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Contents

Contribution

Open Innovation in the EMC Technology Field

Specially Appointed Professor at the Kyushu Institute of Technology
Yukihiro Fukumoto

For over 30 years, I was an EMC engineer at an appliance manufacturer working on a variety of products. Five years ago, I had the opportunity to take a teaching position at a university. In this paper, I would like to share my impressions on the industry-academia collaboration between companies and universities in the EMC technology field. My scope of consideration here will be *Open Innovation in the EMC Technology Field*. Usually, "industry-academia collaboration" refers to one-on-one joint research between a company and a university regarding an individual technical subject, but there are also consortium activities and R&D projects involving multiple companies and universities. It could be said that the VCCI Council's Technical Subcommittees are also places for open innovation activities. Whether each of these organizations is proactive about open innovation partly depends on their corporate culture, with variance even among companies in the same industry, where some are proactive about open innovation and others show no interest at all. It is also a fact that open innovation is easily applied to some industries, and not to others. To car and appliance manufacturers, EMC is an essential part of quality engineering, but not effective for differentiating the product to appeal to end consumers. For this reason, it is considered more advantageous to improve the base technology through open innovation than to develop EMC as a proprietary black-box technology. Meanwhile, to manufacturers supplying EMC components, EMC is an absolute differentiating factor in competition with other companies, and therefore manufacturers want to minimize the outflow of in-house expertise by keeping R&D closed and self-contained wherever possible.

Furthermore, industry-academia collaboration in the EMC field is bustling with all kinds of activities in education and the training and exchange of human resources. In Japan and overseas, EMC seminars and tutorial sessions at academic conferences draw speakers and participants from both industry and academia. Speakers from industry explain the practical application of EMC in product development, and speakers from academia explain EMC mechanisms based on electromagnetics. In terms of human resource exchange, while the basic recruitment mechanism facilitates a flow of people from academia to industry, our university also actively promotes flow in the opposite direction by inviting many corporate engineers to lecture at EMC classes. In addition, there is relatively high activity in recurrent education, in which corporate engineers conduct basic research on EMC as "industry academics". One might call this the "flow from industry to academia to industry".

Returning to our topic of R&D through open innovation, its advantage is the creation of ideas that could not be obtained by a single organization, through collaboration between different industry layers and organizations and people from different cultures. This enables comprehensive problem solving that transcends organizational boundaries. Disadvantages include the aforementioned inability to monopolize technological gains, and the time required to develop proposed solutions to problems. For example, say a system device manufacturer such as for appliances or automobiles were to implement EMC measures on one of its products using existing technologies. It would be quicker and more efficient to reach solutions for such a product by leveraging accumulated in-house expertise in a closed manner. However, when new EMC-related components or design elements are involved, in-house solutions tend to be inefficient and suboptimal. When implementing EMC engineering measures for products using new architecture or new components, it is important to look for total, optimal solutions working intandem with multiple layers such as component manufacturers, assembled product manufacturers, EMC certification sites, standardization organizations, and universities. For example, take a look at EMC technology in the automobile industry, which is experiencing great change such as the recent trend known as CASE (connected, autonomous, shared & services, electric). This industry is seeing a rise in introduction of component devices with differing EMC characteristics such as high currents (including high-frequency components using wide-bandgap semiconductors), high-speed communications as typified by on-board Ethernet, on-board Wi-Fi environments, and wireless charging. Additionally, in engineering environments, the rise of DX is being accelerated by the introduction of MBD (model-based development) even for EMC problems in primarily analog mechanisms. In EMC evaluation environments, mainly in Europe and the US, there has been further introduction of reverberation chambers, components such as semiconductors and anti-noise components, and module-level EMC measurement and evaluation methods. To adapt to such environmental changes, it seems we must adopt problem-solving methods using more open innovation than ever before.

I expect that EMC in product development will be continuously optimized through engineering measures according to the basic mechanisms known as electromagnetic phenomena, and the QCD (quality, cost, and delivery) cycle using standards as common criteria. In this time of dramatic change in product architecture, core components, engineering methods, measuring methods, and standards, collaborative problem solving with industry peers and organizations in other industry layers; that is, introducing open innovation methods; will surely grow more important. To tackle these increasingly sophisticated and complex EMC problems going forward, I ask for your guidance and support in promoting the university as a functional space for this kind of open innovation.

Yukihiro Fukumoto

1988	Completed graduate studies at the Kyoto Institute of Technology
1988	Joined Matsushita Electric Industrial Co., Ltd. (currently known as Panasonic Holdings Corporation)
2001	Completed a PhD in engineering at the Graduate School of Natural Science and Technology, Okayama University
2003	Completed an MBA at McGill University
2017	Specially Appointed Professor at the Faculty of Engineering, Kyushu Institute of Technology

Committee Activities

●Council

Date	June 28, 2022
Agenda items	● Agenda item 1　FY 2021 business report ● Agenda item 2　FY 2021 settlement of accounts (draft)
Decisions and reported items	● Agenda item 1　Approved ● Agenda item 2　Approved ● Reported item 1　FY 2022 business plan ● Reported item 2　FY 2022 budget

●Board

Date	June 14, 2022
Agenda items	● Agenda item 1　FY 2021 business report (draft) ● Agenda item 2　FY 2021 settlement of accounts (draft) ● Agenda item 3　Selection of the members of the Steering Committee ● Agenda item 4　Calling of the ordinary board meeting
Decisions and reported items	● Agenda item 1　Approved ● Agenda item 2　Approved ● Agenda item 3　Approved ● Agenda item 4　Approved ● Reported item 1　Mission-critical system restructuring, overseas projects

●Steering Committee

Date	May 25 and June 15, 2022	
Agenda items	● Agenda item 1	Topics of the 48th board meeting
Decisions and reported items	● Agenda item 1 ● Reported item 1 ● Reported item 2 ● Reported item 3 ● Reported item 4 ● Reported item 5	Approved Activities performed by the dedicated subcommittees (Technical, International Relations, Market Sampling Test, Public Relations, and Education) for the period from April to May Secretariat work (member entry and withdrawal trends, the number of new submissions for Registration of Product Conformity, income and expenditure, etc.) On-demand distribution of VCCI Seminar 2022 at the Info-Communications Promotion Month (see page 17) Distribution of 2022 Rules Briefing and Technical Symposium Program Creation of the material to be used as the FY 2021 business report

