

DP14-004

CHRYSLER

11/25/2015

ENCLOSURE 8

AND

9 PAGE 22

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ENCLOSURE 8

68217404AA_2D PUBLIC

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68217405AA_2D PUBLIC

ENTIRE PAGE CONFIDENTIAL

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ENCLOSURE 8

Documents Submitted with
Confidentiality Request
PUBLIC

Eleven Reports, five Spreadsheets and one Presentation have been submitted to the National Highway Transportation Safety Administration Office of Chief Counsel with a Request for Confidential Treatment

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ENCLOSURE 8

Returned Part Analysis
Summary PUBLIC

REDACTED

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11/25/2015

ENCLOSURE 8

TIPM 7C - Fuel Pump Circuit
schematic PUBLIC

REDACTED

DP14-004

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11/25/2015

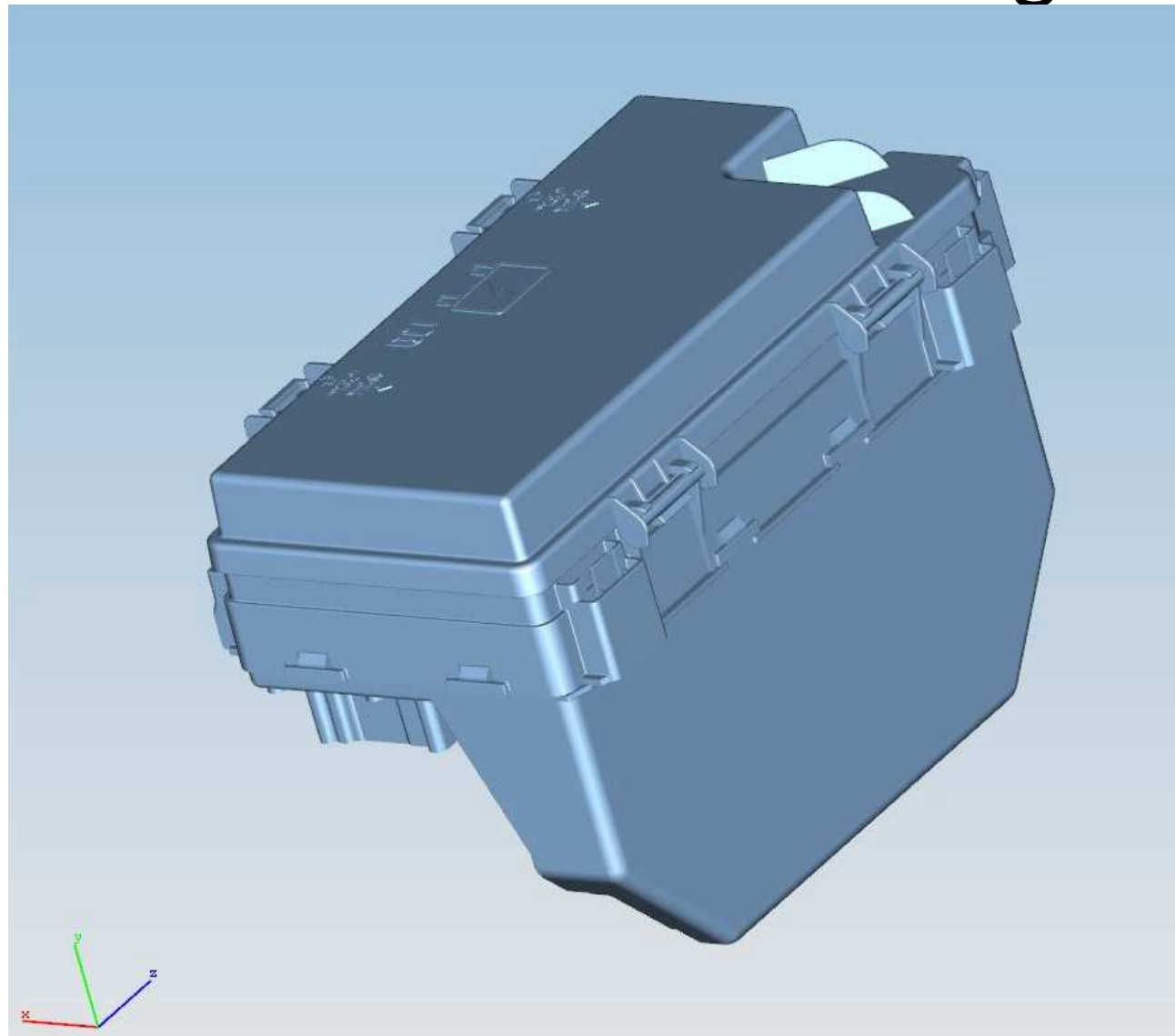
ENCLOSURE 8

TIPM7 - Exterior CAD

PUBLIC

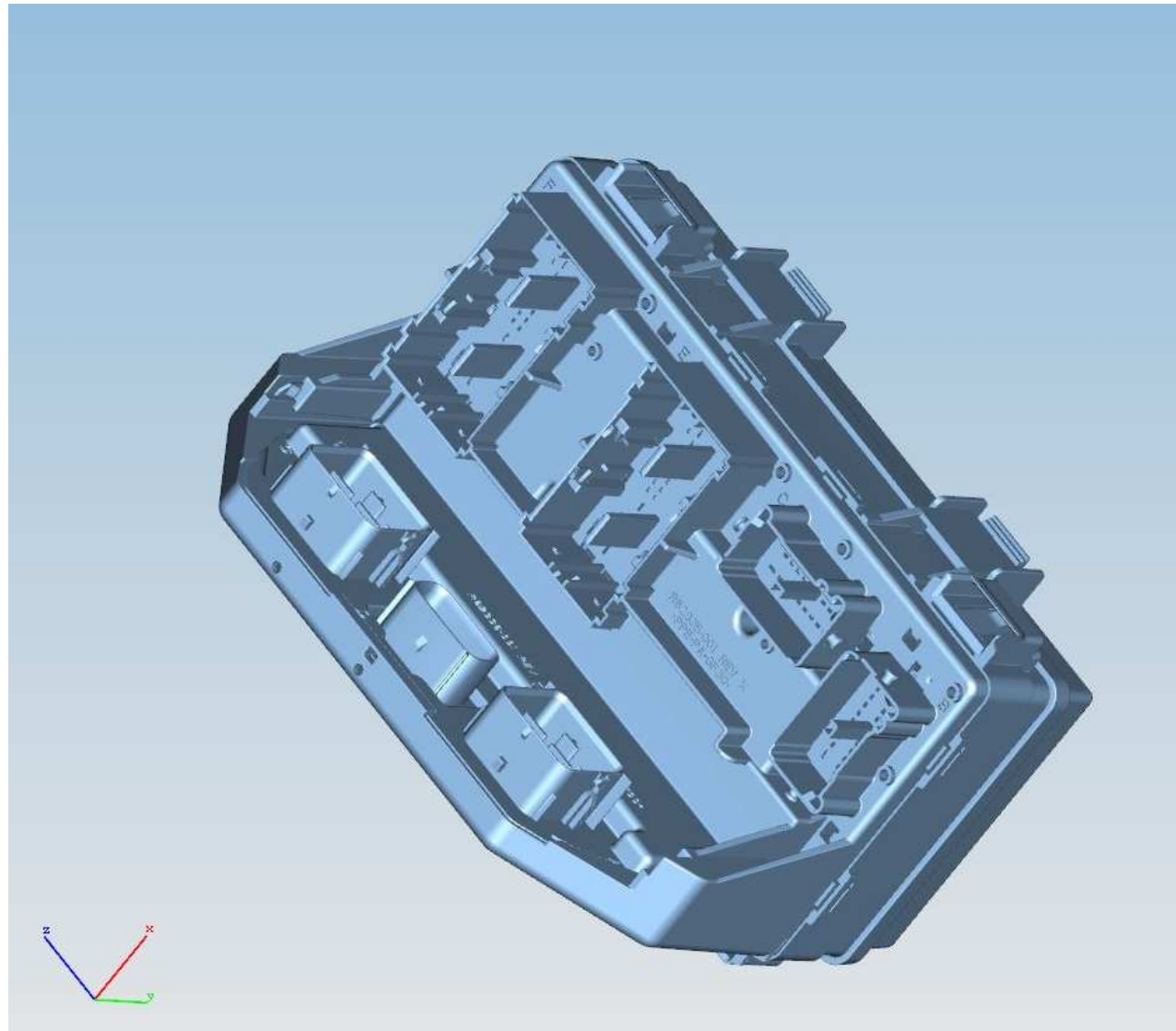
TIPM-7

Exterior CAD rendering



TIPM-7

Exterior CAD rendering



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ENCLOSURE 8

TIPM7S_Fuel_Pump_Relay_M
ission_Profile_revF PUBLIC

REDACTED

REDACTED

REDACTED

REDACTED

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REDACTED

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ENCLOSURE 9

2011 TIPM7 Relay - Narrative

Data Analysis - 4-3-2014

PUBLIC



2011 MY TIPM7

WK, WD, RT, JK DS/DJ

4/3/2014

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

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11/25/2015

ENCLOSURE 9

2011 2013 11 22 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Friday, November 22, 2013 3:26 PM
To: Christopher Pare
Cc: Dennis Gauthier; Simon Kissonergis; Carlos.Munoz-Valadez@continental-corporation.com; Scott.Lucy@continental-corporation.com; Saji John; Satnam Bansal; Robert Samko Jr.
Subject: Re: Presentation
Attachments: Chrysler Fuel Pump Relay Overview 112213.pptx

Chris,

Sure, no problem.

REDACTED

Thank you

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: 248 821 1753
Email: Mark.Cornell@continental-corporation.com

From: Christopher Pare <christopher.pare@chrysler.com>
To: "Mark.Cornell@continental-corporation.com" <Mark.Cornell@continental-corporation.com>,
Cc: Dennis Gauthier <drg15@chrysler.com>, Simon Kissonergis <sak1@chrysler.com>
