COMMON PARTS/MATERIALS, SPACE USE, APPLICATION DATA SHEET FOR

Part Description	CONNECTORS, RECTANGULAR,MICROMINIATURE, HIGH RELIABILITY, SPACE USE
Part Number and Type	JD115-**P-R**** JD115-**S-R**** JD115-**P-S* JD115-**S-S* JD115-**P-W****** JD115-**S-W******
Applicable Specification	JAXA-QTS-2060 JAXA-QTS-2060/F201

November 2021

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Issued by Japan Aerospace Exploration Agency

This document is the English version of JAXA QTS/ADS which was originally written and authorized in Japanese and carefully translated into English for international users. If any question arises as to the context or detailed description, it is strongly recommended to verify against the latest official Japanese version.

The release date of the English version of this specification: January 13, 2022

Revision Log

Rev.	Date	Revised Contents
NC	1 Nov 2021	Original

Contents

COMMON PARTS AND MATERIALS, SPACE USE,
APPLICATION DATA SHEET FOR

1. GENERAL

1.1 Scope

This Application Data Sheet details information necessary for JAXA qualified parts selection, equipment design and usage. Users are responsible for their decisions on part selection, equipment design and usage.

1.2 Applicable Documents

JAXA-QTS-2060	Connectors, High Reliability, Space Use, General Specification for
JAXA-QTS-2060/F201	Connectors, Rectangular, Microminiature, High Reliability, Space Use, Detail Specification For
MIL-STD-1344	Test Methods for Electrical Connectors

2. SUMMARY OF PRODUCTS

2.1 Outline

The rectangular microminiature connectors (herein after referred to as “connectors”) described in this data sheet are high reliability parts for electronic equipment to be installed on satellites and/or aircrafts that are required to be compact and lightweight and for data communication equipment that is required to be made even smaller. The contact size is #24 and they are available in eight shell sizes that accommodate from 9 to 100 contacts. Contact pitch of the connectors is 1.27mm, which is half of that of D-sub connectors. Considering outgas and sublimation in space environment, gold plate, etc. is used for materials and surface treatment of connectors. Shells are rectangular in shape and the mating opening is of D-shape to prevent mis-mating.
Contacts are fixed with epoxy resin, and delivered with wires, solder cup and solid wires attached.
The connectors are interchangeable with MIL-certified Micro-D connectors.

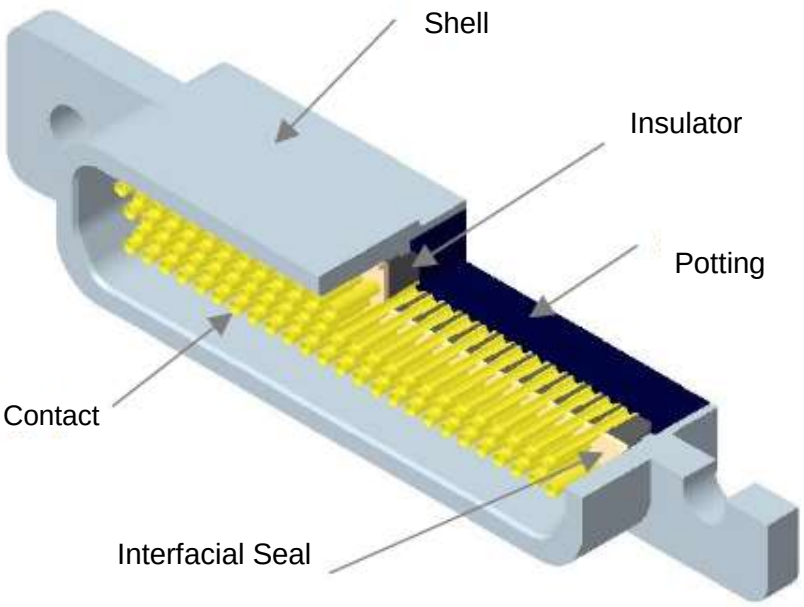
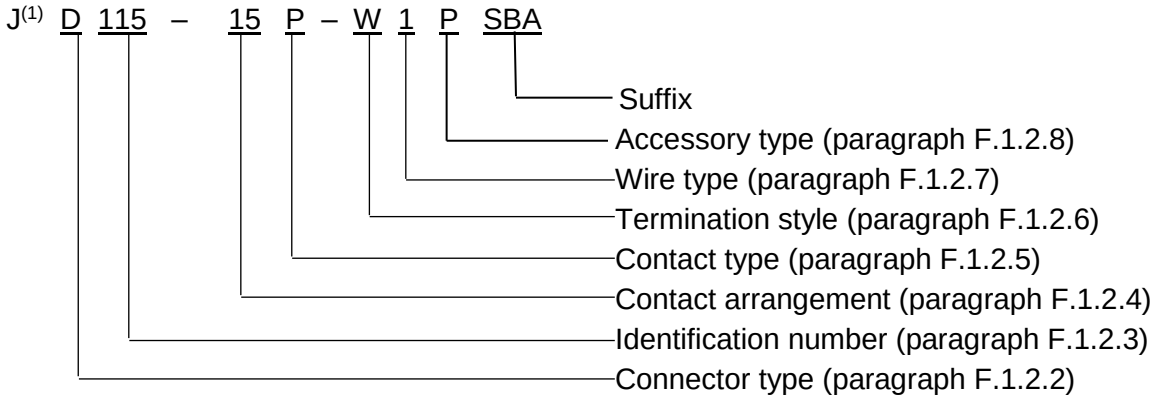


Figure 1. Connector Cross-Section View

2.2 Nomenclature of the Connectors

Nomenclature of the connectors is as follows.



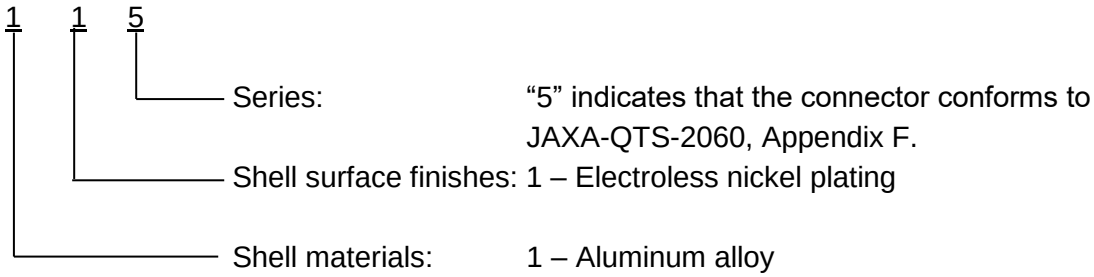
Note: (1) "J" indicates the common part for space use.

2.2.1 Connector Type

The connector type is identified by a single capital letter. "D" indicates a D type shell rectangular connector.

2.2.2 Identification Number

The identification number is identified by three digits as follows.



2.2.3 Contact Arrangement

Contact arrangement is identified by a single, two-digit or three-digit number which indicates the number of contacts.
(9, 15, 21, 25, 31, 37, 51, 100)

2.2.4 Contact Type

Contact type is identified by a single capital letter, "P" or "S", which indicates a pin contact (male) or socket contact (female), respectively.

2.2.5 Termination Style

Termination style is identified by a single capital letter as shown in Table 1.

Table 1. Termination Style

Code	Termination style
W	Wire
S	Solder
R	Right angle(1)

Note: (1) Through hole type for printed boards.

2.2.6 Wire Type

Wire type only used for the termination style "W" is identified by a single number and indicates as shown in Table 2.

Table 2. Wire Type

Code	Wire type	Wire size	Wire color
2	M22759/33	26 AWG	White
3	M22759/33	26 AWG	Repetition of 10 colors (MIL-STD-618 SYSTEM 1)

2.2.7 Accessory Type

Accessories for the rectangular microminiature connectors are identified by a single capital letter as shown in Table 3.

Table 3. Accessory Type

Code	Type		Shape of screw	Shape of screw head
P	Jackpost assembly (1) (3)	For 9 to 51 contacts	-	-
M	Floating jackscrew assembly		-	Slot
L	Jackscrew assembly		Low profile	Slot
R	Jackscrew assembly		Low profile	Hexagon
K	Jackscrew assembly		High profile	Slot
Q	Jackscrew assembly		High profile	Hexagon
S	Jackpost assembly (2) (3)	For 100 contacts	-	-
F	Fixed jackscrew assembly		-	Slot
J	Jackscrew assembly		Low profile	Slot
N	Jackscrew assembly		Low profile	Hexagon
H	Jackscrew assembly		High profile	Slot
T	Jackscrew assembly		High profile	Hexagon

Notes:

(1) Applicable for all jackscrew assemblies for 9 to 51 contacts.

(2) Applicable for all jackscrew assemblies for 100 contacts.

(3) Jackpost assembly is not installed in connectors at delivery.

2.2.8 Suffix

Suffix indicates wire terminal specification and is identified by 4-digit number or triple capital letters, that are added to wire type and right angle type as shown in Table 4.

Table 4. Suffix

Termination Style	Suffix	Description
Wire	####	Wire length shall be displayed in 4 digits and the unit shall be set to mm.
Right Angle	###	S B A Terminal length (1) A: 2.9mm B: 3.1mm C: 2.5mm Terminal bending position (1) A: 7.5mm B: 6.5mm C: 11mm Orientation of mating direction when mounted on top plane of the printed wiring board (1) S: Standard R: Reverse

Note: (1) Combinations of the number of contacts, terminal bending position and mating direction are shown in Supplementary Figures F-6 and F-7 of detailed specification.

2.3 Cross-Section View of Connectors

Cross-section views of connectors are shown in Figures 2 through 7.

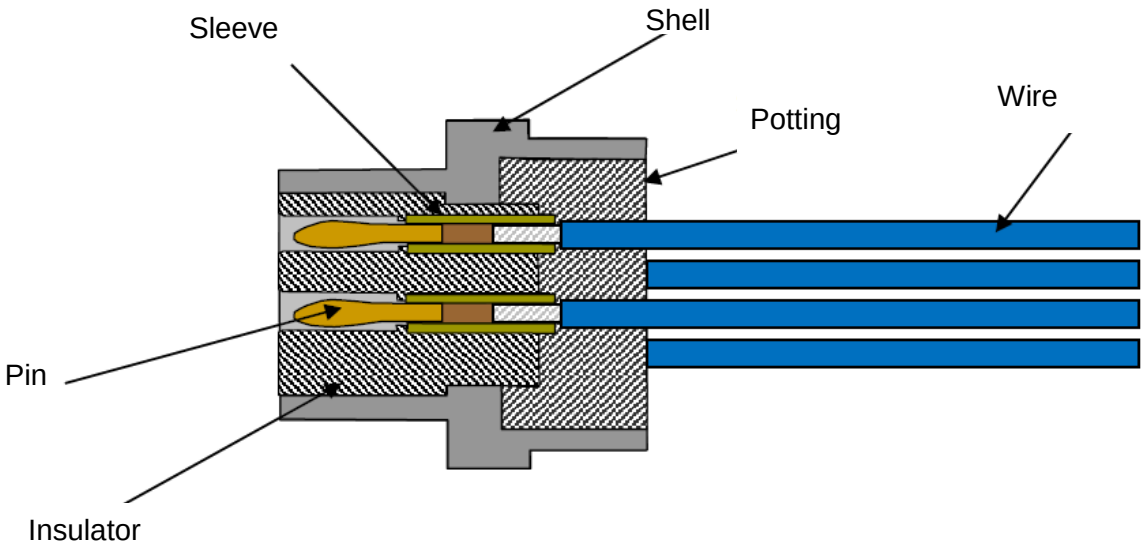


Figure 2. Wire Type (Pin Side)

