Programmable Multi Channel PMIC for Multicore SoC

Preliminary Overview

IDTP9165

Features

- Operates from a 2.7V to 5.25V supply
- Five programmable, current-mode, step-down converters
  - Dynamic voltage scaling (12.5mV steps)
  - Automatic PWM/PFM transition at light load
  - 0.75V to 3.3V software programmable output voltage range
  - Two converters with 1.5A output current
  - One converter with 5A output current
  - One 10A or two 5A output current converters
  - Remote voltage sensing
  - Support for external power sources to increase DCD1 rail output current up to 20A
- 11 programmable general purpose LDOs
  - Eight 200mA, and three 160mA capable LDOs
  - DCD0 or DCD1 Tracking LDO
  - 1.0V to 5.25V input voltage range
  - 0.75V to 3.3V software programmable output voltage range
  - Always-on LDO for RTC with coin cell/SuperCap charging capability
- Low power RTC module
  - Counts seconds, minutes, hours, day, date, month and year
  - Watchdog
- 10-bit ADC
- Host interface and system management
  - Interrupt controller with mask-able interrupts,
  - Reset function
  - Power good monitoring
  - Programmable sequencing of output rails
  - High speed I²C interface (3.4Mbit/s)
- Eight programmable GPIOs
- 84-lead 7mm x 7mm x 0.8mm dual-row QFN package

Applications

- Multi Core SoC power management

Description

IDTP9165 is a programmable, multiple channel power management IC (PMIC). It includes 5 integrated, synchronous, step-down DC/DC regulators (DCD0a, DCD0b, DCD1 through DCD3), 11 LDOs (LDO0 through LDO9, and LDOTR), a Real Time Clock (RTC), a 10-bit ADC,, eight GPIOs (GPIO0 through GPIO7), and a high speed I²C interface (I²C bus address: 0x4F). The product is ideal for Tablet PCs and other multi rail applications and is specifically designed to support the power management requirements of quad-core processor platforms.

The PMIC DC/DC regulators can support the output current requirements for the CPU (DCD0) and SOC (DCD1) of the application processor with up to 10A and 5A, respectively. The output voltages are programmable from 0.7V to 1.5V.

DCD0 can be configured as a dual-phase, step-down regulator or as two single-phase regulators (DCD0a and DCD0b). Both DCD0 and DCD1 offer remote sensing of the rail voltage and dynamic voltage scaling (DVS) in 12.5mV steps. The DVS set output voltage slew rate is software adjustable.

The output current capability of the IDTP9165 solution can be increased by adding IDT's intelligent, scalable, distributed power sources (IDTP9167). These compact, external devices provide up to 6A of additional peak current each. The IDTP9165 supports the connection of up to eight external power sources, for 48A of total scalability.

There are two step-down regulators (DCD2, DCD3) with output currents of up to 1.5A. Those regulators are output voltage software adjustable in 12.5mV steps. All step down switching regulators are current-mode controlled with a switching frequency of 2.1MHz.

Also integrated in the IDTP9165 are 11 software programmable LDOs with a wide output voltage range and with output currents capabilities up to 280mA. All LDOs are low noise, high PSRR, and low dropout regulators.

The output voltages of all regulators as well as device sequencing can be software programmable by writing to volatile registers through the I²C interface or permanently programmed by OTP (One Time Programmable fuse cells). The PMIC operates from a single 2.7V to 5.25V supply. Additionally, the device has an internal high voltage regulator to supply the ONKEY button and RTC circuitry. This feature allows the complete shutdown of the pre-regulator in a dual-cell or triple-cell battery system, thus increasing the battery life of the tablet. IDTP9165 also provides a dedicated pin to sequence the DDR memory power supply.

The package for the IDTP9165 is a 7mm x 7mm, 84 lead, dual row QFN package. Operation through the commercial temperature range -40°C to +85°C is guaranteed.

PRODUCT OVERVIEW

The IDTP9165 is an integrated device that combines power management, backup battery/SuperCap charging, pre-regulator control, system monitoring, a Real Time Clock (RTC) and external regulator enable control. All of these subsystems are configured, monitored and controlled by on-chip programmable registers over an I²C interface. It includes 4 integrated, synchronous, step-down DC/DC regulators (5 regulators when using Device Option 3, which splits the dual phase DCD0 into two separate single phase switching regulators), 11 LDOs, a 10-bit ADC, 8 GPIOs, and a high speed I²C interface. The IDTP9165 also contains all the necessary interface connections required by state-of-the-art quad-core application processor.

There are three device options available: Option 1, 2, 3:

Device option 1: DCD0 configured as 10A Buck with DVS capability. There is no ability to control external power ICs (IDTP9167).

Device option 2: The same as option 1 with the exception that GPIO6 becomes DIO and GPIO7 becomes DIF. These are the data (DIO) and clock (DIF) serial communication lines which enable IDTP9165 to control external IDTP9167 power devices.

Device option 3: The same as option 2 except that DCD0 is split into two 5A Bucks – DCD0a and DCD0b. Only DCD0a is capable of DVS control.

