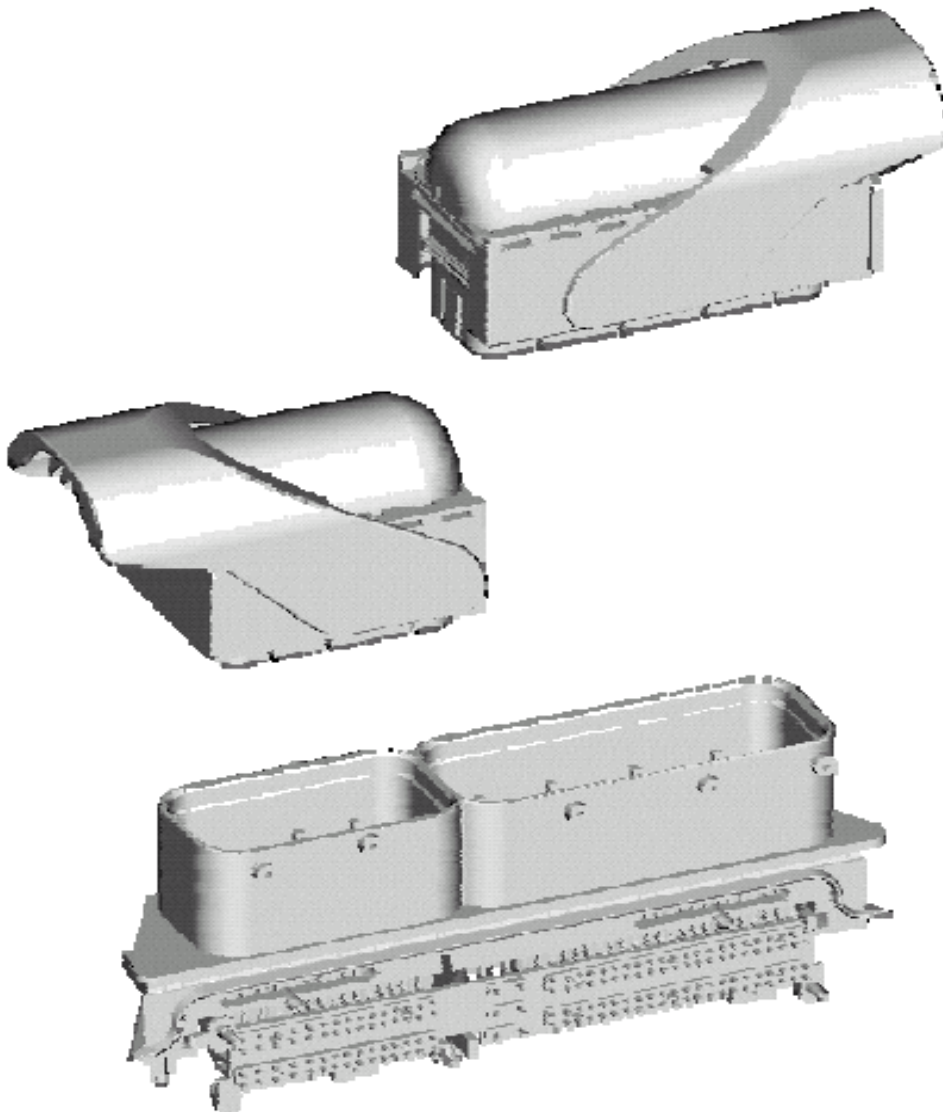


Product Specification

Plug Connector 154-Pin, waterproof “Connector System for Engine Control Unit”



108-61055

1. Scope

1.1 Contents.

This specification covers the requirements for product performance, test methods and quality assurance provisions of a ECU154-Pin Connector. The applicable product descriptions and part number are as follows:

Part Number	Descriptions
See interface 114-18304-1/936524 /936658/1897294	Male connector, 154-Pin
1897302-2,1897635-2	Socket Housing, 60-Pin
1897301-2,1897634-2	Socket Housing, 94-Pin
284726-1, 1452737-1	60P Cover Housing
1897645-2, 1897646-2	60P Lever Housing
284725-1	94P Cover Housing
1897646-2	94P Lever Housing
968220-1	MQS ¹ Clean Body contact, WSR ² 0.2-0.5mm ²
968221-1	MQS Clean Body contact, WSR 0.75mm ²
1241608-1	1.5mm Clean Body contact, WSR 0.75-1.5mm ²
1241394-1	AMP MCP2.8K*, SWS, WSR 0.5-1.0mm ²
1241396-1	AMP MCP2.8K*, SWS, WSR 1.0-2.5mm ²
828904-1, 828905-1 828922-1 (cavity plug (For the assignment of the individual seals to the various wire cross-section, see the drawing of the individual seal)	Single wire seal for AMP MCP2.8K

