

## TEST REPORT For FCC

Test Report No. : CTK-2012-00045  
Date of Issue : February 21, 2012  
FCC ID : QJCB40K  
Model/Type No. : B40K  
Kind of Product : Braille EDGE 40  
Applicant : HIMS International Corporation  
Applicant Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350  
Manufacturer : HIMS International Corporation  
Manufacturer Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350  
Contact Person : Lee Changhui / Associate Researcher  
Telephone : +82-42-864-4460  
Received Date : January 15, 2012  
Test period : Start : February 02, 2012 End : February 15, 2012

The test results presented in this report relate only to the object tested.

*Tested by*

*Y. T. Lee*

Young-taek Lee  
Test Engineer  
Date: February 21, 2012

*Reviewed by*

*Y. J. Park*

Young-Joon, Park  
Technical Manager  
Date: February 21, 2012



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### REPORT REVISION HISTORY

Date	Revision	Page No
February 21, 2012	Issued (CTK-2012-00045)	All

*This report shall not be reproduced except in full, without the written approval of CTK Co., Ltd. This document may be altered or revised by CTK Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CTK Co., Ltd. will constitute fraud and shall nullify the document.*

## TABLE OF CONTENTS

REPORT REVISION HISTORY .....	2
1.0 General Product Description .....	4
1.1 Tested Frequency .....	4
1.2 Tested Mode .....	4
1.3 Device Modifications .....	5
1.4 Peripheral Devices .....	5
1.5 Calibration Details of Equipment Used for Measurement .....	5
1.6 Test Facility.....	5
1.7 Laboratory Accreditations and Listings .....	6
2.0 Summary of tests .....	7
2.1 Transmitter Requirements .....	8
2.1.1 Carrier Frequency Separation .....	8
2.1.2 Number of Hopping Frequencies .....	10
2.1.4 Time of Occupancy (Dwell Time) .....	15
2.1.5 Maximum peak Conducted Output Power.....	19
2.1.6 Band-edge.....	22
2.1.7 Field Strength of Emissions .....	28
2.1.8 AC Conducted Emissions.....	33
APPENDIX A – Test Equipment Used For Tests .....	36



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### 1.0 General Product Description

Equipment model name	B40K
Serial number	Prototype
EUT condition	Pre-production, not damaged
Antenna type	Chip antenna      Gain   -1 dBi
Frequency Range	2402 MHz - 2480 MHz
RF power	-2.436 dBm Peak Conducted
Number of channels	79
Channel Spacing	1 MHz
Channel Access Protocol	Frequency Hopping
Type of Modulation	GFSK(1 Mbps)
Power Source	DC 3.7 V (Polymer Lithium-Ion Battery)

### 1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

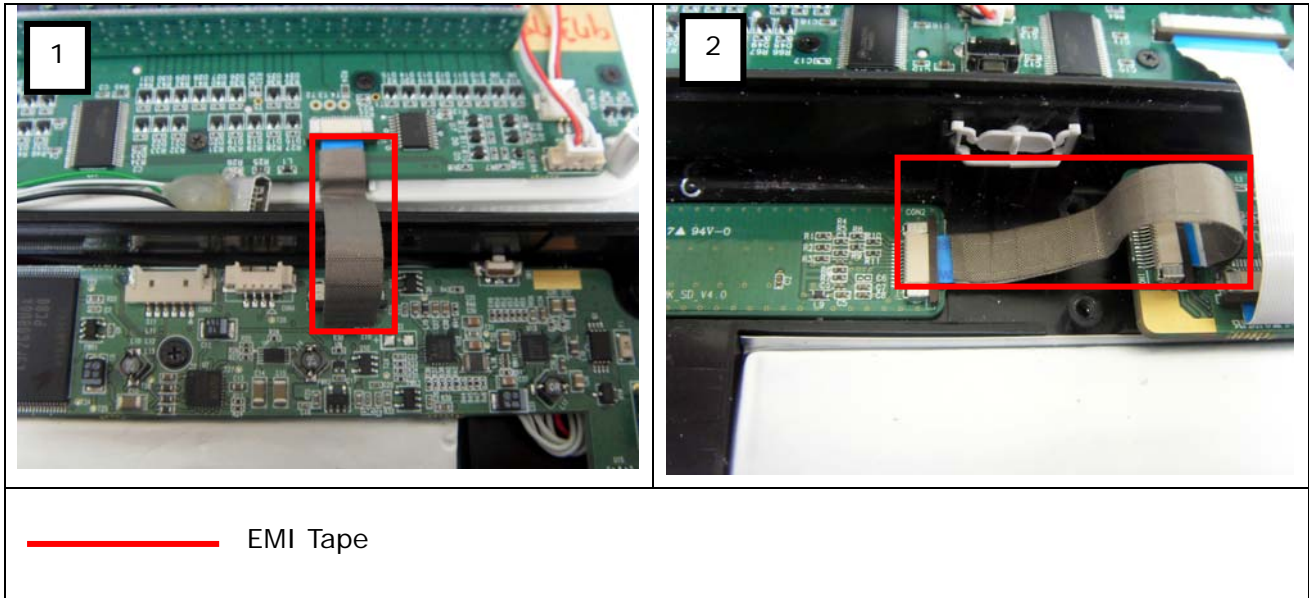
### 1.2 Tested Mode

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Tested Ch	Modulation Technology	Modulation Type
Low, Mid, High	FHSS	GFSK

## 1.3 Device Modifications

The following modifications were necessary for compliance and was applied by applicant.



## 1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
Switching Adapter (for EUT)	Dee Van Electronics(Longchuan)Co., Ltd.	DSA-12CA-05 050200	-	-
SD Card	-	-	-	DoC
Note PC	Samsung Electronics Co., Ltd.	SP10	-	DoC
AC/DC ADAPTER	LiShin International Eletronic Co.,Ltd.	0335C1960 AD-6019	-	-

## 1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.6 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.







CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### 1.7 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986 T-1843
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 No. 51, KR0025
International	KOLAS	EMC	



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

## 2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 15 hops		C
15.247(a)	20 dB Bandwidth	NA		C
15.247	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 0.125 Watts		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.209	Field Strength of Harmonics	15.209(a)	Radiated	C
15.207	AC Conducted Emissions	15.207(a)	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:  
- FCC Part 15.247, ANSI C63.4-2003

## 2.1 Transmitter Requirements

### 2.1.1 Carrier Frequency Separation

#### Test Location

RF Test Room

#### Test Procedures

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz ( $\geq 1\%$  of the span) Sweep = auto

VBW = 30 kHz ( $\geq$  RBW) Detector function = peak

Trace = max hold

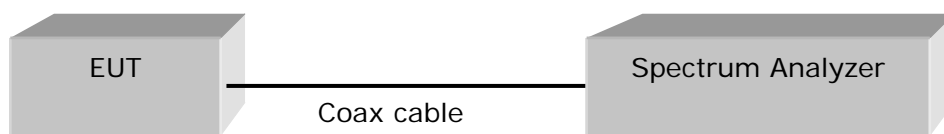


Figure 1 : Measurement setup for the carrier frequency separation

#### Limit

§15.247(a)(1) Frequency hopping system operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

Channel	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz	1010	627	25	Complies

See next pages for actual measured spectrum plots.



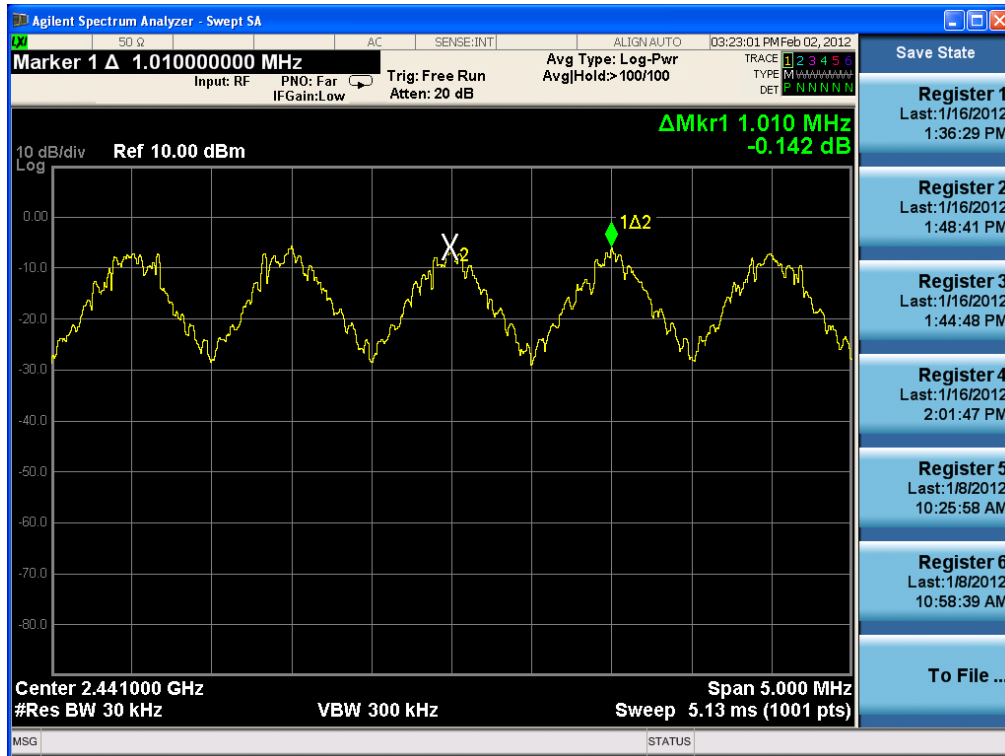


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Carrier Frequency Separation



