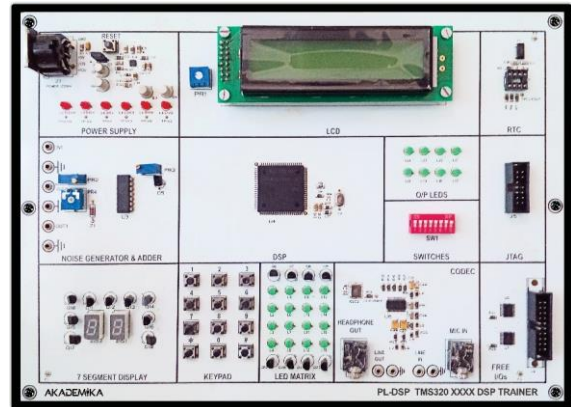# PL-DSP
DSP Trainer Kit

SPECIFICATIONS

• This DSP trainer kit uses Texas Instruments TMS320C6745 DSP chip a 375 MHZ device delivering up to 3648 million instructions per second (MIPs) and 2736 MFLOPS

• This DSP Trainer is specifically designed in a modular and user friendly format with many on board interfaces.

Hardware

• JTAG supported via USB
• TLV320AIC23B programmable stereo codec
• Two 3.5mm audio jacks for microphone and speaker
• Expansion port for plug-in modules
• Power supply : +5V, ±12V, GND
• 8 DIP switches for inputs and 8 LED indication for output
• Provision for manual Reset
• On board 4*4 LED matrix
• On board White noise source of amplitude 0 ~ 5Vpp
• On board 20*2 character LCD display
• On board 7 segment displays
• On board RTC interface : I2C based RTC section
• On board Phone keypad : 0 to 9 digits and *, # characters
• Code composer studio for the TMS320C6745 is included

EXPERIMENTS

• To study the architecture of DSP chips – TMS 320c6X instructions
• To verify linear and circular convolution
• To design FIR(LP/HP/BP) filters using windowing technique
  a) using rectangular window
  b) using triangular window
  c) using kaiser window
• To implement IIR(HP/LP/BP) using following window
  a) Chebyshev filter
  b) Butterworth filter
• N-point FFT algorithm
• N-point DFT and IDFT of given sequence

• Frequency response of system which is given in transfer function and differential form
• Power spectrum density
• Generation of sine wave
• DFT and IFFT using DIT and DIF methods
• Auto-correlation, cross-correlation and it's property
• Sampling of sine signal
• Amplitude modulation, frequency modulation and FSK modulation
• FIR filter using Blackman and hamming window
• Generation of square wave
• Implementation of decimation, interpolation and I/D sampling rate converter
• Impulse response of 1st and 2nd order system
• Addition and removal of noise
• Spectrogram of audio or sine signal
• Generation of DTMF signals and spectrogram of DTMF signal
• RTC displayed on LCD
• Signal companding using μ-law
• Generation of sinusoidal wave based on recursive differential equation
• Generation of sinusoidal through filtering
• To find the FFT of given signal
• FIR filter using Fourier series expansion method

Image processing

• Digital image fundamentals   • Image enhancement
• Image filtering   • Image reconstruction
• Color image processing   • Image compression
• Image segmentation
• Morphology image processing