Ref) 1. Micro Quadlok system*, 2. Wire size range,

- The 154-Pin plug connector is used for the connection of engine control units inside the vehicle and also at various installation locations in the engine compartment. On the cable side, the system has a modular design, permitting the connection of a separate engine and/or vehicle cable harness.

A. Male Connector, 154-Pin

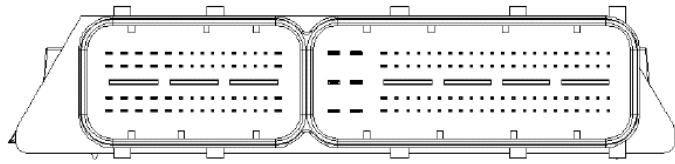


Figure 1

Engine module, 60-pin

Vehicle module, 94-pin

Contacts: 24 x 1.5mm x 0.63mm
36 x 0.63mm x 0.63mm

6 x 2.8mm x 0.8mm
4 x 1.5mm x 0.63mm
84 x 0.63mm x 0.63mm

For the dimensional definition of the interface, see drawing 114-18304-001

B, Socket Housing

[60-Pin, engine connection]

No.	Designation
1	Support housing
2	Seal
3	Chamber block
4	Slide
5	Lever
6	Contact housing A
7	Contact housing B
8	Collective seal
9	
10	Seal holder A
11	Seal holder B
12	Secondary interlock
13	Cap with cable outlet

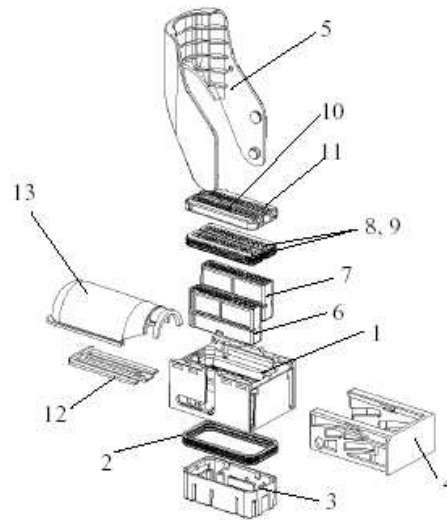


Figure 2

[94-Pin, vehicle connection]

No.	Designation
1	Support housing
2	Seal
3	Chamber block
4	Slide
5	Lever
6	Contact housing A
7	Contact housing B
8	Collective seal
9	
10	Seal holder A
11	Seal holder B
12	Secondary interlock
13	Cap with cable outlet
14	Secondary interlock JPT

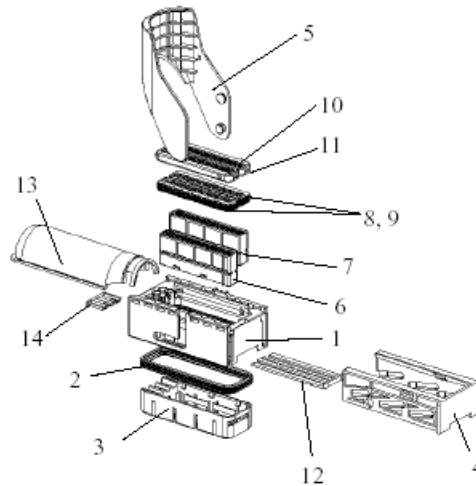


Figure 3

2. Applicable Documents.

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

2.1 AMP Specifications :

- A. 109-5000 Test Specification, General Requirements for Test Methods
- B. 114-18021-1 Application Specification for Clean body MQS receptacle
- C. 114-18148 Application Specification for AMP MCP2.8K* receptacle
- D. 114-61015 Application Specification for 154P connector
- E. 411-61004 Instruction Sheet for 154P connector
- F. 108-61055-1 Test Specification for Japanese version.
- G. 107- Packaging Specification.

