



Dual Rail, $N+M \leq 5$ Phase Digital Controller

1 General Description

The SQ51225 dual rail $N+M \leq 5$ phase digital controller provides power for high performance ASICs. Silergy's unique ripple-based control with built-in flexible loop compensation offers a fast transient response for high current applications. The controller supports integrated power stages that provide current and temperature sense. Additionally, SQ51225's programmable PWM driving configuration provides flexibility when used with DrMOS from multiple vendors.

The SQ51225 supports the PMBus® communication interface and is compatible with 1.8V/3.3V logic levels. Compliant with PMBus, the SQ51225 supports system configurations, dynamic voltage scaling (DVS), and reporting telemetry information of voltage, current, temperature, as well as fault/warning status to the host. It also provides configurable fault responses and thresholds. All programmable parameters can be stored in non-volatile memory.

Additionally, the SQ51225 includes an AVSBus® communication interface to facilitate and expedite point-to-point communication. The SQ51225 supports output voltage target setting, transient rate configuration, and telemetry of current, temperature, as well as fault status reporting with the AVSBus interface.

2 Features

- Flexible Phase Assignment Between Two Rails and Arbitrary Firing Sequence, $N+M \leq 5$
- Differential Remote Sense
- Output Voltage Regulation Range:
 - 0.25~1.52V in 5mV Table
 - 0.25~1.52V in Linear Mode (1mV Custom Table)
- Programmable Soft-Start Slew Rate and Voltage Positioning Slew Rate
- Flexible Pin-strap Settings including:
 - 8 PMBus Device Address
 - 16 Boot Voltage for Both Rails

- PMBus® 1.3.1 Compliant, 1.8/3.3V Signaling:
 - System Configuration
 - Dynamic Voltage Scaling using VOUT_COMMAND
 - Operation Control and Fault Handling
 - Status Reporting and Telemetry
- PMBus® PARTIII, AVSBus Compatible
- Flexible PWM Driver Design to Support SPS (Smart Power Stage) from Multiple Vendors
- Integrated Programmable Loop Compensation
- Adjustable Current Balancing with Optional Thermal Balancing Offsets
- Advanced Protection Scheme with Programmable Response and Thresholds:
 - Fault Response: Latch Shutdown, Hiccup, Autonomous Recovery
 - IUVP, IOVP, OUV, OOV (Fixed and Tracking)
 - OCP
 - OTP, DRV_FLT, DRV_NONRDY Protection
 - SPS Current Sharing Protection
 - Pulse-by-Pulse Current Limit
 - Open/Short Voltage Sense Line Detection
- Internal NVM to Store Configuration
- Switching Frequency Range from 300kHz to 2MHz
- Single +5V Supply Operation
- 48-Lead QFN7x7 0.5mm Pitch Package

3 Applications

- Application-Specific ASIC Power
- Core Routers and Switches
- High Performance XPU/FPGA Power
- High Density Power Solutions

