FCC PART 15, SUBPART C
ISEDC RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

Cisco Systems, Inc.

125 W Tasman Drive,
San Jose, CA 95134, USA

FCC ID: LDK948342197
IC: 2461N-948342197

Report Type: CIIPC Report	**Product Type:** Cisco Catalyst 9130AXE Series Wi-Fi 6 Access Points

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Report Number:	R2104052-01
Report Date:	2021-11-04
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ACCREDITED
CERTIFICATE #3297.02

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" (Rev.2)

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2104052-01	Original Report	2021-08-03
1	R2104052-01	Updated 17065 Reviewer's comments	2021-11-04

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was prepared on behalf of *Cisco Systems Inc*., and their product model: *C9130AXE-B (US), C9130AXE-A (Canada),* FCC ID: LDK948342197, IC: 2461N-948342197 with Marlin Antenna Model: C-ANT9104 as referred to as EUT in this report. The product is an 802.11ax Access Point operates in 2.4 GHz and 5 GHz bands.

1.2 Objective

This report was prepared on behalf of *Cisco Systems Inc.,* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules, ISEDC RSS-247 Issue 2 on February 2017.

The objective was to determine continuous compliance for an additional external antenna with FCC Part 15.247 and ISEDC RSS-247 rules. In order to determine continuous compliance with the new antenna, Output Power, and Power Spectral Density were spot tested.

1.3 Related Submittal(s)/Grant(s)

Equipment Class: NII, FCC ID: LDK948342197, IC: 2461N-948342197

1.4 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

1.5 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.6 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)*****,** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
    1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
    2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
    3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
    1 All Scope 1-Licence-Exempt Radio Frequency Devices;
    2 All Scope 2-Licensed Personal Mobile Radio Services;
    3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
    4 All Scope 4-Licensed Maritime & Aviation Radio Services;
    5 All Scope 5-Licensed Fixed Microwave Radio Services
    6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
    1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
    2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:
  1 All Radio Equipment, per KHCA 10XX-series Specifications;
  2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  1 MIC Telecommunication Business Law (Terminal Equipment):
  - All Scope A1 - Terminal Equipment for the Purpose of Calls;
  - All Scope A2 - Other Terminal Equipment
  2 Radio Law (Radio Equipment):
  - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
  - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
  - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:

  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v05r02.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The test utility used was a script provided by Cisco Systems, Inc. The test software used was *Chelsea, version 0.1.93* – developed by *Alexandrae Duran*. The test software was verified by *Alexandrae Duran* to comply with the standard requirements being tested against.

Data Rates Tested:
802.11b mode: 1Mbps
802.11g mode: 6Mbps
802.11n HT20 mode: MCS0
802.11n HE20 mode: MCS0

2.3 Duty Cycle Correction Factor

According to KDB 558074 D01 DTS Meas Guidance v05r02 section 6.0:

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be utilized to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data is being acquired (i.e., no transmitter off-time is to be considered).

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	94.71	100	94.71	0.24
802.11g	1.42	1.58	89.87	0.46
802.11n20	90.32	100	90.32	0.44
802.11ax20	89.49	100	89.49	0.48

Duty Cycle = On Time (ms)/ Period (ms)
Duty Cycle Correction Factor (dB) = 10*log(1/Duty Cycle)

2.4 Equipment Modifications

N/A

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E6410	3CKRAQ1

2.6 Remote Support Equipment

None.

2.7 Power Supply/Adapter

Manufacturer	Description	Model
Cisco	Power supply	AIR-PWRINJ6 V01

2.8 Interface Ports and Cabling

Description	Length (m)	To	From
Ethernet Cable	2	EUT	PoE Injector
Ethernet to RS-232	2	Laptop	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC and ISEDC Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §2.1091, §15.247(i) ISEDC RSS-102	RF Exposure	Compliant
FCC §15.247(b)(3) ISEDC RSS-247 §5.4 (4)	Maximum Peak Output Power	Compliant
FCC §15.247(e) ISEDC RSS-247 §5.2 (2)	Power Spectral Density	Compliant

4 FCC §15.203 & ISEDC RSS-Gen §6.8 - Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotopically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For license-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.2 Antenna Description

Part Number	Description	Frequency Range (MHz)	Antenna Port	Polarization	Gain
C-ANT9104	Cisco Catalyst 2.4 GHz and 5 GHz Eight-Port Polarization-Diverse Low Sidelobe Patch Antenna	2400-2483.5	EG	Vertical	6 dBi
			FH	Horizontal	
		5150-5350	ACEG	Vertical	10 dBi (Narrow Beam)
			BDFH	Horizontal	
			AC	Vertical	8 dBi (Wide Beam)
			BD	Horizontal	
		5470-5875	ACEG	Vertical	10 dBi (Narrow Beam)
			BDFH	Horizontal	
			EG	Vertical	8 dBi (Wide Beam)
			FH	Horizontal	

Antenna information was provided by customer.

