

Test Report

Lab Number : C005-177 Customer : GM Date In : 10/20/2006
 Type of Test : Special test Part Name : Delta Ignition Switch Date Out : 1/25/2008
 Requested By : A. Alcalá DELPHI P/N : 741-79232 Assigned to : A. Calvillo
 Customer P/N : 15392423 Customer Specialist : J.A.Morales

Objectives : Validate New PCBs

Issued By : J.A.Morales
 Reviewed By : F. Mendoza
 Distribution:
 Full Copy : A. Alcalá
 Top Sheet : A. Calvillo

Specification: 12450250

12 samples of Delta Ignition switch were submitted to 3X life in order to validate new PCBs from Viasystems. Devices were built using Catera Spring Plunger P/N 741-79378. Samples were identified as follows:
 Lab Job C005-177, test units were identified as DUT 1 - 12

Testing performed on samples as per the following plan:

Tests performed:

Initial Parametrics

Voltage Drop/Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.3
 Contact Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.4
 Open Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.5
 Isolation Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.6
 Force & Displacement (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.2.3
 Simple Function Check (Units 1 to 12), As per Spec. 12450250 Sec. 5.6
 Contact Bounce (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.8

Durability to 100%

1X life Durability (50K cycles)
 Voltage Drop/Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.1.5.1
 Contact Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.3
 Open Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.4
 Isolation Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.5
 Force & Displacement (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.6
 Simple Function Check (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.2.3
 Contact Bounce (Units 1 to 12), As per Spec. 12450250 Sec. 5.6

Durability to 200%

2X life Durability (50K Cycles plus. Total of 100K cycles)
 Voltage Drop/Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.1.5.1
 Contact Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.3
 Open Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.4
 Isolation Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.5
 Force & Displacement (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.6
 Simple Function Check (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.2.3
 Contact Bounce (Units 1 to 12), As per Spec. 12450250 Sec. 5.6

Durability to 300%

3X life Durability (50K Cycles plus. Total of 150K cycles)
 Voltage Drop/Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.1.5.1
 Contact Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.3
 Open Circuit Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.4
 Isolation Resistance (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.5
 Force & Displacement (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.1.6
 Simple Function Check (Units 1 to 12), As per Spec. 12450250 Sec. 3.2.2.3
 Contact Bounce (Units 1 to 12), As per Spec. 12450250 Sec. 5.6

Tests results:

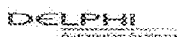
All samples met requirements on initial parametric measurements.
 Initial Contact Bounce testing performed at Room Temp and -40 degrees C. No issues observed during the test.

Initial Torque and Angle Measurements on 6 samples were performed in DG. Results on attached Test Report C005-395.
 Additional Torque and Angle Measurements on the 12 samples were performed using the EOL tester. Make / Break readings below specification's low limit were observed on DUTs 1, 2, 8 and 10.
 See attached data sheet for detailed results.

1x Life:

No issues on millivolt drop behavior were observed; all samples met the millivolt drop spec during the 1x life cycling.
 No issues observed on post durability measurements.

No issues found on Contact Bounce test After 1X cycling at Room Temp and -40 degrees C.



Delphi Mechatronic Systems

2x Life:

During 2x Life durability , DUT #11 became not functional after 50,100 cycles. Parametric measurements were performed to this part showing an open circuit condition in Off/Run/Crank circuit on the Start detent.

Device showed resistor R2 open on Contact Resistance measurement and open circuit condition on Off/Run/Crank circuit on the Start detent on Voltage Drop post parametric measurement.

Sample was sent to DG for analysis showing damage on one of the terminals.

Remaining samples were resumed for cycling.

No millivolt drop issues were observed; all samples met the spec during the cycling.

No issues found on Contact Bounce at room temperature.

DUT# 2, 4 and 12 presented contact bounces at -40 C.

3x Life:

3x life cycle to 11 devices.

No issues on millivolt drop behavior were observed; all samples met the spec during the 3x life cycling.

No issues observed during parametric measurements after cycling.

No Contact Bounce issue was observed at Room Temp.

DUT# 3, 5, 6, 8, 9 and 12 presented contact bounce issues after 3x life at -40C. Remaining devices did not show issues at this temperature.

