

# Hallogic Hall-effect Sensors

OH090U, OH180U, OH360U

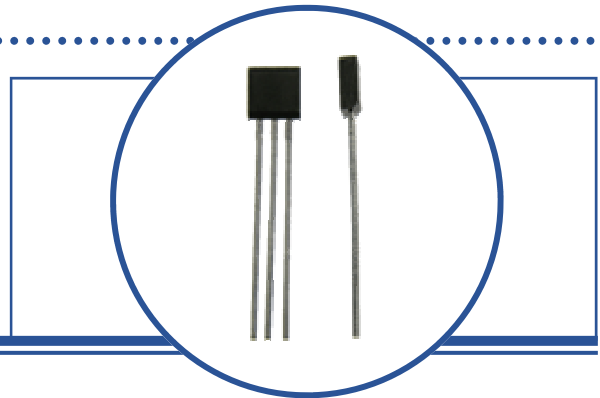
OHN3000 Series, OHS3000 Series

OHN3100 Series, OHS3100 Series



## Features:

- Designed for non-contact switching operations
- Operates over broad range of supply voltages (4.5 V to 24 V)
- Operates with excellent temperature stability in harsh environments
- Drive capability up to 7 TTL loads



## 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 to allow operation with a wide range of supply voltages. The 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.

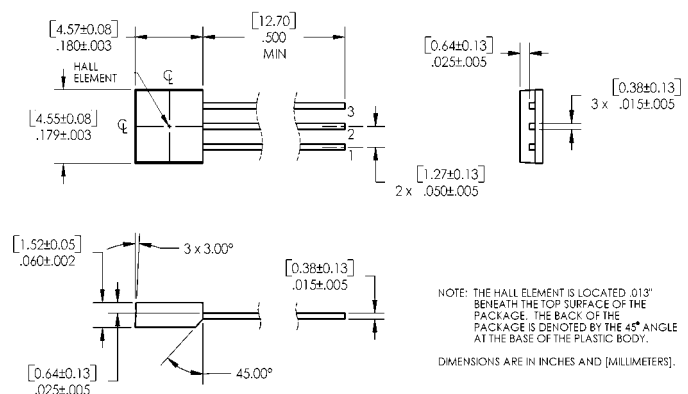
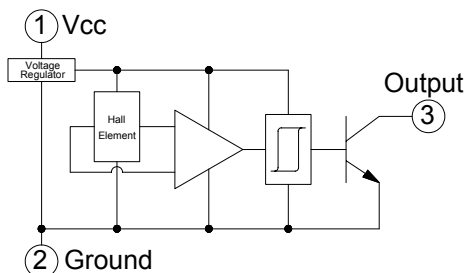
The Uni-Polar turns on with a (logic level "0") with after a sufficient magnetic field from the south pole of a magnet approached the symbolized face of the device (Operating Point) and turns off (logic level "1") after the magnetic field reached a minimum value. The Bi-Polar latch device turns on (logic level "0") in the presence of a magnetic south pole and turn 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.

## Applications:

- Non-Contact Reflective Object Sensor
- Assembly Line Automation
- Machine Automation
- Machine Safety
- End of Travel Sensor
- Door Sensor

Ordering Information	
OH090U, OH180U, OH360U OH3013U, OH3113U OHN3019U, OHS3019U, OHN3119U, OHS3119U OHN3020U, OHS3020U, OHN3120U, OHS3120U OHN3030U, OHS3030U, OHN3130U, OHS3130U OHN3131U, OHS3131U OHN3040U, OHS3040U, OHN3140U, OHS3140U	Unipolar
OH3075U, OHS3075U, OHN3175U, OHS3175U OHN3177U, OHS3177U	Bi-Polar Latch

Pin #	Transistor
1	V <sub>CC</sub>
2	Ground
3	Output



RoHS

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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 +160°C
Operating Temperature Range, $T_A$	OHN30__U OHS30__U OH090/180/360U	-20°C to +85°C -40°C to +125°C -40°C to +150°C
Lead Soldering Temperature (1/8 in. (3.2 mm) from case for 5 sec. 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

## Electrical Characteristics ( $V_{CC} = 4.5\text{ V}$ to $24\text{ V}$ , $T_A = 25^\circ\text{C}$ unless otherwise noted)

