

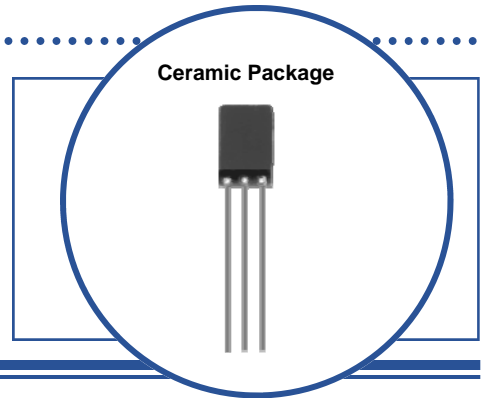
High Reliability Hallogic Hall-Effect Sensors

OMH090 OMH3019, OMH3020, OMH3040, OMH3075,
OMH3131 (B, S versions)



Features:

- Designed for non-contact switching operations
- Operates over a broad range of supply voltages
- Excellent temperature stability operates in harsh environments
- Suitable for military and space applications
- Processing patterned after class B or S of MIL-STD-883
- Through Hole 0.40" [10.16 mm] lead length minimum
- Surface Mount 0.125" [3.18 mm] lead length
- ESD Rating of Class 3B per MIL-STD-883G, M3015.7, HB model.



Description:

These Hall-effect devices contain a monolithic integrated circuit which incorporates a Hall element, a linear amplifier, a threshold amplifier, and Schmitt trigger on a single Hallogic® silicon chip. Included on-chip is a band-gap voltage regulator that allows operation with a wide range of supply voltages. These devices feature logic level output and provide up to 21 mA of sink current. This allows direct driving of more than 7 TTL loads or any standard logic family using power supplies ranging from 4.5 to 24 volts. Output amplitude is constant at switching frequencies from DC to over 200 kHz.

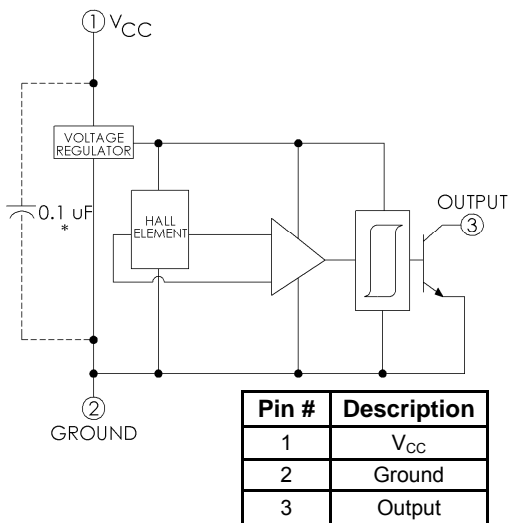
The **Uni-Polar** turns on with a (logic level "0") after a sufficient magnetic field from the south pole of a magnet approaches the symbolized face of the device (operating point) and turns off (logic level "1") after the magnetic field reaches a minimum value. The **Bi-Polar** device turns on (logic level "0") in the presence of a magnetic south pole and turns off (logic level "1") when subjected to a magnetic north pole. Both magnetic poles are necessary for operation for Bi-Polar devices. This feature makes these sensors ideal for applications in non-contact switching operations, brushless DC motors and for use with multiple pole magnets.

B and S devices are processed to OPTEK's military screening program patterned after MIL-STD-883. This product has passed Radiation Hardness testing up to 350 Krad (si) per MIL-STD-883 method 1019.6 and up to 150 Krad (si) for ELDRS.

Contact your local representative or OPTEK for more information.

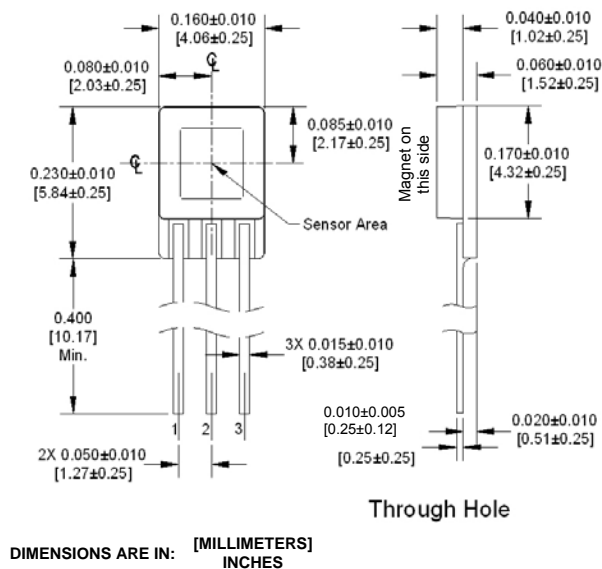
Applications:

