



Test Report Product Development

Braganca-Paulista Electrical Components Test Laboratory
RUA AMPERE 304 Dist. Indl I BRAGANCA PAULISTA SAO PAULO BRAZIL 12929-570

Report Title: BFT 5 POS ASSY
Report Number: RL140558
Revision: O
Date Issued: 10 ago 2014

Execution: Jesus Preto
Phone: 11 3404-6270

Requestor: Natanael Santos
Phone: 11 3404-6225
Address: nmsantos@te.com

Disposition of Samples: Retain in Lab

List of Part Numbers: 2819050-1

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Scope/Abstract and Conclusions

Purpose

Design Validation Phase 1 according to attached DVP&R.

Summary

Samples met requirements except Connector Test - GMW-3191 (For connector 2w).

1. RESULTS

Test Sequence/Environment	Requirements	Results																																																				
Group 0 - Cross Section Inspection	A summary of each component's condition shall be documented and reported to the GM ENV SME or CVE. GM Engineering will evaluate the reports and decide as to the necessity of corrective action.	Samples met requirements.																																																				
Group 0 - Visual Inspection and Dissection	There shall be no corrosion, discoloration, cracks, etc., which could affect the functionality of the part.	Samples met requirements.																																																				
Group 0 - Thermal Cycle Profile Development	N/A	Definition of cycle Temperature x current - This definition occurred in accordance between General Motors and TE.																																																				
Group 0 - Vibration Transmissibility Demonstration	Item 6.8 GMW 3172 (Rev. Nov/2012).	Samples met requirements. Please see Magneti Marelli's test report Nr. DFI017/14 Rev1.																																																				
Group 1 - 5-Point Functional/Parametric Check (Voltage Drop)	Functional Status Classification shall be A.	Initial measurements. Samples met requirements. <table><tr><th rowspan="3">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>1</td><td>0,769</td><td>0,806</td><td>0,795</td><td>0,401</td><td>0,396</td></tr><tr><td>2</td><td>0,768</td><td>0,791</td><td>0,778</td><td>0,367</td><td>0,377</td></tr><tr><td>3</td><td>0,773</td><td>0,782</td><td>0,798</td><td>0,394</td><td>0,402</td></tr><tr><td>Min.</td><td>0,768</td><td>0,782</td><td>0,778</td><td>0,367</td><td>0,377</td></tr><tr><td>Aver.</td><td>0,770</td><td>0,793</td><td>0,790</td><td>0,387</td><td>0,392</td></tr><tr><td>Max.</td><td>0,773</td><td>0,806</td><td>0,798</td><td>0,401</td><td>0,402</td></tr></table>	Sample	Voltage Drop [mV]					Circuit					1	2	3	4	5	1	0,769	0,806	0,795	0,401	0,396	2	0,768	0,791	0,778	0,367	0,377	3	0,773	0,782	0,798	0,394	0,402	Min.	0,768	0,782	0,778	0,367	0,377	Aver.	0,770	0,793	0,790	0,387	0,392	Max.	0,773	0,806	0,798	0,401	0,402
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Group 1 - High Temperature Degradation	Functional Status Classification shall be A.	Samples met requirements.																																																				

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Group 2 - 5-Point Functional/Parametric Check (Voltage Drop)	Functional Status Classification shall be A.	Initial measurements. Samples met requirements. <table><tr><th rowspan="3">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>4</td><td>0,981</td><td>0,986</td><td>0,980</td><td>0,524</td><td>0,356</td></tr><tr><td>5</td><td>0,924</td><td>0,940</td><td>0,941</td><td>0,461</td><td>0,305</td></tr><tr><td>6</td><td>0,851</td><td>0,986</td><td>1,073</td><td>0,472</td><td>0,207</td></tr><tr><td>7</td><td>0,903</td><td>0,827</td><td>0,971</td><td>0,446</td><td>0,333</td></tr><tr><td>Min.</td><td>0,851</td><td>0,827</td><td>0,941</td><td>0,446</td><td>0,207</td></tr><tr><td>Aver.</td><td>0,915</td><td>0,935</td><td>0,991</td><td>0,476</td><td>0,300</td></tr><tr><td>Max.</td><td>0,981</td><td>0,986</td><td>1,073</td><td>0,524</td><td>0,356</td></tr></table>	Sample	Voltage Drop [mV]					Circuit					1	2	3	4	5	4	0,981	0,986	0,980	0,524	0,356	5	0,924	0,940	0,941	0,461	0,305	6	0,851	0,986	1,073	0,472	0,207	7	0,903	0,827	0,971	0,446	0,333	Min.	0,851	0,827	0,941	0,446	0,207	Aver.	0,915	0,935	0,991	0,476	0,300	Max.	0,981	0,986	1,073	0,524	0,356
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Group 2 - Thermal Shock (Air-To-Air)	Functional Status Classification shall be C.	Samples met requirements.																																																										

