Lab Code: 200167-0

FCC PART 15.225
MEASUREMENT AND TEST REPORT

For

Escort Memory Systems

170 Technology Circle
Scotts Valley, California 95066

FCC ID: E36-COBALT-01

Report Type:	**Product Type:**
☒ Class II Permissive Change: Supplemental Report	RFID Reader / Writer

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Escort Memory Systems'* product model: *Cobalt*, FCC ID: *E36-COBALT-01* is a feature-rich, high frequency, Radio-Frequency Identification Controllers that provides read/write RFID data transmission and control solutions to shop floor, item-level tracking and material handling applications. The controller is designed to be compact, rugged and reliable, in order to meet and exceed the requirements of the industrial automation industry.

Product Features

- High performance, industrial, multi-protocol RFID controller
- Supports communication interface protocols: Subnet16™, Commercial TCP/IP, Ethernet/IP™ and Modbus® TCP
- Interface Options: RS232, RS422, RS485, USB and Ethernet
- Reads/Writes ISO 14443A, ISO 15693 and Philips® I•CODE® 1 tag ICs and compliant RFID tags
- Compatible with HMS-Series and LRP-Series RFID tags from Escort Memory Systems
- Supports Escort Memory Systems' ABx Fast & CBx™ command protocols
- Internationally recognized ISM frequency of 13.56 MHz.
- Rugged IP66 rated housing
- 8 LED status indicators for power, COM Activity, RF Activity, Subnet16 Node ID, system diagnostics and error codes
- Flash memory for software upgrades
- Auto configurable and software programmable

EUT Photo

Additional Photos in Exhibit C

Mechanical Description

The *Escort Memory Systems* product model: Cobalt, FCC ID: *E36-COBALT-01*or the "EUT" as referred to in this report is a RFID Reader / Writer (HF-CNTL-422-01). The EUT measures approximately 101.6 mm (L) x 101.6 mm (W) x 38.1 mm (H). FCC ID: *E36-COBALT-01* covers *Cobalt HF* models *HF-CNTL-232-01, HF-CNTL-422-01, HF-CNTL-485-01, HF-CNTL-USB-01, and HF-CNTL-IND-01* wherein all models are identical in components and function, the difference between them being interface ports as detailed in Exhibit B of this report. Each model is designed to function with one of five antennas distributed by Escort Memory Systems.

For the purpose of this Class II permissive change filing, HF-CNTL-422-01 was randomly chosen to represent the six RFID readers/writers, and was outfitted with antenna model: HF-ANT-0776-01 which is being added to the five already existing certified antennae configurations.

** The test data gathered is from production samples, serial number: 06A0312, provided by the manufacturer.*

Objective

This Class II permissive change approval report has been prepared on behalf of *Escort Memory Systems* in accordance with Part 2, Subpart J, and Part 15 Subpart C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate continued compliance with FCC rules, Part 15, sec 15.35, sec 15.203, sec 15.205, sec 15.207, sec 15.209 and sec 15.225 after the addition of a new antenna model: HF-ANT-0776-01.

Related Submittal(s)/Grant(s)

Please see original submission for FCC ID: E36-COBALT-01 for full original test data.

Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurements were performed BACL. The radiated testing was performed at an antenna-to-EUT distance as specified in the applicable measurement procedure.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

EUT Exercise Software

Run RFID simulation program provided by customer.

Special Accessories

N/A

Equipment Modifications

Manufacturer	Description	Model	Serial Number
Wurth Elektronik	Ferrite x 2	7427154 74271112	NA

Remote Support Equipment

N/A

Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop Computer	Latitude Cpi R-series	0002257D-38380-9AR-P0ZA

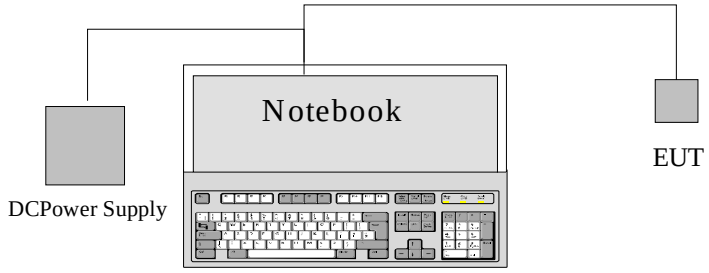
Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Elpac Power Systems	24V DC Power Supply	FW1824	010253

