

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**FORD FOCUS**

**MODEL No.: 91301**

**BRAND NAME: N/A**

**FCC ID: HAP91301**

**REPORT NO: SZE0405040**

**ISSUE DATE: JUNE 25, 2004**

*Prepared for*

**ECHO TOYS LTD  
ROOM 1108 PENINSULA CENTRE 67 MODY ROAD,  
TSIM SHA TSUI EAST KOWLOON, HONGKONG**

*Prepared by*

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*d.b.a.*

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## VERIFICATION OF COMPLIANCE

Applicant:	ECHO TOYS LTD ROOM 1108 PENINSULA CENTRE 67 MODY ROAD, TSIM SHA TSUI EAST KOWLOON,HONGKONG
Product Description:	FORD FOCUS
Brand Name:	N/A
Model Number:	91301
Serial Number:	N/A
File Number:	SZE0405040
Date of Test:	May 27,2004 ~ June 24, 2004

### We hereby certify that:

The above equipment was tested by COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2001) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.235.

The test results of this report relate only to the tested sample identified in this report.

*Approved By*



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*Clinton / Q.A. Manager*  
**COMPLIANCE CERTIFICATION  
SERVICES (SHENZHEN) INC.**

*Reviewed By*



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*Jimmy*  
**COMPLIANCE CERTIFICATION  
SERVICES (SHENZHEN) INC.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description

The ECHO TOYS LTD. Model:91301 (referred to as the EUT in this report) The EUT is an short range, lower power, wireless controller of model car designed as an “ Input Device”. It is designed by way of utilizing the F2DCN modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 49.86 MHz
- B). Modulation: F2DCN
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: 9 Vdc by battery.

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: HAP91301 filing to comply with Section 15.235 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2001). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC. No. 6, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2001 and CISPR 22/EN 55022 requirements.

### 1.5 Special Accessories

Not available for this EUT intended for grant.

### 1.6 Equipment Modifications

Not available for this EUT intended for grant.

## System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the TX frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions (Not apply in the report)

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2001. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and average detector mode**.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2001.

### 2.4 Limitation

#### (1) Conducted Emission (Not applicable in this report)

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

(2) **Radiated Emission**

- The field strength of any emission within this band (section 15.235 frequency between 49.82MHz –49.90MHz) shall not exceed 10000 micro volts/meter at 3 meters. (80dBμV at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.
- The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength μV/m	Distance(m)	Field strength at 3m dBμV/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

- Remark:
- Emission level in dBuV/m=20 log (uV/m)
  - Measurement was performed at an antenna to the closed point of EUT distance of meters.
  - Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
  - Emission spurious frequency which appearing within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.

## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**

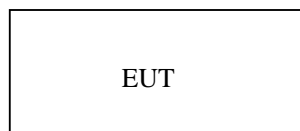


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Ford Focus	N/A	91301	HAP91301	N/A	<b><i>EUT</i></b>



## Summary Of Test Results

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	N/A
§ 15.235	Radiated Emission	Compliant
§ 15.235	26 dB Bandwidth	Compliant

### 1. Description of test modes

1. The EUT (Ford Focus) has been tested under normal operating condition.
2. The EUT stay in continuous transmitting mode. Three axes (X,Y,Z) are chosen for testing.

## Conducted Emissions Test (Not applicable in this report)

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)

### 5.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	HP	8546A	3448A00232	06/08/2004	06/07/2005
Spectrum Analyzer	ADVANTEST	R3132	120901472	06/08/2004	06/07/2005
LISN	EMCO	3825/2	1371	02/27/2004	02/26/2005
LISN	EMCO	3825/2	8901-1459	02/27/2004	02/26/2005

### 5.4 Measurement Result:

N/A

### 5.5 Conducted Measurement Photos:

N/A

## **1. Radiated Emission Test**

### **6.1 Measurement Procedure**

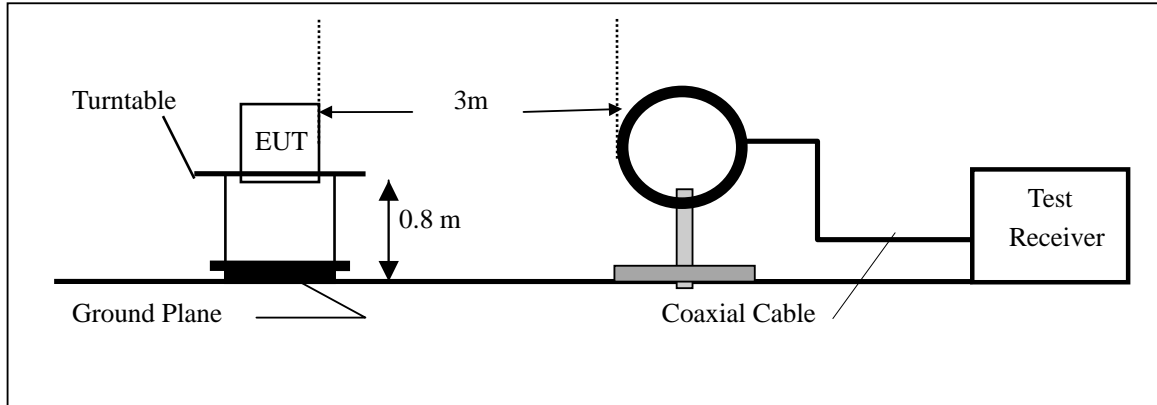
- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on at least twelve highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

