



PRODUCT SPECIFICATION

		No. T-1-2196 (R-1-2196)	Date Issued: May 12, 2005
Customer:	GENERAL	Revised: B	Date Revised: April 24, 2006
Title Subject: ZH Connector (Lead-free product)			Issued by: Osaka Engineering Center

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

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Prepared by: <u>M. Veda</u>	Checked by: <u>K. Ichimi</u>	Reviewed by: <u>K. Wanaka</u>	Approved by: <u>K. Shimizu</u>
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1. PART NAME & PART NUMBER

Part Name		Part Number	
Contact		SZH-002T-P0.5	
		SZH-003T-P0.5	
Housing		ZHR-*	
Header	Printed circuit board (PCB) thickness (For 0.6 to 1.2mm)	Top entry type	B*B-ZR (LF)(SN)
		Side entry type	S*B-ZR (LF)(SN)
	PCB thickness (For 1.6mm)	Top entry type	B*B-ZR-3.4 (LF)(SN)
		Side entry type	S*B-ZR-3.4 (LF)(SN)

Note₁: Number of circuits in one or two-digit figure is indicated in *.
 Note₂: (LF)(SN) as identification part number indicating pure tin-plated specification of 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
Contact		Phosphor bronze	Tin-plated
Housing		66 Nylon	UL94V-0
Header	Pin	Brass	Copper-underplated Tin-plated
	Wafer	66 Nylon (Glass-filled)	UL94V-0

3. CHARACTERISTICS

Item		Rated Value	
Current rating		1A (AC·DC) (Note ₃)	
Voltage rating		50V (AC·DC)	
Temperature range		-25 to +85 °C (Note ₄)	
Applicable wire (Note ₅)	Conductor size	002 Type: AWG#28 to AWG#26 (Note ₅)	
		003 Type: AWG#32 to AWG#28	
	Insulation O.D.	002 Type: φ0.8 to φ1.1 mm	
		003 Type: φ0.5 to φ0.9 mm	
Recommended PCB	Thickness	B/S*B-ZR (LF)(SN)	0.6 to 1.2 mm
		B/S*B-ZR-3.4 (LF)(SN)	1.6 mm
	Hole size	φ0.7 ± 0.03mm (Note ₆)	

Note₃: When AWG#26 applied.
 Note₄: Including temperature rise in applying an electrical current.
 Note₅: Wire conductor shall be tin-plated annealed copper wire (stranded wire).
 Note₆: Recommended values when paper based epoxy resin PCB with drilled hole is used. Tolerance changes depending on PCB material and piercing method.



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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	
Contact		SZH-002T-P0.5	
		SZH-003T-P0.5	
Housing		ZHR-*	
Header	Standard type	Top entry type	B*B-ZR (LF)(SN)
		Side entry type	S*B-ZR (LF)(SN)
	3.4 type	Top entry type	B*B-ZR-3.4 (LF)(SN)
		Side entry type	S*B-ZR-3.4 (LF)(SN)

Note7: Number of circuits in one or two-digit figure is indicated in *.

6. TEST CONDITIONS

- When tested in accordance with the test conditions and method 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].

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

- For environmental tests, as a rule, specimens assembled for actual use and wire of AWG#28 UL1571 style 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 performances specified in this specification.

Test method: Visual inspection.

Test result: Good.

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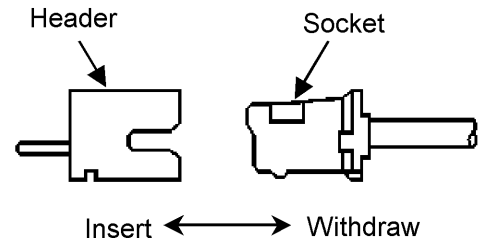
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7.2 Mechanical Performance Test

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

Requirement:

No. of circuits	UNIT: N		
	At initial		At 50th
	I.F. (max.)	W.F. (min.)	W.F. (min.)
2	24.5	3.9	2.0
3	29.4	4.9	2.9
4	34.3	5.9	2.9
5	39.2	6.9	3.9
6	44.1	7.8	4.9
7	49.0	7.8	5.9
8	53.9	8.8	6.9
9	58.8	8.8	6.9
10	63.7	9.8	7.8
11	68.6	9.8	8.8
12	73.5	11.8	9.8
13	78.4	11.8	10.8



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 also withdrawal force at 50th shall be measured. (Testing speed: 1 to 5mm/sec.)



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Test result:

UNIT: N

No. of circuits	Items	Ave.	Max.	Min.
2	Initial I.F.	9.6	10.5	8.5
	Initial W.F.	11.0	12.1	10.3
	W.F. at 50th	8.2	10.0	6.6
3	Initial I.F.	13.2	14.3	12.0
	Initial W.F.	13.8	15.0	13.0
	W.F. at 50th	9.7	11.6	8.1
4	Initial I.F.	16.7	18.0	15.4
	Initial W.F.	16.5	18.0	15.7
	W.F. at 50th	11.3	13.2	9.7
5	Initial I.F.	20.2	21.8	18.9
	Initial W.F.	19.2	20.9	18.4
	W.F. at 50th	12.9	14.8	11.2
6	Initial I.F.	23.8	25.6	22.3
	Initial W.F.	22.0	23.8	21.1
	W.F. at 50th	14.5	16.4	12.7
7	Initial I.F.	27.3	29.3	25.8
	Initial W.F.	24.7	26.8	23.8
	W.F. at 50th	16.0	18.0	14.3
8	Initial I.F.	30.8	33.1	29.2
	Initial W.F.	27.5	29.7	26.5
	W.F. at 50th	17.6	19.6	15.8
9	Initial I.F.	32.7	34.9	31.1
	Initial W.F.	28.1	30.4	26.9
	W.F. at 50th	18.4	20.9	16.7
10	Initial I.F.	34.7	36.6	33.0
	Initial W.F.	28.8	31.1	27.2
	W.F. at 50th	19.3	22.2	17.6
11	Initial I.F.	36.6	38.4	34.9
	Initial W.F.	29.4	31.8	27.6
	W.F. at 50th	20.1	23.5	18.5
12	Initial I.F.	38.6	40.1	36.8
	Initial W.F.	30.1	32.5	27.9
	W.F. at 50th	20.9	24.8	19.4
13	Initial I.F.	40.5	41.9	38.7
	Initial W.F.	30.7	33.2	28.3
	W.F. at 50th	21.8	26.1	20.3

n=10

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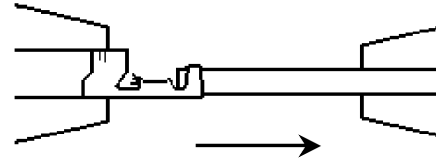
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7.2.2 Crimp Tensile Strength

