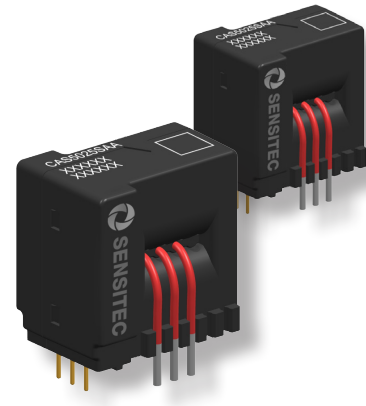


CAS5000-Series

MagnetoResistive Current Sensormodule



The CAS5000 series current sensors are based on the TMR technology and use the closed loop principle.

The sensors can detect direct current, alternating current, as well as pulse and irregular waveforms.

The sensors have galvanic isolation between the primary circuit and the measurement output.

There are different versions available for three current ranges.

Product Overview

Article Description	Package	Features
CAS5015SAA-LI	15 A	
CAS5015SRA-LI		Reference voltage
CAS5025SAA-LI	25 A	
CAS5025SRA-LI		Reference voltage
CAS5050SAA-LI	50 A	
CAS5050SRA-LI		Reference voltage

Quick Reference Guide

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage	4.75	5.0	5.25	V
I_{PN}	Primary nominal current	-	15 25 50	-	A
I_{PR}	Primary measuring range	-51 -85 -150	-	+51 +85 +150	A
t_{reac}	Reaction time	-	0.3	-	μ s
t_{resp}	Response time	-	0.3	-	μ s

Features

- Based on the TunnelMagnetoResistive (TMR) effect
- Galvanic isolation between primary and measurement circuit
- Single 5 V power supply

Advantages

- Excellent accuracy
- Low temperature drift
- Very small size
- Highly dynamic response

Applications

- Variable frequency converters
- Direct-current dynamo
- Switched mode power supplies
- Solar inverters
- Uninterruptible power supplies
- DC/DC converters



General Parameters

Symbol	Parameter	Value	Unit
T _{AMB}	Ambient temperature	-40 ... +105	°C
T _{STG}	Storage temperature	-40 ... +105	°C
m	Mass	13	g

Isolation Parameters

Symbol	Parameter	Remark	Value	Unit
V _i	RMS voltage for AC test 50 Hz / 1 min		4	kV
V _{IMP}	HV pulse withstand voltage 1.2 / 50 μs		6	kV
d _{Cl}	Clearance distance (pri. -sec.)	Shortest distance through air	9.5	mm
d _{CP}	Creepage distance (pri. -sec.)	Shortest path along device body	9.5	mm
d _{Cl(E)}	Electrical clearance	When mounted on PCB with recommended layout	6.1 (CAS50xxSRA) 6.3 (CAS50xxSAA)	mm
	Case material		V0 according to UL 94	
CTI	Comparative tracking index		600	V

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _{CC}	Supply voltage	6	V
V _{ESD}	ESD rating (HBM)	4	kV

Please note: Unrecoverable damage may occur when the product works on the conditions over the absolute maximum ratings. Long-term operation under absolute max, rating conditions may cause degradation of performance and reliability.

CAS5015SAA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	15	-	A
I_{PM}	Primary current measuring range		-51	-	+51	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{off}	Offset voltage	Output @ 0 A	2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{off} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{off} \pm 2.125$	-	V
G_V	Voltage gain	$0.625\text{ V @ } I_{PN}$	-	41.67	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-	0.3	-	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-2.5	-	+2.5	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-3.0	-	+3.0	%/of I_{PN}

CAS5025SAA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	25	-	A
I_{PM}	Primary current measuring range		-85	-	+85	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{off}	Offset voltage	Output @ 0 A	2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{off} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{off} \pm 2.125$	-	V
G_V	Voltage gain	$0.625\text{ V @ } I_{PN}$	-	25	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-	0.3	-	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-2.5	-	+2.5	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-3.0	-	+3.0	%/of I_{PN}

CAS5050SAA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	50	-	A
I_{PM}	Primary current measuring range		-150	-	+150	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{off}	Offset voltage		2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{off} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{off} \pm 1.875$	-	V
G_V	Voltage gain	$0.625\text{ V @ } I_{PN}$	-	12.5	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-	0.3	-	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-2.5	-	+2.5	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-3.0	-	+3.0	%/of I_{PN}