Note:

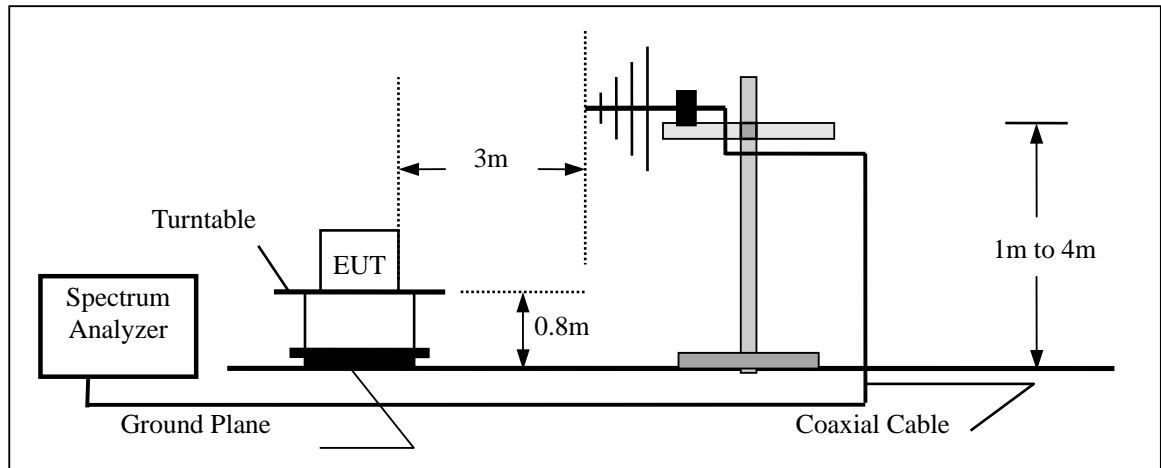
Three axes are chosen for pretest, the Z axis is the worst mode for final test.

## 6.2 Test SET-UP (Block Diagram of Configuration)

### (A) Radiated Emission Test Set-Up, Frequency Below 30MHz



### (B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



### 6.3 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120901472	06/08/2004	06/07/2005
EMI Test Receiver	HP	8546A	3448A00232	06/08/2004	06/07/2005
Pre-Amplifier	HP	8447D	2944A07999	06/08/2004	06/07/2005
Bi-log Antenna	EMCO	3142	9910-1436	06/08/2004	06/07/2005

### 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

## 6.5 Measurement Result

Operation Mode: Transmitting Mode On Z Axis Test Date : MAY 24, 2004  
Fundamental Frequency: 49.86 MHz Test By: Jimmy  
Temperature : 22 Pol: Vertical  
Humidity : 60 %  
Judgement : Passed by -2.87 dB at 49.863 MHz Ant.Pol. Ver.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
49.863	V	Peak	67.77	9.36	77.13	80.00	-2.87	F
99.100	V	Peak	17.33	12.33	29.66	43.50	-13.84	H
148.238	V	Peak	27.39	9.92	37.31	43.50	-6.19	H
199.450	V	Peak	12.90	12.63	25.53	43.50	-17.97	H
249.300	V	Peak	17.16	15.14	32.30	46.00	-13.70	H
299.150	V	Peak	15.67	16.83	32.50	46.00	-13.50	H
349.025	V	Peak	24.18	18.11	42.29	46.00	-3.71	H
398.875	V	Peak	20.24	19.37	39.61	46.00	-6.39	H
448.738	V	Peak	20.31	20.95	41.26	46.00	-4.74	H
498.600	V	Peak	18.12	22.54	40.66	46.00	-5.34	H
67.013	V	Peak	18.75	9.29	28.04	40.00	-11.96	H
548.450	V	Peak	14.62	22.74	37.36	46.00	-8.64	H
685.750	V	Peak	12.05	26.26	38.31	46.00	-7.69	H

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz.

