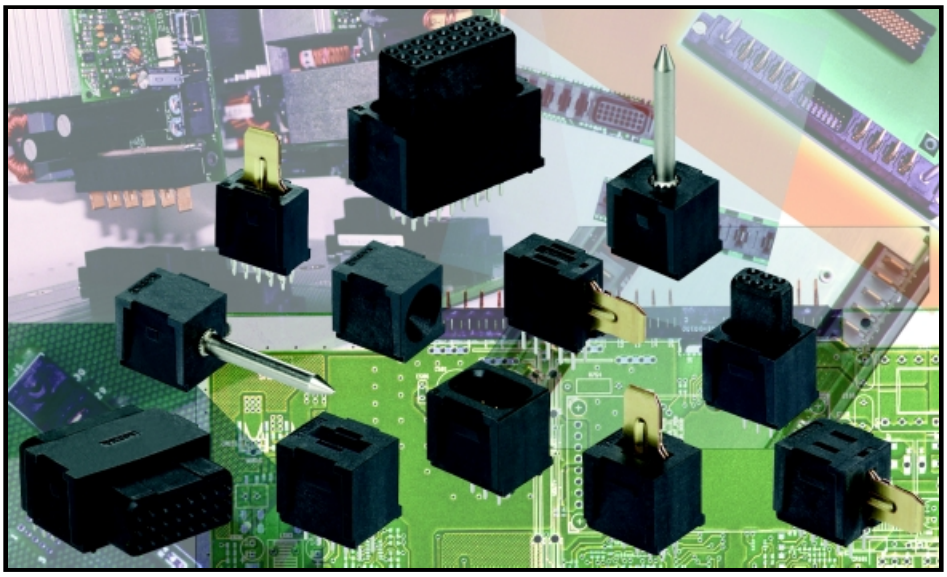
ELCON
PRODUCTS INTERNATIONAL COMPANY

Modular FLATPAQ™

Modular Board-To-Board
Hot Plug High Current Power Connectors

Modular FLATPAQ connectors provide custom solutions to hot pluggable AC and DC power needs in a board-to-board format. By using off-the-shelf modular components, power and signal modules, guide pins and other available features can be combined in a configuration to meet your exact needs. Simply define which modules are required and in what sequence, using the Layout Sheet provided, and Elcon will provide samples, typically within one week.



FEATURES

- Custom configurable modular design
- 35A hot pluggable contacts
- Blind-mating
- Sequenced mating for power & signal
- Solder or press-fit terminations
- Active guide pin
- Low insertion force
- Off-the-shelf modular components

APPLICATIONS

- Board-to-board power connections
- Power supplies, UPS
- Telecommunications
- Computers and file servers
- Aerospace power applications

High Current Capabilities

FLATPAQ uses Elcon's highly reliable CROWN BAND technology that guarantees low insertion and extraction forces, minimal voltage drop and reduced temperature rise. Rated at 35A, FLATPAQ may handle even higher currents when mounted on boards with 5 oz. copper traces or onto a busbar (see Test Data on last page).

Guide Pins

FLATPAQ guide modules, both passive and active (for premate ground), are offered to provide increased gatherability for aligning connectors during blind mating.

Contact Termination Options

FLATPAQ offers a variety of contact terminations for mounting to printed circuit boards, such as compliant press-fit, solder tail length options, and a retentive feature that holds the connector in place prior to soldering.

Sequenced Mating

Power blades are available in standard, postmate and premate lengths, allowing mating sequences suited to any design requirement. Signal contacts are available in standard and premate lengths.[1]

Regulatory Agency Evaluations

Modular FLATPAQ has been evaluated by Underwriters Laboratories Inc. to the U.S. standard UL1977 (USR); by UL (CNR) and CSA to the Canadian standard C22.2 No. 182.3-M1987 for use in data, signal, control and power applications; and by TÜV to the European standard EN60950.[2]

c UL us CSA TÜV PRODUCT SERVICE Bauart geprüft

LEADERS IN CURRENT THINKING

MDFP-010226LTUS

Dimensions, specifications and product external appearance subject to change without

FLATPAQ Connector Layout

Use this sheet to specify the desired connector layout. Please copy this sheet prior to completion to allow reuse.

INSTRUCTIONS

❶ Indicate the connector layout by filling in the FP number of each module required in the boxes below, one per box. Use one form per mated pair.