(JD115-*P-W****)**

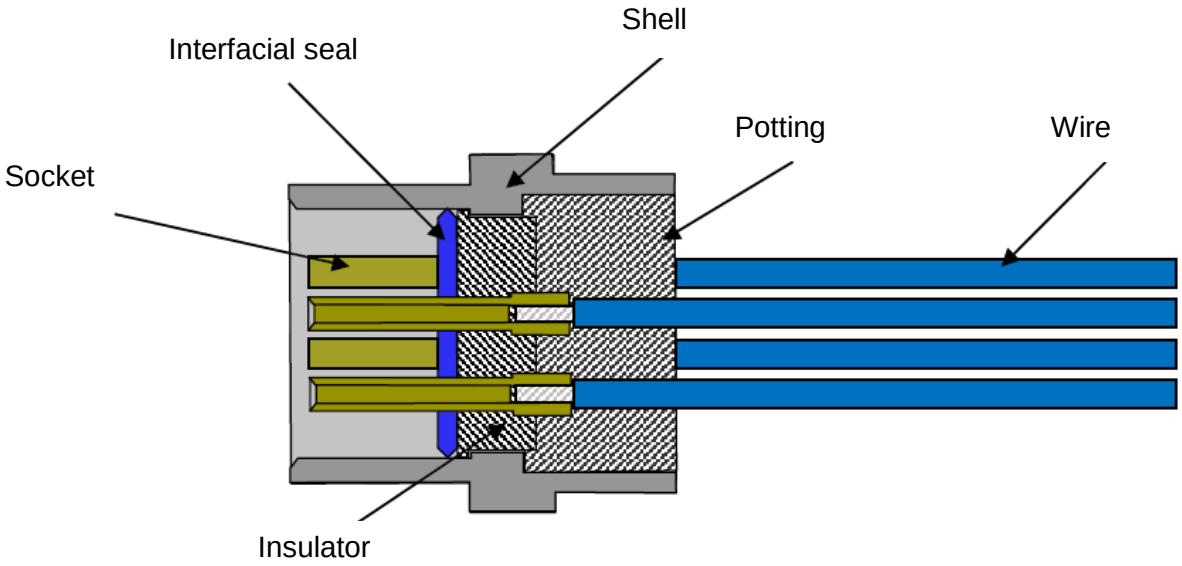


Figure 3. Wire Type (Socket Side)

(JDI15-*S-W****)**

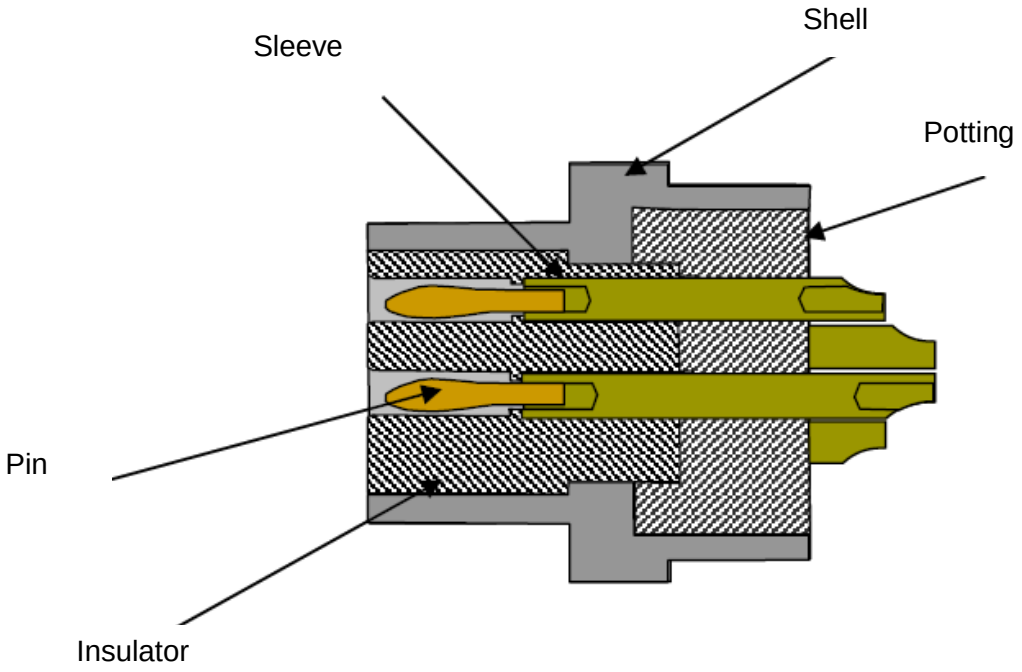


Figure 4. Soldering Type (Pin Side)

(JD115-*P-S*)

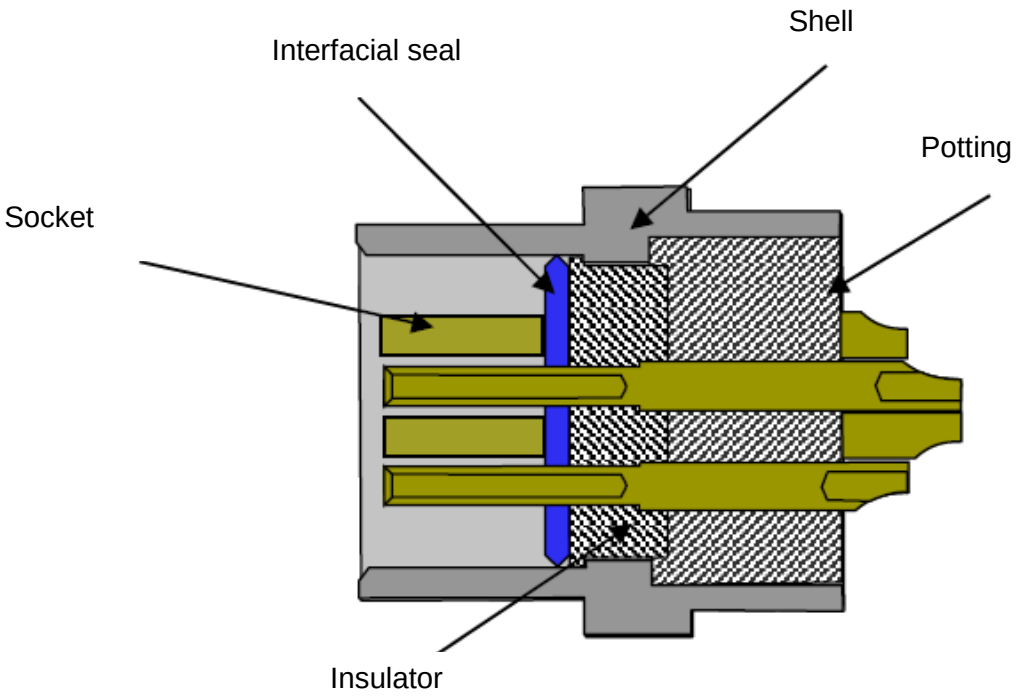


Figure 5. Wire Type (Socket Side)
(JD115-*S-S*)

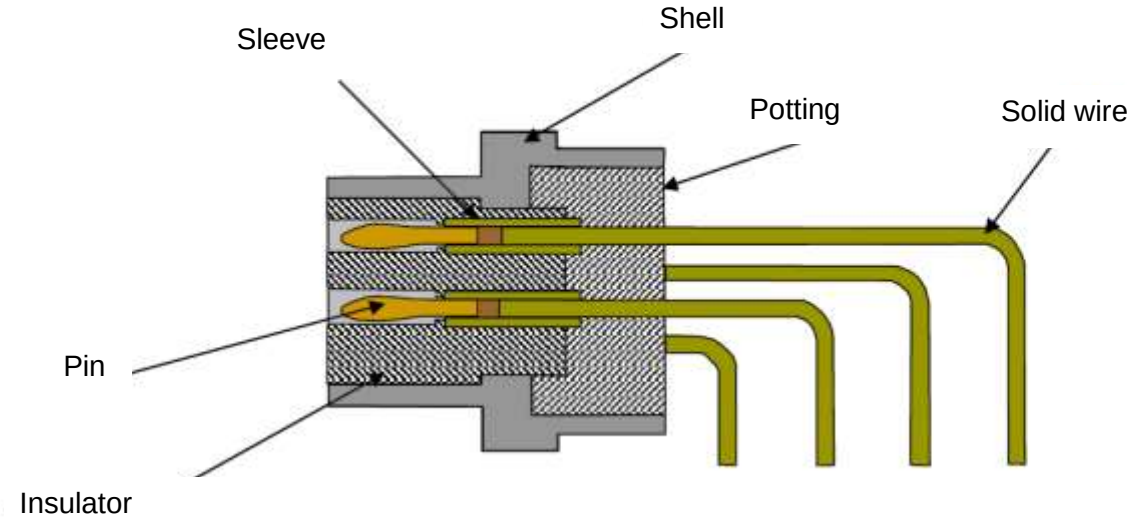


Figure 6. Wire Type (Pin Side)
(JD115-*P-R***)**

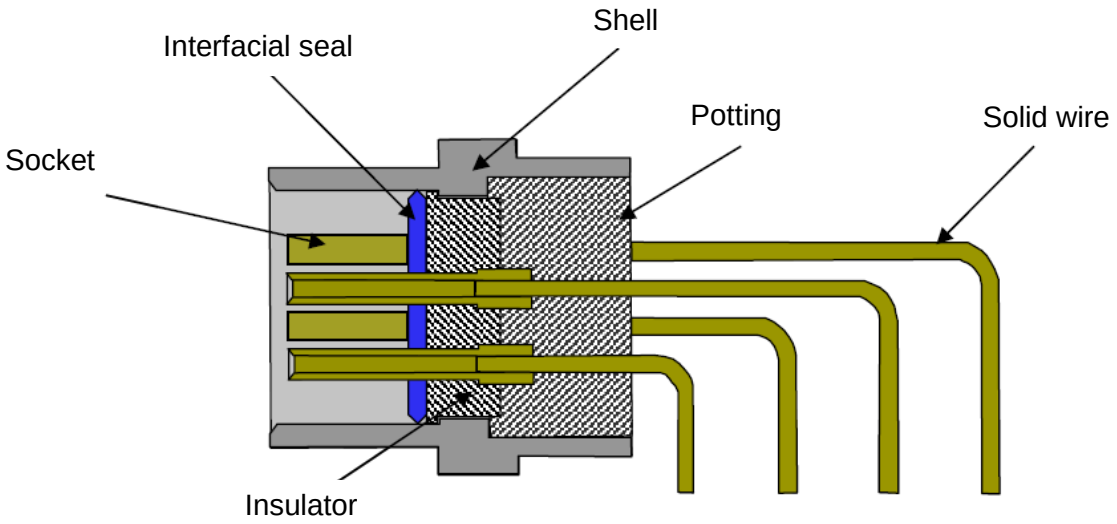


Figure 7. Soldering Type (Socket Side)

(JD115-*S-R***)**

2.4 Contact Arrangement

There are eight contact arrangements to accommodate 9 to 100 contacts as shown in Figure 8.

