HYPER CORP
"Wireless That Works"SM

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Bluetooth® Test Report
FCC Part 15

Prepared for:

Datalogic S.p.A.

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Bluetooth®

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QCD0004 Rev 06 - 05/17/2002

ACCREDITED

Certificate Number 1708-1
Hyper Corp is an Accredited Laboratory by The American Association For Laboratory Accreditation (A2LA) to ISO/IEC 17025-for the scope of BLUETOOTH Testing.

1 Signature(s)

HYPER Corporation Personnel listed below is responsible for the content of this document.

Signature(s)	Date
Original Signed Kevin Marquess	

2 List of Revisions

Version	Date	Author(s)	Description
001	03/15/2004	Kevin Marquess	Initial Version
002	05/10/2004	Kevin Marquess	Editorial changes for TCB submission

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3 Disclaimer Notice

This test report applies only to the EUT (Equipment Under Test) and the results of the specifications called out in this report.

4 Reproduction Clause

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5 Project Details and Description of Test Item

Project Number	704-0310015
Product ID/Model Number	Gryphon BT200
Proposed FCC ID	OMJ0008
Date received	February 18, 2004
Date(s) tested	February 20 & 23, 2004
Description of EUT	Hand-held barcode scanner with Bluetooth® Wireless Technology
Condition of EUT	Good
Serial number	C04B08416
Product Version	v2.04

6 General Testing Information

6.1 Test Facility

Company	**Location**	**Parts Tested**
HYPER Corporation	45388 Warm Springs Blvd.	FCC – Part 15
	Fremont, CA 94539-6102	
Customer Facility	N/A	
(If applicable)		

6.2 Test Environment

Nominal Temperature	25-28°C
Nominal Humidity	25% – 65%
Extreme – Temperature and Voltage	
Low Temperature	N/A
High Temperature	N/A
Nominal Voltage	N/A
Low Voltage	N/A
High Voltage	N/A

7 Test Summary

The tests were performed to show compliance with the applicable FCC Part 15 test requirements.

7.1 Test Results

Test results are summarized below. "Pass" indicates the test case requirements were reviewed to be in conformance. However, the appropriate FCC authoritative body makes final determination – be it a TCB or the FCC directly.

Radiated measurements were made at a subcontracted facility and the associated report is contained in the Appendix of this document.

All test results for the performed Tests are listed here.

FCC Section	Description	Verdict
15.204	Antenna Gain	P
15.207	Conducted Emissions - AC-Mains[1]	P
15.209	Radiated Emissions	P
15.205	Restricted Bands[1]	P
15.247(a)	**FHSS System criteria**	P
	Carrier Frequency Separation	P
	Number of Hopping Channels	P
	Time of Occupancy (Dwell Time)	P
	20 dB – Bandwidth	P
15.247(b) (1)	Peak Output Power	P
15.247(b) (5)	RF Exposure – MPE Calculation	P
15.247 c)	Out-of-Band Spurious Emissions	P
NOTES		
1	See Appendix for results	

8 Test Data

15.204 Antenna Information

Specifications:

