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PRODUCT SPECIFICATION		No. T-1-2317 (R-1-2317)	Date Issued: September 19, 2006
Customer:	GENERAL	Revised: E	Date Revised: August 20, 2015
Title Subject:	FHSY Connector (Gold-plated)(Embossed-ta	ping product)	Issued by: Osaka Engineering Center

This product specification contains the results of performance tests for the FHSY connector (Gold-plated)(Embossed-taping product).

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Prepared by: Checked by:		Reviewed by:	Approved by:	
M.Ueda	A.Okuni	M.Araki	H.Tomimoto	

# 1. PART NAME, PART NUMBER & DRAWING NUMBER

Part Name	Part Number	Drawing Number
	04FHSY-RSM1-GAN-TB (LF)(SN)(Z)	KRD-51423
FHSY connector (Taping product)	*FHSY-RSM1-GAN-TB (LF)(SN)	KRD-33900-3 (5-circuit) KRD-32586-1 (6 to 16-circuit) KRD-32227-3 (17 to 28-circuit)
FHSY connector (Loose piece product)	*FHSY-RSM1-GAN (LF)(SN)	KRD-32225-4

 $Note_1$ : Number of circuits in two-digit figures is indicated in \*.

e.g.) 28FHSY-RSM1-GAN-TB (LF)(SN): 28-circuit

Note<sub>2</sub>: (LF)(SN) as identification part number indicating lead-free product shall be

displayed on a label until all products are shifted to the lead-free.

# 2. CONSTRUCTION, DIMENSIONS, MATERIAL & SURFACE FINISH

Construction and dimensions shall be in accordance with the referenced drawings. Material and surface finish shall be as specified below.

Part Name		ime	Material	Surface Finish, etc.		
part	Carrier tape  Cover tape  Flange		Carrier tape		Polyester (PET) Polystyrene (PS)	
ă D			Polyester (PET)			
Taping			Polystyrene (PS)			
ra Reel ☐		Core	Polypropylene (PP) Polystyrene (PS)			
part	Socket housing		Heat resisting resin	Flammability: UL94V-0 Color: Natural (White)		
	Cover housing		Heat resisting resin	Flammability: UL94V-0 Color: Blue		
Connector	Contact		Contact		Copper alloy	Nickel-underplated Gold-plated
ŏ	Solder tab		Copper alloy	Copper-underplated Tin-plated		

## 3. CHARACTERISTICS

Item	Rated Value	
Current rating	0.5 A (AC, DC)	
Voltage rating	50 V (AC, DC)	
Temperature range	-25 to +85 °C	(Note <sub>3</sub> )
Applicable FPC Drawing No.: KRD-32229-2	Conductor: Gold-plated Conductor pitch: 0.5 mm Conductor width: 0.35 mm Total mating part thickness: 0.3 ± 0.03 mm	(Note <sub>4</sub> )
Recommended coating thickness for soldering	100 to 120 μm	(Note <sub>5</sub> )

Note<sub>3</sub>: Including temperature rise in applying an electrical current.

Note<sub>4</sub>: Confirm the applicability of the connector with the FPC used, before use.

FPC which applicability is not confirmed might not be able to guarantee the performance.

Note<sub>5</sub>: The value when the opening area of metal mask to the area of printed circuit board (PCB) land is 100%. Adjust the volume by making the opening area smaller than the area of PCB land, when making the metal mask over the recommended coating thickness.

(e.g.: When using metal mask 150  $\mu m$  in thickness, the opening area shall be 60 to 80% of the PCB land area.)

# 4. ABOUT WHISKER

Although the lead-free plating of this product has performed re-flow tin plating which ensures maximum effectiveness for retarding whisker growth, it is not possible to completely eliminate the whisker problem.

#### 5. PACKAGING SPECIFICATION (EMBOSSED-TAPING)

5.1 Quantity

Quantity to be wound shall be 3,000 pieces per reel as the standard quantity.

- 5.2 Packaging Method
- (1) Each connector shall be put into the fixed position\*1) of the embossed carrier tape individually. The tape shall be sealed with cover tape by heat treatment.
- (2) After sealed, the carrier tape shall be wound\*<sup>3)</sup> to reel to be specified quantity\*<sup>2)</sup> and the end of cover tape\*<sup>4)</sup> shall be fixed by adhesive tape. Empty rooms of carrier tape shall be less than 2 continuously and less than 0.1% out of quantity\*<sup>2)</sup> to be wound.
- (3) The wound reel shall be packaged to be each specified quantity in a corrugated cardboard box for shipment.
  - Notes \*1: See the attached drawing.
    - \*2: See item 5.1.
    - \*3: The direction to be wound; see the attached drawing.
    - \*4: Corresponding to leader part in taking out the tape. The treatment of the end of tape; see the attached drawing.