Date: 11/22/2013 02:44 PM
Subject: Presentation

Mark, Can you please forward me the presentation from today?

[Christopher A. Paré P.E.](#) | The New Chrysler / QEC | 2021 Executive Hills Blvd.

Manager CST Body Electronics, Active and Passive Safety Systems

Tie-Line: 793-5592 | Outside: +1 (248) 451-5592 | Cell: +1 (810) 543 - 5401

E-mail: christopher.pare@chrysler.com

[Mailing: [800 Chrysler Drive](#) CIMS: 400-00-03 Auburn Hills, MI 48326-2757 USA]

DP14-004

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11/25/2015

ENCLOSURE 9

2014 02 13 CF PUBLIC

From: Chris Freeman
Sent: Thursday, February 13, 2014 10:28 AM
To: Nazmi Sabi; Michael O'Ship; michael.holbrook@asiusa.com; Robert Samko Jr.; Christopher Pare; Dennis Gauthier; Satnam Bansal
Subject: FW: 11WK/WD TIPM7 - Fuel Pump relay
Attachments: TIPM Fuel Pump Relay ABH DOE Results Batch 4 Final 12Feb14.xlsx; TIPM Fuel Pump Relay ABH DOE Results Batch 3 Final_Formatted 12Feb14.xlsx; TIPM Fuel Pump Relay ABH DOE Results Batch 2 Final_Formatted_12Feb14.xlsx; TIPM Fuel Pump ABH DOE Batch 1 Results Final_Formatted 12Feb14.xlsx

Team,
Latest data from Conti DOE.

Thanks.

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems
Regulatory Affairs
Ph: 248-512-4168
Cell: [REDACTED]
E-mail: <mailto:cfreeman@chrysler.com>

From: Scott.Lucy@continental-corporation.com [mailto:Scott.Lucy@continental-corporation.com]
Sent: Wednesday, February 12, 2014 4:05 PM
To: Chris Freeman
Cc: Carlos.Munoz-Valadez@continental-corporation.com; Mark.Cornell@continental-corporation.com
Subject: RE: 11WK/WD TIPM7 - Fuel Pump relay

Hi Chris.

REDACTED

Please let me know if you have any questions/comments.

Regards,
Scott

Best Regards,
Scott Lucy
Principal Staff Hardware Engineer
Interior Body & Security
Continental
4685 Investment Drive
Troy, Michigan 48098
Office Phone (248) 764-6742
Fax Phone (248) 764-7142
Scott.Lucy@continental-corporation.com
www.Continental-Corporation.com

From: Chris Freeman <cfreeman@chrysler.com>
To: "Mark.Cornell@continental-corporation.com" <Mark.Cornell@continental-corporation.com>,
Cc: "Scott.Lucy@continental-corporation.com" <Scott.Lucy@continental-corporation.com>, "Carlos.Munoz-Valadez@continental-corporation.com" <Carlos.Munoz-Valadez@continental-corporation.com>
Date: 02/12/2014 10:19 AM
Subject: RE: 11WK/WD TIPM7 - Fuel Pump relay

Thank you very much.

