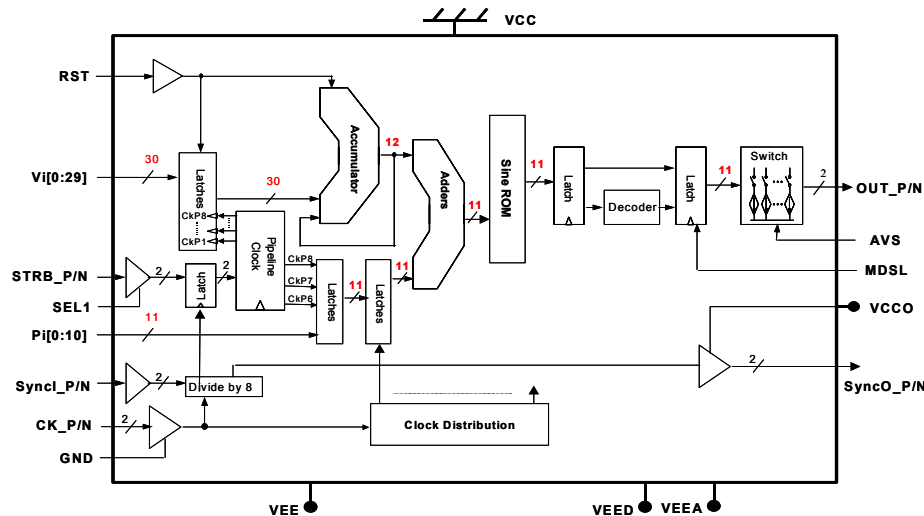


DS875 – Phase Modulated Direct Digital Synthesizer with Phase Modulation Port



KEY FEATURES

- 30-bit frequency tuning word
- 11-bit phase modulation inputs synchronized with frequency word inputs
- 12-bit ROM phase address resolution
- On chip DAC with 11 bit linearity
- Clock rate up to 2.8 GHz
- Analog outputs selectable between Normal-Hold format and Return-to-Zero format.
- Sine wave generation up to 1.4 GHz 1st Nyquist band for Normal-Hold mode or 4.2 GHz 3rd Nyquist band for Return-to-Zero mode.
- Broadband worst SFDR > 50 dBc (DC to 1.4-GHz 1st Nyquist Bandwidth) at a 2.8 GHz clock rate
- Complementary analog waveform outputs with 50 Ω back terminations
- **SyncI_P/N** synchronizes multiple chip applications
- **SyncO_P/N** provides reference for data loading and synchronizes STROBE signals.
- LVTTTL/CMOS frequency word and phase modulation word digital inputs
- Asynchronous Reset (**RST**) pin to initiate starting phase state set by phase bit inputs
- Strobe inputs (**STRB_P/N**) to update the frequency word and phase word of DAC outputs
- Wide data loading window allow **DS875** to be controlled by memory, micro-controller, FPGA or DSP chips to update frequency word and/or phase word as fast as 8 clock cycles without clock slipping or glitches during frequency or phase transition
- 4 W power consumption with a single -5V power supply
- 64-pin QFN package

Description

The **DS875** is a high-speed Direct Digital Synthesizer (DDS) with phase modulation input port. It has a frequency tuning resolution of 30 bits and phase modulation input of 11 bits. The internal

ROM has phase resolution of 12-bit and the internal DAC has amplitude resolution of 11 bits. The analog outputs of DAC can be selected between Normal-Hold mode (for the 1st Nyquist band) and Return-to-Zero mode (for the 1st, 2nd and 3rd Nyquist band) operation. Sine waves can be generated up to 1st Nyquist band near 1.4 GHz (at a 2.8-GHz clock rate) with Normal-Hold mode of DAC or up to 3rd Nyquist band around 4 GHz with Return-to-Zero mode of DAC. The initial phase can be reset to any degree, determined by phase bit inputs, to start with. The chip has a pair of complementary analog outputs with 50-Ω back terminations. The frequency of output waveforms can be controlled by the thirty frequency control bits, **Vi[0:29]**. The phase of output waveforms can be modulated by the 11-bit **Pi[0:10]** phase modulation inputs. The **DS875** accepts either differential clock inputs or a single-ended clock input and features 50-Ω on-chip back terminations to ground. Both the frequency word and phase word inputs accept LVTTTL/CMOS input levels. Differential synchronization input **SyncI_P/N** provides synchronization for multiple chip applications and start each chip with the same phase of synchronization outputs **SyncO_P/N** ready to accept frequency word and strobe inputs. The synchronous Strobe inputs are latched by internal generated divide-by-8 clocks which were also sent to the output pins **SyncO_P/N**. **SyncO_P/N** can be used as a reference to synchronize the frequency word, phase word and strobe signal input timing alignment to the internal divide-by-8 clock to latch all input data properly. The Reset is asynchronous to minimize clock latencies of effectiveness on the analog outputs. The internal timing was optimized to avoid clock slipping during frequency word and/or phase word transition or after reset. The analog outputs of DAC can be selected between Normal Hold mode (for the 1st Nyquist band) or Return-to-Zero mode (for the 1st, 2nd and 3rd Nyquist band) operation. Combining with selectable filters, effectively ultra-broadband signals from DC to the 3rd Nyquist band can be generated. Only a single -5V power supply is required.