RADIO TEST REPORT

Test Report No. 15247953H-C-R1

Customer	**Silex Technology, Inc.**
Description of EUT	**Low Latency Wireless Device**
Model Number of EUT	**LLW-4250**
FCC ID	**N6C-LLW4250**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied**
Issue Date	**August 26, 2024**
Remarks	**DFS test only** **Master**

Representative test engineer	Approved by
	
Tomoya Sone Engineer	Satofumi Matsuyama Engineer

CERTIFICATE 5107.02

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.
☒ There is no testing item of "Non-accreditation".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 23.0

ANNOUNCEMENT

- This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
- The results in this report apply only to the sample tested. (Laboratory was not involved in sampling.)
- This sample tested is in compliance with the limits of the above regulation.
- The test results in this test report are traceable to the national or international standards.
- This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
- This test report covers Radio technical requirements.
  It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
- The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided by the customer for this report is identified in SECTION 1.
- The laboratory is not responsible for information provided by the customer which can impact the validity of the results.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 15247953H-C

This report is a revised version of 15247953H-C. 15247953H-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15247953H-C	August 8, 2024	-
1	15247953H-C-R1	August 26, 2024	p.6 Modified Antenna numbers: Antenna 0, 1, 2, 3 → Antenna 1, 2, 3, 4
1	15247953H-C-R1	August 26, 2024	p. 24 Section 6.4 Correction of test report number of below text. Refer to 15247953H-C FCC Part 15E (FCC 15.407) report for occupied bandwidth. → Refer to 15247953H-B FCC Part 15E (FCC 15.407) report for occupied bandwidth.
1	15247953H-C-R1	August 26, 2024	p. 57 Modified mode name (11ac-20) → (11n-20)
1	15247953H-C-R1	August 26, 2024	p. 63 Un-greyed out of 5514 MHz.

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	ICES	Interference-Causing Equipment Standard
AC	Alternating Current	IEC	International Electrotechnical Commission
AFH	Adaptive Frequency Hopping	IEEE	Institute of Electrical and Electronics Engineers
AM	Amplitude Modulation	IF	Intermediate Frequency
Amp, AMP	Amplifier	ILAC	International Laboratory Accreditation Conference
ANSI	American National Standards Institute	ISED	Innovation, Science and Economic Development Canada
Ant, ANT	Antenna	ISO	International Organization for Standardization
AP	Access Point	JAB	Japan Accreditation Board
ASK	Amplitude Shift Keying	LAN	Local Area Network
Atten., ATT	Attenuator	LIMS	Laboratory Information Management System
AV	Average	MCS	Modulation and Coding Scheme
BPSK	Binary Phase-Shift Keying	MRA	Mutual Recognition Arrangement
BR	Bluetooth Basic Rate	N/A	Not Applicable
BT	Bluetooth	NIST	National Institute of Standards and Technology
BT LE	Bluetooth Low Energy	NS	No signal detect.
BW	BandWidth	NSA	Normalized Site Attenuation
Cal Int	Calibration Interval	NVLAP	National Voluntary Laboratory Accreditation Program
CCK	Complementary Code Keying	OBW	Occupied Band Width
Ch., CH	Channel	OFDM	Orthogonal Frequency Division Multiplexing
CISPR	Comite International Special des Perturbations Radioelectriques	P/M	Power meter
CW	Continuous Wave	PCB	Printed Circuit Board
DBPSK	Differential BPSK	PER	Packet Error Rate
DC	Direct Current	PHY	Physical Layer
D-factor	Distance factor	PK	Peak
DFS	Dynamic Frequency Selection	PN	Pseudo random Noise
DQPSK	Differential QPSK	PRBS	Pseudo-Random Bit Sequence
DSSS	Direct Sequence Spread Spectrum	PSD	Power Spectral Density
EDR	Enhanced Data Rate	QAM	Quadrature Amplitude Modulation
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QP	Quasi-Peak
EMC	ElectroMagnetic Compatibility	QPSK	Quadri-Phase Shift Keying
EMI	ElectroMagnetic Interference	RBW	Resolution Band Width
EN	European Norm	RDS	Radio Data System
ERP, e.r.p.	Effective Radiated Power	RE	Radio Equipment
EU	European Union	RF	Radio Frequency
EUT	Equipment Under Test	RMS	Root Mean Square
Fac.	Factor	RSS	Radio Standards Specifications
FCC	Federal Communications Commission	Rx	Receiving
FHSS	Frequency Hopping Spread Spectrum	SA, S/A	Spectrum Analyzer
FM	Frequency Modulation	SG	Signal Generator
Freq.	Frequency	SVSWR	Site-Voltage Standing Wave Ratio
FSK	Frequency Shift Keying	TR	Test Receiver
GFSK	Gaussian Frequency-Shift Keying	Tx	Transmitting
GNSS	Global Navigation Satellite System	VBW	Video BandWidth
GPS	Global Positioning System	Vert.	Vertical
Hori.	Horizontal	WLAN	Wireless LAN

CONTENTS PAGE

SECTION 1: Customer information

Company Name	Silex Technology, Inc.
Address	2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237, Japan
Telephone Number	+81-774-98-3878
Contact Person	Keisuke Ishiro

The information provided by the customer is as follows;
- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Description	Low Latency Wireless Device
Model Number	LLW-4250
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	April 22, 2024
Test Date	June 5 to July 23, 2024

2.2 Product Description

General Specification

Rating	DC 12 V (AC Adapter Input), DC 24 V (DC Power Input), DC 48 V (PoE Input)
Operating temperature	0 deg. C to 40 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer.
The data provided by the customer is marked “a)” in the table below.

WLAN (IEEE802.11b/11g/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Gain[a)]	1.5 dBi (Antenna 1, 2, 3, 4)

WLAN (IEEE802.11a/11n-20)

Equipment Type	Transceiver		
Frequency of Operation	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5825 MHz		
Type of Modulation	OFDM		
Antenna Gain[a)]	1.6 dBi	5180 MHz to 5240 MHz	(Antenna 1, 2, 3, 4)
	1.7 dBi	5260 MHz to 5320 MHz	(Antenna 1, 2, 3, 4)
	1.7 dBi	5500 MHz to 5700 MHz	(Antenna 1, 2, 3, 4)
	1.6 dBi	5745 MHz to 5825 MHz	(Antenna 1, 2, 3, 4)

*The Antenna 3 and 4 are only used to detect DFS Rader signals and not to transmit them.

SECTION 3: Scope of Report

This report only covers DFS requirement, as specified by the following referenced procedures.

SECTION 4: Test specification, procedures & results

4.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
Title	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

Test Specification	KDB905462 D02 UNII DFS Compliance Procedures New Rules v02
Title	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350MHz AND 5470-5725MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION

Test Specification	KDB905462 D03 Client Without DFS New Rules v01r02
Title	U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY

Test Specification	KDB905462 D04 Operational Modes for DFS Testing New Rules v01
Title	OPERATIONAL MODES SUGGESTED FOR DFS TESTING

FCC Part 15.31 (e)
This EUT provides the stable voltage constantly to RF Module part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
The EUT has a unique coupling/antenna connector (Revers SMA). Therefore the equipment complies with the requirement of 15.203.

4.2 Procedures and results

Table 1: Applicability of DFS Requirements

Requirement	Operating Mode Master	Test Procedures & Limits	Results	Deviation
U-NII Detection Bandwidth	Yes	KDB905462 D02 UNII DFS Compliance Procedures New Rules v02	Complied	N/A
Initial Channel Availability Check Time	Yes	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02 RSS-247 6.3	Complied	N/A
Radar Burst at the Beginning of the Channel Availability Check Time	Yes	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02 RSS-247 6.3	Complied	N/A
Radar Burst at the End of the Channel Availability Check Time	Yes	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02 RSS-247 6.3	Complied	N/A
In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time	Yes	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02 RSS-247 6.3	Complied	N/A
In-Service Monitoring for Non-Occupancy period	Yes *1)	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02 RSS-247 6.3	Complied	N/A
Statistical Performance Check	Yes	FCC15.407 (h) KDB905462 D02 UNII DFS Compliance Procedures New Rules v02	Complied	N/A

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003593.
*1) Although this test was not required in FCC, KDB 905462 D02, it was performed as additional test.

Table 2 DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1,2, and 3)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt and power spectral density < 10dBm/MHz	-62 dBm
< 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 3 DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 100 % of the U-NII 99 % transmission power bandwidth See Note 3
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signal will not count quiet periods in between transmissions. **Note 3:** During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Table 4 Short Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Traials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup{(1/360)* (19*10^6/PRI $_{usec}$)}	60 %	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60 %	30
3	6-10	200-500	16-18	60 %	30
4	11-20	200-500	12-16	60 %	30
Aggregate (Rader Types 1-4)				80 %	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

Table 5 Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chip Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Burst*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5 - 20	1000-2000	1-3	8-20	80 %	30

Table 6 Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulse per Hop (kHz)	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70 %	30

4.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

4.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k = 2.

Item	Unit	Calculated Uncertainty (+/-)
Antenna terminated conducted emission / Power density / Burst power	dB	3.47
Adjacent channel power (ACP)	dB	2.28
Bandwidth (OBW)	%	0.96
Time readout (time span upto 100 msec)	%	0.11
Time readout (time span upto 1000 msec)	%	0.11
Time readout (time span upto 60 sec)	%	0.02
Power measurement (Power meter < 8 GHz)	dB	1.46
Power measurement (Call box < 6 GHz)	dB	1.69
Frequency readout (Frequency counter)	ppm	0.67
Frequency readout (Spectrum analyzer frequency readout function)	ppm	2.13
Temperature (constant temperature bath)	deg.C	0.69
Humidity (constant temperature bath)	%RH	2.98
Modulation characteristics	%	6.93
Frequency for mobile	ppm	0.08
Contention-based protocol	dB	2.26

4.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan
Telephone: +81-596-24-8999
*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919
ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

4.6 Test Instruments of DFS and Test Set up

Refer to APPENDIX.

SECTION 5: Operation of EUT during testing

5.1 Operating Modes

The EUT, which is a Master, operates over the U-NII-2A (W53) and U-NII-2C (W56).

The highest power level is 20.47[dBm] EIRP.

Power level(EIRP) of the EUT[dBm]

Power level (Max)
20Mband
20.47

The highest power spectral density level is 6.04[dBm/MHz].

Power spectral density level (Conducted) of the EUT[dBm/MHz]

Power spectral density level (Max)
20Mband
6.04

The channel-loading of approximately 17% or greater was used for testing, and its test data was transferred from the Master Device to the Client Device for all test configurations.

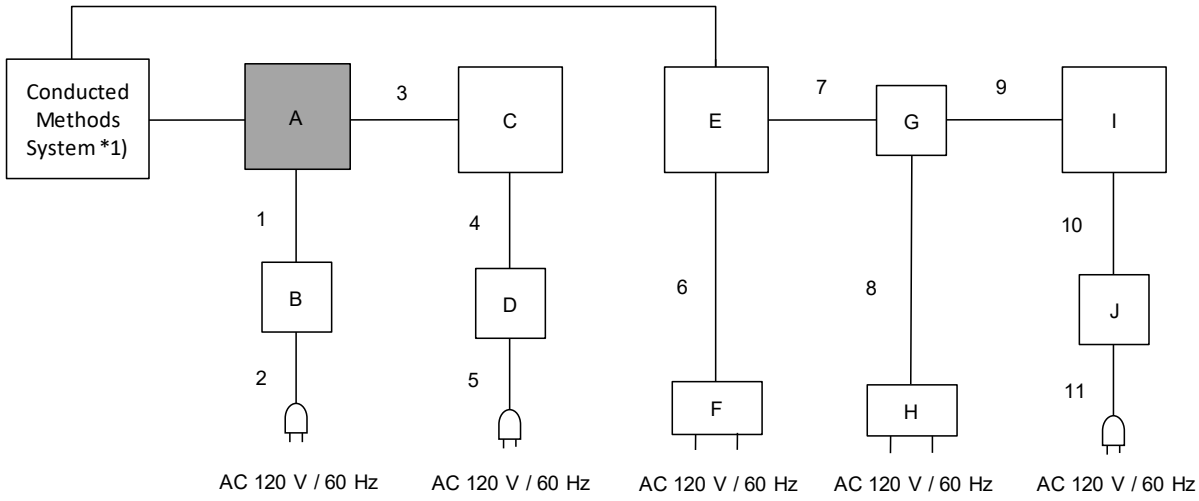
The EUT utilizes the 802.11a/n architecture, with a 20MHz channel bandwidth.

The rated output power of the Master unit is <200 mW (23 dBm) and power spectral density < 10 dBm/MHz. Therefore the required interference threshold level is -62 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -62 + 1 + 1.7 = -59.3 dBm (threshold level + additional 1dB + antenna gain).

It is impossible for users to change DFS control, because the DFS function is written on the firmware and users cannot access it.

The EUT was set by the software as follows:
Software name & version: iperf Ver.2.0.10

5.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
*1) Refer to Conducted Methods System Block Diagram in clause 5.3

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remark
A	Low Latency Wireless Device	LLW-4250	84253FED6E7	Silex Technology, Inc.	EUT
B	AC Adapter	ATS036T-A120	151273-11	Adapter Technology Co., Ltd.	-
C	Laptop PC	CF-SV8RDCVS	0HKSC51454	Panasonic Corporation	-
D	AC Adapter	CF-AA65D2A M1	65D2AM120Y033282WWA	Panasonic Corporation	-
E	Low Latency Wireless Device	LLW-3150	84253FD14C67	Silex Technology, Inc.	-
F	AC Adapter	WB-18D12R	Y23370001353	Asian Power Devices Inc.	-
G	Pseudo terminals	BR-300LLW	001	Silex Technology, Inc.	-
H	AC Adapter	WB-10E05R	Y17100037389	Asian Power Devices Inc.	-
I	Laptop PC	CF-SV8RDCVS	1AKSC82611	Panasonic Corporation	-
J	AC Adapter	CF-AA6532A M1	6532AM120720658A	Panasonic Corporation	-

List of Cables Used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	AC Cable	0.9	Unshielded	Unshielded	-
3	LAN Cable	1.5	Unshielded	Unshielded	-
4	DC Cable	0.9	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-
6	DC Cable	1.8	Unshielded	Unshielded	-
7	LAN Cable	1.6	Unshielded	Unshielded	-
8	DC Cable	1.8	Unshielded	Unshielded	-
9	USB Cable	0.4	Shielded	Shielded	-
10	DC Cable	1.0	Unshielded	Unshielded	-
11	AC Cable	0.8	Unshielded	Unshielded	-

5.3 Test and Measurement System

System Overview

The measurement system is based on a conducted test method.

