File E28476
SR9481720-T001

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REPORT

On

COMPONENT - CONNECTORS FOR USE IN
DATA, SIGNAL, CONTROL AND POWER APPLICATIONS

TYCO ELECTRONICS CORP
HARRISBURG PA 17111

DESCRIPTION

PRODUCT COVERED:

USR, CNR Component Connector, Series Power Triple Lock, PTL-MFBL.

GENERAL:

These devices are multi-pole connectors intended for factory assembly on copper wire sizes as indicated in Ratings table below where the acceptability of combinations is determined by UL LLC. The devices are identified as follows:

USR indicates investigation to United States Standards, UL 1977.
CNR indicates investigation to Canadian National Standards, C22.2 No. 182.3.

RATINGS:

Series	No. of Positions	Voltage, V ac/ dc	Ampere (A)										
			12 AWG	14 AWG	16 AWG	18 AWG	20 AWG	18*2 AWG	20*2 AWG	22 AWG	22*2 AWG (1)	22*2 AWG (1)(2)	**24AWG**
Power Triple Lock	1	600	20	15	15	10	9	16	12	6.2	6	12	**5**
	2		20	15	15	10	9	16	12	6.2	6	12	**5**
	3		20	15	12	10,8	9	16	12	6.2	6	12	**5**
	4		19	14	12	9.8	9	16	12	6.2	4.5	9	**4.7**
	5		18	13	12	9.8	6.8	14	12	6.2	4.5	9	**4.7**
	6		18	13	12	9.8,9.4 ,7.8	6.8	14	12	6.2	4.5	9	**4.7**
	7		16	12	11	9	6.8	14	10	6.2	4	8	**4.5**
	8		16	12	11	9	6.8	14	10	6.2	4	8	**4.5**
	9		16	12	11	9,8.5, 7.2	6.8	14	10	6.2	4	8	**4.5**
	10		15	12	8	7	6.5	12	10	5.8	4	8	**4.5**
	11		15	12	8	7	6.5	12	10	5.8	4	8	**4.5**
	12		15	12	8	7, 5.6	6.5	12	10	5.8	4	8	**4.5**
	13		14	10	8	6	6.5	10	8	5	3.5	7	**4**
	14		14	10	8	6	6.5	10	8	5	3.5	7	**4**
	15		14	10	8	6, 4.8	6.5	10	8	5	3.5	7	**4**
													-
PTL - MFBL	2	600			12	8	7.2				4.8		**-**
	3				9.6	8	7.2				4.8		**-**

Note: (1) Limited to quick-connect terminals 1971783 (Ill. 18), 2238066-1, -2 (Ill. 35) and 1971784 (Ill. 9), 2238067-1, -2 (Ill. 36).
(2) Limited to USR only.

Disconnecting Use - see Sec Gen for required marking.

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Use - For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC.

Conditions of Acceptability - The following are among the considerations to be made when evaluating the device in the end-use product.

Interruption of Current

1. These devices are not suitable for interrupting the flow of current by connecting or disconnecting the mating connector.

Current-Carrying Capability and Current Ratings

2. These devices have been subjected to the Temperature test with the rated currents and maximum temperature rise values tabulated below.

Table 1 Temperature rise for the Plug Connectors

Series Name	Power Triple Lock, Plug													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	*No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
12	20	20	19	18	16	15	14	23	25	25.4	-	24.1	28.97	27.21
14	15	15	14	13	12	12	10	23.3	20	19.6	22.8	21.7	24.24	25.20
16	10	10	9	9	8	8	8	14.9	-	15.2	13.4	13.5	23.21	26.53
16	15	12	12	12	11	8	8	28.97	-	-	28.24	29.61	-	-
18	8	8	8	7	7	7	6	-	14.8	-	14	14.3	20.89	19.93
18	10	10	9.8	9.8	9	7	6	-	25.00	-	28.96	26.17	-	-
18*2	**16**	**16**	**16**	**14**	**14**	**12**	**10**	-	27.7	-	25.1	22.5	26.39	21.14
20	6	6	6	6	5	6	6	-	-	14.1	-	14.2	23.13	19.19
20	9	9	9	6.8	6.8	6.5	6.5	-	-	26.63	-	27.88	-	26.84
20*2	**12**	**12**	**12**	**12**	**10**	**10**	**8**	-	-	28.7	-	25.7	26.11	18.90
22	4	4	4	4	3	4	4	-	-	9.2	-	8	13.36	17.00
22	6.2	6.2	6.2	6.2	6.2	5.8	5	-	-	-	-	27.70	27.83	24.03
22*2	(1)	6	(2)	4.5	(3)	4	3.5 (4)	(1)	18.1	(2)	13.9	(3)	12.7	12.7 (4)
24	**-**	**5**	**-**	**4.7**	**-**	**4.5**	**4**	**-**	**17.1**	**-**	**19.7**	**-**	**24.7**	**26.0**

Temperature rise for the Cap Connectors employing Receptacle/Tab contact (2238066-1 / 2238067-1)

