

FPS2851ULC4 – Urea Quality Sensor



Product performances

Real-time urea quality sensing:

- Urea concentration
- Urea temperature
- Detection of unauthorized fluids

In development:

- Identification of unauthorized fluids

Fully integrated sensor and processing electronics provide a solid state sensor for in line or in tank urea quality monitoring

Factory calibrated in compliance with DIN70070 / ISO 22241 standards.

Digital output as per J1939, CAN2.0B standard or CAN2.0A featuring high-resolution parameter readings



DESCRIPTION

Current performance

The FPS2851ULC4 is a sensor that directly and simultaneously measures all the critical parameters of aqueous urea solution. Relying on patented tuning fork technology, the measurements of urea concentration, temperature enable users to determine if the quality of the employed reducing fluid will enable Selective Catalytic Reduction systems to achieve optimal performance. In-line or in-tank real-time multi-parametric urea analysis allows high performance algorithms to provide direct feedback to urea feed control systems or ECMs to optimize emission control for NOx reduction. The FPS2851ULC4 is an important tool for meeting regulated OBD compliance to confirm urea presence and concentration, security signal communication. A universal digital CAN J1939 compliant protocol provides easy to connect interface to main control systems (i.e., ECM, SCR feed control, OBD bus). A simple 4 pin connector allows cost effective mounting options.

The multiparametric sensor will rely on its simultaneous measurement of a fluids viscosity, density and dielectric constant to detect unauthorized fluids such as diesel fuel, salt water, coolant, windshield fluid, sugar water or water.

In development performance: identification of unauthorized fluids

Based on simultaneous measurement of fluids properties, the function of identification of unauthorized fluids such as diesel fuel, salt water, coolant, windshield fluid, sugar water or water is now in development.

FEATURES

APPLICATIONS

Proprietary corrosion and contaminant resistant coating for wetted parts

High reliability and long term stability

Optimized for OEM specifications

Urea resistant DIN7070/ ISO22241 material

Tank or line mounting

Diesel Engines

Passenger Vehicles

Buses & Trucks

Commercial On and Off Highway Vehicles

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PERFORMANCE SPECS

MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Supply Voltage (Peak)	V_{cc}	60	V_{dc}
Ambient Operating Temperature (electronics)*	T_e	-40 to +125	°C
Ambient Operating Temperature (fluid)**	T_f	-40 to +125	°C
Ambient Operating Pressure (fluid)	P_f	<10	bar
Storage Temperature	T_{stg}	-50 to +125	°C
Input Current @12 Vdc (in rush)	I_{pk}	< 200	mA
Vibration (Peak)		10	Grms

Peak conditions: less than 10% of the operating time.

* Ambient Operating Temperature: Service temperature range at which the sensor and its electronics can operate securely.

** Adblue / DEF fluids classically freeze at temperature inferior to -11°C and quickly degrades at temperatures superior to 40°C

METROLOGICAL CHARACTERISTICS

Measurement Ranges	Symbol	Min	Typ	Max	Unit
Urea concentration	% urea	5	32.5	62.5	% mass
Urea concentration accuracy		-3	+/-1	+3	% mass
DEF Fluid Temperature *	T	-11		40	°C
Other Fluid Temperature **	T	-40		125	°C
Temperature Accuracy	T		+/-1		°C
Response time	t		40		s

* Adblue / DEF fluids classically freeze at temperature inferior to -11°C and quickly degrades at temperatures superior to 40°C

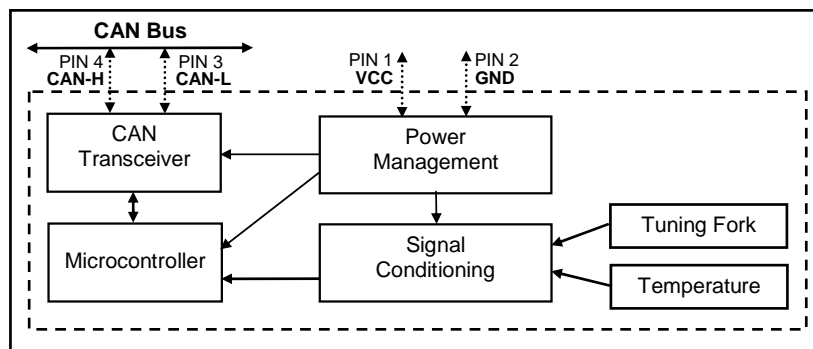
** Temperature sensor is capable within the -40 to 125°C range with a 1°C accuracy

ELECTRICAL CHARACTERISTICS

(@ $V_{cc}=12 V_{dc}$, ambient temperature)

Electrical Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{Batt}	9	12 (24)	36	Vdc
Supply Current (steady state)	I_{avg}		40(30)	100	mA

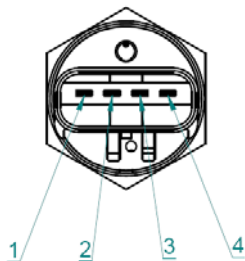
BLOCK DIAGRAM



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CONNECTING & MECHANICAL PACKAGING