# 5.3 Marking

The label marked the following items shall be attached to the flange part of reel.

- (1) Part number
- (2) Quantity
- (3) Manufacturing lot number
- (4) Other necessary items

# 5.4 Storage

Store the products in a clean room of the following conditions under the JST original packaging condition.

Temperature: 5 to 35 °C Humidity: 60% max.

## 6. SPECIMEN

Part Name	Part Number
FHSY connector	04FHSY-RSM1-GAN-TB (LF)(SN)(Z)
(Taping product)	*FHSY-RSM1-GAN-TB (LF)(SN)
FHSY connector (Loose piece product)	*FHSY-RSM1-GAN (LF)(SN)

Note<sub>6</sub>: Number of circuits in two-digit figures is indicated in \*.

e.g.) 28FHSY-RSM1-GAN-TB (LF)(SN): 28-circuit

## 7. TEST CONDITIONS

1) When tested in accordance with the test conditions and methods specified in each item, each requirement shall be met. Unless otherwise specified, tests shall be conducted under the following ambient conditions specified in JIS C 60068-1(IEC 60068-1) [Basic Environmental Testing Procedures General and Guidance]. FPC specified in the attached drawing shall be used.

Temperature: 15 to 35 °C Relative humidity: 25 to 75 %

- 2) For environmental tests, as a rule, the specimen that is mounted on a PCB for actual use and is mated with a FPC shall be used.
- 3) For taping part tests, unless otherwise specified, a 24-mm-wide tape shall be used.

# 8. REQUIREMENTS, TEST METHODS & TEST RESULTS

# 8.1 Taping Part

# 8.1.1 Appearance

# Requirement:

- (1) Sprocket hole shall not be covered with cover tape.
- (2) Cover tape shall not run out of carrier tape.
- (3) Cover tape shall not be peeled.
- (4) There shall be no other defects.

Test method: Visual inspection or with a projector as necessary.

Test result: Good.

# 8.1.2 Tensile Strength of Tape

Requirement: There shall be no defects such as breakage.

Test method: Pulling load of 10 N shall be applied to each of carrier tape and cover tape. Pulling direction shall be its pulling-out direction. Any defects such as breakage shall be checked.

Test result: There was no defect.

# 8.1.3 Peel Strength of Cover Tape

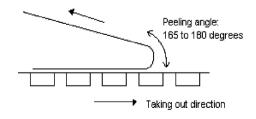
Requirement: 0.1 to 1.0 N

Note: Cover tape shall not be peeled out during transportation.

Test method: Cover tape shall be pulled as shown in the figure on the right side to measure peel strength of cover tape. (Peeling speed: 300 mm/min.)

Test result:

0.20 to 0.54 N n=10 pcs.



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# 8.2 Connector Part

# 8.2.1 Appearance

Requirement: There shall be no crack, deformation or discoloration which may affect the performance specified in this specification.

Test method: Visual inspection.

Test result: Good.

## 8.2.2 Mechanical Performance Test

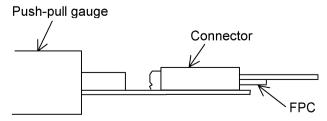
## 8.2.2.1 FPC Retention Force

## Requirement:

ı	П	N	I٦	Г٠	N
	,,	v			1.71

	UNIT. IN
No. of circuits	Requirements
4	1.0 min.
5	1.1 min.
6	1.2 min.
8	1.3 min.
10	1.4 min.
11	1.5 min.
12	1.6 min.
14	1.7 min.
15	1.8 min.
16	1.8 min.
17	1.9 min.
18	2.0 min.
20	3.0 min.
22	3.4 min.
24	4.0 min.
27	4.6 min.
28	5.0 min.

Test method: A cover shall be opened and a FPC shall be inserted into a connector. Then, the FPC shall be withdrawn on the same axis with the cover locked. The load required to pull the FPC out of the connector shall be measured as initial lead retention force. (Testing speed: 1 to 5 mm/sec.)



