


## ATDS Emission Lab Test Report

for Exhaust Emission Test Procedures according

Date:	11/17/2021	Start Time:	12:46:17
Test Number:	ONT3_002494	End Time:	13:40:39
Test Vehicle:	3182_FCRXT03.05PV-349		
Test Legislation:	EPA1066		
Test Cycle:	US06+US06		
Test Purpose:	Certification		
Test Cell:	IGEM-V-TC1		
Order Number:	3182		
Remark:	TEST #3 AS RECEIVED		

 <b>QUALITY ASSURANCE</b>
INSPECTED BY: <small>REDACTED</small> _____
DATE: <u>2021-11-18</u> _____
COMMENTS: <u>OK</u> _____
_____

## General Data

Test Number	ONT3_002494		
Test Name	US06_US06		
Test Cell	iGEM-V-TC1		
Test Type	US06_US06		
Legislation	EPA1066		
Requirements (Bag)	CERTIFICATION		
Requirements (Modal)	CERTIFICATION		
Date	11/17/2021	CH <sub>4</sub> Response Factor	1.186
Test Start	12:46:17	Odometer Position <sup>[mi]</sup>	107928
Start Time Cycle	2021-11-17 13 13-25-(000)	Delay Time Method	
Test End	13:40:39		
Operator	REDACTED	Air Condition	OFF
Driver	REDACTED	Particle Measurement	USUAL
Shifttable	Auto		
Flow Stream	ModalDirty		
Calibrated Ranges	autorange		
Remark	TEST #3 AS RECEIVED		

## Vehicle Data

Manufacturer	1500	Displacement	3.0L
Vehicle Model	REDACTED	Engine Family	FCRXT03.05PV
Order Number	3182	Manufacturer	RAM
Test Group	3182_FCRXT03.05PV-349	Transmission	Automatic
Evaporative Family		Engine Code	

## Dyno Data

Dyno Type	SVOR	Inertia <sup>[lb]</sup>	5500.00
	A <sup>[lb]</sup>	B <sup>[lb/mph]</sup>	C <sup>[lb/mph<sup>2</sup>]</sup>
Street Load	41.680	0.08690	0.036750
Road Load	-2.300	0.34300	0.032700

## Fuel Data

Fuel Type	DIESEL	Fuel Temperature <sup>[°C]</sup>	15.00
Fuel Analyze Date		Fuel Density <sup>[kg/l]</sup>	0.8550
Fuel Manufacturer		Net Heat. Val. <sup>[BTU/lb]</sup>	18295
Fuel Tank Number		Carb. Weight Frac.	0.8650
Fuel Charge		HC Ratio	1.8742
Remarks:		OC Ratio	-1.0000

## Weather Limit Data

Temp Min <sup>[deg F]</sup>	68.00	Dew Point Max <sup>[deg F]</sup>	100.00
Temp Max <sup>[deg F]</sup>	86.00	Pressure Min <sup>[mbar]</sup>	800.0
Dew Point Min <sup>[deg F]</sup>	15.01	Pressure Max <sup>[mbar]</sup>	1100.0

## Fan Speed Data

F1 [%]	F2 [%/mph]	F3 [%/mph <sup>2</sup> ]
5	0.745999992	0.0031

**Test Data**      **REDACTED**      Operator **REDACTED**      Speed Table      Date:      11/17/2021  
**Test Number**      ONT3\_002494      Driver      Joseph Bishop      Shift Table Auto      Cold Start

<b>Vehicle</b>	<b>REDACTED</b>	<b>Dyno</b>	<b>Fuel</b>	<b>Test Timing</b>
Vehicle #	REDACTED	Inertia <sup>[lb]</sup>	Diesel-FL0821BE10	Start Time
Model	1500	A <sup>[lb]</sup>	Fuel type	End Time
Year	2015	B <sup>[lb/ft]</sup>	Density	Soak Time
Displacement:	3.0L	C <sup>[lb/ft/mph<sup>2</sup>]</sup>	NHV	
Engine Family	FCRXT03.05PV		CWF	
Trans	Automatic	Flow Stream		
Odometer <sup>[mile]</sup>	107928	Remark		

