



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

FFC TYPE CONNECTORS 90500 SERIES

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1.0 SCOPE

This specification outlines the technical performances and the quality features of the zero insertion force connectors designed for the connection of flat flexible circuit (FFC) to rigid PCB.

2.0 PRODUCT SPECIFICATION

2.1 APPLICATION

Typical applications are: telephone keyboards, car instrument clusters, personal computers, copiers.

2.2 MAIN FEATURES

- Dual beam contact connector for soldering on rigid PCB
- 2.54 mm (.100") centers
- Suitable for FFC 0.2 ± 0.1 mm (.008" \pm .004") thick
- Product availability: 4 - 20 circuits both in straight and right angle version
- No special tooling required.

2.3 FUNCTIONAL CHARACTERISTICS

The connector is provided with an actuating cover with lateral latches.

The cover is pre-inserted (first latching position) and its central slot allows the FFC insertion with zero force.

Pushing down the cover (second and final latching position) the contacts move against the circuit tracks to achieve the connection.

Due to the symmetry of the connector, loading of the FFC is not restricted to one direction only.

However in automotive applications, or in general in environments more severe than controlled indoor environments, it is preferred to use the connector with the movable formed portion of the contact at the same side of the FFC conductive traces.

The cover is also provided with internal lateral ribs to engage into the relevant notches on the FFC (see Product Drawings).

The cover can be pushed down by hand or using any suitable tool, which must not have sharp edges which may damage the connector or FFC. The correct cover closing is confirmed by two audible "clicks".

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The cover release is achieved by pressing on the two latches one side at a time (not together). It is recommended to avoid extracting completely the cover from the connector due to the possibility of invalidating the connector functionality.

2.4 MATERIALS

- Housing (body and cover): black PBT 30% G.F. UL 94 V-0
- Contacts: Phosphor bronze
- Plating : 4 - 6 µm tin pre-plated strip

3.0 RECOMMENDED PCB AND FFC SPECIFICATIONS

- 3.1 P.C. BOARD THICKNESS: 1.60 ± 0.2 mm
- 3.2 FFC REQUIREMENTS: thickness 0.075 to 0.3 mm; base material polyester (mylar) or kapton; conductive ink traces or tinned copper traces.
- 3.3 PCB HOLE PATTERNS AND FFC TAIL CONFIGURATION: see drawings SD 90500- ...

4.0 TECHNICAL FEATURES

- 4.1 OPERATING TEMPERATURE: -40 °C to +85 °C (polyester, conductive ink)
-40 °C to +105 °C (polyester, tinned copper traces)
- 4.2 STORAGE TEMPERATURE: -40 °C to +105 °C
- 4.3 RATED CURRENT: 2.5 A max / circuit at 20 °C (tinned copper 30 oz traces)
- see Derating Curve (*Attachment A*) -
- 4.4 RATED VOLTAGE: 250 Vdc
- 4.5 INSULATION RESISTANCE: 5000 Mohm min at 500 Vdc (MIL Std 1344, method 3003)
- 4.6 DIELECTRIC WITHSTANDING VOLTAGE: 1000 Vac min, 60 sec 50 Hz (MIL Std. 1344, meth. 3001)
- 4.7 CONTACT RESISTANCE: 30 mohm max (tinned copper traces)
- 4.8 CONTACT RETENTION FORCE IN THE HOUSING: 300 gr min

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4.9 CONTACT WITHDRAWAL FORCE (with gauge): 20 gr min per circuit

4.10 FFC RETENTION FORCE for 0.1 mm (.004") cable thickness: 35 gr min per circuit.

Note: this force is measured without retention notches, but circuit notching is required in actual applications, and will of course increase the retention force significantly.