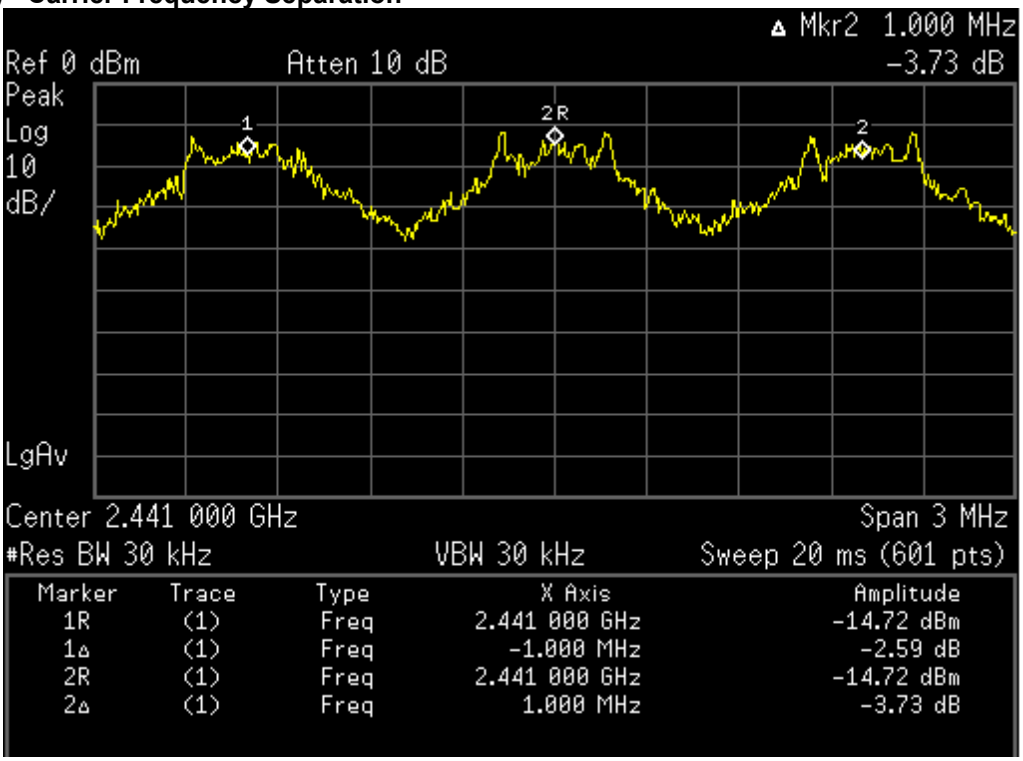
Frequency Range	2.4 – 2.5 GHz
Polarization	Linear
Peak Gain	>2.0 dBi
Average Gain	>0 dBi
Nominal Impedance	50 ohms
VSWR (Min. Performance)	<2.0:1 across band
Temperature Range	-40° to +85°C
Vibration	6G RMS (9.04g2/Hz) for 15 minutes each in vertical and horizontal. No appearance or functional axis.
Thermal Shock	Change after 4 repeated cycles of 1 hr. at +85°C and 1 hr. at -40°C. Transfer time is 5 min.
Radiating Element Size	8mm x 6mm x 2.5mm (l x w x h)
Physical Mass	0.21 grams
Length w/ Solder Tabs	12mm

For further information refer to Appendix

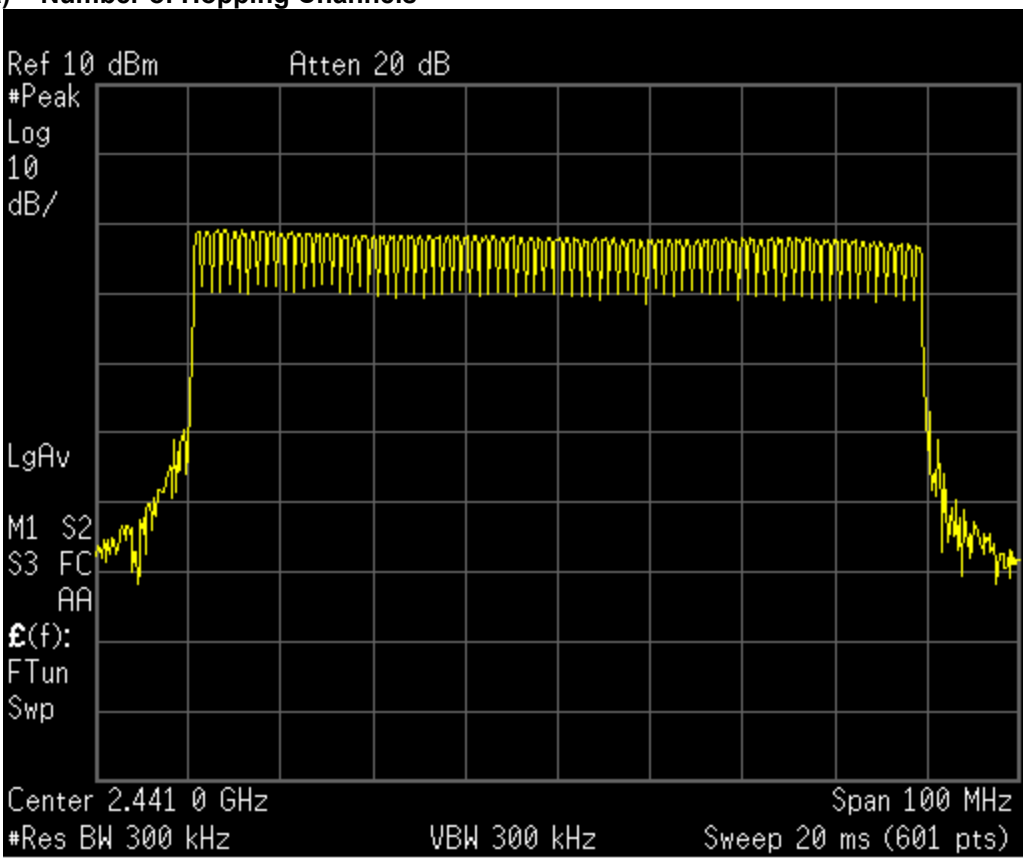
15.207 – Conducted Emissions
See Appendix for results