Requirement:

Wire to be used	Requirement (min.)
AWG#26	19.6
AWG#28	9.8
AWG#30	4.9
AWG#32	2.9

UNIT: N



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

Test result:

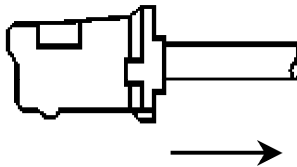
		UNIT: N		
	Wire size (UL1571)	Ave.	Max.	Min.
002 type	AWG#26	36.5	39.2	30.4
	AWG#28	24.4	24.5	23.5
003 type	AWG#28	30.2	30.4	29.4
	AWG#30	18.1	18.6	17.6
	AWG#32	11.9	13.7	10.8

n=10

7.2.3 Contact Retention Force

Requirement: 6.9N min.

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



Test result:

UNIT: N		
Ave.	Max.	Min.
18.7	19.6	17.6

n=20

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7.2.4 Pin Retention Force

Requirement: 9.8N min.

Test method: The end of a pin shall be pushed perpendicularly. The load required to make the pin start moving from a wafer shall be measured. (Testing speed: 25mm/min.)

Test result:

UNIT: N		
Ave.	Max.	Min.
13.9	15.7	11.8

n=20

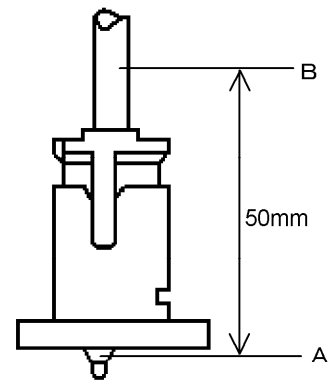
7.3 Electrical Performance Test

7.3.1 Contact Resistance

Requirement: Initial: 20mΩ max.
After tests: 30mΩ 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 #28



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 the 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.



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7.3.3 Insulation Resistance

Requirement: Initial: 500MΩ min.
After tests: 300MΩ min. (Humidity & thermal shock tests)

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

Test result:

UNIT: MΩ	
Items	Measured values
Initial	500 min.
After humidity test	300 min.
After thermal shock test	300 min.

n=20

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. (The header shall not be soldered.)

Initial: 500V AC
After tests: 300V AC (Humidity & thermal shock tests)

Test result:

Initial	Good.
After humidity test	Good.
After thermal shock test	Good.

n=20



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7.4 Environmental Test

7.4.1 Durability

Requirement: Contact resistance shall be 30mΩ max. after the test.

Test method: A housing with crimped contacts and a header shall be mated and unmated. After repeated 50 cycles, contact resistance shall be measured.

Test result:

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	14.12	14.5	13.9	14.63	15.0	14.1

UNIT: mΩ
n=36

7.4.2 Humidity

Requirement: Contact resistance shall be 30mΩ max. after the test.

Insulation resistance shall be 300MΩ 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:

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	15.10	15.4	15.0	15.20	15.5	15.1

UNIT: mΩ
n=36



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7.4.3 Heat Aging

Requirement: Contact resistance shall be 30mΩ 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

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	14.71	14.9	14.3	14.77	15.1	14.4

n=36

7.4.4 Thermal Shock

Requirement: Contact resistance shall be 30mΩ max. after the test.

Insulation resistance shall be 300MΩ 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

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	14.62	15.1	14.5	14.73	15.3	14.6

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7.4.5 Hydrogen Sulfide Gas

Requirement: Contact resistance shall be 30mΩ 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

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	15.43	15.6	15.2	15.57	15.7	15.2

n=36

7.4.6 Salt Spray

Requirement: Contact resistance shall be 30mΩ max. after the test.

Test method: The specimen 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 ± 2 °C
 Concentration: 5 % in weight
 Period: 48 hours

Test result:

UNIT: mΩ

Test item	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	15.37	15.8	15.0	15.36	15.8	15.0

n=36



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7.4.7 Vibration

Requirement: Contact resistance shall be 30mΩ max. after the test.
There shall be no current discontinuity longer than 1 microsecond during the test.

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 and Z-axis directions
 *Each axis shall be at right angles to others.
 Period: 2 hours for each direction

Test result:

UNIT: mΩ

Test item	Initial			After test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	14.20	14.6	14.0	14.33	14.6	14.1

Current continuity	There was no current discontinuity longer than 1 microsecond.
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n=36

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. (The connector shall not be soldered.) After the test, stress corrosion cracking shall be checked.

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

Test result:

There was no stress corrosion cracking.

n=20



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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.

n=10

7.5.2 Resistance to Soldering Heat

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

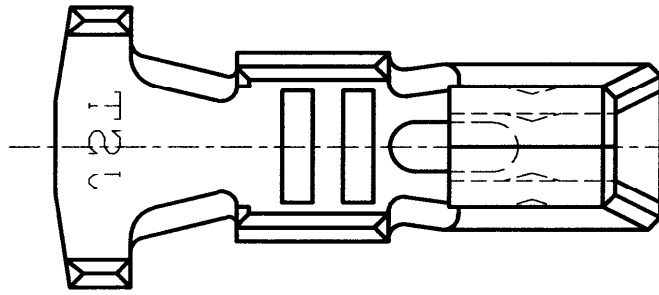
Test method: The specimen shall be mounted on a PCB and subjected to a resistance to soldering heat test of the following conditions.

