MOTOROLA
Semiconductor Products Sector

Order Number: MS140131KTPP/D
Rev. 1, 8/11/00

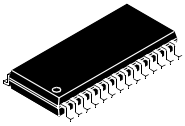
MS140131KT

Product Preview

SH-POTS Chipset

MC1420232 CODSP
MC1430132 SHLIC

FU SUFFIX
TQFP PACKAGE
CASE 824



DW SUFFIX
SOIC PACKAGE
CASE 751F

ORDERING INFORMATION

MC1420232	44-Pin TQFP Package
MC1430132	28-Pin SOIC Package

The MS140131KT chipset provides all the functions necessary to connect analog telephone sets or other analog terminals (telefax, answering machines, modems, etc.) into digital communication systems. It provides an economical solution for the traditional BORS(C)HT [Battery, Overvoltage, Ringing, Supervision, (Codec), Hybrid, Test] functions found in central-office exchanges, but is optimized for short-range communication [e.g., up to 500 m with four RENs (Ringer Equivalence Number) attached]. Virtually all system-dependent parameters can be set under software control, giving a unprecedented flexibility to the system integrator, as well as optimizing the system cost. The digital interface to the SH-POTS (Short Haul, Plain Old Telephone System) chipset uses the industry-standard GCI interface. The system architecture has been designed to offer the most cost-effective solution for short haul systems, yet offers the full flexibility required to meet worldwide analog telephony standards. The MS140131KT chipset is also suitable for Q.552 applications.

The MS140131KT chipset comprises three devices (see the Block Diagram): a pair of high-voltage devices, the Short Haul Line Interface Circuit (SHLIC) which provides the signal and power interface to the analog lines (one per line) and a low-voltage CMOS, DSP-based dual codec/control device (CODSP) which provides all signal processing and control functions for up to two lines.

Key Features

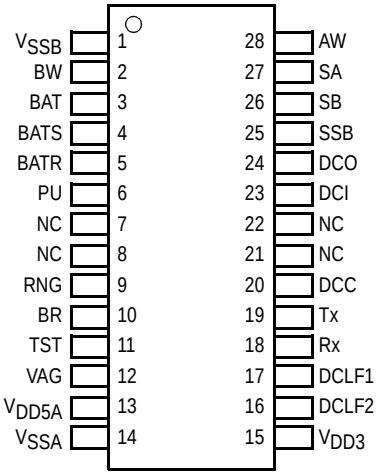
- Digitally Programmed Transmission and Signalling Characteristics Meet Worldwide Specification Requirements
- Integrated Ringing: Sine or Trapezoid
- Metering Injection
- Battery Reversal
- Tone Generators for Signalling and Testing
- Minimal External Components
- Codec and SLIC Functions for Two Lines
- Low-Cost POTS Interface for Short Range
- Standard GCI Interface

Applications

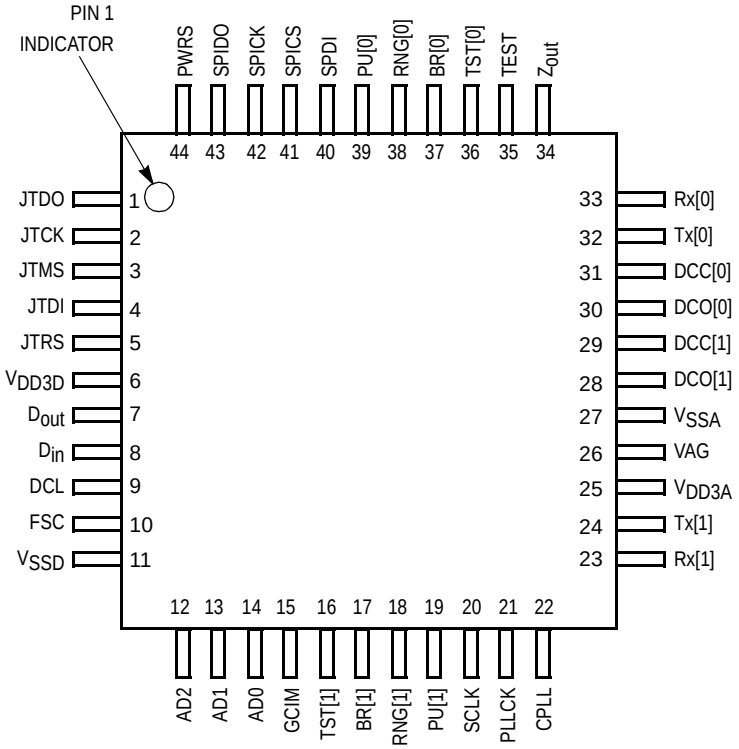
- Advanced ISDN NT (NTplus)
- Analog/Digital PABX
- Cable Telephone Systems (Set-Top Box)
- Remote Telephone Access Systems
  - — Fiber to the Curb
  - — Radio in the Loop
- Internet Telephones

