Design Verification Plan and Report - DV/PV Level - APEX150 14-Way Hybrid Connector System with Shorting Bar
FCI Automotive Group

Program: APEX150 14-Way Hybrid Connector System with Shorting Bar APEX150 Male & Female Gold - 16/18 & 22 Gage	FCI Part No(s): 55251404 , 54251408, 54001627 , 54001629 , 54002004	Resp. Eng. (s):	Frank Holub
		Concurred:	
		Plan Originator:	Frank Holub
Component Supplier: FCI	Component Description: APEX150 14-Way Hybrid Male and Female Connector System	Plan Approval:	FAH
		DVP No:	FCINPEL-14WHybridSB-05192
		Plan Date:	April 27, 2006

Item No.	Procedure or Standard	Test Description	Acceptance Criteria	Sample Qty.	Timing Scheduled Start	Timing Scheduled Finish	Timing Actual Start	Timing Actual Finish	Results Avg.	Results Max.	Results Min.	Pass/ Fail	Comments
1	**SAE/USCAR-2 Rev. 3**	**Connector Mechancial Test Flow Chart 5.8.5**											
A	**05-192a**												16-Gage Terminals APEX 150 (Male)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	3			9/12/2005	9/12/2005				PASS	Visual
	Section 5.4.1	Terminal-Connector Insertion/	Section 5.4.1.4	1			9/12/2005	9/12/2005	8.99	10.58	8.45	PASS	Insertion (N) removing previous terminal
		Extracion Force		1			9/13/2005	9/13/2005	10.65	11.52	9.63	PASS	Insertion (N) w/o removing previous terminal
				1[1]			9/13/2005	9/13/2005	111.5	119	105.00	PASS	Extraction (N) w/o Wedge
				1[2]			9/13/2005	9/13/2005	117.6	134	106.00	PASS	Extraction (N) w/Wedge
				1[3]			9/13/2005	9/14/2005	111.7	130	94.00	PASS	Extraction (N) After Moistire
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	3			9/14/2005	9/14/2005				PASS	Visual
B	**05-192b**												22 Gage Terminals APEX 150 (Male)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	2			9/12/2005	9/12/2005				PASS	Visual
	Section 5.4.1	Terminal-Connector Insertion Force	Section 5.4.1.4	1			9/15/2005	9/15/2005	7.72	8.22	7.16	PASS	Insertion (N) removing previous terminal
				1			9/15/2005	9/15/2005	8.75	9.82	8.22	PASS	Insertion (N) w/o removing previous terminal
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	2			9/15/2005	9/15/2005				PASS	Visual
C	**05-192c**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	20			3/1/2006	3/1/2006				PASS	Visual
	Section 5.4.2	Connector-Connector Mating/	Section 5.4.2.4	10			3/2/2006	3/3/2006	67.29	73.65	61.43	PASS	Mating Force (N) (Record Force vs Distance)
		Unmating Force		10[5]			3/2/2006	3/3/2006	46.2	48	43	PASS	Force (N) to disengage lock
				10[5]			3/2/2006	3/3/2006	212.2	221	208	PASS	Unmating force (N) w/ lock
				5			3/2/2006	3/3/2006	291.2	308	282	PASS	Unmating force (N) w/ lock & CPA
				10[3]			3/2/2006	3/3/2006	49.4	51	48	PASS	Unmating force (N) w/o lock
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	20			3/3/2006	3/4/2006				PASS	Visual
D	**05-192d**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	4			9/7/2005	9/7/2005				PASS	Visual
	Section 5.4.3	Polarization Feature Effectiveness	Section 5.4.4.4	4			9/7/2005	9/7/2005				PASS	No Mating @ >=220N
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	4			9/7/2005	9/7/2005				PASS	Visual
2	**SAE/USCAR-2 Rev. 3 Section 5.8.6**	**Connector System Electrical Test Flow Chart**											
F	**05-192f**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10					1.166	1.52	0.875	PASS	Initial Dry Circuit Resistance (mΩ)
	Section 5.4.5	Vibration/Mechanical Shock	Section 5.4.5.4	10[6,4]									Discontinuity
		(Allow samples to sit 48 Hours)					3/8/2006	3/13/2006					Aging
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10[6,4]					1.286	2.005	0.75	PASS	Final Dry Circuit Resistance (mΩ)
	Section 5.3.2	Voltage Drop	Section 5.3.2.4	10[4]					1.531	2.469	1.101	PASS	Voltage Drop Resistance (mΩ)
	Section 5.1.9	Visual Inspection	Section 5.1.6.5	11								PASS	Visual
G	**05-192g**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10					1.131	1.26	0.99	PASS	Initial Dry Circuit Resistance (mΩ)
	Section 5.6.1	Thermal Shock	Section 5.6.1.4	10[6,4]									Discontinuity
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10[6,4]			3/3/2006	3/14/2006	2.004	2.885	0.57	PASS	Final Dry Circuit Resistance (mΩ)
	Section 5.3.2	Voltage Drop	Section 5.3.2.4	10[4]					2.583	3.947	1.692	PASS	Voltage Drop Resistance (mΩ)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
H	**05-192h**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10					1.203	1.755	0.84	PASS	Initial Dry Circuit Resistance (mΩ)
	Section 5.6.2	Temperature/ Humidity Cycling	Section 5.6.2.4	10[4]									
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10[4]			2/20/2006	3/8/2006	1.494	2.46	0.97	PASS	Final Dry Circuit Resistance (mΩ)
	Section 5.3.2	Voltage Drop	Section 5.3.2.4	10[4]					1.884	3.574	1.205	PASS	Voltage Drop Resistance (mΩ)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
I	**05-192i**												Connector System (Male & Female)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10					0.987	1.48	0.795	PASS	Initial Dry Circuit Resistance (mΩ)
	Section 5.6.3	High Temperatue Exposure	Section 5.6.3.4	10[4]									
	Section 5.3.1	Dry Circuit Resistance	Section 5.3.1.4	10[4]			2/9/2006	3/24/2006	1.045	2.255	0.67	PASS	Final Dry Circuit Resistance (mΩ)
	Section 5.3.2	Voltage Drop	Section 5.3.2.4	10[4]					1.029	2.137	0.783	PASS	Voltage Drop Resistance (mΩ)
	Section 5.1.6	Visual Inspection	Section 5.1.6.4	10								PASS	Visual
3	**05-192l**	**Shorting Bar**											Connector System (Male & Female)
	Section 5.1.6 (Rev 3)	Visual Inspection		16								PASS	
		Mate & Unmate 10 Times		16									
	FCI Requirement	Dry Circuit Resistance (Shorting Bar)	< 200mΩ	16			2/9/2006	3/24/2006	62.538	90.305	54.58	PASS	Final Dry Circuit Resistance (mΩ)
		Re-Mate Connector		16									
	FCI Requirement	Isolation Resistance(SB Terms Pairs Only)	> 20MΩ @ 500VDC	16					∞	∞	∞	PASS	Resistance (MΩ)
	Section 5.1.6 (Rev 3)	Visual Inspection		16								PASS	Visual (per USCAR-2 Rev 3)

Comments and notes from testing.

This Test Program is intended to be a DV/PV Qualification

1- Use sample from "Insertion removing previous"
2- Use sample from "Insertion w/o removing previous"
3- Use virgin sample
4- Use same samples for each test in group
5- Use samples from "Unmating Force"
6- Continuous circuit monitoring of at least 10 terminal pairs and 5 connectors. Remaining samples to be used for dry circuit measurements (minimum 10 terminal pairs)