FeliCa Card RF Performance Certification Specification

Ver.1.51

July 1, 2023

FeliCa Certification Section
Quality Design Department
Enterprise Solutions Business Unit
Sony Corporation

Revision History

Ver. No.	Date issued	Description of Revisions
1.0	October 1, 2013	First edition
1.01	May 1, 2014	The testing organization and the testing laboratory information such as contact information were changed.
1.02	June 1, 2014	The following contact points, which had been the testing organization, were changed to the testing laboratory. - Submission of certification test applications - Submission of Notice of Added Product Model (form) - Submission of Application Form for Certified-Product Listing on Sony's Website - Notifying party of test results - Inquiry The organization who determines the 0-degree direction of test samples was changed from the testing organization to the testing laboratory.
1.1	April 1, 2015	The basic performance test, the performance of communication with the M-class reader/writer, and the reference communication distance of the center were changed.
1.2	May 1, 2017	The Reader/Writer for testing is changed - RC-S462B is replaced to RC-S012B. - RC-S330 is replaced to RC-S380.
1.21	June 1, 2017	Section 3.3, 3.4 and 5.4 are changed. Attachment A, B, C and D are changed.
1.3	April 1, 2018	Section 6.7.1 is changed.
1.4	April 15, 2019	Section 4.1, 4.3, 5.3 and 6 are changed. Attachment A and Article 1, 2 and 5 of Attachment D are changed.
1.41	July 1, 2019	The testing laboratory contact information was changed.
1.42	September. 1, 2019	Section 4.1 Not need to submit the original paper of application to the testing laboratory.
1.5	April. 1, 2021	Changed regulations and operation for basic performance tests - The specifications were changed to tests based on electrical characteristics. - Changed from testing at the laboratory to self-measurement by an applicant Changed regulations of the measurement center point in the interoperability test Name of the Certification Body is changed Changes due to Web application system introduction.
1.51	July 1, 2023	Name of the Certification Body is changed

Contents

Preface

This document outlines the FeliCa card RF performance certification test (abbreviated to certification test hereafter) that is conducted for FeliCa card products that support common area services.
The certification test verifies only the RF performance of the card products, and excludes protocols and other performance factors from testing.
The following chapters specify the contents, methodology, and evaluation criteria, as well as the test environment and test procedures, of the FeliCa card RF performance certification test.

1. Purpose of the Certification Test

The purpose of the certification test is to create an environment in which service providers and end users feel secure and have a positive experience with services that use FeliCa technology. To that end, we will use the certification process to establish shared RF communication performance standards for FeliCa products that support common area services to achieve better interconnectivity between FeliCa devices.

2. Positioning of the Certification Test

The standards defined for the certification test do not certify the interoperability of marketed FeliCa equipment.
The certification test verifies product samples submitted by manufacturers in a testing environment specified for the certification test to determine whether the samples meet the communication performance standards defined for the certification test.

Therefore, achieving passing results in the certification test does not mean that all of the products in the same product series have been tested and have passed the certification test.
Warranties on the products tested shall conform to the warranty conditions originally established by the individual manufacturers.

3. Products to Be Tested

3.1. Products Subject to Testing

This test is intended for FeliCa cards that support common area services.

3.2. Product Models to Be Tested

Applicants for product testing must submit each model of a product for the certification test.

3.3. Updated Products

A manufacturer must resubmit a product that has already passed the certification test if any modifications that might affect FeliCa RF communication performance have been made to the product.

3.4. Addition of Product Models

When a manufacturer adds a new product model to a product series whose models have already passed the certification test, the manufacturer need not submit the new model for certification testing if the manufacturer can guarantee that the new model has the same communication performance as the product that has already passed the certification test and the manufacturer can guarantee the fact. Instead, the manufacturer is only required to apply a Notice of Added Product Model for the new model.
For further details, see *4.6 Addition of Product Models*.

3.5. Certified-Product Listing on "FeliCa Interoperability Technology Information Site"

Your product can be added to a list of certified products on our website after passing the certification test. For further details, see *4.7 Certified-Product Listing on "FeliCa Interoperability Technology Information Site"*.

4. Application

When you apply for the FeliCa card RF performance certification test, please note the following information.

4.1. Application Details

Application deadline

At least four weeks before your desired certification test date (product samples must be submitted at the same time)

It is possible to apply 60 days before the desired certification test date. Please kindly note that the desired certification test date is not guaranteed even if the application is made earlier.

Application Method

Please apply from the following page.

https://www.felicatech.org/card/application.html

Materials to be submitted

- Test samples:
  - 40 units of the product to be tested (10 maximum-frequency samples, 20 standard-frequency samples, and 10 minimum-frequency samples). However, be sure to include one of each of the maximum-frequency, standard-frequency, and minimum-frequency samples used for the basic performance test in 40 units.

    * Send them to the certification laboratory.

  Note:

  - The certification test is performed by using one maximum-frequency sample, one standard-frequency sample, and one minimum-frequency sample, which are used in the basic performance test at the testing laboratory, and two optionally selected maximum-frequency samples, two standard-frequency samples, and two minimum-frequency samples.

    * When you submit 40 test samples, you shall mark three cards so that it can be distinguished from the used card for the basic performance test.

  - Of all the manufactured units of the product being tested, the maximum-frequency sample must be the sample of the product that has minimally the highest resonance frequency value, the minimum-frequency sample must be the sample of the product that has the lowest resonance frequency value, and the standard-frequency sample must be the sample of the product that has a resonance frequency value between the highest resonance frequency value and the lowest resonance frequency value.

  - It is not necessary to submit resonance frequency data of certification test samples.

- Basic performance test check sheet (attached sheet):
  It is a prerequisite for this certification test that all test samples meet the requirements specified in the basic performance test.

- Drawing instructions of the measurement center point
  When shifting the measurement center point from the center of the outline, you submit the drawing indicated by the distance of XY with the long and short sides of the rectangular outline as the starting point at the time of application for this certification test.

Testing organization

Sony Corporation
FeliCa Certification Section, Quality Design Department, Enterprise Solutions Business Unit

Certification Laboratory (Subcontract Laboratory of Sony)

Sony Global Manufacturing & Operations Corporation
Certification Test Team, Quality Assurance Department 1
Address: 8-4 Shiomi, Kisarazu-shi, Chiba Prefecture, 292-0834, JAPAN
E-mail: sgmo-felica-kentei@sony.com

Test fee

The fee is 800,000 yen (not including tax).
If you request a measurement agency service for basic performance tests to Kisarazu, the amount will be 1,000,000 yen (not including tax).
Pay the test fee to the specified account by the date specified by the testing laboratory.
A delay in payment may prevent the certification test from being conducted on the scheduled date.