❷ The left to right order of the modules should match the **mating face views** of the connector. **When laying out right angle assemblies**, make sure that you look at the mating face with the termination tails facing downwards.

❸ **For solder terminated assemblies**, indicate the tail length for each half of the connector and whether the retentive feature is required using the checkboxes to the right of the layout grid.

Upon receipt of this form, Elcon will generate a Customer Use Drawing for you to check and approve prior to connector production.

FAX TO ELCON AT (510) 490-3740

Company	Location	
Contact Name	Title	
Telephone ( )	Fax ( )	
Signature	EMail Address	
	Quantity Required	Date

Write the "FP" numbers to indicate the layout of one half of the connector assembly, matching the left to right order with the mating face view of the connector (right angle assembly tails facing downwards).

FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP

Solder tail options

☐ .062" thick board ☐ .125" thick board
☐ .093" thick board ☐ **Retentive feature**

Write the "FP" numbers to indicate the layout of the mate to the above assembly, matching the left to right order with the mating face view of the connector (right angle assembly tails facing downwards).

FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP

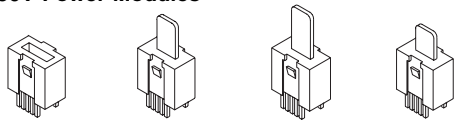
Solder tail options

☐ .062" thick board ☐ .125" thick board
☐ .093" thick board ☐ **Retentive feature**

SOLDER TERMINATED MODULES

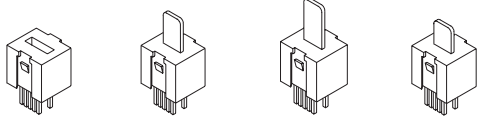
STRAIGHT TAILS

250V Power Modules



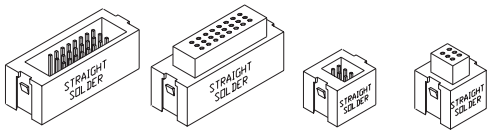
FP100 Socket | FP101 Standard | FP102 Premate | FP103 Postmate

600V Power Modules



FP116 Socket | FP117 Standard | FP118 Premate | FP119 Postmate

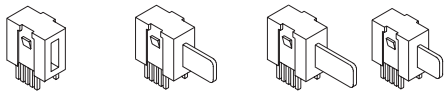
Signal Modules



FP300 24-pin | FP301 24-pin socket | FP312 6-pin | FP313 6-pin socket

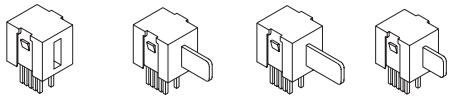
RIGHT ANGLE TAILS

250V Power Modules



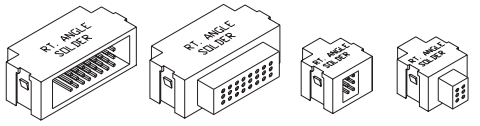
FP104 Socket | FP105 Standard | FP106 Premate | FP107 Postmate

600V Power Modules



FP120 Socket | FP121 Standard | FP122 Premate | FP123 Postmate

Signal Modules



FP302 24-pin | FP303 24-pin socket | FP314 6-pin | FP315 6-pin socket

SOLDER TAIL OPTIONS

The following options are available when specifying solder terminated assemblies. Indicate these options by marking the check-boxes to the right of the connector layout grid.

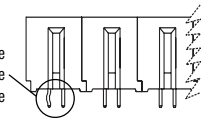
■ Tail length

Solder tails are available in 3 lengths. Select depending on board thickness and mounting style (straight or right angle assembly). See table below or, for more details, refer to TERMINATION OPTIONS at the bottom of next page.

Board Thickness	Straight Tails	Right Angle Tails
.062"	.115" (2.92mm) Nominal	.115" (2.92mm) Nominal
.093"	.143" (3.6mm) Nominal	.177" (4.5mm) Nominal
.125"	.177" (4.5mm) Nominal	.177" (4.5mm) Nominal

■ Retentive feature

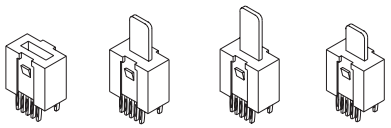
Consists of precisely formed solder tails on the contacts of the outermost power modules of the assembly, as shown in the drawing below.