CAS5015SRA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	15	-	A
I_{PM}	Primary current measuring range		-51	-	+51	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{ref}	Reference voltage		2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{ref} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{ref} \pm 2.125$	-	V
V_{off0}	Electrical offset voltage	100% tested $V_{out} - V_{ref} @ 0\text{ A}$	-	5	-	mV
G_V	Voltage gain	$0.625\text{ V} @ I_{PN}$	-	41.667	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-	0.3	-	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-1.15	-	+1.15	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-1.3	-	+1.3	%/of I_{PN}

CAS5025SRA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	25	-	A
I_{PM}	Primary current measuring range		-85	-	+85	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{ref}	Reference voltage		2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{ref} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{ref} \pm 2.125$	-	V
V_{off0}	Electrical offset voltage	100% tested $V_{out} - V_{ref} @ 0\text{ A}$	-	5	-	mV
G_V	Voltage gain	$0.625\text{ V} @ I_{PN}$	-	25	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-	0.3	-	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-1.15	-	+1.15	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-1.3	-	+1.3	%/of I_{PN}

CAS5050SRA-LI Parameters

Condition: $V_{CC} = 5.0\text{ V}$; $N_P = 1$, $R_L = 10\text{ k}\Omega$; $T_{AMB} = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
I_{PN}	Primary nominal rms current		-	50	-	A
I_{PM}	Primary current measuring range		-150	-	+150	A
V_{CC}	Supply voltage		4.75	5.00	5.25	V
I_{CN}	Nominal current consumption	$N_S = 1200$	-	$15 + I_P(\text{mA})/N_S$	-	mA
N_P	Current turns		-	1, 2, 3	-	Turn
V_{ref}	Reference voltage		2.48	2.50	2.52	V
$V_{OUT(PN)}$	Output voltage @ I_{PN}		-	$V_{ref} \pm 0.625$	-	V
$V_{OUT(PM)}$	Output voltage @ I_{PM}		-	$V_{ref} \pm 1.875$	-	V
V_{off0}	Electrical offset voltage	100% tested $V_{out} - V_{ref} @ 0\text{ A}$	-	5	-	mV
G_V	Voltage gain	$0.625\text{ V} @ I_{PN}$	-	12.5	-	mV/A
t_{reac}	Reaction time @ 10% of I_{PN}		-	0.3	-	μs
t_{resp}	Step response time @ 90% of I_{PN}		-	0.3	-	μs
BW	Signal bandwidth (-3 dB)		-	400	-	kHz
$V_{OUT(Noise)}$	Output noise DC ~ 10 kHz DC ~ 100 kHz		-	5 6	-	mVpp

Accuracy

Symbol	Parameter	Remark	Min.	Typ.	Max.	Unit
ϵ_{LIN}	Linearity error		-0.3	-	+0.3	%/of I_{PN}
$\epsilon_{\pm 25}$	Accuracy @ RT	@ 25°C	-0.8	-	+0.8	%/of I_{PN}
$\epsilon_{\pm 85}$	Accuracy @ 85°C	@ $-40 \dots +85^\circ\text{C}$	-1.1	-	+1.1	%/of I_{PN}
$\epsilon_{\pm 105}$	Accuracy @ 105°C	@ $-40 \dots +105^\circ\text{C}$	-1.3	-	+1.3	%/of I_{PN}

