PRODUCT ADVISORY NOTICE

KEEPING YOU INFORMED OF PRODUCT CHANGES

To: **All Customers, Sales Representatives and Distributors**

Date: September 15, 2014

Subject: Change to 3rd Generation CAN transceiver

This Product Advisory Notice is to alert you that Grayhill is changing the CAN transceiver used in numerous standard products.

Please forward this notification to the appropriate person(s) in your organization.

Description of Change
Grayhill will be changing products currently using NXP Semiconductor CAN transceiver TJA1050T/VM,118 to the next generation NXP Semiconductor CAN transceiver TJA1051T/CM,118.

Reason for Change
The 2nd generation CAN transceiver manufactured by NXP Semiconductor is at end of life. The 3rd generation part is early in its predicted 10 year life cycle and is fully backwards compatible with the TJA1050T/VM,118.

Grayhill tested the new Gen 3 transceiver TJA1051T/3,118 on representative 3J and 3D32 series products. The validation included tests intended to capture any shortcomings of the Gen 3 part. This consisted of CAN signal level comparison, ESD, and short circuit testing. Grayhill also performed temperature testing at operational extremes of +85C and -40C.

Based on this successful testing, Grayhill is confident the change will not impact product performance.

A test report is available on our website or upon request. For a detailed description of the semiconductor change, refer to NXP Product Line In-Vehicle Networking (PL IVN) Transfer of TJA-1050, dated April 19, 2013.

Effective Date
Grayhill is depleting our LTB of GEN 2 transceivers. Based on typical usage, the change to the new part should occur around November 1, 2014.

Part Numbers Affected

3D32HK-100	3J0005-100N	3J0115-200	3J1015-200N	3J2005-200N
3D32HK-200	3J0005-200	3J0115-200N	3J1105-100	3J2015-100
3D32HKR-100	3J0005-200N	3J1005-100	3J1115-100	3J2015-100N
3D32HKR-200	3J0015-100	3J1005-100N	3J1115-100N	3J2015-200
3D32XK-100	3J0015-100N	3J1005-200	3J1115-200	3J2015-200N
3D32XK-200	3J0015-200	3J1005-200N	3J1115-200N	3J2115-100
3D32XKR-100	3J0015-200N	3J1015-100	3J2005-100	3J2115-100N
3D32XKR-200	3J0115-100	3J1015-100N	3J2005-100N	3J2115-200
3J0005-100	3J0115-100N	3J1015-200	3J2005-200	3J2115-200N

Action Required
No action is required. If you have any questions, please contact your Grayhill, Inc. sales associate.

Grayhill INC.
Intuitive Human Interface Solutions

Device Under Test:
3JYY1015-200

Electrical Test:
Short Circuit,ESD

Environmental Test:
Thermal Cycle

Test Report Number:	**VU19-93**
Test Start Date:	**June 12, 2014**
Test Completion Date:	**August 13, 2014**
Test Facility:	**Grayhill Inc.**
Test Requested By:	**Randy Lipinski**
Test Performed By:	**Lakeiah Johnson** **Laboratory Technician**
Report Written By:	**Lakeiah Johnson** **Laboratory Technician**
Report Approved By:	Nicole J Jachna **Nicole Jachna** **Quality Lab Manager**

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1.0 SHORT CIRCUIT (TJA1051_DV, ISO 16750-2)

Test	Specification	DUT Part Number	DUT Serial Number	Test Location	Test Date
Short Circuit	ISO 16750-2, TJA1051_DV	3JYY1004-1 3J1015-100 3DYY32C-180	1,2,3 006,002,257 278,287,269	Grayhill Inc.	06/12/2014

1.1. PURPOSE

Short Circuit can be caused by electrical insulation chaffing next to metal mechanical components, mis-wiring of electrical harness pins, and technicians shorting power voltage to electrical system components. This test will prove that the Nexgen CAN transceiver can survive and function properly after the Electrical Short Circuits tests to all externally connected wire harness connections.

1.2. TEST SETUP DETAILS

1. Apply 24 VDC to the DUT.
2. Connect circuit outputs to ground one at a time for 60 seconds.
3. Return the DUT to its normal electrical connection.
4. Perform the functional test on the DUT.

