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Professional Engineers
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Testing For FCC
Submissions/Verifications

Approved Test Facility



TEST REPORT

REPORT DATE:	12 March 2001	REPORT NO:	21048D
CONTENTS:	See Table of Contents		
SUBMITTOR:	HASBRO INC. 443 Shaker Road East Longmeadow, MA 01028 USA		
SUBJECT:	Model No: 40060 FCC ID: PGN 40060		
TEST SPECIFICATION	CFR 47 FCC Part 15 Sections: 15.35, 15.109, 15.209 and 15.249 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	6 March 2001	DATE TESTED:	8 March 2001
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS:	Refer to schematic drawing [Exhibit C(2)-1 (Detail of Change)]		
Tested by:	<i>Ed. Chang</i> Edward Chang	<i>Robert G. Marshall</i> Robert G. Marshall, P. Eng.	<i>March 14/01</i>
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TECHNICAL REPORT - FCC 2.1033(b)

Applicant

HASBRO INC.
443 Shaker Road
East Longmeadow, MA
01028 USA

FCC Identifier

PGN 40060

Manufacturer

Song Gang Kin Yat Industrial Toys Factory
Luo Tian Village, Songgang Town
Bao An District, Shenzhen, China

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EXHIBIT D

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

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TEST REPORT CONTAINING:

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PRODUCT DESCRIPTION

The Model 40060 is a battery operated electronic transceiver operating in the 315 MHz band and consisting of a low power OOK transmitter and a super-regenerative receiver. The antennae used for transmitter and receiver are permanently attached to the UUT.

TEST EQUIPMENT LIST

- 1 Spectrum Analyzer: HP 8591EM, S/N 3639A00995, Cal. March 2000.
- 2 Spectrum Analyzer: ANRITSU 2601A, S/N MT64544, Cal. May 2000.
- 3 Spectrum Analyzer: IFR AN940, S/N 635001039, Cal. March 2000.
- 4 Spectrum Analyzer: Advantest R3271A, S/N J001279, Cal. due May 2001.
- 5 Preamp: HP 8449B, S/N 3008A00378, Cal. March 2000.
- 6 Bilog Antenna: Chase CBL6121A, S/N 1039, Cal. July 2000.
- 7 Dipole Antenna Kit: Compliance Design A100, S/N 00430, Cal. due Sept. 2004.
- 8 Horn Antenna: Q-PAR 6878/24, S/N 1721, 1.5-18GHz.
- 8 Line Impedance Stabilization Network: Marstech, Cal. July 2000.

TEST PROCEDURE

GENERAL:

A test program was run which simulated a normal transmission.

BANDWIDTH 20dB:

The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=100KHz and the video bandwidth (VBW)=1.0MHz and the span set as shown on the plot.

POWER OUTPUT:

The radiated output power was measured, with the spectrum analyzer and Bilog Antenna, in the test mode which simulated normal operation.

RADIATION INTERFERENCE:

The test procedure used was ANSI STANDARD C63.4-1992 using an appropriate spectrum analyzer, as listed in the Test Equipment List. The bandwidth (RBW) of the spectrum analyzer was 100KHz/120KHz up to 1GHz with an appropriate sweep speed. The RBW above 1.0GHz was = 1MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 24°F with a humidity of 60%. The UUT was tested from 30MHz to 3.5GHz.

BANDWIDTH

The 20dB bandwidth is 408KHz (refer to D(1)-6) which is less than the limit
(.25% of 315MHz = 787.5KHz).