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## Test result:

			UNIT: N
No. of circuits	Ave.	Max.	Min.
4	2.57	2.86	2.17
5	2.43	2.63	2.15
6	2.98	3.13	2.81
8	4.53	4.72	4.39
10	5.05	5.36	4.79
11	4.67	5.07	4.04
12	5.93	6.23	5.59
14	6.21	6.69	6.02
15	6.47	6.87	6.25
16	6.73	6.92	6.58
17	7.14	7.71	6.64
18	7.99	8.68	7.66
20	8.36	8.93	7.85
22	9.05	9.67	8.21
24	10.46	10.71	10.28
27	12.37	13.61	11.64
28	12.54	13.82	11.91

n=10 pcs.

## 8.2.3 Electrical Performance Test

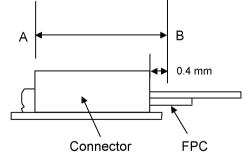
# 8.2.3.1 Contact Resistance

Requirement: Initial:  $60 \text{ m}\Omega \text{ max}.$ 

Variation after tests:  $60 \text{ m}\Omega$  max.

Test method: Contact resistance between points A and B of a specimen assembled for actual use as shown in the figure on the right side shall be measured under the following conditions.

Test current: 1 mA (DC)
Test voltage: 20 mV max.



Test result: See each environmental test item.

## 8.2.3.2 Current Continuity

Requirement: There shall be no current discontinuity longer than 1 microsecond during a vibration test.

Test method: Each circuit of a specimen shall be connected in series and test current of 1 mA (DC) shall be applied. Current discontinuity longer than 1 microsecond during the test shall be detected by continuity meter.

Test result: See vibration test item.

## 8.2.3.3 Insulation Resistance

Requirement: Initial: 800 M $\Omega$  min.

After test: 500 M $\Omega$  min. (Humidity test)

Test method: 100 VDC shall be applied between adjacent contacts to measure insulation resistance. (The contact shall not be soldered.)

Test result:

	UNIT: MΩ
Items	Measured values
Initial	1,000 min.
After humidity test	1,000 min.

n=10 pcs.

# 8.2.3.4 Dielectric Withstanding Voltage

Requirement: There shall be no breakdown or flashover.

Test method: Testing voltage specified below shall be applied between adjacent contacts for one minute. (The contact shall not be soldered.)

Initial: 200 VAC

After test: 100 VAC (Humidity test)

Test result:

Initial	Good.
After humidity test	Good.
	40

n=10 pcs.

#### 8.2.4 Environmental Test

# 8.2.4.1 Durability

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$  max. after the test.

Test method: A cover shall be opened and a FPC shall be inserted into a connector. Then, the FPC shall be withdrawn with a cover locked. After repeated 10 cycles, contact resistance shall be measured.

#### Test result:

UNIT:  $m\Omega$ 

Test item	Initial			Varia	tion after th	e test
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	23.98	26.6	21.7	-2.04	0.3	-4.3

n=28 pin

# 8.2.4.2 Humidity

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$  max. after the test. Insulation resistance shall be 500 M $\Omega$  min. after the test.

There shall be no breakdown or flashover on the dielectric withstanding voltage test.

Test method: A connector mated with a lead shall be placed in a humidity chamber of the following conditions. After the test, contact resistance, insulation resistance and dielectric withstanding voltage shall be measured.

Temperature: 40 ± 2 °C Relative humidity: 90 to 95 % Period: 240 hours

#### Test result:

UNIT:  $m\Omega$ 

Test item		Initial Variation after the tes				e test
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	21.36	22.6	20.3	-1.56	-0.7	-2.4

n=28 pin

## 8.2.4.3 Heat Aging

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$  max. after the test.

Test method: A connector mated with a lead shall be placed in a heat oven of the following conditions. After the test, contact resistance shall be measured.

Temperature:  $85 \pm 2$  °C Period: 250 hours

## Test result:

UNIT:  $m\Omega$ 

Test item	Initial			Variation after the test		
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	24.26	34.0	21.7	-1.65	2.0	-3.6

n=28 pin

## 8.2.4.4 Thermal Shock

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$  max. after the test.

Test method: A connector mated with a lead shall be subjected to a thermal shock test of the following conditions. After the test, contact resistance shall be measured.

1 cycle consists of:

- 55 ± 3 °C for 30 minutes

+ 85 ± 2 °C for 30 minutes

Total cycles: 25 cycles

## Test result:

UNIT:  $m\Omega$ 

Test item	Initial			Variation after the test		
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	21.09	23.3	20.0	-1.24	-0.4	-3.3

n=28 pin

#### 8.2.4.5 Sulfur Dioxide Gas

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$ max. after the test.

Test method: A connector mated with a lead shall be subjected to sulfur dioxide gas of the following conditions. After the test, contact resistance shall be measured.

