



# THE DATASHEET OF OMH3020B



# High Reliability Hallogtic® Hall-Effect Sensors



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



Ceramic Package

## 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
- 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 Hallogtic® 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.

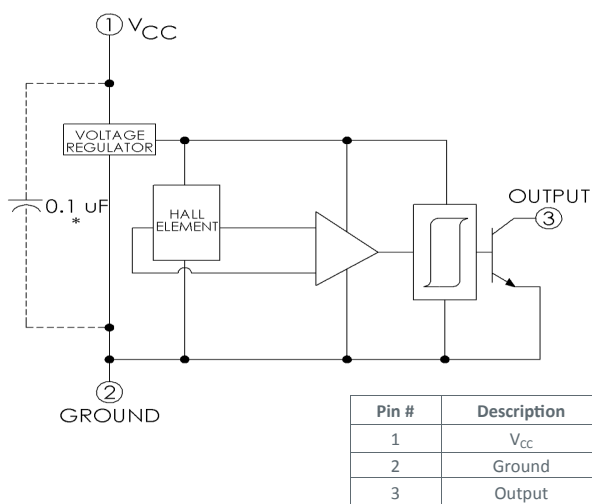
The **Uni-Polar** turns on with a (logic level "0") after a sufficient magnetic field from the south pole of a magnet approaches the symbolized face of the device (operating point) and turns off (logic level "1") after the magnetic field reaches a minimum value. The **Bi-Polar** device turns on (logic 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.

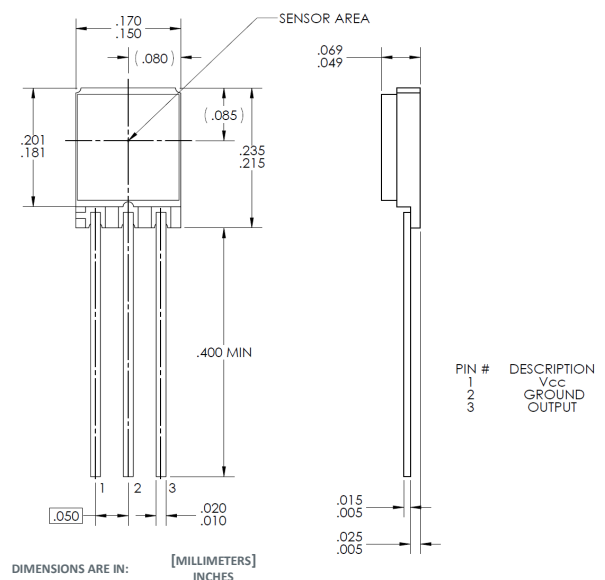
## Applications:

- Non-contact switching operations
- Brushless DC motors
- Multiple pole magnets



\* Add capacitor for stable operation

Lead finish = Solder Dipped (Sn 63/37)



## General Note

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OMH3075, OMH3131 (B, S versions)

## 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 +150°C
Lead Soldering Temperature (1/8 in. (3.2 mm) from case for 5 seconds with soldering iron)	260°C <sup>(1)</sup>
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.

Part Number	Hi-Reliability Halloglic® 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	50/90/180	30 / 65 / 160	10 / 30 / 60	4.5 / 24.0	Through Hole
OMH090S						
OMH3019B						
OMH3019S		175 / 300 / 500	125 / 235 / 420	30 / 100 / 155		
OMH3020B		70 / 220 / 350	50 / 180 / 330	15 / 55 / 200		
OMH3020S						
OMH3040B		70 / 150 / 200	50 / 115 / 180	10 / 35 / 60		
OMH3040S						
OMH3131B						
OMH3131S		20 / 60 / 95	10 / 45 / 85	5 / 15 / 40		
OMH3075B	Bi-Polar Latching	50 / 150 / 250	-250 / -150 / -50	100 / 250 / 500		
OMH3075S						

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OMH3075, 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 <sup>(1)</sup>	45 50 20	- 90 -	210 180 180	Gauss	-55°C +25°C +125°C
$B_{RP}$	Magnetic Release Point	25 30 25	- 65 -	150 160 140	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, $B \geq 250\text{ Gauss}$ +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 <sup>(1)</sup>	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.

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OMH090, OMH3019, OMH3020, OMH3040,  
OMH3075, 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)

### OMH3020, OMH3020B, OMH3020S Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$B_{OP}$	Magnetic Operate Point <sup>(1)</sup>	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	$\mu\text{A}$	$V_{CC} = 24\text{ V}$ , $V_{OUT} = 24\text{ V}$ , $B \leq 50\text{ Gauss}$
$t_r$	Output Rise Time	-	0.21	1	$\mu\text{s}$	$R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$ , $V_{CC} = 12\text{ V}$ (guaranteed not tested)
$t_f$	Output Fall Time	-	0.10	1	$\mu\text{s}$	

## 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 <sup>(1)</sup>	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 -	8 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	$\mu\text{A}$	-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	$\mu\text{s}$	$R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$ , $V_{CC} = 12\text{ V}$ (guaranteed not tested)
Notes: $t_f$	Output Fall Time	-	0.10	1	$\mu\text{s}$	

(1) South pole facing symbolized surface.

