

TABLE OF CONTENTS LIST

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED

FCC ID: JNW67263T

TEST REPORT CONTAINING:

PAGE 1.....TEST EQUIPMENT LIST AND TEST PROCEDURE  
PAGE 2.....TEST PROCEDURE CONTD. & CIRCUIT DESCRIPTION  
PAGE 3.....RADIATION INTERFERENCE TEST DATA  
PAGE 4.....OCCUPIED BANDWIDTH TEST DATA

EXHIBITS CONTAINING:

EXHIBIT 1.....POWER OF ATTORNEY LETTER  
EXHIBIT 2.....BLOCK DIAGRAM  
EXHIBIT 3.....SCHEMATIC  
EXHIBIT 4.....INSTRUCTION MANUAL  
EXHIBIT 5.....SAMPLE OF FCC ID LABEL  
EXHIBIT 6.....LOCATION OF FCC ID LABEL  
EXHIBIT 7.....EXTERNAL PHOTO - FRONT SIDE  
EXHIBIT 8.....EXTERNAL PHOTO - BACK SIDE  
EXHIBIT 9.....INTERNAL PHOTO - COMPONENT SIDE  
EXHIBIT 10.....INTERNAL PHOTO - COPPER SIDE  
EXHIBIT 11.....OCCUPIED BANDWIDTH PLOT

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED

FCC ID: JNW67263T

REPORT #: T:\CUS\M\MATTEL\MAP88H0\MAP88H0.RPT

PAGE: TABLE OF CONTENTS LIST

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED  
FCC ID: JNW67263T

#### TEST EQUIPMENT LIST

1. X Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/  
preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter  
HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02,  
S/N 3008A00372 Cal. 10/17/99
2.    Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
3.    Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
4.    Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N  
9706-1211 Cal. 6/23/97
5. X Biconnical Antenna: Eaton Model 94455-1, S/N 1057
6. X Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
7.    Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153  
Cal. 11/24/99
8.    Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180,  
1-18 GHz, S/N 2319 Cal. 4/27/99
9.    Horn 40-60GHz: ATM Part #19-443-6R
10.    Line Impedance Stabilization Network: Electro-Metrics Model  
ANS-25/2, S/N 2604 Cal. 2/9/00
11.    Line Impedance Stabilization Network: Electro-Metrics Model  
EM-7820, S/N 2682 Cal. 12/1/99
12.    Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
13.    AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
14.    Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
15.    Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
16.    Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99
17.    Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99

#### TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without  
the written approval of TIMCO ENGINEERING, INC.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD  
C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a prese-  
lector. The bandwidth of the spectrum analyzer was 100 kHz with an  
appropriate sweep speed. The analyzer was calibrated in dB above a  
microvolt at the output of the antenna. The resolution bandwidth was  
100KHz and the video bandwidth was 300KHz. The ambient temperature of  
the UUT was 80oC with a humidity of 76%.

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED  
FCC ID: JNW67263T  
REPORT #: T:\CUS\M\MATTEL\MAP88H0\MAP88H0.RPT  
PAGE: 1

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED  
FCC ID: JNW67263T

#### TEST PROCEDURES CONTINUED

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz)	METER READING + ACF = FS
33	20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 80oC with a humidity of 76%.

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-1992 with the EUT 40 cm from the vertical ground wall.

#### CIRCUIT DESCRIPTION:

In the transmit mode multivibrator made up of Q1 & Q2 feed a modulation signal to the crystal controlled oscillator Q3. The output of Q3 is fed into a double tuned circuit T1 and then to a low pass filter made up of C7, L1, and C8. The crystal controlled oscillator is the transmitter.

#### ANTENNA AND GROUND CIRCUITRY

This unit makes use of a external 5" antenna. The antenna is inductively coupled. This unit is powered from a 9.0V battery.

No ground connection is provided. The unit relies on the ground tract of the printed circuit board.

REPORT #: T:\CUS\M\MATTEL\MAP88H0\MAP88H0.RPT  
PAGE #: 2

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED

FCC ID: JNW67263T

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.235

REQUIREMENTS: CARRIER FREQUENCY WILL NOT EXCEED 80 dBuV/m AT 3M.  
OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

30 - 88 MHz	40.0 dBuV/M MEASURED AT 3 METERS
88 - 216 MHz	43.5 dBuV/M
216 - 960 MHz	46.0 dBuV/M
ABOVE 960 MHz	54.0 dBuV/M

TEST DATA:

EMISSION FREQUENCY MHz	METER READING AT 3 METERS dBuV	COAX LOSS dB	ANTENNA CORRECTION FACTOR dB	PEAK FIELD STRENGTH dBuV/m@3m	MARGIN dB	ANT. POL.
49.88	66.70	0.25	11.00	77.95	2.05	V
99.70	9.10	0.80	8.39	18.29	25.21	V
149.60	2.70	0.80	16.90	20.40	23.10	V
199.40	8.90	0.90	12.66	22.46	21.04	H
249.30	8.70	1.20	13.35	23.25	22.75	H
349.00	10.90	1.40	15.52	27.82	18.18	V
398.90	16.00	1.40	16.97	34.37	11.63	V
448.70	15.30	1.60	18.12	35.02	10.98	V
498.60	16.70	1.60	19.27	37.57	8.43	V
548.40	7.60	1.60	19.69	28.89	17.11	V

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: S. S. SANDERS

DATE: 13 March 2000

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED

FCC ID: JNW67263T

REPORT #: T:\CUS\M\MATTEL\MAP88H0\MAP88H0.RPT

PAGE #: 3

APPLICANT: MATTEL ASIA PACIFIC SOURCING LIMITED  
FCC ID: JNW67263T  
NAME OF TEST: Occupied Bandwidth  
RULES PART NO.: 15.235  
REQUIREMENTS: The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits of 15.209, whichever permits the higher emission levels.

THE GRAPH IN EXHIBIT 11 REPRESENTS THE EMISSIONS TAKEN FOR THE DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was taken. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 5 kHz per division.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: S. S. SANDERS

DATE: 13 March 2000

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FCC ID: JNW67263T  
REPORT #: T:\CUS\M\MATTEL\MAP88H0\MAP88H0.RPT  
PAGE #: 4