

1. SCOPE

1.1 Scope. This Design covers C153 Connectors Family aimed to do a connection system for test and measuring "in line" of microelectronic devices wired on the PCB. C153 Connectors Family is designed, manufactured, and tested in accordance with MIL-C-55302. It is equipped, plug and receptacle style, with 57 contact positions, performed to obtain a very high contacts density, and a very low connector thickness and weight. Contact arrangement is offset-grid pattern within dielectric connector body, with two rows, .075 in (1.905 mm) center-to-center contact spacing in each row, and .065 in (1.651 mm) row-to-row spacing. Contact size is 0.5 mm nominal pin DIA. Polarization feature is incorporated in each connector assembly to assure correct insertion. Coding key system provides 16 possible keying combinations.

1.2 Contact terminal types.

1.2.1 Plug connector, socket contacts equipped, contact terminal types available are:

- a. crimp terminal lead attached (wire type, wire size, wire color, and lead length shall be specified on page 22 of this catalog);
- b. surface mount tail terminal (SMT soldering).

1.2.2 Receptacle connector, pin contacts equipped, contact terminal type available is surface mount tail terminal (SMT soldering).

2. APPLIED DOCUMENTS

2.1 Applied documents. C153 Connectors Family is designed, manufactured, tested and delivered in accordance with the documents listed below. The latest issue of the following documents, documents amendments and notices, in being on 4 September 1996 are used unless otherwise specified in this Design.

- MIL-W-22759/19 Wire, Electric, Fluoropolymer-Insulated, Extruded ETFE. Light Weight, Silver-Coated High Strength Copper Alloy Conductor, 600-Volt, 150°C.
- MIL-I-46058 Insulating compound, electrical (for coating printed circuit assemblies).
- MIL-C-55302 Connectors, printed circuit subassembly and accessories.
- MIL-I-81550 Insulating compound electrical, embedding, reversion resistant silicone.
- ASTM B455 Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.

3. REQUIREMENTS

3.1 Connector body is an insulator body of molded one-piece construction.

3.1.1 Connector body material is injection molded from glass reinforced polyphenylene sulfide (PPS) type GST-40F per MIL-M-24519 and in accordance with MIL-C-55302. This thermoplastic compound is flame resistant, having flammability rating V-0/5VA, without additives, per UL94.

3.2 Pin contact and contact terminal.

3.2.1 Pin contact and its surface mount tail terminal is one-piece construction type.

3.2.1.1 Pin contact and its surface mount tail terminal materials. Pin contact, and its surface mount tail terminal, is screw machined from phosphor-bronze alloy per QQ-B-750, (ASTM B139), with protective finishing of gold plate, over suitable underplate, as specified in MIL-C-55302. Surface mount tail, as terminal end, is finished using hot solder dipping, with solder alloy composition Sn63 conforming to QQ-S-571, (ANSI/J-STD-006).

3.3 Socket contact and contact terminal. Socket contact is HYPERTAC, (see figure 1 of this page), and contact terminal types are: crimp terminal lead attached, insulating stranded wire is as specified in MIL-W-22759/19, and surface mount tail SMT soldering.

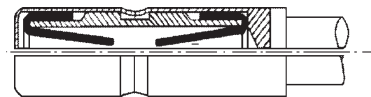


FIGURE 1. HYPERTAC socket contact

3.3.1 Socket contact materials HYPERTAC springs are wire drawn from beryllium-copper alloy per QQ-C-530, (ASTM B197), socket contact body is screw machined from copper-alloy per QQ-B-626, (ASTM B121).

3.3.2 Crimp socket contact terminal is screw machined one-piece construction.

3.3.2.1 Crimp socket contact terminal materials are copper-alloy per ASTM B455 with protective finishing of gold plate, over suitable underplate, as specified in MIL-C-55302.

3.3.3 Socket contact surface mount tail terminal is screw machined one-piece construction.

3.3.3.1 Socket contact surface mount tail terminal materials. Socket contact end is screw machined from phosphor-bronze alloy per QQ-B-750, (ASTM B139), with protective finishing of gold plate, over suitable underplate, as specified in MIL-C-55302. Surface mount tail, as terminal end, is finished using hot solder dipping, with solder alloy composition Sn63 conforming to QQ-S-571, (ANSI/J-STD-006).

3.4 Connector hardware is formed by male guide pins plus female guide inserts.

3.4.1 Connector hardware material. Male guide pin is screw machined from stainless steel per ASTM A582, and passivated per QQ-P-35. Female guide insert is laser microcut from stainless steel per ASTM A582, and passivated per QQ-P-35.

3.4.2 D-shaped guide set provides 16 possible polarized position combinations, plus omnipolarized female guide combination on receptacle connector (i.e. receptacle connector without polarizing inserts), as shown on page 28 of this catalog.

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	DSGN ENGR	CHK MFR ENGR	CHK QUAL	APPVL MGR	DSGN ORIGINATOR	DSGN SUPERSEDED BY
DATE						
SIGNATURE						
SHEET 1 OF 2		TITLE			DESIGN DATE	
 <b>connei S.p.A.</b> GENOVA-ITALY <b>A2857</b>		C153 Connectors Family, plug and receptacle connectors style, with 57 contact positions, conforming to MIL-C-55302, for use as connection system for test and measuring "in line" of microelectronic devices wired on the PCB			September 4, 1996	
					DESIGN C153 ABSTRACT OF.	WK PROG
						REV

3.5 Design and construction of C153 Connectors Family is in accordance with MIL-C-55302 requirements.

3.6 C153 Connectors Family requirements are:

- contact engagement and separation forces: maximum engagement force=50g (1.76 oz); minimum separation force=10g (.35 oz);
- connector mating and unmating forces: maximum mating force=50g (1.76 oz) multiplied by number of contacts; minimum unmating force =10g (.35 oz) multiplied by number of contacts;
- contact current rating: the connector may have any combination of current flow and ambient temperature provided the contact or connector temperature does not exceed 125°C; the test current is 3.0 A for individually connected contact, and 2.0 A for series wired contacts.
- mated contact resistance : 5.0 mΩ maximum individual, if pin and socket contacts have surface mount tail, (SMT soldering), as contact terminal; if socket contact is equipped with crimp terminal lead attached, the total resistance is the sum of the wire resistance and the mated contact resistance.
- temperature range: normal operating temperature is between -65°C and +125°C;
- dielectric withstanding voltage: 1000 VRMS, 60 Hz at sea level, 250 VRMS, 60 Hz at 70,000 feet (21,336 m), when surface mount tail terminals, after SMT soldering; are conformally coated of a suitable electrical insulating compound as specified in MIL-I-46058;
- insulation resistance is  $\geq 5000 \text{ M}\Omega$  at 500 VDC;
- contact life: 30,000 insertion and withdrawal cycles with minimum wear;
- vibration: when tested in accordance with MIL-C-55302, and MIL-STD-1344 method 2005, 10-2000 Hz, 15 G peak, 4 h per axis, 100 mA, there are no interruption in continuity greater than 2 ns of the test circuit which incorporates mated contacts;
- shock: when tested in accordance with MIL-C-55302, and MIL-STD-1344 method 2004, 6 ms, 100 G sawtooth, six shocks, 100 mA, there are no interruption in continuity greater than 2 ns of the test circuit which incorporates mated contacts;
- solderability: in accordance with MIL-STD-202 method 208 at an uniform temperature of 245°C for 5 s;
- resistance to soldering heat: in accordance with MIL-STD-202 method 210 condition C, 260°C for 5 s;
- capacitance: contact-to-contact maximum 1.5 pF;
- calculated inductance: maximum 15 nH.