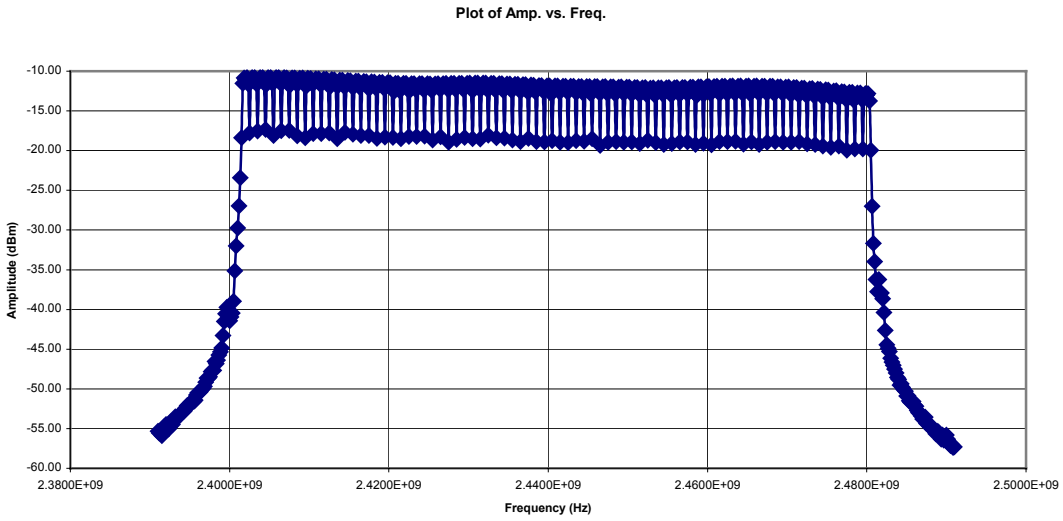
15.209 - Radiated Emissions
See Appendix for results

