | Manufacturer | Type No. | Serial No | Cal. Date |
|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSP | 100561 | Feb, 21, 2008 |
| Vector Signal Generator | Rohde & Schwarz | SUM 200A | 102168 | Feb, 08, 2008 |

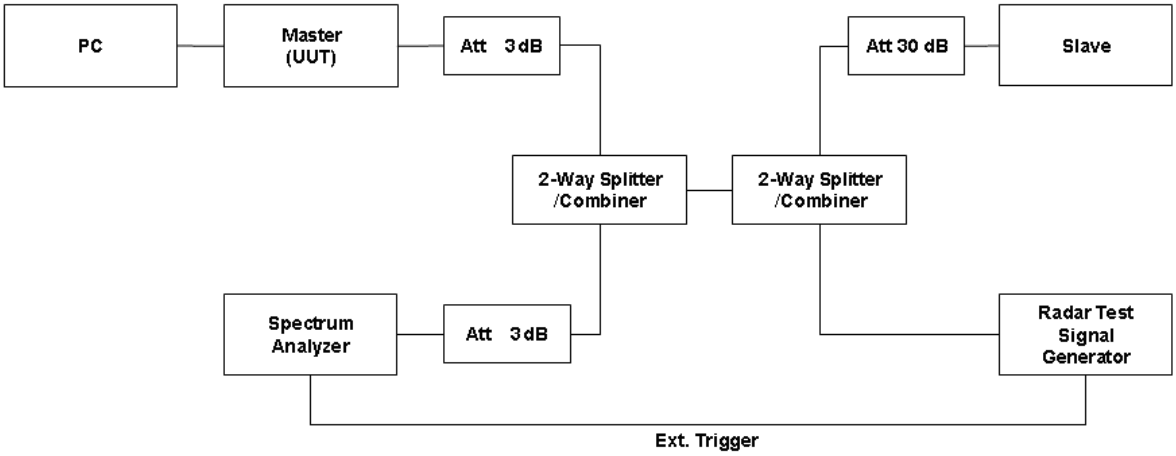
| Instrument | Manufacturer | Type No. | Serial No |
|---|---|---|---|
| Splitter/Combiner (Qty: 2) | Mini-Circuits | ZAPD-50W 4.2-6.0 GHz | NN256400424 |
| Splitter/Combiner (Qty: 2) | Mini-Circuits | ZA2PD-63-S+ | SN049200828 |
| ATT (Qty: 3) | Mini-Circuits | BW-S3W2 DC-18GHz | 0025 |
| Aironet Access Point | Cisco System | AP1252AG | FTX121090DP |
| Laptop PC | Dell | M65 | 28G9N1S |
| RF Cable (Qty: 4) | Schaffner | | 25494/6 |

| Software | Manufacturer | Function |
|---|---|---|
| IOS Releases 12.3(11) JA | Cisco System | DFS Software |
| K6 Pulse Sequencer | Rohde & Schwarz | Radar Signal Generation Software |
| UTP Tool | UNICAST | Package data generator |

## Test Setup

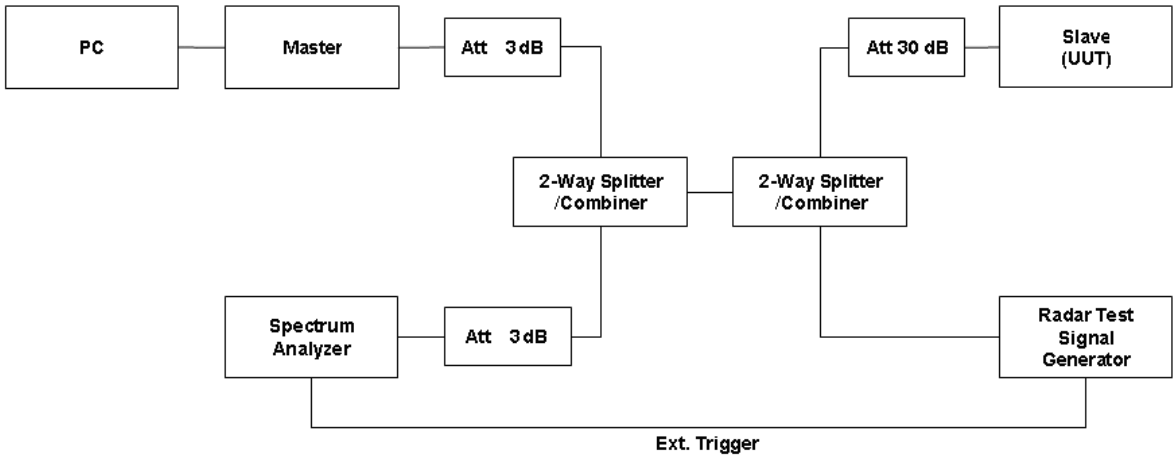
### Set-up A

Set-up A is a set-up whereby the UUT is a RLAN device operating in master mode. Radar test signals are injected into the UUT. This set-up also contains a RLAN device operating in slave mode which is associated with the UUT.



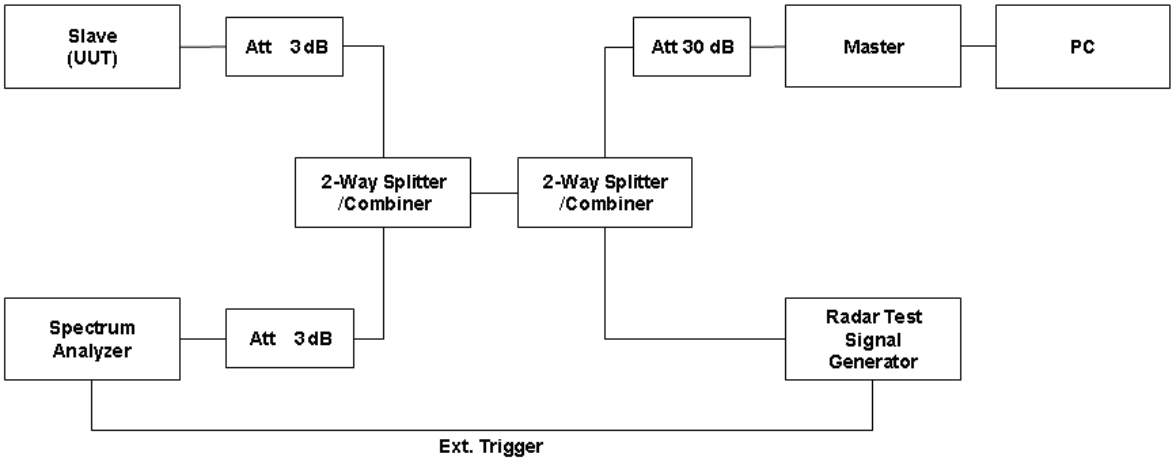

### Set-up B

Set-up B is a set-up whereby the UUT is a RLAN device operating in slave mode, with or without Radar Interference Detection function. This set-up also contains a RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

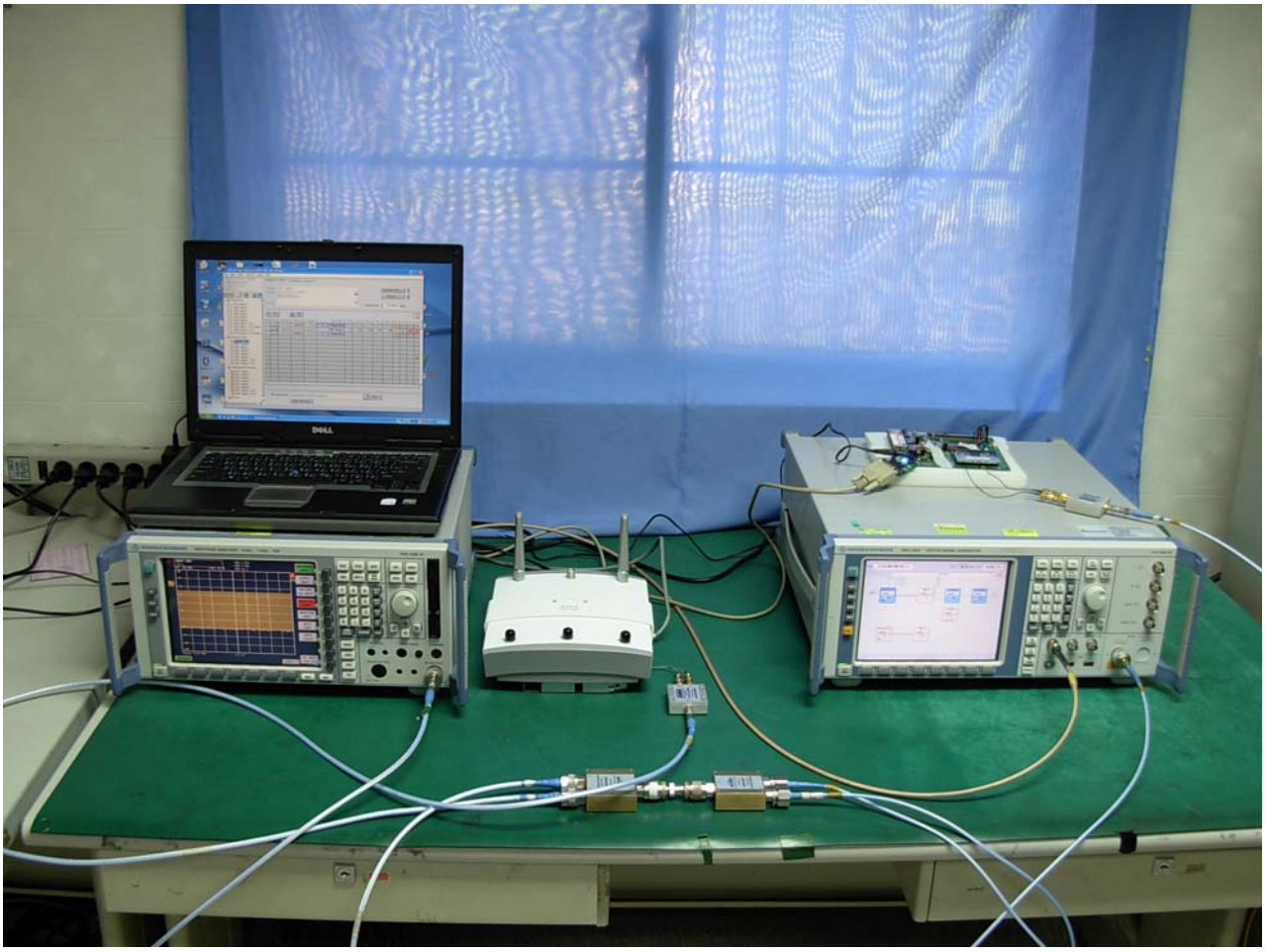


**Set-up C**

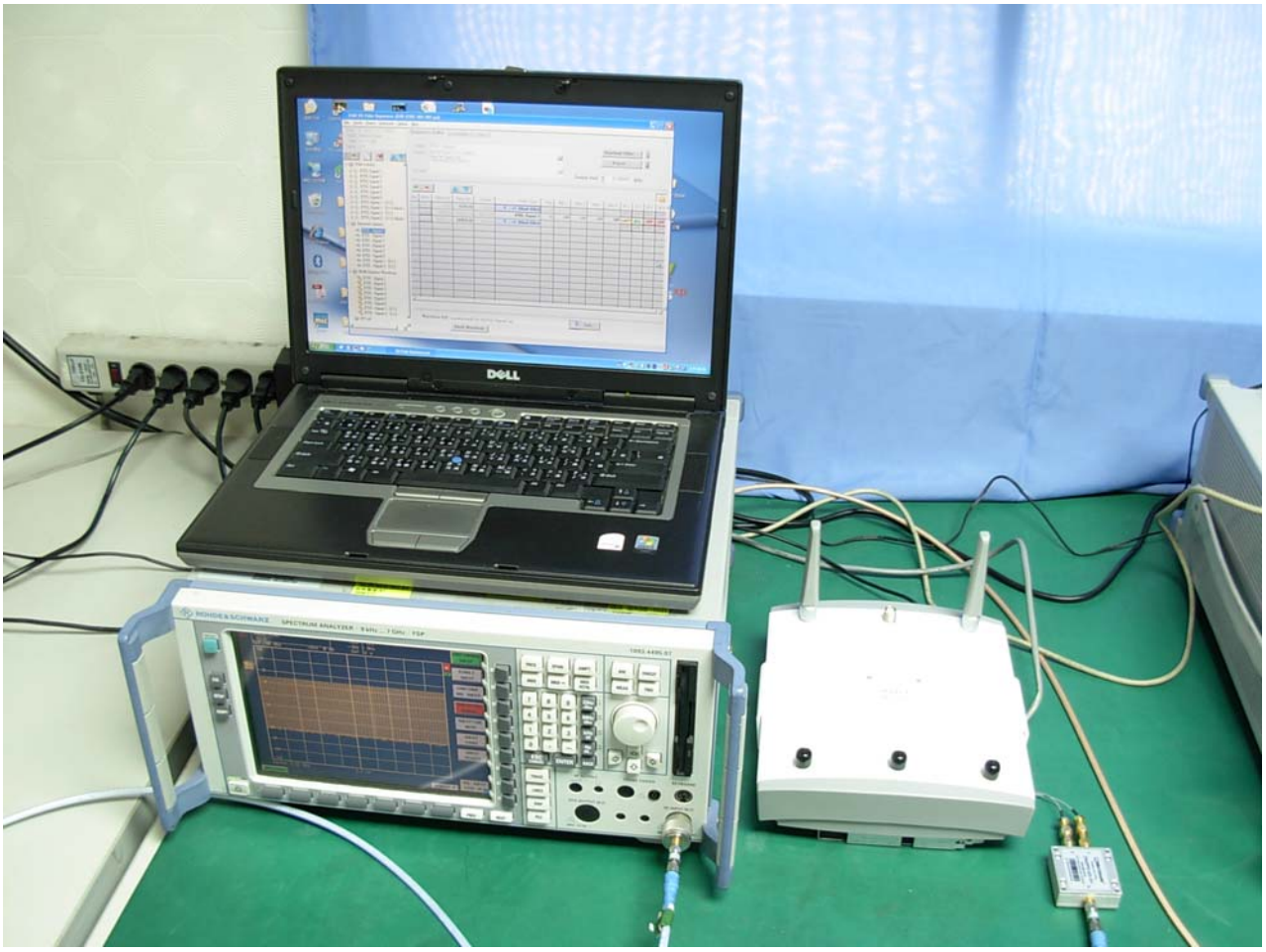
The UUT is a RLAN device operating in slave mode with Radar Interference Detection function. Radar test signals are injected into the slave device. This set-up also contains a RLAN device operating in master mode. The UUT (slave device) is associated with the master device.



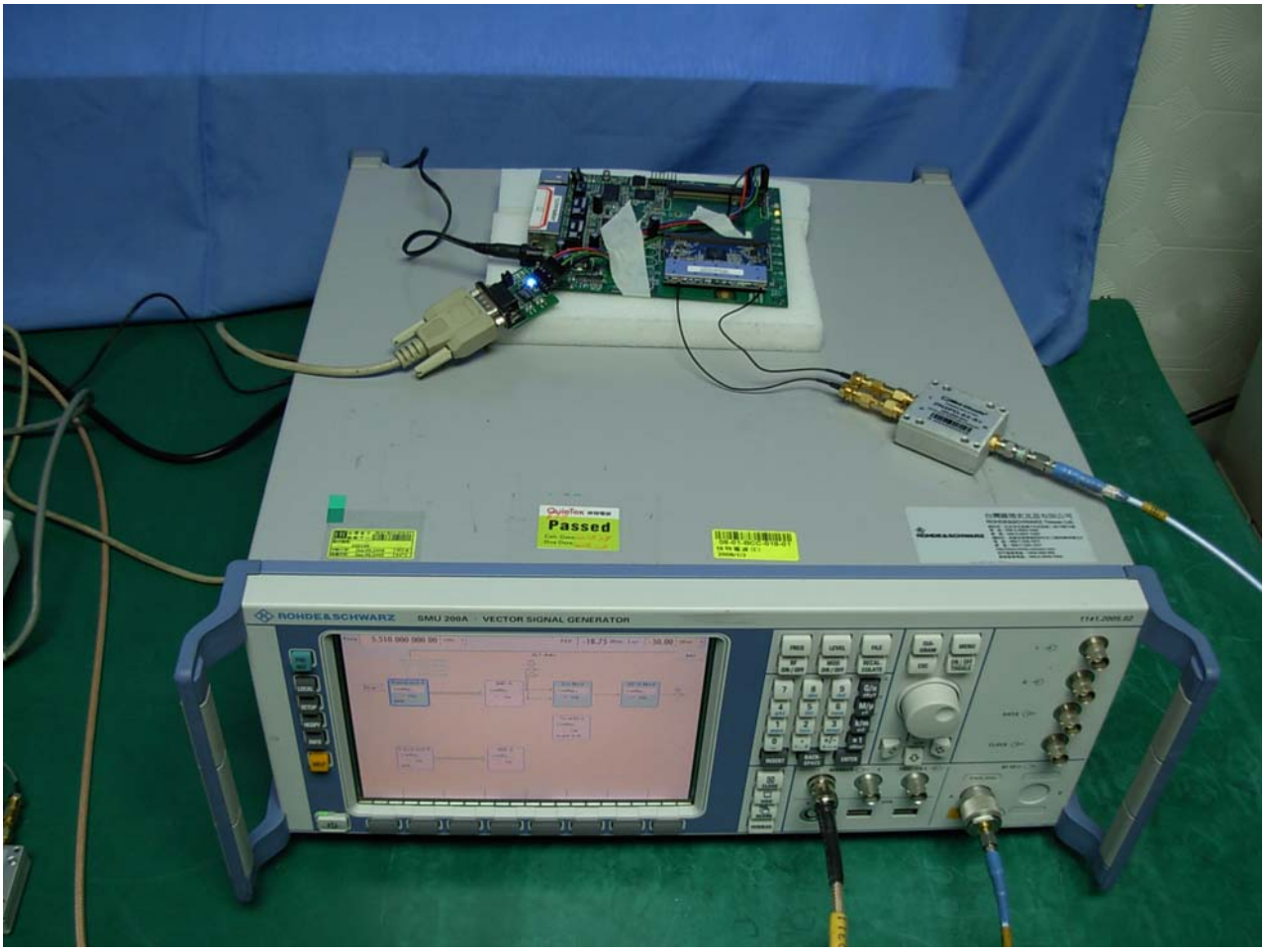
## Full DFS Test Set-up Photo



## DFS Set-up Photo: Master and Spectrum Analyzer



## DFS Set-up Photo: Client and Radar Generator




## DFS technical requirements specifications

Following Table lists the DFS related essential requirements and their applicability for each of the operational modes. If the RLAN device is capable of operating in more than one operating mode then each operating mode shall be assessed separately.

| Requirement | DFS Operational mode | | |
|---|---|---|---|
| | Master | Slave without radar detection (see table D.3) | Slave with radar detection (see table D.3) |
| Channel Availability Check | ✓ | Not required | Not required |
| In-Service Monitoring | ✓ | Not required | ✓ |
| Channel Shutdown | ✓ | ✓ | ✓ |
| Non-Occupancy Period | ✓ | Not required | ✓ |
| Uniform Spreading | ✓ | Not required | Not required |

**Channel Availability Check**

The Channel Availability Check shall be performed during a continuous period in time (Channel Availability Check Time) which shall not be less than the value defined in table D.1 of standard.

During the Channel Availability Check, the RLAN shall be capable of detecting any of the radar signals that fall within the range given by table D.4 of standard with a level above the Interference Detection Threshold defined in tables D.2 and D.3 of standard.