- Non-contact switching operations
- Brushless DC motors
- Multiple pole magnets
- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor



* Add capacitor for stable operation

Lead finish = Solder Dipped (Sn 63/37)



OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| | |
|---|----------------------|
| Supply Voltage, V_{CC} | 25 V |
| Storage Temperature Range, T_S | -65°C to +150°C |
| Operating Temperature Range, T_A | -55°C to +125°C |
| Lead Soldering Temperature (1/8 in. (3.2 mm) from case for 5 seconds with soldering iron) | 260°C ⁽¹⁾ |
| Output ON Current, I_{SINK} | 25 mA |
| Output OFF Voltage, V_{OUT} | 25 V |
| Magnetic Flux Density, B | Unlimited |

Notes:

(1) Heat sink leads during hand soldering.

25°C

| Part Number | Hi-Reliability Hallogic® Sensor | Operate Point Gauss Min / Typ / Max | Release Point Gauss Min / Typ / Max | Hysteresis Gauss Min / Typ / Max | V_{CC} (Volts) Min / Max | Package |
|-------------|---------------------------------|--|--|-------------------------------------|-------------------------------|--------------|
| OMH090B | Uni-Polar Non-Latching | 70/90/200 | 30 / 65 / 180 | 10 / 30 / 60 | 4.5 / 24.0 | Through Hole |
| OMH090S | | | | | | |
| OMH3019B | | 175 / 300 / 500 | 125 / 235 / 420 | 30 / 100 / 155 | | |
| OMH3019S | | | | | | |
| OMH3020B | | 70 / 220 / 350 | 50 / 180 / 330 | 15 / 55 / 200 | | |
| OMH3020S | | | | | | |
| OMH3040B | | 70 / 150 / 200 | 50 / 115 / 180 | 10 / 35 / 60 | | |
| OMH3040S | | | | | | |
| OMH3131B | | 20 / 60 / 95 | 10 / 45 / 85 | 5 / 15 / 40 | | |
| OMH3131S | | | | | | |
| OMH3075B | Bi-Polar Latching | 50 / 150 / 250 | -250 / -150 / -50 | 100 / 250 / 500 | | |
| OMH3075S | | | | | | |

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OMH3131 (B, S versions)



Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH090, OMH090B, OMH090S Uni-Polar

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|----------------|----------------|-------------------|---------------|--|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 45 70 20 | - 90 - | 210 200 180 | Gauss | -55°C +25°C +125°C |
| B_{RP} | Magnetic Release Point | 30 25 | 65 - | 180 170 | Gauss | -55°C & +25°C +125°C |
| B_H | Magnetic Hysteresis | 5 10 | - 30 | 95 60 | Gauss | -55°C +25°C & +125°C |
| I_{CC} | Supply Current | - - - | - 5 - | 9 11 5 | mA | -55°C, $V_{CC} = 24\text{ V}$, Output On, $B \leq 250\text{ Gauss}$ +25° +125°C |
| V_{OL} | Output Saturation Voltage | - - | - 125 | 300 400 | mV | -55°C, $V_{CC} = 4.5\text{ V}$, $I_{OL} = 30\text{ mA}$, $B \geq 250\text{ Gauss}$ +25°C & +125°C |
| I_{OH} | Output Leakage Current | - - - | - 0.50 - | 10 11 12 | μA | -55°C, $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 250\text{ Gauss}$ +25° +125°C |
| t_r | Output Rise Time | - | 0.13 | 1.00 | μs | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 14\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.14 | 1.00 | μs | |

Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH3019, OMH3019B, OMH3019S Uni-Polar