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OMH090, OMH3019, OMH3020, OMH3040,  
OMH3075, 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) OMH3075, OMH3075B, OMH3075S Bi-Polar Latching

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$B_{OP}$	Magnetic Operate Point <sup>(1)</sup>	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 -	8 8 10	mA	+25°C, $V_{CC} = 24\text{ V}$ , (Output On), $B \geq -250\text{ Gauss}$ +125°C -55°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 & OMH3131S Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$B_{OP}$	Magnetic Operate Point <sup>(1)</sup>	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:

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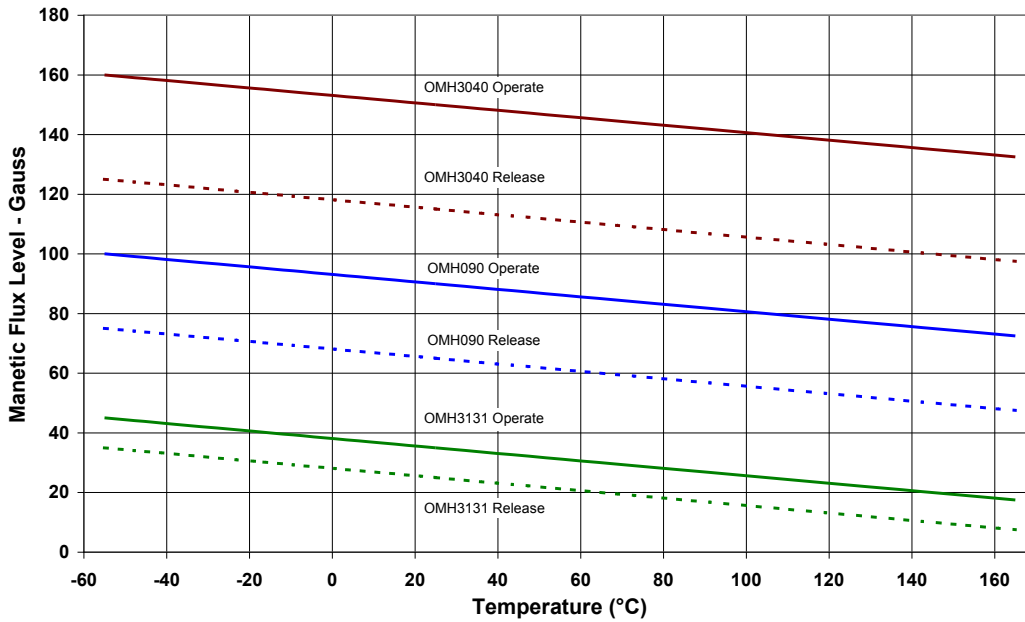
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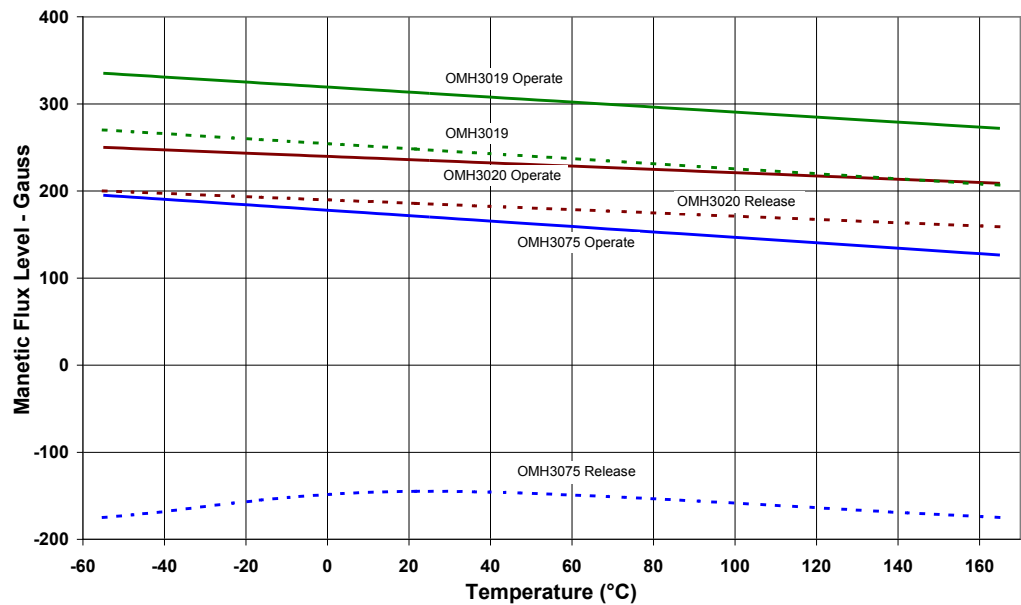
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OMH3075, OMH3131 (B, S versions)