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Group 2 - Power Temperature Cycle (PTC)	Functional Status Classification shall be A.	Samples met requirements. Final measurements after Thermal shock and PTC tests. <table><tr><th rowspan="3">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>4</td><td>0,970</td><td>0,891</td><td>0,872</td><td>0,921</td><td>0,704</td></tr><tr><td>5</td><td>1,122</td><td>1,090</td><td>0,914</td><td>0,844</td><td>0,354</td></tr><tr><td>6</td><td>1,175</td><td>0,936</td><td>0,935</td><td>0,668</td><td>0,313</td></tr><tr><td>7</td><td>0,979</td><td>0,986</td><td>0,986</td><td>0,538</td><td>0,341</td></tr><tr><td>Min.</td><td>0,970</td><td>0,891</td><td>0,872</td><td>0,538</td><td>0,313</td></tr><tr><td>Aver.</td><td>1,062</td><td>0,976</td><td>0,927</td><td>0,743</td><td>0,428</td></tr><tr><td>Max.</td><td>1,175</td><td>1,090</td><td>0,986</td><td>0,921</td><td>0,704</td></tr></table>	Sample	Voltage Drop [mV]					Circuit					1	2	3	4	5	4	0,970	0,891	0,872	0,921	0,704	5	1,122	1,090	0,914	0,844	0,354	6	1,175	0,936	0,935	0,668	0,313	7	0,979	0,986	0,986	0,538	0,341	Min.	0,970	0,891	0,872	0,538	0,313	Aver.	1,062	0,976	0,927	0,743	0,428	Max.	1,175	1,090	0,986	0,921	0,704
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Group 3 - Dust Test	Functional Status Classification shall be C.	Samples met requirements. Please see Feral Mogul's test report Nr.12598.																																																										
Group 3 - Water Test	Functional Status Classification shall be A.	Samples met requirements. Test accomplished in TE USA.																																																										
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Group 6 - 5-Point Functional/Parametric Check (Voltage Drop)	Functional Status Classification shall be A.	Initial measurements. Samples met requirements. <table><tr><th rowspan="3">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>17</td><td>0,762</td><td>0,765</td><td>0,736</td><td>0,403</td><td>0,421</td></tr><tr><td>18</td><td>0,790</td><td>0,739</td><td>0,735</td><td>0,395</td><td>0,386</td></tr><tr><td>19</td><td>0,787</td><td>0,754</td><td>0,735</td><td>0,414</td><td>0,394</td></tr><tr><td>Min.</td><td>0,762</td><td>0,739</td><td>0,735</td><td>0,395</td><td>0,386</td></tr><tr><td>Aver.</td><td>0,779</td><td>0,752</td><td>0,735</td><td>0,404</td><td>0,400</td></tr><tr><td>Max.</td><td>0,790</td><td>0,765</td><td>0,736</td><td>0,414</td><td>0,421</td></tr></table>	Sample	Voltage Drop [mV]					Circuit					1	2	3	4	5	17	0,762	0,765	0,736	0,403	0,421	18	0,790	0,739	0,735	0,395	0,386	19	0,787	0,754	0,735	0,414	0,394	Min.	0,762	0,739	0,735	0,395	0,386	Aver.	0,779	0,752	0,735	0,404	0,400	Max.	0,790	0,765	0,736	0,414	0,421
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Group 6 - Insulation Resistance	Functional Status Classification shall be C. The insulation resistance shall be > 10MΩ.	Samples met requirements. <table><tr><th>Sample</th><th>Insulation Resistance [GΩ]</th></tr><tr><td>17</td><td>> 50</td></tr><tr><td>18</td><td>> 50</td></tr><tr><td>19</td><td>>50</td></tr></table>	Sample	Insulation Resistance [GΩ]	17	> 50	18	> 50	19	>50																																												
