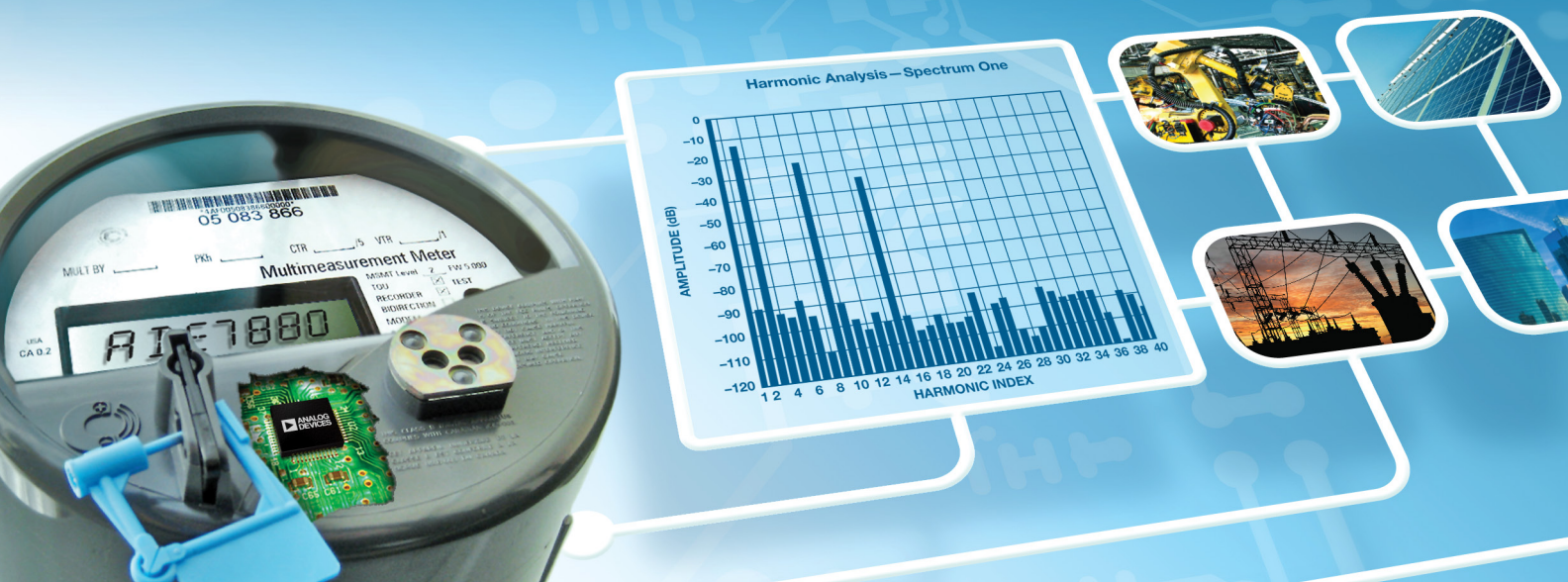


ADE7880—Polyphase Energy Metering IC Includes High Accuracy Harmonic Analysis



Features

- Supports IEC 62053-21, IEC 62053-22, IEC 62053-23, EN 50470-1, EN 50470-3, and ANSI C12.20 standards
- Supports IEC 61000-4-7 Class I and II accuracy specification
- Supplies rms, active, reactive and apparent powers, power factor, THD + N and harmonic distortion of all harmonics within 2.8 KHz pass band
- Supports current transformer and di/dt current sensors
- 10 ppm/°C typical reference drift with external overdrive capability
- 40-lead lead frame chip scale package (LFCSP), Pb-free, pin for pin compatible with [ADE7854](#), [ADE7858](#), [ADE7868](#), and [ADE7878](#)
- Wide-supply voltage operation: 2.4 V to 3.7 V
- Operating temperature: -40° to +85°C

