CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

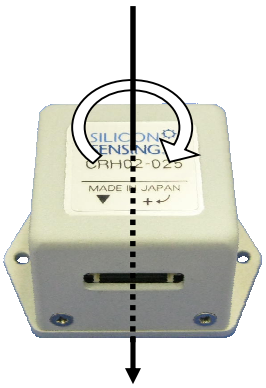


Figure 1 CRH02

FEATURES

- FOG相当の性能をMEMSで実現
- 小型
- Cos2θのMEMSリング振動技術を採用
- 他に類を見ない高い衝撃・振動耐力
- 温度センサ内蔵
- RoHS対応

APPLICATIONS

- 航空宇宙用途
- 慣性計測用途
- 鉄道輸送用途
- 輸送機器
- 産業機器
- 掘削機器
- 地上・海上航法装置
- ロボティクス

1. GENERAL DESCRIPTION

CRH02 は Cos2θ モードの共振振動を利用した MEMS リングを使用した Gyro センサで、下表に示す 4 種類のバリエーションをラインアップしており、各用途に対応可能となっています。
MEMS エレメントは、自動車のシャシー制御用途としてすでに約 2000 万個の市場実績を保有するリング型デザインを踏襲されて製造されるものであり、高い信頼性と市場実績を有しています。
Cos2θ モードのリングの共振は、その振動モードが外部からの衝撃・振動を受けにくい構造の為、他に類をみないほど対振動・衝撃性に優れた性能を実現します。

CRH02 シリーズ	動作レンジ
CRH02-025	±25°/s
CRH02-100	±100°/s
CRH02-200	±200°/s
CRH02-400	±400°/s

2. ELECTRICAL CHARACTERISTICS

Parameter	Minimum	Typical	Maximum	Unit	Notes
Supply voltage (functional)	4.75		5.25	V	(補足：7.1 項)
Supply voltage (full Specification)	4.85		5.25	V	
Current Consumption		60	70	mA	