●Technical Subcommittee

Date	May 19 and July 7, 2022	
Agenda items	● Agenda item 1 ● Agenda item 2 ● Agenda item 3 ● Agenda item 4 ● Agenda item 5	Technical Subcommittee's planned activities for FY 2022 Holding 2022 Rules Briefing and Technical Symposium Assessment of whether EUT impedance affects AANs with asymmetrical transformers during measurement of conducted emissions Methods of validation for test sites for radiated emission measurement up to 30 MHz Activities for promoting standardization of mains cable termination conditions
Continuing agenda items	● Agenda item 1, 3, 4, 5	
Decisions and reported items	● Agenda item 2	Holding 2022 Rules Briefing and Technical Symposium on-demand from June 20 through 24 (see page 18)

●International Relations Subcommittee

Date	April 13, May 11, and June 9, 2022	
Agenda items	● Agenda item 1 ● Agenda item 2	Investigation into trends in world EMC standards Creation of a comparison chart of ITE regulations worldwide that is updated once a year
Continuing agenda items	● Agenda item 1 ● Agenda item 2	 Preparation of a comparison chart of ITE regulations worldwide
Decisions and reported items	● Agenda item 1	The results of the survey on trends in world EMC standards were published on the VCCI website on April 13, May 11, and June 9.

●Market Sampling Test Subcommittee

Date	April 26, May 18, June 7, and June 23, 2022
Agenda items	● Agenda item 1 Summary of the FY 2021 market sampling test report ● Agenda item 2 Summary of the FY 2021 document inspection report ● Agenda item 3 Report on the display of the VCCI mark for FY 2021 and handling ● Agenda item 4 Policies on the FY 2022 market sampling test ● Agenda item 5 Status of the FY 2022 sampling test and document inspections ● Agenda item 6 Notes on performing sampling tests for commissioned testing laboratories ● Agenda item 7 Joint committee meeting with testing laboratories
Decisions and reported items	● Agenda item 1 The summary of the FY 2021 market sampling test was reported. Sampling tests were completed for a total of 100 products, and judgments had been finalized for 97 products as of March 31. 96 products were determined as "passed" and one product was judged as "failed". Continued surveys on three products that were judged as "failed" in the first round of judgments will be reported in FY 2022. ● Agenda item 2 The summary of results of the FY 2021 document inspections was reported. 40 documents were obtained. As a result of inspecting 39 documents for which answers to preliminary screening were received, additional tests due to insufficient test conditions, requests for revising insufficient test reports, and other requests were made. It was confirmed that they were performed satisfactorily. ● Agenda item 3 1,279 products of 97 member companies were checked for the display of the VCCI mark, and results were reported. Registration of product conformity was not filed for some products with VCCI marks. When asked, the responsible members replied they forgot to file the registration. Those members were asked to respond accordingly. ● Agenda item 4 Basically, the policy for FY 2021 will be followed. ● Agenda item 5 So far, 18 products were selected to be bought for sampling tests. Seven products were selected for document inspections and preliminary screening is under way. ● Agenda item 6 The partially revised notes on performing sampling tests were reported, and approved to be discussed in the joint committee meeting with commissioned testing laboratories. ● Agenda item 7 A joint committee meeting was held and the notes on the FY 2022 market sampling tests were agreed with four commissioned testing laboratories.

●Public Relations Subcommittee

Date	May 13 and June 3, 2022	
Agenda items	● Agenda item 1	Creating a video about disturbances by electromagnetic interference
	● Agenda item 2	New contract for illuminated billboard at Haneda Airport
	● Agenda item 3	Creating Chinese, Taiwanese, and Korean versions of some pages of the VCCI website
	● Agenda item 4	TECHNO-FRONTIER 2022
	● Agenda item 5	COMPUTEX TAIPEI 2022
Continuing agenda items	● Agenda item 1, 4	
Decisions and reported items	● Agenda item 1	Video footage of electromagnetic interference will be filmed at JQA and reviewed in the subcommittee to create a video focusing on electromagnetic interference as the overall policy. The subcommittee will create a draft storyboard taking into account explanatory captions and narrations for further deliberation of the contents of the video, and request a professional contractor to create and edit a video in the future.
	● Agenda item 4	Final confirmation was made on the details of the real exhibition and online exhibition of TECHNO-FRONTIER 2022. The subcommittee will continue confirmation until TECHNO-FRONTIER 2022 will begin in July.
	● Reported item 2	It was reported from the Secretariat that an illuminated billboard has been posted in the baggage claim area of Haneda Airport Terminal 1 since May.
	● Reported item 3	It was reported from the Secretariat that Chinese, Taiwanese, and Korean versions of some pages of the VCCI website were created and published.
	● Reported item 5	The Secretariat weighed the possibility of public relations campaigns for VCCI in the booth of each company at the COMPUTEX TAIPEI 2022 online exhibition, but found that the only method of communication available was chatting, which was not expected to have much effect on publicity.

●Education Subcommittee

Date	April 8, May 18, and June 6, 2022
Agenda items	● Agenda item 1 Revision of textbooks, etc., for FY 2022 education and training sessions ● Agenda item 2 Seminar preparation status for FY 2022 ● Agenda item 3 Seminars held in FY 2022
Continuing agenda items	● Agenda item 1
Decisions and reported items	● Agenda item 1 Revisions to the applicable textbooks were completed to reflect feedback from last year's questionnaire results. ● Agenda item 2 ･The classroom seminars planned for the first half of the year were held in an online format (live streaming) to prevent the spread of COVID-19 infection. ･The Secretariat and three training institutions that provide hands-on training verified the preparation status of the "Infection Prevention Check Sheet" and "Preventive Measures for COVID-19 Infection at Hands-on Training Sites". The results of verification were reported to the subcommittee and it was confirmed that the documents are ready. ● Agenda item 3 ･On April 22, the 45th installment of “The basic technique of EMI measurement” was held online (live streaming). All 15 attendees received attendance certificates. ･For the 56th installment of "The basic of electromagnetic waves, EMI measurement technique below 1 GHz", classroom seminars were held online (live streaming) on May 19 and 20, and hands-on training on an attending basis was held on May 26 and 27. For the 57th installment of "The basic of electromagnetic waves, EMI measurement technique below 1 GHz", classroom seminars were held online (live streaming) on May 19 and 20, and hands-on training on an attending basis was held on June 2 and 3. There were a total of 15 attendees, who received completion certificates. ･For the 18th installment of "EMI measurement technique above 1 GHz", classroom seminars were held on an attending basis on June 9 and 10. The 19th installment of "EMI measurement technique above 1 GHz" was held on June 16 and 17. There were a total of 10 attendees, who received completion certificates. ･On June 24, the 7th installment of “EMI measurement instrumentation uncertainty (MIU)” was held online (live streaming). All 14 attendees received attendance certificates.