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems

Regulatory Affairs

Ph: 248-512-4168

Cell: [REDACTED]

E-mail: <mailto:cfreeman@chrysler.com>

From: Mark.Cornell@continental-corporation.com [<mailto:Mark.Cornell@continental-corporation.com>]

Sent: Wednesday, February 12, 2014 10:17 AM

To: Chris Freeman

Cc: Scott.Lucy@continental-corporation.com; Carlos.Munoz-Valadez@continental-corporation.com

Subject: RE: 11WK/WD TIPM7 - Fuel Pump relay

Chris,

No problem. Scott is updating the Excel document, once he has it complete, he will provide it.

Thank you

Mark Cornell

Sr. Project Manager

Continental Automotive Systems

4685 Investment Drive

Troy, MI 48098 USA

Phone: 248 764 6876

Cell: [REDACTED]

Email: Mark.Cornell@continental-corporation.com

From: Chris Freeman <cfreeman@chrysler.com>
To: "Mark.Cornell@continental-corporation.com" <Mark.Cornell@continental-corporation.com>,
Date: 02/12/2014 10:13 AM
Subject: RE: 11WK/WD TIPM7 - Fuel Pump relay

Thanks Mark.

REDACTED

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems

Regulatory Affairs

Ph: 248-512-4168

E-mail: mailto:cfreeman@chrysler.com

From: Mark.Cornell@continental-corporation.com [<mailto:Mark.Cornell@continental-corporation.com>]

Sent: Tuesday, February 11, 2014 3:33 PM

To: Chris Freeman

Cc: 'Carlos.Munoz-Valadez@continental-corporation.com'; Christopher Pare; David Bustamante; 'doug@newedgecomponents.com'; Dennis Gauthier; Ed Baranski; Greg Niemiec; Kristin Kolodge; Michael Cuson; michael.clauw@element.com; Michael Holbrook; michael.oship@asiusa.com; Michael O'Ship; Nazmi Sabi; Robert Samko Jr.; Simon Kissonergis; Satnam Bansal; 'Scott.Lucy@continental-corporation.com'; Saji John; 'Steve.Karalis@continental-corporation.com'

Subject: Re: 11WK/WD TIPM7 - Fuel Pump relay

Chris,

REDACTED

Thanks

Mark Cornell

Sr. Project Manager

Continental Automotive Systems

4685 Investment Drive

Troy, MI 48098 USA

Phone: 248 764 6876

Cell: [REDACTED]

Email: Mark.Cornell@continental-corporation.com

From: Chris Freeman <cfreeman@chrysler.com>

To: Dennis Gauthier <drg15@chrysler.com>, Satnam Bansal <sb710@chrysler.com>, David Bustamante <db29@chrysler.com>, "Mark.Cornell@continental-corporation.com" <Mark.Cornell@continental-corporation.com>, "Robert Samko Jr." <rks34@chrysler.com>, Saji John <sj148@chrysler.com>, "Scott.Lucy@continental-corporation.com" <Scott.Lucy@continental-corporation.com>, "Carlos.Munoz-Valadez@continental-corporation.com" <Carlos.Munoz-Valadez@continental-corporation.com>, "Steve.Karalis@continental-corporation.com" <Steve.Karalis@continental-corporation.com>, "doug@newedgecomponents.com" <doug@newedgecomponents.com>, Ed Baranski <EAB36@chrysler.com>, Nazmi Sabi <nam5@chrysler.com>, "Michael O'Ship" <MO461@chrysler.com>, Simon Kissonergis <sak1@chrysler.com>, Greg Niemiec <gcn2@chrysler.com>, Christopher Pare <christopher.pare@chrysler.com>, Michael Cuson <MC1539@chrysler.com>, "Kristin Kolodge" <kis9@chrysler.com>, "michael.oship@asiusa.com" <michael.oship@asiusa.com>, Michael Holbrook <Michael.holbrook@asiusa.com>, "michael.clauw@element.com" <michael.clauw@element.com>,

Date: 02/11/2014 03:21 PM

Subject: 11WK/WD TIPM7 - Fuel Pump relay

Meeting minutes – do not forward

2/11/2014 12pm-1pm

Attendees:

Conti: Mark Cornell, Saji John, Scott Lucy

ASI: Mike Holbrook, Mike O'Ship,

CG: Rob Samko, Greg Niemiec, Nazmi Sabi, Satnam Bansal, Dennis Gauthier, Chris Pare, Chris Freeman,

On the Phone: Steve Karalis (Conti), Ed Baranski (CG Fuel Pumps), Doug Fits (NEC), Mike Clauw (Element)

REDACTED

REDACTED

REDACTED

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems

Regulatory Affairs

Ph: 248-512-4168

Cell: [REDACTED]

E-mail: <mailto:cfreeman@chrysler.com>

DP14-004

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11/25/2015

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2014 02 21 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Friday, February 21, 2014 1:58 PM
To: Chris Freeman
Cc: Carlos.Munoz-Valadez@continental-corporation.com; Christopher Pare; Dennis Gauthier; Ed Baranski; Everardo Torres; 'michael.holbrook@asiusa.com'; michael.oship@asiusa.com; Michael O'Ship; Nazmi Sabi; Robert Samko Jr.; Satnam Bansal; 'Scott.Lucy@continental-corporation.com' (Scott.Lucy@continental-corporation.com); Saji John
Subject: RE: TIPM7 - Fuel Pump Relay workshop
Attachments: Summary TIPM Relay Analysis.xlsx; Test plan_DOE relay K24 022114.xlsx

Chris,

REDACTED

Thank you

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com

From: Chris Freeman <cfreeman@chrysler.com>
To: Dennis Gauthier <drg15@chrysler.com>, Satnam Bansal <sb710@chrysler.com>, "Robert Samko Jr." <rks34@chrysler.com>, Ed Baranski <EAB36@chrysler.com>, "Mark.Cornell@continental-corporation.com" <Mark.Cornell@continental-corporation.com>, "Scott.Lucy@continental-corporation.com" (Scott.Lucy@continental-corporation.com) <Scott.Lucy@continental-corporation.com>, "Carlos.Munoz-Valadez@continental-corporation.com" <Carlos.Munoz-Valadez@continental-corporation.com>,
Cc: Everardo Torres <EFR4@chrysler.com>, "Michael O'Ship" <MO461@chrysler.com>, "michael.holbrook@asiusa.com" <michael.holbrook@asiusa.com>, Nazmi Sabi <nam5@chrysler.com>, Christopher Pare <christopher.pare@chrysler.com>, "michael.oship@asiusa.com" <michael.oship@asiusa.com>, Saji John <sj148@chrysler.com>
Date: 02/21/2014 01:38 PM
Subject: RE: TIPM7 - Fuel Pump Relay workshop

Team,

REDACTED

REDACTED

Thank you.