Note. Torque and Angle Results from EOL tester showed Make / Break readings below the specification's low limit after 1x, 2x and 3x life.

See attached data sheet for detailed results.

See attached sheets for detailed results.

Analysis/Development/Validation Plan & Report (ADV P & R) --GM 1829

SECTION I --- COMMODITY DESCRIPTION										SECTION II A --- SUPPLIER INFORMATION																			
PART #* 10392423 (D-MS #741-79232) PART NAME* GM DELTA IGNITION SWITCH UPC #* 972251 (D-MS Program Tracking Number) REVISION DATE / LEVEL*					MODEL YEAR* 2005 PLATFORM* MODEL #*					SUPPLIER NAME* Delphi Mechatronic Systems SUPPLIER CONTACT* George Lin SUPPLIER CONTACT PHONE NUMBER* SUPPLIER CONTACT E-MAIL ADDRESS*																			
SECTION II B --- GM CONTACT INFORMATION/APPROVAL										SECTION III -- ADV PLAN SUMMARY										SEC IV -- ADV REPORT									
GM VALIDATION ENGINEER* PHONE NUMBER*					GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio PHONE NUMBER*					DATE: Rev. 3 12/19/05																			
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED			RESULTS	NOTES											
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE													
1	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.6	Isolation Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements	Results Per EOL Tester											
2	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.3	Voltage Drop		350 mV Max	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements	Results Per EOL Tester											
3	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.5	Open Circuit Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements	Results Per EOL Tester											
4	12450250	CTS: Discrete Logic Ignition Switch	3.2.2.3	Torque-Angle at ROOM TEMP		Actuation Torque and angle displacement in accordance to the specification	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Did not meet Requirements	Torque and Angle measurements were performed on 6 devices in DG Test Lab. Results as per Test Report C005-395 Additional Torque and Angle measurements were performed on 12 devices using the EOL Tester. Note. Readings below specification's low limit were observed: DUT# 1 ACC Make, ACC Break Angle under lower limit. DUT# 2 ACC Break under lower limit. DUT# 6 ACC Make, ACC Break, Run Crank Make, Key In Make Break under lower limit. DUT#10 ACC Make, ACC Break, Run Crank Make, Key In Make Break under lower limit.											
5	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.4	Contact Resistance		100 mOhms Max	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements												
6	GM9110P	Procedure for Testing Switches	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements												
7	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at Room Ambient Temperature		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	10/20/05	10/20/05				Met Requirements												

NOTE: Asterisk (*) denotes required field/information.
GM 1829: ADV Plan and Report [2004Jan23 ver.]

SC-000402

DELPHI CONFIDENTIAL

SECTION I --- COMMODITY DESCRIPTION					SECTION II A --- SUPPLIER INFORMATION				
PART #*	10392423 (D-MS #741-79232)	MODEL YEAR*	2005		SUPPLIER NAME*	Delphi Mechatronic Systems			
PART NAME*	GM DELTA IGNITION SWITCH	PLATFORM*			SUPPLIER CONTACT*	George Lin			
UPC #*	972251 (D-MS Program Tracking Number)	MODEL #*			SUPPLIER CONTACT PHONE NUMBER*	[REDACTED]			
REVISION DATE / LEVEL*					SUPPLIER CONTACT E-MAIL ADDRESS*	[REDACTED]			

SECTION II B --- GM CONTACT INFORMATION/APPROVAL					DATE: Rev. 3 12/19/05				
GM VALIDATION ENGINEER*					GM DESIGN/LEAD ENGINEER*	Raymond DeGiorgio			
PHONE NUMBER*					PHONE NUMBER*				

