



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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## Features

- **Complete BORSCHT Functions in a Single 48-Pin QFN Package**
  - Battery feed, Over-voltage support, integrated Ringing, line Supervision, Codec, Hybrid (2W/4W), and Test
  - Combines VE8910 SLIC and SLAC devices
- **Integrated Power Management**
  - Built-in DC/DC controller configurable for inverting-boost or flyback operation
  - Input voltage ( $V_{SW}$ ) range: +4.4 V to +15 V
  - Low power idle mode
- **Worldwide Programmability**
  - Input impedance, balance impedance, gain
  - DC feed voltage and current limit
  - Ringing frequency, voltage and current limit
  - Caller ID Generation based on *Telcordia*, *ETSI*, and *NTT* standards
  - Call progress tone generation
  - Sample coefficients for 44 countries
- **Ringing**
  - 5 REN Support
  - Up to 92- $V_{PK}$  internal balanced sinusoidal
- **VoicePath API-II Software Available to Implement FXS Functions**
  - Significantly reduces development and testing time
  - Configuration via VoicePath Profile Wizard
- **Wideband 16 kHz Sampling Mode**
- **G.711  $\mu$ -Law, A-Law, or 16-Bit Linear Coding**
- **Supported by SDK, Line Module, and Reference Designs**
- **VeriVoice Software Suites Available for Manufacturing and Subscriber Loop Testing**
- **Small Footprint Package - Exposed Pad 48-Pin QFN, 7x7x0.9 mm**
- **Pb-Free, RoHS-Compliant**
- **-40°C to 85°C Operating Range**

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### Ordering Information

Le89156PQC    48-pin QFN (Green)<sup>1</sup>    Tray<sup>2</sup>

1. The Green package meets RoHS Directive 2002/95/EC of the European Council to minimize the environmental impact of electrical equipment.

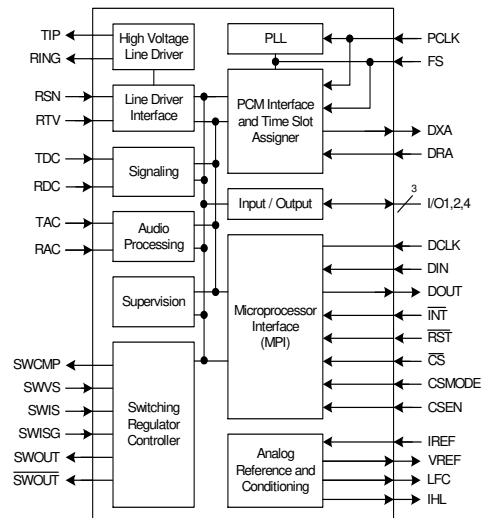
2. For delivery using a tape and reel packing system, add a "T" suffix to the OPN (Ordering Part Number) when placing an order.

## Applications

- **DSL Residential Gateways and Integrated Access Devices (IADs)**
- **Cable eMTAs**
- **PON Single Family Units (SFUs)**
- **Broadband VoIP Gateways**

## Description

The Microsemi Le89156 is an integrated, cost effective single channel FXS device that is optimized for VoIP access devices. It implements a complete BORSCHT functionality by providing the necessary voice interface functions to power, ring, signal, and connect one or more telephones. On the digital side, the Le89156 provides standard MPI and PCM interfaces to leading VoIP processors.



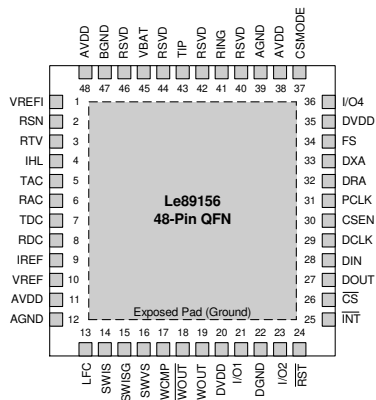
**Le89156 Block Diagram**

### Selected Electrical Specifications

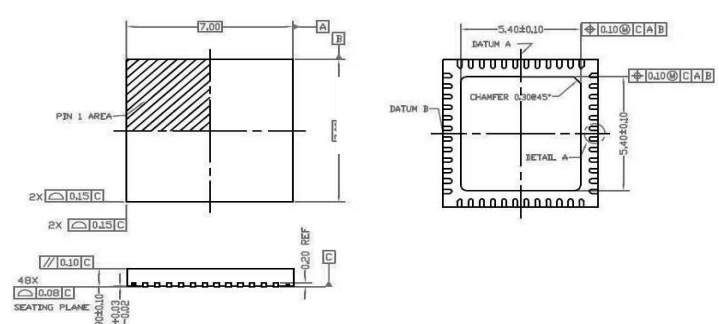
Description	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Ambient Temperature, under Bias	T <sub>A</sub>		-40°C		+85	°C
Digital and Analog Supply Voltages	DVDD,AVDD		3.135	3.3	3.465	V <sub>DC</sub>
Battery Voltage	V <sub>BAT</sub>		-15	-90	-105	V <sub>DC</sub>
Line Current	I <sub>LA</sub>	2 kft on 26 AWG line	20	26	40	mA
Ringing Voltage	V <sub>RING</sub>	Battery Tracking, 5 REN			60	V <sub>RMS</sub>
		Fixed Tracking, 5 REN			65	
Two-Wire Return Loss	R <sub>L</sub>	1 kHz		30		dB
Longitudinal Balance		1 kHz		58		dB
Package Power Consumption	P <sub>D</sub>					mW
Disconnect		Switcher on, but no DC feed to line		20		
Low Power Standby, On-Hook		Switcher on, with limited feed to line		46		
Standby, On-Hook		Normal feed to line, VOC = -57 V <sub>DC</sub>		86		
Talk (Off-Hook)		300 Ω		453		
Ringing		50 V <sub>RMS</sub> into 1 REN 50 V <sub>RMS</sub> into 5 REN		386 583		
Maximum Package Power Dissipation Capability, Continuous	P <sub>D(max)</sub>	T <sub>A</sub> = 85°C		1.7		W
Junction to Ambient Thermal Resistance	θ <sub>JA</sub>			23.5		°C/W

**Note:** Refer to the *Le89156 Single Channel Wideband FXS Advance Data Sheet* for test circuits and additional details

### Device Pinout



### Package Drawings



### Related Collateral

- *Le89156 Single Channel Wideband FXS Advance Data Sheet*, Document ID# 141559
- *Le71HR8927G Reference Design User's Guide for the Le89156*, Document ID# 142126
- *VoicePath™ API-II CSLAC Reference Guide*, Document ID#: 081301