

# VCCI DAYORI

No.138 2020.10

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# God's Number

National Institute of Information and Communications Technology  
Katsumi Fujii

As you are well aware, VCCI was established in 1985. Two years before that, the first batch of a certain home video game console went to market, eventually resulting in worldwide sales of 61.91 million units. A few years prior to that, in 1980, a 3D puzzle, called Rubik's Cube<sup>1)</sup>, became extremely popular. Rubik's Cube, as the name suggests, is a cubic puzzle, with each face consisting of nine (3 x 3) colored squares (actually miniature cubes). The principle is quite simple: scramble the cube, and then restore all the respective squares of all six sides of the cube to their original positions. At the height of the craze, there were many similar (imitative) products on the market in addition to the genuine licensed product. My father bought me a Cube when I was in elementary school. I was immediately hooked, and messed around with it over and over until the colored stickers on the cube started to peel off. Yet, I could never solve even a single side without ruining the order of another.

I felt that I wasn't cut out for multitasking (at least not as an elementary school student). Some time later, a junior high school friend of mine in the neighborhood explained how to solve all six faces on the back of a newspaper insert. The solution (currently called the LBL (or CFOP) method) involves rotating the cube in specific ways. Anyone can solve the cube using this method. Ever since I learned this shortcut, the Rubik's Cube became a means to kill time for me. It wasn't long before the Rubik fad had passed, and home video game consoles usurped the Cube.

More than 10 years later, I found myself working with EMC problems, which require a different kind of juggling: that of electromagnetic fields. For six years (until I completed the doctoral program at my graduate school), I studied under Professor Takashi Iwasaki (currently Emeritus Professor at the University of Electro-Communications), Research Associate Shinobu Ishigami (currently Professor at Tohoku Gakuin University) and Research Associate Lira Hamada (currently Senior Researcher at the National Institute of Information and Communications Technology), after which I took a position at the Research Institute of Electrical Communication of Tohoku University. For five years, I engaged in education and research as a Research Associate with Professor Akira Sugiura (currently Emeritus Professor at Tohoku University) and Assistant Professor Yasushi Matsumoto (currently Executive Researcher at the National Institute of Information and Communications Technology). After that, I moved to the National Institute of Information and Communications Technology and started to work under Group Leader Yukio Yamanaka (currently Manager at the National Institute of Information and Communications Technology) and Mr. Takashi Shinozuka (currently Guest Researcher at the National Institute of Information and Communications Technology). To this day, I continue to work in the field of EMC.

Back in the Rubik's Cube world at this time, larger cubes (for example, 4 x 4 x 4 and 5 x 5 x 5) were appearing on the market<sup>2,3)</sup>. Japan Rubik's Cube Championship and World Rubik's Cube Championship were held<sup>4,5)</sup>, and a scholarly study was conducted to determine the minimum number of rotations required to solve the Cube<sup>6)</sup>.

In July 2010 (almost three decades after the peak of the craze), it was discovered that the Cube could be solved within twenty moves (180-degree rotation being counted as one move) from any scrambled state. The number 20 is called "God's Number". There are more than  $43.25 \times 10^{18}$  (43,252,003,274,489,856,000) Rubik's Cube combinations. It sounded far-fetched that all these combinations could be solved in twenty or less moves. However, given that those combinations arise in one cube, the number of moves to solution might actually be that low. Now I am a little more inclined to accept that a mere twenty moves is all it takes. Personally, it takes me about a hundred moves to solve all six faces.

As for EMC problems that also require juggling (electromagnetically), there are countless patterns of problems. We do have countermeasures, or more accurately, tried-and-true tactics and proven approaches. There are also restrictions represented by the Maxwell's equations. Presently, we do not yet have the smallest number of procedures to guarantee that all problems will be solved. However, if God's Number for EMC problems reveals itself, we may find the number of necessary countermeasures to be unexpectedly low, as in the case of Rubik's Cube.

[References]

- 1) Rubik's® Used under license Rubiks Brand Ltd. All rights reserved.
- 2) MegaHouse Corporation, <https://www.megahouse.co.jp/rubickcube/>
- 3) Tribbox Inc., <https://store.tribbox.com>
- 4) Japan Rubik's Cube Association, <https://jrca.cc>
- 5) World Cube Association, <https://worldcubeassociation.org>
- 6) God's Number is 20, <https://www.cube20.org>



Katsumi Fujii

2001	Completed the doctoral program at Graduate School of the University of Electro-Communications, Doctor (Engineering)
2001 - 2006	Research Associate, Research Institute of Electrical Communication, Tohoku University
2004 - 2006	Short-term Researcher, National Institute of Information and Communications Technology
2006 -	Researcher of the above
Present	Research Manager of the above Member of CISPR A Working Group, Radio Wave Utilization Environment Committee, Information and Communications Council, Ministry of Internal Affairs and Communications

## Committee Activities

### ● Council

Date	June 29, 2020
Agenda items	● Agenda item 1 FY 2019 settlement of accounts (draft)
Decisions	● Agenda item 1 Approved

### ● Board

Date	June 11, 2020
Agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1 FY 2019 business report (draft)</li> <li>● Agenda item 2 FY 2019 settlement of accounts (draft)</li> <li>● Agenda item 3 Selection of the members of the Steering Committee</li> <li>● Agenda item 4 Calling of the ordinary board meeting</li> </ul>
Decisions	<ul style="list-style-type: none"> <li>● Agenda item 1 Approved</li> <li>● Agenda item 2 Approved</li> <li>● Agenda item 3 Approved</li> <li>● Agenda item 4 Approved</li> </ul>

### ● Steering Committee

Date	June 3, 2020
Decisions	<ul style="list-style-type: none"> <li>● Agenda item 1 FY 2019 business report (draft)</li> <li>● Agenda item 2 FY 2020 settlement of accounts (draft)</li> <li>● Agenda item 3 Candidates for the Steering Committee members for the next term (draft)</li> </ul>
Reported items	<ul style="list-style-type: none"> <li>● Reported item 1 Activities in the period from April to May were made by the dedicated subcommittees (Technical, International Relations, Market Sampling Test, Public Relations, and Education)</li> <li>● Reported item 2 Secretariat work (member entry and withdrawal trends, the number of compliance verification reports, income and expenditure, etc.)</li> <li>● Reported item 3 VCCI seminar as the Info-Communication Promotion Month event for the Ministry of Internal Affairs and Communications (content and posting period of online distribution, introduction of application methods, and others)</li> </ul>