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|------------|----------|------------|---------------|--|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 175 - | 300 - | 500 575 | Gauss | +25°C -55°C & +125°C |
| B_{RP} | Magnetic Release Point | 125 100 | 235 - | 420 - | Gauss | +25°C -55°C & +125°C |
| B_H | Magnetic Hysteresis | 30 20 | 100 - | 155 - | Gauss | +25°C -55°C to +125°C |
| I_{CC} | Supply Current | - | 5 | 9 | mA | $V_{CC} = 24\text{ V}$, Output On, $B \leq 50\text{ Gauss}$ |
| V_{OL} | Output Saturation Voltage | - | 125 | 300 | mV | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 15\text{ mA}$, $B \geq 500\text{ Gauss}$ |
| I_{OH} | Output Leakage Current | - | 0.10 | 1.0 | μA | $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B < 50\text{ Gauss}$ |
| t_r | Output Rise Time | - | 0.13 | 1 | μs | $R_L = 460\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 12\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.14 | 1 | μs | |

Notes:

(1) South pole facing symbolized surface.

OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH3020, OMH3020B, OMH3020S Uni-Polar

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|----------|----------|------------|-------|--|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 70 - | 220 - | 350 425 | Gauss | +25°C -55°C & +125°C |
| B_{RP} | Magnetic Release Point | 50 25 | 180 - | 330 - | Gauss | +25°C -55°C & +125°C |
| B_H | Magnetic Hysteresis | 15 10 | 55 - | 200 - | Gauss | +25°C -55°C & +125°C |
| I_{CC} | Supply Current | - | 4 | 7 | mA | $V_{CC} = 24\text{ V}$, Output On, $B \leq 50\text{ Gauss}$ |
| V_{OL} | Output Saturation Voltage | - | 100 | 400 | mV | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 15\text{ mA}$, $B \geq 350\text{ Gauss}$ |
| I_{OH} | Output Leakage Current | - | 0.10 | 10 | μA | $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 50\text{ Gauss}$ |
| t_r | Output Rise Time | - | 0.21 | 1 | μs | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 12\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.10 | 1 | μs | |

Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH3040, OMH3040B, OMH3040S Uni-Polar

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|-------------|----------------|----------------|-------|--|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 70 75 | 150 - | 200 270 | Gauss | +25°C -55°C & +125°C |
| B_{RP} | Magnetic Release Point | 50 25 | 115 - | 180 210 | Gauss | +25°C -55°C & +125°C |
| B_H | Magnetic Hysteresis | 10 20 | 35 - | 60 - | Gauss | +25°C -55°C & +125°C |
| I_{CC} | Supply Current | - - | 4 - | 7 8 10 | mA | +25°C, $V_{CC} = 24\text{ V}$, Output On, $B \geq 300\text{ Gauss}$ +125°C -55°C |
| V_{OL} | Output Saturation Voltage | - | 100 | 400 | mV | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 20\text{ mA}$, $B \geq 250\text{ Gauss}$ |
| I_{OH} | Output Leakage Current | - - - | - 0.10 - | 11 10 12 | μA | -55°C, $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 75\text{ Gauss}$ +25°C, $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 100\text{ Gauss}$ +125°C, $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 75\text{ G}$ |
| t_r | Output Rise Time | - | 0.21 | 1 | μs | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 12\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.10 | 1 | μs | |

Notes:

- (1) South pole facing symbolized surface.

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Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH3075, OMH3075B, OMH3075S Bi-Polar Latching

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|--------------|---------------|-------------------|-------|---|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 50 25 | 150 - | 250 275 | Gauss | +25°C -55°C & +125°C |
| B_{RP} | Magnetic Release Point | -250 -275 | -150 - | -50 -25 | Gauss | +25°C -55°C & +125°C |
| B_H | Magnetic Hysteresis | 100 50 | 250 - | 500 - | Gauss | +25°C -55°C & +125°C |
| I_{CC} | Supply Current | - - | 4 - | 7 8 | mA | +25°C, $V_{CC} = 24\text{ V}$, Output On, $B \leq 250\text{ Gauss}$ -55°C & +125°C |
| V_{OL} | Output Saturation Voltage | - - - | - 100 - | 500 400 400 | mV | -55°C +25°C, $V_{CC} = 4.5\text{ V}$, $I_{OL} = 20\text{ mA}$, $B \geq 250\text{ Gauss}$ +125°C |
| I_{OH} | Output Leakage Current | - | 0.10 | 1.0 | μA | $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 250\text{ Gauss}$ |
| t_r | Output Rise Time | - | 0.21 | 1 | μs | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 12\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.10 | 1 | μs | |

