

Power Management Units for Embedded Processors

1Q 2013



The TPS65K family of Power Management Units (PMUs), also called PMICs, offers complete power solutions for ARM® Cortex™ processors, including the latest-generation of Cortex A9 and A15 processors. PMUs integrate several high-efficiency DC/DC converters and LDOs for the processor core, I/O, memory and other voltages. The new multiphase DC/DC converter technology with integrated FETs allows currents up to 9 A. Also available are integrated functions that support a battery charger (linear or switching), light-management for flash and WLED back-lighting, ADCs, a touch-screen controller, audio codec and USB 2.0 PHY. TI's SmartReflex™ technology and dynamic voltage scaling (DVS) can significantly extend battery lifetime by adjusting the output voltages to match the required performance.

New PMU Highlights

TPS65090: Front-end PMU for 2 to 3 cells in series

Industry's smallest solution integrating a 4-A switching charger (2–3s), DC/DC pre-regulation, load switches and an ADC. An excellent match for next-generation ultra-thin tablets powered by Cortex A15 processors, and other portable devices. Available in 9x9-mm QFN package.

TPS65913/14: Processor PMU

New multiphase PMU targeting Cortex A15 multicore processors that delivers up to 9 A with integrated FETs. It includes 10 DC/DC converters, 11 LDOs, RTC and SmartReflex™ and highly flexible sequencing. Available in 5x5-mm WCSP and 9x9-mm mrQFN package.

TPS659119-Q1: Automotive PMU

Flexible PMU for dual- and quad-core Cortex A9 processors. Includes 1 DC/DC controller,

3 DC/DC converters, 8 LDOs and an RTC. Very fast startup time (under 10 ms) to enable fast system startup for automotive applications like infotainment and others. Available in 12x12-mm QFP package.

TPS650380/1: Multiphase PMU

Three multiphase bucks for up to 6.8 A for processor applications with SmartReflex™. Output-voltage range from 0.5 to 1.77 V and fully programmable via I²C. Available in 3.25x3.25-mm NanoFree™ package.

TPS65290: Ultra-low power PMU

New PMU for ultra-low-power applications like energy harvesting and gas/water meters. The quiescent current in “always-on” sleep mode is only 100's nA. Available in 4x5-mm QFN package.

Embedded Processors Supported by TI Power-Management Units (PMUs)

Processor	Part Number	PMU
TI	C2834x	TPS65000, TPS650061
TI	C55x	TPS65000x
TI	C6742/6/8	TPS65910, TPS65070, TPS65023
TI	C6745/7	TPS65910, TPS65023
TI	C6A814x	TPS659113
TI	C6A816x	TPS659112
TI	DM335, DM355, DM365, DM367	TPS65053, TPS65070
TI	DM368	TPS650532, TPS65023
TI	DM385	TPS659113
TI	DM37x 800MHz	TPS6595x/30/2x/10, TPS65023, TPS650731
TI	DM37x 1GHz	TPS65950A3/x51/x21B1/x10, TPS65023, TPS650731
TI	DM643x, DM644x	TPS65023, TPS659105
TI	DM812x/ DM814x	TPS659113
TI	DM816x	TPS659112
TI	AM17x	TPS65910, TPS65000x, TPS650061, TPS65023
TI	AM18x	TPS65910, TPS65000x, TPS650061, TPS65070
TI	AM335x	TPS65910A/A3, TPS65217, TPS650250
TI	AM35x	TPS65910, TPS650732, TPS65023
TI	AM37x 800MHz	TPS6595x/30/2x/10, TPS65023, TPS650731
TI	AM37x 1GHz	TPS65950A3/x51/x21B1/x10, TPS65023, TPS650731
TI	AM387x	TPS659113
TI	AM389x	TPS659112
TI	RM4x, TMS570	TPS65381-Q1
TI	OMAP™3503/15/25/30	TPS6595x/30/2x/10, TPS65073x, TPS65023
TI	OMAP3611/21/30	TPS6595x/30/2x/10, TPS65023
TI	OMAP-L132, L137, L138	TPS65910, TPS65023, TPS650061, TPS65070
TI	OMAP4430/60/70	TWL6030, TWL6032
TI	Jacinto 6	TPS659038-Q1, TPS650939-Q1, TPS65917-Q1

Processor	Part Number	PMU
Altair	3100/6200	TPS659122
Ambarella	iOne	Please ask TI
Freescale	IMX25	TPS65051/2
Freescale	IMX27	TPS65053, TPS659107
Freescale	IMX35	TPS650250, TPS659107
Freescale	IMX508	TPS659108
Freescale	IMX51	TPS659109
Freescale	IMX53	TPS659106
Freescale	IMX6x	Please ask TI
Leadcore	LC1810	LP8788
Marvell	PXA270	TPS65021/2
Marvell	Armada	Please ask TI
Nvidia	Tegra 2	TPS658621/2/3, TPS658640/3
Nvidia	Tegra 3	TPS659110/9
Nvidia	Tegra 4	TPS65913/14
Nvidia	i450, i500	TPS659121
Rockchip	RK29	TPS659102
Rockchip	RK30	TPS65910x
Samsung	S5PV210, S5PC110	TPS659101
Samsung	S5PC100	TPS659103, LP3974
Samsung	S5P6440	TPS659104
Samsung	S5PV310	Please ask TI
Samsung	Exynos 4210	Please ask TI
STM	SPEAR 300	TPS650532
STM	SPEAR 1310	Please ask TI