2.2 Reference Documents :

- JASO D 605 : Automotive Multi-pole Connectors
- JASO D7101 : Test Methods for Molded Plastic Parts
- JIS C 3406 : Low Voltage Cables for Automobiles
- JIS D 0203 : Method of Moisture, Rain and Spray Test for Automobile Parts
- JIS D 0204 : Method of High and Low Temperature Test for Automobile Parts
- JIS D 1601 : Vibration Testing Method for Electronic Components
- JIS D 0205 : General Rules of Weatherability for Automobile Testing
- JIS K 6301 : Physical Testing Methods for Vulcanized Rubber
- JIS K 2202 : Gasoline for Automobiles

3. Requirements :

3.1 Design and Construction :

Product shall be of the design, construction and physical dimensions Specified on the applicable product drawing.

3.2 Materials & Finish

A. Contacts

● MQS(Micro Quadlock System) Clean Body

MQS (Micro Quadlock System)

WSR	0.2 – 0.5mm ²	0.75mm ²	
Material	CuNiSi / stainless steel		
Surface finish	tinned		
Max. Insertion cycles	20		
Insertion force	2–5N		
Removal force	1–5N		
Contact resistance	≤3mΩ		
Current carrying capacity (contact free in air, 100°C; current carrying capacity in housing: see Section 3.5.14)	Wire cross-section		
	0.35mm ²	0.5mm ²	0.75mm ²
	3.5A	5A	7.5A
Temperature range	–40°C bis +120°C		
Part No.	968220–1	968221–1	



Figure 4

● 1.5mm Clean Body

WSR	0.75 – 1.5mm ²		
Material	CuNiSi / stainless steel		
Surface finish	tinned		
Max. Insertion cycles	20		
Insertion force	2.5–5N		
Removal force	2–4N		
Contact resistance	≤3mΩ		
Current carrying capacity (contact free in air, 100°C; current carrying capacity in housing: see Section 3.5.14)	Wire cross-section		
	0.75mm ²	1mm ²	1.5mm ²
	7.5A	10A	15A
Temperature range	–40°C bis +130°C		
Part No.	1241608–1		

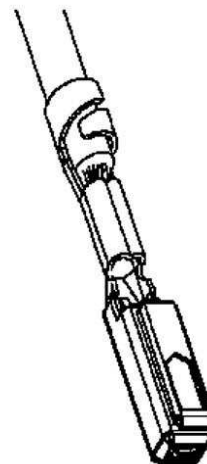


Figure 5

● **AMP MCP2.8K**

AMP MCP2.8K (QKK2.8)

WSR	0.5 – 1mm ²	>1 – 2.5mm ²	
Material	CuNiSi / stainless steel		
Surface finish	tinned		
Max. Insertion cycles	10		
Insertion force	5–8N		
Removal force	3–5N		
Contact resistance	≤3mΩ		
Current carrying capacity (contact free in air, 100°C; current carrying capacity in housing: see Section 3.5.14)	Wire cross-section		
	0.5mm ²	1mm ²	1.5mm ² 2.5mm ²
	9A	12A	14A 17A
Temperature range	–40°C bis +130°C		
Part No.	1241394-1	1241396-1	

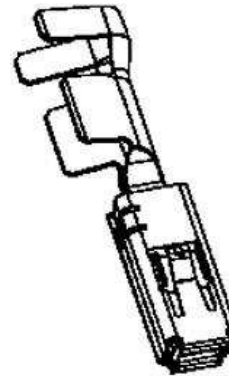


Figure 7

3.3 Ratings:

- A. Temperature Rating : -40°C to + 130°C
(Ambient Temperature + Temperature Rise due to energized current)

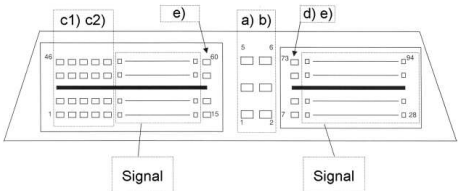
3.4 Performance and Test Descriptions :

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in para. 3.5. All tests are performed at ambient temperature unless otherwise specified.