## 2.1.2 Number of Hopping Frequencies

### Test Location

RF Test Room

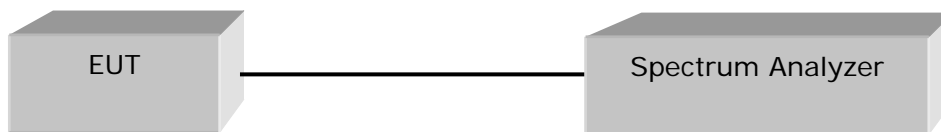
### Test Procedures

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Frequency range      1: Start = 2389.5 MHz, Stop = 2439.5 MHz  
                                 2: Start = 2439.5 MHz, Stop = 2489.5 MHz

Span = 50 MHz  
RBW = 300 kHz ( $\geq 1\%$  of the span)  
VBW = 300 kHz ( $\geq$  RBW)  
Trace = max hold  
Sweep = auto  
Detector function = peak



### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.

### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

Total number of Hopping Channels	Result
79	Complies

See next pages for actual measured spectrum plots.

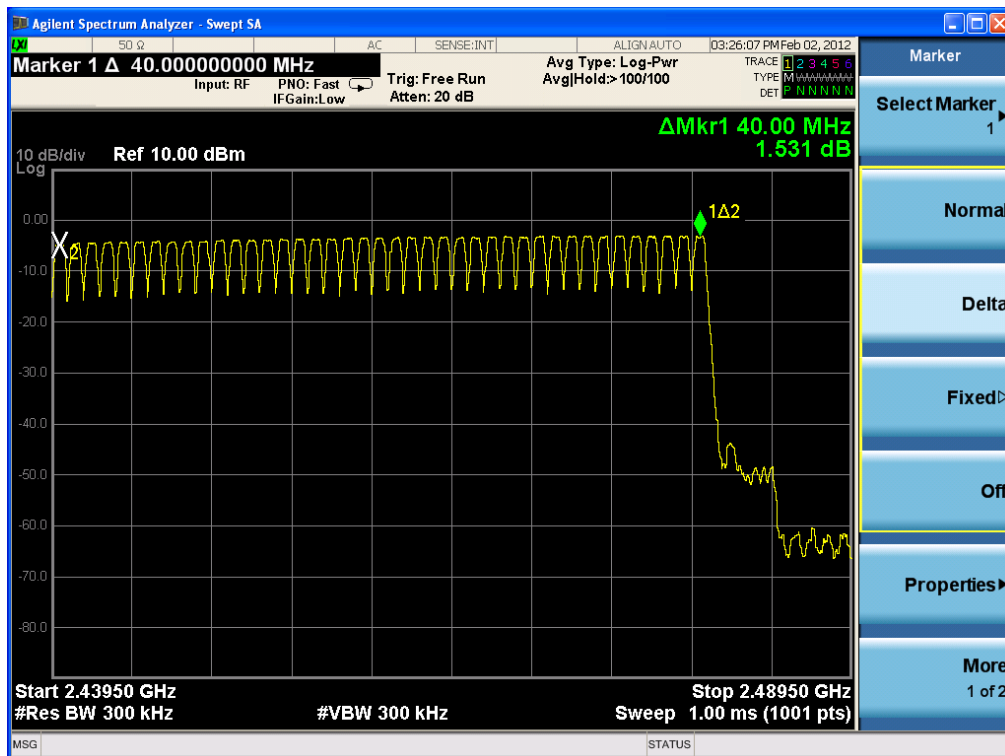
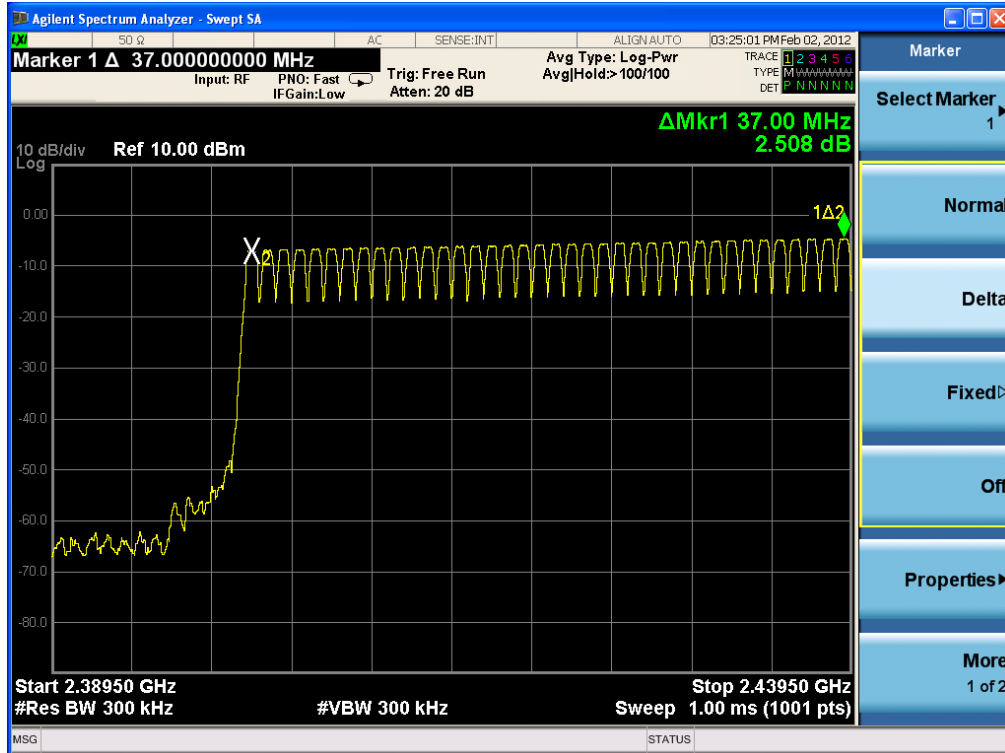


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Number of Hopping Frequencies



### 2.1.3 20 dB bandwidth

#### Test Location

RF Test Room

#### Test Procedures

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels. After the trace being stable, Use the marker-to peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

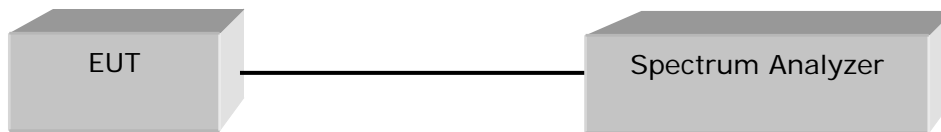
RBW = 30 kHz ( $\geq 1\%$  of the span)

Sweep = auto

VBW = 30 kHz ( $\geq$  RBW)

Detector function = peak

Trace = max hold



#### Limit

Limit : N/A

#### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

Frequency (MHz)	Channel Number.	Measured Bandwidth (MHz)	Result
2402	0	0.938	Complies
2441	39	0.940	Complies
2480	78	0.944	Complies

See next pages for actual measured spectrum plots.



