

Test Report



's-Hertogenbosch Environmental Testing Laboratory (IND)


TE Connectivity Nederland BV, Rietveldeweg 32, 5222 AR, 's-Hertogenbosch, The Netherlands

Report Title: ABB RJ45 Coupler Higher Temperature

Report ID: 502-153348 rev. A

Date Issued: 28-Mar-2019

TE Data Classification (TEC-02-04) class II

Requestor: K. Malczyk	
TE Project Number: PRJ-19-000901071	
Sample Name: RJ45 Coupler	
TE Part number: 1738612-1 1738601-1	
Remarks: Samples returned to requester	

Test Scope: To determine the mechanical and the electrical performance of the coupler produced from PC-material, at higher temperature according to the customer expectation.	
Performed Test or Analysis: 1 Visual inspection 2 Contact resistance 3 Rapid change of temperature 4 Dry heat 5 Temperature rise 6	
Requirement: According the test plan "Preliminary and qualification tests for higher temperature" provided by product engineering, see appendix I.	
Conclusion: After the high temperature tests, resistance values stayed within specification, and no deformation, warpage or any functional damage were observed.	Result: OK

Lab Project ID (lab internal): E19.02.2688	Responsible Test Engineer: A. Verhoeven	Approver: K. Schepers
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SAMPLE DESCRIPTION

The coupler assemblies were divided into two groups and subjected to the tests.

-Test group O consists of 3 couplers produced from PC material (marked: SO1 to SO3) and 2 couplers produced from ABS material (marked: SO4-SO5).

-Test group A consists of 3 couplers (marked: SA1 to SA3) produced from PC material.

-Test group "Ref" consists 2 couplers produced from PC (marked: Sref1 & Sref2). These samples were used to measure the initial resistance values.

Notes: -Part numbers of the couplers: P/N: 1738612-1 and P/N: 1738601-1.

-To measure the resistance, 2 "Golden" RJ45 samples were used as counterpart.

TEST PROCEDURES

IEC 60512-2-1:

Contact resistance:

The contact resistance was measured with an open circuit voltage of 20 mVolt and a maximum current of 100 mA DC.

Aging test with current load:

All signal contacts of the samples were wired in series and charged with a DC current of 500 mA. At the same time the samples were subjected to a temperature of +85°C. The applied DC current and temperature was maintained for a period of 17 days for the 2 Couplers produced with ABS and 23 days for 1 coupler produced PC material.

IEC 60068-2-3:

Rapid change of temperature:

The samples were subjected to a rapid change of temperature test under the following conditions.

Lower temperature	: -40°C for 30 minutes
Upper temperature	: +85°C for 30 minutes
Condition	: unmated
Number of cycles	: 25

IEC 60068-2-2:

Test Bb

Dry heat:

The samples were subjected to a dry heat test under the following conditions.

Temperature	: +85°C
Condition	: unmated
Duration	: 96 hours

IEC 60512-5-2:

Test 5b

Temperature rise vs. Current:

The test samples were charged with a test current of successively 0.5, 1.0, 1.5, 2.0 and 2.5A. The adjusted DC current was maintained for a stabilization period of 1 hour. After stabilisation at each current step, the temperature was measured.

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TEST SEQUENCE

Test Group 0	Test Group A
Contact resistance	Contact resistance
Aging test under load	Rapid change of temperature
Contact resistance	Dry heat
	Contact resistance
	Temperature rise vs. Current

EQUIPMENT USED

<u>Equipment</u>	<u>Manufacturer</u>	<u>Type</u>	<u>Series Nb</u>	<u>Cal. Due</u>
Micro-ohm meter 1	HIOKI	3560	90922733	Jan-20
Climatic chamber 70/350	C.T.S.	C-70/350	98071	Jan-20
Climatic chamber 70/200	C.T.S.	CS-70/200-15	167209	Jan-20
Oven ED 53 - E2	Binder	ED 53 - E2	12-05765	Jan-20
Power Supply E3632A	Agilent	E3632A	MY51280087	Jan-20

SUMMARY OF TESTRESULTS

Test group "Ref"	measured	requirement	
- Contact resistance Initial	Max. 66.90 mΩ	Max. 200 mΩ	OK
Test group 0			
- Contact resistance After Ageing test underload, final	Max. 65.51 mΩ	Max. 200 mΩ	OK
Test group A			
- Contact resistance After Dry heat, final	Max. 64.81 mΩ	Max. 200 mΩ	OK