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Group 6 - Connector Test - GMW-3191 (For connector 2w)	Terminal Push-out Force. Normal condition > 90 N.	Samples didn't meet requirements for this item. <table><tr><th rowspan="3">Connector Sample</th><th colspan="2">Terminal push out force in normal condition [N]</th></tr><tr><th colspan="2">Way</th></tr><tr><th>1</th><th>2</th></tr><tr><td>C6</td><td>70,0</td><td>56,5</td></tr><tr><td>C7</td><td>77,0</td><td>64,0</td></tr><tr><td>C8</td><td>73,5</td><td>79,0</td></tr><tr><td>C9</td><td>68,5</td><td>70,5</td></tr><tr><td>C10</td><td>76,5</td><td>73,5</td></tr><tr><td>Average</td><td>73,1</td><td>68,7</td></tr><tr><td>Max.</td><td>77,0</td><td>79,0</td></tr><tr><td>Min.</td><td>68,5</td><td>56,5</td></tr></table>	Connector Sample	Terminal push out force in normal condition [N]		Way		1	2	C6	70,0	56,5	C7	77,0	64,0	C8	73,5	79,0	C9	68,5	70,5	C10	76,5	73,5	Average	73,1	68,7	Max.	77,0	79,0	Min.	68,5	56,5																					
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Test Sequence/Environment	Requirements	Results																															
	<p>Terminal Push-out Force. After exposure to temperature and humidity > 110N.</p>	<p>Samples didn't meet requirements for this item.</p> <table><tr><th rowspan="3">Connector Sample</th><th colspan="2">Terminal push out force after exposure to temp and humidity [N]</th></tr><tr><th colspan="2">Way</th></tr><tr><th>1</th><th>2</th></tr><tr><td>C1</td><td>79,0</td><td>70,5</td></tr><tr><td>C2</td><td>80,5</td><td>75,5</td></tr><tr><td>C3</td><td>73,5</td><td>74,0</td></tr><tr><td>C4</td><td>77,0</td><td>91,0</td></tr><tr><td>C5</td><td>94,0</td><td>87,0</td></tr><tr><td>Average</td><td>80,8</td><td>79,6</td></tr><tr><td>Max.</td><td>94,0</td><td>91,0</td></tr><tr><td>Min.</td><td>73,5</td><td>70,5</td></tr></table>	Connector Sample	Terminal push out force after exposure to temp and humidity [N]		Way		1	2	C1	79,0	70,5	C2	80,5	75,5	C3	73,5	74,0	C4	77,0	91,0	C5	94,0	87,0	Average	80,8	79,6	Max.	94,0	91,0	Min.	73,5	70,5
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	<p>Connector-to-Connector Engagement Force < 75N.</p>	<p>Samples didn't meet requirements for this item.</p> <table><tr><th colspan="2">Connector-to-Connector Engagement</th></tr><tr><th>Sample</th><th>Force [N]</th></tr><tr><td>C11</td><td>99,5</td></tr><tr><td>C12</td><td>85,5</td></tr><tr><td>C13</td><td>91,5</td></tr><tr><td>C14</td><td>99,0</td></tr><tr><td>C15</td><td>93,5</td></tr><tr><td>C16</td><td>81,5</td></tr><tr><td>C17</td><td>79,0</td></tr><tr><td>C18</td><td>87,0</td></tr><tr><td>C19</td><td>89,0</td></tr><tr><td>C20</td><td>82,5</td></tr><tr><td>Min.</td><td>79,0</td></tr><tr><td>Aver.</td><td>88,8</td></tr><tr><td>Max.</td><td>99,5</td></tr></table>	Connector-to-Connector Engagement		Sample	Force [N]	C11	99,5	C12	85,5	C13	91,5	C14	99,0	C15	93,5	C16	81,5	C17	79,0	C18	87,0	C19	89,0	C20	82,5	Min.	79,0	Aver.	88,8	Max.	99,5	
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Test Sequence/Environment	Requirements	Results																														
	Locked Connector Disengagement Force > 120N.	Samples met requirements for this item. <table><tr><th colspan="2">Locked Connector Disengagement</th></tr><tr><th>Sample</th><th>Force [N]</th></tr><tr><td>C11</td><td>148,5</td></tr><tr><td>C12</td><td>157,0</td></tr><tr><td>C13</td><td>197,0</td></tr><tr><td>C14</td><td>191,5</td></tr><tr><td>C15</td><td>174,0</td></tr><tr><td>C16</td><td>146,5</td></tr><tr><td>C17</td><td>158,5</td></tr><tr><td>C18</td><td>154,5</td></tr><tr><td>C19</td><td>137,0</td></tr><tr><td>C20</td><td>150,0</td></tr><tr><td>Min.</td><td>137,0</td></tr><tr><td>Aver.</td><td>161,5</td></tr><tr><td>Max.</td><td>197,0</td></tr></table>	Locked Connector Disengagement		Sample	Force [N]	C11	148,5	C12	157,0	C13	197,0	C14	191,5	C15	174,0	C16	146,5	C17	158,5	C18	154,5	C19	137,0	C20	150,0	Min.	137,0	Aver.	161,5	Max.	197,0
