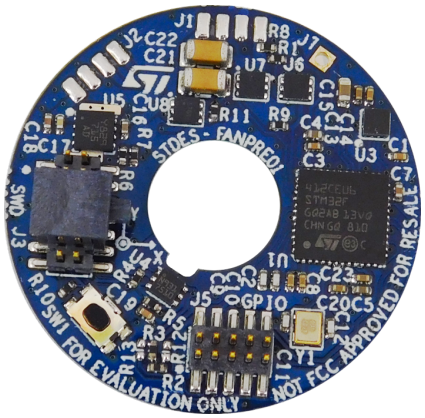
STDES-FANPRE01

Data brief

Solution to enable predictive maintenance for fan and small motor applications, and condition based monitoring



Features

- Compact solution for predictive maintenance and condition monitoring based on 3D accelerometer and contact temperature sensor
- Main components:
  - 32-bit ARM® Cortex®-M4 microcontroller
  - 3D MEMS accelerometer
  - Contact temperature sensor
  - LDO regulator output 3.3 V, 85 mA
  - N-Channel 30 V Power MOSFET
- Embedded firmware developed for sensor data acquisition, predictive maintenance algorithm, and motor speed calculation
- SWD connector for debugging and programming
- Expansion connector for serial data transfer to host unit
- RoHS and WEEE compliant

Description

The STDES-FANPRE01 has a circular form factor (inner diameter 10 mm, outer diameter 32 mm), and is designed to enables the predictive maintenance features, and provide condition based monitoring data in typical fan and small motor applications.

It is driven by the STM32F412CE microcontroller, with an on-board ST715 LDO to power the digital ICs, IIS2DH accelerometer to acquire vibration data for frequency domain and time domain analyses, STTS751 temperature sensor to monitor bearing temperature trends during operation, and a driving circuit based on the STL6N3LLH6 Power MOSFET driven by PWM signals.

The board also offers an ST-LinkV3 programming connector with Virtual COM interface, and a connector with three different serial interfaces to allow connection with a host controller or other board.

The firmware contains algorithms to derive vibration power spectra and acceleration peak and RMS data, which can in turn be used to signal the status of equipment operating conditions (GOOD, WARNING, ALARM).

Product summary table	
STM32 dynamic efficiency MCU with BAM, high-performance and DSP with FPU, ARM Cortex-M4 core, 512 Kbytes Flash, 100 MHz, Art Accelerator, DFSDM	STM32F412CE
3-axis digital accelerometer, ultra low-power high performance MEMS motion sensor	IIS2DH
low-voltage local digital temperature sensor	STTS751
High input voltage - 85 mA LDO linear regulator	ST715
N-channel 30 V, 0.021 Ω typ., 6 A STripFET H6 Power MOSFET	STL6N3LLH6
Application Condition Monitoring and Predictive Maintenance	

