

EMISSION -- TEST REPORT

TEST REPORT No.: **TR6-13363F1** Date of Issue: September 17, 2013

KIND OF EQUIPMENT: Conveyor Medication Checking unit

MODEL: CMC

APPLICANT: TOSHO Inc.

FCC ID: 2AAWK-TSCMC01

TEST STANDARD(S): FCC Part 15 Subpart C, Section 15.225

TEST RESULT: Complied

The above equipment has been tested by EMC Kashima Corporation, and found compliance with the requirements of the above standards. The test result only responds to the tested sample. This test report shall not be reproduced except in full, without the written approval of EMC Kashima Corporation. The engineers of EMC Kashima Corporation were not involved in modification for the tested sample.

TESTED DATE(S): July 5, September 15, 2013

TESTED BY:



Tadashi Kuroda
Assistant Manager

APPROVED BY:



Kazuhiro Ando
Manager

EMC Kashima Corporation
1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan
TEL: +81-478-82-0963, FAX: +81-478-82-3373

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REVISION HISTORY

Rev.	Issue Date	Revision Description	Effect Page	Revised By
00		Initial Issue	All	

1 GENERAL INFORMATION

1.1	APPLICANT	TOSHO Inc.
1.2	ADDRESS	3-13-7 Higashikojiya, Ohta-ku, Tokyo, 144-0033 Japan
1.3	MANUFACTURER	TAKIGUCHI Corp.
1.4	KIND OF EQUIPMENT	Conveyor Medication Checking unit
1.5	MODEL	CMC
1.6	POWER RATING	AC100-240V, 50/60Hz, 1.3-0.65A
1.7	TESTING VOLTAGE	AC120V, 60Hz
1.8	CONDITION OF EUT	Pre-Production (S/N: TSFP04001) Production (S/N: TSFP04002)
1.9	OPERATING FREQUENCY	13.56MHz
1.10	TYPE OF MODURATION	OOK
1.11	OPERATING TEMPERATUR	0 °C to 40 °C
1.12	TEST STANDARD(S)	FCC Part 15 Subpart C, Section 15.225
1.13	TEST METHOD(S)	ANSI C63.4: 2003
1.14	TESTED DATE(S)	July 5, September 15, 2013
1.15	REMARK(S)	

2 SUMMARY OF TEST RESULT

2.1 Test Result

FCC Part 15 Section	Test Item	Worst margin	Condition	Result
15.203	Antenna requirement	-	-	Pass ^{Note1}
15.207	Conducted emissions 0.15MHz - 30MHz	18.2dB at 7.5250MHz	-	Pass
15.225(a)(b)(c)	Radiated emissions 9kHz - 30MHz	85.1dB at 13.5600MHz	Radiated	Pass
15.225(d)	Radiated emissions 9kHz - 30MHz	43.6dB at 27.1200MHz	Radiated	Pass
15.225(d) 15.209	Radiated emissions 30MHz - 1GHz	13.6dB at 542.37MHz	Radiated	Pass
15.225(e)	Frequency stability	0.0046%	Radiated	Pass
15.215(c)	20dB Bandwidth	3.84kHz	Radiated	Pass

Note 1: Users cannot replace the antenna since it is attached to the inside of Conveyor Medication Checking unit.

“Pass” is only based on the measurement data and it does not include the measurement uncertainty.

3 EQUIPMENT UNDER TEST

3.1 Description of the EUT

The Conveyor Medication Checking unit (CMC) is designed to operate in collaboration with TOSHO's Automatic Tablet Packing Machine [Main TOPRA series and XANA series].

CMC was developed in order to utilize the use of these products, and to ensure safety for tablet packaging conveyor system.

3.2 Operation - mode of the EUT

The equipment under test was operated during the measurement under following conditions:

- Transmitting and Receiving mode (with Passive Tag)

