POSITAL
FRABA

DATA SHEET
WIEGAND WIRE SENSOR WS-UTS-0-U0, WS-UFS-0-U0

- Wiegand Wire Sensor for energy harvesting multiturn encoders using the Wiegand effect to generate energy from a rotating magnetic field[1]
- Optimized for operation with the multiturn counter module iC-PMZ and iC-PMX from iC-Haus
- In surface mounted technology suitable for reflow process, RoHS 2 compatible
- Versions for 2.5 mm and 5 mm wire distances from top of seating plane
- High Pulse energy with typical 170 nJ average pulse energy
- Machine readable serial number provides perfect traceability

1. Signal Charactistics

Item No.	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
101	Pulse peak-voltage	U_P	5.3	7.0		V	Valid for each trigger configuration i (Figure 5) with $U_{Pi,Average} - 4\sigma_i > U_{P,min}$ *, analysis over 4*500 pulses @ 25 °C @ 6,8 ± 1% nF
102	Pulse slew rate	S_R	200			V/ms	@ 25 °C, 30% - 70% U_P
103	Pulse energy	E_p		170		nJ	@ 6,8 ± 1% nF
104	Temperature drift V_{peak}	TC_P		-0,008		V/K	

2. Electrical Charactistics

Item No.	Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions
201	Coil resistance	R	250	270	290	Ω	@25 °C, DC
202	Temp. Coefficient of Resistor	TC_R		$3,9*10^{-3}$		1/K	
203	Coil inductance	L	8.5		10.5	mH	@100 Hz - 100 kHz

[1] Devices and processes for energy harvesting by Wiegand wire within position encoders are protected by several worldwide patents (such as WO 2004/046735 A1) and require licensing by the inventors and applicants.

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3. Environmental

Item No.	Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions
301	Ambient operating temperature range	T_a	-40		+125	°C	
302	Relative humidity	rF			90%		No condensation
303	Shock Resitance	S_r			100	g	half sine 6 ms, EN 60068-2-27
304	Permanent shock resistance	S_{rp}			10	g	half sine 16 ms, EN 60068-2-29
305	Vibration Resistance	V_r			10	g	10 Hz-1000 Hz, EN 60068-2-6
306	Insulation Resistance	R_{ISO}	600			MΩ	Insulation resistance between pin and housing @ 1KV, FGluke 1577 isolation multimeter
307	Contact discharge	D_c			6	kV	IEC 61000-4-2
308	Air charge	D_A			8	kV	IEC 61000-4-2
309	Max. magnetic field exposure	B_{exmax}			25	mT	e.g. important for storage
310	Storage Temperature	T_s	-40		+85	°C	

4. Measurement Conditions

Item No.	Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions
401	Magnetic flux density at wire	Bw	11.25		11.75	mT	Measured at wire axis
402	Distance magnet to wire	Wd	9.2	9.3	9.4	mm	Measured from wire axis to magnet surface (Figure 3)
403	Radial Assembly tolerance		-0.1		0.1	mm	Measured from sensor centre – rotational axis
404	Magnet eccentricity				0.1	mm	
405	Load capacitor	C_L	6.7	6.8	6.9	nF	In parallel with IC-PM-Z (Figure 1)
406	Magnet rotation speed	v		1,000		rpm	
407	Input resistance	R_M		10		MΩ	Measurement device
408	Input capacitance	C_M		12		pF	Measurement device

Remarks

Magnet type: NdFeB diametral magnet, dimensions 7.5 x 4.0 mm (Figure 1), FRABA part number 10034019

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Data measured under ideal measuring conditions. Test setup is isolated from the external magnetic fields or other ferromagnetic components.