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	Unlocked Connector Disengagement Force < 100N.	Samples met requirements for this item. <table><tr><th colspan="2">Unlocked Connector Disengagement</th></tr><tr><th>Sample</th><th>Force [N]</th></tr><tr><td>C21</td><td>52,0</td></tr><tr><td>C22</td><td>36,5</td></tr><tr><td>C23</td><td>53,0</td></tr><tr><td>C24</td><td>72,5</td></tr><tr><td>C25</td><td>57,0</td></tr><tr><td>C26</td><td>47,0</td></tr><tr><td>C27</td><td>41,0</td></tr><tr><td>C28</td><td>53,5</td></tr><tr><td>C29</td><td>35,5</td></tr><tr><td>C30</td><td>50,5</td></tr><tr><td>Min.</td><td>35,5</td></tr><tr><td>Aver.</td><td>49,9</td></tr><tr><td>Max.</td><td>72,5</td></tr></table>	Unlocked Connector Disengagement		Sample	Force [N]	C21	52,0	C22	36,5	C23	53,0	C24	72,5	C25	57,0	C26	47,0	C27	41,0	C28	53,5	C29	35,5	C30	50,5	Min.	35,5	Aver.	49,9	Max.	72,5
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Group 7 - 5-Point Functional/Parametric Check (Voltage Drop)	Functional Status Classification shall be A.	Initial measurements. Samples met requirements. <table><tr><th rowspan="3">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>23</td><td>0,763</td><td>0,769</td><td>0,751</td><td>0,432</td><td>0,400</td></tr><tr><td>24</td><td>0,845</td><td>0,783</td><td>0,756</td><td>0,398</td><td>0,481</td></tr><tr><td>25</td><td>0,755</td><td>0,757</td><td>0,761</td><td>0,421</td><td>0,434</td></tr><tr><td>26</td><td>0,772</td><td>0,774</td><td>0,757</td><td>0,401</td><td>0,387</td></tr><tr><td>27</td><td>0,749</td><td>0,761</td><td>0,742</td><td>0,418</td><td>0,501</td></tr><tr><td>28</td><td>0,755</td><td>0,759</td><td>0,746</td><td>0,387</td><td>0,407</td></tr><tr><td>29</td><td>0,763</td><td>0,759</td><td>0,751</td><td>0,403</td><td>0,519</td></tr><tr><td>30</td><td>0,767</td><td>0,748</td><td>0,733</td><td>0,375</td><td>0,380</td></tr><tr><td>31</td><td>0,750</td><td>0,753</td><td>0,733</td><td>0,417</td><td>0,391</td></tr><tr><td>Min.</td><td>0,749</td><td>0,748</td><td>0,733</td><td>0,375</td><td>0,380</td></tr><tr><td>Aver.</td><td>0,769</td><td>0,762</td><td>0,748</td><td>0,406</td><td>0,433</td></tr><tr><td>Max.</td><td>0,845</td><td>0,783</td><td>0,761</td><td>0,432</td><td>0,519</td></tr></table>	Sample	Voltage Drop [mV]					Circuit					1	2	3	4	5	23	0,763	0,769	0,751	0,432	0,400	24	0,845	0,783	0,756	0,398	0,481	25	0,755	0,757	0,761	0,421	0,434	26	0,772	0,774	0,757	0,401	0,387	27	0,749	0,761	0,742	0,418	0,501	28	0,755	0,759	0,746	0,387	0,407	29	0,763	0,759	0,751	0,403	0,519	30	0,767	0,748	0,733	0,375	0,380	31	0,750	0,753	0,733	0,417	0,391	Min.	0,749	0,748	0,733	0,375	0,380	Aver.	0,769	0,762	0,748	0,406	0,433	Max.	0,845	0,783	0,761	0,432	0,519
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Group 7 - Mechanical Shock Collision - 50G 11ms	Functional Status Classification shall be C.	Samples met requirements. Please see Magneti Marelli's test report Nr. DFI017/14 Rev1.																																																																																									
Group 7 - Free Fall	The component shall pass the 5-Point Functional/Parametric Check at the end of the test.	Samples met requirements.																																																																																									
Group 7 - Crush for Housing (Elbow Load)	Functional Status Classification shall be C.	Samples met requirements.																																																																																									