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

Test result:

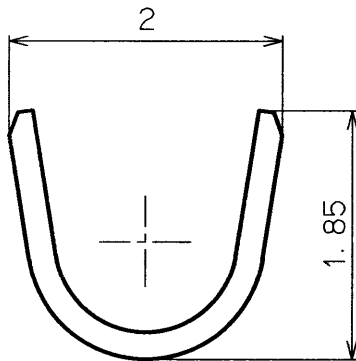
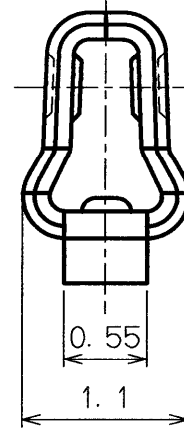
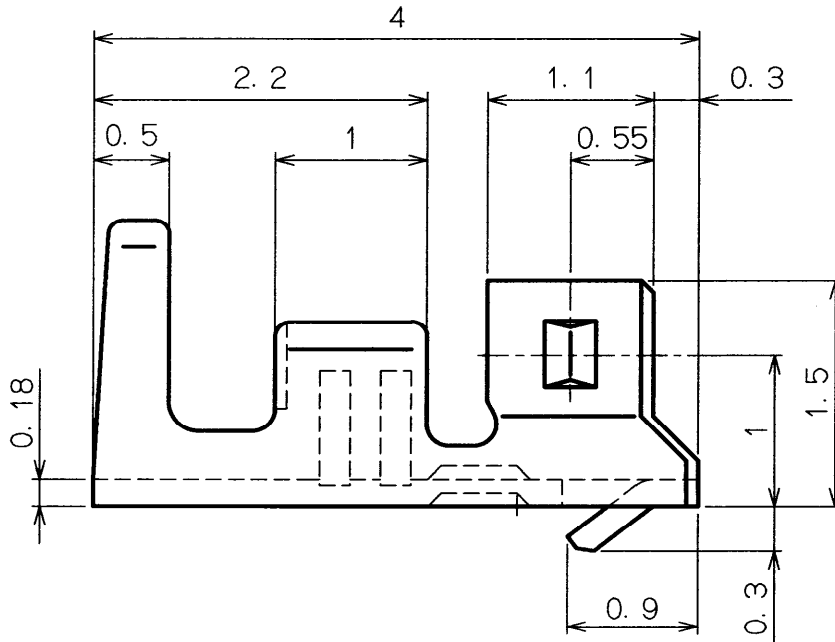
There was no deformation or damage which may affect the performance.

n=10

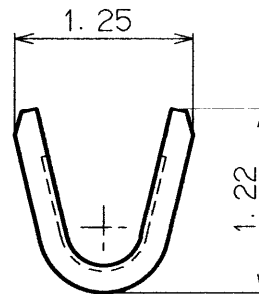


NOTE

1. Unless otherwise specified, tolerances are ± 0.3



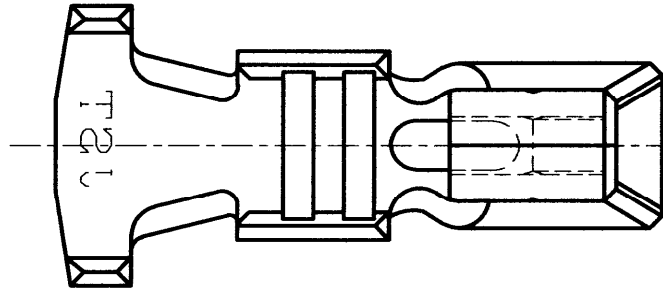
INSULATION BARREL



WIRE BARREL

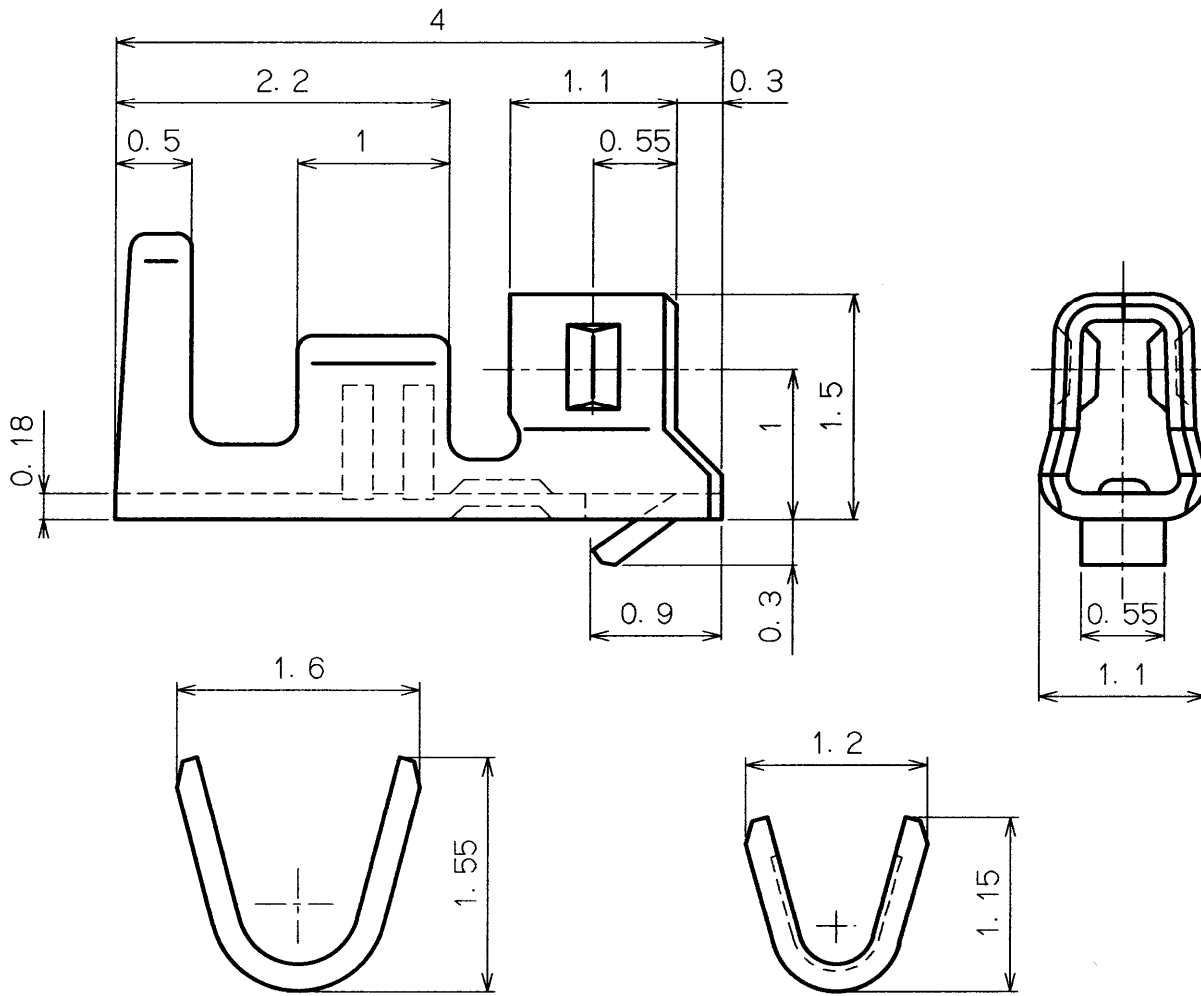
				REVISIONS	
No.	NAME	MATERIAL	REMARKS		
	CONTACT	PHOSPHOR BRONZE	TIN-PLATED		
J. S. T.				PART NAME	ZH CONNECTOR
APPROVED BY	CHECKED BY	DRAWN BY	SCALE	PROJECTION	DATE
<i>J. Louder</i>	<i>S.S.</i>	<i>Nago</i>	free		Mar. 6 '97
				PART No.	SZH-002T-P0. 5
				DRAWING No.	KRD - 13320-3