Frequency Band Width

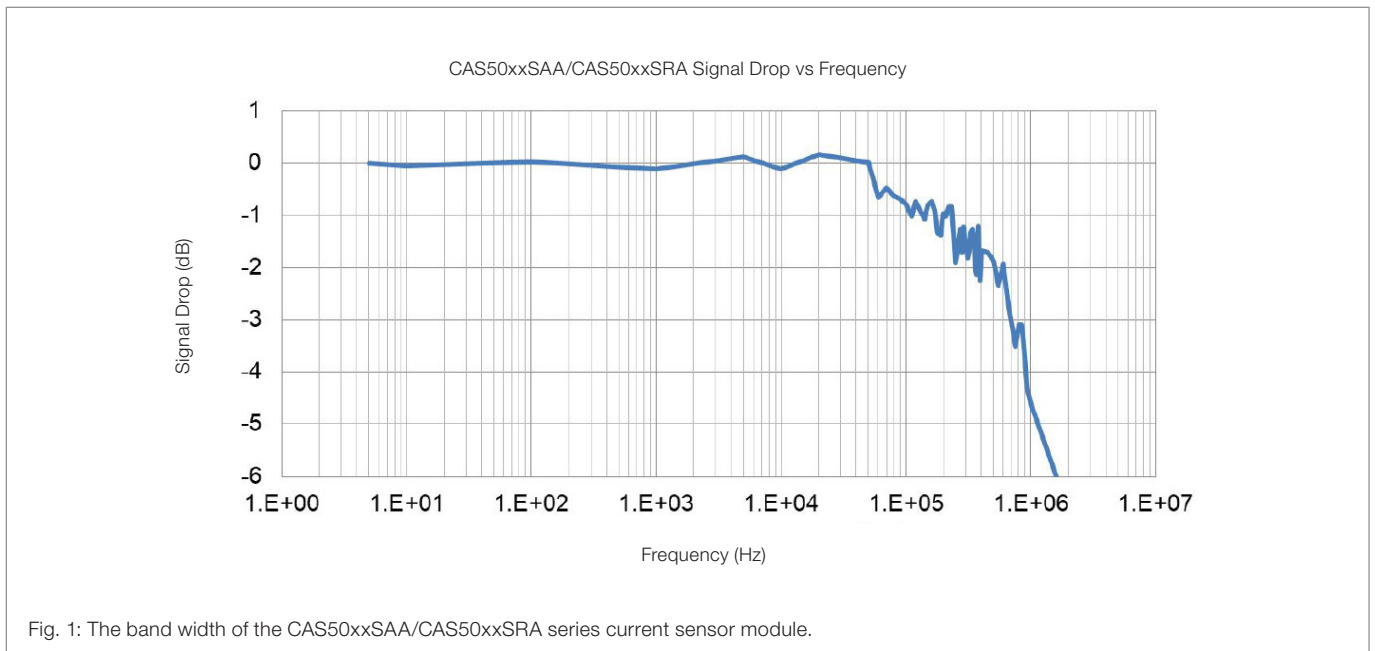


Fig. 1: The band width of the CAS50xxSAA/CAS50xxSRA series current sensor module.

Step Response Time

The diagrams shows the step response time of the CAS5000 series current sensor modules. The light blue line corresponds to the primary current. The green line shows the output signal of the sensor module.