Other

If you have any questions, please contact the testing laboratory.
If you wish to retake the certification test on another sample of the same product, please submit a new certification test application.

4.2. Certification Test Start Date

After the application for the certification test is received, the testing laboratory will notify the applicant within three business days of the day the test is to start.

4.3. Test Period

If the test samples and other required materials are adequate and all measurement results meet pass-level requirements, the certification test will take 10 business days, excluding the day on which the test samples are received.

4.4. Notification of the Test Results

If the testing laboratory determines that any test results are below pass-level requirements, the testing laboratory will immediately report the test results to the applicant.
Regardless of the test results, the testing laboratory will email the Certification Test Results Report to the applicant within three business days following the last day of the test period.
For products that have passed the certification test, the testing laboratory will email the FeliCa Card RF Performance Certificate to the applicant about the seventh day following the last day of the test period.

4.5. Handling of Test Data and Submitted Product Samples

The testing organization and the testing laboratory will handle the test data and information that they obtain as a result of certification testing in accordance with the provisions of the FeliCa Card RF Performance Certification Test Agreement. (see *Attachment A: Terms and Conditions*)
The product samples used for testing will not be returned.
Submitted samples may be used as cards for the interoperability test of the FeliCa Reader/Writer RF Performance Certification Test and for evaluation application of pre-measurement at the discretion of the testing organization.

4.6. Addition of Product Models

A manufacturer that adds a new product model to a product series whose models have already passed the certification test does not need to submit the new model for this test if (1) no modifications that might affect FeliCa RF communication performance have been made to the products since passed the test and (2) the manufacturer can guarantee that the new model has the same communication performance as the products that passed the test. If these conditions are met, the manufacturer need only apply a Notice of Added Product Model to add the new model.

Submit to:

Please apply from the following page.
https://www.felicatech.org/card/application.html

Application fee
There is no application fee for adding product models.

4.7. Certified-Product Listing on "FeliCa Interoperability Technology Information Site"

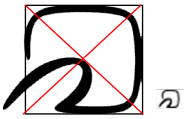
If a manufacture wants your product to be listed as a certified product on our website after passing the certification test, you check the HP application items at the time of application for the certification test or application of addition of product models and apply.

Posting fee
There is no fee for listing your product on our website.

5. Test Method

5.1. Definitions of Terms Related to the Testing Method

The following table defines the terms related to the certification test.

Terms	Description
Measurement center point	The measurement center point of the test sample shall be the center point of the outline of the card product unless specified. When specified, the following provisions shall be followed. 1. Test samples according to ID-1 shape It is possible to freely specify the measurement center point at one point within a radius of 10mm from the center of the outer shape. 2. Test sample whose outline is non-ID-1 shape One measurement center point can be freely specified. The measurement center point of the reader/writer is described in *6.3 Measurement Center Point, X-Axis Direction, and Y-Axis Direction of the Reader/Writer*. For reader/writer other than above, the measurement center point of the reader/writer for the interoperability test is as follows: 3. The intersection of the diagonal lines of the square that overlaps the mobile contactless IC communication mark on the reader/writer used for the interoperability test (Figure 5-1)  is a trademark of FeliCa Networks, Inc. Figure 5-1 Measurement Center Point of the Test Sample 4. Center point in the figure illustrated to show the location to touch with the card Of the two points above, whichever is judged to be rational is used.
Angle	1. Test samples according to ID-1 shape The 0-degree direction of each test sample is the longitudinal direction, and is determined arbitrarily by the testing laboratory. The 90-degree position is achieved by rotating the test sample 90 degrees clockwise from the 0-degree position. 2. Test sample whose outline is non-ID-1 shape The 0-degree direction of the test sample shall be the direction specified by the submitting manufacturer. At 90 degrees, the test sample is rotated 90 degrees clockwise against 0 degrees.

Terms	Description
X axis, Y axis, Z axis	The X axis is the axis that passes through the measurement center point and is parallel to the lines in the 0-degree direction. The positive direction of the X axis is the 0-degree direction. The Y axis is the axis that passes through the measurement center point and is perpendicular to the lines in the 0-degree direction. The Z axis is the axis that is perpendicular to the plane created by the X axis and the Y axis. The positive directions of the X and Y axes of the reader/writer used for the test are described in *6.3 Measurement Center Point, X-Axis Direction, and Y-Axis Direction of the Reader/Writer*.
Center	In centering, the communication distance measuring tool is used to align the measurement center point of the test sample with that of the testing reader/writer on the Z axis.
Offset	Offset refers to moving the test sample in the X-axis direction (or Y-axis direction) parallel to the X axis (or Y axis). If the measurement center point is shifted from the center of the outer shape and it becomes impossible to measure by hitting the protuberance of the reader/writer, the state in close contact with the protuberance shall be the height of 0mm.
Maximum communication distance	When the test sample and the testing reader/writer are moved closer together during measurement, the maximum communication distance is the distance at which the specified success rate is first obtained.
Communication hole	A communication hole is an area whose success rate is less than the specified level at a distance from 0mm to the maximum communication distance. Communication holes do not include areas with a width of less than 1mm. With any reader/writer for certification test, however, even an area with a width of less than 1mm is regarded as a communication hole if the measured success rate is below the specified level at a distance of 0mm.
Success rate	The success rate is the ratio of successful communications to the number of Polling command executions. The success rate requirement specified for the certification test is at least 99% (communication must be successful at least 99 times while the Polling command is executed 100 times).
ID-1 shape	ID-1 shape is defined by ISO/IEC 7810. Cards with vertical and horizontal dimensions ranging from 53.92 to 54,00 in height and from 85.72 to 85.47mm in width.
non-ID-1 shape	Cards whose external dimensions are not ID-1 in length or width, etc.
ISO/IEC 10373-6	ISO/IEC 10373-6 Cards and security devices for personal identification — Test methods — Part 6: Contactless proximity objects

5.2. Test Environment

This test will be conducted in the following test environment:
Temperature: 20°C to 30°C
Relative humidity: 25% to 70%

5.3. Equipment used for basic performance tests

The instrument configuration examples used in this test are as follows.