Concentration:  $10 \pm 3$  ppm Temperature:  $40 \pm 2$  °C Relative humidity:  $80 \pm 5$  % Period: 96 hours

## Test result:

UNIT:  $m\Omega$ 

Test item	Initial			Variation after the test		
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	20.54	21.7	19.4	-0.54	0.1	-1.1

n=28 pin

# 8.2.4.6 Salt Spray

Requirement: Contact resistance at initial shall be 60 m $\Omega$  max. Variation of contact resistance shall be 60 m $\Omega$  max. after the test.

Test method: A connector mated with a lead shall be subjected to a salt spray test of the following conditions. After the test, it shall be washed with running water and dried naturally before the measurement of contact resistance.

Temperature:  $35 \pm 2$  °C Concentration: 5% in weight Period: 48 hours

## Test result:

UNIT: mΩ

Test item	Initial			Test item Initial		Varia	tion after th	e test
Contact	Ave	Max.	Min.	Ave.	Max.	Min.		
resistance	20.77	22.0	19.4	-0.59	0.2	-1.6		

n=28 pin

#### 8.2.4.7 Vibration

Requirement: Contact resistance at initial shall be  $60 \text{ m}\Omega$  max. Variation of contact resistance shall be  $60 \text{ m}\Omega$  max. after the test. There shall be no current discontinuity longer than 1 microsecond during the test.

Test method: A connector mated with a lead shall be mounted on a PCB and subjected to a vibration test of the following conditions. During the test, current continuity shall be checked. After the test, contact resistance shall be measured.

Frequency: 10-55-10 Hz/minute

Amplitude: 1.52 mm

Direction: Each of X, Y and Z-axis directions

\*Each axis shall be at right angles to others.

Period: 2 hours for each direction

Test result:

UNIT:  $m\Omega$ 

Test item	Initial			Variation after the test		
Contact	Ave	Max.	Min.	Ave.	Max.	Min.
resistance	23.28	27.6	21.5	-3.40	-1.7	-6.0

Current continuity	There was no current discontinuity longer than 1 microsecond.
--------------------	---

n=28 pin

# 8.2.5 Solder Test

## 8.2.5.1 Solderability

Requirement: Plating surface of solder-dipping section shall be covered with smooth solder.

Test method: Fluxed soldering section of a specimen shall be dipped in solder of the following conditions.

Solder: Sn-3Ag-0.5Cu Flux: Activation flux

(CF-110VH-2A made by Tamura Kaken Corporation)

Solder temperature: 245 ± 3 °C Immersion period: 3 ± 0.5 seconds

Test result:

Good.

n=10 pcs.

# 8.2.5.2 Resistance to Soldering Heat

Requirement: There shall be no deformation or damage which may affect the performance.

#### Test method:

# [By soldering iron]

The specimen shall be mounted on a PCB and soldered by soldering iron of the following conditions. No abnormal load such as lateral load shall be applied to the specimen during the test.

Solder: Sn-3Ag-0.5Cu Flux: Activation flux

(CF-110VH-2A made by Tamura Kaken Corporation)

PCB to be used: Material; Glass based epoxy resin

Temperature of the tip:  $350 \pm 10$  °C Immersion period: 3 seconds

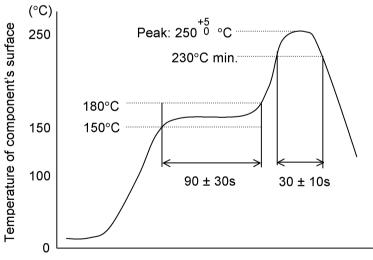
## Test result:

There was no deformation or damage which may affect the performance.

n=20 pcs.

# [By reflow soldering]

The specimen shall be subjected to a reflow soldering of the condition shown in the graph below. After the test, the appearance shall be observed. Material of testing PCB shall be glass based epoxy resin and its thickness shall be 0.8 mm.



[Temperature profile for reflow soldering]

# Test result:

There was no deformation or damage which may affect the performance.

n=20 pcs.

