ICL7135/D, ICL7135/W
4½-Digit BCD Output A/D Converter

INTERSIL

GENERAL DESCRIPTION

The Intersil ICL7135 precision A/D converter, with its multiplexed BCD output and digit drivers, combines dual-slope conversion reliability with ±1 in 20,000 count accuracy and is ideally suited for the visual display DVM/DPM market. The 2.0000V full scale capability, auto-zero and auto-polarity are combined with true ratiometric operation, almost ideal differential linearity and true differential input. All necessary active devices are contained on a single CMOS I.C., with the exception of display drivers, reference, and a clock.

The Intersil ICL7135 brings together an unprecendented combination of high accuracy, versatility, and true economy. It features auto-zero to less than 10 μV, zero drift of less than 1 μV/°C, input bias current of 10 pA max., and rollover error of less than one count. The versatility of multiplexed BCD outputs is increased by the addition of several pins which allow it to operate in more sophisticated systems. These include $\overline{\text{STROBE}}$, OVERRANGE, UNDER-RANGE, RUN/$\overline{\text{HOLD}}$ and BUSY lines, making it possible to interface the circuit to a microprocessor or UART.

FEATURES

- **Accuracy Guaranteed to ±1 Count Over Entire ±20,000 Counts (2.0000V Full Scale)**
- **Guaranteed Zero Reading for 0V Input**
- **1 pA Typical Input Current**
- **True Differential Input**
- **True Polarity at Zero Count for Precise Null Detection**
- **Single Reference Voltage Required**
- **Over-Range and Under-Range Signals Available for Auto-Range Capability**
- **All Outputs TTL Compatible**
- **Blinking Outputs Give Visual Indication of Overrange**
- **Six Auxiliary Inputs/Outputs Are Available for Interfacing to UARTs, Microprocessors or Other Circuitry**
- **Multiplexed BCD Outputs**

ORDERING INFORMATION

Part Number	Temperature	Form
ICL7135/D	+25°C	Dice
ICL7135/W	+25°C	Wafer

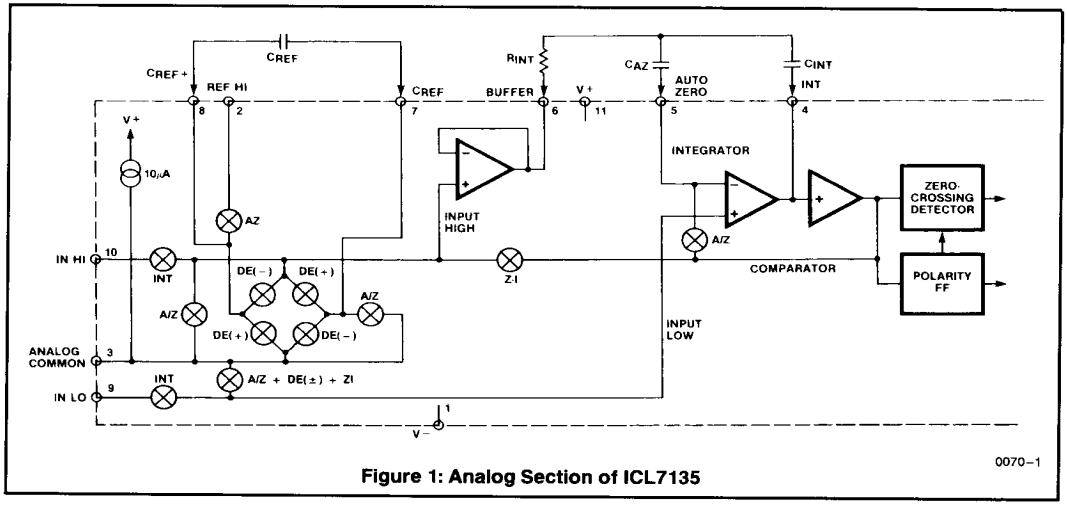


Figure 1: Analog Section of ICL7135

NOTE: All typical values have been characterized but are not tested.