4. QUALITY ASSURANCE PROVISIONS

C153 Connectors Family is inspected using data values of Section 3 of this Design, and measuring and test methods in accordance with Section 4 of MIL-C-55302.

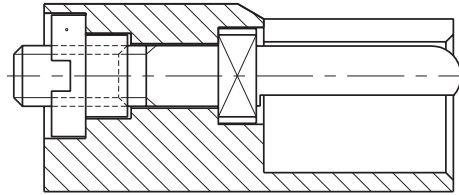
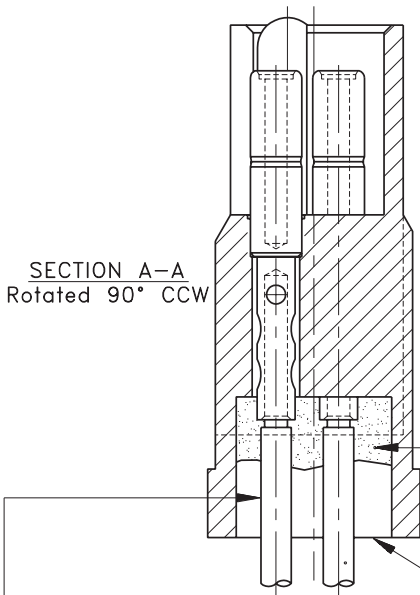
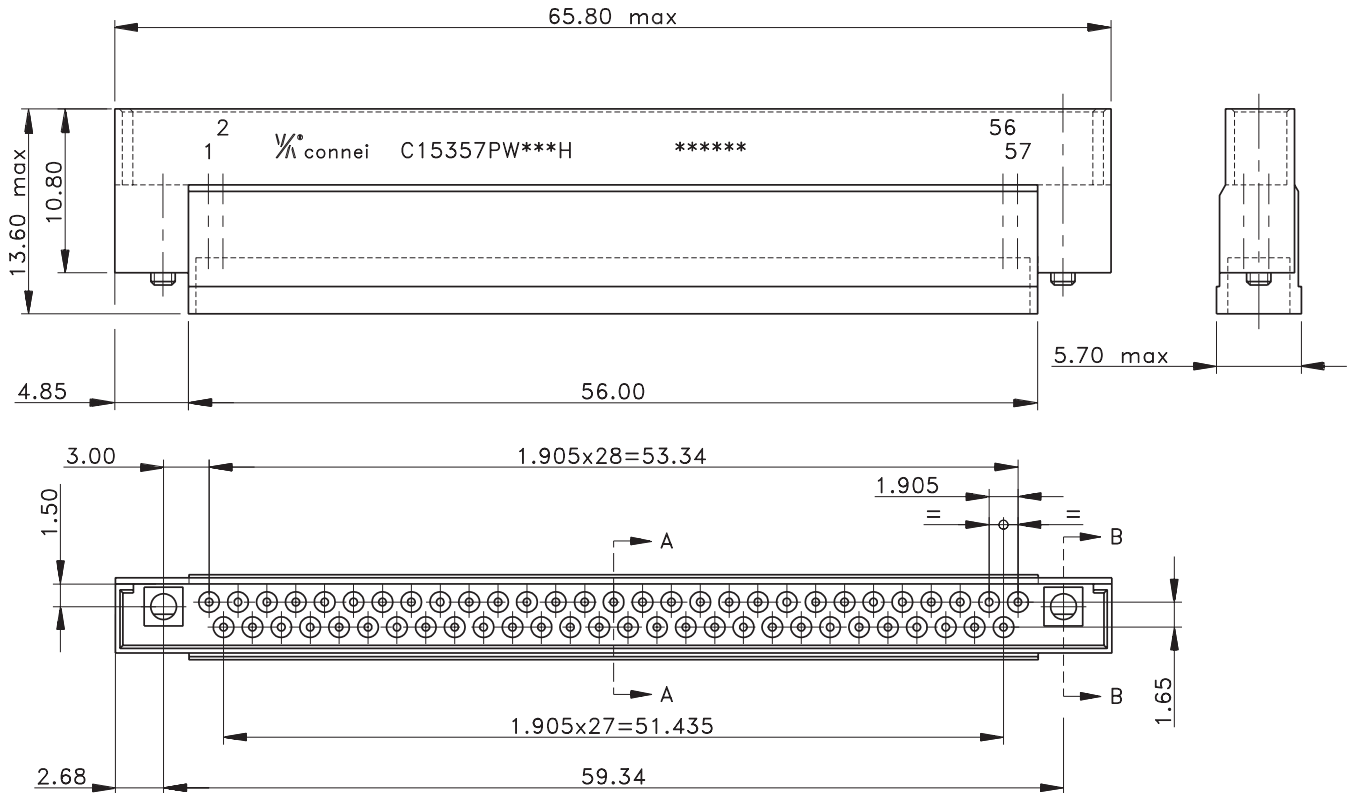
5. PACKAGING

5.1 Packaging requirements are in accordance with "CONNEI's Packaging Procedures", and then packaging is adequate to provide protection against any damage, breakage, or loss during shipment from the supply source to the ultimate using activity.

6. NOTES

6.1 Intended use. C153 Connectors Family is designed for printed wiring board-to-cable or printed wiring board-to-printed wiring board interconnection, for test and measuring "in line", with low-power requirements, of microelectronic devices wired on miniaturized equipment subassemblies. Card edge test connector allows to have special points of access to an electrical circuit used for testing purpose.





EPOXY RESIN AND SILICON POTTING FILLED

CAUTION: Color coding system is not applied. The individual contact cavity number provides the lead identification.