SECTION III -- ADV PLAN SUMMARY														SEC IV -- ADV REPORT			NOTES	
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPON SIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED				RESULTS
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE		
8	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at -40C		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	10/21/05	10/22/05				Met Requirements	
9	12450250	CTS: Discrete Logic Ignition Switch	3.1.5.1	Durability to 100% Life, 50000 Cycles with Proper Function and NO Failures			D-MS	PVA	T	12 (1-12)	D	10/22/05	11/3/05				Met Requirements	Test Load Set Up for Life Cycling: ACC(2-4): 0.99A to 1.03A RUN-CRANK(2-3): 747mA to 755 mA KEY RUN CRANK(6-5): 807uA KEY IN(2-5): 2.3mA
10	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.6	Isolation Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	Results Per EOL Tester
11	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.3	Voltage Drop		350 mV Max	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	Results Per EOL Tester
12	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.5	Open Circuit Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	Results Per EOL Tester
13	12450250	CTS: Discrete Logic Ignition Switch	3.2.2.3	Torque-Angle at ROOM TEMP		Actuation Torque and angle displacement in accordance to the specification	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Did not meet Requirements	Note. Readings below specification's low limit were observed : Results Per EOL Tester DUT# 2 ORC Make Angle under lower limit. DUT# 4 ACC Make, Key In Break, ORC Make under lower limit. DUT# 5 ACC Make, ORC Make under lower limit. DUT# 9 ACC Make, ORC Make under lower limit. DUT#11 Key In Break under lower limit. DUT#12 ACC Make, Key In Break, ORC Make under lower limit.
14	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.4	Contact Resistance		100 mOhms Max	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	

SECTION I --- COMMODITY DESCRIPTION				SECTION II A --- SUPPLIER INFORMATION			
PART #	10392423 (D-MS #741-79232)	MODEL YEAR*	2005	SUPPLIER NAME*	Delphi Mechatronic Systems		
PART NAME*	GM DELTA IGNITION SWITCH	PLATFORM*		SUPPLIER CONTACT*	George Lin		
UPC #	972251 (D-MS Program Tracking Number)	MODEL #		SUPPLIER CONTACT PHONE NUMBER*	[REDACTED]		
REVISION DATE / LEVEL*				SUPPLIER CONTACT E-MAIL ADDRESS*	[REDACTED]		

SECTION II B --- GM CONTACT INFORMATION/APPROVAL				DATE: Rev. 3 12/19/05			
GM VALIDATION ENGINEER*	GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio						
PHONE NUMBER*	PHONE NUMBER*						

SECTION III -- ADV PLAN SUMMARY														SEC IV -- ADV REPORT			NOTES	
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED				RESULTS
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE		
15	GM9110P	Procedure for Testing Switches	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	
16	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at Room Ambient Temperature		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	11/4/05	11/4/05				Met Requirements	
17	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at -40C		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	11/5/05	11/7/05				Met Requirements	
18	12450250	CTS: Discrete Logic Ignition Switch	3.1.5.1	Durability to 200% Life, 100 000 Cycles with Proper Function and NO Failures			D-MS	PVA	T	12 (1-12)	D	11/8/05	11/17/05				Met Requirements	DUT# 11 was removed from Cycling after 50,100 cycles. Device showed open circuit resistance in Off/Run/Crank circuit on Start detent. Device showed open circuit condition in Off/Run/Crank circuit on Start detent Test Load Set Up for Life Cycling: ACC(2-4): 0.99A to 1.03A RUN-CRANK(2-3): 747mA to 755 mA KEY RUN CRANK(6-5): 807uA KEY IN(2-5): 2.3mA
19	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.6	Isolation Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Results Per EOL Tester. Test performed on 11 Devices.
20	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.3	Voltage Drop		350 mV Max	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Results Per EOL Tester. Test performed on 11 Devices.
21	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.5	Open Circuit Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Results Per EOL Tester. Test performed on 11 Devices.

NOTE: Asterisk (*) denotes required field/information.
GM 1829: ADV Plan and Report [2004Jan23 ver.]