The detection probability for a given radar signal shall be greater than the value defined in table D.4 of standard.

Available channels remain valid for a maximum period of 24 hours.

**In-Service Monitoring**

The In-Service Monitoring shall be used to continuously monitor an Operating Channel.

The In-Service Monitoring shall start immediately after the RLAN has started transmissions on an Operating Channel.

During the In-Service Monitoring, the RLAN shall be capable of detecting any of the radar signals that fall within the range given by table D.4 of standard with a level above the Interference Detection Threshold defined in tables D.2 and D.3 of standard.

The detection probability for a given radar signal shall be greater than the value defined in table D.4 of standard.

**Channel Shutdown**

The Channel Shutdown process shall start immediately after a radar signal has been detected.

The Channel Move Time shall not exceed the limit defined in table D.1 of standard.

The Channel Closing Transmission Time shall not exceed the limit defined in table D.1 of standard.

**Non-Occupancy Period**

The Non-Occupancy Period shall not be less than the value defined in table D.1 of standard.

**Uniform Spreading**

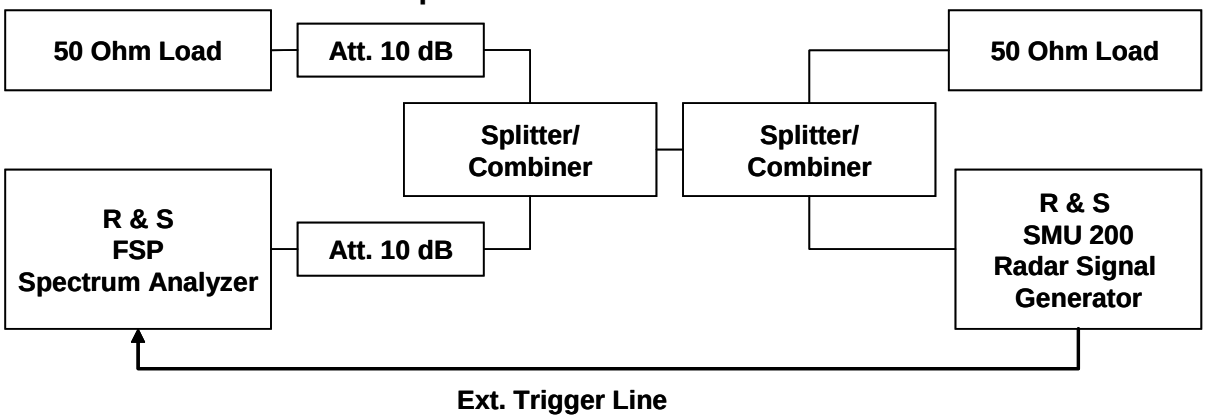
The probability of selecting each of the usable channels shall be within 10 % of the theoretical probability. For “n” channels, the theoretical probability is 1/n.

## Radar Waveform Calibration

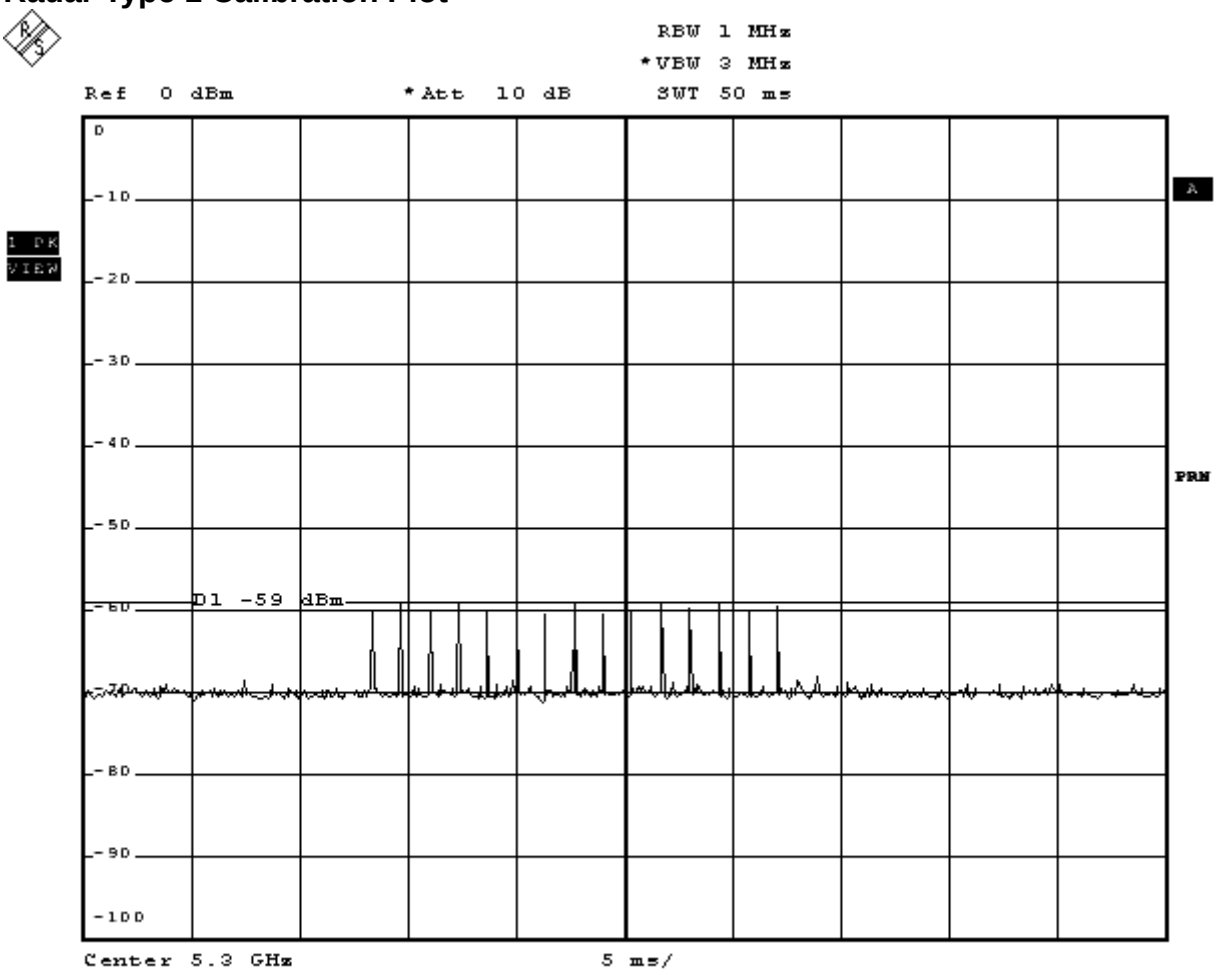
The following equipment setup was used to calibrate the conducted radar waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero span (time domain) at the frequency of the radar waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 1 MHz and 3 MHz.

The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -62 dBm due to the interference threshold level is not required.

## Conducted Calibration Setup



## Radar Type 1 Calibration Plot



## Test Procedure / Results

### For Conducted measurement

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector provided, conducted measurements shall be used.

The UUT shall be configured to operate at the highest transmitter output power setting.

If the UUT has a Radar Interference Detection function, the output power of the signal generator producing the radar test signals, shall (unless otherwise specified) provide a received signal power at the antenna connector of the UUT with a level equal to (Interference Detection Threshold + G), see tables D.2 and D.3 of standard. Parameter G [dBi] corresponds to the gain of the antenna assembly stated by the manufacturer. If more then one antenna assembly is intended for this power setting, the gain of the antenna assembly with the lowest gain shall be used.

A channel shall be selected in accordance with clause 5.1.3 of standard. This channel is designated as $Ch_r$ (channel occupied by radar). The UUT shall be configured to select $Ch_r$ as the first Operating Channel.

### Channel Availability Check

The clauses below define the procedure to verify the Channel Availability Check and the Channel Availability Check Time ($T_{ch\_avail\_check}$) by ensuring that the UUT is capable of detecting radar pulses at the beginning and at the end of the Channel Availability Check Time.

**Tests with a radar burst at the beginning of the Channel Availability Check Time**

The steps below define the procedure to verify the radar detection capability on the selected channel when a radar burst occurs at the beginning of the Channel Availability Check Time.

**a)** The signal generator and UUT are connected using Set-up A and the power of the UUT is switched off.

**b)** The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence ($T_{power\_up}$) and is ready to start the radar detection. The Channel Availability Check is expected to commence on $Ch_r$ at instant T1 and is expected to end no sooner than T1 and is expected to end no sooner than T1 + $T_{ch\_avail\_check}$ unless radar is detected sooner.

**NOTE:** Additional verification may be needed to define T1 in case it is not exactly known or indicated by the UUT.

**c)** A radar burst is generated on $Ch_r$ using radar test signal #1 defined in table D.4 of standard at a level of 10 dB above the level defined in standard. This single-burst radar test signal shall commence within 2 sec after time T1.

**d)** It shall be recorded if the radar test signal was detected.

**e)** A timing trace or description of the observed timing and behavior of the UUT shall be recorded.

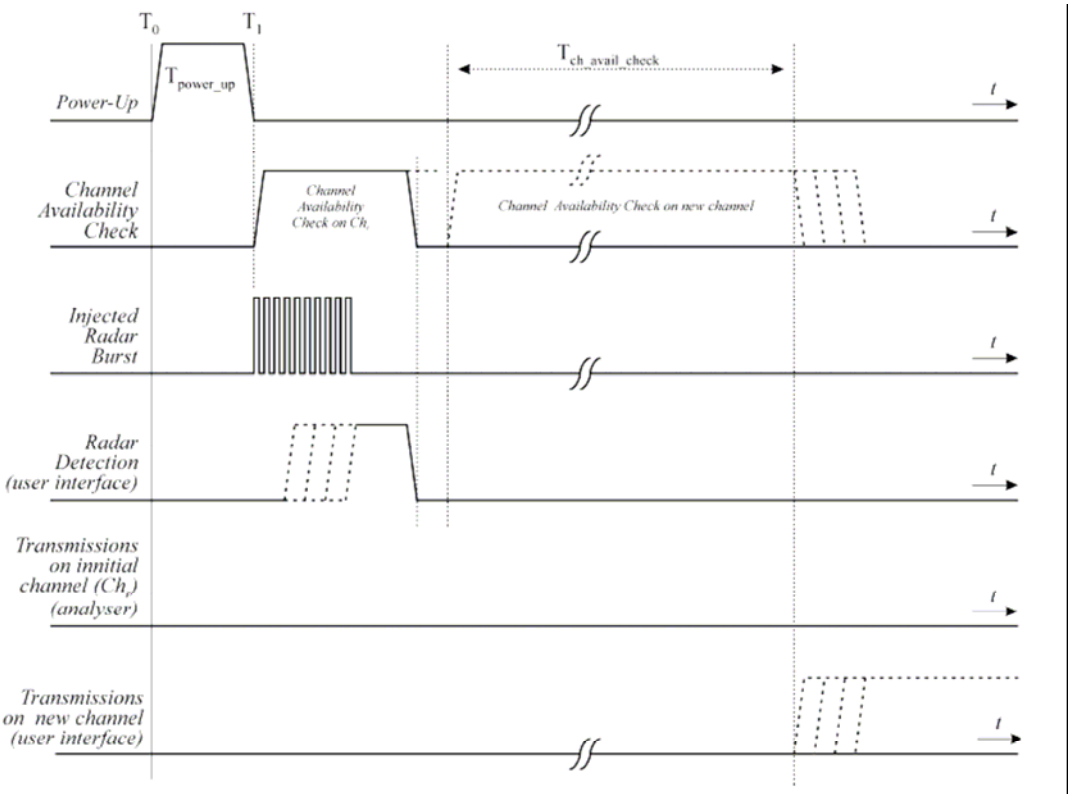



Figure 7: Example of timing for radar testing at the beginning of the Channel Availability Check Time

**Tests with a radar burst at the end of the Channel Availability Check Time**

The steps below define the procedure to verify the radar detection capability on the selected channel when a radar burst occurs at the end of the Channel Availability Check Time.

**a)** The signal generator and UUT are connected using Set-up A and the power of the UUT is switched of.

**b)** The UUT is powered up at T0.T1 denotes the instant when the UUT has completed its power-up sequence ($T_{power\_up}$) and is ready to start the radar detection. The Channel Availability Check is expected to commence on $Ch_r$ at instant T1 and is expected to end no sooner than T1 + $T_{ch\_avail\_check}$ unless radar is detected sooner.

NOTE: Additional verification may be needed to define T1 in case it is not exactly known or indicated by the UUT.

**c)** A radar burst is generated on $Ch_r$ Using radar test signal #1 defined in table D.4 at a level of 10 dB above the level defined in standard. This single-burst radar test signal shall commence towards the end of the minimum required Channel Availability Check Time but not before time T1 + $T_{ch\_avail\_check}$ - 2 [sec].

**d)** It shall be recorded if the radar test signal was detected.

**e)** A timing trace or description of the observed timing and behavior of the UUT shall be recorded.

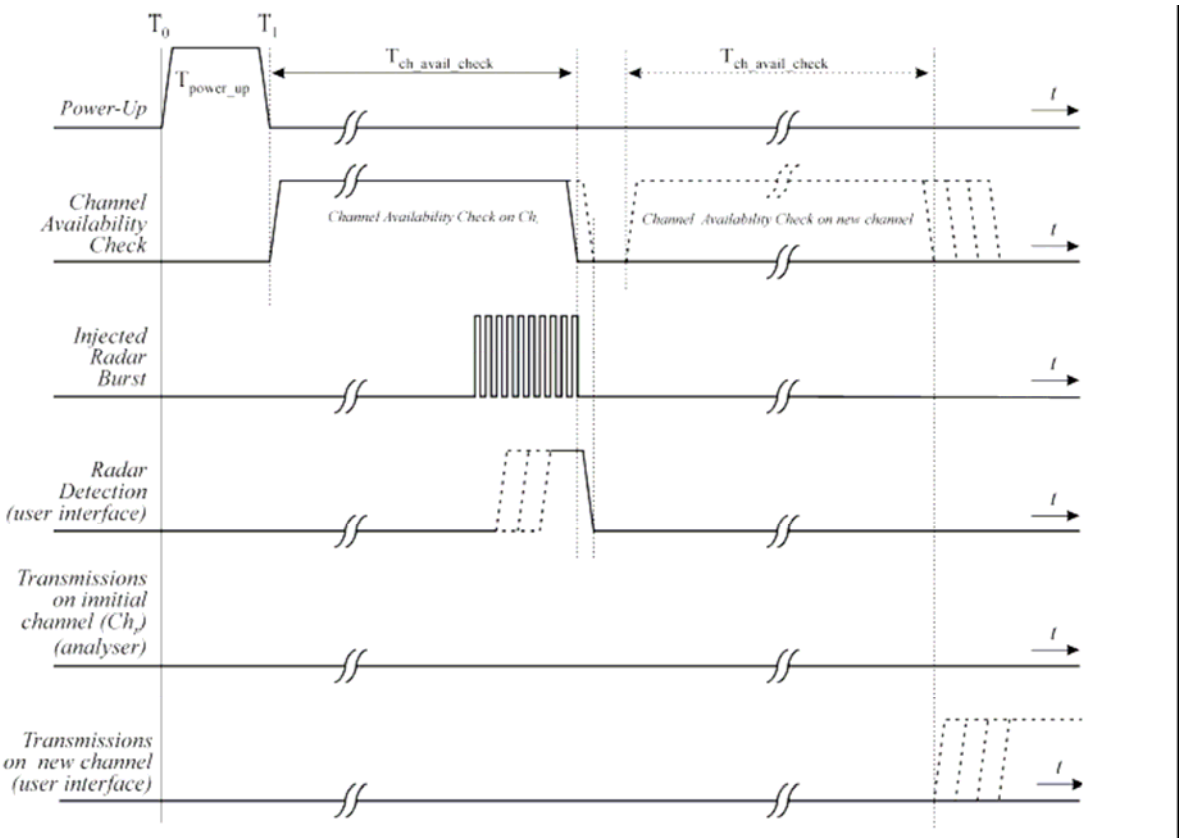



Figure 8: Example of timing for radar testing towards the end of the Channel Availability Check Time

**Interference Detection Threshold (during the Channel Availability Check)**

The different steps below define the procedure to verify the Interference Detection Threshold during the Channel Availability Check Time.

**a)** The signal generator and UUT are connected using Set-up A and the power of the UUT is switched off.

**b)** The UUT is powered on at T0.T1 denotes the instant when the UUT has completed its power-up sequence ($T_{power\_up}$) and is ready to start the radar detection. The channel Availability Check expected to commence on $Ch_r$ at instant T1 and is expected to end no sooner than T1 + $T_{ch\_avail\_check}$ unless radar is detected sooner.
Note: Additional verification may be needed to define T1 in case it is not exactly known or indicated by the UUT.

**c)** mA radar burst is generated on Chr using radar test signal #1 defined in table D.4 of standard. This single-burst radar signal shall commence at approximately 10 seconds after T1.

**d)** It shall be recorded if the radar test signal was detected.

**e)** The step c) to d) shall be repeated at least 20 times in order to determine the detection probability for the selected radar test signal. The detection probability shall be compared with the limit specified the table D.4 of standard.

**f)** The steps c) to e) shall be repeated for each of the radar test signals defined in table D.4.

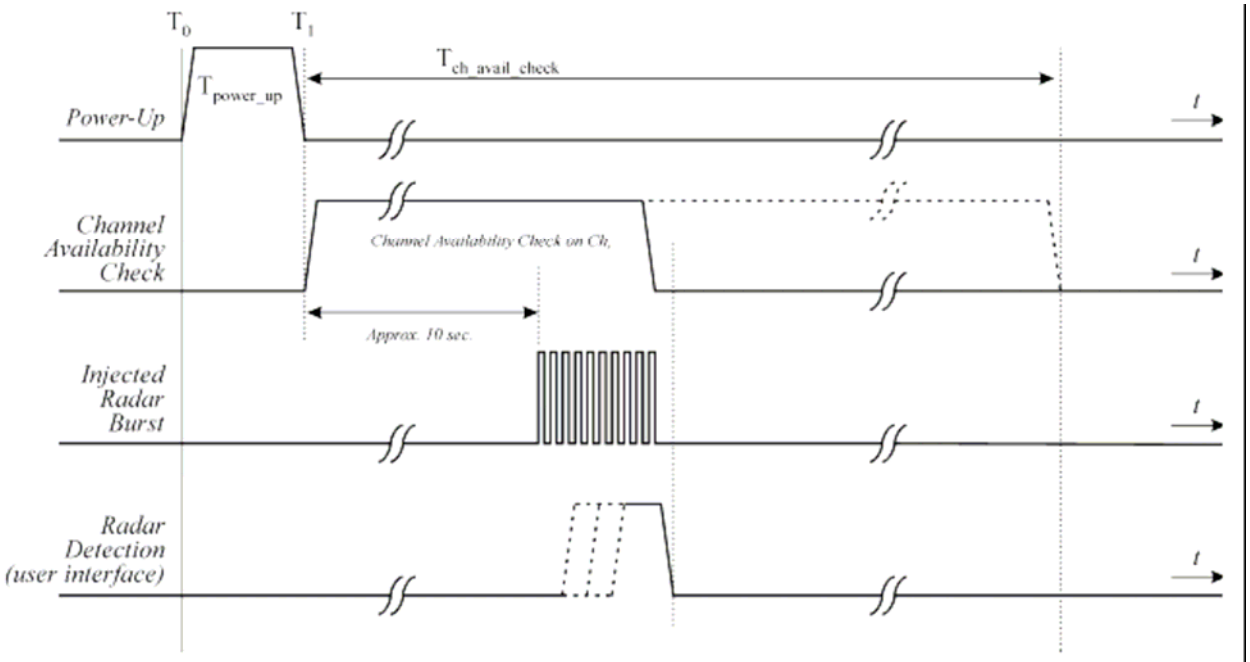



Figure 9: Example of timing for radar testing during the Channel Availability Check

## In-Service Monitoring

The steps below define the procedure to verify the In-Service Monitoring and the Interference Detection Threshold during the In-Service Monitoring.