4 Typical Application

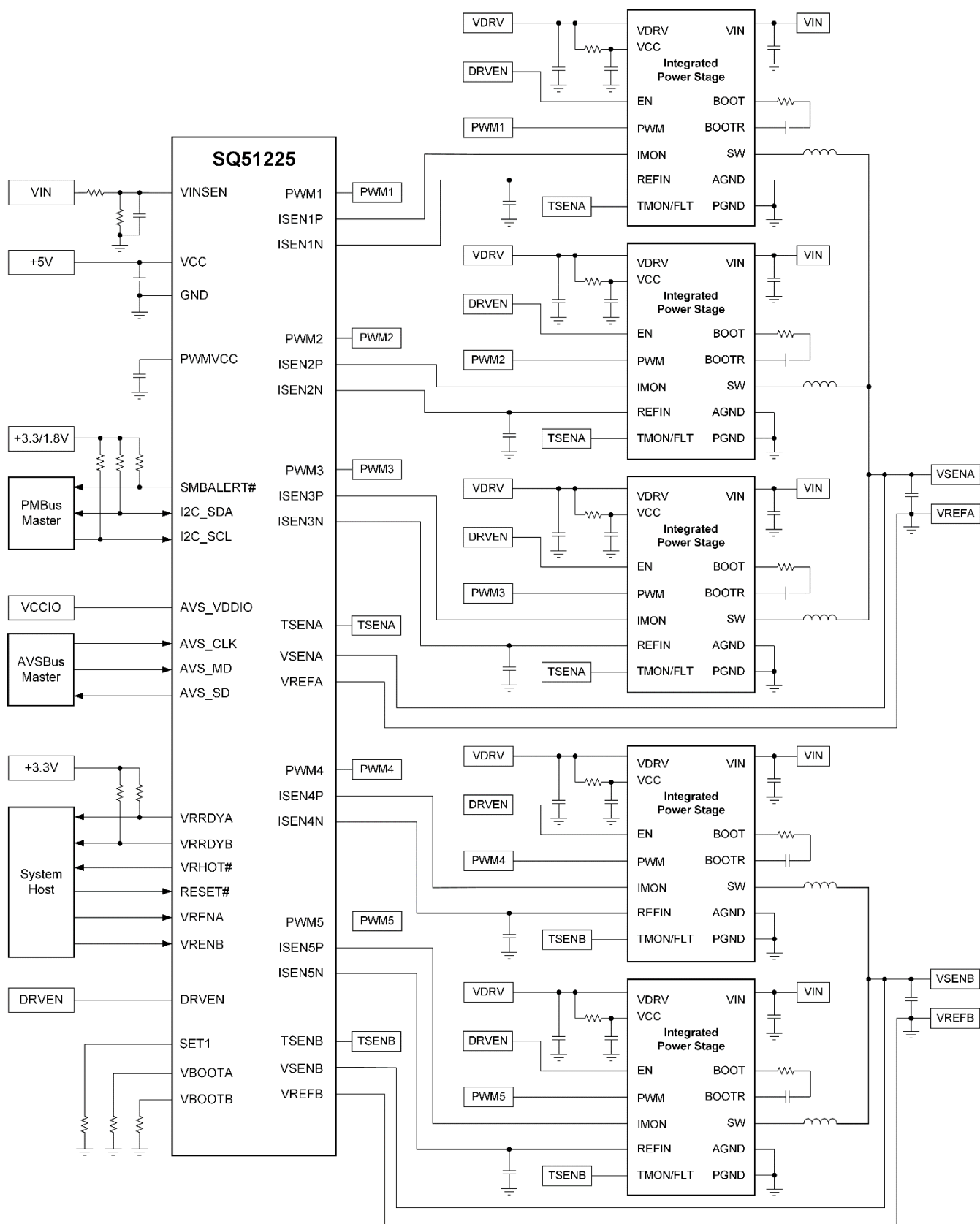


Figure 1. Application Diagram-High Power Rail Using SQ51225 and 3+2 Power Stages

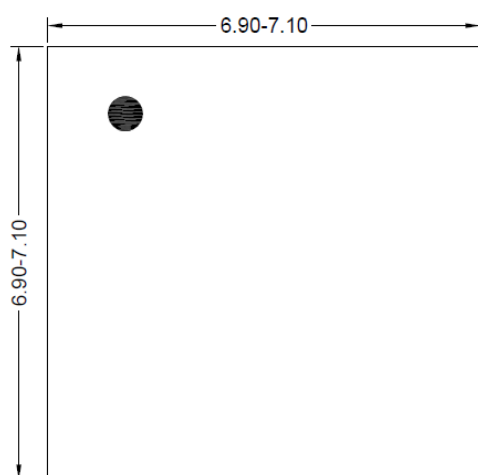
5 Ordering Information

Ordering Part Number	Package Type	Top Mark
SQ51225QJQ	QFN7×7-48 RoHS Compliant and Halogen Free	ENFxyz