Table 1 – Equipment List

Equipment ID	Equipment Type	Model Number	Manufacturer	Calibration Due Date
GT-554	DC Power Supply	GPS-4251	GW Instek	Verified with GT-507
GT-507	Digital Multi-meter	34401A	Agilent	Mar–2015

Table 2 - Test Conditions

Test Condition	Units	Parameters
Quantity	DUT	9
Operational Mode		Powered
Voltage	VDC	24
Test Duration	Seconds	60

1.3. TEST SETUP PHOTOS

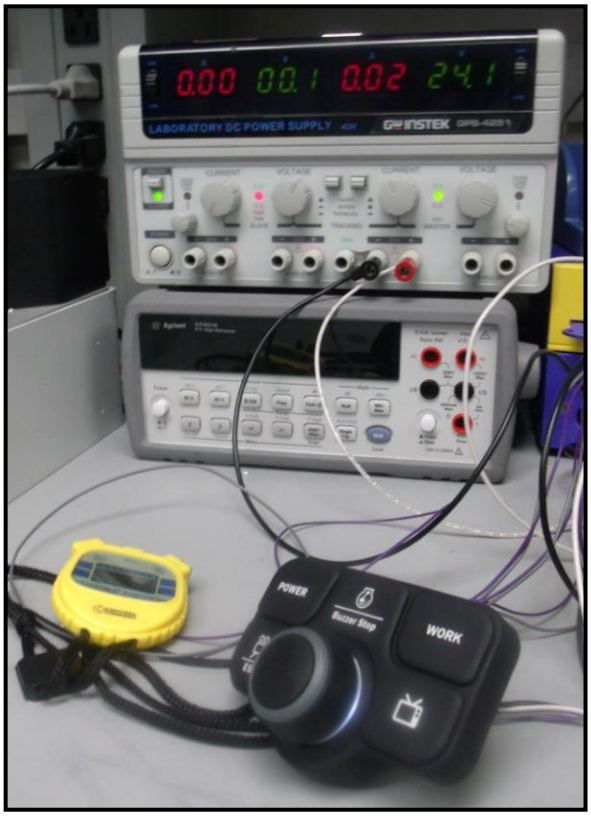

Figure 1 - Test Setup of Doosan

1.4. ACCEPTANCE CRITERIA

Upon completion of the test, the DUT Nexgen CAN transceiver shall operate as intended.

1.5. TEST RESULTS

Table 3 – Test Results

DUT	Part Number	Test	Specification	Pass	Test Location	Test Date
006,002,257	3J1015-100	Short Circuit	ISO 16750-2, TJA1051_DV	PASS	Grayhill Inc.	6/12/2014
278,287,269	3DYY32C-180	Short Circuit	ISO 16750-2, TJA1051_DV	PASS	Grayhill Inc.	6/12/2014
1,2,3	3JYY1004-1	Short Circuit	ISO 16750-2, TJA1051_DV	PASS	Grayhill Inc.	6/12/2014

2.0 THERMAL CYCLE (TJA1051_DV, ISO 16750-4)

Test	Specification	DUT Part Number	DUT Serial Number	Test Location	Test Date
Thermal Cycle	TJA1051_DV, ISO 16750-4	3JYY1004-1 3J1015-100 3DYY32C-180	1,2,3 006,002,257 278,287,269	Grayhill, Inc.	06/16/2014 To 06/23/2014

2.1. PURPOSE

This test is performed to verify that the Nexgen CAN transceiver used in most SSMs, 3Js, CAT paving, etc., is free from manufacturing defects caused by thermally induced stresses, which could occur during intended useful life. This test is intended specifically for assessing thermal coefficient mismatch issues, particularly solder fatigue cracking. Typical environmental effects of this test are fatiguing of materials due to stress created by contraction and expansion of materials. Fatigue issues can occur in solder, solder connections, and PCB traces.

2.2. TEST SETUP DETAILS

1. Visual Inspection of the DUT is to be performed before testing.
2. Perform functional test.
3. Place the DUT inside the chamber.
4. Power up the chamber at the specified temperature.
5. Apply voltage to DUT (shown in Table 5 Test conditions)
6. Continue to cycle the DUT according to the test condition table.
7. Perform Visual inspection of the DUT after completing thermal profile

Table 4 – Equipment List

Equipment ID	Equipment Type	Model Number	Manufacturer	Calibration Due Date
GT-540	ExTech Datalogger	EasyView 15	Extech	Sept–2014
GT-1004	Temperature Chamber	SMS-8-3800	Thermotron	May–2015
GT-13	Digital Multimeter	87III	Fluke	May–2015
GT-501	DC Power Supply	SPS-3610	GW INSTEK	Verified With GT-13