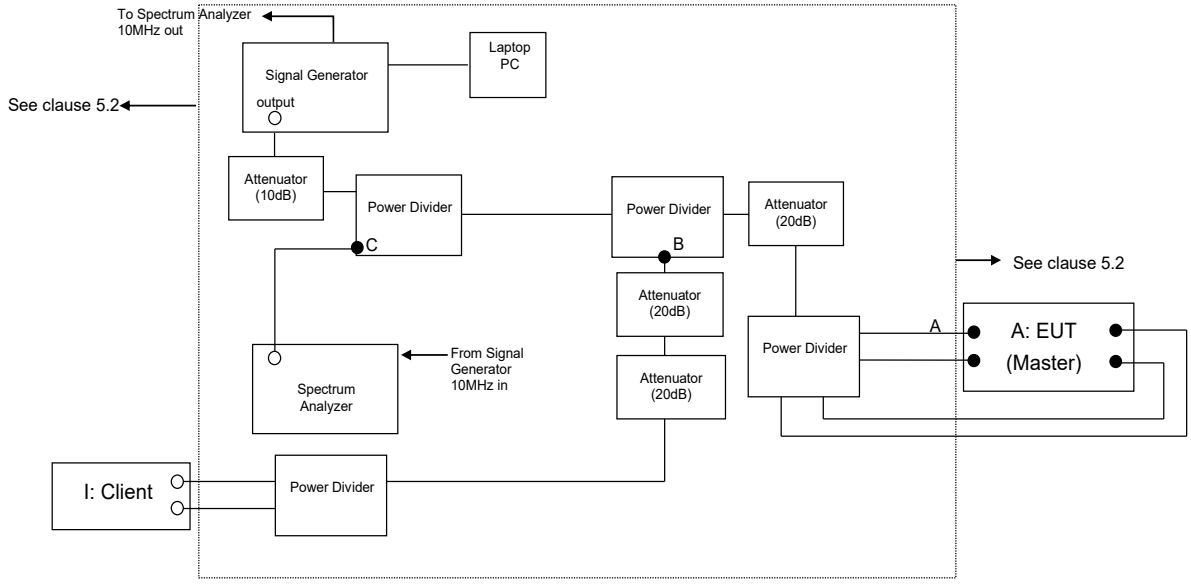
The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution. The short pulse types 1, 2, 3, and 4, the long pulse type 5, and the frequency hopping type 6 parameters are randomized at run-time.

The signal monitoring equipment consists of a spectrum analyzer with the capacity to display 8001 bins on the horizontal axis. A time-domain resolution of 2 ms/bin is achievable with a 16 second sweep time, meeting the 10 seconds short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection.

Frequency Hopping Radar Waveform Generating Subsystem

The first 100 frequencies are selected out of the hopping sequence of the randomized 475 hop frequencies. Only a *Burst* that has the frequency falling within the receiver bandwidth of the tested U-NII device is selected among those frequencies. (Frequency-domain simulation). The radar waveform generated at the start time of the selected *Burst* (Time-domain simulation) is download to the Signal Generator.
If all of the randomly selected 100 frequencies do not fall within the receiver bandwidth of the U-NII device, the radar waveform is not used for the test.

Conducted Methods System Block Diagram



Measurement System Frequency Reference

Lock the signal generator and the spectrum analyzer to the same reference sources as follows: Connect the 10 MHz OUT on the signal generator to the EXT REF IN on the spectrum analyzer and set the spectrum analyzer Ext to On.

System Calibration

Step 1: Set the system as shown in Figure 2 of KDB905462 D02 7.2.1.

Step 2: Adjust each attenuator to fulfill the following three conditions:
- WLAN can be communicated, and
- Rader detection threshold level is bigger than Client Device traffic level on the spectrum analyzer, and
- Client Device traffic level is not displayed on the spectrum analyzer.

Step 3: Terminate 50 ohm at B and C points, and connect the spectrum analyzer to the point A. (See the figure on clause 5.2)
At the point A, adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured.
Download the applicable radar waveforms to the signal generator. Select the radar waveform, trigger a burst manually and measure the amplitude on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold.
Separate signal generator amplitude settings are determined as required for each radar type.

Step 4: Without changing any of the instrument settings, restore the system setting to Step 2 and adjust the Reference Level Offset of the spectrum analyzer to the level at Step 3.

By taking the above steps 1 to 4, the spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device.

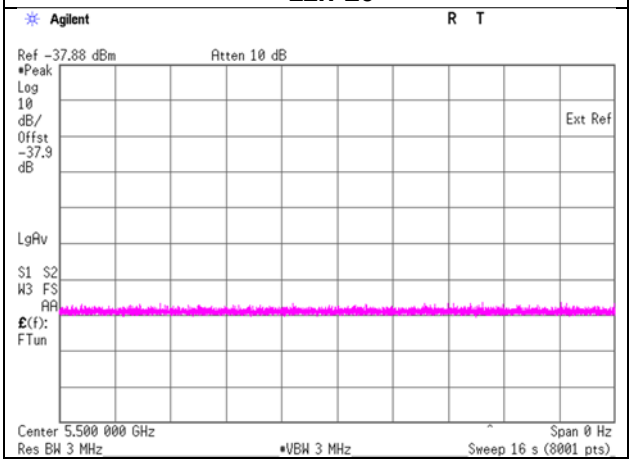
See Clause 5.4 for Plots of Noise, Rader Waveforms, and WLAN signals.

5.4 Plots of Noise, Rader Waveforms, and WLAN signals

<Master mode>

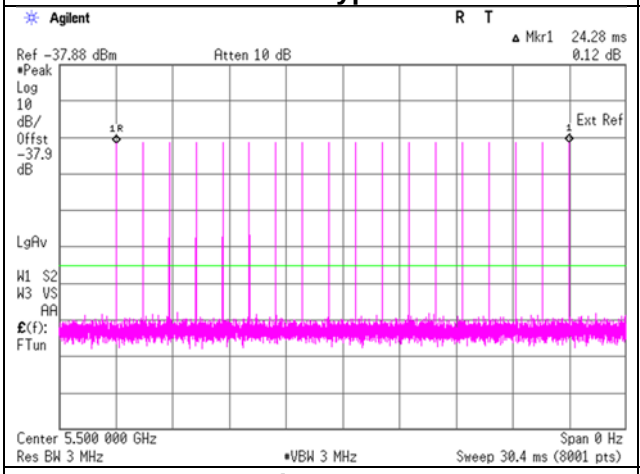
Plots of System Noise Floor

11n-20

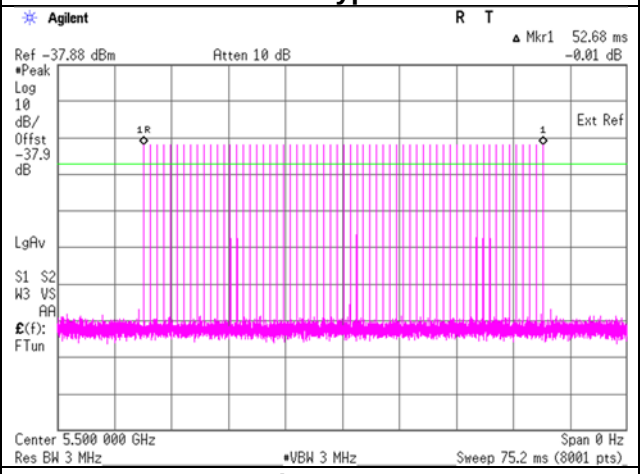


Plots of Radar Waveforms

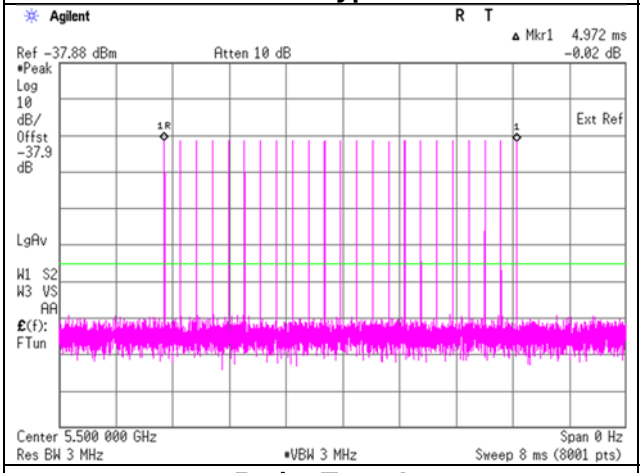
Rader Type 0



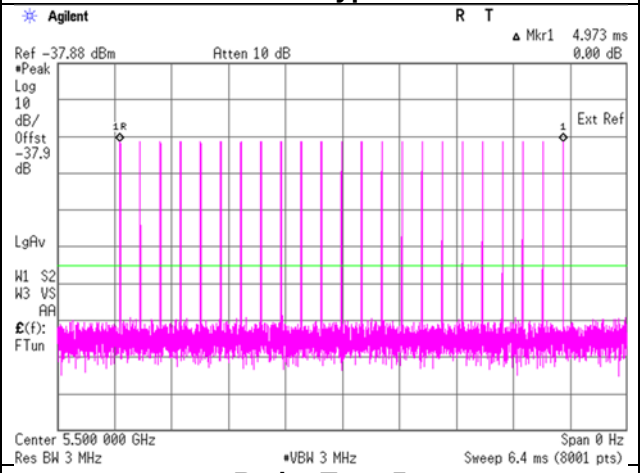
Rader Type 1



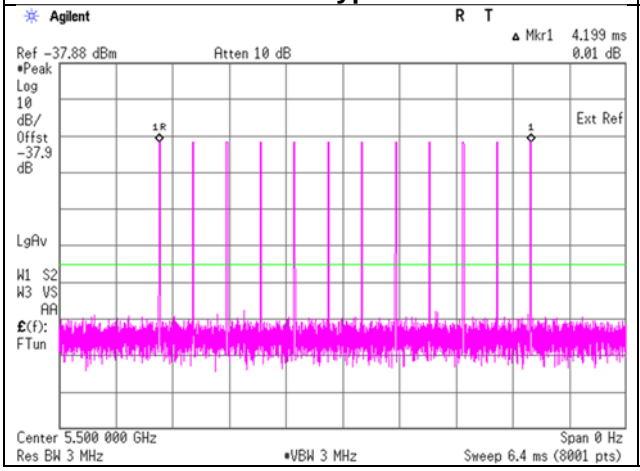
Rader Type 2



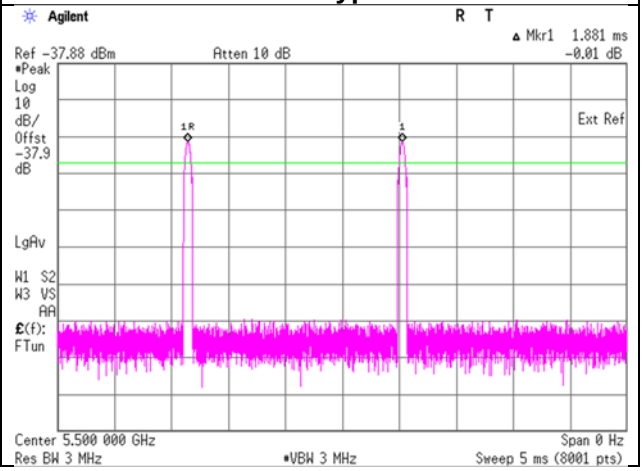
Rader Type 3



Rader Type 4

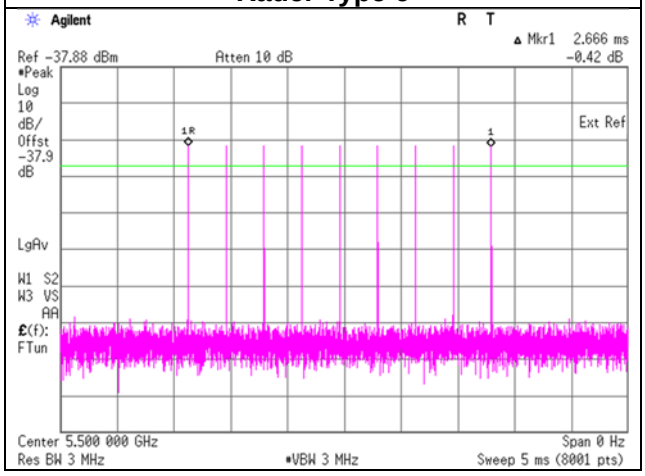


Rader Type 5



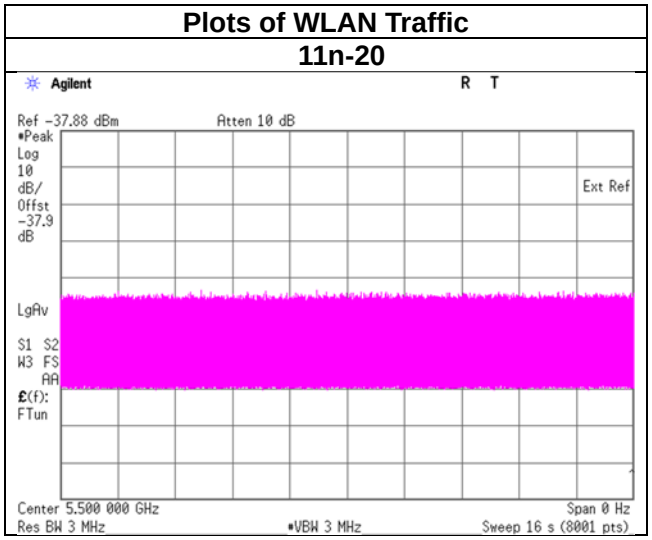
Plots of Radar Waveforms

Rader Type 6



Plots of WLAN Traffic

11n-20



SECTION 6: U-NII Detection Bandwidth

6.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 23, 2024
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Tomoya Sone
Mode	11n-20

6.2 Test Procedure

Adjust the equipment to produce a single Burst of the Short Pulse Radar Type 0 at the center frequency of the EUT Operating Channel at the specified DFS Detection Threshold level.
Set the EUT up as a standalone device (no associated Client or Master, as appropriate) and no traffic. Frame based systems will be set to a talk/listen ratio reflecting the worst case (maximum) that is user configurable during this test.
Generate a single radar Burst, and note the response of the EUT. Repeat for a minimum of 10 trials. The EUT must detect the Radar Waveform within the DFS band using the specified U-NII Detection Bandwidth criterion.
In cases where the channel bandwidth may exceed past the DFS band edge on specific channels (i.e., 802.11ac or wideband frame based systems) select a channel that has the entire emission bandwidth within the DFS band. If this is not possible, test the detection BW to the DFS band edge.