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems

Regulatory Affairs

Ph: 248-512-4168

Cell: [REDACTED]

E-mail: <mailto:cfreeman@chrysler.com>

From: Chris Freeman

Sent: Wednesday, February 19, 2014 9:12 AM

To: Michael O'Ship; 'michael.holbrook@asiusa.com'; Nazmi Sabi; Dennis Gauthier; Satnam Bansal; Robert Samko Jr.; Christopher Pare; michael.oship@asiusa.com; Ed Baranski; Mark.Cornell@continental-corporation.com; 'Scott.Lucy@continental-corporation.com' (Scott.Lucy@continental-corporation.com); Carlos.Munoz-Valadez@continental-corporation.com; Saji John

Cc: Everardo Torres

Subject: RE: TIPM7 - Fuel Pump Relay workshop

Team,

REDACTED

Please let me now if you have any questions.

Thank you.

Chris Freeman

Product Investigator – Body | Interior | Electrical Systems

Regulatory Affairs

Ph: 248-512-4168

Cell: [REDACTED]

E-mail: <mailto:cfreeman@chrysler.com>

-----Original Appointment-----

From: Chris Freeman

Sent: Friday, February 14, 2014 8:39 AM

To: Chris Freeman; Michael O'Ship; 'michael.holbrook@asiusa.com'; Nazmi Sabi; Dennis Gauthier; Satnam Bansal; Robert Samko Jr.; Christopher Pare; michael.oship@asiusa.com; Ed Baranski; Mark.Cornell@continental-corporation.com; 'Scott.Lucy@continental-corporation.com' (Scott.Lucy@continental-corporation.com); Carlos.Munoz-Valadez@continental-corporation.com; Saji John

Cc: Everardo Torres

Subject: TIPM7 - Fuel Pump Relay workshop

When: Tuesday, February 18, 2014 1:00 PM-4:00 PM (UTC-05:00) Eastern Time (US & Canada).

Where: EE Lab - QEC (2021 Executive Hills)

[Join online meeting](#)

REDACTED

[First online meeting?](#)

[iOC(1033)]

Placeholder – need requested data from NEC to support the meeting.

DP14-004

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11/25/2015

ENCLOSURE 9

2014 04 09 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Wednesday, April 09, 2014 12:45 PM
To: Robert Samko Jr.; Satnam Bansal; Adam Brackmann; Dennis Gauthier; Christopher Pare; Chris Freeman; Nazmi Sabi
Cc: Scott.Lucy@continental-corporation.com; Carlos.Munoz-Valadez@continental-corporation.com; Saji John; Steve.Karalis@continental-corporation.com
Subject: Continental Tear down report for the first 5 relays
Attachments: 00243-14 version 1 .pdf

All,

REDACTED

Thank you

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com

DP14-004

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11/25/2015

ENCLOSURE 9

2014 04 10 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Thursday, April 10, 2014 10:04 AM
To: Dennis Gauthier; Christopher Pare; Adam Brackmann; Satnam Bansal; Robert Samko Jr.; Nazmi Sabi; Carlos.Munoz-Valadez@continental-corporation.com; Scott.Lucy@continental-corporation.com; Saii John; Steve.Karalis@continental-corporation.com
Subject: REDACTED
Attachments: 00271-14 version 1 .pdf

All,

REDACTED

Thank you

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com

DP14-004

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11/25/2015

ENCLOSURE 9

2014 05 29 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Thursday, May 29, 2014 5:02 PM
To: Robert Samko Jr.; Adam Brackmann; Dennis Gauthier
Cc: Scott.Lucy@continental-corporation.com
Subject: report 00388-14
Attachments: 00388-14 version 1 .pdf

REDACTED

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com
----- Forwarded by Mark Cornell/usr/cag on 05/29/2014 04:59 PM -----

From: Carl Bloomer/dp/na/au/cag
To: Carlos Munoz-Valadez/usr/cag@conti07,
Cc: Mark Cornell/usr/cag@conti07
Date: 05/20/2014 03:48 PM
Subject: report 00388-14

six preconditioning parts

DP14-004

CHRYSLER

11/25/2015

ENCLOSURE 9

2014 07 08 DG PUBLIC

From: Dennis Gauthier
Sent: Tuesday, July 08, 2014 3:01 PM
To: Dennis Craggs; Robert Samko Jr.
Subject: RE: TIPM Starter Contacts
Attachments: WK WD Fuel Pump Relay PA Worksheet 051214.xls

Dennis,

PA attached.

Regards,

Dennis Gauthier

CST Body Electronics Master Blackbelt
Department 8173 - CIMS 400-00-03 - Email drg15@chrysler.com
O/L (248)451.5629 - T/L 793.5629 - Cell (248) 613.9756

From: Dennis Craggs
Sent: Tuesday, July 08, 2014 10:20 AM
To: Robert Samko Jr.; Dennis Gauthier
Subject: TIPM Starter Contacts

I need some background information:

REDACTED

Dennis Craggs, BSMe, MSMe, MS Operations Research, PE, CQE, CRE
Chrysler LLC, Corporate Quality, Duty Cycle Group
248-576-8653

DP14-004

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11/25/2015

ENCLOSURE 9

2014 09 03 MC PUBLIC

From: Mark.Cornell@continental-corporation.com
Sent: Wednesday, September 03, 2014 11:31 AM
To: Adam Brackmann; Robert Samko Jr.; Chris Freeman; Dennis Gauthier; David Bustamante
Cc: Carlos.Munoz-Valadez@continental-corporation.com; Scott.Lucy@continental-corporation.com; michael.baibak@continental-corporation.com; Thomas.Schaffer@continental-corporation.com; annette.pohlman@continental-corporation.com; Tammy.Fanning@conti-na.com
Subject: report 00580-14 (resend)
Attachments: 00538-14 version 1 .pdf; 00580-14 version 1 .pdf

Adam,

I received a failure to delivery notice due to the size of this email. I am going to breakout the November report and send it in a separate email.