●Registration Committee for Measurement Facilities

Date	April 18, 2022
Agenda items	● The subcommittee reviewed the results of deliberations by the Measurement Facility Examination and Registration WG.
Decisions and reported items	Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 20 companies Radiated emission measurement facilities below 1 GHz 11 AC-mains-ports-conducted emission measurement facilities 13 Telecommunication-port-conducted emission measurement facilities 4 Radiated emission measurement facilities above 1 GHz 11 Applications returned with comments None Applications carried over to the next meeting None
Date	May 23, 2022
Agenda items	● The subcommittee reviewed the results of deliberations by the Measurement Facility Examination and Registration WG.
Decisions and reported items	Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 23 companies Radiated emission measurement facilities below 1 GHz 10 AC-mains-ports-conducted emission measurement facilities 12 Telecommunication-port-conducted emission measurement facilities 8 Radiated emission measurement facilities above 1 GHz 10 Applications returned with comments None Applications carried over to the next meeting None
Date	June 20, 2022
Agenda items	● The subcommittee reviewed the results of deliberations by the Measurement Facility Examination and Registration WG.
Decisions and reported items	Conformity certified (including cases certified with qualification comments after checking of supplementary papers): 24 companies Radiated emission measurement facilities below 1 GHz 16 AC-mains-ports-conducted emission measurement facilities 9 Telecommunication-port-conducted emission measurement facilities 11 Radiated emission measurement facilities above 1 GHz 9 Applications returned with comments None Applications carried over to the next meeting None

30th instalment

EMC Standards for Semiconductor Devices – Emission Measurement Methods –

Masamitsu Tokuda

1. Foreword

As IoT, sensor networks, and automated driving become an increasing part of our daily life, it is important to ensure reliability of electrical and electronic systems hardware. With development of ADAS (advanced driver assistance systems), the techniques that are required for achieving EMC are shifting from conventional “techniques for minimizing noise” to techniques for securing functional safety and reliability of equipment, especially for onboard networks. At the same time, as immunity characteristics and ESD (electrostatic discharge) tolerance are expected to improve and wireless networks with lower electromagnetic emissions are high in demand, EMC evaluation and design of semiconductor devices (the building blocks of electrical and electronic systems) are also becoming increasingly more important. While TC47 (semiconductor devices) / SC47A (integrated circuits) of the IEC has developed EMC standards for integrated circuits (ICs), this article describes the standards for emission measurement methods for ICs published as IEC 61967 series, based on references 1 and 2. For an overview of EMC standards for semiconductor devices, refer to VCCI Dayori No. 139 [3].

2. Emission measurement methods for integrated circuits (ICs)

The IEC 61967 series of emission measurement method standards, which specify measurement methods for electromagnetic disturbances emitted from ICs, assume measurement in the frequency domain, and Table 1 shows the structure of the IEC 61967 series. Although they are broadly divided into Part 4, Part 5, and Part 6, which are "conducted emission measurement methods," and Part 2, Part 3, and Part 8, which are "radiated emission measurement methods," the "150Ω method" of IEC 61967-4 is mainly used. Note that Part 1-1 describes the "near-field scan data exchange format" corresponding to Part 3: Surface scan method, and uses XML format data.

The standards governing emission measurement methods (IEC 61967 series) and immunity measurement methods (IEC 62132 series) initially covered a frequency range from 150 kHz to 1 GHz, but the frequency range has been expanded to the GHz band as equipment and circuits operate at higher frequencies. Therefore, newly finalized measurement and test method standards after 2010 exclude frequency ranges from their titles and specify the applicable frequency bands in individual standards. For the IEC 62132 series of immunity measurement method standards, the revised Part 1 (general conditions and definitions) (Ed. 2.0) was published in 2015 according to this policy, and for the IEC 61967 series of emission measurement method standards, the revised IEC 61967-1 (Ed. 2.0) was published in December 2018.

Recent topics are the publication of Ed. 2.0, which sets the upper frequency limit to 30 MHz for the IEC 61967-4 "1Ω method" and the start of deliberations on Ed. 2.0, which changes the upper frequency limit from 3 GHz to 6 GHz for the IEC 61967-8 "IC stripline method".

(1) IEC 61967-1: General conditions and definitions

It includes "Terms and definitions" common to the IEC 61967 series, common "Measurement conditions", "Test equipment" (including resolution bandwidth (RBW) during measurement), "Standard termination conditions for IC pins", "Test procedure", "Test report" requirements, "General test board description", and "Test method comparison tables" (for the IEC 61967 series) (Annex A). Since standards for high frequencies above 1 GHz have already been published (IEC 61967-2, IEC 61967-6, and IEC 61967-8), a revised version (Ed. 2.0) was published in 2018 with the frequency range removed from the title as mentioned above (Japan was the project leader). At the time of revision, a table of standards in this series was developed as Annex A.

Table 1 Standards Specifying Emission Measurement Methods for Semiconductor Integrated Circuits (as of April, 2022)[2)]

IEC 61967: Integrated circuits- Measurement of electromagnetic emissions

	Title
IEC 61967-1:2018 Ed.1.0 (2002-03-12) Ed.2.0 (2018-12-12)	Integrated circuits - Measurement of electromagnetic emissions - Part 1: General conditions and definitions
IEC TR 61967-1-1:2015 Ed.2.0 (2015-08-28)	Integrated circuits - Measurement of electromagnetic emissions - Part 1-1: General conditions and definitions -Near-field scan data exchange format
IEC 61967-2:2005 Ed.1.0 (2005-09-29)	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz - Part 2: Measurement of radiated emissions - TEM cell and wideband TEM cell method
IEC TS 61967-3:2014 Ed.1.0 (2005-06-10) Ed.2.0 (2014-08-25)	Integrated circuits - Measurement of electromagnetic emissions, Part 3: Measurement of radiated emissions - Surface scan method
IEC 61967-4:2002+AMD1:2006 Ed.1.1 (2006-07-27) COR1:2017 (2017-06-29) Ed.2. 0 (2021-03-16)	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz - Part 4: Measurement of conducted emissions - 1 ohm/150 ohm direct coupling method
IEC TR 61967-4-1:2005 Ed.1.0 (2005-02-07)	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz - Part 4-1: Measurement of conducted emissions - 1 ohm/150 ohm; direct coupling method - Application guidance to IEC 61967-4
IEC 61967-5:2003 Ed.1.0 (2003-02-13)	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz - Part 5: Measurement of conducted emissions - Workbench Faraday Cage method
IEC 61967-6:2002+AMD1:2008 Ed.1.0 (2002-06-25) Ed.1.1 (2008-03-12) COR1:2010 (2010-08-30)	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz - Part 6: Measurement of conducted emissions - Magnetic probe method
IEC 61967-8:2011 Ed.1.0 (2011-08-11) Ed.2.0: 47A/1136/CD (2022-03)	Integrated circuits - Measurement of electromagnetic emissions - Part 8: Measurement of radiated emissions - IC stripline method