SC-000404

DELPHI CONFIDENTIAL

SECTION I --- COMMODITY DESCRIPTION				SECTION II A --- SUPPLIER INFORMATION			
PART #	10392423 (D-MS #741-79232)	MODEL YEAR*	2005	SUPPLIER NAME*	Delphi Mechatronic Systems		
PART NAME*	GM DELTA IGNITION SWITCH	PLATFORM*		SUPPLIER CONTACT*	George Lin		
UPC #	972251 (D-MS Program Tracking Number)	MODEL #		SUPPLIER CONTACT PHONE NUMBER*	[REDACTED]		
REVISION DATE / LEVEL*				SUPPLIER CONTACT E-MAIL ADDRESS*	[REDACTED]		

SECTION II B --- GM CONTACT INFORMATION/APPROVAL				DATE: Rev. 3 12/19/05			
GM VALIDATION ENGINEER*	GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio						
PHONE NUMBER*	PHONE NUMBER*						

SECTION III -- ADV PLAN SUMMARY														SEC IV -- ADV REPORT			NOTES	
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED				RESULTS
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE		
22	12450250	CTS: Discrete Logic Ignition Switch	3.2.2.3	Torque-Angle at ROOM TEMP		Actuation Torque and angle displacement in accordance to the specification	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Did not meet Requirements	Note. Readings below specification's low limit were observed: Results Per EOL Tester DUT# 2 ACC Make, Key In Break under lower limit. DUT# 3 ACC Make, Key In Break under lower limit. DUT# 5 ACC Make, Key In Break under lower limit. DUT# 8 ACC Make, Key In Break under lower limit. DUT# 9 ACC Key In Break under lower limit.
23	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.4	Contact Resistance		100 mOhms Max	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Test performed on 11 Devices.
24	GM9110P	Procedure for Testing Switches	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Test performed on 11 Devices.
25	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at Room Ambient Temperature		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	11/18/05	11/18/05				Met Requirements	Test performed on 11 Devices.
26	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at -40C		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	11/19/05	11/20/05				Did not meet Requirements	Test performed on 11 Devices. Contact Bounces were observed after 2x life: DUT# 2 showed bounces on ACC circuit at -40C. DUT#4 showed bounces on ACC circuit at -40C. DUT#12 showed bounces on ORC circuit at -40C.

DELPHI CONFIDENTIAL

SC-000405

SECTION I --- COMMODITY DESCRIPTION				SECTION II A --- SUPPLIER INFORMATION			
PART #	10392423 (D-MS #741-79232)	MODEL YEAR*	2005	SUPPLIER NAME*	Delphi Mechatronic Systems		
PART NAME*	GM DELTA IGNITION SWITCH	PLATFORM*		SUPPLIER CONTACT*	George Lin		
UPC #	972251 (D-MS Program Tracking Number)	MODEL #		SUPPLIER CONTACT PHONE NUMBER*	[REDACTED]		
REVISION DATE / LEVEL*				SUPPLIER CONTACT E-MAIL ADDRESS*	[REDACTED]		

SECTION II B --- GM CONTACT INFORMATION/APPROVAL				DATE: Rev. 3 12/19/05			
GM VALIDATION ENGINEER*	GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio						
PHONE NUMBER*	PHONE NUMBER*						

SECTION III -- ADV PLAN SUMMARY														SEC IV -- ADV REPORT			NOTES	
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED				RESULTS
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE		
27	12450250	CTS: Discrete Logic Ignition Switch	3.1.5.1	Durability to 300% Life, 150 000 Cycles with Proper Function and NO Failures			D-MS	PVA	T	12 (1-12)	D	11/22/05	12/1/05				Met Requirements	Test Load Set Up for Life Cycling: ACC(2-4): 0.99A to 1.03A RUN-CRANK(2-3): 747mA to 755 mA KEY RUN CRANK(6-5): 807uA KEY IN(2-5): 2.3mA
28	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.6	Isolation Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements	Results Per EOL Tester
29	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.3	Voltage Drop		350 mV Max	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements	Results Per EOL Tester
30	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.5	Open Circuit Resistance		20 Mohm Min	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements	Results Per EOL Tester
31	12450250	CTS: Discrete Logic Ignition Switch	3.2.2.3	Torque-Angle at ROOM TEMP		Actuation Torque and angle displacement in accordance to the specification	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Did not meet Requirements	Note. Readings below specification's low limit were observed : Results Per EOL Tester DUT# 2 ACC Make, Key In Break under lower limit. DUT# 3 ACC Make under lower limit. DUT# 4 ACC Make, Key In Break under lower limit. DUT# 5 ACC Make, Run Make, ORC Make under lower limit. DUT# 8 Run Make, Key In Break under lower limit. DUT# 9 ACC Make, Run Make, Key In Break under lower limit. DUT#12 ACC Make, Run Make, Key In Break under lower limit.
32	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.4	Contact Resistance		100 mOhms Max	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements	
33	GM9110P	Procedure for Testing Switches	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements	

NOTE: Asterisk (*) denotes required field/information.
GM 1829: ADV Plan and Report [2004Jan23 ver.]