Power module with retentive feature

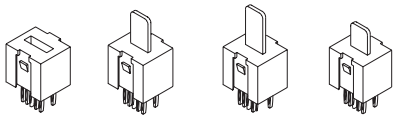
PRESS-FIT TERMINATED MODULES For 0.093" or thicker boards

250V Power Modules



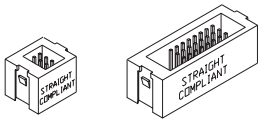
FP200 Socket | FP201 Standard | FP202 Premate | FP203 Postmate

600V Power Modules

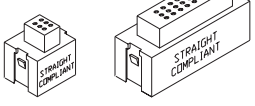


FP216 Socket | FP217 Standard | FP218 Premate | FP219 Postmate

Signal Modules



FP412 6-pin | FP400 24-pin



FP413 6-pin socket | FP401 24-pin socket

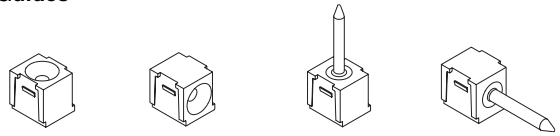
OTHER MODULES

Mounts

FP500 Left flange mount

FP501 Right flange mount

Guides



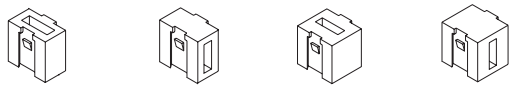
FP502 Straight passive guide socket

Right angle guide sockets
FP506 Passive
FP516 Active

Straight guide pins
FP503 Passive
FP515 Active, M3
FP517 Active, 4-40

FP507 Right angle passive guide pin

Spacers (without contacts)



FP511 Straight 250V spacer | FP512 Right angle 250V spacer | FP513 Straight 600V spacer | FP514 Right angle 600V spacer

