Occupant Classification Module

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Occupant Classification Module to determine its conformance to the requirements of Product Specification 108-2142 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Occupant | Classification Module. Testing was performed at the Global Automotive Division Product Reliability | Center between Nov02 and Jan03. The test file numbers for this testing are 20020270ACL and 20020271ACL. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The Occupant Classification Module listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2142 Revision A.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,4,5	2 each	638517-1	10 position sealed plug
6	16		
7	18		
8	8		
1,2,3,4,5	2 each	638518-1	12 position sealed plug
6	16		
7	18		
8	18		
1	44	1326028-1	0.64 mm terminals crimped to 20 AWG wire
2,3,4,5	44 each		0.64 mm terminals crimped to 18 AWG wire
6	176		0.64 mm terminals crimped to 20 AWG wire
	176		0.64 mm terminals crimped to 18 AWG wire
7	132		0.64 mm terminals crimped to 20 AWG wire
	164		0.64 mm terminals crimped to 18 AWG wire
8	22		0.64 mm terminals crimped to 22 AWG wire
1,2,3,4,5	2 each	1438304-1	22 position 0.64 mm ACTION PIN header
6	16		
7	18		
8	8		
10	5		
11	5		

Figure 1 (cont)

* Trademark
| Indicates change

Test Group	Quantity	Part Number	Description
9	30	1438305-1	22 position header housing
1,2,3,4,5	2 each	1438306-1	22 position cover
6	16		
7	18		
10	5		
9	30	1438308-1	ACTION PIN

Figure 1 (end)

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35˚C
- Relative Humidity: 25 to 75%

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (b)										
Visual inspection	1	1,7	1,7	1,7	1,7	1,5	1,3	1,4	1,5	1,4	1,3
Dry circuit resistance	3,6	2,5	2,5	2,5	2,5						
Voltage drop (c)	4,7	3,6	3,6	3,6	3,6						
Temperature rise vs current	2(c)										
Terminal-connector insertion/extraction force									2		
Connector-connector mating/unmating force								2,3			
Vibration/mechanical shock		4									
Thermal shock (c)			4								
Temperature/humidity cycling (c)				4							
High temperature exposure (c)					4						
Pressure/vacuum leak						4					
1008 hour current cycling	5										
High/low temperature soak						2					
Drop test										3	
Contact retention, push-in									3		
Contact retention, pull-out									4		
Salt water immersion						3					
Fluid resistance							2				
Buzz, squeak, rattle										2	
Cleanliness											2

NOTE
(a) See paragraph 1.4.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 10 mating/unmating cycles.

Figure 2

2. SUMMARY OF TESTING

2.1. Visual Inspection

Specimens were visually inspected with the naked eye under fluorescent lighting. No evidence of damage, deformation or delamination were found.

2.2. Dry circuit resistance

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 20 milliohms.

2.3. Voltage Drop

All voltage drop measurements were less than 10 millivolt/ampere.

2.4. Terminal-Connector Insertion/Extraction Force

All insertion force measurements were less than 15N. All primary locks withstood a force of 30 N.

2.5. Connector-Connector Mating/Unmating Force

All mating force measurements were less than 75 N. All unmating force measurements with the lock disengaged were less than 75 N. All unmating force measurements with the lock engaged were greater than 110 N.

2.6. Vibration/Mechanical Shock

No discontinuities were detected during vibration/mechanical shock testing. Following testing, no cracks, breaks, or loose parts on the specimens were visible.

2.7. Thermal Shock

No evidence of physical damage was visible as a result of thermal shock testing.

2.8. Temperature-Humidity Cycling

No evidence of physical damage was visible as a result of temperature-humidity cycling.

2.9. High Temperature Exposure

No evidence of physical damage was visible as a result of exposure to high temperature.

2.10. Pressure/Vacuum Leak

No evidence of pressure loss or visible bubbles exiting the specimens.

2.11. 1008 Hour Current Cycling

No evidence of physical damage was visible as a result of cycling current for 45 minutes ON and 15 minutes OFF for 1008 hours.

2.12. High/Low Temperature Soak

No evidence of leakage as a result of temperature cycling and immersion into a 5% salt solution for 1 hour.