10:34:44 MAR 13, 2001
/P

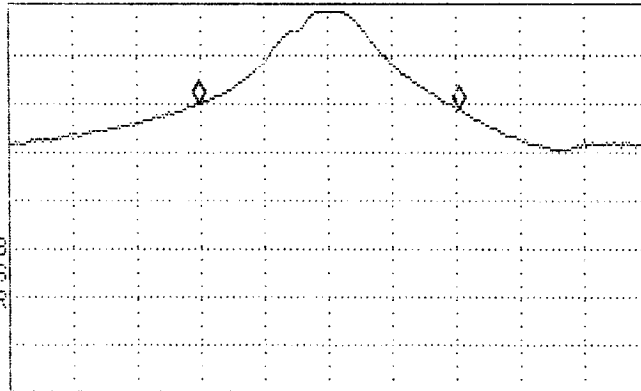
SWEEPTIME
30.0 sec

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 400 kHz
-1.96 dB

LOG REF 61.0 dBμV

10
dB/
#ATN
0 dB

WA SB
SC FS
CORR



CENTER 314.855 MHz SPAN 1.000 MHz
IF BW 120 kHz #AVG BW 1 MHz #SWP 30.0 sec

15.231**FIELD STRENGTH OF EMISSIONS****Requirements:**

<u>Field Strength of Fundamental</u>		<u>Field Strength of Harmonics</u>	<u>S15.209</u>	
315MHz	67dB μ V	47dB μ V/m@ 3m	30-88MHz	40 dB μ V/m@ 3m
			88-216MHz	43.5
			216-960 MHz	46
			Above 960 MHz	54

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

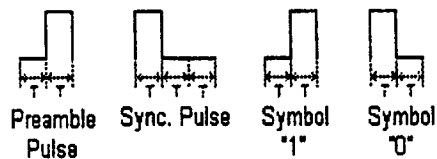
Emissions that fall in the restricted bands (15.205) must be less than 54dB μ V/m

FIELD STRENGTH OF EMISSIONS

Freq.Band MHz	Meter Rdg @3m dB μ V	Antenna	Cable & ACF (dB)	F. S. dB μ V/M	Pk/Av Ratio (dB)	Corrected F.S. dB μ V/M	FCC Limit dB μ V/M	Margin dB	Detector & BW KHz
RX									
300.8	12.2	LPH	15.7	27.9	-	27.9	46	18.1	QP120
317.27	12.64	LPH	15.7	28.34	-	28.34	46	17.66	QP120
325.52	6.3	LPH	16.4	22.7	-	22.7	46	23.3	QP120
TX									
314.79	57.42	LPH	15.7	73.12	-6	67.12	67.67	0.55	PK 100
629.59	26.05	LPH	22	48.05	-6	42.05	47.7	5.65	PK 100
944.42	13.6	LPH	25.2	38.8	-6	32.8	47.7	14.9	PK 100

MODULATION AND CODING

FREQUENCY		315MHz *
MODULATION		On Off Keyed
BIT FORMATTING		MANCHESTER CODE **
DATA RATE		1.17kbps
CRC Used		CCITT CRC
TOTAL PAYLOAD		A) Preamble - 135 Pulses - $854\mu\text{S} \times 135 = 115.29 \text{ mS}$ B) Sync. Pulse - 1 Pulse = 1.281 mS C) Data - 160 Bits - $854\mu\text{S} \times 160 = 136.64 \text{ mS}$
TOTAL TIME		253.211 mS
RETRANSMITTED RATE		(11 + X) Seconds where $X < 6$



where $T = 427\mu\text{S}$

15.231(e)

The Model 40060 operates at nominally 315 MHz.

CARRIER

The limit for the carrier is given according to the formula:

$$\begin{array}{lcl} \text{F S } (\mu\text{V/M}) & = & 16.67 \times \text{F} - 2833.33 \\ \text{(Field Strength)} & & \end{array}$$

$$\text{The limit for the 40060} = 16.67 \times 315 - 2833.33 = 2417.72 \mu\text{V/M} \text{ or } 67.67 \text{ dB}\mu\text{V/M}.$$

UNWANTED EMISSIONS

The limit for unwanted emissions is 1/10 of the maximum carrier field strength or $241.77 \mu\text{V/M}$ which converts to $47.7 \text{ dB}\mu\text{V/M}$. Unwanted emissions above 960 MHz may use the general limit of $54 \text{ dB}\mu\text{V/M}$. [15.231(b)(3)]

15.231(e) AUTOMATIC TRANSMISSION LIMITATION

(refer to Modulation & Coding [Exhibit D(1)-9])

The re-transmission rate is $11 + X$ seconds where X is less than 6. The silent period is therefore greater than $30 \times .253 \text{ S} = 7.6$ seconds and is always longer than the 10 seconds minimum.

15.231(b)(2); 15.35(c)

PEAK TO AVERAGE RATIO (refer to Modulation & Coding [Exhibit D(1)-9])

The total on time is 253.211 mSeconds which is less than the 1 Second period allowed.

The pulse on time vs pulse off time is nominally 50% or 0.5.

The peak to average ratio is therefore $20 \log 0.5 = -6 \text{ dB}$

15.231(d)

New batteries were used for the measurements.