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September 27, 2020

CalAmp
2200 Faraday Ave, Suite 220
Carlsbad, CA 92008
USA

Dear Mr. Imad Rizk,

Enclosed is the Antenna Characterization Test Report for the LTE trace antenna of the Calamp TTU2830 integrated device.

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely yours,
Eurofins E&E North America

Arsalan Hasan
Wireless Laboratory

Reference: (\Calamp, Inc.\WIRS109402-Passive Rev. 1)

ACCREDITED
TESTING CERT #0591.02

CTIA Certification
Authorized Test Lab
Lab Code: 20200407- 00

Antenna Characterization Test Report

For the

Manufacturer: Calamp
Model Name/Number: TTU2830
Device Type: Integrated Device

Report: WIRS109402-Passive Rev. 1

September 27, 2020

Prepared For:

CalAmp
2200 Faraday Ave, Suite 220
Carlsbad, CA 92008
USA

Prepared By:
Eurofins E&E North America
3162 Belick St,
Santa Clara CA, 95054

Antenna Characterization Test Repot

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Manufacturer: Calamp
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Device Type: Integrated Device

Report: WIRS109402-Passive Rev. 1

Alberto Saldivar
Engineer, Wireless Laboratory

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Eleazar Zuniga, PhD.
Director, Wireless Technologies

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	September 21, 2020	-Initial Issue.
1	September 27, 2020	Review Updates

Table of Contents

1. Executive Summary

Eurofins E&E North America was contracted by Calamp to perform passive mode testing of the LTE trace antenna of the TTU2830 Integrated Device under the Calamp purchase order number 401701.

2. Equipment Configuration

2.1. Overview

This document reports the Antenna Efficiency and Peak Gain of the LTE trace antenna of the Calamp TTU2830 Integrated Device

2.1.1. Equipment Under Test (EUT) Information

Manufacture:	Calamp	
Model:	TTU2830MB	
Device Type:	Integrated Device	
Antenna Type:	Internal Trace Antenna	
Cellular Frequencies	715 MHz, 785 MHz, 830 MHz, 1730 MHz, 1880 MHz	
EUT Specifications:	Device Code:	109402_AA01
	Device Dimensions (HxWxD):	110x75x35 mm
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Alberto Saldivar	
Report Date(s):	September 27, 2020	

2.1.2. References

ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories

2.2. Test Site

All testing was performed in a limited access test laboratory facility located at Eurofins E&E North America, 3162 Belick St., Santa Clara, CA 95054. All testing performed at Eurofins E&E North America. Was conducted in the Environmental Simulation Lab. All equipment used in making physical determinations is accurate and bears recent traceability to the National Standards and Technology.

2.3. Test Equipment Used During Testing

2.3.1. Total radiated power / Total isotropic sensitivity/Conducted Power/Conducted Sensitivity

MET Asset #	Equipment	Manufacturer	Model Number	Last Cal Date	Cal Due Date
1S2811	Radio Communication Analyzer	Anritsu	MT8821C	12/15/2019	12/15/2020
1S2809	Signal Analyzer	Anritsu	MS2830A	12/5/2019	12/5/2020
Note 1:					

2.3.2. Measurement Software

Description	Manufacturer	Name	Version
OTA software	ETS	EMQuest	1.13

3. Result Summary

3.1. Project Summary

Customer:	Calamp
EUT Name/Model:	TTU2830
Job Number	109402, Sample AB01
Test Standard:	N/A
Test Name	Antenna Efficiency and Peak Gain
Test Dates:	September 21, 2020
Laboratory	Eurofins E&E North America, 3162 Belick St., Santa Clara, CA 95054
Test Engineer:	Alberto Saldivar
Test Results:	Compliant/Completed
Additional Notes:	

4. Passive Testing

4.1. Test Setup

Next figures shows the OTA test set up, in order to measure the antenna efficiency and Peak gain in Active configuration.