5 FCC §2.1091, §15.247(i) & ISEDC RSS-102 – RF Exposure

5.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to KDB 447 498 Section (7.2), "simultaneous transmission of MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Where: f = frequency in MHz
* = Plane-wave equivalent power density

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF field.

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Note: According to MIMOFCC KDB 662911 D02 MIMO with Cross Polarized Antenna v01, Where an FCC rule specifies limits in radiated terms such as EIRP or ERP, the limits apply to the maximum emission that would be observed by a linearly polarized measurement antenna. Therefore, the highest output power from single antenna power was selected to calculate in this section.

5.3 MPE Results

Radio Standalone RF Exposure Configuration

2.4 GHz Wi-Fi: 802.11g, Mid Channel 2442 MHz

Maximum output power at antenna input terminal (dBm):	19.8
Maximum output power at antenna input terminal (mW):	95.50
Prediction distance (cm):	30
Prediction frequency (MHz):	2442
Maximum Antenna Gain, typical (dBi):	9
Maximum Antenna Gain (numeric):	7.94
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.067
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

2.4 GHz Wi-Fi ChillWave: 802.11g, Low Channel 2412 MHz

Maximum output power at antenna input terminal (dBm):	9.2
Maximum output power at antenna input terminal (mW):	8.32
Prediction distance (cm):	30
Prediction frequency (MHz):	2412
Maximum Antenna Gain, typical (dBi):	7
Maximum Antenna Gain (numeric):	5.012
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.004
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5 GHz Wi-Fi: 802.11a, Low Channel 5745 MHz

Maximum output power at antenna input terminal (dBm):	21.67
Maximum output power at antenna input terminal (mW):	146.89
Prediction distance (cm):	30
Prediction frequency (MHz):	5745
Maximum Antenna Gain, typical (dBi):	11
Maximum Antenna Gain (numeric):	12.59
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.164
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5 GHz Wi-Fi ChillWave: 802.11a, Middle Channel 5560 MHz

Maximum output power at antenna input terminal (dBm):	9.8
Maximum output power at antenna input terminal (mW):	9.55
Prediction distance (cm):	30
Prediction frequency (MHz):	5560
Maximum Antenna Gain, typical (dBi):	10
Maximum Antenna Gain (numeric):	10
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.008
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

BLE: Low Channel 2402 MHz

Maximum output power at antenna input terminal (dBm):	2.4
Maximum output power at antenna input terminal (mW):	1.74
Prediction distance (cm):	30
Prediction frequency (MHz):	2402
Maximum Antenna Gain, typical (dBi):	6
Maximum Antenna Gain (numeric):	3.98
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.0006
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure at 30 cm distance.

Radio Co-location RF Exposure Configuration

Standalone MPE (mW/cm^2)					Total MPE Ratio	Limit
BLE	2.4 GHz ChillWave	5 GHz ChillWave	2.4 GHz	5 GHz		
0.0006	0.004	0.008	0.067	0.164	0.244	1

5.4 RF exposure evaluation exemption for IC

2.4 GHz Wi-Fi: 802.11g, Mid Channel 2442 MHz

Maximum EIRP power = 19.8 dBm + 9 dBi = 28.8 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.70 W = 34.31 dBm

2.4 GHz Wi-Fi ChillWave: 802.11g, Low Channel 2412 MHz

Maximum EIRP power = 9.2 dBm + 7 dBi = 16.2 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.70 W = 34.31 dBm

5 GHz Wi-Fi: 802.11ax80, Low Channel 5745 MHz

Maximum EIRP power = 21.67 dBm + 11 dBi = 32.67 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 4.86 W = 36.87 dBm

5 GHz Wi-Fi ChillWave: 802.11a, Middle Channel 5560 MHz

Maximum EIRP power = 9.8 dBm + 10 dBi = 19.80 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 4.75 W = 36.77 dBm

BLE: Low Channel 2402 MHz

Maximum EIRP power = 2.4 dBm + 6 dBi = 8.4 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.68 W = 34.3 dBm

Therefore, the RF exposure Evaluation is not required.