Thank you

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com
----- Forwarded by Mark Cornell/usr/cag on 09/03/2014 11:29 AM -----

From: Mark Cornell/usr/cag
To: "Adam Brackmann" <AB1272@chrysler.com>, rks34@chrysler.com, cfreeman@chrysler.com, drg15@chrysler.com, db29@chrysler.com,
Cc: Carlos Munoz-Valadez/usr/cag@conti07, Scott Lucy/usr/cag@conti07, Michael Baibak/dp/na/au/cag@CONTI07, Thomas Schaffer/usr/cag@conti07, Annette Pohlman/dp/na/au/cag@CONTI07, Tammy Fanning/ti3/ti/cag@conti03
Date: 09/03/2014 11:27 AM
Subject: report 00580-14 (resend)

Adam,

Per Dave's request from the meeting this morning. Please review the attached files below. They are our tear down analysis reports of the test samples Chrysler provided from your relay testing from May 2014 - August 2014.

REDACTED

I am available this afternoon except from 3:30PM - 5:00PM. If you wish to revist these reports, please let me know.

Thank you

Mark Cornell
Sr. Project Manager

Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com

----- Forwarded by Mark Cornell/usr/cag on 09/03/2014 10:30 AM -----

From: Mark Cornell/usr/cag
To: drq15@chrysler.com, rks34@chrysler.com, "Adam Brackmann" <AB1272@chrysler.com>, "Saji John" <sj148@chrysler.com>, Carlos Munoz-Valadez/usr/cag@conti07, Scott Lucy/usr/cag@conti07,
Date: 08/18/2014 03:33 PM
Subject: report 00580-14

Dennis.

REDACTED

Thanks

Mark Cornell
Sr. Project Manager
Continental Automotive Systems
4685 Investment Drive
Troy, MI 48098 USA
Phone: 248 764 6876
Cell: [REDACTED]
Email: Mark.Cornell@continental-corporation.com

DP14-004

CHRYSLER

11/25/2015

ENCLOSURE 9

2014 10 27 SG PUBLIC

From: Shulke Gerald (FCA)
Sent: Monday, October 27, 2014 5:28 PM
To: Samko Jr. Robert (FCA)
Subject: TIPM Report
Attachments: RO_148452mr.pdf

Robert,

REDACTED

Gerry Shulke
Head of the Materials Characterization Labs
Fiat Chrysler Automobiles
(248) 512-4832
[REDACTED]

DP14-004

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11/25/2015

ENCLOSURE 9

Chrysler Relay Test Status -
July 2014 PUBLIC



TIPM7S Fuel Pump Relay Test Status Reliability Analysis

Dennis Craggs
7/22/2014



REDACTED

REDACTED

REDACTED

REDACTED

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11/25/2015

ENCLOSURE 9

Conditions pareto PUBLIC

REDACTED

REDACTED

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11/25/2015

ENCLOSURE 9

Documents Submitted with
Confidentiality Request
PUBLIC

Eleven Reports, five Spreadsheets and one Presentation have been submitted to the National Highway Transportation Safety Administration Office of Chief Counsel with a Request for Confidential Treatment

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11/25/2015

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Fuel pump durability - remote
start PUBLIC

REDACTED

REDACTED

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ENCLOSURE 9

relay_ex1_ex2_e PUBLIC

AUTOMOTIVE RELAYS
EX2/EX1 SERIES**DESCRIPTION**

The new NEC EX2/EX1 series is PC-board mount type and the most suitable for various motor and heater controls in the automobiles which require high quality and high performance.

The EX2 series is succeeding in about 60% of miniaturization in comparison with the ET2 series. The EX1 series is succeeding in about 50% of miniaturization in comparison with the ET1 series.

FEATURES

- PC-board mounting
- Lead free solder is used
- Approx. 75% relay volume of ET2
- Approx. 60% relay space of ET2
- Approx. 88% relay weight of ET2
- Approx. 65% relay volume of ET1
- Approx. 50% relay space of ET1
- Approx. 78% relay weight of ET1

APPLICATIONS

- Motor control
- Solenoid control



EX2 SERIES



EX1 SERIES

For Proper Use of Miniature Relays**DO NOT EXCEED MAXIMUM RATING**

Do not use relay under excessive conditions such as over ambient temperature, over voltage and over current. Incorrect use could result in abnormal heating and damage to the relay or other parts.

READ CAUTIONS IN THE SELECTION GUIDE

Read the cautions described in NEC's "Miniature Relays" (ER0046EJ*) before dose designing your relay applications.

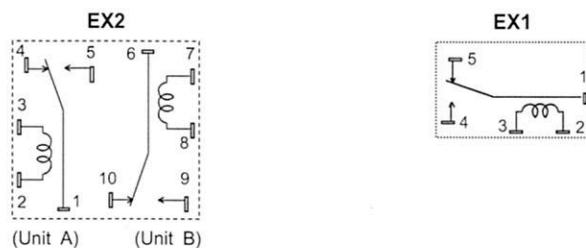
The information in this document is subject to change without notice.