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### 20 dB Bandwidth





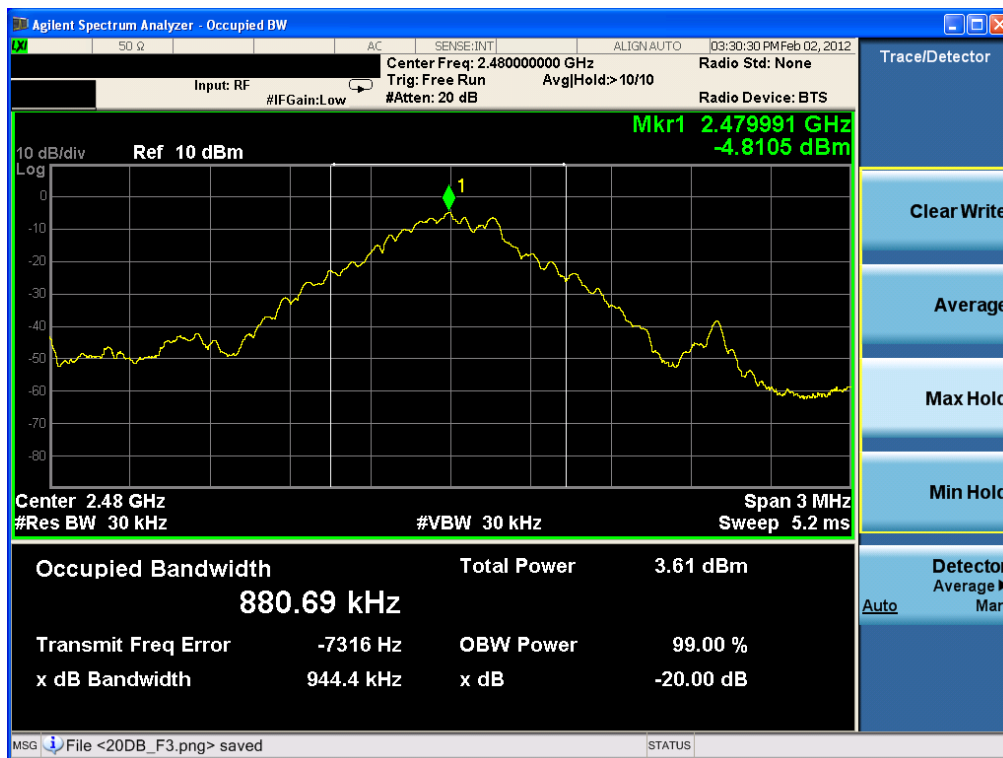
CTK Co., Ltd.

# CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com



## 2.1.4 Time of Occupancy (Dwell Time)

### Test Location

RF Test Room

### Test Procedures

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The B40K has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

Span = zero

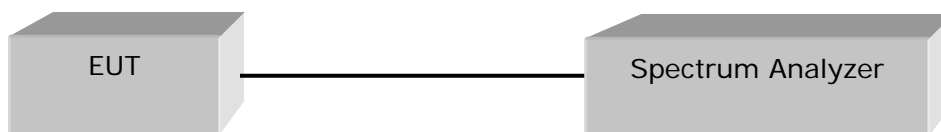
RBW = 1 MHz

Trace = max hold

VBW = 1 MHz ( $\geq$  RBW)

Detector function = peak

Sweep = as necessary to capture the entire dwell time per hopping channel



### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in 2400-2483.5 MHz band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Test Results

Time of occupancy on the TX channel in 31.6 sec = time domain slot length × hop rate ÷  
number of hop per channel × 31.6

#### Test mode : GFSK

Channel Frequency (MHz)	Packet Type	Dwell Time (ms)	Test Results	
			Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441	DH 1	0.400	128.00	Complies
	DH 3	1.650	264.00	Complies
	DH 5	2.900	309.33	Complies

DH1 Dwell time =  $0.400 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 128.00 \text{ ms}$

DH3 Dwell time =  $1.650 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 264.00 \text{ ms}$

DH5 Dwell time =  $2.900 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 309.33 \text{ ms}$

See next pages for actual measured spectrum plots.



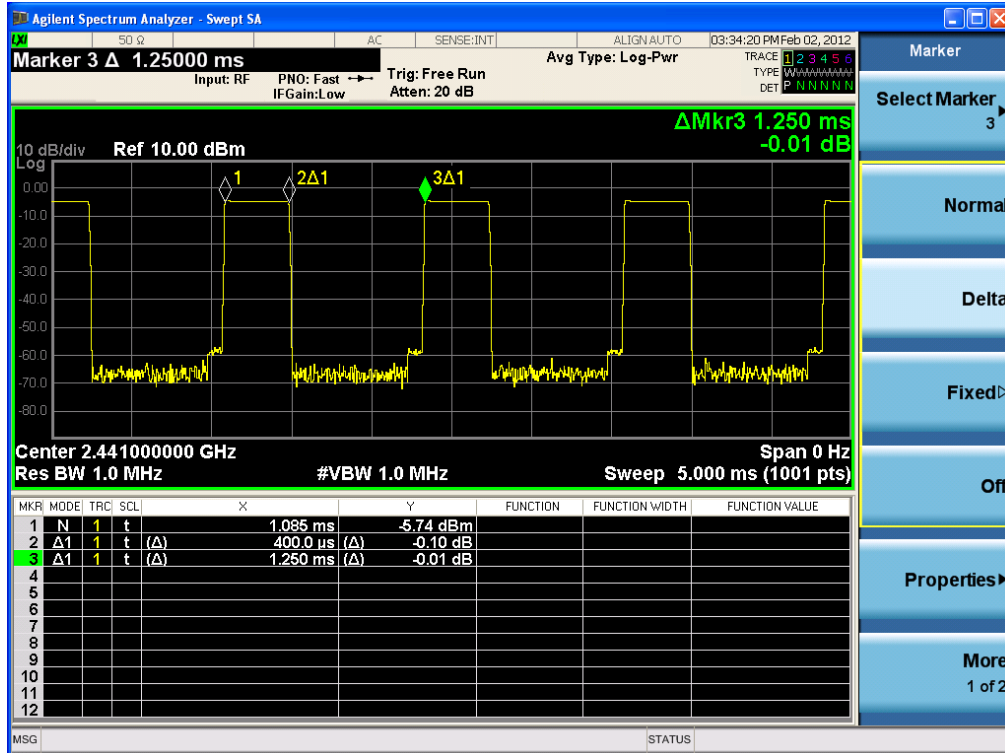


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

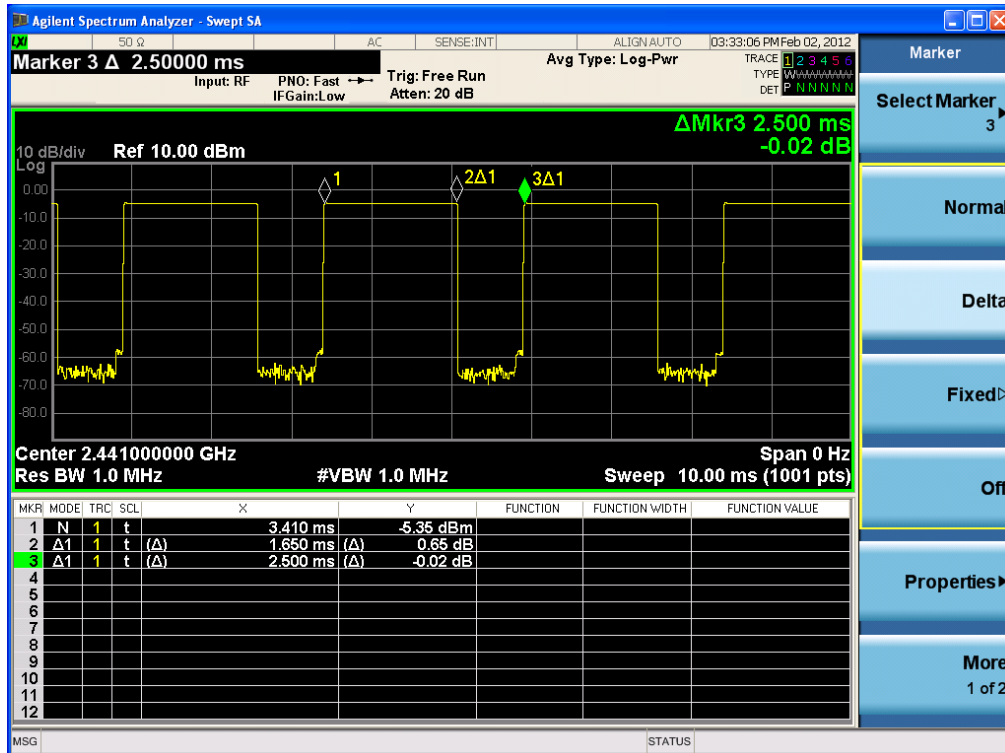
## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Time of Occupancy for PACKET Type - DH1