Visit power.ti.com, www.ti.com/pmu and www.ti.com/processorpower

Selection Guide

Device	V _{IN} (V)	No. of Regulator Outputs	Charger	Audio Codec	USB 2.0 OTG Transceiver	WLED Boost	DC/DC Step-Down Converter	DC/DC Step-Down Controller	LDO	Communication Interface	Description	Package(s)	Automotive Qualified†	Price*
General Purpose PMUs														
TPS65280/1/2	4.5 to 18.0	1	—	—	—	—	1	—	—	—	With 1 to 2 power switches	QFN-24	—	2.45
TPS65720/1	4.3 to 28.0	2	Linear	—	—	—	1	—	1	I ² C	Smallest single Li-Ion applications, also QFN	WCSP-25	—	1.65
TPS65253	4.5 to 16.0	2	—	—	—	—	2	—	—	—	General purpose (3.5 A, 2.5 A)	QFN-28	—	2.95
TPS65270	4.5 to 16.0	2	—	—	—	—	2	—	—	—	General purpose (3 A, 2 A), ideal for 2-layers	QFN-28	—	2.95
LM26400Y	3.0 to 20.0	2	—	—	—	—	2	—	—	—	Dual buck	LLP-16	—	2.25
TPS65000/6	1.8 to 6.0	3	—	—	—	—	1	—	2	—	General purpose	QFN-16	—	1.40
TPS65250/1	4.5 to 18.0	3	—	—	—	—	3	—	—	—	General purpose	QFN-40	—	3.05
TPS65257/8	4.5 to 16	3	—	—	—	—	3	—	—	—	With 1/2 USB switches	QFN-40	—	3.25
LM3686	2.7 to 5.5	3	—	—	—	—	1	—	2	—	General purpose	SMD-12	—	0.95
LP3907	2.8 to 5.5	4	—	—	—	—	2	—	2	I ² C	General purpose	SMD-25, LLP-24	Yes	2.28
LM26480	2.8 to 5.5	4	—	—	—	—	2	—	2	—	General purpose	LLP-24	Yes	1.90
LM3280	2.7 to 5.5	4	—	—	—	—	1	—	3	—	Battery powered RF	SMD-16	—	2.31
TPS65211	1.8 to 5.5	4	—	—	—	Yes	3	—	1	I ² C	2x AA alkaline battery	QFN-32	—	TBC
LP3910	2.7 to 5.5	5	Linear	—	—	—	3	—	2	I ² C	Portable with buck boost	LLP-48	—	3.95
TPS65053/8	2.5 to 6.0	5	—	—	—	—	2	—	3	—	Low-cost 5x channel PMU	QFN-24	Yes	1.85
TPS65050/1/2/4/6	2.5 to 6.0	6	—	—	—	—	2	—	4	Logic H/L	Low-cost 6x channel PMU	QFN-32	—	1.85
LP8720	2.7 to 4.5	6	—	—	—	—	1	—	5	I ² C	General purpose	Micro SMD-20	—	1.50
LP8725	2.6 to 4.5	9	—	—	—	—	2	—	7	I ² C	General purpose	Micro SMD-30	—	2.30
ARM® Cortex™-R4														
TPS65381-Q1	5.8 to 36	5	—	—	—	—	1	—	4	I ² C	Safety-critical applications	HTSSOP-32	Yes	2.60
TPS65919-Q1	2.7 to 5.5	11	—	—	—	—	3	—	9	2x I ² C	Flexible PMU with ext DC/DC controller option	HTQFP-80	Yes	5.72
ARM Cortex A8 PMUs														
TPS65070/2/3	2.8 to 6.3	5	Linear	—	—	Yes	3	—	2	I ² C	With and without touch-screen controller	QFN-48	Yes	3.60
TPS65023x	2.5 to 6.0	6	—	—	—	—	3	—	3	I ² C	Flexible 6x-channel PMU, also WCSP package	QFN-40	Yes	3.30
TPS650250	2.5 to 6.0	6	—	—	—	—	3	—	3	—	Flexible PMU with adj V _{OUT}	QFN-32	Yes	2.95
TPS65217	2.7 to 6.5	7	Linear	—	—	Yes	3	—	4	—	Optimized for AM335x processors	QFN-48	—	3.45
TPS65921	2.7 to 4.5	7	—	—	Yes	—	3	—	4	2x I ² C	Optimized for OMAP™35x processors	BGA-139	—	3.60
TPS65930	2.7 to 4.5	7	—	Yes	Yes	—	3	—	4	2x I ² C	Optimized for OMAP35x processors	BGA-139	—	3.95
LP8765	4.5 to 6.8	12	Linear	—	—	Yes	2	—	10	I ² C	Smartphone PMU	Micro SMD-49	—	3.00
TPS65950	2.7 to 4.5	13	Linear	Yes	Yes	—	3	—	10	2x I ² C	Optimized for OMAP35x processors	BGA-209	—	4.50