PLANE FROM WHICH THE LEAD LENGTH IS MEASURED

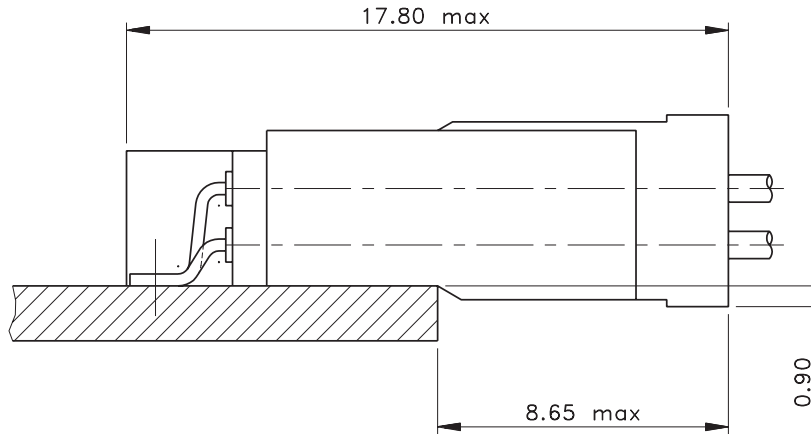
Wire per MIL-W-22759/19 - Wire, Electric, Fluoropolymer-Insulated, Extruded EFTE. Light Weight, Silver-Coated High Strength Copper Alloy Conductor, 600-Volt, 150°C.

Lead length = 2 ft; lead length tolerance +1.0, -0.0 in.

Part No	Wire size	Stranding (Number of strands X AWG gage of strands)	Diameter of stranded conductor (inches)		Finished wire			
			(min)	(max)	Resistance at 20°C (68°F) (ohms/1000ft) (max)	Diameter (inches)	Weight (lbs/1000ft) (max)	Color
M22759/19-26-9	26	19x38	.018	.020	44.8	.032 ± .002	1.41	white

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**Figure 22** UMBILICAL CONNECTOR FOR MEASURING AND TEST EQUIPMENTS 57 SOCKET CONTACT POSITIONS, .075 in x .065 in, (1.905 mm x 1.651 mm), OFFSET GRID, CRIMP CONTACT TERMINAL STYLE, LEAD ATTACHED.



**Figure 23** MATED CONNECTORS, PLUG CONNECTOR SOCKET CONTACTS EQUIPPED, CRIMP TERMINAL STYLE, LEAD ATTACHED, AND RECEPTACLE CONNECTOR PIN CONTACTS EQUIPPED, SURFACE MOUNT TAIL TERINAL STYLE

### NOTES

1. Dimensions for User installation purpose only.
2. Dimensions are in millimeters.
3. Materials, finishes and connector requirements are described into this catalog.
4. This plug connector is conforming to MIL-C-55302, and the wire of leads attached is per MIL-W-22759/19.
5. This plug connector mates C15357RS\*\*\*HS receptacle connector, (see pages 26 & 27), when both of them, (plug and receptacle connectors), are equipped with the appropriate hardware, and identical polarizing combination.
6. Plug connector weight is about 78 grams, (with  $g=9.81 \text{ m/s}^2$ ).
7. The spanner wrench to adjust polarization guide pins is shown on page 32.

### HOW TO ORDER

#### ORDERING NOMENCLATURE

YOUR NOTES:

**C 1 5 3 5 7 P W \* \* \* H**

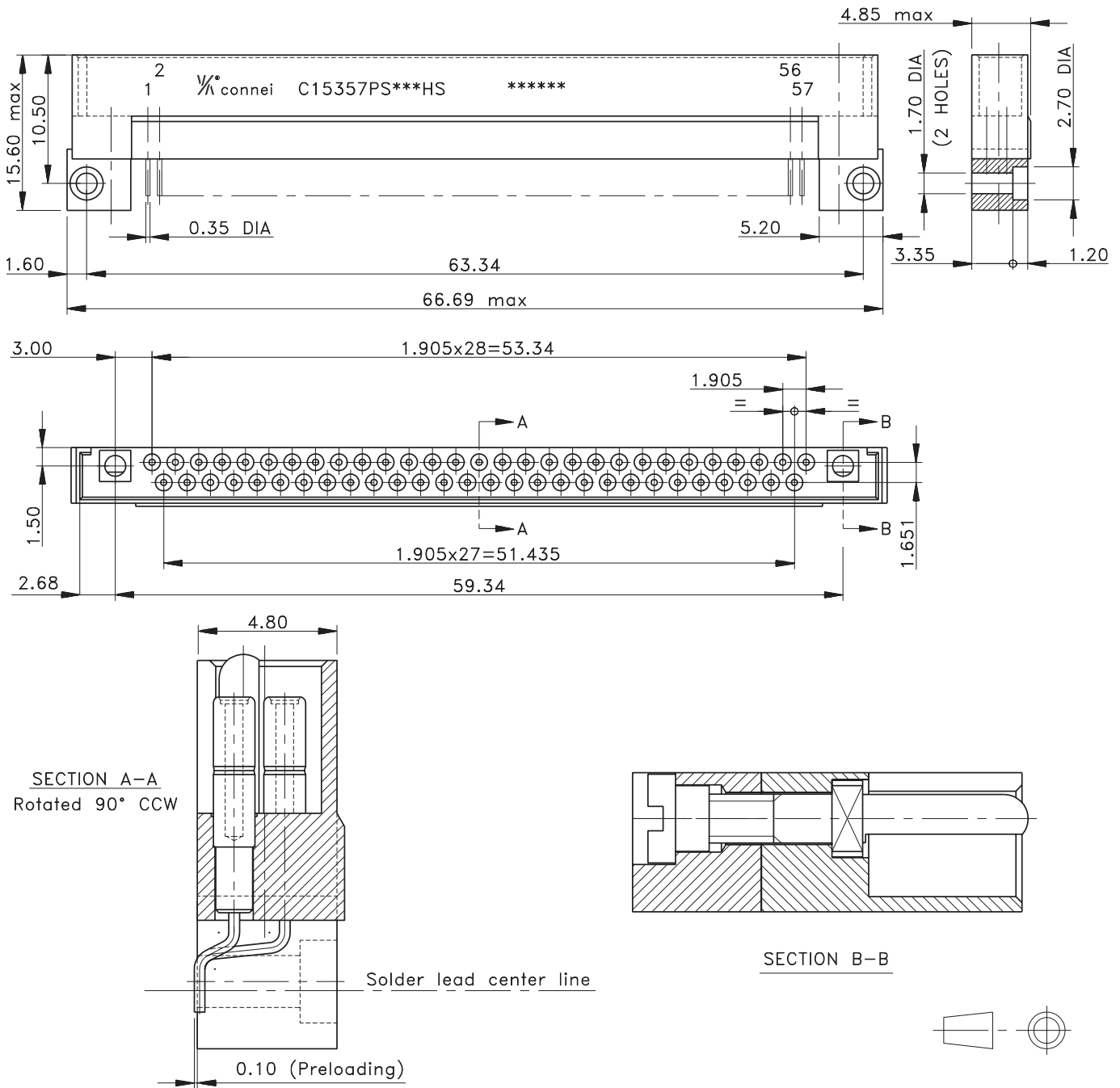
CONNECTOR FAMILY	
C153 .....	Designation C 1 5 3
CONNECTOR SIZE	
57 contact positions .....	Designation 5 7
CONNECTOR AND CONTACTS STYLE	
Plug connector socket contacts equipped .....	Designation P
CONTACT TERMINAL STYLE	
Crimp terminal style, lead attached, (wire type is specified on figure 22 of the previous page) .....	
	Designation W
HARDWARE CODE	
D-shaped male guide pins .....	Designation Y
Omnipolarized male guide pins .....	Designation P