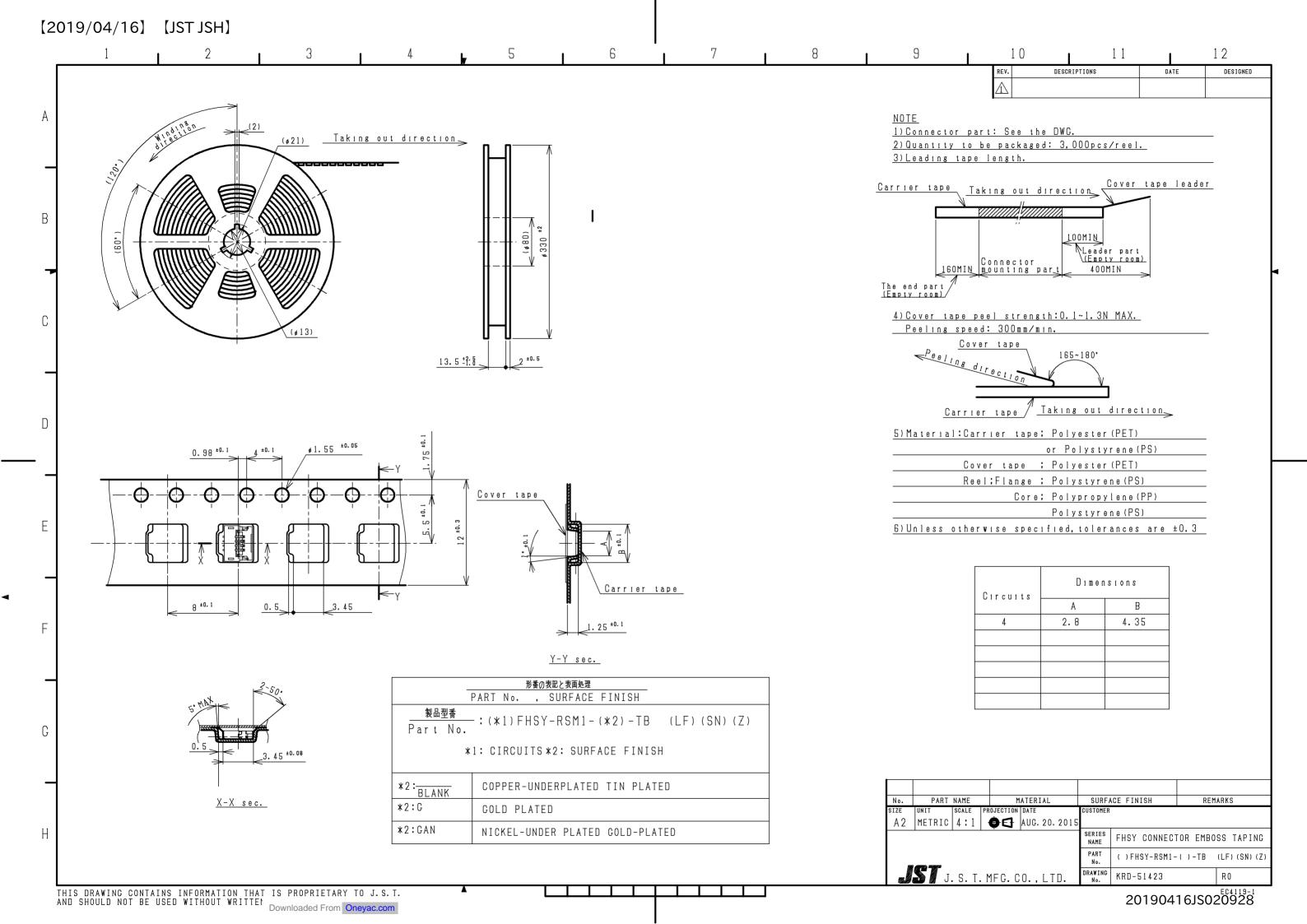
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