5. Magnet System

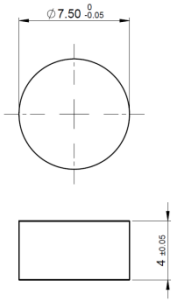


Figure 1

6. Test Circuit

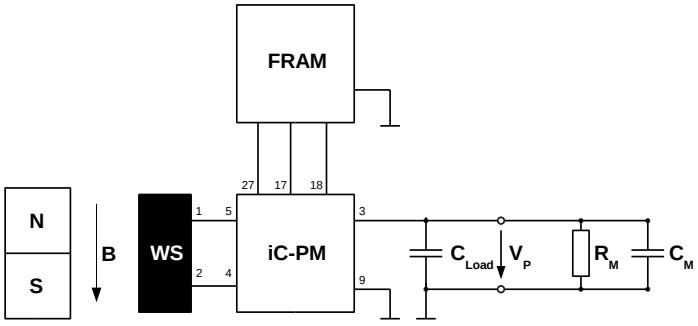


Figure 2

7. Typical Signal Wave

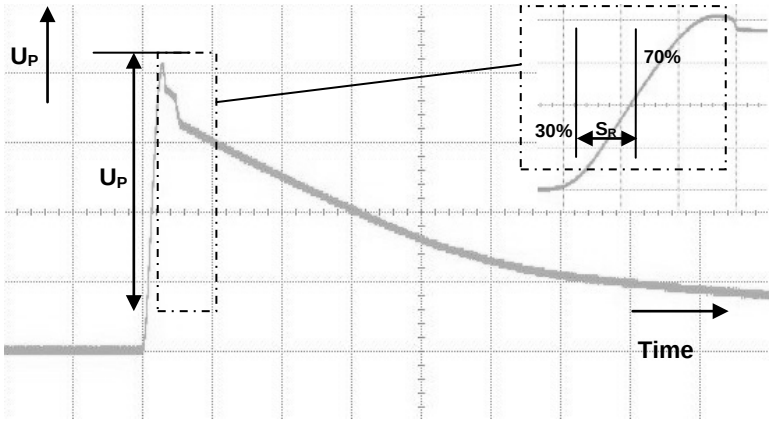


Figure 3

8. Declaration Trigger Point

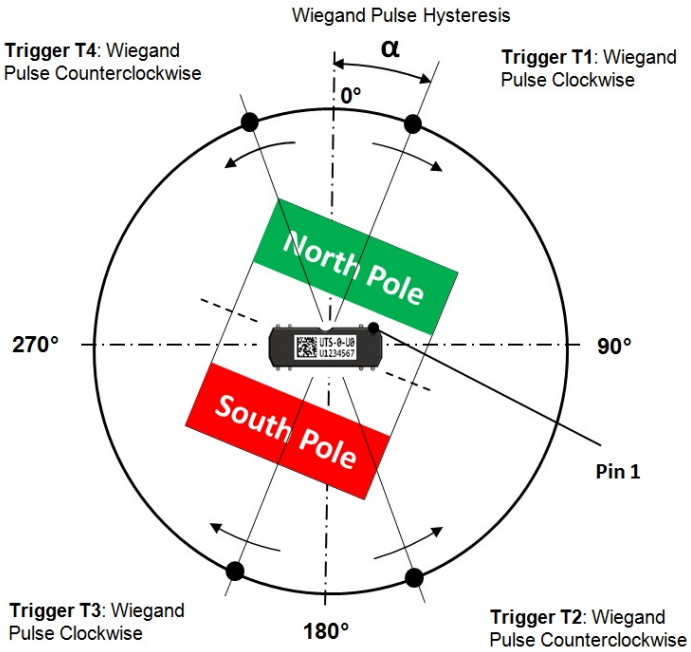
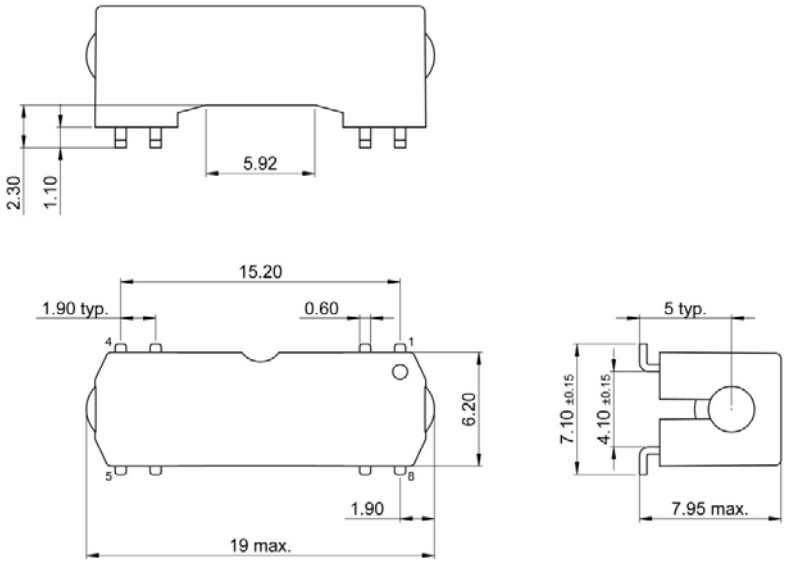