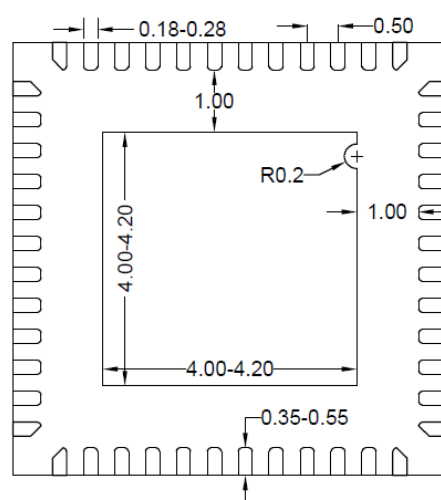
Device code: ENF

x=year code, y=week code, z=lot number code

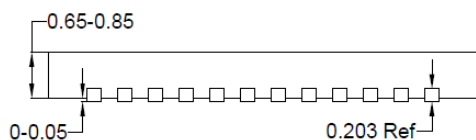
6 Package Outline Drawing



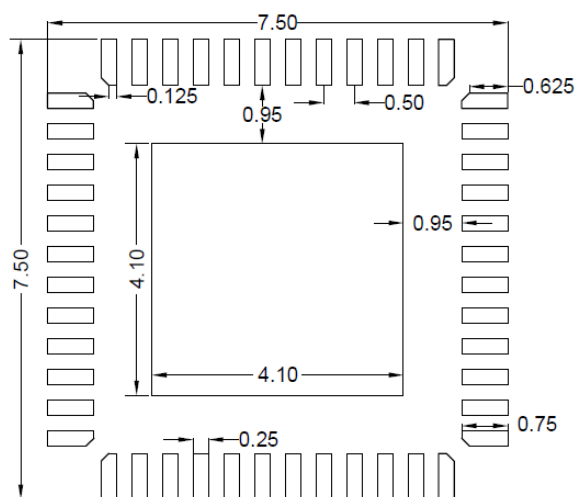
Top View



Side View



Bottom View



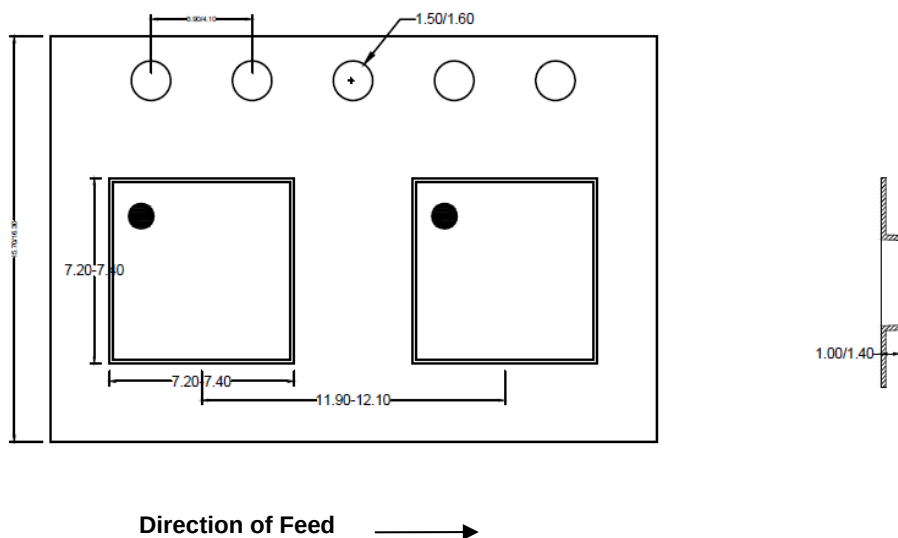
Recommended PCB Layout

(For Reference Only)

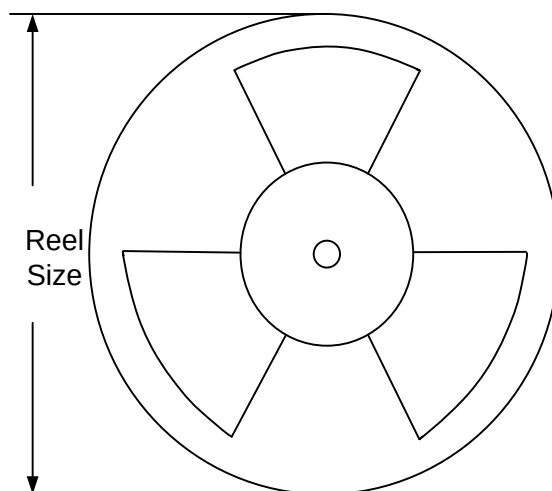
Note: All dimensions are in millimeters and exclude mold flash and metal burr.

7 Tape and Reel Information

QFN7x7 Tape Dimensions and Pin 1 Orientation



Reel Dimensions



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
QFN7×7	16	12	13"	400	400	3000

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