PIN ASSIGNMENTS

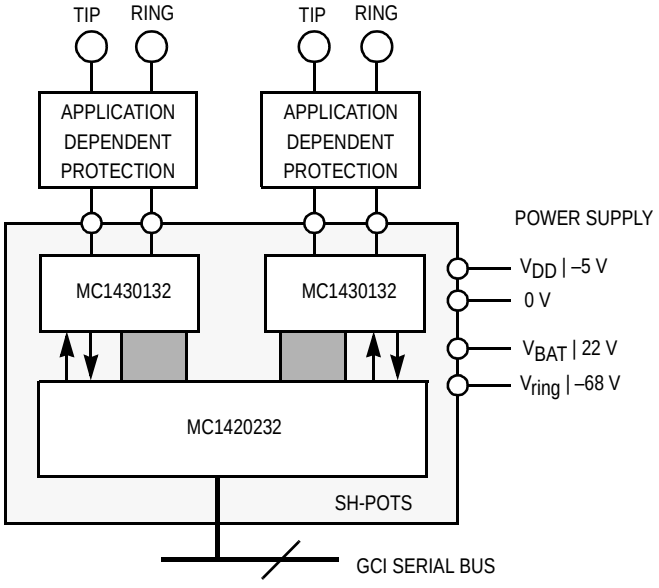
MC1430132
28-LEAD SOIC



MC1420232
44-LEAD TQFP



BLOCK DIAGRAM



OPERATING CONDITIONS

Operating ranges define the limits for functional operation and parametric characteristics of the device.

OPERATING CONDITIONS (All Voltages Referenced to V_{SSA} = V_{SSB} or V_{SS} = V_{SSA}, as Appropriate)

Symbol	Parameter	Limits			Unit
		Min	Typ	Max	
BATR	Ringing Battery Voltage	–72	–65	– 18	V
BATS	Speech Battery Voltage	–35	–32	– 18	V
D_{BAT}	Difference Between the Batteries BATR and BATS, BATR-BATS	–40	–35	0	V
V_{DD5A}	Supply Voltage SHLIC	4.75	5	5.5	V
T_{range}	Operating Temperature Range	–40	—	85	°C
V_{DD3D} V_{DD3A}	V_{DD} of CODSP (3.3 V ±8%)	3.036	3.3	3.564	V

FUNCTIONAL CHARACTERISTICS OF THE SH-POTS SYSTEM

For reference, Figure 1 shows the typical voltages on both wires during various stages of operation.

ON-HOOK CONDITIONS

When a line is not in use (on-hook), the designer may select either the speech battery or the ringing battery as the supply to the line drivers. In this mode, most of the internal circuits are put into a low-power operating mode to minimize supply currents. The A and B wire outputs are effectively connected to the supply voltage, thus applying this voltage to the line. The output is current-limited in this mode, thus protecting against short circuits and limiting any inrush current when a set goes off-hook. If the SHLIC detects a current in excess of a (programmable) limit, the off-hook condition will be detected (an on-chip debouncer with selectable delay avoids accidental hookswitch detection), and the circuit will be put into active speech mode.

RINGING INJECTION

The SH-POTS chipset is capable of directly injecting a ringing signal of up to 50 Vrms (sine wave) without the need for additional external components. The technique of “balanced ringing” is used, which allows this large voltage swing to remain within the technology limits of the SHLIC device. The SH-POTS chipset allows the user to program a DC offset during ringing as well as a reduced amplitude ringing signal, should the application require this. Ringing waveform, frequency, amplitude, and cadence, as well as ring-trip thresholds, are controlled by the CODSP device and are all programmable. Ringing cadence can be automatic, with independently programmable ring and pause times, or ringing can be controlled directly via the GCI bus. In automatic cadence mode, ringing bursts on both channels can optionally be interleaved if simultaneously active, to avoid peaks in current from the ringing battery supply.