6 FCC §15.247(b) (3) & ISEDC RSS-247 §5.4 (4) - Output Power Measurement

6.1 Applicable Standards

According to ECFR §15.247(b) (3) and ISEDC RSS-247 §5.4 (4) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

6.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2019-08-24	20 months
Radiall	SP8T Coax Switch	R574F11801	2011	N/A	N/A
-	RF cable	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.4 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	55 %
ATM Pressure:	102.1 kPa

The testing was performed by Alexandrae Duran from 2021-07-06 at RF site.

6.5 Test Results

Average Output Power

2412 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Tx 3 Max Power (dBm)	Tx 4 Max Power (dBm)	DCCF (dB)	Total Max Power (dBm)	FCC Limit (dBm)	Margin (dB)
CCK, 1 to 11 Mbps	1	6	-	15.62	-	-	0.24	15.86	30.00	-14.14
CCK, 1 to 11 Mbps	4	6	11.16	14.55	14.98	15.13	0.24	20.47	30.00	-9.53
non HT20, 6 to 54 Mbps	1	6	-	14.21	-	-	0.47	14.21	30.00	-15.79
non HT20, 6 to 54 Mbps	4	6	10.17	13.39	13.51	14.1	0.47	19.05	30.00	-10.95
non HT20, 6 to 54 Mbps-BF	4	9	8.14	11.4	11.56	12.19	0.47	17.56	27.00	-9.44
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6	-	14.35	-	-	0.44	14.35	30.00	-15.65
HT/VHT20, M0 to M7, M0.1 to M9.1	4	6	10.1	13.18	13.42	13.95	0.44	19.36	30.00	-10.64
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9	7.85	11.34	11.49	11.82	0.44	17.35	27.00	-9.65
HE20, M0.1 to M9.1	1	6	-	13.51	-	-	0.48	13.51	30.00	-16.49
HE20, M0.1 to M9.1	4	6	9.39	12.41	12.78	13.4	0.48	18.74	30.00	-11.26
HE20, M0.4 to M9.4-BF	4	9	8.31	11.55	12.06	12.31	0.48	17.82	27.00	-9.18

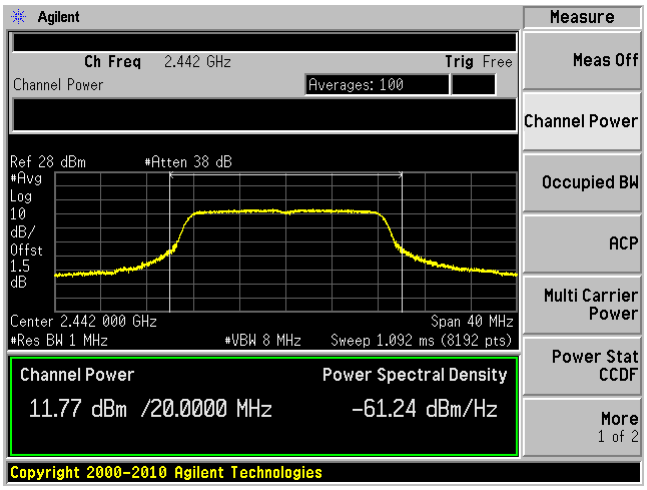
2442 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Tx 3 Max Power (dBm)	Tx 4 Max Power (dBm)	DCCF (dB)	Total Max Power (dBm)	FCC Limit (dBm)	Margin (dB)
CCK, 1 to 11 Mbps	1	6.00	-	16.37	-	-	0.24	16.61	30.00	-13.39
CCK, 1 to 11 Mbps	4	6.00	9.99	14.06	14.45	14.34	0.24	19.80	30.00	-10.20
non HT20, 6 to 54 Mbps	1	6.00	-	15.93	-	-	0.47	15.93	30.00	-14.07
non HT20, 6 to 54 Mbps	4	6.00	9.93	13.86	14.13	14.01	0.47	19.77	30.00	-10.23
non HT20, 6 to 54 Mbps-BF	**4**	**9.00**	**9.96**	**13.90**	**14.13**	**14.06**	**0.47**	**19.80**	**27.00**	**-7.20**
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6.00	-	15.88	-	-	0.44	15.88	30.00	-14.12
HT/VHT20, M0 to M7, M0.1 to M9.1	4	6.00	9.76	13.80	13.93	14.11	0.44	19.68	30.00	-10.32
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9.00	9.87	13.89	13.91	13.99	0.44	19.68	27.00	-7.32
HE20, M0.1 to M9.1	1	6.00	-	16.31	-	-	0.48	16.31	30.00	-13.69
HE20, M0.1 to M9.1	4	6.00	8.96	13.23	13.82	13.36	0.48	19.21	30.00	-10.79
HE20, M0.4 to M9.4-BF	4	9.00	8.04	12.26	12.82	12.25	0.48	18.20	27.00	-8.80