Parameter	Error Rate	Dynamic Range @ TA = 25°C
Harmonic voltage/current rms	<1% error	2000:1
Harmonic active/reactive powers	<1% error	2000:1
Active/reactive energy	<0.1% error	1000:1
Active/reactive energy	<0.2% error	5000:1
Voltage/current rms	<0.1% error	1000:1

The [ADE7880](#) is a high accuracy, 3-phase electrical energy measurement IC featuring an adaptive real time monitoring (ARTM) harmonic engine. ARTM is capable of monitoring three user selectable harmonics, in addition to the fundamental. ARTM automatically tracks fundamental frequency and provides real-time harmonic measurement updates. Harmonic analysis includes current rms, voltage rms, active, reactive, and apparent powers, power factor, harmonic distortion, and total harmonic distortion plus noise (THD + N) calculations.

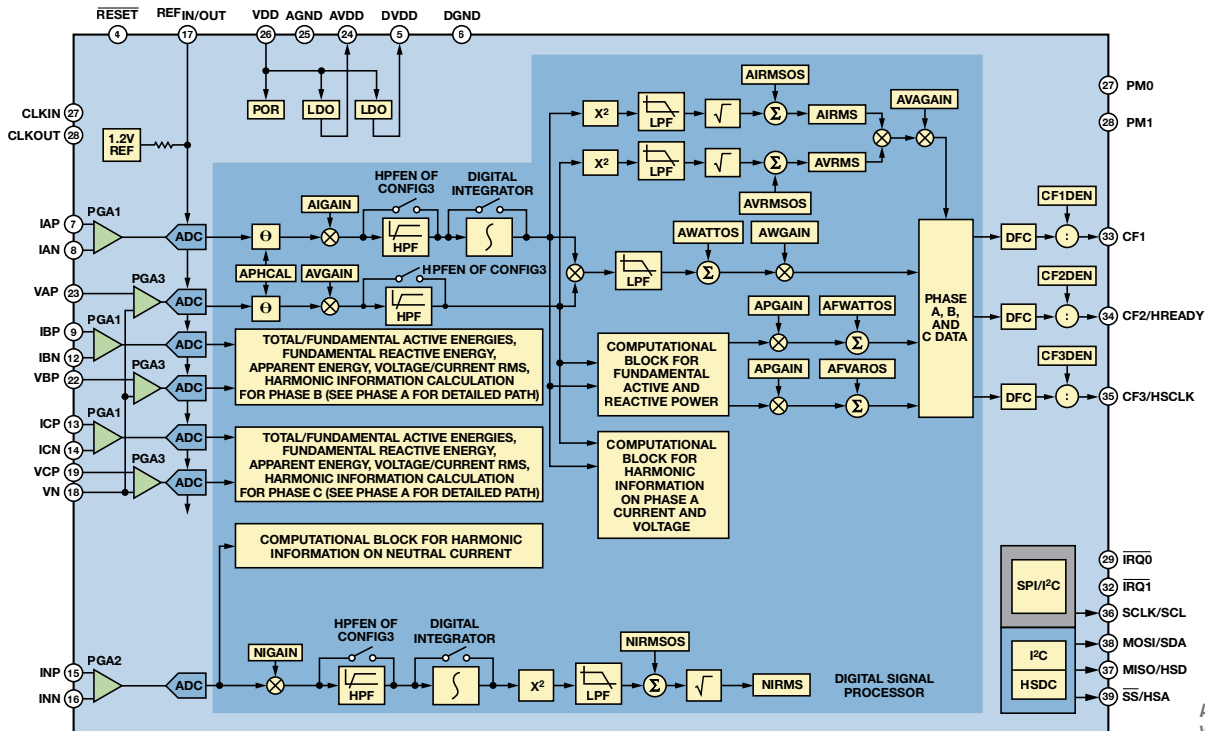
The [ADE7880](#) incorporates seven second-order Σ - Δ ADCs, a digital integrator, reference circuitry, and all the signal processing required to perform total (fundamental and harmonic) active, fundamental active, fundamental reactive, and apparent energy measurement and rms calculations.