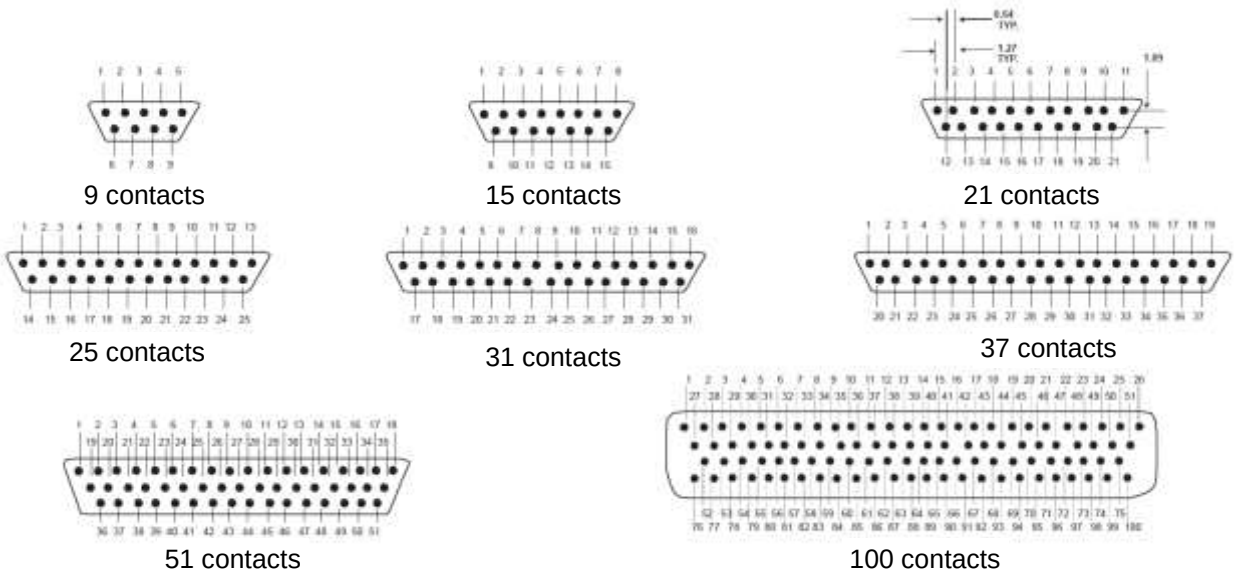


Figure 8. Contact Arrangements

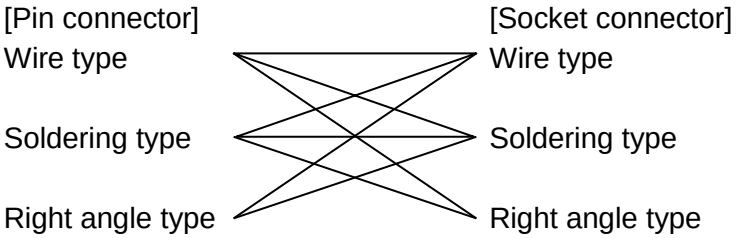
Note: The figure above is the engaging face of the pin connector. The engaging face of the socket connector is a mirror image of the above figure.

2.5 Connection Methods

The followings connections are applicable.
Between panel chassis and cable
Between cable and cable
Between cable and printed wiring board (PWB)

2.6 Interchangeability of Connectors

Pin connectors and socket connectors of the same number of pins and sockets are intermatable as follows.



2.7 Applicable Wire Sizes

Applicable wire sizes to soldering type is 26AWG or smaller.
For right angle type connectors, the recommended through hole diameter is φ0.8mm to allow φ0.46mm for contact soldering.

3. USAGE

3.1 Tools for Wiring and Assembly

The contacts can be wired and assembled with general tools such as wire strippers and soldering irons.

3.2 Wiring and Assembly Methods

Wiring and assembly shall be performed in accordance with the processes shown in Table 5. Each process is detailed in paragraph shown in the “Paragraph no.” column.

Table 5. Processes for Wiring and Assembly

Paragraph no.		Process	Connector type	
			Soldering	Through hole
3.2.1		Stripping wire jacket	O	
3.2.2		Soldering	O	O
	(1)	Soldering type	O	
	(2)	Right angle type		O

3.2.1 Stripping Wire Jacket

Strip the jacket at the termination side end using wire strippers by the length of 2.0+0.5/0mm as shown in Figure 9 below.

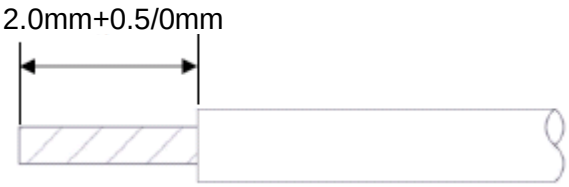


Figure 9. Stripping Length of Wire Jacket

Notes:

(1) Stripping length is a recommended dimension. Use an appropriate length according to wire type and wire insertion condition.
(2) Ensure not to damage or lose the individual wires while stripping. Keep the stranded wires from loosening.
(3) For jackets which are difficult to remove, part of the jacket may stick to the conductor. Remove any jacket fragments from the conductor.
(4) Perform soldering immediately after removal of the jacket before the conductor surface is oxidized.

3.2.2 Soldering

(1) Soldering type
Solder wires to the connectors using 295°C to 345°C soldering iron. Do not hold the soldering iron in contact with the contacts for more than ten seconds to keep the insulator from thermal deformation.
Remove residue flux after soldering.

(2) Right angle type
Fix the connector on a PWB securely with screws or by other methods and solder at the through hole.
Remove residue flux after soldering.

3.3 Dimensions for Mounting Holes

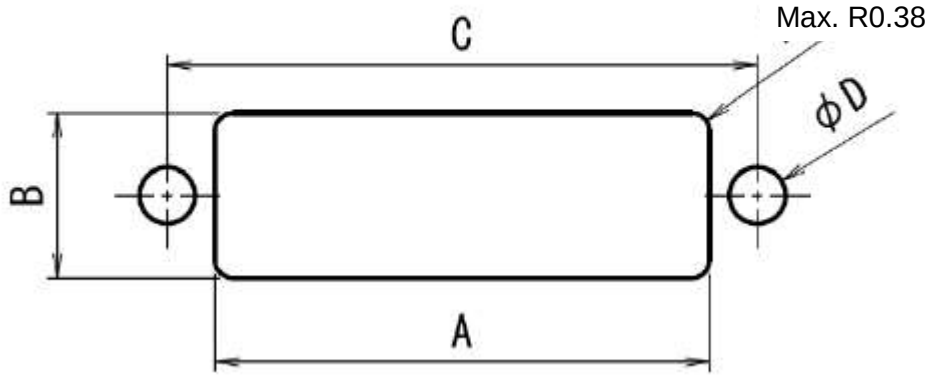
3.3.1 Wire Type and Soldering Type Connectors

Recommended mounting hole dimensions of panel chassis for panel mounting are shown in Table 6.
Recommended dimensions are for front panel mounting. As for rear panel mounting, separate parts are necessary.

Table 6. Mounting Hole Dimensions of Panel Chassis

Unit: mm

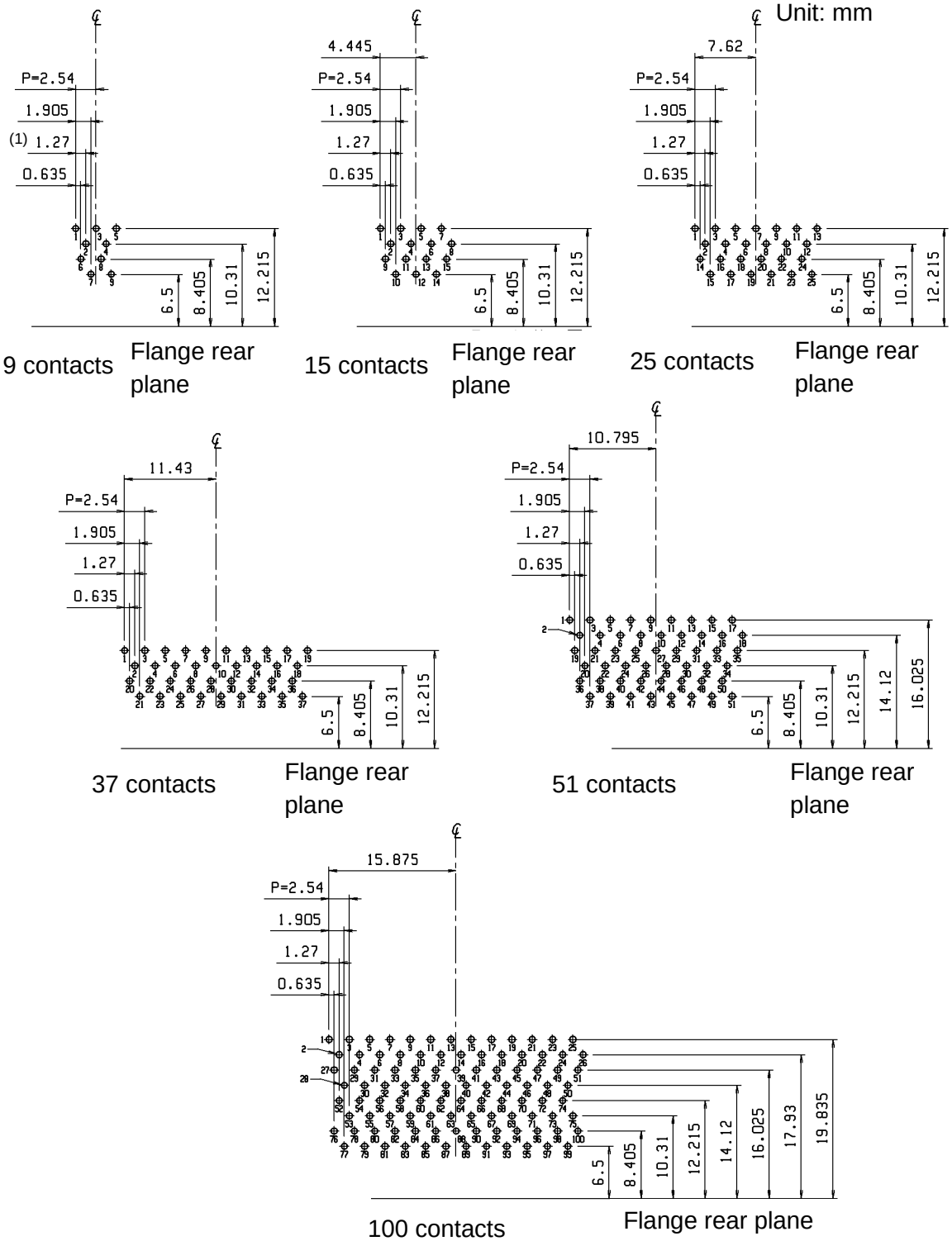
No. of contacts	A+0.1/0	B+0.1/0	C±0.13	ΦD+0.13/0
9	10.36	6.86	14.35	2.26
15	14.17	6.86	18.16	2.26
21	17.98	6.86	21.97	2.26
25	20.52	6.86	24.51	2.26
31	24.33	6.86	28.32	2.26
37	28.14	6.86	32.13	2.26
51	26.87	8.00	30.86	2.26
100	36.98	9.17	45.72	3.00



3.3.2 Right Angle Type Connectors

Recommended dimensions for the through holes on a PWB are shown in Figure 10. Recommended through hole diameter is φ0.8mm.

Unit: mm

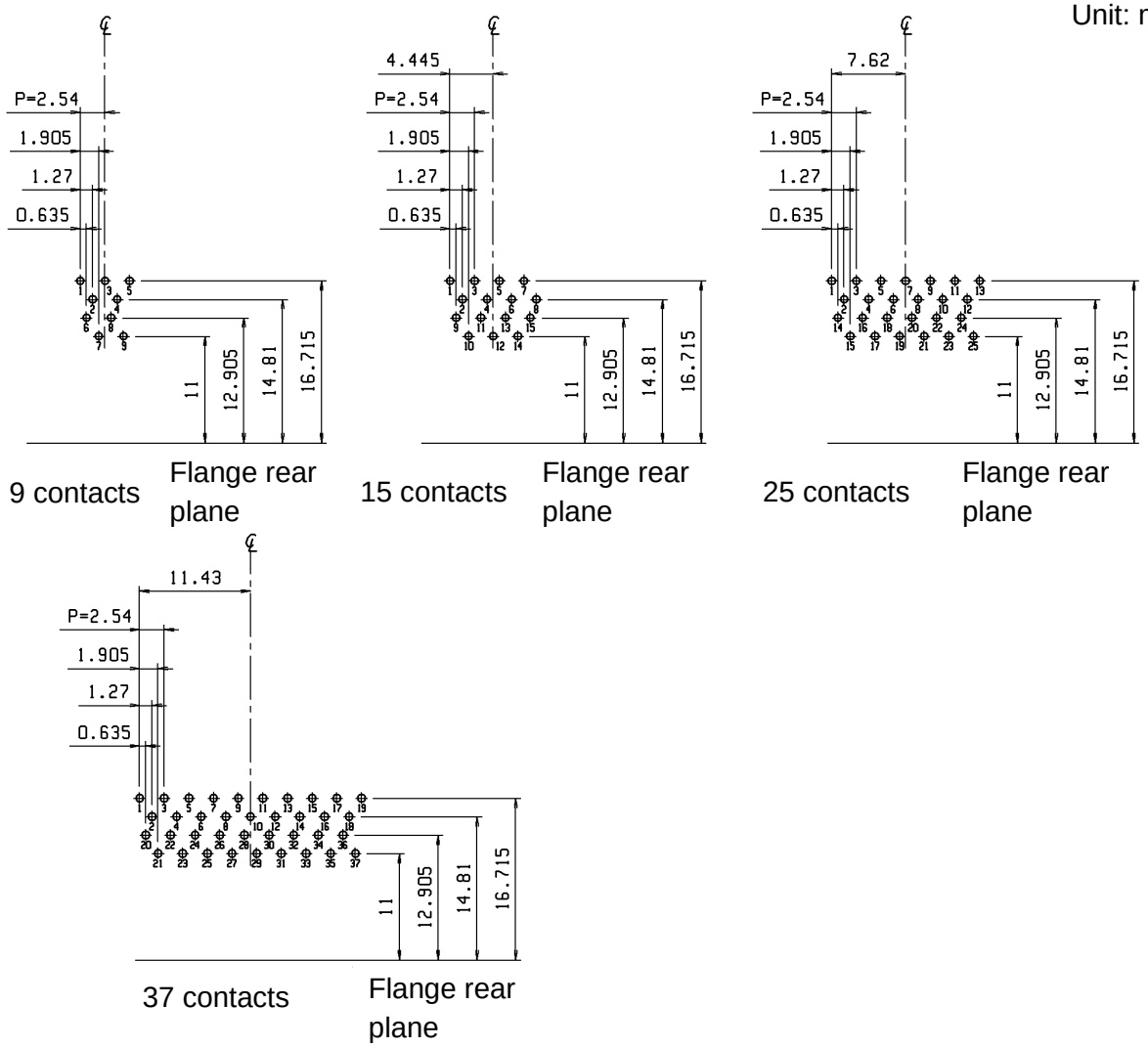


Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (1/12)

