

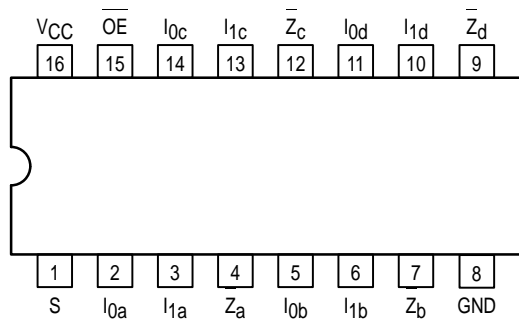


MC74AC258 MC74ACT258

Quad 2-Input Multiplexer with 3-State Outputs

The MC74AC258/74ACT258 is a quad 2-input multiplexer with 3-state outputs. Four bits of data from two sources can be selected using a common data select input. The four outputs present the selected data in the complement (inverted) form. The outputs may be switched to a high impedance state with a HIGH on the common Output Enable (OE) input, allowing the outputs to interface directly with bus-oriented systems.

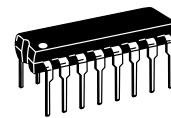
- Multiplexer Expansion by Tying Outputs Together
- Inverting 3-State Outputs
- Outputs Source/Sink 24 mA
- 'ACT258 Has TTL Compatible Inputs



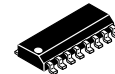
PIN NAMES

- S_c Common Data Select Input
- OE 3-State Output Enable Input
- I_{0a}-I_{0d} Data Inputs from Source 0
- I_{1a}-I_{1d} Data Inputs from Source 1
- Z_a-Z_d 3-State Multiplexer Outputs

QUAD 2-INPUT
MULTIPLEXER WITH
3-STATE OUTPUTS



N SUFFIX
CASE 648-08
PLASTIC



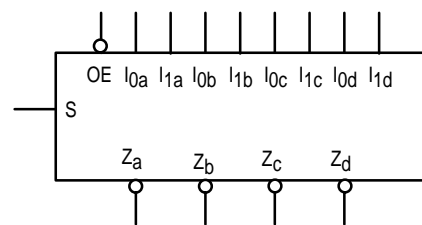
D SUFFIX
CASE 751B-05
PLASTIC

TRUTH TABLE

| Output Enable | Select Input | Data Inputs | | Outputs |
|---------------|--------------|----------------|----------------|---------|
| OE | S | I ₀ | I ₁ | Z |
| H | X | X | X | Z |
| L | H | X | L | H |
| L | H | X | H | L |
| L | L | L | X | H |
| L | L | H | X | L |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

LOGIC SYMBOL



MC74AC258 MC74ACT258

FUNCTIONAL DESCRIPTION

The MC74AC258/74ACT258 is a quad 2-input multiplexer with 3-state outputs. It selects four bits of data from two sources under control of a common Select input (S). When the Select input is LOW, the I_{0x} inputs are selected and when Select is HIGH, the I_{1x} inputs are selected. The data on the selected inputs appears at the outputs in inverted form. The MC74AC258/74ACT258 is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The logic equations for the outputs are shown below:

$$\bar{Z}_a = \overline{OE} \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S})$$

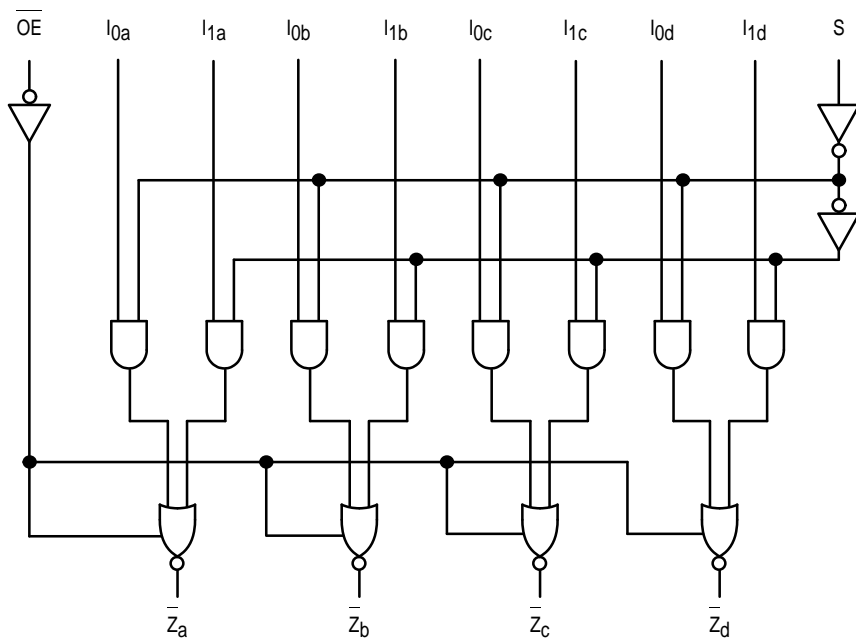
$$\bar{Z}_b = \overline{OE} \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S})$$