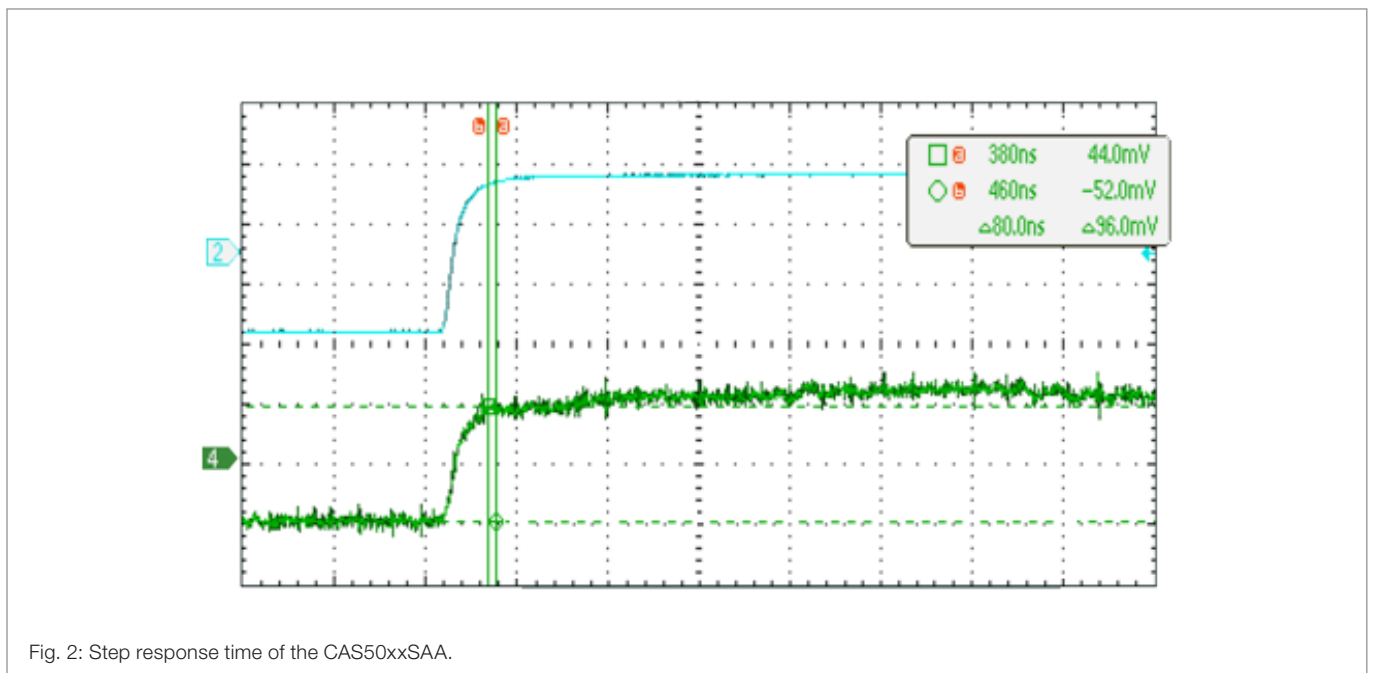


Fig. 2: Step response time of the CAS50xxSAA.

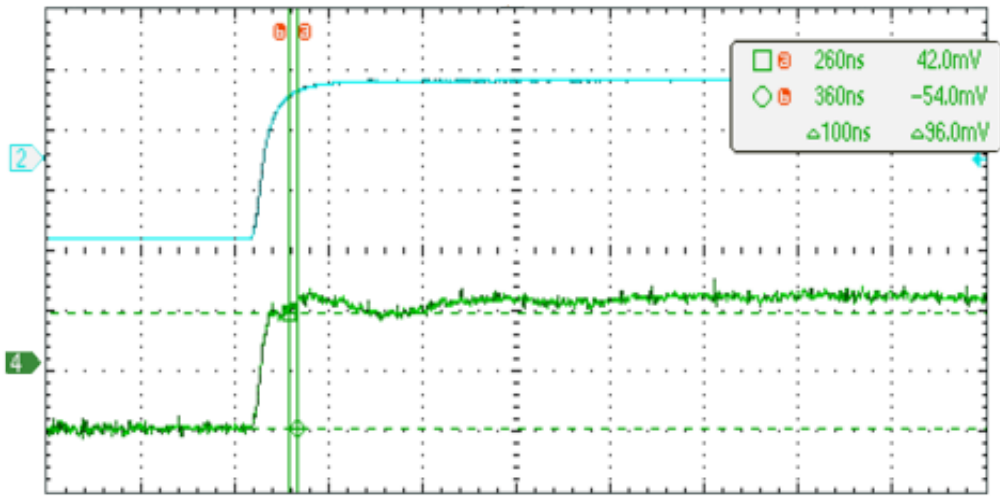


Fig. 3: Step response time of the CAS50xxSRA.

Frequency Delay Performance

The diagram shows the output signal (green line) of the sensor module with a primary input current (light blue line) with a frequency of 200 kHz.

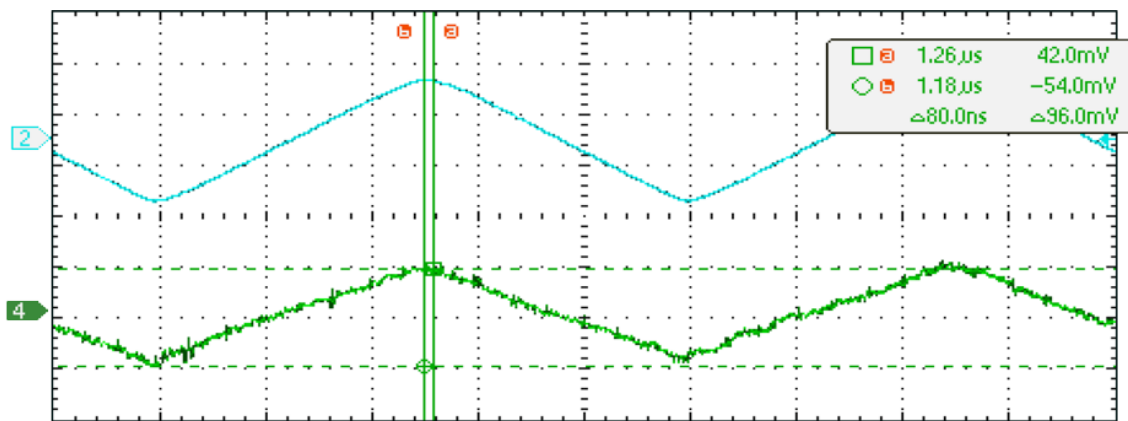


Fig. 4: Frequency delay performance of the CAS5000 series sensor modules.