## ● Technical Subcommittee

Date	June 23, 2020 (web conference)
Agenda items	● Agenda item 1 On the Technical Subcommittee's planned activities for FY 2020
Continuing agenda items	● Agenda item 1
Decisions and reported items	<ul style="list-style-type: none"> <li>● Reported item 1 This year's activities will be performed according to the activity plan for FY 2020. However, due to the influence of COVID-19, meetings will be mainly conducted online and verification by experiment will be performed with minimum personnel.</li> <li>● Reported item 2 The English version of VCCI 32-1-F:2020 (Guidance on Measurement of Equipment Under Test (EUT) with Radio Functionality) was uploaded to the VCCI website at the end of March.</li> </ul>

## ● International Relations Subcommittee

Date	June 10, 2020 (web conference) (The meetings in April and May were canceled due to COVID-19.)
Agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1 Survey of trends in world EMC regulations</li> <li>● Agenda item 2 FY 2020 overseas survey</li> <li>● Agenda item 3 Discussion on the International Forum</li> </ul>
Continuing agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1</li> <li>● Agenda item 2</li> </ul>
Decisions and reported items	<ul style="list-style-type: none"> <li>● Agenda item 1 The final version of the research of the world's EMC requirements was completed and planned to be uploaded in July.</li> <li>● Agenda item 3 Whether to hold the International Forum at CEATEC will be decided after considering the content of the CEATEC online briefing.</li> <li>● Reported item In accordance with government requests, the meetings will be basically held online until the COVID-19 issue is resolved. Web conferencing starts from June.</li> </ul>

## ●Market Sampling Test Subcommittee

Date	May 15 and June 10 of 2020 (web conference) (The meeting was canceled in April.)
Agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1 Summary of the FY 2019 market sampling test</li> <li>● Agenda item 2 Handling of failed products found during the FY 2019 market sampling test</li> <li>● Agenda item 3 Summary of the FY 2019 document inspections</li> <li>● Agenda item 4 FY 2020 selection policies and handling</li> <li>● Agenda item 5 Report on the display of the VCCI mark for FY 2019 and handling</li> <li>● Agenda item 6 FY 2020 request documents for testing laboratories</li> <li>● Agenda item 7 Status of the FY 2020 sampling test</li> </ul>
Decisions and reported items	<ul style="list-style-type: none"> <li>● Agenda item 1 The summary of the FY 2019 market sampling test was reported. A total of 100 products were tested and four failed. After re-examination, three passed and one failed. Test reports for the products subjected to the market sampling test were also checked and the items that were frequently identified as problems were reported.</li> <li>● Agenda item 2 For one of the products that were initially determined as failures, the responsible member conducted a research and submitted a report, which revealed specific malfunctions. As a result, the product passed.</li> <li>● Agenda item 3 The summary of the FY 2019 document inspections was reported, including the result of 40 document inspections, additional tests due to insufficient test conditions, and requests for revising insufficient test reports.</li> <li>● Agenda item 4 FY 2020 basically adopts the FY 2019 policies. However, when selecting the sources of borrowed products for testing, the possible effects of COVID-19 will be taken into consideration.</li> <li>● Agenda item 5 1,619 products of 197 companies were checked for the display of the VCCI mark. Conformity verification reports did not exist for some products with VCCI marks. When asked, the responsible members replied they forgot to file the reports. Those members were asked to respond accordingly. In order to prevent such mistakes, the subcommittee will consider creating a guideline for how to write model names in conformity verification reports and promoting awareness in seminars in Japan and overseas.</li> <li>● Agenda item 6 The revised notes on performing sampling tests were reported and approved to be sent to commissioned testing laboratories.</li> <li>● Agenda item 7 So far, 14 products were bought and 11 products were borrowed for sampling tests and some of them are being tested. Five products were selected for document inspections and preliminary screening is under way for some other products.</li> </ul>

## ●Public Relations Subcommittee

Date	April 7 to 24, May 12, June 8 to 30 of 2020 (deliberated via email)
Agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1 FY 2019 business report</li> <li>● Agenda item 2 TECHNO-FRONTIER Virtual Exhibition 2020</li> <li>● Agenda item 3 CEATEC 2020 ONLINE</li> <li>● Agenda item 4 Promotional novelty notebooks</li> </ul>
Continuing agenda items	<ul style="list-style-type: none"> <li>● Agenda item 2, 3, and 4</li> </ul>
Decisions and reported items	<ul style="list-style-type: none"> <li>● Agenda item 1 The activity report draft for the FY 2019 Public Relations Subcommittee was created and checked within the subcommittee.</li> <li>● Agenda item 2 TECHNO-FRONTIER 2020, which was planned to be held in April, was canceled and replaced by the online version (official name: TECHNO-FRONTIER Virtual Exhibition 2020, held between September 8 and 18). After some deliberations, the subcommittee decided to attend the exhibition. We will discuss and determine the data to be posted on the website.</li> <li>● Agenda item 3 CEATEC 2020, which was planned to be held in October, was canceled and replaced by the online version as well (official name: CEATEC 2020 ONLINE, held between October 20 and 23, available for on-demand viewing until December 31). After some deliberations, the subcommittee decided to attend the exhibition. We will discuss and determine the data to be posted on the website.</li> </ul>

## ●Education Subcommittee

Date	April 22 to 28, May 11 to 14, June 4 to 12 of 2020 (deliberated via email)
Agenda items	<ul style="list-style-type: none"> <li>● Agenda item 1 Status of education and training conducted in FY 2020</li> <li>● Agenda item 2 Conducting education and training seminars for FY 2020 from October</li> </ul>
Continuing agenda items	<ul style="list-style-type: none"> <li>● Agenda item 2</li> </ul>
Decisions and reported items	<ul style="list-style-type: none"> <li>● Agenda item 1 In accordance with government reports on handling the COVID-19 issue, the subcommittee decided to cancel all education and training seminars until July.</li> <li>● Agenda item 2 The subcommittee is assessing future prospects and discussing ways in which to hold seminars in a manner that is safe for attendees.</li> </ul>