### OH090U Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$B_{OP}$	Magnetic Operate Point <sup>(1)</sup>	0	90	180	Gauss	
$B_{RP}$	Magnetic Release Point	-100	65	100	Gauss	
$B_H$	Magnetic Hysteresis	10	25	100	Gauss	
$I_{CC}$	Supply Current	-	6	9	mA	$V_{CC} = 24\text{ V}$ , Output Off
$V_{OL}$	Output Saturation Voltage	-	100	300	mV	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 20\text{ mA}$ , $B \geq 180\text{ Gauss}$
$I_{OH}$	Output Leakage Current	-	0.5	10.0	$\mu\text{A}$	$V_{CC} = 24\text{ V}$ , $V_{OUT} = 24\text{ V}$ , $B \leq -100\text{ Gauss}$
$t_r$	Output Rise Time	-	0.21	1.00	$\mu\text{s}$	$R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$ , $V_{CC} = 14\text{ V}$
$t_f$	Output Fall Time	-	0.10	1.00	$\mu\text{s}$	

### OH180U Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$B_{OP}$	Magnetic Operate Point <sup>(1)</sup>	70	180	290	Gauss	
$B_{RP}$	Magnetic Release Point	0	140	230	Gauss	
$B_H$	Magnetic Hysteresis	20	40	120	Gauss	
$I_{CC}$	Supply Current	-	6	9	mA	$V_{CC} = 24\text{ V}$ , Output Off
$V_{OL}$	Output Saturation Voltage	-	100	300	mV	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 20\text{ mA}$ , $B \geq 290\text{ Gauss}$
$I_{OH}$	Output Leakage Current	-	0.5	10.0	$\mu\text{A}$	$V_{CC} = 24\text{ V}$ , $V_{OUT} = 24\text{ V}$ , $B \leq 0\text{ Gauss}$
$t_r$	Output Rise Time	-	0.21	1.00	$\mu\text{s}$	$R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$ , $V_{CC} = 14\text{ V}$
$t_f$	Output Fall Time	-	0.10	1.00	$\mu\text{s}$	

Notes:

(1) South pole facing symbolized surface.

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OH090U, OH180U, OH360U

OHN3000 Series, OHS3000 Series

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## Electrical Characteristics (V<sub>CC</sub> = 4.5 V to 24 V, T<sub>A</sub> = 25° C unless otherwise noted)

### OH360U Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	235	300	465	Gauss	
B <sub>RP</sub>	Magnetic Release Point	120	235	325	Gauss	
B <sub>H</sub>	Magnetic Hysteresis	30	65	200	Gauss	
I <sub>CC</sub>	Supply Current	-	6	9	mA	V <sub>CC</sub> = 24 V, Output Off
V <sub>OL</sub>	Output Saturation Voltage	-	100	300	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 465 Gauss
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 120 Gauss
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 14 V
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs	

### OHN3013U, OHN3113U Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OHN3013 -	300 -	450 510	Gauss	+25°C -20°C TO 85°C
B <sub>RP</sub>	Magnetic Release Point	OHN3013 30 20	235 -	- -	Gauss	+25°C -20°C TO 85°C
B <sub>H</sub>	Magnetic Hysteresis	OHN3013 20 10	65 -	- -	Gauss	+25°C -20°C TO 85°C
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ 25 Gauss
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 450 Gauss
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 25 Gauss
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs	

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## Electrical Characteristics (V<sub>CC</sub> = 4.5 V to 24 V, T<sub>A</sub> = 25° C unless otherwise noted)

### OHN3019U, OHS3019U, OHN3119U, OHS3119U Uni-Polar

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3019	175	300	500	Gauss	+25°C
		OHN3119	100	-	545		-20°C to +85°C
		OHS3119	45	-	575		-40°C to +125°C
B <sub>RP</sub>	Magnetic Release Point	OH_3019	125	235	450	Gauss	+25°C
		OHN3119	50	-	495		-20°C to +85°C
		OHS3119	25	-	555		-40°C to +125°C
B <sub>H</sub>	Magnetic Hysteresis	OH_3019	50	65	-	Gauss	+25°C
		OHN3119	50	-	-		-20°C to +85°C
		OHS3119	20	-	-		-40°C to +125°C
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ 125 Gauss	
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 500 Gauss	
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 100 Gauss	
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V	
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs		