Dimensions – CAS50xxSAA

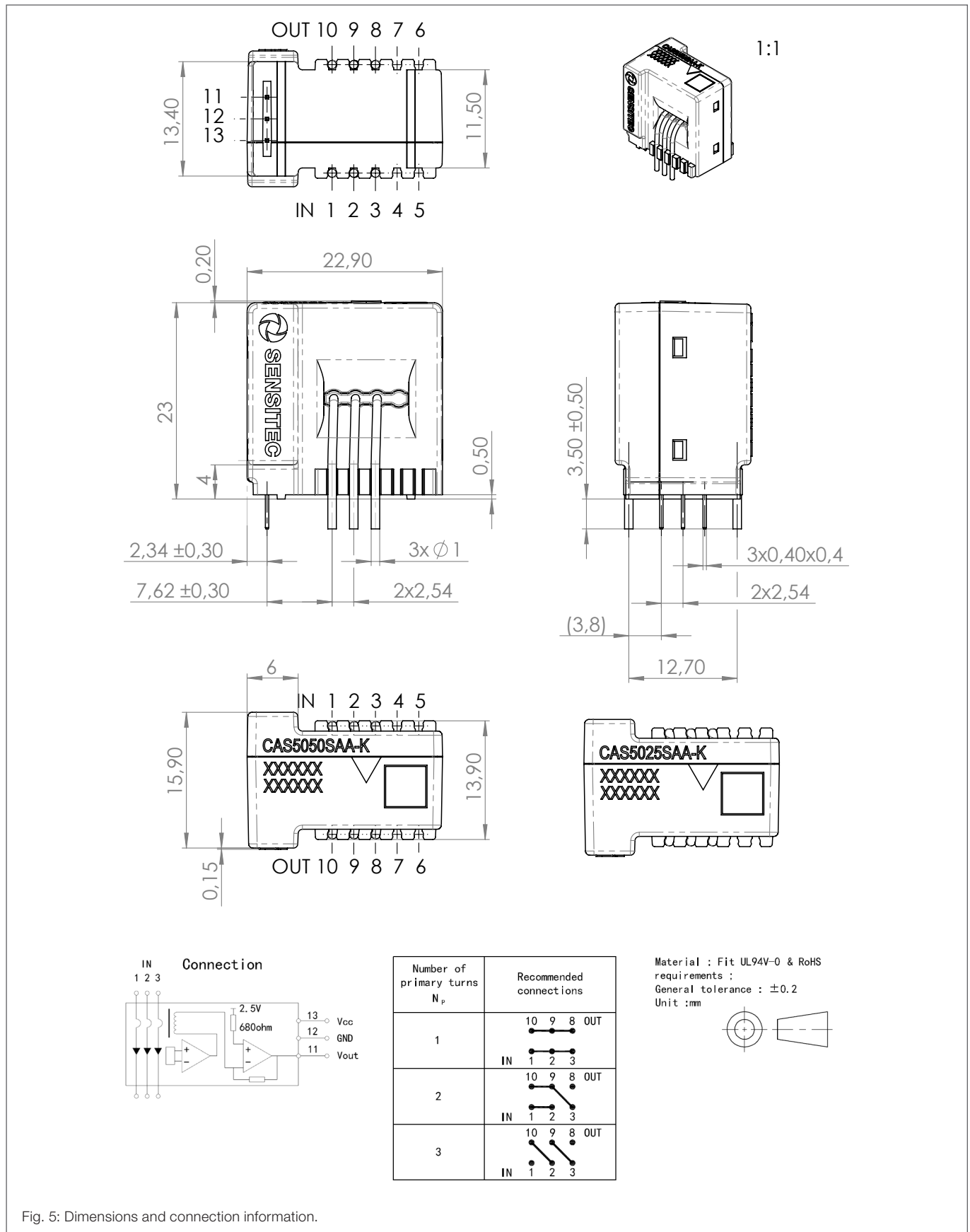


Fig. 5: Dimensions and connection information.