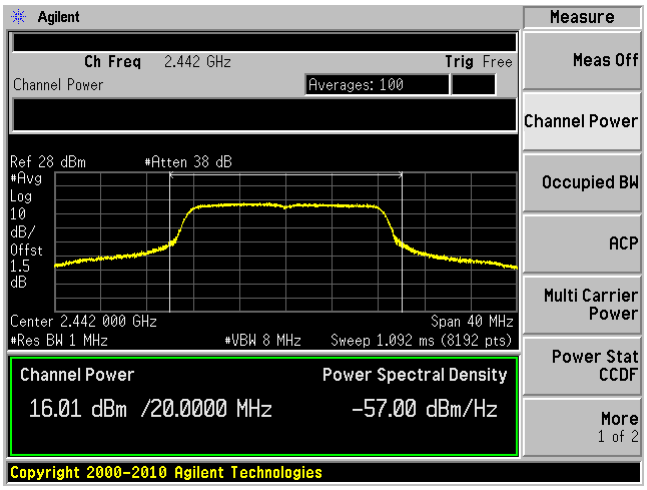
Please refer to the following plots as the worst case configuration.

nonHT20 4Tx BF

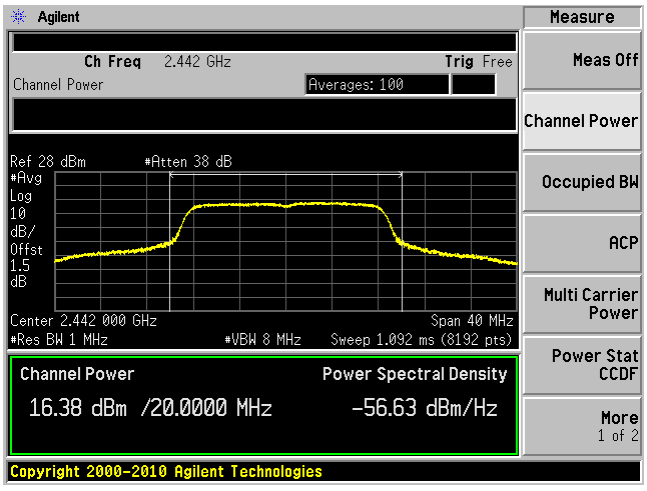
Ant-1



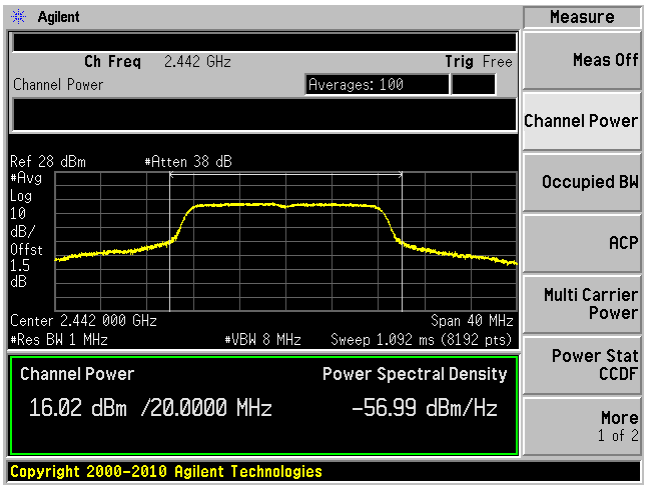
Ant-2



Ant-3



Ant-4



2462 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Tx 3 Max Power (dBm)	Tx 4 Max Power (dBm)	DCCF (dB)	Total Max Power (dBm)	FCC Limit (dBm)	Margin (dB)
CCK, 1 to 11 Mbps	1	6.00	-	15.95	-	-	0.24	16.19	30.00	-13.81
CCK, 1 to 11 Mbps	4	6.00	10.09	13.75	14.04	14.21	0.24	19.56	30.00	-10.44
non HT20, 6 to 54 Mbps	1	6.00	-	14.75	-	-	0.47	14.75	30.00	-15.25
non HT20, 6 to 54 Mbps	4	6.00	9.60	12.85	13.13	12.67	0.47	18.75	30.00	-11.25
non HT20, 6 to 54 Mbps-BF	4	9.00	7.42	10.83	10.99	10.51	0.47	16.64	27.00	-10.36
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6.00	-	13.67	-	-	0.44	13.67	30.00	-16.33
HT/VHT20, M0 to M7, M0.1 to M9.1	4	6.00	9.29	12.83	12.85	12.67	0.44	18.60	30.00	-11.40
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9.00	6.20	9.59	9.80	9.63	0.44	15.49	27.00	-11.51
HE20, M0.1 to M9.1	1	6.00	-	12.87	-	-	0.48	12.87	30.00	-17.13
HE20, M0.1 to M9.1	4	6.00	8.57	11.94	12.45	11.96	0.48	17.97	30.00	-12.03
HE20, M0.4 to M9.4-BF	4	9.00	7.74	10.96	11.53	10.91	0.48	17.01	27.00	-9.99

Note: Duty Cycle correction factor has already been added to the measurement.

7 FCC §15.247(e) & ISEDC RSS-247 §5.2(2) – Power Spectral Density

7.1 Applicable Standards

