

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Per

FCC PART 15 TECHNICAL REQUIREMENT

HANDS FREE CAR KIT

MODEL NAME: CA17400R

FCC ID: QJ9CA17400R

Prepared For

**FSL ELECTRONICS PTY. LTD.
15 GRACE ST., P.O. BOX 270
CRANBOURNE, VIC.3977
AUSTRALIA**

Prepared by

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**Report No: 02U1454-1
Revision No: A
Date: 8/23/02**



[Total number of pages: 19]

TABLE OF CONTENTS	PAGE
1. VERIFICATION OF COMPLIANCE	3
2. PRODUCT DESCRIPTION	3
3. TEST FACILITY	4
4. MEASUREMENT STANDARDS	4
5. TEST METHODOLOGY	4
6. MEASUREMENT EQUIPMENT USED	4
7. POWERLINE RFI LIMIT	5
8. RADIATED EMISSION LIMITS	5
9. SYSTEM TEST CONFIGURATION	6
10. TEST PROCEDURE	7
11. EQUIPMENT MODIFICATIONS	8
12. TEST RESULT	9
12.1 MAXIMUM MODULATION PERCENTAGE (M%)	9
12.2 THE EMISSIONS BANDWIDTH	9
TEST DATA	
• Maximum Modulation Percentage Plot • Emission Bandwidth Plot • Radiated Emission Worksheet for Peak Measurement • Radiated Emission Worksheet for Average Measurement	
ATTACHMENT	
• EUT Photographs	

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: FSL ELECTRONICS Pty, Ltd.
15 GRACE ST., P.O. BOX 270
CRANBOURNE, VIC.3977
AUSTRALIA

EUT DESCRIPTION: HANDS FREE CAR KIT

MODEL NAME/NUMBER: CA17400R

FCC ID: QJ9CA17400R

DATE TESTED: August 13, 2002

REPORT NUMBER: 02U1454-1

TYPE OF EQUIPMENT	HANDS FREE CAR KIT
EQUIPMENT TYPE	434 MHz CAR TRANSMITTER
MEASUREMENT PROCEDURE	ANSI C63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning** : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

Tested By:

Approved & Released By:



CHIN PANG
EMC TECNICIAN
COMPLIANCE CERTIFICATION SERVICES



THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

Fundamental Frequency	434 MHz
Power Source	LR44 1.5VX2
Transmitting Time	Periodic $\leq$ 5 seconds
Associated Receiver	NA

3. TEST FACILITY

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27,1994.

4. MEASUREMENT STANDARD

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

5. TEST METHODOLOGY

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

6. MEASUREMENT EQUIPMENT USED

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Quasi Peak Adapter	HP9K - 1GHz	85650A	2811A01155	5/16/03
Spectrum Display	HP	85662A	2816A16696	5/16/03
Spectrum Analyzer	HP 0.1K - 1.5GHz	8568B	2732A03661	5/16/03
Pre-Amplifier,25 dB	HP0.1 - 1300MHz	8447D (P8)	2944A06589	8/10/02
Antenna, Bilog	Schaffner-Chase30M-2GHz	CBL6112B	2586	3/30/03
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01335	5/23/03
Spectrum Display	HP	85662A	3026A19146	5/23/03
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/23/03
Horn	Emco	3115	6717	1/31/03
Pre-Amplifier	MITEQ1-26GHz	NSP2600-44	646456	4/17/03

7. POWERLINE RFI LIMIT

CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NOT REQUIRED

8. RADIATED EMISSION LIMITS

GENERAL REQUIREMENTS	SECTION 15.209
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 - 40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

9. SYSTEM TEST CONFIGURATION

Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

10. TEST PROCEDURE

Radiated Emissions, 15.231(4)(b)