Starting at the center frequency of the EUT operating Channel, increase the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion.
Repeat this measurement in 1 MHz steps at frequencies 5 MHz below where the detection rate begins to fall.
Record the highest frequency (denote as FH) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies above FH is not required to demonstrate compliance.

Starting at the center frequency of the EUT operating Channel, decrease the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion.
Repeat this measurement in 1 MHz steps at frequencies 5 MHz above where the detection rate begins to fall.
Record the lowest frequency (denote as FL) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies below FL is not required to demonstrate compliance.

The U-NII Detection Bandwidth is calculated as follows:
U-NII Detection Bandwidth = FH - FL

Radar detection is observed by two techniques.
a). Monitoring LAN traffic with Spectrum Analyzer.
b). Indicator of EUT and PC connected to EUT.

6.3 Test data

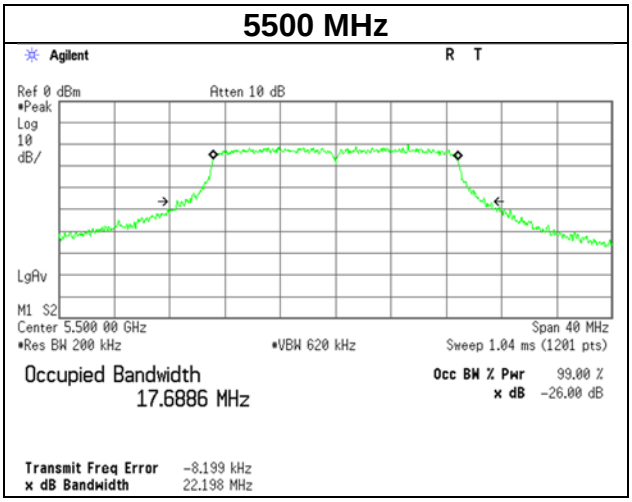
5500 MHz (11n-20)
Waveform : Radar Type 0

FL [MHz]	FH [MHz]	Detection Bandwidth [MHz]	99% Power Bandwidth [MHz]	Ratio of Detection BW to 99% Power BW [%]	Limit [%]	Results
5490	5509	19	17.6886	107.4	100	Pass

99 % Occupied Bandwidth

11n-20

5500 MHz



6.4 Test result

Test result: Pass

Refer to 15247953H-B FCC Part 15E (FCC 15.407) report for occupied bandwidth.
(For test report(s) referred in this report, the latest version (including any revisions) is always referred.)

SECTION 7: Initial Channel Availability Check Time

7.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 22, 2024
Temperature/ Humidity	23 deg. C / 56 % RH
Engineer	Tomoya Sone
Mode	11n-20

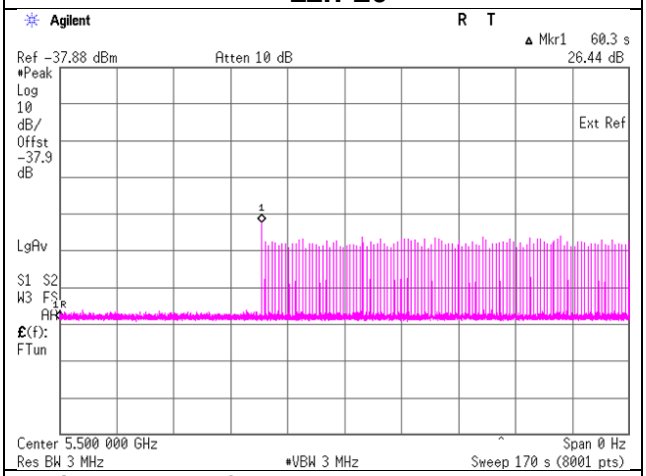
7.2 Test Procedure

The Initial Channel Availability Check Time tests that the EUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel.
This test does not use any Radar Waveforms and only needs to be performed one time.
The U-NII devices will be powered on and be instructed to operate on the appropriate U-NII Channel that must incorporate DFS functions. At the same time the EUT is powered on, the spectrum analyzer will be set to zero span mode with a 3 MHz RBW and 3 MHz VBW on the Channel occupied by the radar (Chr) with a 2.5 minute sweep time.
The spectrum analyzer's sweep will be started at the same time power is applied to the U-NII device.
The EUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle.

7.3 Test data

Initial Channel Availability Check Time

11n-20



Marker 1R: Start of CAC	**: 0 sec**
Marker 1: End of CAC	**: 60.30 sec**
Channel Availability Check Time	**: 60.30 sec**

7.4 Test result

Test result: Pass

SECTION 8: Radar Burst at the Beginning of the Channel Availability Check Time

8.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 22, 2024
Temperature/ Humidity	23 deg. C / 56 % RH
Engineer	Tomoya Sone
Mode	11n-20

8.2 Test Procedure

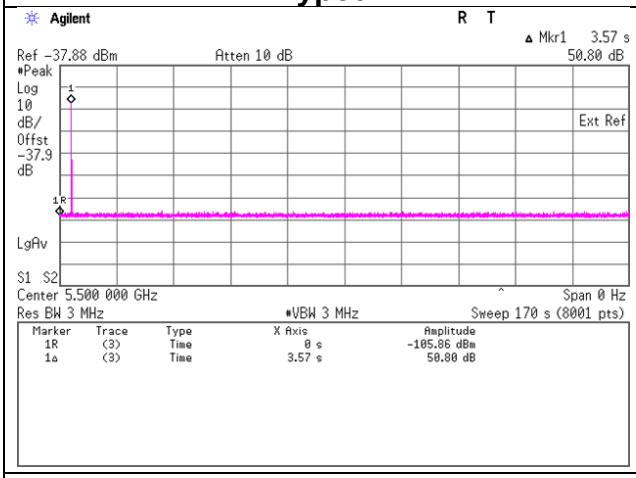
A single Burst of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at Start of CAC. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Verify that during the 2.5 minute measurement window no EUT transmissions occurred on Chr.

8.3 Test data

Radar Burst at the Beginning of the Channel Availability Check Time

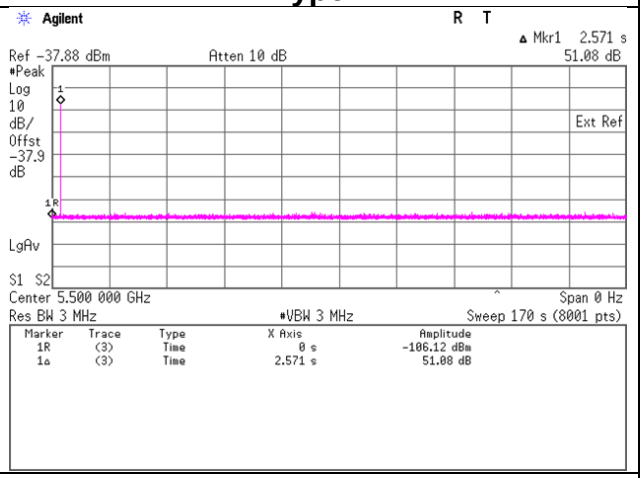
11n-20

Type0

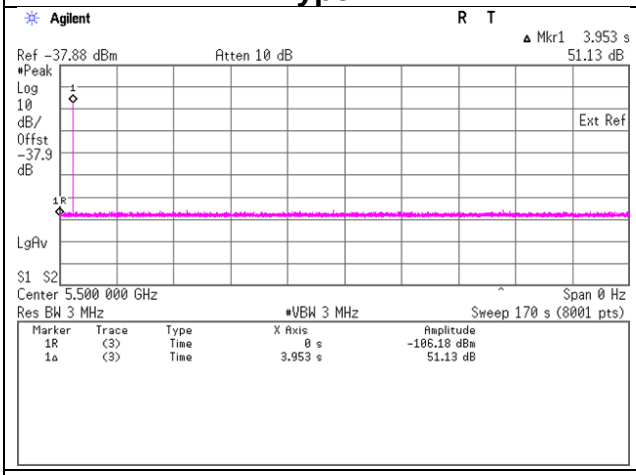
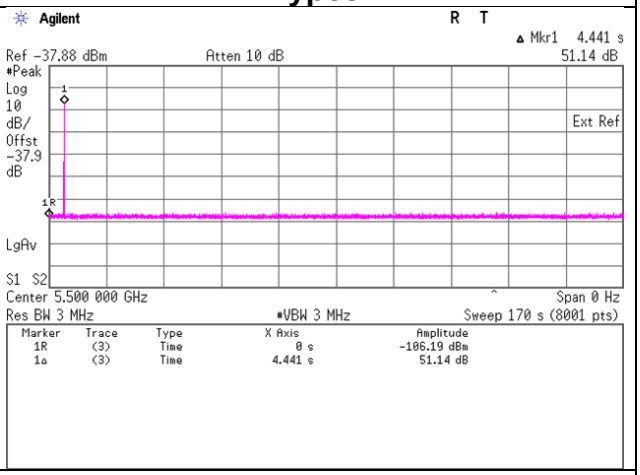
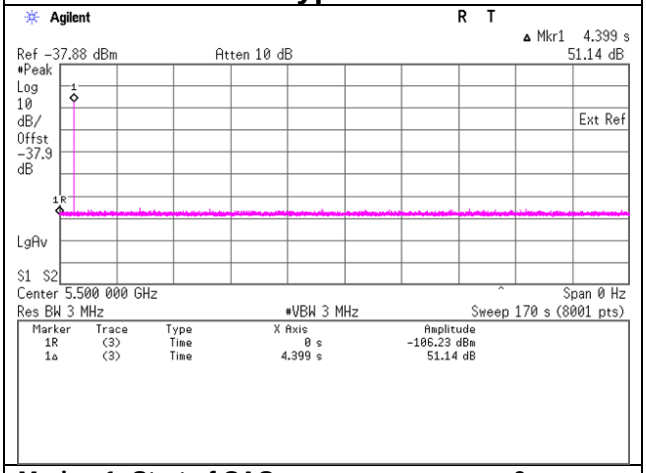


Marker 1: Start of CAC : 0 sec
Marker 2: Radar Signal(Type 0) applied : 3.57 sec

Type1



Marker 1: Start of CAC : 0 sec
Marker 2: Radar Signal(Type 1) applied : 2.571 sec

Radar Burst at the Beginning of the Channel Availability Check Time	
11n-20	
Type2	**Type3**
	
Marker 1: Start of CAC : 0 sec **Marker 2: Radar Signal(Type 2) applied : 3.953 sec**	**Marker 1: Start of CAC : 0 sec** **Marker 2: Radar Signal(Type 3) applied : 4.441 sec**
Type4	
	
Marker 1: Start of CAC : 0 sec **Marker 2: Radar Signal(Type 4) applied : 4.399 sec**	

8.4 Test result

Test result: Pass

SECTION 9: Radar Burst at the End of the Channel Availability Check Time

9.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 22, 2024
Temperature/ Humidity	23 deg. C / 56 % RH
Engineer	Tomoya Sone
Mode	11n-20

9.2 Test Procedure

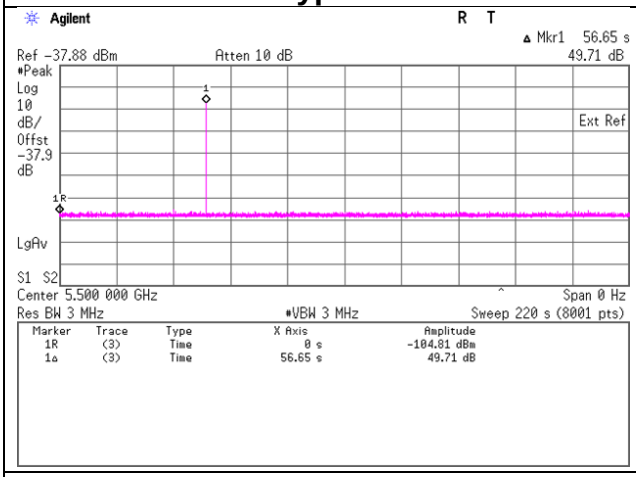
A single Burst of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at Start of CAC + 54 seconds. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Verify that during the 2.5 minute measurement window no EUT transmissions occurred on Chr.