4 TEST CONFIGURATION

4.1 EUT(s) and Peripheral(s)

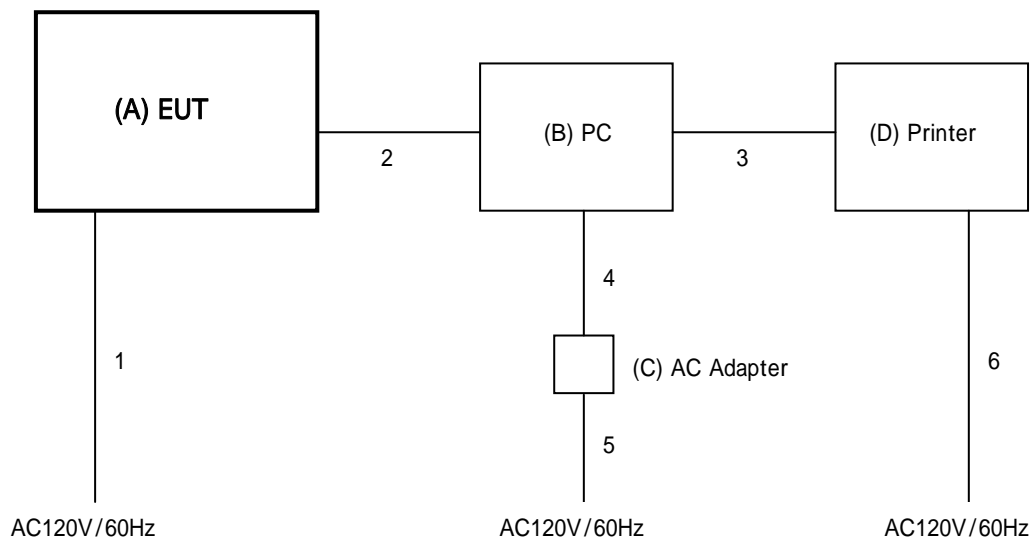
	Equipment Name	Model	Serial No.	Company	FCC ID
A1	Conveyor Medication Checking unit (EUT)	CMC	TSFP04002	TOSHO Inc.	2AAWK-TSCMC01
A2	Conveyor Medication Checking unit (EUT)	CMC	TSFP04001	TOSHO Inc.	2AAWK-TSCMC01
B	PC	2746-8MJ	ML-LMY40 09/02	Lenovo	DoC*
C	AC Adapter	92P1213	11S92P1213Z1ZBGK 8AP46J	Lenovo	N/A
D	Printer	K10220	FBJY52587	Canon	DoC*
*Note: Declaration of Conformity					
N/A: Not Applicable					
A1: It was used in the Conducted emissions test and Radiated emissions test.					
A2: It was used in the other test.					

4.2 Cable(s) Used

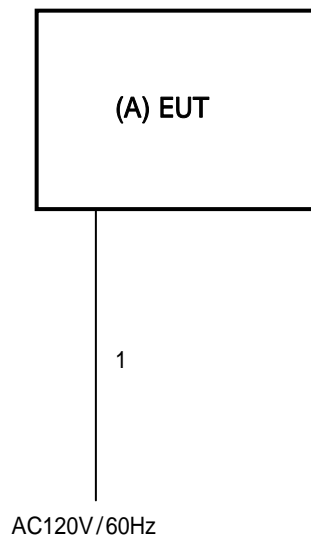
	Cable Name	Length	Shielded	Remarks (Model, Company, etc.)
1	AC Power (EUT)	3.0 m	no	EUT accessory, 3-wire
2	USB	3.0 m	Yes	EUT accessory
3	USB	2.0 m	Yes	
4	DC Power (AC Adapter)	1.8 m	no	
5	AC Power (AC Adapter)	1.0 m	no	
6	AC Power (Printer)	1.8 m	no	

4.3 Connection figure

Conducted Emissions



Radiated Emissions / Frequency stability



5 TEST FACILITIES

All measurement facilities in EMC Kashima Corporation are located in 1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan.

Accredited by American Association for Laboratory Accreditation (A2LA) for the emission and immunity tests stated in the scope of the certificate under Certificate Number 1266-01.

Authorized by TUV Rheinland for the emission and immunity tests stated in the scope of the certificate under Certificate No. UA 50061520

Registered by Federal Communications Commission (FCC). Each registered facility number is as follows:

Test site No. 1 90558 / Test site No. 2 510504 / Test site No. 5 99356

Test site No. 6 372431 / Test site No. 10 682397

Registered by Industry Canada (IC). Each registered facility number is as follows:

Test site No. 1 IC 4659A-1 / Test site No. 2 IC 4659A-2 / Test site No.5 IC 4659A-5

Test site No. 6 IC 4659A-6 / Test site No. 10 IC 4659A-10

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI).