$$\bar{Z}_c = \overline{OE} \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S})$$

$$\bar{Z}_d = \overline{OE} \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S})$$

When the Output Enable input (\overline{OE}) is HIGH, the outputs are forced to a high impedance state. If the outputs of the 3-state devices are tied together, all but one device must be in the high impedance state to avoid high currents that would exceed the maximum ratings. Designers should ensure the Output Enable signals to 3-state devices whose outputs are tied together are designed so there is no overlap.

LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

MC74AC258 MC74ACT258

MAXIMUM RATINGS*

| Symbol | Parameter | Value | Unit |
|-----------|---|------------------------|--------------------|
| V_{CC} | DC Supply Voltage (Referenced to GND) | -0.5 to +7.0 | V |
| V_{in} | DC Input Voltage (Referenced to GND) | -0.5 to $V_{CC} + 0.5$ | V |
| V_{out} | DC Output Voltage (Referenced to GND) | -0.5 to $V_{CC} + 0.5$ | V |
| I_{in} | DC Input Current, per Pin | ± 20 | mA |
| I_{out} | DC Output Sink/Source Current, per Pin | ± 50 | mA |
| I_{CC} | DC V_{CC} or GND Current per Output Pin | ± 50 | mA |
| T_{stg} | Storage Temperature | -65 to +150 | $^{\circ}\text{C}$ |

* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Typ | Max | Unit | |
|-------------------|---|------------------|-----|----------|--------------------|------|
| V_{CC} | Supply Voltage | 'AC | 2.0 | 5.0 | 6.0 | V |
| | | 'ACT | 4.5 | 5.0 | 5.5 | |
| V_{in}, V_{out} | DC Input Voltage, Output Voltage (Ref. to GND) | 0 | | V_{CC} | V | |
| t_r, t_f | Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs | V_{CC} @ 3.0 V | | 150 | | ns/V |
| | | V_{CC} @ 4.5 V | | 40 | | |
| | | V_{CC} @ 5.5 V | | 25 | | |
| t_r, t_f | Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs | V_{CC} @ 4.5 V | | 10 | | ns/V |
| | | V_{CC} @ 5.5 V | | 8.0 | | |
| T_J | Junction Temperature (PDIP) | | | 140 | $^{\circ}\text{C}$ | |
| T_A | Operating Ambient Temperature Range | -40 | 25 | 85 | $^{\circ}\text{C}$ | |
| I_{OH} | Output Current — High | | | -24 | mA | |
| I_{OL} | Output Current — Low | | | 24 | mA | |

1. V_{in} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

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DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74AC | | 74AC | | Unit | Conditions |
|------------------|-----------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|---|------------|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 3.0 | 1.5 | 2.1 | 2.1 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 4.5 | 2.25 | 3.15 | 3.15 | | | |
| | | 5.5 | 2.75 | 3.85 | 3.85 | | | |
| V _{IL} | Maximum Low Level Input Voltage | 3.0 | 1.5 | 0.9 | 0.9 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 4.5 | 2.25 | 1.35 | 1.35 | | | |
| | | 5.5 | 2.75 | 1.65 | 1.65 | | | |
| V _{OH} | Minimum High Level Output Voltage | 3.0 | 2.99 | 2.9 | 2.9 | V | I _{OUT} = -50 μA | |
| | | 4.5 | 4.49 | 4.4 | 4.4 | | | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 3.0 | | 2.56 | 2.46 | V | *V _{IN} = V _{IL} or V _{IH} -12 mA I _{OH} -24 mA -24 mA | |
| | | 4.5 | | 3.86 | 3.76 | | | |
| | | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum Low Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 3.0 | | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA | |
| | | 4.5 | | 0.36 | 0.44 | | | |
| | | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| I _{OZ} | Maximum 3-State Current | 5.5 | | ±0.5 | ±5.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND | |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | V _{OLD} = 1.65 V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85 V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | V _{IN} = V _{CC} or GND | |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