### Time of Occupancy for PACKET Type - DH3



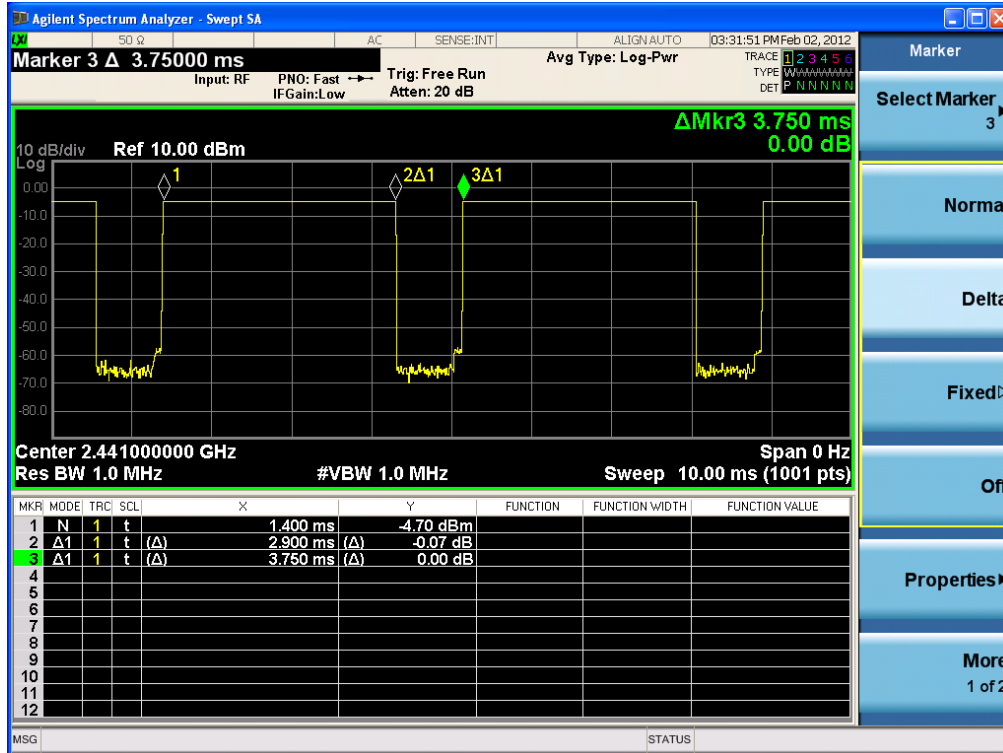


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Time of Occupancy for PACKET Type - DH5



## 2.1.5 Maximum peak Conducted Output Power

### Test Location

RF Test Room

### Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

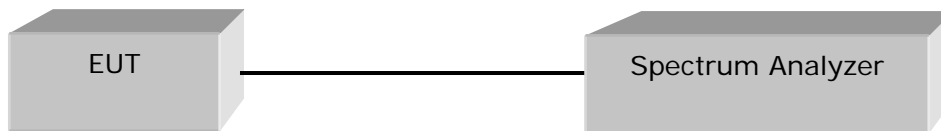
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)

VBW = 1 MHz ( $\geq$  RBW)

Detector function = peak

Trace = max hold

Sweep = auto



### Limit

§5.247(b)(1) The Maximum Peak Output Power Measurement is 0.125 Watts for frequency hopping system operating in 2400-2483.5 MHz employing at least 15 Hopping channels.

### Test Results

**Test mode : GPSK, CFG PKT Packet Type : 4 Packet Size : 27(DH1)**

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	-6.367	0.231	Complies
2441	39	-3.703	0.426	Complies
2480	78	-2.436	0.571	Complies

See next pages for actual measured spectrum plots.

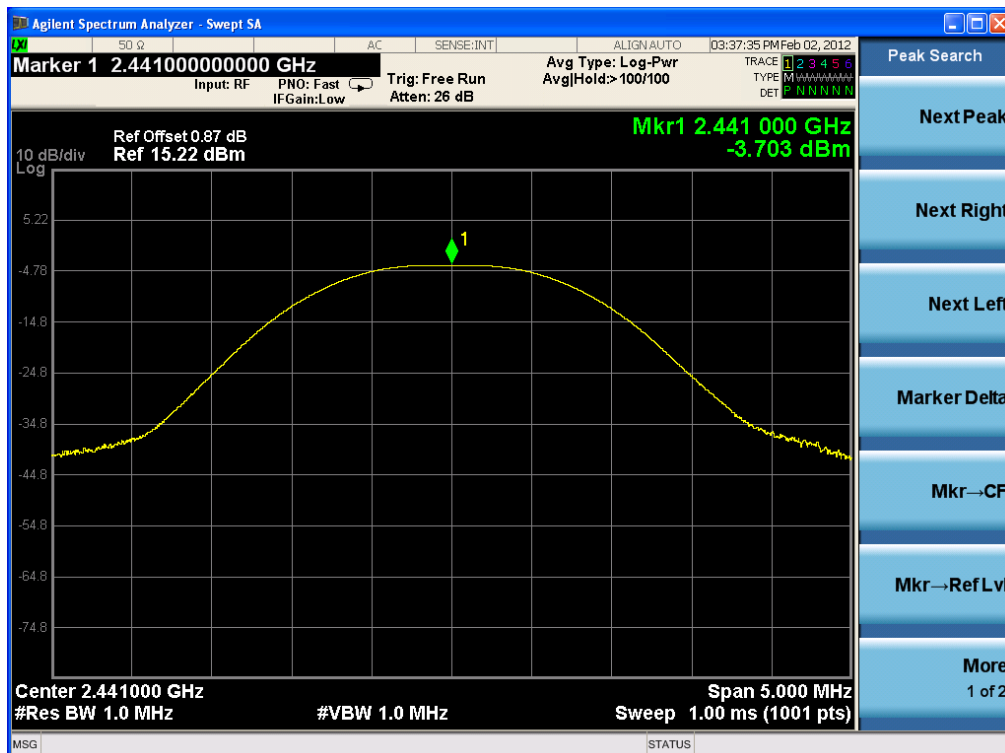
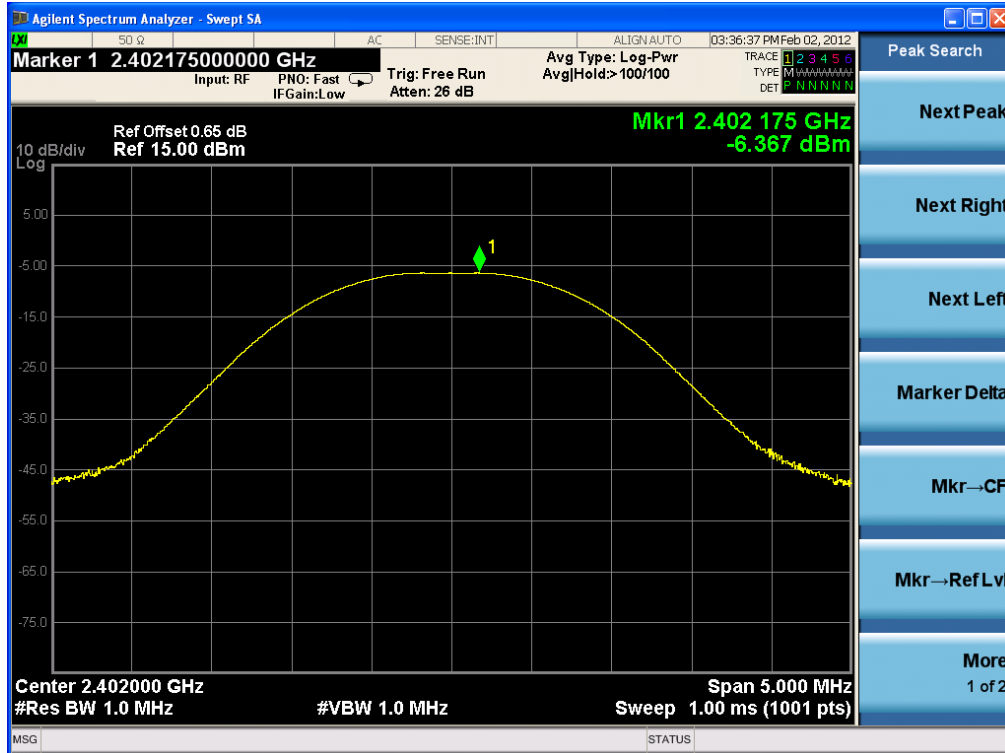


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Maximum peak Conducted Output Power

