

### 1 General Description

The SQ51222 dual rail N+M≤5 phase digital controller provides power for high performance ASICs. Silergy's unique ripple-based control architecture with built-in flexible loop compensation provides fast transient response for high current applications. The controller supports complete solutions for dual rails using integrated power stages that provides current and temperature sense. Additionally, SQ51222's programmable PWM configuration provides flexibility when used with DrMOS power stages from multiple vendors.

The SQ51222 supports the PMBus® communication interface and is compatible with 1.8V/3.3V logic levels. Compliant with PMBus, the SQ51222 supports system configuration, dynamic voltage scaling(DVS), and reporting telemetry information of voltage, current, temperature, and fault/warning status to the host. It also provides configurable fault responses and thresholds. All programmable parameters can be stored in local NVM (non-volatile memory).

Additionally, the SQ51222 includes an AVSBus® communication interface to facilitate fast point-to-point communication. The SQ51222 supports output voltage target setting, transient rate configuration, and telemetry for current, temperature and fault status reporting using the AVSBus interface.

### 2 Features

- Flexible Phase Assignment between Two Rails and Arbitrary Sequence for N+M≤5
- Differential Remote Sense
- Output Voltage Regulation Range:
  - 0.25~1.52V using 5mV Table
  - 0.5~2.0V using 10mV Table
- Programmable Soft-Start and Voltage Positioning Slew Rate
- Flexible Pin-strap Settings including:
  - 16 PMBus Device Addresses
- PMBus® 1.3.1 Compliant, 1.8V/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: Latched Shutdown, Hiccup, Autonomous Recovery
  - IUVP, IOVP, OUV, OOV (Fixed and Tracking)
  - OCP
  - OTP, DRV\_FLT, DRV\_NONRDY Protection
  - Pulse by Pulse Current Limit
  - Open/Short Voltage Sense Line Detection
- Internal NVM to Store Customer Configuration
- Switching Frequency Range from 300kHz to 1MHz with Frequency Compensation
- Single +3.3V Supply Operation
- 40-Lead QFN5x5 0.4mm Pitch Package

### 3 Applications

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



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**Table of Contents**

1 General Description ..... 1  
2 Features ..... 1  
3 Applications ..... 1  
4 Typical Applications ..... 3  
5 Ordering Information ..... 4  
6 Package Outline Drawing ..... 4  
7 Tape and Reel Information ..... 5