15.247(a) - Carrier Frequency Separation



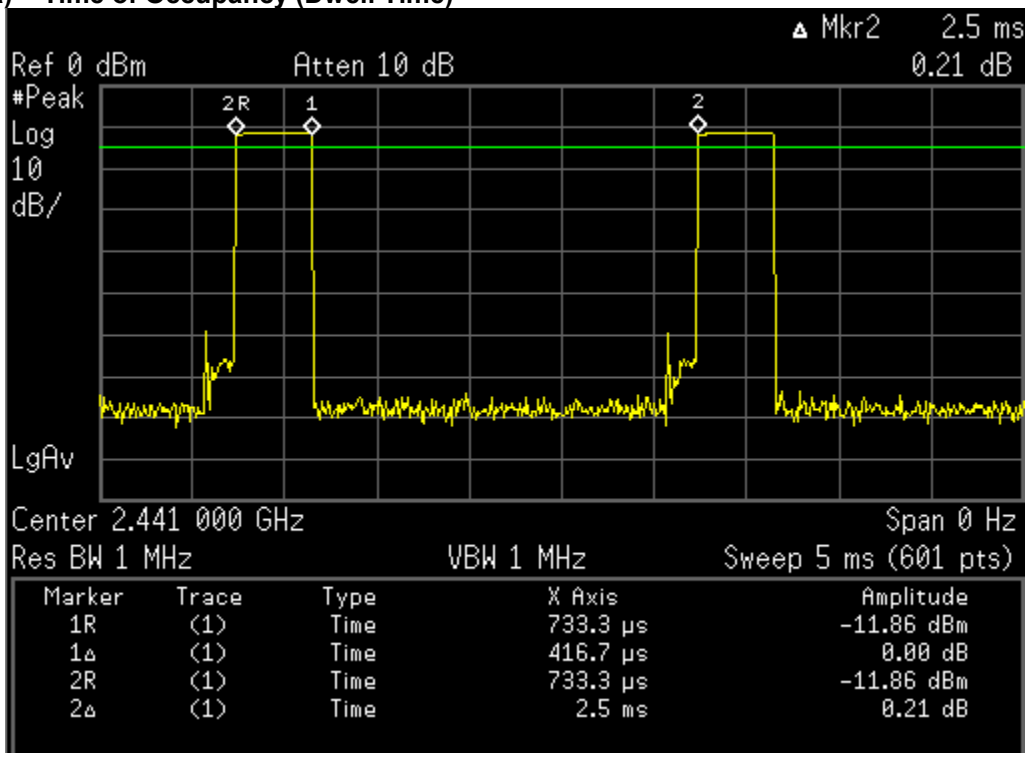
15.247 (a) – Number of Hopping Channels





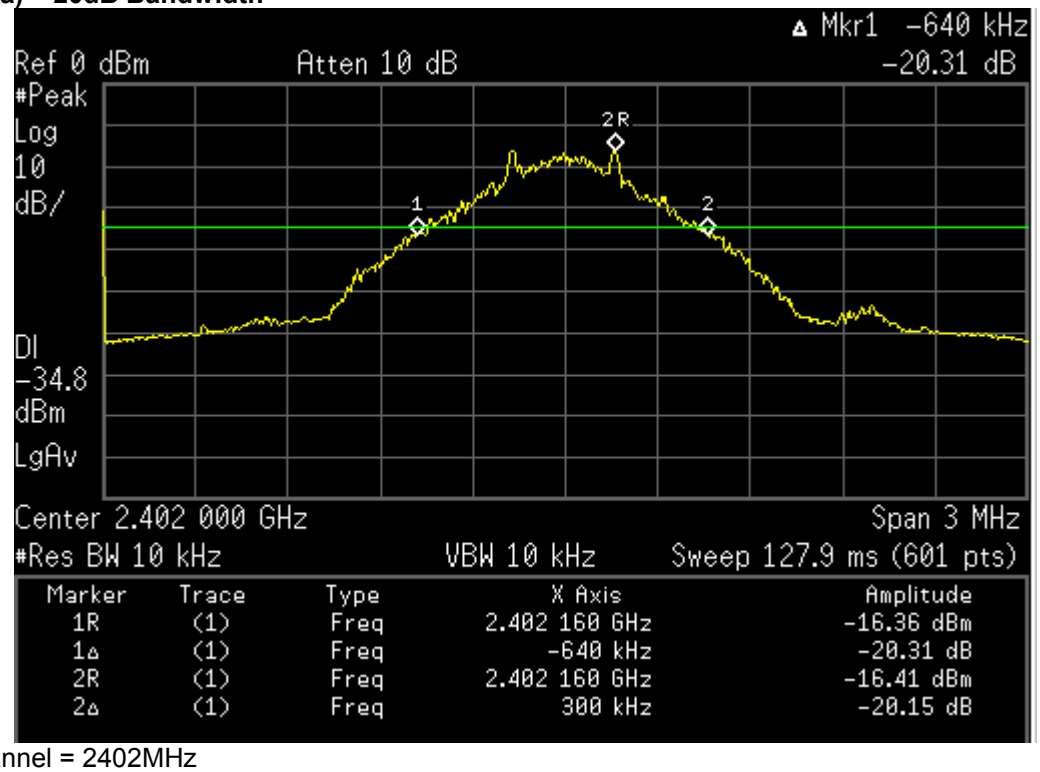
CSV-File plot of the Amplitude versus Frequency

15.247 (a) – Time of Occupancy (Dwell Time)

