Product - Specification

108-160117
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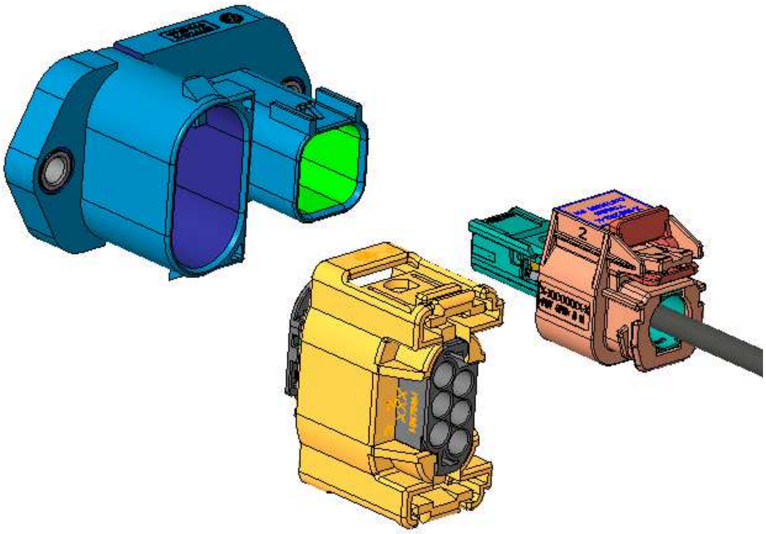
MATEnet and MQS-Pin 6 pos Hybrid Connector System

The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.



1. SCOPE

This specification covers the general performance, tests and quality requirements for MATEnet and MQS-Pin 6 pos Hybrid Connector System.

1.1 General Product Description

The MATEnet and MQS-Pin 6 pos Hybrid Connector System is combined 2 connector systems. One is Matenet connector system. The other is MQS-Pin 6 pos connector system.

1.2 MATEnet connector system Description

The MATEnet connector system is designed for automotive data network architecture and is applicable for e.g. infotainment networks, on-board diagnostics, 360° camera systems, and Advanced Driver Assistance Systems (ADAS).

The MATEnet connector system is suitable for automotive Ethernet for data transmission rate of 100 Mbit/s according to Open Alliance „IEEE 100BASE-T1 Definition for Communication Channel " (IEEE 802.3bw™) and 1 Gbit/s according Open Alliance „Channel and Components Requirements for 1000BASE-T1 Link Segment Type A " (IEEE 802.3bp™).

The MATEnet connector system is depending on the used components compatible with Power over Data Line (PoDL), for all power classes according to IEEE Std 802.3bu™.
Precondition is that the interface is designed according to IEC60664-1 and UL840 with respect to pollution degree, material properties, and creepage / clearance distances.

The electrical contact is made by a rectangle pin with length 0,5x0,4mm, and nanoMQS contact system.

1.3 MQS-Pin 6 pos connector system Description

The electrical contact is made by a rectangle pin with length 0,63x0,63mm, and MQS contact system. The combined MQS-Pin 6 pos header connector is in a pitch of 4,0 x3,5mm.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the events of conflict between the requirements of this specification and the product drawing or of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1 General Documents

A DIN IEC 60512
Electromechanical components for electronic equipment; basic testing procedures and measuring methods - edition May 1994

B IEC 60512-2-1
Electrical continuity and contact resistance tests; Test 2a: contact resistance; millivolt level method, edition 2002

C DIN IEC 60512-8
Connectors for electronics equipment – tests and measurements, part 8-1: static load tests,

edition 2002

D DIN IEC 68-2-20
Test method for solderability and resistance to soldering heat, edition 2006

E DIN EN 60352
Solderless connections – Part 2: Crimped connections - General requirements, test methods and practical guidance

F DIN EN 60068
Environmental testing

G LV 214
Test Guideline for Motor Vehicle Connectors, Edition March 2010

2.2 TE Documents

A 108-94099 Product specification NanoMQS

B 108-18030 Product specification MQS

B 108-94106 UTP / STP Cable Requirements for Ethernet Applications

C 108-94414 RF Connector Requirements for frequency bandwidth up to 100MHz

D 108-94509 RF Connector Requirements for frequency bandwidth up to 1GHz

2.3 Interface Drawings

208-18013 1-Port Header Interface – sealed

114-18063 MQS-Pin 6 pos connector

3. REQUIREMENTS

3.1 Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable production drawing.