Group 7 - 5-Point Functional/Parametric Check (Voltage Drop)	Functional Status Classification shall be A.	Final measurements. Samples met requirements. <table><tr><th rowspan="2">Sample</th><th colspan="5">Voltage Drop [mV]</th></tr><tr><th colspan="5">Circuit</th></tr><tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>23</td><td>0,825</td><td>0,759</td><td>0,738</td><td>0,385</td><td>0,438</td></tr><tr><td>24</td><td>0,977</td><td>0,813</td><td>0,807</td><td>0,414</td><td>0,660</td></tr><tr><td>25</td><td>0,859</td><td>0,786</td><td>0,779</td><td>0,402</td><td>0,542</td></tr><tr><td>26</td><td>0,787</td><td>0,754</td><td>0,745</td><td>0,419</td><td>0,453</td></tr><tr><td>27</td><td>0,771</td><td>0,764</td><td>0,743</td><td>0,408</td><td>0,538</td></tr><tr><td>28</td><td>0,762</td><td>0,769</td><td>0,741</td><td>0,398</td><td>0,445</td></tr><tr><td>29</td><td>0,773</td><td>0,768</td><td>0,746</td><td>0,392</td><td>0,524</td></tr><tr><td>30</td><td>0,785</td><td>0,739</td><td>0,741</td><td>0,387</td><td>0,391</td></tr><tr><td>31</td><td>0,763</td><td>0,769</td><td>0,749</td><td>0,421</td><td>0,389</td></tr><tr><td>Min.</td><td>0,762</td><td>0,739</td><td>0,738</td><td>0,385</td><td>0,389</td></tr><tr><td>Aver.</td><td>0,811</td><td>0,769</td><td>0,754</td><td>0,403</td><td>0,486</td></tr><tr><td>Max.</td><td>0,977</td><td>0,813</td><td>0,807</td><td>0,421</td><td>0,660</td></tr></table>	Sample	Voltage Drop [mV]					Circuit						1	2	3	4	5	23	0,825	0,759	0,738	0,385	0,438	24	0,977	0,813	0,807	0,414	0,660	25	0,859	0,786	0,779	0,402	0,542	26	0,787	0,754	0,745	0,419	0,453	27	0,771	0,764	0,743	0,408	0,538	28	0,762	0,769	0,741	0,398	0,445	29	0,773	0,768	0,746	0,392	0,524	30	0,785	0,739	0,741	0,387	0,391	31	0,763	0,769	0,749	0,421	0,389	Min.	0,762	0,739	0,738	0,385	0,389	Aver.	0,811	0,769	0,754	0,403	0,486	Max.	0,977	0,813	0,807	0,421	0,660
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26	0,787	0,754	0,745	0,419	0,453																																																																																						
27	0,771	0,764	0,743	0,408	0,538																																																																																						
28	0,762	0,769	0,741	0,398	0,445																																																																																						
29	0,773	0,768	0,746	0,392	0,524																																																																																						
30	0,785	0,739	0,741	0,387	0,391																																																																																						
31	0,763	0,769	0,749	0,421	0,389																																																																																						
Min.	0,762	0,739	0,738	0,385	0,389																																																																																						
Aver.	0,811	0,769	0,754	0,403	0,486																																																																																						
Max.	0,977	0,813	0,807	0,421	0,660																																																																																						
Group 7 - Visual Inspection and Dissection	There shall be no corrosion, discoloration, cracks, etc., which could affect the functionality of the part.	Samples met requirements.																																																																																									
Group 8 - Fretting Corrosion	The resistance measured shall always meet the value as required by GMW3191 Dry Circuit Resistance. Acceptance Criteria.	Samples met requirements. Please see Qualpas' test report Nr. 081.																																																																																									

