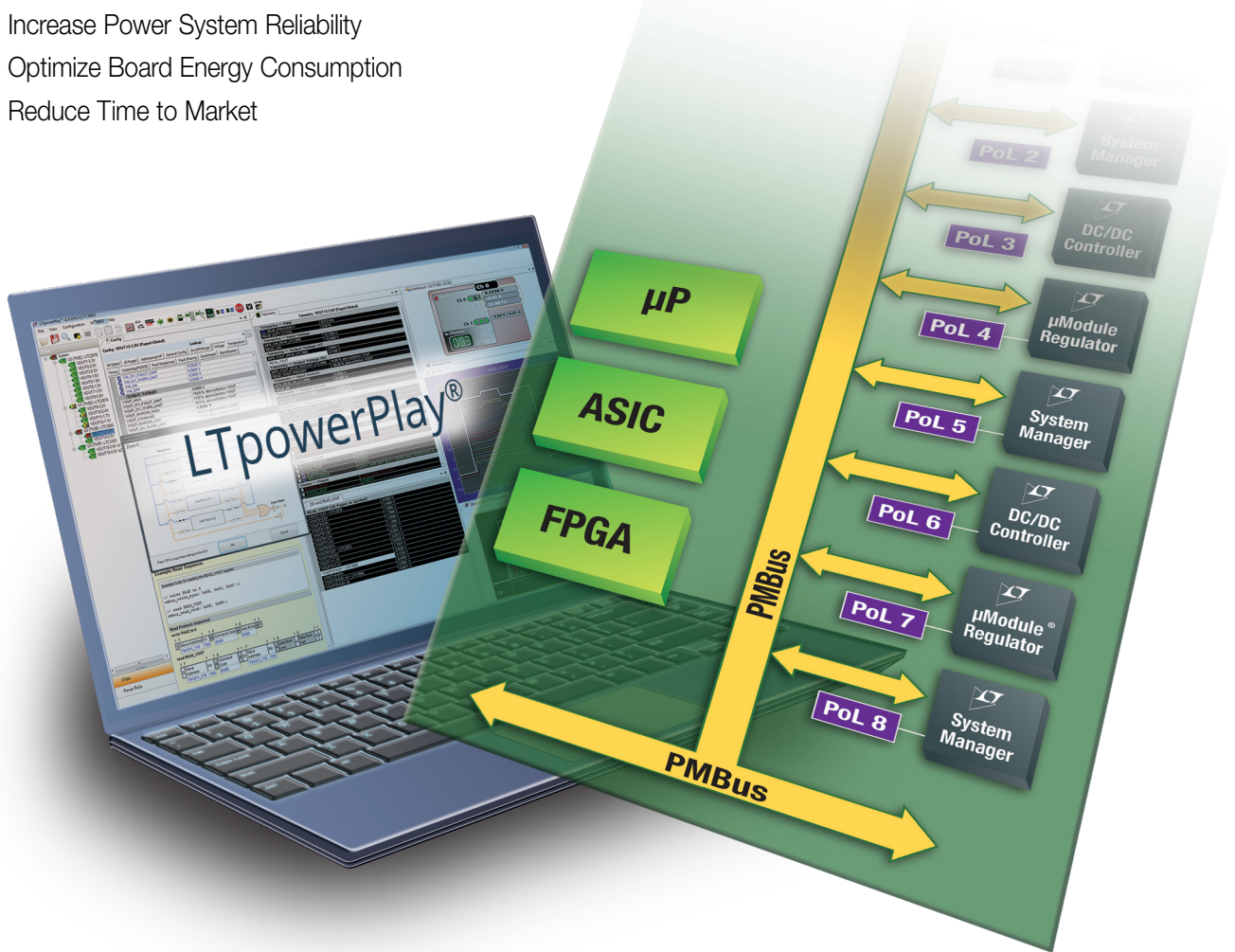


DIGITAL POWER SYSTEM MANAGEMENT

µModule Regulators • DC/DC ICs • Manager ICs • Sequencers • Supervisors

- ✓ Digitally Manage Point-of-Load (POL) Power Supplies
 - Trim, Margin, Sequence, Supervise, Log Faults
 - Monitor Voltage, Current, Power, Energy, and Temperature
- ✓ Increase Power System Reliability
- ✓ Optimize Board Energy Consumption
- ✓ Reduce Time to Market