Each registered facility number is as follows:

Test site No. 1 R-188, G-43, C-785 (Open site) / C-187, T-1461 (Shielded room)

Test site No. 2 R-189 (Open site) / C-188, T-1427 (Shielded room)

Test site No. 4 / C-613, T-1958 (Shielded room)

Test site No. 5 R-1227, G-45, C-1290, T-1833 (Open site) / C-1291, T-1462 (Shielded room)

Test site No. 6 R-1895, G-46, C-2042, T-1502 (Semi-Anechoic chamber)

Test site No. 10 R-3178, G-100, C-3519, T-1684 (Semi-Anechoic chamber)

6 MEASUREMENT UNCERTAINTY

The measurement instrumentation uncertainties (MIU) have been determined according to CISPR 16-4-2:2011 or referring to UKAS Publication LAB34:2002. A coverage factor $k = 2$ was applied to yield approximately a 95 % level of confidence.

Measurement	MIU U_{lab}
Conducted Emissions at mains (0.15 MHz - 30 MHz)	± 2.8 dB
Radiated Emissions (9kHz - 30MHz)	± 2.7 dB
Radiated Emissions (30 MHz - 1000 MHz)	± 6.0 dB

7 TEST CONDITIONS

7.1 Section 15.207 Conducted Emissions

7.1.1 Test Location

Test site No. 6 (Semi-anechoic chamber)

7.1.2 Used Test Instruments

Model	Name	Manufacturer	Code No.	Last Cal.	Remarks
ESCI	Test Receiver	Rohde & Schwarz	RCV06	2012.10	
ESH3-Z5	AMN	Rohde & Schwarz	LSN08	2013.07	
ESH3-Z5	AMN	Rohde & Schwarz	LSN11	2013.07	for EUT
8567A	Spectrum Analyzer	Hewlett Packard	SPR13	2012.10	
5D-2W	Coaxial cable	FUJIKURA	6CSAC	2013.08	

All used test instruments are calibrated at least once a year.

7.1.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003
7. AC power line conducted emission measurements.

Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final conducted emissions.

7.1.4 Limit

Mains ports (AC Power line)

Frequency (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

7.2 Section 15.225(a)(b)(c)(d) Radiated Emissions (9kHz - 30MHz)

7.2.1 Test Location

Test site No. 6 (Semi-anechoic chamber) 3 meters distance

7.2.2 Used Test Instruments

Model	Name	Manufacturer	Code No.	Last Cal.	Remarks
ESHS10	Test Receiver	Rohde & Schwarz	RCH02	2013.03	
HFH2-Z2	Loop Antenna	Rohde & Schwarz	LPA01	2013.06	
3D-2W	Coaxial cable	FUJIKURA	MG5m	2013.05	

All used test instruments are calibrated at least once a year.

7.2.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 8. Radiated emission measurements.

The test was performed at 3 meter distance and its result was converted into the one at specified 30 meter distance according to 15.31(f). The turntable was rotated and the center point of the loop antenna was fixed at 1 meter above ground level to investigate the maximum radiated emission, positioning the loop antenna in vertical and horizontal. Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final radiated emissions.

7.2.4 Limit

Frequency (MHz)	Field strength @30m (uV/m)	Field strength @30m (dBuV/m)	Field strength @3m (dBuV/m)
Below 13.110	30	29.5	69.5
13.110 - 13.410	106	40.5	80.5
13.410 - 13.553	334	50.5	90.5
13.553 - 13.567	15,848	84	124
13.567 - 13.710	334	50.5	90.5
13.710 - 14.010	106	40.5	80.5
Above 14.010	30	29.5	69.5

$\text{dBuV/m} = 20 \times \log(\text{uV/m})$

Distance factor = 40dB / decade (15.31(f))

7.3 Section 15.225(d) Radiated Emissions (30MHz - 1000MHz)

7.3.1 Test Location

Test site No. 6 (Semi-anechoic chamber) 3 meters distance

7.3.2 Used Test Instruments

Model	Name	Manufacturer	Code No.	Last Cal.	Remarks
ESCI	Test Receiver	Rohde & Schwarz	RCV06	2012.10	
VULB 9168	Logbicon Antenna	Schwarzbeck	LGBC06	2013.04	
8567A	Spectrum Analyzer	Hewlett Packard	SPR13	2012.10	
8447D	Pre-Amplifier	Hewlett Packard	PRA01	2013.08	
RG214/U	Coaxial cable	SUHNER	6R3m	2013.08	

All used test instruments are calibrated at least once a year.

7.3.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003
8. Radiated emission measurements.

They were performed at the measurement distance that specified for compliance to determine the frequency producing the maximum emissions. The turntable was rotated and the antenna height was varied 1 to 4 meters to investigate the maximum radiated emission for the horizontal and vertical polarization. Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final radiated emissions.