TPS65951	2.7 to 4.5	13	—	Yes	Yes	—	3	—	10	2x I ² C	Optimized for OMAP35x, 0.8-mm pitch	BGA-169	—	4.50
TPS65910x	2.7 to 5.5	13	—	—	—	—	3	—	9	2x I ² C	Flexible PMU with 5-V boost	QFN-48	—	3.45
LP3925	4.5 to 6.5	18	Linear	—	—	Yes	3	—	15	I ² C	Smartphone PMU	Micro SMD-81	—	3.95
LP3974	4.5 to 6.5	20	Linear	—	—	—	4	—	16	I ² C	Smartphone PMU	Micro SMD-100	—	2.46
ARM Cortex A9 PMUs														
TPS659110/2/3/9	2.7 to 5.5	13	—	—	—	—	3	1	9	2x I ² C	With DC/DC controller up to 10 A	BGA-98	Yes	4.45
TPS65862x/4x	4.3 to 6.5	14	Linear	—	—	Yes	3	—	11	I ² C	Nvidia Tegra 2 and other microprocessors	BGA-121	Yes	5.95
TPS65912x	2.3 to 5.5	14	—	—	—	—	4	—	10	I ² C/SPI	Flexible PMU with 4 DC/DC converters	WCSP-81	—	4.45
LP8788	4.5 to 6.5	26	Linear	—	—	Yes	4	—	22	I ² C	Smartphone PMU	Micro SMD-100	—	TBC
TWL6030/32/40/41	2.3 to 5.5	18	Switch	Yes	—	—	7	—	11	2x I ² C	OMAP4 power and audio	FBGA + PBGA	—	6.35
ARM Cortex A15 PMUs														
TPS650380	2.5 to 5.5	3	—	—	—	—	3	—	—	2x I ² C	Multiphase DC/DC technology	NanoFree™-49	—	TBC
TPS659039-Q1	3.15 to 5.5	12	—	—	—	—	7	—	5	2x I ² C	Cortex A15 processors	nfBGA, mrQFN-st	Yes	TBC
TPS65913/14	2.3 to 5.5	18	—	—	—	1	6	—	11	2x I ² C	Cortex A15 processors	WCSP, mrQFN	—	TBC
TPS659038-Q1	3.15 to 5.5	18	—	—	—	—	7	—	11	2x I ² C	Cortex A15 processors	nfBGA, mrQFN-st	Yes	TBC
TPS65917-Q1	2.5 to 5.5	10	—	—	—	—	5	—	5	I ² C	Cortex A15 processors	QFN-48	Yes	TBC
Special Function PMUs														
TPS65200	2.5 to 6.5	0	Switch	—	—	Yes	—	—	—	I ² C	Front-end PMU with charger+WLED	WCSP, QFN	—	2.45
TPS658310	3.0 to 6.0	0	Switch	—	—	Yes	—	—	—	I ² C	Front-end PMU with charger+flash+WLED	WCSP-49	—	3.45
TPS65735/835	2.5 to 6.4	2	Linear	—	—	—	—	—	1	—	3D glasses, x835 with MSP430™	QFN-40	—	1.25
TPS65290	2.5 to 5.5	2	—	—	—	—	1	—	1	I ² C	Meters, energy-harvesting, +10-year battery	QFN-24	—	TBC
TPS65320	3.6 to 40	2	—	—	—	—	1	—	1	—	Eco-mode™ 3.2-A buck + LDO	HTSSOP-14	Yes	1.10
LM10502	2.5 to 5.5	3	—	—	—	—	2	—	1	SPI	PMU for SSD memory	Micro SMD-34	—	0.80
TPS65090	5.0 to 17.0	5	Switch	—	—	—	3	—	2	I ² C	Front-end PMU for 2 to 3 Li-Ion in series	QFN-100	—	4.95

†Devices qualified for Automotive (A) applications are available. Certain voltage options are not available. Different pricing may apply.

New devices are listed in bold red.

*Suggested resale price in U.S. dollars in quantities of 1,000.

Visit www.ti.com/pmu
Product Information Centers:
support.ti.com

Important Notice: The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

The platform bar, Eco-mode, MSP430, NanoFree, OMAP and SmartReflex are trademarks of Texas Instruments. All other trademarks are the property of their respective owners.
 © 2013 Texas Instruments Incorporated



SLVT158G

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com