

SN54F520, SN54F521, SN74F520, SN74F521 8-BIT IDENTITY COMPARATORS

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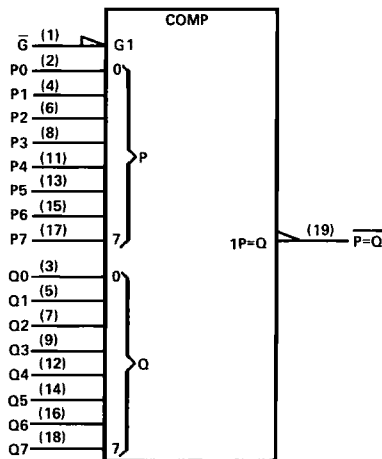
- Compares Two 8-Bit Words
- 'F520 has 20-k Ω Pull-up Resistors on Q Inputs
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These identity comparators perform comparisons on two eight-bit binary or BCD words. The 'F520 and F521 provide $\overline{P=Q}$ outputs. The 'F520 devices feature 20-k Ω pull-up termination resistors on the Q inputs for analog or switch data.

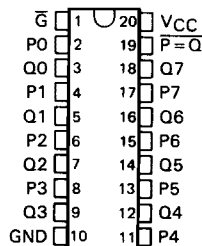
The SN54F520 and SN54F521 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F520 and SN74F521 are characterized for operation from 0°C to 70°C .

logic symbol†

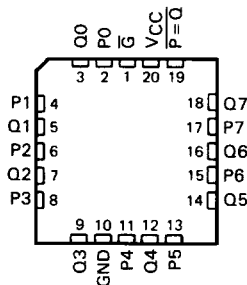


†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

SN54F520, SN54F521 . . . J PACKAGE
SN74F520, SN74F521 . . . DW OR N PACKAGE
(TOP VIEW)



SN54F520, SN54F521 . . . FK PACKAGE
(TOP VIEW)



FUNCTION TABLE

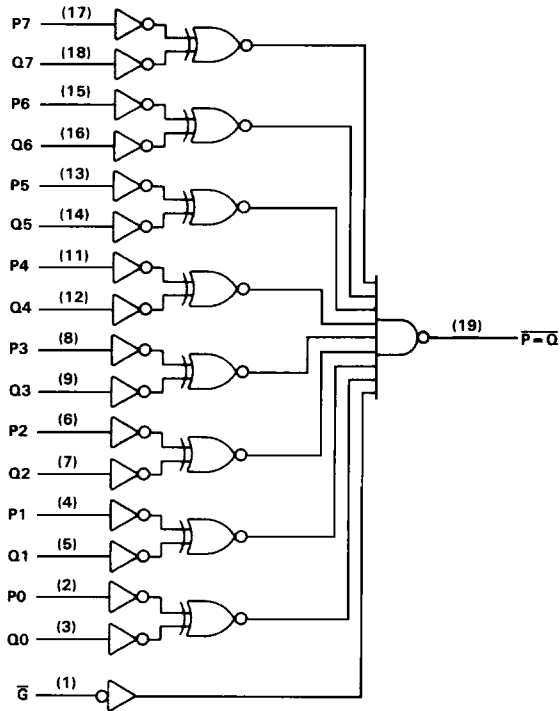
| INPUTS | | OUTPUT |
|--------------|-------------|------------------|
| DATA P, Q | ENABLE G | $\overline{P=Q}$ |
| P = Q | L | L |
| P \neq Q | X | H |
| X | H | H |

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Data Sheets

SN54F520, SN54F521, SN74F520, SN74F521
8-BIT IDENTITY COMPARATORS

logic diagram (positive logic)



NOTE: The 'F520 has a 20-kΩ pullup resistors on the Q inputs.

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

| | |
|--|--------------------|
| Supply voltage, V_{CC} | -0.5 V to 7 V |
| Input voltage [†] | -1.2 V to 7 V |
| Input current | -30 mA to 5 mA |
| Voltage applied to any output in the high state | -0.5 V to V_{CC} |
| Current into any output in the low state | 40 mA |
| Operating free-air temperature range: SN54F520, SN54F521 | -55°C to 125°C |
| SN74F520, SN74F521 | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

[†]The input voltage ratings may be exceeded provided the input current ratings are observed.

SN54F520, SN74F520 8-BIT IDENTITY COMPARATORS

recommended operating conditions

| | SN54F520 | | | SN74F520 | | | UNIT |
|---|----------|-----|-----|----------|-----|-----|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V _{IH} High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I _{IK} Input clamp current | | | -18 | | | -18 | mA |
| I _{OH} High-level output current | | | -1 | | | -1 | mA |
| I _{OL} Low-level output current | | | 20 | | | 20 | mA |
| T _A Operating free-air temperature | -55 | 125 | | 0 | 70 | | °C |