7.3.4 Limit

Frequency (MHz)	Field strength @3m (uV/m)	Field strength @3m (dBuV/m)
30 - 88	100	40
88 - 216	150	43.5
216 -960	200	46
Above 960	500	54

$\text{dBuV/m} = 20 \times \log (\text{uV/m})$

7.4 Section 15.225(e) Frequency Stability

7.4.1 Test Location

Test site No. 6

7.4.2 Used Test Instruments

Model	Name	Manufacturer	Code No.	Last Cal.	Remarks
R3162	Spectrum Analyzer	ADVANTEST	SPTG02	2013.05	Note 1
7334-1	Loop Antenna	SOLAR	LPA03	2012.07	Note 1
Sucoflex 104	Micro Wave cable	SUHNER	MWC-5m	2012.08	Note 1
PR-4KPH	Temperature Chamber	ESPEC	TMPC02	2011.12	Note 2
FLK-83-V	MULTIMETER	FLUKE	MTM38	2012.11	Note 1

Note 1: Calibrated at least once a year.

Note 2: Calibrated at least twice a year.

7.4.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 Annex H5.

The EUT was measured with the condition that the measuring instrument was connected to the antenna output connector through the coaxial cable. The measurement started with the Temperature chamber sufficiently stabilized.

7.4.4 Limit

Item	Variation	Limit (%)
Temperature variation	-20°C - +50°C	+/- 0.01
Voltage variation	85% - 115%	+/- 0.01

7.5 Section 15.215(c) 20dB Bandwidth

7.5.1 Test Location

Test site No. 6

7.5.2 Used Test Instruments

Model	Name	Manufacturer	Code No.	Last Cal.	Remarks
R3162	Spectrum Analyzer	ADVANTEST	SPTG02	2013.05	Note 1
7334-1	Loop Antenna	SOLAR	LPA03	2012.07	Note 1
Sucoflex 104	Micro Wave cable	SUHNER	MWC-5m	2012.08	Note 1
PR-4KPH	Temperature Chamber	ESPEC	TMPC02	2011.12	Note 2
FLK-83-V	MULTIMETER	FLUKE	MTM38	2012.11	Note 1

Note 1: Calibrated at least once a year.

Note 2: Calibrated at least twice a year.

7.5.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 Annex H6.

The spectrum analyzer RBW and VBW were set as follows. The marker-to-peak function of the spectrum analyzer was used to measure to peak level and the marker-delta function was used to measure the emission 20dB below the peak. It has been plotted.

Spectrum Analyzer Setup

RBW	VBW	Detector
1kHz	3kHz	Peak

8 TEST DATA

8.1 Section 15.207 Conducted Emissions

Company : TOSHO Inc. Tested Date : September 15, 2013
 Equipment : Conveyor Medication Checking Unit Temperature : 23 °C
 Model : CMC Humidity : 48 %
 Power : AC120V, 60Hz Atmos. Press : 1007 hPa
 Test Mode : Transmitting and Receiving mode

Tested by : Tadashi Kuroda

Freq. (MHz)	Phase	Reading (dBuV)		Corr. Factor (dB)	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV		QP	AV	QP	AV	QP	AV
0.1500	N	13.0	-	10.0	23.0	-	66.0	56.0	43.0	-
0.1698	N	29.6	-	10.0	39.6	-	65.0	55.0	25.4	-
4.7060	N	15.0	-	10.4	25.4	-	56.0	46.0	30.6	-
7.5250	N	31.2	-	10.6	41.8	-	60.0	50.0	18.2	-
13.5600	N	24.1	-	11.1	35.2	-	60.0	50.0	24.8	-
21.5037	N	22.5	-	11.5	34.0	-	60.0	50.0	26.0	-
27.1200	N	2.0	-	11.6	13.6	-	60.0	50.0	46.4	-
0.1500	L	14.1	-	10.0	24.1	-	66.0	56.0	41.9	-
0.1698	L	28.9	-	10.0	38.9	-	65.0	55.0	26.1	-
4.7060	L	14.2	-	10.4	24.6	-	56.0	46.0	31.4	-
7.5250	L	31.0	-	10.6	41.6	-	60.0	50.0	18.4	-
13.5600	L	24.6	-	11.1	35.7	-	60.0	50.0	24.3	-
21.5037	L	22.7	-	11.5	34.2	-	60.0	50.0	25.8	-
27.1200	L	2.0	-	11.6	13.6	-	60.0	50.0	46.4	-

Correction Factor(dB) = AMN Factor(dB) + Cable Loss(dB)

