# Si3217x-C

## ProSLIC® Single-Chip FXS Solutions

### Description

The Si3217x devices are pin-compatible single-channel ProSLIC products that implement a complete foreign exchange station (FXS) telephony interface solution in accordance with all relevant LSSGR, ITU, and ETSI specifications. The Si3217x ProSLIC ICs are available in a 5x7 mm 42-pin QFN package and operate from a 3.3 V supply and support 3.3 V and 1.8 V I/O.

The Si32170/1/6/7 devices use a standard PCM/SPI digital interface to connect to SoCs, while the Si32172/3/5 devices use Silicon Labs' proprietary three-wire digital Integrated Serial Interface (ISI) to connect to SoCs with the ISI pre-integrated.

The Si3217x integrated dc-dc controller automatically generates the optimal battery voltages required for each line state. The Si3217x ICs are available with voltage ratings of –110 V or –140 V to support a wide range of ringing voltages. See the Ordering Guide for the voltage rating of each Si3217x version.

**For more information, visit the Si3217x ProSLIC web page.**

### Features

- Complete FXS solution in 5x7 mm
- Choice of PCM/SPI Interfaces or 3-wire ISI bus that combines PCM, SPI, and interrupt data
- Performs all BORSCHT functions
- Ideal for short to medium loops
- Global programmability
- Internal balanced or unbalanced ringing
- Patented low power ringing
- Simplified configuration and diagnostics
- Supported by ProSLIC API
- Ultra low power consumption
- Tracking dc-dc controller with direct connection to MOSFET
- Wideband voice support (Si32172/3/6/7)
- On-hook transmission
- Loop or ground start operation
- Smooth polarity reversal
- A-Law/u-Law companding, linear PCM
- Software-programmable parameters:
  - Ringing frequency, amplitude, cadence, and waveshape
  - Two-wire ac impedance
  - Transhybrid balance
  - DC current loop feed (10-45 mA)
  - Loop closure and ring trip thresholds
  - Ground key detect threshold
- DTMF generation
- DTMF detection (Si32170/1/5)
- Pulse metering
- 3.3 V operation
- Support for 1.8 V I/O
- Maximum battery up to –140 V
- Pb-free/RoHS-compliant packaging

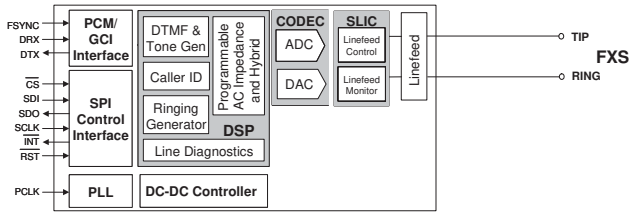
### Applications

- Customer Premise Equipment (CPE)
- VoIP DSL Gateways and Routers
- Wireless Local Loop (WLL)
- Integrated Access Devices (IAD)
- Analog Terminal Adapters (ATA)
- Small Office/Home Office PBX

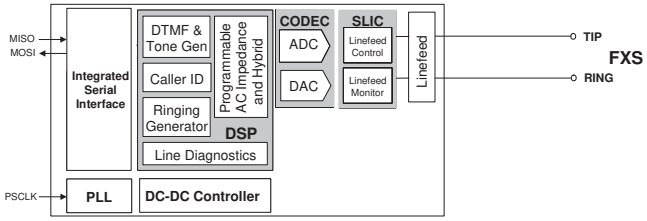
### Ordering Guide

| Part # | SoC Interface | Max Vbat | Wideband | DTMF Detection | Pulse Metering | Temperature |
|---|---|---|---|---|---|---|
| Si32170-C-FM1 | PCM/SPI | –140 V | | ✓ | ✓ | 0 to 70 °C |
| Si32170-C-GM1 | | | | | | –40 to 85 °C |
| Si32171-C-FM1 | PCM/SPI | –110 V | | ✓ | ✓ | 0 to 70 °C |
| Si32171-C-GM1 | | | | | | –40 to 85 °C |
| Si32172-C-FM1 | ISI | –110 V | ✓ | | | 0 to 70 °C |
| Si32172-C-GM1 | | | | | | –40 to 85 °C |
| Si32173-C-FM1 | ISI | –140 V | ✓ | | | 0 to 70 °C |
| Si32173-C-GM1 | | | | | | –40 to 85 °C |
| Si32175-C-FM1 | ISI | –110 V | | ✓ | ✓ | 0 to 70 °C |
| Si32175-C-GM1 | | | | | | –40 to 85 °C |
| Si32176-C-FM1 | PCM/SPI | –110 V | ✓ | | | 0 to 70 °C |
| Si32176-C-GM1 | | | | | | –40 to 85 °C |
| Si32177-C-FM1 | PCM/SPI | –140 V | ✓ | | | 0 to 70 °C |
| Si32177-C-GM1 | | | | | | –40 to 85 °C |

