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<b>PRODUCT SPECIFICATION</b>		No. T-2-42353 (R-2-42353)	Date Issued: February 5, 2008
Customer:	PELCO PRODUCTS INC.	Revised:	Date Revised:
Title Subject:	PUD Connector (Lead-free product)		Issued by: Osaka Engineering Center

This product specification contains the results of performance tests for the PUD connector (Lead-free product).

-Index-

1. PART NAME, PART NUMBER & DRAWING NUMBER
2. CONSTRUCTION, DIMENSIONS, MATERIAL & SURFACE FINISH
3. CHARACTERISTICS
4. ABOUT WHISKER
5. SPECIMEN
6. TEST CONDITIONS
7. REQUIREMENTS, TEST METHODS & TEST RESULTS
  - 7.1 Appearance
  - 7.2 Mechanical Performance Test
    - 7.2.1 Insertion Force (I.F.) & Withdrawal Force (W.F.)
    - 7.2.2 Crimp Tensile Strength
    - 7.2.3 Post Retention Force
    - 7.2.4 Contact Retention Force
    - 7.2.5 Locking Strength
  - 7.3 Electrical Performance Test
    - 7.3.1 Contact Resistance
    - 7.3.2 Current Continuity
    - 7.3.3 Insulation Resistance
    - 7.3.4 Dielectric Withstanding Voltage
  - 7.4 Environmental Test
    - 7.4.1 Durability
    - 7.4.2 Humidity
    - 7.4.3 Heat Aging
    - 7.4.4 Thermal Shock
    - 7.4.5 Salt Spray
    - 7.4.6 Hydrogen Sulfide Gas
    - 7.4.7 Vibration
    - 7.4.8 Ammonia Gas
  - 7.5 Solder test (Header)
    - 7.5.1 Solderability
    - 7.5.2 Resistance to Soldering Heat
8. NOTICE

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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

## 1. PART NAME, PART NUMBER & DRAWING NUMBER

Part Name		Part Number	Drawing Number	
Contact	001 type	SPUD-001T-P0.5	KRD-41911	
	002 type	SPUD-002T-P0.5	KRD-41937	
Receptacle housing		8 to 40-circuit	PUDP-**V-( ) <sub>1</sub>	KRD-41913
Header	Top entry type	8 to 40-circuit	B**B-PUD( ) <sub>1</sub> S-( ) <sub>2</sub> (LF)(SN)	KRD-41914

Note<sub>1</sub>: Number of circuits in two-digit figures is indicated in \*\*.

A character of an alphabet in color is indicated in ( )<sub>1</sub>.

The number showing boss existence is indicated in ( )<sub>2</sub>.

(None: Without boss, 1: With boss)

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		Material	Surface Finish, etc.
Receptacle	Contact	Copper alloy	Tin-plated
	Housing	66 Nylon	Flammability: UL94V-0
Header	Post	Copper alloy	Copper-underplated Tin-plated
	Wafer	66 Nylon (Glass-filled)	Flammability: UL94V-0

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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

### 3. CHARACTERISTICS

Item		Rated Value	
Current rating		3A (AC, DC) (Note <sub>3</sub> )	
Voltage rating		250V (AC, DC)	
Temperature range		-25 to +85 °C (Note <sub>4</sub> )	
Applicable wire	Conductor size	001 type	AWG#26 to #22
		002 type	AWG#28 to #24
	Conductor Spec.	Tin-plated annealed copper wire (stranded wire)	
	Insulation O.D.	001 type	φ1.0 to φ1.5 mm
002 type		φ0.8 to φ1.5 mm	
Recommended printed circuit board (PCB)	Thickness	1.6 mm	
	Hole size	See the attached drawing. (Note <sub>5</sub> )	

Note<sub>3</sub>: When AWG#22 applied.

Note<sub>4</sub>: Including temperature rise in applying an electrical current.

Note<sub>5</sub>: Recommended values when paper based epoxy resin PCB with drilled hole is used.  
Tolerance changes depending on PCB material and piercing method.

### 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. SPECIMEN

Part Name			Part Number
Receptacle	Contact	001 type	SPUD-001T-P0.5
		002 type	SPUD-002T-P0.5
	Housing		PUDP-( )V-Z
Header	Top entry type	With boss 8- ~ 40-circuit	B( )B-PUDSS-1 (LF)(SN)

Note<sub>6</sub>: Number of circuits in one or two-digit figures is indicated in ( ).

Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

## 6. TEST CONDITIONS

- 1) When tested in accordance with the test condition and method specified in each item, each requirement shall be met.
- 2) 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].

Temperature: 15 to 35 °C

Relative humidity: 25 to 75 %

- 3) For environmental tests, as a rule, the specimen that a header and a socket are assembled for actual use and the wire of UL1061 style AWG#22 shall be used.

## 7. REQUIREMENTS, TEST METHODS & TEST RESULTS

### 7.1 Appearance

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

Test method: Visual inspection.

Test result: Good.

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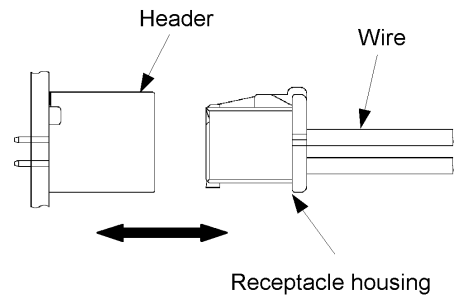
Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
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## 7.2 Mechanical Performance Test

### 7.2.1 Insertion Force (I.F.) & Withdrawal Force (W.F.)

Requirement:

No. of circuits	At Initial		At 30th
	I.F. N max.	W.F. N min.	W.F. N min.
8	25	1	1
10	28	3	2
12	31	4	2
14	34	6	3
16	37	7	3
18	40	9	4
20	43	10	4
22	46	12	5
24	49	13	5
26	52	15	6
28	55	16	6
30	58	18	7
32	61	19	7
34	64	21	8
36	67	22	8
38	70	24	9
40	73	25	9



Test method: A housing with crimped contacts and a header shall be mated and unmated on the mating axis. Initial insertion and withdrawal forces and withdrawal force at 30th shall be measured. The housing lock device shall be removed before the test. (Testing speed: 1 to 5mm/sec.)

Test result:

UNIT: N				
No. of circuits	Items	Ave.	Max.	Min.
8	Initial I.F.	8.0	8.3	7.7
	Initial W.F.	6.0	6.4	5.6
	W.F. at 30th	4.6	5.0	4.3
10	Initial I.F.	10.0	10.5	9.7
	Initial W.F.	7.2	7.7	6.3
	W.F. at 30th	6.0	6.5	5.5
12	Initial I.F.	12.0	12.8	11.1
	Initial W.F.	8.7	9.5	8.3
	W.F. at 30th	7.2	7.6	6.8
14	Initial I.F.	14.2	14.5	13.8
	Initial W.F.	9.6	10.1	9.0
	W.F. at 30th	8.3	9.1	7.8

n=10

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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

Test result:

UNIT: N

No. of circuits	Items	Ave.	Max.	Min.
16	Initial I.F.	16.0	16.8	15.2
	Initial W.F.	12.5	13.3	11.2
	W.F. at 30th	9.6	10.8	8.8
18	Initial I.F.	18.0	18.6	17.5
	Initial W.F.	13.3	14.1	12.7
	W.F. at 30th	11.1	11.9	10.5
20	Initial I.F.	20.3	20.7	20.2
	Initial W.F.	14.6	15.4	13.7
	W.F. at 30th	12.3	13.5	11.6
22	Initial I.F.	22.0	22.5	21.1
	Initial W.F.	15.9	16.9	15.2
	W.F. at 30th	13.4	14.4	12.5
24	Initial I.F.	23.7	24.2	23.1
	Initial W.F.	17.0	17.6	16.1
	W.F. at 30th	14.3	14.9	13.5
26	Initial I.F.	26.4	27.1	25.0
	Initial W.F.	19.3	21.0	17.2
	W.F. at 30th	15.5	16.7	14.6
28	Initial I.F.	28.8	30.5	27.6
	Initial W.F.	21.6	22.8	20.8
	W.F. at 30th	16.1	17.8	14.9
30	Initial I.F.	30.5	31.1	29.8
	Initial W.F.	23.9	24.6	23.1
	W.F. at 30th	18.3	19.3	17.4
32	Initial I.F.	31.9	32.4	31.3
	Initial W.F.	25.1	26.6	23.0
	W.F. at 30th	19.5	20.2	18.8
34	Initial I.F.	34.0	35.2	32.7
	Initial W.F.	25.3	27.4	22.8
	W.F. at 30th	20.5	21.3	20.1
36	Initial I.F.	36.6	39.2	34.7
	Initial W.F.	27.0	29.5	25.2
	W.F. at 30th	21.0	23.2	19.2
38	Initial I.F.	38.6	39.4	37.2
	Initial W.F.	29.1	30.6	26.1
	W.F. at 30th	21.8	24.0	20.5
40	Initial I.F.	40.2	41.4	39.2
	Initial W.F.	32.2	32.8	31.1
	W.F. at 30th	22.6	23.7	21.8