**a)** When the UUT is a master device, a slave device will be used that associates with the UUT. The signal generator and the UUT are connected using Set-up A.
When the UUT is a slave device with a Radar Interference Detection function, the UUT shall associate with a master device. The signal generator and the UUT are connected using Set-up C.

**b)** The UUT shall transmit a test transmission sequence in accordance with clause 5.1.2.2 of standard on the selected channel $Ch_r$.

**c)** At a certain time T0, a radar burst is generated on $Ch_r$ using radar test signal #1 defined in table D.4 of standard and at a level defined in standard T1 denotes the end of the radar burst.

**d)** It shall be recorded if the radar test signal was detected.

**e)** The step b) to d) shall be repeated at least 20 times in order to determine the detection probability for the selected radar test signal. The detection probability shall be compared with the limit specified in table D.4 of standard.

**f)** The steps b) to e) shall be repeated for each of the radar test signals defined in table D.4 and as described in standard.

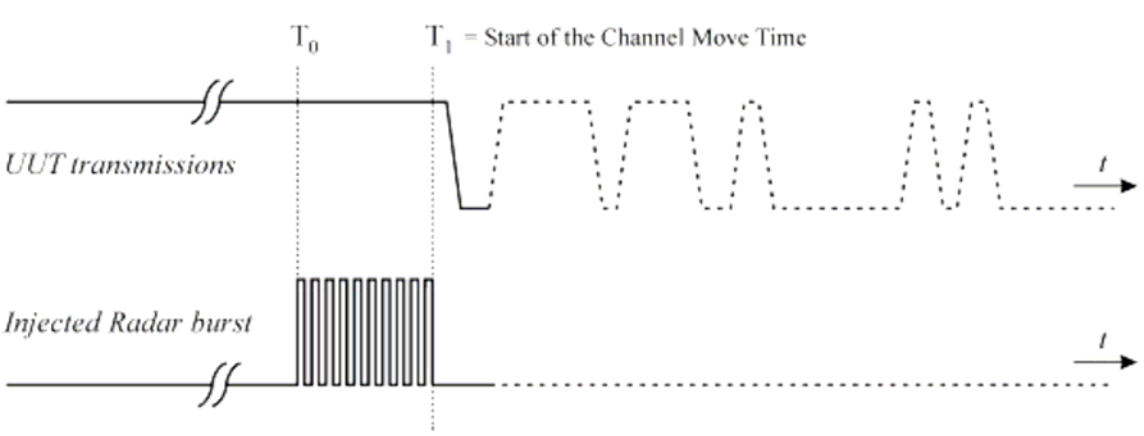
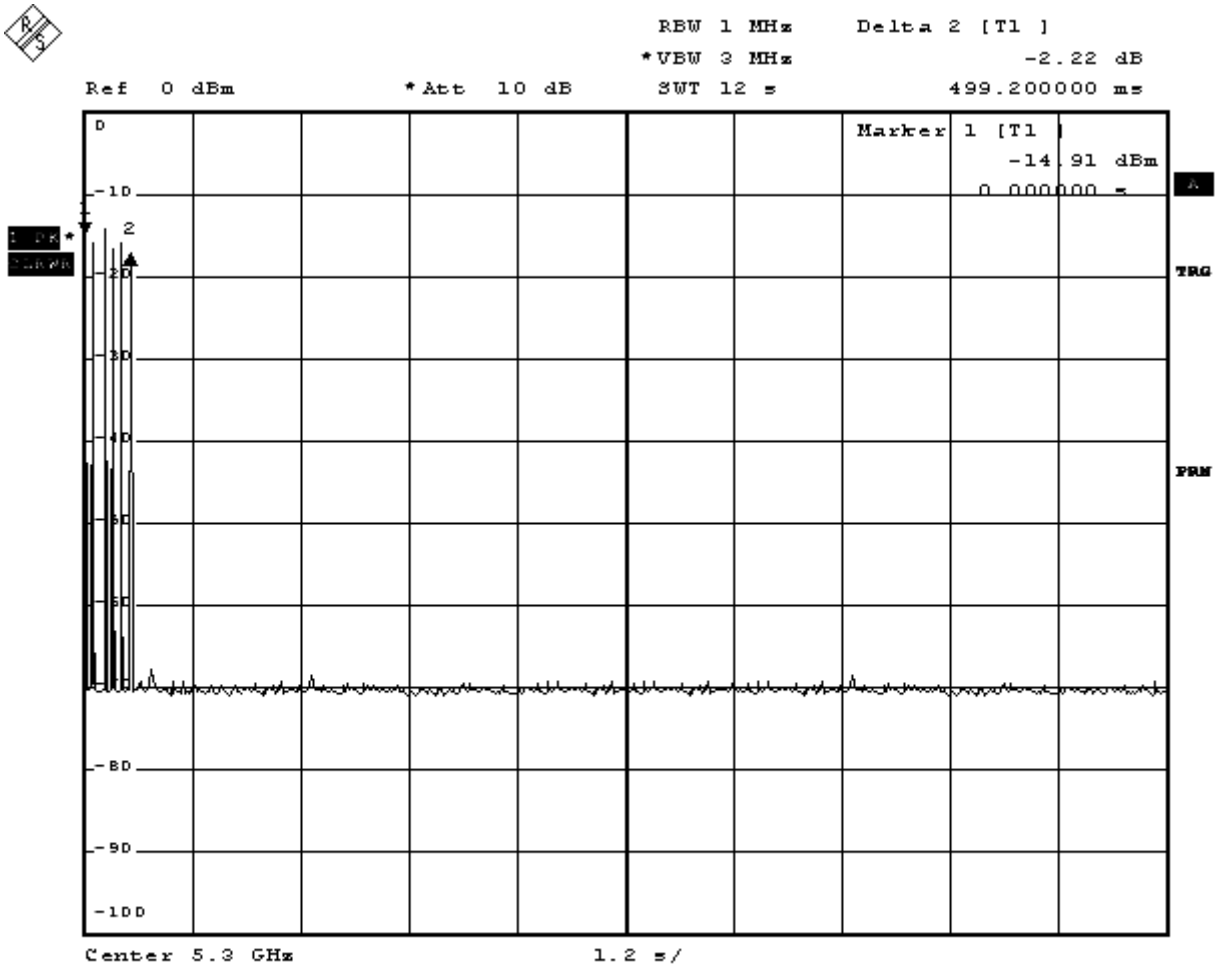