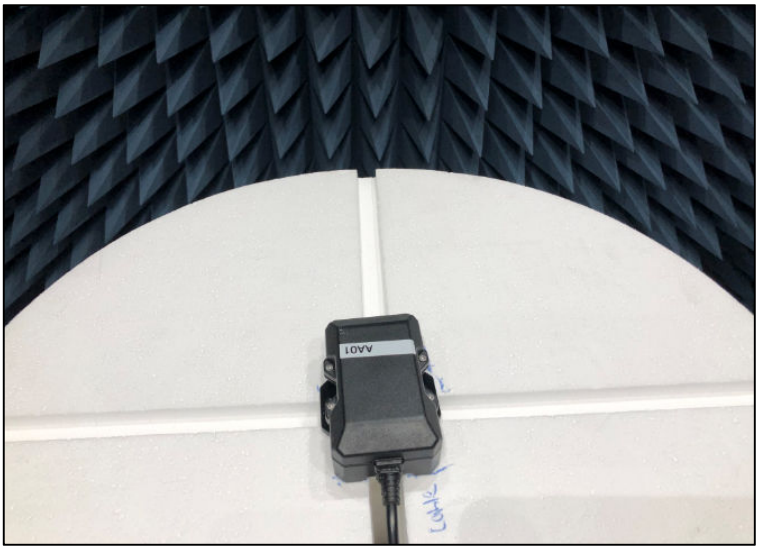

Figure 1; EUT Front View

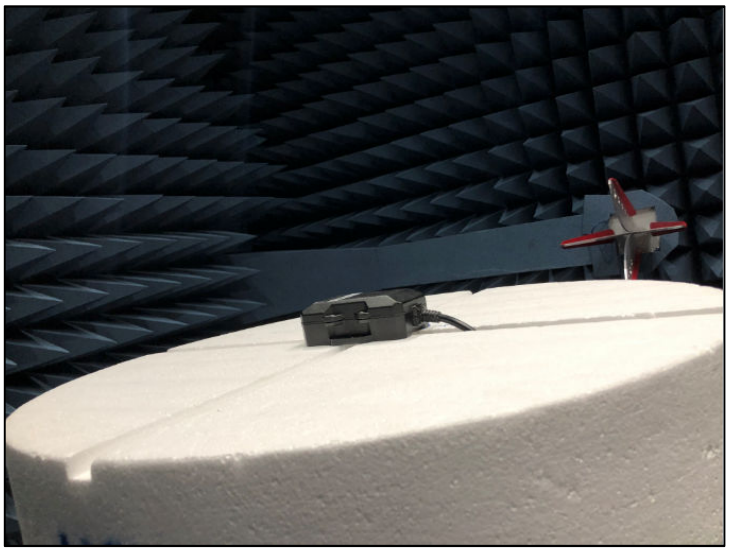

Figure 2; EUT Side View

4.2. Antenna Efficiency

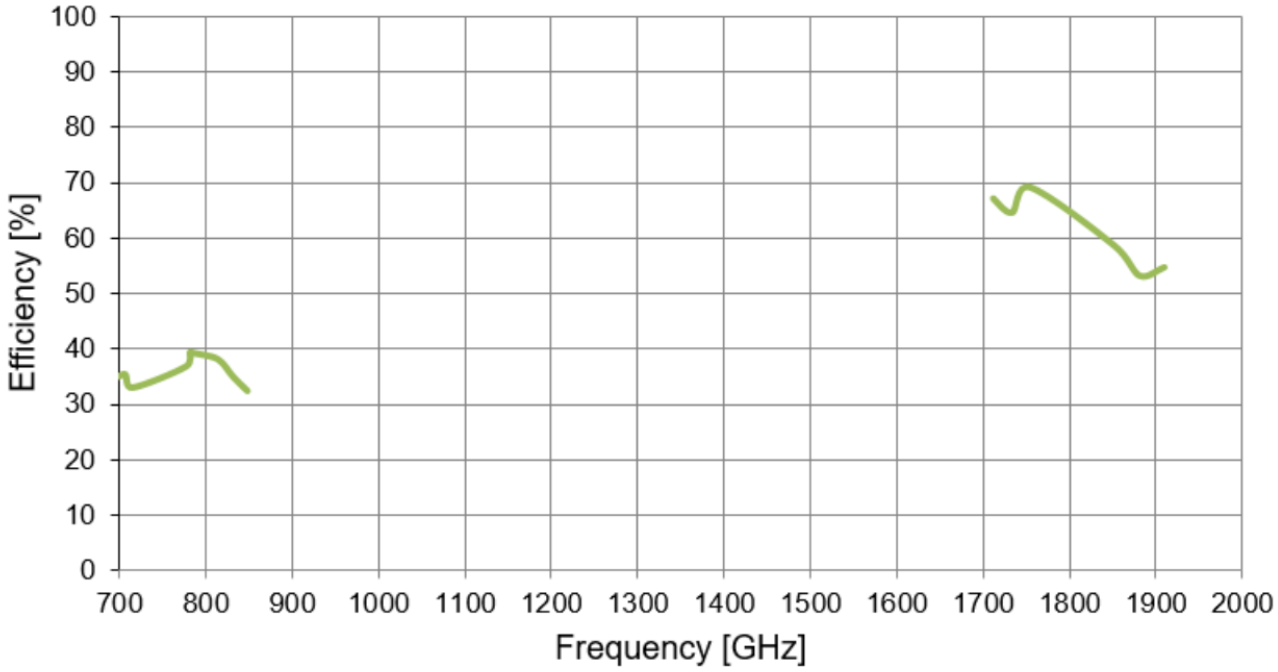

Figure 3; Antenna Efficiency