9.3 Test data

Radar Burst at the End of the Channel Availability Check Time

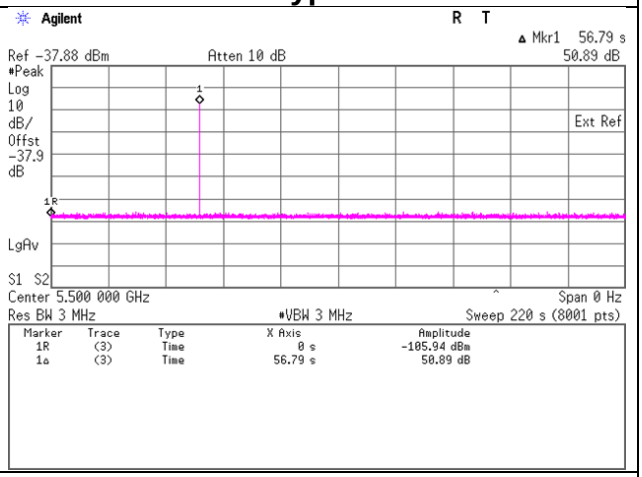
11n-20

Type0

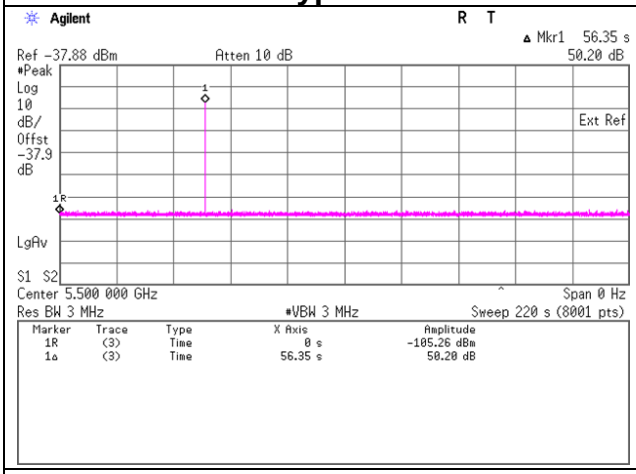
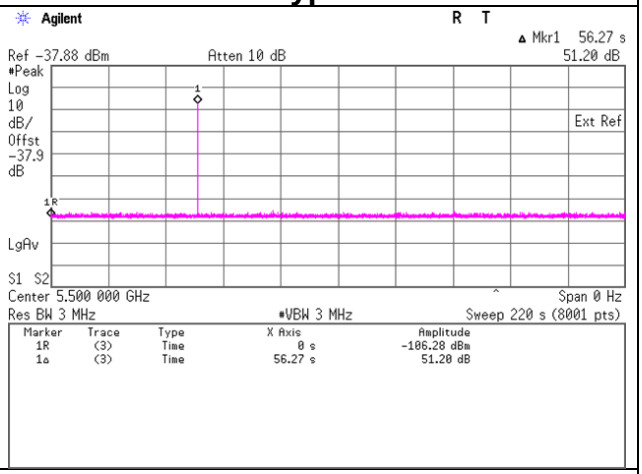
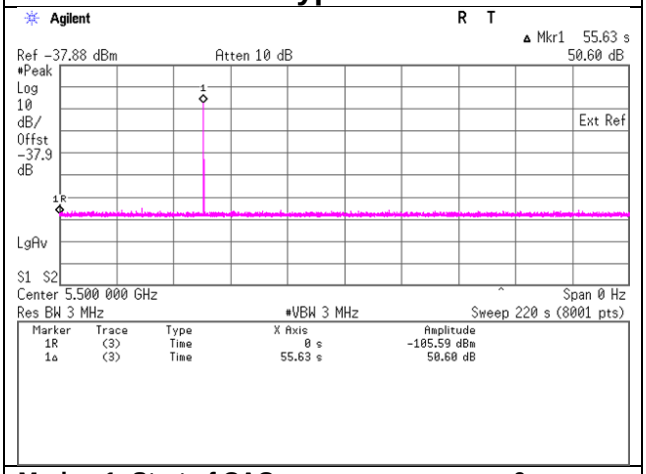


Marker 1: Start of CAC : 0 sec
Marker 2: Radar Signal(Type 0) applied : 56.65 sec

Type1



Marker 1: Start of CAC : 0 sec
Marker 2: Radar Signal(Type 1) applied : 56.79 sec

Radar Burst at the End of the Channel Availability Check Time	
11n-20	
Type2	Type3
	
Marker 1: Start of CAC : 0 sec **Marker 2: Radar Signal(Type 2) applied : 56.35 sec**	**Marker 1: Start of CAC : 0 sec** **Marker 2: Radar Signal(Type 3) applied : 56.27 sec**
Type4	
	
Marker 1: Start of CAC : 0 sec **Marker 2: Radar Signal(Type 4) applied : 55.63 sec**	

9.4 Test result

Test result: Pass

SECTION 10: Channel Move Time, Channel Closing Transmission Time

10.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 22, 2024
Temperature/ Humidity	23 deg. C / 56 % RH
Engineer	Tomoya Sone
Mode	11n-20

10.2 Test Procedure

Transmit the data from the Master Device to the Client Device on the test Channel for the entire period of the test.
The Radar Waveform generator sends a Burst of pulses for one of the Radar Types 0 at levels defined on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds.

10.3 Test data

<Master Device>

11n-20

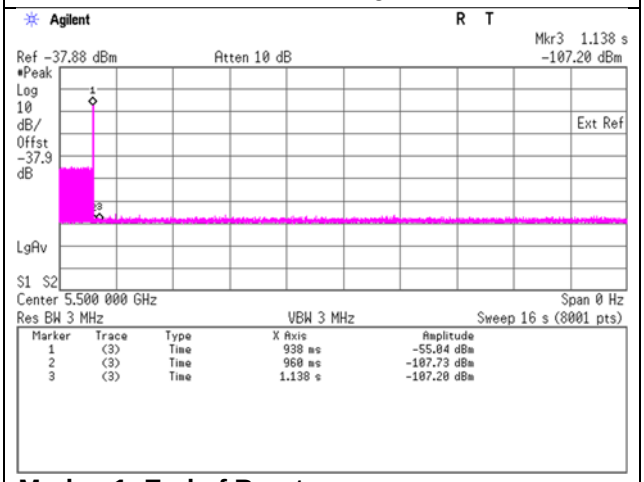
Test Item	Unit	Measurement Time	Limit	Results
Channel Move Time *1)	[sec]	0.022	10.000	Pass
Channel Closing Transmission Time *2)	[msec]	0	60	Pass

*1) Channel Move Time is calculated as follows:
(Channel Move Time) = (End of Transmission) - (End of Burst) = 0.96-0.938
*2) Channel Closing Transmission Time is calculated from (End of Burst + 200msec) to (End of Burst + 10sec)
(Channel Closing Transmission Time) = (Number of analyzer bins showing transmission) × (dwell time
= 0 × 2 [msec]

<Master mode>

Radar Type 0

11n-20



Marker 1: End of Burst
Marker 2: End of Transmission
Marker 3: End of Burst + 200 ms

10.4 Test result

Test result: Pass

SECTION 11: Non-Occupancy Period

11.1 Operating environment

Test place	Ise EMC Lab.No.4 Shielded Room
Date	July 23, 2024
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Tomoya Sone
Mode	11n-20

11.2 Test Procedure

The following two tests are performed:

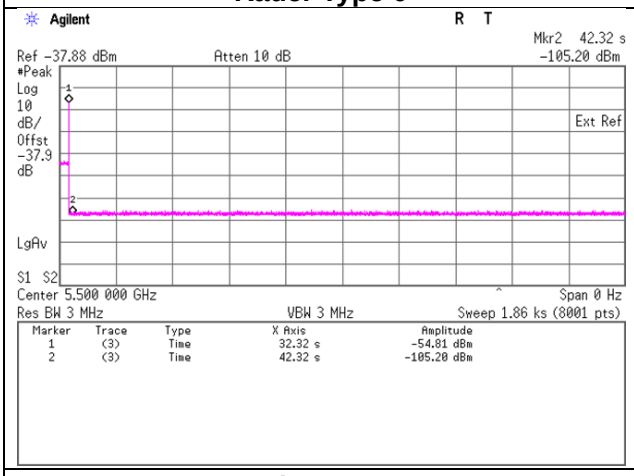
1). Transmit the data from the Master Device to the Client Device on the test Channel for the entire period of the test.
The Radar Waveform generator sends a Burst of pulses for one of the Radar Types 0-4(Master Device) or the Radar Types 0(Client Device) at levels defined on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Observe the transmissions of the EUT after the Channel Move Time on the Operating Channel for duration greater than 30 minutes.

11.3 Test data

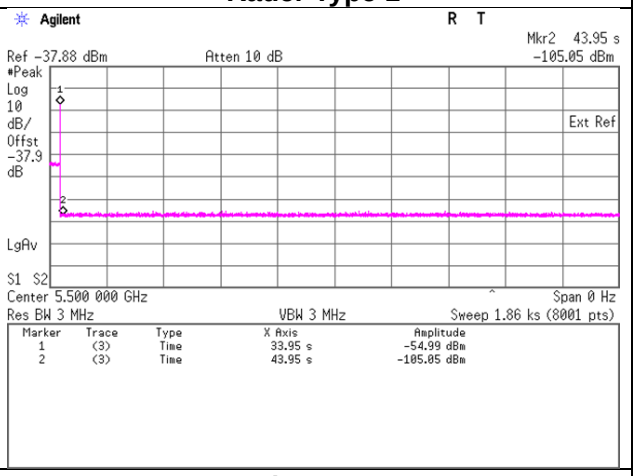
<Master mode>

Non-Occupancy Period

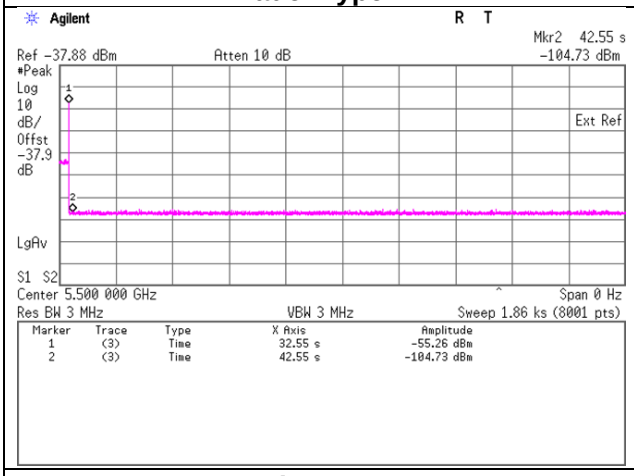
Rader Type 0



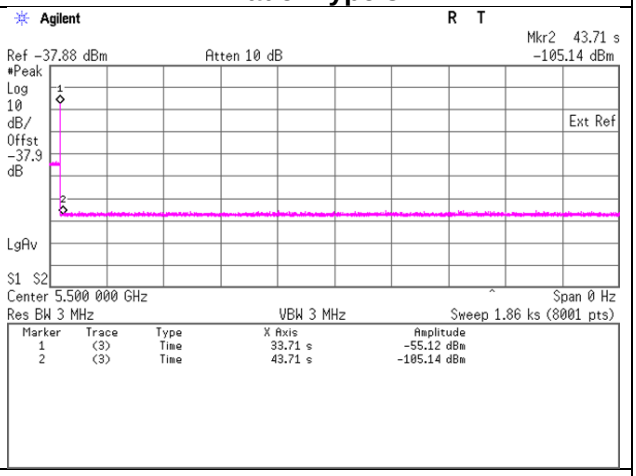
Rader Type 1



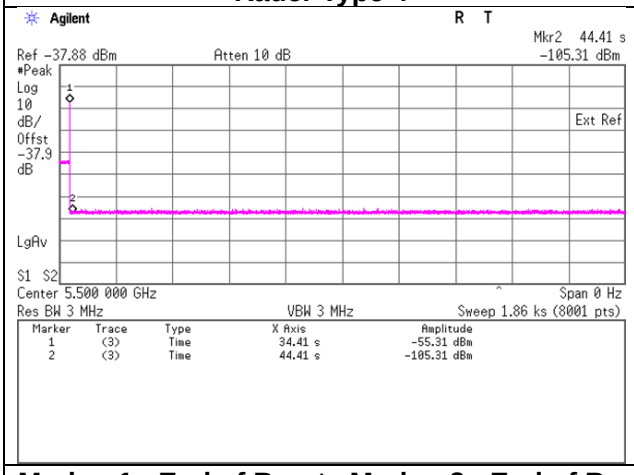
Rader Type 2



Rader Type 3



Rader Type 4



Marker 1 : End of Burst , Marker 2 : End of Burst + 10sec

11.4 Test result

Test result: Pass

SECTION 12: In-Service Monitoring (Statistical Performance Check)

12.1 Operating environment

Test place	Ise EMC Lab. No.4 Shielded room
Date	July 18, 2024
Temperature/ Humidity	23 deg. C / 58 % RH
Engineer	Tomoya Sone
Mode	11n-20

12.2 Test Procedure

Transmit the data from the Master Device to the Client Device on the test Channel for the entire period of the test.
Radar Waveform generator sends the individual waveform for each of the Radar Types 1-6, at levels defined, on the Operating Channel. An additional 1dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

Observe the transmissions of the EUT at the end of the Burst on the Operating Channel for duration greater than 10 seconds for Short Pulse Radar Types 1-4 and 6 to ensure detection occurs.
Observe the transmissions of the EUT at the end of the Burst on the Operating Channel for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs.