## 4 Typical Applications

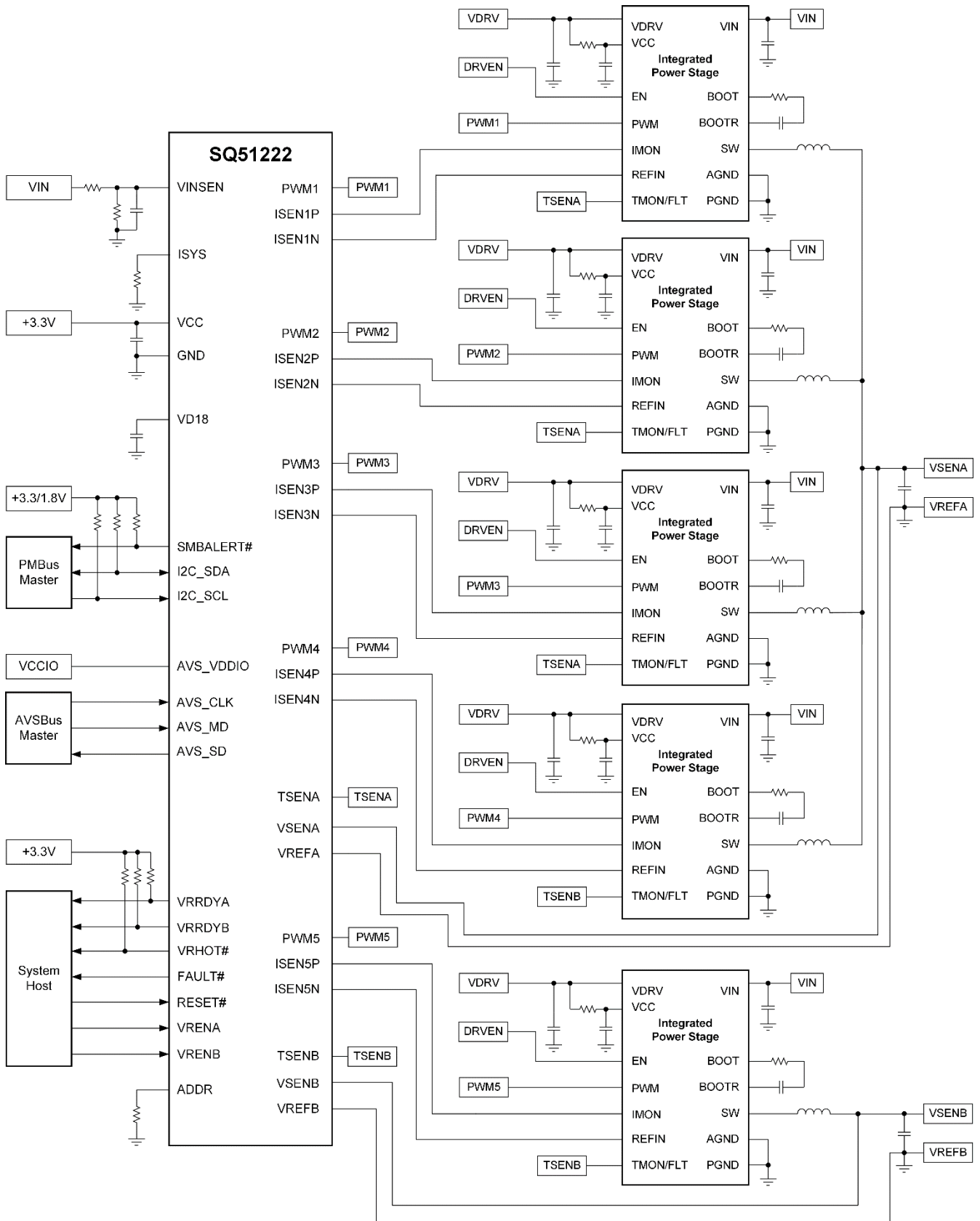


Figure 1 Application Diagram-High Power Rail Using SQ51222 and 4+1 Power Stages

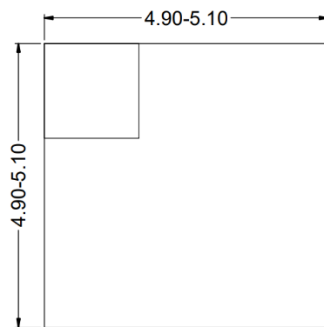
## 5 Ordering Information

Ordering Part Number	Package Type	Top Mark
SQ51222RPQ	QFN5×5-40 RoHS Compliant and Halogen Free	GGTxyz

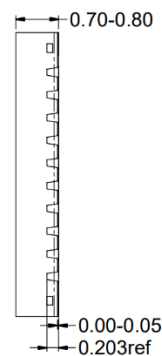
Device code: GGT

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

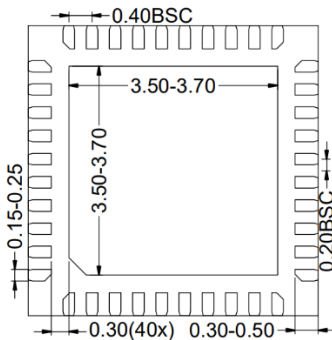
## 6 Package Outline Drawing



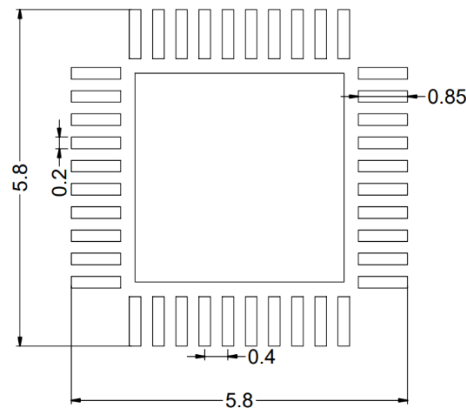
**Top view**



**Side view**



**Bottom view**

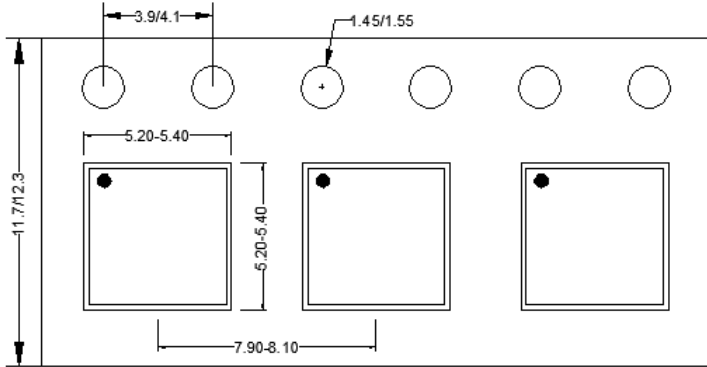


**Recommended PCB layout  
(Reference only)**

*Notes: All dimensions are in millimeters and exclude mold flash & metal burr.*

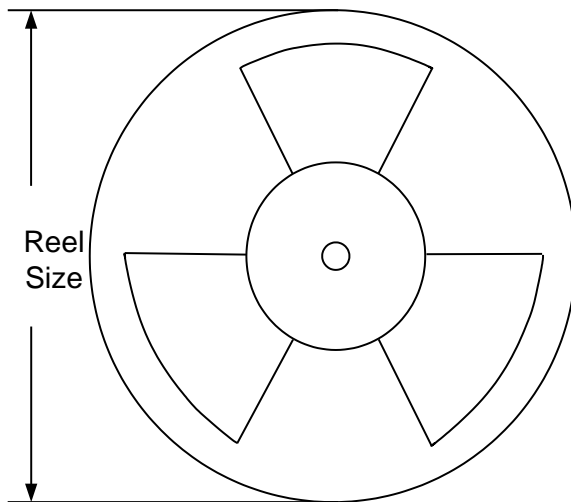
## 7 Tape and Reel Information

### 1. Tape dimensions and Pin1 orientation



Direction of Feed →

### 2. Reel dimensions



Package type	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
QFN5×5	12	8	13"	400	400	5000

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