Electrical Characteristics ($V_{CC} = 4.5\text{ V to }24\text{ V}$, $T_A = 25^\circ\text{ C}$ unless otherwise noted)
OMH3131, OMH3131B & OMS3131S Uni-Polar

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|----------|---------------------------------------|----------|---------|-----------|-------|--|
| B_{OP} | Magnetic Operate Point ⁽¹⁾ | 20 10 | 60 - | 95 150 | Gauss | +25°C -55°C to +125°C |
| B_{RP} | Magnetic Release Point | 10 5 | 45 - | 85 145 | Gauss | +25°C -55°C to +125°C |
| B_H | Magnetic Hysteresis | 5 5 | 15 - | 40 145 | Gauss | +25°C -55°C to +125°C |
| I_{CC} | Supply Current | - | 4 | 7 | mA | $V_{CC} = 24\text{ V}$, Output On, $B > 250\text{ Gauss}$ |
| V_{OL} | Output Saturation Voltage | - | 100 | 400 | mV | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 15\text{ mA}$, $B \geq 250\text{ Gauss}$ |
| I_{OH} | Output Leakage Current | - | 0.10 | 10 | μA | $V_{CC} = 24\text{ V}$, $V_{OUT} = 24\text{ V}$, $B \leq 0\text{ Gauss}$ |
| t_r | Output Rise Time | - | 0.21 | 1 | μs | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$, $V_{CC} = 12\text{ V}$ (guaranteed not tested) |
| t_f | Output Fall Time | - | 0.10 | 1 | μs | |

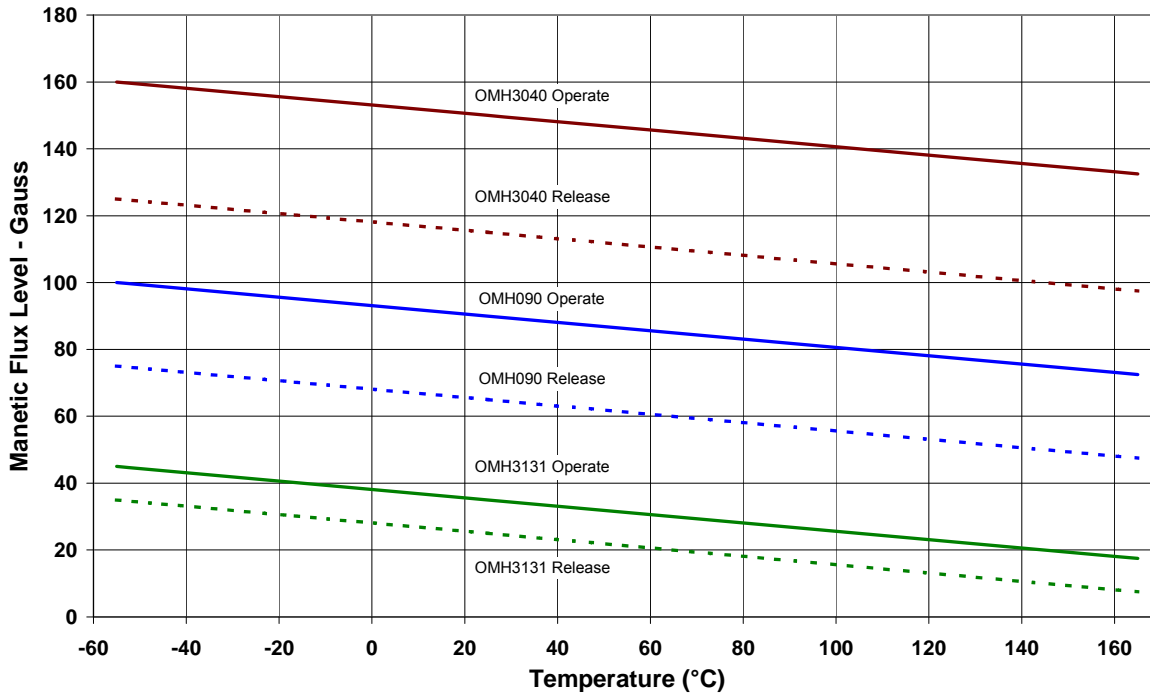
Notes:

(1) South pole facing symbolized surface.