(Standard Type, Pin Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 6.5mm)

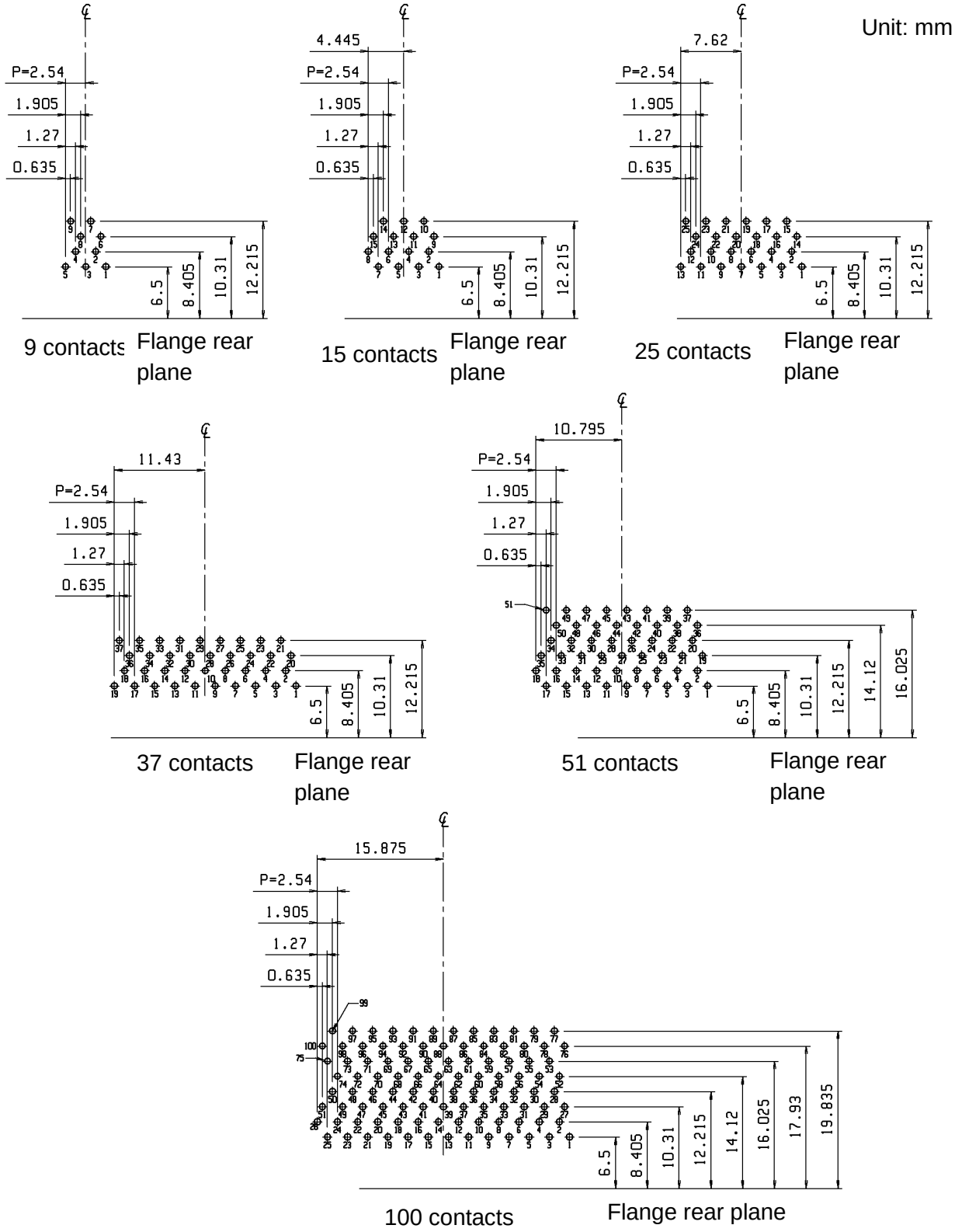
Unit: mm



Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (2/12) (Standard Type, Pin Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 11mm)

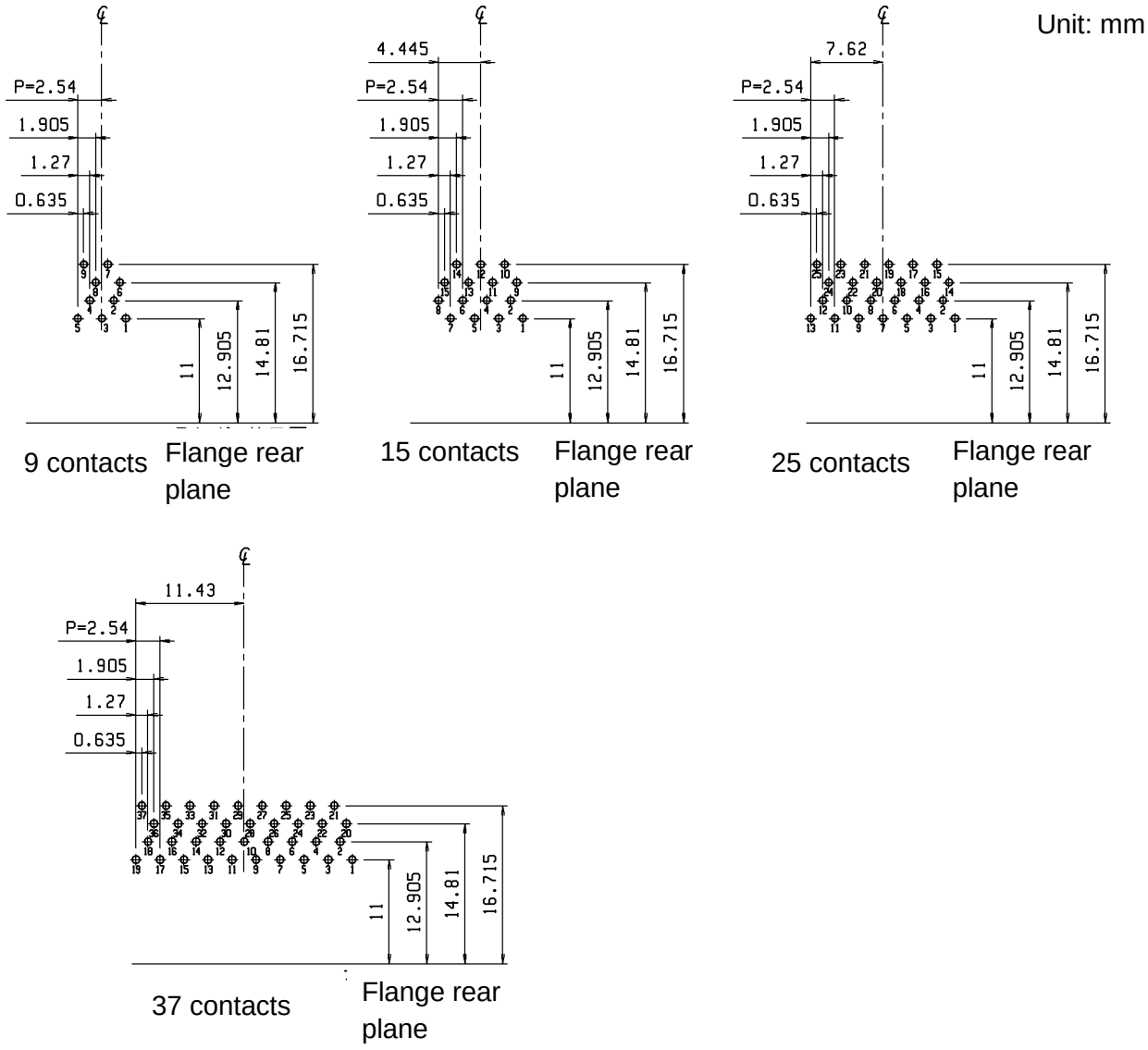
Unit: mm



Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (3/12)
(Reverse Type, Pin Connectors, Terminal Bending Pitch: 1.905mm,
Terminal Bending Position: 6.5mm)

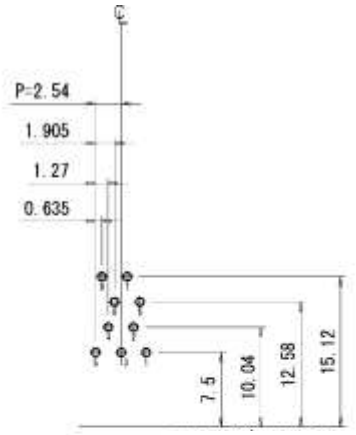
Unit: mm



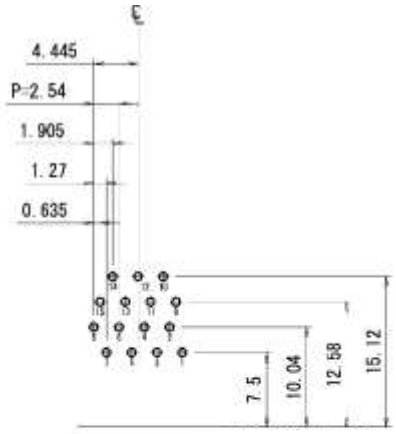
Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (4/12)
(Reverse Type, Pin Connectors, Terminal Bending Pitch: 1.905mm,
Terminal Bending Position: 11mm)