(2) IEC TR 61967-1-1: Near-field scan (NFS) data exchange format: Radiated emissions

It specifies the method of describing "Near-field scan (NFS) data" that employs the XML format. It is mainly used to share the measurement results of "surface scan method: IEC 61967-3 (Emission) and IEC 62132-9 (Immunity)", but it is also used to compare the results of EMC simulations using IC models (ICEM-RE, ICIM-RI) being discussed in WG2 with the results of near-field measurements (measured values). When updated from Ed. 1.0 (2010) to Ed. 2.0 (2015), 3D objects, binary data files, piece-wise linear data for time and frequency domain data, vectors allowing rotation and offset of measurement points, and DUT reference planes were added. In addition, it allows complex-valued probe factors including phase information to be handled as probe factors.

(3) IEC 61967-2: TEM cell method: radiated emissions[)]

This standard is based on SAE J1752/3, "TEM cell method"[4], which was the earliest semiconductor EMC measurement method standardized in 1995. Initially, emissions from 150 kHz to 1 GHz were targeted, and this was extended to an upper frequency limit of 18 GHz with a wideband TEM cell (so-called GTEM cell) for high frequencies in 47A/619/NP proposed in 2001. However, the measurement sensitivity was not satisfactory, so IEC 61967-8: IEC 62132-8 (IC stripline method) was proposed as an improvement to this method. An immunity measurement method for the same setup is specified in IEC 62132-2. A proposal to revise the TEM cell calibration method was announced by the U.S., but has not yet been proposed.

(4) IEC TS 61967-3: Surface scan method: radiated emissions

The so-called "near-field measurement method" is standardized as IEC TS 61967-3. It is not an International Standard (IS) but a Technical Specification (TS), which is positioned as a future IS. The first edition was IEC TS 61967-3: 2005, but a second edition was published in 2014 with support for near-field scan (NFS) data and additions such as "data analysis" and "probe factors and probe calibration".

(5) IEC 61967-4: 1Ω/150Ω method (VDE method): conducted emissions

This is a combination of the 1Ω method, which measures the high-frequency current in the power supply system through a 1Ω resistor inserted in series, and the 150Ω method, which measures the high-frequency voltage in the signal system through a 150Ω impedance. The "1Ω method" was commonly known as the "VDE method" in Japan because it was proposed by the VDE (Verband der Elektrotechnik Elektronik Informationstechnik eV, which means the German Electrical and Electronic Information Technology Association). It was standardized as Ed.1.0 in 2002. The 2006 revision added, among other things, a common-mode emission measurement method for CAN (Controller Area Network: ISO 11898, etc.) and LVDS (Low Voltage Differential Signaling). IEC 61967-4 is cited in the BISS (Basic Interoperable Scrambling System) standard[5] and is a commonly used measurement method in Europe. Recently, the "150Ω method" has been used with increasing frequency. Some technical modifications in the coupled circuits of the 150Ω method were published in 2017 as a Corrigendum. With respect to IEC 62228-5 EMC evaluation of Ethernet transceivers, which is currently under deliberation, the extension of the measurement bandwidth of the 150Ω method to 3 GHz is being considered, and in Ed. 2.0 that was published in 2021, guidelines for frequency extension to 1 GHz and above were added as Annex G.

In IEC 61867-4 Ed. 2.0, the upper frequency limit was set to 30 MHz for the "1Ω method" used for emission measurement of power supply systems at the same time as the frequency extension of the "150Ω method" mentioned above. The conventional "1Ω probe" has a large parasitic inductance and does not allow accurate measurement at high frequencies, so the parasitic inductance was reduced and Annex A: Probe calibration procedure in Ed.1.0 was changed to Annex A: Probe verification procedure for the verification of the probe characteristics.

A technical report (TR) has been published as IEC 61967-4-1, which describes the actual board design and details of the measurement method for the "1Ω/150Ω method". The contents of IEC 61967-4-1 ("Application guidance to IEC 61967-4") are taken from the aforementioned BISS standard.

(6) IEC 61967-5: Workbench Faraday Cage method (WBFC method): conducted emissions

Originally proposed by Philips, this is a conductive common-mode measurement method using a small desktop shielded box (WBFC: Workbench Faraday Cage). A counterpart immunity measurement method for the same setup is specified in IEC 62132-5. IEC-standard WBFCs are small in size, but slightly larger WBFCs are commercially available.

(7) IEC 61967-6: Magnetic probe method (MP method): conducted emissions

The MP method (IEC 61967-6: magnetic probe method), standardized in 2002, is a standard proposed by Japan and is also called the magnetic field probe method, but its purpose is not to measure magnetic fields but to measure high-frequency currents flowing through wiring in a microstrip structure by non-contact magnetic field coupling. Because of its name (MP), initially, it was often misunderstood as "near-field measurement method" and confused with IEC TS 61967-3 (surface scan method), but it is an excellent high-frequency current measurement method that is not affected by wiring inductance or series resistance in the same way as the VDE method. Although not described in IEC standards, the time waveform of the current can also be observed with high accuracy by using a microstrip line and a network analyzer (VNA) to perform complex calibration of probes. Currently, the 2008 revised edition extends the measurement bandwidth to 3 GHz. Corrections (corrigendum) were added in 2010 to correct two typographical errors that existed in the original 2002 edition (incorrect probe dimensions and incorrect equation (A.1) for the calibration factor), and the latest edition is Ed. 1.1.

(8) IEC 61967-7: (Number unassigned) Measurement of radiated emissions - Mode Stirred Chamber method

Since the roadmap "IC EMC standardization roadmap 2004" shared as a WG internal document during the SC47A/WG9 Eindhoven meeting in 2004, which was described as a "New Proposal (NP) 2005", no progress has been made and IEC 61967-7 is missing without being proposed. This method is a smaller version of the so-called "Reverberation Chamber (IEC61000-4-21)" and the immunity test method for on-board devices (ISO 11452-11), for which a counterpart immunity measurement method also exists.

