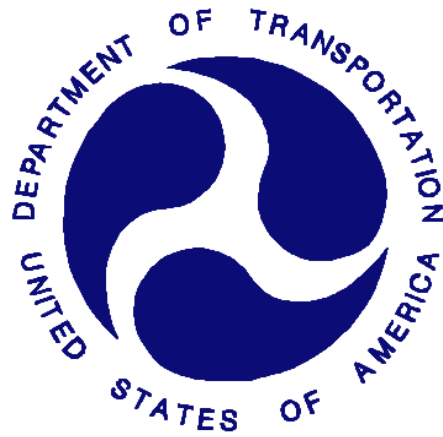


**Vehicle Research and Test Center
FMVSS 213 Testing
Hybrid III 10 Year Old**

**Prepared By:
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Summary Report

October – November 2018

**Prepared For
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SECTION 1

PURPOSE AND SUMMARY FOR HYBRID III 10 YEAR OLD

The purpose of this test was to evaluate the CRS performance data in a frontal FMVSS 213 test condition. The durability and repeatability of three other manufactured foams were tested and analyzed on the FMVSS 213 frontal buck.

SUMMARY

A Hybrid III 10 year old dummy (serial number F001) was secured in the right rear occupant position (position 3 or P3) and left rear seating position (position 4 or P4) in a forward facing belt position booster child restraint system (CRS). The Hybrid III 10 year old was instrumented with head, chest, and pelvis triaxial accelerometers, upper neck, lower neck, and lumbar force and moment load cells, a displacement potentiometer in the chest. During this test series the dummy was restrained with a 3 point seat belt (SB3PT) or with a 3 point seat belt and top tether (SB3PT&T).

Section 2 contains the testing performed using a forward facing CRS in the right rear seating position. Section 3 contains testing performed using a forward facing CRS in the left rear seating position. Section 4 contains the dummy certification information.

**SECTION 2
FORWARD FACING CRS TEST SUMMARY**

TEST DUMMY INFORMATION

Description	Position # 3 CRS
ATD Type/Serial No.	Hybrid III 10 Year Old/F001
Restraint System	SB3PT, SB3PT&T
CRS Direction	Forward Facing
Foam Cushion	LEAR_1, CENT_1, PF_1, WB

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N1 Passenger Front	mm	1875.99	-336.13	-522.00
N6 Passenger Side	mm	367.09	905.24	-354.66

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181023-1

VRTC Test Number: FR_FM_02



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-117.94	-351.39	-680.65
Top of Head	mm	112.29	-350.16	-907.10
Bridge of Nose	mm	199.76	-350.25	-807.94
Head CG Outboard	mm	116.31	-284.96	-802.26
Neck Center	mm	113.41	-351.90	-678.41
Shoulder Belt Upper	mm	190.31	-350.22	-594.67
Shoulder Belt Lower	mm	219.17	-350.94	-520.97
Lap Belt Upper	mm	267.11	-350.50	-408.95
Lap Belt Lower	mm	304.93	-350.80	-381.04
Base Center	mm	529.55	-351.75	-270.45
Center of Seat Frame Bottom	mm	616.83	-349.69	-110.34
Outboard Knee	mm	520.85	-252.31	-390.60
Outboard Ankle	mm	641.86	-260.78	-153.65
Target 2 - Seat Base H-Point	mm	174.63	-168.24	-299.95
Target 3 - Seat Base Side	mm	352.67	-153.66	-211.49

DUMMY INJURY

HIC (36 ms)	543*
Chest Clip (3 ms)	44.49 g

*Truncated to exclude rebound

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181024-1

VRTC Test Number: FR_FM_04



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-128.21	-352.07	-703.21
Top of Head	mm	116.13	-350.27	-906.96
Bridge of Nose	mm	201.86	-348.92	-807.28
Head CG Outboard	mm	117.50	-285.01	-802.98
Neck Center	mm	114.28	-352.86	-678.78
Shoulder Belt Upper	mm	189.37	-350.54	-594.53
Shoulder Belt Lower	mm	216.12	-350.06	-521.52
Lap Belt Upper	mm	261.46	-350.87	-409.39
Lap Belt Lower	mm	297.23	-349.89	-379.39
Base Center	mm	529.50	-351.37	-275.08
Center of Seat Frame Bottom	mm	617.14	-349.70	-109.66
Outboard Knee	mm	510.90	-250.84	-397.95
Outboard Ankle	mm	646.86	-246.55	-168.38
Target 2 - Seat Base H-Point	mm	172.28	-161.94	-298.07
Target 3 - Seat Base Side	mm	353.74	-149.15	-213.44