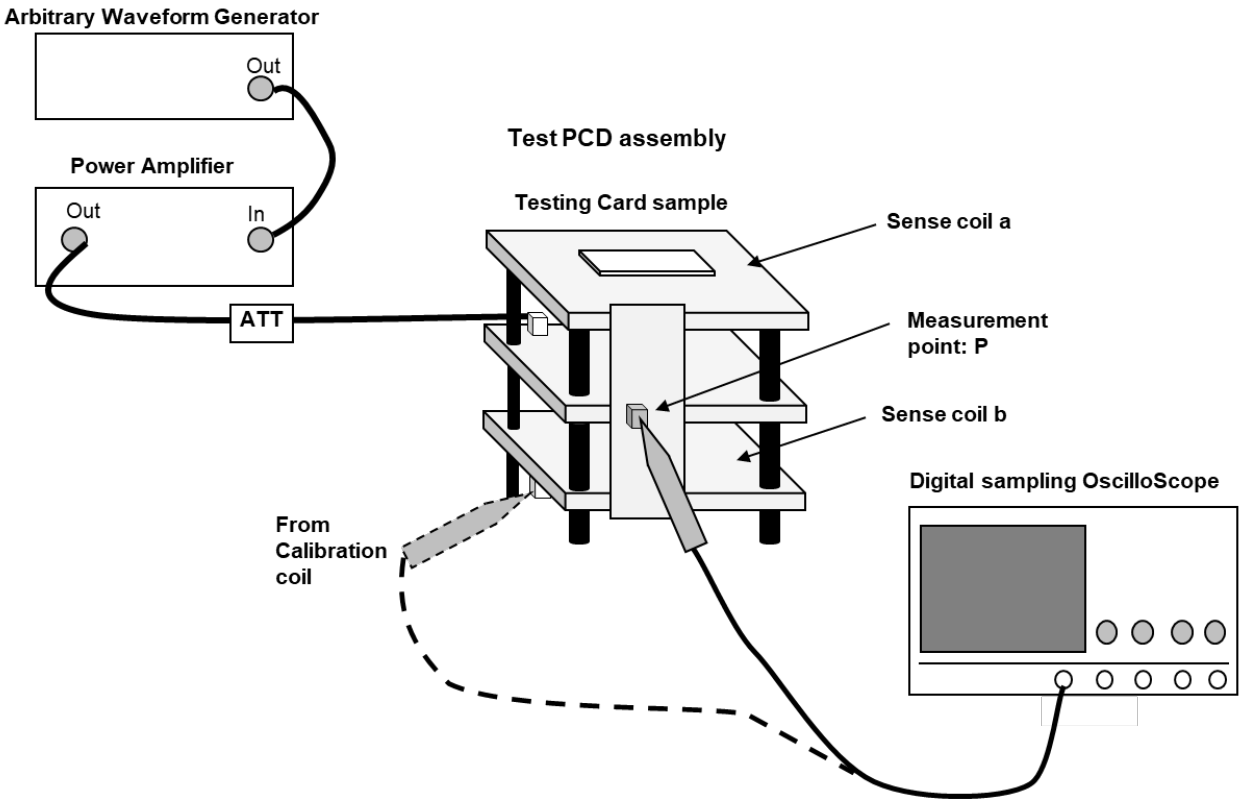


Figure 5-2 Example configuration of equipment for basic performance testing51

5.4. Electrical Characteristics Measurement Procedure

Measurement conditions

To obtain a stable measurement result, the test uses a measuring instrument that has passed the specified aging time since the power was turned on.
Also, place the test PCD assembly in an environment that does not affect the RF communication performance of FeliCa (i.e., not affected by metals, noises, etc.).

How to measure the load modulation amplitude

The following measurement methods are narrowed down to the points of the work procedure.

Refer to ISO/IEC 10373-6 for the sampling rate setting of the digital sampling oscilloscope and how to calculate the load modulation amplitude.
If you get the same results as ISO/IEC 10373-6, you can use a contactless IC card dedicated measuring instrument or a measuring instrument other than a digital sampling oscilloscope.

(1) Depending on the test sample, select test PCD assembly to be used.
  - ID-1 shape: test PCD assembly 1
  - non-ID-1 shape: test PDC assembly 2

(2) Connect the probe connected to the digital sampling oscilloscope to Calibration coil located on test PDC sense coil b.

(3) Place the test sample on test PCD sense coil a. At this time, place the test sample so that the measurement center point of the card and the center of the sense coil a coincide.

(4) Calibrate the magnetic field strength at four measurement points.

(5) Replace the probe with point P on test PDC assembly.

(6) A Polling command with a bit rate of 212kbps and a modulation depth of 11% is sent from the arbitrary waveform generator.

(7) Adjust the digital sampling oscilloscope so that the preamble of Polling response to which the test sample is returned is displayed for at least 6etu.
  ※ In order to increase the analysis accuracy, the leading 1etu of the preamble and 1etu before the sync code are not included in the 6etu.

Measure the load modulation amplitude of both side bands at 13.56MHz±212kHz by referring to load modulation amplitude measuring methods of ISO/IEC 10373-6.

(8) Repeat steps (6) through (8) until all measurement points are completed by changing the measurement points for the magnetic field strength.

(9) Repeat steps (2) through (9) until all unevaluated test samples have been measured.

5.5. Equipment Used in the Interoperability Test

The following figure shows the configuration of the equipment used in the interoperability test.

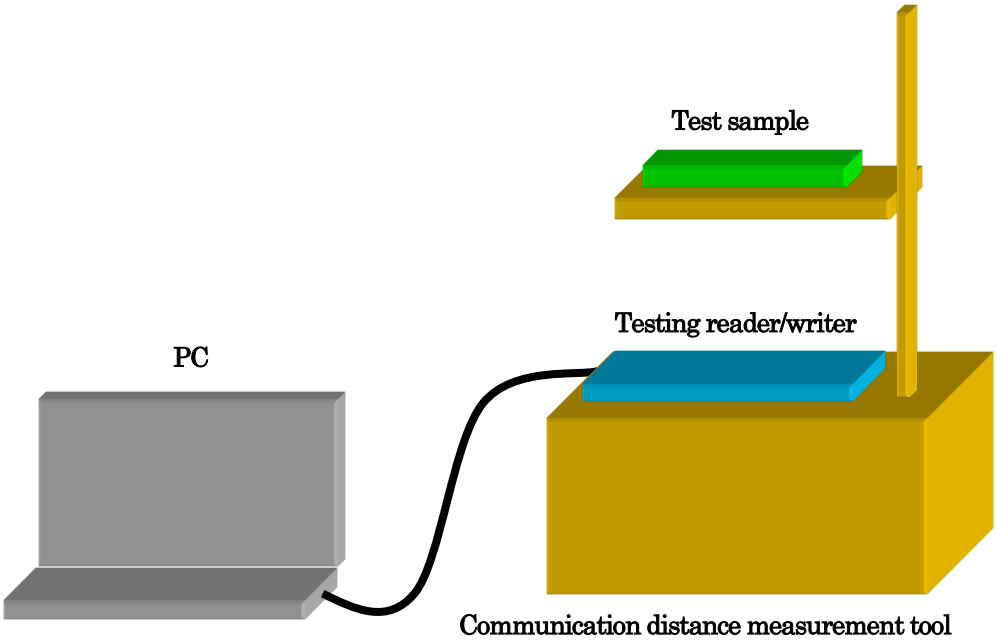


Figure 5-3 Equipment Configuration for the Interoperability Test

5.6. Communication Performance Measurement Procedure

Measurement conditions

To ensure stable measurement results, the test will begin 10 minutes after the reader/writer is turned on.
Also, the test will be conducted in an environment that eliminates effects caused by metallic objects, electrical interference, and other factors on FeliCa RF communication performance.

