

DTT35XS: A new compact piezo tilt mechanism with 3 degrees of freedom.

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The **DTT35XS** is a new piezo mechanism coming from **CEDRAT TECHNOLOGIES** lab in February 2002. It comes from a development for space needs defined with the CNES (the French space agency), and for which a first application was found in the frame of "PHARAO". This mechanism is based on two pairs of **APA35XS**, Amplified Piezo Actuators displaying **35 µm of stroke** each, arranged in cross configuration (see figures 1 & 2). The mechanism allows both a **deflection of +/- 2 mrad** around the X and Y axis and a vertical displacement of **35 µm** in the Z direction (see figure 3, data sheet of the standard version). In order to achieve the two **θ_x** and **θ_y** deflections, each pair of **APA35XS** is electrically driven in **push pull configuration**, so the device only requires two output channels from the standard driving electronics **LA75A-2** of **CEDRAT TECHNOLOGIES**. In the context of the PHARAO space mission (first space cold atomic clock on board of the ISS), a set of **10 mechanisms** will be integrated by EADS-

SODERN for the **stability control** of the "optical molasses" near to the outlet of the **Cesium atomic fountain**. The **DTT35XS** will perform this control by **changing the angle of incidence** of a **laser beam** in front of an **optical fibre**. This **new 3 degrees of freedom piezo mechanism** thanks to a **high bandwidth** (higher than 1 kHz) can also fulfil technical specifications for precise and **fast optical applications** such like **optical switches, laser cavity tuning and spectrometry**.



Figure 1: DTT35XS for PHARAO space mission.



Figure 2: 3D view (I-DEAS) of the standard DTT35XS.

References	Unit	DTT35XS
Notes		Preliminary data*
Sensors option		SG
Max. No load displacement	µm	35.00
Max. Angular displacement	µrad (+/-)	2.00
Out of plane Y displacement	µm	10
Voltage range	V	- 20 ... 150
Stiffness	N/µm	1
Height	mm	22
Diameter	mm	30.0
Resolution	nm	3.5
Mass	g	25.0
Unloaded resonance frequency (in the tilt direction)	Hz	3200
Response time	ms	0.22
Capacitance (per electrical port)	µF	0.50
Mechanical interfaces (payload)		Flat surface Ø 10mm
Mechanical interfaces (frame)		Cylinder Ø 38.1mm
Electrical interfaces		PFTE insulated AWG36wires 100mm long and shield with sub D15 connector

Figure 3: Technical data sheet of the DTT35XS.

APA available in India.

G. Rajeev - MAXSOFT, Thomas Maillard - CEDRAT TECHNOLOGIES.

MAXSOFT signed an agreement of promotion and distribution of our standard piezo products in INDIA. Mister G. RAJEEV, Marketing Director of Maxsoft, is eager to express to the Flux Magazine readers his feelings about this new collaboration with CEDRAT TECHNOLOGIES:
 " It is a great privilege for MAXSOFT to

carry the CEDRAT's world class, unique, well proven, Piezo Actuators too in Indian Market along with their flagship software products FLUX, ATILA, etc. I am sure that Indian Smart Structure applications can benefit from these tools to a very great extent, for various applications in Space, Defence too apart from Vibrations, positioning applications

etc.. We are thankful for the dedication of the CEDRAT - AMA group in developing these niche products." So, through this representation, we hope that our piezo products will find their niches in the Indian market. The search for partners in other countries (Japan, UK, Spain, Scandinavia) still continues.