n=10

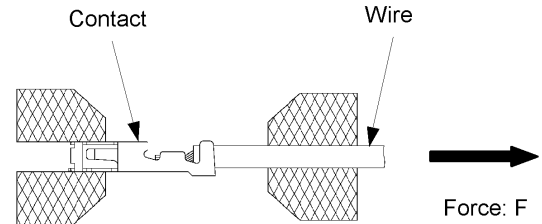
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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

## 7.2.2 Crimp Tensile Strength

Requirement:

Wire to be used	Requirements N min.
AWG#28	9.8
AWG#26	19.6
AWG#24	29.4
AWG#22	39.2



Test method: Pulling load shall be applied to a correctly crimped contact and a wire. The load to pull the wire out of the contact or break the wire shall be measured. (Testing speed: Approx. 25mm/min.)

Test result:

Contact	Wire size	Measured values		
		Ave.	Max.	Min.
001 type	AWG#26	39.0	42.1	37.2
	AWG#24	56.9	61.5	53.1
	AWG#22	74.6	77.2	69.0
002 type	AWG#28	26.2	29.7	23.8
	AWG#26	38.3	40.7	34.6
	AWG#24	54.0	56.6	51.4

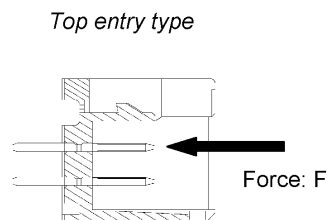
UNIT: N

n=10

## 7.2.3 Post Retention Force

Requirement: 10N min.

Test method: The end of a post shall be pushed in the axial direction. The load to make the post start moving from the wafer shall be measured (Testing speed: Approx. 25mm/min.)



Test result:

UNIT: N		
Ave.	Max.	Min.
18.5	22.0	15.3

n=10

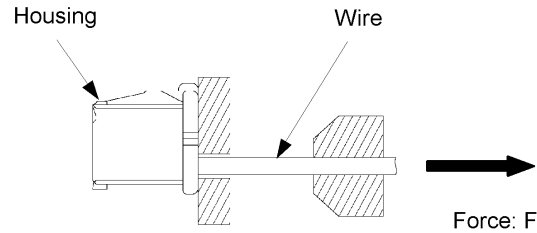
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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

### 7.2.4 Contact Retention Force

Requirement: 10N min.

Test method: A crimped contact shall be mounted in a housing and pulled in the axial direction. The load to pull the contact out of the housing shall be measured. (Testing speed: 1 to 5mm/sec.)



Test result:

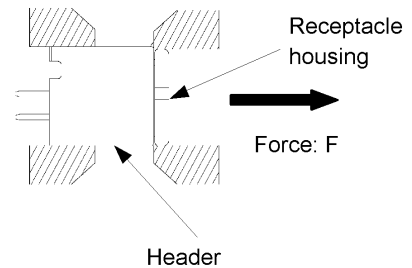
UNIT: N		
Ave.	Max.	Min.
28.1	30.5	27.0

n=10

### 7.2.5 Locking Strength

Requirement:

No. of circuits	Requirements (N min.)
8- ~ 18-circuit	20
20- ~ 28-circuit	25
30- ~ 40-circuit	30



Test method: A housing and a header shall be mated. Pulling load shall be applied them. The load to make them come off each other shall be measured. (Testing speed: 1 to 5mm/sec.)

Test result:

UNIT: N			
	Ave.	Max.	Min.
12-circuit	49.3	49.5	49.1
26-circuit	60.9	61.6	59.1
40-circuit	79.1	79.5	78.7

n=10



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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

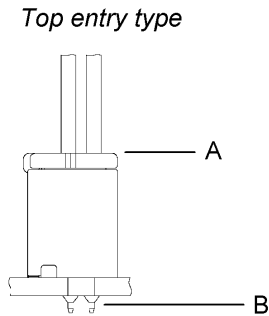
## 7.3 Electrical Performance Test

### 7.3.1 Contact Resistance

Requirement: Initial: 10mΩ max.  
After tests: 20mΩ max.