DUMMY INJURY

HIC (36 ms)	412*
Chest Clip (3 ms)	42.19 g

*Truncated to exclude rebound

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181026-1

VRTC Test Number: FR_FM_06



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-128.96	-350.21	-708.39
Top of Head	mm	111.92	-350.88	-898.04
Bridge of Nose	mm	201.30	-349.84	-802.86
Head CG Outboard	mm	120.28	-284.81	-795.30
Neck Center	mm	118.92	-349.64	-669.60
Shoulder Belt Upper	mm	188.85	-350.44	-596.16
Shoulder Belt Lower	mm	219.39	-350.47	-520.49
Lap Belt Upper	mm	270.53	-350.55	-412.12
Lap Belt Lower	mm	303.56	-350.29	-381.22
Base Center	mm	530.87	-349.73	-255.49
Center of Seat Frame Bottom	mm	617.01	-349.53	-109.65
Outboard Knee	mm	527.03	-244.00	-393.49
Outboard Ankle	mm	647.33	-253.61	-160.31
Target 2 - Seat Base H-Point	mm	183.41	-160.12	-299.54
Target 3 - Seat Base Side	mm	361.73	-149.37	-213.11

DUMMY INJURY

HIC (36 ms)	551
Chest Clip (3 ms)	42.48 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181030-1

VRTC Test Number: FR_FM_08



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-135.50	-351.89	-683.79
Top of Head	mm	116.88	-349.82	-895.17
Bridge of Nose	mm	204.86	-349.58	-796.46
Head CG Outboard	mm	121.88	-282.89	-791.88
Neck Center	mm	115.71	-349.37	-666.68
Shoulder Belt Upper	mm	183.65	-350.56	-596.71
Shoulder Belt Lower	mm	216.71	-350.54	-526.42
Lap Belt Upper	mm	265.68	-350.09	-412.22
Lap Belt Lower	mm	301.66	-350.08	-384.88
Base Center	mm	528.96	-350.10	-255.19
Center of Seat Frame Bottom	mm	617.13	-349.63	-109.68
Outboard Knee	mm	525.48	-247.00	-397.13
Outboard Ankle	mm	635.36	-254.16	-159.17
Target 2 - Seat Base H-Point	mm	172.10	-161.30	-294.82
Target 3 - Seat Base Side	mm	350.47	-151.89	-211.24

DUMMY INJURY

HIC (36 ms)	567
Chest Clip (3 ms)	45.74 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181030-2

VRTC Test Number: FR_FM_10



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-134.69	-351.25	-684.22
Top of Head	mm	112.50	-352.14	-901.37
Bridge of Nose	mm	199.52	-352.17	-802.40
Head CG Outboard	mm	118.46	-287.18	-798.40
Neck Center	mm	111.88	-351.61	-672.86
Shoulder Belt Upper	mm	184.98	-350.28	-594.85
Shoulder Belt Lower	mm	215.30	-350.01	-524.07
Lap Belt Upper	mm	269.59	-350.48	-412.24
Lap Belt Lower	mm	302.79	-350.32	-383.38
Base Center	mm	529.42	-351.28	-261.13
Center of Seat Frame Bottom	mm	617.21	-349.76	-109.52
Outboard Knee	mm	526.37	-249.58	-394.09
Outboard Ankle	mm	644.80	-256.91	-159.63
Target 2 - Seat Base H-Point	mm	174.18	-161.99	-299.69
Target 3 - Seat Base Side	mm	351.55	-151.16	-213.21

