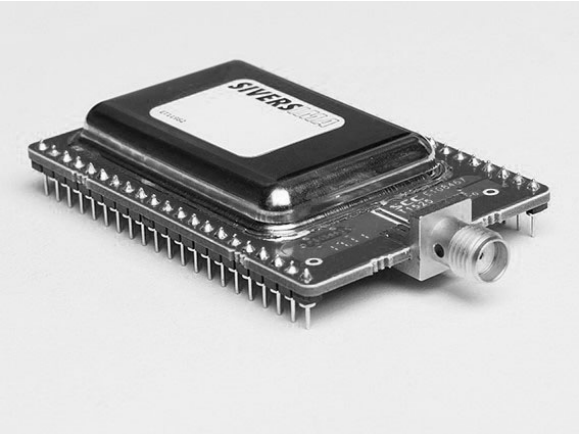
RS3400K/00
24 GHz Radar Sensor



Features

- Complete K-band FMCW Radar Front End
- Intrinsic Safe Design
- Synthesized Frequency Source
- Wideband Sweep
- Low Power Consumption

Description

The RS3400K/00 is a synthesized, K-band, FMCW radar front end. It is designed according to previously proven concepts for intrinsic safety giving a reliable unit with low power consumption. It utilizes only packaged low-cost components, which makes low unit prices and high volumes possible. The frequency is digitally controlled via a standard, 3-wire serial interface, which programs a modern high performance synthesizer circuit. A complete kit for controlling the unit through RS-232 or USB from a PC for easy evaluation is available.

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Performance Specification

Guaranteed values. Tested or implicated by design. All units are tested at operating temperature range limits and at room temperature.

Parameter	Min.	Typ.	Max.	Unit
RF: (Probing signal)				
Minimum output frequency			24000	MHz
Maximum output frequency	25500			MHz
Frequency stability (1)			35	ppm
Bandwidth stability			35	ppm
Frequency setting resolution	2			kHz
Frequency settling time (2)		40	250	µs
Output port return loss	12			dB
IF: (Sensor output)				
Full reflection response amplitude (3)	-12	-6	0	dBVpp
Reflection response amplitude variation		3	3.6	dB
Sensor performance (uncalibrated):				
Range measurement variation (4)		100	300	ppm

1. Over operating temperature range, input voltage variation, aging, shock, and vibration.
2. Defined as time elapsed for a signal to settle within 0.1MHz of a 1 MHz frequency step. Settling time is strongly dependent on digital parameters settings within the FMCW module.
3. Defined as IF output signal when the complete RF (probing signal) is returned from a target. Characterization is made using a device that reflects approximately –40 dB of the signal.
4. Defined as variation in range measurements over temperature for two targets 5m < separation < 6m apart.

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Typical values, not tested.

Parameter	Min.	Typ.	Max.	Unit
RF output power	5	10	15	dBm
RF output power variation (over frequency)			5	dB
RF output power variation (over temperature)			5	dB
Harmonics related to carrier			-20	dBc
Spurious (synthesizer related) (5)			-26	dBc
Spurious (not synthesizer related)			-60	dBc
SSB phase noise @ 100 kHz from carrier			-67	dBc/Hz
RF to IF conversion efficiency (6)		-20		dB
Sensor dynamic range (7)		-80		dBc
Power consumption		900		mW
Total internal capacitance			100	nF

Environmental Specification

Parameter	Min.	Max.	Unit
Operational temperature range (8)	0	+70	°C
Storage temperature range	-50	+100	°C
Vibration		TBD	
Shock (9)		100g 6ms	

5. Average over whole frequency band.
6. The IF signal power is measured as a single ended voltage from the IF port. The signal is internally terminated in a 150 Ω resistor.
7. Defined as signal level below full reflection response adjacent to detected peak in fourier transformed IF signal.
8. Other temperature ranges available upon request.
9. According to MIL-STD-202G method 213B.

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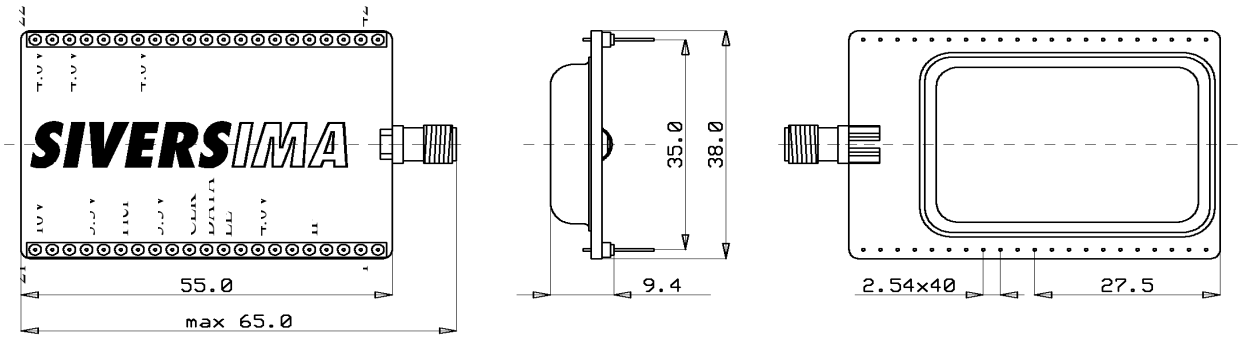
Outline Drawing [mm]



Bottom View | Side View | Top View

Interfaces

RF I/O: SMA-female.

Digital, power, IF: Samtec interconnect strips, BBL-121-G-E. Mating connector: SL-series.

Pin	Description	Specification
23	Power Supply	+4.0 V (max 4.3V), app. 25 mA
25	Power Supply	+4.0 V (max 4.3V), app. 25 mA
29	Power Supply	+4.0 V (max 4.3V), app. 25 mA
20	Power Supply for synthesizer active loop filter	+10.0 V (max 18V), approx. 1 mA
17	Power Supply	+3.3V (max 3.6 V), app. 35 mA
15	PLL reference signal output	24 MHz +-25ppm, 3.3Vpp
13	Power Supply	+3.3 V (max 3.6 V), app. 10 mA
11	Clock signal for Synthesizer	5.0 V ≥ Logic Level High ≥ 2.7 V 0.7 V ≥ Logic Level Low ≥ 0 V Load resistance: 10kΩ
10	Data signal for Synthesizer	
9	Latch/Enable signal for Synthesizer	
7	Power Supply	+4.0 V (max 4.3V), app. 80 mA
4	IF (Baseband) Output	DC-coupled, output impedance 150Ω.

Grounded pins (power and I/O): 1, 3, 5, 8, 12, 14, 16, 21, 24, 26, 28, 30, 32, 34, 36, 38, 39, 40, 42.

Pins not to be connected: 2, 6, 18, 19, 31, 33, 35, 37, 41.

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