3.2 Materials

Descriptions for material see in production drawing.

3.3 Plating

Part	Plating Material
Signal Contact NanoMQS	Sn
Signal Contact MQS	Sn
Ground Contact	Sn

3.4 General Requirements

- **Temperature range over lifetime:**

- -40°C to 105°C

- **Ingress Protection Class acc. ISO 20653:**
  - **After Mating: IP X7 and IPx9K**
- **Flammability according UL94: HB**

3.5 Ratings

3.5.1 Mechanical Data

3.5.1.1 Mechanical Data for MATEnet Connector system

Characteristic	Acceptance Criteria
Mating cycles	min. 20
Pin retention force	Min. 15N
Mating Force	max. 50N
Unmating Force	min. 5N max. 50N
Retention Force Connector Lock	min. 80N
Actuation Force of housing latch/lock (per locking latch)	min. 3N max. 15N
Actuation forces for secondary lock (per bracket) Open Close	< 50N < 50N
Keying Efficiency	min. 80 N
Polarization Feature Effectiveness	min. 80N
Cable holding Force	min. 120 N
Contact Overlapping Signal Contact Ground Contact (STP)	> 1,0 mm > 0,45 mm
Contact Retention Force 1. Locking 2. Locking	F Prim. >25 N F Sek. >50 N
Mounting Force 2 pos. Module into Frame	max. 30 N
Retention Force 2 pos Module in Frame Only Primary locking Only 2. Module locking Total Locking	> 25 N > 50 N > 120 N

3.5.1.2 Mechanical Data for MQS-Pin 6 pos Connector system

Characteristic	Acceptance Criteria
Mating cycles	min. 20
Pin retention force	min. 25N
Mating Force	max. 50N
Unmating Force	min. 5N max. 50N
Retention Force Connector Lock	min. 110N
Keying Efficiency	min. 80 N
Polarization Feature Effectiveness	min. 80N
Contact Overlapping	> 1,0 mm

3.5.2 Electrical Data

Characteristic	Acceptance Criteria
Contact Resistance before aging: Signal / Power Contact straight Ground Contact (STP)	max. 30 mOhm max. 40 mOhm
Contact Resistance after aging: Signal / Power Contact straight Ground Contact (STP)	max. 40 mOhm max. 100 mOhm
Isolation Resistance	min. 1,00 MOhm
Current Capability at 80°C	max. 3 A (Matenet) max. 7.5 A (MQS-Pin 6 pos)
Operating Voltage	up to 60 V DC (Eathernet) up to 50 V DC (MQS)
Test Voltage	500 Vrms

3.5.3 Environmental Data

Mechanical Shock	DIN IEC 60068-2-27 Class 2
Vibration	DIN IEC 60068-2-64 Class 2
Thermal Shock	DIN IEC 60068-2-14 -40°C - +105°C
Dry Heat	DIN IEC 60068 2-2 Temperature +105°C