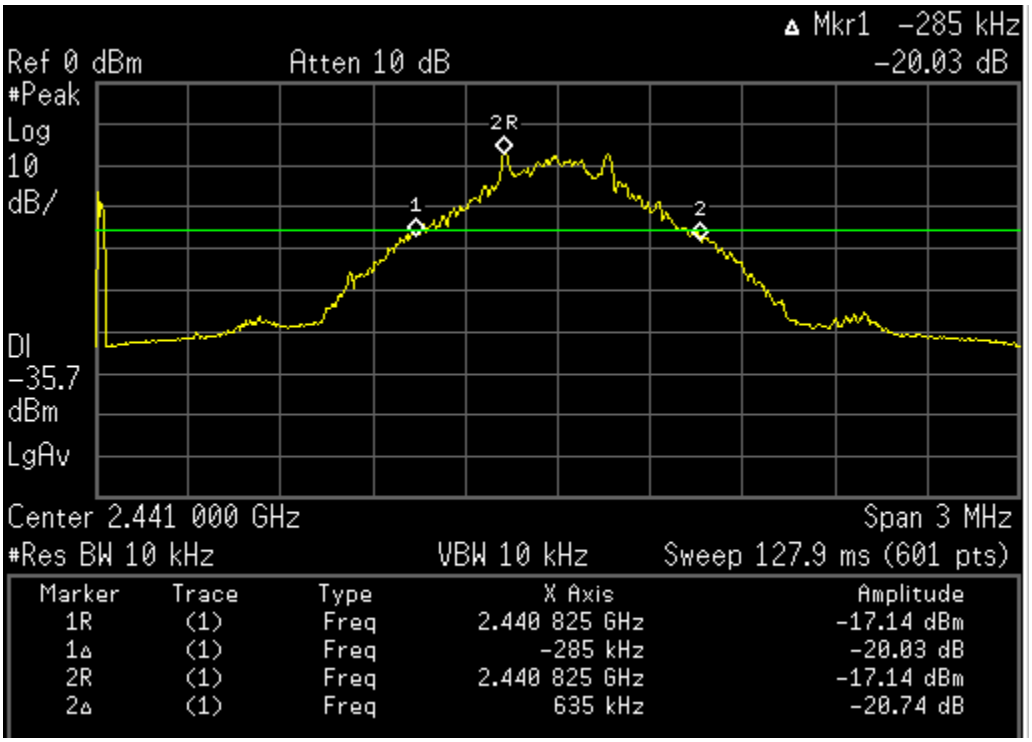


Dwell-time: **T = 2.5ms with Δ = 416.µs** which is < 0.4s with over T = 31.6ms – which is the defined limit