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

3. OUTLINE

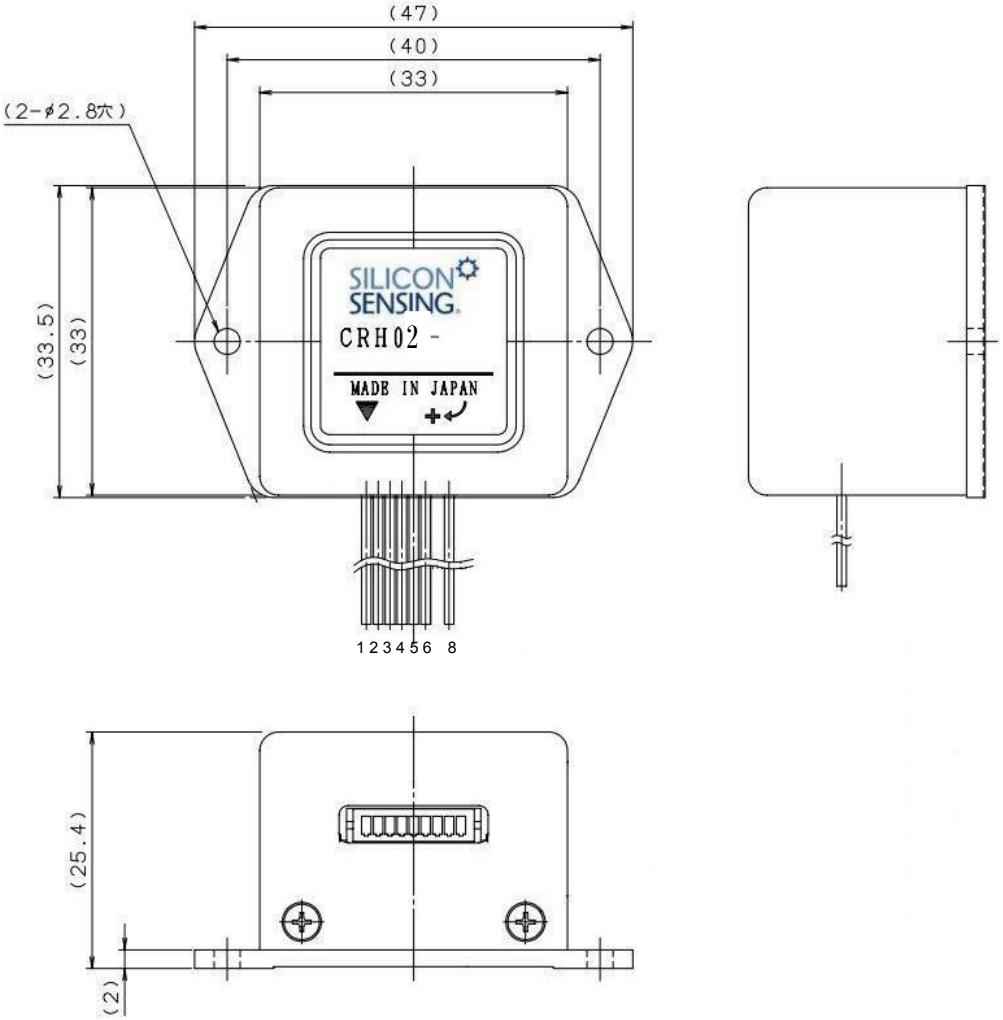


Figure.2 CRH02 Overall Dimensions

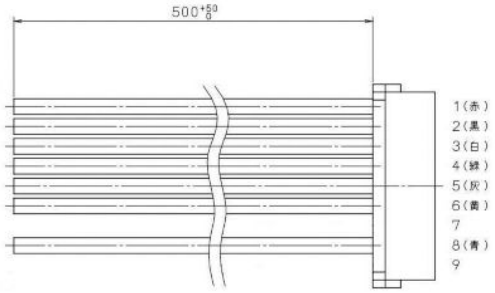


Figure.3 Accessory Cable

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

SILICON SENSING
everything in motion

4. SPECIFICATION

Unless stated otherwise, the following specification values assume Vdd = 4.85V to 5.25V and an ambient temperature of +25°C. "Over temperature" refers to the temperature range -40°C to +85°C.

Parameter		Minimum	Typical	Maximum	Notes
Dynamic Range	CRH02-025		±25°/s		
	CRH02-100		±100°/s		
	CRH02-200		±200°/s		
	CRH02-400		±400°/s		
Scale Factor at 25℃	CRH02-025	79.6mV/°/s	80.0mV/°/s	80.4mV/°/s	
	CRH02-100	19.9mV/°/s	20.0mV/°/s	20.1mV/°/s	
	CRH02-200	9.95mV/°/s	10.0mV/°/s	10.05mV/°/s	
	CRH02-400	4.975mV/°/s	5.00mV/°/s	5.025mV/°/s	
Scale Factor variation over temperature w.r.t R.T. (25℃)	CRH02-025		±0.15%	±0.5%	
	CRH02-100				
	CRH02-200		±0.3%		
	CRH02-400				
Scale Factor non-linearity	CRH02-025		±0.02%	±0.05%	
	CRH02-100				
	CRH02-200				
	CRH02-400				
Bias at 25℃				±10mV	w.r.t. REF
Bias over temperature w.r.t R.T. (25℃)	CRH02-025		±0.1°/s	±0.2°/s	
	CRH02-100				
	CRH02-200		±0.15°/s	±0.25°/s	
	CRH02-400				
Angular Random Walk			0.017°/√h		(補足：7.7 項)
Bias Instability			0.12°/h		(補足：7.8 項)
Quiescent Noise	CRH02-025		0.15°/s rms		3~100Hz
	CRH02-100		0.20°/s rms		3~100Hz
	CRH02-200		0.20°/s rms		3~100Hz
	CRH02-400		0.15°/s rms		3~100Hz
Bandwidth	CRH02-025		50Hz		
	CRH02-100		100Hz		
	CRH02-200		100Hz		
	CRH02-400		50Hz		
Reference output		2.380V	2.400V	2.420V	w.r.t. REFL
Minimum output current		500μA			
Temperature Sensor Scale Factor			-11.7mV/℃		
Start up time				750ms	
Physical					
Mass			45gram		
Cross Axis Sensitivity				3%	
Environmental					
Temperature (Operating)		-40℃		85℃	
Temperature (Storage)		-40℃		85℃	
Humidity				95%	結露無きこと
Linear Acceleration sensitivity			0.02°/s/g.		
Shock (operating)				95g×6ms	
Shock (powered survival)				1000g×1ms	
Vibration rectification error			$0.002°/s/g^2_{RMS}$		10~2000Hz $10g_{RMS}$
Vibration induced noise			$0.01°/s_{RMS}/g^2_{RMS}$		10~2000Hz $10g_{RMS}$
MTTF			70,000hr		