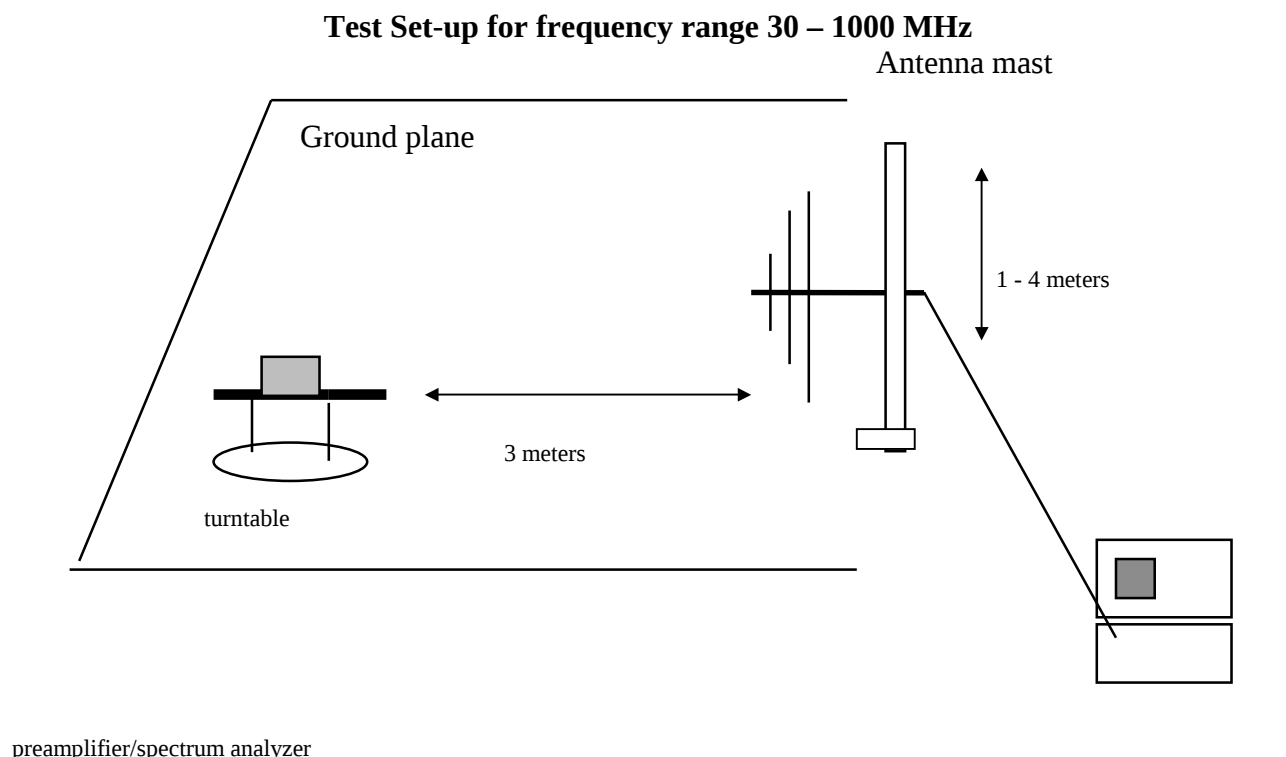
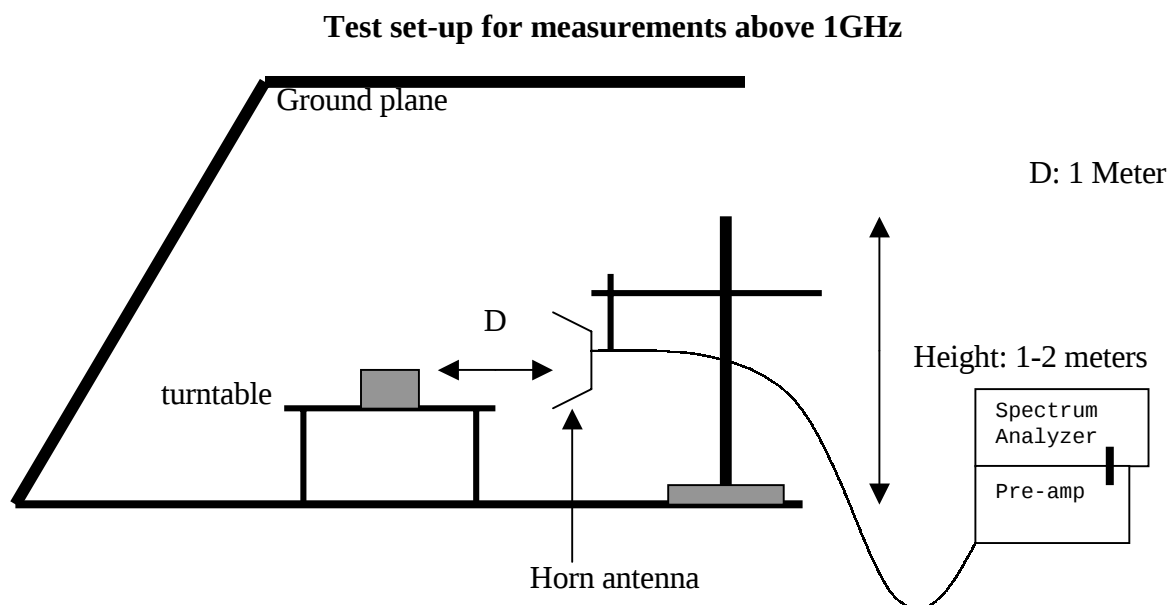