●Registration Committee for Measurement Facilities

Date	April 20, 2020 (deliberated via email)												
Agenda items	● Reviewed the results of deliberations by the Measurement Facility Examination WG.												
Decisions	<p>Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 22 companies</p> <table> <tr> <td>Radiated emission measurement facilities below 1 GHz</td> <td>13</td> </tr> <tr> <td>AC-mains-ports-conducted emission measurement facilities</td> <td>18</td> </tr> <tr> <td>Telecommunication-port-conducted emission measurement facilities</td> <td>10</td> </tr> <tr> <td>Radiated emission measurement facilities above 1 GHz</td> <td>5</td> </tr> <tr> <td>Applications returned with comments</td> <td>None</td> </tr> <tr> <td>Applications carried over to the next meeting</td> <td>None</td> </tr> </table>	Radiated emission measurement facilities below 1 GHz	13	AC-mains-ports-conducted emission measurement facilities	18	Telecommunication-port-conducted emission measurement facilities	10	Radiated emission measurement facilities above 1 GHz	5	Applications returned with comments	None	Applications carried over to the next meeting	None
Radiated emission measurement facilities below 1 GHz	13												
AC-mains-ports-conducted emission measurement facilities	18												
Telecommunication-port-conducted emission measurement facilities	10												
Radiated emission measurement facilities above 1 GHz	5												
Applications returned with comments	None												
Applications carried over to the next meeting	None												
Date	May 25, 2020 (deliberated via email)												
Agenda items	● Reviewed the results of deliberations by the Measurement Facility Examination WG.												
Decisions	<p>Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 25 companies</p> <table> <tr> <td>Radiated emission measurement facilities below 1 GHz</td> <td>14</td> </tr> <tr> <td>AC-mains-ports-conducted emission measurement facilities</td> <td>10</td> </tr> <tr> <td>Telecommunication-port-conducted emission measurement facilities</td> <td>9</td> </tr> <tr> <td>Radiated emission measurement facilities above 1 GHz</td> <td>10</td> </tr> <tr> <td>Applications returned with comments</td> <td>None</td> </tr> <tr> <td>Applications carried over to the next meeting</td> <td>None</td> </tr> </table>	Radiated emission measurement facilities below 1 GHz	14	AC-mains-ports-conducted emission measurement facilities	10	Telecommunication-port-conducted emission measurement facilities	9	Radiated emission measurement facilities above 1 GHz	10	Applications returned with comments	None	Applications carried over to the next meeting	None
Radiated emission measurement facilities below 1 GHz	14												
AC-mains-ports-conducted emission measurement facilities	10												
Telecommunication-port-conducted emission measurement facilities	9												
Radiated emission measurement facilities above 1 GHz	10												
Applications returned with comments	None												
Applications carried over to the next meeting	None												
Date	June 15, 2020 (deliberated via email)												
Agenda items	● Reviewed the results of deliberations by the Measurement Facility Examination WG.												
Decisions	<p>Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 19 companies</p> <table> <tr> <td>Radiated emission measurement facilities below 1 GHz</td> <td>7</td> </tr> <tr> <td>AC-mains-ports-conducted emission measurement facilities</td> <td>7</td> </tr> <tr> <td>Telecommunication-port-conducted emission measurement facilities</td> <td>9</td> </tr> <tr> <td>Radiated emission measurement facilities above 1 GHz</td> <td>7</td> </tr> <tr> <td>Applications returned with comments</td> <td>None</td> </tr> <tr> <td>Applications carried over to the next meeting</td> <td>None</td> </tr> </table>	Radiated emission measurement facilities below 1 GHz	7	AC-mains-ports-conducted emission measurement facilities	7	Telecommunication-port-conducted emission measurement facilities	9	Radiated emission measurement facilities above 1 GHz	7	Applications returned with comments	None	Applications carried over to the next meeting	None
Radiated emission measurement facilities below 1 GHz	7												
AC-mains-ports-conducted emission measurement facilities	7												
Telecommunication-port-conducted emission measurement facilities	9												
Radiated emission measurement facilities above 1 GHz	7												
Applications returned with comments	None												
Applications carried over to the next meeting	None												



## ●Report on Committee Activities: List of Acronyms

Abbreviation	Full Name
AAN	Asymmetric Artificial Network
AMN	Artificial Mains Network
ANSI	American National Standards Institute
APD	Amplitude Probability Distribution
APAC	Asia Pacific Accreditation Corporation
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
BSMI	Bureau of Standards, Metrology and Inspection
CALTS	Calibration Test Site
CB	Certification Body
CB	Competent Body
CCC	China Compulsory Product Certification
CD	Committee Draft
CDN	Coupling Decoupling Network
CDNE	Coupling Decoupling Network for Emission
CDV	Committee Draft for Vote
CEMC	China Certification Center for Electromagnetic Compatibility
CEN	European Committee for Standardization
CENELEC	European Committee for Electro Technical Standardization
CISPR	International Special Committee on Radio Interference
CMAD	Common Mode Absorbing Device
CQC	China Quality Certification Center
CSA	Classical (Conventional) Site Attenuation
CSA	Canadian Standards Association
DAF	Dual Antenna Factor
DC	Document for Comment
DoC	Declaration of Conformity
DOW	Date of Withdrawal
DTI	Department of Trade and Industry
DUT	Device Under Test
Ecma	Ecma International
EICTA	European Information, Communications and Consumer Electronics Technology Industry Association
EMCC	Electro Magnetic Compatibility Conference
EMCAB	Electromagnetic Compatibility Advisory Bulletin
EMF	Electromagnetic Field
EMF	Electromotive Force
ETSI	European Telecommunication Standards Institute
EUANB	European Union Association of Notified Bodies
EUT	Equipment Under Test
FAR	Fully Anechoic Room
FDIS	Final Draft International Standard
GB	guo jia biao zhun (National Standard of China)