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

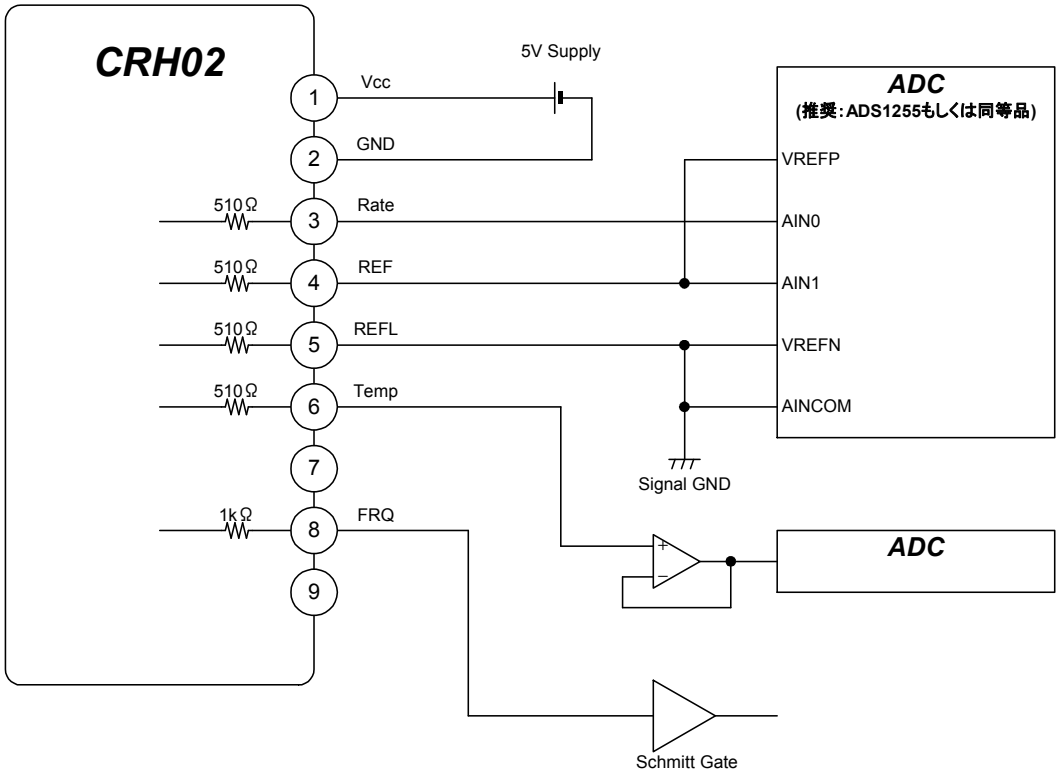
CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

5. ABSOLUTE MAXIMUM

Parameter	Minimum	Maximum
Electrical		
Supply voltage		6.0V
ESD protection		2kV HBM
Temperature		
Operating	-40℃	85℃
Storage	-40℃	100℃
Humidity		95% (結露無し)

6. INTERFACE



Pin Number	Pin Name	Signal Direction (I/O)	Function
1	Vcc		Power supply to Sensor
2	GND		Power ground
3	Rate	Output	Rate output with respect to REF
4	REF	Output	Reference voltage. Datum for Rate, Temp
5	REFL		Reference Low voltage
6	Temp	Output	Temperature output with respect to REF
7	DNC		Do not connect (SSS internal use)
8	FRQ	Output	Second Harmonic Resonating Ring Frequency output
9	DNC		Do not connect (SSS internal use)

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

7. OTHER INFORMATION

7.1 Supply Voltage

CRH02 シリーズは、動作電圧範囲であれば、供給される電源電圧に関係しない Non-Ratiometric 特性を持つ角速度センサです。
なお、供給電圧はリップル電圧、電源ノイズを含めた状態で、4.75V 以下にならないようコントロールする必要があります。