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AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74AC | | | 74AC | | Unit | Fig. No. |
|------------------|---|--------------------------|--|------------|-------------|--|--------------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay I _n to Z _n | 3.3 5.0 | 2.0 1.5 | 6.0 4.5 | 9.5 7.5 | 1.5 1.0 | 11.0 8.5 | ns | 3-5 |
| t _{PHL} | Propagation Delay I _n to Z _n | 3.3 5.0 | 2.0 1.5 | 5.0 4.0 | 8.5 6.5 | 1.5 1.0 | 9.5 7.0 | ns | 3-5 |
| t _{PLH} | Propagation Delay S to Z _n | 3.3 5.0 | 3.0 2.0 | 7.5 6.0 | 12.0 9.5 | 2.5 1.5 | 14.0 10.5 | ns | 3-6 |
| t _{PHL} | Propagation Delay S to Z _n | 3.3 5.0 | 2.5 1.5 | 7.5 5.5 | 11.5 9.0 | 2.0 1.5 | 13.0 10.0 | ns | 3-6 |
| t _{PZH} | Output Enable Time | 3.3 5.0 | 2.5 1.5 | 6.0 4.5 | 9.5 7.5 | 2.0 1.5 | 10.5 8.5 | ns | 3-7 |
| t _{PZL} | Output Enable Time | 3.3 5.0 | 2.0 1.5 | 5.5 5.5 | 9.0 7.0 | 1.5 1.0 | 10.0 8.0 | ns | 3-8 |
| t _{PHZ} | Output Disable Time | 3.3 5.0 | 2.5 2.0 | 5.5 5.5 | 10.0 8.5 | 2.0 1.5 | 11.0 9.0 | ns | 3-7 |
| t _{PLZ} | Output Disable Time | 3.3 5.0 | 2.0 1.5 | 5.5 5.0 | 9.0 7.0 | 2.0 1.5 | 10.0 8.0 | ns | 3-8 |

* Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC258 MC74ACT258

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74ACT | | 74ACT | | Unit | Conditions |
|-------------------|--|------------------------|------------------------|-------------------|------------------------------------|----|---|------------|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 4.5 | 1.5 | 2.0 | 2.0 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 5.5 | 1.5 | 2.0 | 2.0 | | | |
| V _{IL} | Maximum Low Level Input Voltage | 4.5 | 1.5 | 0.8 | 0.8 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 5.5 | 1.5 | 0.8 | 0.8 | | | |
| V _{OH} | Minimum High Level Output Voltage | 4.5 | 4.49 | 4.4 | 4.4 | V | I _{OUT} = -50 μA | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 4.5 | | 3.86 | 3.76 | V | *V _{IN} = V _{IL} or V _{IH} -24 mA I _{OH} -24 mA | |
| | | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum Low Level Output Voltage | 4.5 | 0.001 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 4.5 | | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 24 mA I _{OL} 24 mA | |
| | | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| ΔI _{CCT} | Additional Max. I _{CC} /Input | 5.5 | 0.6 | | 1.5 | mA | V _I = V _{CC} - 2.1 V | |
| I _{OZ} | Maximum 3-State Current | 5.5 | | ±0.5 | ±5.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND | |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | V _{OLD} = 1.65 V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85 V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | V _{IN} = V _{CC} or GND | |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

MC74AC258 MC74ACT258

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74ACT | | | 74ACT | | Unit | Fig. No. |
|------------------|---|-----------------------|--|-----|------|--|------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay I _n to Z _n | 5.0 | 2.0 | 6.5 | 8.5 | 1.5 | 9.5 | ns | 3-5 |
| t _{PHL} | Propagation Delay I _n to Z _n | 5.0 | 2.0 | 5.5 | 7.5 | 1.5 | 8.0 | ns | 3-5 |
| t _{PLH} | Propagation Delay S to Z _n | 5.0 | 3.0 | 7.5 | 10.5 | 2.0 | 11.5 | ns | 3-6 |
| t _{PHL} | Propagation Delay S to Z _n | 5.0 | 1.5 | 7.0 | 9.5 | 1.5 | 11.0 | ns | 3-6 |
| t _{PZH} | Output Enable Time | 5.0 | 2.0 | 6.5 | 8.5 | 1.5 | 9.5 | ns | 3-7 |
| t _{PZL} | Output Enable Time | 5.0 | 2.0 | 6.5 | 8.5 | 1.5 | 9.5 | ns | 3-8 |
| t _{PHZ} | Output Disable Time | 5.0 | 1.5 | 7.0 | 9.0 | 1.0 | 10.0 | ns | 3-7 |
| t _{PLZ} | Output Disable Time | 5.0 | 2.0 | 6.0 | 8.0 | 1.5 | 9.0 | ns | 3-8 |