Measuring the communication distance and communication holes

(1) The test sample will be placed stably on the measuring surface of the testing reader/writer in close contact with the surface while its measurement center point is aligned with that of the testing reader/writer. The distance of the card in this position will be treated as 0mm. If the card cannot be placed in close contact with the measuring surface of the reader/writer under test, position it on a plane that extends from the measuring surface of the reader/writer, creating the effect of close contact with the measuring surface.

(2) The position of the test sample will be adjusted for centering, offset and rotation.

(3) The communication distance measurement tool will be used to move the test sample to a position that exceeds the maximum communication distance.

(4) The communication performance measurement software will be used to execute the Polling command from the testing reader/writer. Only 212 kbps communication is used in this certification test.

(5) The communication distance measurement tool will be used to move the test sample downward in order to determine the maximum communication distance.

(6) The test sample will be moved from the maximum communication distance to a distance of 0mm in 1mm steps to locate any communication holes.

(7) Steps (2) to (6) will be repeated until measurement at all measurement points has been completed.

6. Test Items

6.1. Test Configuration

This certification test consists of (1) a basic performance test that evaluates electrical characteristics and (2) an interoperability test that evaluates communication performance.
If all test items meet the criteria, the certification test passes.

6.2. Type of equipment for testing

6.2.1. Jig for Basic Performance Test

Use test PCD assembly 1 (for bit rates higher than fc/128 specified by ISO/IEC 10373-6) when measuring ID-1 shape. Use test PCD assembly 2 when measuring non-ID-1 shape.

6.2.2. Reader/Writer for Interoperability Test

A reader/writer for the interoperability test is a reader/writer that has passed the FeliCa reader/writer performance certification test or the FeliCa reader/writer RF performance certification test designated by the testing organization, and that has been registered as a product for the interoperability test.

A reader/writer having the standard resonance frequency is used.

Reader/writers used for the interoperability test are revised periodically. Please check the latest information when you plan to take the certification test.

6.3. Measurement Center Point, X-Axis Direction, and Y-Axis Direction of the Reader/Writer

This section describes the measurement center point, X-axis direction, and Y-axis direction of reader/writers.

6.3.1. RC-S380 Measurement Center Point, X-Axis Direction, and Y-Axis Direction

Measurement center point: Center of the circular section at the center of the RC-S380.
X-axis and Y-axis directions: Shown in Figure 6-1.

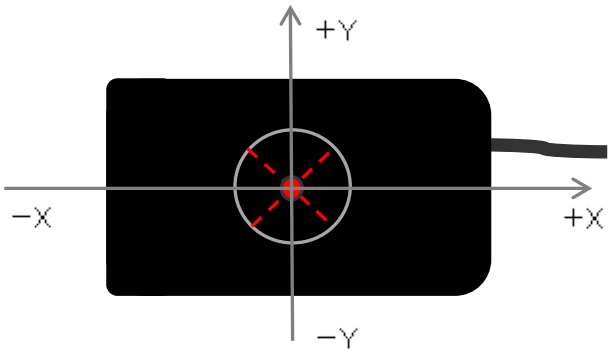
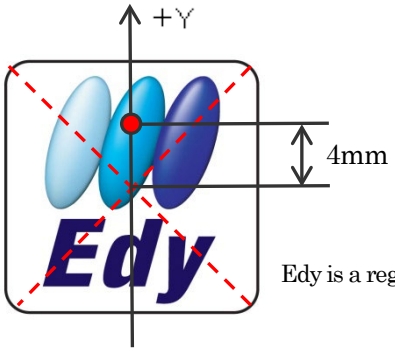


Figure 6-1 RC-S380 X-Axis and Y-Axis Directions

6.3.2. Measurement Center Point, X-Axis Direction, and Y-Axis Direction of the Edy Touch Operation Terminals

Measurement center point: Shown in Figure 6-2.

X-axis and Y-axis directions: Shown in Figure 6-3.



Edy is a registered trademark of Rakuten Edy, Inc.

Figure 6-2 Measurement Center Point of the Edy Touch Operation Terminal

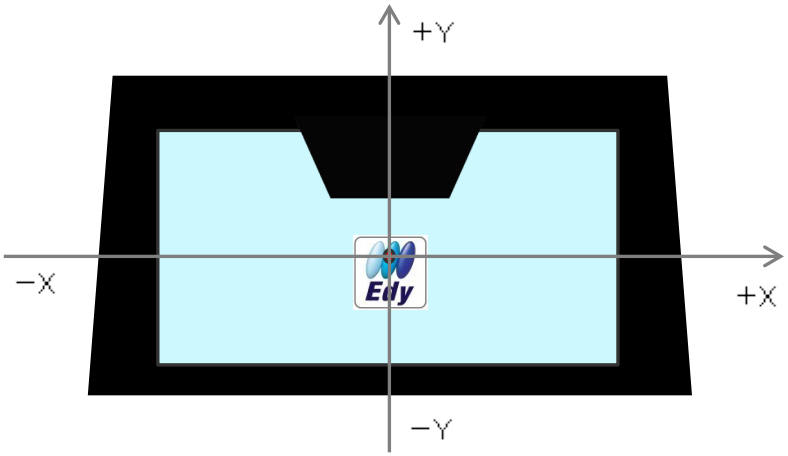


Figure 6-3 X-Axis and Y-Axis Directions of the Edy Touch Operation Terminal

6.3.3. Measurement Center Point of Edy Charging Machine Operation Terminal

Measurement center point:

(1) Card of ID-1 shape

The center point is the center of a card when the card is placed at the horizontal center of the touching area and the bottom of the card is placed on the stopper at the bottom of the touching area. (Figure 6-4)

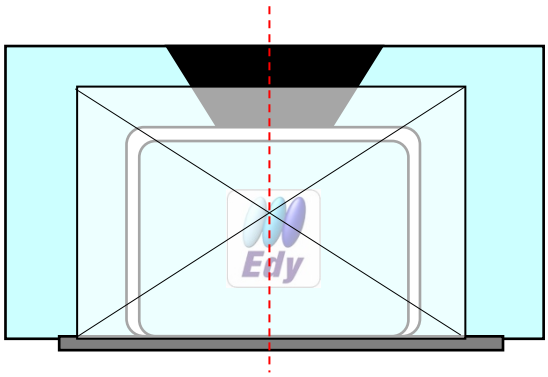


Figure 6-4 Measurement Center Point of Edy Charging Machine Operation Terminal

(2) Card of non-ID-1 shape

The same as the measurement center point of the Edy touch operation terminal. (Figure 6-2)

If you have any questions, please contact the testing laboratory.