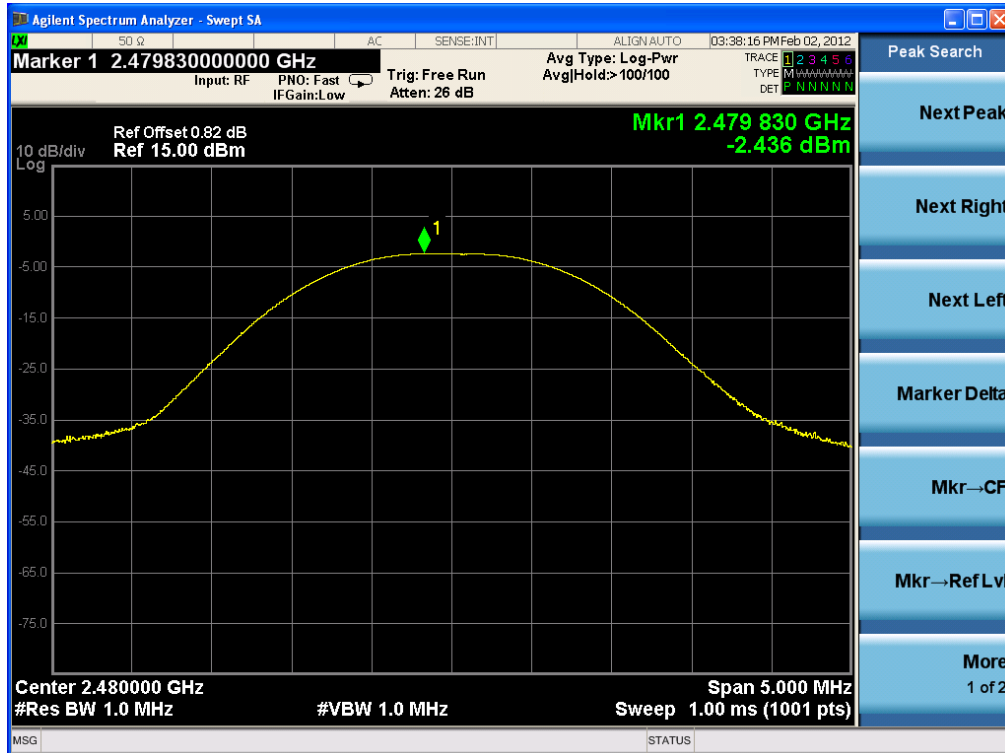




CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com



## 2.1.6 Band-edge

### Test Location

RF Test Room

### Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

RBW = 100 kHz

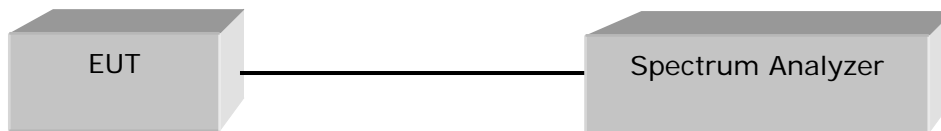
VBW = 100 kHz ( $\geq$  RBW)

Span = 10 MHz

Trace = max hold

Detector function = peak

Sweep = auto



### Limit

> 20 dBc

### Test Results

All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest level of the inband spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

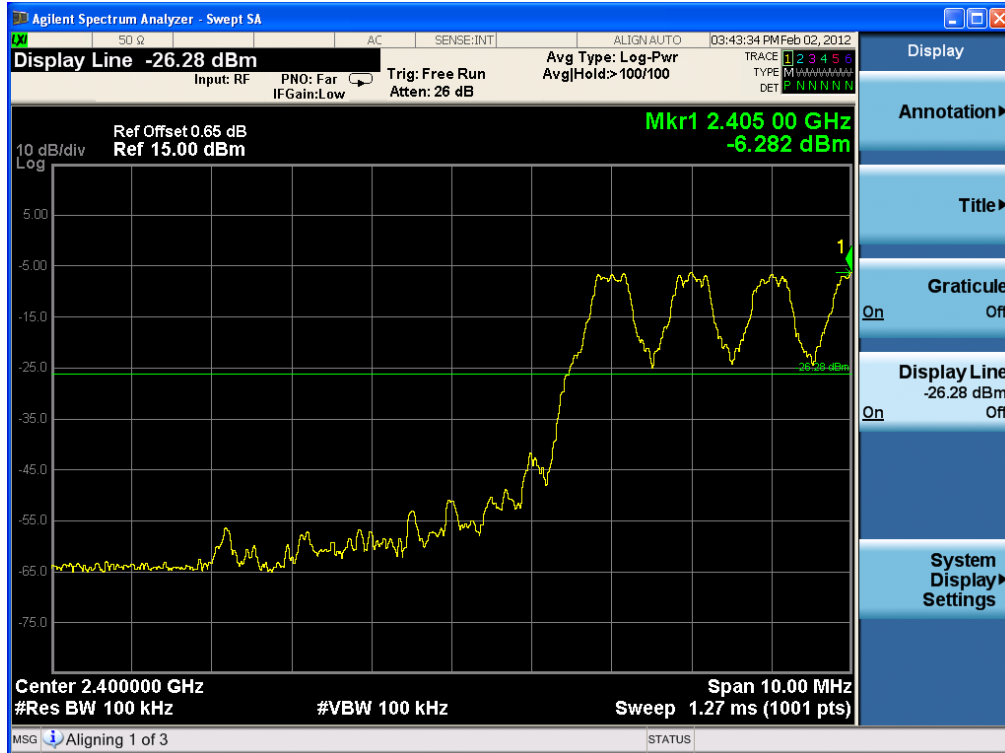


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Band – edge (with Hopping)



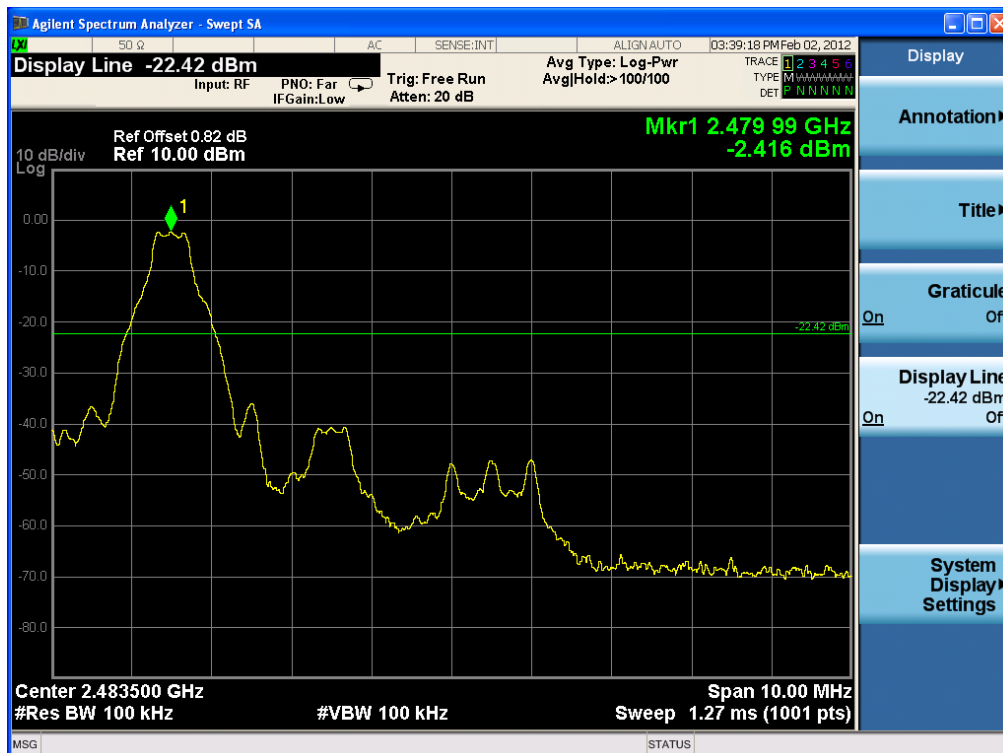
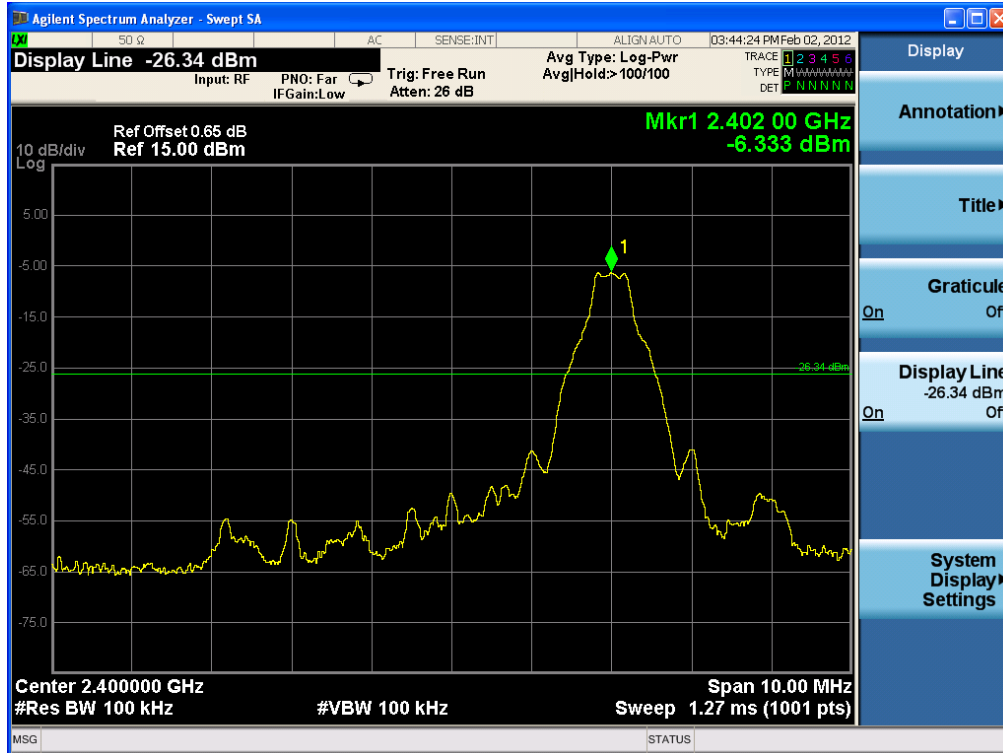


CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

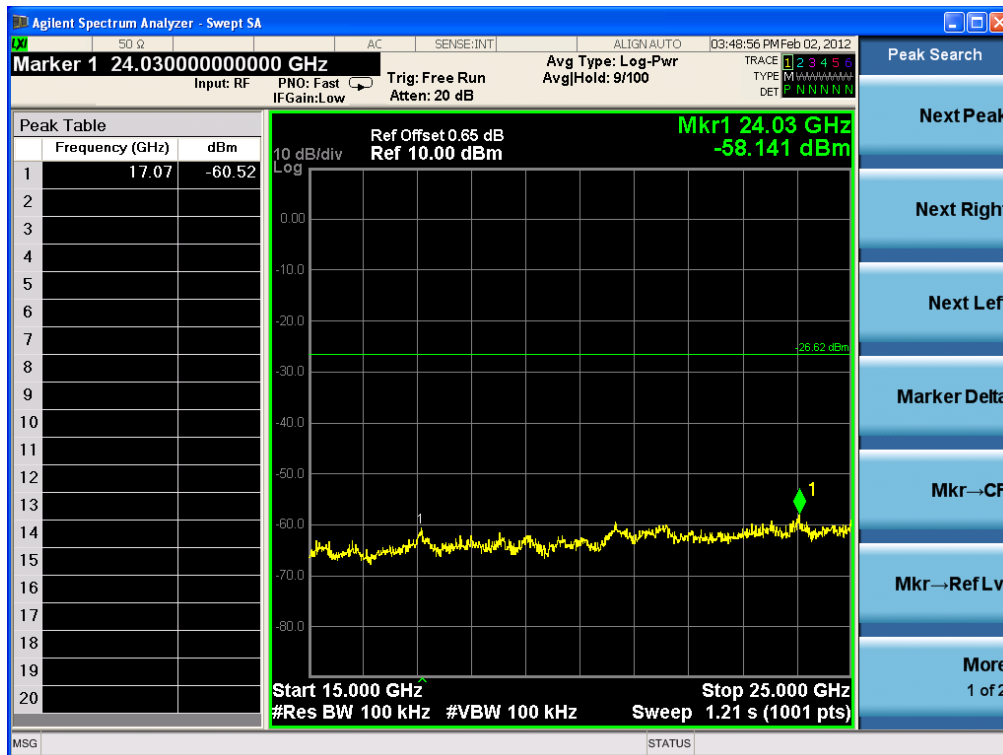
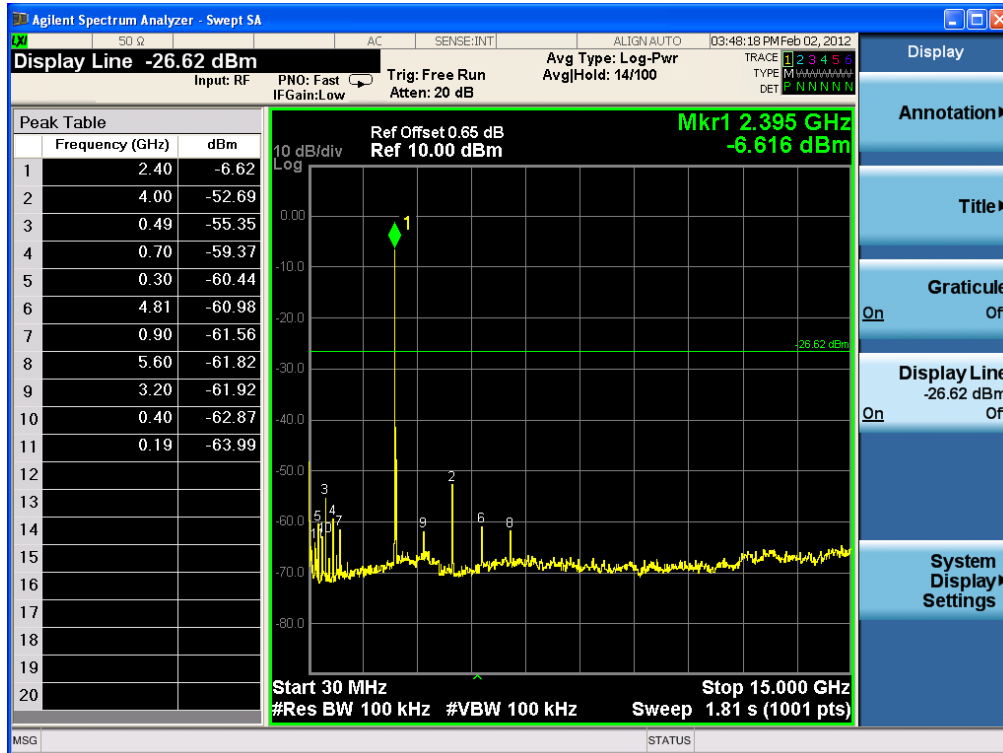
386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Band – edge (without Hopping)



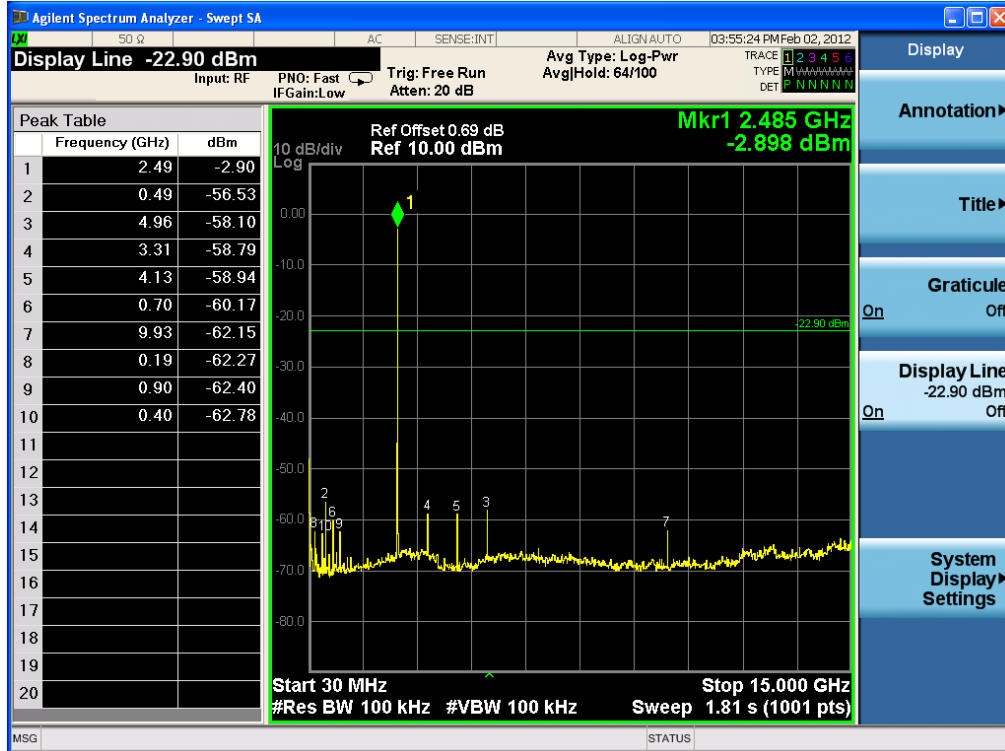


**Band – edge (at 20 dB blow) – Low channel**  
**Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic**





**Band – edge (at 20 dB blow) – High channel**  
**Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic**



## 2.1.7 Field Strength of Emissions

### Test Location

☒ Testing was performed at a test distance of 3 meter SAC

### Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic

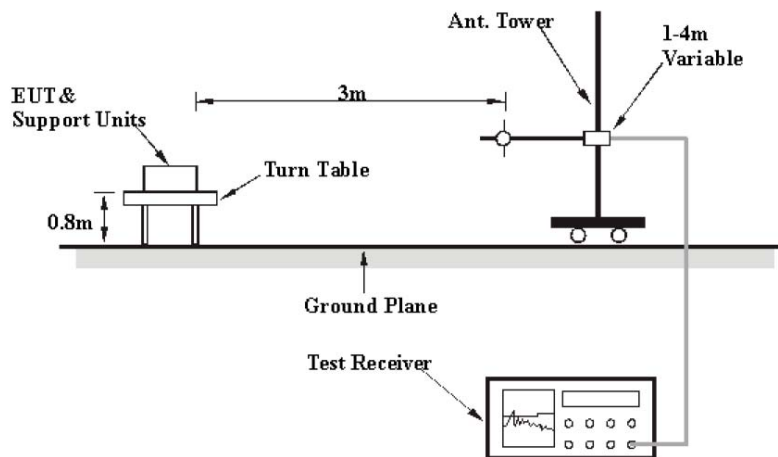
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic)