Abbreviation	Full Name
GSO	Gulf Cooperation Council Standardization Organization
ICES	Interference-Causing Equipment Standard
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IS	International Standard
ISM	Industrial Scientific and Medical
ITE	Information Technology Equipment
LCL	Longitudinal Conversion Loss
MIC	Ministry of Information and Communication
MME	Multimedia Equipment
MOU	Memorandum of Understanding
MP	Magnetic Probe
MRA	Mutual Recognition Agreement/Arrangement
NCB	National Certification Body
NICT	National Institute of Information and Communications Technology
NIST	National Institute of Standards and Technology
NP	New Work Item Proposal
NSA	Normalized Site Attenuation
OFDM	Orthogonal Frequency Division Multiplex
PAS	Publicly Available Specification
PLT	Power Line Telecommunication
R&TTE	Radio & Telecommunications Terminal Equipment
RBW	Resolution Band Width
REF	Reference
RRA	Radio Research Agency
RRT	Round Robin Test
RSM	Reference Site Method
RVC	Reverberation Chamber
SAC	Semi Anechoic Chamber
SDPPI	Semangat Disiplin Profesional Proaktif Integritas
S/N	Signal to Noise ratio
TF	Task Force
TG	Tracking Generator
UPS	Uninterruptible Power Supply
VBW	Video Band Width
VHF-LISN	Very High Frequency-Line Impedance Stabilization Network
VSWR	Voltage Standing Wave Ratio
WG	Working Group
WP	Working Party

# R10: International Regulation on EMC of Automobiles

Masamitsu Tokuda

## 1. Foreword

Automotive emission standards are developed by SC-D of the International Special Committee on Radio Interference (CISPR) and automotive immunity standards are developed by TC22 (Road vehicles) of the International Organization for Standardization (ISO). In addition, EMC standards for electric vehicle chargers are developed by TC69 (Electric vehicles and electric industrial trucks) of the International Electrotechnical Commission (IEC).<sup>1-3)</sup> However, the definitive EMC regulation on automobiles is UN ECE Regulation No. 10 (R10), which is defined by the Economic Commission for Europe of the United Nations as the international type approval standard. This article introduces R10, the international regulation on EMC of automobiles.

## 2. R10: international regulation on EMC of automobiles<sup>1, 2)</sup>

This chapter discusses the regulation that is defined as an international harmonization standard for automobile EMC. That is UN ECE Regulation No. 10 (R10), which is defined by the Economic Commission for Europe of the United Nations as the international type approval standard for automobiles. R10 is one of the UN Regulations regarding the safety and environment of automobiles, which are defined based on the 1958 Agreement. R10 specifies EMC requirements. The UN Regulations themselves are not enforceable. When a government adopts the UN Regulations in its domestic legal system, they become binding. In the fourth revision of R10 (issued in 2011), the tests for charging mode were specified for the first time. In the fifth revision (issued in October 2014), some vehicle tests were revised and component tests for charging mode were added. The sixth (and latest) revision was adopted and approved at WP29 (World Forum for Harmonization of Vehicle Regulations) in March 2019. In Japan, the sixth revision was issued in October 2019.

Table 1 outlines the sixth revision. The major changes from the fifth revision to the sixth revision are: (1) Changes of the versions of the reference international standards (ISO 11451-2, ISO 11451-4, ISO 11452-3, ISO 11452-4, CISPR 16-1-2), (2) Adoption of the limits from CISPR 12 Edition 2.0 in the narrowband noise tests, (3) Changes to the test setups for artificial mains networks and charging mode to match CISPR 12 Edition 7.0 under discussion, (4) Changing the maximum rate of change of voltage fluctuations for flicker tests to 6%, and (5) Deletion of test pulse 4 in the transient voltage tests for charging mode<sup>2)</sup>. For details about the changes, see the references<sup>4)</sup>.

Table 1 Content of the Sixth Revision of UN Regulation No.10<sup>1,2)</sup>

Test	Section in R10 sixth revision		Vehicle test	Component test	Reference standard
	Driving mode	Charging mode			
Annex 4 Broadband emissions	6.2	7.2	✓	—	CISPR 12 Edition 5.0
Annex 5 Narrowband emissions	6.3	—	✓	—	CISPR 12 Edition 5.0 CISPR 25 Edition 2.0 + corrigenda
Annex 6 RF immunity	6.4	7.7	✓	—	ISO11451-2 Edition 4.0 ISO11451-4 Edition 3.0
Annex 7 Broadband emissions	6.5	7.10	—	✓	CISPR 25 Edition 2.0
Annex 8 Narrowband emissions	6.6		—	✓	CISPR 25 Edition 2.0
Annex 9 RF immunity	6.8	7.18	—	✓	ISO 11452-2 Edition 2.0 ISO 11452-3 Edition 3.0 ISO 11452-4 Edition 4.0 ISO 11452-5 Edition 2.0
Annex 10 Transient voltages	6.7 (EMI) 6.9 (EMS)	7.17 (EMI) 7.19 (EMS)	—	✓	ISO 7637-2 Edition 2.0
Annex 11 Harmonics on AC power lines		7.3	✓	—	
Annex 12 Voltage changes and flicker on AC power lines		7.4	✓	—	IEC 61000-3-3 Edition 2.0 IEC 61000-3-11 Edition 1.0
Annex 13 Emission of conducted disturbances on power lines		7.5	✓	—	CISPR 16-2-1 Edition 2.0 CISPR 16-1-2 Edition 2.0
Annex 14 Emission of conducted disturbances on communication lines		7.6	✓	—	CISPR 22 Edition 6.0
Annex 15 EFT/B		7.8	✓	—	IEC 61000-4-4 Edition 2.0
Annex 16 Surges		7.9	✓	—	IEC 61000-4-5 Edition 2.0
Annex 17 Harmonics on AC power lines		7.11	—	✓	IEC 61000-3-2 Edition 3.2 + Amendment 1 + Amendment 2 IEC 61000-3-12 Edition 1.0
Annex 18 Voltage changes and flicker on AC power lines		7.12	—	✓	IEC 61000-3-3 Edition 2.0 IEC 61000-3-11 Edition 1.0
Annex 19 Emission of conducted disturbances		7.13	—	✓	CISPR 16-2-1 Edition 2.0 CISPR 16-1-2 Edition 2.0
Annex 20 Emission of conducted disturbances on communication lines		7.14	—	✓	CISPR 22 Edition 6.0
Annex 21 EFT/B		7.15	—	✓	IEC 61000-4-4 Edition 2.0
Annex 22 Surges		7.16	—	✓	IEC 61000-4-5 Edition 2.0

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- 1) Hitoshi Tsukahara: VI. EMC standards and stipulations related to vehicles and chargers, special feature “World EMC standards and stipulations” (FY 2019 edition), Japan Management Association, p.38-48, 2019.4.
- 2) Hitoshi Tsukahara: III. EMC standards and stipulations related to vehicles and EV chargers, “World EMC standards and stipulations” (FY 2020 edition), Japan Management Association, pp.18-28, 2020.7. [https://event.jma.or.jp/TF\\_EMC2020](https://event.jma.or.jp/TF_EMC2020)
- 3) Masamitsu Tokuda: The history of ISO/TC22 (Road vehicles) and UN Regulation No. 10 (R10), VCCI DAYORI No. 123, pp.10-12, 2017.1.
- 4) Shinichiro Ito: “Revising the International Standard for Automobile EMC – Sixth Revision of UN Regulation No. 10 (R10)”, Monthly EMC (Electromagnetic Environment Engineering Information), No. 383, pp.239-259, 2020.3.