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TESTRESULTS

Test group "Ref"

-Contact resistance of the reference samples:

All values represented in milli-Ohms.						
Column.	Group	Lot	Test			
-1-		Golden Plug 1				
-2-		Golden Plug 2				
-3-	Ref	Sref 1 total	Inclusive bulk resistance of the 2 Golden plugs			
-4-	Ref	Sref 2 total	Inclusive bulk resistance of the 2 Golden plugs			
-5-	Ref	Sref 1	Exclusive the bulk resistance			
-6-	Ref	Sref 2	Exclusive the bulk resistance			
	-1-	-2-	-3-	-4-	-5-	-6-
1	157.84	59.92	263.99	266.90	46.23	49.14
2	180.07	71.12	309.84	294.99	58.65	43.80
3	179.16	60.38	291.90	293.41	52.36	53.87
4	189.24	61.92	284.30	283.80	33.14	32.64
5	198.19	66.44	297.87	299.41	33.24	34.78
6	179.35	59.79	248.03	249.18	8.89	10.04
7	154.64	48.65	246.19	247.90	42.90	44.61
8	152.26	65.93	283.41	285.09	65.22	66.90
Max.	198.19	71.12	309.84	299.41	65.22	66.90
Min.	152.26	48.65	246.19	247.90	8.89	10.04
Mean	173.84	61.77	278.19	277.59	42.58	41.97

Test group O

-Contact resistance, ABS samples final compared with the reference PC samples

All values represented in milli-Ohms. (Exclusive bulk resistance)				
Product name:		ABB RJ45 coupler ABS material		
Column.	Group	Lot	Test	
-1-	O	Sref 1	Initial	
-2-		Sref 2	Initial	
-3-		SO4	After 17 days ageing test underload, final	
-4-		SO5	After 17 days ageing test underload, final	
	-1-	-2-	-3-	-4-
1	46.23	49.14	49.49	37.09
2	58.65	43.80	22.85	22.12
3	52.36	53.87	62.21	42.14
4	33.14	32.64	51.58	20.39
5	33.24	34.78	21.95	24.30
6	8.89	10.04	31.27	65.51
7	42.90	44.61	36.68	46.82
8	65.22	66.90	21.19	44.15
Max.	65.22	66.90	62.21	65.51
Min.	8.89	10.04	21.19	20.39
Mean	42.58	41.97	37.15	37.82

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-Contact resistance, PC samples final compared with the reference PC samples

All values represented in milli-Ohms. (Exclusive bulk resistance)					
Product name: ABB RJ45 coupler PC material					
Column.	Group	Lot	Test		
-1-	O	Sref 1	Initial		
-2-		Sref 2	initial		
-3-		SO2	After 17 days ageing test underload, final		
-4-		SO3	After 17 days ageing test underload, final		
-5-		SO1	After 23 days ageing test underload, final		
	-1-	-2-	-3-	-4-	-5-
1	46.23	49.14	46.64	37.09	47.17
2	58.65	43.80	35.01	53.46	54.21
3	52.36	53.87	52.06	49.14	53.30
4	33.14	32.64	56.94	30.52	34.64
5	33.24	34.78	32.17	32.41	35.47
6	8.89	10.04	10.66	6.92	10.08
7	42.90	44.61	42.71	46.82	44.75
8	65.22	66.90	64.81	44.15	30.46
Max.	65.22	66.90	64.81	53.46	54.21
Min.	8.89	10.04	10.66	6.92	10.08
Mean	42.58	41.97	42.63	37.56	38.76

Test group A

-Contact resistance, PC samples final compared with the reference PC samples

All values represented in milli-Ohms. (Exclusive bulk resistance)					
Product name: ABB RJ45 Coupler PC material					
Column.	Group	Lot	Test		
-1-	A	Sref 1	Initial		
-2-		Sref 2	Initial		
-3-		SA1	After dry heat, final		
-4-		SA2	After dry heat, final		
-5-		SA3	After dry heat, final		
	-1-	-2-	-3-	-4-	-5-
1	46.23	49.14	46.34	46.64	46.96
2	58.65	43.80	32.81	35.01	45.86
3	52.36	53.87	50.56	52.06	52.36
4	33.14	32.64	33.64	56.94	34.53
5	33.24	34.78	31.17	32.17	31.44
6	8.89	10.04	9.26	10.66	12.62
7	42.90	44.61	41.01	42.71	41.11
8	65.22	66.90	64.61	64.81	69.18
Max.	65.22	66.90	64.61	64.81	69.18
Min.	8.89	10.04	9.26	10.66	12.62
Mean	42.58	41.97	38.68	42.63	41.76