6.4. Pass Criteria of Basic Performance Test

The pass criteria for the basic performance test are as follows.
According to the measurement procedure of Section *5.4 Electrical Characteristics Measurement Procedure*, all of the test samples (three maximum-frequency sample, three standard-frequency sample, and three minimum-frequency sample) shall meet the following criteria.

Acceptable range of Load Modulation Amplitude

- The acceptable range shall be $V_{LMA,min,PICC}$ or more, and $V_{LMA,max,PICC}$ or less. However, the specified $V_{LMA,min,PICC}$ or $V_{LMA,max,PICC}$ value of ±5% is acceptable as the error of the measurement system.

Item	Unit	ID-1 shape	non-ID-1 shape
Measurement point	A/m(rms)	1.5 2.5 4.5 7.5	2.5 4.5 7.0 12.0
H_{min}	A/m(rms)	1.5	2.5
H_{max}	A/m(rms)	7.5	12.0
$V_{LMA,min,PICC}$	mV(peak)	22/√H	7.0
$V_{LMA,max,PICC}$	mV(peak)	80	80

Pass criteria

- The mean (($V_{LMA,USB,PICC}$+ $V_{LMA,LSB,PICC}$)/2) of the load modulation amplitude for both sidebands shall be in the acceptable range at two or more points of the four measurement points.
- Polling response must be confirmed by the magnetic field strength H_{min} and H_{max}.

6.5. Pass Criteria of Interoperability Test

The table below shows the pass criteria of the interoperability test.

6.5.1. Communication Performance with M-class Reader/Writer

All test samples (three maximum-frequency samples, three standard-frequency samples, and three minimum-frequency samples) shall satisfy the following criteria in the measurement performed according to the measurement procedure of Section *5.6 Communication Performance Measurement Procedure* using the M-class reader/writer for the interoperability test.

No.	Test Item	Pass criteria
1	Number of communication holes (Center at 0 degree)	There must be no communication holes over 3mm wide within 0mm to 15mm of the reader/writer.
2	Number of communication holes (Center and XY±10mm at 0 degree)	At 0mm, communication shall be possible at least three points out of five points at the center and XY ±10mm.

6.5.2. Communication Performance with S-class Reader/Writer

All test samples (three maximum-frequency samples, three standard-frequency samples, and three minimum-frequency samples) shall satisfy the following criteria in the measurement performed according to the measurement procedure of Section *5.6 Communication Performance Measurement Procedure* using the S-class reader/writer for the interoperability test.

No.	Test Item	Pass criteria
1	Number of communication holes (Center and XY±10mm at 0 degree)	At 0mm, communication shall be possible at least three points out of five points at the center and XY ±10mm.

6.5.3. Performance of Communication with Edy Touch Operation Terminal

All test samples (three maximum-frequency samples, three standard-frequency samples, and three minimum-frequency samples) shall satisfy the following criteria in the measurement performed according to the measurement procedure of Section *5.6 Communication Performance Measurement Procedure* using the Edy touch operation terminal.

No.	Test Item	Pass criteria
1	Number of communication holes (Center and XY±10mm at 0 degree)	Center: There must be no communication holes within 6mm to 15mm height of the reader/writer. However, any communication holes of less than 3mm are allowed. Center and offset *: There must be two or less communication holes point out of five points at center and XY±10mm at 0, 1, 2, 3, 4, 5mm height of the reader/writer.

* Communication holes at center and offsets are judged just at each measurement point by the success rate without taking their height into consideration.