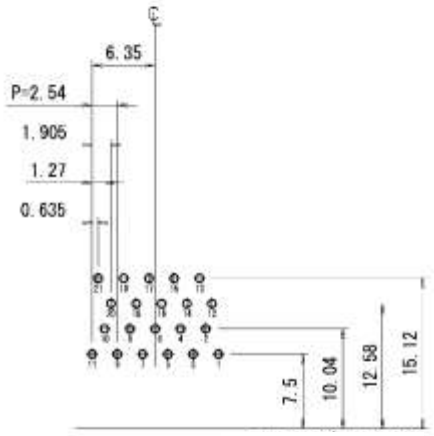
Unit: mm



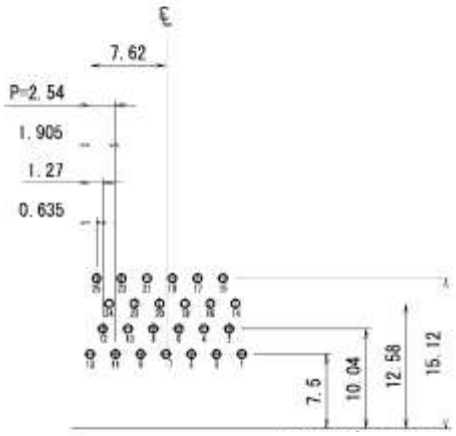
9 contacts Flange rear plane



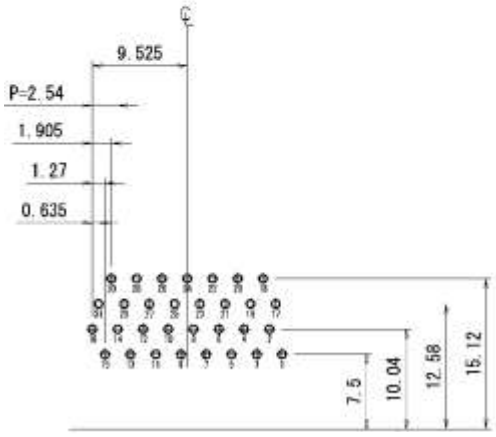
15 contacts Flange rear plane



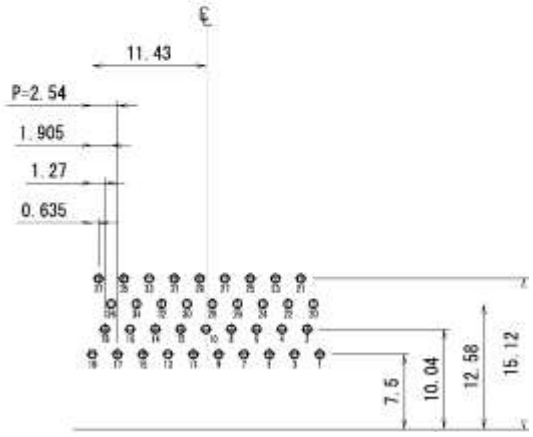
21 contacts Flange rear plane



25 contacts Flange rear plane



31 contacts Flange rear plane



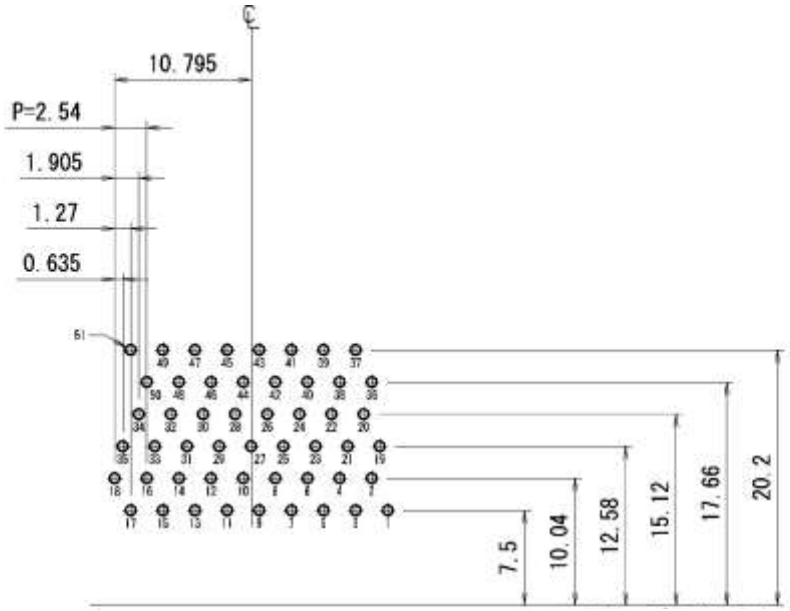
37 contacts Flange rear plane

Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (5/12)

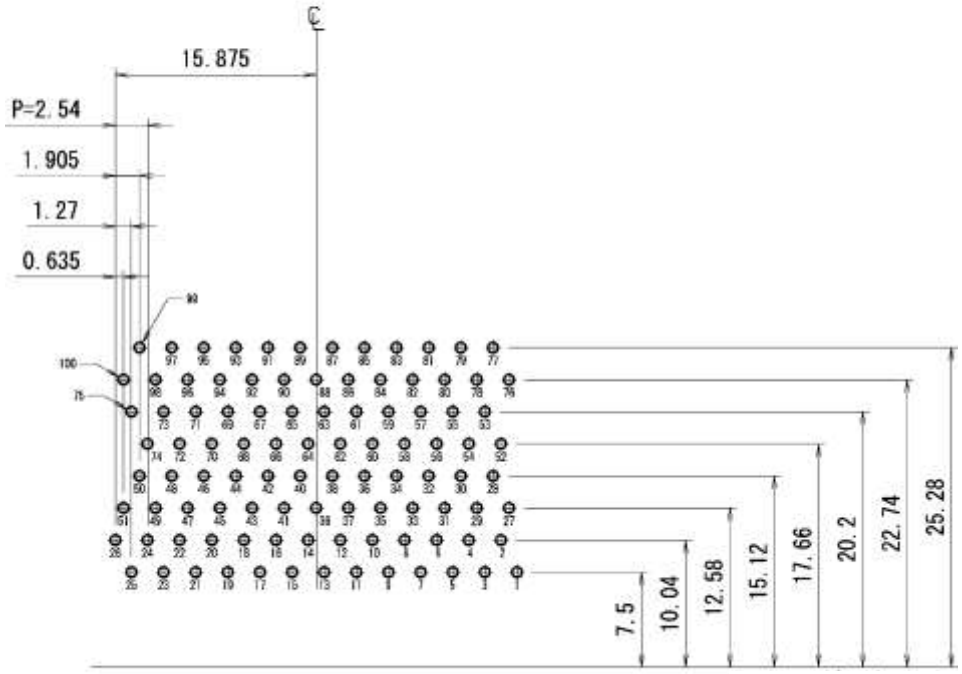
(Reverse Type, Pin Connectors, Terminal Bending Pitch: 2.54mm, Terminal Bending Position: 7.5mm)

Unit: mm



51 contacts

Flange rear plane



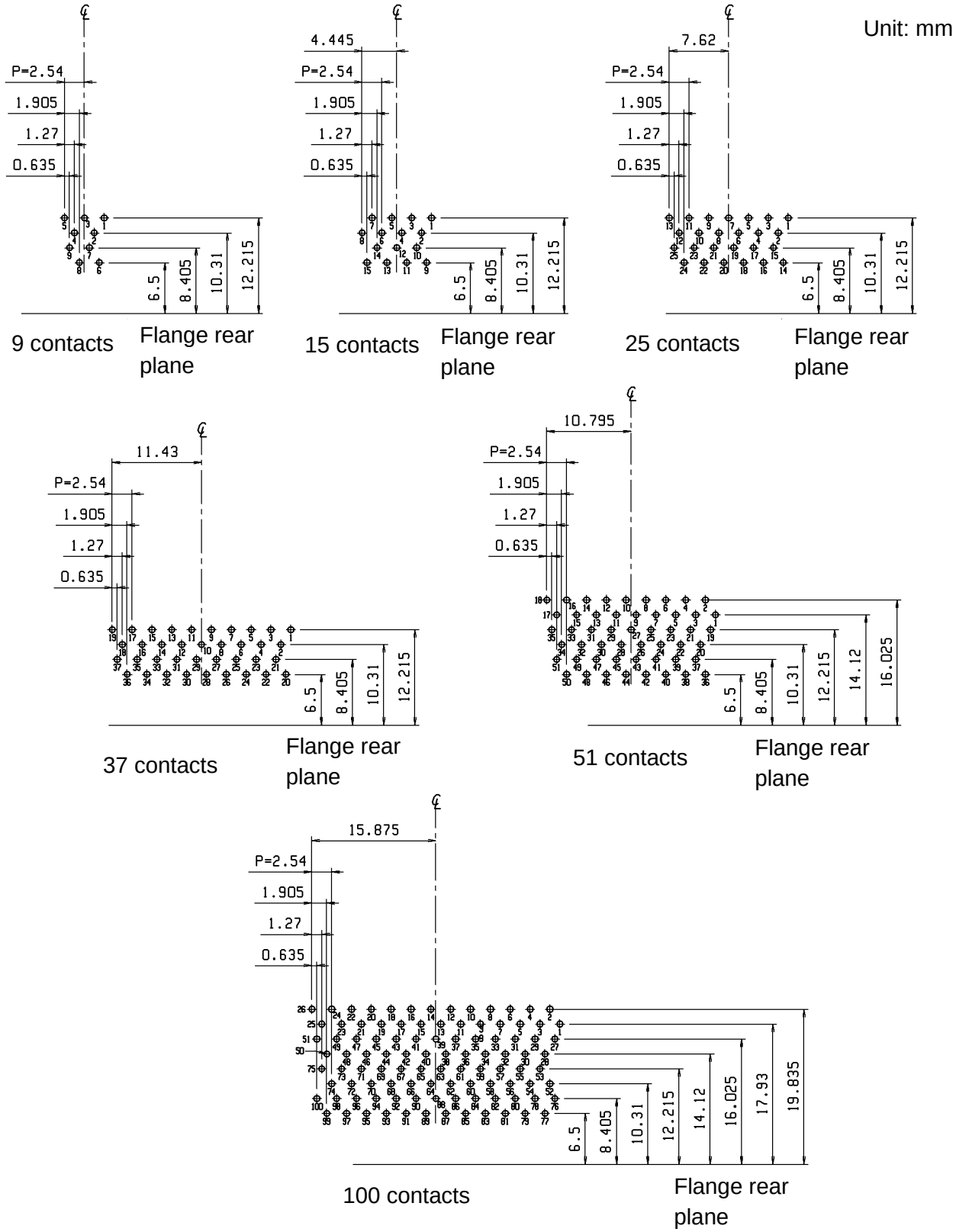
100 contacts

Flange rear plane

Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (6/12) (Reverse Type, Pin Connectors, Terminal Bending Pitch: 2.54mm, Terminal Bending Position: 7.5mm)

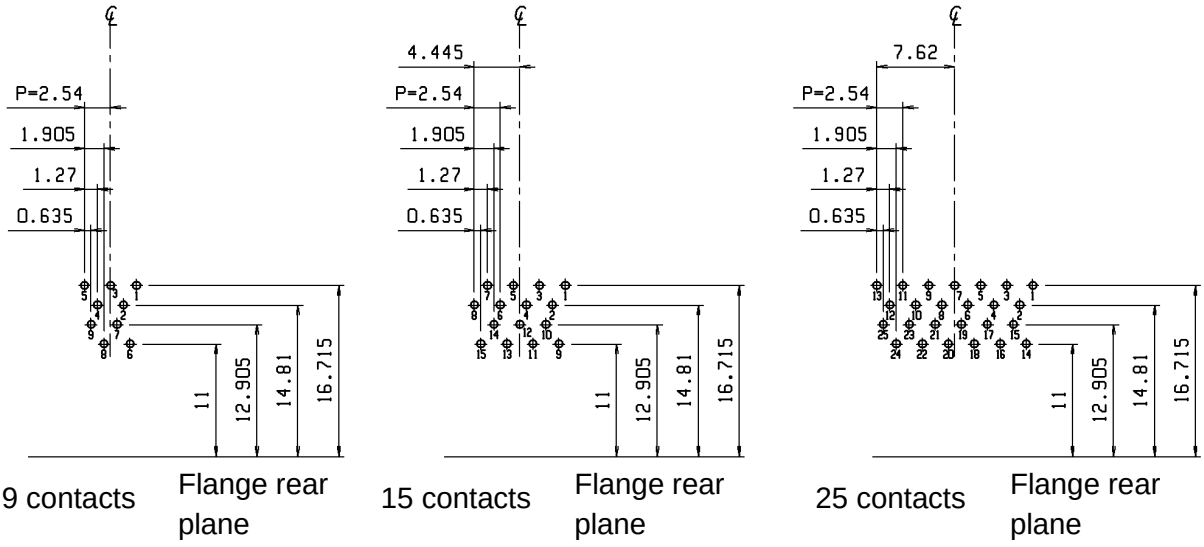
Unit: mm

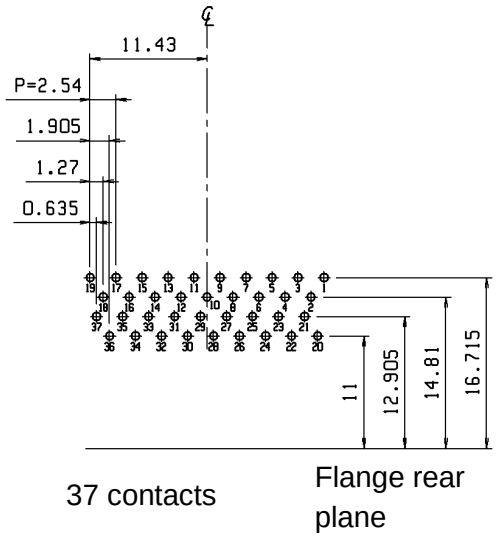


Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (7/12) (Standard Type, Socket Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 6.5mm)