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

Test current: 10mA (DC)  
Open voltage: 20mV max.  
Wire to be used: AWG#22



Test result: See each environmental test item.

### 7.3.2 Current Continuity

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

Test method: Each circuit of a specimen assembled for actual use shall be connected in series and test current of 10mA(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.

### 7.3.3 Insulation Resistance

Requirement: Initial: 1,000MΩ min.  
After tests: 500MΩ min. (Humidity & thermal shock tests)

Test method: 500V DC shall be applied between adjacent contacts of a mated specimen to measure insulation resistance. (Connectors shall not be soldered.)

Test result

UNIT: MΩ	
	Measured values
Initial	1,000 min.
After humidity test	500 min.
After thermal shock test	500 min.

n=10

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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

### 7.3.4 Dielectric Withstanding Voltage

Requirement: There shall be no breakdown or flashover.

Test method: Testing voltage specified below shall be applied between adjacent contacts of a mated specimen for one minute. (Connectors shall not be soldered.)

Initial: 800V AC  
 After tests: 500V AC (Humidity & thermal shock tests)

Test result:

Initial	Good
After humidity test	Good
After thermal shock test	Good

n=10

### 7.4 Environmental Test

#### 7.4.1 Durability

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: A housing with crimped contacts and a header shall be mated and unmated. After repeated 30 cycles, contact resistance shall be measured.

Test result:

UNIT: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.88	5.1	4.5	4.97	5.5	4.5

n=20

#### 7.4.2 Humidity

Requirement: Contact resistance shall be 20mΩ max. after the test. Insulation resistance shall be 500MΩ min. after the test. There shall be no breakdown or flashover on the dielectric withstanding voltage test.

Test method: The specimen 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: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.76	5.3	4.5	4.94	5.7	4.6

n=20

Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

### 7.4.3 Heat Aging

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: The specimen shall be placed in a heat oven of the following conditions. After the test, contact resistance shall be measured.

Temperature: 85 ± 2 °C  
Period: 250 hours

Test result:

UNIT: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.87	5.5	4.6	5.02	5.9	4.7

n=20

### 7.4.4 Thermal Shock

Requirement: Contact resistance shall be 20mΩ max. after the test. Insulation resistance shall be 500MΩ min. after the test. There shall be no breakdown or flashover on the dielectric withstanding voltage test.

Test method: The specimen shall be subjected to a thermal shock test of the following conditions. After the test, contact resistance, insulation resistance and dielectric withstanding voltage 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: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.80	5.2	4.6	4.95	5.6	4.6

n=20

Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

#### 7.4.5 Salt Spray

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: The specimen shall be subjected to a salt spray test of the following condition. After the test, it shall be washed with running water and dried naturally before the measurement of contact resistance.

Temperature: 35 ± 2 °C  
 Concentration: 5 % in weight  
 Period: 48 hours

Test result:

UNIT: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.82	5.5	4.6	4.91	5.9	4.7

n=20

#### 7.4.6 Hydrogen Sulfide Gas

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: The specimen shall be subjected to hydrogen sulfide gas of the following conditions. After the test, contact resistance shall be measured.

Concentration: 3 ± 1 ppm  
 Temperature: 40 ± 2 °C  
 Relative humidity: 80 ± 5 %  
 Period: 96 hours

Test result:

UNIT: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	5.01	5.4	4.8	5.12	5.5	4.9

n=20

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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

### 7.4.7 Vibration

Requirement: Contact resistance shall be 20mΩ max. after the test. There shall be no current discontinuity longer than 1 microsecond.

Test method: The specimen 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: 10-55-10Hz/minute  
Amplitude: 1.52mm  
Direction: Each of X,Y,Z-axis directions  
\*Each axis shall be at right angles to others.  
Period: 2 hours for each direction

Test result:

UNIT: mΩ

Contact resistance	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
	4.79	5.2	4.6	4.89	5.5	4.7

Current continuity	There was no current discontinuity longer than 1 microsecond.
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n=20

### 7.4.8 Ammonia Gas

Requirement: There shall be no stress corrosion cracking.

Test method: The mated specimen shall be subjected to an ammonia gas test of the following conditions. (Connectors shall not be soldered.) After the test, stress corrosion cracking shall be checked.

Ammonia solution: 3 % in weight  
Solution volume: 25 ml per liter of volume  
Period: 7 hours

Test result:

There was no stress corrosion cracking.
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n=10

Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
--	------------------------------	----------

## 7.5 Solder test (Header)

### 7.5.1 Solderability

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

Test method: Fluxed soldering section of the 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.