**Figure 10: Example of timing for radar testing during In-Service Monitoring**

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 1 at 5300MHz**

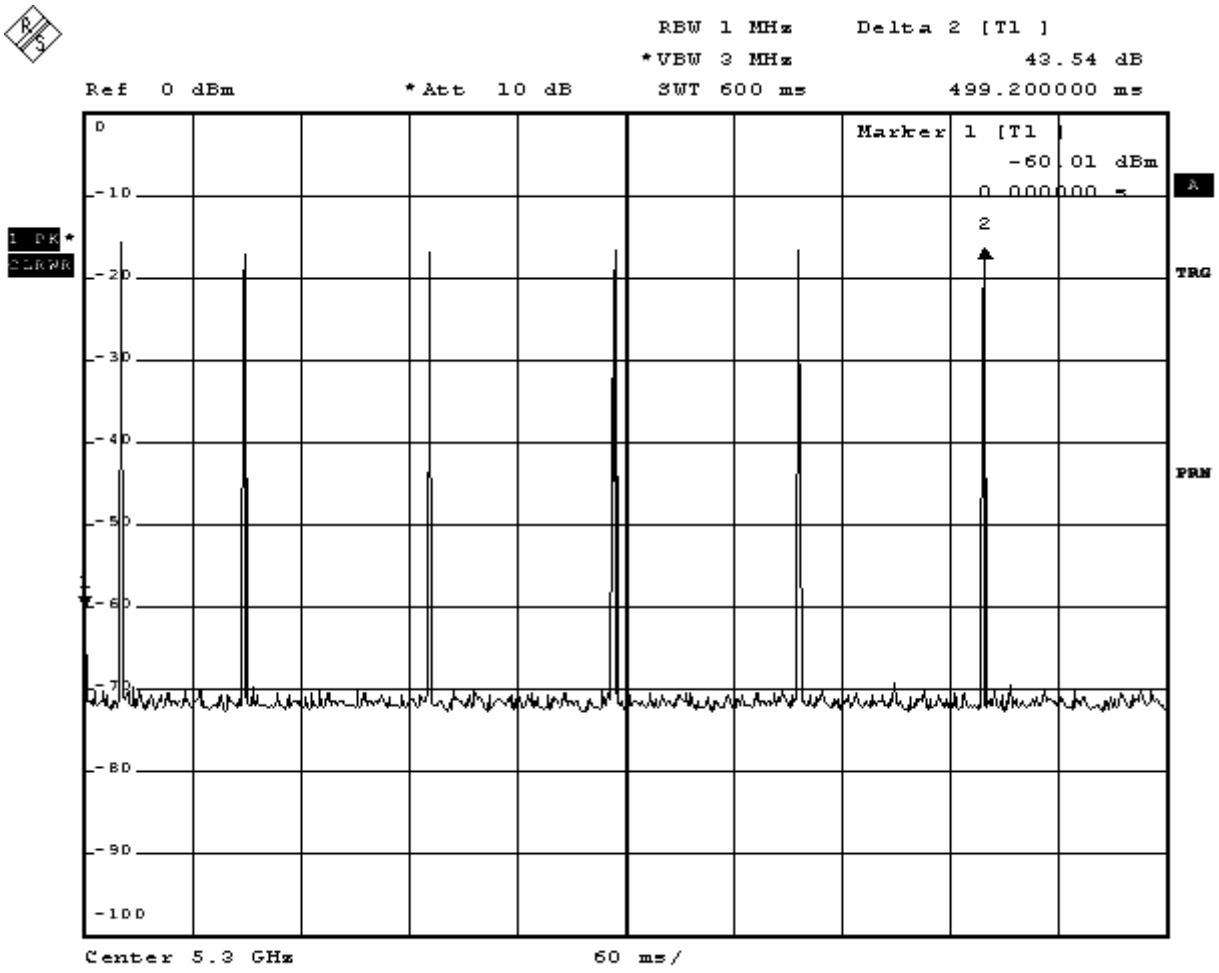



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 1 at 5300 MHz**

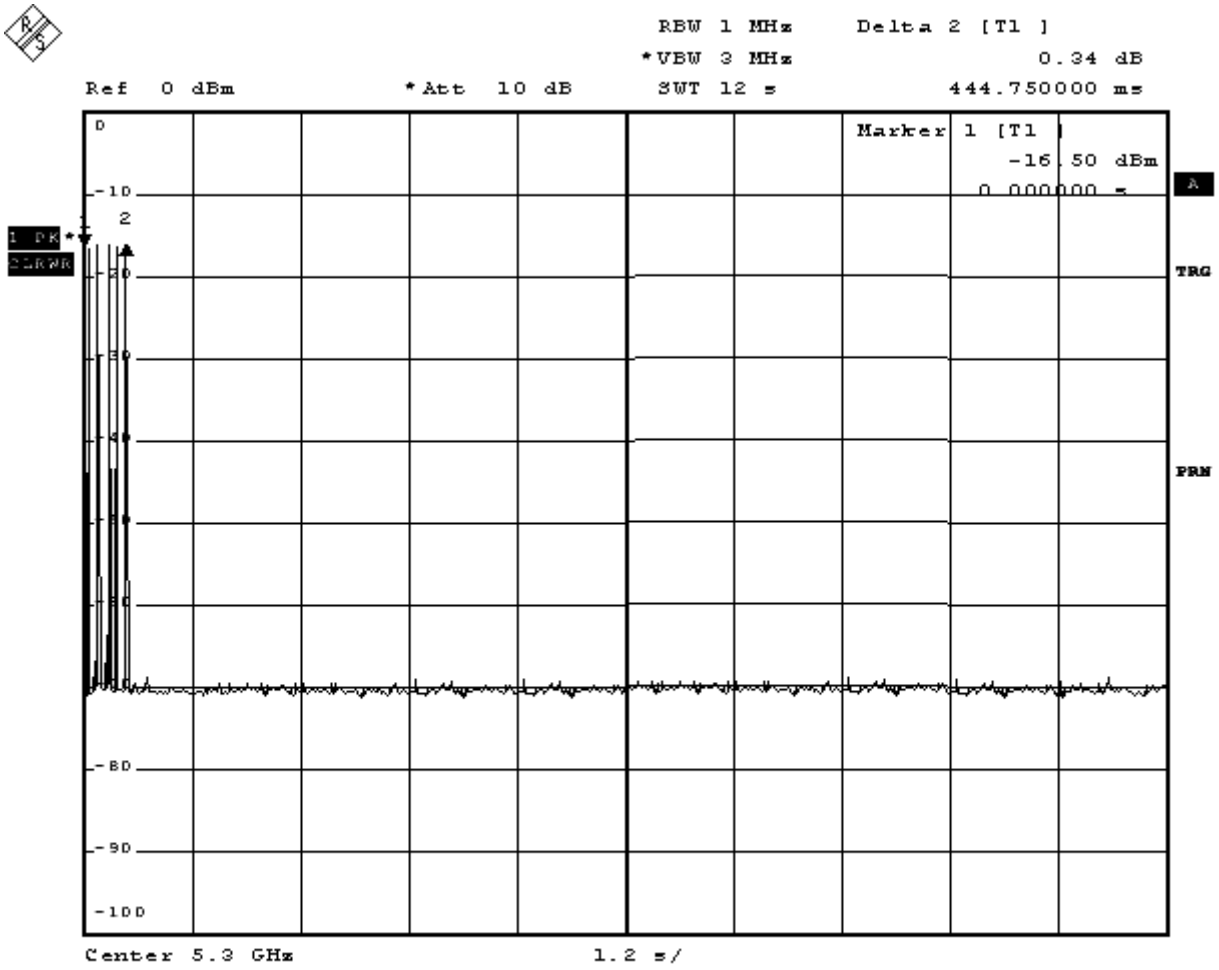



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 5 at 5300MHz**

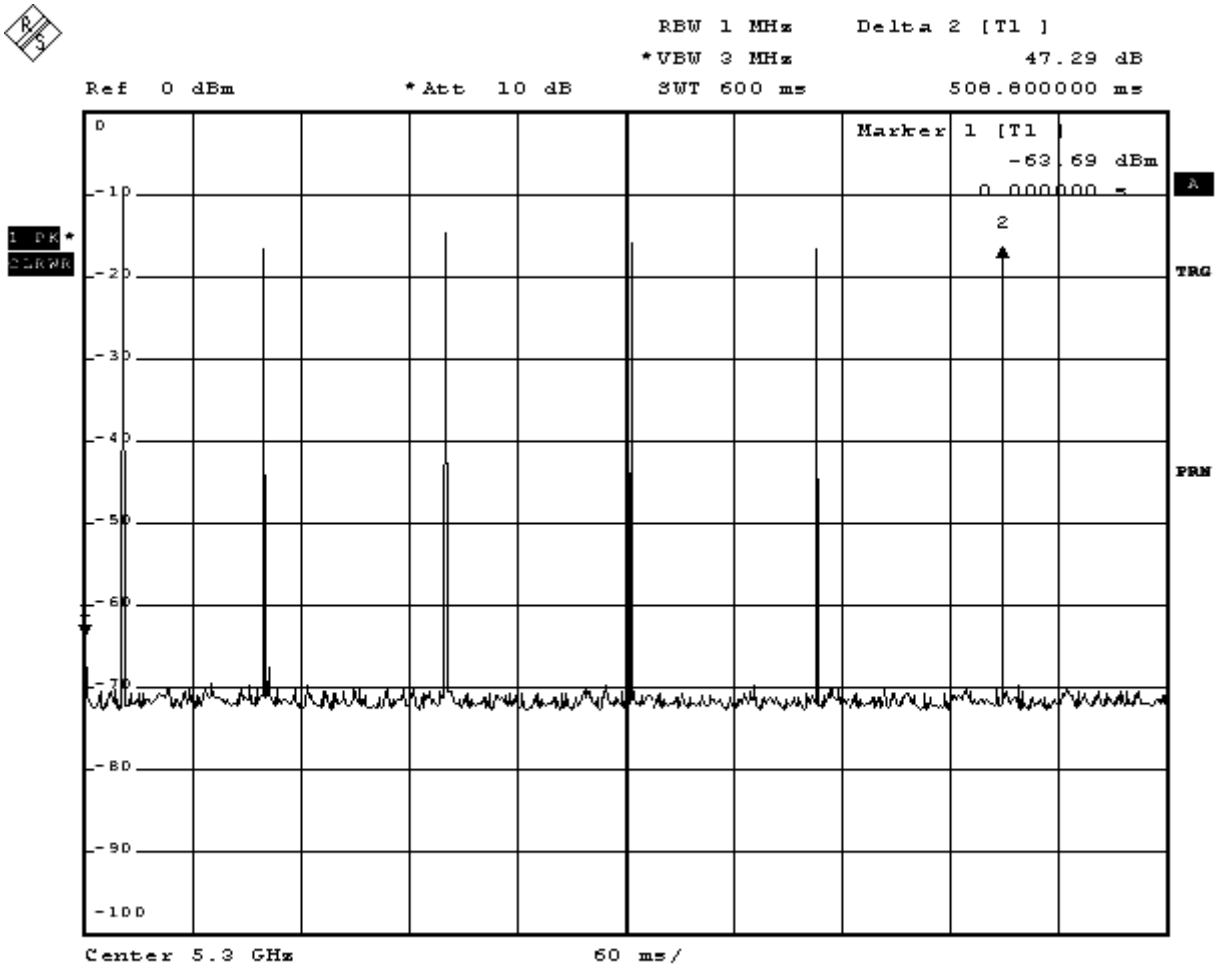



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 5 at 5300 MHz**

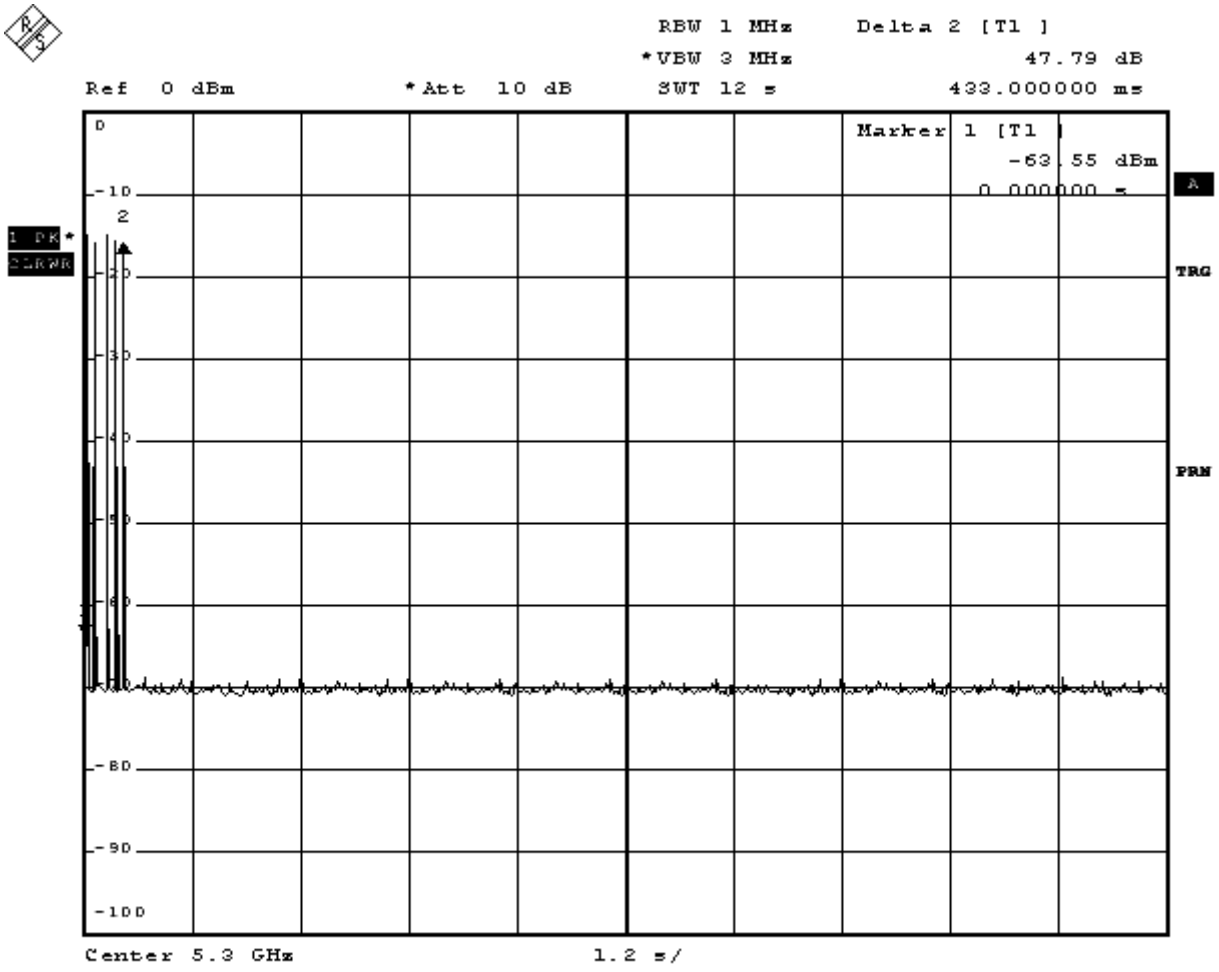



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 6 at 5300MHz**

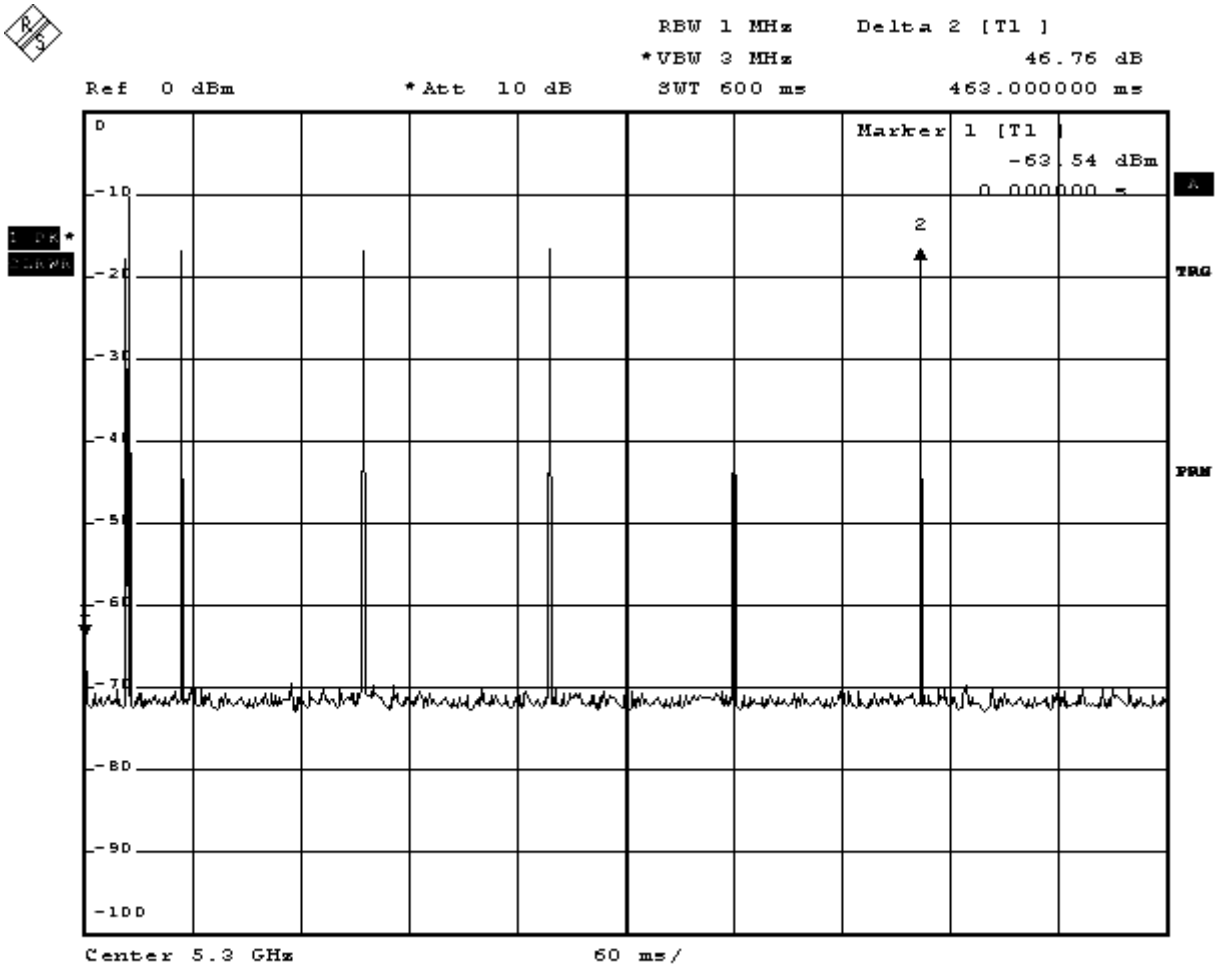



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 6 at 5300 MHz**

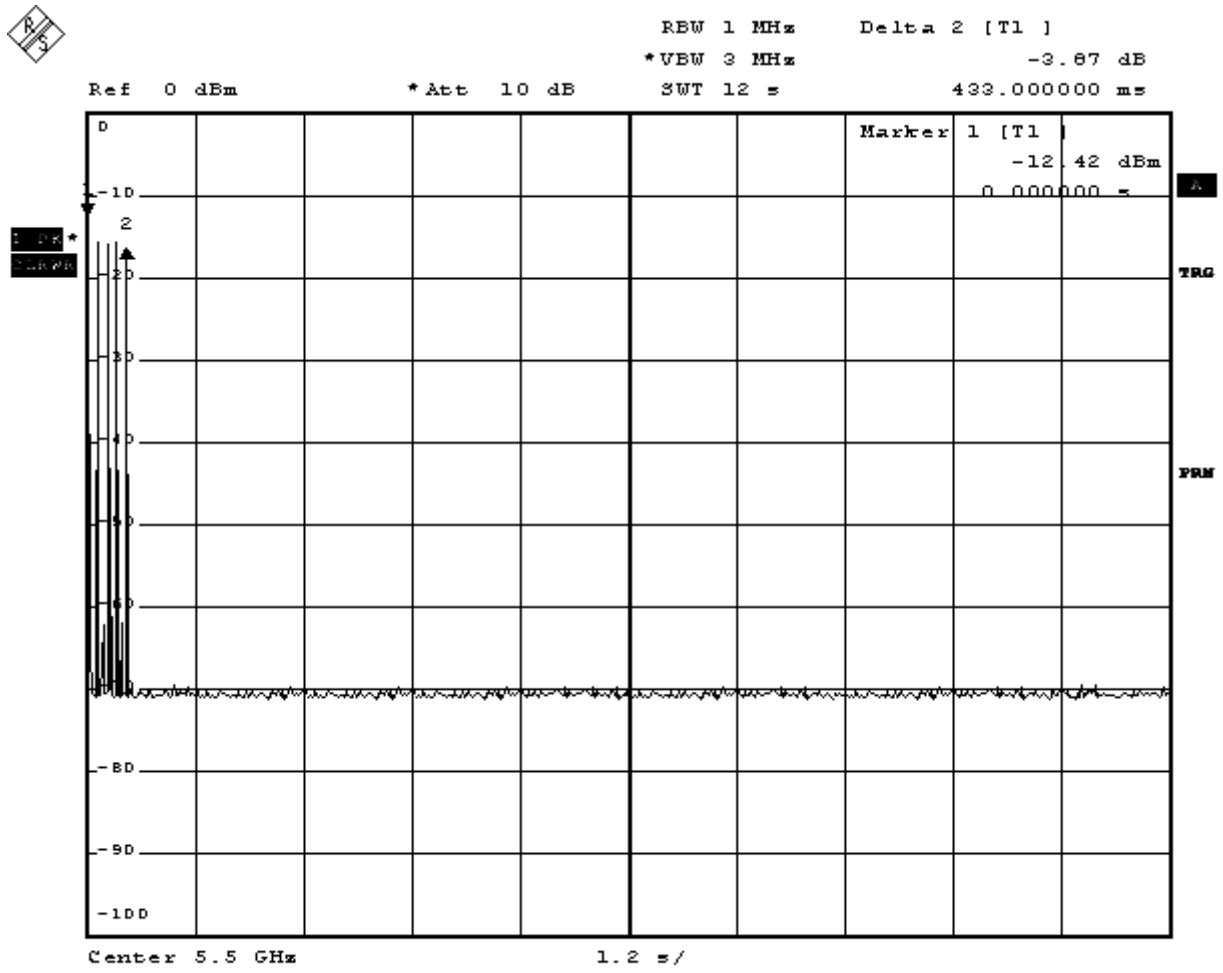