The [ADE7880](#) is suitable to measure active, reactive, and apparent energy in various 3-phase configurations, such as wye or delta services, with both three and four wires. This metering IC provides system calibration features for each phase: rms and energy offset correction, phase calibration, and gain calibration.

The [ADE7880](#) supports IEC 62053-21, IEC 62053-22, IEC 62053-23, EN 50470-1, EN 50470-3, ANSI C12.20, and IEC 61000-4-7 standards.

The [ADE7880](#) is pin compatible with the popular [ADE7878](#), [ADE7868](#), [ADE7858](#), and [ADE7854](#) 3-phase energy metering ICs.

Functional Block Diagram

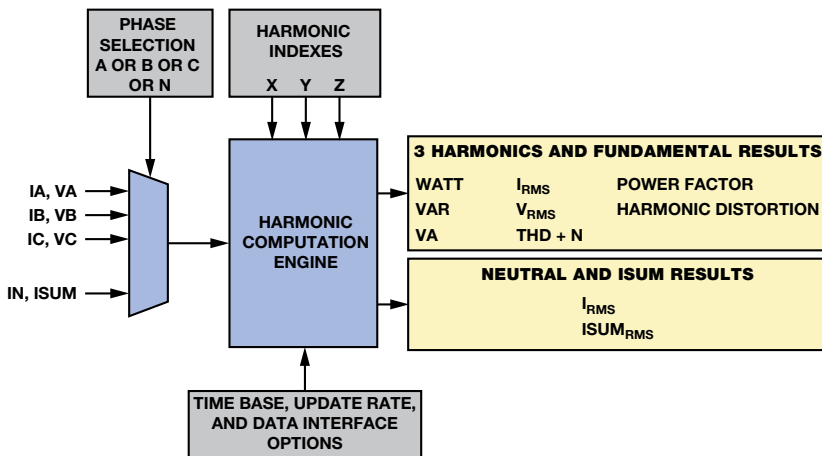


General Description

The ADE7880 ARTM features complete harmonic analysis including magnitude and phase information. ARTM also computes harmonic distortion relative to the fundamental, as well as THD + N. Harmonic analysis data can be accessed in real time using a burst mode transfer via an SPI interface.

The ADE7880 waveform sample registers allow access to all ADC outputs. This device also incorporates power quality measurements such as short duration low or high voltage detections, short duration high current variations, line voltage period measurement, and angles between phase voltages and currents. Two serial interfaces can be used for communication: SPI or I²C. A dedicated high speed interface HSDC (high speed data capture) port can be used in conjunction with I²C to provide access to the ADC outputs and real-time power information. Two interrupt request pins, IRQ0 and IRQ1, indicate that an enabled interrupt event has occurred. The CF1, CF2, and CF3 logic outputs provide a wide choice of power information: total/fundamental active/reactive power, total apparent power, or sum of current rms values.

ADE7880 Harmonic Calculations



I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

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analog.com/energymeter

Analog Devices, Inc.
Worldwide Headquarters
Analog Devices, Inc.
One Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
U.S.A.

Tel: 781.329.4700
(800.262.5643,
U.S.A. only)
Fax: 781.461.3113

Analog Devices, Inc.
Europe Headquarters
Analog Devices, Inc.
Wilhelm-Wagenfeld-Str. 6
80807 Munich
Germany
Tel: 49.89.76903.0
Fax: 49.89.76903.157

Analog Devices, Inc.
Japan Headquarters
Analog Devices, KK
New Pier Takeshiba
South Tower Building
1-16-1 Kaigan, Minato-ku,
Tokyo, 105-6891
Japan
Tel: 813.5402.8200
Fax: 813.5402.1064

Analog Devices, Inc.
Southeast Asia
Headquarters
Analog Devices
22/F One Corporate Avenue
222 Hu Bin Road
Shanghai, 200021
China
Tel: 86.21.2320.8000
Fax: 86.21.2320.8222