#### CONTACT FINISHING

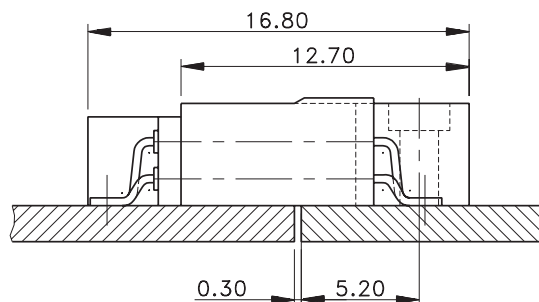
H Designation-  
Contacts with plating and underplating conforming to MIL-C-55302.

#### HARDWARE POLARIZATION

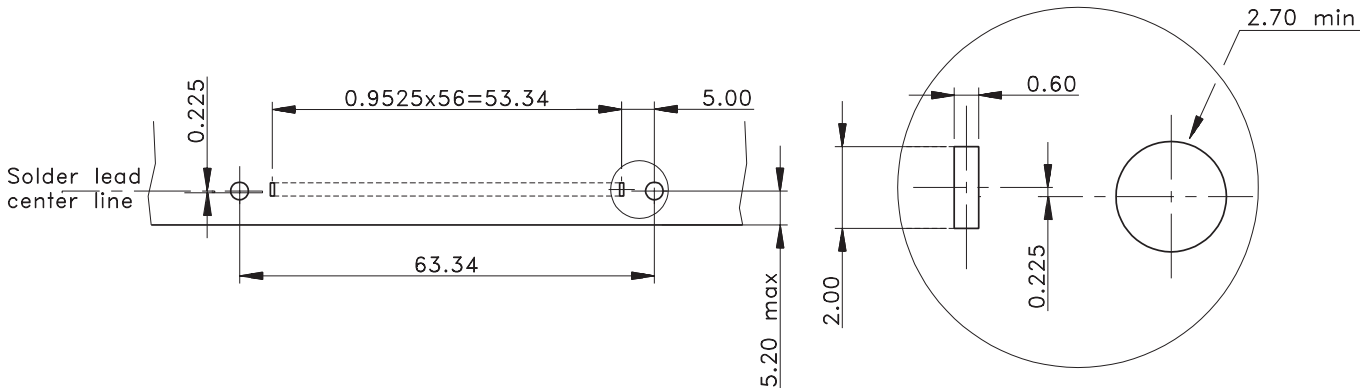
- |   |   |                                                                                                                                                                       |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | 0 | Designation-                                                                                                                                                          |
| 0 | 1 | When D-shaped guide pins are installed in the 01 polarized position, (see polarization configuration chart on page 28), without Loctite 242 applied.                  |
| 1 | 6 |                                                                                                                                                                       |
|   |   | Designation-                                                                                                                                                          |
|   |   | When D-shaped guide pins are installed in the proper polarized position and Loctite 242 is applied to the threads, (see polarization configuration chart on page 28). |
| 1 | 7 | Designation-                                                                                                                                                          |
|   |   | When omnipolarized male guide pins, (for test type connectors), are installed.                                                                                        |
| 1 | 8 | Designation-                                                                                                                                                          |
|   |   | When D-shaped guide pins or omnipolarized male guide pins, (for test type connectors), are shipped loose in a plastic bag.                                            |



**Figure 24** CARD EDGE CONNECTOR FOR MEASURING AND TEST DEVICES, (i.e. EXTENDER BOARD APPLICATIONS), 57 SOCKET CONTACT POSITION, .075 in x .065 in, (1.905 mm x 1.651 mm), OFFSET GRID, SURFACE MOUNT TAIL TERMINAL STYLE, (SMT SOLDERING).



**Figure 25** MATED CONNECTORS. PLUG CONNECTOR SOCKET CONTACTS EQUIPPED, AND RECEPTACLE CONNECTOR PIN CONTACTS EQUIPPED, BOTH WITH SURFACE MOUNT TAIL TERMINAL STYLE, (SMT SOLDERING).



**Figure 26** MOUNTING PATTERN, IN LINE ARRANGEMENT BOARD-TO-BOARD CONNECTION.

**NOTES**

1. Dimensions for User installation purpose only.
2. Dimensions are in millimeters.
3. Materials, finishes and connector requirements are described into this catalog. Contact terminal end gold plated protected, without hot solder dipping, is available at Customer request, (please consult the Factory).
4. This plug connector is conforming to MIL-C-55302.
5. This plug connector mates C15357RS\*\*\*HS receptacle connector, (see pages 26 & 27), when both of them, (plug and receptacle connectors), are equipped with the appropriate hardware, and identical polarizing combination.
6. Plug connector weight is about 20 grams, (with  $g=9.81 \text{ m/s}^2$ ).
7. The spanner wrench to adjust polarization guide pins is shown on page 32.

