



DEFENSE LOGISTICS AGENCY
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DLA LAND AND MARITIME-VAI

May 30, 2023

MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Final draft(s) of MIL-DTL-32139 (see enclosed table for details)

Document Number	Action Taken	Complete Title	Spec-Finder (Y/N)	Reason Code	Project Number
MIL-DTL-32139/15 and /16	EPS	Connectors, Electrical, Rectangular, Nanominiature, Dual Row, Plug, Receptacle, Polarized Shell, Pin, Sockets Contacts, Vertical PCB Surface Mount Shell Type	N	MIL	5935-2023-054

The subject not stabilized, QPL document(s), have been dated 25 May 2023. Copies of these document(s) may be downloaded from the DLA Land and Maritime Web site:

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Sincerely,

/ SIGNED /

ABDONASSER M. ABDOUNI
Chief,
Interconnection Branch

cc:
FMTD (Dave Barman)

ENGINEERING PRACTICE STUDY
(EPS)

MIL-DTL-32139/15 and /16

FINAL REPORT

CONNECTORS, ELECTRICAL, RECTANGULAR,
NANOMINIATURE, DUAL ROW, PLUG, RECEPTACLE, POLARIZED SHELL,
PIN, SOCKETS CONTACTS, VERTICAL PCB SURFACE MOUNT SHELL TYPE

PROJECT NUMBER: 5935-2023-054

30 May 2023

Prepared by:
Ed Wypasek
Project officer (Rectangular connectors)
DLA Land and Maritime-VAI

ENGINEERING PRACTICE STUDY
FINAL REPORT
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Objective: The purpose of this EP Study is to address the D dimensions, leads for the co-planar from the surface X, and the PCB layout for the pad lengths.

Background: The initial draft resulted a difference of the manufactures comments. The comments are applicable to both the MIL-DTL-32139/15 and /16. Please see the disposition of comments as reference that was emailed 2/13/23.

1. Figure 1, D dimensions:
Manufacture A - responded for shorter dimensions.
Manufacture B – keep the larger dimension from the initial draft.
Manufacture C – no comment.
2. Leads for the co-planer – there was difference in tolerance:
Manufacture A - Data indicates tolerances should be leads to be co-planer within .002 above to .004 below mounting surface.
Manufacture B – leads to be co-planar within .004 above to .001 below the mounting surface.
Manufacture C – prefer +/- .003 from co-planar.
3. The recommended PC board pad lengths do not match other manufactures:
Manufacture A – Recommend showing PCB layout for each size and eliminating dims E and F.
Manufacture B – Agreed with mfg. A.
Manufacture C – responded for longer pad dimensions.

Initial Proposal:

1. Figure 1, D dimensions – Manufacture B is proposing to label a MAX dimension which was the larger dimension from the initial draft. Thus, allowing the other manufactures to meet the specifications.
2. Since there were a difference among manufactures, DLA is for a looking for consensus from the manufacture industry on the co-planar tolerances.
3. Manufacture B submitted new tables and drawings. Larger PC pads are included for the size 85. The larger pads should allow for the size 85 contacts. Please see the included drawings below.

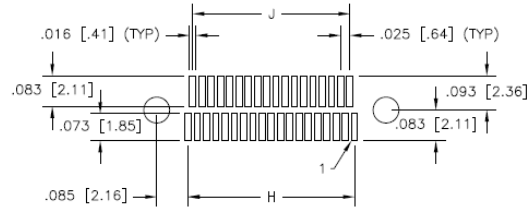
ENGINEERING PRACTICE STUDY

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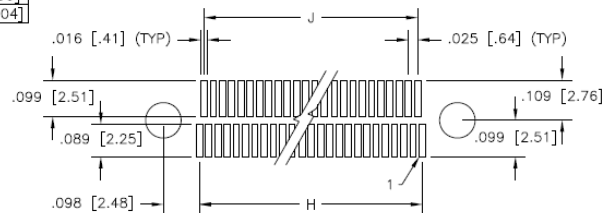
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MIL-DTL-32139/15

SIZE	H	J
9	.100 [2.54]	.075 [1.90]
15	.175 [4.44]	.150 [3.81]
21	.250 [6.35]	.225 [5.71]
25	.300 [7.62]	.275 [6.98]
31	.375 [9.52]	.350 [8.89]
37	.450 [11.43]	.425 [10.79]
51	.625 [15.87]	.600 [15.24]
65	.800 [20.32]	.775 [19.68]
69	.850 [21.59]	.825 [20.96]
85	1.050 [26.67]	1.025 [26.04]



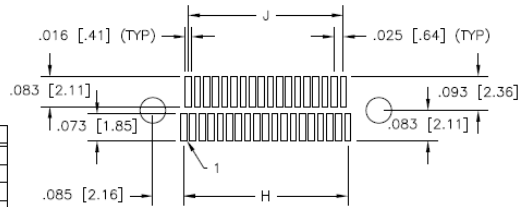
RECOMMENDED PC BOARD LAYOUT
FOR SIZE 9 THROUGH 69
(COMPONENT SIDE)



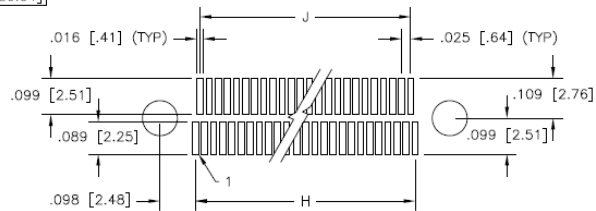
RECOMMENDED PC BOARD LAYOUT
FOR SIZE 85
(COMPONENT SIDE)

MIL-DTL-32139/16

SIZE	H	J
9	.100 [2.54]	.075 [1.90]
15	.175 [4.44]	.150 [3.81]
21	.250 [6.35]	.225 [5.71]
25	.300 [7.62]	.275 [6.98]
31	.375 [9.52]	.350 [8.89]
37	.450 [11.43]	.425 [10.79]
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RECOMMENDED PC BOARD LAYOUT
FOR SIZE 9 THROUGH 69
(COMPONENT SIDE)



RECOMMENDED PC BOARD LAYOUT
FOR SIZE 85
(COMPONENT SIDE)

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Results and Conclusion: The following comments received from the manufactures.