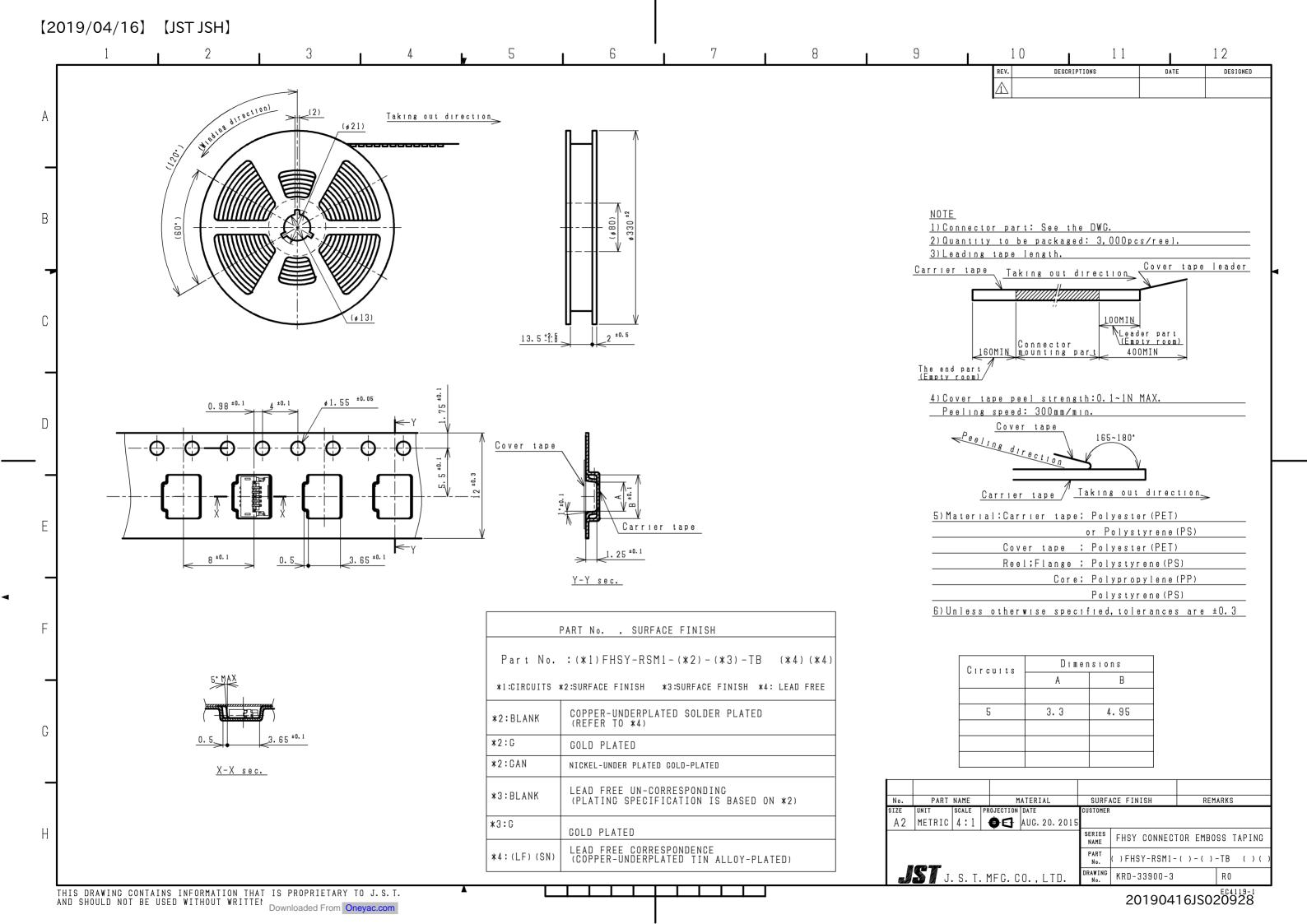
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# 9. HANDLING FOR FHSY CONNECTOR