3.5 Test Requirements and Procedures Summary :

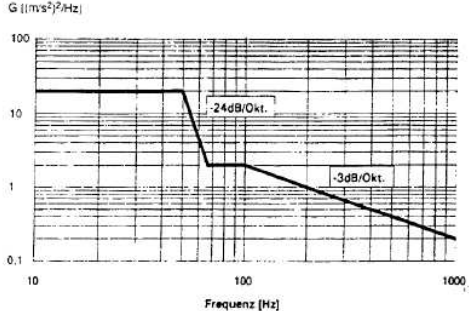
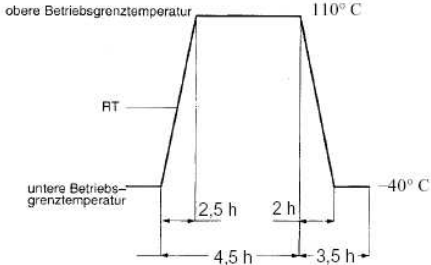
Para.	Test items	Requirements	Procedures
3.5.1	Confirmation of Product	Product shall be conforming to the requirements of applicable product drawing and Application Specification	Visually, Dimensionally and Functionally inspected per applicable inspection plan.
3.5.2	Connector Insertion and removal forces (With Lever)	Insertion and removal Force: < 150 N	Connectors to be mated by applying a measured force axially to the slide lock at a rate of V= 50 mm/min.
3.5.3	Connector Insertion and removal forces (Without Lever)	Insertion and removal Force: Documentation of the results	Connectors to be mated by applying a measured force axially to the slide lock at a rate of V= 50 mm/min.

Para.	Test items	Requirements	Procedures
3.5.4	Contact pull-out forces	1st contact retainer for signal contacts(0.63x0.63 / 1.5x0.6) ; pull-out Force: ≥ 30 N	Pulling wires axially with an operating speed of V=50 mm/min
3.5.5	Contact pull-out forces	2st contact retainer for signal contacts(0.63x0.63 / 1.5x0.6) ; pull-out Force: ≥ 40 N	Pulling wires axially with an operating speed of V=50 mm/min
3.5.6	Contact pull-out forces	1st contact retainer for power contacts 2.8x0.8mm ; pull-out Force: ≥ 60 N	Pulling wires axially with an operating speed of V=50 mm/min
3.5.7	Contact pull-out forces	2st contact retainer for power contacts 2.8x0.8mm ; pull-out Force: ≥ 60 N	Pulling wires axially with an operating speed of V=50 mm/min
3.5.8	Drop test	Dropped 1m onto concrete In accordance with IEC 512-5-7b(cable connected) Drops : 2	No Breakage / cracks
3.5.9	Blade strip(male Side) Force to push out of plastic body	0.63 x 0.63 : ≥ 30 N 1.5 x 0.6 : ≥ 30 N 2.8 x 0.8 : ≥ 55 N (max. perm. Motion: 0.1mm with 10 sec. hold time)	In accordance with SIEMENS SPEC, 657783.01 ◆New condition ◆After soldering : solder bath temperature: $260 \pm 5^{\circ}\text{C}$
3.5.10	Blade strip(male Side) Force to push out of plastic body	0.63 x 0.63 : ≥ 40 N 1.5 x 0.6 : ≥ 50 N 2.8 x 0.8 : ≥ 80 N	In accordance with VW 801 01 / 1998-01, Section4.2(V=100mm/min) ◆New condition ◆Pre-aged: $-40^{\circ}\text{C}/+110^{\circ}\text{C}$, 30min 20cycles

Para.	Test items	Requirements	Procedures
3.5.11	Waterproofness Cable-harness connector with blade strip(male side) (complete system)	No entry of water	High-pressure washing. IP X9K (similar to steam-jet test in accordance with DIN 40 050 Part 9) Pressure : 80 - 100bar Test duration per side : 30s Distance nozzle-test object : 10-15cm Temp. control unit : 90°C Temp. room : 25°C Temp. water : 15°C±5°C
3.5.12	Watertight Sealing	1.0Kg/cm ²	Blow compressed air into mated pair of connectors through a small hole. Place the connectors in 30 cm deep water, and must withstand the air pressure of 9.8Kpa(0.1Kgf/cm ²) for 30 seconds/increase pressure at a rate of 9.8Kpa(0.1Kgf/cm ²) each time until air leakage takes place.
3.5.13	Dust Bombardment	No ingress of dust	In accordance with DIN 40 050 part 9 page 11 & IEC 529 page 43 Category 1.
3.5.14	Electrical tests Current load(derating)/ Current heating	Temperature rise due To current < 30K	Current load profile(in accordance with Execution Specification SIEMENS SPEC, 657783.01) <u>Range</u> <u>Σ contacts</u> <u>I_{rms}</u> <u>Cross-section</u> Signal 10 2A 0.75mm ² (0.5 mm ²) 10 1A 0.5mm ² Rest 0.5A 0.35mm ² a).b) 6 7A 2.55mm ² c1) 12 4.2A 1.55mm ² 8 2.5A 0.75mm ² (1.0 mm ²) c2) 3 5A 1.5 mm ² 6 4.2A 1.5 mm ² 11 2.5A 0.75mm ² (1.0 mm ²) d) 4 4A 1.5 mm ² e) 4 max. 1.5 mm ² Ambient temperature: 110°C  Current test condition : 0.63 : 2A, 1.5 : 2.5A, 2.8 : 7A

