

Installation Instructions for the FSS-SMT Series Low Profile Force Sensor

ISSUE 2
50044164

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

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 Vdc ± 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

Table 3. Environmental Specifications

Parameter	Characteristic
Shock	Qualification tested to 150 G
Vibration	Qualification tested to 0 to 2 kHz, 20 G sine
Mean Cycles To Failure (MCTF) ¹⁵	20 million at 25 °C [77 °F]

Notes:

1. Absolute maximum ratings are the extreme limits that the device can withstand without damage to the device.
2. The temperature range over which the product may safely be exposed without excitation or force applied. Under these conditions the product will remain in specification after excursion to any temperatures in this range. Exposure to temperatures beyond this range may cause permanent damage to the product.
3. The maximum temperature and time for which the product can be exposed to for processing of solder electrical connections.
4. The range of voltage excitation which can be supplied to the product to produce an output which is proportional to Force but due to Ratiometricity errors may not remain within the specified performance limits.
5. The temperature range over which the product will produce an output proportional to force but may not remain within the specified performance limits.
6. The output signal obtained when the zero force is applied to the sensor. Also known as "null" or "zero".
7. The algebraic difference between the output signal measured at the upper and lower limits of the Operating Force Range. Also known as "full scale output" or simply "span".
8. The ratio of output signal change to the corresponding input force change. Sensitivity is determined by computing the ratio of Span to the specified Operating Force Range.
9. Force Non-Linearity (Best Fit Straight Line): The maximum deviation of product output from a straight line fitted to output measured over the operating force range. The straight line through a set of points which minimizes the sum of the square of the deviations of each of the points from the straight line.
10. The maximum difference between output readings when the same force is applied consecutively, under the same operating conditions, with force approaching from the same direction within the operating force range.
11. The maximum difference between output readings when the same force is applied consecutively, under the same operating conditions, with force approaching from opposite directions within the operating force range.
12. The maximum deviation in Offset due to changes in temperature over the Operating Temperature Range, relative to Offset measured at 25 °C.
13. The maximum deviation in Full Scale Span due to changes in temperature over the Operating Temperature Range, relative to Full Scale Span measured at 25 °C.
14. The maximum force which may safely be applied to the product for it to remain in specification once force is returned to the Operating Force Range. Exposure to higher forces may cause permanent damage to the product. Unless otherwise specified this applies to all temperature within the Operating Temperature Range.
15. MCTF is a basic measure of reliability for a non-repairable device. It is the mean number of cycles to maximum operating force over which a sensor can be expected to operate until failure. The mean value is determined statistically from a probability distribution for failures based upon test data. MCTF may vary depending on the specific application in which a sensor is utilized.

Figure 1. Sensor Pinout

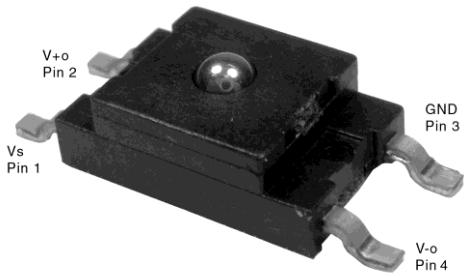
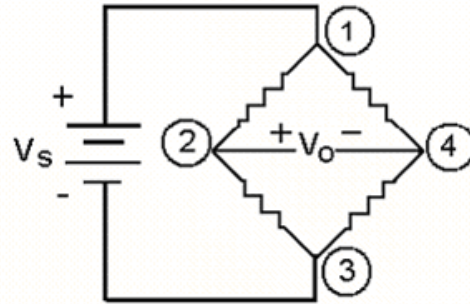


Figure 2. Excitation Schematics – Excitation 5 Vdc Typ., 6 Vdc max.



FSS Series Circuit

1. Circled numbers refer to sensor terminals (pins).
 Pin 1 = Supply V_s (+)
 Pin 2 = Output V_o (+)
 Pin 3 = Ground V_g (-)
 Pin 4 = Output V_o (-)
2. The force sensor may be powered by voltage or current. Maximum supply voltage is not to exceed 6 V. Maximum supply current is not to exceed 1.2 mA. Power is applied across Pin 1 and Pin 3.
3. The sensor output should be measured as a differential voltage across Pin 2 and Pin 4 ($V_o = V_o(+)-V_o(-)$). The output is ratiometric to the supply voltage. Shifts in supply voltage will cause shifts in output. Neither Pin 2 nor Pin 4 should be tied to ground or voltage supply.