**HOW TO ORDER**

**ORDERING NOMENCLATURE**

YOUR NOTES:

**C 1 5 3 5 7 P S \* \* \* H S**

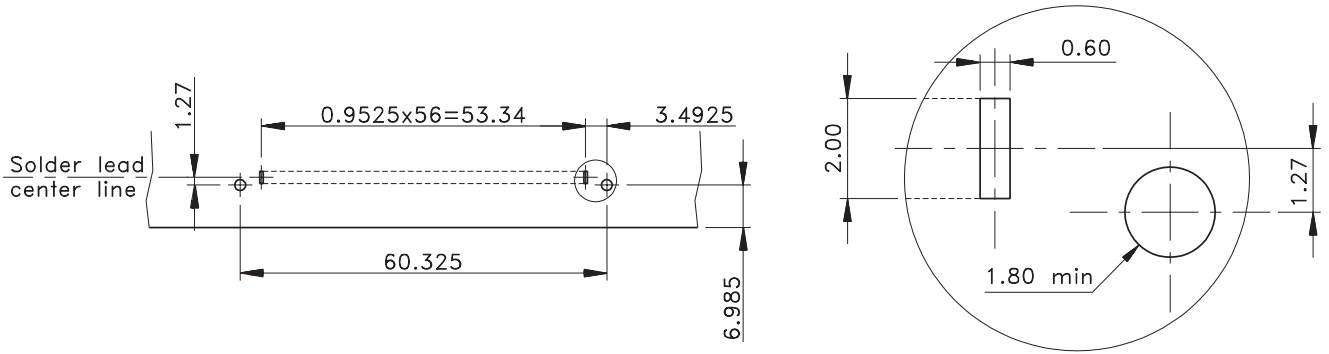
CONNECTOR FAMILY	
C153 .....	Designation C 1 5 3
CONNECTOR SIZE	
57 contact positions .....	Designation 5 7
CONNECTOR AND CONTACTS STYLE	
Plug connector socket contacts equipped .....	Designation P
CONTACT TERMINAL STYLE	
Surface mount tail (SMT soldering) .....	Designation S
HARDWARE CODE	
D-shaped male guide pins .....	Designation Y
Omnipolarized male guide pins .....	Designation P

**CONTACT FINISHING**  
 H S Designation-  
 Contacts with plating and underplating conforming to MIL-C-55302. Hot solder dipping, as dip solder terminal end finishing, is applied, and its meets procedures and requirements of MIL-STD-202 method 208.

**HARDWARE POLARIZATION**  
 0 0 Designation-  
 When D-shaped guide pins are installed in the 01 polarized position, (see polarization configuration chart on page 28), without Loctite 242 applied.  
 0 1 } Designation-  
 to }  
 1 6 } When D-shaped guide pins are installed in the proper  
 incl } polarized position and Loctite 242 is applied to the  
 threads, (see polarization configuration chart on page  
 28).  
 1 7 Designation-  
 When omnipolarized male guide pins, (for test type  
 connectors), are installed.  
 1 8 Designation-  
 When D-shaped guide pins or omnipolarized male  
 guide pins, (for test type connectors), are shipped  
 loose in a plastic bag.

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**Figure 28** MOUNTING PATTERN, DAUGHTERBOARD APPLICATION, OR IN LINE ARRANGEMENT BOARD-TO-BOARD CONNECTION.

**NOTES**

1. Dimensions for User installation purpose only.
2. Dimensions are in millimeters.
3. Materials, finishes and connector requirements are described into this catalog. Contact terminal end gold plated protected, without hot solder dipping, is available at Customer request, (please consult the Factory).
4. This receptacle connector is conforming to MIL-C-55302.
5. This receptacle connector mates C15357PW\*\*\* H (see pages 22 & 23), and C15357PS\*\*\*HS (see pages 24 & 25) plug connectors, when receptacle and plug connectors are equipped with appropriate hardware, and identical polarizing combination.
6. Receptacle connector weight is about 3.0 grams, (with  $g=9.81 \text{ m/s}^2$ ).

**HOW TO ORDER**

**ORDERING NOMENCLATURE**

YOUR NOTES:

**C 1 5 3 5 7 R S \* \* \* H S**

CONNECTOR FAMILY	
C153 .....	Designation C 1 5 3
CONNECTOR SIZE	
57 contact positions .....	Designation 5 7
CONNECTOR AND CONTACTS STYLE	
Receptacle connector pin contacts equipped .....	Designation R
CONTACT TERMINAL STYLE	
Surface mount tail (SMT soldering) .....	Designation S
HARDWARE CODE	
D-shaped female guide insert .....	Designation Y
Without D-shaped female guide inserts (=omnipolarized thru holes) .....	Designation P

**CONTACT FINISHING**  
 Designation-  
 H S  
 Contacts with plating and underplating conforming to MIL-C-55302. Hot solder dipping, as dip solder terminal end finishing, is applied, and its meets procedures and requirements of MIL-STD-202 method 208.

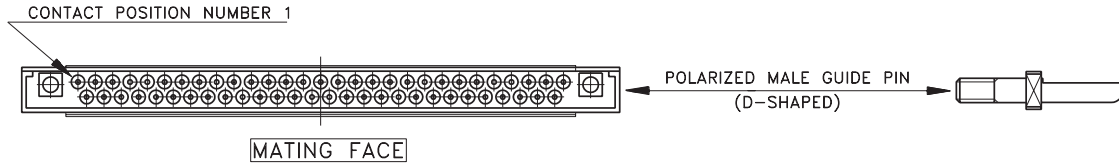
**HARDWARE POLARIZATION**  
 0 0 Designation-  
 When D-shaped female guide inserts are installed in the 01 polarized position, (see polarization configuration chart on page 28).  
 0 1 }  
 to } Designation-  
 1 6 } When D-shaped female guide inserts are installed in the proper polarized position, (see polarization configuration chart on page 28).  
 incl }  
 1 7 Designation-  
 When connector is supplied without D-shaped female guide inserts (= omnipolarized thru holes).  
 1 8 Designation-  
 When D-shaped female guide inserts are shipped loose in a plastic bag.



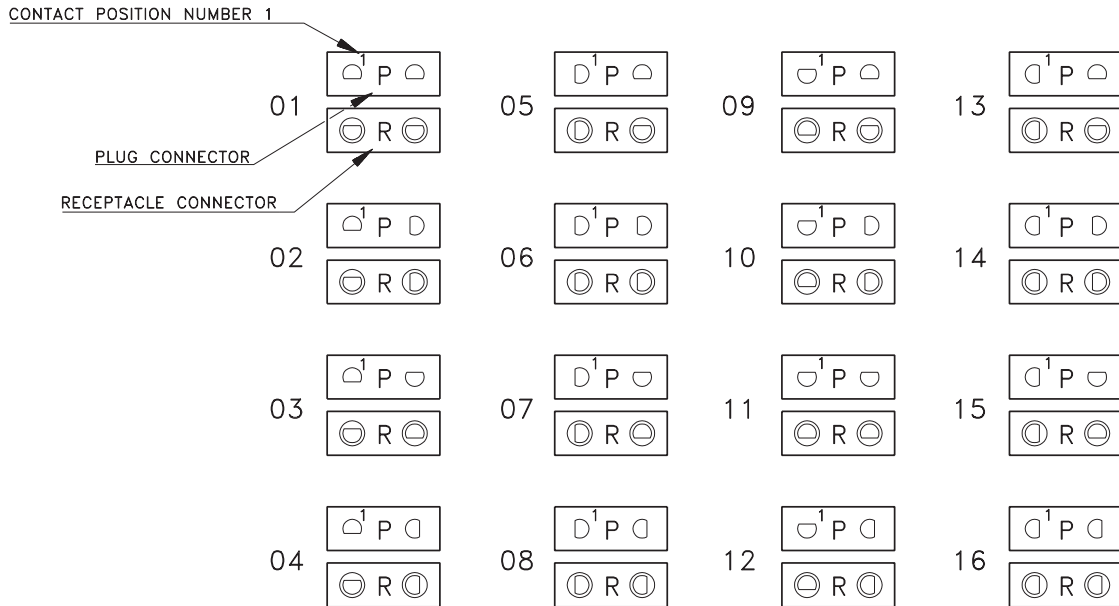
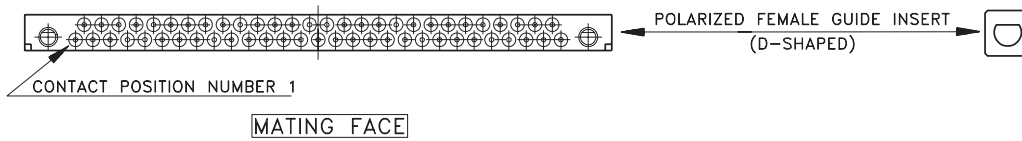
### D-SHAPED GUIDE SETS