According to ECFR §15.247(e) and RSS-247 §5.2 (2) , for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2019-08-24	20 months
Radiall	SP8T Coax Switch	R574F11801	2011	N/A	N/A
-	RF cable	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.4 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	55 %
ATM Pressure:	102.1 kPa

The testing was performed by Alexandrae Duran from 2021-07-06 at RF site.

7.5 Test Results

2412 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 PSD (dBm/3 kHz)	Tx 2 PSD (dBm/3 kHz)	Tx 3 PSD (dBm/3 kHz)	Tx 4 PSD (dBm/3 kHz)	DCCF (dB)	Total PSD (dBm/3 kHz)	FCC/IC Limit (dBm/3 kHz)	Margin (dB)
CCK, 1 to 11 Mbps	1	6.00	-	-8.62	-	-	0.24	-8.38	8.00	-16.38
CCK, 1 to 11 Mbps	4	9.00	-9.89	-7.80	-7.85	-5.71	0.24	-1.31	5.00	-6.31
non HT20, 6 to 54 Mbps	1	6.00	-	-11.66	-	-	0.47	-11.19	8.00	-19.19
non HT20, 6 to 54 Mbps	4	9.00	-16.55	-13.13	-12.75	-12.40	0.47	-6.95	5.00	-11.95
non HT20, 6 to 54 Mbps-BF	4	9.00	-18.42	-15.25	-15.45	-13.78	0.47	-8.94	5.00	-13.94
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6.00	-	-9.50	-	-	0.44	-9.05	8.00	-17.05
HT/VHT20, M0 to M7, M0.1 to M9.1	4	9.00	-14.83	-10.85	-11.24	-11.68	0.44	-5.44	5.00	-10.44
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9.00	-17.29	-13.43	-13.40	-10.63	0.44	-6.63	5.00	-11.63
HE20, M0.1 to M9.1	1	6.00	-	-12.78	-	-	0.48	-12.30	8.00	-20.30
HE20, M0.1 to M9.1	4	9.00	-16.36	-13.50	-13.28	-12.29	0.48	-7.11	5.00	-12.11
HE20, M0.4 to M9.4-BF	4	9.00	-17.87	-13.54	-14.24	-13.45	0.48	-7.95	5.00	-12.95