(9) IEC 61967-8: IC stripline method: radiated emissions

A method proposed by Germany, which is a pair of emission measurements (IEC 61967-8) and immunity measurements (IEC 62132-8), has been cited since BISS Version 2.0 (2012). Theoretically, it is similar to the TEM cell method, but smaller and more sensitive than the TEM and GTEM cells. It is cited, albeit informatively, in IEC 62228-5 (EMC evaluation method for Ethernet transceiver ICs): Ed. 1.0 (2021) described below.

Ed. 2.0 to change the upper frequency limit of IEC 61967-8 from 3 GHz to 6 GHz was proposed by Germany and deliberation on 47A/1136/CD (2022-03) was initiated.

[References]

1) Osami Wada: "VI. EMC Standards for Semiconductor Devices, World EMC standards and stipulations" (FY 2020 version), Japan Management Association, pp. 42-52, July 2020
https://event.jma.or.jp/TF_EMC2020
2) Osami Wada: "VII. EMC Standards for Semiconductor Devices, World EMC standards and stipulations" (FY 2022 version), Japan Management Association, pp. 59-67, July 2022
3) Masamitsu Tokuda: "EMC Standards for Semiconductor Devices: Overview", VCCI Dayori No. 139, pp. 11-13, January 2021
4) SAE J1752/3, "Integrated Circuit Radiated Emissions Measurement Procedure 150kHz to 1000MHz, TEM Cell," Mar. 1995.
5) Generic IC EMC Test Specification ("BISS paper"), open copyright by Robert Bosch GmbH, Infineon Technologies AG, Continental AG; ZVEI, "Generic IC EMC Test Specification," Version 2.1, July 2017.
https://www.zvei.org/fileadmin/user_upload/Presse_und_Medien/Publikationen/2017/Juli/Generic_IC_EMC_Test_Specification/Generic_IC_EMC_Test_Specification_2.1_180713_ZVEI.pdf

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

Report on the 2022 VCCI Seminar
Participation in the Info-Communications Promotion Month Event
(Ministry of Internal Affairs and Communications)

Steering Committee

The VCCI Council will be holding its annual (May) seminar, Info-Communications Promotion Month event for the Ministry of Internal Affairs and Communications, again this year. As in 2020 and 2021, we shall be showcasing our recent activities through the VCCI Council website to prevent the spread of COVID-19. The registration ID for the Info-Communication Promotion Month Council is C070.

The following five introductory videos pertaining to VCCI Council were posted from June 6th (Mon) through 10th (Fri), 2022 in the Info-Communications Promotion Month. People who wished to participate made applications through our website and watched the videos (73 applicants for participation). We are sincerely grateful to our viewers.

[Videos]

・VCCI Council activities
・Market survey-1
・Market survey-2
・Overview of VCCI facility registration
・Answers to questions sent to VCCI Council

Report on the 2022 Rules Briefing and Technical Symposium

Technical Subcommittee

The 2022 Rules Briefing and Technical Symposium provided in February 2022 for Japanese members was held on demand mainly for overseas members. In the rules briefing, two guidances were explained. In the technical symposium, CISPR standardization trends and FY 2021 Technical Subcommittee activities were reported. The on-demand Rules Briefing and Technical Symposium was held on June 20 through 24, 2022, with 31 participants: Korea (9), China (6), Taiwan (5), USA (5), Germany (2), UK (1), Singapore (1), Canada (1), and Japan (1). Table 1 shows the 2022 Rules Briefing and Technical Symposium program.

In Part 1: Rules Briefing, the following two guidances were introduced:

(1) VCCI 32-1-G:2021 "Guidance for Registration of Product Conformity - How to Input the Model Number" (issued in 2021)

(2) VCCI 32-1-H:2022 "Guidance for Emission Measurement Using FFT Based Measuring Instruments"

In Part 2: Technical Symposium, the Technical Subcommittee chairperson gave a briefing on the FY 2021 activities of the Technical Subcommittee and working groups and provided an overview of papers presented at academic conferences. This was followed by reports detailing the activities of the working groups.

Table 1　2022 Rules Briefing and Technical Symposium Program

	Theme	Presenter
Rules Briefing and Technical Symposium (individual video)　Distributed on demand (June 20th to 24th, 2022)		
Part 1 Rules Briefing	Guidance for Registration of Product Conformity — How to Input the Model Number —	Mr. Minoru Hirata VCCI Council
	Guidance for Emission Measurement Using FFT Based Measuring Instruments	Mr. Fuminori Kanahara Sony Global Manufacturing & Operations Corporation Convener, Radiated Emission WG, Technical Subcommittee
Part2 Technical Symposium	Opening Considerations for the Technical Symposium	Mr. Kazuyuki Hori Sony Group Corporation Chair, Technical Subcommittee
	Deliberation Efforts for CISPR Standards and Progress of Domestic Endorsement	Mr. Nobutoshi Chigira Oki Electric Industry Co., Ltd. Convener, CISPR Project WG, Technical Subcommittee
	Deliberation Efforts by SC-A/I JAHG6 for Including VHF-LISNs in CISPR Standards	Mr. Kunihiro Osabe VCCI Council CISPR SC-A/I JAHG6 Co-Convener Convener, VHF-LISN WG, Technical Subcommittee
	Considerations on Height Scan and Limits in Radiated Emission Measurements Above 1 GHz Response to CIS/I/642/DC Comments	Mr. Fuminori Kanahara Sony Global Manufacturing & Operations Corporation Convener, Radiated Emission WG, Technical Subcommittee
	Report on Verification of Voltage/Current Conversion Ratio of Shunt-Type Transformer-Coupled AAN	Ms. Nozomi Miyake NEC Corporation Convener, Conducted Emission WG, Technical Subcommittee
	Verification of Evaluation Methods for Measurement Site Validity for Measurement of Radiated Emissions Below 30 MHz - In Relation to CISPR 16-1-6 (CIS/A/1362/FDIS) and CISPR 16-1-4 (CIS/A/1323/CDV)-	Mr. Hironari Tanaka Ohtama Calibration Service Co., Ltd. Convener, Antenna Calibration and Site Validation WG, Technical Subcommittee

Status on FY2021 Market Sampling Tests

Market Sampling Test Subcommittee

As of April 26, 2022

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

Sampling test		Selected	Cancelled (Not shipped, etc.)	Testable samples	Test completed (Included number)	Judgment			
						Passed	Failed- tentative		
							Finally passed	Finally failed	Pending
Grand total		101	1	100	100	95	1	1	3
Loan-based testing total		46	1	45	45	42	1	1	1
Term (Included number)	1st Quarter	12	1	11	11	11	—	—	—
	2nd Quarter	20	—	20	20	17	1	1	1
	3rd Quarter	8	—	8	8	8	—	—	—
	4th Quarter	6	—	6	6	6	—	—	—
Purchase-based testing total		55	0	55	55	53	0	0	2
Term (Included number)	1st Quarter	20	0	20	20	19	—	—	1
	2nd Quarter	20	—	20	20	20	—	—	—
	3rd Quarter	13	—	13	13	12	—	—	1
	4th Quarter	2	—	2	2	2	—	—	—

Final Result

Passed	Failed	Pending*
96	1	3

* Passed / Failed judgements will be carried over to FY 2022.