Unit: mm

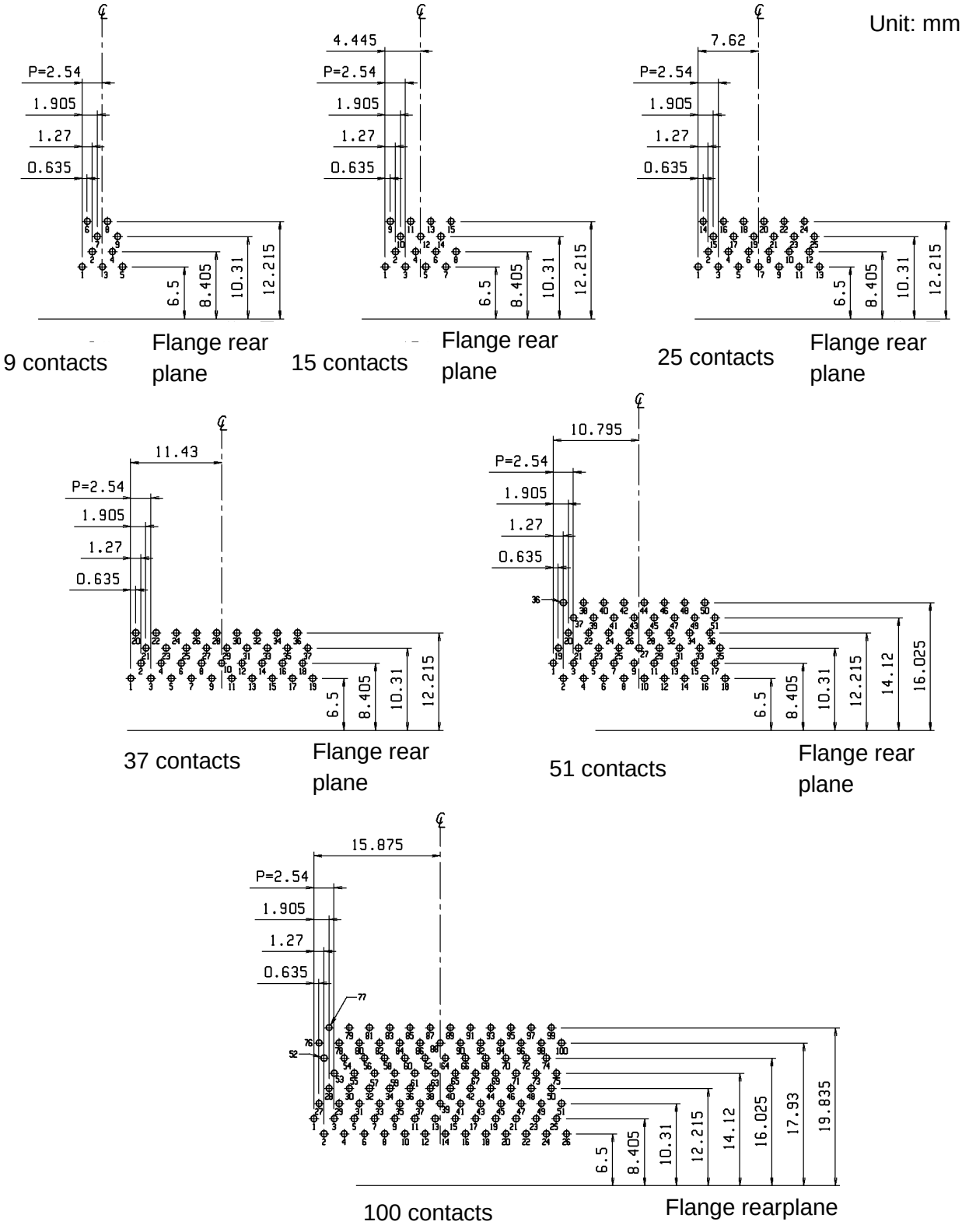




Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (8/12) (Standard Type, Socket Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 11mm)

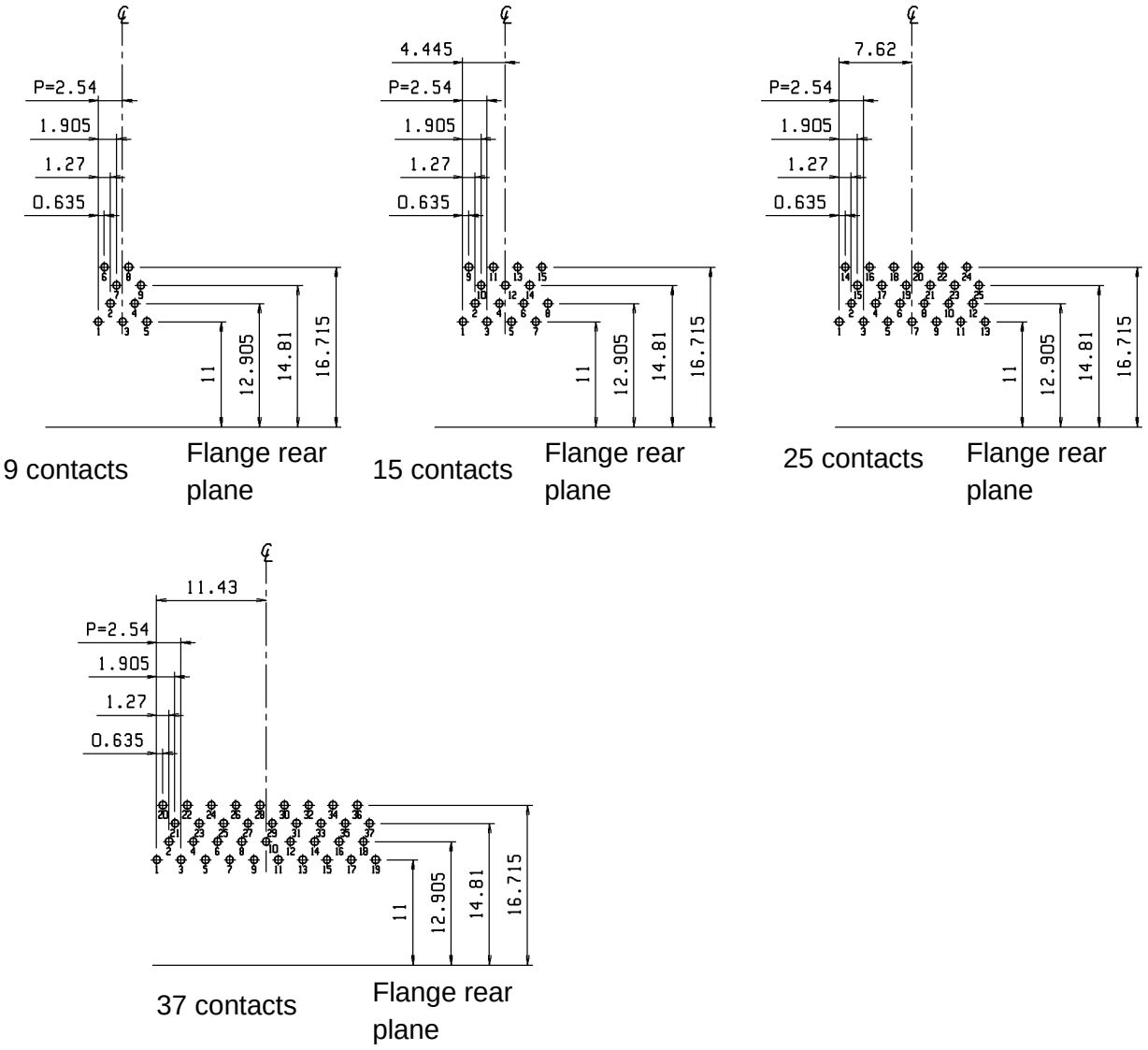
Unit: mm



Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (9/12) (Reverse Type, Socket Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 6.5mm)

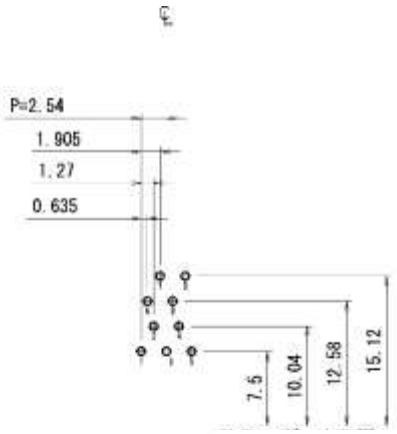
Unit: mm



Note(1) View from connector mounting side shown.

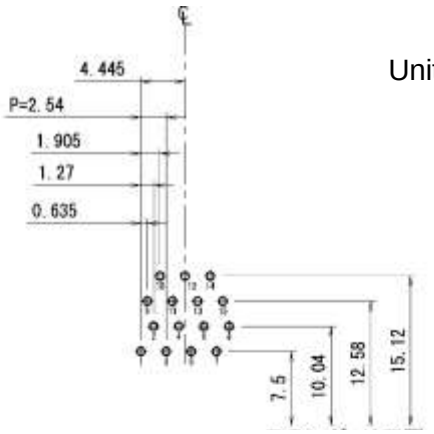
Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (10/12) (Reverse Type, Socket Connectors, Terminal Bending Pitch: 1.905mm, Terminal Bending Position: 11mm)