Radar detection is observed by two techniques.
a). Monitoring LAN traffic with Spectrum Analyzer.
b). Indicator of PC connected to EUT

12.3 Test data

5500 MHz (11n-20)

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections [%]	Limit [%]	Results
1	30	30	100.00	60	Pass
2	30	26	86.67	60	Pass
3	30	24	80.00	60	Pass
4	30	23	76.67	60	Pass
Aggregate of 1 to 4	-	-	85.83	80	Pass
5	30	29	96.67	80	Pass
6	30	29	96.67	70	Pass

12.4 Test result

Test result: Pass

APPENDIX 1: Data of DFS test

U-NII Detection Bandwidth

5500 MHz (11n-20)

Frequency [MHz]	Number of Trials [Times]	Number of Detected [Times]	Ratio of Detected [%]	Mark
5490	10	10	100	FL
5491	10	10	100	
5492	10	10	100	
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	10	100	FH

Statistical Performance Check

5500 MHz (11n-20)

Trial ID	Radar Type1	Radar Type2	Radar Type3	Radar Type4	Radar Type5	Radar Type6
	Dectection	Dectection	Dectection	Dectection	Dectection	Dectection
	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
0	Yes	Yes	No	Yes	Yes	Yes
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	No	No	Yes	Yes
5	Yes	Yes	Yes	No	Yes	Yes
6	Yes	Yes	Yes	No	Yes	Yes
7	Yes	Yes	Yes	Yes	Yes	Yes
8	Yes	Yes	Yes	Yes	Yes	Yes
9	Yes	Yes	Yes	Yes	Yes	Yes
10	Yes	Yes	Yes	Yes	Yes	Yes
11	Yes	No	Yes	Yes	No	Yes
12	Yes	Yes	Yes	No	Yes	No
13	Yes	Yes	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes	Yes	Yes
15	Yes	No	Yes	Yes	Yes	Yes
16	Yes	Yes	Yes	No	Yes	Yes
17	Yes	Yes	Yes	Yes	Yes	Yes
18	Yes	Yes	No	No	Yes	Yes
19	Yes	Yes	Yes	Yes	Yes	Yes
20	Yes	No	Yes	Yes	Yes	Yes
21	Yes	No	Yes	Yes	Yes	Yes
22	Yes	Yes	Yes	Yes	Yes	Yes
23	Yes	Yes	No	Yes	Yes	Yes
24	Yes	Yes	Yes	Yes	Yes	Yes
25	Yes	Yes	No	Yes	Yes	Yes
26	Yes	Yes	Yes	Yes	Yes	Yes
27	Yes	Yes	Yes	Yes	Yes	Yes
28	Yes	Yes	No	Yes	Yes	Yes
29	Yes	Yes	Yes	Yes	Yes	Yes
EUT Test Frequency: 5500 MHz Radar Frequency: 5500 MHz						

Parameter Data sheet for Radar Type 1

5500 MHz (11n-20)

Radar Type1				
Trial ID	Pulse Repetition Frequency Number(1 to 23)	Pulse Repetition Frequency (Pulses Per Second)	Number of Pulses	Pulse Repetition Interval (Microseconds)
0	19	1139.0	61	878
1	9	1474.9	78	678
2	13	1319.3	70	758
3	5	1672.2	89	598
4	21	1089.3	58	918
5	3	1792.1	95	558
6	23	326.2	18	3066
7	10	1432.7	76	698
8	16	1222.5	65	818
9	2	1858.7	99	538
10	11	1392.8	74	718
11	4	1730.1	92	578
12	12	1355.0	72	738
13	18	1165.6	62	858
14	8	1519.8	81	658
15	-	385.1	21	2597
16	-	1017.3	54	983
17	-	749.6	40	1334
18	-	499.0	27	2004
19	-	1396.6	74	716
20	-	532.8	29	1877
21	-	366.6	20	2728
22	-	419.6	23	2383
23	-	341.2	19	2931
24	-	483.1	26	2070
25	-	429.9	23	2326
26	-	545.9	29	1832
27	-	628.9	34	1590
28	-	385.8	21	2592
29	-	415.1	22	2409

Parameter Data sheet for Radar Type 2

5500 MHz (11n-20)

Radar Type2			
Trial ID	Number Pulses per Burst	Pulse Width [us]	PRI [us]
0	23	1.3	226
1	28	3.9	195
2	23	1.1	198
3	25	2.2	163
4	27	3.4	189
5	25	2.5	169
6	26	3.3	158
7	25	2.6	184
8	25	2.2	151
9	25	2.3	183
10	29	4.8	230
11	23	1.5	223
12	29	5.0	156
13	25	2.6	157
14	23	1.3	211
15	28	4.1	172
16	25	2.2	194
17	29	5.0	202
18	26	2.9	205
19	28	4.2	179
20	23	1.1	197
21	24	1.7	210
22	26	3.2	206
23	26	3.1	155
24	28	4.3	209
25	27	3.7	164
26	26	3.1	219
27	24	1.6	228
28	25	2.4	199
29	29	4.9	174

Parameter Data sheet for Radar Type 3

5500 MHz (11n-20)

Radar Type3			
Trial ID	Number Pulses per Burst	Pulse Width [us]	PRI [us]
0	16	6.3	381
1	18	8.9	467
2	16	6.1	499
3	16	7.2	361
4	17	8.4	234
5	17	7.5	458
6	17	8.3	433
7	17	7.6	240
8	16	7.2	362
9	16	7.3	425
10	18	9.8	211
11	16	6.5	245
12	18	10.0	355
13	17	7.6	408
14	16	6.3	436
15	18	9.1	369
16	16	7.2	454
17	18	10.0	466
18	17	7.9	421
19	18	9.2	477
20	16	6.1	329
21	16	6.7	266
22	17	8.2	215
23	17	8.1	317
24	18	9.3	366
25	17	8.7	327
26	17	8.1	375
27	16	6.6	474
28	17	7.4	423
29	18	9.9	473

Parameter Data sheet for Radar Type 4

5500 MHz (11n-20)

Radar Type4			
Trial ID	Number Pulses per Burst	Pulse Width [us]	PRI [us]
0	12	11.8	381
1	15	17.5	467
2	12	11.2	499
3	13	13.6	361
4	15	16.5	234
5	13	14.5	458
6	14	16.1	433
7	13	14.5	240
8	13	13.8	362
9	13	13.9	425
10	16	19.4	211
11	12	12.2	245
12	16	19.9	355
13	14	14.6	408
14	12	11.7	436
15	15	18.0	369
16	13	13.8	454
17	16	19.9	466
18	14	15.2	421
19	15	18.2	477
20	12	11.3	329
21	12	12.6	266
22	14	15.9	215
23	14	15.7	317
24	16	18.5	366
25	15	17.0	327
26	14	15.7	375
27	12	12.5	474
28	13	14.2	423
29	16	19.6	473

Parameter Data sheet for Radar Type 5

5500 MHz (11n-20)

Trial ID	Burst ID	Number of Pulses	Pulse Width [usec]	Chirp Width [MHz]	Pulse 1-to-2 Spacing [usec]	Pulse 2-to-3 Spacing [usec]	Starting Location Within Interval [usec]	Center Frequency[MHz]
0	0	1	54.7	6	-	-	448227	5500
	1	3	86.1	6	1147	1639	769376	
	2	1	51.5	6	-	-	1094023	
	3	1	64.8	6	-	-	85259	
	4	2	80.4	6	1179	-	408023	
	5	2	69.5	6	1309	-	730695	
	6	2	78.4	6	1881	-	1052492	
	7	2	69.6	6	1432	-	45431	
	8	1	65.5	6	-	-	368520	
1	0	1	66.4	16	-	-	365921	5500
	1	3	96.5	16	1152	1559	534628	
	2	1	56.6	16	-	-	3018	
	3	3	99.3	16	1140	1231	173378	
	4	2	70.3	16	1713	-	343614	
	5	1	54	16	-	-	515448	
	6	3	88.6	16	1575	1698	683135	
	7	1	65.4	16	-	-	152793	
	8	3	99.3	16	1869	1701	322045	
	9	2	73.2	16	1058	-	493572	
	10	3	89.9	16	1009	1172	663412	
	11	1	51.7	16	-	-	131848	
	12	1	59.1	16	-	-	302399	
	13	2	76.9	16	1671	-	472029	
	14	2	76	16	1510	-	643244	
	15	3	91.4	16	1002	1221	110304	
	16	2	83.3	16	1077	-	281315	

2	0	2	76.2	5	1826	-	961054	5500
	1	1	58.3	5	-	-	1326124	
	2	2	67.8	5	1195	-	190694	
	3	3	97.7	5	1661	1879	553043	
	4	3	85.9	5	1580	1617	915780	
	5	3	94.4	5	1728	1265	1278766	
	6	3	85.1	5	1024	2000	145677	
	7	3	93.9	5	1299	1960	508487	
3	0	1	52.5	9	-	-	634585	5500
	1	1	58.4	9	-	-	898707	
	2	3	95.6	9	1697	1473	73362	
	3	3	91.9	9	1937	1711	336846	
	4	3	96.7	9	1663	1751	600061	
	5	2	75.7	9	1709	-	865239	
	6	2	73.5	9	1466	-	41016	
	7	3	94.9	9	1132	1291	304598	
	8	3	90.9	9	1479	1353	568112	
	9	3	95.9	9	1893	1784	831204	
	10	3	98.6	9	1786	1197	8497	

4	0	2	68.7	14	1374	-	199503	5500
	1	2	75.2	14	1868	-	392507	
	2	3	87.1	14	1548	1830	584743	
	3	1	50.7	14	-	-	780606	
	4	3	90.1	14	1944	1425	175402	
	5	2	81.6	14	1119	-	369106	
	6	1	56.9	14	-	-	563498	
	7	1	50.2	14	-	-	757499	
	8	1	64	14	-	-	152107	
	9	1	55.2	14	-	-	345831	
	10	3	95.6	14	1949	1886	537153	
	11	1	59.1	14	-	-	733119	
	12	2	75.6	14	1023	-	128174	
	13	2	73.4	14	1636	-	321309	
	14	3	97.1	14	1445	1088	514236	
5	0	3	93.4	11	1813	1470	815625	5500
	1	2	70.1	11	1939	-	120293	
	2	1	51.7	11	-	-	344219	
	3	2	67.8	11	1779	-	566250	
	4	2	80.6	11	1219	-	790064	
	5	1	52	11	-	-	93071	
	6	2	71.5	11	1439	-	315969	
	7	1	55.3	11	-	-	540238	
	8	2	67.8	11	1626	-	762188	
	9	3	95.6	11	1773	1909	65243	
	10	3	93.1	11	1499	1490	288082	
	11	2	73.6	11	1948	-	511486	
	12	1	52.6	11	-	-	736042	

6	0	3	97.6	14	1117	1207	32827	5500
	1	1	66.3	14	-	-	226695	
	2	1	56.9	14	-	-	420378	
	3	2	68.2	14	1511	-	612785	
	4	2	81	14	1744	-	9054	
	5	2	77.5	14	1734	-	202397	
	6	2	72.7	14	1281	-	395888	
	7	1	58.1	14	-	-	590195	
	8	3	89.2	14	1381	1463	780887	
	9	1	57.5	14	-	-	178984	
	10	2	77.8	14	1927	-	371668	
	11	1	66	14	-	-	566300	
	12	2	78.9	14	1174	-	759004	
	13	3	94.2	14	1897	1724	154315	
	14	2	71.1	14	1621	-	348056	
7	0	3	88.6	11	1894	1336	623959	5500
	1	1	56.9	11	-	-	849571	
	2	3	99.4	11	1745	1875	150855	
	3	2	69.9	11	1240	-	374471	
	4	2	68.5	11	1320	-	597228	
	5	3	99.6	11	1588	1086	819922	
	6	2	82.4	11	1032	-	123753	
	7	1	53.4	11	-	-	347240	
	8	3	93.1	11	1928	1145	569071	
	9	2	73	11	1478	-	793021	
	10	1	65.3	11	-	-	96305	
	11	3	96.5	11	1839	1415	318645	
	12	3	97.2	11	1492	1122	541589	

8	0	2	69.8	9	1688	-	829497	5500
	1	2	69.2	9	1350	-	74407	
	2	1	55.1	9	-	-	316732	
	3	3	97.1	9	1229	1194	557716	
	4	1	58	9	-	-	800706	
	5	1	54.3	9	-	-	44704	
	6	1	52.7	9	-	-	287000	
	7	3	97.7	9	1003	1638	527455	
	8	3	98.4	9	1248	1367	769319	
	9	2	77.3	9	1729	-	14839	
	10	2	78.1	9	1890	-	256579	
	11	3	98.2	9	1496	1253	497909	
9	0	1	50.6	10	-	-	741686	5500
	1	3	89	10	1135	1059	981678	
	2	1	54.2	10	-	-	227234	
	3	1	62.5	10	-	-	469285	
	4	2	74	10	1459	-	710227	
	5	1	51.7	10	-	-	953265	
	6	1	51.6	10	-	-	197430	
	7	1	57.8	10	-	-	439339	
	8	1	50.4	10	-	-	681868	
	9	2	66.7	10	1587	-	922449	
	10	1	60.8	10	-	-	167537	
	11	3	96.2	10	1202	1087	408689	

10	0	2	73.1	19	1822	-	389552	5498.7557
	1	1	55	19	-	-	535862	
	2	1	53	19	-	-	82516	
	3	1	65.1	19	-	-	227814	
	4	1	62.9	19	-	-	372792	
	5	1	63.9	19	-	-	518047	
	6	3	95.2	19	1651	1896	64300	
	7	1	65.7	19	-	-	209887	
	8	2	81	19	1961	-	354104	
	9	2	75.5	19	1347	-	498759	
	10	3	88.3	19	1480	1853	46547	
	11	2	69.9	19	1092	-	191456	
	12	1	52.3	19	-	-	337302	
	13	2	80.7	19	1316	-	481443	
	14	1	57.9	19	-	-	28890	
	15	2	74.6	19	1419	-	173766	
	16	3	91.5	19	1315	1817	317362	
	17	2	73.5	19	1208	-	463413	
	18	3	90.3	19	1758	1076	10985	
	19	2	79.6	19	1365	-	155917	
11	0	2	71.3	7	1391	-	669973	5493.9557
	1	2	71.8	7	1222	-	992356	
	2	2	67.8	7	1810	-	1315227	
	3	1	60.6	7	-	-	307851	
	4	2	78.2	7	1712	-	630091	
	5	3	91	7	1256	1261	952269	
	6	2	69.1	7	1761	-	1274855	
	7	2	71.2	7	1392	-	267605	
	8	1	63.7	7	-	-	591205	

12	0	3	88.6	20	1819	1982	407988	5499.1557
	1	3	96.8	20	1006	1406	553541	
	2	1	53	20	-	-	102572	
	3	1	58.4	20	-	-	247660	
	4	1	58.9	20	-	-	392838	
	5	2	73.9	20	1046	-	536933	
	6	1	53	20	-	-	84676	
	7	1	51.2	20	-	-	229798	
	8	3	87.6	20	1612	1085	373157	
	9	3	84.7	20	1104	1052	518455	
	10	3	84.5	20	1360	1494	66438	
	11	2	82.2	20	1215	-	211593	
	12	1	62.4	20	-	-	357374	
	13	2	67.1	20	1343	-	500935	
	14	2	75.2	20	1959	-	48719	
	15	1	50.6	20	-	-	194031	
	16	3	84.4	20	1898	1017	337756	
	17	1	60.1	20	-	-	484475	
	18	3	93.3	20	1741	1165	30883	
	19	3	93.9	20	1900	1570	175097	
13	0	2	77	11	1930	-	493563	5495.5557
	1	1	66.4	11	-	-	717929	
	2	2	77	11	1138	-	20220	
	3	2	76.5	11	1131	-	243434	
	4	2	81.2	11	1602	-	466283	
	5	2	74.9	11	1114	-	690102	
	6	1	51.3	11	-	-	914069	
	7	3	87.3	11	1106	1902	215495	
	8	3	92.5	11	1027	1720	438344	
	9	3	87	11	1109	1794	660800	
	10	2	72	11	1422	-	885737	
	11	3	94.8	11	1362	1583	188047	
	12	2	73.9	11	1123	-	411618	