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

**Magnetic Operate & Release Points vs Temperature**



**Magnetic Operate & Release Points vs Temperature**



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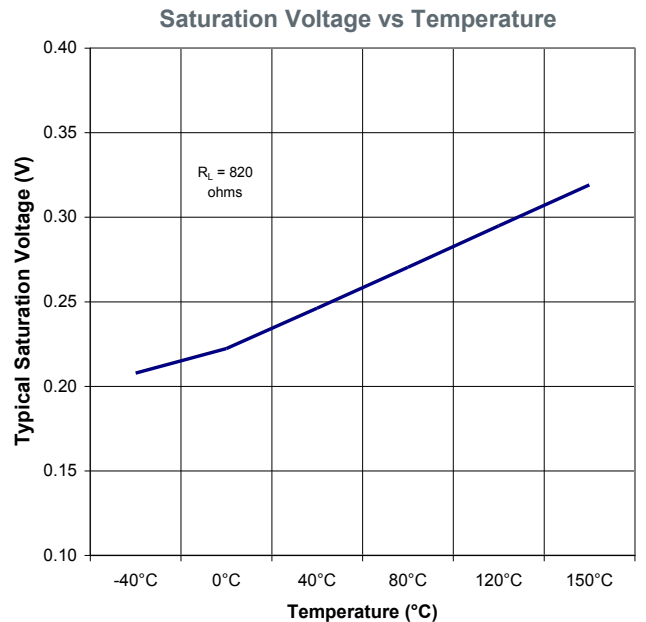
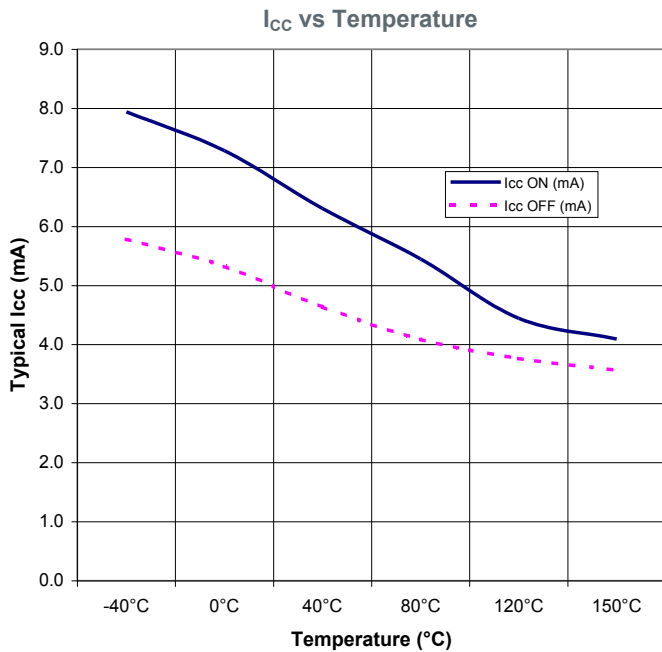
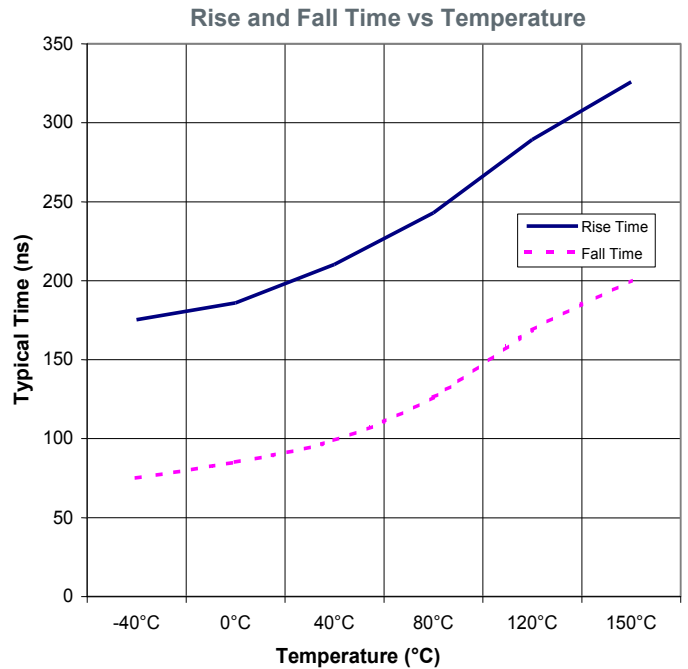
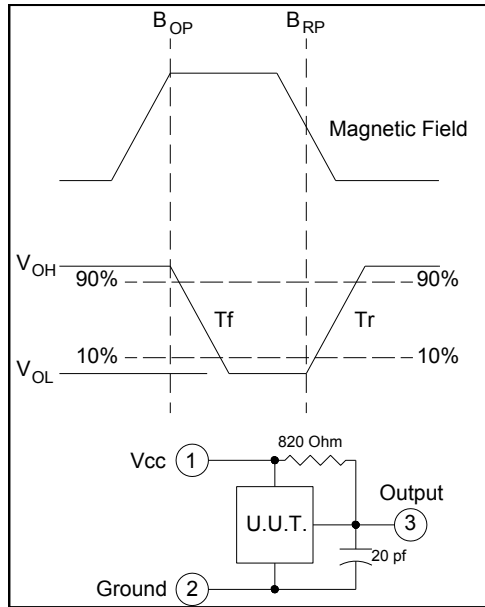
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Issue	Change Description	Approval	Date
A	Initial Release		02/05
A.1	Put into new template. Required changes on all pages. Added new .jpg logo. Updated data and graphs		08/18/06
B	Updated graphs and Typical Op and Rel points for OMH3075	Sergio DeLaGarza	03/09/07
B.1	Added sentence to Description last paragraph on front page	Sergio DeLaGarza	06/06/07
C	Added SMD versions	Sergio DeLaGarza	05/21/08
C.1	Added Lead finish = Solder Dipped (Sn 63/37), added Rad Hard testing on page 1	Sergio DeLaGarza	07/31/08
C.2	Delete both SMD illustrations from cover page. Delete all –SM part numbers from table on page 2.	Sergio DeLaGarza	2/18/09
C.3	Change test conditions for tests $I_{CC}$ & $I_{OH}$ .	Sergio DeLaGarza	5/28/10
C.4	Change 100 Krad to 150 Krad. Update dimensions on through hole illustration.	Sergio DeLaGarza	6/3/10
D	Add 10 to Max for Supply Current at –55°C	Sergio DeLaGarza	9/20/10
E	Update schematic on page 1 and add “Add capacitor...” note.	Sergio DeLaGarza	11/9/10