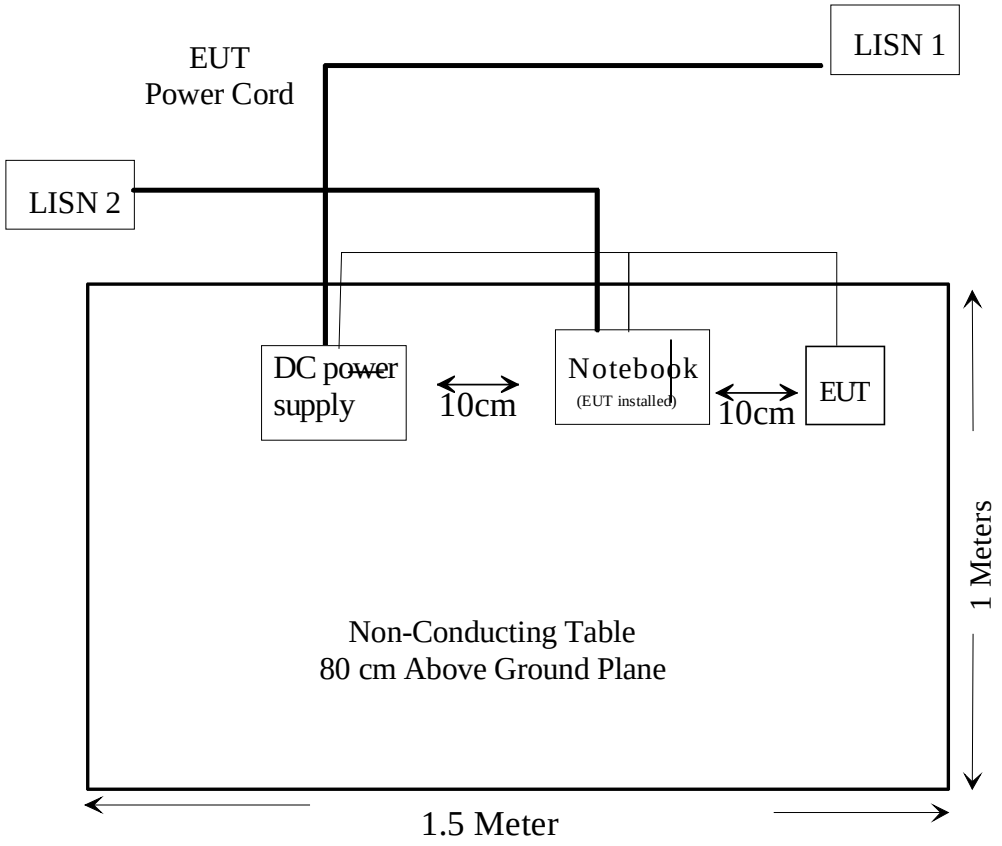
Interface Ports and Cabling

Cable Description	Length (M)	Port/From	To
Shielded Cable	2	Serial Port / Host Laptop	EUT
Shielded Power Cable	1.1	Serial Port / Host Laptop	DC power supply

Test Setup Configuration



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§ 15.35 § 15.205 § 15.209 § 15.225	Radiated Emission	Compliant
§ 15.207	Conducted Emission	N/A *
§15.225(e)	Frequency Stability	N/A*

Note: * Please refer to the original grant.

§ 15.203 – ANTENNA REQUIREMENTS

Applicable Standard

According to § 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.