4.11 CONTACT NORMAL FORCE (Fn) VS. MYLAR THICKNESS: see graph in Attachment B.

4.12 CONNECTOR INSERTION/WITHDRAWAL FORCE ONTO/FROM THE PCB (ONLY KINKED VERSION)

KINKED VERTICAL MOUNTING VERSION: INSERTION FORCE onto the PCB: 12 N MAX (PCB hole φ=0.9) WITHDRAWAL FORCE from the PCB: 0.3 N MIN (PCB hole φ=1.0)

KINKED HORIZONTAL MOUNTING VERSION: INSERTION FORCE onto the PCB: 10 N MAX (PCB hole φ=0.9) WITHDRAWAL FORCE from the PCB: 0.3 N MIN (PCB hole φ=1.0)

5.0 TEST CONDITIONS

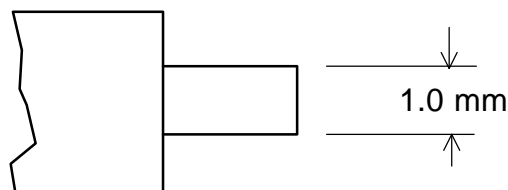
5.1 CONTACT RESISTANCE

Measurements are performed close to the contact point using a Flat Flexible tinned copper circuit 0.2 mm thick.

Test Conditions: 20 mVdc, 10 mAdc.

5.2 WITHDRAWAL FORCES WITH GAUGE

Measurements are performed using the gauge, as shown, punched from a steel strip of 0.1 mm thickness:



→| 5.5 mm |←

Measurement speed: 25 ± 3 mm / min

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5.3 CONTACT RETENTION IN THE HOUSING

Measurements are performed by pushing the contacts from the tail side and recording the force when the contact moves.

6.0 QUALITY REQUIREMENTS

The parts submitted to the mentioned tests shall maintain the same features as stated at point 4, unless different indication is given in the following points and/or on the relevant product drawings.

6.1 VISUAL CONTROL

Parts, inspected at 3X, shall not show defects that could compromise their functionality.
In detail:

- Housing: cracks, short shots, flash exceeding 0.05 mm, warping exceeding 0.1 mm/25.4 mm, discolorations, blooming, unreadable logo shall constitute reason for reject.
- Contact: missing contacts, deformations, plating and/or base material de-laminations, surface corrosions, unplated areas, metallic bridges or protuberances between contacts, foreign particles in the contact cavities, burrs, more than 0.03 mm (.001"), bent pins are not allowed.

6.2 DIMENSIONAL CONTROL

Parts shall conform to the relevant manufacturing drawings (first pieces control) or the relevant inspection instruction sheets. The following checks shall be performed:

- Contact profile before inserting it into the housing (profile projector at 20X)
- Contact profile when positioned in the housing cavity (micro-section)
- Contact foot print (grid gauge $\Phi = 0.8 \text{ mm } (.032\text{'})$)
- Plating thickness (X-ray fluorescence)

6.3 ENDURANCE TEST WITH FFC'S

Parts shall be subjected to 50 mating cycles with a FFC of 0.3 mm (.012") thickness. After this test the parts shall not show evidence of damage nor the withdrawal force (point 4.9) shall result below the limit.

Measurements of withdrawal forces shall be performed using the 0.1 mm (.004") thick gauge (according to point 5.2) and shall be recorded initially, and after the 50 cycles.

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6.4 DAMP HEAT TEST

Parts, mated with 0.1-0.3 mm (.004-.012") thick FFC's, shall be subjected for 21 days to this test according to IEC 68-2-3 Test Ca. After the test no corrosion of the plating and deformation of the housing (body and cover) shall be allowed.

Withdrawal force measurements shall be performed with gauges of the same thickness as the cable.

6.5 THERMAL CYCLING

Parts, mated with 0.1-0.3 mm (.004-.012") thick FFC's, shall be subjected, according to IEC 68-2-14 Test Na, 5 times to the following temperature cycle:

- 30 minutes at - 40 °C
- 5 minutes at +25 °C
- 30 minutes at +105 °C
- 5 minutes at +25 °C

Withdrawal force measurements shall be performed with gauges of the same thickness as the circuit.

6.6 DRY HEAT TEST

Parts, mated with 0.1-0.3 mm (.004-.012") thick FFC's, shall be subjected for 240 hours at the temperature of +105 °C in an air circulating oven according to IEC 68-2-2.

Withdrawal force measurements shall be performed with gauges of the same thickness as the circuit.