Span = 100 MHz

Detector function = Quasi-peak

Trace = max hold



### Limit

#### - 15.209(a)

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

\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### Test Results

**Test mode : Hopping, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

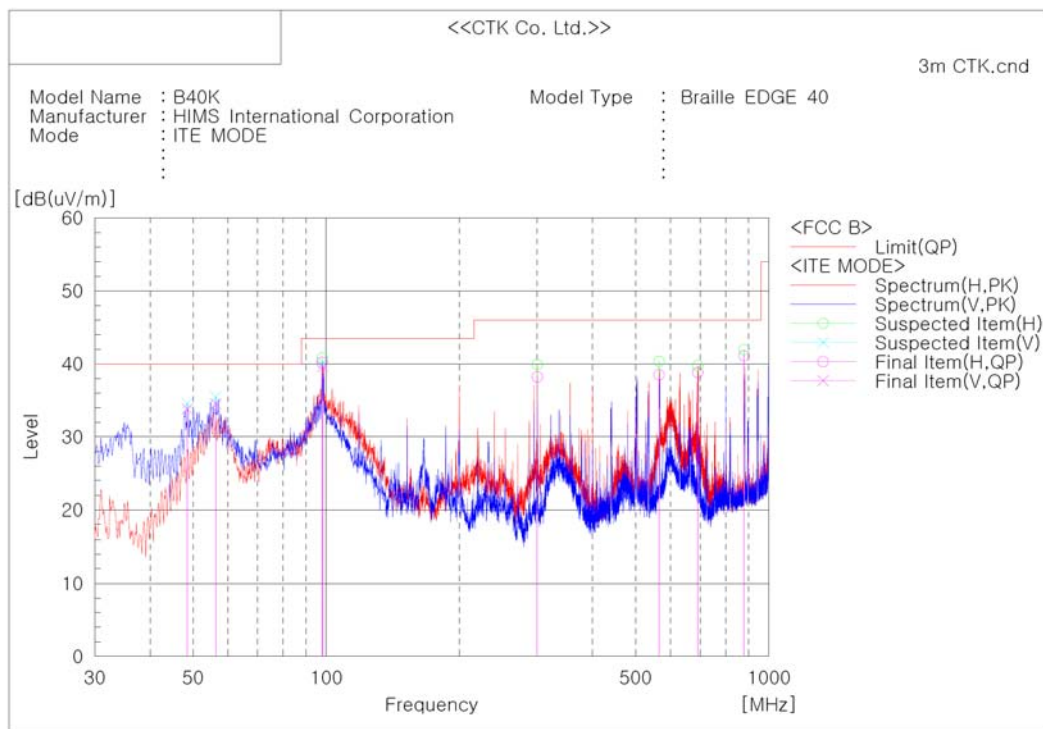
EUT	Braille EDGE 40	Measurement Detail	
Model	B40K	Frequency Range	Below 1000MHz
Test mode	Hopping	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
97.91	40.2	3.3	Quasi-peak

### Test Data



#### Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	48.551	V	54.3	-20.5	33.8	40.0	6.2	100.0	290.0
2	56.311	V	58.5	-24.0	34.5	40.0	5.5	100.0	253.0
3	97.910	H	59.7	-19.5	40.2	43.5	3.3	317.0	308.0
4	98.264	V	59.0	-19.4	39.6	43.5	3.9	100.0	253.0
5	300.024	H	52.6	-14.4	38.2	46.0	7.8	100.0	278.0
6	565.319	H	45.8	-7.3	38.5	46.0	7.5	205.0	105.0
7	691.055	H	43.5	-4.7	38.8	46.0	7.2	100.0	315.0
8	879.356	H	42.2	-1.1	41.1	46.0	4.9	100.0	129.0

#### Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(X axis) and the worst case was recorded.



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Braille EDGE 40	Measurement Detail	
Model	B40K	Frequency Range	1-25GHz
Channel	Channel 0	Detector function	Peak

### Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4804.00	41.0 / 56.6	13.0 / 17.4	Average / Peak

### Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4804.00	31.8 / 47.4	V	1.0	32.7	34.9	11.4	54.0 / 74.0	41.0 / 56.6	13.0 / 17.4

### Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2390.00	28.6 / 40.2	V	1.0	28.2	35.3	7.4	54.0 / 74.0	28.9 / 40.5	25.1 / 33.5



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
Tel: +82-31-339-9970 Fax: +82-31-339-9855  
www.e-ctk.com

### Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Braille EDGE 40	Measurement Detail	
Model	B40K	Frequency Range	1-25GHz
Channel	Channel 39	Detector function	Peak

### Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4882.00	42.6 / 57.9	11.4 / 16.1	Average / Peak

### Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4882.00	33.4 ..... 48.7	V	1.0	32.7	34.9	11.4	54.0 ..... 74.0	42.6 ..... 57.9	11.4 ..... 16.1

### Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									

## Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Braille EDGE 40	Measurement Detail	
Model	B40K	Frequency Range	1-25GHz
Channel	Channel 78	Detector function	Peak

## Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4960	42.1 / 56.1	11.9 / 17.9	Average / Peak

## Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4960.00	32.9 : 46.9	V	1.0	32.7	34.9	11.4	54.0 : 74.0	42.1 : 56.1	11.9 : 17.9

## Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2483.50	33.9 : 50.3	V	1.0	28.2	35.3	7.4	54.0 : 74.0	34.2 : 50.6	19.9 : 23.4



## 2.1.8 AC Conducted Emissions

### Test Location

Shielded Room

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

### Limit

#### - 15.207(a)

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

\* Decreases with the logarithm of the frequency.

### Test Results

The requirements are:

☒ Complies

#### Test mode : Hopping

Frequency (MHz)	Measured Data (dBuV)	Margin (dB)	Remark
0.1905	39.8	14.2	Average



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

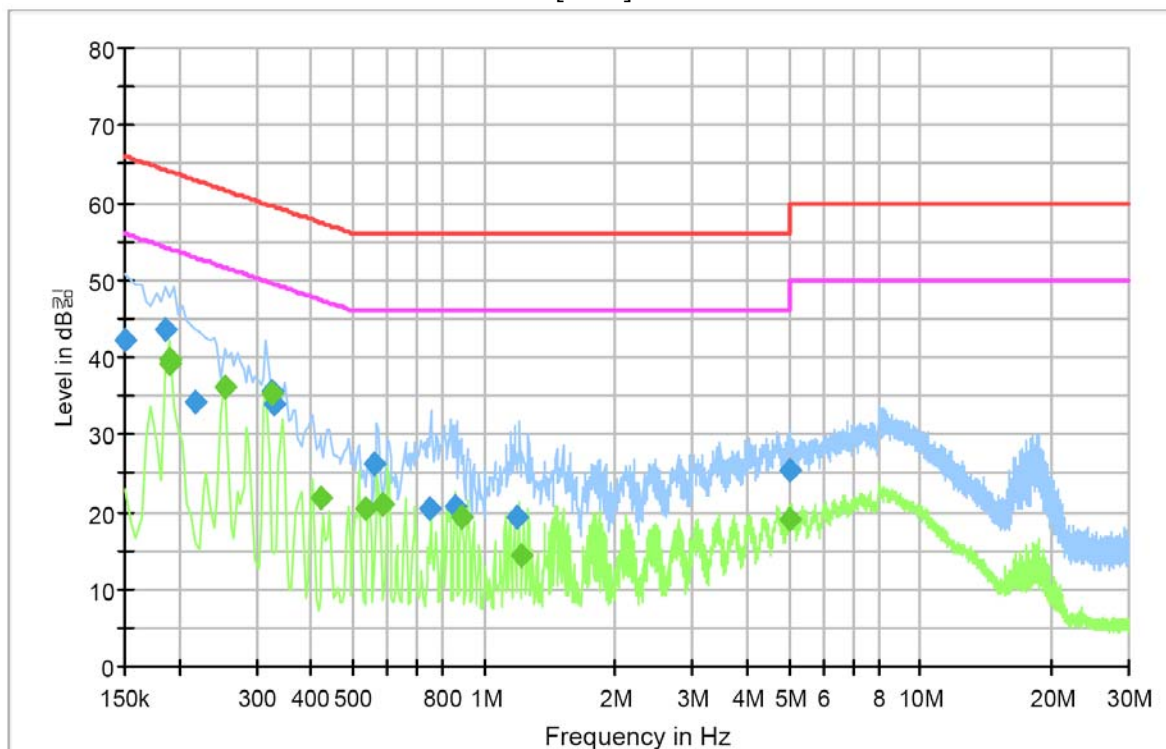
386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### Test Data