Figure 4

9. Component Dimension Type: UTS-0

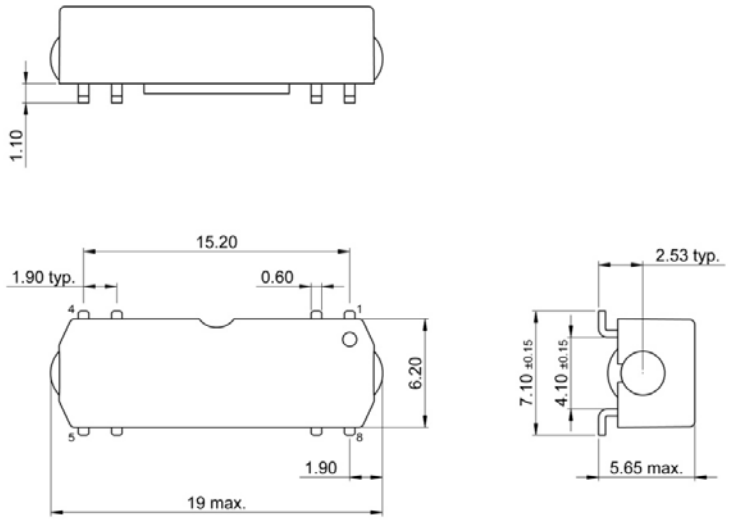


Coplanarity tolerance of leads 0.1 mm.

All dimension in mm.

Figure 5

10. Component Dimension Type: UFS-0

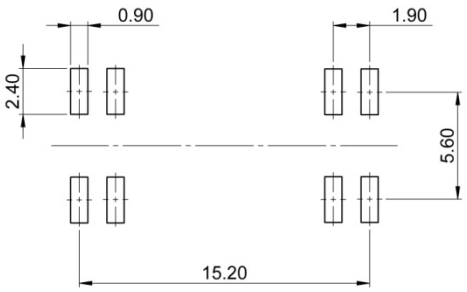


Coplanarity tolerance of leads 0.1 mm.

All dimension in mm.

Figure 6

11. Land Pattern Dimensions



All dimension in mm.

Figure 7

Item No.	Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions
1101	Sensor terminals			Pin 3 / Pin 4 and Pin 7 / Pin 8			Pin 3 / Pin 4: coil-winding end Pin 7 / Pin 8: coil-winding start Pin 1, 2, 5, 6 not used

Remarks

Pin material Cu tin plated, mass 0.029 g, results in a theoretical thermal energy surge of ΔQ ≈ 2 W for each contact pin (390 W/(kg*K) and ΔT_reflow of 170 K.