Table 5 - Test Conditions

Test Condition	Units	Parameters
Quantity	DUT	9
Duration of Test	Cycles	30
Operational Mode		Powered
Operational Voltage	DCV	14
Minimum Test Temperature	°C	-40
Maximum Test Temperature	°C	85
Dwell Time	Hours	2
Temperature change rate	°C/min	1

2.3. TEST SETUP PHOTOS

Figure 2–Test setup

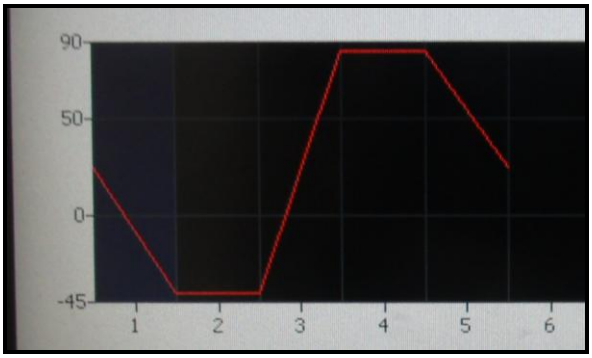

Figure 3 – Temperature profile (one complete cycle)

2.4. ACCEPTANCE CRITERIA

The Nexgen CAN Transceiver shall operate as intended and there shall be no electrical damage done to transceiver.

2.5. TEST RESULTS

Table 6–Test Results

DUT	Part Number	Test	Specification	Pass	Test Location	Test Date
1,2,3	3JYY1004-1	Thermal Cycle	TJA1051_DV, ISO 16750-4	PASS	Grayhill Inc.	06/16/2014 To 06/23/2014
006,002,257	3J1015-100	Thermal Cycle	TJA1051_DV, ISO 16750-4	PASS	Grayhill Inc.	06/16/2014 To 06/23/2014
278,287,269	3DYY32C-180	Thermal Cycle	TJA1051_DV, ISO 16750-4	PASS	Grayhill Inc.	06/16/2014 To 06/23/2014

3.0 ELECTROSTATIC DISCHARGE UNPOWERED (ANSI/ASAE EP455.5.12, JDQ 53.3)

Test	Specification	DUT Part Number	Part Number	Test Location	Test Date
ESD	ANSI/ASAE EP455.5.12 JDQ 53.3	3JYY1004-1 3J1015-100 3DYY32C-180	1,2,3 006,002,257 278,287,269	Grayhill Inc.	07/01/2014 To 07/02/2014

3.1. PURPOSE

Electrostatic discharge may occur from the human body or from nearby objects which has been electrically charged due to friction, airflow or material flow across their surface. The purpose of this test is to expose the Nexgen CAN to Electrostatic Discharges at 8kV or higher using the air discharge method and to Electrostatic Discharges at 8kV or higher using the indirect discharge method. Testing also shall be satisfied at the lower levels. The potential product issue modes and effects detected in this test are:

- Anomalies in performance
- Intermittent operation
- Failure of electrical components

3.2. TEST SETUP DETAILS

1. Visual check.
2. Mount the DUT in the Mounting Orientation specified in the Test Conditions if applicable.
3. Load the discharge network specified in the Test Conditions.
4. Apply the pulse to the DUT in the sequence specified in the Test Conditions.
5. Perform functional check after each voltage level
6. Perform the Visual Check after exposure.

Table 7 – Equipment List

Equipment ID	Equipment Type	Model Number	Manufacturer	Calibration Due Date
GT-361	ESD Generator	NSG 438	Teseq	Dec - 2014
GT-361	Discharge Network 150pF / 330Ω	403-550	Teseq	Dec - 2014
GT-117	DC Power Supply	E3649A	Agilent	Sep-2014
GT-507	Digital Multimeter	34401A	Agilent	May-2014

Table 8 - Test Conditions

Test Condition	Units	Parameters
Quantity	DUT	9
Operational Mode		Unpowered
Temperature	°C	23.3
Humidity	%Rh	24.6
Discharge Network	PF - Ohms	150pF / 2k Ohms
Discharge Location	NA	Front Housing, Keypads, Display, Back Housing Studs, Terminals
Contact Discharge	k Volts	+/-2, +/-4, +/-6, +/-8, +/-15
Air Discharge Voltage	k Volts	+/-2, +/-4, +/-8, +/-15, +/-25

3.3. TEST SETUP PHOTOS

Figure 4–Test Setup

3.4. ACCEPTANCE CRITERIA

The Nexgen CAN transceiver shall continue to operate as intended.

3.5. TEST RESULTS

The Nexgen CAN transceiver operated as intended. After unpowered ESD testing, all (3) micro display units showed some pixels that were missing from the display (shown in figure 5), all units still functioned as intended. After being analyzed by engineering, it was requested that an older version of a micro display be tested. After retest of the older version, it was found that it too had the same results as the original micro display. A retest was done on two additional micro displays. Both passed the minimum requirements of 8kV for unpowered ESD, however for contact discharge the maximum voltage tested was 15kV and for ESD testing, contact discharge is not considered passing at 15kV. Both units on retest passed and functioned as intended.

Table 9 – Joystick unpowered Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3J1015-100 (006,002,257)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	±25kV ±15kV	**Passed**

Table 10– Micros Display unpowered Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-180 (278,287,269)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	±25kV ±15kV	**Passed**

Note all micro Display showed missing pixel on display

Table 11– Doosan unpowered Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3JYY1004-1 (1,2,3)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	±25kV ±15kV	**Passed**

Table 12– Retest of Micro display Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-213	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	±25kV ±15kV	**Passed**

*** Note after completing unpowered testing DUT display was missing pixel same results as previous testing of the micro displays***

Table 13 – Retest of Micro Display

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-100	Air Discharge	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±2kV ±4kV ±6kV ±8kV ±15kV	±2kV ±4kV ±6kV ±8kV ±15kV	**Passed**

Table 14 – Retest of Micro Display (3DYY32C-200)

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
Micro Display 3DYY32C-200	Air Discharge	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±2kV ±4kV ±6kV ±8kV ±15kV	±2kV ±4kV ±6kV ±8kV ±15kV	**Passed**

NOTE - at +15kV a vertical line appeared on the display screen on DUT 3DYY32C - 200, unit still function as intended. ESD testing for contact discharge is not considered passing at 15kV, but all DUT met the 8kV requirement for unpowered ESD testing.

Figure 5–Micro Display after unpowered ±25K

4.0 ELECTROSTATIC DISCHARGE POWERED (ANSI/ASAE EP455.5.12, JDQ 53.3)

Test	Specification	DUT Part Number	Philips Part Number	Test Location	Test Date
ESD	ANSI/ASAE EP455.5.12 JDQ 53.3	3JYY1004-1 3J1015-100 3DYY32C-180	1,2,3 006,002,257 278,287,269	Grayhill Inc.	07/15/2014 To 08/8/2014

4.1. PURPOSE

Electrostatic discharge may occur from the human body or from nearby objects which has been electrically charged due to friction, airflow or material flow across their surface. The purpose of this test is to expose the Nexgen CAN used in most SSMs, 3Js, CAT paving, etc., to Electrostatic Discharges at 8kV or higher using the air discharge method and to Electrostatic Discharges at 8kV or higher. Testing also shall be satisfied at the lower levels. The potential product issue modes and effects detected in this test are:

- Anomalies in performance
- Intermittent operation
- Failure of electrical components

4.2. TEST SETUP DETAILS

1. Visual check.
2. Mount the DUT in the Mounting Orientation specified in the Test Conditions if applicable.
3. Load the discharge network specified in the Test Conditions.
4. Apply the pulse to the DUT in the sequence specified in the Test Conditions.
5. Apply voltage specified in test condition table
6. Perform functional check after each voltage level
7. Perform the Visual Check after exposure.

Table 15 – Equipment List

Equipment ID	Equipment Type	Model Number	Manufacturer	Calibration Due Date
GT-361	ESD Generator	NSG 438	Teseq	Dec - 2014
GT-361	Discharge Network 150pF / 330Ω	403-550	Teseq	Dec - 2014
GT-117	DC Power Supply	E3649A	Agilent	Sep-2014
GT-507	Digital Multimeter	34401A	Agilent	May-2014

Table 16 - Test Conditions

Test Condition	Units	Parameters
Quantity	DUT	9
Operational Mode		Powered
Voltage	VDC	12
Temperature	°C	23.3
Humidity	%Rh	24.6
Discharge Network	PF - Ohms	330pF / 2k Ohms
Discharge Location	NA	Front Housing, Keypads, Display, Back Housing Studs, Terminals
Contact Discharge	k Volts	+/-2, +/-4, +/-6, +/-8, +/-15
Air Discharge Voltage	k Volts	+/-2, +/-4, +/-8, +/-15, +/-25

4.3. TEST SETUP PHOTOS

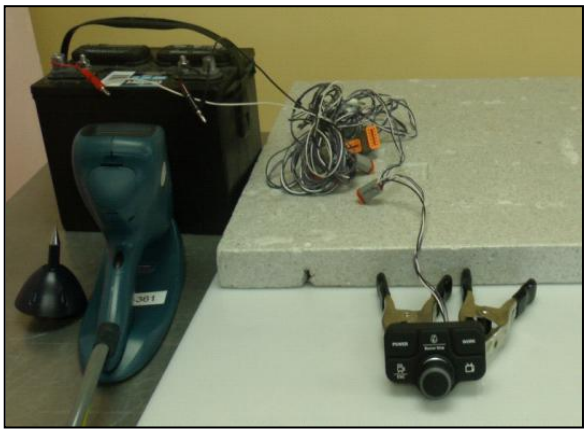

Figure 6– Test Setup of 3J1015-100

Figure 7– Test Setup of 3DYY32C-180

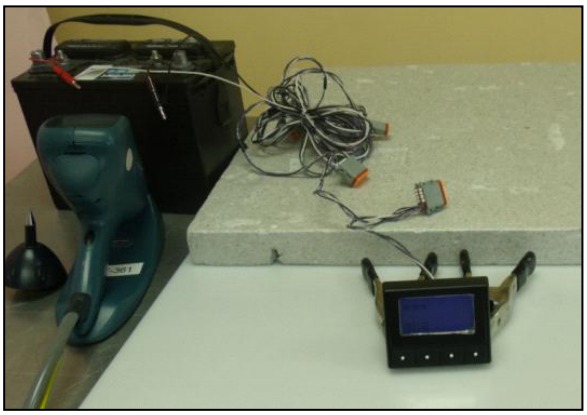

Figure 8– Test Setup of 3JYY1004-1

4.4. ACCEPTANCE CRITERIA

The Nexgen CAN transceiver shall continue to operate as intended.

4.5. TEST RESULTS

All units Nexgen CAN transceiver operated as intended. After powered ESD testing DUT SN#278 powered off at -25k during testing and remained off after testing. DUT buttons further right on the front panel were not functioning either. When analyzed by engineer it was found that leaving the DUT powered for a while that the display finally came back on. The CAN for this unit was working as intended but there were some pixel that was missing on the display. A retest was scheduled for an additional two micro displays .In which both of these units passed powered ESD testing, however they were only tested to a maximum of 15kV for contact discharge and ESD testing for contact discharge is not considered passing at 15kV, but all units met and passed the minimum requirement of 8kV.

Table 17 –Powered Joystick Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3J1015-100 (002,006,257)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	NA	**Passed**

Table 18 – Powered Micro Display Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-180 (278,287,269)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	NA	**Failed (front panel buttons on DUT #287)**

Table 19 – Powered Doosan Test Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3JYY1004-1 (1,2,3)	Air Discharge	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	±25kV ±15kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±25kV ±15kV	NA	**Passed**

Table 20 – Powered Micro Display Retest Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-100	Air Discharge	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±2kV ±4kV ±6kV ±8kV ±15kV	±2kV ±4kV ±6kV ±8kV ±15kV	**Passed**

NOTE – ESD testing for contact discharge is not considered passing at 15kV, but all DUT met the 8kV requirement for unpowered ESD testing.

Table 21 – Powered Micro Display Retest Results

Part Number	Location	Front Housing	Back Housing	Keypads	LCD Display	Side Housing	Studs	Terminals	Function Performance
3DYY32C-200	Air Discharge	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	±2kV ±4kV ±8kV ±15kV ±25kV	NA	NA	**Passed**
	Contact Discharge	NA	NA	NA	NA	NA	±2kV ±4kV ±6kV ±8kV ±15kV	±2kV ±4kV ±6kV ±8kV ±15kV	**Passed**

NOTE – ESD testing for contact discharge is not considered passing at 15kV, but all DUT met the 8kV requirement for unpowered ESD testing.