



# ISD33120/150/180/240 Products

## Single-Chip Voice Record/Playback Devices

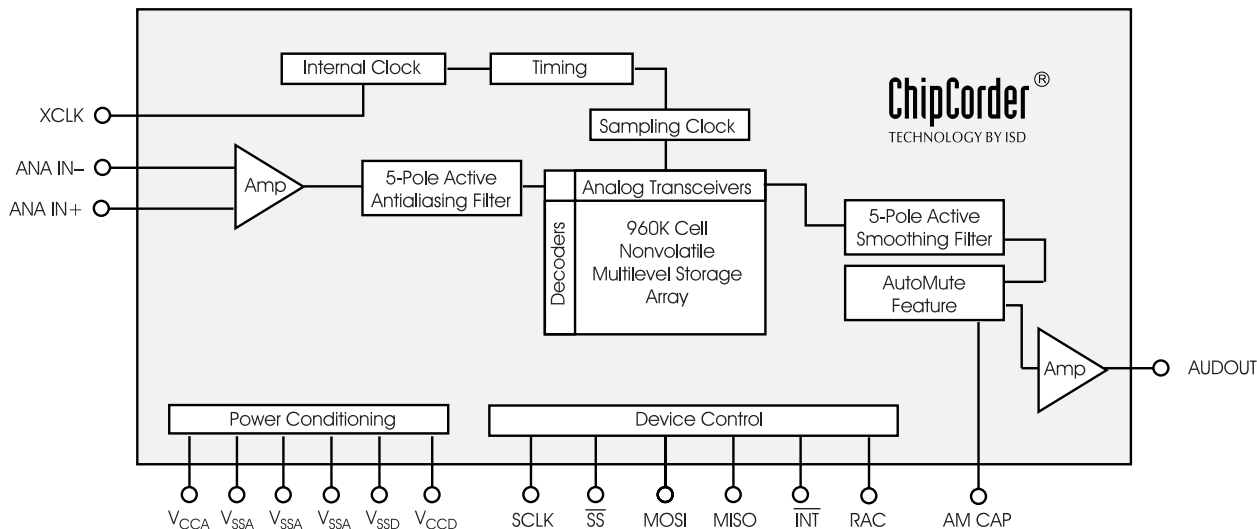
### 2-, 2.5-, 3-, and 4-Minute Durations

### GENERAL DESCRIPTION

The ISD33120/150/180/240 ChipCorder® Products provide high-quality, 3-volt, single-chip record/playback solutions for 2- to 4-minute messaging applications which are ideal for cellular phones and other portable products. The CMOS devices include an on-chip oscillator, antialiasing filter, smoothing filter, AutoMute™ feature, audio amplifier, and high density, multilevel storage array. The ISD33000 series is designed to be used in a microprocessor- or microcontroller-based system. Address and control are accomplished through a Serial Peripheral Interface (SPI) or Microwire Serial Interface to minimize pin count.

Recordings are stored in on-chip nonvolatile memory cells, providing zero-power message storage. This unique, single-chip solution is made possible through ISD's patented multilevel storage technology. Voice and audio signals are stored directly into memory in their natural form, providing high-quality, solid-state voice reproduction.

Figure: ISD33000 Series Block Diagram



**FEATURES**

- Single-chip voice record/playback solution
- Single +3 volt supply
- Low-power consumption
  - Operating current:
    - $I_{CC}$  Play = 25 mA (typical)
    - $I_{CC}$  Rec = 30 mA (typical)
  - Standby current: 1  $\mu$ A (typical)
- Single-chip durations of 2 to 4 minutes
- High-quality, natural voice/audio reproduction
- AutoMute™ feature provides background noise attenuation during periods of silence
- No algorithm development required
- Microcontroller SPI or Microwire™ Serial Interface
- Fully addressable to handle multiple messages
- Nonvolatile message storage
- Power consumption controlled by SPI or microwire control register
- 100-year message retention (typical)
- 100,000 record cycles (typical)
- On-chip clock source
- Available in die form, PDIP, SOIC, and TSOP packaging
- Extended temperature (–20°C to +70°C) and industrial temperature (–40°C to +85°C) versions available

