


ATDS Emission Lab Test Report

for Exhaust Emission Test Procedures according

Date:	11/17/2021	Start Time:	11:43:28
Test Number:	ONT3_002493	End Time:	12:42:45
Test Vehicle:	3182_FCRXT03.05PV-349		
Test Legislation:	EPA1066		
Test Cycle:	HWFET+HWFET		
Test Purpose:	Certification		
Test Cell:	IGEM-V-TC1		
Order Number:	3182		
Remark:	TEST #3 AS RECEIVED		

	QUALITY ASSURANCE
INSPECTED BY:	REDACTED
DATE:	2021-11-18
COMMENTS:	OK

General Data

Test Number	ONT3_002493		
Test Name	HWFET_HWFET		
Test Cell	iGEM-V-TC1		
Test Type	HWFET_HWFET		
Legislation	EPA1066		
Requirements (Bag)	CERTIFICATION		
Requirements (Modal)	CERTIFICATION		
Date	11/17/2021	CH ₄ Response Factor	1.186
Test Start	11:43:28	Odometer Position ^[mi]	107907
Start Time Cycle	2021-11-17 12 13-17-(000)	Delay Time Method	
Test End	12:42:45		
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 **3182_FCRXT03.05PV-349**

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 **3182**

Dyno Type	SVOR	Inertia ^[lb]	5500.00
	A ^[lb]	B ^[lb/mph]	C ^[lb/mph²]
Street Load	41.680	0.08690	0.036750
Road Load	-2.300	0.34300	0.032700

Fuel Data **Diesel-FL0821BE10**

Fuel Type	DIESEL	Fuel Temperature ^[°C]	15.00
Fuel Analyze Date		Fuel Density ^[kg/l]	0.8550
Fuel Manufacturer		Net Heat. Val. ^[BTU/lb]	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 ^[deg F]	68.00	Dew Point Max ^[deg F]	100.00
Temp Max ^[deg F]	86.00	Pressure Min ^[mbar]	800.0
Dew Point Min ^[deg F]	15.01	Pressure Max ^[mbar]	1100.0

Fan Speed Data **RoadSpeed**

F1 ^[%]	F2 ^[%/mph]	F3 ^[%/mph²]
5	0.745999992	0.0031

Test Data HWFET_HWFET Operator REDACTED Speed Table Date: 11/17/2021
 Test Number ONT3_002493 Driver REDACTED Shift Table Auto Cold Start

Vehicle	REDACTED	Dyno	Fuel	Test Timing
Vehicle #	REDACTED	Inertia ^[lb]	Diesel-FL0821BE10	Start Time 11:43:28
Model	1500	A ^[br]	Fuel type DIESEL	End Time 12:42:45
Year	2015	B ^[lb/imp]	Density 0.8550	
Displacement:	3.0L	C ^[lb/imp2]	NHV 18295	Soak Time
Engine Family	FCRXT03.05PV		CWF 0.8650	
Trans	Automatic	Flow Stream	ModalDirty	
Odometer ^[mile]	107907	Remark	TEST #3 AS RECEIVED	

Bag Analysis

PHASE 1	THC ^[ppmC]	CO ^[ppm]	CO ₂ ^[%]	NO _x ^[ppm]	N ₂ O ^[ppm]	CH ₄ ^[ppm]	NMHC ^[ppm]	Temp. ^[°F]	76.13	Volume ^[scf]	4717
Range	100	50	4	30		30		Press. ^[inHg]	28.99	D.F.	11.66
Zero Read	0.00	0.0	0.0	0.0		0.0		RH ^[%]	38.92	Ph. Start ^[s]	779.3
Span Read	93.39	46.53	3.719	27.920		27.700		AH ^[°/°]	7.681	Ph. End ^[s]	1544.2
Sample	0.45	0.66	1.103	0.113		0.160	0.264	Dist. ^[m]	10.28	Ph. Length ^[s]	764.0
Mass.	0.035	0.103	2713.456	0.026		0.014	0.020	NO _x Ccr.	0.9094	Bag An. Del	621
Mass per Dist.	0.0034	0.0101	263.956	0.0026		0.0014	0.0020	Dr. Viola.	0	Vio. Durat. ^[s]	0.0
PSS Massflow Particles [g/h]	0.0209							Crank ^[s]	0.00	FE ^[mile/gal]	38.5
				PSS Mass per Dist. [g/mile]							
											0.0004

Total Result

actual	THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	N ₂ O ^[g/mile]	CH ₄ ^[g/mile]	NMHC ^[g/mile]	HC+NC _x ^[g/mile]	Fuel Economy
Mass per Dist.	0.0034	0.0101	263.96	0.0026		0.0014	0.0020	0.0060	mile/gal 38.55
Mass per Dist. (rounded)	0.0034	0.0101	264.0	0.0026		0.0014	0.0020	0.0060	Dist. ^[m] 10.28

Mass per Dist. - Particulate PSS 0.0004

Test Data HWFET_HWFET
 Test Number ONT3_002493

Operator REDACTED
 Driver REDACTED

Auto

Correlation Bag and Modal (diluted) for Mass per Distance

		THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	CH ₄ ^[g/mile]	N ₂ O ^[g/mile]	NMHC ^[g/mile]
Bag	Phase 1	0.0000	0.0101	263.9558	0.0026	0.0014		
Modal	Phase 1	0.0000	0.0102	268.0944	0.0010	0.0016		
Percent	Phase 1	#DIV/0!	-1.41	-1.54	147.44	-14.46	#DIV/0!	#DIV/0!
Total								
Bag		0.0000	0.0101	263.9558	0.0026	0.0014		0.0014
Modal		0.0000	0.0102	268.0944	0.0010	0.0016		
Percent		#DIV/0!	-1.41	-1.54	147.44	-14.46	#DIV/0!	#DIV/0!