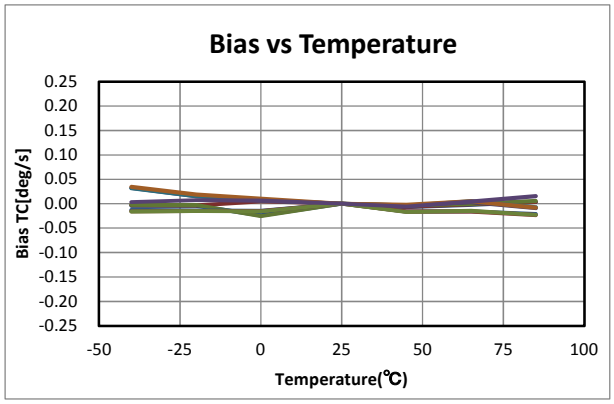
7.2 Solderling

最高保存温度以上の環境（例えば半田リフロー内）は許容できません。
組み立て上を含め、最高保存温度以下になるよう取扱お願いします。

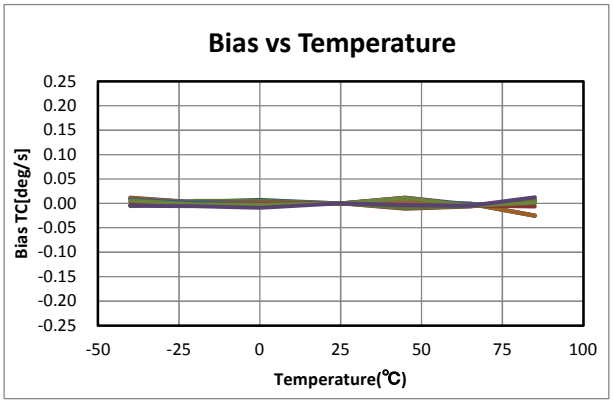
7.3 Accessory Cable

CRH02 シリーズは、Fig.3 に示されるケーブルが 1 台に対して 1 個付属しています。
なお、付属ケーブルはヒロセ電機製 DF13A-9S-1.25C になります。

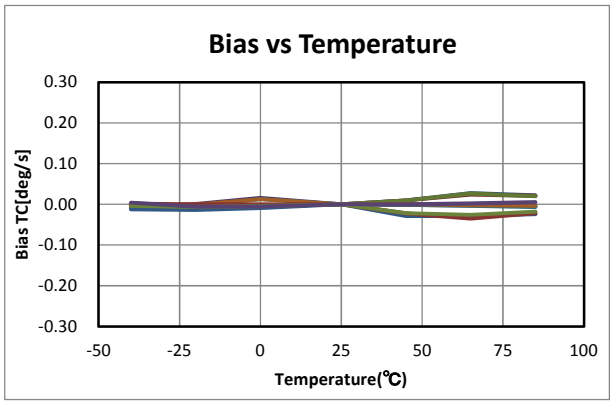
7.4 BIAS 特性参考データ



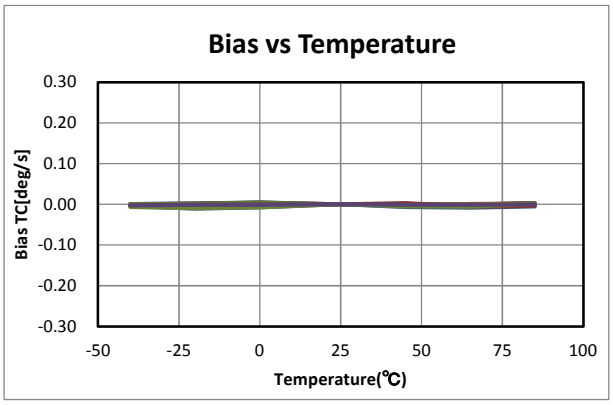
CRH02-025 BIAS 温度特性(25℃基準)



CRH02-100 BIAS 温度特性(25℃基準)



CRH02-200 BIAS 温度特性(25℃基準)



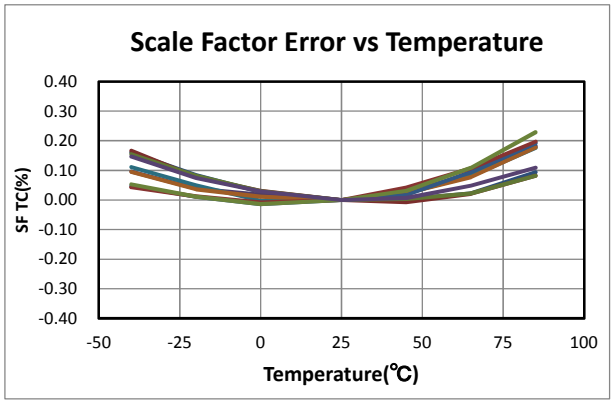
CRH02-400 BIAS 温度特性(25℃基準)