Result(dBuV) = Reading (dBuV) + Correction Factor(dB)

8.2 Section 15.225(a)(b)(c) Radiated Emissions (9kHz - 30MHz)

Company	: TOSHO Inc.	Tested Date	: September 15, 2013
Equipment	: Conveyor Medication Checking Unit	Temperature	: 23 °C
Model	: CMC	Humidity	: 48 %
Power	: AC120V, 60Hz	Atmos. Press	: 1007 hPa
Test Mode	: Transmitting and Receiving mode		
Test Distance	: 3m		

Tested by : Tadashi Kuroda

Freq. (MHz)	Ant. Angle	Reading @3m (dBuV)	Detector (QP/Pk)	Corr. Factor (dB)	Result (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Note
13.1100	90°	5.3	QP	19.9	25.2	69.5	44.3	Noise floor
13.4100	90°	5.3	QP	19.9	25.2	80.5	55.3	Noise floor
13.5530	90°	10.1	QP	19.9	30.0	90.5	60.5	
13.5600	0°	13.7	QP	19.9	33.6	124.0	90.4	
13.5600	90°	19.0	QP	19.9	38.9	124.0	85.1	
13.5670	90°	10.0	QP	19.9	29.9	90.5	60.6	
13.7100	90°	5.3	QP	19.9	25.2	80.5	55.3	Noise floor
14.0100	90°	5.3	QP	19.9	25.2	69.5	44.3	Noise floor

$$\text{Correction Factor(dB)} = \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)}$$
$$\text{Result(dBuV/m)} = \text{Reading(dBuV)} + \text{Correction Factor(dB)}$$

Section 15.225(d) Radiated Emissions (9kHz - 30MHz)

Company : TOSHO Inc. Tested Date : September 15, 2013
Equipment : Conveyor Medication Checking Unit Temperature : 23 °C
Model : CMC Humidity : 48 %
Power : AC120V, 60Hz Atmos. Press : 1007 hPa
Test Mode : Transmitting and Receiving mode
Test Distance : 3m

Tested by : Tadashi Kuroda

Freq. (MHz)	Ant. Angle	Reading @ 3m (dBuV)	Detector (QP/Pk)	Corr. Factor (dB)	Result (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Note
27.1200	0°	3.0	QP	22.9	25.9	69.5	43.6	Noise floor
27.1200	90°	3.0	QP	22.9	25.9	69.5	43.6	Noise floor

$$\text{Correction Factor(dB)} = \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)}$$
$$\text{Result(dBuV/m)} = \text{Reading(dBuV)} + \text{Correction Factor(dB)}$$

8.3 Section 15.225(d) Radiated Emissions (30MHz - 1000MHz)

Company	: TOSHO Inc.	Tested Date	: September 15, 2013
Equipment	: Conveyor Medication Checking Unit	Temperature	: 23 °C
Model	: CMC	Humidity	: 48 %
Power	: AC120V, 60Hz	Atmos. Press	: 1007 hPa
Test Mode	: Transmitting and Receiving mode		
Test Distance	: 3m		

Tested by : Tadashi Kuroda

Freq. (MHz)	Pol. (H/V)	Reading (dBuV)	Detector (QP/Pk)	Corr. Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
127.99	H	33.4	QP	-11.6	21.8	43.5	21.7
127.99	V	32.6	QP	-11.6	21.0	43.5	22.5
143.99	H	30.6	QP	-9.9	20.7	43.5	22.8
143.99	V	37.5	QP	-9.9	27.6	43.5	15.9
461.02	V	36.3	QP	-4.3	32.0	46.0	14.0
474.58	V	34.3	QP	-3.9	30.4	46.0	15.6
542.37	V	34.7	QP	-2.3	32.4	46.0	13.6
569.49	V	29.3	QP	-1.5	27.8	46.0	18.2
583.05	V	33.4	QP	-1.1	32.3	46.0	13.7
759.33	V	28.9	QP	1.6	30.5	46.0	15.5

$$\text{Correction Factor(dB)} = \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)} - \text{Preamplifier Gain(dB)} + 3\text{dB Attenuator}$$

$$\text{Result(dBuV/m)} = \text{Reading(dBuV)} + \text{Correction Factor(dB)}$$

8.4 Section 15.225(e) Frequency Stability

Company : TOSHO Inc. Tested Date : July 5, 2013
 Equipment : Conveyor Medication Checking Unit Temperature : 24 °C
 Model : CMC Humidity : 48 %
 Power : AC120V, 60Hz Atmos. Press : 1002 hPa
 Test Mode : Transmitting and Receiving mode