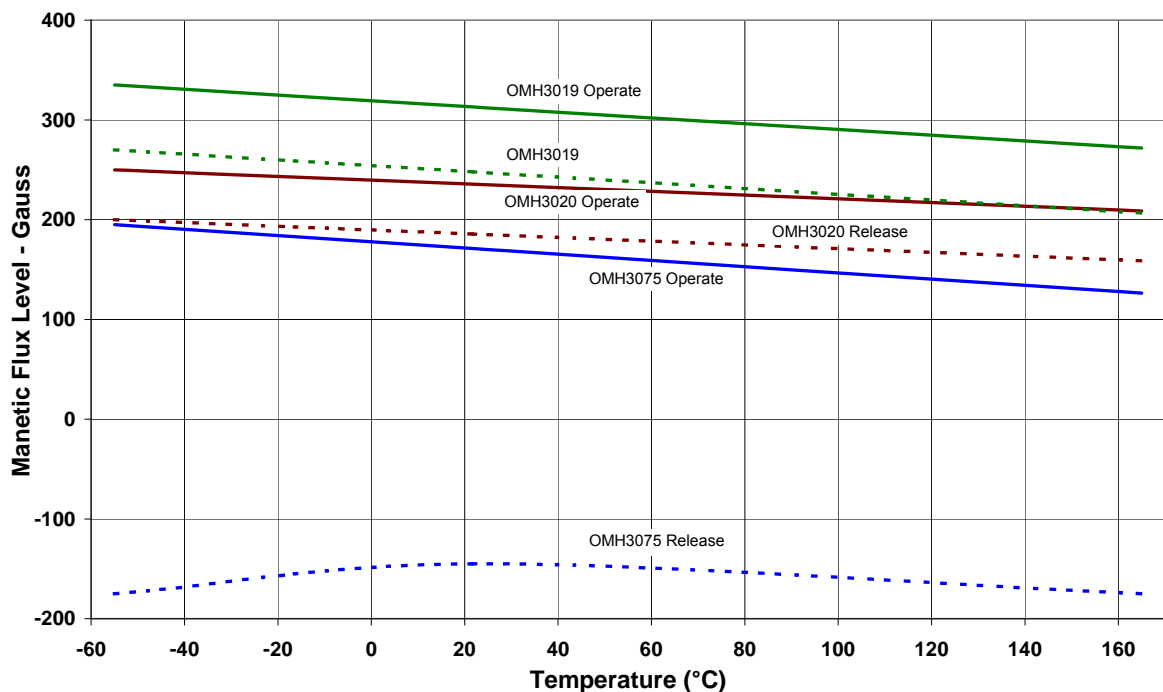
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OMH090, OMH3019, OMH3020, OMH3040, OMH3075, OMH3131 (B, S)