**Bag Analysis**

PHASE 1	THC <sup>[ppmC]</sup>	CO <sup>[ppm]</sup>	CO <sub>2</sub> <sup>[%]</sup>	NO <sub>x</sub> <sup>[ppm]</sup>	N <sub>2</sub> O <sup>[ppm]</sup>	CH <sub>4</sub> <sup>[ppm]</sup>	NMHC <sup>[ppm]</sup>	Temp. <sup>[°F]</sup>	Volume <sup>[cc]</sup>
Range	100	50	1	30		30		76.25	7969
Zero Read	0.00	0.0	0.0	0.0		0.0		28.98	15.21
Span Read	93.39	46.55	0.933	27.940		27.710		38.60	690.3
Sample	0.19	0.08	0.834	5.563		0.061	0.115	7.650	1288.8
Mass.	0.024	0.021	3454.098	2.188		0.009	0.015	8.00	595.7
Mass per Dist.	0.0030	0.0027	431.922	0.2736		0.0011	0.0019	0.9085	614
PSS Massflow Particles [g/h]	0.0353							0	0.0
			PSS Mass per Dist. [g/mile]					0.00	23.6

**Total Result**

actual	THC <sup>[g/mile]</sup>	CO <sup>[g/mile]</sup>	CO <sub>2</sub> <sup>[g/mile]</sup>	NO <sub>x</sub> <sup>[g/mile]</sup>	N <sub>2</sub> O <sup>[g/mile]</sup>	CH <sub>4</sub> <sup>[g/mile]</sup>	NMHC <sup>[g/mile]</sup>	HC+NO <sub>x</sub> <sup>[g/mile]</sup>	Fuel Economy
Mass per Dist.	0.0030	0.0027	431.92	0.2736		0.0011	0.0019	0.2767	23.56
Mass per Dist. (rounded)	0.0030	0.0027	431.9	0.2736		0.0011	0.0019	0.2767	8.00

Mass per Dist. - Particulate PSS 0.0007

Test Data US06\_US06  
 Test Number ONT3\_002494

Operator REDACTED  
 Driver REDACTED

Auto

**Correlation Bag and Modal (diluted) for Mass per Distance**

		THC [g/mile]	CO [g/mile]	CO <sub>2</sub> [g/mile]	NO <sub>x</sub> [g/mile]	CH <sub>4</sub> [g/mile]	N <sub>2</sub> O [g/mile]	NMHC [g/mile]	
Bag	Phase 1	0.0000	0.0027	431.9216	0.2736	0.0011			
Modal	Phase 1	0.0000	0.0027	442.9012	0.2761	0.0014			
Percent	Phase 1	#DIV/0!	-1.08	-2.48	-0.87	-16.29	#DIV/0!	#DIV/0!	
<b>Total</b>									
Bag		0.0000	0.0027	431.9216	0.2736	0.0011		0.0011	
Modal		0.0000	0.0027	442.9012	0.2761	0.0014			
Percent		#DIV/0!	-1.08	-2.48	-0.87	-16.29	#DIV/0!	#DIV/0!	

**Total Result (weighted)**

<b>Weighted</b>		THC [g/mile]	CO [g/mile]	CO <sub>2</sub> [g/mile]	NO <sub>x</sub> [g/mile]	CH <sub>4</sub> [g/mile]	N <sub>2</sub> O [g/mile]	NMHC [g/mile]	HC+NO <sub>x</sub> [g/mile]	<b>Fuel Economy</b>
Mass per Dist.		0.0000	0.00	431.92	0.27	0.00			0.274	mile/gal 23.6

**Total Result**

<b>actual</b>		THC [g/mile]	CO [g/mile]	CO <sub>2</sub> [g/mile]	NO <sub>x</sub> [g/mile]	CH <sub>4</sub> [g/mile]	N <sub>2</sub> O [g/mile]	NMHC [g/mile]	HC+NO <sub>x</sub> [g/mile]	<b>Fuel Economy</b>
Mass per Dist.		0.0000	0.00	431.92	0.27	0.00			0.274	mile/gal 23.6
										Dist. [mi] 8.00

