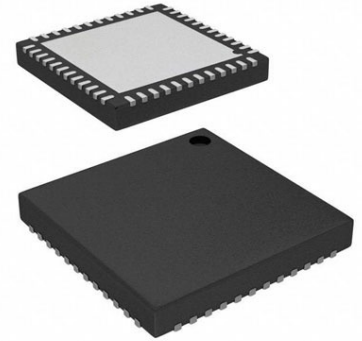


## Power Management Unit 4.5V to 18V Automotive 48-Pin VQFN EP T/R



Images are for reference only

[Inquiry](#)

**Manufacturer:** [Texas Instruments, Inc](#)

**Package/Case:** VQFN-48

**Product Type:** Power Management ICs

**RoHS:** RoHS Compliant/Lead free 

**Lifecycle:** Active

### General Description

The TPS65400-Q1 is an integrated PMU optimized for applications requiring small form factor and high power conversion efficiency, enabling small space-constrained equipment with high ambient operating temperature without cooling. It provides high-power efficiency at a system level by enabling a single stage conversion from an intermediate distribution bus with an optimized combination of regulators.

TPS65400-Q1 implements a PMBus-I<sup>2</sup>C-compatible digital interface. It helps Core Chip optimize system performance by runtime changing regulated voltage, power sequence, phase interleaving, operating frequency, read back operating status, and so forth.

The TPS65400-Q1 consists of four high-current buck switching regulators (SW1, SW2, SW3, and SW4) with integrated FETs. The switching power supplies are intended for powering high-current digital circuits such as the processor, FPGA, ASIC, memory, and digital I/Os. SW1 and SW2 support 4 A each, and SW3 and SW4 support 2 A each. Each regulator's switching frequency is independently adjustable up to 2.2 MHz.

Current limit programmability on each switcher enables optimization of inductor ratings for a particular application configuration not requiring the maximum current capability.

The TPS65400-Q1 can be powered from a single-input voltage rail between 4.5 and 18 V, making it suitable for applications running off a 5- or 12-V intermediate power distribution bus.

Sequencing requirements can be met using the individual enable terminals or by programming the sequence through the I<sup>2</sup>C bus into the onboard EEPROM. Output voltages can be set through external resistor networks and VREF can be programmed from 0.6 to 1.87 V in 10-mV steps. All control and status info can be accessed through a PMBus-compatible I<sup>2</sup>C bus.

The TPS65400-Q1 provides a high level of flexibility for monitoring and control through the I<sup>2</sup>C bus while providing the option of programmability through the use of external components and voltage levels for systems not using I<sup>2</sup>C.

## Key Features

Qualified for Automotive Applications

AEC-Q100 Qualified With the Following Results:

Device Temperature Grade 1: -40°C to 125°C Ambient Operating Temperature Range

Device HBM ESD Classification Level H2

Device CDM ESD Classification Level C4B

Efficiency up to 95% for Each Switching Regulator

Switching Regulator Specifications:

Input Voltage Range: 4.5 to 18 V

Vout Range: 0.6 V-90%Vin

SW1, SW2 Iout: 4-A Max

SW3, SW4 Iout: 2-A Max

Pre-Bias Startup Algorithm Minimizes Voltage Dip During Startup

Internal Undervoltage Lockout (UVLO), Overcurrent Protection (OCP), Overvoltage Protection (OVP), and Overtemperature Protection (OTP)

Thermally-Enhanced 7-mm × 7-mm 48-Pin, 0.5-mm Pitch VQFN Package

Pin Accessible Features:

Adjustable VOUT With External Feedback Resistors

Sequencing Control Through Precision Enable Pins for Each Switcher

Resistor Adjustable PWM Switching Frequency from 275 kHz to 2.2 MHz

Clock Sync Input and Clock Output

Soft-Start Delay Through External Capacitor

Current Sharing Between SW1 and SW2 and Between SW3 and SW4 Allows Support of Higher Current Needs if Required

PMBus Runtime Control and Status

Runtime Voltage Positioning Through Adjustment of VREF

Enable and Disable of Each Switcher

Fault and Status Monitoring

User-Configurable PMBus / I<sup>2</sup>C Options, Saved in EEPROM

Power Supply Turn-On and Turn-Off Sequencing

Sequencing can be Based on Fixed Time Delays or PGOOD Dependence

Initial Voltage Positioning Through VREF Configuration

PWM Frequency Adjustment for Each Switcher

Individual PWM Phase Alignment for Each Switcher to Minimize Ripple and Capacitor Size

Adjustable Current Limit on Each Regulator Enables Size and Cost Optimization of Inductors

Soft-Start Time

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## Recommended For You

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### **TPD3S014DBVR**

Texas Instruments, Inc  
SOT23-6

### **TPS2065CDBVR**

Texas Instruments, Inc  
SOT23-5

### **TPS2557DRBT**

Texas Instruments, Inc  
SON8

### **TPS2042BDR**

Texas Instruments, Inc  
SOP8

### **TPS2051BDR**

Texas Instruments, Inc  
SOP8

### **TPL7407LPWR**

Texas Instruments, Inc  
TSSOP16

### **TPS23753APWR**

Texas Instruments, Inc  
TSSOP14

### **TPS2116DRLR**

Texas Instruments, Inc  
SOT5X3-8

### **TPS259460ARPWR**

Texas Instruments, Inc  
VQFN-10

### **TPS23751PWPR**

Texas Instruments, Inc  
HTSSOP16

### **TPS65150QPWPRQ1**

Texas Instruments, Inc  
HTSSOP-24

### **TPS2410PWR**

Texas Instruments, Inc  
TSSOP-14

### **TPS22914BYFPR**

Texas Instruments, Inc  
DSBGA4

### **TPS2115ADRBR**

Texas Instruments, Inc  
VSON8

### **TPS2113ADRBR**

Texas Instruments, Inc  
SON8