Magnetic Operate & Release Points vs Temperature

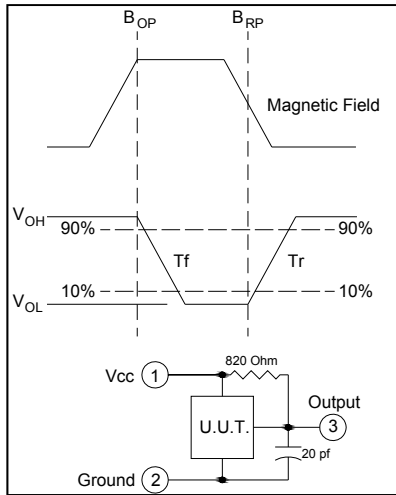


Magnetic Operate & Release Points vs Temperature

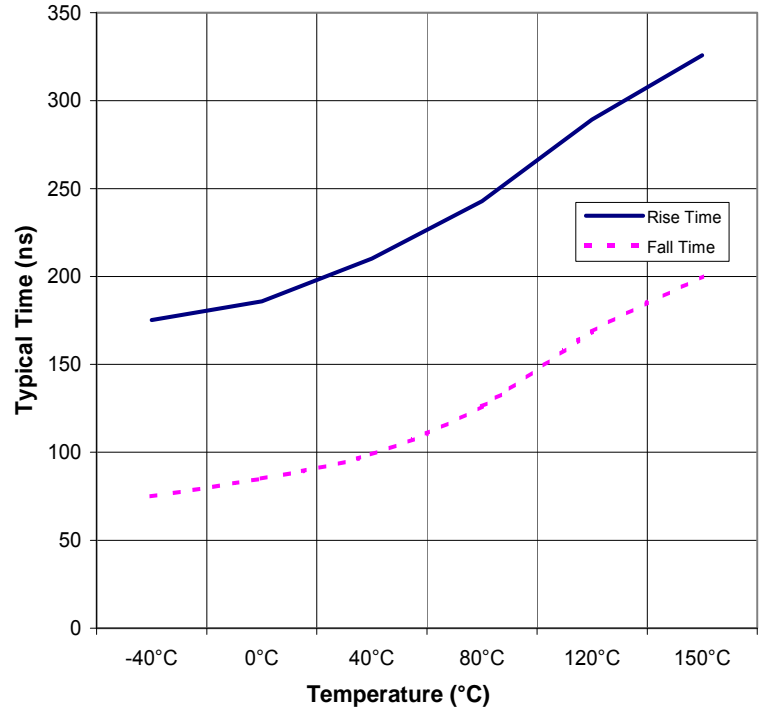


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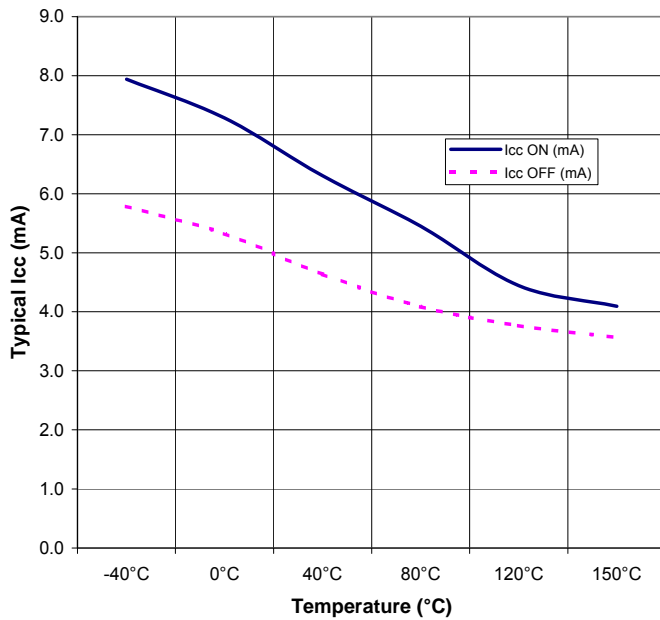
OMH090, OMH3019, OMH3020, OMH3040, OMH3075, OMH3131 (B, S)



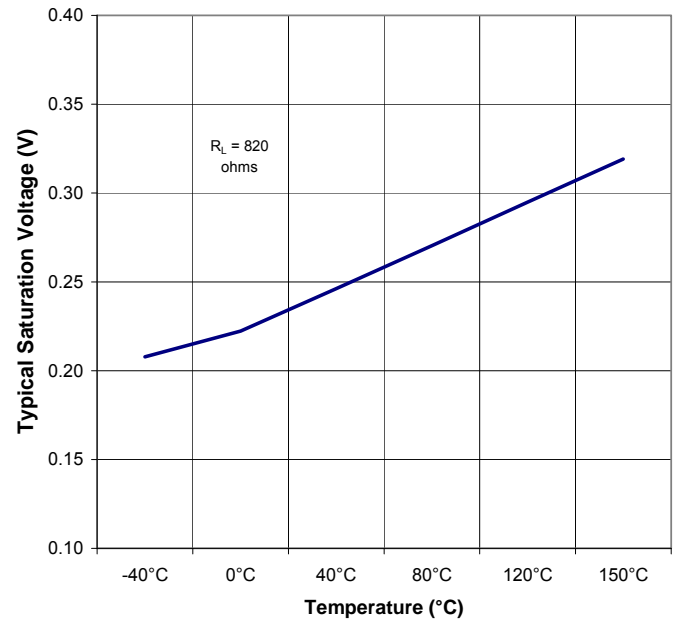
Rise and Fall Time vs Temperature



I_{CC} vs Temperature



Saturation Voltage vs Temperature



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