CVS Data		Cycle data		Environmental Data	
Dilution Factor (Bag)	15.21	Vio. Dur. <sup>[s]</sup>	0.0	Rel. Hum. <sup>[%]</sup>	38.60
Dilution Factor (Modal)	14.85	Number	0	Ab. Hum. <sup>[g/lbs]</sup>	7.65
CVS Volume <sup>[scf]</sup>	7968.70	Act. Dist. <sup>[mi]</sup>	8.00	Pressure <sup>[inHg]</sup>	28.98
CVS Flow <sup>[scfm]</sup>	802.62			Temp. <sup>[°F]</sup>	76.25
CVS Inlet Pressure	28.51			Temp. Min. <sup>[°F]</sup>	70.88
CVS Inlet Temp. <sup>[°F]</sup>	117.62			Temp. Max. <sup>[°F]</sup>	83.66
CVS Inlet Temp. Min. <sup>[°F]</sup>	101.75			NO <sub>x</sub> Corr. F	0.9085
CVS Inlet Temp. Max. <sup>[°F]</sup>	133.43				

### Bag

Concentrations	THC <sup>[ppmC]</sup>	CO <sup>[ppm]</sup>	CO <sub>2</sub> <sup>[%]</sup>	NO <sub>x</sub> <sup>[ppm]</sup>	N <sub>2</sub> O <sup>[ppm]</sup>	CH <sub>4</sub> <sup>[ppm]</sup>	NMHC <sup>[ppm]</sup>
Range	100	50	1	30		30	
Sniff	0.000	1.248	0.880	5.921		0.733	
Zero Read	0.002	0.004	0.000	0.009		0.000	
Zero Offset <sup>[%]</sup>	0.027	0.021	0.002	0.018		0.007	
Span Read	93.390	46.550	0.933	27.940		27.710	
Span Offset <sup>[%]</sup>	0.059	-0.139	-0.173	-0.003		0.000	
Sample	0.000	1.344	0.881	5.616		2.158	
Std. Dev.	0.000						
Ambient	3.926	1.353	0.050	0.056		2.245	
Std. Dev.	0.000						
Corrected	0.186	0.081	0.834	5.563		0.061	0.115
<b>Mass</b>	<b>THC<sup>[g]</sup></b>	<b>CO<sup>[g]</sup></b>	<b>CO<sub>2</sub><sup>[g]</sup></b>	<b>NO<sub>x</sub><sup>[g]</sup></b>	<b>N<sub>2</sub>O<sup>[g]</sup></b>	<b>CH<sub>4</sub><sup>[g]</sup></b>	<b>NMHC<sup>[g]</sup></b>
Uncorrected	0.0244	0.0212	3454.098	2.1883		0.0091	0.0149
Corrected	0.0244	0.0212	3454.098	2.1883		0.0091	0.0149
<b>Mass per distance</b>	<b>THC<sup>[g/mile]</sup></b>	<b>CO<sup>[g/mile]</sup></b>	<b>CO<sub>2</sub><sup>[g/mile]</sup></b>	<b>NO<sub>x</sub><sup>[g/mile]</sup></b>	<b>N<sub>2</sub>O<sup>[g/mile]</sup></b>	<b>CH<sub>4</sub><sup>[g/mile]</sup></b>	<b>NMHC<sup>[g/mile]</sup></b>
Corrected for Lost Sample Mass	0.0030	0.0027	431.922	0.2736		0.0011	0.0019
<b>Fuel Consumption</b>							
Fuel Consumption <sup>[g]</sup>	1098.644	Fuel Consumption <sup>[l/100km]</sup>		9.984			
Fuel Consumption <sup>[l]</sup>	1.285	<b>Fuel Economy<sup>[mile/gal]</sup></b>		23.559			

