

**FULL MILITARY TEMPERATURE RANGE
HIGH-SPEED SENSE AMPLIFIERS FOR CONVERSION OF
COINCIDENT-CURRENT MEMORY READOUT TO SATURATED DIGITAL-LOGIC LEVELS**

performance features

- high speed and fast recovery time
- time and amplitude signal discrimination
- adjustable input threshold voltage levels
- narrow region of threshold voltage uncertainty
- multiple differential-input preamplifiers
- high d-c noise margin—typically one volt
- good fan-out capability

ease-of-design features

- choice of output circuit function
- TTL or DTL drive capability
- standard logic supply voltages
- plug-in configuration ideal for flow-soldering techniques
- pins on 100-mil grid spacings for industrial-type circuit boards

description

Series 5520 monolithic sense amplifiers are designed for use with high-speed memory systems. These sense amplifiers detect bipolar differential-input signals from the memory and provide the interface circuitry between the memory and the logic section. Low-level pulses originating in the memory are transformed into logic levels compatible with standard transistor-transistor-logic (TTL) and diode-transistor-logic (DTL) circuits.

These sense amplifiers feature multiple differential-input preamplifiers and versatile gating and output circuits, permitting a significant reduction in the circuitry required to accomplish the sensing function. A unique circuit design provides inherent stability of the input threshold level over a wide range of power-supply voltage levels and temperature ranges. Independent strobing of each of the dual sense-input channels ensures maximum versatility and permits detection to occur when the signal-to-noise ratio is at a maximum. The gate and strobe inputs and the outputs are compatible with standard TTL and DTL digital logic circuits.

The SN5520 and SN5521 circuits may be used to perform the functions of a flip-flop or register which responds to the sense and strobe input conditions.

The SN5522 and SN5523 circuits feature a high-fan-out, single-ended, open-collector output stage. In addition, they may be used to expand the inputs to an SN5520 or SN5521 circuit, or to perform the wired-AND function.

The SN5524 and SN5525 circuits provide for independent, dual-channel sensing with separate outputs. SN55234 and SN55235 are similar but have inverted outputs and internal compensation. SN55232 and SN55233 are identical to the SN55234 and SN55235, respectively, except that their output gates each feature an open-collector output.

The SN5528 and SN5529 circuits are identical to the SN5524 and SN5525, respectively, except that the output of each preamplifier is available as a test point. SN55238 and SN55239 are similar to SN5528 and SN5529, respectively, but have inverted outputs and internal compensation.

Series 5520 sense amplifiers are available in the J ceramic dual-in-line package and are characterized for operation over the full military temperature range of -55°C to 125°C . Terminal assignments and functions are identical to the corresponding Series 7520 circuits.

ITEM	PAGE
Design Characteristics, Circuit Operation, and Other General Information	11-6
Maximum Ratings, Recommended Operating Conditions, and Definitive Specifications (see next page and also:)	
For Types SN5520, SN5521, see SN7520, SN7521	11-10
For Types SN5522, SN5523, see SN7522, SN7523	11-12
For Types SN5524, SN5525, see SN7524, SN7525	11-14
For Types SN5528, SN5529, see SN7528, SN7529	11-18
For Types SN55232, SN55233, see SN75232, SN75233	11-20
For Types SN55234, SN55235, see SN75234, SN75235	11-22
For Types SN55238, SN55239, see SN75238, SN75239	11-24
D-C Test Circuits	11-26
Switching Time Test Circuits and Voltage Waveforms	11-43
Typical Characteristics	11-53
Application Data	11-55

SERIES 5520 SENSE AMPLIFIERS

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltages (see Note 1)	
V_{CC+}	7 V
V_{CC-}	-7 V
Differential input voltage, V_{ID} or V_{ref}	± 5 V
Voltage from any input to ground (see Note 2)	5.5 V
Off-state voltage applied to open-collector outputs	5.5 V
Operating free-air temperature range	-55°C to 125°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

	MIN	NOM	MAX	UNIT
V_{CC+} (see Note 1)	4.75	5	5.25	V
V_{CC-} (see Note 1)	-4.75	-5	-5.25	V
V_{ref}	15		40	mV

- NOTES: 1. These voltage values are with respect to network ground terminal.
2. Strobe and gate input voltages must be zero or positive with respect to network ground terminal.

electrical characteristics (unless otherwise noted $V_{CC+} = 5$ V, $V_{CC-} = -5$ V, $T_A = -55^\circ\text{C}$ to 125°C)

All electrical characteristics and test conditions are identical to those of the corresponding Series 7520 types with the exception of the items shown below. Limits which apply to Series 7520 circuits over the temperature range 0°C to 70°C apply to Series 5520 circuits over the range -55°C to 125°C .

PARAMETER	TEST CONDITIONS	SN5520			SN5521			UNIT	
		SN5522			SN5523				
		SN5524			SN5525				
		SN5528			SN5529				
		SN55232			SN55233				
		SN55234			SN55235				
		SN55238			SN55239				
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX		
V_T Differential input threshold voltage [†]	$V_{ref} = 15$ mV	$T_A = -55^\circ\text{C}$ to 0°C and 70°C to 125°C		10	15	20	8	15	22
		$T_A = 0^\circ\text{C}$ to 70°C		11	15	19	8	15	22
	$V_{ref} = 40$ mV	$T_A = -55^\circ\text{C}$ to 0°C and 70°C to 125°C		35	40	45	33	40	47
		$T_A = 0^\circ\text{C}$ to 70°C		36	40	44	33	40	47
I_{IB} Differential input bias current	$V_{CC+} = 5.25$ V, $V_{CC-} = -5.25$ V, $V_{ID} = 0$	$T_A = -55^\circ\text{C}$ to 0°C		100			100		
		$T_A = 0^\circ\text{C}$ to 125°C		30	75		30	75	

[†]The differential input threshold voltage (V_T) is defined as the d-c differential input voltage (V_{ID}) required to force the output of the sense amplifier to the logic-gate threshold voltage level.

[‡]All typical values are at $V_{CC+} = 5$ V, $V_{CC-} = -5$ V, $T_A = 25^\circ\text{C}$.

switching characteristics and typical recovery and cycle times, $V_{CC+} = 5$ V, $V_{CC-} = -5$ V, $T_A = 25^\circ\text{C}$

These characteristics are identical to those of the corresponding Series 7520 types.

11