SC-000406

DELPHI CONFIDENTIAL

SECTION I --- COMMODITY DESCRIPTION										SECTION II A --- SUPPLIER INFORMATION									
PART # 10392423 (D-MS #741-79232)					MODEL YEAR* 2005					SUPPLIER NAME* Delphi Mechatronic Systems					SUPPLIER CONTACT* George Lin				
PART NAME* GM DELTA IGNITION SWITCH					PLATFORM* MODEL #					SUPPLIER CONTACT PHONE NUMBER*					SUPPLIER CONTACT E-MAIL ADDRESS*				
UPC # 972251 (D-MS Program Tracking Number)					REVISION DATE / LEVEL*														
SECTION II B --- GM CONTACT INFORMATION/APPROVAL										DATE: Rev. 3 12/19/05									
GM VALIDATION ENGINEER* PHONE NUMBER*					GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio PHONE NUMBER*														
SECTION III -- ADV PLAN SUMMARY										SEC IV -- ADV REPORT									
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED			RESULTS	NOTES	
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE			
34	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at Room Ambient Temperature		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	12/2/05	12/2/05				Met Requirements		
35	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.8	Contact Bounce at -40C		3 Max, 1.0 mSec Max, No Bounces 10mS After Initial Make or Break	D-MS	PVA	T	12 (1-12)	D	12/3/05	12/5/05				Did not meet Requirements	Test performed on 11 Devices. Contact Bounces were observed after 3x life: DUT#3 showed bounces on ORC circuit at -40C. DUT#5 showed bounces on ORC circuit at -40C. DUT# 6 showed bounces on ORC circuit at -40C. DUT#8 showed bounces on ORC circuit at -40C. DUT#9 showed bounces on ORC circuit at -40C. DUT#12 showed bounces on ORC circuit at -40C.	
36	12450250	CTS: Discrete Logic Ignition Switch	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	10	D	11/1/05	11/1/05				Met Requirements		
37	12450250	CTS: Discrete Logic Ignition Switch	3.2.1.7.1	Short Circuit Requirement		Switch must be able to sustain a short circuit condition	D-MS	PVA	T	10	D	11/2/05	11/16/05				Met Requirements	3 Devices were submitted to test as per spec conditions. 7 remaining devices were tested with experimental purposes in order to determine the maximum current supported by the switch.	

DELPHI CONFIDENTIAL

SC-000407

SECTION I --- COMMODITY DESCRIPTION				SECTION II A --- SUPPLIER INFORMATION			
PART #	10392423 (D-MS #741-79232)	MODEL YEAR*	2005	SUPPLIER NAME*	Delphi Mechatronic Systems		
PART NAME*	GM DELTA IGNITION SWITCH	PLATFORM*		SUPPLIER CONTACT*	George Lin		
UPC #	972251 (D-MS Program Tracking Number)	MODEL #		SUPPLIER CONTACT PHONE NUMBER*	[REDACTED]		
REVISION DATE / LEVEL*				SUPPLIER CONTACT E-MAIL ADDRESS*	[REDACTED]		

SECTION II B --- GM CONTACT INFORMATION/APPROVAL				DATE: Rev. 3 12/19/05			
GM VALIDATION ENGINEER*				GM DESIGN/LEAD ENGINEER* Raymond DeGiorgio			
PHONE NUMBER*				PHONE NUMBER*			