Be sure to read through the attached handling manual (CHM-1-2145) before using the FHSY connector.



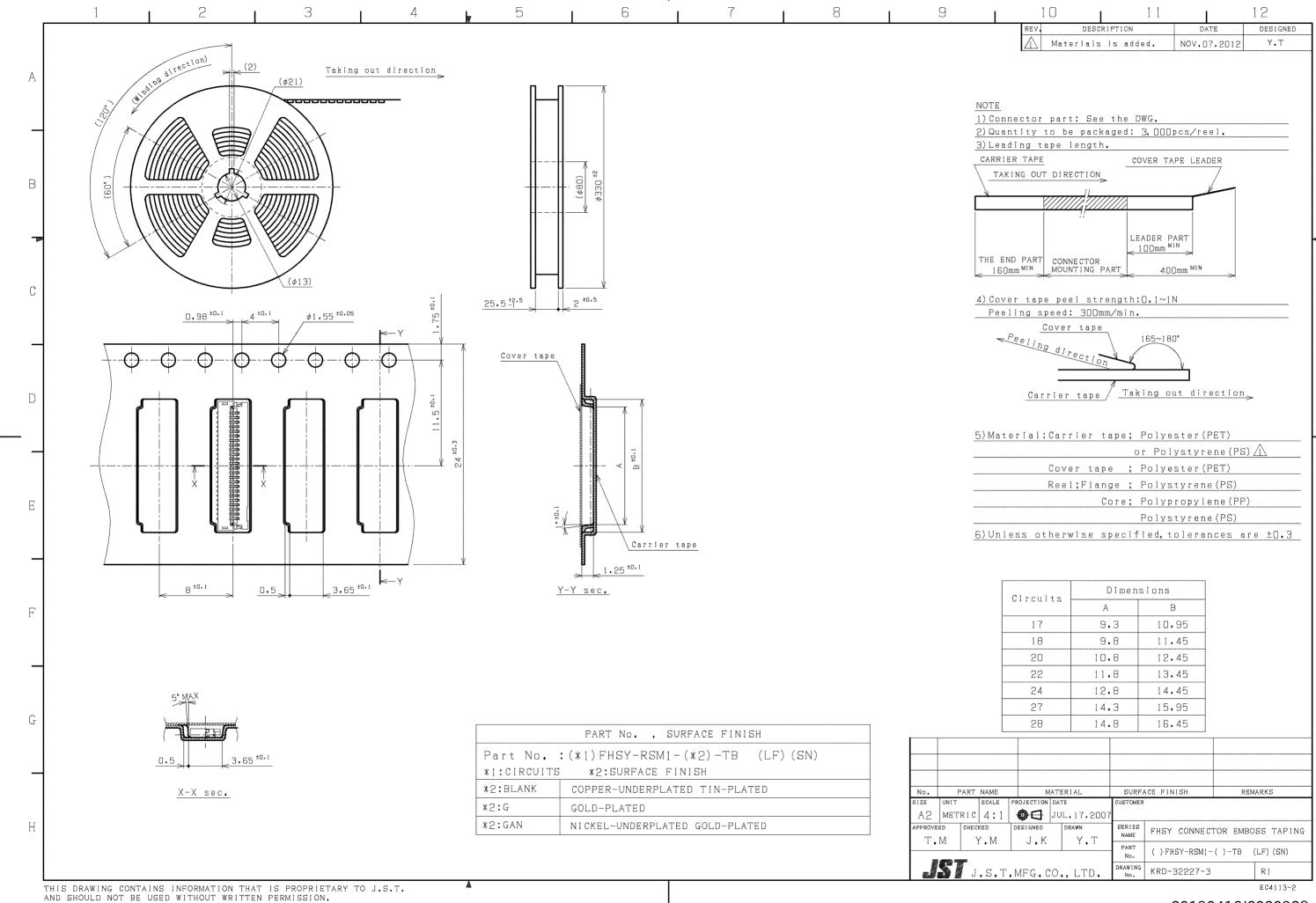


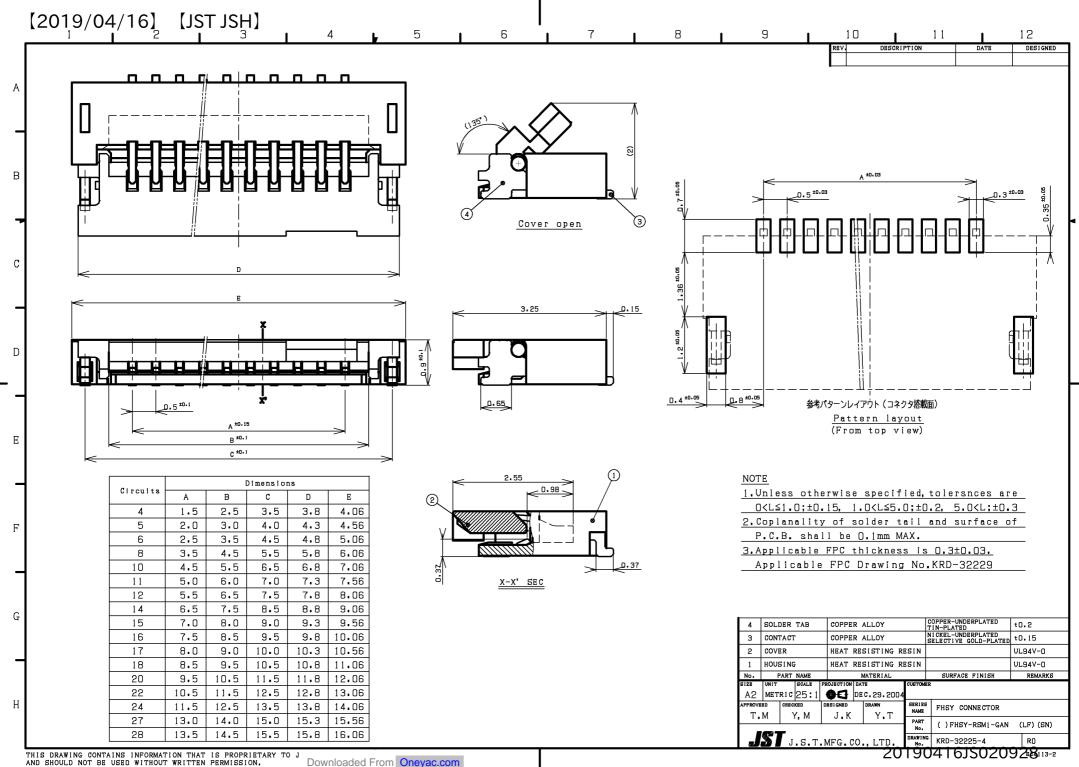