### Diluted Modal

Concentrations	THC <sup>[ppmC]</sup>	CO <sup>[ppm]</sup>	CO <sub>2</sub> <sup>[%]</sup>	NO <sub>x</sub> <sup>[ppm]</sup>	N <sub>2</sub> O <sup>[ppm]</sup>	CH <sub>4</sub> <sup>[ppm]</sup>
Sample	-	1.343	0.902	5.674		2.166
Ambient (bag)	3.926	1.353	0.050	0.056		2.245
Corrected	0.186	0.081	0.855	5.622		0.072
<b>Mass</b>	<b>THC<sup>[g]</sup></b>	<b>CO<sup>[g]</sup></b>	<b>CO<sub>2</sub><sup>[g]</sup></b>	<b>NO<sub>x</sub><sup>[g]</sup></b>	<b>N<sub>2</sub>O<sup>[g]</sup></b>	<b>CH<sub>4</sub><sup>[g]</sup></b>
Uncorrected	0.024	0.021	3541.902	2.208		0.011
Corrected	0.024	0.021	3541.902	2.208		0.011
<b>Mass per distance</b>	<b>THC<sup>[g/mile]</sup></b>	<b>CO<sup>[g/mile]</sup></b>	<b>CO<sub>2</sub><sup>[g/mile]</sup></b>	<b>NO<sub>x</sub><sup>[g/mile]</sup></b>	<b>N<sub>2</sub>O<sup>[g/mile]</sup></b>	<b>CH<sub>4</sub><sup>[g/mile]</sup></b>
Corrected	0.003	0.003	442.901	0.276		
<b>Fuel Consumption</b>						
Fuel Consumption <sup>[g]</sup>	1098.644	Fuel Consumption <sup>[l/100km]</sup>		10.238		
Fuel Consumption <sup>[l]</sup>	1.285	<b>Fuel Economy<sup>[mile/gal]</sup></b>		22.975		

### Correlation for Mass per distance

	THC <sup>[%]</sup>	CO <sup>[%]</sup>	CO <sub>2</sub> <sup>[%]</sup>	NO <sub>x</sub> <sup>[%]</sup>	N <sub>2</sub> O <sup>[%]</sup>	CH <sub>4</sub> <sup>[%]</sup>
Bag to Diluted	0.00	-1.08	-2.48	-0.87	#DIV/0!	#DIV/0!

**Test Data:** US06\_US06  
**Test Number:** ONT3\_002494

**Operator:** REDACTED  
**Driver:** REDACTED

**Date:** 11/17/2021

**Driver Violations**

		<u>P1</u>	<u>I1</u>	<u>Phase1</u>
Number of Violations	-	0	0	0
Duration of Violations	(s)	0.0	0.0	0.0

Number	Phase	Violation Begin (s)	Violation End (s)	Violation Duration (s)	Scheduled Speed (mph)	Max Speed Deviation (mph)
No Violations In This Test				0.0		

**Phase 1**

**Analyzer Adjust**

	Range Number	Range ppm	Zero Value ppm	Zero Set Value ppm	Zero Offset %	Span Value ppm	Span Set Value ppm	Span Offset %	ReZero Value ppm
CO <sub>2</sub> (%)	1	1	0.00	0.00	0.01	0.93	0.93	-0.02	0.00
CO	1	50	0.00	0.00	0.01	46.55	46.54	0.02	0.01
NO <sub>x</sub>	1	30	0.01	0.00	0.03	27.94	27.90	0.13	0.00
THC (ppmC1)	2	30	0.00	0.00	0.01	28.02	28.02	0.00	0.18
CH <sub>4</sub>	1	30	0.00	0.00	0.00	27.71	27.70	0.03	0.04

**Analyzer Check**

	Range Number	Range ppm	Zero Value ppm	Zero Set Value ppm	Zero Drift %	Span Value ppm	Span Set Value ppm	Span Drift %
CO <sub>2</sub> (%)	1	1	0.00	0.00	0.00	0.93	0.93	-0.15
CO	1	50	0.01	0.00	0.01	46.47	46.54	-0.16
NO <sub>x</sub>	1	30	0.01	0.00	0.00	27.90	27.90	-0.14
THC (ppmC1)	2	30	0.16	0.00	-0.07	28.14	28.02	0.40
CH <sub>4</sub>	1	30	0.00	0.00	-0.11	27.70	27.70	-0.03

Operator **REDACTED** Driver **REDACTED** Customer : 3182  
 Test Purpose: Certification Legislation: EPA1066 Requirements (Bag) CERTIFICATION  
 Conditioning: Emission Standards Default  
 Test Intent: TEST #3 AS RECEIVED

