TEXAS INSTRUMENTS

TPS50601-DIE

SLVSC37B – JUNE 2013 – REVISED JANUARY 2016

TPS50601-DIE 1.6-V TO 6.3-V Input, 6-A Synchronous Step Down SWIFT™ Converter

1 Features

- Split Power Rail: 1.6 V to 6.3 V on PVIN
- Power Rail: 3 V to 6.3 V on VIN
- Flexible Switching Frequency Options:
  - Adjustable Internal Oscillator
  - External Sync Capability
  - Sync Pin can be Configured as a 500-kHz Output for Master/Slave Applications
- Monotonic Start-Up into Prebiased Outputs
- Adjustable Slow Start and Power Sequencing
- Power Good Output Monitor for Undervoltage and Overvoltage
- Adjustable Input Undervoltage Lockout

2 Applications

Point-of-Load Regulation

3 Description

The TPS50601-DIE is a 6.3-V, 6-A synchronous step-down converter which is optimized for small designs through high efficiency and integrating the high-side and low-side MOSFETs. Further space savings are achieved through current mode control, which reduces component count, and a high switching frequency, reducing the inductor's footprint.

The output voltage startup ramp is controlled by the SS/TR pin which allows operation as either a standalone power supply or in tracking situations. Power sequencing is also possible by correctly configuring the enable and the open-drain power good pins.

Cycle-by-cycle current limiting on the high-side FET protects the device in overload situations and is enhanced by a low-side sourcing current limit which prevents current runaway. A low-side sinking current limit also turns off the low-side MOSFET to prevent excessive reverse current. Thermal shutdown disables the part when die temperature exceeds thermal shutdown temperature.

Ordering Information[1]

PRODUCT	PACKAGE DESIGNATOR	PACKAGE	ORDERABLE PART NUMBER	PACKAGE QUANTITY
TPS50601	TD	Bare die in waffle pack[2]	TPS50601VTDC1	77
			TPS50601VTDC2	10

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.

(2) Processing is per the Texas Instruments space production baseline and is in compliance with the Texas Instruments Quality Control System in effect at the time of manufacture. Electrical screening consists of DC parametric and functional testing at room temperature only. Unless otherwise specified by Texas Instruments AC performance and performance over temperature is not warranted. Visual Inspection is performed in accordance with MIL-STD-883 Test Method 2010 Condition B at 75X minimum.

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

4 Bare Die Information

DIE THICKNESS	BACKSIDE FINISH	BACKSIDE POTENTIAL	BOND PAD METALLIZATION COMPOSITION	BOND PAD THICKNESS
15 mils.	Silicon with backgrind	Ground	Al5TiN	557.5 nm