DUMMY INJURY

HIC (36 ms)	492
Chest Clip (3 ms)	42.14 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181031-1

VRTC Test Number: FR_FM_12



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-134.85	-351.62	-684.14
Top of Head	mm	115.33	-349.98	-903.76
Bridge of Nose	mm	204.08	-349.49	-804.88
Head CG Outboard	mm	120.12	-285.01	-799.20
Neck Center	mm	115.52	-351.43	-674.60
Shoulder Belt Upper	mm	188.89	-350.51	-595.39
Shoulder Belt Lower	mm	219.64	-350.80	-520.66
Lap Belt Upper	mm	266.63	-350.66	-411.54
Lap Belt Lower	mm	300.34	-350.64	-382.40
Base Center	mm	524.45	-350.50	-248.22
Center of Seat Frame Bottom	mm	617.27	-349.79	-109.62
Outboard Knee	mm	523.40	-251.61	-393.68
Outboard Ankle	mm	648.13	-251.84	-161.37
Target 2 - Seat Base H-Point	mm	172.31	-160.15	-299.15
Target 3 - Seat Base Side	mm	351.34	-148.64	-212.33

DUMMY INJURY

HIC (36 ms)	438
Chest Clip (3 ms)	40.32 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181031-2

VRTC Test Number: FR_FM_14



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-135.13	-351.69	-683.95
Top of Head	mm	110.70	-351.72	-901.83
Bridge of Nose	mm	200.28	-352.19	-804.13
Head CG Outboard	mm	118.14	-285.98	-798.17
Neck Center	mm	113.99	-351.67	-672.29
Shoulder Belt Upper	mm	184.28	-350.32	-595.65
Shoulder Belt Lower	mm	213.95	-350.84	-522.62
Lap Belt Upper	mm	262.29	-350.77	-409.75
Lap Belt Lower	mm	299.93	-350.70	-382.48
Base Center	mm	533.56	-351.85	-251.01
Center of Seat Frame Bottom	mm	617.10	-349.69	-109.50
Outboard Knee	mm	524.18	-256.42	-390.42
Outboard Ankle	mm	643.80	-258.86	-156.02
Target 2 - Seat Base H-Point	mm	184.60	-161.87	-300.91
Target 3 - Seat Base Side	mm	363.26	-154.73	-213.72

DUMMY INJURY

HIC (36 ms)	525
Chest Clip (3 ms)	44.41 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181101-1

VRTC Test Number: FR_FM_16



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-135.22	-352.30	-683.69
Top of Head	mm	115.36	-351.92	-897.14
Bridge of Nose	mm	202.17	-350.27	-798.25
Head CG Outboard	mm	119.10	-285.22	-793.64
Neck Center	mm	113.44	-350.86	-668.11
Shoulder Belt Upper	mm	182.49	-350.34	-595.85
Shoulder Belt Lower	mm	214.78	-350.80	-524.16
Lap Belt Upper	mm	265.72	-350.57	-411.96
Lap Belt Lower	mm	300.86	-350.13	-386.82
Base Center	mm	523.41	-348.89	-260.33
Center of Seat Frame Bottom	mm	616.90	-349.73	-110.03
Outboard Knee	mm	525.57	-236.89	-398.31
Outboard Ankle	mm	652.66	-244.77	-168.85
Target 2 - Seat Base H-Point	mm	171.47	-154.95	-298.93
Target 3 - Seat Base Side	mm	350.54	-142.57	-212.43

