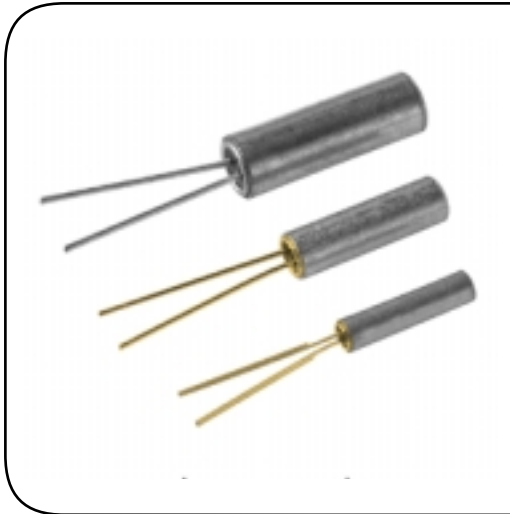
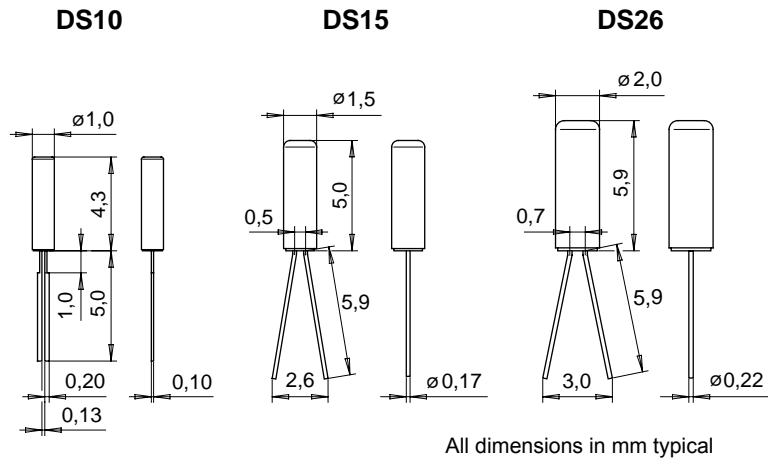


# DS – Series

## Watch Crystal 32.768 kHz



### DIMENSIONS



**Very small metal-can packages**  
**Very price competitive**  
**High stability**  
**Low aging**  
**Low power consumption**  
**High shock and vibration resistance**

### DESCRIPTON:

The DS-crystal-series are tubular metal-can packages in the standardized watch-crystal sizes  $\varnothing 2 \times 6$  mm,  $\varnothing 1.5 \times 5$  mm and  $\varnothing 1 \times 4.3$  mm for thru-hole applications.

Within the package is a high-quality tuning fork quartz crystal resonator, manufactured with precision high-volume photolithographic process and operating in the fundamental mode at 32.768 kHz.

Due to highly automated, large-volume production, the DS-crystal-series is very price competitive and ideal for any consumer application.

DS26 and DS15 are supplied in plastic-bags. (1000 pcs.)

DS10 is supplied in plastic-bags (200 pcs.)

### ELECTRICAL CHARACTERISTICS AT 25°C:

Package Size		DS26	DS15	DS10	
Nominal frequency	$F_L$	32.768	32.768	32.768	kHz
Load capacitance <sup>1)</sup>	$C_L$	8.2	8.2	8.2	pF
Frequency tolerance <sup>2)</sup>	$\Delta F/F$	+/-20	+/-20	+/-20	ppm
	$\Delta F/F$	+/-30	+/-30	+/-30	ppm
	$\Delta F/F$	+/-100	+/-100	+/-100	ppm
Series resistance typ./max.	$R_s$	30 / 42	35 / 50	45 / 60	k $\Omega$
Motional capacitance typ.	$C_1$	2.1	2.1	2.1	fF
Static capacitance typ.	$C_0$	0.9	0.9	0.9	pF
Drive level max.	P	1.0	1.0	1.0	$\mu$ W
Quality factor min.	Q	55'000	45'000	38'000	
Insulation resistance min.	$R_i$	500	500	500	M $\Omega$
Aging first year max.	$\Delta F/F$	+/-3	+/-3	+/-3	ppm
Turnover temperature	$T_0$	25 +/-5	25 +/-5	25 +/-5	$^{\circ}$ C
Frequency vs. temperature	$\Delta F/F_0$	$-0.035 \text{ ppm}/^{\circ}\text{C}^2 (T - T_0)^2 \pm 10\%$			ppm

1) Other load capacitances on request.

2) Tighter and wider frequency tolerances on request.

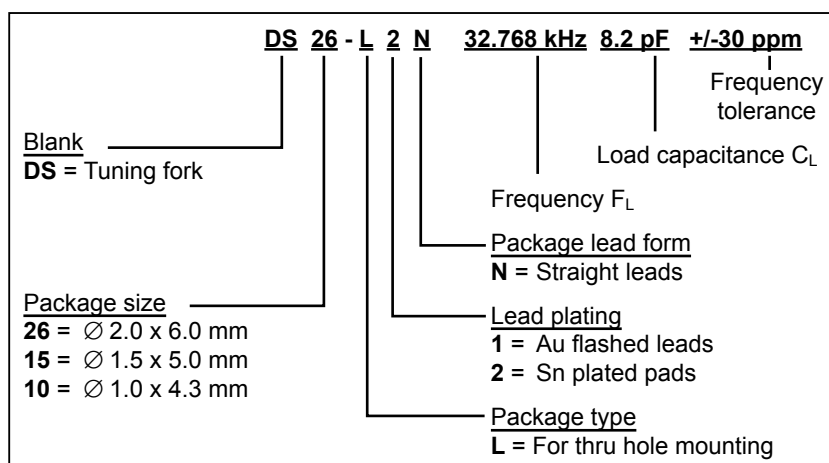
**ENVIRONMENTAL CHARACTERISTICS:**

		Conditions	Max. Dev.
Storage temp. range		-20 to +70°C	
Operating temp. range		-10 to +60°C	
Shock resistance	ΔF/F	5000 g, 0.3 ms, ½ sine	+/-5 ppm
Vibration resistance	ΔF/F	20 g / 10-2000 Hz	+/-5 ppm

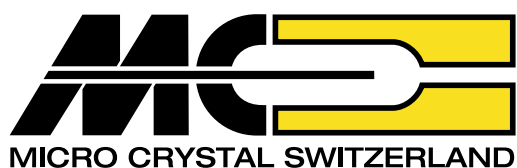
**TERMINATIONS AND PROCESSING:**

Type	Termination	Processing
DS26-L2N	Can: Sn plated Leads: Straight leads Sn plated	Thru-hole mounting Wave or hand soldering Max. 280°C / 5 sec. leads only
DS15-L1N	Can: Sn plated Leads: Straight leads Au flashed	Thru-hole mounting Wave or hand soldering Max. 280°C / 5 sec. leads only
DS10-L1N	Can: Sn plated Leads: Straight leads Au flashed	Thru-hole mounting Wave or hand soldering Max. 280°C / 5 sec. leads only

**PART NUMBER/ ORDERING INFORMATION EXAMPLE:**



All specifications subject to change without notice. 08.02



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