Fig. 1

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3-meters from the EUT.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.



1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1-meters from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

11. EQUIPMENT MODIFICATIONS

To achieve compliance to FCC Section 15.231 technical limits, the following change(s) were made during compliance testing:

No changes were required in order to achieve compliance to Section 15.231 levels.

12. TEST RESULT

Powerline RFI Class B	Eut	Radiated Emission Limits	Eut
SECTION 15.207		SECTION 15.209	X
SECTION 15.205, 15.209, 15.221, 15.223, x 15.225 OR 15.227		SECTION 15.205	X
BATTERY POWER	X	SECTION 15.231 (b)	X
		SECTION 15.231 (e)	

12.1 MAXIMUM MODULATION PERCENTAGE (M%)

CALCULATION:

Average Reading = Peak Reading (dBuV/m)+ 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE

1 Period	= 100 mS
Long pulse	= 0.72 mS
Short pulse	= 0.36 mS
No of Long pulse	= 35
No of Short pulse	= 13

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = ((35x0.72)+(13x0.36))/64=0.4668=46.68%

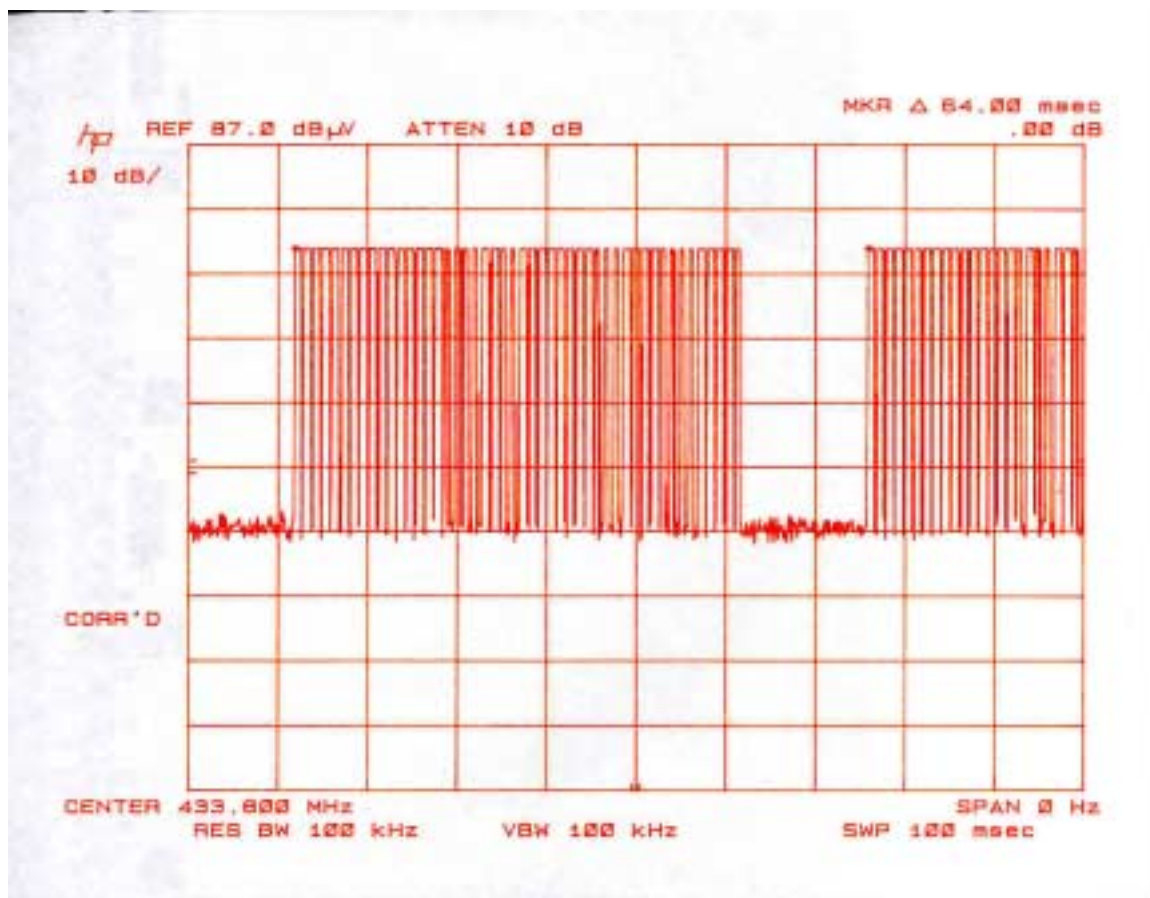
For duty cycle refer to plot #1, 2, 3,4.