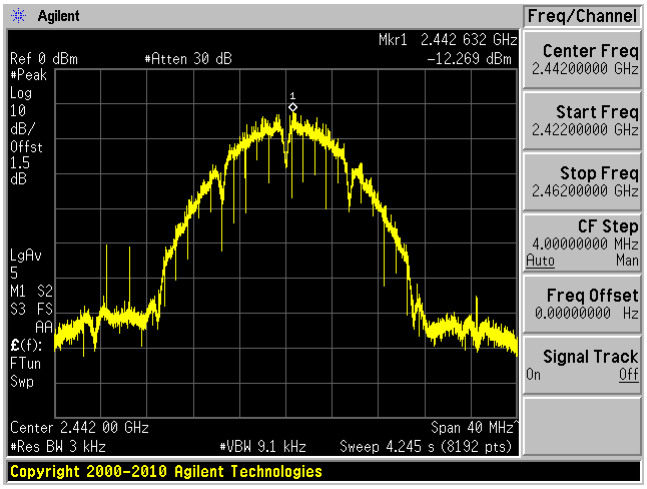
2442 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 PSD (dBm/3 kHz)	Tx 2 PSD (dBm/3 kHz)	Tx 3 PSD (dBm/3 kHz)	Tx 4 PSD (dBm/3 kHz)	DCCF (dB)	Total PSD (dBm/3 kHz)	FCC/IC Limit (dBm/3 kHz)	Margin (dB)
CCK, 1 to 11 Mbps	1	6.00	-	-6.55	-	-	0.24	-6.31	8.00	-14.31
CCK, 1 to 11 Mbps	**4**	9.00	**-12.27**	**-7.82**	**-6.09**	**-6.04**	**0.24**	**-1.19**	5.00	**-6.19**
non HT20, 6 to 54 Mbps	1	6.00	-	-8.91	-	-	0.47	-8.44	8.00	-16.44
non HT20, 6 to 54 Mbps	4	9.00	-13.43	-10.63	-8.75	-11.01	0.47	-4.16	5.00	-9.16
non HT20, 6 to 54 Mbps-BF	4	9.00	-14.58	-9.73	-10.26	-9.40	0.47	-4.09	5.00	-9.09
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6.00	-	-9.69	-	-	0.44	-9.25	8.00	-17.25
HT/VHT20, M0 to M7, M0.1 to M9.1	4	9.00	-13.18	-7.90	-9.39	-8.80	0.44	-2.96	5.00	-7.96
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9.00	-13.02	-8.28	-7.65	-8.77	0.44	-2.54	5.00	-7.54
HE20, M0.1 to M9.1	1	6.00	-	-9.55	-	-	0.48	-9.06	8.00	-17.06
HE20, M0.1 to M9.1	4	9.00	-16.22	-12.79	-11.73	-11.32	0.48	-6.15	5.00	-11.15
HE20, M0.4 to M9.4-BF	4	9.00	-18.01	-13.51	-13.50	-13.13	0.48	-7.65	5.00	-12.65

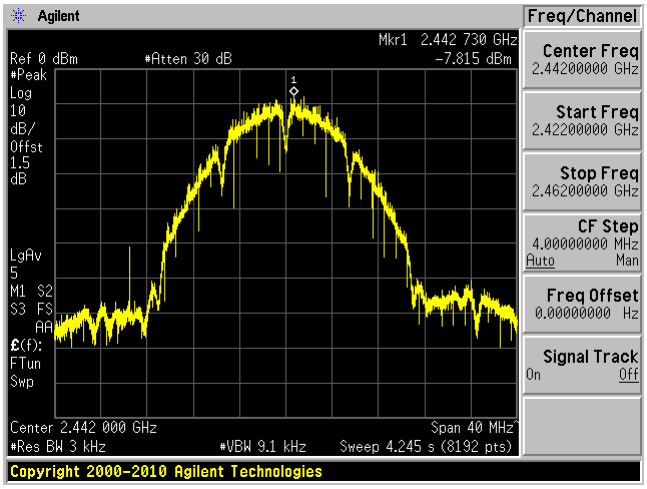
Please refer to the following plots as the worst case configuration.

