TWL6030 Fully Integrated Power Management with Switched-Mode Charger

1 Device Overview

1.1 Features

- Seven Highly Efficient 6-MHz Buck Converters
  - Two 0.6 to 2.1 V at 1.5 A (up to 2.0 A with some Limitations)
  - Five 0.6 to 2.1 V at 0.8 A (up to 1.0 A with some Limitations)
- 11 General-Purpose LDOs
  - Six 1.0 to 3.3 V at 0.2 A with Battery or Preregulated Supply (One can be used as a Vibrator Driver)
  - One 1.0 to 3.3 V at 50 mA with Battery or Preregulated Supply
  - One Low Noise 1.0 to 3.3 V at 50 mA with Battery or Preregulated Supply
  - 3.3 V at 35 mA USB LDO
  - One LDO for TWL6030 Internal Use
  - One LDO for Internal and External Use
- USB OTG Module
- Backup Battery Charger
- 10-Bit ADC with 17 Input Channels
- 13-Bit Coulomb Counter with Four Programmable Integration Periods
- Low-Power Consumption
  - 5 µA in Backup Mode
  - 20 µA in Wait-on Mode
  - 110 µA in Deep Sleep, with Two DC-DC Converters Active
- RTC with Alarm Wake-up Mechanism
- SIM and MMC Card Detections
- Two Digital PWM Outputs
- Thermal Monitoring
  - High-Temperature Warning
  - Thermal Shutdown
- Control
  - Configurable Power-up and Power-down Sequences (OTP Memory)
  - Three Output Signals that can be Included in the Start-up Sequence
  - Two I^2C Interfaces
  - All Resources Configurable by I^2C
- Clock Management

  32-kHz Output
- Battery Charger 1.5 A
  - Charger for Single-Cell Li-Ion and Li-Polymer Battery Packs
  - Switched-Mode Charger with Integrated Power FET for up to 1.5-A Current
  - High-Accuracy Voltage and Current Regulation
  - Safety Timer and Reset Control
  - Thermal Regulation Protection
  - Input/Output Overvoltage Protection
  - Charging Indicator LED Driver
  - Boost Mode Operation for USB OTG
  - Compliant with:
    - USB 2.0
    - OTG and EH 2.0
    - YD/T 1591-2006
    - USB Battery Charging 1.2
    - Japanese Battery Charging Requirements (JEITA)
- Package: 7 mm x 7 mm 187-Pin nFBGA

1.2 Applications

- Mobile Phones and Smart Phones
- Gaming Handsets
- Portable Media Players
- Portable Navigation Systems
- Handheld Devices
- Tablets

1.3 Description

The TWL6030 device is an integrated power-management integrated circuit (IC) for applications powered by a rechargeable battery. The device provides seven configurable step-down converters with up to 2.0-A capability for memory, processor core, I/O, auxiliary, preregulation for LDOs, and so forth. The device also contains 11 LDO regulators that can be supplied from a battery or a preregulated supply. The power-up and power-down controller is configurable and can support any power-up and power-down sequences (programmed in OTP memory). The real-time clock (RTC) provides a 32-kHz output buffer, second, minute, hour, day, month, year information, and alarm wake up. The TWL6030 device supports 32-kHz clock generation based on a crystal oscillator. The device integrates a switched-mode charger allowing faster battery charge, higher efficiency, and less power dissipation.

The TWL6030 device generates power supplies for OMAP™ 4 processors and operates together with the TWL6040 device, which includes all audio and related detection features. For audio IC parameters, see the TWL6040 data sheet. The TWL6030 device is available in an nFBGA package, 7.0 mm x 7.0 mm, with a 0.4-mm ball pitch.

Device Information(1)

PART NAME	PACKAGE	BODY SIZE
TWL6030	FC/CSP [FCBGA] (187)	7.00 mm x 7.00 mm

(1) For more information, see , *Mechanical Packaging and Orderable Information*

1.4 Functional Block Diagram

Figure 1-1 shows the TWL6030 block diagram.