Series Name	Power Triple Lock, Cap													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
18	-	10	-	9.4	8.5	7	6	-	28.2	-	28.7	19.3	27.9	27.9

Temperature rise for the Plug Connectors employing Receptacle/Tab contact (2238066-1 / 2238067-1)

Series Name	Power Triple Lock, Plug													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
18	-	10	-	9.4	8.5	7	6	-	29.1	-	28.9	24.9	25.4	25.4

Temperature rise for the Cap Connectors employing Receptacle/Tab contact (2238066-2 / 2238067-2)

Series Name	Power Triple Lock, Cap													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
18	-	8	-	7.8	7.2	5.6	4.8	-	18.4	-	21.5	24.3	17.5	15.1

Temperature rise for the Plug Connectors employing Receptacle/Tab contact (2238066-2 / 2238067-2)

Series Name	Power Triple Lock, Plug													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
18	-	8	-	7.8	7.2	5.6	4.8	-	19.9	-	22.0	24.6	17.3	15.7

Table 2 Temperature rise for the Cap Connectors

Series Name	Power Triple Lock, Cap													
Wire Size, AWG	Current, A							Maximum Temperature Rise, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
12	20	20	19	18	16	15	14	23	25	25.4	-	24.1	29.88	27.57
14	15	15	14	13	12	12	10	23.3	20	19.6	22.8	21.7	21.95	25.73
16	10	10	9	9	8	8	8	14.9	-	15.2	13.4	13.5	24.35	25.70
16	15	12	12	12	11	8	8	28.84	-	-	30.00	29.78	-	-
18	8	8	8	7	7	7	6	-	14.8	-	14	14.3	20.52	20.48
18	10	10	9.8	9.8	9	7	6	-	24.75	-	29.47	25.88	-	-
18*2	16	16	16	14	14	12	10	-	27.7	-	25.1	22.5	27.75	20.90
20	6	6	6	6	5	6	6	-	-	14.1	-	14.2	24.30	17.35
20	9	9	9	6.8	6.8	6.5	6.5	-	-	28.29	-	26.10	-	28.80
20*2	12	12	12	12	10	10	8	-	-	28.7	-	25.7	26.05	20.21
22	4	4	4	4	3	4	4	-	-	9.2	-	8	14.42	17.44
22	6.2	6.2	6.2	6.2	6.2	5.8	5	-	-	-	-	28.55	29.69	22.02
22*2	(1)	6	(2)	4.5	(3)	4	3.5 (4)	(1)	15.6	(2)	15.6	(3)	12.2	12.2 (4)
24	**-**	**5**	**-**	**4.7**	**-**	**4.5**	**4**	**-**	**17.0**	**-**	**18.9**	**-**	**24.7**	**27.0**

These devices have been subjected to the Temperature test with the rated currents and recorded temperature (adjusted to 25°C ambient) values tabulated below:

Table 1A Temperature rise for the Plug Connectors:

Series Name	Power Triple Lock, Plug													
Wire Size, AWG	Current, A							Maximum Temperature, °C						
	No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
22*2	(1)	12	(2)	9	(3)	8	7 (4)	(1)	80.4	(2)	61.2	(3)	63.7	77.1 (4)

Table 2A Temperature rise for the Cap Connectors:

Series Name	Power Triple Lock, Cap													
Wire Size, AWG	Current, A							Maximum Temperature, °C						
	*No. of Positions							No. of Positions						
	2	3	4	6	9	12	15	2	3	4	6	9	12	15
22*2	(1)	12	(2)	9	(3)	8	7 (4)	(1)	81.8	(2)	60.2	(3)	64.7	75.9 (4)

*

Note:
(1) Represented by 3 position device inclusive of 1 position device; (2) represented by 6 position device inclusive of 5 position device; (3) Represented by 12 position device inclusive of 8, 10, 11 position devices; (4) Represents the 13 and 14 position devices.

Table 3 Temperature rise for the Header Connectors

Series Name	Power Triple Lock, Header								
	Current, A					Maximum Temperature Rise, °C			
	No. of Contacts					No. of Contacts			
	2	3	4	5		2	3	4	5
	20	20	19	18		24.9	24.9	23.6	22.0

Table 4 Temperature rise for the Cap/Plug Connectors:

Series Name	Power Triple Lock, Plug			
Wire Size, AWG	Current, A		Maximum Temperature Rise, °C	
	No. of Positions		No. of Positions	
	2	3	2	3
16	12	9.6	24	20.6
18	8	8	17.2	21.8
20	7.2	7.2	18.2	21.0

*

Insulating Materials

3. These devices employ insulating materials with properties as tabulated below at the minimum thickness employed in the connector housing, the suitability of the insulating materials based on the documented values shall be determined in the end-use application. Please note the values specified in the table when multiple materials are indicated represent the minimum values for the group of materials.