Proposal 1: Figure 1, D dimensions.

Glenair (Manufacture A) - Regarding dimension D as a MAX dimension, which is the washout area where the leads exit the shell. Converting dim D to a Max dimension works for Glenair in that our current shell designs and tooling is set for a dimension that is .023 less than a D Max and it is not a critical feature for functionality. Manufactures will have to ensure their washout dimension, while allowed to be less than the D MAX, does not encroach on the PCB pads presenting a shorting possibility.

Ulti-Mate Connector (Manufacture B) - We made this dimension on the table as a MAX dimension so that other competitor dimensions would also be allowed.

Omnetics (Manufacture C) -To clarify, for D dimension, we requested the tolerance on that value to be +/- .010 instead of default .005 since our standard dimension D is .005" smaller than the nominal D dim listed in the table such that we would not expect to exceed the listed dim D +.005 but may have a lower value.

Airforce (AF85) - No comment.

Army (CR) – No comment.

Conclusion - Acceptance of the D MAX with the larger dimensions to meet all manufactures dimensions and tolerance of +/- .010.

Proposal 2: Leads for the co-planer.

Glenair (Manufacture A) - The only way to be inclusive of all the responding manufactures is to expand the coplanarity from .004 above and .004 below the mounting surface. Glenair favors .002 above to .004 below with the philosophy that .010 diameter leads, which are easily moved, positioned a reasonable amount below the mounting surface will be in direct contact with the pad once mounting screws are affixed, essentially making the leads flush with the pad once mounted. Like a self-correcting feature. Leads that hover too far above the pad can cause an incomplete solder fillet depending on the gap between pad and lead, the amount of solder paste applied and the physical alignment of the lead with the pad.

Ulti-Mate (Manufacture B) – A stress analysis test exhibited that each lead was subjected to a large amount of a downward and sliding force. The results revealed internal stress to the inside solder joints. Thus, weakening the solder joints over a period time and lead to a functional failure.

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Thick solder volume between SMT pads is a recommendation by IPC. Solder thickness increases the mounting and mating forces that can lead to internal stress on the solder joints. Solder paste thickness of an industry standard .006 inches can generate a reflow that solidifies to .002 - .003 inches on top of the SMT pads. Thus, elevates the connector above the PCB.

The vertical SMT connectors with a coplanarity call out of a negative tolerance can lead to undesired stress. Also, the increase negative tolerance can cause a tilt on the connector. Such tilt on a connector will have an effect on the orientation to meet the form, fit, and function of the connector.

Having a coplanarity tolerance of $+.004/-0.001$ will reduce the above mentioned issues for the SMT leads.

Omnetics (Manufacture C) - Await industry consensus on coplanarity.

Air Force (AF85) – no comment.

Army (CR) – no comment.

Conclusion – The connector specifications are for only the connector. Anything outside of the scope of the connector are for recommendations. The mounting of the leads to the PCB surface with the given coplanarity tolerance is outside of the connector specification. There was not a consensus on the coplanarity tolerance. The coplanarity tolerance in reference to the PCB mounting surface of .004 above and .001 below will be stated in the specification as the recommended tolerance. The stress test analysis was the deciding factor. To include the other manufactures tolerances, the specification will also state the tolerances outside of the recommended coplanarity tolerance, the PCB mounted connector shall meet form, fit, and function.

Proposal 3: The recommended PC board pad lengths do not match other manufactures.

Glenair (Manufacture A) - The key word is “recommended”. The PCB layout is not a part of the M32139/15 or /16 product. The layout is a guideline for customers to develop their PCB’s using these connectors. Therefore, the proposed layout does not affect the Glenair product. Glenair made changes to their recommended PCB layouts for vertical surface mount connectors around the 2015 time frame after assessing the ability to get a complete heel and toe fillet. The Glenair PCB layouts provide room on the heel and toe to achieve a complete solder fillet and be more forgiving with connector placement.

Ulti-Mate (Manufacture B) - Agreed with mfg. A.

Omnetics (Manufacture C) - The proposed dimensions are nominally only .011 larger than tails ($.093+.083=.176$ versus $.125+.02+.02 = .165$, respectively). We'd expect our connector to work on the smaller pads and realize toe overhang is permissible per J-

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STD-001, but our rationale for larger pads is to minimize risk of toe overhang based on connector, PCB and placement tolerances.

Air Force (85) – No comment.

Army (CR) – No comment.

Conclusion – The included initial proposed drawings above will be the acceptable standard SMT pads. The lengths meet all manufactures recommendations.

Methodology: Obtain input from the manufactures industry to standardize of the proposed recommendations.

If there are any questions, please contact Mr. Ed Wypasek, phone 614-692-0530, E-mail edmund.wypasek@dla.mil, DLA Land and Maritime-VAI, P.O. Box 3990, Columbus, OH 43218-3990.