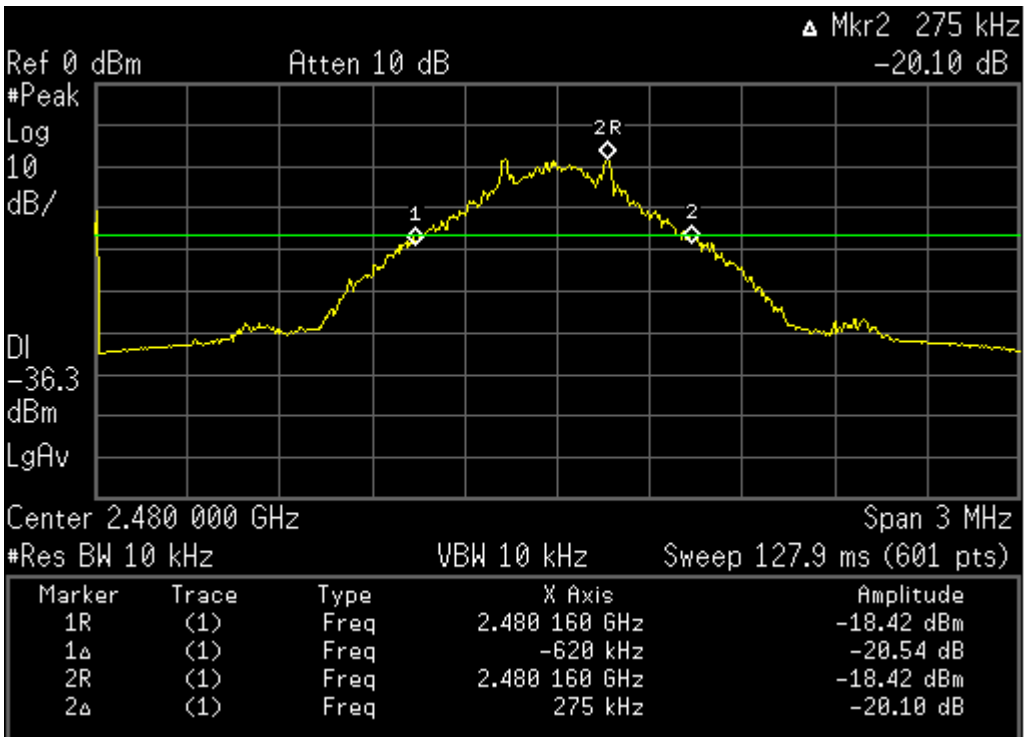
15.247 (a) – 20dB Bandwidth



Low channel = 2402MHz

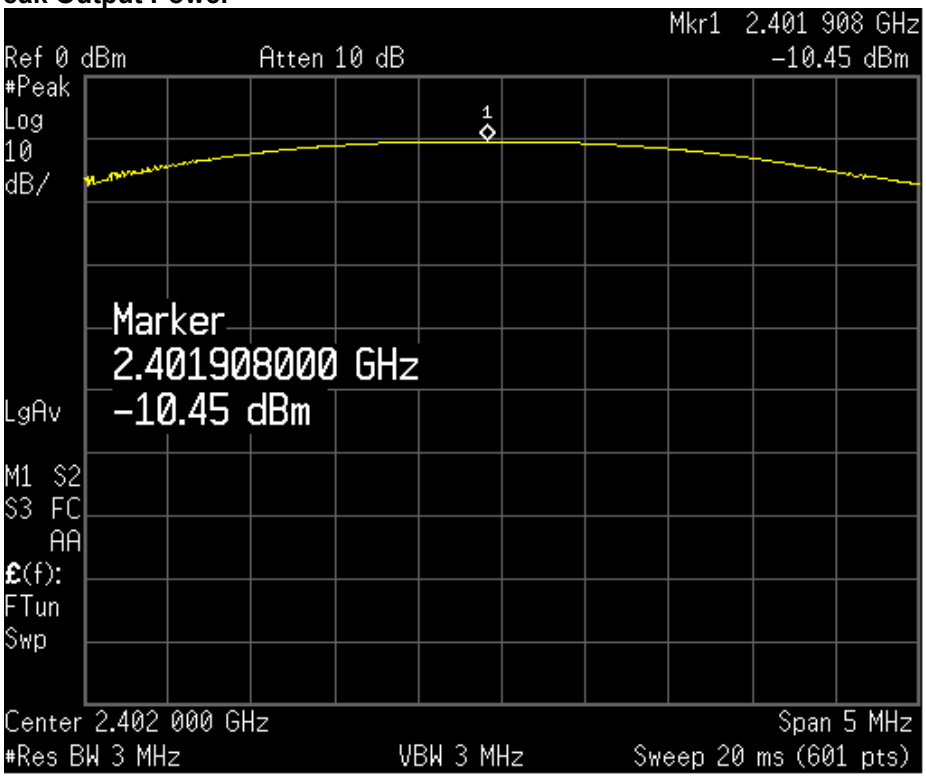


Mid channel = 2441MHz

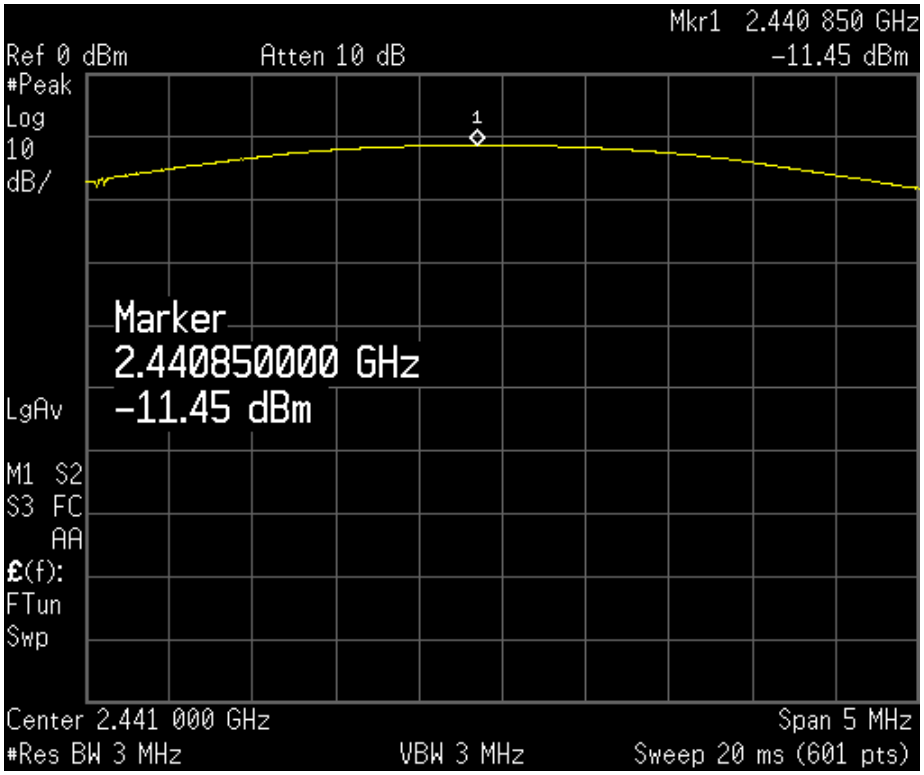


High channel = 2480MHz

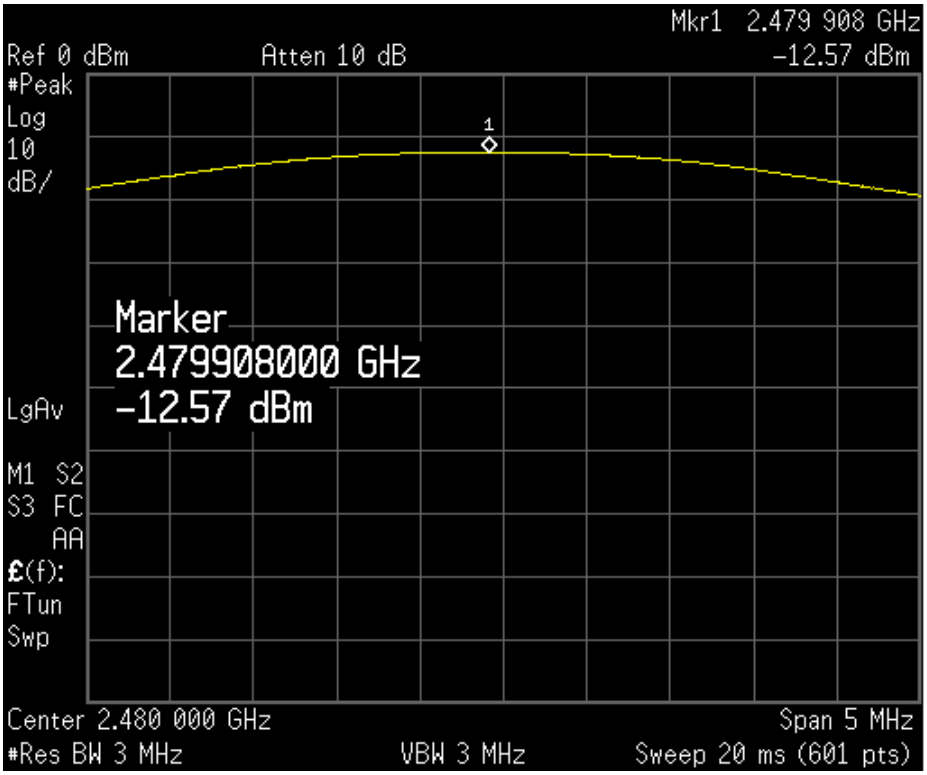
15.247(b) – Peak Output Power



Low channel = 2402MHz
Output corrected = -10.45 + 9.62 = **-0.83**



Mid channel = 2441MHz
Output = -11.45 + 9.62 = **-1.83**



High channel = 2480MHz
Output = -12.57 + 9.62 = **-2.95**
Note: See Block Diagram 1 below for more information regarding output correction

15.247(b)(5) – RF Exposure – MPE Calculation
The maximum permissible exposure as defined in 47 CFR 1.1310 is 1 mW/cm². The distance from the EUT's transmitting antenna where the exposure level reaches the maximum permitted level above is calculated using the general equation:

$$S = P*G / 4\pi R^2$$