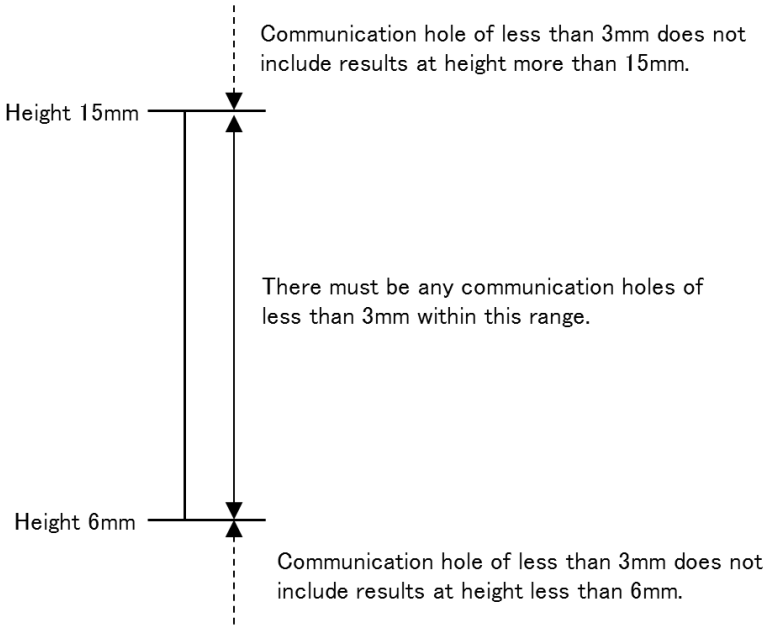


Figure 6-5 Example1: Pass/Fail Criteria for Center

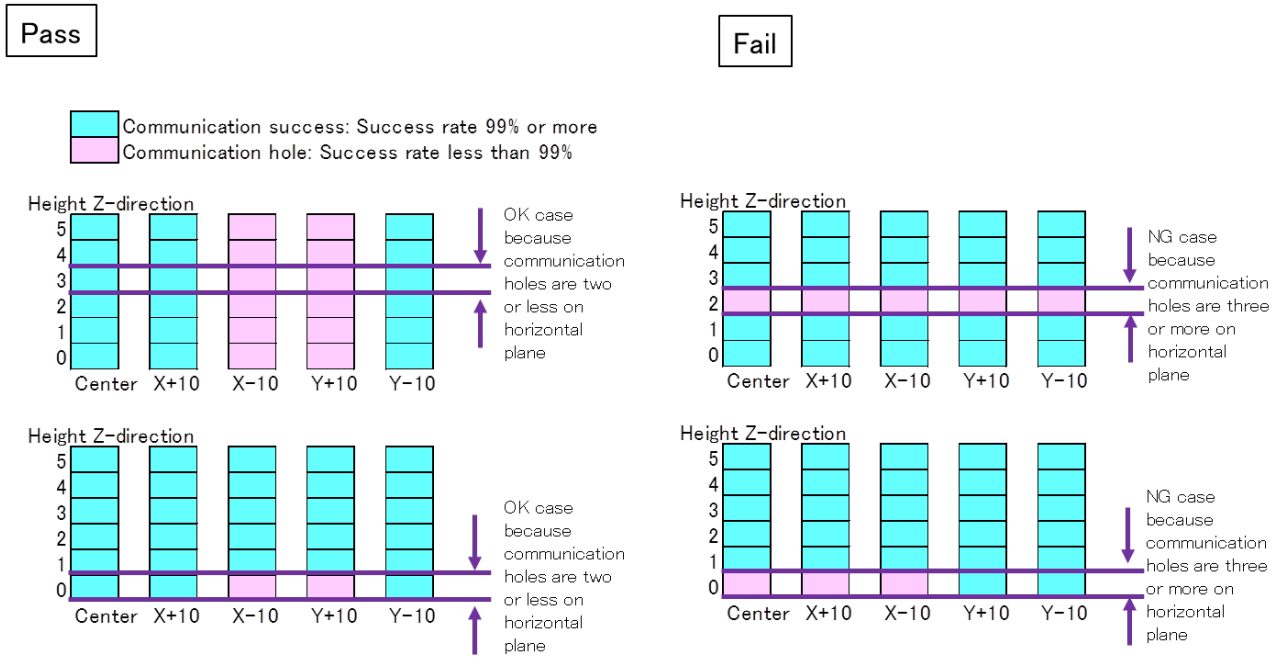


Figure 6-6 Example2: Pass/Fail Criteria for Center, Offset

6.5.4. Performance of Communication with Edy Charging Machine Operation Terminal

All test samples (three maximum-frequency samples, three standard-frequency samples, and three minimum-frequency samples) shall satisfy the following criteria in the measurement performed according to the measurement procedure of Section *5.6 Communication Performance Measurement Procedure* using the Edy charging machine operation terminal.

No.	Test Item	Pass criteria
1	Number of communication holes (Center and XY±5mm, 10mm, and 15mm at 0 degree and 180 degree)	There must be no communication holes at 0mm height at all measurement points. Note that, at a height of 0mm, not even one communication hole with a width of less than 1mm is allowed.

Attachment A: Terms and Conditions

Terms and Conditions for FeliCa Card Performance Certification Test

The following terms and conditions (the "Terms and Conditions") apply with respect to the Card Performance Certification Test of your Product (hereinafter defined) conducted by Sony Corporation ("Sony"). The Terms and Conditions apply to individual applications for the Card Performance Certification Test submitted on the FeliCa Card RF Performance Certification Application. These Terms and Conditions become an agreement with respect to the Card Performance Certification Test (the "Agreement") between you and Sony upon Sony's acceptance of your application for the Card Performance Certification Test submitted in accordance with Section 2.01 hereof (such acceptance date is referred to as "Effective Date").

ARTICLE I. DEFINITIONS

The following terms as used in these Terms and Conditions shall have the meanings set forth below.

(1) "FeliCa" shall mean the Contactless IC technology called "FeliCa" which includes "Command Standard" and Security Standard.
(2) "FeliCa IC" shall mean a chip for contactless IC card which is manufactured based on FeliCa.
(3) "Product" shall mean contactless IC cards and any other devices based on FeliCa which incorporate "FeliCa IC" provided by Sony. However, "Product" shall not include reader/writer or mobile phone. In this Section, (a) reader/writer shall mean reader/writer products (including module products) for contactless IC card system based on "FeliCa" and (b) "Mobile phone" shall mean a mobile device (i) of which primary function is communication call and (ii) which is sold, rented, leased or otherwise provided with the trademarks of Telecommunication Carriers (a provider of trans receiver functionalities via mobile communication system to users of mobile devices that are sold, rented, leased or otherwise provided to them with such providers' trademarks.), third party or your company.
(4) "Certification Specification" shall mean the specification designated by Sony which is called FeliCa Card RF Performance Certification Specification.
(5) "Card Performance Certification Test" or "Test" shall mean 'FeliCa Card RF Performance Certification Specification' defined in Certification Specification.
(6) "Test Institute" shall mean the third-party agency that Sony designates as an institute who conducts the Card Performance Certification Test.

ARTICLE II. CERTIFICATION TEST

2.01 An application for the Card Performance Certification Test shall be made for each model of your Product, in accordance with the provisions of the Certification Specification. Your application is deemed to be accepted unless it is rejected by Sony with reasonable cause within five (5) business days (of Sony in Japan) from the date of submission of your application. You shall arrange the test schedule with the Test Institute directly.

2.02 You must submit forty (40) samples (of which breakdown is hereinafter provided) of your Product and the data of your Product which is separately designated by Sony and ownership of such samples will be transferred to Sony, free of charge, when such samples arrives at the Test Institute. Sony shall not be

responsible for any damages to the samples in connection with the Card Performance Certification Test of the Products performed by Sony. After the completion of the Card Performance Certification Test, Sony may keep such samples at Sony or the Test Institute for Sony and/or its subcontractor to use for the FeliCa Reader/Writer RF Performance Certification and/or the FeliCa Reader/Writer RF Performance Pre-test of Felica Reader/Writer products. Such forty (40) samples shall consist of 10 maximum-frequency samples, 20 standard-frequency samples, and 10 minimum-frequency samples (Of all the manufactured units of the Product being tested, the maximum-frequency sample must be the sample of the Product that has minimally the highest resonance frequency value, the minimum-frequency sample must be the sample of the Product that has the lowest resonance frequency value, and the standard-frequency sample must be the sample of the Product that has a resonance frequency value between the highest resonance frequency value and the lowest resonance frequency value.)

2.03 Sony will, after the Agreement becomes effective and Sony receives the samples set forth in Section 2.02 above, promptly conduct the Card Performance Certification Test in accordance with the Certification Standards and notify you the results thereof. Upon passing of the Card Performance Certification Test, Sony will issue a pass certificate (the "Pass Certificate") with respect to the specific model of the Product for which the samples were provided.

2.04 If (a) you request to add a new Product model which has not yet passed the Test but has the same communication performance under the same measurement conditions as the Product which has passed the Test to a Product series whose models have already passed the Test, by means separately designated by Sony, and (b) Sony approves such request by the form separately designated by Sony, then such a new Product model is deemed to have passed the Test without being Tested, provided that you warrant such sameness of the communication performance thereto.