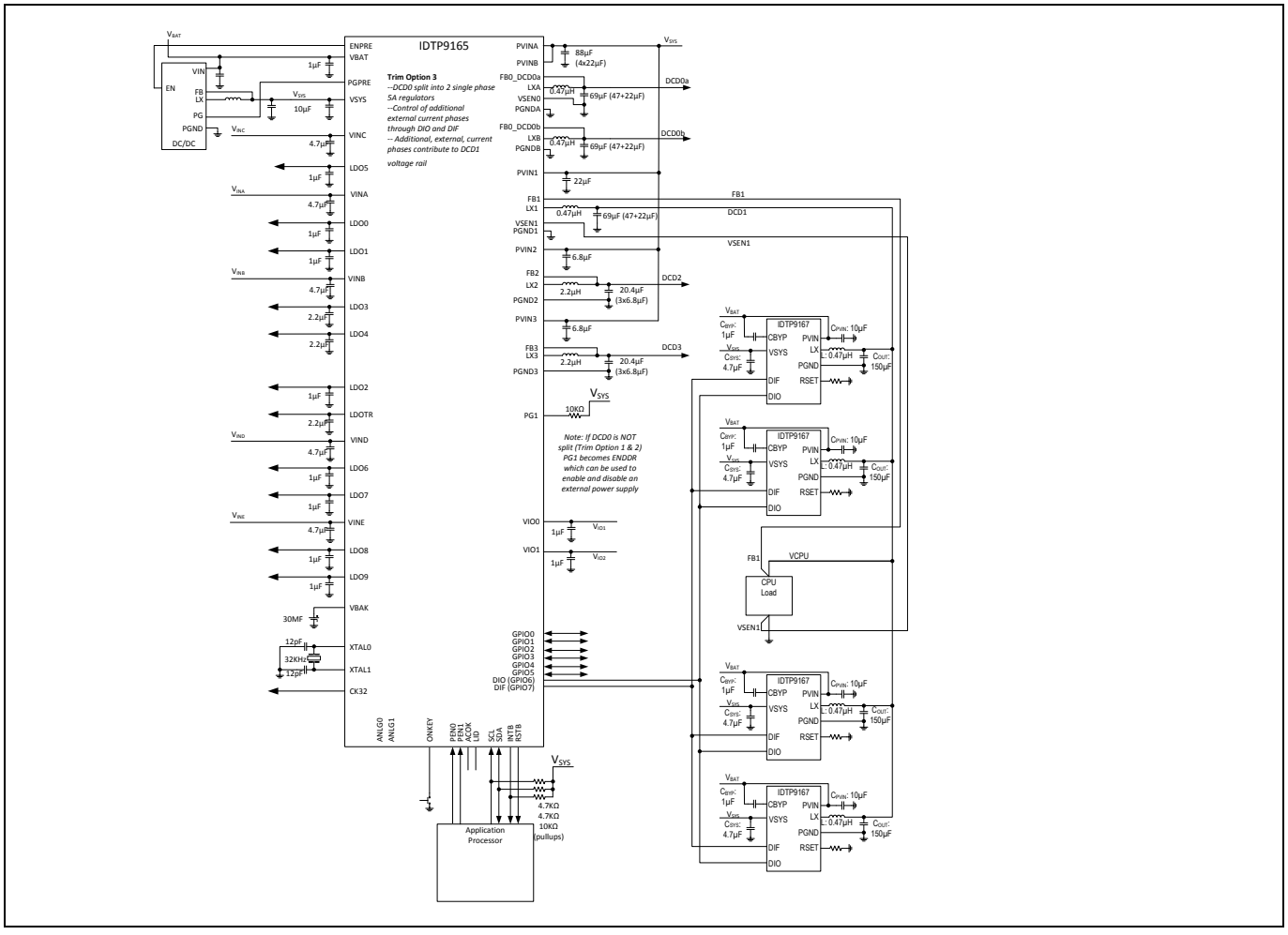


Figure 1. External Component Connections

PACKAGE OUTLINE DRAWING

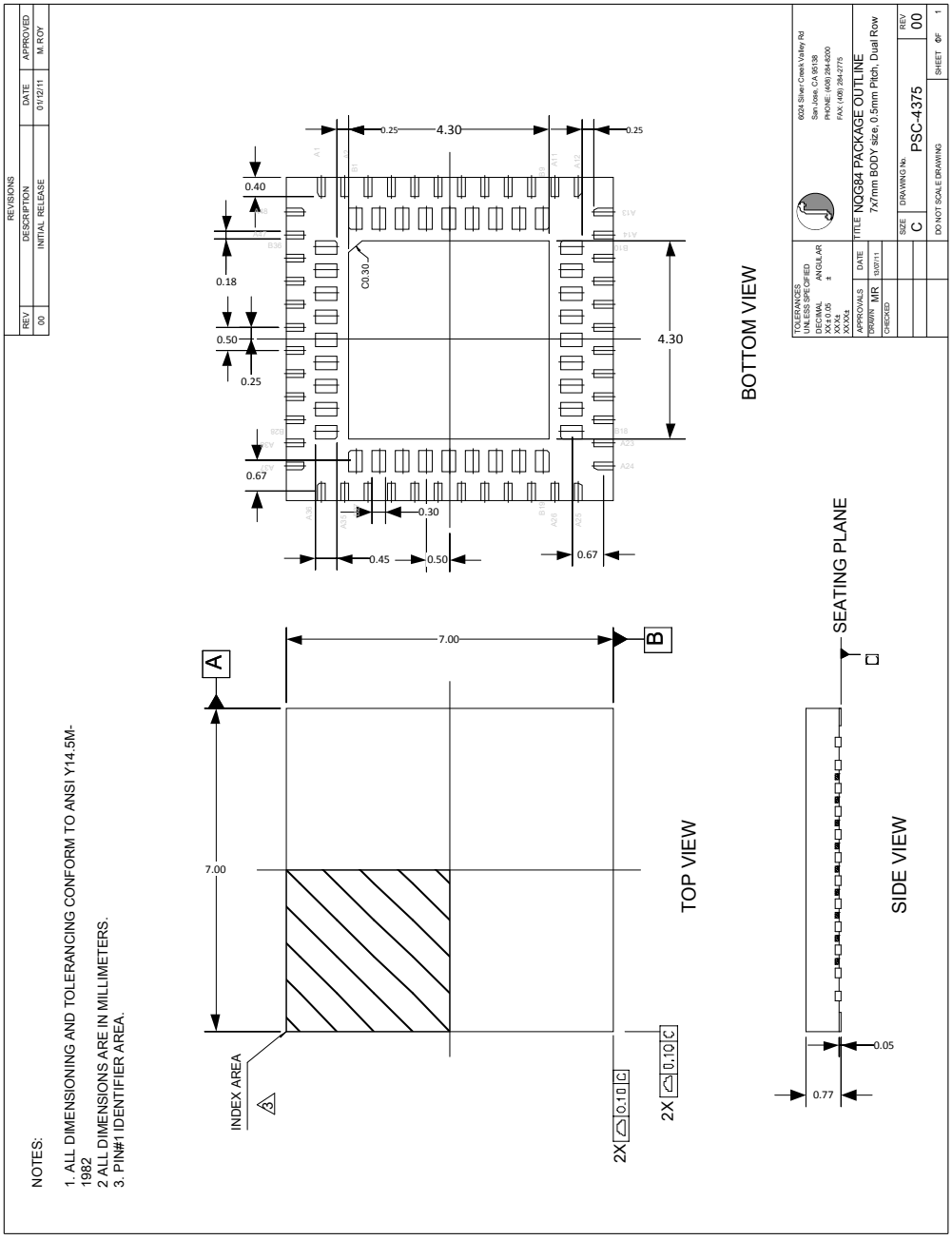
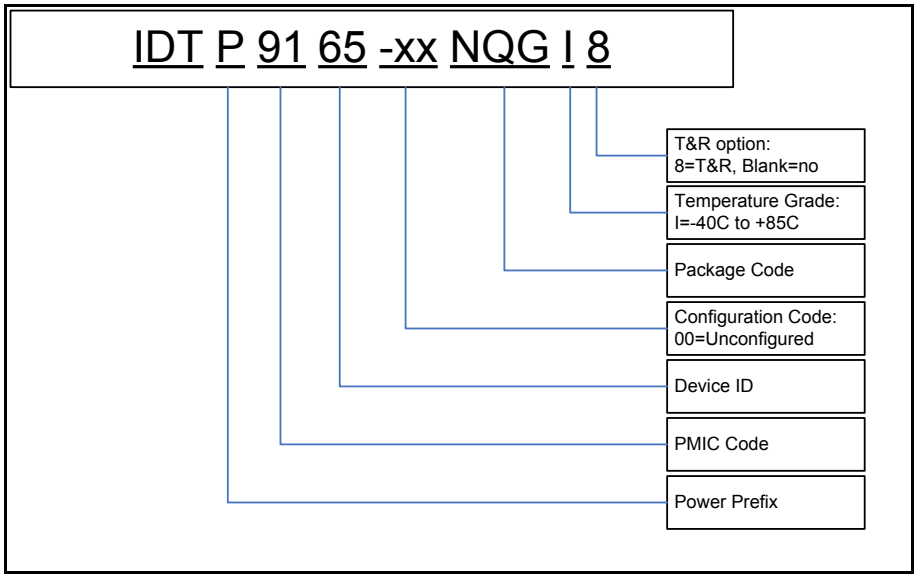


Figure 2 – Package Outline Drawing (NQG QFN-84 7x7x0.85mm 84-ld)

ORDERING GUIDE

Table 1 – Ordering Summary

PART NUMBER	MARKING	PACKAGE	AMBIENT TEMP. RANGE	SHIPPING CARRIER	QUANTITY
P9165-xxNQGI	P9165-xxNQGI	84ld-7x7 DR-QFN	-40°C to +85°C	Tape or Canister	25
P9165-xxNQGI8	P9165-xxNQGI	84ld-7x7 DR-QFN T&R	-40°C to +85°C	Tape and Reel	2,500



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