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

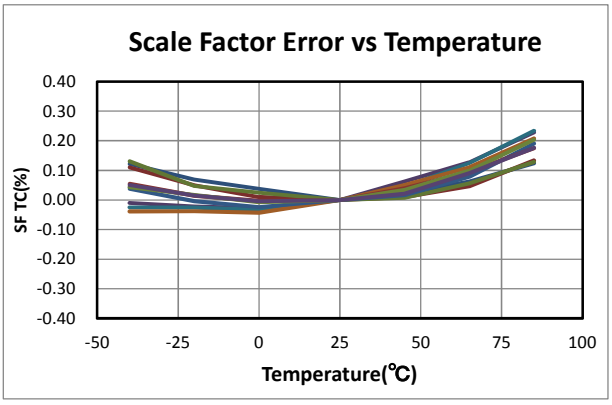
CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

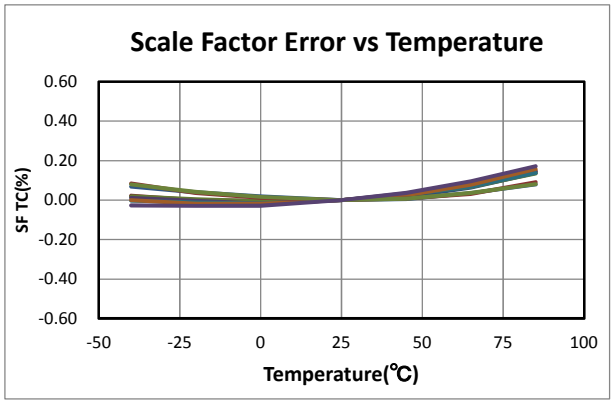
7.5 Scale Factor 特性参考データ



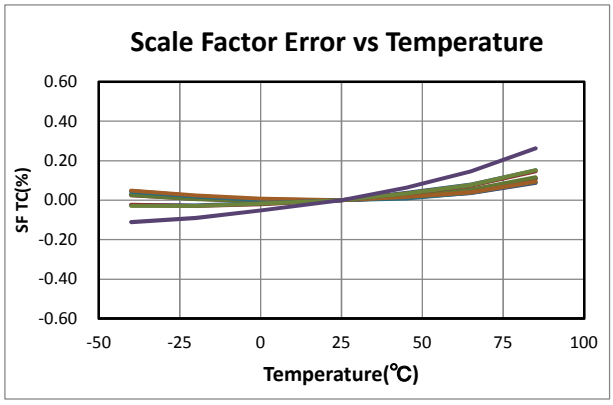
CRH02-025 SF 温度特性(25℃基準)



CRH02-100 SF 温度特性(25℃基準)



CRH02-200 SF 温度特性(25℃基準)



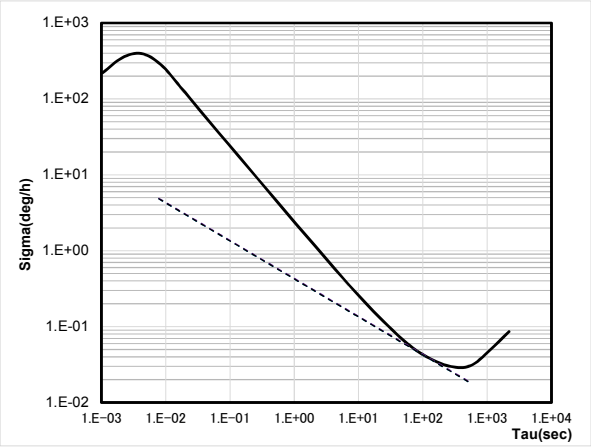
CRH02-400 SF 温度特性(25℃基準)