Total Result (weighted)

<i>Weighted</i>	THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	CH ₄ ^[g/mile]	N ₂ O ^[g/mile]	NMHC ^[g/mile]	HC+NO _x ^[g/mile]	Fuel Economy
Mass per Dist.	0.0000	0.01	263.96	0.00	0.00			0.003	mile/gal 38.5

Total Result

<i>actual</i>	THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	CH ₄ ^[g/mile]	N ₂ O ^[g/mile]	NMHC ^[g/mile]	HC+NO _x ^[g/mile]	Fuel Economy
Mass per Dist.	0.0000	0.01	263.96	0.00	0.00			0.003	mile/gal 38.5 Dist. ^[mi] 10.28

CVS Data		Cycle data		Environmental Data	
Dilution Factor (Bag)	11.66	Vio. Dur. ^[s]	0.0	Rel. Hum. ^[%]	38.92
Dilution Factor (Modal)	11.48	Number	0	Ab. Hum. ^[g/lbs]	7.68
CVS Volume ^[scf]	4717.41	Act. Dist. ^[mi]	10.28	Pressure ^[inHg]	28.99
CVS Flow ^[scfm]	370.48			Temp. ^[°F]	76.13
CVS Inlet Pressure	28.90			Temp. Min. ^[°F]	73.04
CVS Inlet Temp. ^[°F]	114.68			Temp. Max. ^[°F]	80.78
CVS Inlet Temp. Min. ^[°F]	106.43			NO _x Corr. F	0.9094
CVS Inlet Temp. Max. ^[°F]	120.65				

Bag

Concentrations	THC ^[ppmC]	CO ^[ppm]	CO ₂ ^[%]	NO _x ^[ppm]	N ₂ O ^[ppm]	CH ₄ ^[ppm]	NMHC ^[ppm]
Range	100	50	4	30		30	
Sniff	0.000	1.041	1.149	0.206		0.720	
Zero Read	0.004	-0.027	0.000	0.021		0.000	
Zero Offset ^[%]	0.032	0.001	0.003	0.040		0.001	
Span Read	93.390	46.530	3.719	27.920		27.700	
Span Offset ^[%]	0.071	-0.122	-0.067	-0.190		-0.233	
Sample	0.000	1.081	1.150	0.163		2.329	
Std. Dev.	0.000						
Ambient	4.096	0.460	0.051	0.055		2.372	
Std. Dev.	0.000						
Corrected	0.454	0.661	1.103	0.113		0.160	0.264
Mass	THC ^[g]	CO ^[g]	CO ₂ ^[g]	NO _x ^[g]	N ₂ O ^[g]	CH ₄ ^[g]	NMHC ^[g]
Uncorrected	0.0352	0.1035	2713.456	0.0265		0.0144	0.0203
Corrected	0.0352	0.1035	2713.456	0.0265		0.0144	0.0203
Mass per distance	THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	N ₂ O ^[g/mile]	CH ₄ ^[g/mile]	NMHC ^[g/mile]
Corrected for Lost Sample Mass	0.0034	0.0101	263.956	0.0026		0.0014	0.0020
Fuel Consumption							
Fuel Consumption ^[g]	863.128	Fuel Consumption ^[l/100km]		6.102			
Fuel Consumption ^[l]	1.010	Fuel Economy ^[mile/gal]		38.547			

Diluted Modal

Concentrations	THC ^[ppmC]	CO ^[ppm]	CO ₂ ^[%]	NO _x ^[ppm]	N ₂ O ^[ppm]	CH ₄ ^[ppm]
Sample	-	1.090	1.167	0.096		2.353
Ambient (bag)	4.096	0.460	0.051	0.055		2.372
Corrected	0.454	0.670	1.120	0.046		0.187
Mass	THC ^[g]	CO ^[g]	CO ₂ ^[g]	NO _x ^[g]	N ₂ O ^[g]	CH ₄ ^[g]
Uncorrected	0.035	0.105	2756.000	0.011		0.017
Corrected	0.035	0.105	2756.000	0.011		0.017
Mass per distance	THC ^[g/mile]	CO ^[g/mile]	CO ₂ ^[g/mile]	NO _x ^[g/mile]	N ₂ O ^[g/mile]	CH ₄ ^[g/mile]
Corrected	0.003	0.010	268.094	0.001		
Fuel Consumption						
Fuel Consumption ^[g]	863.128	Fuel Consumption ^[l/100km]		6.198		
Fuel Consumption ^[l]	1.010	Fuel Economy ^[mile/gal]		37.952		

Correlation for Mass per distance

	THC ^[%]	CO ^[%]	CO ₂ ^[%]	NO _x ^[%]	N ₂ O ^[%]	CH ₄ ^[%]
Bag to Diluted	0.00	-1.41	-1.54	147.44	#DIV/0!	#DIV/0!