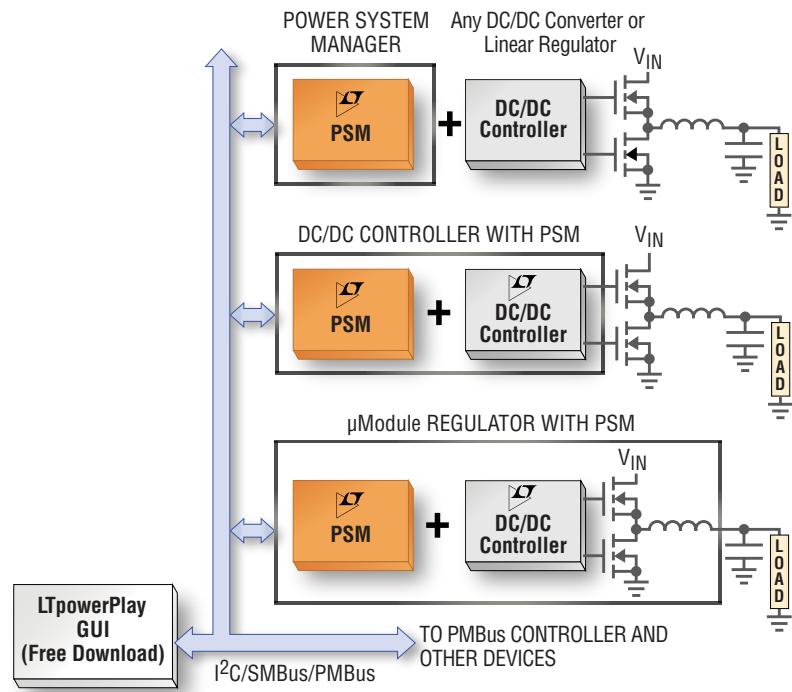
Take Control of Your Power Supplies

Accelerate characterization and optimization during prototyping and field operation with Analog Devices' digital power system management (DPSM) products, configured and monitored via a PMBus/SMBus/I²C digital interface.

Digital Power System Management

Benefits

- ±0.25% Voltage Accuracy
- Products
 - Power System Managers
 - DC/DC Controllers with PSM
 - Fully Integrated μ Module[®] Regulators
- LTpowerPlay[®] GUI: Engineering-Level Development Environment
- PMBus Compliant Commands Over I²C/SMBus Digital Interface
- EEPROM for Configuration and Black Box Fault Logging
- Autonomous Operation – No Software Coding Required
- Coordinate Sequencing and Fault Management Across PSM Devices
- Reduced BOM Cost and Validation Effort



μ Module Regulators, DC/DC Controllers and Monolithic Regulators with Power System Management

- Fast Analog Feedback Loop with Digital Telemetry and Control
- Program V_{OUT} , I_{LIM} , OV/UV Level, Frequency, Ramp Rate, Sequencing Time Delays, Margining
- Read Back V_{IN} , I_{IN} , V_{OUT} , I_{OUT} , P_{OUT} , Duty Cycle, Temperature, Faults

PSM Switcher Selection Guide

Features	μ Module Regulators				
	LTM [®] 4675	LTM4676A	LTM4677	LTM4678	LTM4686/-1
PSM	Full	Full	Full	Full	Full
Number of Outputs	2	2	2	2	2
PWM Control Mode	Current	Current	Current	Current	Current
Start-Up Time (ms) (Typ)	35	35	35	30	35
	(40 Max)	(40 Max)	(40 Max)		(40 Max)
Input Current Sense	Calibrated	Calibrated	Calibrated	Yes	Calibrated
V_{OUT} Range (V)	0.5 to 5.5	0.5 to 5.5	0.5 to 1.8	0.5 to 3.3	0.5 to 2.75
V_{IN} Range (V)	4.5 to 17	4.5 to 17	4.5 to 16	4.5 to 16	4.5 to 17/2.7* to 17
V_{OUT} Accuracy (%)	0.5	0.5	0.5	0.5	0.5
I_{OUT} (A) (Max)	Dual 9 or Single 18	Dual 13 or Single 26	Dual 18 or Single 36	Dual 25 or Single 50	Dual 13 or Single 26
Temperature Sensing	ΔV_{BE}	ΔV_{BE}	ΔV_{BE}	ΔV_{BE}	ΔV_{BE}
DCR Sensing	NA	NA	NA	NA	NA
Dedicated PGOOD Pins	No	No	No	Yes	No
Gate Drivers	NA	NA	NA	NA	NA
Three-State PWM Control	NA	NA	NA	NA	NA
Digitally Adjustable Loop Compensation	No	No	No	Yes	No
On-Chip LDO from V_{IN}	Yes	Yes	Yes	Yes	Yes
Fast ADC Mode	Yes	Yes	Yes	Yes	Yes
Corresponding Slaves	NA	NA	NA	NA	NA
Package (mm x mm)	16 x 11.9 x 3.51 BGA	16 x 16 x 5.01 BGA	16 x 16 x 5.01 BGA	16 x 16 x 5.86 BGA	16 x 11.9 x 1.82 LGA