Tested by : Tadashi Kuroda

Temperature Variations

Temp. (°C)	Voltage (V)	Measured Frequency (MHz)				Worst Deviation (%)	Limit (%)
		Start-up	2 min.	5 min.	10 min.		
50	120	13.55938	13.55938	13.55938	13.55938	0.0046	+/- 0.01
40	120	13.55940	13.55939	13.55939	13.55939	0.0045	+/- 0.01
30	120	13.55941	13.55941	13.55940	13.55940	0.0044	+/- 0.01
20	120	13.55941	13.55941	13.55941	13.55941	0.0044	+/- 0.01
10	120	13.55943	13.55942	13.55942	13.55942	0.0043	+/- 0.01
0	120	13.55941	13.55942	13.55942	13.55942	0.0044	+/- 0.01
-10	120	13.55939	13.55940	13.55941	13.55941	0.0045	+/- 0.01
-20	120	13.55937	13.55939	13.55939	13.55939	0.0046	+/- 0.01

Voltage Variations

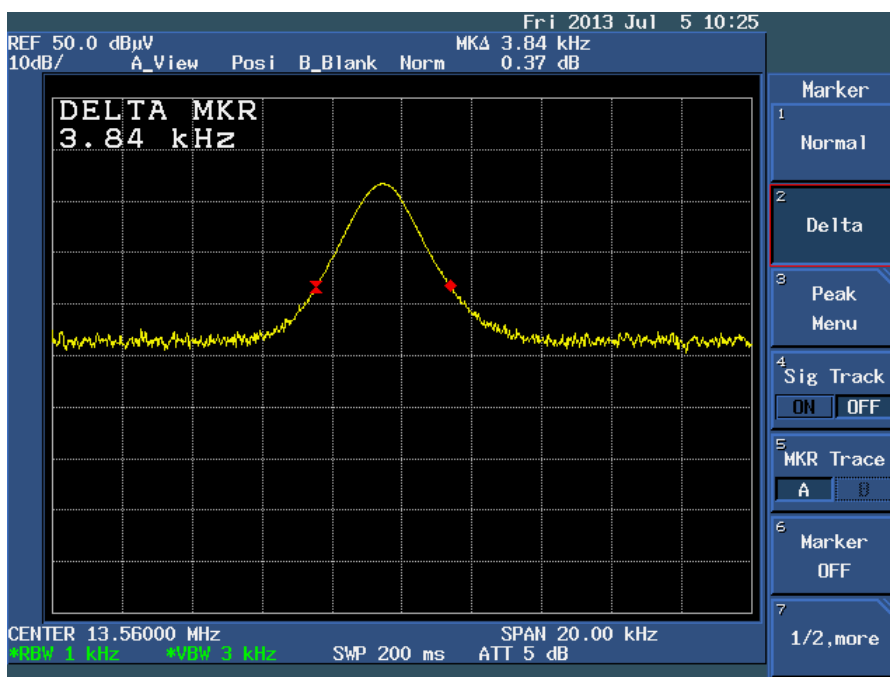
Temp. (°C)	Voltage (V)	Measured Frequency (MHz)				Worst Deviation (%)	Limit (%)
		Start-up	2 min.	5 min.	10 min.		
20	102	13.55941	13.55941	13.55941	13.55941	0.0044	+/- 0.01
20	120	13.55941	13.55941	13.55941	13.55941	0.0044	+/- 0.01
20	138	13.55941	13.55941	13.55941	13.55941	0.0044	+/- 0.01

8.5 Section 15.215(c) 20dB Bandwidth

Company	: TOSHO Inc.	Tested Date	: July 5, 2013
Equipment	: Conveyor Medication Checking Unit	Temperature	: 24 °C
Model	: CMC	Humidity	: 48 %
Power	: AC120V, 60Hz	Atmos. Press	: 1002 hPa
Test Mode	: Transmitting and Receiving mode		

Tested by : Tadashi Kuroda

Freq. (MHz)	20dB Bandwidth (kHz)
13.56	3.84



9 THE PHOTOS OF TEST-SETUP

9.1 Conducted Emissions 0.15 MHz - 30 MHz



9.2 Radiated Emissions 9 kHz - 30 MHz

Antenna angle: 0°



Antenna angle: 90°



9.3 Radiated Emissions 30 MHz - 1000 MHz



9.4 Frequency Stability