Test Data: HWFET_HWFET
Test Number: ONT3_002493

Operator: REDACTED
Driver: REDACTED

Date: 11/17/2021

Driver Violations

	<u>P1</u>	<u>I1</u>	<u>Phase1</u>
Number of Violations	-	0	0
Duration of Violations	(s)	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 ₂ (%)	2	4	0.00	0.00	-0.01	3.72	3.72	-0.03	0.00
CO	1	50	-0.03	0.00	-0.05	46.53	46.54	-0.02	0.00
NO _x	1	30	0.02	0.00	0.07	27.92	27.90	0.07	0.01
THC (ppmC1)	2	30	0.00	0.00	0.01	28.02	28.02	0.00	0.18
CH ₄	1	30	0.00	0.00	0.00	27.70	27.70	0.00	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 ₂ (%)	2	4	0.00	0.00	0.00	3.72	3.72	-0.04
CO	1	50	0.00	0.00	-0.01	46.48	46.54	-0.10
NO _x	1	30	0.01	0.00	0.01	27.84	27.90	-0.26
THC (ppmC1)	2	30	0.16	0.00	-0.05	28.13	28.02	0.36
CH ₄	1	30	0.00	0.00	-0.14	27.63	27.70	-0.23

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
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

	Phase1	Phase2	Phase3	Phase4	Weighted
Distance (m)					
Target	16506.54				16506.54
Driven	16540.28				16540.28
Distance Rating (%)	0.2044				0.2044
Cycle Energy (MJ)					
Target	11.45				11.45
Driven	11.52				11.52
Distance per Energy Cycle (m/MJ)					
Target	11.45				1441.13
Driven	11.52				1435.70
Road Load Work Fraction					
Target	0.7437				0.7437
Driven	0.7465				0.7465
Inertial Work (MJ)					
Target	2.94				2.94
Driven	2.92				2.92
Inertial Work Fraction					
Target	0.2563				0.2563
Driven	0.2535				0.2535
Inertial Work Rating (%)	-0.4960				-0.4960
Absolute Speed Change (m/s)					
Target	130.69				130.69
Driven	130.03				130.03
Absolute Speed Change Rating (%)	-0.5030				-0.5030
Energy Rating (%)	0.5833				0.5833
Energy Economy Rating (%)	0.3767				0.3767

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

Overall Status **Passed**

Phase 1

Test Record #: ONT3_002493

Vehicle ID: **REDACTED**

	<u>Average</u>	<u>Min</u>	<u>Max</u>	<u>Low Limit</u>	<u>Upper Limit</u>	<u>Status</u>
General						
Cell Temperature (°C)	24.52	22.80	27.10	20.00	30.00	Passed
Barometer (mbar)	981.75	981.60	981.90	800.00	1100.00	Passed
Dew Point Temperature (°C)	9.60	9.10	10.40	-9.44	37.78	Passed
Specific Humidity Test Cell (gr/lb)	53.77	51.61	56.62	38.50	87.50	Passed
Dilution Air Temperature (°C)	35.80	35.45	36.05	15.00	52.00	Passed
Weighted Test Dilution Factor (-)	11.66			7.00	20.00	Passed
Dilution Factor (-)	11.66			7.00	20.00	Passed
Fuel Economy (mpg)	38.55			10.00	50.00	Passed
Zero Offset (%)	-	-0.05	0.07	-2.00	2.00	Passed
Span Offset (%)	-	-0.03	0.07	-2.00	2.00	Passed
Zero Check Drift (%)	-	-0.14	0.01	-2.00	2.00	Passed
Span Check Drift (%)	-	-0.26	0.36	-2.00	2.00	Passed
Bag vs. Modal Validation (CO2) (%)	n.a.	-	-	-10.00	10.00	Passed
Ambient Concentrations						
HC (ppm)	4.10			2.00	10.00	Passed
NO _x (ppm)	0.05			-0.10	10.00	Passed
CO (ppm)	0.46			0.00	15.00	Passed
CO ₂ (ppm)	514.44			300.00	650.00	Passed
CH ₄ (ppm)	2.37			1.30	10.00	Passed
N ₂ O (ppm)				0.20	0.50	
PM Filter Parameters						
Particulate Filter Temperature (°C)	49.45	45.65	51.35	42.00	60.00	Passed
Filter Face Velocity (cm/s)	89.80			0.00	100.00	Passed
Particulate Result Validation (ug)	23.00			1.00	600.00	Passed
Test-Cycle Specific Validations						
Phase Distance (miles)	10.28			10.05	10.46	Passed
Sample Phase Time (s)	764.0			762.9	766.9	Passed
Duration Phase 1 (s)	764.90					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