## 6.6 Measurement Result

Operation Mode: Transmitting Mode On Z Axis

Test Date : May 24, 2004

Fundamental Frequency: 49.86 MHz

Test By: Jimmy

Temperature : 22

Pol: Horizontal

Humidity: 60 %

Judgement: Passed by -10.61 dB at 720.088 MHz Ant.Pol. Hor.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
49.863	H	Peak	32.37	9.36	41.73	80.00	-38.27	F
67.238	H	Peak	18.99	9.29	28.28	40.00	-11.72	H
99.675	H	Peak	15.67	12.66	28.33	43.50	-15.17	H
148.225	H	Peak	20.15	9.92	30.07	43.50	-13.43	H
199.650	H	Peak	11.95	12.63	24.58	43.50	-18.92	H
249.325	H	Peak	14.11	15.15	29.26	46.00	-16.74	H
300.663	H	Peak	16.00	16.88	32.88	46.00	-13.12	H
348.988	H	Peak	16.02	18.10	34.12	46.00	-11.88	H
398.875	H	Peak	13.58	19.37	32.95	46.00	-13.05	H
448.713	H	Peak	10.11	20.95	31.06	46.00	-14.94	H
497.175	H	Peak	11.17	22.49	33.66	46.00	-12.34	H
720.088	H	Peak	8.66	26.73	35.39	46.00	-10.61	H

Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz.

## **7. Occupied Bandwidth**

### **7.1 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 1KHz, Span =100KHz.
4. Set SPA Max hold. Mark peak, -26dB.

### **7.2 Test SET-UP (Block Diagram of Configuration)**

Same as 4.2 Radiated Emission Measurement.

### **7.3 Measurement Equipment Used:**

Same as 4.2 Radiated Emission Measurement.

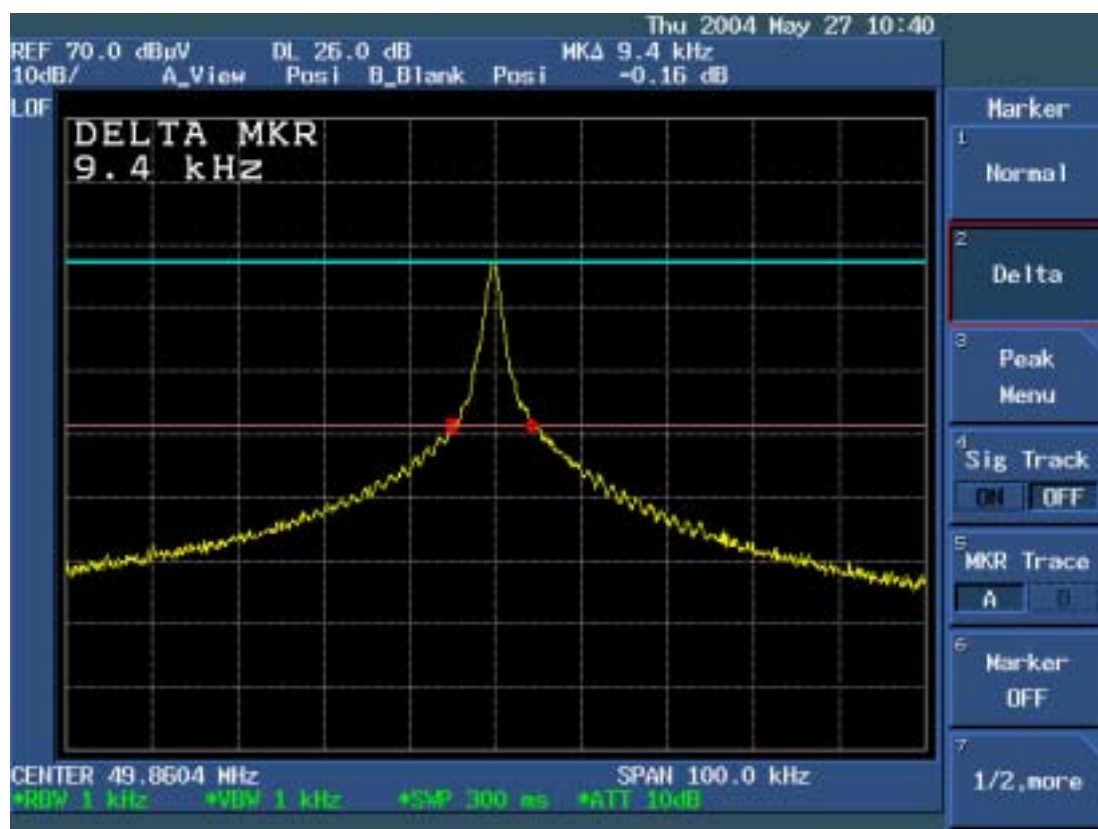
### **7.4 Measurement Results:**

26dB bandwidth = 9.4KHz

Refer to attached data chart.



## 26dB Bandwidth Test Data :



## **APPENDIX 1**

### **PHOTOGRAPHS OF SET UP**

## **Radiated Emission Setup Photos**



## **APPENDIX 2**

# **PHOTOGRAPHS OF EUT**

***Top View of TX***



***Bottom View of TX***



***Front View of TX***



***Back View of TX***



### Internal of TX- Open



### Internal of TX- 1



### Internal of TX- 2