When connector is equipped with D-shaped guide hardware, any of the following polarization numbers are used, polarizing hardware will be oriented per this chart. Use appropriate number as shown, (designation 01 to 16 incl).

#### PLUG CONNECTOR SOCKET CONTACTS EQUIPPED



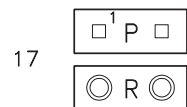
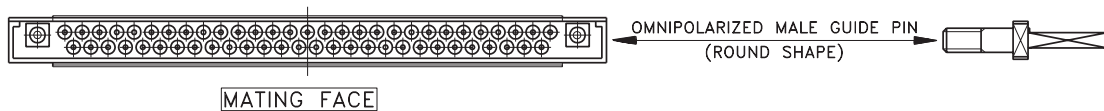
#### RECEPTACLE CONNECTOR PIN CONTACTS EQUIPPED



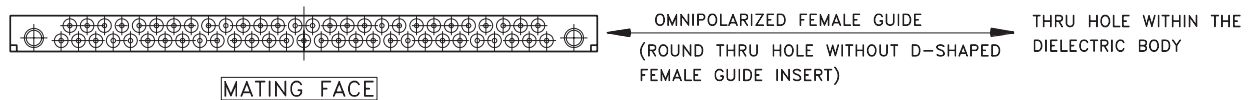
#### NOTES

1. It is recommended that the following polarization positions be chosen first: 01, 06, 11, and 16.
2. Universal coupling guide sets, (designation 17).

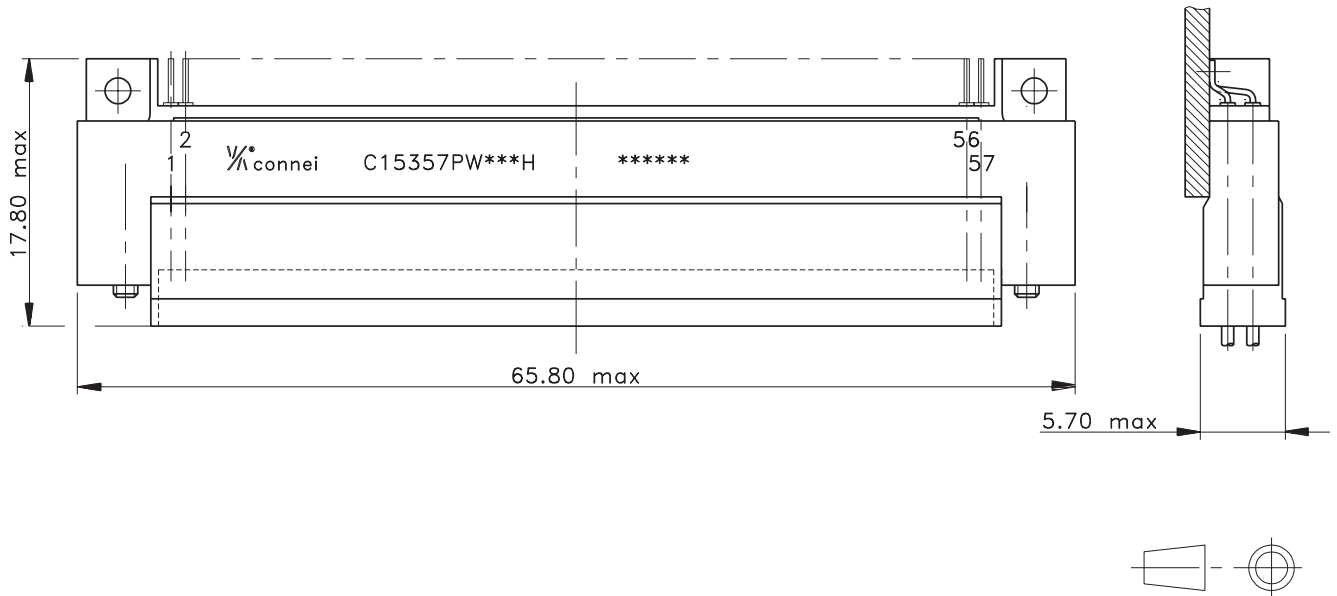
#### PLUG CONNECTOR SOCKET CONTACTS EQUIPPED