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n=10

### 7.5.2 Resistance to Soldering Heat

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

Test method: The specimen shall be mounted on a PCB and subjected to a resistance to soldering heat test of the following conditions.

Solder:	Sn-3Ag-0.5Cu
Flux:	Activation flux (CF-110VH-2A made by Tamura Kaken Corporation)
Testing PCB:	Material; Paper based epoxy resin, Pattern on one side
Solder temperature:	260 ± 5 °C
Immersion period:	5 ± 0.5 seconds

Test result:

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

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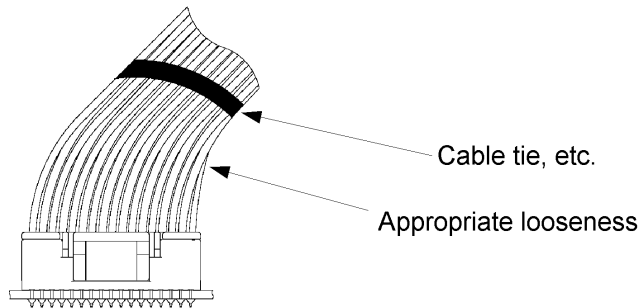
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Title Subject: PUD Connector (Lead-free product)	No. T-2-42353 (R-2-42353)	Revised:
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## 8. NOTICE

This connector is secure lock type, so the connector must be treated with care after mated. Incorrect handling direction and excessive pulling load to wire harness may cause troubles which affect its performances such as degradation at solder tail, breakage of the connector itself (lock devise, etc.) and a mounted PCB. To prevent these troubles and make full use of the connector's performances, special care should be taken on the following points when handling wire harness.

- \* Do not apply external forces to the connector continuously except for pulling load or tension when handling a wire harness as usual.
- \* For wires, make the appropriate looseness to mate and unmate the connector on the mating axis without strain.



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2

3

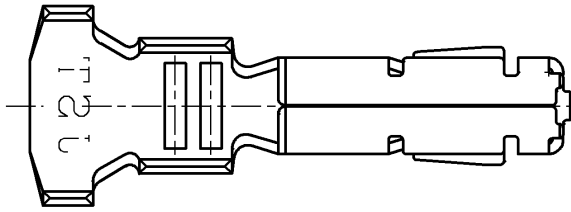
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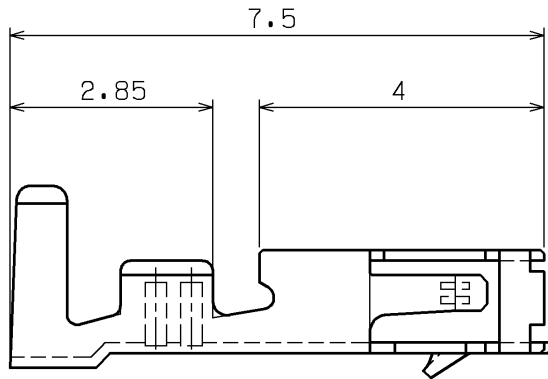
NOTE

1. Unless otherwise specified, tolerances are ±0.3

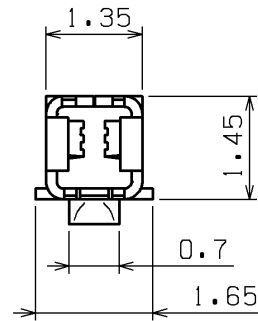
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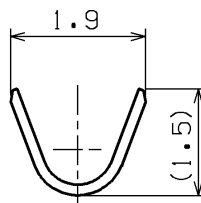
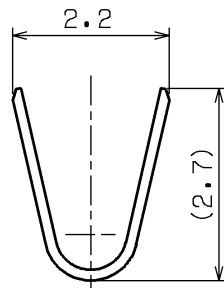
B



C



D



E

INSULATION BARREL

WIRE BARREL

CONTACT		COPPER ALLOY		TIN-PLATED	t=0.15
No.	PART NAME	MATERIAL	SURFACE FINISH	REMARKS	
SIZE	UNIT	SCALE	PROJECTION	DATE	CUSTOMER
A4	METRIC	10:1		SEP. 3.2007	
APPROVED	CHECKED	DESIGNED	DRAWN	SERIES NAME	PUD CONNECTOR
S.K		M.I	M.Y	PART No.	SPUD-001T-P0.5
<b>JST</b> J.S.T.MFG.CO., LTD.				DRAWING No.	KRD-41911
					RO

