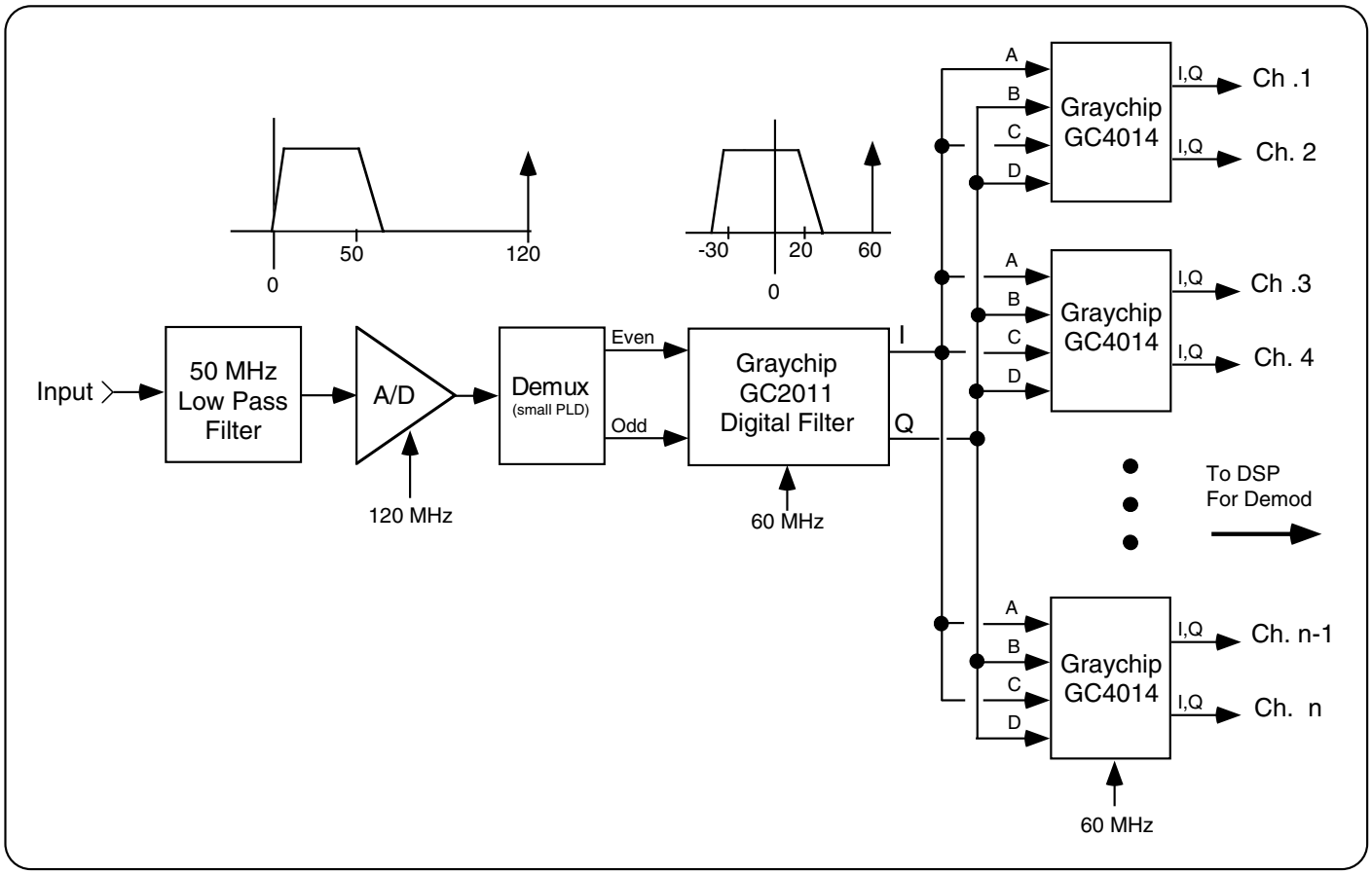
Multi-Channel 120 MSPS Digital Tuner Architecture



This application note describes how a 120 MHz sample rate multi-channel digital down-conversion system can be implemented using GRAYCHIP GC2011 Digital Filter and GC4014 Quad Digital Receiver chips.

An analog RF spectrum is band-limited to 50 MHz and then sampled at 120 MHz with an analog to digital converter. The resulting 120 MSPS digital data is then separated into even and odd streams. The GC2011, operating in double rate input real-to-complex down-conversion mode, takes the real even/odd data and translates the spectrum down by $F_S/4$ (30 MHz) to baseband. The baseband data is now complex-valued with in-phase and quadrature components (I and Q).

The GC4014 Quad Digital Receiver, clocking at 60 MHz, is used in complex input mode to provide two down-conversion channels per chip. Multiple GC4014 chips can be operated in parallel off the GC2011 I/Q output bus. The GC4014 extracts a single narrowband channel by shifting (up or down) the complex input spectrum by a programmable tuning word to 0 Hz. The GC4014's programmable filter then isolates a single channel.

General purpose programmable DSP chips are typically used to demodulate and further process the channelized outputs. The GC4014's output data is bit serial for glueless interface to most popular DSP chips. The GC4014 can be optionally programmed to multiplex both channel's serial data streams to a single output. In addition, it is possible to further multiplex multiple GC4014 outputs into a single stream for processing by a single programmable DSP chip.

Please contact Texas Instruments for additional information.

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