SOURCE IMPEDANCE (Z_{CO})

The central-office impedance, Z_{CO}, is synthesized using digital signal processing techniques. This renders it very stable, and, moreover, programmable by the user by means of coefficients which are loaded via the GCI. The Z_{CO} setting is common for both lines. Both real and complex Z_{CO}s can be programmed to address the local requirements of specifications world-wide, and cover the range.

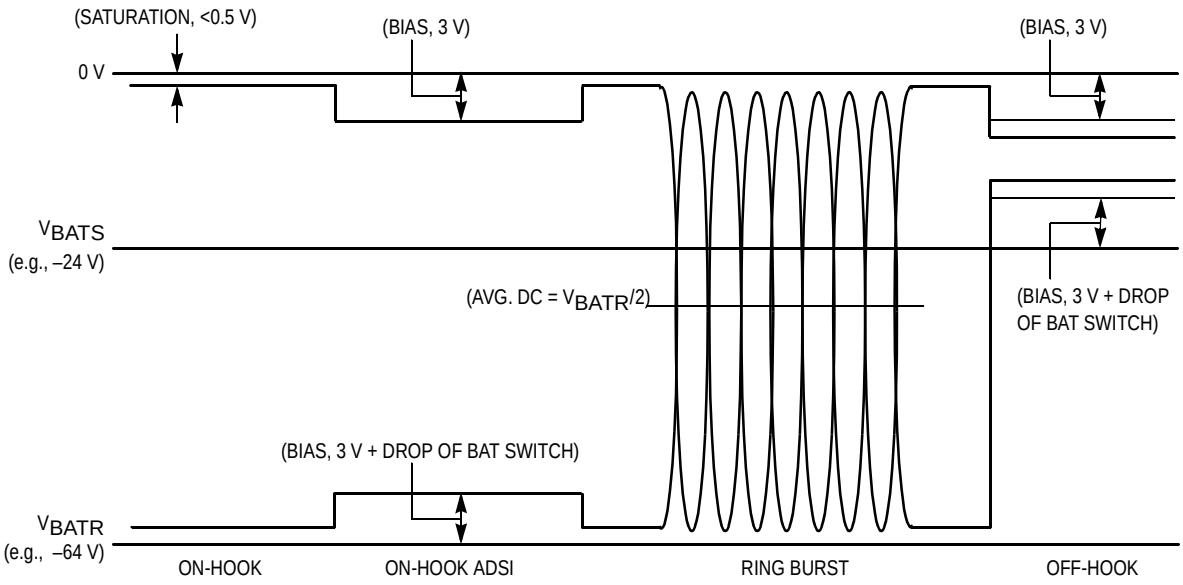


Figure 1. SH-POTS Line Voltages — Example

BALANCE IMPEDANCE (ECHO CANCELLER)

The balance impedance (model of the line + set impedance used to separate the receive and transmit signals in the “hybrid”) is independently programmable (though is the same for both channels). Default values offer echo return loss of better than 20 dB, though optimization to specific line and set characteristics may yield further improvement.

METERING INJECTION

Metering pulses of selectable frequency (12 or 16 kHz) and programmable amplitude can be injected into either analog channel independently. The width of the injected pulse is determined by the user (“on/off mode”), or by an internal timer (“burst mode”) which can be set by the user from 2 ms to 510 ms in steps of 2 ms. The metering signal is always a multiple of half metering periods.

TONE GENERATION

The SH-POTS system allows the injection of user programmable tones, independently per channel, for signalling or user test purposes. Per channel, a tone comprising two programmable (sine-wave) frequencies and programmable amplitudes can be generated (in this way, the most common call-progress and information tones, melody notes, or DTMF tones can be synthesized). The tone signal is added to the speech signal, or the speech signal can also be muted during a tone burst.

GCI INTERFACE

The SH-POTS system uses the GCI standard interface to exchange B channel data (PCM coded voice) and control information with the controlling system. GCI data is exchanged in both directions (downstream, towards the analog line, and upstream, from the analog line) in 4-byte frames at a rate of 8000 frames per second (the standard PCM sampling rate).

Digital DNA is a trademark of Motorola, Inc.
The General Circuit Interface (GCI) is an interface specification developed jointly by Alcatel, Italtel, GPT, and Siemens; March 1989; Issue 1.0.

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