14	0	1	51.9	6	-	-	918745	5493.5557
	1	3	92.4	6	1254	1895	1238883	
	2	2	78.8	6	1933	-	232637	
	3	3	85.2	6	1951	1791	554278	
	4	1	61.4	6	-	-	878897	
	5	3	93.4	6	1880	1674	1198439	
	6	1	56.8	6	-	-	193086	
	7	1	54.9	6	-	-	515955	
	8	2	73.3	6	1149	-	838172	
15	0	1	53.8	17	-	-	580453	5497.9557
	1	3	88.8	17	1793	1289	76166	
	2	1	55.8	17	-	-	238027	
	3	3	97.5	17	1030	1596	397632	
	4	1	58.9	17	-	-	560318	
	5	1	54.7	17	-	-	56689	
	6	3	92.7	17	1098	1848	217031	
	7	1	59.9	17	-	-	379406	
	8	3	93.8	17	1454	1857	537677	
	9	2	80.8	17	1670	-	36759	
	10	2	75.8	17	1746	-	197777	
	11	2	77.4	17	1644	-	358767	
	12	3	86.7	17	1096	1501	518457	
	13	2	72.2	17	1232	-	16922	
	14	2	69.8	17	1018	-	177922	
	15	2	76.6	17	1620	-	338631	
	16	2	77.3	17	1731	-	499711	
	17	3	84.1	17	1397	1164	659826	

16	0	2	72.5	9	1446	-	237511	5494.7557
	1	1	65.7	9	-	-	479996	
	2	1	58.8	9	-	-	721889	
	3	1	50.5	9	-	-	964333	
	4	1	62.7	9	-	-	208067	
	5	3	89.7	9	1737	1964	448355	
	6	1	58.2	9	-	-	692628	
	7	1	60.4	9	-	-	934798	
	8	2	74.7	9	1667	-	177762	
	9	3	96.4	9	1144	1266	419492	
	10	1	65.4	9	-	-	662442	
	11	2	72.9	9	1680	-	902916	
17	0	2	66.7	20	1542	-	88619	5499.1557
	1	3	86.4	20	1157	1872	232806	
	2	3	88.9	20	1375	1699	377493	
	3	1	53.7	20	-	-	523945	
	4	1	62.5	20	-	-	71043	
	5	3	88.3	20	1684	1986	214848	
	6	2	70.6	20	1539	-	360301	
	7	3	83.7	20	1115	1180	504895	
	8	1	66	20	-	-	53147	
	9	3	96.7	20	1272	1471	197486	
	10	3	94.6	20	1351	1013	341952	
	11	2	82.6	20	1938	-	487137	
	12	3	93.2	20	1067	1844	35090	
	13	3	91.2	20	1161	1788	179419	
	14	2	69	20	1755	-	324853	
	15	3	96.5	20	1037	1407	468766	
	16	1	65.2	20	-	-	17390	
	17	2	70.2	20	1563	-	162223	
	18	1	59	20	-	-	307575	
	19	1	58.6	20	-	-	452965	

18	0	3	84.2	12	1832	1468	851824	5495.9557
	1	1	59.3	12	-	-	206873	
	2	3	84.3	12	1251	1917	412594	
	3	3	89.2	12	1485	1780	619491	
	4	1	64.5	12	-	-	829762	
	5	1	53.3	12	-	-	181155	
	6	2	76	12	1048	-	388487	
	7	1	66.2	12	-	-	596052	
	8	3	89.3	12	1235	1403	801527	
	9	3	98.5	12	1811	1924	155058	
	10	2	80	12	1220	-	362886	
	11	3	96.3	12	1655	1325	569015	
	12	3	94.5	12	1554	1260	776015	
	13	2	70.8	12	1899	-	129850	
19	0	1	64.1	17	-	-	262407	5497.9557
	1	3	89.4	17	1452	1335	422167	
	2	3	88.6	17	1921	1974	581510	
	3	2	83	17	1151	-	81183	
	4	1	59.7	17	-	-	242576	
	5	2	81.6	17	1806	-	402612	
	6	1	55.9	17	-	-	564993	
	7	3	93.6	17	1912	1932	61086	
	8	2	68	17	1590	-	222139	
	9	2	75.9	17	1000	-	383437	
	10	2	71.2	17	1317	-	544099	
	11	2	76.2	17	1989	-	41395	
	12	1	57.4	17	-	-	202753	
	13	2	71.6	17	1498	-	363281	
	14	2	70.6	17	1975	-	523690	
	15	1	61.7	17	-	-	21676	
	16	3	95.3	17	1526	1627	182248	
	17	1	54.5	17	-	-	344074	

20	0	3	87.4	5	1301	1523	1137015	5506.8443
	1	1	56.8	5	-	-	4049	
	2	3	88.8	5	1756	1313	366685	
	3	1	57.3	5	-	-	730808	
	4	1	52.1	5	-	-	1094107	
	5	3	99.7	5	1438	1759	1454607	
	6	3	89.2	5	1605	1120	322105	
	7	1	59.2	5	-	-	686372	
21	0	1	62.2	7	-	-	839205	5506.0443
	1	1	54.4	7	-	-	1129796	
	2	3	94.5	7	1968	1646	221657	
	3	2	67.5	7	1423	-	512329	
	4	1	66.6	7	-	-	803402	
	5	3	98.4	7	1176	1155	1091991	
	6	3	88.1	7	1807	1985	185917	
	7	2	72.3	7	1302	-	476474	
	8	2	77	7	1834	-	766642	
	9	2	79.6	7	1433	-	1057131	

22	0	1	57.9	13	-	-	100381	5503.6443
	1	2	82.2	13	1790	-	293565	
	2	1	60.5	13	-	-	487535	
	3	2	77.5	13	1441	-	679778	
	4	1	52.6	13	-	-	76504	
	5	3	90.6	13	1380	1962	269096	
	6	3	91.3	13	1236	1228	462178	
	7	1	58.3	13	-	-	657528	
	8	2	68	13	1764	-	52574	
	9	3	88.3	13	1412	1998	245378	
	10	3	96	13	1042	1584	438521	
	11	1	54.4	13	-	-	633881	
	12	3	95.6	13	1158	1619	28720	
	13	2	77.6	13	1206	-	222294	
	14	1	53.2	13	-	-	416355	
23	0	2	75.5	13	1774	-	651728	5503.6443
	1	1	58.9	13	-	-	5338	
	2	3	87.7	13	1417	1416	212193	
	3	2	82.1	13	1186	-	420013	
	4	1	56.7	13	-	-	628174	
	5	3	87.3	13	1866	1431	831912	
	6	3	88.9	13	1558	1159	186802	
	7	3	93.9	13	1544	1443	393483	
	8	1	50.5	13	-	-	602274	
	9	2	69.3	13	1168	-	808579	
	10	1	51.5	13	-	-	161687	
	11	3	99.2	13	1019	1396	368277	
	12	1	50.4	13	-	-	576761	
	13	1	59.3	13	-	-	784474	

24	0	2	72.8	18	1319	-	105585	5501.6443
	1	3	88.2	18	1405	1257	265972	
	2	3	85.1	18	1148	1778	426670	
	3	3	94.6	18	1672	1572	587001	
	4	3	91.1	18	1482	1650	85581	
	5	1	53.7	18	-	-	247178	
	6	1	63	18	-	-	408805	
	7	3	94.1	18	1871	1865	566673	
	8	1	59.8	18	-	-	66134	
	9	1	54.1	18	-	-	227455	
	10	3	98.3	18	1413	1393	387297	
	11	1	66.1	18	-	-	550105	
	12	3	93.8	18	1368	1573	46019	
	13	2	81.6	18	1941	-	207095	
	14	1	50.8	18	-	-	369170	
	15	1	63.3	18	-	-	529854	
	16	1	57.8	18	-	-	26378	
	17	1	58.9	18	-	-	187754	
25	0	2	66.9	15	1269	-	392289	5502.8443
	1	1	64.3	15	-	-	573956	
	2	3	91.2	15	1427	1121	7292	
	3	3	89.4	15	1455	1050	188229	
	4	1	50.4	15	-	-	370208	
	5	3	90.3	15	1555	1615	549384	
	6	2	70.3	15	1740	-	731971	
	7	3	92.3	15	1014	1641	165861	
	8	2	69	15	1719	-	347079	
	9	3	88.4	15	1170	1913	527241	
	10	1	60	15	-	-	711520	
	11	1	58.1	15	-	-	144047	
	12	1	51.1	15	-	-	325451	
	13	3	91.4	15	1623	1263	505157	
	14	3	90.8	15	1628	1127	686064	
	15	3	99.1	15	1297	1534	121301	

26	0	3	95.2	13	1066	1133	345916	5503.6443
	1	1	50.1	13	-	-	553992	
	2	1	60.8	13	-	-	761425	
	3	1	59.8	13	-	-	113639	
	4	1	54.4	13	-	-	321012	
	5	2	73.8	13	1687	-	527566	
	6	3	90.3	13	1557	1599	733183	
	7	2	81.5	13	1252	-	87925	
	8	3	99.1	13	1749	1994	294442	
	9	3	83.5	13	1666	1562	501372	
	10	3	83.8	13	1836	1838	707786	
	11	3	90.7	13	1034	1264	62364	
	12	3	93.6	13	1550	1768	269079	
	13	1	57.2	13	-	-	477372	
27	0	3	93	7	1552	1094	957145	5506.0443
	1	3	87.2	7	1312	1475	51621	
	2	1	61.5	7	-	-	342506	
	3	3	92.7	7	1983	1111	631371	
	4	2	82.3	7	1804	-	922469	
	5	3	86.2	7	1079	1243	15927	
	6	2	68.2	7	1675	-	306310	
	7	3	83.5	7	1031	1116	596309	
	8	3	87.8	7	1377	1783	885589	
	9	3	94.8	7	1990	1950	1174625	

28	0	2	74.2	10	1920	-	225086	5504.8443
	1	3	98.8	10	1125	1987	466283	
	2	3	84.7	10	1512	1364	707908	
	3	2	74.7	10	1169	-	951383	
	4	3	84.1	10	1283	1203	195252	
	5	1	51.6	10	-	-	438060	
	6	1	53	10	-	-	679879	
	7	1	56.8	10	-	-	922411	
	8	2	75.3	10	1330	-	165756	
	9	3	94.7	10	1311	1474	406910	
	10	3	86.5	10	1597	1339	648447	
	11	1	50.7	10	-	-	892079	
29	0	1	52.4	20	-	-	81616	5500.8443
	1	3	98	20	1128	1245	225771	
	2	1	54.4	20	-	-	372056	
	3	3	93.1	20	1892	1762	513635	
	4	2	74.1	20	1873	-	63491	
	5	1	59.7	20	-	-	208910	
	6	3	90.3	20	1025	1327	352878	
	7	2	66.9	20	1166	-	497896	
	8	1	56.5	20	-	-	45818	
	9	2	79.7	20	1607	-	190442	
	10	3	98.8	20	1787	1800	334118	
	11	1	61.8	20	-	-	481342	
	12	3	95.4	20	1435	1657	27805	
	13	2	72.8	20	1372	-	172806	
	14	3	96.7	20	1379	1649	316562	
	15	1	58.5	20	-	-	463564	
	16	1	59.1	20	-	-	10078	
	17	1	54.6	20	-	-	155266	
	18	2	80.9	20	1214	-	299637	
	19	1	61.7	20	-	-	445369	

Parameter Data sheet for Radar Type 6

5500 MHz (11n-20)

Trial ID	Frequency List (MHz)	0	1	2	3	4
0	0	5417	5408	5369	5455	5693
	5	5483	5688	5584	5364	5500
	10	5313	5415	5558	5526	5707
	15	5710	5703	5494	5650	5554
	20	5266	5296	5630	5569	5279
	25	5570	5310	5547	5549	5697
	30	5401	5366	5262	5522	5403
	35	5540	5250	5432	5520	5696
	40	5425	5473	5446	5718	5467
	45	5619	5686	5462	5377	5579
	50	5700	5528	5498	5362	5561
	55	5708	5286	5260	5628	5391
	60	5382	5489	5349	5609	5299
	65	5546	5351	5651	5517	5409
	70	5380	5680	5663	5645	5531
	75	5576	5537	5298	5676	5337
	80	5551	5563	5586	5507	5567
	85	5557	5311	5519	5617	5555
	90	5293	5709	5347	5456	5418
	95	5323	5682	5389	5670	5399

Trial ID	Frequency List (MHz)	0	1	2	3	4
1	0	5672	5647	5305	5616	5438
	5	5525	5613	5288	5272	5571
	10	5334	5674	5456	5278	5547
	15	5698	5362	5709	5539	5367
	20	5562	5432	5712	5622	5542
	25	5545	5422	5513	5651	5486
	30	5264	5290	5483	5484	5511
	35	5342	5445	5631	5521	5585
	40	5434	5535	5508	5314	5589
	45	5715	5396	5599	5391	5654
	50	5515	5455	5401	5579	5587
	55	5660	5408	5421	5618	5353
	60	5447	5441	5697	5492	5552
	65	5600	5553	5679	5658	5374
	70	5649	5648	5380	5496	5645
	75	5469	5344	5318	5347	5560
	80	5332	5630	5271	5407	5287
	85	5460	5628	5482	5423	5621
	90	5424	5357	5564	5309	5454
	95	5598	5565	5663	5262	5375

