

# 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

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## Selection Guide

Device	V <sub>IN</sub> (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 <sup>†</sup>	Price*
<b>General Purpose PMUs</b>														
<b>TPS65280/1/2</b>	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 <sup>2</sup> 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 <sup>2</sup> 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
<b>TPS65211</b>	1.8 to 5.5	4	—	—	—	Yes	3	—	1	I <sup>2</sup> C	2x AA alkaline battery	QFN-32	—	TBC
LP3910	2.7 to 5.5	5	Linear	—	—	—	3	—	2	I <sup>2</sup> 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 <sup>2</sup> C	General purpose	Micro SMD-20	—	1.50
LP8725	2.6 to 4.5	9	—	—	—	—	2	—	7	I <sup>2</sup> C	General purpose	Micro SMD-30	—	2.30
<b>ARM® Cortex™-R4</b>														
<b>TPS65381-Q1</b>	5.8 to 36	5	—	—	—	—	1	—	4	I <sup>2</sup> C	Safety-critical applications	HTSSOP-32	Yes	2.60
TPS659119-Q1	2.7 to 5.5	11	—	—	—	—	3	—	9	2x I <sup>2</sup> C	Flexible PMU with ext DC/DC controller option	HTQFP-80	Yes	5.72
<b>ARM Cortex A8 PMUs</b>														
TPS65070/2/3	2.8 to 6.3	5	Linear	—	—	Yes	3	—	2	I <sup>2</sup> C	With and without touch-screen controller	QFN-48	Yes	3.60
TPS65023x	2.5 to 6.0	6	—	—	—	—	3	—	3	I <sup>2</sup> 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 <sub>OUT</sub>	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 <sup>2</sup> C	Optimized for OMAP™35x processors	BGA-139	—	3.60
TPS65930	2.7 to 4.5	7	—	Yes	Yes	—	3	—	4	2x I <sup>2</sup> C	Optimized for OMAP35x processors	BGA-139	—	3.95
LP8765	4.5 to 6.8	12	Linear	—	—	Yes	2	—	10	I <sup>2</sup> C	Smartphone PMU	Micro SMD-49	—	3.00
TPS65950	2.7 to 4.5	13	Linear	Yes	Yes	—	3	—	10	2x I <sup>2</sup> C	Optimized for OMAP35x processors	BGA-209	—	4.50
TPS65951	2.7 to 4.5	13	—	Yes	Yes	—	3	—	10	2x I <sup>2</sup> C	Optimized for OMAP35x, 0.8-mm pitch	BGA-169	—	4.50
TPS65910x	2.7 to 5.5	13	—	—	—	—	3	—	9	2x I <sup>2</sup> C	Flexible PMU with 5-V boost	QFN-48	—	3.45
LP3925	4.5 to 6.5	18	Linear	—	—	Yes	3	—	15	I <sup>2</sup> C	Smartphone PMU	Micro SMD-81	—	3.95
LP3974	4.5 to 6.5	20	Linear	—	—	—	4	—	16	I <sup>2</sup> C	Smartphone PMU	Micro SMD-100	—	2.46
<b>ARM Cortex A9 PMUs</b>														
TPS659110/2/3/9	2.7 to 5.5	13	—	—	—	—	3	1	9	2x I <sup>2</sup> 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 <sup>2</sup> C	Nvidia Tegra 2 and other microprocessors	BGA-121	Yes	5.95
TPS65912x	2.3 to 5.5	14	—	—	—	—	4	—	10	I <sup>2</sup> C/SPI	Flexible PMU with 4 DC/DC converters	WCSP-81	—	4.45
<b>LP8788</b>	4.5 to 6.5	26	Linear	—	—	Yes	4	—	22	I <sup>2</sup> C	Smartphone PMU	Micro SMD-100	—	TBC
TWL6030/32/40/41	2.3 to 5.5	18	Switch	Yes	—	—	7	—	11	2x I <sup>2</sup> C	OMAP4 power and audio	FBGA + PBGA	—	6.35
<b>ARM Cortex A15 PMUs</b>														
<b>TPS650380</b>	2.5 to 5.5	3	—	—	—	—	3	—	—	2x I <sup>2</sup> C	Multiphase DC/DC technology	NanoFree™-49	—	TBC
TPS659039-Q1	3.15 to 5.5	12	—	—	—	—	7	—	5	2x I <sup>2</sup> C	Cortex A15 processors	nfBGA, mrQFN-st	Yes	TBC
TPS65913/14	2.3 to 5.5	18	—	—	—	1	6	—	11	2x I <sup>2</sup> C	Cortex A15 processors	WCSP, mrQFN	—	TBC
TPS659038-Q1	3.15 to 5.5	18	—	—	—	—	7	—	11	2x I <sup>2</sup> C	Cortex A15 processors	nfBGA, mrQFN-st	Yes	TBC
TPS65917-Q1	2.5 to 5.5	10	—	—	—	—	5	—	5	I <sup>2</sup> C	Cortex A15 processors	QFN-48	Yes	TBC
<b>Special Function PMUs</b>														
TPS65200	2.5 to 6.5	0	Switch	—	—	Yes	—	—	—	I <sup>2</sup> C	Front-end PMU with charger+WLED	WCSP, QFN	—	2.45
TPS658310	3.0 to 6.0	0	Switch	—	—	Yes	—	—	—	I <sup>2</sup> 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
<b>TPS65290</b>	2.5 to 5.5	2	—	—	—	—	1	—	1	I <sup>2</sup> C	Meters, energy-harvesting, +10-year battery	QFN-24	—	TBC
TPS65320	3.6 to 4.0	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
<b>TPS65090</b>	5.0 to 17.0	5	Switch	—	—	—	3	—	2	I <sup>2</sup> C	Front-end PMU for 2 to 3 Li-Ion in series	QFN-100	—	4.95

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

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

New devices are listed in bold red.

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