2.05 The Pass Certificate shall be valid for ten (10) years from the date of issuance (the "Term"), unless invalidated by Sony pursuant to these Terms and Conditions. The Term will be indicated on the Pass Certificate. Provided that the Term of the Pass Certificate for a new Product model which has been added as set forth in the Section 2.04 (without being Tested) shall be the same period with the Term of the model of Products which has actually passed the Test pursuant to Section 2.03.

ARTICLE III. EFFECT OF THE PASS CERTIFICATE

3.01 During the Term of the Pass Certificate, you may publicly announce or indicate that the applicable model of the Product has passed the Card Performance Certification Test. Such announcement or indication must include the name of the certification test, the version of the Certification Specification and the applicable model name of the Product, all exactly as set forth on the Pass Certificate.

3.02 Sony reserves the right to cancel the rights granted to you under Section 3.01 immediately if you fail to comply with the requirements set forth in Section 3.01.

3.03 In response to your request by means separately designated by Sony, Sony may list on its Web site your name along with the model name and other information of your Product that has passed the Card Performance Certification Test.

3.04 Your announcement or indication permitted under Section 3.01 shall be made with respect to the model of the Product that has passed Card Performance Certification Test.

3.05 Upon expiration or termination of the Term of the Pass Certificate, you will no longer have the rights granted to you under Section 3.01.

ARTICLE IV. FEES

4.01 In consideration for the completion of the Card Performance Certification Test, you shall pay to Sony (a) the fees in the amount of eight hundred thousand (800,000) Japanese Yen (not including any applicable taxes respectively) where you apply for interoperability test by the Test Institute only or (b) the fees in the amount of one million (1,000,000) Japanese Yen (not including any applicable taxes respectively) where you apply for both basic performance test and interoperability test by the Test Institute. The payment of the fees and any applicable taxes shall be made to Sony in Japanese Yen by means of wire transfer remittance into a bank account designated by Sony, at least one (1) week prior to the estimated date of sample submission in accordance with Section 2.02. Sony may withhold performance as set forth in Section 2.03 until receipt of such payment.

4.02 The fees paid to Sony hereunder are non-refundable.

ARTICLE V. CHANGES AND INVALIDATION

5.01 The Pass Certificate is valid only with respect to the Product model that is identical to the sample Product model that passed the Card Performance Certification Test. To obtain the Pass Certificate for any other Product model, you must separately apply for and pass the Card Performance Certification Test with respect to such other Product model.

5.02 If you make modifications to the Product, such modified Product is not deemed to be passed the Test and the Pass Certificate is no longer valid for such modified Product even if the model of the Product is the same as the Product which has passed the Test and you need to apply for the Test for such modified Product. Notwithstanding above, if (i) you notify Sony of such modification in the form separately designated by Sony and (ii) Sony, at its sole discretion, determined and approved that such modification does not affect the RF communication performance, and (iii) you warrant the same communication performance under the same measurement conditions as the Product without such modification, then you do not need re-apply for the Test despite of the modification to the Product.

5.03 Sony may amend or update the Certification Standards at its discretion from time to time in part or in whole. In such event, Sony will update the version number of the Certification Specification, and you may, at your option, apply for the Card Performance Certification Test under the updated Certification Specification in order to obtain a Pass Certificate under the updated Certification Specification. However, any amendment or the update to the Certification Standards will not affect the validity of any Pass Certificate issued under previous version(s) of the Certification Specification.

5.04 If Sony finds that, as to any Product that has passed the Card Performance Certification Test, such Product made available in the market does not meet the Certification Standards applied at the time of the issuance of the relevant Pass Certificate, Sony may, at its option, invalidate such Pass Certificate.

5.05 If you make any public announcement or indication with respect to your Product pursuant to Section 3.01 (a) without having re-applied or passed the Card Performance Certification Test even though you have made one or more modifications to your Product that require re-application for the Card

Performance Certification Test pursuant to Section 5.01, (b) without notifying Sony of modification to the Product or without receiving Sony's approval pursuant to Section 5.02 or (c) under any updated version of the Certification Specification when you have not passed the Card Performance Certification Test under such updated version of the Certification Specification, Sony may, at its option, immediately invalidate the relevant Pass Certificate.

ARTICLE VI. CONFIDENTIALITY

6.01 You and Sony (each, a "Party" and collectively, the "Parties") shall each maintain as confidential and shall not disclose to any third party any technical, business or other proprietary information of the other Party disclosed during the course of the Card Performance Certification Test (the "Confidential Information") without the prior written consent of such other Party, for three (3) years after such disclosure. Further, Sony will not use your Confidential Information for any purpose other than the purposes contemplated under these Terms and Conditions.

6.02 Notwithstanding the provisions of Section 6.01, such restrictions shall not apply to any portion of the Confidential Information which a Party can prove:

(a) was part of the public domain at the time of disclosure;
(b) was previously known to the receiving Party at the time of disclosure;
(c) subsequently becomes part of the public domain through no fault of the receiving Party or its employees; or
(d) is rightfully obtained by the receiving Party from a third-party source without any restriction on disclosure or use; or
(e) is independently ascertainable or developed by the receiving Party who have not had access to the Confidential Information.

6.03 If the receiving Party is required to disclose any of the Confidential Information of the other Party by government authorities or required by law, ordinance, rule, regulation or court order applicable to the receiving Party, notwithstanding the provisions of Section 6.01, the receiving Party may so disclose such Confidential Information; provided that the receiving Party shall take reasonable steps to obtain confidential treatment of such Confidential Information and shall make reasonable efforts to give the other Party prior written notice of such requirement together with a copy of the information to be disclosed.

6.04 Notwithstanding the provisions of Section 6.01, Sony may disclose the results of FeliCa Reader/Writer RF Performance Certification Test and FeliCa Reader/Writer RF Performance Pre-test using your sample cards set forth in the Section 2.02 to a third party without your prior written consent. Provided that if Sony discloses such a result before the Product become available on the market, Sony will not disclose the name of manufacturer and product model name to a third party until your Product become available on the market.

6.05 Notwithstanding the provisions of Section 6.01, Sony may disclose your Confidential Information to the Test Institute, the subcontractors set forth in Section 11.03 and Sony's affiliates for the purposes contemplated under these Terms and Conditions. In such case, Sony shall cause the Test Institute, the subcontractors and the affiliates to be bound by the obligations no less restrictive than those of Sony under the provisions of Section 6.01. Failure by the Test Institute, the subcontractors or the affiliates to observe such obligations shall constitute a breach of this Agreement by Sony.