SECTION III -- ADV PLAN SUMMARY														SEC IV -- ADV REPORT			NOTES	
ITEM #	PROCEDURE #	PROCEDURE TITLE	REQMNT #	REQMT TITLE	REGULATORY	REQMT VALUE	RESPONSIBILITY	EVALUATION		SAMPLE		TIMING		SAMPLES TESTED				RESULTS
								PHASE	METHOD	QTY	TYPE	START	COMPL	QTY	TYPE	STAGE		
38	12450250	CTS: Discrete Logic Ignition Switch	5.6	Simple Function Check		Correct Circuit Electrical States in All Switch Positions	D-MS	PVA	T	10	D	11/17/05	11/17/05				Did Not meet Requirements	<p>Note: Devices were affected due to the destructive characteristics of the experimental test performed on item 37 and some of them did not meet the Simple Function Test requirements.</p> <p>DUT# 13, 14 and 15 were submitted to Short Circuit Requirement test as per CTS 12450250 Sec. 3.2.1.7.1 . None of the devices met the Function Check requirements.</p> <p>On the experimental test the following devices did not meet the Simple Function Check Test requirements :</p> <p>DUT#21: Damage on Run/Crank circuit @ 7 Amps. DUT#24: Damage on Run/Crank circuit @ 7 Amps. DUT#22: Damage on Key In circuit @ 7 Amps. DUT#23: Damage on Run/Crank circuit @ 7.5 Amps. DUT#25: Damage on Run/Crank circuit @ 8 Amps.</p>

DELPHI CONFIDENTIAL

SC-000408

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/20/2005 Qty tested 12
 Part Name GM Delta Ignition Switch DELPHI Part Number 741-79232 Specification 12450250
 Spec section (number & name) Sec. 3.2.1.6 Isolation Resistance

Measurement units Attribute Acceptable limits See first two rows for acceptable limits.

Accepted (Yes/No) Yes Temp 25°C RH 46%

Evaluated by J.Martinez Shift 1st.

Equipment description	Calibration ID
HY-POT	E-2343
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS

DUT #	B+ RUN/CRANK (Pin 2-3)	B+ Accessory (2-4)	B+ KEY-IN (2-5)	±5V OFF/RUN/CRACK (6 5)													
	Hi Lim	N/A	N/A	N/A	N/A												
Lo Lim	20MΩ	20MΩ	20MΩ	20MΩ													
1	OK	OK	OK	OK													
2	OK	OK	OK	OK													
3	OK	OK	OK	OK													
4	OK	OK	OK	OK													
5	OK	OK	OK	OK													
6	OK	OK	OK	OK													
7	OK	OK	OK	OK													
8	OK	OK	OK	OK													
9	OK	OK	OK	OK													
10	OK	OK	OK	OK													
11	OK	OK	OK	OK													
12	OK	OK	OK	OK													

Comments Initial Parametrics

Note: The isolation resistance of all circuits shall be greater than 20MΩ for isolation resistance

SC-000409

DELPHI CONFIDENTIAL

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/20/2005 Qty tested 12
 Part Name GM Delta Ignition Switch DELPHI Part Number 741-79232 Specification 12450250

Spec section (number & name) Sec. 3.2.1.3- Voltage Drop

Measurement units Volts Acceptable limits The voltage drop on all low current switches (>3.0 mA) ia not to exceed 350 mV .

Accepted (Yes/No) Yes Temp 25°C RH 46%

Evaluated by J.Martinez Shift 1st.

Equipment description	Calibration ID
Multimeter	MULT-2041
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS													
DUT #	ACC (V)	RUN/CRANK (V)	KEY-IN (V)	OFF/RUN/CRANK (V)									
Hi Lim	0.350	0.350	0.350	0.350									
Lo Lim	0	0	0	0									
1	0.097	0.135	0.00027	0.00009									
2	0.090	0.132	0.00028	0.00010									
3	0.090	0.135	0.00029	0.00009									
4	0.090	0.133	0.00029	0.00009									
5	0.088	0.132	0.00028	0.00009									
6	0.089	0.134	0.00028	0.00010									
7	0.089	0.135	0.00029	0.00009									
8	0.089	0.135	0.00029	0.00009									
9	0.089	0.133	0.00030	0.00009									
10	0.089	0.134	0.00029	0.00009									
11	0.089	0.133	0.00030	0.00009									
12	0.099	0.136	0.00031	0.00009									

Comments Initial Parametrics

SC-000410

DELPHI CONFIDENTIAL

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/20/2005 Qty tested 12
 Part Name GM Delta Ignition Switch DELPHI Part Number 741-79232 Specification 12450250
 Spec section (number & name) Sec. 3.2.1.5.- Open Circuit Resistance

Measurement units Attribute Acceptable limits See first two rows for acceptable limits.