6.7 SALT FOG TEST

After endurance test (point 6.3) the same parts, in the mated condition, shall be subjected for 48 hours to the salt fog test, according to IEC 68-2-11, test Ka.

After the test, the connector contacts shall be inspected: no corrosion coming from the contact base material shall be allowed.

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6.8 SOLDERABILITY TEST

Test shall be run according to MIL Std 202 E method 208 C with the following details:

- Contact tails shall be immersed in the solder up to a point 1.6 mm (.063") away from the housing.
- Ageing shall be 16 hours at 155 °C

After the test the following requirements are requested:

- Solder coating shall be uniform and bright
- 95% (at least) of the surface shall be wetted
- No damages of the contact and the housing

6.9 RESISTANCE TO THE SOLDERING HEAT

Test shall be run according to MIL Std 202 E, method 210 A, condition B.

Contact tails shall be immersed for 10 seconds in the solder (at 260 °C) up to a point 1.6 mm (.063") away from the housing.

No damage of the contacts and housing are allowed.

6.10 VIBRATIONS

Parts shall be soldered to a rigid PCB and mated with a 0.1 mm (.004") thick, 100 mm (4") long FFC. The free end of the circuit shall be electrically connected to the instrumentation in order to record possible electrical interruptions. The circuits shall be provided with the two lateral notches for a firm retention in the housing.

Test shall be run according to the following conditions:

- frequency range: 10 Hz to 200 Hz to 10 Hz
- vibration levels: 10 - 14.8 Hz, constant displacement 10 mm pk to pk
14.8 - 20 Hz, acceleration 4.4 G
20 - 200 Hz, acceleration 2.5 G
- type of sweep: logarithmic
- sweep rate: 15 minutes total (7.5 minutes from 10 to 200 Hz,
7.5 minutes from 200 to 10 Hz)

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- vibration planes: three mutually perpendicular
- durations (8 hours total): 4 hrs vertical (up and down)
2 hrs lateral (right and left)
2 hrs axial (front and rear)

After the test:

- no mechanical damages
- no current interruptions more than 1 µsec
- contact resistance no more than 1.5 times the initial value
- other electrical characteristics within the limits