Para.	Test items	Requirements	Procedures
3.5.15	Electrical tests Insulation Resistance	$R \geq 100M\Omega$	Storage in dry 90°C / 120h Moist heat, Applicable standards: IEC 60068-2-8Z/AD, Temperature: -10°C~65°C, Relative humidity: 93%, Cycle duration: 24H, Number of cycles: 10, Frost cycles: first cycle with frost then without, and then repeat this until end of test . In accordance with IEC 512, Part 2, Test 3a, Connection type C V = 500V (DC) AMP SPEC. 109-5302
3.5.16	Electrical tests Dielectric strength	No puncture or arcing	Storage in dry 90°C / 120h Moist heat, constant 10days, 40°C, 95% relative humidity Allow samples to cool for 0.5h on laboratory bench In accordance with IEC 512, Part 2, Test 3a, Connection type C V = 500V ~ / 60s
3.5.17.1	Figure moisture Entry due to Temperature changes No arcing Test set-up 1: Contact housing: 1h cold, $t_0 = -20^\circ\text{C}$	Unit: 1h warm, $t_0 = 40^\circ\text{C}$ at 90% relative humidity Plug contact housing into unit immediately after removal from cold storage. Contact housing and unit, connected, $t_0 = +40^\circ\text{C}$ at	90% relative humidity, storage duration 1h. Immediate application of current to neighbouring 1.5mm contacts outside climate cabinet. Test voltage: 1kV (then increase until arcing occurs) Test duration: 3min.
3.5.17.2	Figure moisture Entry due to Temperature changes	No arcing	Test set-up 2: Contact housing: 1h cold, $t_0 = -20^\circ\text{C}$ Unit: 1h warm, $t_0 = 40^\circ\text{C}$ at 90% relative humidity Plug contact housing into unit immediately after Removal from cold storage. Contact housing and unit, connected, $t_0 = 80^\circ\text{C}$ at 90% relative humidity, storage duration 1h. Application of current to neighbouring 1.5mm contacts outside climate cabinet. (max. transfer Time 1min.). Test voltage: 1kV Test duration: 3min.

Para.	Test items	Requirements	Procedures
3.5.17.3	Figure moisture Entry due to Temperature changes	No arcing	<p>Test set-up 3: Contact housing and unit, connected, $t_0=80^{\circ}\text{C}$ at 98% relative humidity, storage duration 10h. Contact housing and unit, not connected: 1h cold, $t_0= -40^{\circ}\text{C}$ Plug contact housing without removing from the Climate chamber. Immediate application of current to neighbouring 1.5mm contacts outside climate cabinet. Test voltage: 1kV (then increase until arcing occurs) Test duration: 3min.</p>
3.5.18	Solderability (soldering pins)	Sufficient wetting, no gaps Permitted (examine with 10x magnifying glass)	<p>In accordance with IEC 68, Parts 2-20 ♦ New condition ♦ Pre-ageing (4h water vapour or 4h dry storage at 155°C) Solder-bath temperature: $235 \pm 3^{\circ}\text{C}$ Immersion duration: 2s Immersion depth: to PCB level</p>
3.5.19	Temperature change/shock	<ul style="list-style-type: none"> ♦ No cracking ♦ No embrittlement of material ♦ Compliance with values for : <ul style="list-style-type: none"> ▪ Insulation resistance ▪ Contact push-out force (blade strip) 	<p>Use the same sample for the entire test sequence ♦ Temperature storage in accordance with DIN / IEC 68-2-2 ♦ Temperature: 110°C ♦ Test Duration: 48h then ♦ Temperature shock test in accordance with DIN / EC 68-2-14 Na ♦ Temperature range: $-40 \dots +110$ ♦ Hold time: $\geq 45\text{min}$ (cycle length 1.5h) ♦ Transfer time: $\leq 10\text{s}$ ♦ Number of cycles: 500 then ♦ Moisture test in accordance with AK test guideline PG 19-b 19.5</p>
3.5.20	Vibration resistance Test with pre-aged samples Pre-ageing	<ul style="list-style-type: none"> ♦ Visual inspection for cracks or changes ♦ $R \leq 10\text{m}\Omega$ 	<p>Pre-ageing: $110^{\circ}\text{C} / 48\text{h}$ $-40^{\circ}\text{C} / +110^{\circ}\text{C}$, 30min each, 50 cycles</p>