**Masamitsu Tokuda**

- 1967 Graduated from Electronics Engineering Department of Hokkaido University
  - 1969 Completed Electronics Engineering, Faculty of Engineering, Graduate School of Hokkaido University
  - Joined NTT, assigned to the Electrical Communications Laboratories
  - 1987 Leader of EMC Study Group, NTT Telecommunication Networks Laboratories
  - 1996 Professor of Electric Engineering Department, Kyushu Institute of Technology
  - 2001 Professor of Electronic Communication Department, Musashi Engineering University
  - 2010 Professor emeritus of Tokyo City University
  - Visiting co-researcher of the Graduate School of Frontier Sciences, The University of Tokyo
- Major prizes received
- 1986 Merit award – IEICE  
(on the design theory and evaluation method for optical fiber cables)
  - 1997 Information communication merit award by MPT  
(on EMC technology development)
  - 2003 Industrial standard merit award by the minister of METI
  - 2004 IEICE fellow
  - 2007 Promoted to IEEE fellow

## **Holding a VCCI Seminar as the 2020 Info-Communication Promotion Month Event for MIC**

Steering Committee

The VCCI Council usually holds a VCCI seminar as the Info-Communication Promotion Month event for the Ministry of Internal Affairs and Communications in May each year. This year, to prevent the spread of COVID-19, we decided to post the following four videos on our website instead. We are truly grateful to our viewers.

[61 applicants, videos posted between June 8 (Mon) and June 15 (Mon) of 2020]

[Posted videos]

- Introduction to VCCI Council activities
- Guidance VCCI 32-1-F:2020  
Guidance on Measurement of Equipment Under Test (EUT) with Radio Functionality  
- Considerations for Using a Preamplifier -
- Activity report on the market surveillance
- Overview and notes on registering VCCI facilities

# Status on FY2020 Market Sampling Tests

Market Sampling Test Subcommittee

As of June 30, 2020

Planned number of market sampling tests	Loan-based	45	100
	Purchase-based	55	

Sampling test	Selected	Cancelled (Not shipped, etc.)	Owner's consent pending inspectable samples	Testable samples	Test completed (Included number)	Judgment awaited	Judgment			
							Passed	Failed - tentative		
								Finally passed	Finally failed	Pending
Grand total	25	0	3	22	4	0	0	0	0	0
(Previous month grand total)	0	0	0	0	0	0	0	0	0	0

Loan-based testing total		11	0	3	8	0	0	0	0	0	0
Term (Included number)	1 <sup>st</sup> Quarter	11	0	3	8	0	0	0	0	0	0
	2 <sup>nd</sup> Quarter	0	0	0	0	0	0	0	0	0	0
	3 <sup>rd</sup> Quarter	0	0	0	0	0	0	0	0	0	0
	4 <sup>th</sup> Quarter	0	0	0	0	0	0	0	0	0	0

Purchase-based testing total		14	0	0	14	4	0	0	0	0	0
Term (Included number)	1 <sup>st</sup> Quarter	14	0	0	14	4	0	0	0	0	0
	2 <sup>nd</sup> Quarter	0	0	0	0	0	0	0	0	0	0
	3 <sup>rd</sup> Quarter	0	0	0	0	0	0	0	0	0	0
	4 <sup>th</sup> Quarter	0	0	0	0	0	0	0	0	0	0

**Final Result**

Passed	Failed	Pending
0	0	0

Document inspection	Selected	Cancelled (withdrawal, etc.)	Owner's consent pending inspectable samples	Inspectable samples	Pre-check completed	Judgment awaited	Judgment completed	Judgment	
								Cleared	Problems identified
	5	0	0	5	4	4	0	0	0

# Report from the Secretariat

## ● List of Members (April 2020 - June 2020)

### New members

Membership	Member No.	Company Name	Country
Regular	4058	Deraoya-Project LLC	JAPAN
Regular	4063	GST Japan Co., Ltd.	JAPAN
Regular	4070	GES Japan Co., Ltd.	JAPAN
Regular	4076	UCOS Co., Ltd.	JAPAN
Regular	4077	LIVING ROBOT INC.	JAPAN
Supporting	4073	Yamagata Research Institute of Technology	JAPAN
Regular	4056	Kontron Canada Inc.	CANADA
Regular	4059	SGM, Co., Ltd.	KOREA
Regular	4060	Actions Microelectronics Co., Ltd.	CHINA
Regular	4062	Ruijie Networks Co., Ltd.	CHINA
Regular	4068	Innowireless Co., Ltd.	KOREA
Regular	4069	DERA Co., Ltd.	CHINA
Regular	4071	Tobii Pro AB	SWEDEN
Regular	4072	Rosenberger Asia Pacific Electronic Co., Ltd.	CHINA
Regular	4075	SambaNova Systems, Inc.	USA
Regular	4079	Shenzhen Longsys Electronics Co., Ltd.	CHINA
Regular	4080	iodyne	USA
Regular	4081	O-Jin Corporation	KOREA
Regular	4083	DustPhotonics LTD	ISRAEL
Supporting	4057	LabTest Certification Inc.	CANADA
Supporting	4065	RN Electronics Limited	U.K.
Supporting	4066	UL Korea, Ltd.	KOREA
Supporting	4067	Centre Testing International (Suzhou) Co., LTD.	CHINA
Supporting	4074	TÜV Rheinland (Shenzhen) Co., Ltd.	CHINA