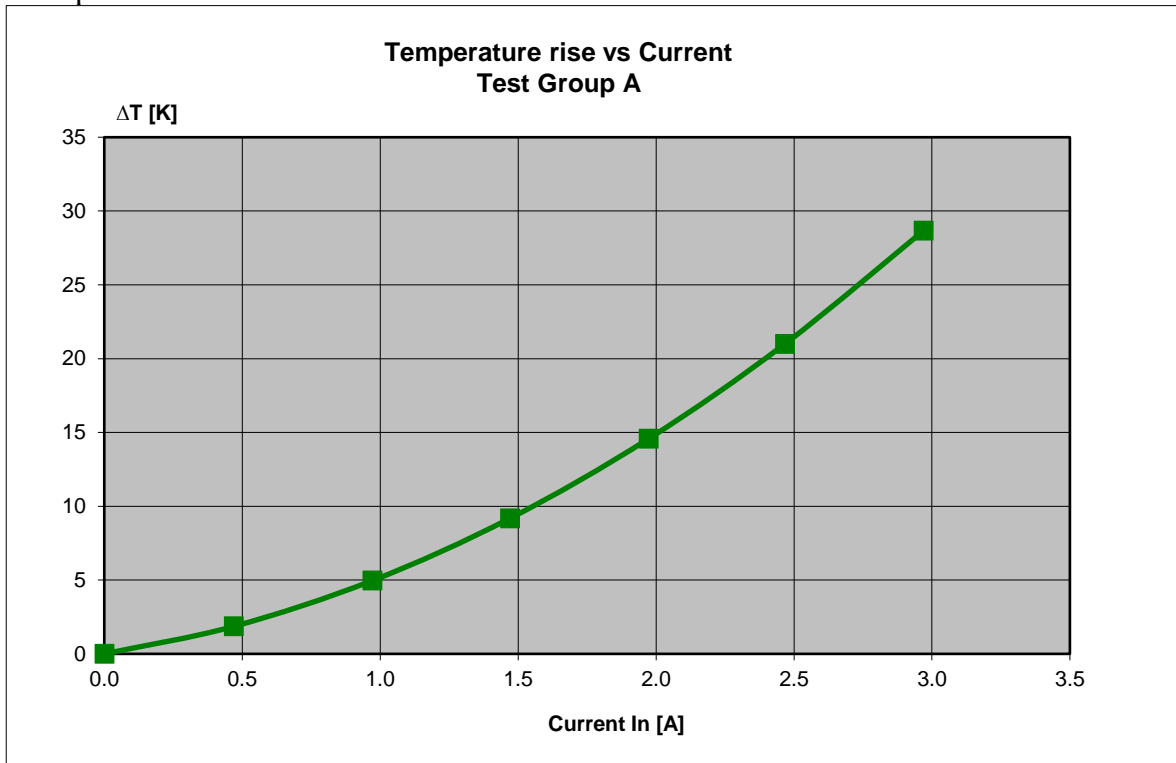
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-Temperature rise:



Note: for the test circuit 2 RJ45 cable plugs with the initial provided cable is used.

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COUPLER PN1738612-1 (PN 1738601-1) Preliminary and qualification tests for higher temperature.