2. SAMPLE & WIRE DESCRIPTION

The Certification of Conformance (C of C), submitted with the test request, lacked the necessary information to verify the samples tested. Therefore the Test Lab cannot verify that the samples have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production or parts.

2.1. Group / Samples

Group	Part Number	Rev.	Date Code	Sample Description	Quantity Tested
0	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 1 to 3.	3
1	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 1 to 3.	3
2	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 4 to 7.	4
3	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 8 to 10.	3
5	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 11 to 13.	3
6	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 14 to 22.	9
6	2819052-1	1	N/A*	2 WAYS CONNECTOR Nr. C1 to C30	30
7	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 23 to 31.	9
8	2819050-1	3	N/A*	BFT 5 POS ASSY – Nr 32 to 36.	5

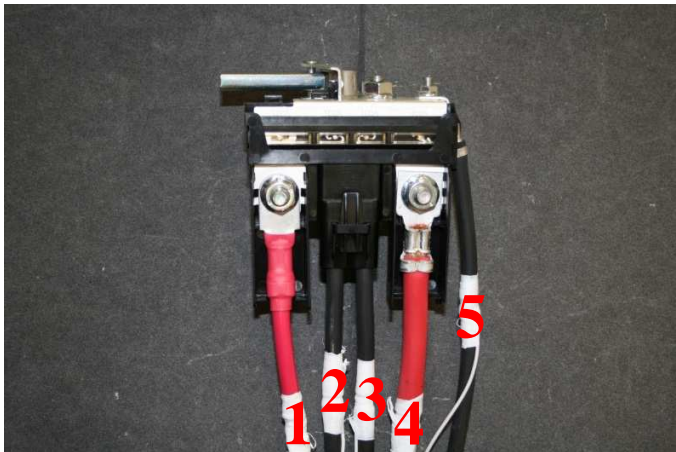
* Information either unavailable or not provided by requestor.

2.2. Wire Information

Group Number	Wire Gage	Overall Diameter	Strand Diameter	Number of Strands	Wire Length
All Groups	16mm ²	7,1	0,38	122	500
	16mm ²	7,4	0,38	125	520
	25mm ²	10	0,38	256	500

3. SAMPLE PREPARATION

3.1. Sample identification



CIRCUIT IDENTIFICATION



BFT 5 POS ASSY

4. TEST PROCEDURE

4.1. Cross Section Inspection

According to GMW 3172 (Rev. Nov/2012) item 6.6.

4.2. Visual Inspection and Dissection

According to GMW 3172 (Rev. Nov/2012) item 6.5.

4.3. Thermal Cycle Profile Development

According to GMW 3172 (Rev. Nov/2012) item 6.9.