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NOTE

1. Unless otherwise specified, tolerances are ± 0.3



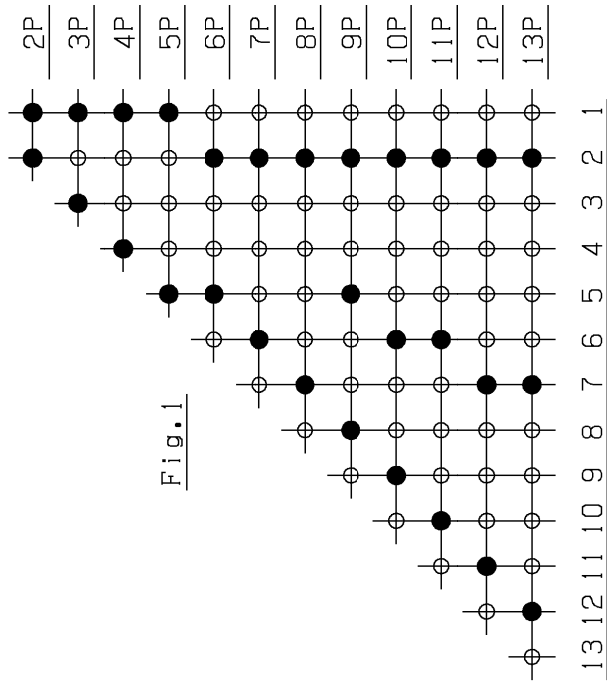
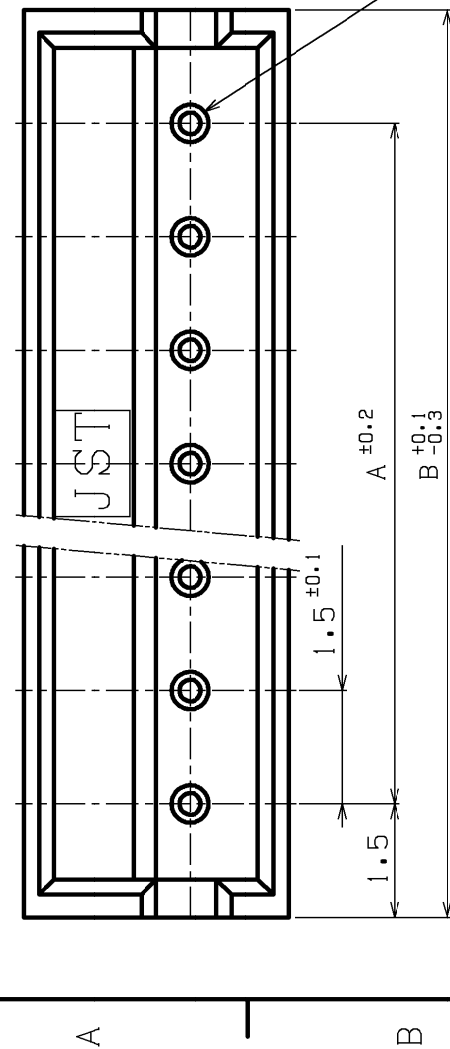
INSULATION BARREL

WIRE BARREL

				REVISIONS	
CONTACT		PHOSPHOR BRONZE	TIN-PLATED		
No.	NAME	MATERIAL	REMARKS		
J. S. T.				PART NAME	ZH CONNECTOR
APPROVED BY	CHECKED BY	DRAWN BY	SCALE	PROJECTION	DATE
<i>T.S.</i>	<i>44.</i>	<i>Nago</i>	free		Mar. 6 '97
				PART No.	SZH-003T-P0.5
				DRAWING No.	KRD-8255-2