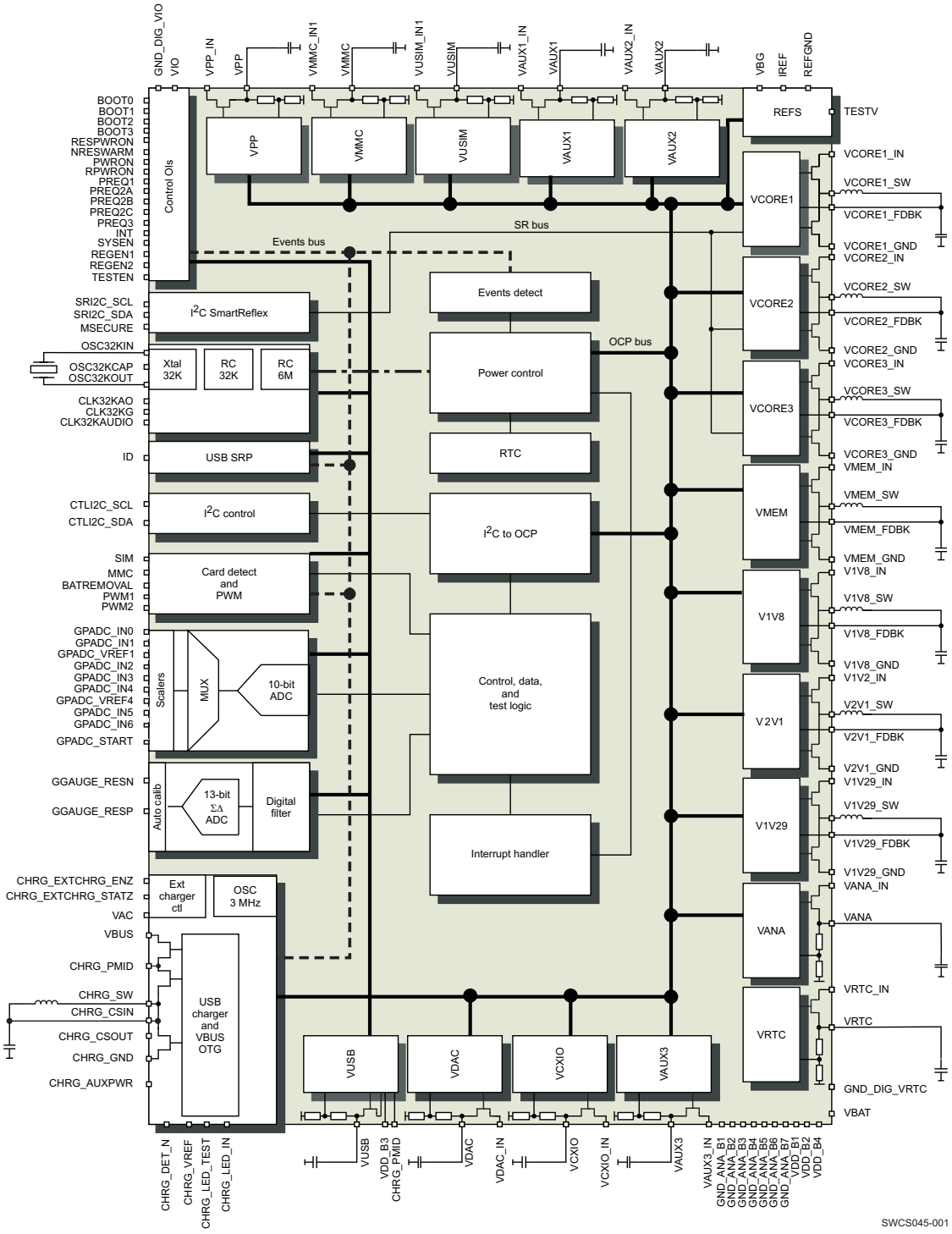


Figure 1-1. TWL6030 Block Diagram

For the complete TWL6030 data sheet, contact your TI sales representative. The document is internally available for download on ESP under the corresponding TWL6030 product folders and can be shared with customers.

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
TWL6030B107CMR	NRND	FCBGA	CMR	187	260	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	6030B107	
TWL6030B107CMRR	NRND	FCBGA	CMR	187	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	6030B107	
TWL6030B1A0CMR	NRND	FCBGA	CMR	187	260	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR		6030B1A0	
TWL6030B1A0CMRR	NRND	FCBGA	CMR	187	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR		6030B1A0	
TWL6030B1A4CMR	NRND	FCBGA	CMR	187	260	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	6030B1A4	
TWL6030B1A4CMRR	NRND	FCBGA	CMR	187	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	6030B1A4	
TWL6030B1AACMR	NRND	FCBGA	CMR	187	260	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR		6030B1AA	
TWL6030B1AACMRR	NRND	FCBGA	CMR	187	2500	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR		6030B1AA	

(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.

