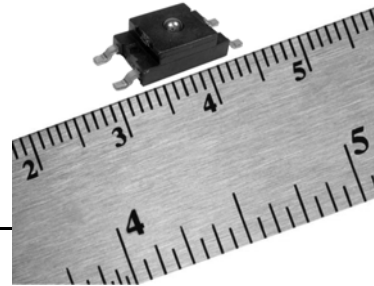


FSS-SMT Series

Low Profile Force Sensor



DESCRIPTION

Honeywell's FSS-SMT Series force sensors are designed to be one of the most reliable force sensors available as illustrated by 20 million Mean Cycles To Failure (MCTF) at 25 °C [77 °F] rating. This low profile Surface Mount Technology (SMT) sensor allows for automated assembly on a printed circuit board, often helping the customer to reduce assembly costs.

The FSS-SMT Series force sensor is designed to provide precise and reliable force sensing performance in a compact commercial-grade package. The sensor incorporates Honeywell sensing technology that uses a specialized piezoresistive micromachined silicon sensing element. The low power, unamplified, uncompensated Wheatstone bridge circuit design provides inherently stable millivolt output over the force range.

Force sensors operate on the principle that the resistance of silicon-implanted piezoresistors will change when the resistors flex under applied force. The sensor concentrates force from the applications, through the stainless steel ball, directly to the silicon-sensing element. The amount of resistance changes in proportion to the amount of force being applied. This change in circuit resistance results in a corresponding mV output level change.

The sensor package design incorporates patented modular construction. The use of innovative elastomeric technology and engineered molded plastics results in load excitation capacities of 44 N over-force. The stainless steel ball provides excellent mechanical stability, and is suitable for a variety of potential medical and commercial applications.

FEATURES/BENEFITS

- Surface Mount Technology allows for automated assembly and may eliminate hand soldering
- RoHS-compliant materials meet Directive 2002/95/EC
- Low deflection (30 microns typical at full scale) help reduce measurement error
- Direct mechanical coupling of the actuation ball to the sense element reduces coupling errors and keeps mechanical hysteresis to a minimum
- Product rating of 20 million MCTF at 25 °C [77 °F], subject to application variation, provides for consistent output over time and reduces repairs or replacements
- Small size minimizes space on the printed circuit board (PCB)
- Provides enhanced sensitivity without compromising signal integrity, resulting in low system noise and reducing measurement errors
- Electrically ratiometric output accommodates supply voltage variations, leading to low ratiometricity error
- Low voltage supply allows for use in many battery powered applications
- High resistance to electrostatic discharge (ESD) (8 KV) meets ESD Sensitivity Classification Level 3, reducing special handling during assembly
- Sensor output has low sensitivity to many mounting stresses

FSS-SMT Series

POTENTIAL APPLICATIONS

Medical

- Infusion pumps
- Ambulatory non-invasive pumps
- Occlusion detection
- Kidney dialysis machines
- Enteral pumps

Commercial

- Load and compression sensing
- Variable tension control
- Wire bonding equipment

Table 1. Absolute Maximum Ratings¹

Parameter	Min.	Max.	Unit
Electro-Static Discharge (ESD)	-	8	kV
Storage temperature ²	-40 [-40]	100 [212]	°C [°F]
Solderability ³	-	260 [500] for 10 s	°C [°F]

Table 2. Operating Specifications (Performance characteristics at 5.0 ± 0.01 Vdc excitation, 25 °C [77 °F])

Parameter	Min.	Typical	Max.	Unit
Supply voltage ⁴	3.0	5.0	6.0	V
Operating force	0	-	14.7	N
Operating temperature ⁵	-40 [-40]	-	85 [185]	°C [°F]
Offset ⁶	-15	0	15	mV
Span ⁷	150	180	210	mV
Sensitivity ⁸	10.2	12.2	14.3	mV/N
Force non-linearity (BFSL) ⁹	-	±0.7	±1.5	%FSS
Repeatability at 2.9 N ¹⁰	-	±1.5	-	mV
Mechanical hysteresis ¹¹		±0.5		%FSS
Thermal effect on offset ¹² 25 °C to 0 °C [77 °F to 32 °F], 25 °C to 50 °C [77 °F to 122 °F]	-	±0.5	-	mV
Thermal effect on span ¹³ 25 °C to 0 °C [77 °F to 32 °F], 25 °C to 50 °C [77 °F to 122 °F]	-	±5.5	-	%FSS
Input resistance	4.0	5.0	6.0	kOhm
Output resistance	4.0	5.0	6.0	kOhm
Over force ¹⁴	44	-	-	N