VIN **REDACTED**

DYNO Data

	Road Load	Street Load	Phase1	Phase2	Phase3	Phase4	Weighted
Inertia [lb]	5500.00						
A [N]	-10.231	185.402					
B [N/km/h]	0.94805	0.24019					
C [N/km2/h2]	0.056161	0.063117					
Distance (m)							
Target			12887.54				12887.54
Driven			12867.77				12867.77
Distance Rating (%)			-0.1534				-0.1534
Cycle Energy (MJ)							
Target			14.66				14.66
Driven			14.43				14.43
Distance per Energy Cycle (m/MJ)							
Target			14.66				879.13
Driven			14.43				891.55
Road Load Work Fraction							
Target			0.5504				0.5504
Driven			0.5682				0.5682
Inertial Work (MJ)							
Target			6.59				6.59
Driven			6.23				6.23
Inertial Work Fraction							
Target			0.4496				0.4496
Driven			0.4318				0.4318
Inertial Work Rating (%)			-5.4330				-5.4330
Absolute Speed Change (m/s)							
Target			360.04				360.04
Driven			349.19				349.19
Absolute Speed Change Rating (%)			-3.0143				-3.0143
Energy Rating (%)			-1.5446				-1.5446
Energy Economy Rating (%)			-1.4131				-1.4131



Operator	<b>REDACTED</b>	Driver	<b>REDACTED</b>	Customer :	3182
Test Purpose:	Certification	Legislation:	EPA1066	Requirements (Bag)	CERTIFICATION
Conditioning:		Emission	Default		

Overall Status **Passed**

**Phase 1**

Test Record #: ONT3\_002494

Vehicle ID: **REDACTED**

	<u>Average</u>	<u>Min</u>	<u>Max</u>	<u>Low Limit</u>	<u>Upper Limit</u>	<u>Status</u>
<b>General</b>						
Cell Temperature (°C)	24.58	21.60	28.70	20.00	30.00	Passed
Barometer (mbar)	981.22	981.10	981.30	800.00	1100.00	Passed
Dew Point Temperature (°C)	9.45	8.50	10.50	-9.44	37.78	Passed
Specific Humidity Test Cell (gr/lb)	53.55	49.72	57.36	38.50	87.50	Passed
Dilution Air Temperature (°C)	35.16	34.75	35.45	15.00	52.00	Passed
Weighted Test Dilution Factor (-)	15.21			7.00	20.00	Passed
Dilution Factor (-)	15.21			7.00	20.00	Passed
Fuel Economy (mpg)	23.56			10.00	50.00	Passed
Zero Offset (%)	-	0.00	0.03	-2.00	2.00	Passed
Span Offset (%)	-	-0.02	0.13	-2.00	2.00	Passed
Zero Check Drift (%)	-	-0.11	0.01	-2.00	2.00	Passed
Span Check Drift (%)	-	-0.16	0.40	-2.00	2.00	Passed
Bag vs. Modal Validation (CO2) (%)	n.a.	-	-	-10.00	10.00	Passed
<b>Ambient Concentrations</b>						
HC (ppm)	3.93			2.00	10.00	Passed
NO <sub>x</sub> (ppm)	0.06			-0.10	10.00	Passed
CO (ppm)	1.35			0.00	15.00	Passed
CO <sub>2</sub> (ppm)	502.47			300.00	650.00	Passed
CH <sub>4</sub> (ppm)	2.24			1.30	10.00	Passed
N2O (ppm)				0.20	0.50	
<b>PM Filter Parameters</b>						
Particulate Filter Temperature (°C)	49.92	45.65	51.55	42.00	60.00	Passed
Filter Face Velocity (cm/s)	90.71			0.00	100.00	Passed
Particulate Result Validation (ug)	14.00			1.00	600.00	Passed
<b>Test-Cycle Specific Validations</b>						
Phase Distance (miles)	8.00			7.85	8.17	Passed
Sample Phase Time (s)	595.7			594.5	598.5	Passed
Duration Phase 1 (s)	596.50					NA
Crank Time Phase1 (s)	0.00			0	5	Passed
Crank Time Phase3 (s)				0	5	
Crank Counts	0			0	1	Passed
Shutdown Time Phase 1				0	5	
Shutdown Time Phase 3				0	5	
Hot Soak Time (s)				540.00	660.00	
Test Hold Counts	0					Passed
Duration Test Hold (s)	0.00			0	60	Passed