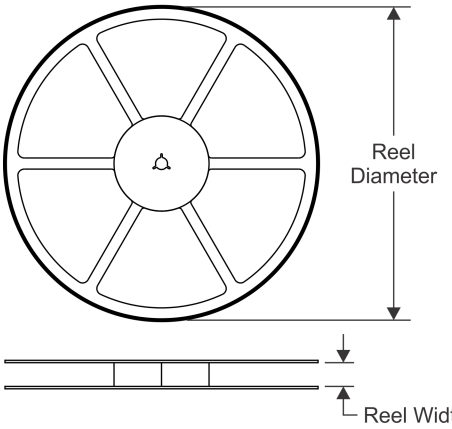
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(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.

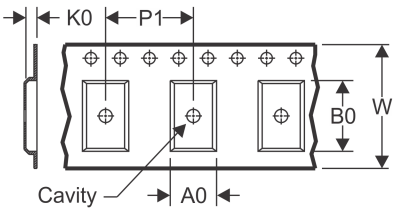
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

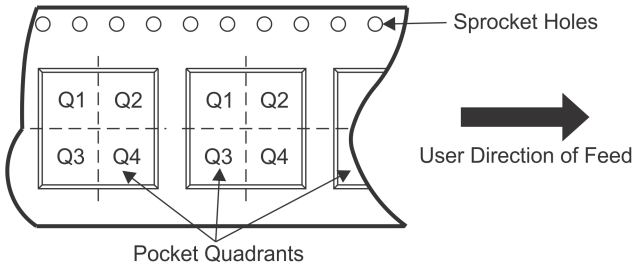


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

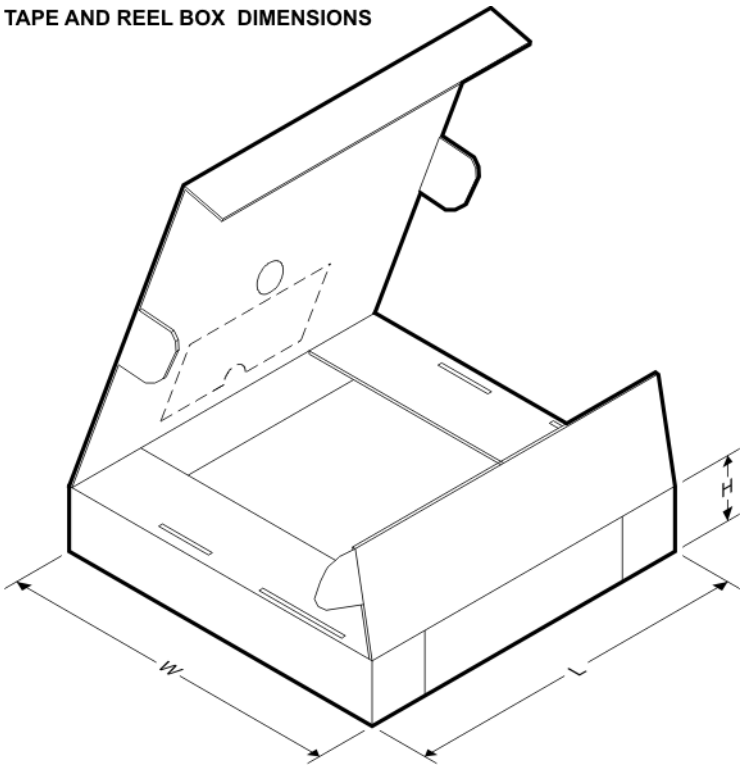
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TWL6030B107CMRR	FCBGA	CMR	187	2500	330.0	16.4	7.3	7.3	1.5	12.0	16.0	Q1
TWL6030B1A0CMRR	FCBGA	CMR	187	2500	330.0	16.4	7.3	7.3	1.5	12.0	16.0	Q1
TWL6030B1A4CMRR	FCBGA	CMR	187	2500	330.0	16.4	7.3	7.3	1.5	12.0	16.0	Q1
TWL6030B1AACMRR	FCBGA	CMR	187	2500	330.0	16.4	7.3	7.3	1.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TWL6030B107CMRR	FCBGA	CMR	187	2500	336.6	336.6	31.8
TWL6030B1A0CMRR	FCBGA	CMR	187	2500	336.6	336.6	31.8
TWL6030B1A4CMRR	FCBGA	CMR	187	2500	336.6	336.6	31.8
TWL6030B1AACMRR	FCBGA	CMR	187	2500	336.6	336.6	31.8

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