SMD package, suitable for reflow process

RoHS 2 (2011/65/EU) Compatible

12. Reflow Profile

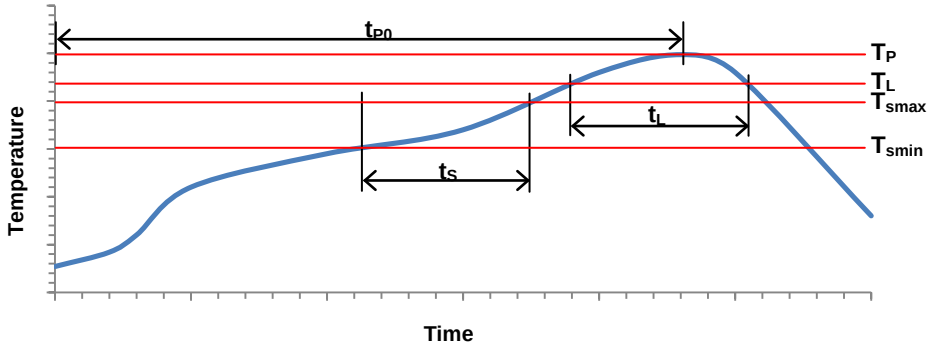


Figure 8

Item No.	Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions
1201	Liquidous temperature	T_L		217		°C	Soldering paste material: Sn95.5Ag4Cu0.5
1202	Time maintained above T_L	t_L		60		s	
1203	Peak package body temperature	T_P		249		°C	
1204	Time 25 °C to T_P	t_{P0}		230		s	
1205	Preheat / Soak temperature min	T_{smin}		150		°C	
1206	Preheat / Soak temperature max	T_{smax}		200		°C	
1207	Time from T_{smin} to T_{smax}	t_S		70		s	
1208	Ramp-up rate (T_L to T_P)			0.9	3	K / s	
1209	Ramp-down rate (T_P to T_L)			1.3	6	K / s	
1210	Reflow soldering speed	v_S		1000.0		mm / min	reflow soldering machine: Linie VX-nitro-3500 (Type 734)

13. Labeling Information

Type and Serial number
Serial Number in Aztec Code

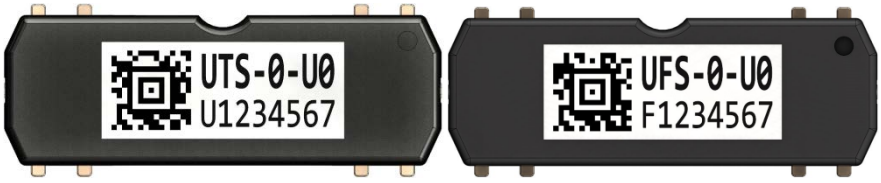


Figure 9

14. Packaging Information

13-inch reel.
Max. 700 pcs./reel
Connectors across to reel.

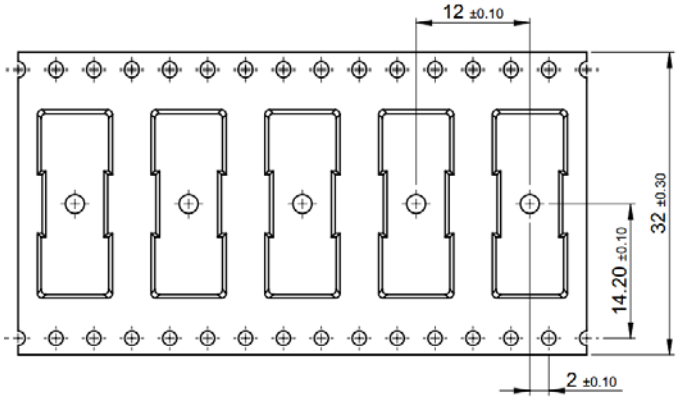


Figure 10

15. Ordering Information

Article Name	Article Number
WS-Sensor-WS-UTS-0-U0 on Reel	10035123
WS-Sensor-WS-UFS-0-U0 on Reel	10035122

16. Revision History

Rev.:	Date	BY	Remarks
1.0	17.09.2015	MFO	Created UBITO standard product data sheet
1.1	18.09.2015	MFO	Item103 set typ. value to 170 nJ, corrected cover text accordingly Item402 set min. max. typ. value to 9.1 9.3 9.5 Updated Figures 5-7, 9
1.2	18.09.2015	MLO	Item401 set min. (max.) value to 9 (11) Added description in Figure 4
1.3	06.04.2016	MFO	Removed silicone free comment
1.4	28.06.2016	MFO	Updated drawings of Figure 5, 6, and 7 Item401 set min. max. value to 11.25 11.75 Item402 set min. typ. max. value to 9.2 9.3 9.4 Item403 set min. max. value to -0.1 0.1 Items 105 and 106 removed Updated ordering information Updated magnet part number
1.5	14.07.2016	MFO	Created final version
1.6	27.10.2016	MFO	Updated footonote regarding licensing

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Contact

FRABA America
T +1 609 750-8705
info@posital.com

FRABA Europe
T +49 221 96213-0
info@posital.eu

FRABA Asia
T +65 6514 8880
info@posital.sg

All dimension in [inch] mm. This drawing and the information contained is for general presentation purposes only. Please refer to the "Download" section for detailed technical drawings.