© NEC/TOKIN Corporation 2006

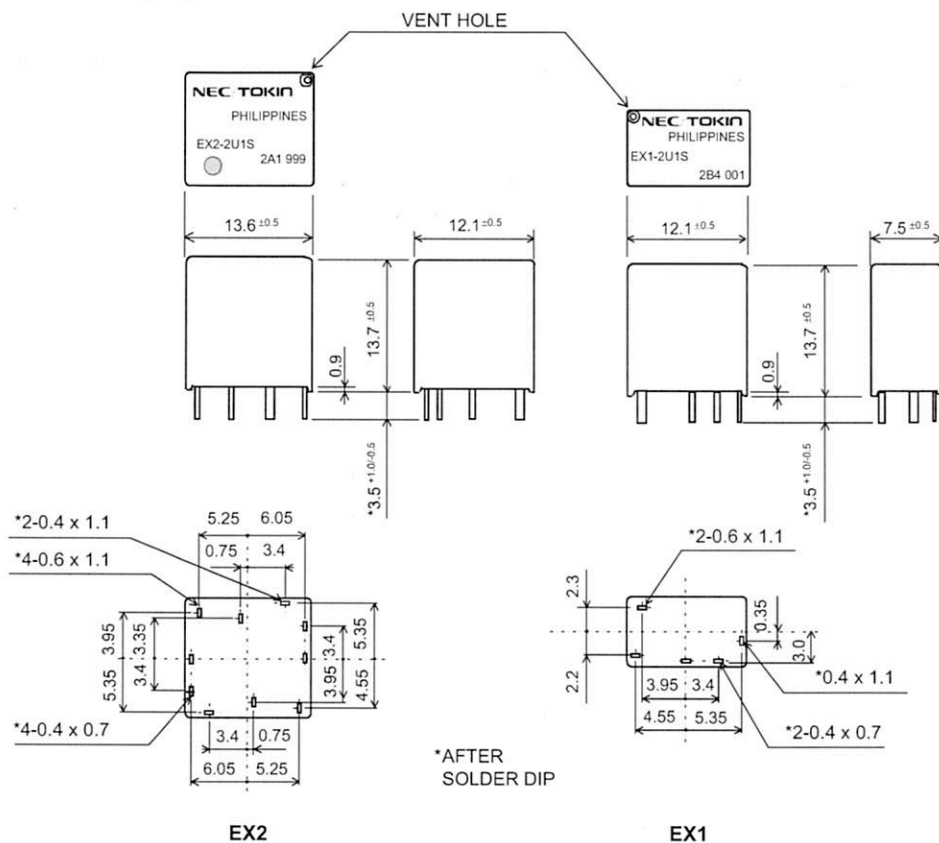


- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact NEC Tokin for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

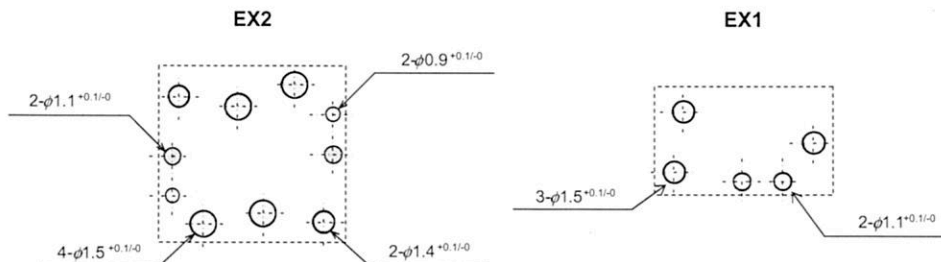
SCHEMATIC (BOTTOM VIEW)



DIMENSIONS [mm]



PCB PAD LAYOUT [mm] (BOTTOM VIEW)



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact NEC Tokin for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

SPECIFICATION

(at 20 °C)

(at 20 °C)

Items			Specifications	
			EX2	EX1
Contact Form			1c x 2 (Separate)	1c
Contact Rating	Max. Switching Voltage		16Vdc	
	Max. Switching Current		30A (at16Vdc)	
	Min. Switching Current		1A (5Vdc)	
	Max. Carrying Current		35A (2minutes max. 12Vdc at 25°C) 30A (2minutes max. 12Vdc at 85°C) 20A (2minutes max. 12Vdc at 125°C)	
	Contact Resistance		4mΩ typical (measured at 7A) initial	
Contact Material			Silver oxide complex alloy	
Operate Time (Excluding Bounce)			2.5ms typical (at nominal voltage)	
Release Time (Excluding Bounce)			3ms typical (at nominal voltage with diode)	
Nominal Operate Power			900mW	
Insulation Resistance			100MΩ at 500Vdc	
Withstand Voltage	Between Open Contact		500Vac min. (for 1minute)	
	Between Contact and Coil		500Vac min. (for 1minute)	
Shock Resistance	Misoperation		98m/s ²	
	Destructive Failure		980m/s ²	
Vibration Resistance	Misoperation		10 to 300Hz, 43m/s ²	
	Destructive Failure		10 to 500Hz 43m/s ² , 200hour	
Ambient Temperature			-40 to +125 °C	
Coil Temperature Rise			70°C / W (without contact carrying current)	
Life Expectancy	Mechanical		1 x 10 ⁶ operations	
	Electrical	P/W motor lock (14Vdc, 25A)	100x10 ³ operations	
		P/W motor free (14Vdc, 25A/7A)	100x10 ³ operations	
Weight			Approx. 6.4g	Approx. 3.5g

COIL RATING

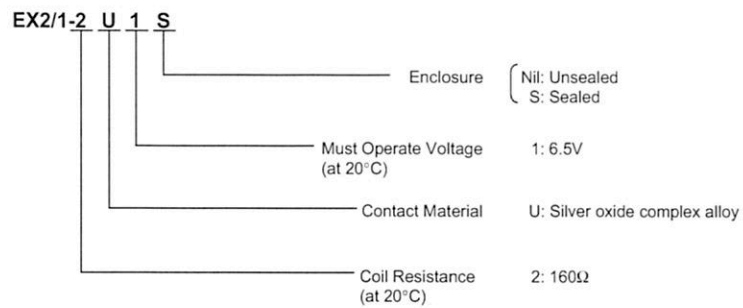
(at 20 °C)

Part Numbers	Nominal Voltage (Vdc)	Coil Resistance (Ω) +/-10%	Must Operate Voltage (Vdc)	Must Release Voltage (Vdc)
EX2/1-2U1S (Sealed type)	12	160	6.5	0.9
EX2/1-2U1 (Unsealed type)	12	160	6.5	0.9