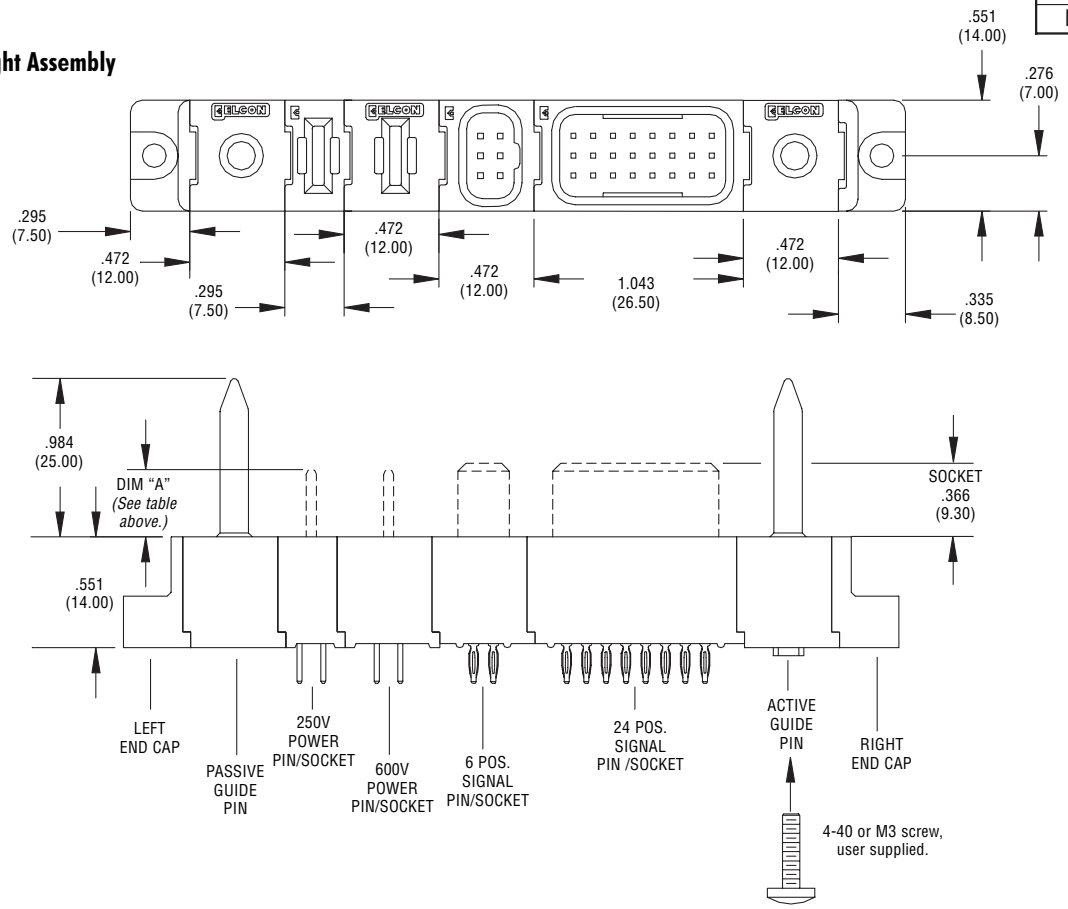
■ DIMENSIONS

The drawings below show module dimensions for one of the countless layouts possible with Modular FLATPAQ. These drawings are for reference only. To do actual engineering design work, request a Customer User Drawing (CUD) from Elcon for your particular module configuration.

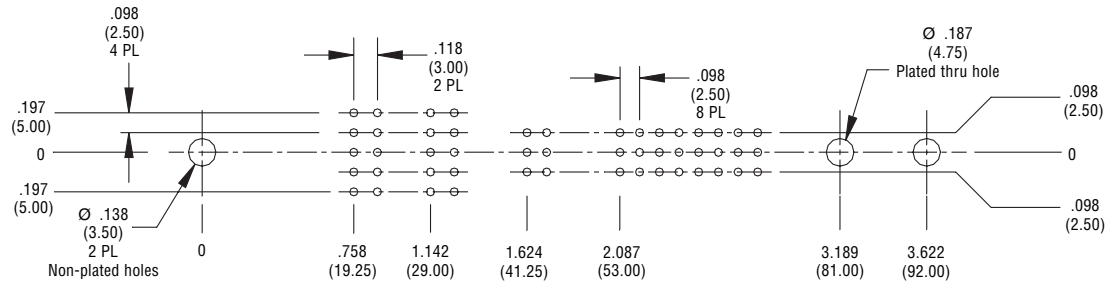
Power Blade Length

Blade Type	Dimension "A"	
	Inches	mm
Premate	.492	12.50
Standard	.413	10.50
Postmate	.335	8.50

Straight Assembly



PC Board Footprint

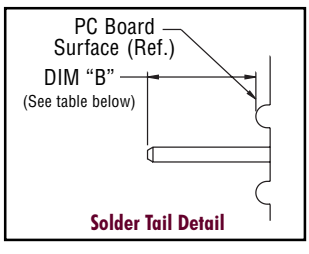


Dimensions, specifications and product external appearance subject to change without notice.

■ TERMINATION OPTIONS

Solder termination

Solder termination is available in three lengths for straight connectors, and in two lengths for right-angle assemblies. Please refer to the table below for board thicknesses and recommended tail lengths.



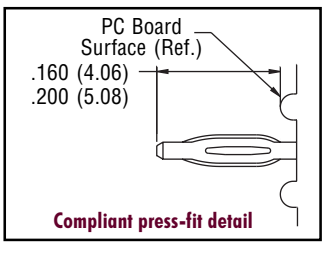
Solder Tail Detail

Relationship between tail length and board thicknesses

Board Thickness	Dimension "B"	
	Straight Mounting	Right Angle Mounting
.062"	.100" – .140" (2.55 – 3.57mm) [.115" (2.92mm) nominal]	.100" – .140" (2.55 – 3.57mm) [.115" (2.92mm) nominal]
.093"	.130" – .170" (3.30 – 4.32 mm) [.143" (3.6mm) nominal]	.160" – .200" (4.06 – 5.08mm) [1.77" (4.5mm) nominal]
.125"	.160" – .200" (4.06 – 5.08mm) [1.77" (4.5mm) nominal]	.160" – .200" (4.06 – 5.08mm) [1.77" (4.5mm) nominal]

Compliant press-fit termination

Compliant press-fit termination is available for straight assemblies only, and it is designed for use with boards 0.093" thick and above.



Compliant press-fit detail

Tooling for compliant press-fit assemblies

Press plates are recommended for compliant press-fit assemblies. Elcon will provide details of the recommended tooling fixture for each assembly.