12.2 EMISSION BANDWIDTH

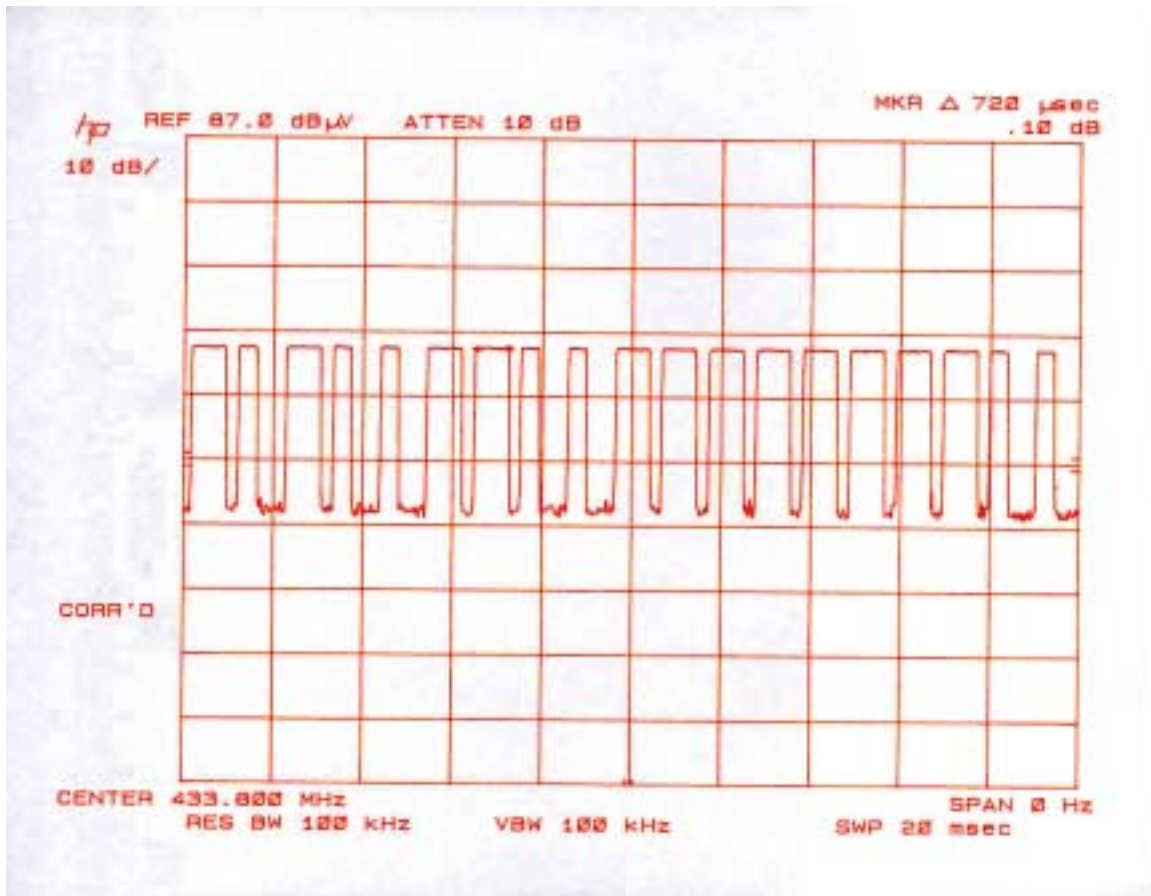
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
434 MHz	641 KHz (refer to plot)	434 x 0.25% = 1.085 MHz