Document inspection	Selected	Cancelled (withdrawal, etc.)	Inspectable samples	Pre-check completed	Judgment completed	Judgment	
						Cleared	Problems identified
	42	2	40	40	39	33	6

Report from the Secretariat

● List of Members (April 2022 - June 2022)

New members

Membership	Member No.	Company Name	Country
Regular	4239	Panasonic Industry Co., Ltd.	JAPAN
Regular	4240	Panasonic Entertainment & Communication Co., Ltd.	JAPAN
Regular	4241	Panasonic Automotive Systems Co., Ltd.	JAPAN
Regular	4242	Panasonic Corporation	JAPAN
Regular	4245	NTT Sonority Inc.	JAPAN
Regular	4248	iMercury	JAPAN
Regular	4250	TEKWIND Co., Ltd.	JAPAN
Regular	4253	SGST CO., LTD	JAPAN
Regular	4254	IRIS OHYAMA Inc.	JAPAN
Regular	4233	SK hynix NAND Product Solutions Corp.	USA
Regular	4234	G-Youth TECHNOLOGIES (Shenzhen) CO. LTD	CHINA
Regular	4235	Veo Technologies ApS	DENMARK
Regular	4237	G.Tech Technology Ltd.	CHINA
Regular	4244	JAASOFT Co., Ltd.	KOREA
Regular	4246	WINGTECH GROUP (HONGKONG) LIMITED	HONG KONG
Regular	4247	Formerica OptoElectronics Inc.	CHINESE TAIPEI
Regular	4249	Prime Computer AG	SWITZERLAND
Regular	4252	2N TELEKOMUNIKACE a.s.	Czech Republic*
Regular	4256	Mech-Mind Robotics Technolgies Ltd.	CHINA
Regular	4258	Plasmapp Co., Ltd.	KOREA
Regular	4260	Yibin Jiaxin Electronic Technology Co., Ltd.	CHINA
Supporting	4236	Dynabook Technology (Hangzhou) Inc.	CHINA
Supporting	4238	BWS TECH INC.	KOREA
Supporting	4243	BTF Testing Lab (Shenzhen) Co., Ltd.	CHINA
Supporting	4255	Kunshan Balun Communications Technology Co., Ltd.	CHINA

* Country where we previously had no members

Company name change

Membership	Member No.	Company Name	Country	Old company name
Regular	15	Panasonic Holdings Corporation	JAPAN	Panasonic Corporation
Regular	17	Panasonic Connect Co., Ltd.	JAPAN	Panasonic System Solutions Japan Co., Ltd.
Regular	130	BIPROGY Inc.	JAPAN	Nihon Unisys, Ltd.
Regular	1780	Panasonic Electric Works Networks Co., Ltd.	JAPAN	Panasonic Life Solutions Networks Co., Ltd.
Regular	3471	QUADRAC Holdings Co., Ltd.	JAPAN	QUADRAC Co., Ltd.

Membership	Member No.	Company Name	Country	Old company name
Regular	3671	FUJIFILM Digital Solutions Co., Ltd.	JAPAN	HOYA DIGITAL SOLUTIONS COOPERATION
Regular	3886	Netgen, Inc.	JAPAN	NextGen Business Solutions, Inc.
Regular	4022	i-PRO Co., Ltd.	JAPAN	Panasonic i-PRO Sensing Solutions Co., Ltd.
Regular	4063	TJ Japan Co., Ltd.	JAPAN	GST Japan Co., Ltd.
Supporting	575	Industrial Technology Institute Fukushima Prefectural Government	JAPAN	Fukushima Technology Centre
Regular	1090	Musarubra US LLC (Trellix)	USA	McAfee, LLC.
Regular	3076	Bosch Security Systems	THE NETHERLANDS	Robert Bosch Taiwan Co., Ltd.
Regular	3658	Ivanti	USA	Pulse Secure, LLC
Regular	3729	ZPE Systems, Inc.	USA	ZPE Systems
Supporting	656	Element Materials Technology Washington DC LLC	USA	PCTEST Engineering Laboratory, Inc.
Supporting	1980	Eurofins KCTL Co., Ltd.	KOREA	KCTL Inc.
Supporting	3387	Bay Area Compliance Laboratories Corp. (Shenzhen)	CHINA	Bay Area Compliance Labs Corp., (ShenZhen)
Supporting	4224	Nebraska Center for Excellence in Electronics	USA	The Nebraska Center for Excellence in Electronics

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

● VCCI Schedule for FY 2022 (as of June 30, 2022)

April ・The basic technique of EMI measurement	**May** ・The basic of electromagnetic waves, EMI measurement technique below 1 GHz	**June** ・EMI measurement technique above 1 GHz ・EMI measurement instrumentation uncertainty (MIU) ・Release VCCI Dayori No.145
July ・TECHNO-FRONTIER 2022	**August** ・Release Annual Report	**September** ・Release VCCI Dayori No.146
October ・CEATEC 2022	**November**	**December** ・Release VCCI Dayori No.147
January	**February**	**March** ・Release VCCI Dayori No.148

● Status of Compliance Test Notifications

April 2022—June 2022 (Product names are examples and are not limiting)