4.4. Vibration Transmissibility Demonstration

According to GMW 3172 (Rev. Nov/2012) item 6.8. Test accomplished in Magneti Marelli's laboratory. Please see Magneti Marelli's test report Nr. DFI017/14 Rev1.

4.5. 5-Point Functional/Parametric Check (Voltage Drop)

According to GMW 3172 (Rev. Nov/2012) item 6.1, measurements accomplished at room temperature using 1A. Measurements accomplished from wires (circuit identification above) to battery terminal.

4.6. High Temperature Degradation

According to GMW 3172 (Rev. Nov/2012) item 9.4.1. 1000 hours. 105°C.

4.7. Thermal Shock (Air-To-Air)

According to GMW 3172 (Rev. Nov/2012) item 9.4.2. Test accomplished in TE USA Laboratory facilities.

4.8. Power Temperature Cycle (PTC)

According to GMW 3172 (Rev. Nov/2012) item 9.4.3. Test accomplished in TE USA Laboratory facilities.

4.9. Dust Test

According to GMW 3172 (Rev. Nov/2012) item 9.5.1. Test accomplished in Federal Mogul laboratory. Please see Federal Mogul's test report Nr.12598.

4.10. Water Test

According to GMW 3172 (Rev. Nov/2012) item 9.5.2. Test accomplished in TE USA Laboratory facilities.

4.11. Salt-spray

According to GMW 3172 (Rev. Nov/2012) item 9.4.8.

4.12. Insulation Resistance

According to GMW 3172 (Rev. Nov/2012) item 9.2.16. Measurements accomplished between wires (circuit identification above) and carcass with aluminum foil.

4.13. Connector Test - GMW-3191 (For connector 2w)

- Terminal Push-out Force -Item 4.5.2.5 GMW 3191.
- Connector-to-Connector Engagement Force – Item 4.2.8.2 GMW 3191.
- Locked Connector Disengagement Force – Item 4.2.18.5 GMW 3191.
- Unlocked Connector Disengagement Force – Item 4.2.19.5 GMW 3191.

4.14. Mechanical Shock Collision - 50G 11ms

According to GMW 3172 (Rev. Nov/2012) item 9.3.3. Test accomplished in Magneti Marelli's laboratory. Please see Magneti Marelli's test report Nr. DFI017/14 Rev1.

4.15. Free Fall

According to GMW 3172 (Rev. Nov/2012) item 9.3.10.

4.16. Crush for Housing (Elbow Load)

According to GMW 3172 (Rev. Nov/2012) item 9.3.5.

4.17. Fretting Corrosion

According to GMW 3172 (Rev. Nov/2012) item 9.3.11. Test accomplished in Qualpas' laboratory. Please see Qualpas' test report Nr. 081.

5. TEST EQUIPMENT

All equipment containing a calibration number is calibrated and traceable through TE to the National Institute of Standards and Technology (NIST).

Instrument Description	Manufacturer	Model Number	Calibration Number	Purpose
Hypot	Associated Research, Inc.	7650	93-339033-001	Insulation Resistance
Salt Spray Chamber	ACS	EWTC 102	92-339032-009-A	Salt-spray test
Dynamometer	Mecmesin	AFG 2500N	92-339017-090	- Connector Test - GMW-3191 (For connector 2w) - Crush for Housing (Elbow Load).
Oven	Fanem	320E	93-339032-1231	High Temperature Degradation
DC Power Supply	GW Laboratory	GPR-1810	93-339033-726	- 5-Point Functional/Parametric Check (Voltage Drop) - Fretting Corrosion
Digital Multimeter	Hewlett Packard	34401A	93-339033-024	- 5-Point Functional/Parametric Check (Voltage Drop) - Fretting Corrosion
Humidity chamber	ACS	DCTC 1300	92-339032-009	Connector Test - GMW-3191 (For connector 2w)

6. APPROVALS

Approvals are secured electronically through the corporate document repository routing and approval system.

Testing & Report By: Jesus Preto, Laboratory Engineer

Reviewed & Approved By: Paulo Almeida, Laboratory Coordinator