Insertion & extraction forces of compliant modules

Forces:	Tested per MIL-C-28859 (reference only)
Push In:	11.2 – 22.5 lbs. per pin (50 – 100N)
Push Out:	10.1 – 20.2 lbs. per pin (45 – 90N)

■ DIMENSIONS

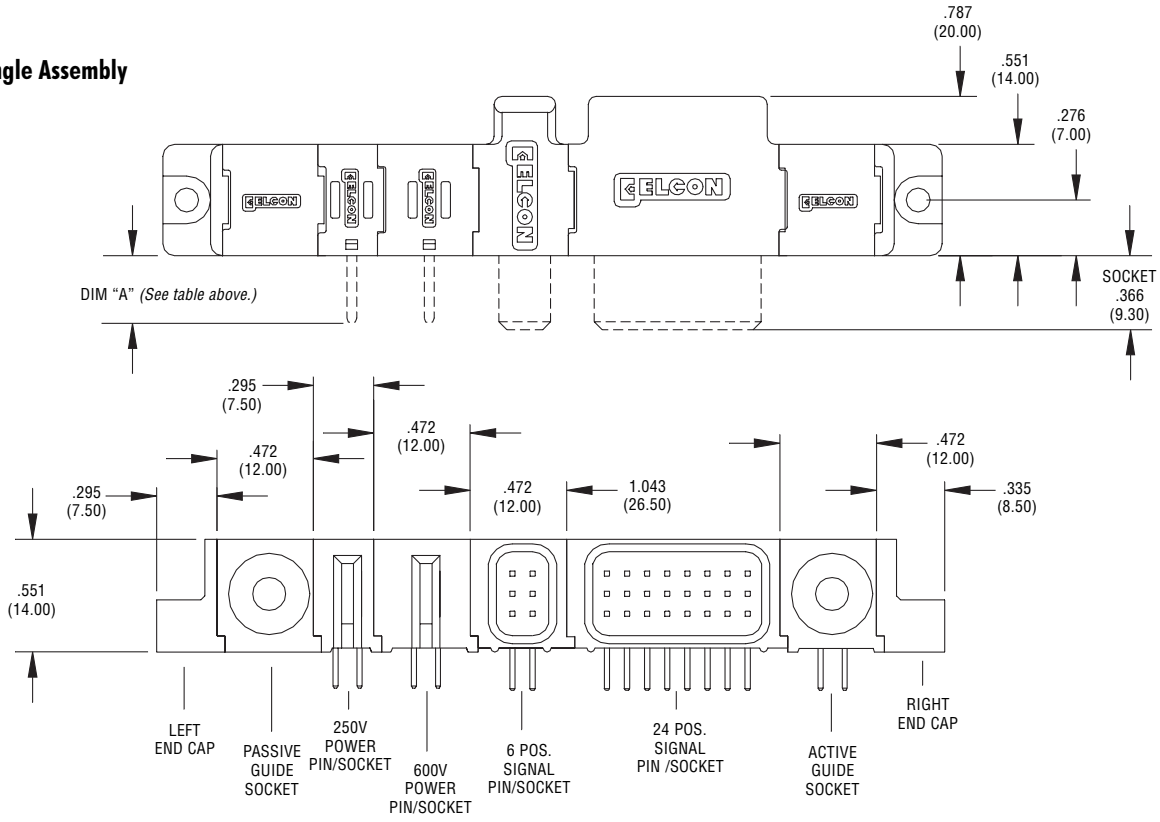
Units: Inches (mm)

The drawings below show module dimensions for one of the countless layouts possible with Modular FLATPAQ. These drawings are for reference only. To do actual engineering design work, request a Customer User Drawing (CUD) from Elcon for your particular module configuration.

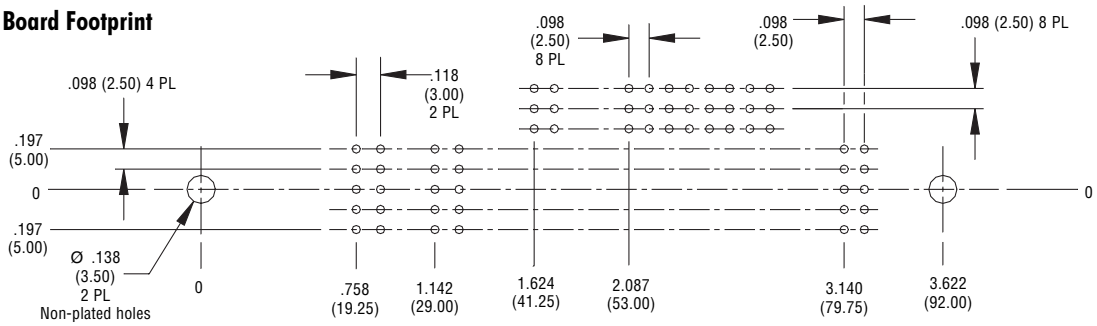
Power Blade Length

Blade Type	Dimension "A"	
	Inches	mm
Premate	.492	12.50
Standard	.413	10.50
Postmate	.335	8.50