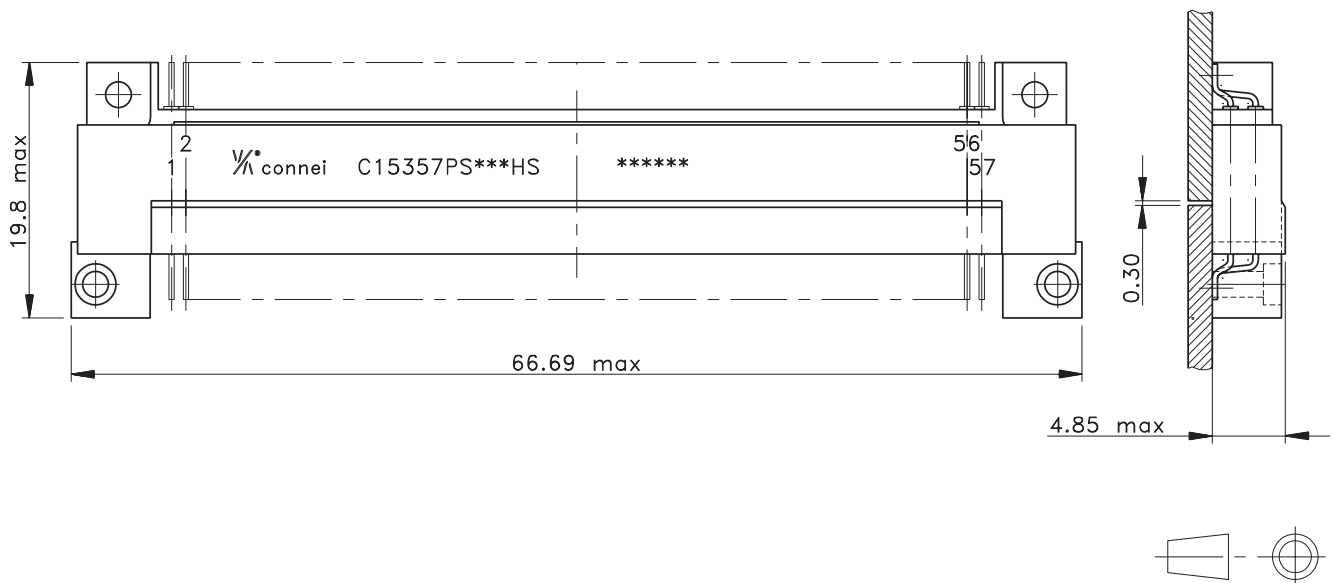
#### RECEPTACLE CONNECTOR PIN CONTACTS EQUIPPED



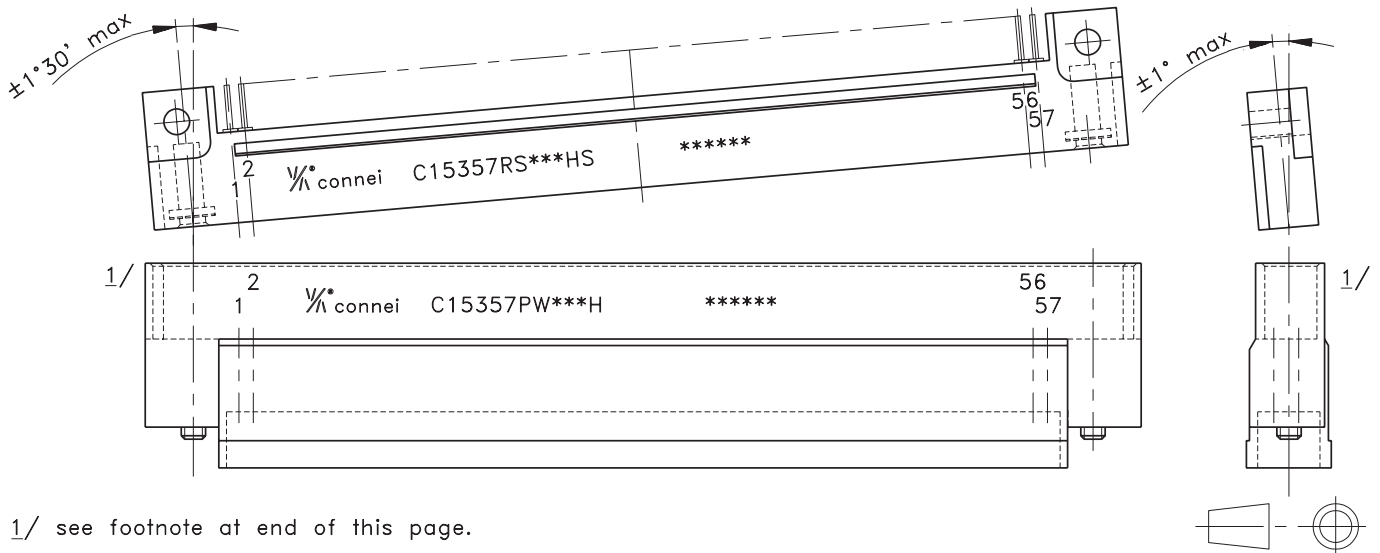
3. The tool to adjust polarization guide pins is shown on page 32.



**Figure 29** MAXIMUM DIMENSION OF MATED CONNECTORS. PLUG CONNECTOR CRIMP TERMINALS EQUIPPED, LEAD ATTACHED, AND RECEPTACLE CONNECTOR, SURFACE MOUNT TAIL TERMINALS EQUIPPED, (SMT SOLDERING).

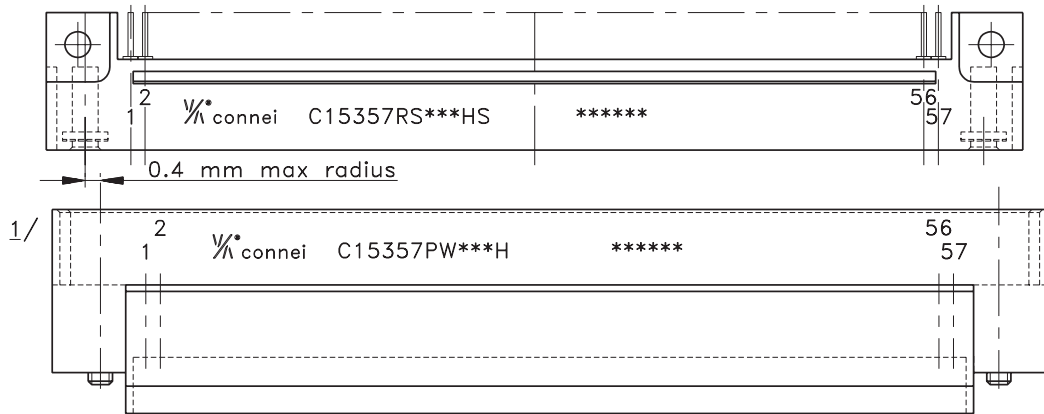


**Figure 30** MAXIMUM DIMENSIONS OF MATED CONNECTORS. PLUG AND RECEPTACLE CONNECTORS SURFACE MOUNT TAIL TERMINALS EQUIPPED, (SMT SOLDERING).