F	Add ESD rating bullet to first page. Update limits for OMH090B,S, OMH3019B, S, OMH3020B, S & OMH3040B & S. Update the BH, BOP and BRP limits in the Electrical Characteristics charts.	Sergio DeLaGarza	12/22/10
G	Change 300 to 250 under Magnetic Hysteresis. Change - to 15 under TYP for BH on the Electrical Characteristics table for OMH3131, OMH3131B etc.	Sergio DeLaGarza	1/7/11
H	Move OMH3131B & S to the Uni-Polar section on the Part Number chart on page 2	Sergio DeLaGarza	11/8/11
I	Update package outline on page 1, $I_{CC}$ electrical test condition for OMH3075 & 3040	Sergio DeLaGarza	8/4/14
J	Delete the surface mount.....lead length feature from page 1.	Sergio DeLaGarza	11/2/15
K	Updated Supply Current Test Conditions pg 5—changed Output On, $B \leq 250$ to Output Off, $B \leq -250$ . And, Output Leakage Current from $B \leq 250$ to $B \leq -250$	Mark Miller	05/17/16
K-1	Pg 2 changed Operate Point Gauss for OMH090B from 70/90/200 to 50/90/180; pg 3 changed $B_{OP}$ Min from 45, 70, 20 to 45, 50, 20 and Max from 210, 200, 180 to 210, 180, 180; pg 3 changed BRP Min from 30, 25 to 25, 30, 25 and Max from 180, 170 to 150, 180, 1400 and Test conditions changed “-55°C ^ + 25°C” to “-55°C”; pg 3 changed ICC Test conditions “+55°C, $V_{CC} = 24$ V, Output On, $B \leq 250$ Gauss” to “-55°C, $V_{CC} = 24$ V, Output On, $B \geq 250$ Gauss”; pg 5 changed ICC Test conditions from “+25°C, $V_{CC} = 24$ V, (Output Off), $B \leq -250$ Gauss” to “+25°C, $V_{CC} = 24$ V, (Output On), $B \geq -250$ Gauss”	Rodney Bailey	08/17/16

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