Product Folder Links: *TPS50601-DIE*
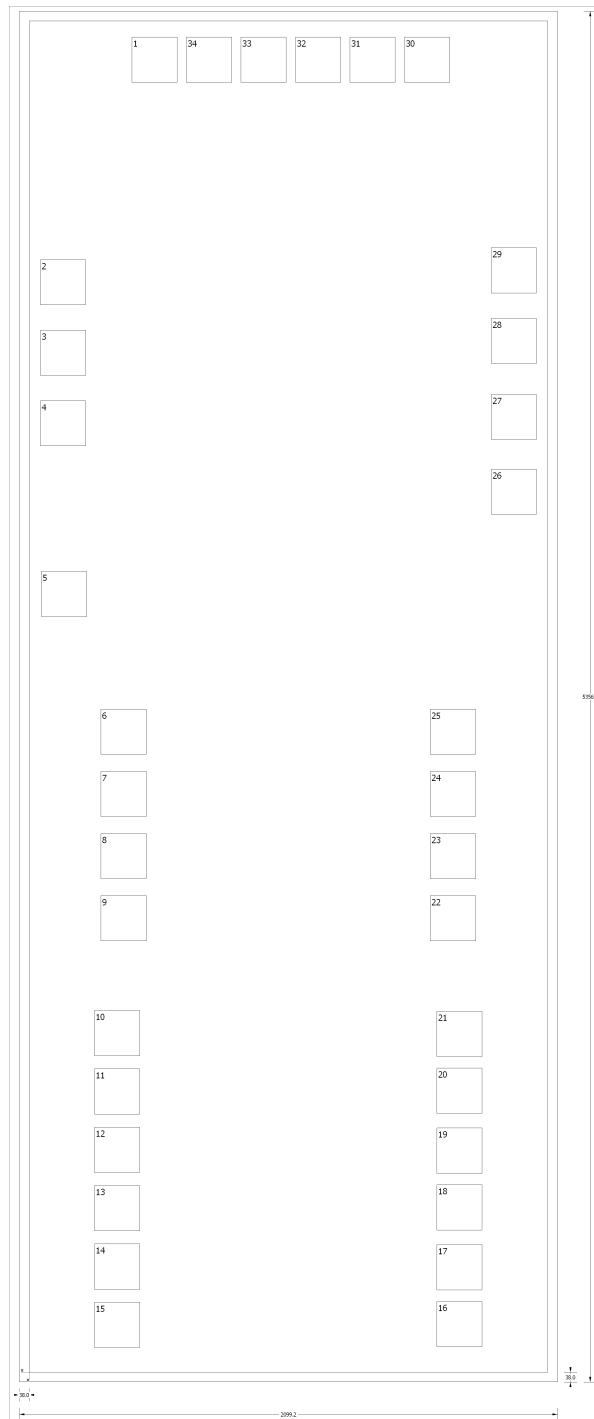
Bond Pad Coordinates in Microns

DESCRIPTION	PAD NUMBER	X MIN	Y MIN	X MAX	Y MAX
GND	1	400.77	5039.325	578.07	5216.625
EN	2	44.19	4169.79	221.49	4347.09
RT	3	44.19	3894.21	221.49	4071.51
SYNC	4	44.19	3618.63	221.49	3795.93
VIN	5	47.565	2952.27	224.865	3129.57
PVIN	6	280.215	2414.115	457.515	2591.415
PVIN	7	280.215	2170.665	457.515	2347.965
PVIN	8	280.215	1928.115	457.515	2105.415
PVIN	9	280.215	1684.665	457.515	1861.965
PGND	10	254.52	1236.285	431.82	1413.585
PGND	11	254.52	1008.315	431.82	1185.615
PGND	12	254.52	780.345	431.82	957.645
PGND	13	254.52	552.375	431.82	729.675
PGND	14	254.52	324.405	431.82	501.705
PGND	15	254.52	96.435	431.82	273.735
PH	16	1590.12	99.405	1767.42	276.705
PH	17	1590.12	321.435	1767.42	498.735
PH	18	1590.12	555.345	1767.42	732.645
PH	19	1590.12	777.375	1767.42	954.675
PH	20	1590.12	1011.285	1767.42	1188.585
PH	21	1590.12	1233.315	1767.42	1410.615
PH	22	1564.335	1684.665	1741.635	1861.965
PH	23	1564.335	1928.115	1741.635	2105.415
PH	24	1564.335	2170.665	1741.635	2347.965
PH	25	1564.335	2414.115	1741.635	2591.415
BOOT	26	1801.71	3352.14	1979.01	3529.44
VSENSE	27	1801.71	3644.145	1979.01	3821.445
COMP	28	1801.71	3940.92	1979.01	4118.22
SS/TR	29	1801.71	4216.5	1979.01	4393.8
PWRGD	30	1463.67	5039.325	1640.97	5216.625
GND	31	1251.09	5039.325	1428.39	5216.625
GND	32	1038.51	5039.325	1215.81	5216.625
GND	33	825.93	5039.325	1003.23	5216.625
GND	34	613.35	5039.325	790.65	5216.6

Product Folder Links: *TPS50601-DIE*

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS50601VTDC1	ACTIVE			0	77	TBD	Call TI	N / A for Pkg Type	25 to 25		Samples
TPS50601VTDC2	ACTIVE			0	10	TBD	Call TI	N / A for Pkg Type	25 to 25		Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF TPS50601-DIE :

● Space: TPS50601-SP

NOTE: Qualified Version Definitions:

● Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

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