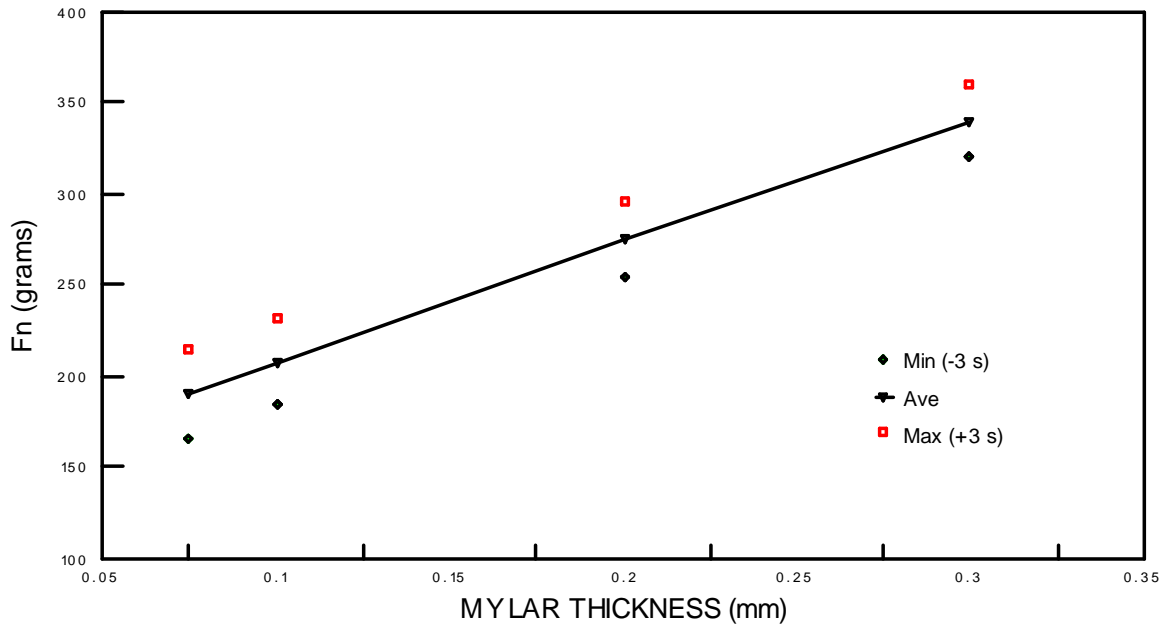
7.0 PACKING CONDITIONS

The connectors are packed in plastic PVC tubes, 591 ± 1 mm (23.26") long, closed at the ends with rubber stoppers or notches. The label on the carton shall specify:

- Manufacturer name
- Part number
- Quantity
- Lot and manufacturing date

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FFC 90500 CONNECTOR SERIES
 INITIAL CONTACT NORMAL FORCE VS MYLAR THICKNESS



ATTACHMENT A: DERATING CURVE

T amb [°C]	Max Current [A]
20	2.5
60	2.3
75	2.0
82	1.7
90	1.2
105	0

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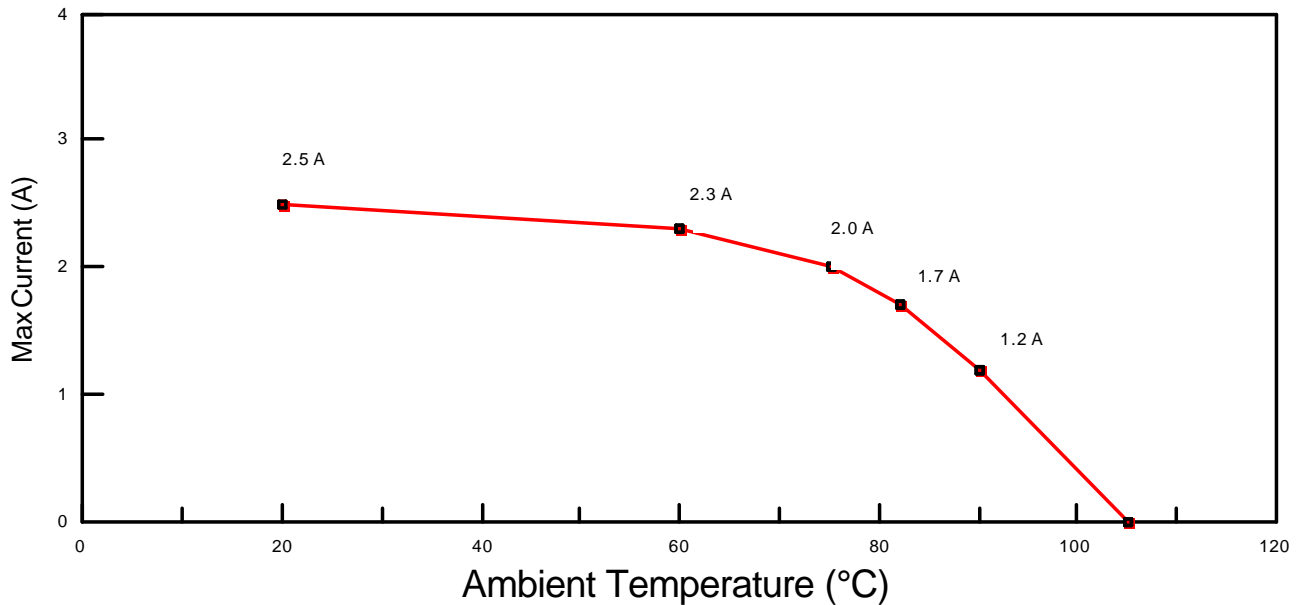
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90500 FFC CONNECTOR SERIES DERATING CURVE



ATTACHMENT B: CONTACT NORMAL FORCE VS MYLAR THICKNESS

FFC thickness mm (")	Min (-3 s)	Average	Max (+3 s)
0.075 mm (.003 ")	166	190	214
0.100 mm (.004 ")	185	208	231
0.200 mm (.008 ")	254	275	296
0.300 mm (.012 ")	320	340	360

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