4.3. Antenna Peak Gain

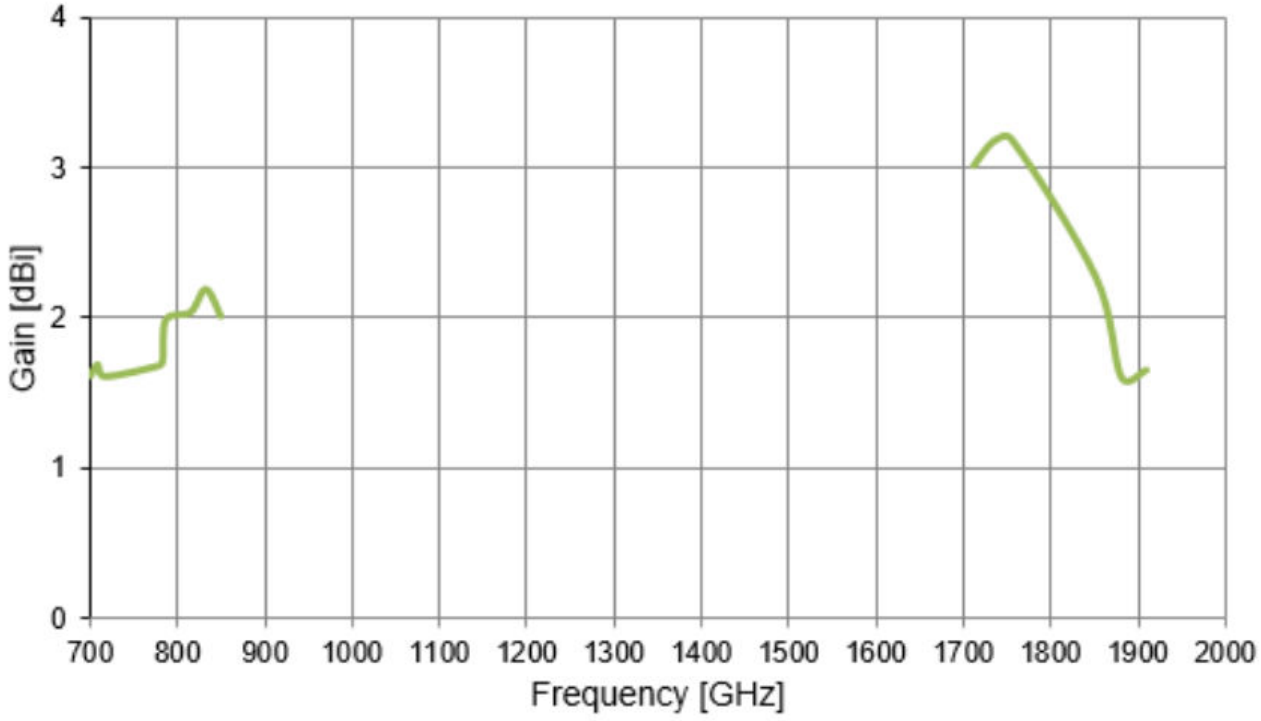

Figure 4; Antenna Peak Gain

4.4. Antenna 3D Patterns

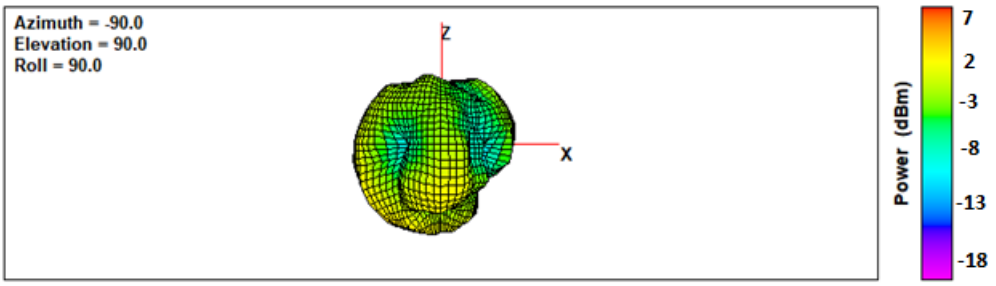

Figure 5; 3D pattern, 1880MHz

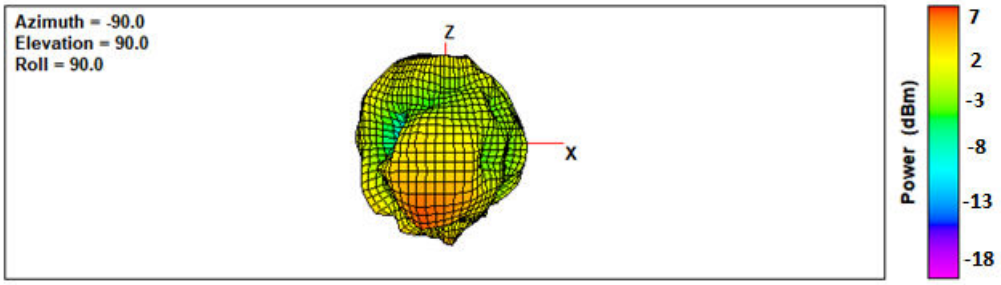

Figure 6; 3D pattern, 1730 MHz