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1

2

3

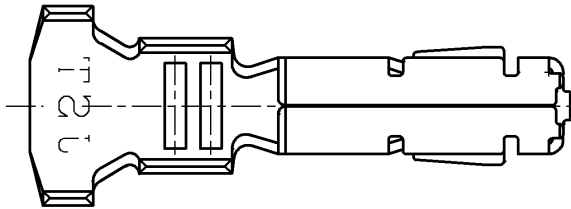
4

REV.	DESCRIPTION	DATE	DESIGNED
△			

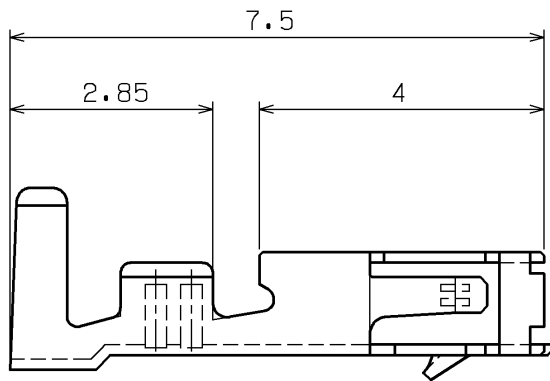
NOTE

1. Unless otherwise specified, tolerances are ±0.3

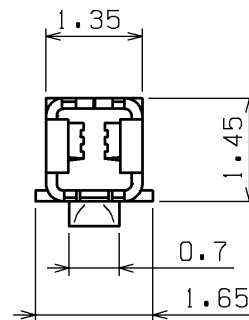
A



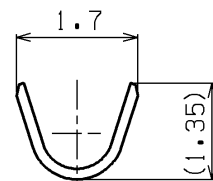
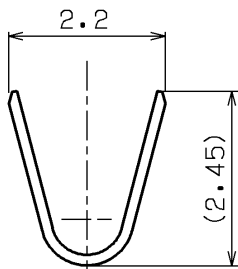
B



C



D



E

INSULATION BARREL

WIRE BARREL

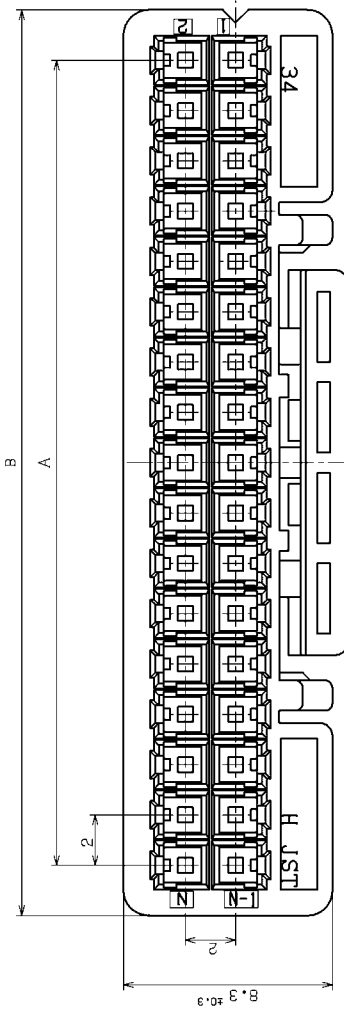
CONTACT		COPPER ALLOY		TIN-PLATED		t=0.15	
No.	PART NAME	MATERIAL		SURFACE FINISH		REMARKS	
SIZE	UNIT	SCALE	PROJECTION	DATE	CUSTOMER		
A4	METRIC	10:1		SEP. 3.2007			
APPROVED	CHECKED	DESIGNED	DRAWN	SERIES NAME	PUD CONNECTOR		
S.K		M.I	M.Y	PART No.	SPUD-002T-P0.5		
<b>JST</b> J.S.T.MFG.CO.,LTD.				DRAWING No.	KRD-41937	RO	