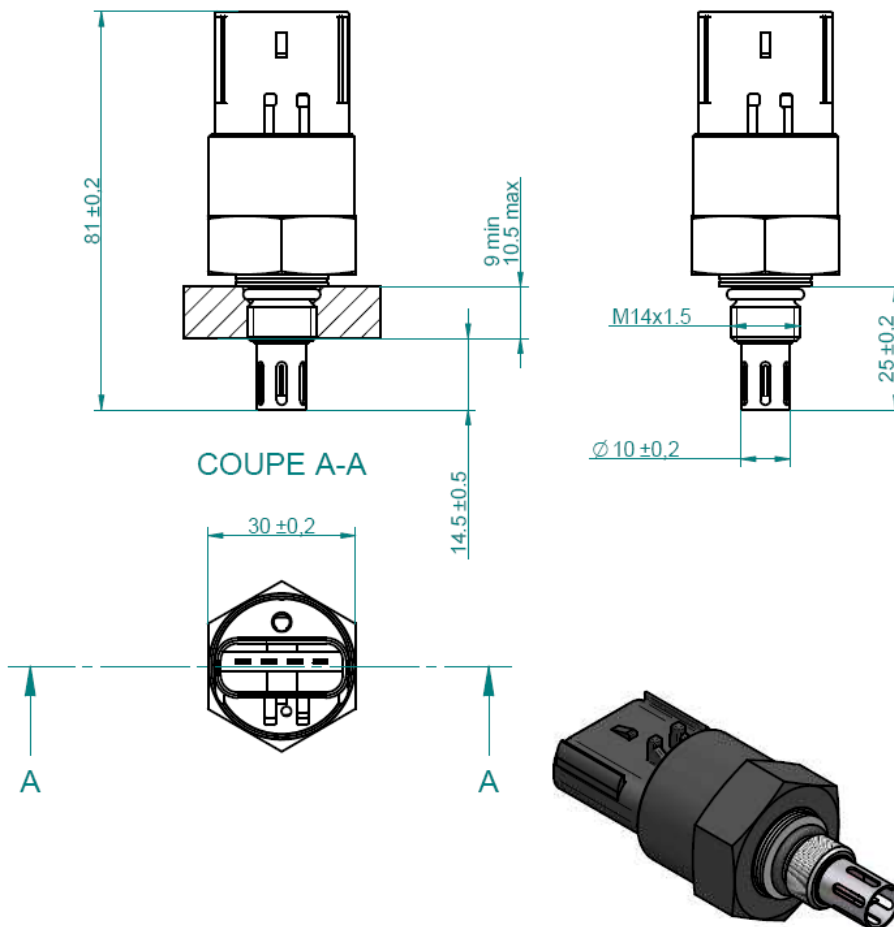
PINOUT ASSIGNMENT



N ₀	Function
1	VCC – Voltage Supply
2	GND – Ground
3	CAN_L
4	CAN_H

MECHANICAL CHARACTERISTICS: FPS2851ULC4 PACKAGE

All dimensions are in millimetres (mm). Mating connector type is FCI female receptacle ref. 54200409 (black-sealed).



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TRANSMISSION DATA

FPS2851ULC4 UREA QUALITY SENSOR J1939 STANDARD SPN AND STANDARD PGN

PGN 64923 is related to catalyst reagent properties.

Catalyst Reagent Temperature: SPN 3515	Min	Typ	Max
Limits (°C)	-40		210
Limits (DATA)	0x00		0xFA
Resolution (°C per bit)		1	
Byte position		1	
Update rate (s)		1	
Catalyst Reagent Concentration : SPN3516	Min	Typ	Max
Limits (%)	0		62.5
Limits (DATA)	0x00		0xFA
Resolution (% per bit)		0.25	
Byte position		2	
Update rate (s)		1	
Catalyst Reagent Type : SPN3521	This parameter indicates what reagent is in the tank		
0000	urea		
1101	Not able to determine catalyst reagent type		
1110	Error detected with urea reagent type detection		
1111	Not available		
In development			
0001	water		
0010	Diesel fuel		
0011	Proper fluid		

In development : Failure status and diagnostic of the sensor are defined by SPN 3519 and 3520.

SPN 3519	Catalyst reagent temperature Preliminary FMI
Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the catalyst temperature sensor	
SPN 3520	Catalyst reagent properties Preliminary FMI
Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the catalyst reagent properties sensor. This may be used for indicating failures of the catalyst reagent concentration or catalyst reagent type.	

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RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES

FPS2851ULC4 contains circuits to protect its inputs and outputs against Electrostatic discharges (ESD) up to $\pm 15\text{kV}$ (air discharge)

FPS2851ULC4 is protected against EMC interferences (SAE J1114)

FPS2851ULC4 is protected against reverse polarity

FPS2851ULC4 is cross wire protected

FPS2851ULC4 sensor is qualified for operation in harsh operating conditions and protected from corrosion and contamination by urea, fuel, water, soaps and acids.

NOTE: This FPS2851ULC4 – Urea Quality Sensor and its use may be covered by one or more patents, including US Patents 6,957,565; 6,873,916; 6,494,079; 6,336,353; 7,043,969 and other pending US and worldwide patents.

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