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

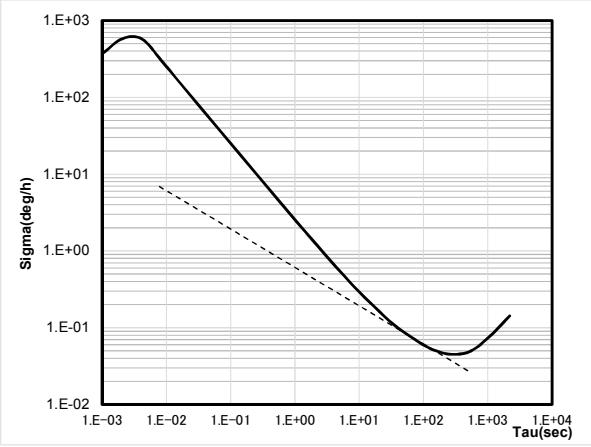
CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

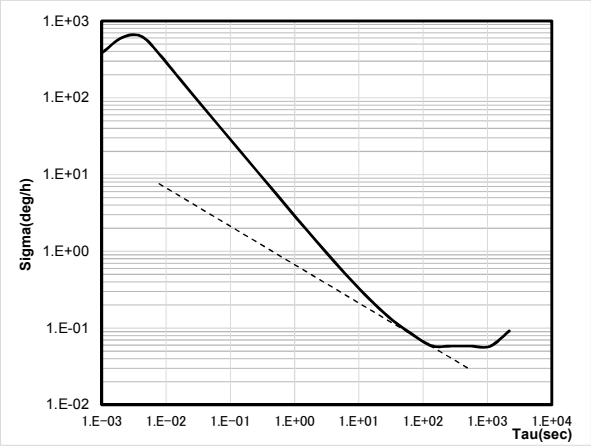
7.6 アランバリアンス参考データ



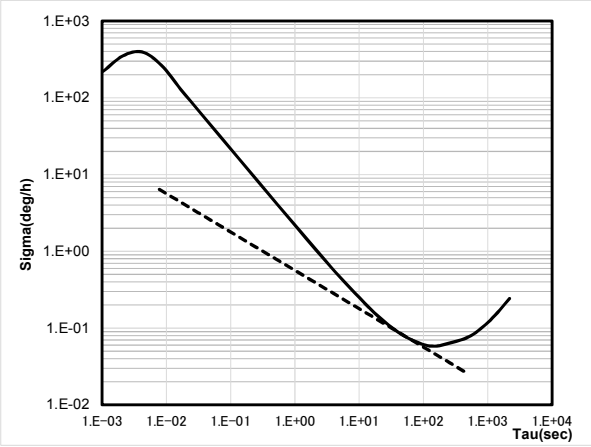
CRH02-025 アランバリアンス



CRH02-100 アランバリアンス



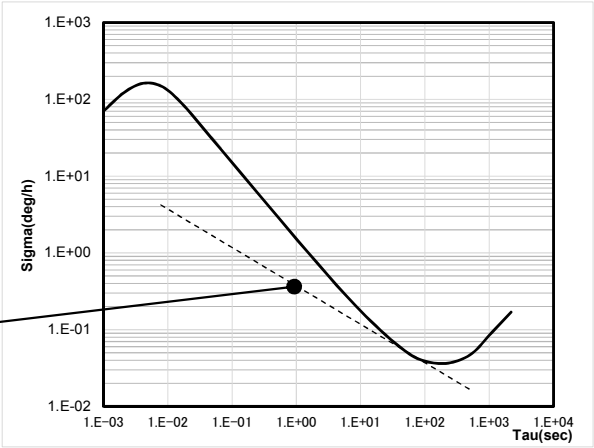
CRH02-200 アランバリアンス



CRH02-400 アランバリアンス

7.7 Angle Random Walk

Angle Random Walk 値は、アランバリアンスグラフ(右図)における傾き 1/2 の部分を延長した直線の τ =1s の値としています。



本仕様書ではこの点の値を Angle Random Walk 値として扱っています。

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.

CRH02 series

High Performance Angular Rate Sensor
CRH02 Technical Datasheet

7.8 Bias Instability

Bias Instability 値は、アランバリアンスグラフにおける最小値を 0.664 で除した数値としています。

7.9 Notice

本資料の掲載項目は製品の改良等により予告無しに変更される事があります。

© Copyright 2012 Silicon Sensing Systems Limited. All rights reserved. Silicon Sensing is an Atlantic Inertial Systems, Sumitomo Precision Products joint venture company.
Specification subject to change without notice.