04 February, 2019

K.Malczyk



EVERY CONNECTION COUNTS



Test Report

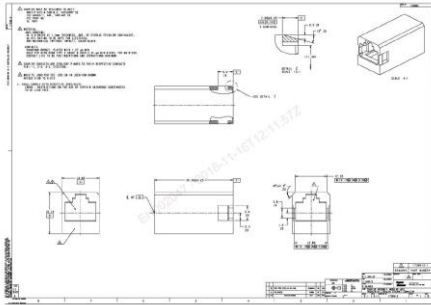


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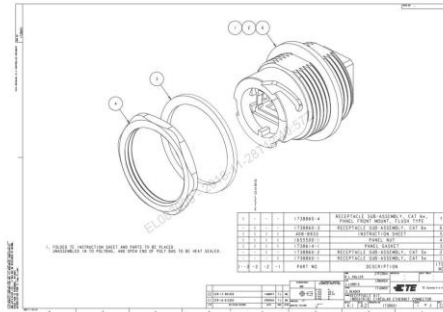
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COUPLER ASSY, MODULAR JACK PN1738612-1 (PN 1738601-1) Preliminary testing for higher temp. -40/+85°C

PN 1738612-1



PN 1738601-1



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COUPLER ASSY, MODULAR JACK PN1738612-1 (PN 1738601-1)

ABS – material (existing version) + PC – material (new version)

Preliminary testing for higher temp. +85°C/ 400 hours .

TEST GROUP „0” (execution on 2 samples PN 1738601-1 (ABS) + 2(+1) samples PN 1738601-1 (PC):

The test to be performed:

1. Check electrical continuity of communication signal between pins 1 – 1, 2 – 2, 3 – 3, ... , 8 – 8. Input to output resistance (acc. to IEC 60512, test 2a); signal contacts 200 mOhm maximum
2. Functional electrical test (communication signal checking at):
 - rated voltage 24 VDC; rated current 500mA (each pin charged),
 - temperature +85°,
 - duration 400 hours for 2 samples (of each – ABS and PC samples) **and 550 hours only for one PC-sample**
3. C Check electrical continuity of communication signal between pins 1 – 1, 2 – 2, 3 – 3, ... , 8 – 8. Input to output resistance (acc. to IEC 60512, test 2a); signal contacts 200 mOhm maximum.

(Checking of electrical continuity to be performed for each temp. on one modular jack sample mated with industrial RJ45 plug PN 1738607-1 or -2 on both sites.)

If New = 2x pass + Old = 2x fail, then continue qualification of new part (PC-material), otherwise re-investigate failure modes.



COUPLER ASSY, MODULAR JACK PN1738612-1 (PN 1738601-1)

PC – material; new version

Qualification testing for higher temp. +85°C and -40°C.

TEST GROUP A (3 samples PN 1738601-1):

The tests to be performed:

1. Check electrical continuity of communication signal between pins 1 – 1, 2 – 2, 3 – 3, ... , 8 – 8. Input to output resistance (acc. to IEC 60512, test 2a); signal contacts 200 mOhm maximum

2. Rapid change of temperature acc. to IEC 60068-2-3, test Na (on unmated part)
Ta = -40 °C; Tb =85 °C; ta =30 min.; tb = 30 min.; Number of cycles: 25

17	Rascher Temperaturwechsel Rapid change of temperature	Keine sichtbaren oder funktionstechnischen Beschädigungen No physical damage.	Nach IEC 60068-2-3, Prüfung Na Ta = -40 °C; Tb = 85 °C ta = 30 min.; tb = 30 min. Anzahl der Zyklen: 25 Acc. to IEC 60068-2-3, method Ta = -40 °C; Tb = 85 °C ta = 30 min.; tb = 30 min. Number of cycles: 25
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3. Check electrical continuity of communication signal between pins 1 – 1, 2 – 2, 3 – 3, ... , 8 – 8. Input to output resistance (acc. to IEC 60512, test 2a); signal contacts 200 mOhm maximum.

4. Dry heat acc. To IEC 60068-2-2 test Bb (on unmated part).
Temperature: +85°C. ; Duration: 96 h

Trockene Wärme Dry heat	Keine sichtbaren oder funktionstechnischen Beschädigungen No physical damage	Nach IEC 60068-2-2, Prüfung Bb Temperatur: 85°C Dauer: 96h According to IEC 60068-2-2, test Bb Temperature 85 °C Duration: 96h
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5. Check electrical continuity of communication signal between pins 1 – 1, 2 – 2, 3 – 3, ... , 8 - 8. Input to output resistance (acc. to IEC 60512, test 2a); signal contacts 200 mOhm maximum.

6. Perform current rating test to define current rating graph which should be added to the product spec. Starting with 0,5A up to 1,5A.

(Checking of electrical continuity to be performed for each temp. on one modular jack sample mated with industrial RJ45 plug PN 1738607-1 or -2 on both sites.)

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