### Company name change

Membership	Member No.	Company Name	Country	Old company name
Regular	606	Horizon Inc.	JAPAN	TAIYO SEIKI COMPANY., LTD.
Regular	1231	CTCSP Corporation	JAPAN	CTCSP Corporation
Regular	2847	TAKASAGO, ltd	JAPAN	TAKASAGO, LTD.
Regular	3284	VALTEC CO., LTD.	JAPAN	OFFICE24 CO., LTD.
Regular	3495	IDEC AUTO-ID SOLUTIONS CO., LTD.	JAPAN	Welcat Inc.
Regular	4032	P3, Inc.	JAPAN	TRANZAS, INC.
Supporting	2024	Panasonic Smart Factory Solution Co., Ltd.	JAPAN	Panasonic Co., Ltd.
Regular	578	Plantronics Limited	U.K.	Polycom, Inc.
Regular	1524	Thales DIS France SA	FRANCE	GEMALTO



Membership	Member No.	Company Name	Country	Old company name
Regular	1968	Huawei Technologies Co., Ltd.	CHINA	Huawei Technologies CO., LTD.
Regular	3085	CA Inc.	USA	Symantec Corporation
Regular	3372	Hitachi Vantara LLC	USA	Hitachi Vantara
Regular	3813	OnLogic Inc. DBA Logic Supply	USA	Logic Supply, Inc.
Regular	3901	Telestream, LLC	USA	Commcepts

Note: Please fill out and submit "Form 9 Change Notification" on the website when a company name has been changed.

#### Withdrawn members (who submitted a withdrawal notice)

Membership	Member No.	Company Name	Country
Regular	2074	SHINJUKU JAPANESE LANGUAGE INSTITUTE	JAPAN
Regular	2977	CCP Co., Ltd.	JAPAN
Regular	3907	inMusic Japan K.K.	JAPAN
Regular	2873	Ampronix Inc.	USA
Regular	3487	Aerohive Networks, Inc.	USA
Regular	3515	Adtran Inc.	USA
Regular	3855	Nebbiolo Technologies Inc.	USA
Regular	3992	Cosmo Industries (Dongguan) Co., Ltd.	CHINA

#### ● VCCI Schedule for FY 2020

<b>April</b>	<b>May</b>	<b>June</b> ・Info-communications promotion month VCCI seminar ・Release VCCI Dayori No.137
<b>July</b> ・VCCI Business Reporting Meeting ・Release Annual Report	<b>August</b>	<b>September</b> ・Release VCCI Dayori No.138 ・TECHNO-FRONTIER Virtual Exhibition 2020
<b>October</b> ・CEATEC 2020 ONLINE	<b>November</b>	<b>December</b> ・Release VCCI Dayori No.139
<b>January</b> ・VCCI Technical Symposium	<b>February</b>	<b>March</b> ・Release VCCI Dayori No.140

● Status of Compliance Test Notifications (VCCI 32-1)

(April 2020 ~ June 2020) (Product names are examples and are not limiting)

Classification/product name (example)			Classification code		April 2020			May 2020			June 2020		
			Class A	Class B	Class A	Class B	Total	Class A	Class B	Total	Class A	Class B	Total
Computer	Server	Super Computer, Server, etc.	A 2	a 2	23	0	23	17	0	17	16	0	16
	Tabletop type	WS, Desk-top PCs, etc.	B 2	b 2	1	27	28	0	14	14	0	23	23
	Portable type	Note PCs, Tablet PCs, etc.	C 2	c 2	1	55	56	1	65	66	0	52	52
	Others	Office Computer, Wearable computers, etc.	E 2	e 2	3	1	4	2	4	6	6	3	9
Peripherals/Terminals Equipment	Storage Device	HDD, SSD, USB Memory, Media drives, etc. Disk drives, NAS, DAS, SAN, etc.	G 2	g 2	4	29	33	7	28	35	10	23	33
	Printer	Printer (Compound equipment included), etc.	H 2	h 2	1	5	6	2	1	3	5	5	10
	Display	CRT displays, Monitor, projector, etc.	J 2	j 2	13	51	64	13	85	98	21	72	93
	Input/Output Device (excluding Auxiliary Memory, Printer, Display)	Image scanners, OCR, etc.	M 2	m 2	2	4	6	0	2	2	1	5	6
	General Purpose Terminal	Display control terminals, etc.	N 2	n 2	0	3	3	0	0	0	0	1	1
	Exclusive Terminal	POS, Terminal for Financial and Insurance use, etc.	Q 2	q 2	6	1	7	8	0	8	4	2	6
	Other Peripherals Equipment	Others (PCI cards, Graphics cards, Mouse, Keyboard, etc.)	R 2	r 2	6	53	59	2	68	70	5	34	39
Audio visual equipment	Broadcast receivers	Television, Radio, Tuner, Video recorder, Set-top Boxes, etc.	-	k 2	-	0	0	-	1	1	-	1	1
	Audio equipment	Speaker, Amplifier, IC recorder, MP3 player, Headsets, etc.	L 2	l 2	2	9	11	0	7	7	1	2	3
	Video/Camera equipment	Digital video cameras, Web cameras, Network cameras, Video players, Photo frames, Digital-camera, etc.	I 2	i 2	7	6	13	1	2	3	11	7	18
	Others	Other Audio visual equipment	P 2	p 2	3	3	6	1	4	5	0	10	10
Copying Machine/Compound	-	Copying Machine/Compound equipment, etc.	S 2	s 2	1	0	1	1	0	1	1	1	2
Communications Equipment	Terminal equipment	Mobilephone, Smartphone, PHS telephones	T 2	t 2	0	12	12	0	6	6	0	3	3
		Telephone Equipment (PBX, FAX, Key Telephone System, etc.), Cordless telephones	U 2	u 2	0	1	1	1	0	1	0	1	1
	Network related equipment	Network Channel Terminating Equipment (Modem, Digital Transmission Equipment, DSU, TA, etc.)	V 2	v 2	0	0	0	1	0	1	0	1	1
		LAN Equipment (Router, HUB, etc.), Switching-node, etc.	W 2	w 2	50	52	102	24	53	77	70	59	129
Others	Other Communications Equipment	X 2	x 2	19	11	30	13	5	18	24	10	34	
Entertainment and educational equipment	Electronic stationeries	Electronic dictionaries, Electronic book readers, etc.	D 2	d 2	0	0	0	0	0	0	0	0	0
	Electronic toys	Game machines, Game pads, Toy drones, etc.	Y 2	y 2	0	1	1	0	0	0	0	4	4
	Lighting control equipment for entertainment	Lighting control equipment for entertainment	Z 2	z 2	0	0	0	0	0	0	0	0	0
	Others	Others (Navigator, etc.)	F 2	f 2	0	0	0	0	0	0	0	0	0
Others		O 2	o 2	19	8	27	5	6	11	24	3	27	
Total				161	332	493	99	351	450	199	322	521	

## ● Registration Status of Measurement and Other Facilities

The following table indicates the status on registration of measuring facilities in the most recent three months.