The variable for distance is R, while the remaining variables should be known; thus we solve for R to determine the minimum distance from the transmitter.

$$R = (P*G/4\ \pi\ S)^{1/2}$$

S(max) = 1mW/cm²
P = the maximum measured power output = 2.9 dBm = 1.95mW
G = the maximum antenna gain = 2.0 dBi = 1.585 (numeric gain)
P = 1.91 mW, linear power gain relative to the isotropic radiator = 2.0 dBi = 1.585 (numeric gain),
R = distance in cm

Solving for R, the 1mW/cm² limit is reached in a distance of **0.4959 cm** to the transmitting antenna.

The radio has to be integrated in a way that the minimum distance of 0.4959 cm is ensured regarding so that a statement in the users manual regarding RF safety is not necessary.

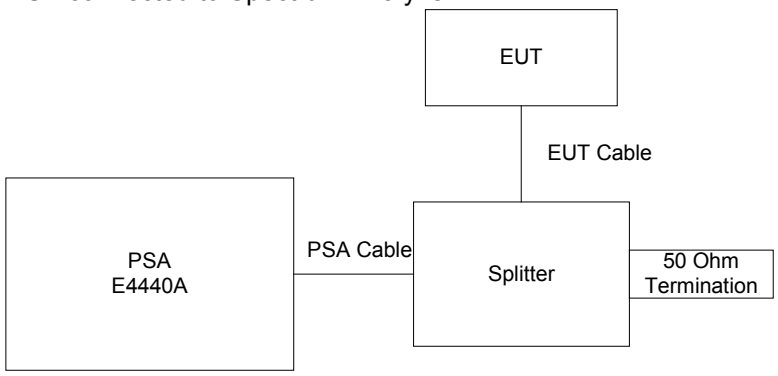
15.247 c) – Out-of-Band Spurious Emissions
See Appendix for results

9 Test Procedure

The procedure followed for the test cases is defined in CFR 47 – Part 15, Subparts: 31, 35, 205, 209, 247, as well as, Public Notice DA 00-705.