3.5.4 RF-Parameters for UTP

Characteristic Impedance Differential Mode (CIDM)	100 Ω ± 5 % (at 500 ps rise time)
Propagation Delay (td)	⩽ 667 ps 2 ⩽ f ⩽ 600, frequency f in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Insertion Loss IL (Sdd21)	$\leq (0{,}01 \cdot \sqrt{f})\ dB$ 1 ⩽ f ⩽ 600, frequency f in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Return Loss RL (Sdd11 / Sdd22)	$\geq \begin{pmatrix} 38 & 1 \leq f < 75 \\ 20 - 20 \cdot \log\left(\frac{f}{600}\right) & 75 \leq f \leq 600 \end{pmatrix} dB$ 1 ⩽ f ⩽ 600, frequency f in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Longitudinal Conversion Loss LCL (Sdc11/Sdc22) Longitudinal Conversion Transfer Loss LCTL (Sdc12/Sdc21)	$\geq \begin{pmatrix} 55 & 10 \leq f \leq 80 \\ 77 - 11{,}51 \cdot \log(f) & 80 < f \leq 600 \end{pmatrix} dB$ 10 ⩽ f ⩽ 600, frequency f in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Power Sum Alien Near End Crosstalk PSANEXT Loss (Sdd31, Sddyx)	$\geq \begin{pmatrix} 57 - 10 \cdot \log\left(\frac{f}{100}\right) & 1 \leq f \leq 100 \\ 57 - 15 \cdot \log\left(\frac{f}{100}\right) - 6 \cdot \left(\frac{f-100}{400}\right) & 100 < f \leq 600 \end{pmatrix} dB$ 1⩽ f ⩽600 frequency f in MHz, Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Power Sum Alien Far End Crosstalk PSAFEXT Loss (Sdd41, Sddyx)	$\leq \left(46.67 - 20 \log\left(\frac{f}{100}\right)\right) dB$ 1 ⩽ f ⩽ 600, frequency f in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)
Alien Far End Cross Conversion Loss Common to Differential AFEXTDC Loss (Sdc41, Sdcyx) Alien Far End Cross Conversion Loss Single-ended to Differential AFEXTDS Loss (Sds45, Sdsyx)	$\geq \begin{pmatrix} 50 & 10 \leq f \leq 80 \\ 72 - 11{,}51 \cdot \log(f) & 80 < f \leq 600 \end{pmatrix} dB$ 10 ⩽ f ⩽ 600, frequency in MHz Port reference impedances: 100 Ω (DM), 25 Ω (CM)

3.5.4 RF-Parameters for STP

Characteristic Impedance Differential Mode (CIDM)	100 Ω ± 5 % (at 500 ps rise time)
Propagation Delay (td)	≤ 667 ps 2 ≤ f ≤ 600, frequency f in MHz
Insertion Loss IL (Sdd21)	$\leq (0{,}01 \cdot \sqrt{f})\, dB$ 1 ≤ f ≤ 600, frequency f in MHz
Return Loss RL (Sdd11 / Sdd22)	$\geq \begin{pmatrix} 30 & 1 \leq f < 190 \\ 20 - 20\,log\left({}^{f}/_{600}\right) & 190 \leq f \leq 600 \end{pmatrix} dB$ 1 ≤ f ≤ 600, frequency f in MHz
Longitudinal Conversion Loss LCL (Sdc11/Sdc22) Longitudinal Conversion Transfer Loss LCTL (Sdc12/Sdc21)	$\geq \begin{pmatrix} 50 & 10 \leq f \leq 50 \\ 75.2 - 14.83\,log(f) & 50 < f \leq 600 \end{pmatrix} dB$ 10 ≤ f ≤ 600, frequency f in MHz
Power Sum Alien Near End Crosstalk PSANEXT Loss (Sdd31, Sddyx)	$\geq \begin{pmatrix} 57 - 10 \cdot \log\left(\frac{f}{100}\right) & 1 \leq f \leq 100 \\ 57 - 15 \cdot \log\left(\frac{f}{100}\right) - 6 \cdot \left(\frac{f-100}{400}\right) & 100 < f \leq 600 \end{pmatrix} dB$ 1≤ f ≤600 frequency f in MHz,
Power Sum Alien Far End Crosstalk PSAFEXT Loss (Sdd41, Sddyx)	$\leq \left(46.67 - 20\log\left(\frac{f}{100}\right)\right) dB$ 1 ≤ f ≤ 600, frequency f in MHz
Coupling attenuation ac	$\geq \begin{pmatrix} 70 & 30 \leq f \leq 100 \\ 70 - 19.3\,log\left({}^{f}/_{100}\right) & 100 < f \leq 600 \end{pmatrix} dB$ 30 ≤ f ≤ 600, frequency in MHz
Screening attenuation as	≥28 dB 30 ≤ f ≤ 600, frequency in MHz

Revision	Chapter	Change	Date
A	Ares Huang	Initial	Dec. 05, 2023