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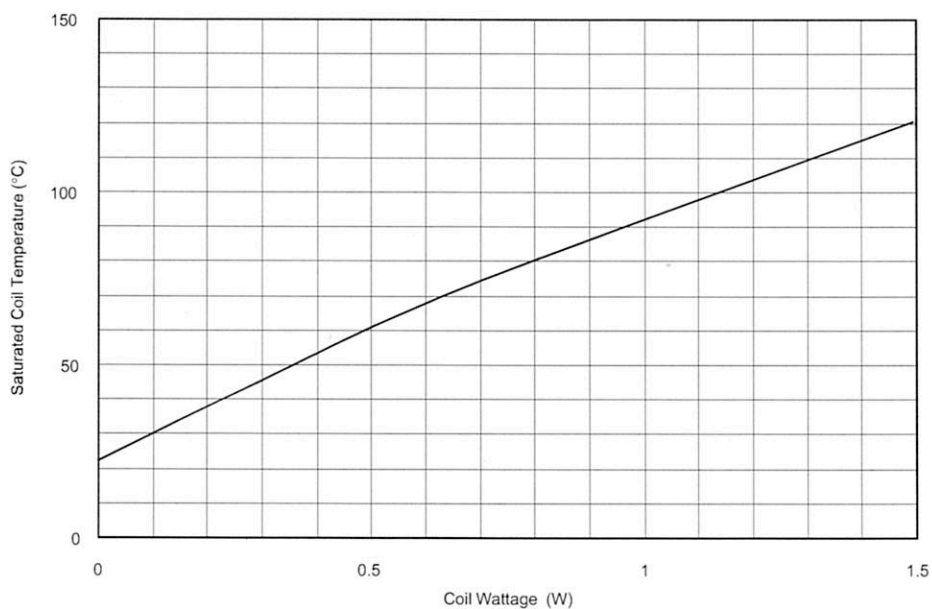
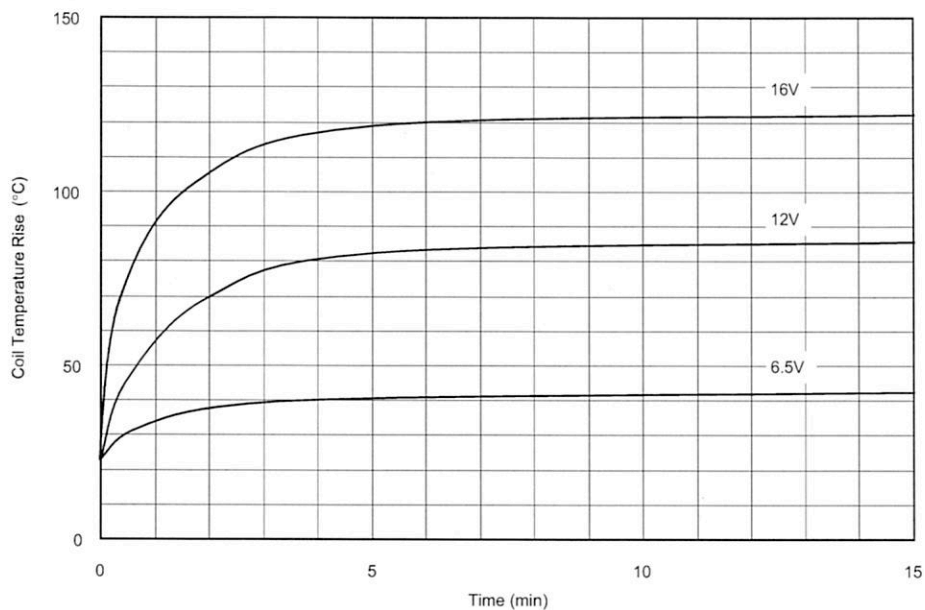
NUMBERING SYSTEM



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TECHNICAL DATA

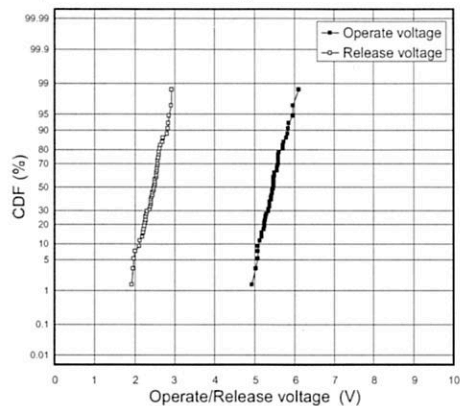
Coil Temperature Rise



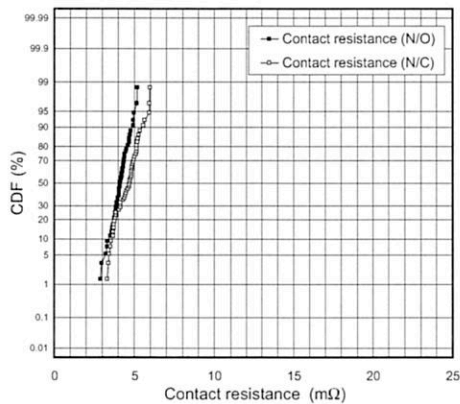
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RELAY CHARACTERISTICS DISTRIBUTION (INITIAL, n = 25 pcs., at 20°C)