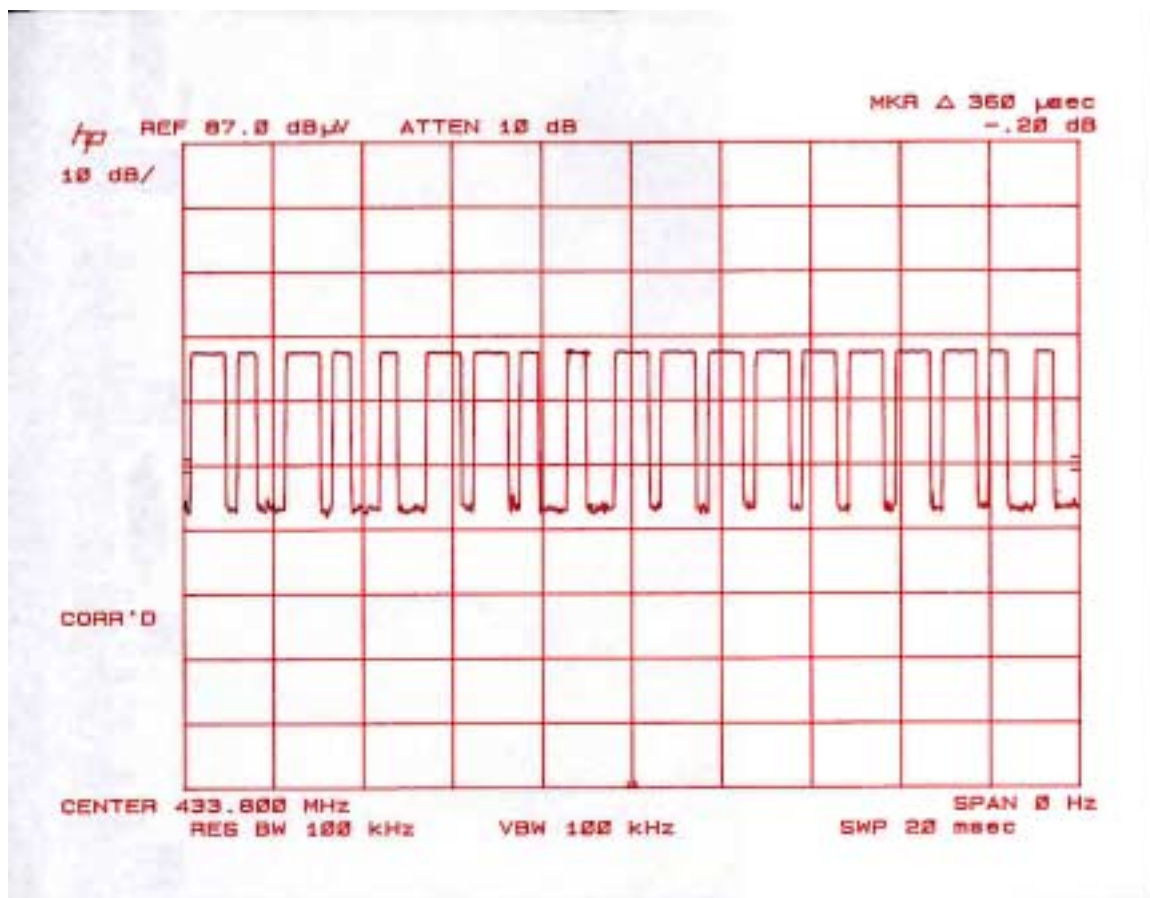
DUTY CYCLE 1



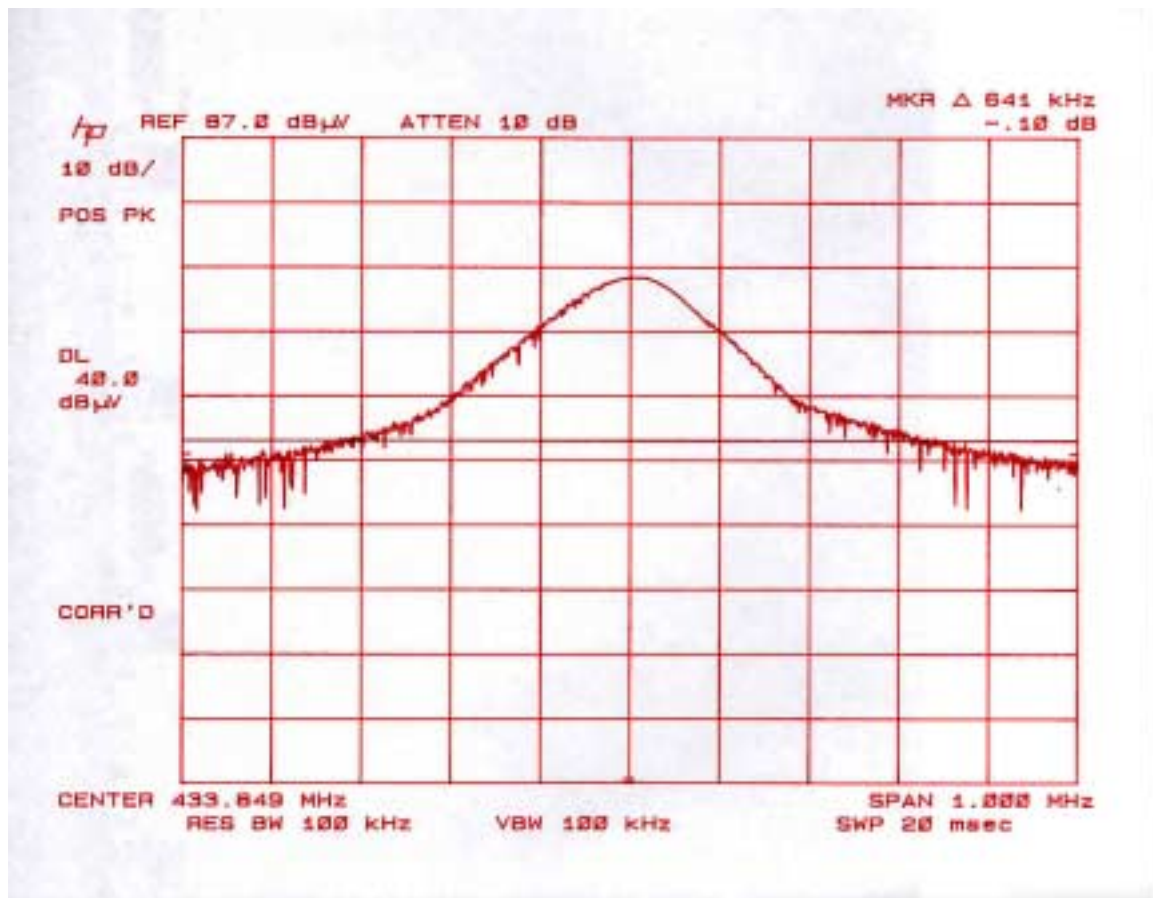
DUTY CYCLE 2



DUTY CYCLE 3



EMISSION BANDWIDTH



RADIATED DATA

		Project #: 02U1454-1 Report #: 020813B1 Date & Time: 08/13/02 Test Engr: Chin Pang										
		FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888										
Company: FSL Electronics Pty. Ltd. EUT Description: Hands Free Car Kit (SHF-400R) Test Configuration : EUT only Type of Test: FCC 15.231 Mode of Operation: Transmitting												
M% = ((t1+t2+t3+...)/T)= 46.67%		Av Reading = Pk Reading + 20*log(M%) 20*log(M%) = -6.62										
Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
433.92Mhz Fundamental frequency												
X-Position (stand Up)												
433.80	69.30	62.68	16.35	4.79	29.48	54.34	80.10	-25.76	3mV	0.00	2.00	P
433.80	77.30	70.68	16.35	4.79	29.48	62.34	80.10	-17.76	3mH	0.00	1.00	P
Y-Position (Side Lay Down)												
433.80	65.80	59.18	16.35	4.79	29.48	50.84	80.10	-29.26	3mV	0.00	1.50	P
433.80	71.20	64.58	16.35	4.79	29.48	56.24	80.10	-23.86	3mH	0.00	1.00	P
Z-Position (Lay Down)												
433.80	71.00	64.38	16.35	4.79	29.48	56.04	80.10	-24.06	3mV	0.00	1.50	P
433.80	79.30	72.68	16.35	4.79	29.48	64.34	80.10	-15.76	3mH	0.00	1.00	P
The Data show Z-Position is the worst case												
867.60	62.70	56.08	20.11	7.44	29.03	54.60	60.10	-5.50	3mV	0.00	1.00	P
867.60	58.70	52.08	20.11	7.44	29.03	50.60	60.10	-9.50	3mH	0.00	1.40	P