Classification of MME (Product types are not limited to only the following examples.)				Classification code Class A	Classification code Class B	April 2022 Class A	April 2022 Class B	April 2022 Total	May 2022 Class A	May 2022 Class B	May 2022 Total	June 2022 Class A	June 2022 Class B	June 2022 Total
ITE	Computer	Large	Super computer, Server, etc.	A 2	a 2	19	0	19	26	0	26	22	1	23
ITE	Computer	Stationary	Workstation, Desktop PC, etc.	B 2	b 2	5	11	16	1	24	25	0	17	17
ITE	Computer	Portable	Laptop PC, Tablet PC, etc.	C 2	c 2	0	66	66	1	41	42	4	29	33
ITE	Computer	Other computers	Wearable computers, Wearable device, Smart watch, Smart glass, etc.	E 2	e 2	4	1	5	0	1	1	0	0	0
ITE	Peripheral / Terminal	Memory device	HDD, SSD, USB Memory, Media drive, Disk device, NAS, DAS, SAN, etc.	G 2	g 2	4	23	27	8	18	26	4	27	31
ITE	Peripheral / Terminal	Printer device	Printer including multifunction machine, etc. (portable)	H 2	h 2	0	4	4	1	7	8	2	10	12
ITE	Peripheral / Terminal	Display device	CRT display, Monitor, Projector, etc.	J 2	j 2	17	58	75	2	69	71	9	79	88
ITE	Peripheral / Terminal	Other I/0 devices	Image scanner, OCR, Pen tablet, Stylus pen, etc.	M 2	m 2	0	7	7	4	7	11	3	9	12
ITE	Peripheral / Terminal	General purpose terminal	Display controller terminal, etc.	N 2	n 2	0	2	2	0	0	0	3	0	3
ITE	Peripheral / Terminal	Special purpose terminal	POS, Terminal for finance, insmance, etc.	Q 2	q 2	0	4	4	4	1	5	4	2	6
ITE	Peripheral / Terminal	Other peripheral	PCI Card, Graphics Card, Mouse, Keyboard, Cradle, etc.	R 2	r 2	7	37	44	4	29	33	10	24	34
ITE	Peripheral / Terminal	Copying machine / Multifunction copying machine	Copying machine, Multifunction copying machine, etc. (Stationary)	S 2	s 2	0	0	0	0	0	0	1	0	1
ITE	Communications equipment	Terminal equipment	Mobile phone, Smart phone, PHS phone, etc.	T 2	t 2	0	1	1	0	2	2	0	4	4
ITE	Communications equipment	Terminal equipment	Telephone device such as PBX, FAX, Key telephone systems, Cordless phone, etc.	U 2	u 2	0	0	0	3	2	5	0	0	0
ITE	Communications equipment	Network-related equipment	Communication line connecting device including Modem, Digital transmission unit, DSU, TA, Media converter, etc.	V 2	v 2	0	1	1	1	2	3	1	2	3
ITE	Communications equipment	Network-related equipment	LAN-related device, including Router, HUB, etc. Local switch, etc.	W 2	w 2	31	13	44	29	25	54	26	23	49
ITE	Communications equipment	Other communication equipment	Other communication equipment	X 2	x 2	22	9	31	19	13	32	17	14	31
Broadcast receiver equipment			TV, Radio, Tuner, Video recorder, Set-top box, etc.		k 2		0	0		3	3		2	2
Audio equipment			Speaker, Amplifier, IC recorder, Digital audio player, Headset, DTM, AI speaker, etc.	L 2	l 2	0	5	5	0	5	5	0	13	13
Video equipment		Video equipment	Digital video camera, Web camera, Network camera, Video player, Photo frame, Digital camera, Drive recorder, etc.	I 2	i 2	9	8	17	14	7	21	15	9	24
Video equipment		Other video equipment	VR goggles, Scan converter, etc.	P 2	p 2	0	0	0	0	0	0	0	0	0
Entertainment lighting control equipment			Entertairunent lighting control equipment, etc.	Z 2	z 2	0	1	1	0	0	0	0	0	0
Other MME	Entertainment / Education	Electronic stationery	Electronic dictionary, e-book reader, Translator, Calculator, etc.	D 2	d 2	0	0	0	0	0	0	0	0	0
Other MME	Entertainment / Education	Electronic toy	Game console, Game pad, toy drone, etc.	Y 2	y 2	1	0	1	0	2	2	0	2	2
Other MME	Entertainment / Education	Other Entertainment / Education equipment	Navigator, AI robot, etc.	F 2	f 2	0	0	0	0	1	1	0	0	0
Other MME	Other MME		MME other than the above	O 2	o 2	5	3	8	3	6	9	9	2	11
Total						124	254	378	120	265	385	130	269	399

● 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 2022 – June 2022)

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:
Ultratech Engineering Labs Inc.	Ultratech Engineering Labs Inc.	-	-	-	-	-	C-20117	2025/4/17	3000 Bristol Circle, Oakville, Ontario, Canada	+1-905-829-1570
Hubei Institute of Measurement and Testing Technology	Sheilded Room	-	-	-	-	-	C-20114	2025/4/17	No. 2, Mao Dian Shan Road, East Lake Hi-Tech Park, Wuhan, Hubei, China	+86-18040519001
Hubei Institute of Measurement and Testing Technology	10 m Anechoic chamber	-	-	-	-	○	R-20159	2025/5/22	No. 2, Mao Dian Shan Road, East Lake Hi-Tech Park, Wuhan, Hubei, China	+86-18040519001
RN Electronics Limited	Site H 30 MHz- 1 GHz	-	-	-	○	-	R-20118	2025/5/22	Arnolds Court, Arnolds Farm Lane, Brentwood, Essex, United Kingdom	+44-1277-352219
CSA Group Bayern GmbH	SR2	-	-	-	-	-	C-20118	2025/5/22	Straubinger Strasse 100, D-94447 Plattling, Germany	+49-9424-9481-310
Kiwa Netherlands B.V.	Kiwa Netherlands B.V.	-	-	-	-	-	C-20119	2025/5/22	Wilmersdorf 50, 7327 AC Apeldoorn, The Netherlands	+31-88-998-3600
SIQ Ljubljana	SIQ Ljubljana	-	-	-	○	-	R-20162	2025/5/22	Masera-Spasiceva ulica 10, SI-1000 Ljubljana, Slovenia	+386-1-4778-178
TUV Rheinland (Guangdong) Ltd.	Radiated emission Chamber: District B	-	-	-	-	-	G-20153	2025/5/22	No. 110, 1/F, Building B, No. 102, 1F of Southwest and No. 205, 2F of West Warehouse Building, No. 767 Tianyuan Road, Tianhe District, Guangzhou 510650, Guangdong, P.R.China	+86-20-2839-1159
Guangdong Keyway Testing Technology Co., Ltd.	Guangdong Keyway Testing Technology Co., Ltd.	-	-	-	-	-	T-20120	2025/6/19	No.7 of Zhangmutou District, Guanzhang Road, Zhangmutou town, Dongguan Guangdong, China	+86-769-8718-2258