ARTICLE VII. WARRANTIES AND LIMITATION OF LIABILITY

7.01 SONY MAKES NO REPRESENTATION OR WARRANTIES, EXPRESSLY OR BY IMPLICATION, STATUTORY OR OTHERWISE, IN CONNECTION WITH PASSING OF THE CARD PERFORMANCE CERTIFICATION TEST, INCLUDING BUT NOT LIMITED TO REPRESENTATIONS OR WARRANTIES OF QUALITY, FUNCTIONALITY, PERFORMANCE, SAFETY, UTILITY, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF YOUR PRODUCT.

7.02 IN NO EVENT SHALL SONY BE LIABLE TO YOU OR ANY THIRD PARTY FOR ANY DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OR LOSSES WHATSOEVER UNDER ANY CIRCUMSTANCES (INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR OTHER PECUNIARY LOSS) THAT ARISE IN CONNECTION WITH THE PRODUCTS THAT HAVE PASSED THE CARD PERFORMANCE CERTIFICATION TEST, EVEN IF SONY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

ARTICLE VIII. EXCLUSION OF UNSOCIAL SYNDICATE

8.01 Each of you and Sony represents to the other Party that at the time of the conclusion of this Agreement, the Party, its directors and corporate executive officers are not Antisocial Forces and warrants that they are not Antisocial Forces during the terms of this Agreement. Antisocial Forces hereinafter means that organized gangster crime groups defined in the Section 2.02 of Act on Prevention of Unjust Acts by Organized Crime Group Members ("Act") and organized gangster crime groups members defined in the Section 2.06 of the Act, any crime syndicates or gangs, a quasi-member of any crime syndicates or gangs, individuals for whom left an organized gangster crime group within the past 5 years have not yet elapsed since leaving any crime syndicate or gang, quasi-members of any organized gangster crime groups ("boryokudan junkose-in"), an enterprises affiliated with organized gangster crime groups ("boryokudan kankei kigyo") a crime syndicates or gangs. Corporate extortionists ("sokai-ya") corporate swindler acting groups engaging in criminal activities under the pretext of conducting social movements or political activities ("shakai undou hyoubou goro", "seiji katsudou hyoubou goro"), groups of individuals specialized in intellectual crimes ("tokushu chinou bouryoku shuudan"), individuals being in closely contact affiliated with to any organized gangster crime groups ("boryokudan missetsu-kankeisha"), crime syndicates or gangs, and any individual or a group of individuals being equivalent thereto.

8.02 Each of you and Sony also warrants that, in connection with this Agreement, it shall not, either by itself or by way of third parties, conduct any of the following acts: (i) violent demands, (ii) improper demands in excess of legal responsibilities, (iii) acts of violence or menacing statements in relation to a transaction, (iv) spreading of rumors, use of fraudulent means or use of obstruction to harm the reputation of the other party, or to obstruct the business of the other party; or (v) any other act equivalent to any of the previous items.

8.03 Each of you and Sony may terminate, in whole or in any part, of the Agreement without any demands or notice, if (a) the other Party breaches the representations and warranties set forth in Section 8.01 or 8.02 above, or (b) you or Sony determines that performance of this Agreement helps or otherwise promote the activities of such Antisocial Forces.

8.04 Each of Sony and you shall not be liable to the other party for any damage arising out of termination of this Agreement in accordance with Section8.03.

8.05 In the event that any of items set forth in Section 9.03 applies to Sony or you, the applicable party shall, upon the other party's request, lose the benefit of time relating to any debt against such other party and immediately pay such debt.

ARTICLE IX. TERM

9.01 This Agreement shall become effective as from the Effective Date and thereafter shall remain in effect (unless terminated earlier as set forth in this Agreement) until either the Card Performance Certification Test shall have been completed or the payment for the Card Performance Certification Test shall have been completed pursuant to Section 4.01, whichever comes later.

9.02 Each Party reserves the right to terminate the Agreement immediately without any notice or demand in the event that:

(a) the other Party is adjudicated a bankrupt, makes assignment for the benefit of its creditors; takes advantage of any insolvency act; or is the subject of a case for its liquidation or reorganization under any law;
(b) the other Party breaches any provision of these Terms and Conditions and does not cure such breach within thirty (30) days after receipt of notice thereof;
(c) the other Party ceases to function as a going concern or to conduct its operations in the normal course of business;
(d) the other Party uses Card Performance Certification Test and/or Product in an illegal or unlawful way.

9.03 Sony reserves the right to invalidate the Pass Certificate issued to you hereunder immediately without notice or demand in the event that you:

(a) fail to make any payment required under the Agreement for more than two (2) months from the due date;
(b) harm Sony or any third party designated by Sony in any way (including but not limited to damage to reputation and business obstruction);
(c) destroy or damage (or cause to destroy or damage) any building or storage of Sony or any third party designated by Sony.

9.04 In the event that the Agreement becomes terminable by Sony under this Article IX, all of your obligations under the Agreement shall immediately accelerate.

9.05 Sections 2.02, 2.04 and 2.05, Article III, Section 4.02, Articles V, VI and VII, Sections 8.04 and 8.05, and Articles X and XI shall survive any expiration or termination of the Agreement.

ARTICLE X. NO ASSIGNMENT

10.01 You may not assign, transfer or mortgage any of your rights and obligations hereunder without the prior written consent of Sony.

ARTICLE XI. MISCELLANEOUS

11.01 Sony may, at any time with prior notice to you, cease to conduct the Card Performance Certification Test or assign or transfer its rights and obligations hereunder with respect to the Card Performance Certification Test to a third party in part or in whole, and you shall not object to any of such assignment or transfer.

11.02 You must observe and comply with all relevant laws, ordinances, rules and regulations of relevant countries in performing your obligations and exercising your rights hereunder.

11.03 Sony may use subcontractors to conduct the Test.

11.04 These Terms and Conditions and the Agreement shall be construed under and governed by the laws of Japan. If any provision of these Terms and Conditions is held by a court or other tribunal of competent jurisdiction to be invalid or unenforceable, that provision of these Terms and Conditions shall be enforced to the maximum extent permissible so as to effect the intent of the parties hereto, and the reminder of these Terms and Conditions shall continue in full force and effect.

11.05 In the event of any dispute arising out of or in connection with these Terms and Conditions or the Agreement, which cannot be amicably settled by the Parties, the Parties shall submit any such disputes to the Tokyo District Court in Japan as the court of first instance. Any counter-claim shall be filed with the court with which the original action is filed. The Parties agree that the judgment, decree or order rendered by a court of last resort or a court of lower jurisdiction from which no appeal has been taken in Japan shall be final and binding upon both Parties.

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