### Functional Block Diagrams




Si32170/1/6/7



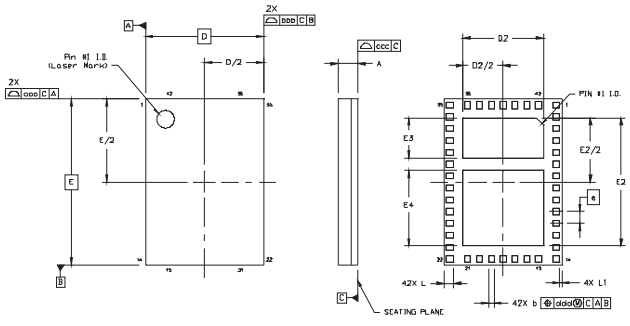

Si32172/3/5


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### Selected Electrical Specifications

| Parameter | Symbol | Test Condition | Min | Typical | Max | Unit |
|---|---|---|---|---|---|---|
| Ambient Temperature | $T_A$ | F-Grade | 0 | 25 | 70 | °C |
| | | G-Grade | –40 | 25 | 85 | °C |
| Supply Voltage | $V_{DD}$ | | 3.13 | 3.3 | 3.47 | V |
| Battery Voltage, Si32171/2/5/6 | $V_{BAT}$ | | –110 | –95 | –15 | V |
| Battery Voltage, Si32171/3/7 | $V_{BAT}$ | | –140 | –130 | –15 | V |
| Maximum Loop Resistance (loop + load) | $R_{LOOP}$ | $R_{DC,MAX}$ = 430 Ω, $I_{LOOP}$ = 18 mA, $V_{BAT}$ = –52 V, $R_{PROT}$ = 0 Ω, | — | — | 2000 | Ω |
| DC Differential Output Resistance | $R_{DO}$ | $I_{LOOP} < I_{LIM}$ | 160 | — | 640 | Ω |
| Idle Channel Noise | | C-Message weighted | — | 8 | 12 | dBrnC |
| | | Psophometric weighted | — | –82 | –78 | dBmP |
| PSRR from $V_{DD}$, $V_{DDIO}$ @ 3.3 V | | RX and TX, 200 Hz to 3.4 kHz | — | 55 | 0 | dB |
| Longitudinal to Metallic/PCM Balance (forward or reverse) | | 200 Hz to 1 kHz | 58 | 60 | — | dB |
| | | 1 kHz to 3.4 kHz | 53 | 58 | — | dB |
| Metallic/PCM to Longitudinal Balance | | 200 Hz to 3.4 kHz | 40 | – | — | dB |
| Longitudinal Impedance | | 200 Hz to 3.4 kHz at TIP or RING | — | 50 | — | Ω |
| Longitudinal Current Capability | | Active off-hook 60 Hz Reg 73 = 0x0B | — | 25 | — | mA |
| DC Feed Current | | Differential | — | — | 45 | mA |
| | | Common Mode | — | — | 30 | mA |
| | | Differential + Common Mode | — | — | 45 | mA |
| 2-Wire Return Loss | | 200 Hz to 3.4 kHz | 26 | 30 | — | dB |
| Transhybrid Balance | | 300 Hz to 3.4 kHz | 26 | 30 | — | dB |
| Thermal Resistance (QFN-42) | ΘJA | | — | 53 | — | °C/W |
| | ΘJB | | — | 33 | — | |
| | ΘJC | | — | 39 | — | |
| Continuous Power Dissipation (QFN-42) | PD | TA = 85 °C | — | 0.75 | — | W |

### Package Information




### 42-Pin QFN/LGA Package Diagram Dimensions

| Dimension | Min | Nom | Max |
|---|---|---|---|
| A | 0.80 | 0.85 | 0.90 |
| b | 0.20 | 0.25 | 0.30 |
| D | | 5.00 BSC | |
| D2 | 3.35 | 3.40 | 3.45 |
| e | | 0.50 BSC | |
| E | | 7.00 BSC | |
| E2 | 5.35 | 5.40 | 5.45 |
| E3 | 1.65 | 1.70 | 1.75 |
| E4 | 3.15 | 3.20 | 3.25 |
| L | 0.35 | 0.40 | 0.45 |
| L1 | 0.05 | 0.10 | 0.15 |
| aaa | — | — | 0.10 |
| bbb | — | — | 0.10 |
| ccc | — | — | 0.08 |
| ddd | — | — | 0.10 |


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