Dimensions – CAS50xxSRA

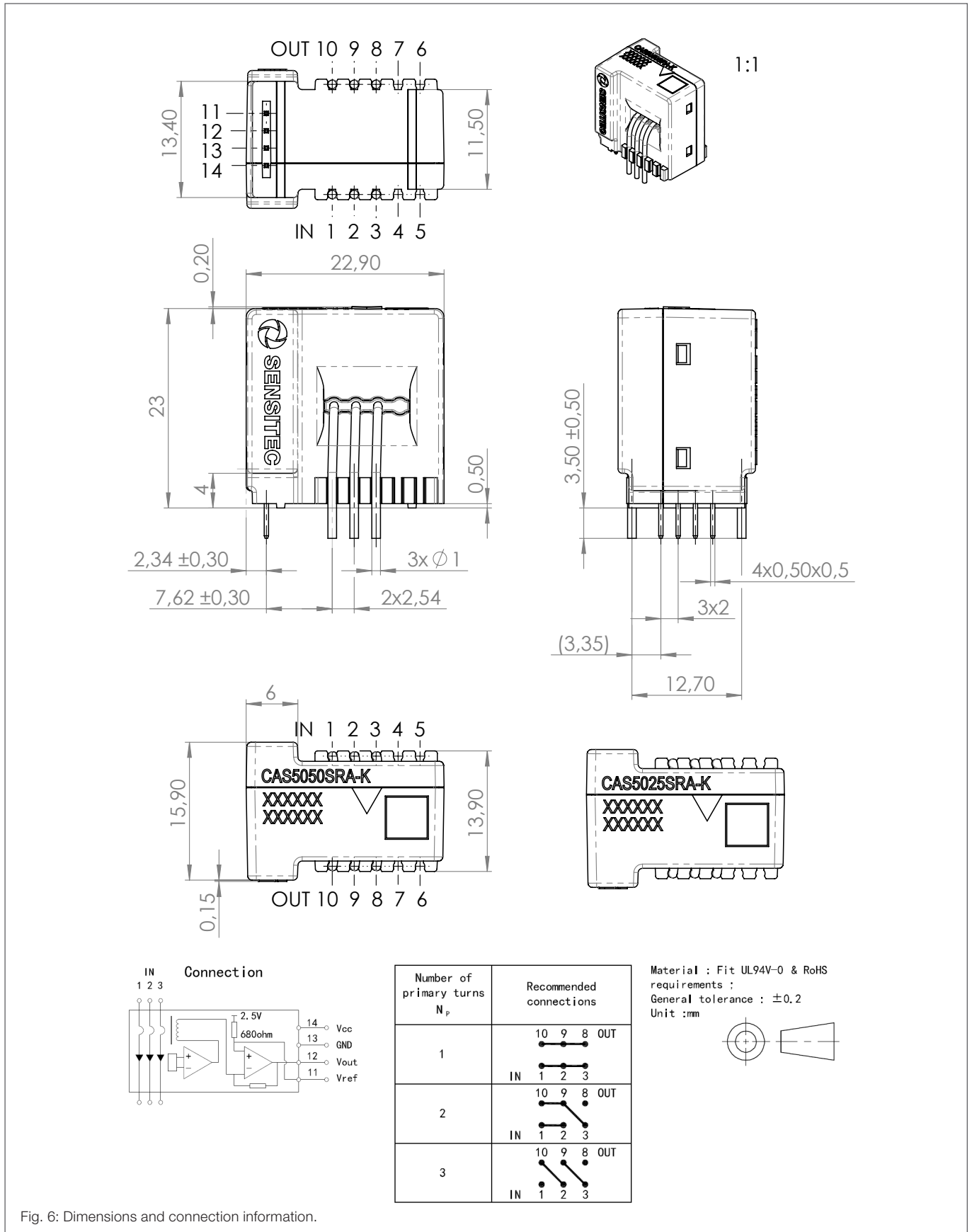


Fig. 6: Dimensions and connection information.

General Information

Product Status

Article	Status
C-Status	The product is in series production.
Note	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at www.sensitec.com .

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Changelist

Version	Description of the Change	Date
CAS5000.DSE.00	Original (pp. 1-14)	03/2021

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