Figure 3. Mounting Dimensions (for reference only) in mm

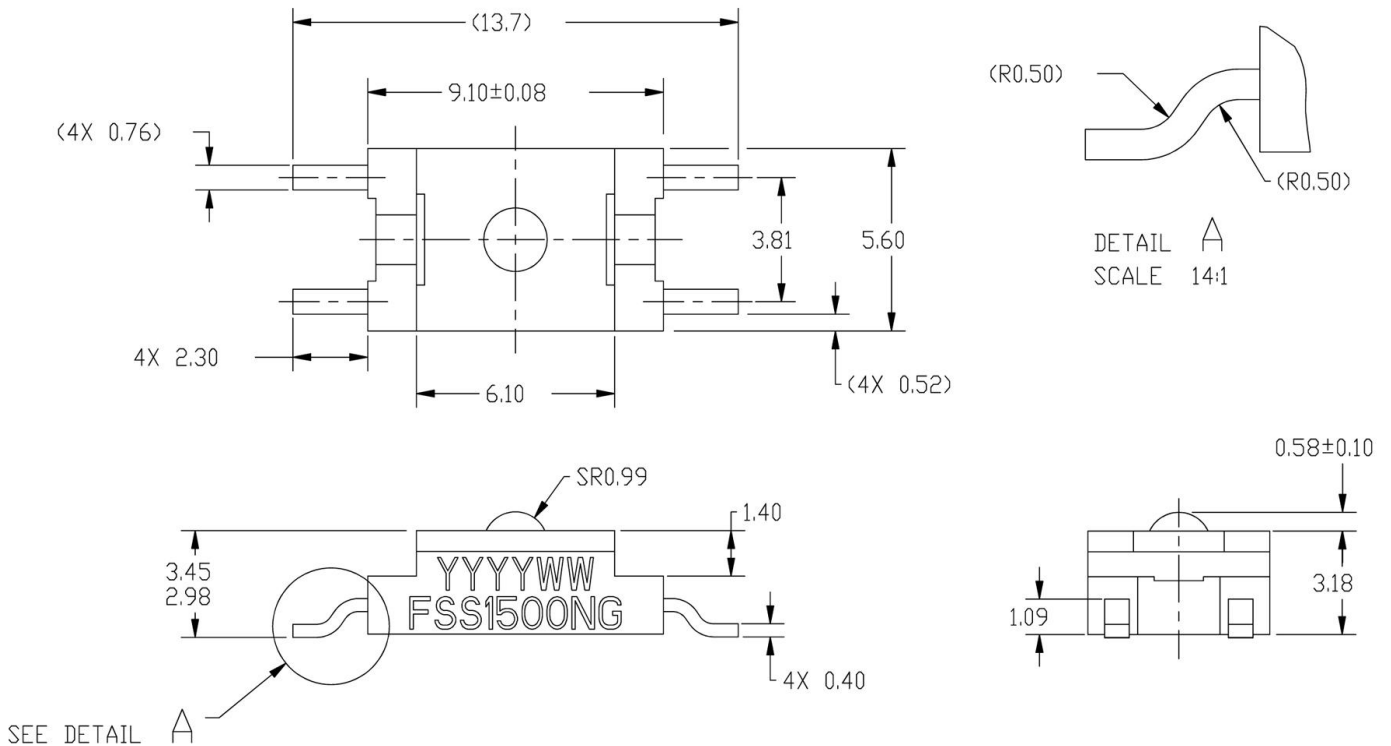
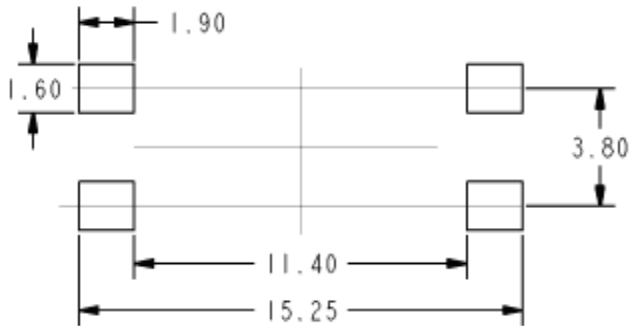


Figure 4. Suggested Land Pattern in mm



WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828 +65 6445-3033 Fax
Europe	+44 (0) 1698 481481 +44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188 +1-305-883-8257 Fax
USA/Canada	+1-800-537-6945 +1-815-235-6847 +1-815-235-6545 Fax

Sensing and Control

Honeywell

1985 Douglas Drive North

Golden Valley, MN 55422

www.honeywell.com

50044164-2-EN IL50 GLO Printed in USA

July 2009

Copyright © 2009 Honeywell International Inc. All rights reserved.

Honeywell