Unit: mm



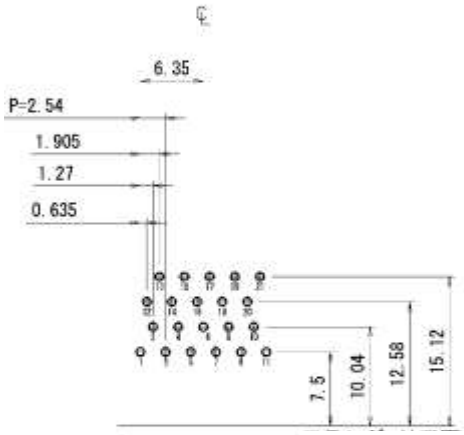
9 contacts

Flange rear plane



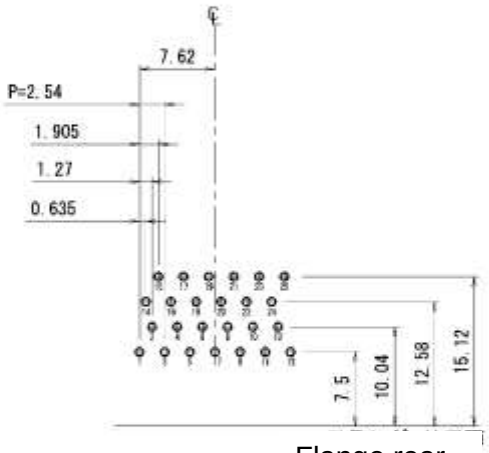
15 contacts

Flange rear plane



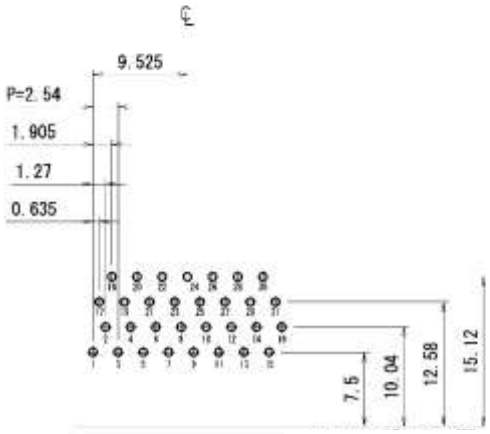
21 contacts

Flange rear plane



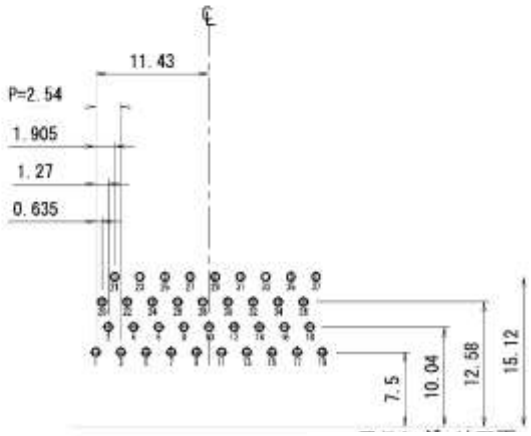
25 contacts

Flange rear plane



31 contacts

Flange rear plane



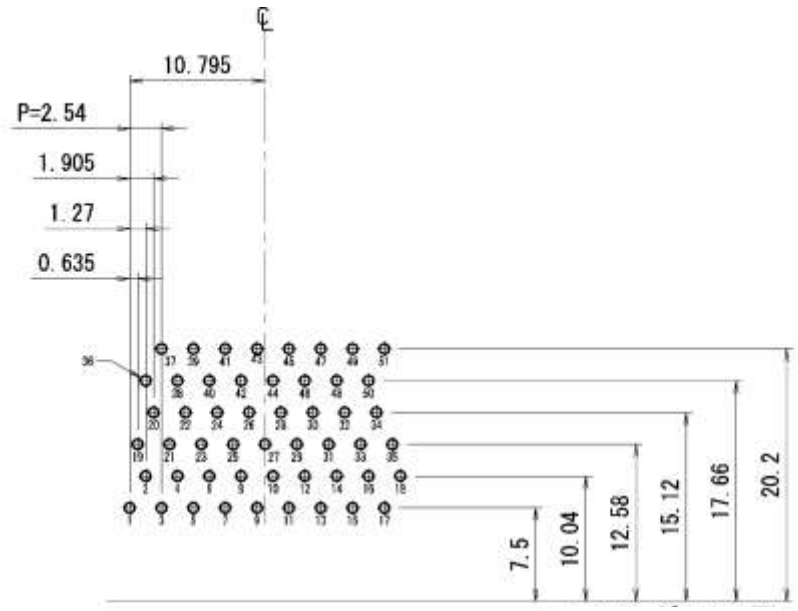
37 contacts

Flange rear plane

Note(1) View from connector mounting side shown.

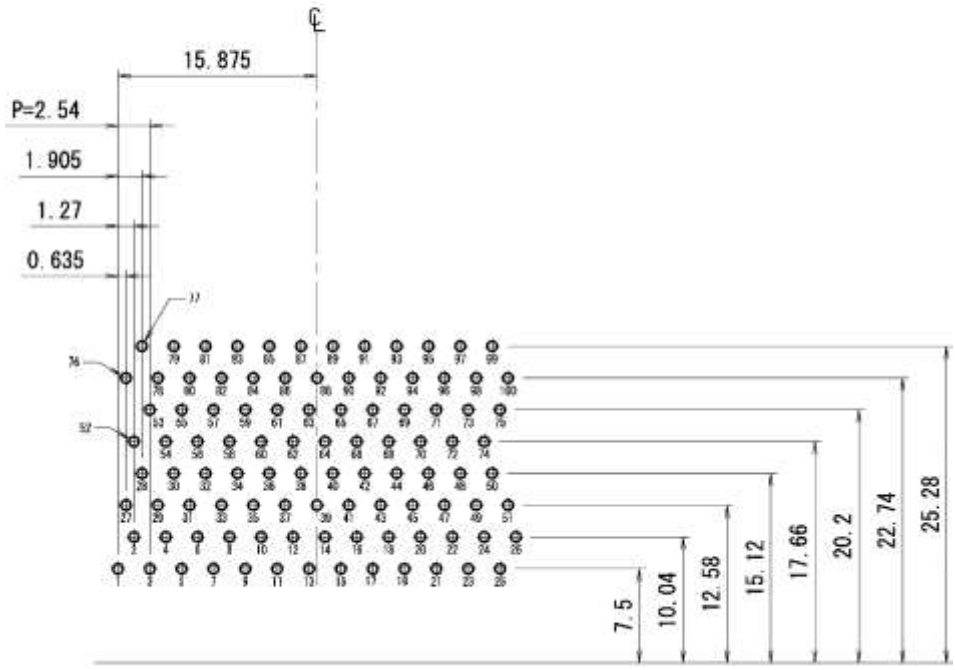
Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (11/12)
(Reverse Type, Socket Connectors, Terminal Bending Pitch: 2.54mm,
Terminal Bending Position: 7.5mm)

Unit: mm



51 contacts

Flange rear plane



100 contacts

Flange rear plane

Note(1) View from connector mounting side shown.

Figure 10. Dimensions of Mounting Holes on PWB (Right Angle) (12/12) (Reverse Type, Socket Connectors, Terminal Bending Pitch: 2.54mm, Terminal Bending Position: 7.5mm)

3.4 Accessory Screw Fastening Torque

Accessory screws shall be fastened with the recommended fastening torque specified below.

Jackpost assembly (for 9 to 51 contacts):	0.339 to 0.451N·m {3.46 to 4.60kgf·cm}
Jackpost assembly (for 100 contacts):	0.565 to 0.677N·m {5.77 to 6.91kgf·cm}
Jackscrew assembly (for 9 to 51 contacts):	0.113 to 0.282N·m {1.16 to 2.88kgf·cm}
Jackscrew assembly (for 100 contacts):	0.452 to 0.508N·m {4.61 to 5.18kgf·cm}

3.5 Precautions

3.5.1 Wiring

(1) Wear clean white gloves or finger cots to handle connectors.
(2) When connectors are cleaned for residue flux, ensure that flux doesn't adhere to the contact surface.

3.5.2 Electrical Conductivity Check

Use the opposite connector to ensure not to damage the contact in checking the electrical conductivity.

3.5.3 Mating and Unmating

Mating and unmating of the connectors shall be performed gently in parallel with the mating axis. Do not attempt to mate or demate the connectors by applying forces not in parallel with the mating axis.

3.5.4 Mounting on Panel Chassis

When mounting connectors on panel chassis, the intensity of the panel chassis shall be fully considered.

4. CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS

4.1 Ratings

(1) Rated voltage: At barometic pressure ····· $200V_{AC}$
At reduced pressure ····· $50V_{AC}$
(2) Operating temperature range: -65 to +125°C

4.2 Electrical Characteristics

(1) Insulation resistance: 5,000MΩ as a minimum

(2) Dielectric withstanding voltage: 600V_{AC}
(3) Contact resistance: 10mΩ as a maximum (1)
(4) Current: 3A (per contact)

Note (1): Measurement and calculation methods of contact resistance shall be in accordance with detail specification and wire conductive resistance is not included in contact resistance. Since used wire conductive resistance of harness type is vestly different from that of right angle type, measurement and calculation methods of contact resistance are specified to remove effects of wire conductive resistance. Wire reference resistance value is as follows:

Termination style	Wire specification	Wire materials	Wire reference resistance value (unit: Ω/km)
Wire	M22759/33-26	Copper and silver plating	147.0
Right angle	JIS H 3270	Phosphor bronze and gold plating	836.3

4.3 Mechanical Characteristics

(1) Durability: 500 times of mating and unmating operations
(2) Vibration: High frequency vibration··· 10 to 2,000Hz (196.1m/s^2 [20G] peak)
Random vibration ····· 333.6m/s^2rms effective acceleration [34.02Grms]
(3) Shock: Shock (I)····· 2,942m/s^2 [300G], duration: 3msec.
Shock (II)····· 14,710m/s^2 [1,500G], duration: 0.5msec.

4.4 Thermal Characteristics

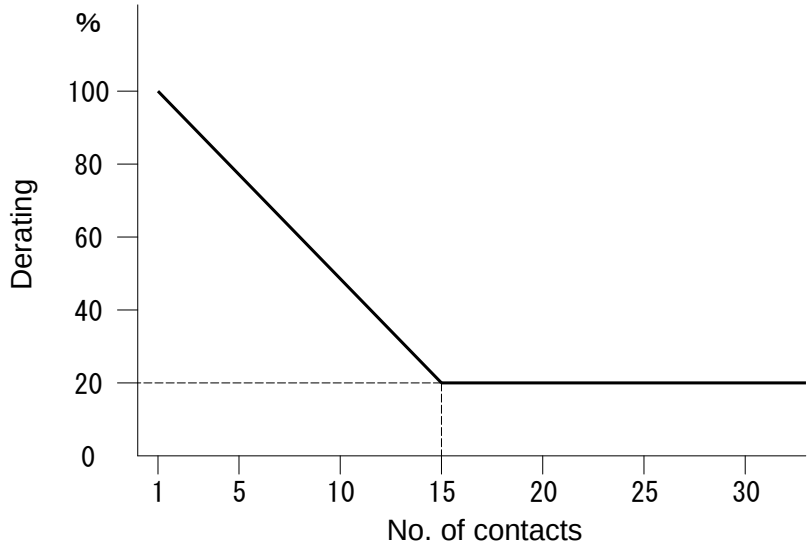
(1) Thermal shock: Temperature cycle (I)··· -65 to +125°C, 5 cycles
Temperature cycle (II)·· -30 to 100°C, 1,000 cycles

4.5 Current Capacity

Although the maximum current is defined for each contact size and wire size, the maximum total current for the connector needs to be defined to limit the temperature rise. SAE-AS50881 specifies the current derating as shown in Table 7 with 15 contacts as the boundary.

Table 7. Current Derating

No. of contacts	Reduction rate (%)	No. of contacts	Reduction rate (%)
1	100	9	54.3
2	94.3	10	48.6
3	88.6	11	42.9
4	82.9	12	37.1
5	77.1	13	31.4
6	71.4	14	25.7
7	65.7	15 or more	20.0
8	60.0		



In the case of 9 contacts, the maximum total current is calculated as follows:
A = Contact current capacity x no. of contacts x derating
= 3A x 9 contacts x 54.3%
= 14.7
Even though a maximum of 3A can be flown through each contact, the total current for the connector is limited to a maximum of 14.7A.

5. CHARACTERISTICS UNDER VARIOUS OPERATING CONDITIONS AND ENVIRONMENTAL LIMITS

In this section, the connector characteristics under various environmental conditions, environmental limits of the connectors and precautions are described based on the quality conformance inspection and breakdown limit test data.

5.1 Salt Spray (Corrosion)

The connectors have superior corrosion resistance because the metal parts are plated of an appropriate thickness, and no dissimilar metals are used in intimate contact.
The salt spray test was performed in accordance with test method 1001 of MIL-STD-1344 for 48 hours which is specified in the applicable specification, Appendix F of JAXA-QTS-2060.
As a result, there was no corrosion or discoloration that could affect the connector performance. The following test result satisfied the requirements specified in the applicable specification.
[Test condition]
Salt concentration: 5%
Temperature: 35°C
[Test items]
Low-signal level contact resistance
Contact resistance
Mating and unmating forces
Contact retention
External and construction
[Test samples]
Connectors (wire type, soldering type and right angle type)

5.2 Humidity

Humidity test was performed in accordance with test method 1002 of MIL-STD-1344 for 240 hours which is specified in the applicable specification, Appendix F of JAXA-QTS-2060.
As a result, there was no corrosion or discoloration that could affect the connector performance. The following electrical tests were performed after the completion of the humidity rest, and the results satisfied the requirements.
[Test conditions]
Temperature: 65°C
Relative humidity: 95 to 98%RH
[Test items]
Dielectric withstanding voltage (barometic pressure): 600V for 60sec.
Insulation resistance
Specification: Initial: 5,000MΩ min.
Immediately after test: 1MΩ min.
After 24hours: 1,000 MΩ min.
[Test samples]
Connectors (wire type, soldering type and right angle type)

5.3 Thermal characteristics

Thermal characteristics tests consist of temperature cycling test and temperature life test.