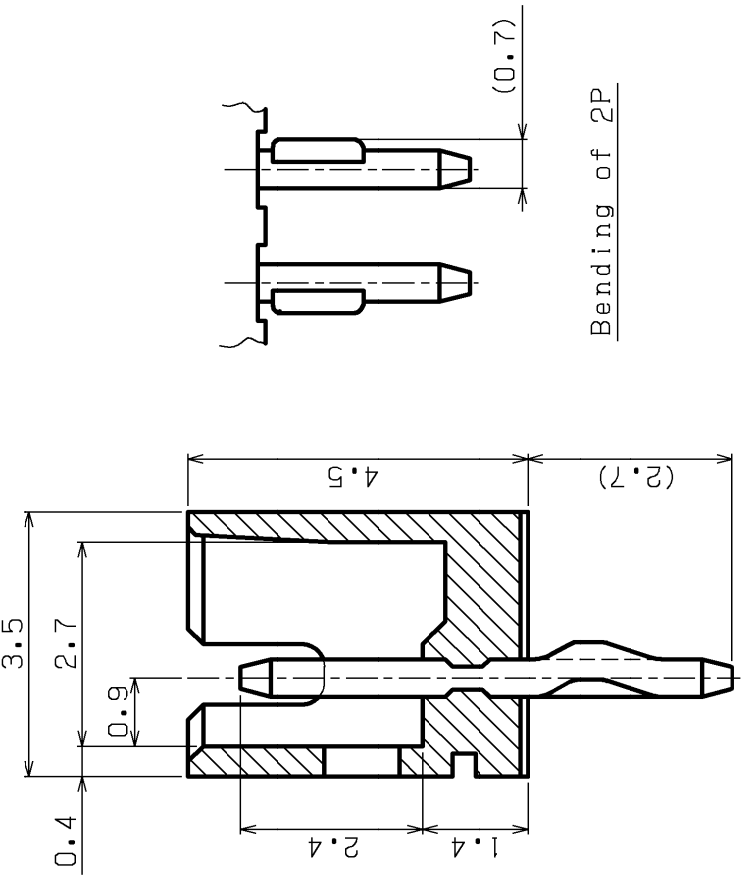
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REV.	DESCRIPTION	DATE	DESIGNED
△			

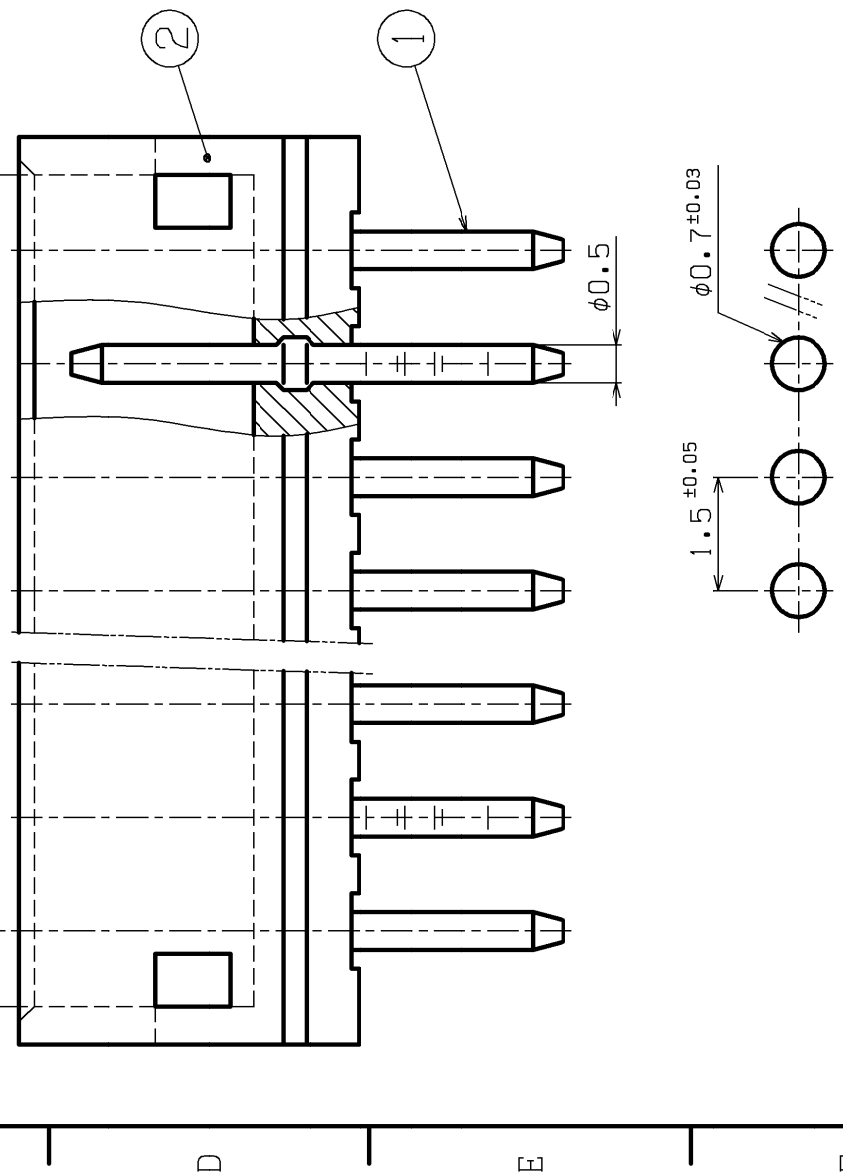


[Circuit No.] 13 12 11 10 9 8 7 6 5 4 3 2 1

Part No.	A	B	C
B2B-ZR (LF) (SN)	1.5	4.5	3.5
B3B-ZR (LF) (SN)	3.0	6.0	5.0
B4B-ZR (LF) (SN)	4.5	7.5	6.5
B5B-ZR (LF) (SN)	6.0	9.0	8.0
B6B-ZR (LF) (SN)	7.5	10.5	9.5
B7B-ZR (LF) (SN)	9.0	12.0	11.0
B8B-ZR (LF) (SN)	10.5	13.5	12.5
B9B-ZR (LF) (SN)	12.0	15.0	14.0
B10B-ZR (LF) (SN)	13.5	16.5	15.5
B11B-ZR (LF) (SN)	15.0	18.0	17.0
B12B-ZR (LF) (SN)	16.5	19.5	18.5
B13B-ZR (LF) (SN)	18.0	21.0	20.0



