

TEST REPORT

Report Number. : 14441108-E3V1

Applicant : DISH TECHNOLOGIES LLC
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112, UNITED STATES

Model : D35

Brand : DISH

FCC ID : DKNP27TJ

EUT Description : TV SET TOP BOX CLIENT

Test Standard(s) : FCC 47 CFR PART 1 SUBPART I
FCC 47 CFR PART 2 SUBPART J

Date Of Issue:

2022-09-27

Prepared by:

UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888



Revision History

| <u>Rev.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|------------------|-------------------|
| V1 | 2022-09-27 | Initial Issue | --- |

TABLE OF CONTENTS

| | |
|--|---|
| 1. ATTESTATION OF TEST RESULTS | 4 |
| 2. TEST METHODOLOGY | 5 |
| 3. REFERENCES | 5 |
| 4. FACILITIES AND ACCREDITATION | 5 |
| 5. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS) | 6 |
| 5.1. FCC RULES | 6 |
| 5.2. EQUATIONS..... | 7 |
| 6. RF EXPOSURE RESULTS..... | 9 |

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: DISH TECHNOLOGIES LLC
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112, UNITED STATES

EUT DESCRIPTION: TV SET TOP BOX CLIENT

MODEL: D35

BRAND: DISH

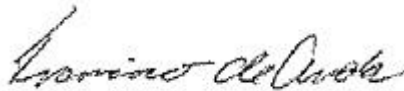
| APPLICABLE STANDARDS | |
|---|--------------|
| STANDARD | TEST RESULTS |
| FCC PART 1 SUBPART I & PART 2 SUBPART J | Complies |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

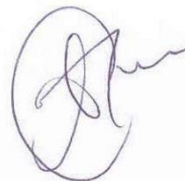
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Francisco de Anda
Staff Engineer
UL Verification Services Inc.

Prepared By:



Tina Chu
Senior Project Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

All calculations were made in accordance with FCC Parts 1.1310, 2.1091, 2.1093, KDB 447498 D01 v06, KDB 447498 D03 V01, IEEE Std C95.1-2005, IEEE Std C95.3-2002.

3. REFERENCES

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

All measurements were made as documented in test reports;
UL Verification Services Inc. Document 13618993-E1 for operation in the BLE 2.4 GHz Band,
UL Verification Services Inc. Document 13618993-E2 for operation in the BT 2.4 GHz band and
UL Verification Services Inc. Document 14441108-E1 for operation in the Zigbee 2.4 GHz

Output power and Duty cycle data is excerpted from the applicable test reports.

Manufacturing tolerance and Antenna gain data is provided by the customer.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

| | Address | ISED CABID | ISED Company Number | FCC Registration |
|-------------------------------------|--|------------|---------------------|------------------|
| <input type="checkbox"/> | Building 1: 47173 Benicia Street, Fremont, California, USA | US0104 | 2324A | 550739 |
| <input type="checkbox"/> | Building 2: 47266 Benicia Street, Fremont, California, USA | US0104 | 22541 | 550739 |
| <input checked="" type="checkbox"/> | Building 4: 47658 Kato Rd, Fremont, California, USA | US0104 | 2324B | 550739 |

5. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS)

5.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposure | | | | |
| 0.3-3.0 | 614 | 1.63 | *100 | 6 |
| 3.0-30 | 1842/f | 4.89/f | *900/f ² | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1,500 | | | f/300 | 6 |
| 1,500-100,000 | | | 5 | 6 |
| (B) 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 |
| 300-1,500 | | | f/1500 | 30 |
| 1,500-100,000 | | | 1.0 | 30 |

f = frequency in MHz

* = Plane-wave equivalent power density

Notes:

- (1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
- (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

5.2. EQUATIONS

POWER DENSITY

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * D^2)$$

Where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Power density in units of mW/cm² is converted to units of W/m² by multiplying by 10.

DISTANCE

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

Where

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power in mW

S = Power density in mW/cm²

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

$$\text{Source-based time-averaged EIRP} = (\text{DC} / 100) * \text{EIRP}$$

Where

DC = Duty Cycle in %, as applicable

EIRP = Equivalent Isotropic Radiated Power in mW

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

$$\text{Total EIRP} = (\text{EIRP1}) + (\text{EIRP2}) + \dots + (\text{EIRPn})$$

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

6. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

| Multiple chain or colocated transmitters | | | | | | | | | |
|--|--------|----------------|-------------------|------------------------|-----------------|----------------|-----------|------------------------------|------------------------------------|
| Band | Mode | Chain for MIMO | Separ. Dist. (cm) | Output AVG Power (dBm) | Ant. Gain (dBi) | Duty Cycle (%) | EIRP (mW) | FCC PD (mW/cm ²) | FCC PD Limit (mW/cm ²) |
| 2.4 GHz | BLE | N/A | | 8.75 | 4.20 | 100.0 | 19.72 | | |
| 2.4 GHz | Zigbee | N/A | | 12.45 | 4.10 | 100.0 | 45.19 | | |
| Combined | | | 20 | | | | 64.91 | 0.01 | 1.00 |

| Multiple chain or colocated transmitters | | | | | | | | | |
|--|--------|----------------|-------------------|------------------------|-----------------|----------------|-----------|------------------------------|------------------------------------|
| Band | Mode | Chain for MIMO | Separ. Dist. (cm) | Output AVG Power (dBm) | Ant. Gain (dBi) | Duty Cycle (%) | EIRP (mW) | FCC PD (mW/cm ²) | FCC PD Limit (mW/cm ²) |
| 2.4 GHz | BT | N/A | | 9.47 | 4.20 | 100.0 | 23.28 | | |
| 2.4 GHz | Zigbee | N/A | | 12.45 | 4.10 | 100.0 | 45.19 | | |
| Combined | | | 20 | | | | 68.47 | 0.01 | 1.00 |

| Multiple chain or colocated transmitters | | | | | | | | | |
|--|--------|----------------|---------------------------------|------------------------|-----------------|----------------|-----------|--------------------------|--|
| Band | Mode | Chain for MIMO | FCC Limit (mW/cm ²) | Output AVG Power (dBm) | Ant. Gain (dBi) | Duty Cycle (%) | EIRP (mW) | Separ. Distance FCC (cm) | |
| 2.4 GHz | BLE | N/A | | 8.75 | 4.20 | 100.0 | 1.0 | | |
| 2.4 GHz | Zigbee | N/A | | 12.45 | 4.10 | 100.0 | 1.0 | | |
| Combined | | | 1.00 | | | | 2.0 | 0.40 | |

| Multiple chain or colocated transmitters | | | | | | | | | |
|--|--------|----------------|---------------------------------|------------------------|-----------------|----------------|-----------|--------------------------|--|
| Band | Mode | Chain for MIMO | FCC Limit (mW/cm ²) | Output AVG Power (dBm) | Ant. Gain (dBi) | Duty Cycle (%) | EIRP (mW) | Separ. Distance FCC (cm) | |
| 2.4 GHz | BT | N/A | | 9.47 | 4.20 | 100.0 | 1.0 | | |
| 2.4 GHz | Zigbee | N/A | | 12.45 | 4.10 | 100.0 | 1.0 | | |
| Combined | | | 1.00 | | | | 2.0 | 0.40 | |

Notes:

- 1) Manufacturing tolerance (+ 1dB) was added to measured data. The manufacturer configures output power so that the maximum power will never exceed the maximum power level listed above.
- 2) The output power in the tables above is the maximum power per antenna among various channels and various modes within the specific band.
- 3) The antenna gain in the tables above is the maximum antenna gain among various channels within the specified band.

END OF REPORT