Trial ID	Frequency List (MHz)	0	1	2	3	4
2	0	5452	5411	5716	5302	5280
	5	5664	5635	5363	5435	5400
	10	5265	5463	5497	5473	5568
	15	5311	5489	5337	5487	5559
	20	5570	5501	5275	5711	5515
	25	5433	5371	5377	5520	5306
	30	5654	5440	5699	5663	5540
	35	5584	5722	5317	5360	5445
	40	5374	5591	5252	5354	5334
	45	5703	5482	5474	5712	5529
	50	5331	5577	5630	5676	5483
	55	5352	5609	5572	5543	5266
	60	5333	5640	5344	5336	5273
	65	5523	5535	5278	5549	5492
	70	5270	5461	5446	5257	5704
	75	5528	5455	5614	5589	5390
	80	5299	5599	5670	5588	5319
	85	5404	5579	5460	5470	5542
	90	5526	5388	5298	5255	5268
	95	5527	5294	5510	5326	5509

Trial ID	Frequency List (MHz)	0	1	2	3	4
3	0	5707	5650	5652	5463	5500
	5	5706	5560	5438	5501	5607
	10	5574	5252	5538	5571	5589
	15	5399	5616	5440	5532	5276
	20	5481	5667	5691	5703	5488
	25	5321	5698	5444	5554	5445
	30	5640	5397	5439	5437	5360
	35	5723	5338	5588	5513	5359
	40	5688	5296	5665	5594	5331
	45	5632	5462	5557	5295	5524
	50	5416	5682	5278	5681	5290
	55	5306	5674	5322	5526	5258
	60	5304	5294	5509	5281	5677
	65	5446	5576	5498	5528	5577
	70	5366	5264	5615	5718	5456
	75	5504	5414	5486	5709	5533
	80	5377	5279	5305	5369	5483
	85	5401	5299	5363	5409	5505
	90	5621	5256	5503	5563	5379
	95	5328	5522	5343	5564	5566

Trial ID	Frequency List (MHz)	0	1	2	3	4
4	0	5487	5414	5685	5624	5342
	5	5273	5582	5513	5664	5339
	10	5505	5516	5579	5291	5610
	15	5646	5543	5577	5468	5489
	20	5358	5632	5317	5461	5587
	25	5647	5585	5588	5529	5354
	30	5654	5589	5655	5290	5429
	35	5481	5666	5527	5379	5603
	40	5262	5328	5464	5442	5640
	45	5256	5681	5454	5257	5476
	50	5507	5618	5413	5480	5448
	55	5282	5653	5326	5674	5323
	60	5509	5272	5427	5302	5447
	65	5467	5312	5636	5445	5687
	70	5704	5376	5305	5383	5373
	75	5455	5531	5318	5625	5460
	80	5398	5494	5266	5251	5565
	85	5338	5696	5303	5276	5286
	90	5544	5539	5265	5631	5360
	95	5619	5259	5392	5497	5478

Trial ID	Frequency List (MHz)	0	1	2	3	4
5	0	5645	5653	5621	5310	5562
	5	5315	5604	5588	5352	5643
	10	5436	5305	5620	5486	5631
	15	5575	5298	5646	5622	5660
	20	5497	5427	5670	5406	5434
	25	5475	5499	5278	5689	5529
	30	5418	5311	5297	5363	5378
	35	5429	5617	5277	5441	5284
	40	5463	5462	5541	5502	5325
	45	5393	5422	5723	5314	5630
	50	5568	5337	5308	5565	5330
	55	5601	5638	5576	5624	5455
	60	5364	5268	5341	5573	5470
	65	5600	5396	5503	5619	5528
	70	5381	5690	5379	5629	5359
	75	5332	5424	5377	5722	5339
	80	5428	5714	5395	5266	5433
	85	5564	5257	5524	5581	5709
	90	5545	5299	5373	5265	5674
	95	5632	5274	5658	5589	5561

Trial ID	Frequency List (MHz)	0	1	2	3	4
6	0	5425	5417	5557	5374	5404
	5	5454	5529	5663	5515	5375
	10	5270	5666	5661	5681	5652
	15	5566	5570	5377	5408	5593
	20	5611	5398	5407	5266	5351
	25	5481	5415	5656	5668	5268
	30	5512	5673	5568	5708	5548
	35	5594	5302	5545	5479	5267
	40	5322	5402	5331	5372	5683
	45	5358	5688	5359	5654	5628
	50	5409	5314	5388	5353	5298
	55	5595	5584	5648	5496	5416
	60	5326	5345	5539	5451	5323
	65	5526	5453	5478	5335	5291
	70	5296	5497	5293	5320	5560
	75	5441	5662	5403	5295	5644
	80	5507	5588	5625	5432	5308
	85	5675	5304	5399	5551	5711
	90	5255	5277	5491	5254	5615
	95	5530	5253	5703	5278	5347

Trial ID	Frequency List (MHz)	0	1	2	3	4
7	0	5680	5656	5493	5535	5624
	5	5496	5551	5263	5678	5582
	10	5676	5455	5702	5401	5673
	15	5654	5552	5280	5615	5666
	20	5416	5662	5487	5380	5629
	25	5300	5684	5519	5690	5710
	30	5293	5700	5252	5289	5396
	35	5707	5324	5441	5272	5587
	40	5616	5250	5417	5507	5319
	45	5382	5414	5333	5261	5720
	50	5564	5410	5268	5451	5353
	55	5502	5342	5543	5592	5566
	60	5713	5694	5633	5577	5322
	65	5362	5294	5478	5661	5593
	70	5329	5622	5284	5482	5705
	75	5311	5265	5617	5436	5301
	80	5337	5443	5567	5271	5292
	85	5701	5644	5349	5397	5262
	90	5448	5599	5270	5612	5386
	95	5508	5309	5696	5525	5610

Trial ID	Frequency List (MHz)	0	1	2	3	4
8	0	5460	5420	5429	5696	5466
	5	5538	5476	5338	5269	5411
	10	5607	5719	5365	5499	5694
	15	5267	5679	5383	5660	5424
	20	5353	5493	5479	5627	5412
	25	5623	5724	5277	5279	5657
	30	5467	5691	5274	5415	5712
	35	5522	5598	5455	5333	5355
	40	5650	5413	5558	5362	5497
	45	5391	5314	5510	5343	5683
	50	5461	5357	5652	5675	5690
	55	5296	5258	5440	5367	5384
	60	5409	5308	5350	5718	5514
	65	5485	5270	5554	5287	5684
	70	5612	5262	5482	5282	5492
	75	5661	5699	5256	5431	5289
	80	5421	5547	5666	5611	5437
	85	5265	5313	5322	5254	5304
	90	5397	5495	5525	5364	5680
	95	5423	5589	5434	5417	5371

Trial ID	Frequency List (MHz)	0	1	2	3	4
9	0	5618	5659	5365	5382	5686
	5	5580	5498	5413	5432	5441
	10	5508	5406	5694	5715	5355
	15	5709	5486	5705	5575	5422
	20	5531	5568	5326	5308	5576
	25	5615	5252	5283	5416	5643
	30	5614	5585	5690	5414	5506
	35	5675	5512	5391	5671	5415
	40	5410	5390	5720	5449	5270
	45	5397	5384	5543	5475	5619
	50	5403	5250	5351	5411	5399
	55	5549	5620	5716	5546	5551
	60	5667	5550	5703	5280	5313
	65	5291	5353	5641	5581	5285
	70	5625	5263	5269	5674	5480
	75	5323	5494	5286	5616	5450
	80	5605	5574	5629	5267	5469
	85	5617	5419	5666	5279	5507
	90	5542	5664	5321	5471	5537
	95	5712	5466	5487	5332	5592

Trial ID	Frequency List (MHz)	0	1	2	3	4
10	0	5398	5423	5301	5543	5528
	5	5719	5488	5595	5350	5372
	10	5297	5447	5414	5261	5346
	15	5361	5589	5653	5292	5343
	20	5588	5472	5560	5299	5671
	25	5428	5721	5453	5317	5458
	30	5532	5571	5325	5464	5709
	35	5552	5694	5304	5353	5426
	40	5705	5499	5609	5655	5407
	45	5319	5700	5663	5410	5323
	50	5662	5570	5563	5632	5298
	55	5466	5494	5679	5541	5427
	60	5382	5714	5565	5548	5374
	65	5616	5489	5535	5647	5591
	70	5460	5339	5252	5617	5602
	75	5405	5293	5521	5309	5487
	80	5557	5283	5336	5450	5537
	85	5573	5318	5717	5340	5584
	90	5672	5275	5539	5656	5474
	95	5270	5640	5435	5561	5699

Trial ID	Frequency List (MHz)	0	1	2	3	4
11	0	5653	5284	5712	5704	5273
	5	5286	5445	5563	5283	5654
	10	5303	5561	5488	5609	5282
	15	5434	5595	5698	5484	5351
	20	5657	5413	5649	5272	5462
	25	5280	5449	5557	5500	5518
	30	5528	5540	5616	5529	5594
	35	5310	5672	5603	5437	5544
	40	5679	5547	5420	5404	5723
	45	5680	5271	5468	5376	5549
	50	5446	5261	5614	5721	5596
	55	5410	5682	5633	5256	5353
	60	5510	5380	5295	5718	5575
	65	5565	5525	5270	5442	5394
	70	5532	5325	5688	5576	5593
	75	5422	5339	5700	5298	5419
	80	5517	5651	5620	5658	5531
	85	5386	5597	5441	5538	5490
	90	5635	5274	5300	5687	5421
	95	5250	5673	5254	5592	5429

Trial ID	Frequency List (MHz)	0	1	2	3	4
12	0	5433	5523	5648	5390	5590
	5	5328	5370	5638	5349	5386
	10	5612	5447	5529	5329	5303
	15	5522	5615	5698	5268	5676
	20	5359	5348	5451	5641	5720
	25	5350	5704	5652	5661	5385
	30	5542	5407	5485	5280	5252
	35	5258	5401	5468	5281	5351
	40	5383	5287	5563	5555	5660
	45	5354	5526	5429	5339	5700
	50	5437	5665	5335	5322	5257
	55	5395	5587	5446	5540	5702
	60	5311	5569	5552	5309	5596
	65	5286	5398	5514	5464	5577
	70	5712	5672	5701	5691	5520
	75	5294	5645	5482	5681	5550
	80	5432	5298	5340	5305	5655
	85	5256	5703	5560	5633	5406
	90	5323	5263	5358	5439	5306
	95	5721	5262	5690	5584	5713

Trial ID	Frequency List (MHz)	0	1	2	3	4
13	0	5591	5287	5584	5454	5335
	5	5467	5392	5713	5512	5593
	10	5543	5711	5570	5427	5324
	15	5610	5267	5326	5313	5393
	20	5270	5417	5255	5693	5616
	25	5556	5380	5290	5419	5681
	30	5296	5442	5398	5542	5547
	35	5397	5492	5264	5434	5265
	40	5697	5370	5423	5328	5495
	45	5484	5640	5437	5482	5701
	50	5576	5613	5716	5521	5620
	55	5676	5583	5444	5636	5262
	60	5673	5440	5259	5497	5422
	65	5707	5599	5463	5500	5312
	70	5604	5475	5298	5394	5316
	75	5652	5545	5479	5263	5668
	80	5528	5284	5327	5554	5407
	85	5368	5256	5253	5371	5277
	90	5414	5653	5658	5563	5639
	95	5319	5485	5377	5651	5274

Trial ID	Frequency List (MHz)	0	1	2	3	4
14	0	5371	5526	5520	5615	5652
	5	5509	5317	5313	5675	5422
	10	5377	5500	5611	5622	5345
	15	5601	5297	5429	5261	5585
	20	5278	5583	5333	5722	5666
	25	5504	5505	5394	5453	5723
	30	5282	5399	5613	5316	5270
	35	5536	5632	5587	5276	5633
	40	5550	5361	5568	5492	5620
	45	5545	5535	5491	5452	5314
	50	5292	5610	5443	5523	5296
	55	5398	5351	5556	5644	5569
	60	5424	5442	5448	5653	5412
	65	5619	5656	5467	5380	5319
	70	5501	5521	5438	5707	5671
	75	5265	5482	5555	5335	5571
	80	5431	5649	5263	5634	5484
	85	5445	5714	5328	5662	5376
	90	5294	5318	5692	5480	5346
	95	5694	5303	5383	5647	5374

Trial ID	Frequency List (MHz)	0	1	2	3	4
15	0	5626	5290	5456	5301	5397
	5	5551	5339	5388	5363	5629
	10	5308	5289	5652	5342	5366
	15	5689	5424	5532	5306	5399
	20	5286	5274	5371	5336	5639
	25	5295	5357	5595	5487	5646
	30	5259	5353	5468	5565	5578
	35	5674	5428	5362	5665	5472
	40	5633	5299	5711	5489	5720
	45	5503	5603	5491	5378	5706
	50	5490	5343	5699	5266	5467
	55	5484	5352	5541	5375	5615
	60	5601	5589	5387	5280	5599
	65	5623	5361	5475	5354	5291
	70	5459	5539	5419	5350	5400
	75	5579	5433	5717	5721	5591
	80	5260	5458	5537	5326	5643
	85	5637	5679	5282	5435	5574
	90	5324	5705	5492	5287	5281
	95	5583	5669	5367	5334	5302

Trial ID	Frequency List (MHz)	0	1	2	3	4
16	0	5406	5529	5392	5462	5714
	5	5593	5264	5463	5429	5361
	10	5553	5315	5537	5387	5302
	15	5551	5538	5351	5591	5672
	20	5343	5312	5328	5612	5658
	25	5684	5417	5699	5521	5535
	30	5691	5568	5717	5288	5515
	35	5579	5311	5716	5615	5476
	40	5486	5649	5483	5686	5661
	45	5544	5643	5582	5666	5394
	50	5313	5467	5314	5306	5634
	55	5669	5489	5255	5279	5587
	60	5472	5642	5446	5310	5511
	65	5561	5262	5708	5352	5422
	70	5577	5376	5356	5548	5385
	75	5702	5300	5372	5424	5654
	80	5546	5275	5606	5257	5547
	85	5711	5683	5624	5427	5663
	90	5601	5380	5329	5368	5508
	95	5297	5433	5366	5451	5375