* Requires external bias voltage

Power System Managers

- Manage Any Adjustable Point-of-Load Power Supply
- Trim, Margin, Sequence, Supervise, Manage Faults, Monitor Telemetry, Record Fault Logs
- Read Back Voltage, Current, Power, Energy, Temperature, and Faults

Device	Voltage Supply Channels Managed ¹	Number of Current Sensed Loads	Input Energy	Temp Sense		Digital Interface			EEPROM	Includes Res/Cap	Trim/Margin/Monitor Accuracy	Sequencing			Bias Supply			Package (mm × mm)	Demo Board
				Internal	External	PMBus	SMBus	I ² C				Time	Cascade	Tracking	3.3V	5V	12V		
LTC2970 ²	2	2		•			•	•			±0.50%				•	•	4 x 5 QFN-24	DC980	
LTC2972	2	3	•	•	2	•	•	•	•		±0.25%	•	•	•	•	•	6 x 7 QFN-44	DC2619	
LTC2974	4	4		•	4	•	•	•	•		±0.25%	•	•	•	•	•	9 x 9 QFN-64	DC1978	
LTC2975	4	5	•	•	4	•	•	•	•		±0.25%	•	•	•	•	•	9 x 9 QFN-64	DC2022	
LTC2977	8			•		•	•	•	•		±0.25%	•		•	•	•	9 x 9 QFN-64	DC2028	
LTC2979	16			•		•	•	•	•		±0.50%	•		•	•		12 x 12 BGA		
LTC2980	16			•		•	•	•	•		±0.25%	•		•	•	•	12 x 12 BGA	DC2198	
LTM2987	16			•		•	•	•	•	•	±0.25%	•		•	•	•	15 x 15 BGA	DC2023	

¹ A channel refers to the collection of functions that trims, supervises and monitors a given power supply rail.

² See LTC2970-1 for sequencing.

Programmable 6-Channel Sequencer and Supervisors with EEPROM

Device	Sequencer/Supervisor	Comparator Outputs	Threshold Range	Threshold Accuracy	Power Supply	Package (mm × mm)	Demo Board
LTC2933	Supervisor	No	1V to 13.9V (1×) 0.2V to 5.8V (5×)	±1%	3.4V to 13.9V	5×4 DFN-16, SSOP-16	DC1633
LTC2936	Supervisor	Yes	0.2V to 5.8V (6×)	±1%	3.13V to 13.9V	4×5 QFN-24, SSOP-24	DC1605
LTC2937	Both	No	0.2V to 6V (6×)	±0.75%	2.9V to 16.5V	5×6 QFN-28	DC2313

Features	DC/DC Controllers					
	LTC [®] 3880/-1	LTC3882/-1	LTC3883/-1	LTC3884/-1	LTC3886	LTC3887/-1/-2
PSM	Full	Full	Full	Full	Full	Full
Number of Outputs	2	2	1	2	2	2
PWM Control Mode	Current	Voltage	Current	Current	Current	Current
Start-Up Time (Typ)	145	70	145	65	65	70
Input Current Sense	Inferred	No	Yes	Yes	Yes	Inferred
V _{OUT} Range (V)	0.5 to 4.0, ch0 0.5 to 5.4, ch1	0.5 to 5.3	0.5 to 5.4	0.5 to 5.4	0.5 to 13.2	0.5 to 5.5
V _{IN} Range (V)	4.5 to 24	3.0 to 38	4.5 to 24	4.5 to 38	4.5 to 60	4.5 to 24/24/34
V _{OUT} Accuracy (%)	0.5	0.5	0.5	0.5	0.5	0.5
I _{OUT} (A) Max/Phase*	30	40	30	30	30	30/40/30
Temperature Sensing	ΔV _{BE}	ΔV _{BE} and Direct	ΔV _{BE}	ΔV _{BE} and Direct	ΔV _{BE} and Direct	ΔV _{BE}
DCR Sensing	Low	Ultralow	Low	Very Low	Low	Low
Dedicated PGOOD Pins	No	No/Yes	Yes	Yes	Yes	No
Gate Drivers	Yes	No	Yes	Yes/No	Yes	Yes/No/Yes
Three-State PWM Control	No	Yes	No	No/Yes	No	No/Yes/No
Digitally Adjustable Loop Compensation	No	No	No	Yes	Yes	No
On-Chip LDO from V _{IN}	Yes/No	No	Yes/No	Yes	Yes	Yes
Fast ADC Mode	No	No	No	Yes	Yes	Yes
Corresponding Slaves	LTC3870	NA	LTC3870	LTC3874	LTC3870	LTC3870
Package (mm × mm)	6 x 6 QFN-40	6 x 6 QFN-40	5 x 5 QFN-32	7 x 7 QFN-48	7 x 8 QFN-46	6 x 6 QFN-40