Company name	Equipment name	3 m	10 m	30 m	Dark 3m	Dark 10m	Registration number	Effective date	Location	Contact to:
Dynabook Technology (Hangzhou) Inc.	Dynabook Technology (Hangzhou) Inc. Qualification Center	-	-	-	-	○	R-20165	2025/6/19	2/F, Building 2, No.3, East Gate, Comprehensive Bonded Zone, Hangzhou Economic and Technical Development Zone, Zhejiang, China	+86-571-8671-4411-3201
Dynabook Technology (Hangzhou) Inc.	Dynabook Technology (Hangzhou) Inc. Qualification Center	-	-	-	-	-	C-20121	2025/6/19	2/F, Building 2, No.3, East Gate, Comprehensive Bonded Zone, Hangzhou Economic and Technical Development Zone, Zhejiang, China	+86-571-8671-4411-3201
Dynabook Technology (Hangzhou) Inc.	Dynabook Technology (Hangzhou) Inc. Qualification Center	-	-	-	-	-	T-20122	2025/6/19	2/F, Building 2, No.3, East Gate, Comprehensive Bonded Zone, Hangzhou Economic and Technical Development Zone, Zhejiang, China	+86-571-8671-4411-3201
Dynabook Technology (Hangzhou) Inc.	Dynabook Technology (Hangzhou) Inc. Qualification Center	-	-	-	-	-	G-20156	2025/6/19	2/F, Building 2, No.3, East Gate, Comprehensive Bonded Zone, Hangzhou Economic and Technical Development Zone, Zhejiang, China	+86-571-8671-4411-3201
BTF Testing Lab (Shenzhen) Co., Ltd.	BTF Testing Lab (Shenzhen) Co., Ltd.	-	-	-	○	-	R-20166	2025/6/19	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street,Bao'an District, Shenzhen, China	+86-755-2314-6130
BTF Testing Lab (Shenzhen) Co., Ltd.	BTF Testing Lab (Shenzhen) Co., Ltd.	-	-	-	-	-	C-20122	2025/6/19	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street,Bao'an District, Shenzhen, China	+86-755-2314-6130
BTF Testing Lab (Shenzhen) Co., Ltd.	BTF Testing Lab (Shenzhen) Co., Ltd.	-	-	-	-	-	G-20157	2025/6/19	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street,Bao'an District, Shenzhen, China	+86-755-2314-6130
BUREAU VERITAS ADT (SHANGHAI) CORPORATION	No. 1 10 m Semi-anechoic chamber	-	-	-	-	○	R-20164	2025/6/19	Building C, No. 829, Xinzhuan Road, Song Jiang District, Shanghai, China	+86-21-3760-2600-2721

Company name	Equipment name	3 m	10 m	30 m	Dark 3m	Dark 10m	Registration number	Effective date	Location	Contact to:
BUREAU VERITAS ADT (SHANGHAI) CORPORATION	No. 1 10 m Semi-anechoic chamber	-	-	-	-	-	G-20155	2025/6/19	Building C, No. 829, Xinzhuan Road, Song Jiang District, Shanghai, China	+86-21-3760-2600-2721
Bay Area Compliance Laboratories Corp. (Shenzhen)	Bay Area Compliance Laboratories Corp. (Shenzhen)	-	-	-	-	-	C-20120	2025/6/19	6/F, the 3rd Phase of Wan Li Industrial Bldg., Shihua Rd.,FuTian Free Trade Zone, Shenzhen, China	+86-755-3332-0018
Bay Area Compliance Laboratories Corp. (Shenzhen)	Bay Area Compliance Laboratories Corp. (Shenzhen)	-	-	-	-	-	T-20121	2025/6/19	6/F, the 3rd Phase of Wan Li Industrial Bldg., Shihua Rd.,FuTian Free Trade Zone, Shenzhen, China	+86-755-3332-0018

Closing words

Bullet trains in Taiwan

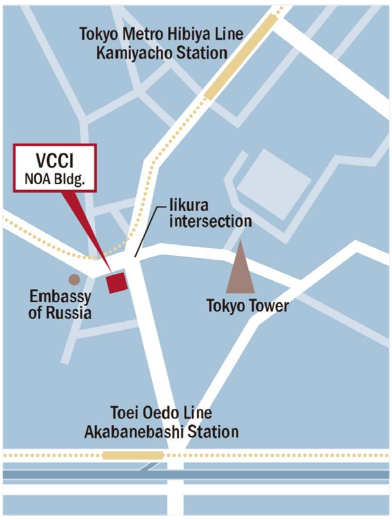
How is everyone coping with this never-ending COVID-19 pandemic? It seems travel to China, Taiwan, and South Korea is still far from easy, but today, I'd like to give you all a rundown on bullet trains in Taiwan. In Taiwan, as in Japan, conventional and bullet trains both run on the left side of the railway (except for the Taipei MRT subway, where some trains run on the right side). Current Taiwan bullet train cars are of the 700T model, based on the 700 series that ran on the Tokaido and Sanyo bullet train lines. For this reason, bullet trains in Taiwan might look familiar to those of us in Japan.

While the two models are similar, there are two differences I find interesting: the business entities running the trains, and the station names. In Japan, the privatization of the national railway divided the operation of bullet trains across multiple companies, of which there are currently five (including companies established later): Hokkaido Railway Company, East Japan Railway Company, Central Japan Railway Company, West Japan Railway Company, and Kyushu Railway Company. Most bullet trains are run by the same companies as the region's conventional trains (with the exception of Tokyo-Atami and Kokura-Hakata, where the different companies running the conventional and bullet trains are in competition).

Meanwhile, in Taiwan, the situation is simple: bullet trains and conventional trains are run by different business entities. The bullet train operator, Taiwan High Speed Rail (THSR), is in competition with the conventional train operator, Taiwan Railways Administration (TRA), across all train lines. While TRA cannot compete with THSR in speed, TRA impressively offers multiple express and limited-express options running on parallel lines to those of THSR.

Additionally, the station names have interesting characteristics. In Japan, stations on conventional-train stations such as "Yokohama", "Osaka", and "Kobe" are located slightly away from the bullet-train lines, thus requiring connecting stations such as "Shin-Yokohama" or "Shin-Osaka", and stations such as "Shin-Kobe" that allow transfer to and from the subway. However, in Taiwanese convention, bullet-train stations located away from conventional-train stations still have the same names (so in Japanese terms, the station names would be "Yokohama", "Osaka", or "Kobe" for both conventional and bullet trains). As you can see on Google Maps, TRA stations such as "Hsinchu", "Miaoli", and "Taichung" exist alongside THSR stations with the same names but in different locations, which connect with TRA stations such as "Liuja", "Fengfu", or "Xinwuri". In the Taipei metropolitan area, the THSR and TRA stations "Nangang", "Taipei", and "Banqiao" are alongside each other. But, beware: the THSR and TRA stations for the international airport, "Taoyuan", are in completely different locations!

(M.H.)



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