Facilities listed here are only those made open by registering members in principle. Members with those facilities whose valid period expired are kindly advised to contact VCCI to inform of the status they are in. Status to choose from are, renewal application being filed, new application being filed, waiting for the next issue to carry, or terminating the registration (all facilities are posted in the Web site).

Facilities in Japan are listed in Japanese.

### List of newly registered or renewed facilities (April 2020 – June 2020)

R: Radiated EMI measurement facilities below 1GHz C: AC-mains-ports-conducted EMI measurement facilities

T: Telecommunication-port-conducted EMI measurement facilities G: Radiated EMI measurement facilities above 1GHz

Company name	Equipment name	3 m	10 m	30 m	Dark 3m	Dark 10m	Registration number	Effective date	Location	Contact to:
ローランド ディー・ ジー株式会社	ローランド ディー・ ジー都田事業所 電波暗室	-	-	-	○	○	R-20100	2023/4/19	静岡県浜松市北区新都 田 1-1-3	053-428-8879
Intertek Testing Services Hong Kong Ltd.	Conducted Emission (Telecom Port)	-	-	-	-	-	T-20075	2023/4/19	Workshop No.3 G/F, World Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin	+852-3912-6901
パナソニック株式会社	門真 EMC サイト 10m 法電波暗室	-	-	-	-	-	G-20096	2023/4/19	大阪府門真市大字門真 1048	06-6903-3384
パナソニック株式会社	門真 EMC サイト 第一 EMI 用シール ド室	-	-	-	-	-	C-20074	2023/4/19	大阪府門真市大字門真 1048	06-6903-3384
パナソニック株式会社	門真 EMC サイト 第一 EMI 用シール ド室	-	-	-	-	-	T-20072	2023/4/19	大阪府門真市大字門真 1048	06-6903-3384
パナソニック株式会社	門真 EMC サイト 10m 法電波暗室	-	-	-	-	○	R-20102	2023/4/19	大阪府門真市大字門真 1048	06-6903-3384
株式会社イー・エム・ シー・ジャパン	第2テストサイト	-	-	-	-	-	C-20076	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
株式会社イー・エム・ シー・ジャパン	第2テストサイト	-	-	-	-	-	T-20076	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
株式会社イー・エム・ シー・ジャパン	第2テストサイト	-	-	-	○	○	R-20104	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
株式会社イー・エム・ シー・ジャパン	第2テストサイト	-	-	-	-	-	G-20098	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
株式会社イー・エム・ シー・ジャパン	第4テストサイト	-	-	-	-	-	C-20077	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
株式会社イー・エム・ シー・ジャパン	第4テストサイト	-	-	-	-	-	T-20077	2023/4/19	神奈川県相模原市緑区 長竹 210-3	042-784-8005
富士電機株式会社	三重工場 3m 法電 波暗室	-	-	-	○	-	R-20099	2023/4/19	三重県四日市市富士町 1-27	059-330-1627
富士電機株式会社	三重工場 3m 法電 波暗室	-	-	-	-	-	C-20072	2023/4/19	三重県四日市市富士町 1-27	059-330-1627

Company name	Equipment name	3 m	10 m	30 m	Dark 3m	Dark 10m	Registration number	Effective date	Location	Contact to:
洛菱テクニカ株式会社	洛菱・電波暗室	-	-	-	-	-	C-20073	2023/4/19	京都府長岡京市馬場 所 1 番地	075-958-3122
DEKRA Testing and Certification Co., Ltd.	SR9-H	-	-	-	-	-	C-20075	2023/4/19	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan 31061, R.O.C.	+886-3-582-8001
DEKRA Testing and Certification Co., Ltd.	SR9-H	-	-	-	-	-	T-20074	2023/4/19	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan 31061, R.O.C.	+886-3-582-8001
EST Technology Co., Ltd.	844 Shield room	-	-	-	-	-	T-20073	2023/4/19	Santun Management Zone, Houjie District Dongguan, Guangdong, China	+86-769-8308-1888
EST Technology Co., Ltd.	966 Chamber	-	-	-	-	-	G-20097	2023/4/19	Santun Management Zone, Houjie District Dongguan, Guangdong, China	+86-769-8308-1888
EST Technology Co., Ltd.	10m chamber	-	-	-	-	○	R-20103	2023/4/19	Santun Management Zone, Houjie District Dongguan, Guangdong, China	+86-769-8308-1888
Nemko Canada Inc.	Nemko Montreal - Radiated Emissions Below 1 GHz	-	-	-	○	-	R-20101	2023/4/19	292 Labrosse Avenue, Pointe-Claire, Quebec, Canada	+1-514-694-2684
Nemko Canada Inc.	Nemko Cambridge - Conducted Emissions at AC Mains Power Ports	-	-	-	-	-	C-20078	2023/5/24	130 Saltsman Drive, Unit 1 Cambridge, Ontario, Canada	+1-519-650-4811
Nemko Canada Inc.	Nemko Cambridge - Conducted Emissions at Telecommunication Ports	-	-	-	-	-	T-20079	2023/5/24	130 Saltsman Drive, Unit 1 Cambridge, Ontario, Canada	+1-519-650-4811
Nemko Canada Inc.	Nemko Cambridge - Radiated Emissions Below 1 GHz	-	-	-	○	-	R-20107	2023/5/24	130 Saltsman Drive, Unit 1 Cambridge, Ontario, Canada	+1-519-650-4811
Global Certification Corp.	GCC_RE_01	-	-	-	○	-	R-20106	2023/5/24	No. 146, Sec.2, Xiangzhang Rd., Xizhi Dist., New Taipei City 221, Taiwan, R.O.C."	+886-2-2642-6992 #225
Plantronics Limited	EMC Chamber 2	-	-	-	-	-	G-20100	2023/5/24	Singleton Court Business Centre, Wonastow Road Industrial Estate (West), Monmouth, United Kingdom	+44-1753-723387
Plantronics Limited	EMC Chamber 2	-	-	-	-	-	T-20078	2023/5/24	Singleton Court Business Centre, Wonastow Road Industrial Estate (West), Monmouth, United Kingdom	+44-1753-723387
Nemko Canada Inc.	Nemko Cambridge - Radiated Emissions Above 1 GHz	-	-	-	-	-	G-20101	2023/6/14	130 Saltsman Drive, Unit 1 Cambridge, Ontario, Canada	+1-519-650-4811