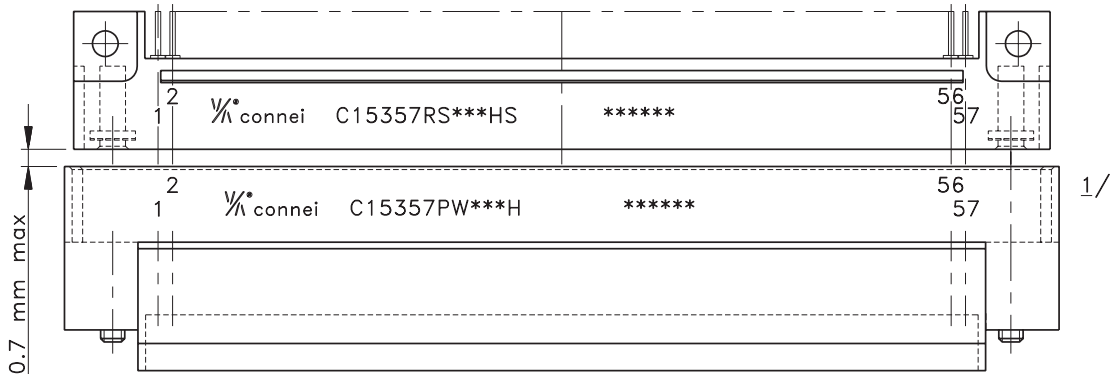
1/ see footnote at end of this page.

**Figure 31** MAXIMUM PERMISSIBLE INCLINATION, IN LONGITUDINAL AND IN TRASVERSAL AXIS, BETWEEN THE PLUG CONNECTOR AND THE RECEPTACLE CONNECTOR, IN ORDER TO ENSURE THE ACCEPTABLE ELECTRICAL ENGAGEMENT MADE BY ALL CONTACTS.



1/ see footnote at end of this page.

**Figure 32** MAXIMUM PERMISSIBLE DISPLACEMENT, BETWEEN THE PLUG CONNECTOR AND THE RECEPTACLE CONNECTOR, IN ORDER TO ENSURE SUITABLE FULLY INSERTION OF THE CONNECTOR HALVES.



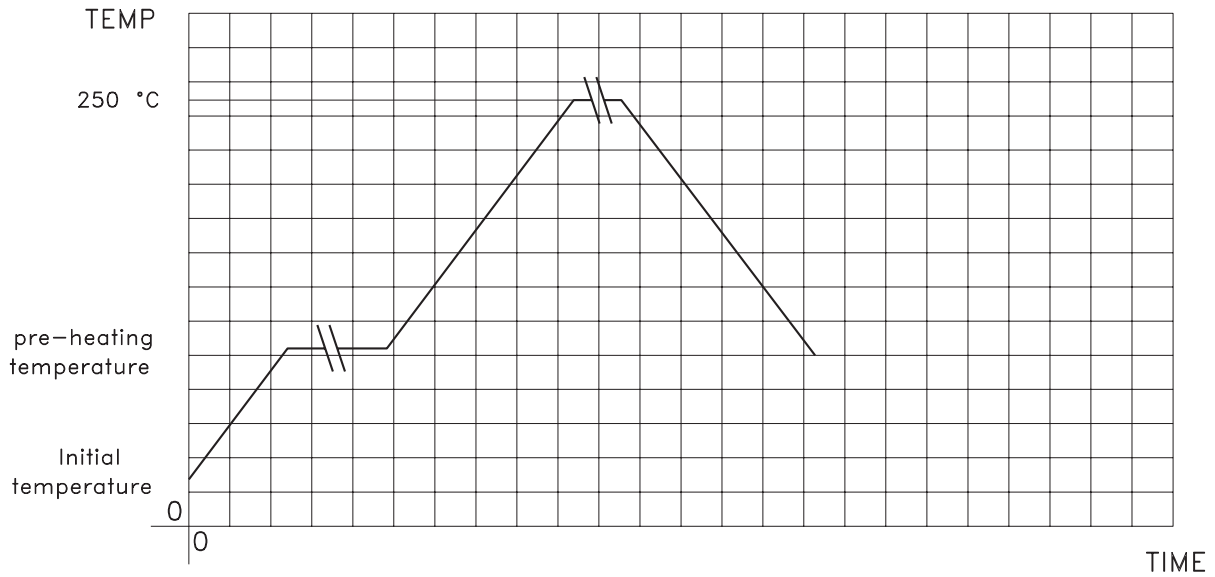
1/ see footnote at end of this page.

**Figure 33** MAXIMUM PERMISSIBLE SEPARATION DISTANCE, BETWEEN THE PLUG CONNECTOR AND THE RECEPTACLE CONNECTOR, IN ORDER TO ENSURE THE ACCEPTABLE ELECTRICAL ENGAGEMENT MADE BY ALL CONTACTS.

1/ Value of these measures is applicable to plug connector equipped with crimp contact terminal style (lead attached), or equipped with surface mount tail contact terminal style (SMT soldering).



**SURFACE MOUNT TAILS SOLDERING  
SUGGESTED TEMPERATURE VARIATION IN HOT BAR SOLDERING PROCESS**



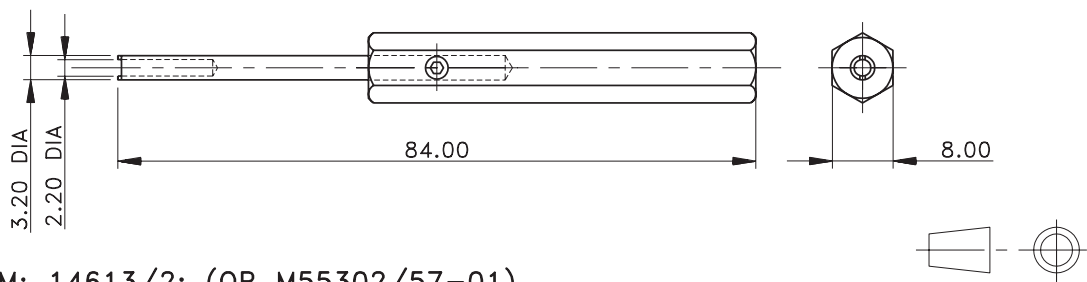
Soldering profile shall be defined and optimized in relation with the characteristics of the soldering equipment, and of the board features, (i.e. board package thickness, composite board type, heat sink thickness, microelectronic devices density etc.)

**Figure 34** GRAPHICAL REPRESENTATION OF HOT BAR SUGGESTED TEMPERATURE VARIATION, DURING SUFACE MOUNT TAILS, AS CONTACTS TERMINALS, AND RIGID PRINTED WIRING LANDS CONTACTS SOLDERING.

**CAUTION:** surface mount tails, as contacts terminals, and rigid printed wiring lands contacts, must be conformally coated, after soldering and cleaning, of a suitable electrical insulating compound as specified in MIL-I-46058 document, (latest issue).

**TOOL**

**CAUTION:** when polarized position shall be changed, apply Loctite 242 to the threads, if specified.



ORDERING DATUM: 14613/2; (OR M55302/57-01)

**Figure 35** SPANNER WRENCH TO ASSEMBLY, OR TO REMOVE, OR TO REPOSITION MALE GUIDE PINS ON PLUG CONNECTOR.