2.13. Drop Test

There was no evidence of physical damage as a result of dropping the specimens from a height of 1 meter onto a concrete surface on each axes, X, Y, and Z both positive and negative sides.

2.14. Contact Retention, Push-In

All contact push-in measurements were greater than 24 N.

2.15. Contact Retention, Pull-Out

All contact pull-out measurements were greater than 24 N.

2.16. Salt Water Immersion

No evidence of leakage into the connector.

2.17. Fluid Resistance

No evidence of physical damage was visible as a result of exposure to coffee, soapy water, saline solution, soft drink, Armoral Protectant and WD-40.

2.18. Buzz, Squeak and Rattle

No objectionable noises.

2.19. Cleanliness

Solution analysis did not exceed specification.

3. TEST METHODS

3.1. Visual Inspection

Specimens were visually inspected with the naked eye under fluorescent lighting for functionality, deformation and delamination. A signed Certificate of Conformance was submitted.

3.2. Dry Circuit Resistance

Dry circuit resistance measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Voltage Drop

Millivolt drop was measured between points T1 and T2 using a test current of 4 amperes.

3.4. Terminal-Connector Insertion/Extraction Force

Insertion and extraction measurements were performed in a cycling mode on an Instron machine. Each receptacle specimen was engaged into each blade by inserting each individual receptacle held by a chuck. A floating vise attached to the base of the Instron held the blades. After the receptacle was fully inserted, it was then disengaged by the crosshead changing from compression to tensile mode which returned the receptacle to its original starting position. Each specimen was inserted and separated 10 times with readings being taken on the 1st and 10th cycles. The test speed was 50 mm per minute.

3.5. Connector-Connector Mating/Unmating Force

A. Connector-Connector Mating Force

All plugs were mated using an L-vise attached to the crosshead of an Instron machine by pushing each plug into the header until it was latched. The header was held by a L-vise attached to a free-floating table on the base of the Instron. The test speed was 50 mm per minute.

B. Connector-Connector Unmating Force Without Latch

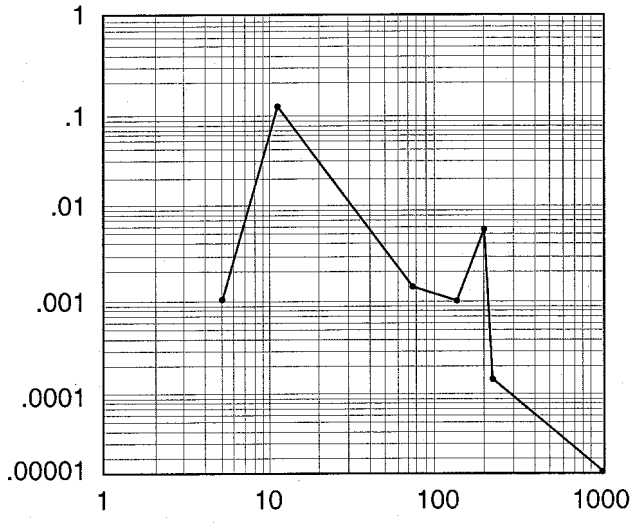
All plugs were unmated using an L-vise attached to the crosshead of an Instron machine by pulling each plug out of each header until it was fully removed. The header was held by a L-vise attached to a free-floating table on the base of the Instron. The test speed was 50 mm per minute.

C. Connector-Connector Unmating Force With Latch

An L-vise attached to the crosshead of an Instron machine was used to grip the wires and pull each of the plugs. A second L-vise was attached to a free-floating table on the base of the Instron to hold the header by the side tabs. The locking latch was not disengaged before unmating. The test speed was 50 mm per minute.

3.6. Vibration/Mechanical Shock

Specimens were subjected to a mechanical shock of 35 G's half-sine shock pulses of 10 milliseconds duration, 10 shocks in each direction applied along 3 mutually perpendicular planes. Following mechanical shock, specimens were subjected to 10 half-sine wave impulses (10 millisecond duration at 35 Gs force) in each of the 3 mutually perpendicular axes. Vibration time was 8 hours in each of the 3 mutually perpendicular axes.