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1 2 3 4 5 6 7 8

REV.	DESCRIPTION	DATE	DESIGNED
△	Addition of color part No.	OCT.31.2007	M.I

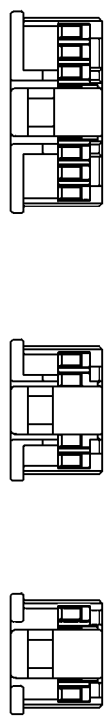
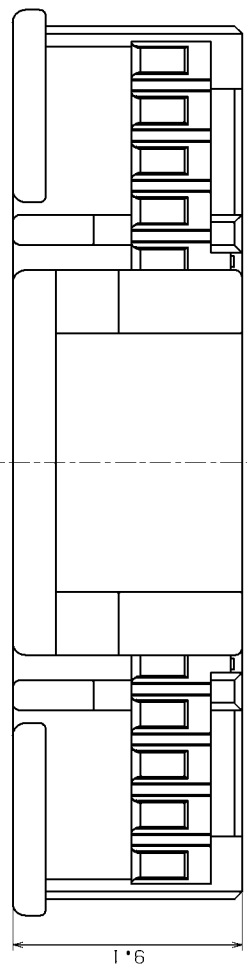
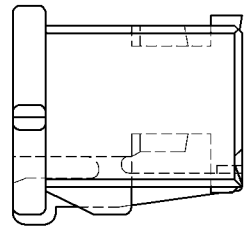


**NOTE**

1. Unless otherwise specified, tolerances are  $0 < L \leq 5.0 : \pm 0.3$   
 $5.0 < L : \pm 0.4$

Color	Part No.
Natural	PUDP-( )V-S
Black	PUDP-( )V-K
Red	PUDP-( )V-R
Blue	PUDP-( )V-E

Circuits	Dimensions	
	A	B
8	6.0	10.0
10	8.0	12.0
12	10.0	14.0
14	12.0	16.0
16	14.0	18.0
18	16.0	20.0
20	18.0	22.0
22	20.0	24.0
24	22.0	26.0
26	24.0	28.0
28	26.0	30.0
30	28.0	32.0
32	30.0	34.0
34	32.0	36.0
36	34.0	38.0
38	36.0	40.0
40	38.0	42.0



Configuration for 8 to 10 circuits.  
 Configuration for 12 to 14 circuits.  
 Configuration for 16 to 18 circuits.

No.		PART NAME		MATERIAL		SURFACE FINISH		REMARKS	
SIZE		UNIT		SCALE		PROJECTION		DATE	
A3		METRIC		5:1		FIRST ANGLE		SEP. 3. 2007	
APPROVED		CHECKED		DESIGNED		DRAWN		SERIES NAME	
S.K		M.I		M.I		M.Y		PUD CONNECTOR	
DRAWING No.		KRD-41913		CUSTOMER		UL94V-0		REMARKS	
DRAWING No.		R1		CUSTOMER		UL94V-0		REMARKS	



J.S.T.MFG.CO., LTD.

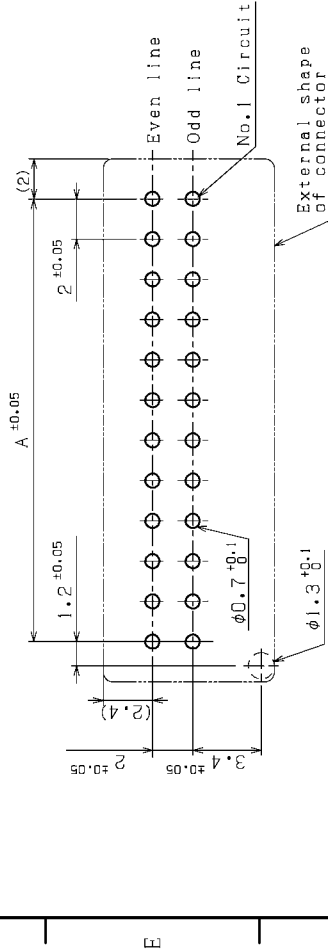
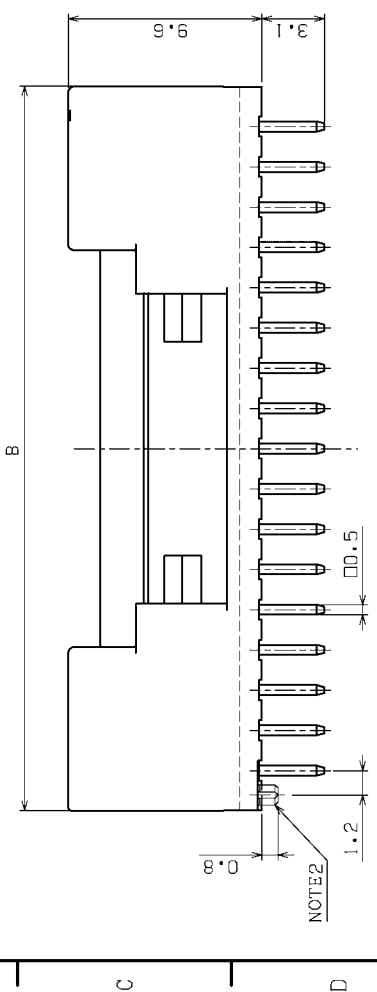
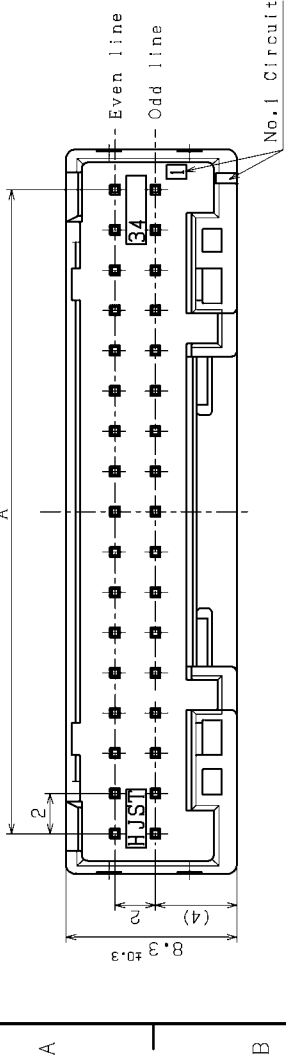
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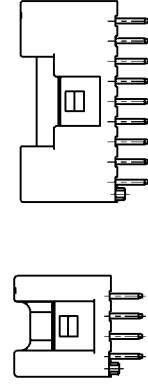
REV.	DESCRIPTION	DATE	DESIGNED
△	Addition of color part No.	OCT.31.2007	M.I