DUMMY INJURY

HIC (36 ms)	515
Chest Clip (3 ms)	43.57 g

Dummy Positioning

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181101-2

VRTC Test Number: FR_FM_18



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-135.07	-352.13	-683.96
Top of Head	mm	113.66	-351.31	-899.19
Bridge of Nose	mm	201.36	-349.01	-801.16
Head CG Outboard	mm	118.11	-285.56	-795.49
Neck Center	mm	116.19	-351.74	-669.71
Shoulder Belt Upper	mm	185.21	-350.04	-595.64
Shoulder Belt Lower	mm	217.88	-350.64	-523.92
Lap Belt Upper	mm	268.16	-351.12	-410.34
Lap Belt Lower	mm	303.46	-350.56	-383.94
Base Center	mm	526.83	-348.91	-260.25
Center of Seat Frame Bottom	mm	617.06	-349.60	-110.05
Outboard Knee	mm	526.34	-245.13	-390.06
Outboard Ankle	mm	658.40	-250.80	-162.22
Target 2 - Seat Base H-Point	mm	179.82	-151.85	-300.72
Target 3 - Seat Base Side	mm	359.12	-144.04	-212.30

DUMMY INJURY

HIC (36 ms)	472
Chest Clip (3 ms)	--- ¹

¹Data was anomalous

**SECTION 3
FORWARD FACING CRS TEST SUMMARY**

TEST DUMMY INFORMATION

Description	Position # 4 CRS
ATD Type/Serial No.	Hybrid III 10 Year Old/F001
Restraint System	SB3PT, SB3PT&T
CRS Direction	Forward Facing
Foam Cushion	PF_1, WB

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N5 Driver Front	mm	1900.66	346.17	-486.70
N3 Driver Side	mm	428.43	-911.77	-387.87

DUMMY POSITIONING

CRS: Evenflo Amp NB – Belt Position Booster – SB3PT

TRC Test Number: S181116-1

VRTC Test Number: FR_FM_47



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-135.29	350.19	-685.44
Top of Head	mm	105.80	351.23	-894.11
Bridge of Nose	mm	195.47	351.63	-800.10
Head CG Outboard	mm	118.59	281.78	-796.56
Neck Center	mm	115.31	350.34	-673.39
Shoulder Belt Upper	mm	185.28	350.63	-595.70
Shoulder Belt Lower	mm	219.50	350.35	-521.04
Lap Belt Upper	mm	276.31	351.52	-410.39
Lap Belt Lower	mm	312.51	350.60	-386.83
Outboard Knee	mm	524.70	235.62	-403.17
Outboard Ankle	mm	648.07	267.21	-163.40
CRS Base Center	mm	528.64	351.52	-263.78
Center of Seat Frame Bottom	mm	619.47	349.65	-103.61
Target 2 - Seat Base H-Point	mm	168.73	154.77	-296.35
Target 3 - Seat Base Side	mm	341.17	145.36	-224.53

DUMMY INJURY

HIC (36 ms)	517
Chest Clip (3 ms)	41.77 g

DUMMY POSITIONING

CRS: Britax Frontier Clicktight – Forward Facing with Harness – SB3PT&T

TRC Test Number: S181116-2

VRTC Test Number: FR_FM_45



Dummy Positioning FARO Measurements

Description	Units	X	Y	Z
Z-Point	mm	0.00	0.00	0.00
Center of Seat Frame Back	mm	-118.47	352.08	-682.45
Top of CRS	mm	-43.58	351.34	-722.87
CRS Top of Headrest	mm	-74.92	352.30	-946.85
Top of Head	mm	170.92	351.40	-924.73
Bridge of Nose	mm	264.97	351.67	-833.93
Head CG Outboard	mm	186.46	280.79	-827.88
Neck Center	mm	187.02	351.79	-703.85
Chest Clip	mm	260.17	351.75	-645.63
Buckle	mm	410.42	348.19	-417.21
CRS Base Center	mm	587.84	349.76	-303.28
Center of Seat Frame Bottom	mm	619.20	350.33	-104.02
Knee	mm	604.77	227.03	-421.72
Ankle	mm	659.06	236.36	-154.53
Target 2 - Seat Base H-Point	mm	243.62	140.64	-314.92
Target 3 - Seat Base Side	mm	424.71	117.22	-235.34
Target 1 - Seat Side Upper	mm	50.60	179.59	-616.25
Target 4 - Seat Side Lower	mm	104.27	168.95	-350.15

DUMMY INJURY

HIC (36 ms)	336
Chest Clip (3 ms)	36.66 g

SECTION 4

DUMMY CALIBRATION DATA