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| | TEST CONDITIONS | | SN54F520 | | | SN74F520 | | | UNIT |
|------------------------------|---------------------------|---|----------|------------------|------|----------|------------------|------|------|
| | | | MIN | TYP [†] | MAX | MIN | TYP [†] | MAX | |
| V _{IK} | V _{CC} = 4.5 V, | I _I = -18 mA | | | -1.2 | | | -1.2 | V |
| V _{OH} | V _{CC} = 4.5 V, | I _{OH} = -1 mA | 2.5 | 3.4 | | 2.5 | 3.4 | | V |
| | V _{CC} = 4.75 V, | I _{OH} = -1 mA | | | | 2.7 | | | |
| V _{OL} | V _{CC} = 4.5 V, | I _{OL} = 20 mA | | 0.30 | 0.5 | | 0.3 | 0.5 | V |
| I _I | Q and P inputs | V _{CC} = 5.5 V, V _I = 7 V | | | 0.1 | | | 0.1 | mA |
| | Q inputs | V _{CC} = 5.5 V, V _I = 5.5 V | | | 0.1 | | | 0.1 | |
| I _{IH} | Q and P inputs | V _{CC} = 5.5 V, V _I = 2.7 V | | | 20 | | | 20 | μA |
| | Q inputs | | | | -0.3 | | | -0.3 | |
| I _{IL} | Q and P inputs | V _{CC} = 5.5 V, V _I = 0.5 V | | | -0.6 | | | -0.6 | mA |
| | Q inputs | | | | -1 | | | -1 | |
| I _{OS} [‡] | V _{CC} = 5.5 V, | V _O = 0 | -60 | | -150 | -60 | | -150 | mA |
| I _{CC} | V _{CC} = 5.5 V, | See Note 1 | | 21 | 32 | | 21 | 32 | mA |

switching characteristics (see Note 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 5 V, C _L = 50 pF, R _L = 500 Ω, T _A = 25°C | | | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX [§] | | | | UNIT |
|------------------|--------------|-------------|---|-----|-----|---|------|----------|------|------|
| | | | 'F520 | | | SN54F520 | | SN74F520 | | |
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | P or Q | P = Q | 3.9 | 5.7 | 7.7 | 3.7 | 10.2 | 3.7 | 8.7 | ns |
| t _{PHL} | | | 4.7 | 7 | 9.3 | 4.4 | 11.3 | 4.4 | 10.3 | |
| t _{PLH} | Q | P = Q | 3.5 | 4.6 | 5.8 | 3.4 | 7 | 3.4 | 6.4 | ns |
| t _{PHL} | | | 5.2 | 7.5 | 9.5 | 4.9 | 11.2 | 4.9 | 10.4 | |

[†] All typical values are at V_{CC} = 5 V, T_A = 25°C.

[‡] Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

[§] For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTES: 1. I_{CC} is measured with all inputs at 4.5 V.

2. Load circuits and waveforms are shown in Section 1.

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Data Sheets

SN54F521, SN74F521

8-BIT IDENTITY COMPARATORS

recommended operating conditions

| | | SN54F521 | | | SN74F521 | | | UNIT |
|-----------------|--------------------------------|----------|-----|-----|----------|-----|-----|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V _{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} | Low-level input voltage | 0.8 | | | 0.8 | | | V |
| I _{IK} | Input clamp current | -18 | | | -18 | | | mA |
| I _{OH} | High-level output current | -1 | | | -1 | | | mA |
| I _{OL} | Low-level output current | 20 | | | 20 | | | mA |
| T _A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SN54F521 | | | SN74F521 | | | UNIT |
|------------------------------|---|----------|------------------|------|----------|------------------|------|------|
| | | MIN | TYP [†] | MAX | MIN | TYP [†] | MAX | |
| V _{IK} | V _{CC} = 4.5 V, I _I = -18 mA | -1.2 | | | -1.2 | | | V |
| V _{OH} | V _{CC} = 4.5 V, I _{OH} = -1 mA | 2.5 | 3.4 | | 2.5 | 3.4 | | V |
| | V _{CC} = 4.75 V, I _{OH} = -1 mA | | | | 2.7 | | | |
| V _{OL} | V _{CC} = 4.5 V, I _{OL} = 20 mA | 0.3 | | 0.5 | 0.3 | | 0.5 | V |
| I _I | V _{CC} = 5.5 V, V _I = 7 V | 100 | | | 100 | | | μA |
| I _{IH} | V _{CC} = 5.5 V, V _I = 2.7 V | 20 | | | 20 | | | μA |
| I _{IL} | V _{CC} = 5.5 V, V _I = 0.5 V | -0.6 | | | -0.6 | | | mA |
| I _{OS} [‡] | V _{CC} = 5.5 V, V _O = 0 | -60 | | -150 | -60 | | -150 | mA |
| I _{CC} | V _{CC} = 5.5 V, See Note 1 | 21 | | 32 | 21 | | 32 | mA |

switching characteristics (see Note 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 5 V, C _L = 50 pF, R _L = 500 Ω, T _A = 25°C | | | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX [§] | | | | UNIT |
|------------------|--------------|-------------|---|-----|-----|---|------|----------|-----|------|
| | | | F521 | | | SN54F521 | | SN74F521 | | |
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | P or Q | P = Q | 2.7 | 6.6 | 10 | 2.7 | 15 | 2.7 | 11 | ns |
| t _{PHL} | | | 3.7 | 6.6 | 10 | 3.2 | 12 | 3.2 | 11 | |
| t _{PLH} | Q | P = Q | 2.2 | 4.6 | 6.5 | 2.2 | 8.5 | 2.2 | 7.5 | ns |
| t _{PHL} | | | 2.7 | 6.1 | 9 | 2.7 | 13.5 | 2.7 | 10 | |

[†]All typical values are at V_{CC} = 5 V, T_A = 25°C.

[‡]Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

[§]For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTES: 1. I_{CC} is measured with all inputs at 4.5 V.

2. Load circuits and waveforms are shown in Section 1.

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