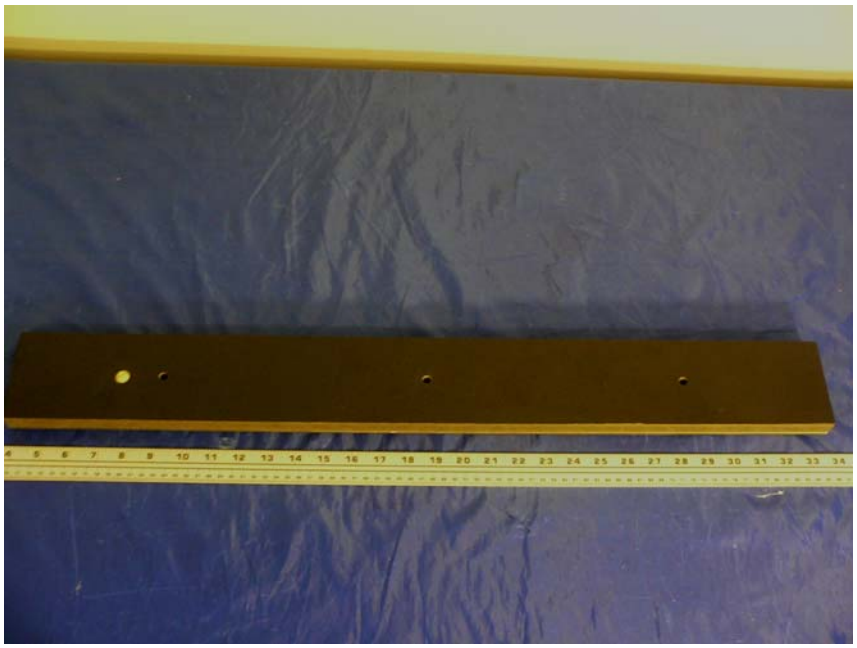
Refer to statement below for compliance.

“The antennae for this device are an integral part of the device and the end user cannot modify or use unauthorized antennae due to its construction. Furthermore the device is for indoor/outdoor use as detailed in the Users Manual and Operational Description”.

Antenna Connected Construction

This device has five antenna options each designed to fit only Cobalt series controllers by a proprietary mechanical fastening method and the use of a reverse polarity antenna connector, thus ensuring it is only outfitted with those antennae intended by the manufacturer.

This filing is adding new antenna (convey style antenna, model No.: HF-ANT-0776-01) to the EUT.



Model No.: HF-ANT-0776-01

§ 15.35, § 15.205, § 15.209, § 15.225 - RADIATED EMISSIONS TEST

EUT Setup

The radiated emission tests were performed in the closed chamber 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of test table and bundle when necessary.

The EUT was placed on the center of the back edge on the test table.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Amplifier, Pre (.1~1300MHz)	8447D	2944A10198	2008-01-08
Agilent	Analyzer, Spectrum	E4446A	US44300386	2008-04-26
ETS-Lindgren	Passive Loop Antenna (10KHz-30MHz)	6512	34167	2008-03-16*
Sunol Sciences	30MHz~2GHz Antenna	JB3	A020106-3	2008-03-05

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dB of specification limitation), and are distinguished with a "**QP**" in the data table.

The EUT was operating at normal to represent worst case during final qualification test. Therefore, this configuration was used for final test data recorded in the following table of this report.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