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 1 at 5500MHz**

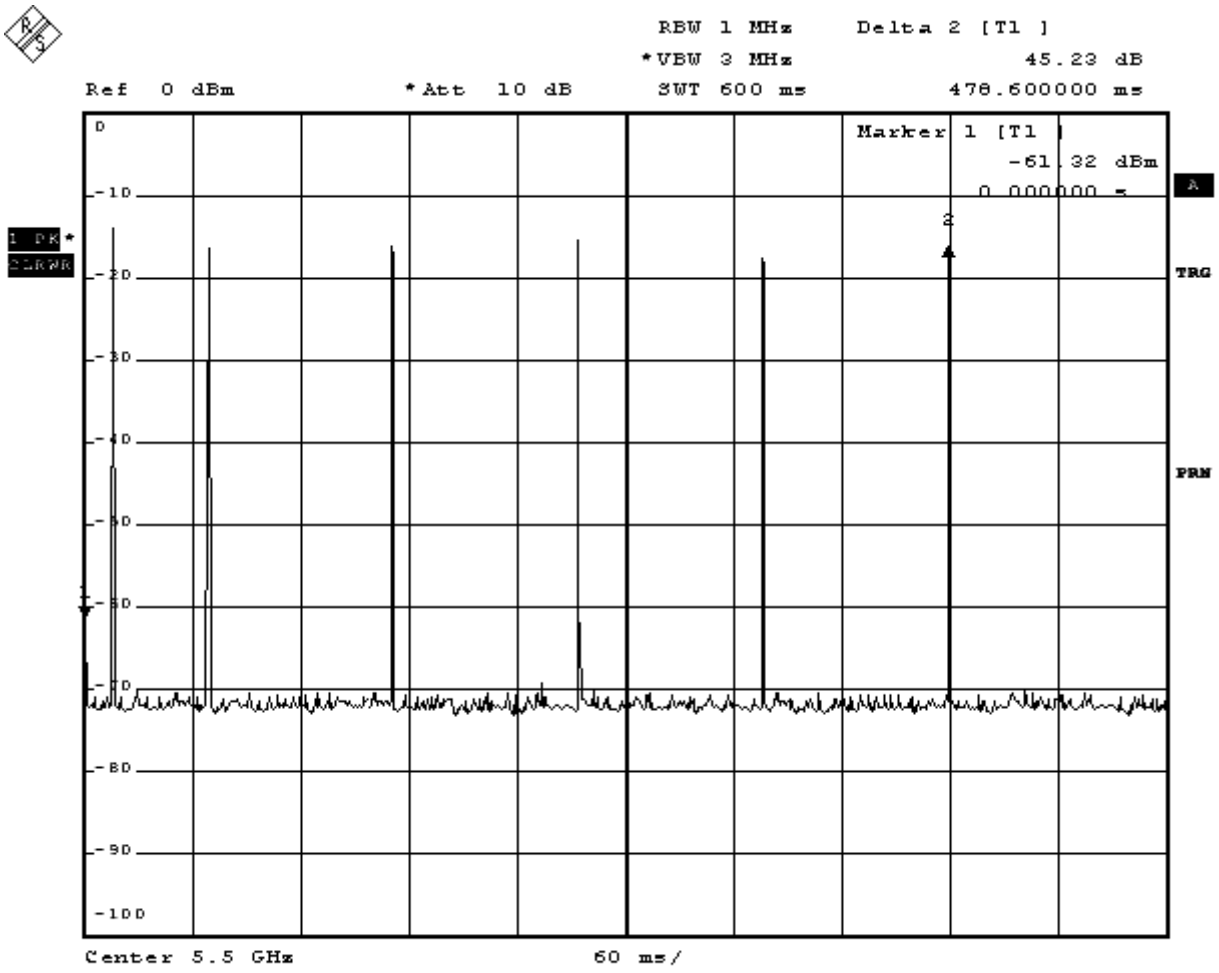



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 1 at 5500 MHz**

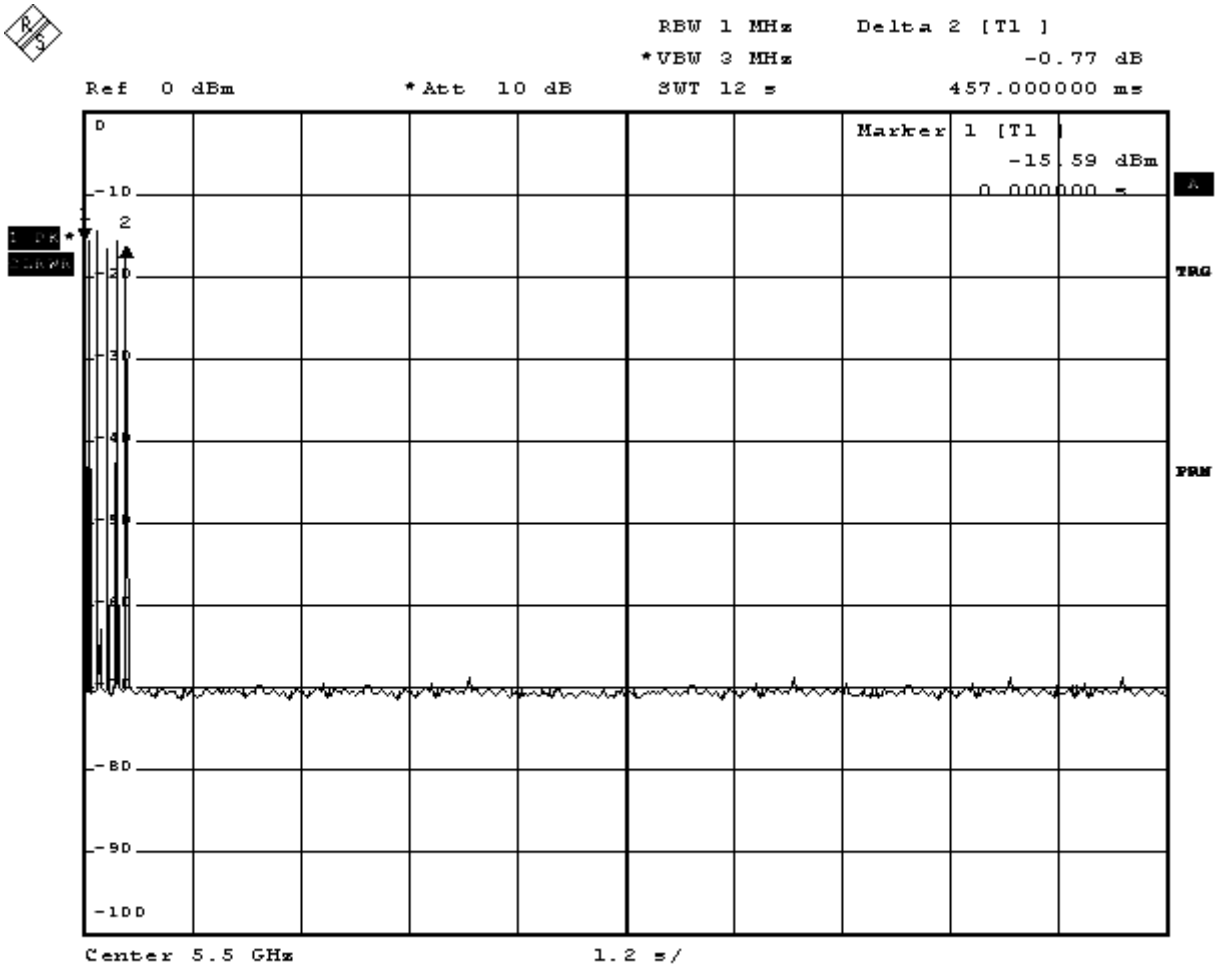



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 5 at 5500MHz**

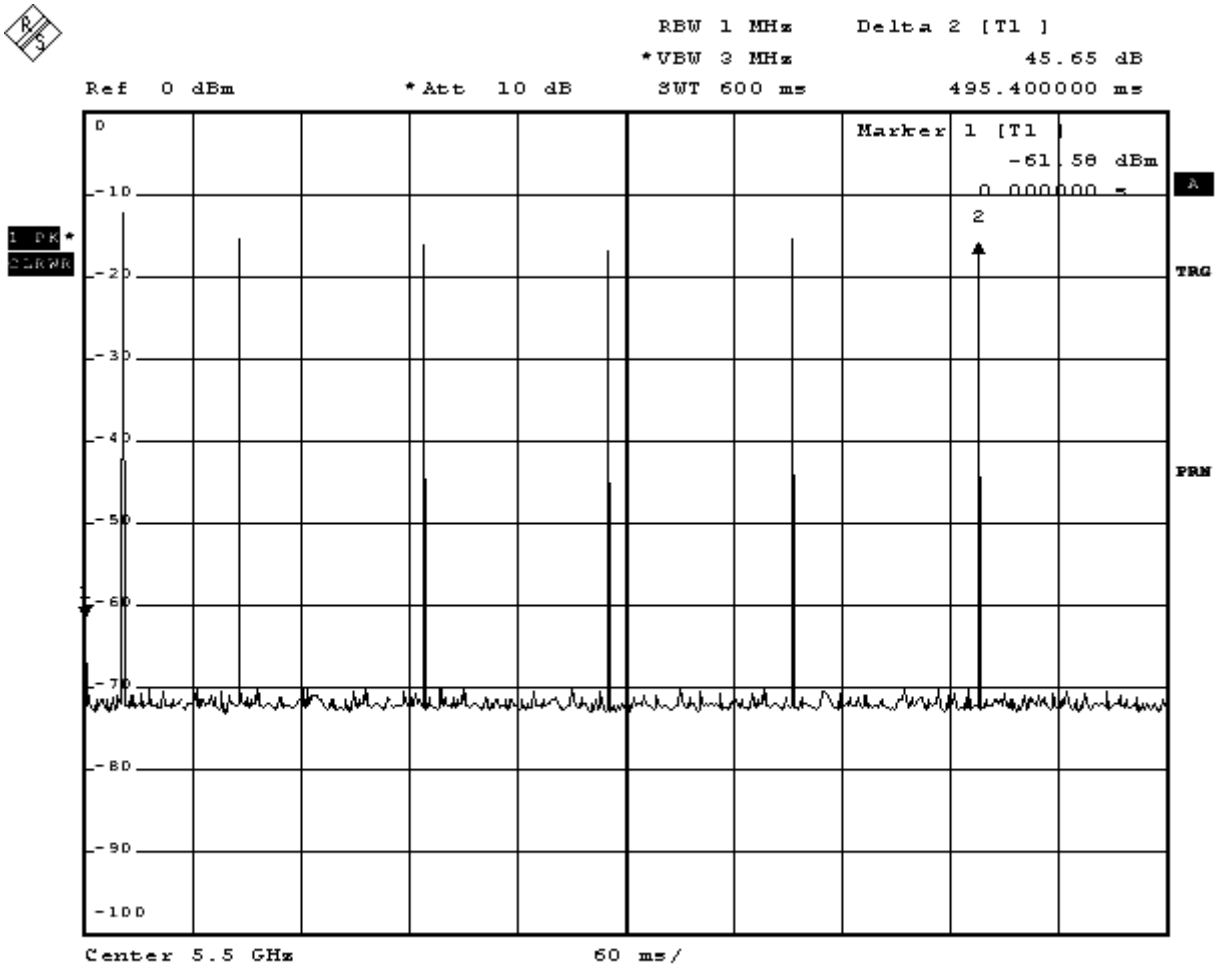



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 5 at 5500 MHz**

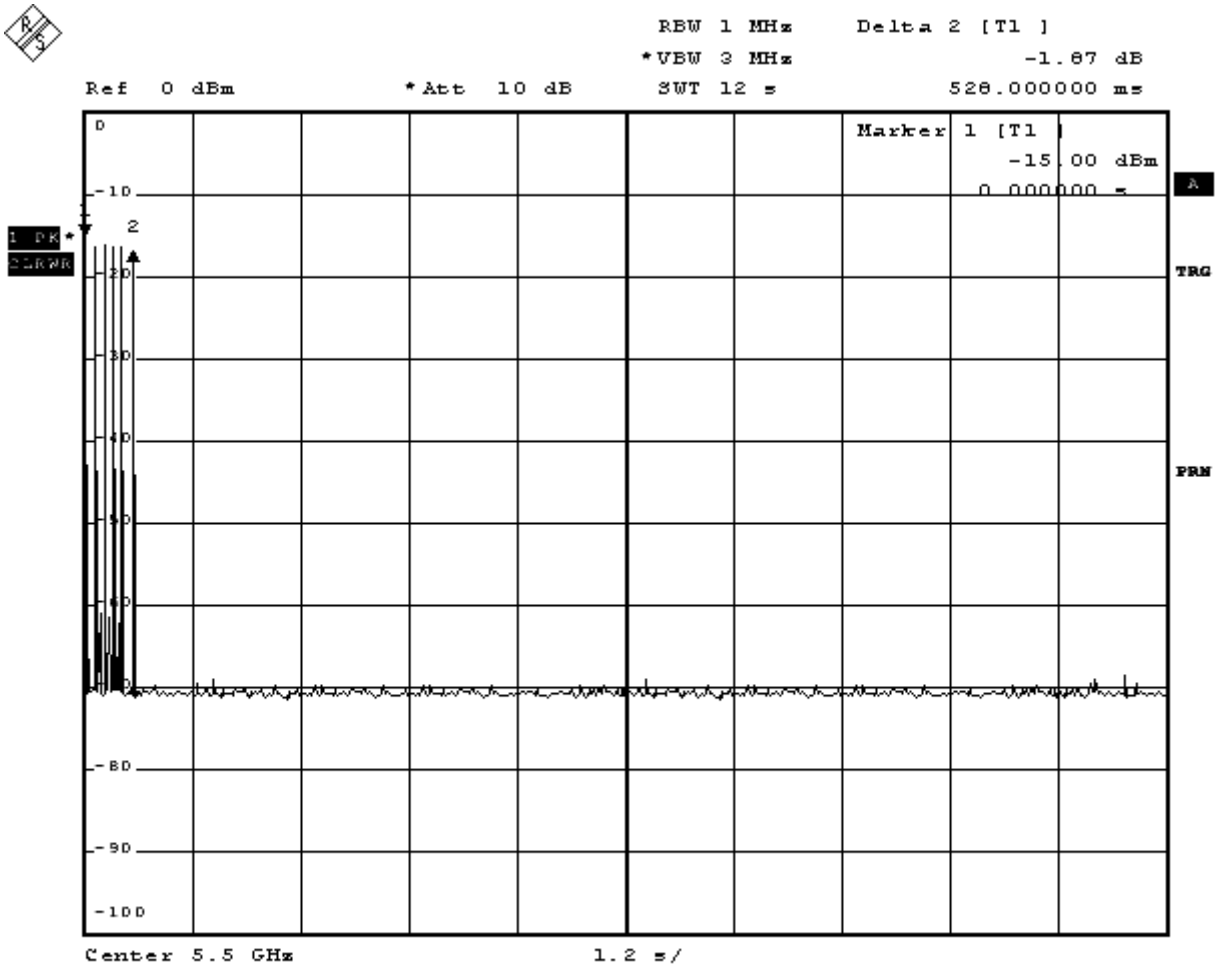



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**20MHz Channel Mode**

**Channel Move Time for Radar Test Signal 6 at 5500MHz**

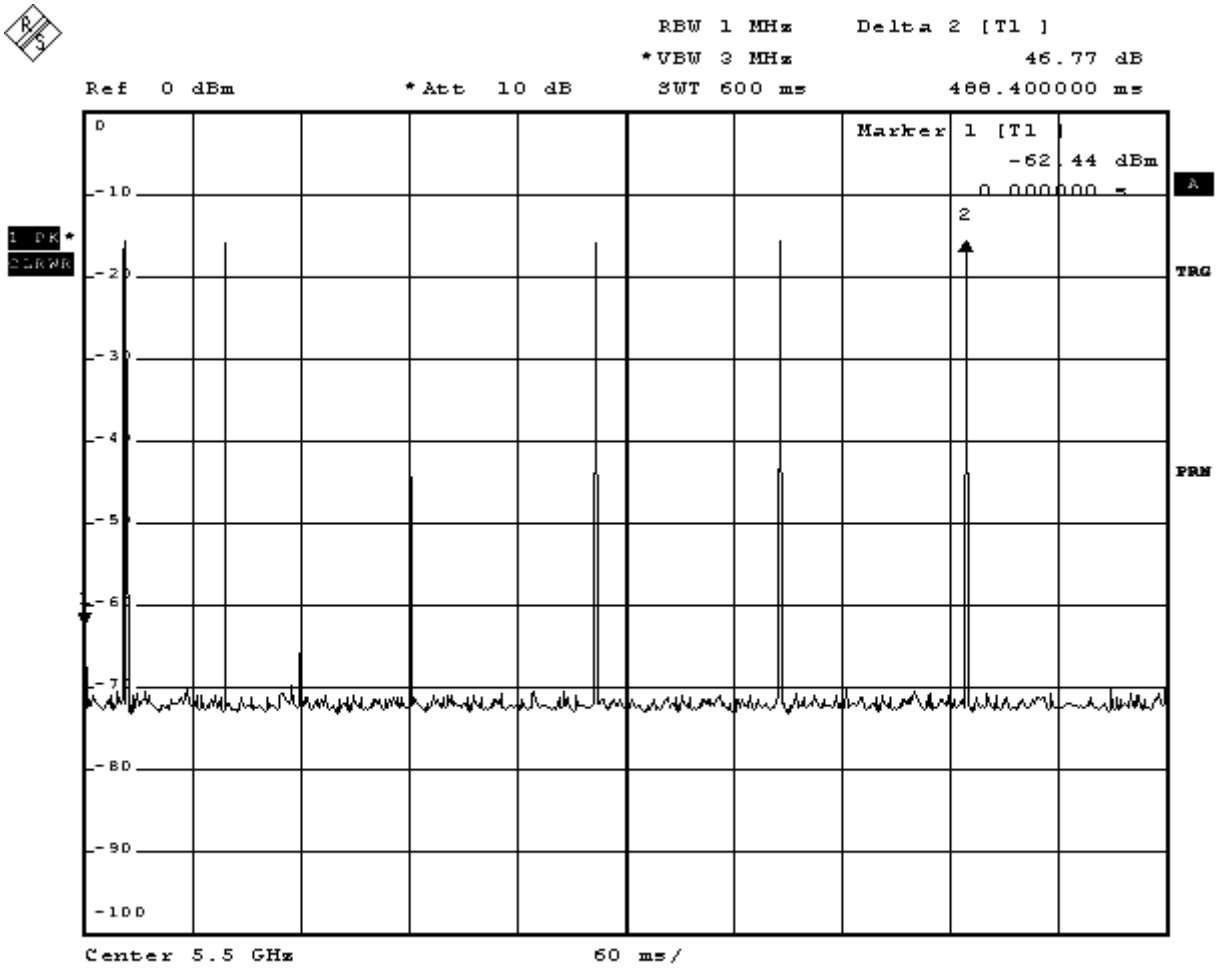



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**20MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 6 at 5500 MHz**