ICL7135/D, ICL7135/W

ABSOLUTE MAXIMUM RATINGS

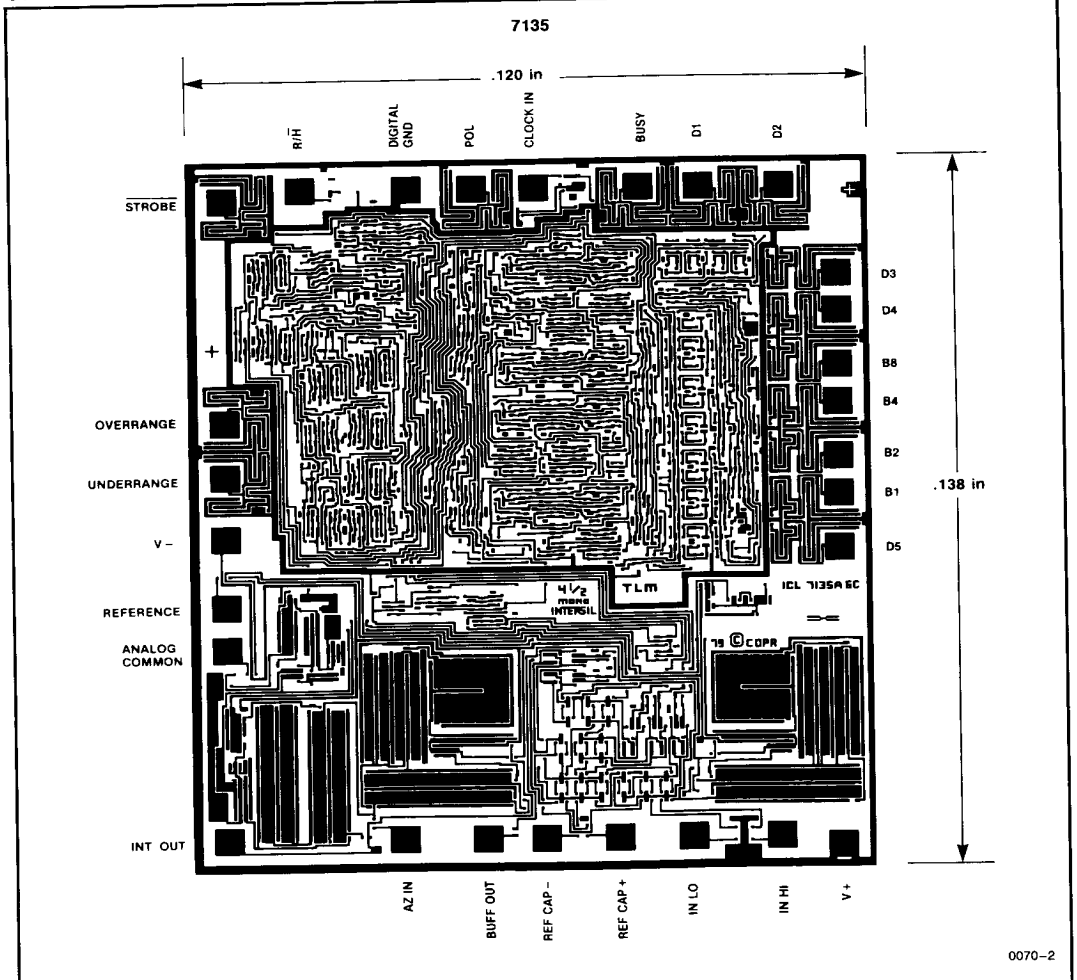
Supply Voltage V^+ ..... +6V
V^- ..... −9V
Analog Input Voltage (either input) (Note 1) ..... V^+ to V^-
Reference Input Voltage (either input) ..... V^+ to V^-
Clock Input ..... GND to V^+

NOTE: *Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

NOTE 1: Input voltages may exceed the supply voltages provided the input current is limited to +100 μA.

2: Dissipation rating assumes device is mounted with all leads soldered to printed circuit board.

CHIP TOPOGRAPHY



Pad size = 0.005 x 0.005 in.

Figure 2

NOTE: All typical values have been characterized but are not tested.

ELECTRICAL CHARACTERISTICS (Note 1)

$V^+ = 5V$, $V^- = -5V$, $T_A = 25°C$, Clock Frequency Set for 3 Reading/Sec

Symbol	Parameter	Test Conditions	Min	Max	Units
ANALOG (Note 1) (Note 2)					
	Zero Input Reading	$V_{IN} = 0.0V$ Full-Scale = 2.000V	−0.0002	+0.0002	Digital Reading
	Ratiometric Reading (Note 2)	$V_{IN} \cong V_{REF}$ Full-Scale = 2.000V	+0.9995	+1.0000	Digital Reading
DIGITAL					
INPUTS					
V_{INH}			2.8		V
V_{INL}				0.8	V
I_{INL}	Clock In, RUN/$\overline{HOLD}$	$V_{IN} = 0$		0.1	mA
I_{INH}		$V_{IN} = +5V$		10	μA
OUTPUTS					
V_{OL}	All Outputs	$I_{OL} = 1.6$ mA		0.40	V
V_{OH}	B_1, B_2, B_4, B_8 D_1, D_2, D_3, D_4, D_5	$I_{OH} = -1$ mA	2.4		V
V_{OH}	BUSY, $\overline{STROBE}$, OVER-RANGE, UNDER-RANGE POLARITY	$I_{OH} = 10$ μA	4.9		V
SUPPLY					
V^+	+5V Supply Range		+4	+6	V
V^-	−5V Supply Range		−3	−8	V
I^+	+5V Supply Current	$f_C = 0$		3.0	mA
I^-	−5V Supply Current	$f_C = 0$		3.0	

NOTE 1: Tested in 4½-digit (20,000 count) clock frequency 120 kHz.

2: Tested with a low dielectric absorption integrating capacitor.

NOTE: All typical values have been characterized but are not tested.