---

**Table: ISD33120/150/180/240 Product Summary**

<b>Part Number</b>	<b>Duration</b>	<b>Input Sample Rate (KHz)</b>	<b>Typical Filter Pass Band (KHz)</b>
ISD33120	2.0 Min.	8.0	3.4
ISD33150	2.5 Min.	6.4	2.7
ISD33180	3.0 Min.	5.3	2.3
ISD33240	4.0 Min.	4.0	1.7

# Table of Contents

---

## ISD33120/150/180/240 Products

Single-Chip Voice Record/Playback Devices  
2-, 2.5-, 3-, and 4-Minute Durations

DETAILED DESCRIPTION	1
Speech/Sound Quality	1
Duration	1
EEPROM Storage	1
Microcontroller Interface	1
Programming	1
PIN DESCRIPTIONS	2
Voltage Inputs ( $V_{CCA}$ , $V_{CCD}$ )	2
Ground Inputs ( $V_{SSA}$ , $V_{SSD}$ )	2
Non-Inverting Analog Input (ANA IN+)	3
Inverting Analog Input (ANA IN-)	3
Audio Output (AUD OUT)	3
Slave Select ( $\overline{SS}$ )	4
Master Out Slave In (MOSI)	4
Master In Slave Out (MISO)	4
Serial Clock (SCLK)	4
Interrupt ( $\overline{INT}$ )	4
Row Address Clock (RAC)	4
External Clock Input (XCLK)	5
AutoMute™ Feature (AM CAP)	5
SERIAL PERIPHERAL INTERFACE (SPI) DESCRIPTION	5
Message Cueing	6
Power-Up Sequence	7
SPI Port	8
SPI Control Register	8
TIMING DIAGRAMS	17
DEVICE PHYSICAL DIMENSIONS	21
ORDERING INFORMATION	26

**FIGURES, CHARTS, AND TABLES IN THE ISD33120/150/180/240 PRODUCTS DATASHEET**

Figure 1:	ISD33000 TSOP and DIP/SOIC Pinouts	2
Figure 2:	ISD33000 Series ANA IN Modes	3
Figure 3:	SPI Port	7
Figure 4:	SPI Interface Simplified Block Diagram	8
Figure 5:	Timing Diagram	17
Figure 6:	8-Bit Command Format	17
Figure 7:	16-Bit Command Format	18
Figure 8:	Playback/Record and Stop Cycle	18
Figure 9:	Application Example Using SPI	19
Figure 10:	Application Example Using Microwire	20
Figure 11:	Application Example Using SPI Port on Microcontroller	20
Figure 12:	28-Lead 8x13.4mm Plastic Thin Small Outline Package (TSOP) Type I (E)	21
Figure 13:	28-Lead 0.600-Inch Plastic Dual Inline Package (PDIP) (P)	22
Figure 14:	28-Lead 0.300-Inch Plastic Small Outline Integrated Circuit (SOIC) (S)	23
Figure 15:	ISD33120/150/180/240 Products Bonding Physical Layout (Unpackaged Die)	24
Table 1:	External Clock Input Precision Power Regulation	5
Table 2:	Opcode Summary	6
Table 3:	SPI Control Register	8
Table 4:	Absolute Maximum Ratings (Packaged Parts)	9
Table 5:	Operating Conditions (Packaged Parts)	9
Table 6:	DC Parameters (Packaged Parts)	9
Table 7:	AC Parameters (Packaged Parts)	10
Table 8:	Absolute Maximum Ratings (Die)	13
Table 9:	Operating Conditions (Die)	13
Table 10:	DC Parameters (Die)	13
Table 11:	AC Parameters (Die)	14
Table 12:	SPI AC Parameters	16
Table 13:	Plastic Thin Small Outline Package (TSOP) Type I (E) Dimensions	21
Table 14:	Plastic Dual Inline Package (PDIP) (P) Dimensions	22
Table 15:	Plastic Small Outline Integrated Circuit (SOIC) (S) Dimensions	23
Table 16:	ISD33120/150/180/240 Devices PIN/PAD Designations,	25