

## DAISHINKU develops high-precision/low current consumption kHz-range crystal oscillators of the smallest size in the world

September 24, 2013

DAISHINKU CORP. (President: Sohei Hasegawa) announces development and release of DSK321STD, DSK321STA, DSK324SR and DSO221SR 32.768 kHz, crystal oscillators of the smallest size in the world.

Crystal devices of 32.768 kHz are electronic components used as clock sources in many digital devices. DAISHINKU has developed, among other items, four types of kHz-range crystal oscillators that are suited for smart meters and health care supplies (expected to come into wide use) and automotive electronics (demand for which continues to expand). In general, frequency shift of kHz-range crystal resonator against temperature change exhibits a quadratic curve, frequency shift being likely to become against temperature change.

The latest DSK series employs temperature compensation circuits, while DSO221SR (kHz) employs AT-cut crystal resonator whose frequency shift against temperature change exhibits a cubic curve. These products serve as high-precision time bases that are resistant to the external thermal environment. There has also been demand for added features, such as low current consumption and small size and thinness, as various applications are getting more sophisticated and developed for mobile use. To meet these market needs, DAISHINKU developed crystal devices ideal for various applications, by taking advantage of its frequency adjustment expertise regarding temperature-compensated oscillators (TCXO) and high-precision photolithography processing technologies, among others. One result was small/thin kHz-range crystal oscillators featuring high precision and low current consumption.

These oscillators are environmental responsive products which are lead-free and RoHS compliant.

The new products will be exhibited at CEATEC JAPAN 2013, to be held in Makuhari Messe from October 1 to October 5, 2013 (Daishinku booth: 1A07, Hall 1).

### <Product>

DSK321STD, DSK321STA, DSK324SR, DSO221SR

### <Features>

DSK321STD (TCXO with built-in tuning-fork type crystal resonator)

- High frequency stability achieved by digital temperature compensation:

$\pm 5 \times 10^{-6}$  (-40~+85°C)

- Low current consumption with low frequency oscillation circuits using tuning-fork type resonator: 1.2μA typ.

DSK321STA (TCXO with built-in tuning-fork type crystal resonator)

- High frequency stability achieved by analog temperature compensation:

$\pm 5.5 \times 10^{-6}$  (-40~+85°C)

- Low voltage operation: from +1.1 V to +3.6 V (temperature compensation operation)

- Low current consumption with low frequency oscillation circuits using tuning-fork type resonator: 1.05μA typ.

DSK324SR (RTC with built-in tuning-fork type crystal resonator)

- High frequency stability achieved by digital temperature compensation:  
 $\pm 5 \times 10^{-6}$  (-40~+85°C)
- Low current consumption with low frequency oscillation circuits using tuning-fork type resonator: 1.5μA typ.
- Featuring various built-in calendar and timer functions

DSO221SR (SPXO with built-in AT-cut crystal resonator)

- High frequency stability achieved using AT-cut oscillators  
(without temperature compensation functions):  $\pm 35 \times 10^{-6}$  (-40~+85°C)
- Short start-up time of 2 ms (maximum value) from power actuation, using AT-cut resonator and quick-starting oscillation circuits
- Low current consumption using AT-cut resonator: 35μA typ.  
Adapted to the industry's lowest current consumption among 32.768 kHz crystal oscillators using AT-cut resonator \*
- Adapted to high-temperature operation  $\pm 100 \times 10^{-6}$  (-40~+125°C)
- Available in 2520 size (smaller than ever)

\* Source: survey by DAISHINKU CORP. valid as of September 23, 2013

<Main applications>

High-precision time bases, smart meters, health care supplies, automotive electronics and general electronic equipment

<Mass Production date>

DSO221SR (SPXO with built-in AT-cut crystal resonator): Jan., 2013

DSK321STD, DSK321STA, DSK324SR

(TCXO and RTC with built-in tuning-fork type crystal resonator): Dic., 2013

<Sample price>

300 yen Samples are available now

< Manufacturing Capacity >

DSO221SR (SPXO with built-in AT-cut crystal resonator): 1million/month

DSK321STD, DSK321STA, DSK324SR

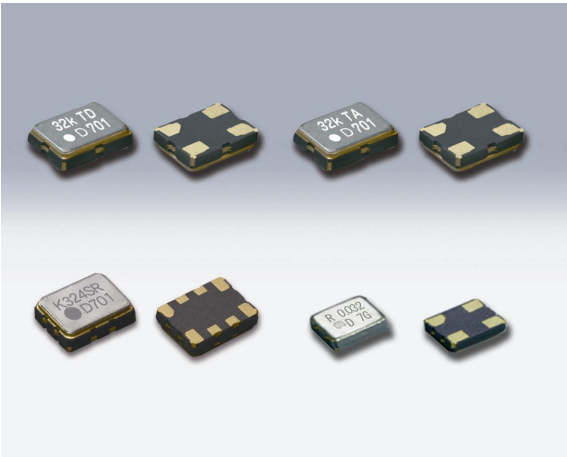
(TCXO and RTC with built-in tuning-fork type crystal resonator): Half-million/month