Right Angle Assembly

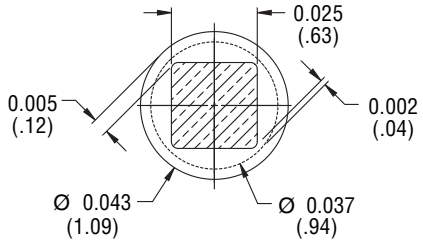


PC Board Footprint



Dimensions, specifications and product external appearance subject to change without notice.

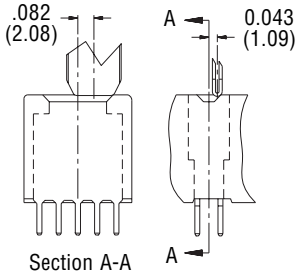
■ SUGGESTED PRINTED CIRCUIT HOLE



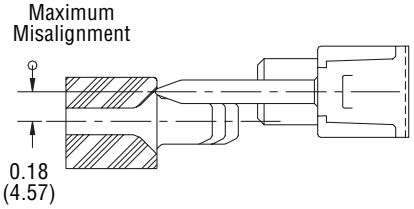
Solder and compliant press-fit termination area

Finished Hole: Ø.040 ± .0030 (Ø1.02 ± .08)
Drilled Hole: Ø.0453 ± .0005 (Ø1.15 ± .013)
Copper Plate: .0010 (.025) min. (per surface)
Tin Plate: .0003 (.008) min. (per surface)

■ BLIND MATING ALIGNMENT



Without Guides



With Guide Pin/Socket

Product Specifications

MATERIALS			
Insulators			PPA, UL 94-V-0 flammability rated, color black
Signal Contacts			Solder termination brass alloy per ASTM-B-36; compliant termination phosphor bronze alloy per ASTM-B-103, selectively plated with gold per MIL-G-45204, Type II, Grade C, Class 0 (30µin minimum) and bright tin/lead per MIL-T-10727, Type 1 (100µin minimum) on terminations, all over nickel per QQ-N-290, Class 2 (50µin minimum)
Crown Bands			Beryllium copper alloy per ASTM-B-194, selectively plated with gold per MIL-G-45204, Type II, Grade C, Class 0 (30µin minimum), over nickel per QQ-N-290, Class 2 (50µin minimum)
Power Socket Contacts			Phospor bronze alloy per ASTM-B-103, selectively plated with bright tin/lead per MIL-T-10727, Type 1 (100µin minimum) on terminations, over nickel per QQ-N-290
Power Blade Contacts			Copper alloy per ASTM-B-152, selectively plated with gold per MIL-G-45204, Type II, Grade C, Class 0 (30µin minimum), over nickel per QQ-N-290, Class 2 (50µin minimum)
Other Modules	**Passive Guide Pin**		Brass alloy per ASTM-16 plated with nickel per AMS2404
	Activated Guide Pin		Tellurium copper alloy per ASTM-B-301, plated with silver per QQ-S-365
	Activated Guide Socket Contact		Phosphor bronze per ASTM-B-103, plated with silver per QQ-S-365
ELECTRICAL			
Regulatory Agency Ratings	**Power Contact**	**UL/TÜV**	35A at 250V (50 cycles, hot plug module)
		CUR/CSA	20A at 250V (50 cycles, hot plug module)
	Signal Contact	**UL/TÜV**	3A
		CUR/CSA	2.5A
Contact Resistance	**Power Contact**		2mΩ maximum initial, (3mΩ maximum after 500 cycles durability), at 35A per MIL-STD 1344, Method 3004
	Signal Contact		15mΩ maximum initial, (30mΩ maximum after 500 cycles durability), at 100mA, 20mV, per MIL-STD 1344, Method 3002
Insulation Resistance	**Power Contact**		5,000MΩ minimum at 500VDC for 2 minutes, per MIL-STD 1344, Method 3003
	Signal Contact		
Dielectric Strength	**Power Contact**		1,500VDC for 1 minute, per MIL-STD 1344, Method 3001
	Signal Contact		
MECHANICAL			
Insertion Force	**Power Contact**		4.0lbf maximum
	Signal Contact		5.0ozf maximum using .0305" (.775mm) diameter steel test pin
Extraction Force	**Power Contact**		1.0lbf minimum
	Signal Contact		0.5ozf minimum using .0295" (.749mm) diameter steel test pin
Durability	**Power Contact**		500 cycles, per MIL-STD-1344, Method 2016
	Signal Contact		
Contact Retention	**Power Contact**		10.0lbf minimum
	Signal Contact		5.0lbf minimum
Tooling			Press fixture is recommended for compliant press fit assemblies Consult ELCON for details.
Marking			Connectors are marked with manufacturer's logo, part number and lot code.
ENVIRONMENTAL			
Temperature Rating			-40°C to +105°C
Vibration			MIL-STD 1344, Method 2005, Test Condition II
Shock			MIL-STD 1344, Method 2004, Test Condition I
Humidity			MIL-STD 1344, Method 1002, Type 1, Test Condition B
Temperature Life			MIL-STD 1344, Method 1005, Test Condition 4D (105 ±2°C, 1,000 hours)
Solderability			MIL-STD 202, Method 208