Series	Insulating Material (#)	Measured Minimum Thickness	Flame Class	HWI	HAI	RTI Elec	Max Operating Temp, ^{0}C
Power Triple Lock(@)	A for housing	0.5 mm	V-0	4	2	150	150
	B for housing(+)	0.75 mm	V-0	-	-	140	140
	C for housing	0.5	V-0	4	3	130	130
	D for housing	0.75 mm	V-0	2	0	140	140
	E or G for housing	0.5	V-0	3	0	140	140
	F for housing	0.8 mm	V-0	2	0	140	140

(#) - Code for Insulating Body Material.

(+) - Indicates material only applicable to the following Cat. Nos.:

Cat. No.	Max No. of Positions
1-2232263-1	5
2-2232263-1	5
1-2232264-1	6
1-2232265-1	5
2-2232265-1	5
1-2232266-1	6
1-2232356-6	9
1-2232357-6	15
1-2232356-5	15
1-2232357-4	12
1-2232357-5	15
1-2232360-4	12
1-2232360-5	15

(@) - Indicates material A applicable to level 2 in Ills. 1 thru 6, 13 thru 15, with the marking HDT in products; material B applicable to level B in Ills. 22 thru 27, with the marking HWT in products; material C applicable to level 1 in Ills. 1 thru 6, 13 thru 15, with the marking PBT in products; material D applicable to level A in Ills. 22 thru 27 and 31 thru **33, 38, 39** with the marking GWT in products. Material E applicable to Power Triple Lock Header in **Ills.** 34 and **37. Material E applicable to series PTL MFBL in Ills. 38 and 39. Material E applicable to Power Triple Lock, level 1 with prefix "1-" in Ill. 2 and level 1 with prefix "1-" in Ill. 13. Material G applicable to Power Triple Lock Header in Ills. 42 and 43. Material G applicable to Power Triple Lock, level 1 with prefix "2-, 3- or 4-" in Ill. 2, level A in Ill. 22, level 1 with prefix "2-, 3- or 4-" in Ill. 13, level A in Ill. 25.**

A. Tyco Raw
Material P/N 705264.
1. Dielectric strength (kV/mm): 25
2. CTI: 0

B. Tyco Raw
Material P/N 1573374
1. Dielectric strength (kV/mm): 23
2. CTI: 3

*

C. Tyco Raw Material P/N 1573716.
1. Dielectric strength (kV/mm): -
2. CTI: 2

D. Tyco Raw Material P/N 2136325.
1. Dielectric strength (kV/mm): 11
2. CTI: 1

E. Tyco Raw Material P/N 2136507.
1. Dielectric strength (kV/mm): 19
2. CTI: -

F. Tyco Raw Material P/N 2136325 w/ Colorants #XXXXXXX, #XXXXXXXX.
1. Dielectric strength (kV/mm): 11
2. CTI: 1

G. Tyco Raw Material P/N 2136507 w/ Colorants NBXXXXXXXX.
1. Dielectric strength (kV/mm): 19
2. CTI: -

Mating Connectors

4. These devices have only been assessed for use with specific types of connectors within their product family. They have not been assessed to operate with any other similar devices from any other manufacturer.

*5. Crimp contacts of Power Triple Lock Series are intended for crimp termination on stranded copper conductor using the automatic crimp machine shown in Fig. 1, Fig. 2 and Fig. 3 matched with applicators indicated below respectively in table 4, and the hand tool requirements shown in table 5, see below tables for details.

*Table 4

Contact	US/EMEA only Ocean Atlantic Application Tool P/N	US/EMEA only Ocean Pacific Application Tool P/N	AP only HDE Application Tool P/N	Wire Size (AWG)	Crimp Width (mm)	Crimp Height (mm)
Tab/ Rec	2151741-1	2-2151741-1	1552992-2	12	3.05	1.87±0.05
	2151742-1	2-2151742-1	1552993-2	14	2.29	1.56±0.05
	2151743-1	2-2151743-1	1552994-2	16	2.03	1.37±0.04
				18		1.21±0.04
				20		1.08±0.04
	2151745-1	2-2151745-1	1552996-2	18*2	2.29	1.53±0.05
	2151746-1	2-2151746-1	1552511-2	20*2	2.03	1.28±0.04
	2151744-1	2-2151744-1	1552995-2	22	1.4	0.89±0.03
	2151743-1	2-2151743-1	--	22*2	2.03	1.08±0.04
	2837163-1	**2-2837163-1**	**--**	**24**	**1.4**	**0.91±0.05**

*Table 5

Contact	Hand Tool No.	Wire Size (AWG)	Crimp Width (mm)	Crimp Height (mm)
Tab/ Rec	2217268-1	12	3.05	1.87+0.05-0.1
	2217266-1	14	2.29	1.56+0.05-0.1
	2217208-1	16	2.03	1.37+0.04-0.08
		18		1.21+0.04-0.08
		20		1.08+0.04-0.08
	2217266-1	18*2	2.29	1.53+0.05-0.1
	2217267-1	20*2	2.03	1.28+0.04-0.08
	2217267-1	22	1.4	0.89+0.03-0.06