Environmental Conditions

Temperature:	18°C
Relative Humidity:	58%
ATM Pressure:	1022 mbar

** Testing was performed by Choon Ooi on 2007-11-29.*

Summary of Test Results

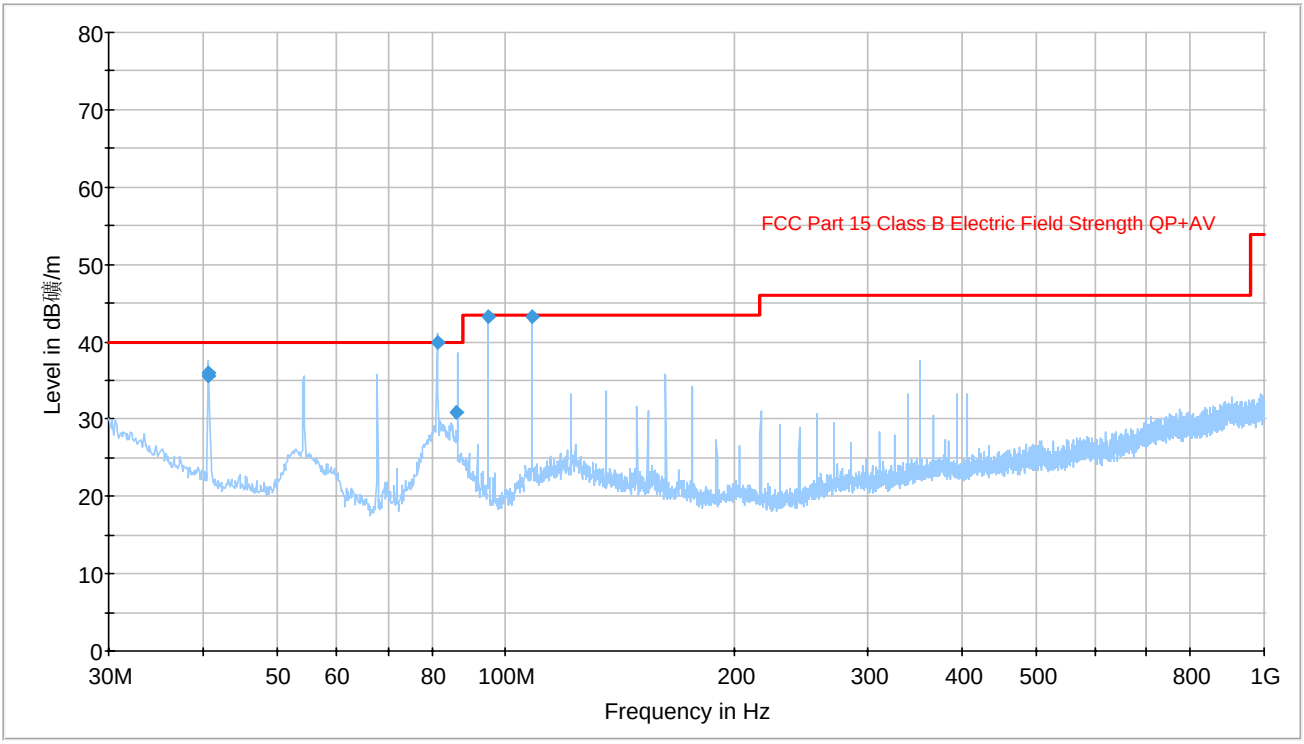
According to the data in the following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.225. The EUT measured within the measurement uncertainty of ±4.0 dB, and had the worst margin reading of:

- 0.1 dB at **81.37 MHz** in the **Vertical** polarization for Part 15C 30-1000 MHz

-11.77 dB at **27.12 MHz** in the **Horizontal** polarization for Part 15C below 30 MHz

Radiated Emissions Test Result Data @ 3meter

30 – 1000 MHz



Frequency (MHz)	Quasi-Peak dBµV/m	Turn Table Degree	Ant. Height (m)	Ant. Polar (H/V)	Correction Factor (dB)	FCC 15C	
						Limit (dBuV/m)	Margin (dB)
81.370000	39.9	188.0	138.0	V	-6.4	40.0	-0.1
94.908750	43.3	149.0	98.0	V	-5.1	43.5	-0.2
108.488750	43.2	133.0	149.0	H	-2.5	43.5	-0.3
40.670000	36.0	146.0	97.0	V	-1.6	40.0	-4.0
40.668750	35.7	141.0	102.0	V	-1.6	40.0	-4.4
86.222500	30.8	324.0	101.0	V	-6.2	40.0	-9.2

Below 30 MHz

Freq. (MHz)	Receiver Reading (BuV)	Turn Table Degrees	Antenna			Cable Factor (dB)	Distance Factor (dB)	Corrected Reading (dBuV/m)	FCC 15C	
			Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)
27.12	48.13	120	1.0	H	9.4	0.2	40	17.73	29.5	-11.77