**NOTE**  
 1. Unless otherwise specified, tolerances are  $0.075 \pm 0.3$   
 $5.0 \text{KL} \pm 0.4$   
 2. Part No. with boss : B ( ) B-PUD ( ) S-1 (LF) (SN)  
 Part No. without boss : B ( ) B-PUD ( ) S (LF) (SN)

Color		Part No.	Dimensions	
Natural	Black	B ( ) B-PUDSS- ( ) (LF) (SN)	A	B
		B ( ) B-PUDKS- ( ) (LF) (SN)	8	6.0
		B ( ) B-PUDRS- ( ) (LF) (SN)	10	8.0
		B ( ) B-PUDS- ( ) (LF) (SN)	12	10.0
		B ( ) B-PUDS- ( ) (LF) (SN)	14	12.0
		B ( ) B-PUDS- ( ) (LF) (SN)	16	14.0
		B ( ) B-PUDS- ( ) (LF) (SN)	18	16.0
		B ( ) B-PUDS- ( ) (LF) (SN)	20	18.0
		B ( ) B-PUDS- ( ) (LF) (SN)	22	20.0
		B ( ) B-PUDS- ( ) (LF) (SN)	24	22.0
		B ( ) B-PUDS- ( ) (LF) (SN)	26	24.0
		B ( ) B-PUDS- ( ) (LF) (SN)	28	26.0
		B ( ) B-PUDS- ( ) (LF) (SN)	30	28.0
		B ( ) B-PUDS- ( ) (LF) (SN)	32	30.0
		B ( ) B-PUDS- ( ) (LF) (SN)	34	32.0
		B ( ) B-PUDS- ( ) (LF) (SN)	36	34.0
		B ( ) B-PUDS- ( ) (LF) (SN)	38	36.0
		B ( ) B-PUDS- ( ) (LF) (SN)	40	38.0



Recommendable P.C.Board hole layout  
 (Connector mounted side)



Configuration for 8 to 10 circuits.  
 Configuration for 12 to 18 circuits.

No.	PART NAME	MATERIAL	SURFACE FINISH	REMARKS
2	WAFER	66NYLON (G.F.)		UL94V-0
1	POST	COPPER ALLOY	COPPER-UNDERPLATED TIN-PLATED	

UNIT	SCALE	PROJECTION	DATE
A3	METRIC 4:1	☉	SEP. 3. 2007

APPROVED	CHECKED	DESIGNED	DRAWN
S.K		M. I	M. Y

SERIES NAME	PART No.	DRAWING No.
PUD CONNECTOR	B ( ) B-PUD ( ) S- ( ) (LF) (SN)	KRD-41914



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