Frequency (Hz)	Power Spectral Density (g^2/Hz)
5.0	0.00200
12.5	0.24800
77.5	0.00320
145.0	0.00200
200.0	0.01180
230.0	0.00032
1000.0	0.00002
Grms = 1.81	

Figure 3
Vibration Requirements

3.7. Thermal Shock

Specimens were subjected to 100 cycles between -40 and 85˚C with 30 minute dwells at temperature extremes and 30 second transition between temperatures. Specimens were monitored for discontinuities of 1 microsecond or greater.

3.8. Temperature-Humidity Cycling

Specimens were subjected to 40 temperature-humidity cycles per Figure 4. Specimens were monitored for discontinuities of 1 microsecond or greater.

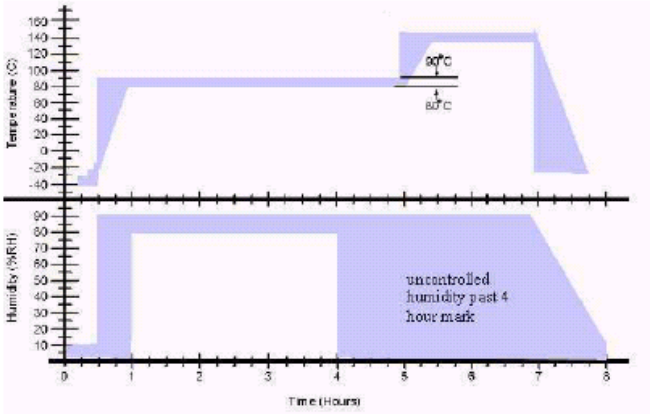


Figure 4

3.9. High Temperature Exposure

Specimens were subjected to a temperature of 85˚ for 1008 hours.

3.10. Pressure/Vacuum Leak

Specimens were submerged in a salt water solution. A pressure of 48 kPa was applied to each specimen for 15 seconds, and then decreased until a vacuum of 48 kPa was obtained and held for 15 seconds.

3.11. 1008 Hour Current Cycling

Specimens were subjected to 1008 current cycles of 45 minutes ON and 15 minutes OFF. Millivolt drop readings were taken at least once daily 30 minutes into the ON cycle, and 30 minutes into the final ON cycle at the end of the test.

3.12. High/Low Temperature Soak

Specimens were subjected to thermal shock between -40 and 85˚C for 24 hours in each extreme. They were then subjected to heat age at 110˚C for 2 hours. Within 30 seconds after being removed from the chamber, the specimens were submerged into a 5% salt solution at 0˚C for 1 hour.

3.13. Drop Test

Specimens were dropped from a height of 1 m onto a concrete surface on each axes, X, Y, and Z both positive and negative sides.

3.14. Contact Retention, Push-In

The force required to insert a contact into the connector was measured.

3.15. Contact Retention, Pull-Out

The force required to remove a contact from the connector was measured.

3.16. Salt Water Immersion

Specimens heated to 110˚C were submerged in a 0˚C 5% salt solution for 1 hour.

3.17. Fluid Resistance

Specimens were exposed to the following fluids in the specified volume:

- Coffee: 250 ml (8.5 fluid ounce) with 14.8 ml (3 teaspoons) of cream and 14.8 ml (3 teaspoons) of sugar.
- Soapy Water: 250 ml (8.5 fluid ounce) with soap concentration of 5% by weight.
- Saline Solution: 250 ml (8.5 fluid ounce) with 10% salt by weight.
- Soft Drink: 355 ml (12 fluid ounce) of regular (non-diet) cola.
- Armorall Protectant: 10 direct sprays in a commercial bottle or can.
- WD-40: 10 direct sprays in a commercial bottle or can.

For the first 4 fluids, perform 4 passes within 5 seconds 150 ± 25 mm above the specimen surface. For Armoral and WD-40, apply 10 direct sprays within 20 seconds 150 ± 25 mm above the specimen surface until visible condensation is built up.

3.18. Buzz, Squeak and Rattle

Specimens were subjected to frequency sweeps while being monitored for internal noises.

3.19. Cleanliness

Specimens were cleaned in a solvent solution, the solution was then analyzed using chromatography.