* Depends on choice of external components

Hardware Support

A DC1613 USB-to-I²C/SMBus/PMBus controller (adapter) is used to interface any PSM demo board to a computer. Every PSM device comes with at least one specific demo board. Some PSM demo boards can be cascaded together for evaluating multiple rails.

To USB Port of
Computer Running
LTpowerPlay

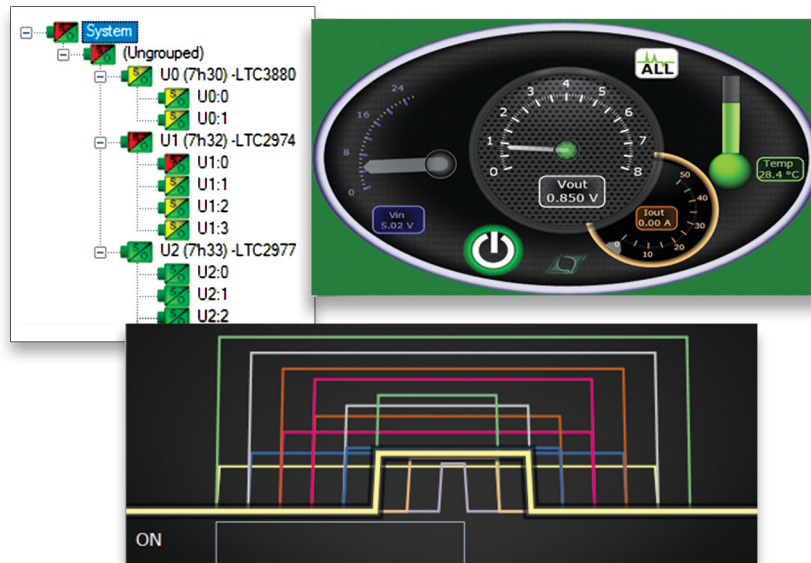


12-Pin Ribbon Cable
to PSM Demo Board

If Needed, DC2086 Adapts
12-Pin Cable to 4-Pin Header

Software Support

LTpowerPlay is a powerful and intuitive Windows-based development environment used to configure and interrogate PSM devices. It can also be used in an offline mode (with no hardware present) in order to build a multichip configuration file that can be saved and reloaded at a later time. It is available as a free download at: www.analog.com/LTpowerPlay



Device Programming

PSM devices ship from Analog Devices with a default register configuration loaded in EEPROM. The options to ship with a customized, application-specific configuration developed during the prototyping phase are as follows:

- **Analog Devices NVM Programming Service:** This involves submitting the configuration file, then receiving a few custom programmed samples (First Articles) for verification and approval. Contact Linear Express: express@analog.com
- **In-Circuit Programming:** Use LTpowerPlay on a computer with a DC1613 USB-to-PMBus controller (adapter) to program PSM devices on circuit boards with pin headers accessing the PSM device.
- **JTAG Programming:** Use third-party programmers from Asset Intertech or JTAG Technologies to program PSM devices on circuit boards connected to JTAG scan chains without needing additional programmers or pin headers.

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 GmbH
Otto-Aicher-Str. 60-64
80807 München
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. Asia Pacific Headquarters

Analog Devices
5F, Sandhill Plaza
2290 Zuchongzhi Road
Zhangjiang Hi-Tech Park
Pudong New District
Shanghai, China 201203
Tel: 86.21.2320.8000
Fax: 86.21.2320.8222

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