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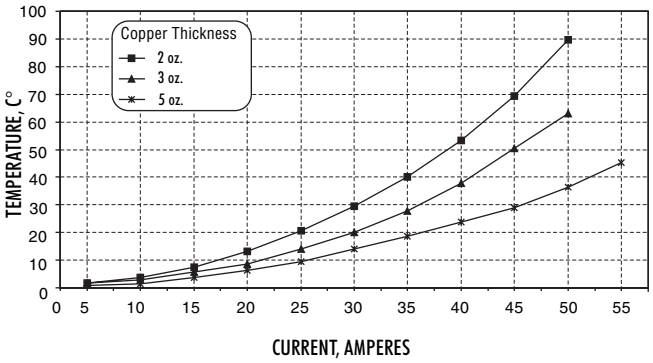
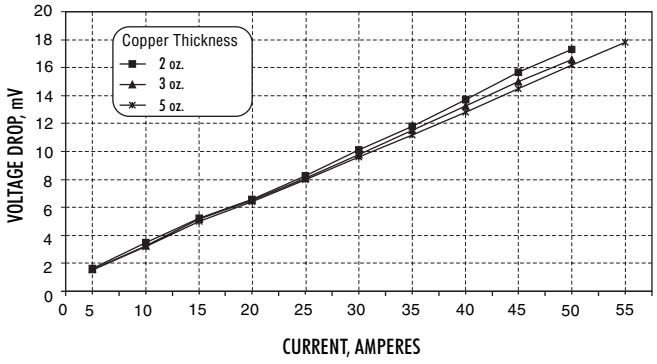
Test Data

The two graphs below show the performance of Modular FLATPAQ in terms of temperature rise and voltage drop against current. Both tests were performed on 250V power modules mounted on PC boards with 2 oz., 3 oz. and 5 oz. copper traces.

■ TEMPERATURE RISE

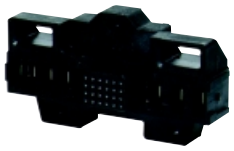


■ VOLTAGE DROP



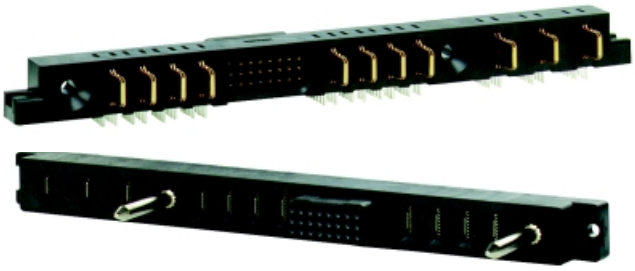
Dedicated FLATPAQ

Popular configurations are available as premolded FLATPAQ connectors. Elcon will automatically suggest the optimum solution for your application from all currently tooled insulators. For more information, request Dedicated FLATPAQ product literature from Elcon.



SERVERPAK

Cost-effective FLATPAQ specifically designed for high-end PC servers. SERVERPAK features 8 power and 24 signal contacts in less than 3.5" (90 mm) of length.



Dedicated FLATPAQ

This is one of the many dedicated FLATPAQ connectors that replicate the modular FLATPAQ, resulting in a more cost effective solution.

tyco / Electronics

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PRODUCTS INTERNATIONAL COMPANY

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