<Electrical specification>

Type	DSK321STD	DSK321STA	DSK324SR	DSO221SR
Size	3.2*2.5*0.9	3.2*2.5*0.9	3.2*2.5*0.9	2.5*2.0*0.815
Output Frequency Range	32.768kHz	32.768kHz	32.768kHz	32.768kHz ( ~ 50kHz)
Output Specification	CMOS	CMOS	CMOS	CMOS
Oscillating source	32.768kHz (Tuning-fork type )	32.768kHz (Tuning-fork type )	32.768kHz (Tuning-fork type )	16.778MHz (AT-cut)
Supply Voltage	2.0V ~ +5.5V	1.1V ~ +3.6V	2.0V ~ +5.5V	1.6V ~ +5.5V
Frequency Tolerance	$\pm 5.0 \times 10^{-6}$	$\pm 5.5 \times 10^{-6}$	$\pm 5.0 \times 10^{-6}$	$\pm 35 \times 10^{-6}$ / $\pm 100 \times 10^{-6}$
Operating Temperature Range	-40 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C/ -40 ~ 125°C
Current Consumption	3.0 $\mu$ A max. (1.2 $\mu$ A typ.) (Vcc=3.3V)	2.5 $\mu$ A max. (1.05 $\mu$ A typ.) (Vcc=1.2V)	4.0 $\mu$ A max. (1.5 $\mu$ A typ.) (Vcc=3.3V)	50.0 $\mu$ A max. (35 $\mu$ A typ.) (Vcc=3.3V)
Start up Time	3.0s max.	1.0s max.	3.0s max.	2.0ms max.

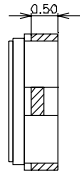
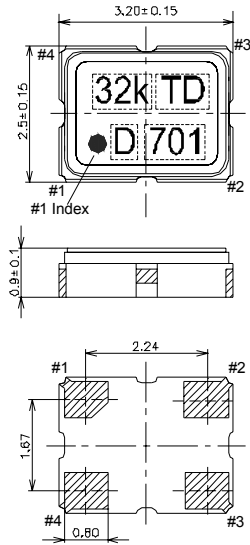
Consult our sales representative for other specifications.

<Product Photograph>



<Dimensions>

■ DSK321STD, DSK321STA (TCXO with built-in tuning-fork type crystal resonator)



Model Code  
 TD: DSK321STD  
 TA: DSK321STA

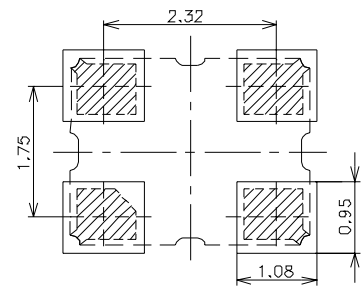
Pin Connections

Pin No.	Connection
#1	OE(Output Enable) (DSK321STD) Vcc (DSK321STA)
#2	GND
#3	Output
#4	Vcc

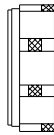
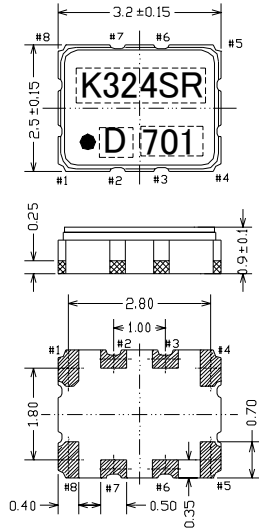
Function (DSK321STD)

#1 input	#3 Output condition
H	Oscillation out
L	High Z

<TOP View>



■ DSK324SR (RTC with built-in tuning-fork type crystal resonator)



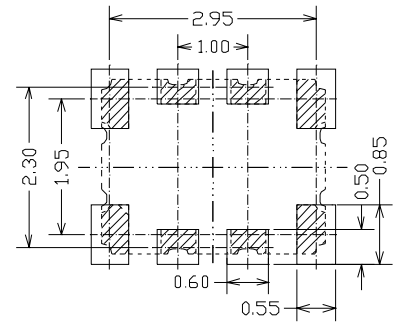
Pin Connections

Pin No.	Connection
#1	OE(Output Enable)
#2	INTN
#3	N.C.
#4	GND
#5	Output
#6	SCL
#7	SDA
#8	Vcc

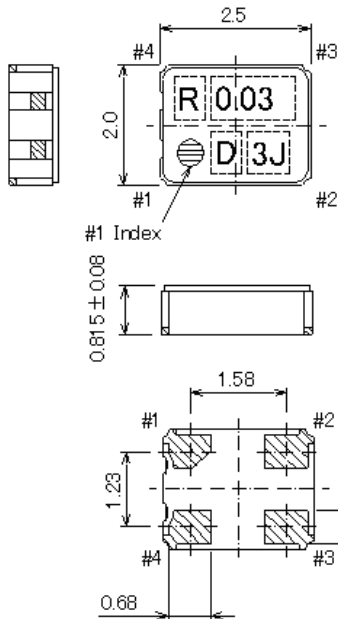
Function

#1 input	#5 Output condition
H	Oscillation out
L	High Z

<TOP View>



■ DSO221SR (SPXO with built-in AT-cut crystal resonator)



Pin Connections

Pin No.	Connection
#1	OE(Output Enable)
#2	GND
#3	Output
#4	Vcc

Function

#1 input	#3 Output condition
H	Oscillation out
Open	Oscillation out
L	High Z

<TOP View>