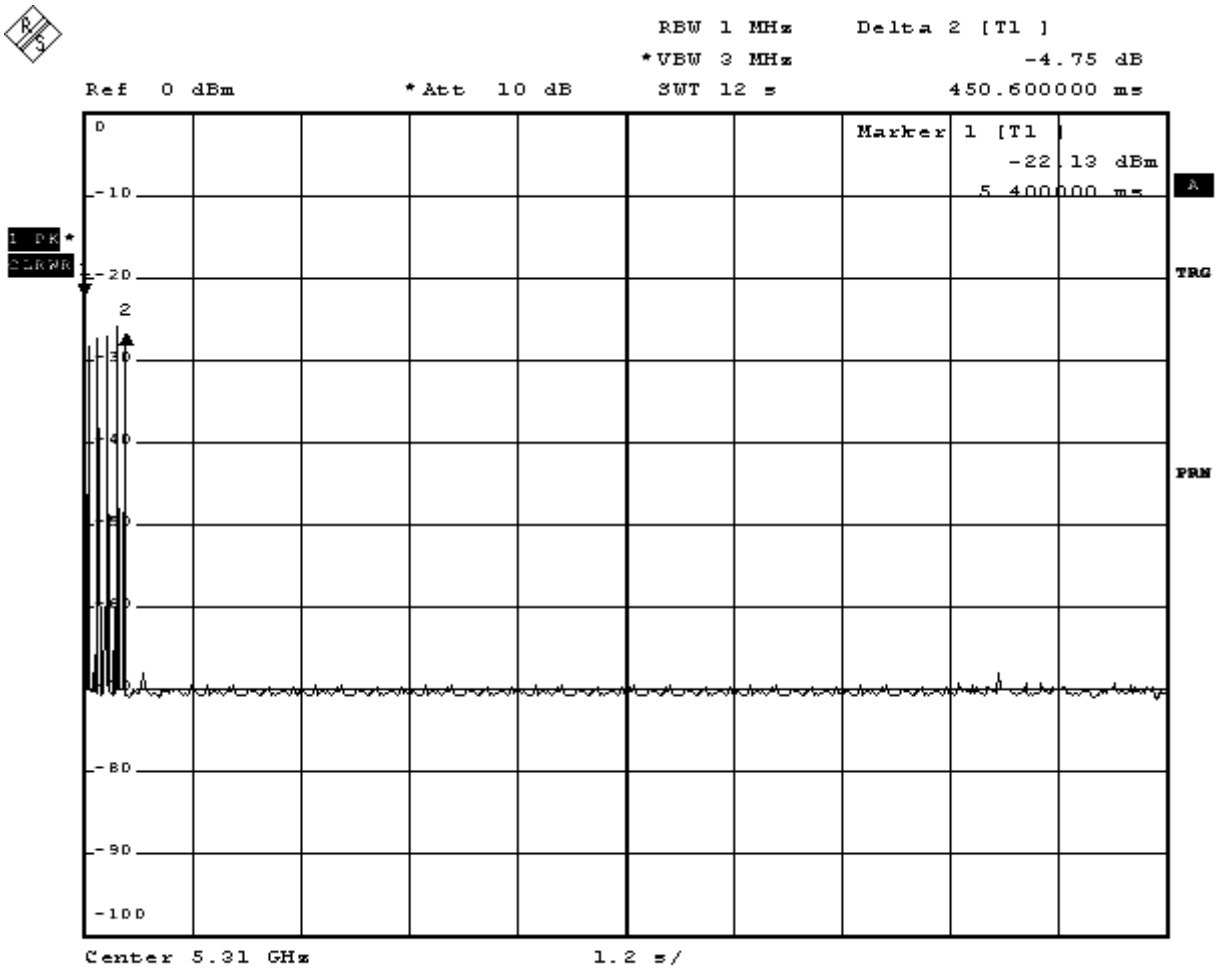



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 1 at 5310MHz**

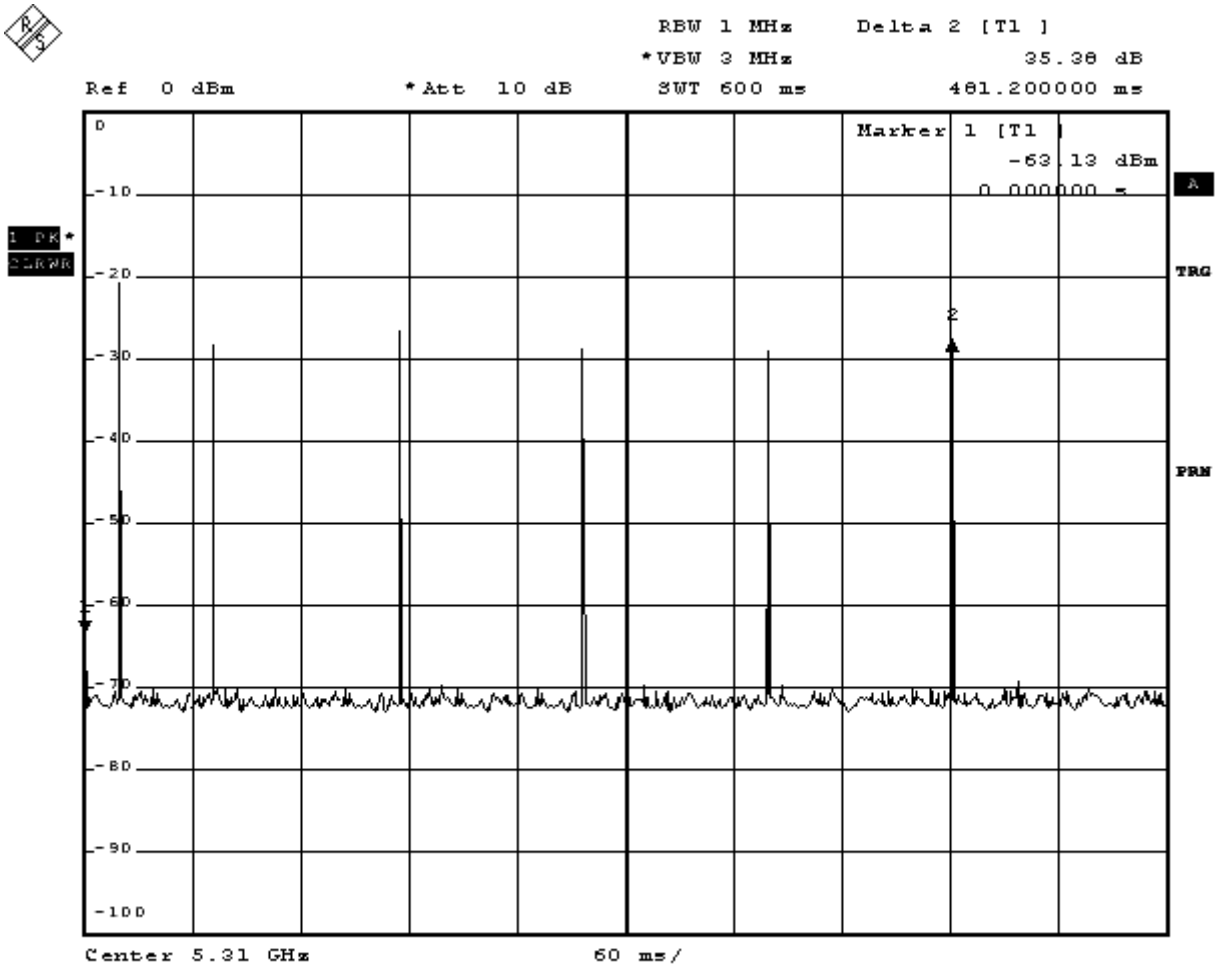



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 1 at 5310 MHz**

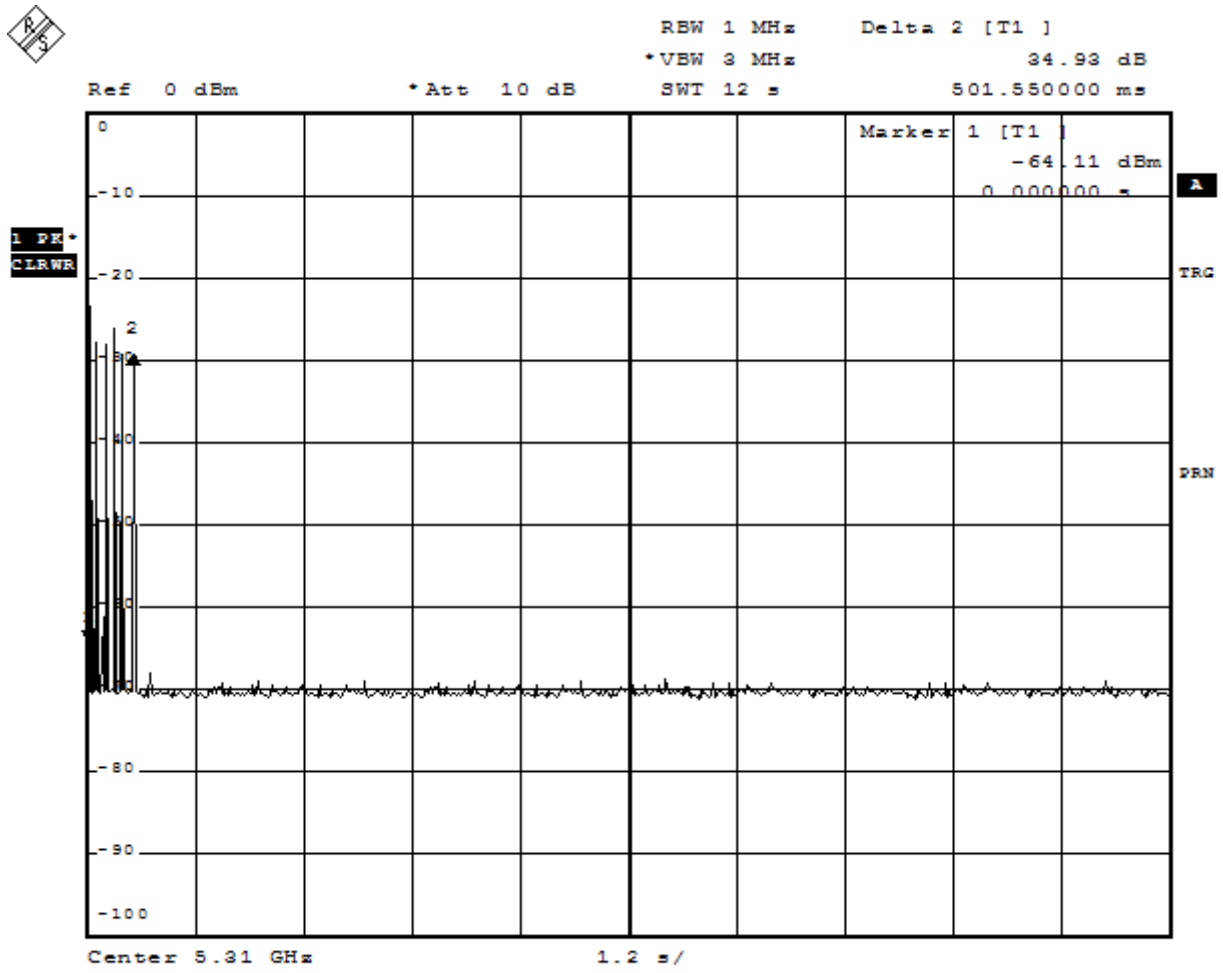



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 5 at 5310MHz**

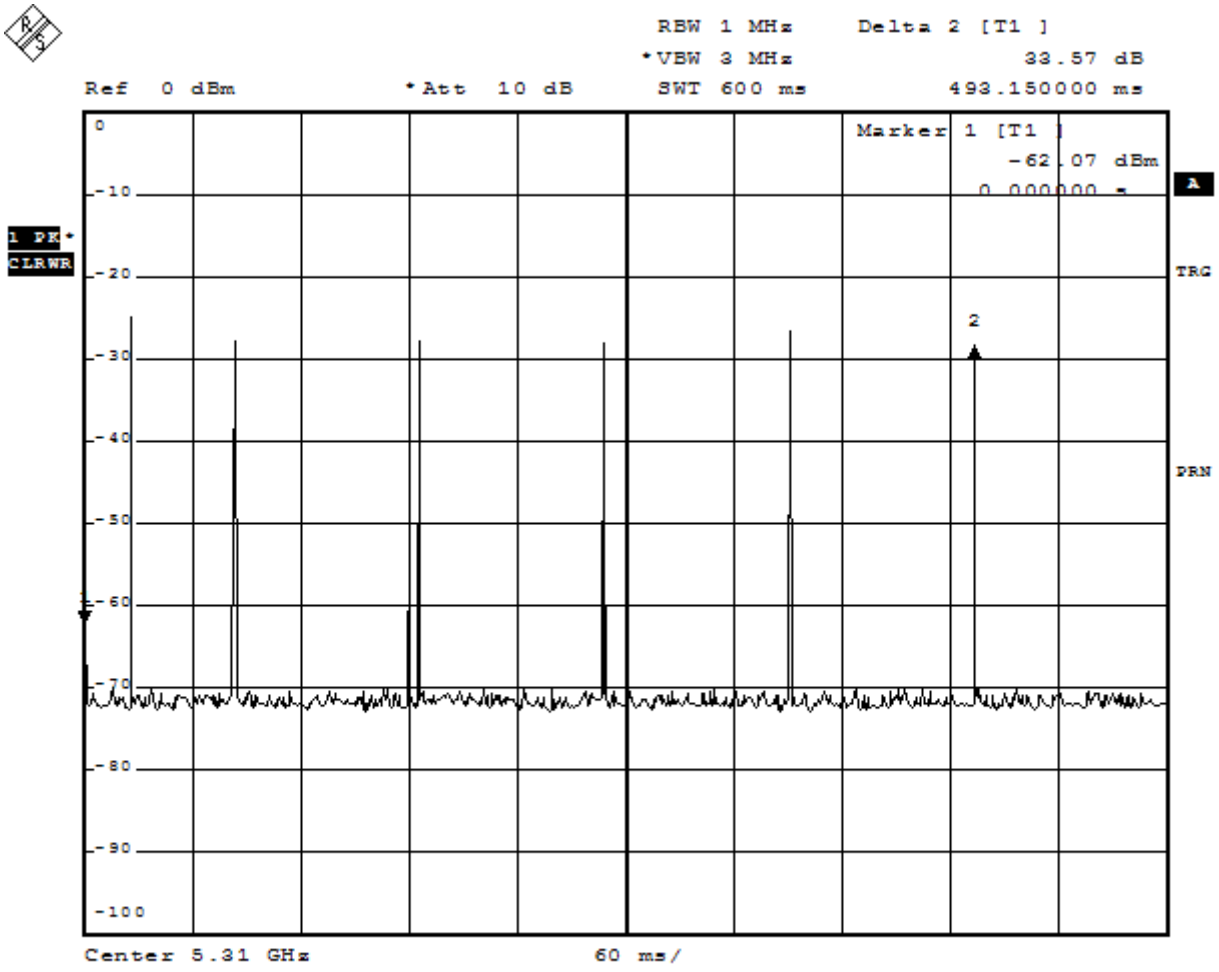



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 5 at 5310 MHz**

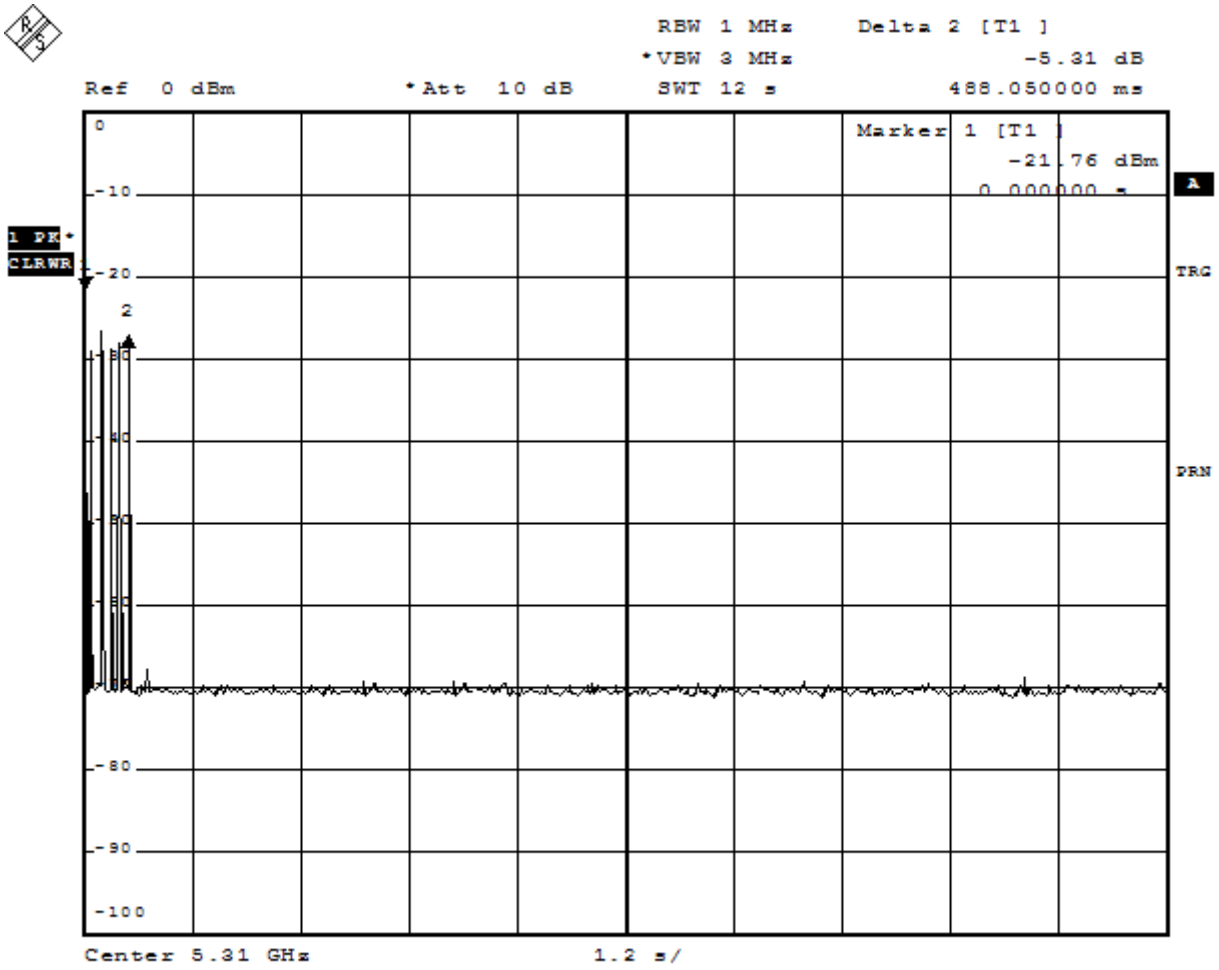



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 6 at 5310MHz**

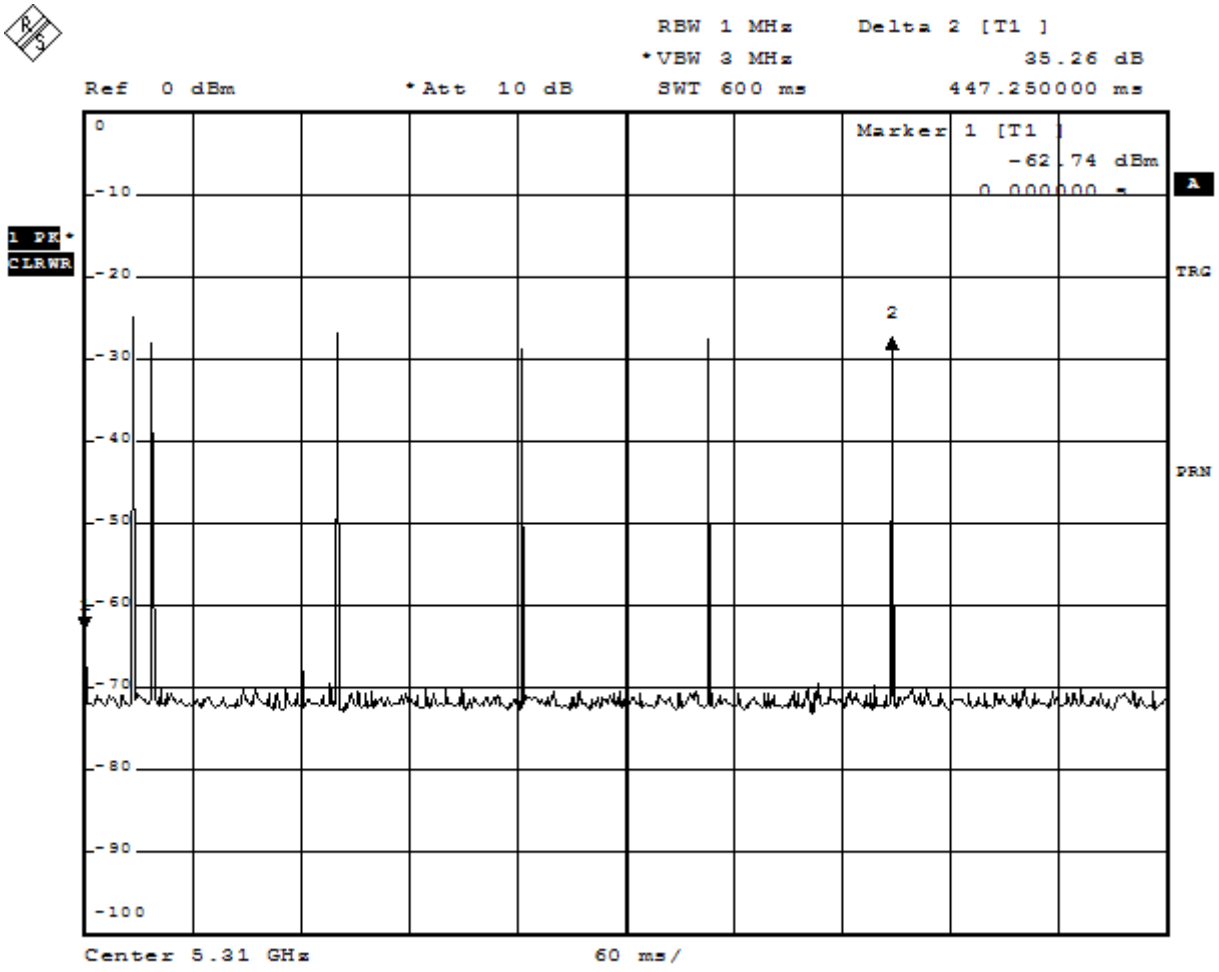



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 6 at 5310 MHz**

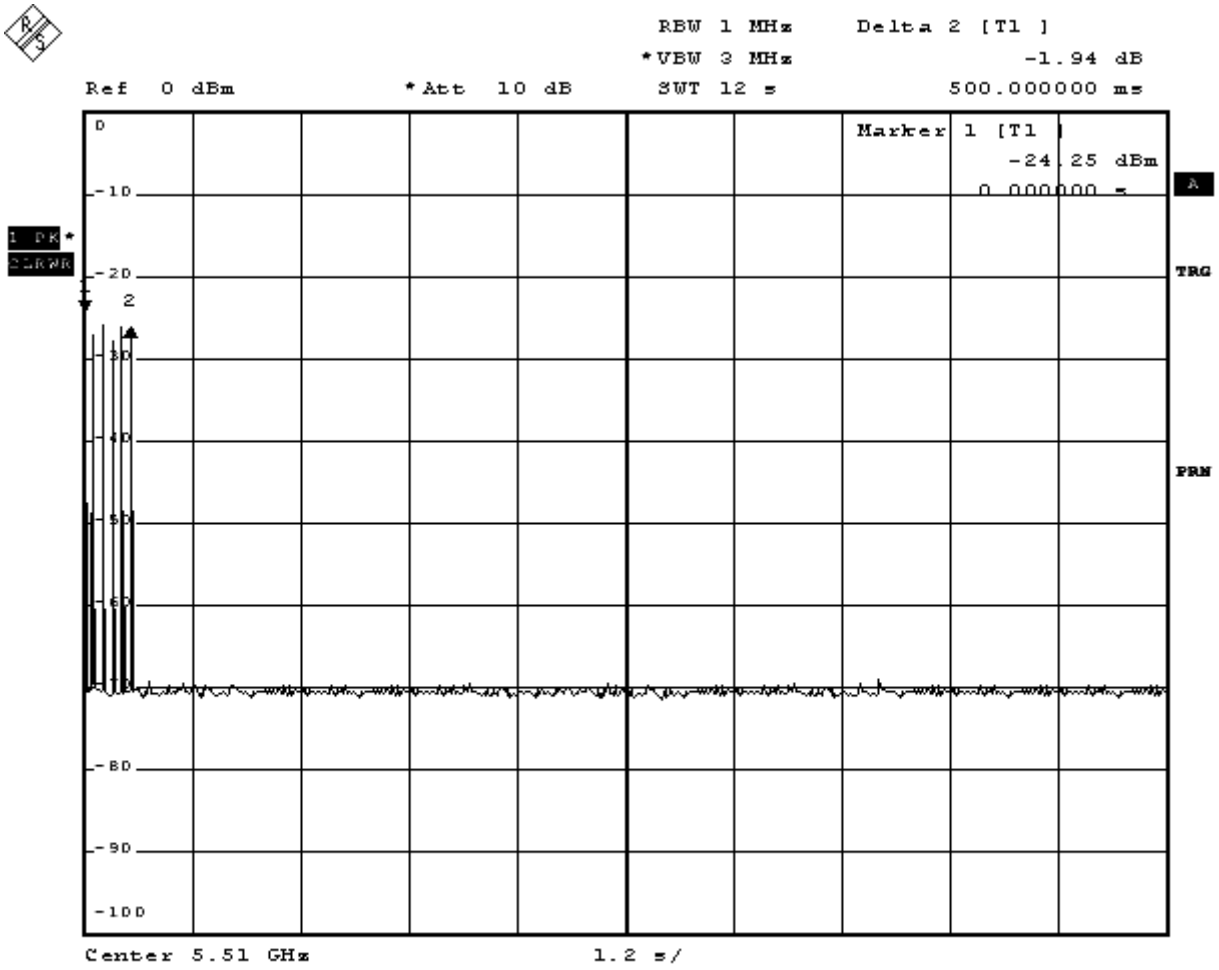



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 1 at 5510MHz**

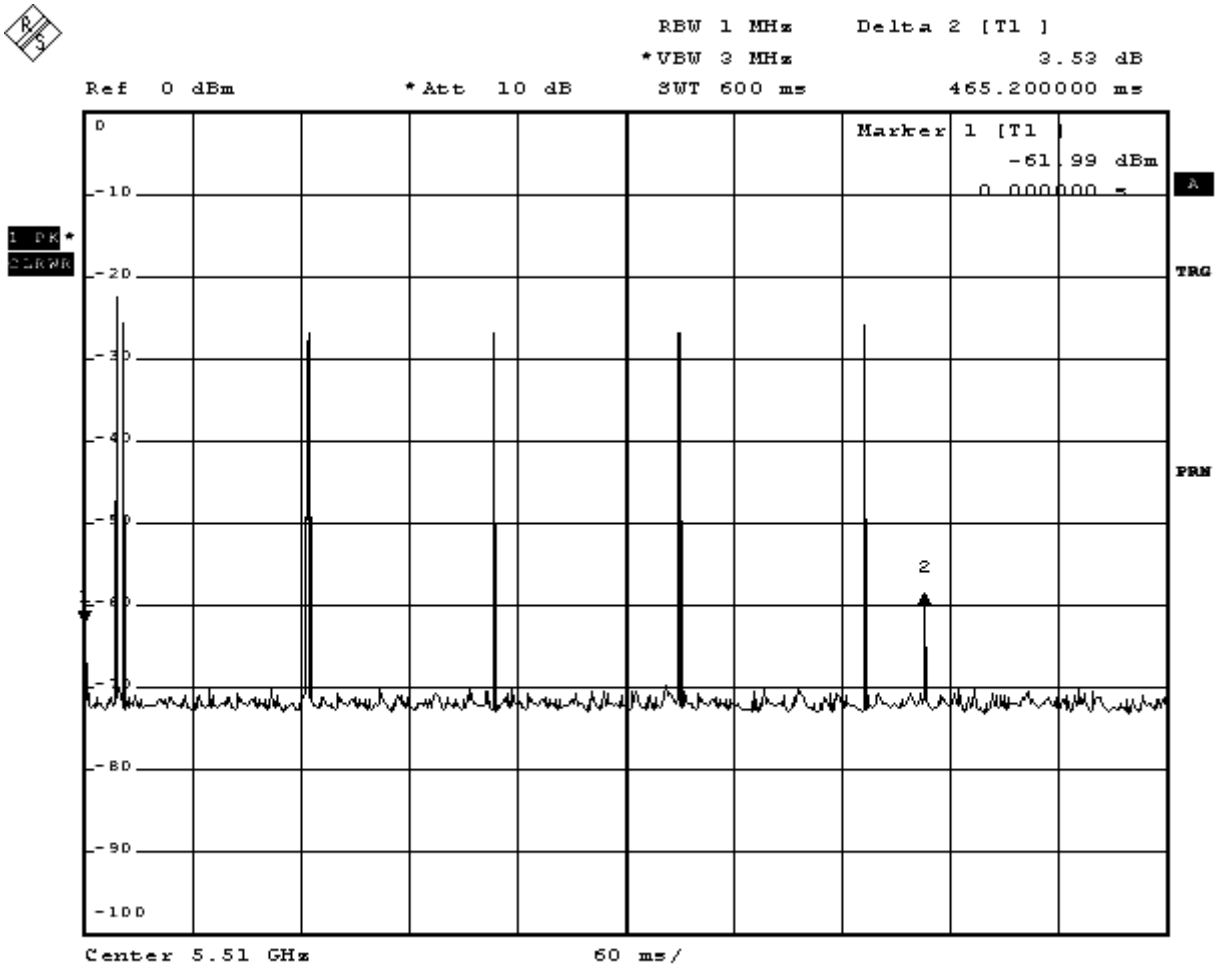



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 1 at 5510 MHz**

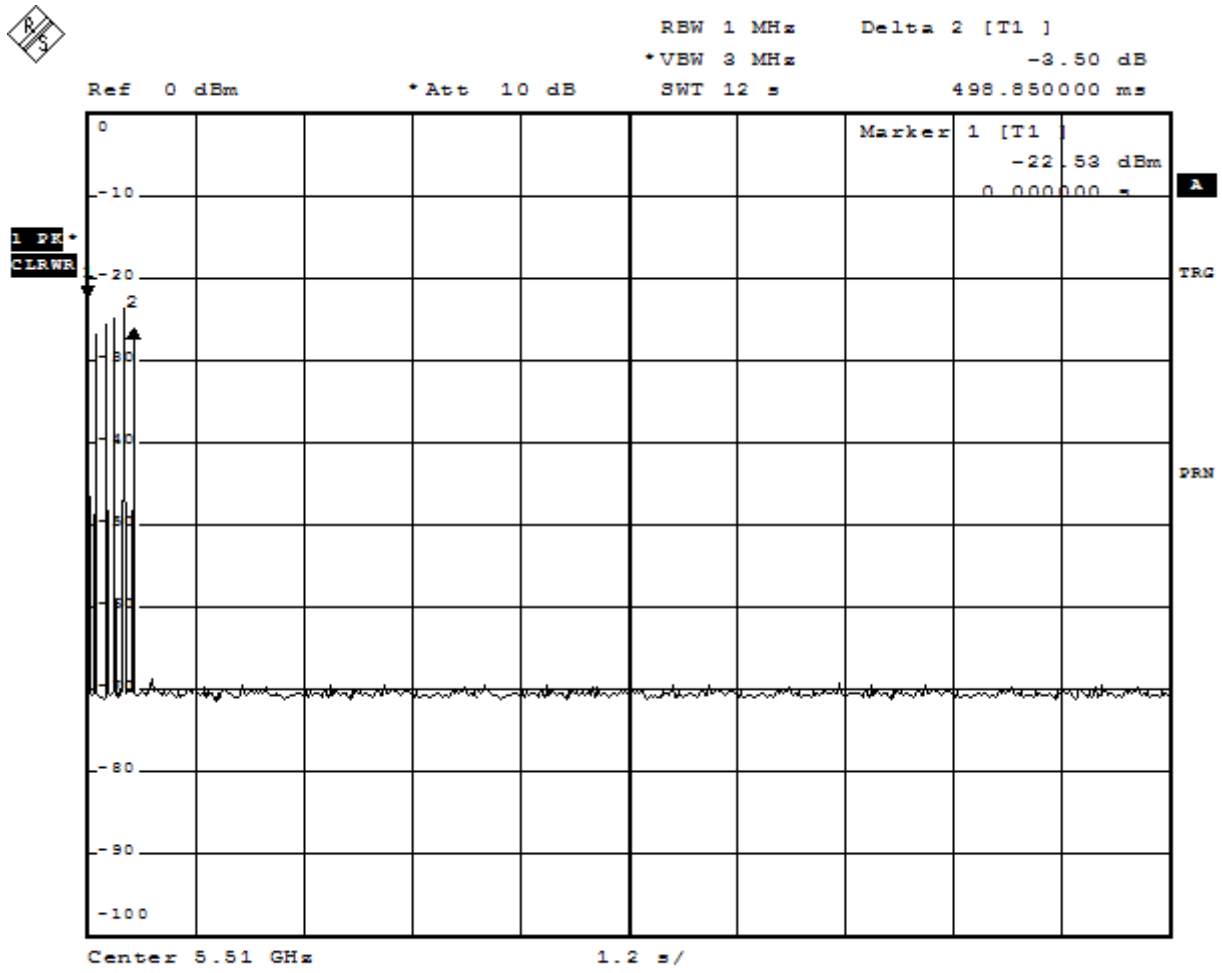



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 5 at 5510MHz**

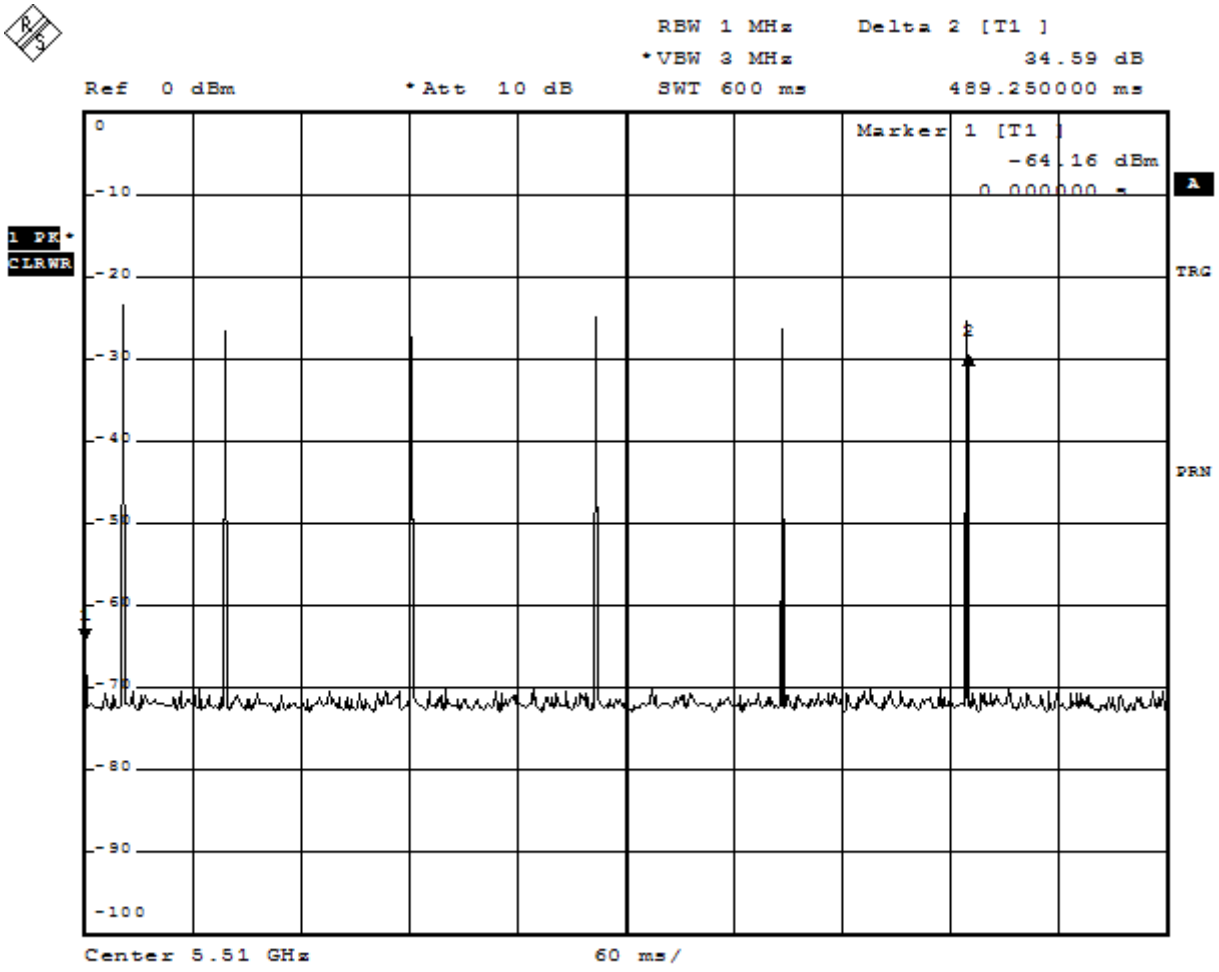



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 5 at 5510 MHz**

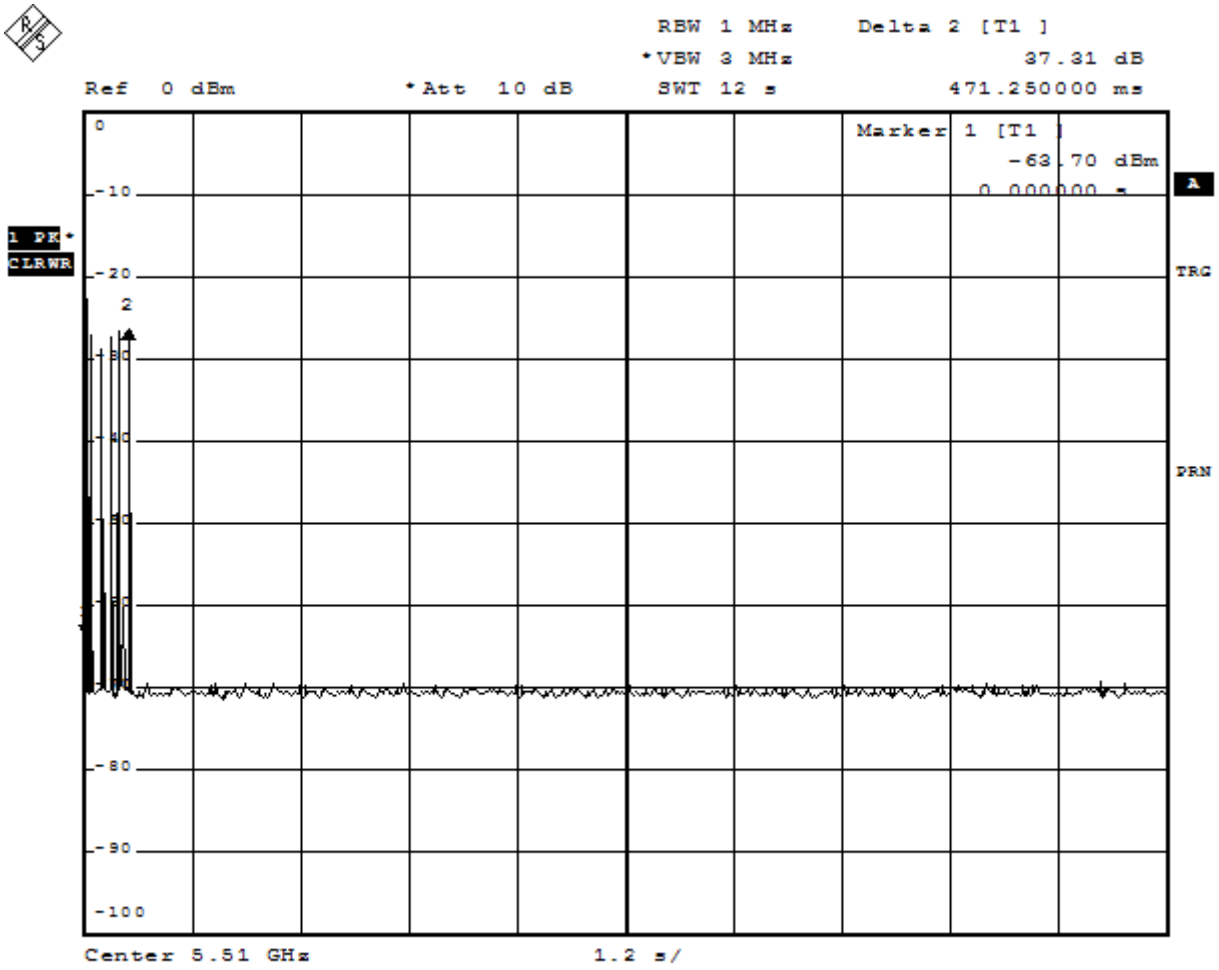



| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Move Time for Radar Test Signal 6 at 5510MHz**

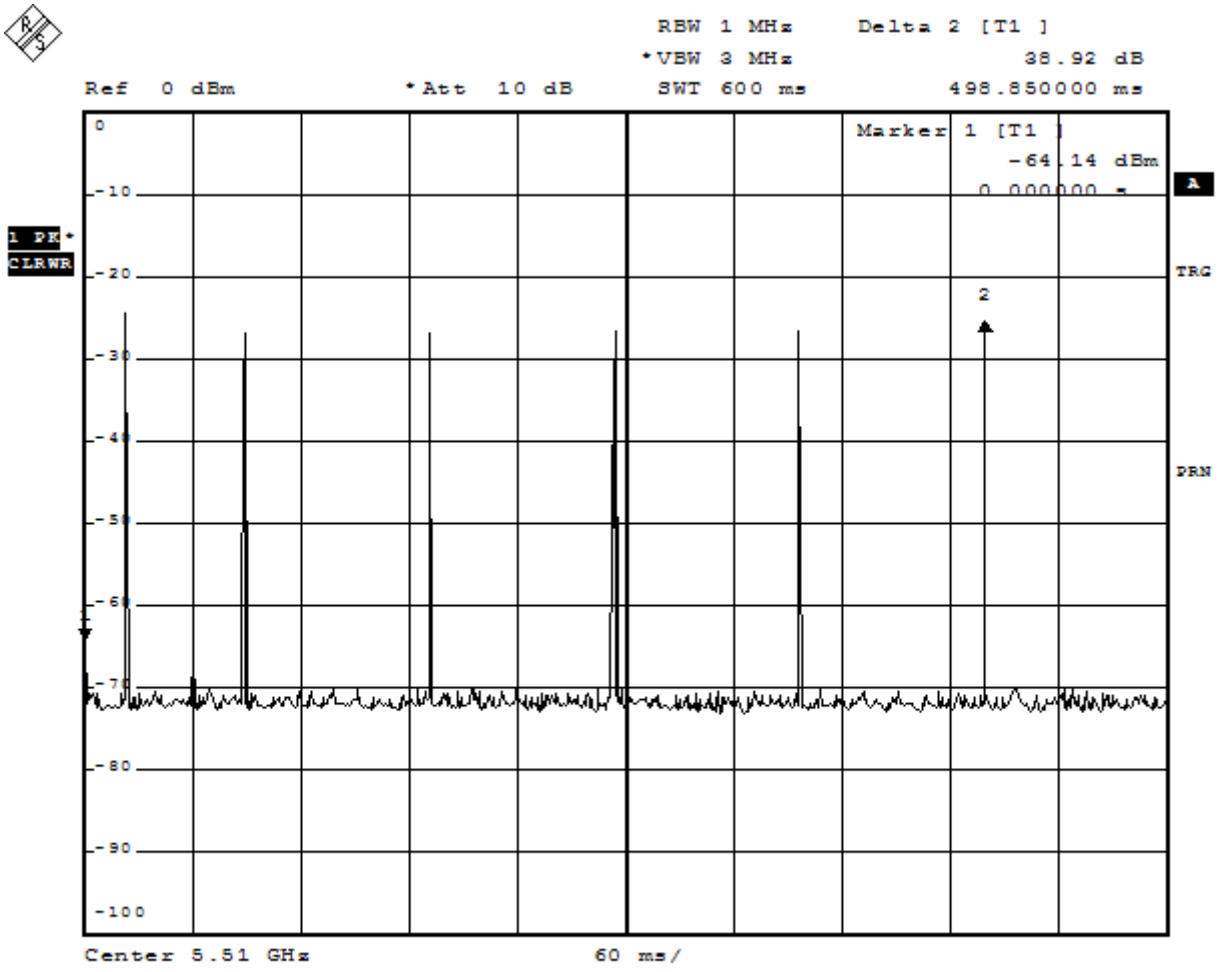



| Test Item | Limit | Results |
|---|---|---|
| Channel Move Time | 10 Seconds | Pass |

The results showed that after radar signal injected the channel move time was less than 10 seconds.

**Draft 802.11n Standard – 40MHz Channel Mode**

**Channel Closing Transmission Time for Radar Test Signal 6 at 5510 MHz**




| Test Item | Limit | Results |
|---|---|---|
| Channel Closing Transmission | 260 milliseconds over remaining 10 seconds period | Pass |

The results showed that after radar signal injected the transmission closing was less than 260 milliseconds.

**Channel Shutdown and Non-Occupancy period**

The steps below define the procedure to verify the Channel Shutdown process and to determine the Channel Closing Transmission Time, the Channel Move Time and the Non-Occupancy Period.