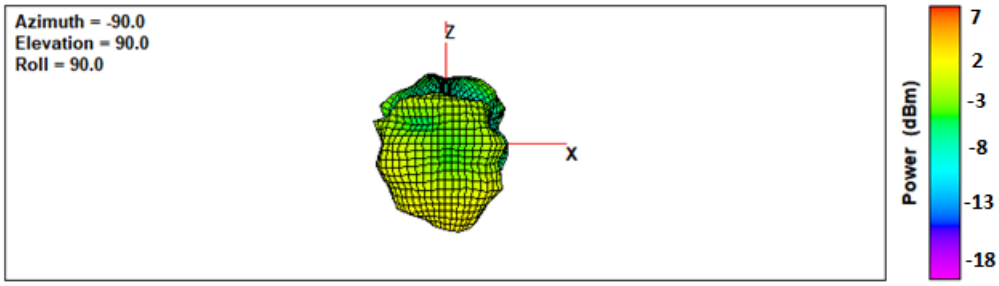

Figure 7; 3D pattern, 830 MHz

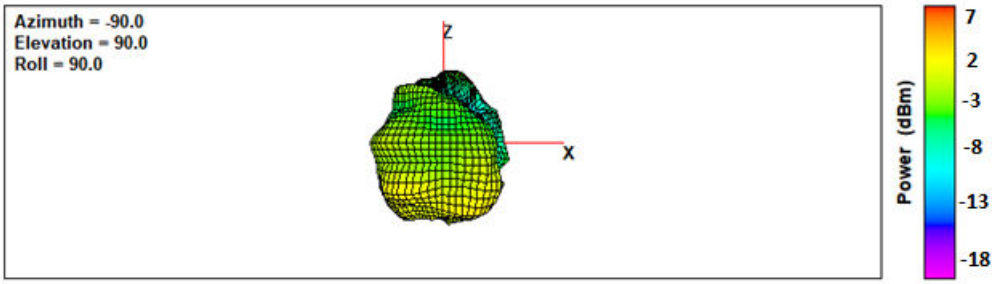

Figure 8; 3D pattern, 715 MHz

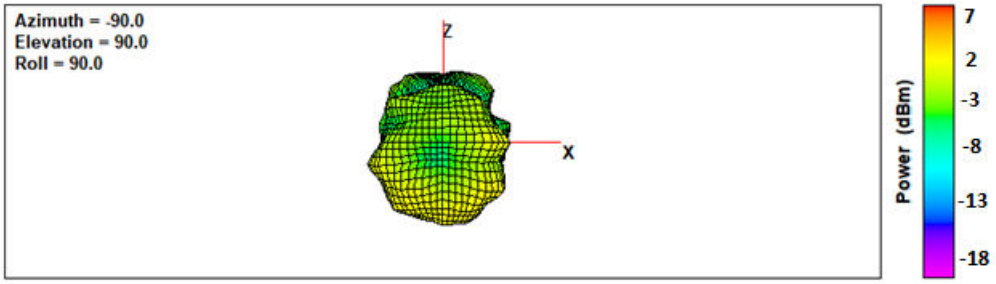

Figure 9; 3D pattern, 785 MHz

End of Report