Company name	Equipment name	3 m	10 m	30 m	Dark 3m	Dark 10m	Registration number	Effective date	Location	Contact to:
TÜV Rheinland (Shenzhen) Co., Ltd.	TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center	-	-	-	-	-	G-20105	2023/6/14	No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P.R. China	+86-755-8268-1326
TÜV Rheinland (Shenzhen) Co., Ltd.	TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center	-	-	-	-	-	C-20080	2023/6/14	No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P.R. China	+86-755-8268-1326
TÜV Rheinland (Shenzhen) Co., Ltd.	TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center	-	-	-	-	-	T-20081	2023/6/14	No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P.R. China	+86-755-8268-1326
SGS Taiwan Ltd.	SGS 966 Chamber No.B	-	-	-	-	-	G-20104	2023/6/14	No.2, Keji 1st Rd., Guishan Township, Taoyan County, Taiwan	+886-2-2299-3279
Huawei Technologies Co., Ltd.	No.1 RE test site in Shanghai (3m chamber)	-	-	-	○	-	R-20109	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Huawei Technologies Co., Ltd.	No.1 RE test site in Shanghai (3m chamber)	-	-	-	-	-	G-20102	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Huawei Technologies Co., Ltd.	No.2 RE test site in Shanghai (10m chamber)	-	-	-	-	○	R-20108	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Huawei Technologies Co., Ltd.	No.2 RE test site in Shanghai (10m chamber)	-	-	-	-	-	G-20103	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Huawei Technologies Co., Ltd.	No.1 CE test site in Shanghai	-	-	-	-	-	C-20079	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Huawei Technologies Co., Ltd.	No.1 CE test site in Shanghai	-	-	-	-	-	T-20080	2023/6/14	No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, China	+86-769-2383-0808
Mellanox Technologies, Ltd.	3m Full compliance EMC chamber	-	-	-	○	-	R-20111	2023/6/14	Hatnufa 3, Ofer Industrial Park, Yokneam, Israel	+972-74-723-5134

## Closing words

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### Turning sixty!

How is everyone in this prolonged coronavirus catastrophe? Although we cannot see the light at the end of the tunnel yet, I fortunately turned sixty at the beginning of the year. Some of you may have already taken this rite of passage and others may do so in the near future.

“Kanreki”, the Japanese tradition of celebrating the sixtieth birthday, is likely influenced by the sexagenary cycle that originated in ancient China, and which was introduced to Japan during the Nara period (more than 1200 years ago). Each term (year) in the sexagenary cycle is represented by two Chinese characters, the first being one of the ten Heavenly Stems, and the second being one of the twelve Earthly Branches. The year you were born is indicated by a certain combination of these Heavenly Stems and Earthly Branches. In sixty years, the same combination returns. It is as if you are reborn. In Japan, we put red kimono coats on newborn babies to ward off evil. When people turn sixty, they also dress in red. It is regarded as a reward for enduring the hardships of life and a wish for longevity. I used to wonder why sixty years make up one cycle because ten (stems) times twelve (branches) makes one hundred and twenty. I did not give much thought to it.

If you are Japanese, I’m sure you know your Earthly Branch. But how about your Heavenly Stem? The only stem-and-branch combination I knew was 甲子 (ki-no-e-ne, or “ki-no-e” and “ne”) because the famous Koshien Stadium was built that year and was named after 甲子 (which also reads “koshi” in Japanese). In ancient China, five elements (wood, fire, earth, metal, water), which are, by the way, incorporated in the names

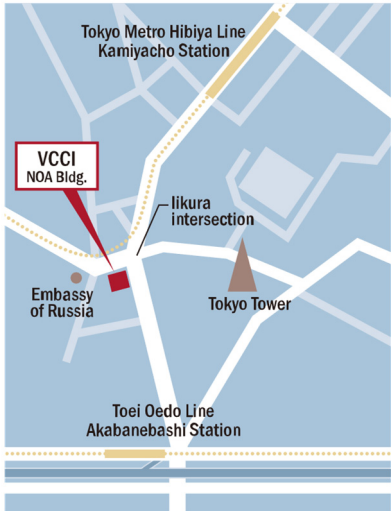
of the days of the week in the Japanese calendar, were believed to make up the universe, and each element was thought to have the yin and yang sides (yin being the younger brother and yang the older brother). Five times two is ten. This is the origin of the ten Heavenly Stems. Each stem was assigned a specific Chinese character. For example, “甲” (ki-no-e) means the elder brother of wood, “乙” (ki-no-to) means the younger brother of wood, “丙” (hi-no-e) means the elder brother of fire, and “丁” (hi-no-to) means the younger brother of fire. The rest are: “戊” (tsuchi-no-e), “己” (tsuchi-no-to), “庚” (ka-no-e), “辛” (ka-no-to), “壬” (mizu-no-e), and “癸” (mizu-no-to). The stems, like the branches, cycle and only one stem is used per year. While the ten stems cycle six times, the twelve branches cycle five times. This is how you obtain the least common multiple of ten and twelve, which is sixty – hence the sexagenary cycle. The Koshien Stadium which I mentioned earlier was built in 1924, the year of “甲”. From this example, you can tell the year is “甲” when the last digit of the year is four. When the last digit is five, the year is “乙”. When the last digit is six, the year is “丙”. When the last digit is zero, like this year and the year I was born, the year is “庚”.

At the beginning of the year, shortly before the virus became the menace it is now, my children persuaded me to wear a red sports shirt with the number 60 in white on the back. That experience made me look into the world I never thought about. I hope you enjoyed reading the result of my little research.

(M.H.)

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