Trial ID	Frequency List (MHz)	0	1	2	3	4
17	0	5661	5293	5328	5623	5459
	5	5257	5286	5538	5592	5568
	10	5548	5439	5356	5408	5390
	15	5678	5641	5299	5308	5680
	20	5509	5253	5417	5585	5449
	25	5633	5620	5555	5471	5521
	30	5648	5686	5394	5583	5381
	35	5478	5495	5668	5590	5625
	40	5324	5553	5716	5483	5481
	45	5463	5294	5622	5597	5530
	50	5458	5367	5445	5402	5290
	55	5258	5288	5260	5349	5391
	60	5460	5384	5444	5374	5516
	65	5395	5588	5647	5259	5450
	70	5396	5540	5305	5435	5425
	75	5426	5352	5315	5420	5673
	80	5431	5683	5313	5628	5717
	85	5543	5470	5440	5582	5666
	90	5512	5287	5456	5314	5433
	95	5697	5372	5613	5397	5552

Trial ID	Frequency List (MHz)	0	1	2	3	4
18	0	5344	5532	5264	5309	5301
	5	5299	5686	5613	5280	5397
	10	5479	5703	5355	5429	5381
	15	5330	5269	5500	5688	5578
	20	5291	5409	5558	5337	5485
	25	5348	5432	5589	5513	5410
	30	5605	5426	5643	5403	5423
	35	5569	5388	5443	5504	5561
	40	5491	5481	5577	5377	5680
	45	5650	5320	5334	5543	5496
	50	5588	5580	5476	5689	5539
	55	5685	5431	5609	5319	5696
	60	5534	5373	5683	5486	5723
	65	5343	5421	5525	5275	5328
	70	5274	5389	5574	5664	5540
	75	5655	5305	5665	5424	5629
	80	5544	5380	5716	5704	5412
	85	5439	5634	5254	5722	5414
	90	5336	5450	5369	5417	5652
	95	5495	5287	5497	5714	5582

Trial ID	Frequency List (MHz)	0	1	2	3	4
19	0	5599	5296	5675	5470	5521
	5	5341	5708	5688	5443	5604
	10	5410	5492	5438	5550	5450
	15	5469	5360	5372	5389	5692
	20	5269	5707	5498	5531	5700
	25	5434	5551	5633	5623	5652
	30	5396	5562	5641	5320	5601
	35	5660	5659	5596	5418	5400
	40	5587	5429	5624	5574	5717
	45	5423	5460	5263	5703	5682
	50	5588	5719	5547	5677	5411
	55	5524	5664	5643	5254	5504
	60	5402	5642	5299	5361	5655
	65	5619	5577	5671	5632	5522
	70	5518	5546	5407	5528	5304
	75	5261	5645	5695	5533	5665
	80	5344	5465	5537	5385	5343
	85	5363	5689	5345	5292	5477
	90	5610	5644	5445	5668	5611
	95	5356	5494	5417	5348	5520

Trial ID	Frequency List (MHz)	0	1	2	3	4
20	0	5379	5535	5611	5631	5363
	5	5383	5633	5288	5509	5336
	10	5719	5281	5479	5270	5471
	15	5557	5487	5475	5434	5409
	20	5607	5338	5648	5490	5504
	25	5491	5286	5657	5262	5560
	30	5694	5285	5519	5381	5569
	35	5421	5701	5276	5455	5274
	40	5332	5714	5670	5367	5389
	45	5571	5646	5403	5543	5699
	50	5472	5464	5323	5598	5291
	55	5612	5371	5377	5597	5444
	60	5674	5306	5445	5523	5397
	65	5581	5461	5410	5327	5618
	70	5393	5628	5448	5280	5667
	75	5705	5626	5546	5446	5508
	80	5528	5534	5580	5721	5680
	85	5652	5453	5688	5430	5334
	90	5548	5605	5396	5368	5545
	95	5549	5401	5343	5623	5331

Trial ID	Frequency List (MHz)	0	1	2	3	4
21	0	5634	5299	5547	5695	5583
	5	5522	5655	5363	5672	5640
	10	5650	5545	5520	5465	5492
	15	5645	5614	5481	5382	5601
	20	5615	5504	5589	5579	5477
	25	5379	5613	5385	5366	5594
	30	5261	5649	5476	5499	5721
	35	5619	5365	5464	5348	5524
	40	5343	5553	5375	5305	5629
	45	5568	5575	5286	5626	5282
	50	5712	5359	5340	5380	5435
	55	5315	5565	5551	5722	5328
	60	5251	5416	5271	5469	5530
	65	5497	5480	5680	5605	5312
	70	5631	5675	5577	5581	5431
	75	5607	5724	5656	5702	5591
	80	5531	5397	5624	5548	5653
	85	5297	5401	5628	5554	5639
	90	5278	5562	5604	5716	5684
	95	5272	5307	5638	5446	5630

Trial ID	Frequency List (MHz)	0	1	2	3	4
22	0	5317	5538	5483	5381	5425
	5	5564	5580	5438	5360	5372
	10	5484	5431	5561	5660	5513
	15	5636	5266	5584	5427	5415
	20	5526	5573	5627	5571	5450
	25	5645	5562	5588	5470	5628
	30	5400	5635	5433	5714	5495
	35	5439	5407	5555	5619	5677
	40	5257	5392	5458	5718	5394
	45	5565	5709	5340	5290	5624
	50	5691	5675	5700	5566	5258
	55	5637	5278	5505	5349	5339
	60	5693	5457	5319	5671	5723
	65	5669	5512	5421	5479	5436
	70	5312	5572	5408	5384	5462
	75	5256	5524	5610	5585	5546
	80	5701	5477	5685	5501	5291
	85	5264	5276	5592	5461	5265
	90	5521	5251	5649	5448	5664
	95	5560	5576	5586	5579	5659

Trial ID	Frequency List (MHz)	0	1	2	3	4
23	0	5572	5302	5419	5542	5645
	5	5606	5602	5513	5523	5579
	10	5415	5695	5283	5534	5724
	15	5393	5687	5472	5607	5264
	20	5568	5660	5423	5533	5414
	25	5316	5671	5662	5442	5524
	30	5390	5454	5647	5637	5546
	35	5646	5355	5328	5541	5656
	40	5537	5659	5336	5721	5317
	45	5301	5343	5511	5470	5376
	50	5276	5655	5556	5581	5369
	55	5459	5633	5664	5586	5484
	60	5713	5555	5495	5458	5719
	65	5525	5522	5367	5686	5553
	70	5448	5259	5373	5544	5515
	75	5620	5666	5278	5304	5428
	80	5339	5312	5527	5303	5260
	85	5360	5486	5422	5354	5566
	90	5610	5420	5598	5693	5714
	95	5450	5512	5545	5457	5547

Trial ID	Frequency List (MHz)	0	1	2	3	4
24	0	5352	5541	5355	5703	5487
	5	5648	5527	5588	5589	5408
	10	5346	5484	5265	5478	5555
	15	5337	5423	5315	5517	5324
	20	5542	5333	5509	5652	5396
	25	5363	5519	5300	5696	5413
	30	5347	5669	5421	5457	5685
	35	5262	5686	5605	5657	5642
	40	5624	5497	5302	5656	5643
	45	5701	5400	5359	5301	5552
	50	5327	5269	5282	5428	5557
	55	5632	5538	5715	5649	5658
	60	5387	5321	5404	5445	5474
	65	5508	5354	5637	5392	5625
	70	5531	5697	5562	5503	5369
	75	5666	5647	5433	5414	5520
	80	5592	5402	5425	5507	5430
	85	5620	5698	5256	5670	5466
	90	5572	5547	5707	5710	5294
	95	5434	5410	5524	5560	5270

Trial ID	Frequency List (MHz)	0	1	2	3	4
25	0	5607	5305	5291	5389	5707
	5	5312	5549	5663	5277	5615
	10	5655	5273	5306	5673	5576
	15	5425	5550	5418	5465	5516
	20	5453	5499	5547	5266	5369
	25	5687	5690	5625	5404	5255
	30	5526	5399	5304	5573	5349
	35	5353	5579	5283	5571	5481
	40	5329	5435	5542	5653	5572
	45	5681	5483	5417	5449	5697
	50	5253	5378	5358	5580	5372
	55	5270	5347	5649	5509	5339
	60	5603	5694	5719	5350	5646
	65	5423	5447	5564	5529	5670
	70	5319	5517	5362	5538	5462
	75	5356	5489	5334	5628	5685
	80	5427	5301	5281	5422	5702
	85	5430	5559	5661	5269	5307
	90	5443	5664	5684	5675	5581
	95	5562	5341	5252	5515	5308

Trial ID	Frequency List (MHz)	0	1	2	3	4
26	0	5387	5544	5702	5550	5549
	5	5354	5474	5263	5440	5347
	10	5586	5537	5393	5597	5416
	15	5677	5424	5510	5708	5461
	20	5665	5488	5258	5342	5575
	25	5542	5353	5508	5289	5288
	30	5261	5527	5475	5391	5444
	35	5375	5436	5485	5320	5412
	40	5373	5685	5650	5501	5661
	45	5566	5378	5502	5453	5573
	50	5429	5403	5694	5458	5699
	55	5468	5480	5401	5504	5548
	60	5623	5545	5469	5372	5483
	65	5396	5324	5473	5503	5365
	70	5298	5514	5421	5703	5609
	75	5380	5462	5557	5348	5625
	80	5419	5519	5333	5721	5364
	85	5662	5691	5484	5374	5681
	90	5615	5269	5404	5499	5303
	95	5385	5291	5646	5559	5350

Trial ID	Frequency List (MHz)	0	1	2	3	4
27	0	5545	5405	5638	5711	5294
	5	5396	5496	5338	5603	5651
	10	5517	5423	5388	5588	5618
	15	5504	5329	5527	5555	5425
	20	5469	5259	5429	5347	5315
	25	5366	5491	5556	5709	5323
	30	5707	5652	5693	5267	5499
	35	5295	5530	5632	5646	5686
	40	5256	5495	5311	5450	5647
	45	5333	5641	5649	5436	5458
	50	5340	5352	5605	5480	5633
	55	5701	5653	5252	5665	5451
	60	5669	5590	5455	5468	5339
	65	5670	5321	5519	5606	5691
	70	5276	5463	5489	5465	5622
	75	5393	5380	5672	5523	5714
	80	5435	5512	5688	5319	5684
	85	5627	5312	5464	5682	5539
	90	5687	5552	5704	5462	5286
	95	5459	5483	5676	5394	5486

Trial ID	Frequency List (MHz)	0	1	2	3	4
28	0	5325	5644	5574	5300	5514
	5	5438	5421	5413	5291	5383
	10	5351	5687	5429	5686	5639
	15	5592	5359	5630	5503	5617
	20	5380	5425	5467	5339	5288
	25	5254	5343	5284	5338	5357
	30	5274	5638	5650	5482	5273
	35	5493	5669	5723	5539	5364
	40	5410	5570	5578	5724	5690
	45	5266	5262	5524	5257	5494
	50	5511	5605	5703	5306	5531
	55	5722	5427	5485	5607	5442
	60	5484	5659	5535	5287	5294
	65	5285	5270	5458	5486	5554
	70	5632	5572	5468	5471	5369
	75	5544	5277	5666	5571	5491
	80	5660	5691	5676	5276	5316
	85	5434	5711	5657	5269	5651
	90	5495	5615	5405	5704	5693
	95	5586	5474	5400	5564	5721

Trial ID	Frequency List (MHz)	0	1	2	3	4
29	0	5580	5408	5510	5461	5356
	5	5577	5443	5488	5357	5590
	10	5282	5476	5470	5406	5660
	15	5680	5486	5258	5548	5334
	20	5388	5494	5428	5261	5520
	25	5292	5487	5442	5391	5413
	30	5527	5607	5600	5425	5313
	35	5711	5339	5335	5517	5324
	40	5409	5283	5662	5455	5263
	45	5569	5504	5340	5564	5492
	50	5579	5482	5582	5336	5250
	55	5429	5547	5561	5632	5303
	60	5296	5524	5480	5594	5595
	65	5328	5694	5648	5281	5704
	70	5558	5568	5320	5345	5676
	75	5513	5397	5712	5552	5268
	80	5295	5472	5365	5629	5614
	85	5499	5707	5368	5363	5695
	90	5700	5394	5321	5523	5371
	95	5583	5417	5603	5456	5452

*The test was performed on frequencies of shown in white.

APPENDIX 2: Test instruments

Test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
DFS	141269	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	03/08/2024	12
DFS	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	02/01/2024	12
DFS	141590	PowerDivider DC to 26.5GHz	Keysight Technologies Inc	11636B	52258	03/01/2024	12
DFS	141898 *1)	Signal Generator	Keysight Technologies Inc	N5182B	MY56200177	11/16/2023	12
DFS	141902	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187105	05/30/2024	12
DFS	142304	Attenuator(20dB)	Suhner	6820.19.A	-	-	-
DFS	142310	Attenuator	Pasternack Enterprises	PE7087-20	1328	-	-
DFS	142311	Attenuator	Pasternack Enterprises	PE7087-20	1329	-	-
DFS	142344	Microwave Cable	Junkosha	MWX221-01000AMSAMS	1304S247	-	-
DFS	142345	Microwave Cable	Junkosha	MWX221-01000AMSAMS	1304S248	-	-
DFS	142365	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S307	-	-
DFS	142370	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S308	-	-
DFS	142371	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S309	-	-
DFS	142372	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S310	-	-
DFS	142378	Microwave Cable	Junkosha	MWX-221-02000DMSDMS	1507S110	-	-
DFS	142379	Microwave Cable	Junkosha	MWX-221-02000DMSDMS	1507S111	-	-
DFS	142735	Power Splitters/Combiners	Pasternack Enterprises	ZFRSC-123-S+	ZFRSC-123-00231	-	-
DFS	142736	Power Splitters/Combiners	Pasternack Enterprises	ZFRSC-123-S+	ZFRSC-123-00232	-	-
DFS	142738	Power Splitters/Combiners	Mini-Circuits	ZFRSC-4-842-S+	2	-	-
DFS	244710	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202104	01/25/2024	12

***Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

***1) Signal generator is only used to generate radar test signal, and the wave form is confirmed with spectrum analyzer every time before the test.**

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

The expiration*1) This test equipment was used for the tests before the expiration date of the calibration.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:
DFS: Dynamic Frequency Selection