	FCC Measurement													
Compliance Certification Services, Morgan Hill Open Field Site														
Customer: FSL Electronics Pty. Ltd.					08/13/02									
EUT: Hands Free Car Kit														
Model: CA17400R														
Tested by: Chin Pang														
	Cable length													
		12.0		feet										
	Distance to Antenna													
		3.3		feet										
Average Measurements:					Peak Measurements:									
	1 MHz Resolution Bandwidth					1MHz Resolution Bandwidth								
	10Hz Video Bandwidth					1MHz Video Bandwidth								
f	Peak R.	Avg. R.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Peak Mar	Avg Mar	Notes
GHz	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
1.301	90.6	64.3	23.9	2.2	-36.5	-9.5	0.0	70.8	44.5	74.0	54.0	-3.2	-9.5	V
1.735	70.2	55.6	25.8	2.6	-36.5	-9.5	0.0	52.6	38.0	74.0	54.0	-21.4	-16.0	V
2.168	60.2	48.0	27.5	3.0	-36.4	-9.5	1.0	45.7	33.5	74.0	54.0	-28.3	-20.5	V
2.602	58.8	45.0	28.4	3.2	-36.4	-9.5	1.0	45.5	31.7	74.0	54.0	-28.5	-22.3	V
3.036	54.0	43.0	32.5	3.4	-36.3	-9.5	1.0	45.1	34.1	74.0	54.0	-28.9	-19.9	V
3.470	67.4	51.8	31.5	3.7	-36.3	-9.5	1.0	57.8	42.2	74.0	54.0	-16.2	-11.8	V
3.904	69.7	49.2	32.5	4.0	-36.2	-9.5	1.0	61.5	41.0	74.0	54.0	-12.5	-13.0	V
4.338	62.9	49.3	32.2	4.3	-36.0	-9.5	1.0	54.9	41.3	74.0	54.0	-19.1	-12.7	V
1.301	88.4	63.9	23.9	2.2	-36.5	-9.5	0.0	68.6	44.1	74.0	54.0	-5.4	-9.9	H
1.735	73.3	54.9	25.8	2.6	-36.5	-9.5	0.0	55.7	37.3	74.0	54.0	-18.3	-16.7	H
2.168	69.0	53.0	27.5	3.0	-36.4	-9.5	1.0	54.5	38.5	74.0	54.0	-19.5	-15.5	H
2.602	59.0	50.0	28.4	3.2	-36.4	-9.5	1.0	45.7	36.7	74.0	54.0	-28.3	-17.3	H
3.036	57.0	45.0	30.2	3.4	-36.3	-9.5	1.0	45.8	33.8	74.0	54.0	-28.2	-20.2	H
3.470	67.7	58.8	31.5	3.7	-36.3	-9.5	1.0	58.1	49.2	74.0	54.0	-15.9	-4.8	H
3.904	69.9	52.0	32.4	4.0	-36.2	-9.5	1.0	61.6	43.7	74.0	54.0	-12.4	-10.3	H
4.338	65.8	50.0	32.2	4.3	-36.2	-9.5	1.0	57.6	41.8	74.0	54.0	-16.4	-12.2	H
Note: Measured EUT fundamental frequency(433.8MHZ) up to 10th Harmonic														
f	Measurement Frequency						HPF		High Pass filter					
Peak R.	Analyzer Peak Reading						Peak		Calculated peak field Strength					
Avg. R.	Analyzer Avg. Reading						Avg		Calculated average field Strength					
AF	Antenna Factor						Pk Lim		Peak Field Strength Limit					
CL	Cable Loss						Avg Lim		Average Field Strength Limit					
Amp	Pre amp gain						Pk Mar		Margin vs. Peak Limit					
D Corr	Discorrections to 3 meter						Avg Mar		Margin vs. Average Limit					

ATTACHMENT - EUT PHOTOGRAPHS