Bending of 2P



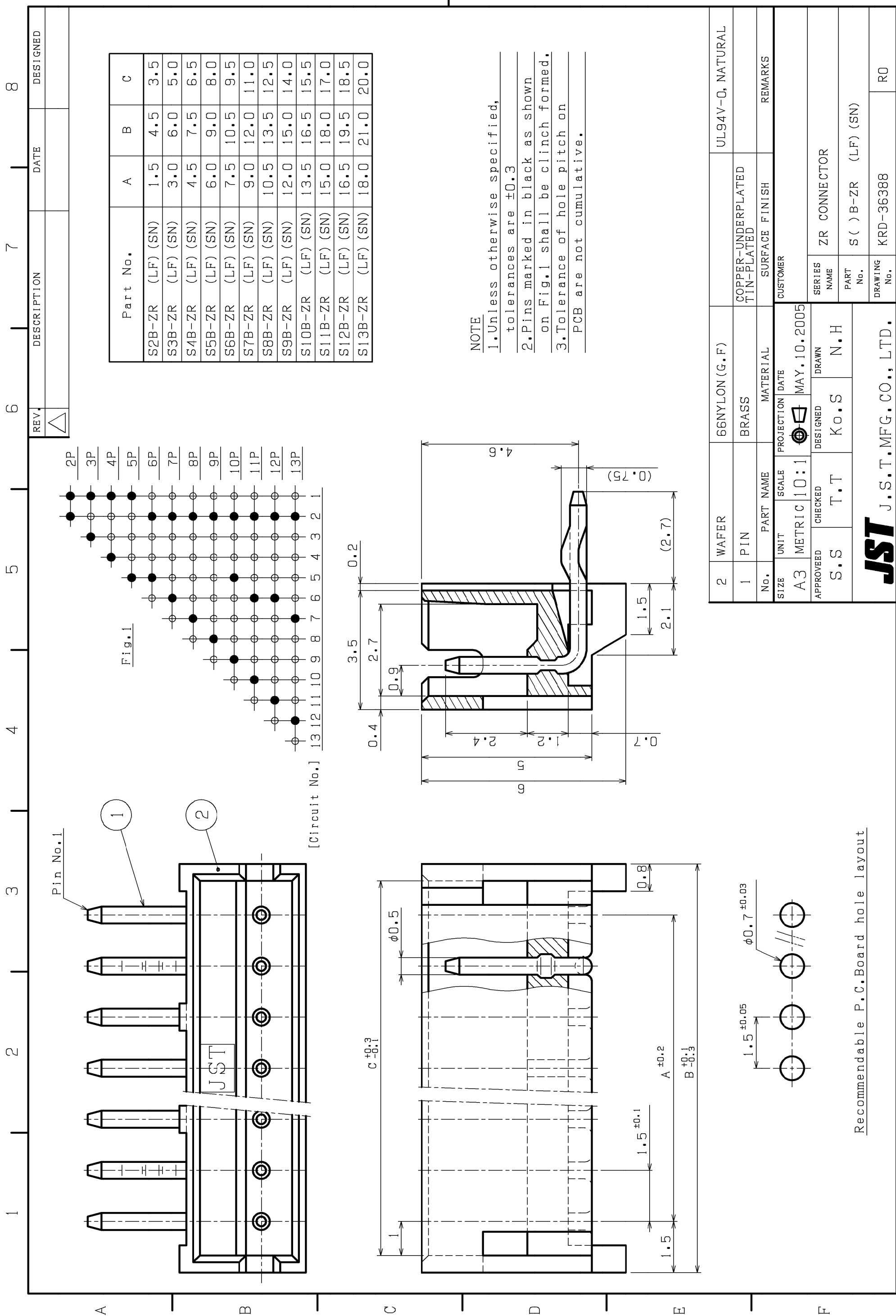
Recommendable P.C.Board hole layout

NOTE
 1. Unless otherwise specified, tolerances are ± 0.3
 2. Pins marked in black as shown on Fig. 1 shall be clinch formed.
 3. Tolerance of hole pitch on PCB are not cumulative.

2	WAFER	66NYLON (G.F.)	UL94V-0, NATURAL
1	PIN	BRASS	COPPER-UNDERPLATED TIN-PLATED
No.	PART NAME	MATERIAL	SURFACE FINISH
SIZE	UNIT	SCALE	PROJECTION DATE
A3	METRIC	10:1	MAY. 10. 2005
APPROVED	CHECKED	DESIGNED	DRAWN
S.S	T.T	Ko.S	N.H
SERIES NAME		ZR CONNECTOR	
PART No.		B () B-ZR (LF) (SN)	
DRAWING No.		KRD-36387	RO

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2	WAFER	66NYLON (G.F.)	UL94V-0, NATURAL
1	PIN	BRASS	COPPER-UNDERPLATED TIN-PLATED
No.	PART NAME	MATERIAL	SURFACE FINISH
SIZE	UNIT	SCALE	PROJECTION
A3	METRIC	10:1	⊕
APPROVED	CHECKED	DESIGNED	DATE
S.S	T.T	Ko.S	MAY.10.2005
		DRAWN	
		N.H	

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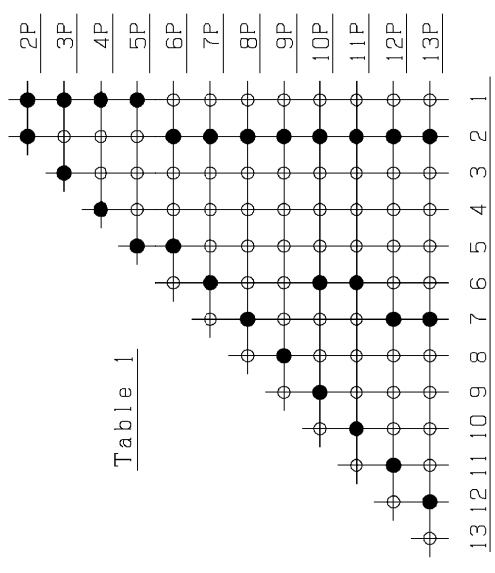
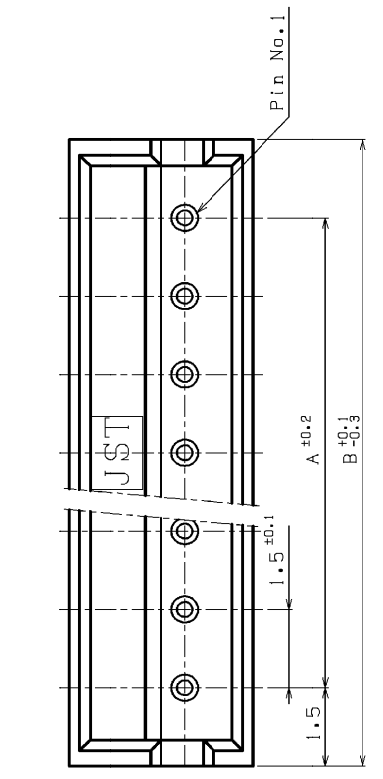
RECOMMENDABLE P.C. BOARD HOLE LAYOUT