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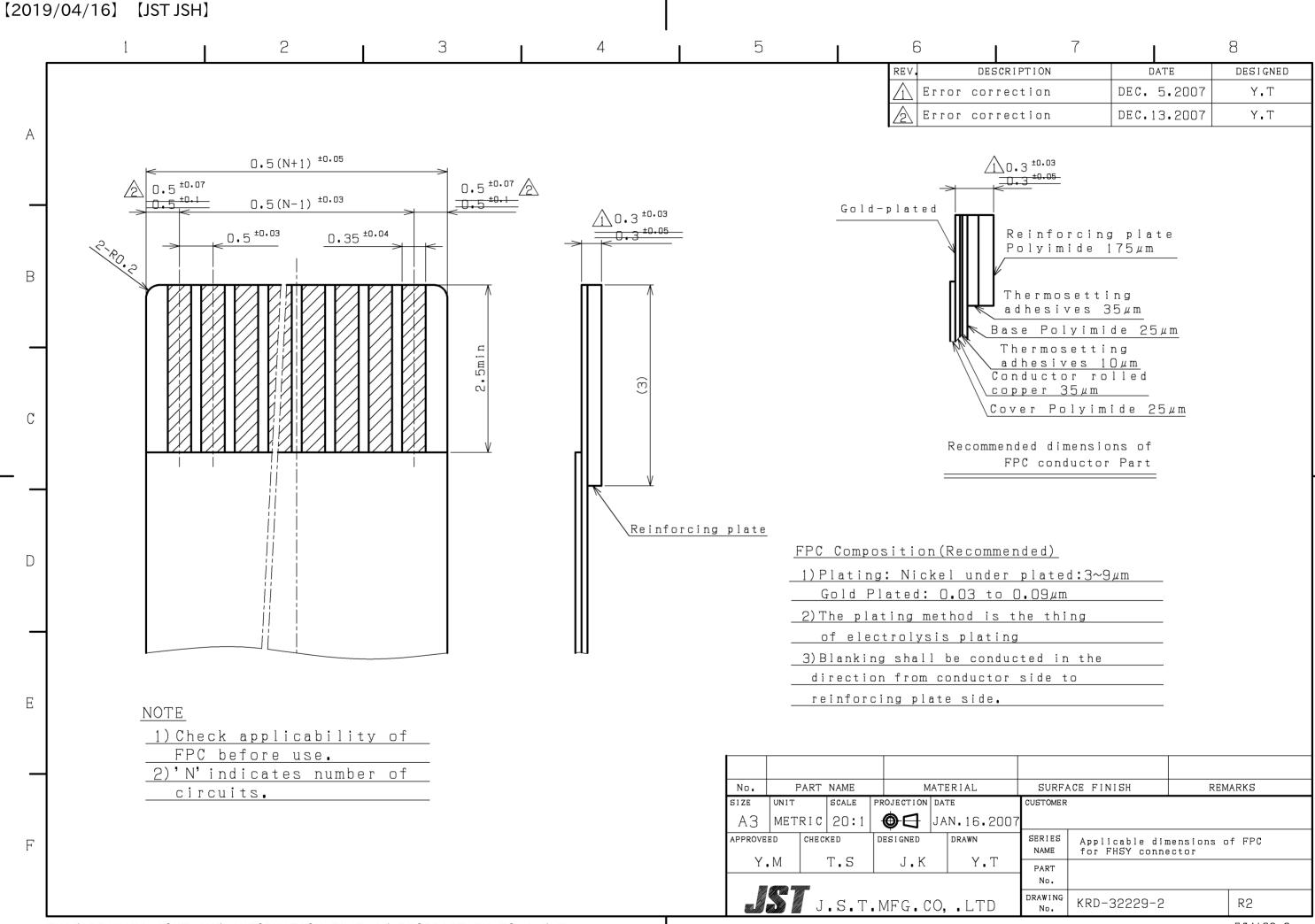
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DRAWING KRD-32586-1

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