Para.	Test items	Requirements	Procedures
3.5.21	Wideband noise test	<ul style="list-style-type: none"> ◆ Visual inspection for crack or changes ◆ R before/after test $R \leq 10m \Omega$ ◆ Monitoring for impermissible contact disconnection $\geq 1\mu s$ (100mA, $R_{threshold}=25 \Omega$) sampling rate: 20ns ◆ Examine surface for freedom from impermissible holes due to wear (document with photographs) 	<p>In accordance with VW 801 01 / 1996-06, Section 8.2 / stringency 1 (Table 7) with superimposed temperature change Frequency : 10-1000Hz RMS value of acceleration : 3.81g Test in all 3 major axes Vibration duration per axis : 8h (test each sample in all major spatial axes)</p>  <p>Temperature change in accordance with VW 801 01, Section 10.3, temperature profile as shown in Fig. 6.</p> 
3.5.22	Chemical resistance	The samples display no functionally important changes in their dimensions and structure	Test in accordance with AK test guideline PG 22 B, Extended test, 4 cycles (including test with battery acid)

<p>3.5.23</p>	<p>Long-term test(wear resistance)</p>	<ul style="list-style-type: none"> ◆ Visual inspection for crack or changes ◆ R before/after test R ≤ 10mΩ ◆ Monitoring for impermissible contact disconnection ≥ 1μs (100mA, R_{threshold}=25Ω) sampling rate: 20ns ◆ Examine surface for freedom from impermissible holes due to wear (document with photographs) 	<p>Pre-ageing : 85°C / 48h -40°C / +85°C, 30min each, 100 cycles transfer time < 10s</p> <p>Wideband noise test, 224 hours</p> <table border="1" data-bbox="824 426 1295 619"> <thead> <tr> <th>Frequency (Hz)</th> <th>G (m/s²)²/Hz</th> <th>RMS value of acceleration</th> <th>Test time</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>4,84</td> <td rowspan="3">14m/s²</td> <td rowspan="3">200h</td> </tr> <tr> <td>300</td> <td>0,163</td> </tr> <tr> <td>1000</td> <td>0,0148</td> </tr> <tr> <td>10</td> <td>9,68</td> <td rowspan="3">20m/s²</td> <td rowspan="3">24h</td> </tr> <tr> <td>300</td> <td>0,326</td> </tr> <tr> <td>1000</td> <td>0,0296</td> </tr> </tbody> </table> <p>A plug connector is shaken in only one spatial Direction.</p> <p>Vibration test is executed without superimposed Temperature test.</p> <p>The samples may be equipped with only one type of signal contact(MQS TML); mixing of contacts not permitted.</p> <p>Distribution of the wire cross-sections happens linear over the number of contacts in the module being tested.</p>	Frequency (Hz)	G (m/s ²) ² /Hz	RMS value of acceleration	Test time	10	4,84	14m/s ²	200h	300	0,163	1000	0,0148	10	9,68	20m/s ²	24h	300	0,326	1000	0,0296
Frequency (Hz)	G (m/s ²) ² /Hz	RMS value of acceleration	Test time																				
10	4,84	14m/s ²	200h																				
300	0,163																						
1000	0,0148																						
10	9,68	20m/s ²	24h																				
300	0,326																						
1000	0,0296																						

4. Revision History

Current Revision	New Revision	Changes	Reason for Change	EC No.
		-		

5. SPECIFICATION APPROVAL

Prepared by,

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Product Engineer

Approved by,

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Checked By,

K.T.LIM

Senior Product Engineer