Accepted (Yes/No) Yes Temp 25°C RH 46%

Evaluated by J.Martinez Shift 1st.

Equipment description	Calibration ID
HY-POT	E-2343
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS

DUT #	B+ RUN/CRANK (Pin 2-3)	B+ Accessory (2-4)	B+ KEY-IN 5)	±5V OFF/RUN/CRACK (2 5) (6)														
Hi Lim	-----	-----	-----	-----														
Lo Lim	20MΩ	20MΩ	20MΩ	20MΩ														
1	OK	OK	OK	OK														
2	OK	OK	OK	OK														
3	OK	OK	OK	OK														
4	OK	OK	OK	OK														
5	OK	OK	OK	OK														
6	OK	OK	OK	OK														
7	OK	OK	OK	OK														
8	OK	OK	OK	OK														
9	OK	OK	OK	OK														
10	OK	OK	OK	OK														
11	OK	OK	OK	OK														
12	OK	OK	OK	OK														

Comments Initial Parametrics

Note :The open circuit resistance of all circuits shall be grater than 20 MΩ

SC-000411

DELPHI CONFIDENTIAL

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/21/2005 Qty tested 12
 Part Name GM Delta Ignition Switch DELPHI Part Number 741-79232 Specification 12450250

Spec section (number & name) Sec. 3.2.1.4.- Contact Resistance

Measurement units Ohm(Ω) Acceptable limits Contact resistance on all logic level switches (< 3.0 mA) is not to exceed 100 mOhms at the rated current.

Accepted (Yes/No) Yes Temp 26° C RH 45%

Evaluated by J.Martinez Shift 1st

Equipment description	Calibration ID
Multimeter	MULT-2214
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS

DUT #	ACC (Ω)	RUN/CRANK (Ω)	KEY-IN (Ω)	OFF/RUN/CRANK (Ω)	R2 (300Ω-9KΩ)													
Hi Lim	0.100	0.100	0.100	0.100	REF													
Lo Lim	N/A	N/A	N/A	N/A	REF													
1	0.0486	0.0586	0.0715	0.0371	2420													
2	0.0467	0.0562	0.0702	0.0407	372													
3	0.0454	0.0576	0.0712	0.0383	373													
4	0.0468	0.0585	0.0748	0.0384	373													
5	0.0467	0.0574	0.0768	0.0388	2420													
6	0.0499	0.0573	0.0749	0.0391	373													
7	0.0486	0.0568	0.0750	0.0378	373													
8	0.0462	0.0579	0.0734	0.0397	373													
9	0.0467	0.0577	0.0723	0.0399	373													
10	0.0466	0.0565	0.0721	0.0412	2420													
11	0.0440	0.0554	0.0727	0.0392	372													
12	0.0481	0.0577	0.0738	0.0387	373													

Comments Initial Parametrics

SC-000412

DELPHI CONFIDENTIAL

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/21/2005 Qty tested 12
 Part Name GM Delta Ignition Sw DELPHI Part Number 741-79232 Specification 12450250
 Spec section (number & name) Sec. 5.6. Simple Function Check

Measurement units Attribute Acceptable limits Correct circuit electrical states in all switch positions when tested

Accepted (Yes/No) Yes Temp 26° C RH 45%

Evaluated by J.Martinez Shift 1st

Equipment description	Calibration ID
Multimeter	MULT-2041
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS

DUT #	OFF Lock (KEY-IN)	ACC DETENT (Acc)	RUN DETENT (Acc)	RUN DETENT (Run/Crank)	RUN DETENT (Off/Run/Crank)	START (Off/Run/Crank)	START (Run/Crank)										
1	OK	OK	OK	OK	OK	OK	OK										
2	OK	OK	OK	OK	OK	OK	OK										
3	OK	OK	OK	OK	OK	OK	OK										
4	OK	OK	OK	OK	OK	OK	OK										
5	OK	OK	OK	OK	OK	OK	OK										
6	OK	OK	OK	OK	OK	OK	OK										
7	OK	OK	OK	OK	OK	OK	OK										
8	OK	OK	OK	OK	OK	OK	OK										
9	OK	OK	OK	OK	OK	OK	OK										
10	OK	OK	OK	OK	OK	OK	OK										
11	OK	OK	OK	OK	OK	OK	OK										
12	OK	OK	OK	OK	OK	OK	OK										

Comments Initial Parametrics

SC-000413

DELPHI CONFIDENTIAL

QA LAB TEST RESULTS (REGISTRO DE DATOS DE PRUEBAS DE QA)

Test number C005-177 Type of Test DV PV RV SP CC Date tested 10/20/2005 Qty tested 12
 Part Name GM Delta Ignition Switch DELPHI Part Number 741-79232 Specification 12450250
 Spec section (number & name) Sec. 3.2.2.3 Torque & Angle

Measurement units Deg(°),Ncm Acceptable limits See first two rows for acceptable limits.

Accepted (Yes/No) No Temp 25°C RH 46%

Evaluated by J.Martinez Shift 1st.

Equipment description	Calibration ID
END OF LINE	TT-01617
Thermo-Hygrometer	THY-2032
N/A	N/A

PARAMETERS

DUT #	ACC MAKE (DEG)	ACC BREAK (DEG)	RUN CRANK MAKE (DEG)	KEY IN BREAK (DEG)	ORC MAKE (DEG)	ACC DETENT (-25°DEG)	RUN DETENT (0°DEG NOM)	TOTAL TRAVEL (40°DEG NOM)	PEAK FORCE RUN (NCM)	FORCE TO START (NCM)	RETURN FORCE FROM START (NCM)						
Hi Lim	-39.0	27.0	-5.0	-32.0	-11.0	REF	REF	REF	REF	REF	N/A						
Lo Lim	-45.0	21.0	-12.0	-38.0	-17.0	REF	REF	REF	REF	REF	15.0						
1	-45.3	20.3	-11.5	-37.7	-15.4	-24.7	-1.0	39.9	15.261	59.690	35.260						
2	-44.9	20.4	-11.5	-37.3	-14.5	-25.2	-0.8	40.0	16.117	60.109	36.780						
3	-43.6	21.8	-10.9	-36.8	-13.9	-25.4	-0.9	39.9	16.642	60.317	35.182						
4	-43.4	21.5	-11.0	-36.5	-14.1	-24.9	-1.2	40.0	15.964	58.905	35.436						
5	-42.6	22.7	-9.9	-35.8	-13.0	-25.1	-0.8	39.9	16.178	61.958	34.754						
6	-45.4	19.5	-12.3	-38.6	-15.5	-25.5	-1.0	40.0	15.339	59.439	36.463						
7	-44.2	21.1	-10.8	-37.4	-15.4	-25.3	-1.0	39.9	15.511	60.002	35.458						
8	-43.4	21.9	-10.8	-36.6	-13.8	-25.2	-0.9	39.9	16.496	60.498	36.814						
9	-44.0	21.3	-10.5	-36.5	-14.3	-25.1	-1.4	40.0	16.273	59.150	35.143						
10	-45.1	20.3	-12.3	-38.3	-15.4	-25.3	-0.8	40.0	16.509	62.639	37.269						
11	-43.4	22.2	-10.6	-35.7	-13.6	-25.0	-1.5	39.9	16.080	58.656	35.612						
12	-43.3	21.1	-10.5	-36.4	-14.3	-24.9	-1.3	40.0	16.481	58.918	35.358						

Comments Initial Parametrics

Note: Results were obtained from EOLT, this equipment only takes measurement from Off to Start position but not backward (Start to Off).

SC-000414

DELPHI CONFIDENTIAL