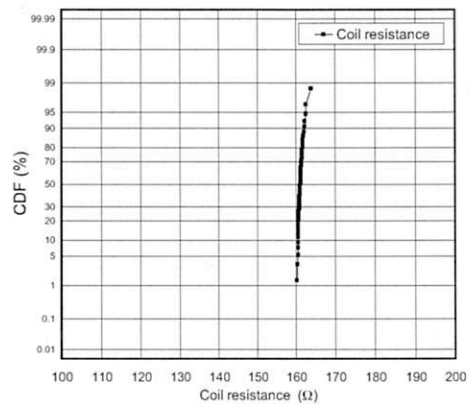
Operate/Release Voltage



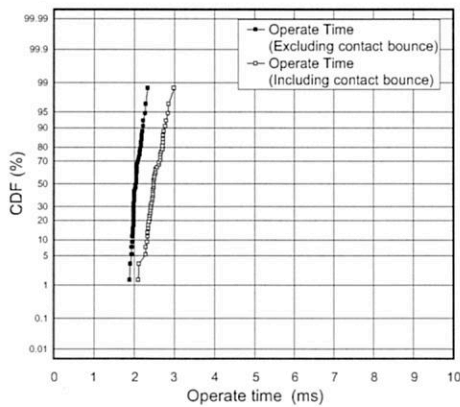
Contact Resistance



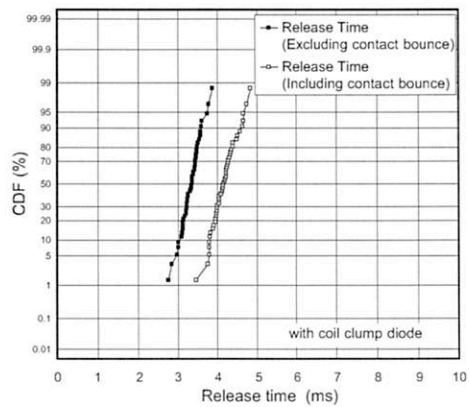
Coil Resistance



Operate Time



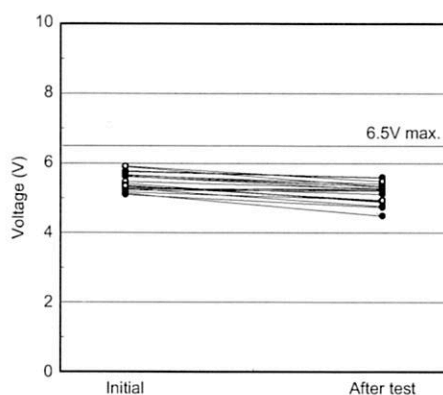
Release Time



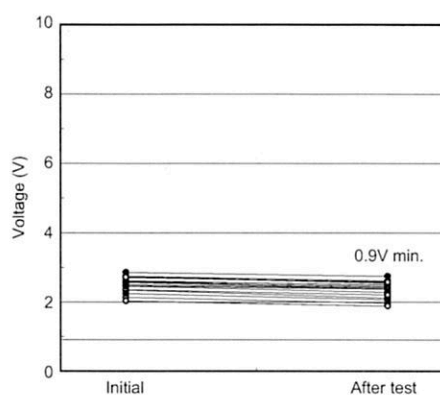
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ELECTRICAL LIFE TEST (14Vdc-25A, P/W motor, Lock)

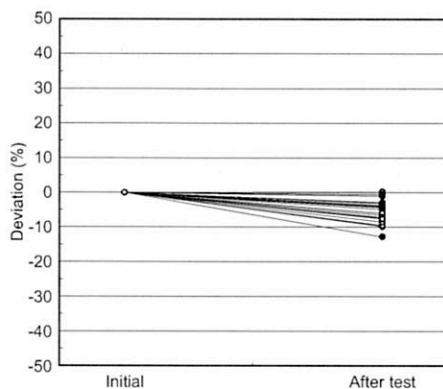
Test items	Test conditions	Samples
1. Operate voltage 2. Release voltage 3. Contact resistance 4. Coil resistance 5. Operate time 6. Release time (with coil clump diode)	Temperature :20°C Frequency :0.2s ON, 9.8s OFF, 0.1Hz Contact load :14Vdc-25A, P/W motor, Lock Number of operations :100 x 10 ³	EX2-2U1S 10 pcs



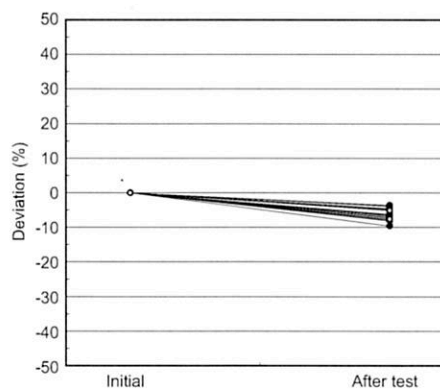
Operate voltage



Release voltage



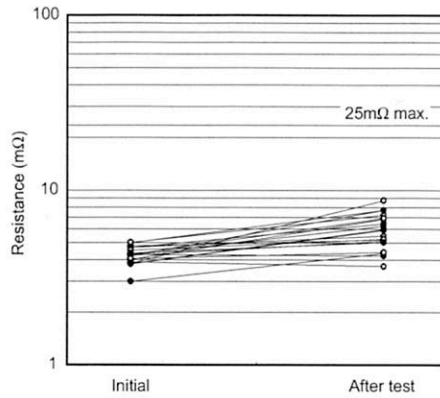
Operate voltage



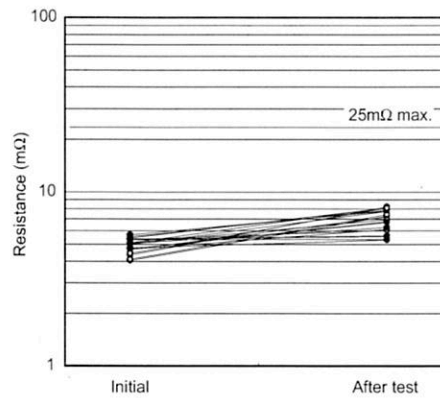
Release voltage



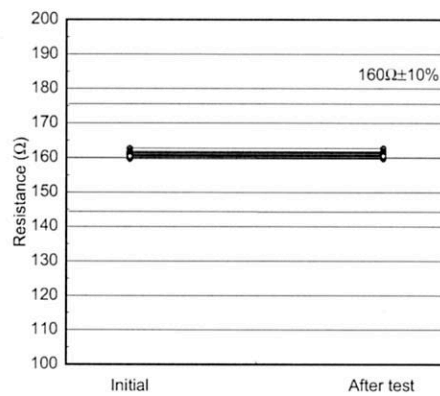
- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact NEC Tokin for updated product data.
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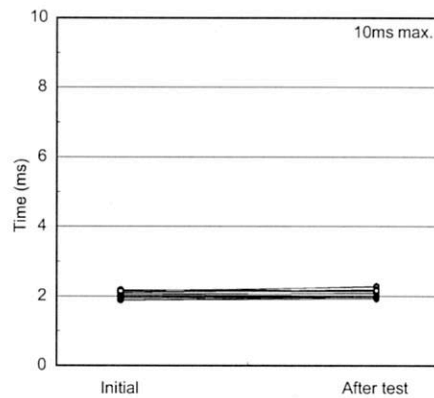
Contact resistance (N/O)



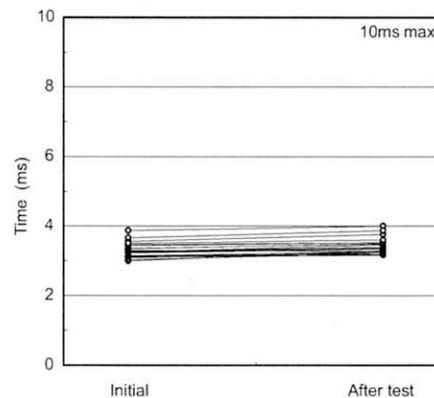
Contact resistance (N/C)



Coil resistance



Operate time



Release time



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DP14-004

CHRYSLER

11/25/2015

ENCLOSURE 9

Summary TIPM Relay Analysis

PUBLIC

REDACTED

REDACTED

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Test flow PUBLIC

REDACTED

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ENCLOSURE 9

Test plan_DOE relay K24

022114 PUBLIC

REDACTED

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ENCLOSURE 9

TIPM fuel pump relay CTC test
setup PUBLIC

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED