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Prepared By: Debbie Messick

Approved By: Grant Farrand

Approval Date: 12/05/08

FINAL REPORT ACCEPTANCE BY OVSC:

Edward E. Chan

Accepted By: ______________________________

Acceptance Date: __________________________
### Abstract

Compliance tests were conducted on the subject, 2008 Scion XD, passenger car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-202aS-00 for the determination of FMVSS 202a compliance. Test failures identified were as follows:

NONE
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5.1 Left Side View of Vehicle
5.2 Right Side View of Vehicle
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5.4 ¾ Rear View from Right Side of Vehicle
5.5 Vehicle Certification Label
5.6 Vehicle Tire Information Label
5.7 Driver Seat Head Restraint
5.8 Passenger Seat Head Restraint
5.9 Row 2, Right Side Head Restraint
5.10 Row 2, Center Head Restraint
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5.13 Driver Head Restraint in Lowest Position
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5.27 Head Restraint with 50 N Load for Height Retention
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<tr>
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<td>Owner's Manual Information</td>
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SECTION 1
PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2008 Scion XD passenger car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 202a testing to determine if the vehicle was in compliance with the requirements of the standard. The purpose of this standard is to establish requirements for head restraints to reduce the frequency and severity of neck injury in rear end and other collisions.

1.1 The test vehicle was a 2008 Scion XD passenger car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: JTKKU10468J015848
B. NHTSA No.: C85107
C. Manufacturer: TOYOTA MOTOR CORPORATION
D. Manufacture Date: 11/07

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 202a testing during the time period November 13-17, 2008.
SECTION 2

COMPLIANCE TEST RESULTS

2.0 TEST RESULTS

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures, TP-202aS-00 dated 22 December 2004.

Based on the test performed, the 2008 Scion XD passenger car appeared to meet the requirements of FMVSS 202a testing.
SECTION 3

COMPLIANCE TEST DATA

3.0 TEST DATA

The following data sheets document the results of testing on the 2008 Scion XD passenger car.
SUMMARY OF RESULTS

VEH. MOD YR/MAKE/MODEL/BODY STYLE: 2008 SCION XD PASSENGER CAR

VEH. NHTSA NO.: C85107; VIN: JTKKU10468J015848

VEH. BUILD DATE: 11/07; TEST DATE: November 13-17, 2008

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: G. FARRAND, J. LATANE

A. VISUAL INSPECTION OF TEST VEHICLE

Upon receipt for completeness, function, and discrepancies or damage which might influence the testing.

RESULTS: OK for testing. Due to manufacture date of vehicle, rear DSP’s are not required to meet 202a requirements.

B. DIMENSIONAL REQUIREMENTS

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C. OWNER’S MANUAL

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D. REMOVABILITY

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E. NON-USE POSITION

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### DATA SHEET 1 (2 of 2)
#### SUMMARY OF RESULTS

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**RECORDED BY: G. FARRAND**
**DATE: 11/17/08**
**APPROVED BY: D. MESSICK**
DATA SHEET 2a (1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: _______ C85107 _______ TEST DATE: _______ 11/13/08 _________

Seat Location: _______ DRIVER _______

Height Measurement

SAE J826 three-dimensional manikin torso angle: ___ 19° ___

Striker to H-Point (mm): ___ 89 mm ___ (Ahead) Striker to H-Point angle: ___ Down ___

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): ___ 810 mm ___ X ___ PASS _________ FAIL

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): ___ 767 mm ___ X ___ PASS _________ FAIL

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere. N/A

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.
Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh – 65): ___ 745 mm ___

Width, W (mm): ___ 207 mm ___ X ___ PASS _________ FAIL

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A
**Backset Measurement (Front Head Restraints Only)**

Position the HRMD and record the following measurements.

- HRMD torso angle: _____ 19° ______
- Striker to H-Point (mm): _____ 90 mm _____
- Striker to H-Point angle: _____ Down _____

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

- Backset, B (mm): _____ 37 mm _____
- X _____ PASS _______ FAIL

Backset must be less than or equal to 55 mm.

**Gap Measurement**

Position the head restraint in the lowest position of vertical adjustment.

- Number of gaps within the gap measurement zone: None
- Least dimension of each gap (measured with a steel tape): N/A
- Size of each gap (as measured with the spherical head form):

<table>
<thead>
<tr>
<th>Gap Size</th>
<th>N/A</th>
<th>X</th>
<th>PASS</th>
<th>FAIL</th>
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</table>

Gaps must be less than or equal to 60 mm.

**REMARKS:**

**RECORDED BY:**  G. FARRAND __________  **DATE:**  __11/14/08_______

**APPROVED BY:**  D. MESSICK __________


DATA SHEET 2b (1 of 2)
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

VEH. NHTSA NO.: C85107 TEST DATE: 11/13/08

Seat Location: PASSENGER

Height Measurement

SAE J826 three-dimensional manikin torso angle: 19°

Striker to H-Point (mm): 87 mm (Ahead) Striker to H-Point angle: Down

Position the head restraint in the highest position of vertical adjustment.
Height, Hh (mm): 808 mm

Hh > or = 800 mm for front seats.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere.

Position the head restraint in the lowest position of vertical adjustment.
Height, Hl (mm): 767 mm

Hl > or = 750 mm for front seats and rear seats with head restraints.

If the head restraint is less than the required height, check for passage of the 25 mm diameter sphere.

Width Measurement

If the manikin is moved between the Height measurement and the Width measurement, re-record the torso angle, striker to H-Point distance and angle.

Position the head restraint in the highest position of vertical adjustment.
Width is measured 65 mm below the measured Height, Hh.

Height, Hw (= Hh − 65): 743 mm

Width, W (mm): 208 mm

Width must be greater than or equal to 170 mm. If a vehicle has a front center designated seating position the front outboard head restraints must be greater than or equal to 254 mm. N/A
DIMENSIONAL REQUIREMENTS FOR ADJUSTABLE HEAD RESTRAINTS

Backset Measurement (Front Head Restraints Only)

Position the HRMD and record the following measurements.

HRMD torso angle: ________ 18.9° ________

Striker to H-Point (mm): __ 86 mm ____ Striker to H-Point angle: __ Down __

Position the head restraint at a height greater than or equal to 750 mm and less than or equal to 800 mm for front head restraints. Exception: head restraint with lowest position higher than 800 mm, adjust to lowest position.

Backset, B (mm): ________ 36 mm ________ X ___ PASS ________ FAIL

Backset must be less than or equal to 55 mm.

Gap Measurement

Position the head restraint in the lowest position of vertical adjustment.

Number of gaps within the gap measurement zone: None

Least dimension of each gap (measured with a steel tape): N/A

Size of each gap (as measured with the spherical head form):

Gap Size __________ N/A ________ X ___ PASS ________ FAIL

Gaps must be less than or equal to 60 mm.

REMARKS:

RECORDED BY: __ G. FARRAND ________ DATE: ______ 11/14/08 ________

APPROVED BY: __ D. MESSICK ________
DATA SHEET 3
OWNER’S MANUAL

VEH. NHTSA NO.: _______ C85107 _______ TEST DATE: _______ 11/13/08 _________

Emphasize that all occupants should place their head restraint in a proper position prior to operating the vehicle in order to prevent the risk of serious injury.

PASS X FAIL ______

Description of the head restraint system and identification of which seats are equipped.

PASS X FAIL ______

If the head restraint is removable, instructions on how to properly remove and reinstall using a deliberate action distinct from any act necessary for adjustment.

PASS X FAIL ______ N/A ______

Warning that all head restraints must be reinstalled properly to protect occupants.

PASS X FAIL ______

Describe the adjustment of the head restraints and/or seat back to achieve proper head restraint position relative to the head. The description must include the following:

1) a presentation and explanation of the main components of the vehicle’s head restraints

2) the basic requirements for proper head restraint operation, including an explanation of the actions that may affect the proper functioning of the head restraints.

3) the basic requirements for proper positioning of a head restraint in relation to an occupant’s head position, including information regarding the proper positioning of the center of gravity of an occupant’s head in relation to the head restraint.

PASS X FAIL ______

Include copies of relevant pages from the owner’s manual in the final report.

REMARKS:

RECORDED BY: G. FARRAND _______ DATE: ______ 11/14/08 _______

APPROVED BY: D. MESSICK _______
Are the head restraints removable?    X  YES  NO

If removable, does removal REQUIRE an action distinct from actions to adjust the head restraint?    X  YES (PASS)  NO (FAIL)

Description of action(s) for head restraint adjustment:
Lift upward on head restraint to raise;  Push in and hold release button on left side post while pushing down on headrest to lower.

Description of distinct action for removal:  Push in on release button on right side post with key
While lifting upward on head restraint to remove.

REMARKS:

RECORDED BY:  G. FARRAND  DATE:  11/14/08
APPROVED BY:  D. MESSICK
DATA SHEET 5
ENERGY ABSORPTION TEST

VEH. NHTSA NO.: C85107 TEST DATE: 11/17/08

Seat Location: PASSENGER Type of head restraint: ADJUSTABLE

Test Number: 6117

635 mm Height Measurement for lower boundary of the impact zone

SAE J826 three-dimensional manikin torso angle: 19°

Striker to H-Point (mm): 87 mm Striker to H-Point angle: Down

Description of equipment or method used to rigidly fix the seat back: Telescoping steel tube brace from top of seat back frame to rear floor of vehicle.

Accelerometer identification: F209 Accelerometer type/brand: ENDEVCO

Last calibration date: 11/08

Head form vertical angle (-2° - +2°): 0.0

Distance between head form and target location (> or = 25 mm): 40 mm

Impact velocity (23.6 kph ± 0.5 kph): 23.2 KpH

Impact location: 100 mm down from top of headrest on left/right centerline of headrest.

Maximum deceleration (< or = 785 m/s² (80 g)): 37.2 PASS X FAIL

REMARKS:

RECORDED BY: G. FARRAND DATE: 11/17/08

APPROVED BY: D. MESSICK
DATA SHEET 6
HEIGHT RETENTION TEST
(ADJUSTABLE HEAD RESTRAINTS ONLY)

VEH. NHTSA NO.: C85107 TEST DATE: 11/14/08

Seat Location: DRIVER Test Number: 6111, 6112

Pre-test measurements

SAE J826 Manikin torso angle: 19° Top of Head Restraint Height (mm): 810 mm
Striker to H-Point (mm): 89 mm Striker to H-Point angle: Down

Description of height retention lock: Spring loaded catch on left side post with four locking positions.

Test measurements

Initial load (50 N ± 1 N): 55 N Initial Displacement, D1 (mm): 11.7 mm
Initial Displacement (D1) < 25 mm Yes PASS X FAIL
Maximum load (495 N ± 5 N): 505 N Maximum Displacement, D2 (mm): 32.4 mm
Return load (50 N ± 1 N): 52 N Return Displacement, D3 (mm): 12.5 mm
Total displacement (D3-D1) < 13 mm 0.8 mm PASS X FAIL

REMARKS:

RECORDED BY: G. FARRAND DATE: 11/17/08

APPROVED BY: D. MESSICK
DATA SHEET 7
BACKSET RETENTION TEST

VEH. NHTSA NO.: C85107 TEST DATE: 11/17/08
Seat Location: DRIVER Type of head restraint: ADJUSTABLE
Test Number: 6113, 6114, 6115, 6116

Pre-test measurements

SAE J826 Manikin torso angle: 19° Top of Head Restraint Height (mm): 810 mm
Striker to H-Point (mm): 89 mm Striker to H-Point angle: Down

Displacement torso reference line

Test device back pan angle: 19.4°
Distance from the H-point to the initial location of the load (0.290 ± 0.013 m): 0.29 m
Initial load (N): 1290 N Initial moment (373 ± 7.5 Nm): 374 Nm

Backset retention and strength

Distance from the H-point to the head form tangency point (m): 0.745 m
Head Restraint contact (mm): -50.6 mm
Initial load (N): 50 N Initial moment (37 ± 0.7 Nm): 37 Nm
Initial head form displacement, D1 (< or = 25 mm): 10 mm PASS X FAIL
Load range to generate a 373 ± 7.5 Nm rearward moment (N): 500.6 N
Actual load applied (N): 490N Resultant moment (Nm): 366 Nm
Maximum Head form displacement, D2 (< or = 102 mm): 39.2 mm PASS X FAIL
Final head form displacement, D3 (mm): -27.8 mm measured at (37 ± 0.7 Nm)
Total displacement (D3-D1) < 13 mm : 12.8 mm PASS X FAIL
Maximum applied load (> or equal to 885 N): 885 N PASS X FAIL

REMARKS:

RECORDED BY: G. FARRAND DATE: 11/17/08
APPROVED BY: D. MESSICK
## TABLE 1 – INSTRUMENTATION & EQUIPMENT LIST

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SECTION 5
PHOTOGRAPHS
2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 202a

FIGURE 5.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE
2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 202a

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE
FIGURE 5.7
DRIVER SEAT HEAD RESTRAINT
FIGURE 5.12
J826 MANIKIN POSITIONED IN DRIVER SEAT
2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 202a

FIGURE 5.13
DRIVER HEAD RESTRAINT IN LOWEST POSITION
FIGURE 5.14
DRIVER HEAD RESTRAINT IN HIGHEST POSITION
FIGURE 5.15
DRIVER HEAD RESTRAINT WIDTH MEASUREMENT
FIGURE 5.17
DRIVER HEAD RESTRAINT IMPACT ZONE AND GAPS
FIGURE 5.18
TYPICAL HEAD RESTRAINT ADJUSTMENT BUTTON
FIGURE 5.19
TYPICAL HEAD RESTRAINT REMOVAL BUTTON
FIGURE 5.20
J826 MANIKIN POSITIONED IN PASSENGER SEAT
FIGURE 5.21
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PASSENGER HEAD RESTRAINT IN HIGHEST POSITION
FIGURE 5.25
PASSENGER HEAD RESTRAINT IMPACT ZONE AND GAPS
FIGURE 5.26
PRE-TEST SET-UP FOR HEIGHT RETENTION
FIGURE 5.28
HEAD RESTRAINT WITH FULL LOAD FOR HEIGHT RETENTION
FIGURE 5.29
HEAD RESTRAINT POST TEST HEIGHT RETENTION TEST
FIGURE 5.30
PRE-TEST SET-UP FOR BACKSET RETENTION TEST
FIGURE 5.31
BACK PAN LOADING FOR DISPLACED TORSO LINE
FIGURE 5.32
HEAD RESTRAINT WITH 37 Nm LOAD APPLIED
FIGURE 5.33
HEAD RESTRAINT WITH 373 Nm LOAD APPLIED
FIGURE 5.34
HEAD RESTRAINT WITH 37Nm LOAD REAPPLIED
FIGURE 5.35
HEAD RESTRAINT POST TEST BACKSET TESTING
FIGURE 5.36
HEAD RESTRAINT WITH 895 N LOAD APPLIED
2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 202a

FIGURE 5.37
PRE-TEST SET-UP FOR ENERGY ABSORPTION TEST
FIGURE 5.38
POST TEST ENERGY ABSORPTION TEST
SECTION 6
TEST PLOTS
GTL 6116, C85107

202, Head Restraint Retention, Vertical

Time in Seconds

Force in Newtons, Displ. in MM/10

Thousands
Head restraints

For your safety and comfort, adjust the head restraint before driving.

Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top your ears.

To raise: Pull it up.
To lower: Push it down while pressing the lock release button.

Rear center head restraint—When an occupant sits on the rear center seat, always pull up the rear center head restraint to the lock position.

The head restraint is most effective when it is close to your head. Therefore, using a cushion on the seatback is not recommended.

The head restraints are specially designed for the seats on which they are installed.

Removing the front head restraints

1. Pull the head restraint up.
2. Insert a flathead screwdriver into the head restraint installation hole with red marking. (The other installation hole has the lock release button.)
3. While pushing in the screwdriver, pull up the head restraint.

\[\text{CAUTION}\]

The head restraints are designed to help reduce risk of whiplash injury by restraining the movement of the occupant's head in the event of a rear collision.

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Adjust the center of the head restraint so that it is closest to the top of your ears.
- After adjusting the head restraint, make sure it is locked in position.
- Do not drive with the head restraints removed.