**a)** When the UUT is a master device, a slave device will be used that associates with the UUT. The signal generator and the UUT shall be connected using Sep-up A.
When the UUT is a slave device (with or without a Radar Interference Detection function), the UUT shall associate with a master device. The signal generator and the UUT shall be connected using Set-up B.
In both cases, it is assumed that the channel selection mechanism for the Uniform Spreading requirement is disabled in the master.

**b)** The UUT shall transmit a test transmission sequence in accordance with clause 5.1.2.2 of standard on the selected channel $Ch_r$.

**c)** At a certain time T0, a radar burst is generated on $Ch_r$ using radar test signal #1 defined in table D.4 of standard and at level of 10 dB above the level defined in standard on the selected channel. T1 denotes the end of the radar burst.

**d)** The transmissions of the UUT following instant T1 on the selected channel shall be observed for a period greater than or equal to the Channel Move Time defined in table D.1 of standard. The aggregate duration (Channel Closing Transmission Time) of all transmissions from the UUT during the Channel Move Time shall be compared to the limit defined in table D.1 of standard.
Note: The aggregate duration of all transmissions of the UUT does not include quiet periods in between transmissions of the UUT.

**e)** T2 denotes the instant when the UUT has ceased all transmissions on the channel. The time difference between T1 and T2 shall be measured. This value (Channel Move Time) shall be noted and compared with the limit defined in table D.1 of standard.

**f)** When the UUT is a master device, following instant T2, the selected channel shall be observed for a period equal to the Non-Occupancy Period (T3-T2) to verify that the UUT does not resume any transmissions on this channel.

**g)** When the UUT is a slave device with a Radar Interference Detection function the steps b) to e) shall be repeated with the generator connected to the UUT using Set-up C. See also table D.3 of standard.