[HOT]



### Final Result 1

Frequency (MHz)	QuasiPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBm)
0.150000	42.2	1000.0	9.000	On	L1	10.2	23.8	66.0
0.186000	43.5	1000.0	9.000	On	L1	10.0	20.7	64.2
0.217500	34.1	1000.0	9.000	On	L1	10.1	28.8	62.9
0.325500	35.6	1000.0	9.000	On	L1	10.0	24.0	59.6
0.330000	33.9	1000.0	9.000	On	L1	10.0	25.6	59.5
0.559500	26.3	1000.0	9.000	On	L1	10.0	29.7	56.0
0.748500	20.5	1000.0	9.000	On	L1	10.1	35.5	56.0
0.856500	20.7	1000.0	9.000	On	L1	10.0	35.4	56.0
1.194000	19.4	1000.0	9.000	On	L1	10.0	36.6	56.0
5.014500	25.2	1000.0	9.000	On	L1	9.8	34.8	60.0

### Final Result 2

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBm)
0.190500	39.3	1000.0	9.000	On	L1	10.0	14.7	54.0
0.190500	39.8	1000.0	9.000	On	L1	10.0	14.2	54.0
0.253500	36.2	1000.0	9.000	On	L1	10.1	15.4	51.6
0.325500	35.4	1000.0	9.000	On	L1	10.0	14.2	49.6
0.420000	21.8	1000.0	9.000	On	L1	10.0	25.6	47.4
0.537000	20.5	1000.0	9.000	On	L1	10.0	25.5	46.0
0.582000	20.9	1000.0	9.000	On	L1	10.0	25.1	46.0
0.883500	19.2	1000.0	9.000	On	L1	10.0	26.8	46.0
1.216500	14.2	1000.0	9.000	On	L1	10.0	31.8	46.0
5.014500	18.9	1000.0	9.000	On	L1	9.8	31.1	50.0



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

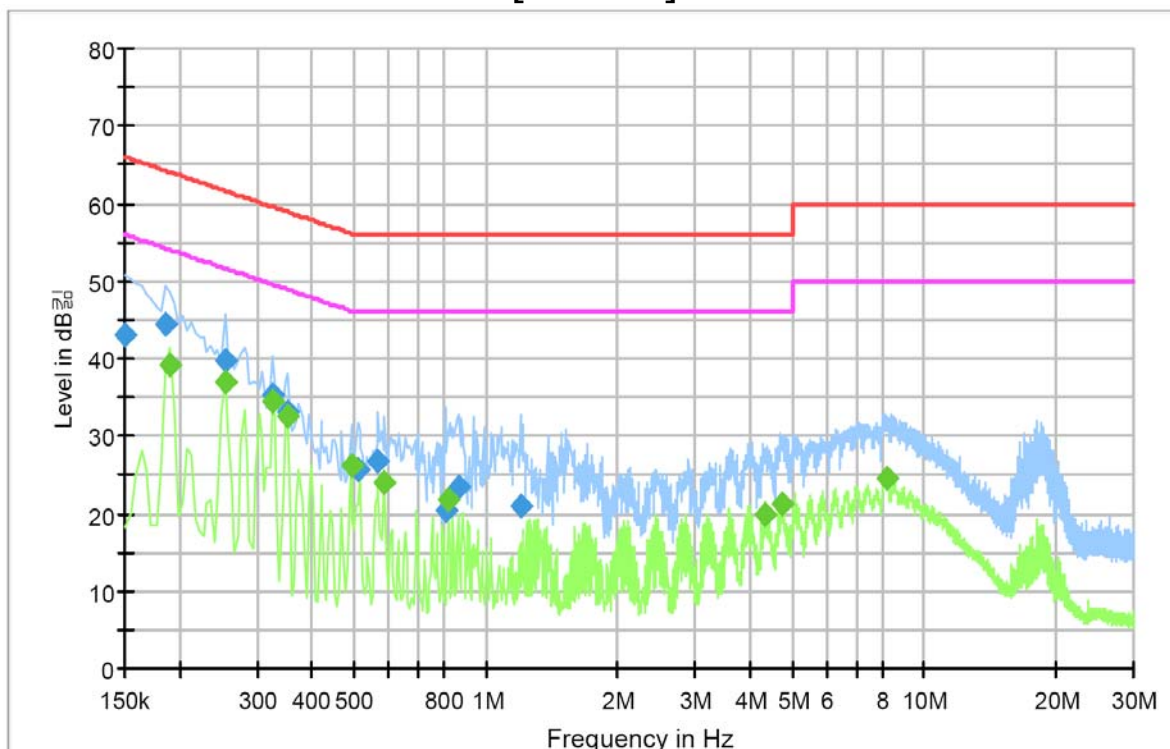
## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### [NEUTRAL]



### Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	43.1	1000.0	9.000	On	N	10.2	22.9	66.0
0.186000	44.5	1000.0	9.000	On	N	10.1	19.7	64.2
0.253500	39.8	1000.0	9.000	On	N	10.1	21.9	61.6
0.325500	35.3	1000.0	9.000	On	N	10.0	24.2	59.6
0.352500	33.0	1000.0	9.000	On	N	10.0	25.9	58.9
0.510000	25.8	1000.0	9.000	On	N	9.9	30.2	56.0
0.568500	26.8	1000.0	9.000	On	N	10.0	29.2	56.0
0.807000	20.4	1000.0	9.000	On	N	10.1	35.6	56.0
0.865500	23.5	1000.0	9.000	On	N	10.0	32.5	56.0
1.198500	21.0	1000.0	9.000	On	N	10.0	35.0	56.0

### Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190500	39.1	1000.0	9.000	On	N	10.1	14.9	54.0
0.253500	36.9	1000.0	9.000	On	N	10.1	14.7	51.6
0.325500	34.6	1000.0	9.000	On	N	10.0	15.0	49.6
0.352500	32.5	1000.0	9.000	On	N	10.0	16.4	48.9
0.492000	26.2	1000.0	9.000	On	N	9.9	20.0	46.1
0.586500	24.0	1000.0	9.000	On	N	10.0	22.0	46.0
0.820500	21.9	1000.0	9.000	On	N	10.1	24.1	46.0
4.344000	19.9	1000.0	9.000	On	N	9.8	26.1	46.0
4.767000	21.1	1000.0	9.000	On	N	9.8	24.9	46.0
8.209500	24.5	1000.0	9.000	On	N	9.7	25.5	50.0



CTK Co., Ltd.  
The Power Leader of Global Regulatory Compliance

## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea

Tel: +82-31-339-9970 Fax: +82-31-339-9855

www.e-ctk.com

### APPENDIX A – Test Equipment Used For Tests

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Signal Analyzer	Agilent	N9020A	MY48011598	2012-11-10
Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2012-11-10
EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2012-07-07
ULTRA Broadband Antenna	Rohde & Schwarz	HL562	100203	2013-07-05
LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
Attenuator	HP	8494A	3308A33351	2012-11-14
EPM Series Power Meter	HP	E4418A	GB38272734	2012-11-10
Power Sensor	HP	8487A	3318A03524	2012-07-07
Audio Analyzer	HP	8903B	2747A03432	2012-11-10
ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2012-11-21
SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2012-11-10
Modulation Analyzer	HP	8901B	3438A05228	2012-11-18
Attenuator	BIRD	1000-WA-MFN-30	236	2012-11-14
Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2012-01-14
DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
EMC Analyzer	Agilent	E7405A	MY45110859	2013-02-13
Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
Antenna(Biconical)	EMCO	3110	9202-1510	2012-06-10
Antenna(Log Periodic)	EMCO	3146	9607-4567	2012-06-10
OPT H64 AMPLIFIER	HP	8447F	3113A06814	2012-03-31
PREAMPLIFIER	Agilent	8449B	3008A02307	2012-11-17
EMI Test Receiver	Rohde & Schwarz	ESHS30	828144/022	2013-02-09
LISN	Rohde & Schwarz	ENV216	101150	2013-02-09
EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2013-02-09
AC Power Source	California Instruments	2001RP	08770	2013-02-09