As a result, there were no cracks, peeled plating or degradation of the insulator that could affect the connector performance. The following test results satisfied the requirements specified in the applicable specification, Appendix F of JAXA-QTS-2060.

5.3.1 Temperature Cycling (I)

The thermal shock test was performed at -65°C to +125°C for five cycles in accordance with the applicable specification, Appendix F of JAXA-QTS-2060.
[Test conditions]
Temperature: -65 to +125°C
Cycle: 5 cycles
[Test items]
External and construction
[Test samples]
Connectors (wire type, soldering type and right angle type)

5.3.2 Temperature Cycling (II)

The thermal shock test was performed at -30°C to +100°C for 1,000 cycles in accordance with the applicable specification, Appendix F of JAXA-QTS-2060.
[Test conditions]
Temperature: -30 to +100°C
Cycle: 1,000 cycles
[Test items]
External and construction
Contact resistance
Dielectric withstanding voltage (barometric pressure)
Insulation resistance
[Test samples]
Connectors (wire type and soldering type)

5.3.3 Temperature Life

The temperature life test was performed at +125°C for 1,000 hours in accordance with the applicable specification, Appendix F of JAXA-QTS-2060.
As a result, there were no defects which could affect the connector performance. The following electrical tests were performed after the completion of the temperature life test, and the results satisfied the requirements.
[Test condition]
Temperature: +125°C
Duration: 1,000 hours
[Test items]
External and construction
Low-signal level contact resistance
Contact resistance
Contact engagement and separation forces

[Test samples]
Connectors (wire type and soldering type)

5.4 Durability

The durability test was performed by repeating the mating and unmating operation 500 times, which is specified in the applicable specification, Appendix F of JAXA-QTS-2060. As a result, there was no degradation which could affect the connector performance. The following test results satisfied the requirements.
[Test items]
External and construction
Contact resistance
Contact engagement and separation forces
Mating and unmating forces
[Test samples]
Connectors (wire type, soldering type and right angle type)

5.5 Fluid Immersion

The fluid immersion test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.
[Test condition]
Lubricating oil specified in MIL-PRF-23699
Coolant (nonconductive synthetic silica ester base)
[Test items]
External and construction
Contact engagement and separation forces
Insert retention
[Test samples]
Connectors (wire type, soldering type and right angle type)

5.6 Residual Magnetization

Metal materials (copper alloy and aluminum alloy) and surface finishes (gold plating and electroless nickel plating) are used for the connectors.
Residual magnetization was measured after the connector passed in the magnetic field of 0.5T {5,000G}. The results are shown in Table 8.

Table 8. Residual Magnetization Test Results

Part number	Residual magnetization (nT)(1)	Remarks
JD115-100P-S	2,310 2,280	Electroless nickel plating, soldering type, pin contact
JD115-100S-S	2,200 2,480	Electroless nickel plating, soldering type, socket contact
JD115-100P-W1	2,000 2,300	Electroless nickel plating, wire type, pin contact
JD115-100S-W1	2,000 2,320	Electroless nickel plating, wire type, socket contact
JD115-100P-R	4,600 4,900	Electroless nickel plating, right angle type, pin contact
JD115-100S-R	5,200 6,900	Electroless nickel plating, right angle type, socket contact

Note(1): Top line: result from test group 1, bottom line: result from test group 2

5.7 Outgassing

The outgassing test was performed in accordance with ASTM E595-77 for organic materials used for the connectors. The results are shown in Table 9.

Table 9. Outgassing Test Results

Material		Application	TML(%)(1)	CVCM(%)(1)	WVR(%)(1)
Polyphenylene sulfide resin		Insulator	0.043±0.000	0.007±0.003	0.015±0.001
Epoxy resin (for potting)		Wire fixing material	0.528±0.003	0.004±0.000	0.284±0.004
Marking ink (black)		Part no.	9.151±0.151	0.500±0.083	0.482±0.042
Silicon resin		Interfacial seal (Gasket)	0.169±0.003	0.017±0.004	0.022±0.001
Teflon resin (M22759/33)	(Black)	Wire jacket	0.076±0.002	0.005±0.001	0.025±0.001
	(Brown)		0.085±0.002	0.008±0.002	0.023±0.000
	(Red)		0.070±0.003	0.004±0.001	0.022±0.001
	(Orange)		0.059±0.001	0.002±0.001	0.021±0.000
	(Yellow)		0.134±0.004	0.004±0.000	0.028±0.004
	(Green)		0.068±0.001	0.003±0.000	0.022±0.001
	(Blue)		0.078±0.002	0.004±0.001	0.019±0.000
	(Purple)		0.064±0.002	0.003±0.001	0.019±0.000
	(Gray)		0.071±0.002	0.001±0.001	0.027±0.000
	(White)		0.091±0.001	0.006±0.001	0.026±0.001

Note (1) TML: Total Mass Loss, CVCM: Collected Volatile Condensable Material,
WVR: Water Vapor Regained

By using the results in Table 9, the outgassing data evaluated in consideration of the weight allocation for entire connector organic materials are shown in Table 10.

Table 10. Outgassing Data Evaluated in Consideration of the Weight Allocation

No.	Part number	Mass (g)(1)	TML (%)(2)	CVCM (%)(3)
1	JD115-100P-W**	2.98	0.323	0.005
2	JD115-100S-W**	2.32	0.407	0.005
3	JD115-100P-S*	2.98	0.323	0.005
4	JD115-100S-S*	2.32	0.407	0.005
5	JD115-100P-R*	2.98	0.323	0.005
6	JD115-100S-R*	2.32	0.407	0.005

Notes:
(1) Mass of whole organic materials used for the connectors. Wires are not included.
(2) Requirement is 1.0% as a maximum.
(3) Requirement is 0.1% as a maximum.

5.8 Resistance to corrosive gas

The resistance to corrosive gas test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060.
The following test results satisfied the requirements.
[Test condition]
Solution: 10% solution of potassium sulfide in distilled water
Exposure time: 100 hours
[Test items]
Low-signal level contact resistance
[Test samples]
Connectors (wire type and soldering type)

5.9 Contact Retention

The contact retention test was performed in accordance with test method 2007 of MIL-STD-1344.
The following test results satisfied the requirements.
[Test condition]
Load application speed: approx. 4.4N/s {0.45kgf/s}
Duration of load application: 5 seconds as a minimum
[Test samples]
Connectors (wire type, soldering type and right angle type)
Wire used: M22759/33-26-9

5.10 Vibration

High-frequency vibration test and random vibration test were performed as vibration test. As a result, no intermittent current discontinuity in excess of 1μs or loosened parts was observed during the test duration, which satisfied the requirements specified in the applicable specification.

5.10.1 High Frequency Vibration

The high frequency vibration test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.

[Test condition]
Acceleration: 294m/s^2{30G}p-p
Frequency: 10 to 2,000Hz
1 cycle: 20 minutes
No. of cycles: 12 cycles
Applied directions: 3 directions for each axis

[Measurement items]
Presense of intermittent current discontinuity in excess of 1μsec
Looseness of parts

[Test samples]
Connectors (wire type, soldering type and right angle type)

5.10.2 Random Vibration

The random vibration test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.

[Test condition]
Acceleration: 334m/s^{2}rms{34.02Grms}
Frequency: 10 to 2,000Hz
Duration: 15 minutes
Applied directions: 3 directions for each axis

[Measurement items]
Presense of intermittent current discontinuity in excess of 1μsec
Looseness of parts

[Test samples]
Connectors (wire type and soldering type)

5.11 Shock

Shock (I) test and shock (II) test were performed as shock test. As a result, no intermittent current discontinuity in excess of 1μs or loosened parts was observed during the test duration, which satisfied the requirements specified in the applicable specification.

5.11.1 Shock (I)

The shock (I) test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.

[Test conditions]
Acceleration: 2,942m/s^2{300G}±20%
Applied waveform: half-wave sinusoidal wave
Pulse duration: 3.0ms±15%
Pulse rate change (vi): 5.61m/s±10%
Shock direction: ±X, ±Y, ±Z (3 times in each direction, 18 times in total)

[Measurement items]
Presense of intermittent current discontinuity in excess of 1μsec
Looseness of parts

[Test samples]
Connectors (wire type, soldering type and right angle type)

5.11.2 Shock (II)

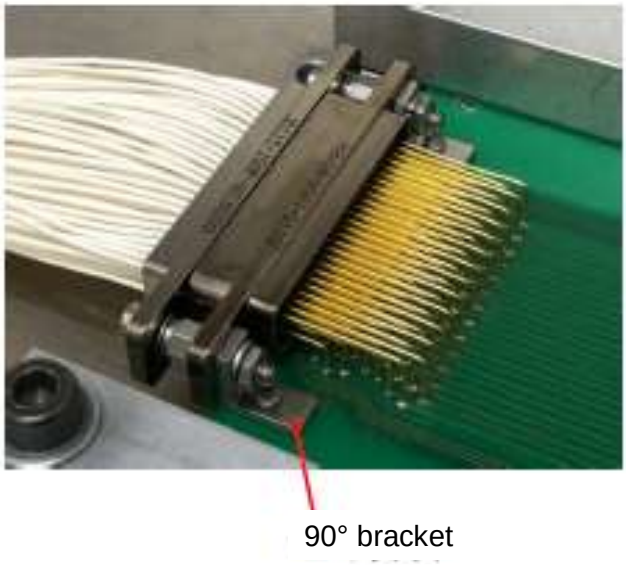
The shock (II) test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.

[Test conditions]
Acceleration: 14,710m/s^2{1,500G}±20%
Applied waveform: half-wave sinusoidal wave
Pulse duration: 0.5ms±15%
Pulse rate change (vi): 4.68m/s±10%
Shock direction: ±X, ±Y, ±Z (3 times in each direction, 18 times in total)

[Measurement items]
Presense of intermittent current discontinuity in excess of 1μsec
Looseness of parts

[Test samples]
Connectors (wire type and soldering type)

Since FEM analysis performed prior to the tests revealed that there was a wire resonant point near 1.6kHz, random vibration test and shock (II) test were performed as additional tests. The additional test results were positive.
At vibration and shock tests, right angle type connector was fixed to PWB using a 90° bracket (refer to Picture 1)
Since the way the vibration is transmitted to the connector depends on connector fixing methods to panel and PWB and PWB fixing methods to the housing, it is recommended to decide fixing methods by evaluating vibration and shock using actual equipment or at conditions close to actual installation conditions



Picture 1. Connector Fixation at Vibration and Shock Tests

5.12 Radiation Hardness

Radiation hardness test was performed in accordance with the applicable specification, Appendix F of JAXA-QTS-2060. The following test results satisfied the requirements.

[Test conditions] Radiation type: ^{60}Co γ-rays
Total dose of radiation: 10^5Gy

[Measurement items] External and construction
Contact resistance
Dielectric withstanding voltage
Insulation resistance

[Test samples] Connectors (Wire type and solder type)

6. RELIABILITY

6.1 Failure Mode

The major failure modes are as follows.

- Open failure: disconnection, contact deformation, corrosion, adhesion of foreign materials, soldering defect and overcurrent
- Short circuit: corrosion, condensation, adhesion of foreign materials and soldering defect
- Characteristics degradation: Plating defect

7. STORAGE CONDITIONS

(1) Confirm the notes described in paragraph F.6.1 of JAXA-QTS-2060 when procuring the connectors.
(2) The connectors are sealed before shipping to protect the connectors from dusts, etc. Do not open the sealed bag if not necessary. Re-seal the bag before storage if opened for incoming inspection or other needs.
(3) To store unmated connectors, install the attached dust caps on the connectors to protect the connectors from dusts and/or external forces.
(4) Store the connectors at room temperature and normal humidity as much as possible.
(5) Minimize vibrations and shocks during shipping and storage.

8. OTHERS

8.1 Connector Mating Warranty

Warranty coverage is limited to mating connectors to ITT Cannon products (including overseas products by ITT Cannon).

8.2 Contact Information

(1) Manufacturer: ITT Cannon, LTD.
(2) Address: 5-11-3, Hibariga-oka, Zama-shi, Kanagawa 252-0003, Japan
(3) Tel: +81-46-257-2010 (main)