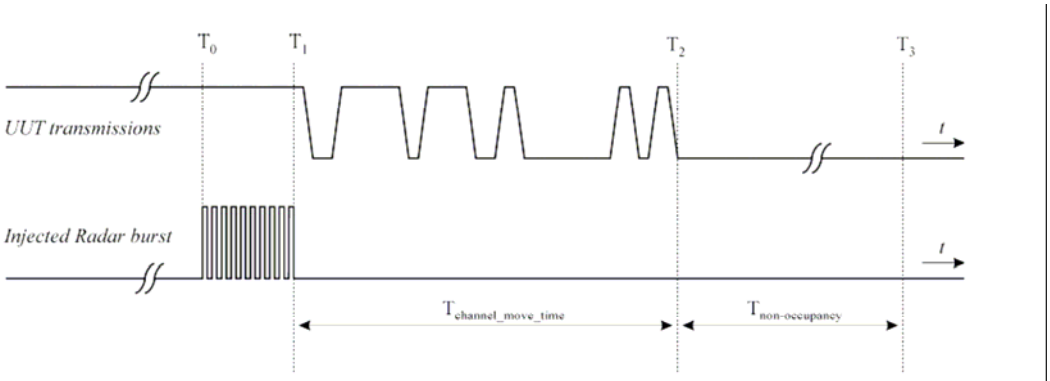
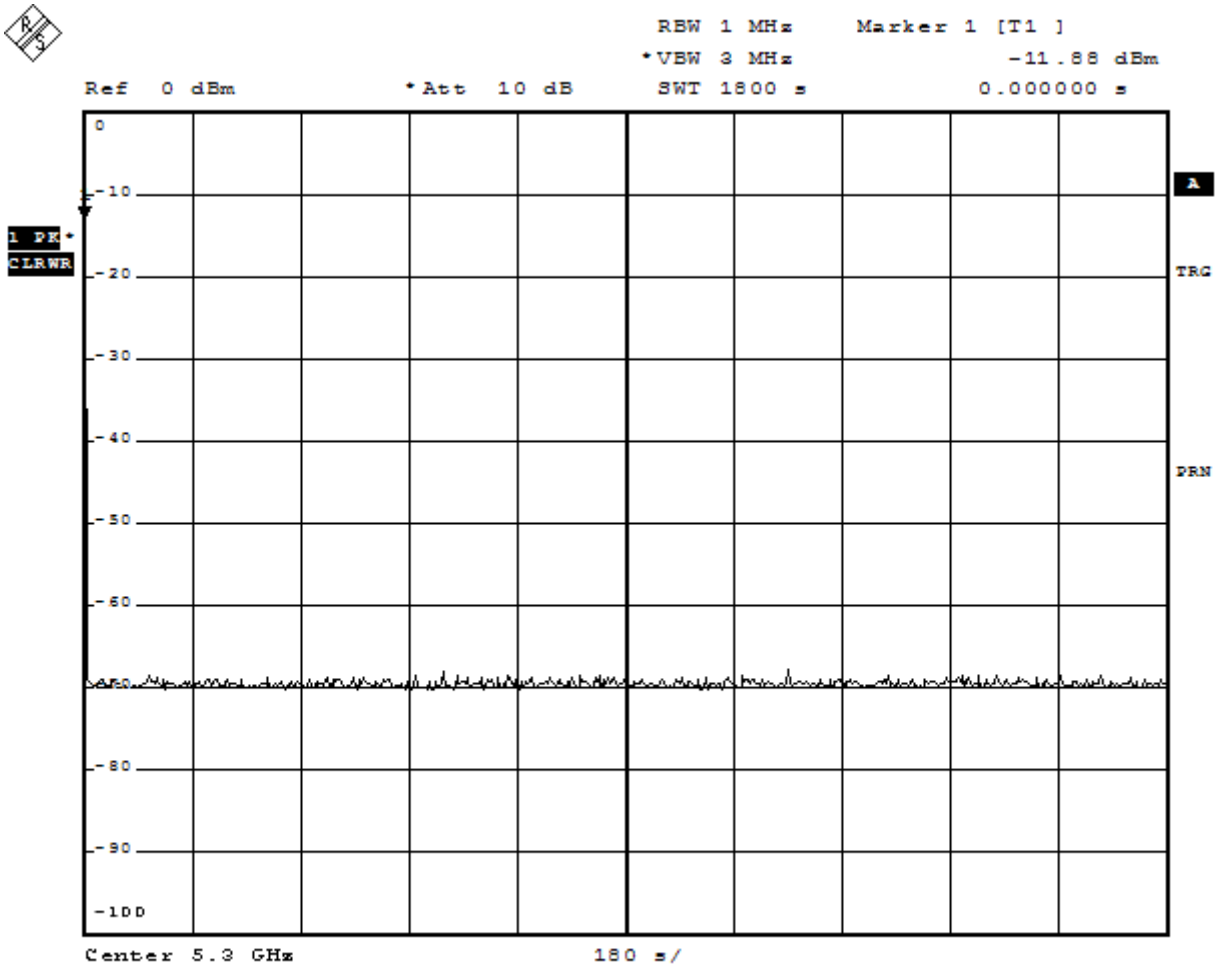



Figure 11: Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

## 20MHz Channel Mode

## 30 Minute Non-Occupancy Period (using Type 1 Radar) at 5300 MHz

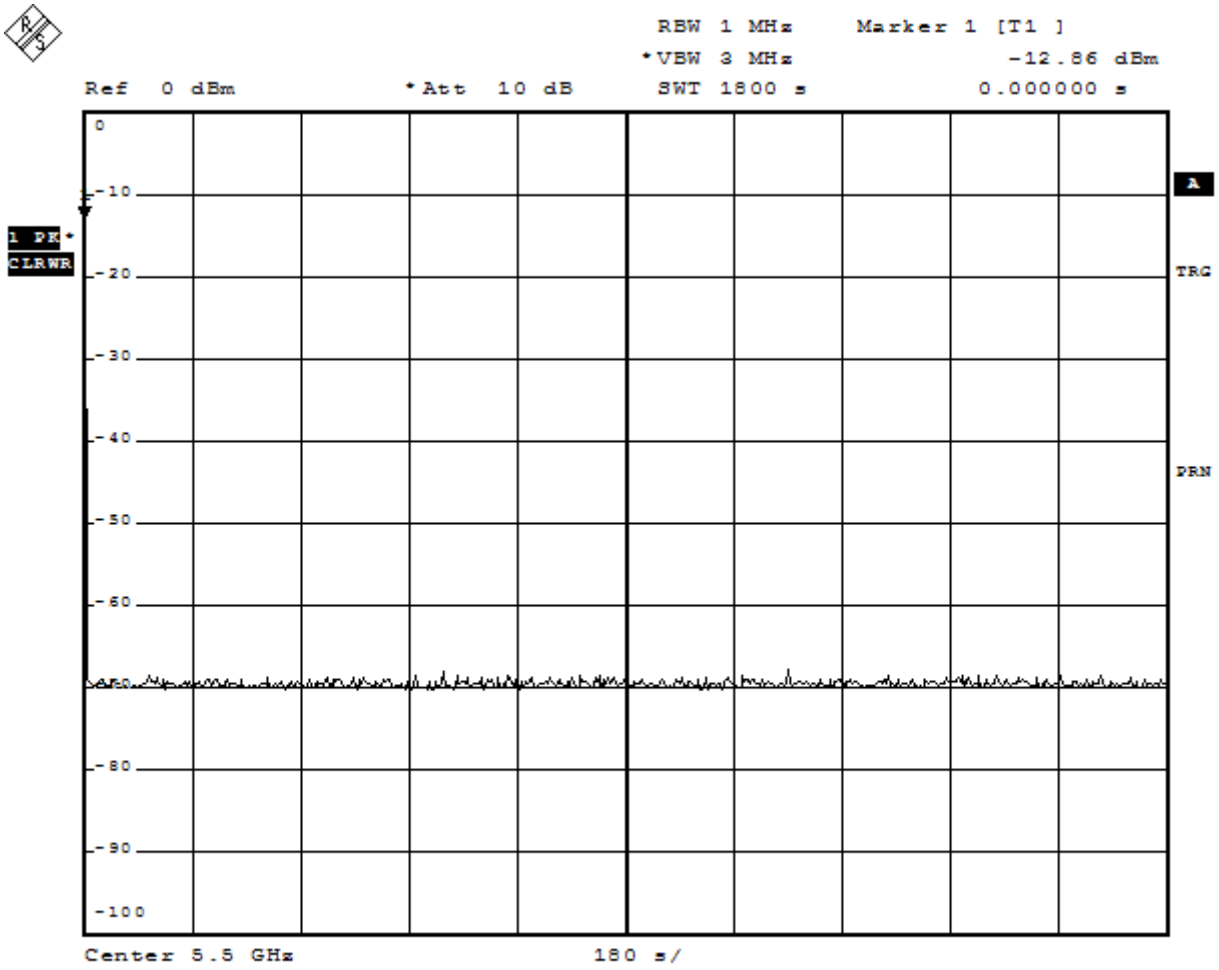



| Test Item | Limit | Results |
|---|---|---|
| Non-Occupancy Period | 30 Minutes | Pass |

No EUT transmissions were observed on the test channel during 30 minutes observation time.

## 20MHz Channel Mode

## 30 Minute Non-Occupancy Period (using Type 1 Radar) at 5500 MHz

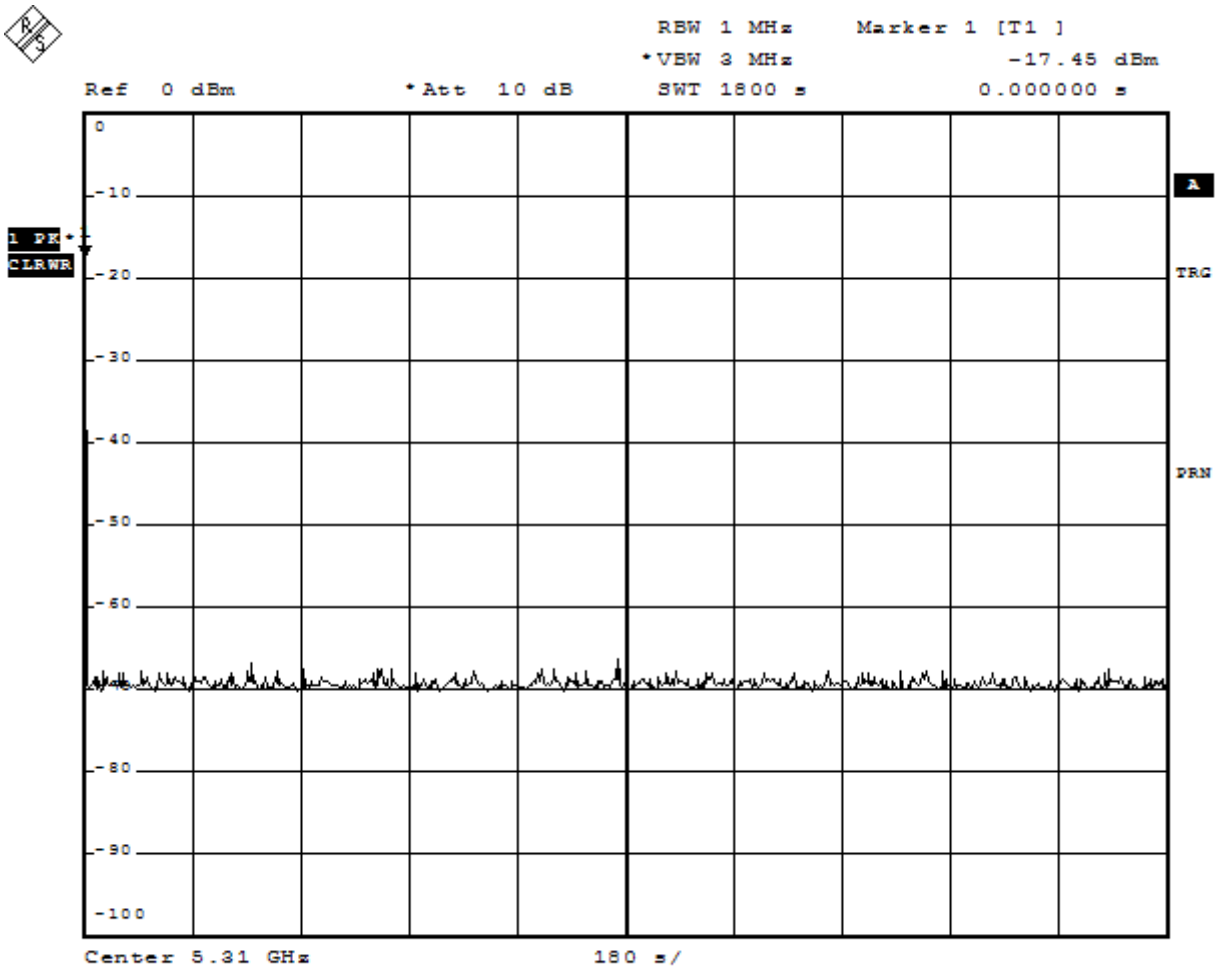



| Test Item | Limit | Results |
|---|---|---|
| Non-Occupancy Period | 30 Minutes | Pass |

No EUT transmissions were observed on the test channel during 30 minutes observation time.

**Draft 802.11n Standard – 40MHz Channel Mode**

**30 Minute Non-Occupancy Period (using Type 1 Radar) at 5310 MHz**

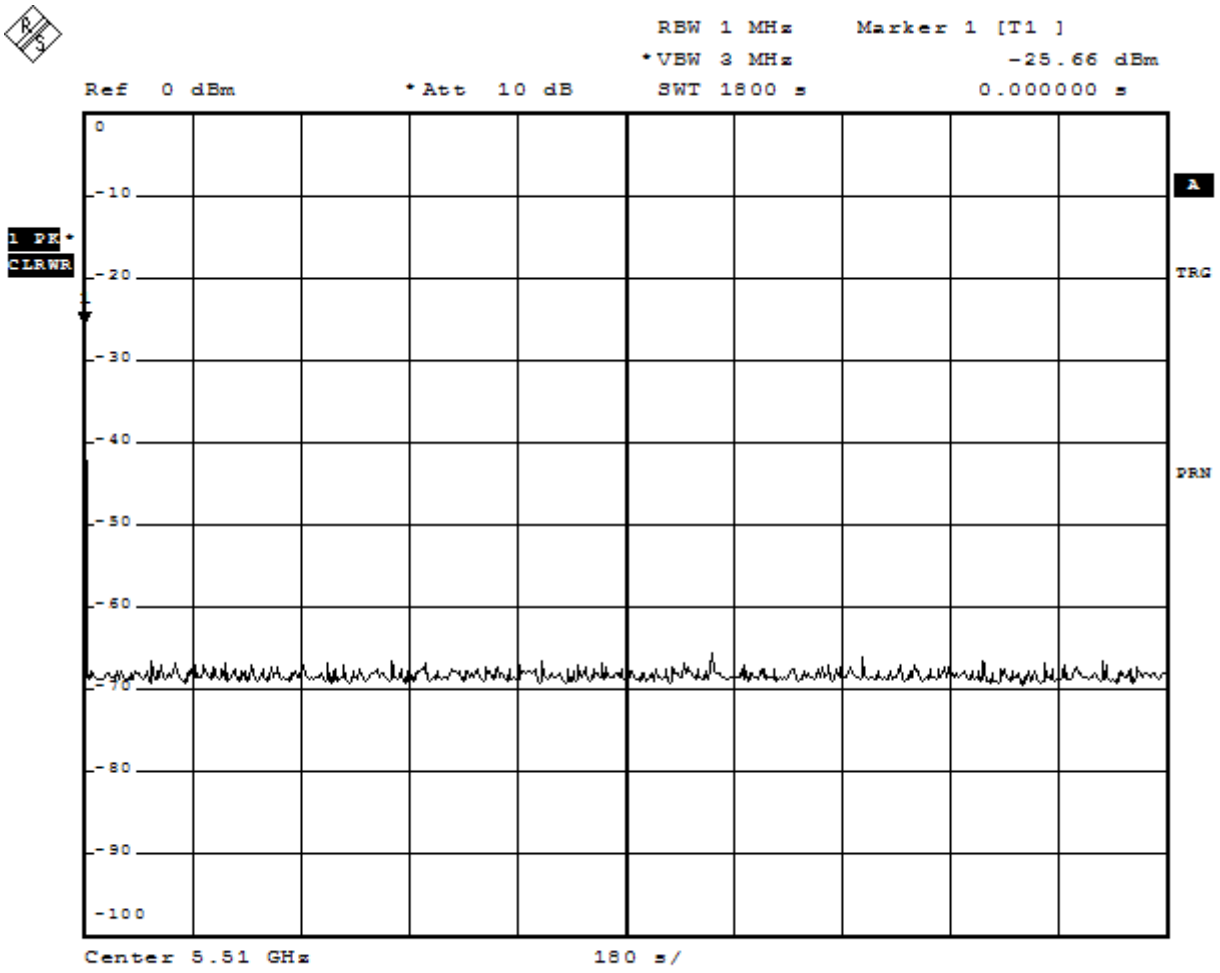



| Test Item | Limit | Results |
|---|---|---|
| Non-Occupancy Period | 30 Minutes | Pass |

No EUT transmissions were observed on the test channel during 30 minutes observation time.

**Draft 802.11n Standard – 40MHz Channel Mode**

**30 Minute Non-Occupancy Period (using Type 1 Radar) at 5510 MHz**




| Test Item | Limit | Results |
|---|---|---|
| Non-Occupancy Period | 30 Minutes | Pass |

No EUT transmissions were observed on the test channel during 30 minutes observation time.

**For Radiated measurement**

For a UUT with integral antenna(s) and without temporary antenna connector, radiated measurements shall be used.

If the UUT has a Radar Interference Detection function, the output power of the signal generator shall (unless otherwise specified) provide a signal power at the antenna of the UUT with a level equal to Interference Detection Threshold (table D.2, table D.3 of standard).

The test set up as described in annex B of standard and applicable measurement procedures as described in annex C of standard shall be used to test the different DFS features of the UUT. The test procedure is further as described under clause 5.3.7.2.1 of standard.

**Uncertainty**

The measurement uncertainty is defined as ± 1.27 dB for conducted measurement
± 3.90 dB for radiated measurement

# Annex D (normative)

# DFS parameters

**Table D.1: DFS requirement values**

| Parameter | Value |
|---|---|
| Channel Availability Check Time | 60 s |
| Channel Move Time | 10 s |
| Channel Closing Transmission Time | 260 ms |
| Non-Occupancy Period | 30 min |

**Table D.2: Interference threshold values, mater**

| Maximum Transmit Power (eirp) | Value (see note) |
|---|---|
| ≥200 mW | -64 dBm |
| ＜200 mW | -62 dBm |
| **NOTE:** This is the level at the input of the receiver assuming a 0 dBi receive antenna | |

**Table D.3: Interference threshold values, slave**

| Maximum Transmit Power (eirp) | Value (see note) |
|---|---|
| ≥200 mW | -64 dBm |
| ＜200 mW | N/A |
| **NOTE:** This is the level at the input of the receiver assuming a 0 dBi receive antenna | |

**Table D.4: Parameters of DFS test signals**

| Radar Test Signal | Pulse Width W [ $\mu s$ ] (see note 5) | Pulse Repetition Frequency PRF [pps] | Pulses per Burst (see note 1) | Detection Probability with 30% Channel Load |
|---|---|---|---|---|
| 1 – Fixed | 1 | 750 | 15 | Pd > 60% |
| 2 – Variable | 1, 2, 5 | 200, 300, 500, 800, 1000 | 10 | Pd > 60% |
| 3 – Variable | 10, 15 | 200, 300, 500, 800, 1000 | 15 | Pd > 60% |
| 4 – Variable | 1, 2, 5, 10, 15 | 1200, 1500, 1600 | 15 | Pd > 60% |
| 5 – Variable | 1, 2, 5, 10, 15 | 2300, 3000, 3500, 4000 | 25 | Pd > 60% |
| 6 – Variable Modulated (see note 6) | 20, 30 | 2000, 3000, 4000 | 20 | Pd > 60% |

**NOTE 1:** This represents the number of pulses seen at the RLAN per radar scan:
N = [{antenna beam width (deg)} × {pulse repetition rate (pps)}] / [{scan rate (deg/s)}].

**NOTE 2:** The test signals above only contain a single burst of pulses.

**NOTE 3:** The number of pulses per burst given in this table simulates real radar systems and t takes into account the effects of pulse repetition rate and pulse width on the detection probability for a single burst.

**NOTE 4:** Pd gives the probability of detection per simulated radar burst and represents a minimum level of detection performance under defined conditions - in this case 30 % traffic load. Therefore Pd does not represent the overall detection probability for any particular radar under real life conditions. In general 5 sequential bursts are needed to achieve a real life detection rate of better that 99 % for any radar that falls within the scope of this table.

**NOTE 5:** The pulse width used in these tests is assumed to be representative of real radar systems with different pulse widths and different modulations. The pulse width is assumed to have an accuracy of ±5 %.

**NOTE 6:** The modulation to be used for the radar test signal 6 is a chirp modulation with a ±2,5MHz frequency deviation which is described below.