CCK 4Tx

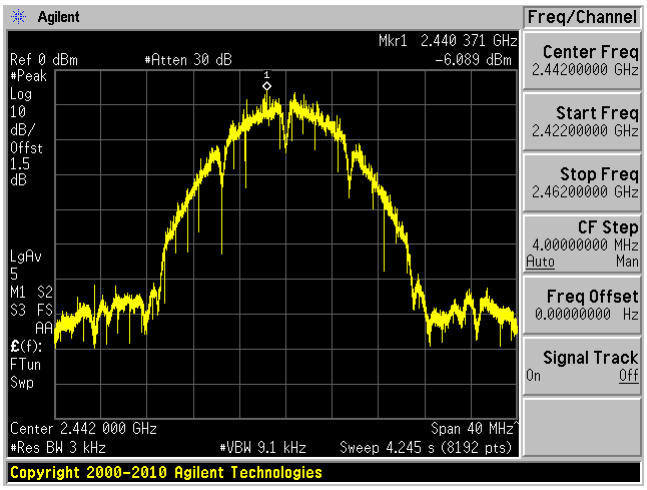
Ant-1



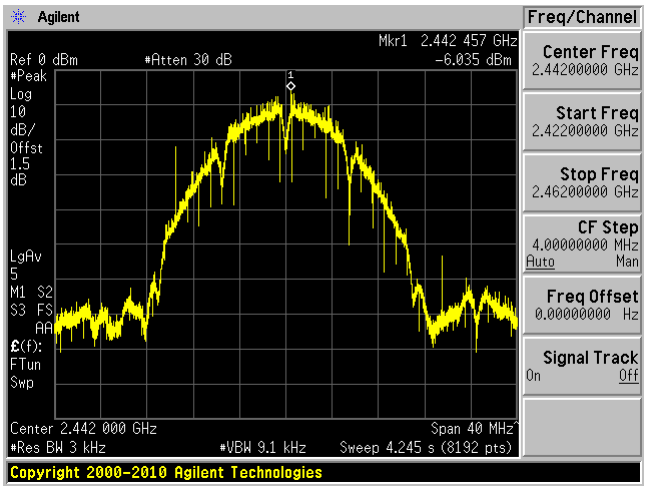
Ant-2



Ant-3



Ant-4



2462 MHz:

Mode	Tx paths	correlated antenna gain (dBi)	Tx 1 PSD (dBm/3 kHz)	Tx 2 PSD (dBm/3 kHz)	Tx 3 PSD (dBm/3 kHz)	Tx 4 PSD (dBm/3 kHz)	DCCF (dB)	Total PSD (dBm/3 kHz)	FCC/IC Limit (dBm/3 kHz)	Margin (dB)
CCK, 1 to 11 Mbps	1	6.00	-	-8.04	-	-	0.24	-7.80	8.00	-15.80
CCK, 1 to 11 Mbps	4	9.00	-10.74	-7.01	-7.07	-7.28	0.24	-1.52	5.00	-6.52
non HT20, 6 to 54 Mbps	1	6.00	-	-12.36	-	-	0.47	-11.89	8.00	-19.89
non HT20, 6 to 54 Mbps	4	9.00	-16.21	-12.95	-12.87	-13.20	0.47	-7.12	5.00	-12.12
non HT20, 6 to 54 Mbps-BF	4	9.00	-19.37	-15.84	-15.85	-15.86	0.47	-10.01	5.00	-15.01
HT/VHT20, M0 to M7, M0.1 to M9.1	1	6.00	-	-10.51	-	-	0.44	-10.07	8.00	-18.07
HT/VHT20, M0 to M7, M0.1 to M9.1	4	9.00	-14.89	-12.01	-12.57	-12.09	0.44	-6.28	5.00	-11.28
HT/VHT20, M0 to M7, M0.4 to M9.4-BF	4	9.00	-18.52	-15.43	-14.62	-14.72	0.44	-9.11	5.00	-14.11
HE20, M0.1 to M9.1	1	6.00	-	-11.89	-	-	0.48	-11.41	8.00	-19.41
HE20, M0.1 to M9.1	4	9.00	-16.26	-13.19	-12.96	-14.56	0.48	-7.55	5.00	-12.55
HE20, M0.4 to M9.4-BF	4	9.00	-17.54	-15.00	-14.18	-14.66	0.48	-8.67	5.00	-13.67

8 Annex A (Normative) – EUT External Photographs

Please refer to the attachment.

9 Annex B (Normative) – EUT Internal Photographs

Please refer to the attachment.

10 Annex C (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets A2LA *R222 - Specific Requirements EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 10th day of March 2021.

Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2022

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---