1 Schematic diagrams

Figure 1. Microcontroller and programming connector

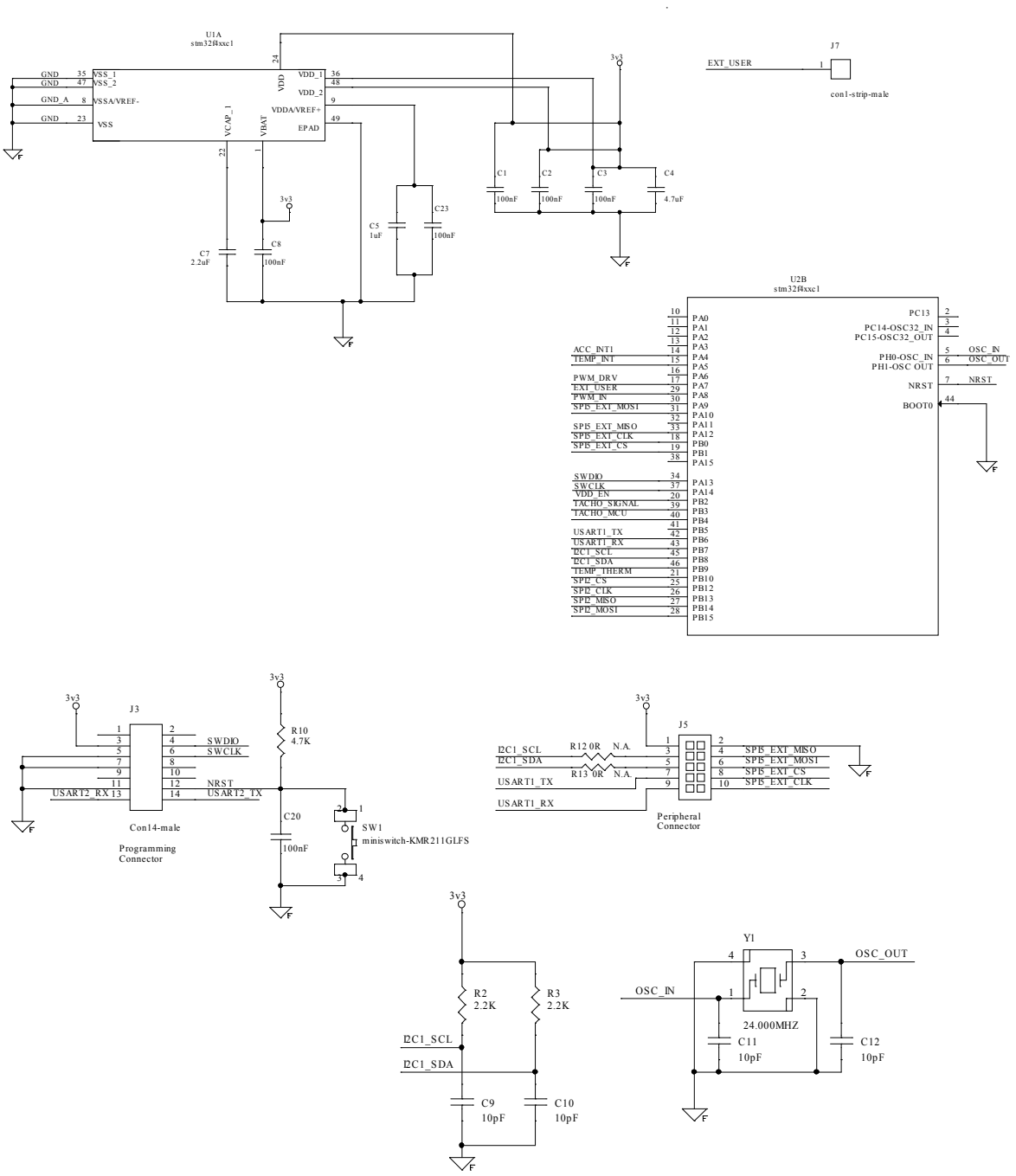


Figure 2. Wires connection for MCU and external equipment

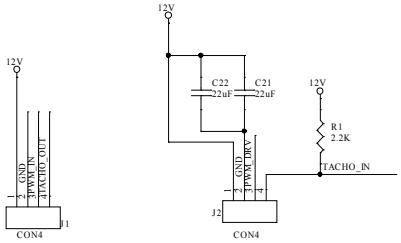


Figure 3. Supply voltage regulation circuit

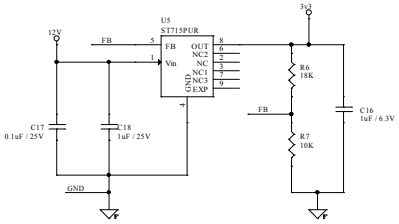


Figure 4. Sensors

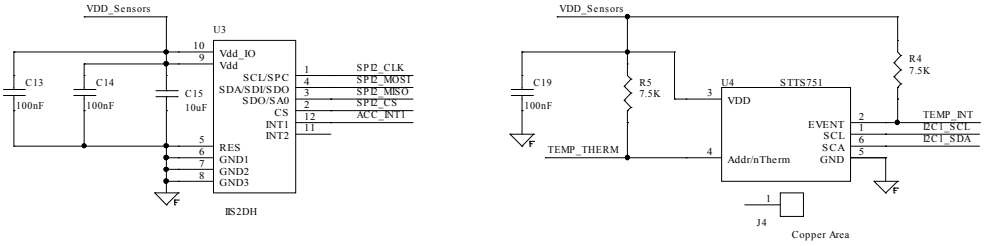


Figure 5. Tachometer signal level shifting

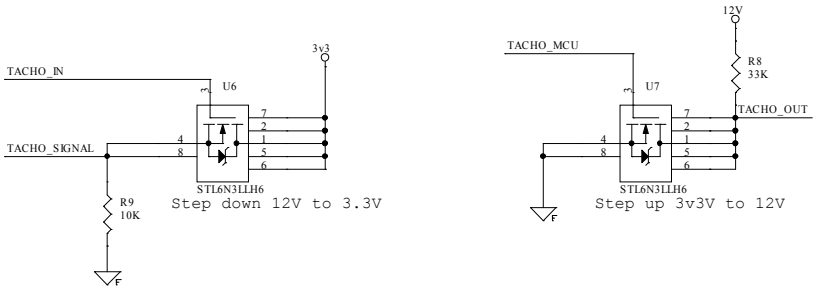
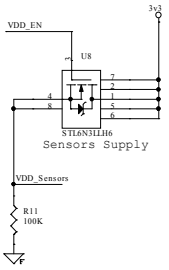


Figure 6. **Enable Vdd sensor**



Revision history

Table 1. **Document revision history**

Date	Version	Changes
18-Dec-2019	1	Initial release.
16-Apr-2020	2	Updated description.
25-Aug-2020	3	Updated title and Section Description