* Voltage Range 5.0 V is 5.0 V ± 0.5 V.

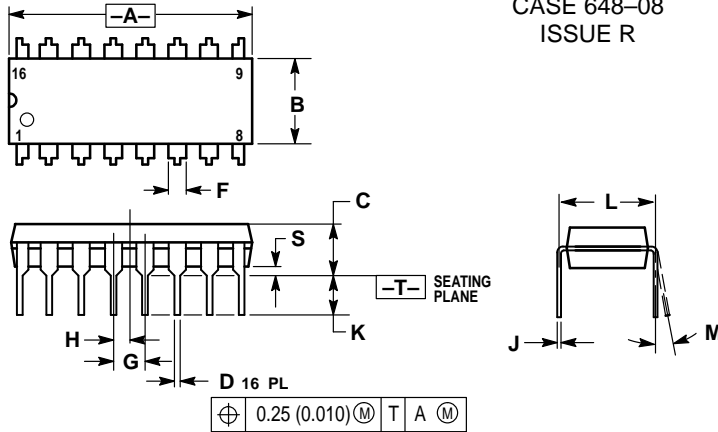
CAPACITANCE

| Symbol | Parameter | Value Typ | Unit | Test Conditions |
|-----------------|-------------------------------|--------------|------|-------------------------|
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = 5.0 V |
| CPD | Power Dissipation Capacitance | 55 | pF | V _{CC} = 5.0 V |

MC74AC258 MC74ACT258

OUTLINE DIMENSIONS

N SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R

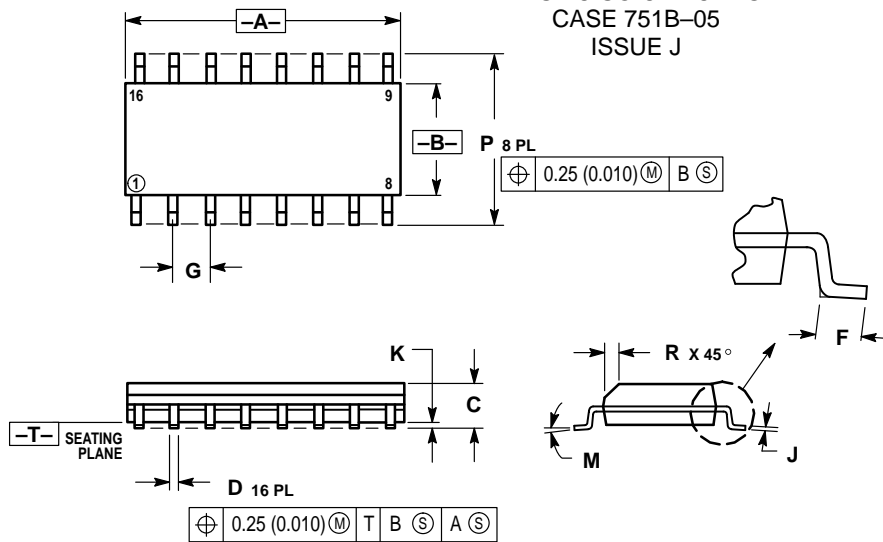


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.740 | 0.770 | 18.80 | 19.55 |
| B | 0.250 | 0.270 | 6.35 | 6.85 |
| C | 0.145 | 0.175 | 3.69 | 4.44 |
| D | 0.015 | 0.021 | 0.39 | 0.53 |
| F | 0.040 | 0.70 | 1.02 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.050 BSC | | 1.27 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.130 | 2.80 | 3.30 |
| L | 0.295 | 0.305 | 7.50 | 7.74 |
| M | 0° | 10° | 0° | 10° |
| S | 0.020 | 0.040 | 0.51 | 1.01 |


D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

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