1.5 ±0.05 φ0.7 ±0.03

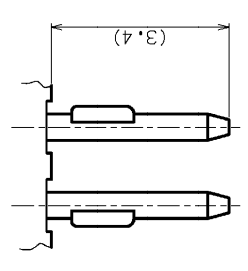
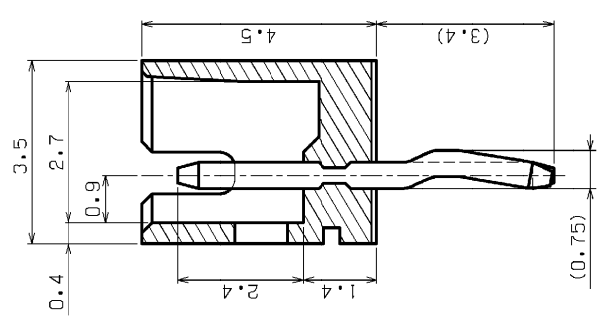
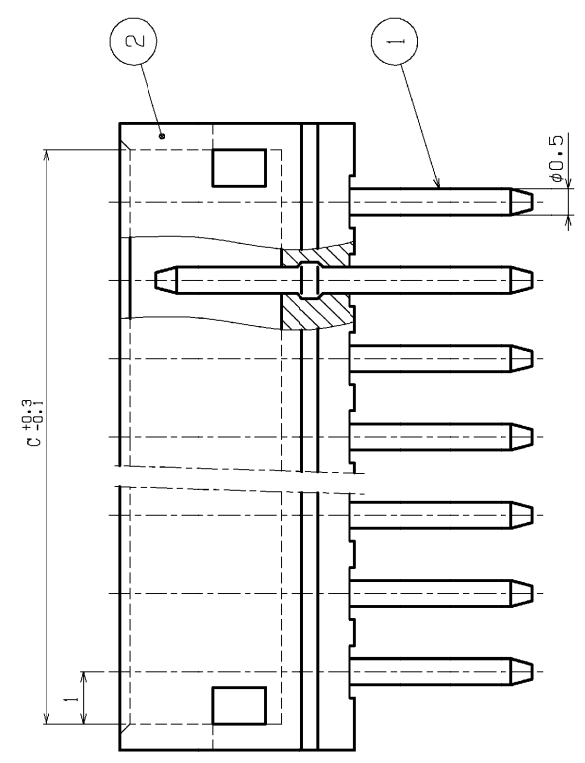
THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO J.S.T. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.

1 2 3 4 5 6 7 8 9 10 11 12

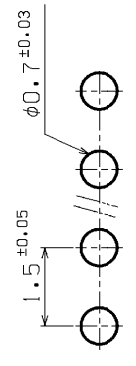
A



Part No.	A	B	C
B2B-ZR-3.4 (LF) (SN)	1.5	4.5	3.5
B3B-ZR-3.4 (LF) (SN)	3.0	6.0	5.0
B4B-ZR-3.4 (LF) (SN)	4.5	7.5	6.5
B5B-ZR-3.4 (LF) (SN)	6.0	9.0	8.0
B6B-ZR-3.4 (LF) (SN)	7.5	10.5	9.5
B7B-ZR-3.4 (LF) (SN)	9.0	12.0	11.0
B8B-ZR-3.4 (LF) (SN)	10.5	13.5	12.5
B9B-ZR-3.4 (LF) (SN)	12.0	15.0	14.0
B10B-ZR-3.4 (LF) (SN)	13.5	16.5	15.5
B11B-ZR-3.4 (LF) (SN)	15.0	18.0	17.0
B12B-ZR-3.4 (LF) (SN)	16.5	19.5	18.5
B13B-ZR-3.4 (LF) (SN)	18.0	21.0	20.0



Clinch configuration of 2-circuit



Recommendable P.C.Board hole layout

NOTE
 1. Pins indicated in black in table 1 shall be clinched.
 2. Unless otherwise specified, tolerances are ± 0.3
 3. Tolerance of hole pitch on PCB are not cumulative.

2	WAFER	66NY1.0N (G.F.)	UI.94V-0, NATURAL.
1	PIN	BRASS	COPPER-UNDERPLATED TIN-PLATED
No.	PART NAME	MATERIAL	SURFACE FINISH
UNIT	SCALE	PROJECTION DATE	CUSTOMER
A2	METRIC 10:1	SEP. 6, 2005	
APPROVED	CHECKED	DESIGNED	DRAWN
S.S	T.T	K.o.S	N.H
			ZR CONNECTOR (TOP TYPE)
			B () B-ZR-3.4 (LF) (SN)
			DRAWING No.
			KRD-36846
			RO