9.1 Test Setup – Block Diagrams

Block Diagram 1 – EUT connected to Spectrum Analyzer



A system loss of ~ –9.62 dBm seen by Spectrum Analyzer, was not accounted for in the display

10 List of Test Equipment Used

Description	Manufacturer	Serial Number
E4440 – PSA (Performance Spectrum Analyzer)	Agilent Technologies	US40420768
Splitter	Agilent Technologies	TE0093
EUT Cable	Gore	TE0104
PSA Cable	Gore	TE0105

11 Appendix I

Antenna Information

CENTURION WIRELESS TECHNOLOGIES, INC.

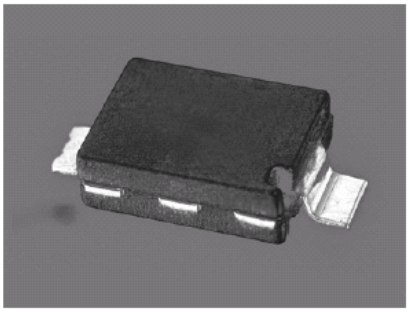
Specifications

BlueChip ™

Part Number (P/N):
CAF95901

Features:

- Small and lightweight
- Omnidirectional, azimuth plane
- Wide bandwidth
- PCB surface mount
- Internal mounting
- Available in tape and reel packaging
- Solder reflow-able



Specifications:

Frequency Range	2.4 – 2.5 GHz
Polarization	Linear
Peak Gain	>2.0 dBi
Average Gain	>0 dBi
Nominal Impedance	50 ohms
VSWR (Min. Performance)	<2.0:1 across band
Temperature Range	-40° to +85°C
Vibration	6G RMS (9.04g2/Hz) for 15 minutes each in vertical and horizontal. No appearance or functional axis.
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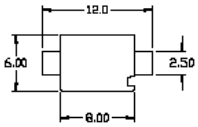
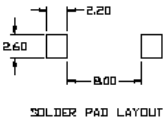
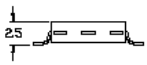
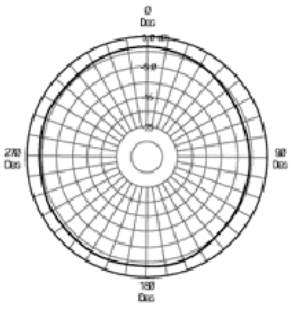
Radiating Element Size	8mm x 6mm x 2.5mm (l x w x h)
Physical Mass	0.21 grams
Length w/ Solder Tabs	12mm



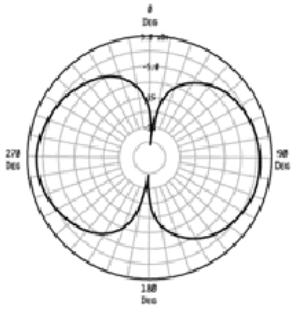


SOLDER PAD LAYOUT

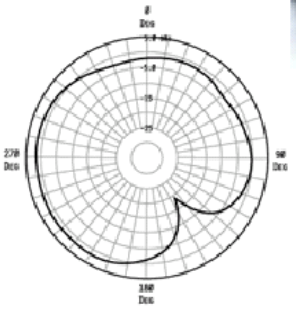




Free Space Azimuth Pattern



Free Space Elevation Pattern PHI=0



Free Space Elevation Pattern PHI=90

Specifications subject to change without notice

BlueChip – 7/1/02

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INTERNATIONAL PHONE 402.474.0706 • FAX 402.467.4528

QS-9000 REGISTERED ISO 9001

Referenced FCC report – See complete report for specific details. File: **R55061-3.pdf**

Elliott Laboratories Inc. 684 West Maude Avenue 408-245-7800 Phone
www.elliottlabs.com Sunnyvale, CA 94086-3518 408-245-3499 Fax

Electromagnetic Emissions Test Report
and
Application for Grant of Equipment Authorization
pursuant to
FCC Part 15, Subpart C (15.247) FHSS Specifications for an
Intentional Radiator on the
Hyper Corporation
Model: Bar Code Scanner

FCC ID:	OMG0008
GRANTEE:	Hyper Corporation 3000 Danville Blvd., Suite F Alamo, CA 94507-1572
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	March 30, 2004
FINAL TEST DATE:	February 23, 2004
AUTHORIZED SIGNATORY:	Juan Martinez Senior EMC Engineer

A2LA ACCREDITED