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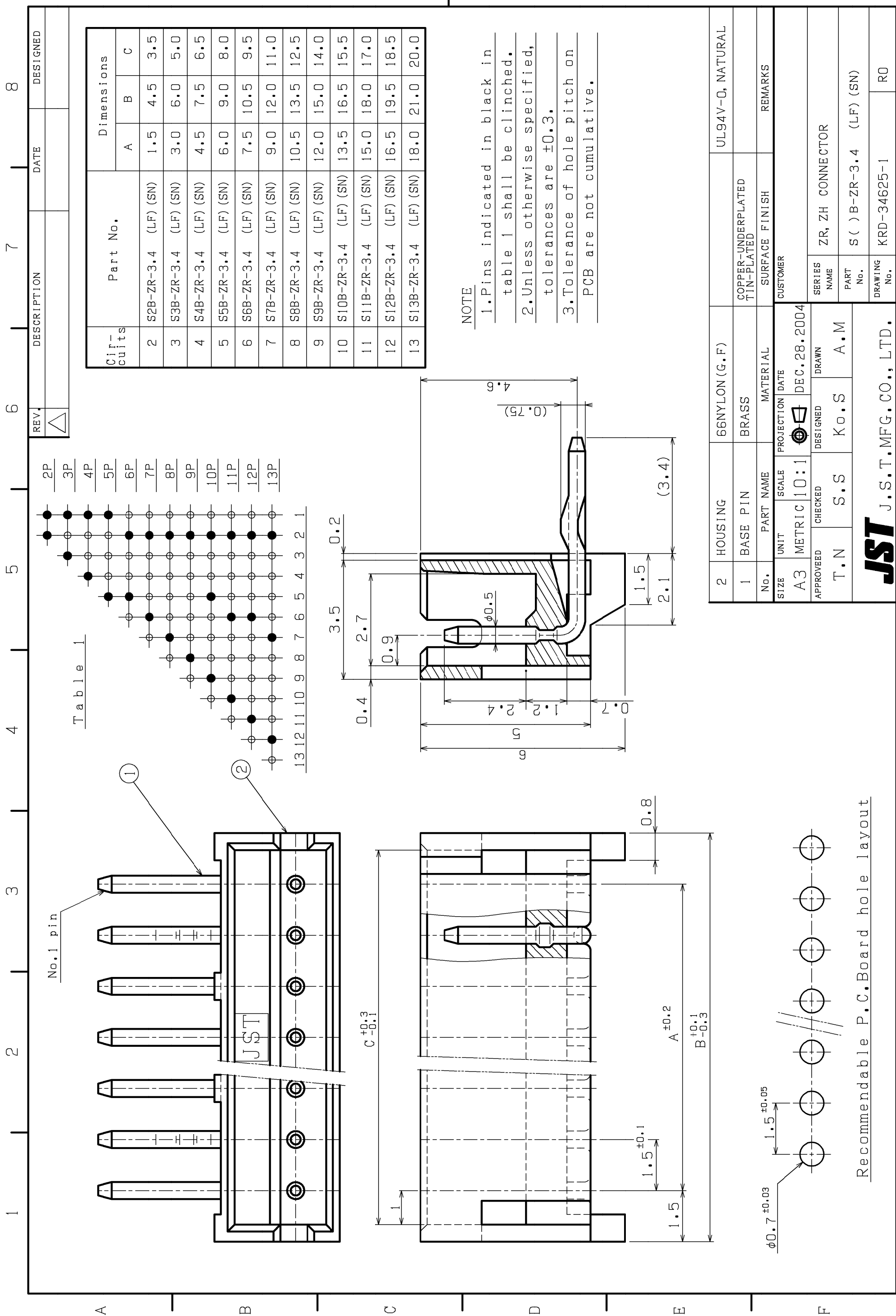


Table 1

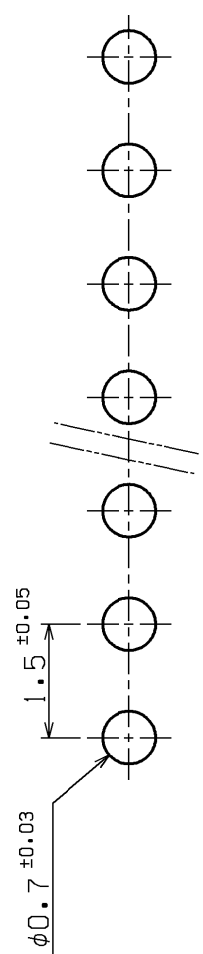
Circuits	Part No.	Dimensions		
		A	B	C
2	S2B-ZR-3.4 (LF) (SN)	1.5	4.5	3.5
3	S3B-ZR-3.4 (LF) (SN)	3.0	6.0	5.0
4	S4B-ZR-3.4 (LF) (SN)	4.5	7.5	6.5
5	S5B-ZR-3.4 (LF) (SN)	6.0	9.0	8.0
6	S6B-ZR-3.4 (LF) (SN)	7.5	10.5	9.5
7	S7B-ZR-3.4 (LF) (SN)	9.0	12.0	11.0
8	S8B-ZR-3.4 (LF) (SN)	10.5	13.5	12.5
9	S9B-ZR-3.4 (LF) (SN)	12.0	15.0	14.0
10	S10B-ZR-3.4 (LF) (SN)	13.5	16.5	15.5
11	S11B-ZR-3.4 (LF) (SN)	15.0	18.0	17.0
12	S12B-ZR-3.4 (LF) (SN)	16.5	19.5	18.5
13	S13B-ZR-3.4 (LF) (SN)	18.0	21.0	20.0

NOTE

1. Pins indicated in black in table 1 shall be clinched.
2. Unless otherwise specified, tolerances are ± 0.3 .
3. Tolerance of hole pitch on PCB are not cumulative.

2	HOUSING	66NYLON (G.F.)	UL94V-0, NATURAL
1	BASE PIN	BRASS	COPPER-UNDERPLATED TIN-PLATED
No.	PART NAME	MATERIAL	SURFACE FINISH
SIZE	UNIT	SCALE	PROJECTION
A3	METRIC	10:1	DEC.28.2004
APPROVED	CHECKED	DESIGNED	DRAWN
T.N	S.S	Ko.S	A.M
SERIES NAME		ZR, ZH CONNECTOR	
PART No.		S () B-ZR-3.4 (LF) (SN)	
DRAWING No.		KRD-34625-1	
REMARKS		CUSTOMER	

Recommendable P.C.Board hole layout



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