### OHN3020U, OHS3020U, OHN3120U, OHS3120U Uni-Polar

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3020	70	230	350	Gauss	+25°C
		OHN3120	70	-	425		-20°C to +85°C
		OHS3120	35	-	450		-40°C to +125°C
B <sub>RP</sub>	Magnetic Release Point	OH_3020	50	180	330	Gauss	+25°C
		OHN3120	50	-	405		-20°C to +85°C
		OHS3120	25	-	430		-40°C to +125°C
B <sub>H</sub>	Magnetic Hysteresis	OH_3020	20	50	-	Gauss	+25°C
		OHN3120	20	-	-		-20°C to +85°C
		OHS3120	20	-	-		-40°C to +125°C
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ 50 Gauss	
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 350 Gauss	
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 50 Gauss	
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V	
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs		

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OHN3000 Series, OHS3000 Series

OHN3100 Series, OHS3100 Series



## Electrical Characteristics (V<sub>CC</sub> = 4.5 V to 24 V, T<sub>A</sub> = 25° C unless otherwise noted)

### OHN3030U, OHS3030U, OHN3130U & OHS3130U Uni-Polar

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3030	-	205	250	Gauss	+25°C
		OH_3130	-	-	150		+25°C
		OHN3130	-	-	175		-20°C to +85°C
		OHS3130	-	-	200		-40°C to +125°C
B <sub>RP</sub>	Magnetic Release Point	OH_3030	0	160	-	Gauss	+25°C
		OH_3130	-150	-	-		+25°C
		OHN3130	-175	-	-		-20°C to +85°C
		OHS3130	-200	-	-		-40°C to +125°C
B <sub>H</sub>	Magnetic Hysteresis	OH_3030	20	45	-	Gauss	+25°C
		OH_3130	20	-	-		+25°C
		OHN3130	20	-	-		-20°C to +85°C
		OHS3130	20	-	-		-40°C to +125°C
I <sub>CC</sub>	Supply Current		-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ 0 Gauss
V <sub>OL</sub>	Output Saturation Voltage		-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 200 Gauss
I <sub>OH</sub>	Output Leakage Current		-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 50 Gauss
t <sub>r</sub>	Output Rise Time		-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time		-	0.10	1.00	μs	

### OHN3131U & OHS3131U Uni-Polar

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3131	-75	-	95	Gauss	+25°C
		OHN3131	-75	-	95		-20°C to +85°C
		OHS3131	-75	-	135		-40°C to +125°C
B <sub>RP</sub>	Magnetic Release Point	OH_3031	-95	-	85	Gauss	+25°C
		OHN3131	-59	-	85		-20°C to +85°C
		OHS3131	-135	-	125		-40°C to +125°C
B <sub>H</sub>	Magnetic Hysteresis	OH_3031	10	-	-	Gauss	+25°C
		OHN3131	10	-	-		-20°C to +85°C
		OHS3131	10	-	-		-40°C to +125°C
I <sub>CC</sub>	Supply Current		-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ 0 Gauss
V <sub>OL</sub>	Output Saturation Voltage		-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 200 Gauss
I <sub>OH</sub>	Output Leakage Current		-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ 50 Gauss
t <sub>r</sub>	Output Rise Time		-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time		-	0.10	1.00	μs	

Notes:

(1) South pole facing symbolized surface.

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OH090U, OH180U, OH360U

OHN3000 Series, OHS3000 Series

OHN3100 Series, OHS3100 Series



## Electrical Characteristics (V<sub>CC</sub> = 4.5 V to 24 V, T<sub>A</sub> = 25° C unless otherwise noted)

### OHN3040U, OHS3040U, OHN3140U, OHS3140U Uni-Polar

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3040	70	150	220	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3140	45	-	260	
		OHS3140	45	-	270	
B <sub>RP</sub>	Magnetic Release Point	OH_3040	50	115	180	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3140	25	-	240	
		OHS3140	25	-	250	
B <sub>H</sub>	Magnetic Hysteresis	OH_3040	20	35	-	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3140	20	-	-	
		OHS3140	20	-	-	
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ -50 Gauss
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 200 Gauss
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ -50 Gauss
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs	

### OHN3075U, OHS3075U, OHN3175U, OHS3175U Bi-Polar Latch

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3075	50	100	250	Gauss +25°C +25°C -20°C to +85°C -40°C to +125°C
		OH_3175	25	-	170	
		OHN3175	15	-	180	
		OHS3175	10	-	260	
B <sub>RP</sub>	Magnetic Release Point	OH_3075	-250	-100	-50	Gauss +25°C +25°C -20°C to +85°C -40°C to +125°C
		OH_3175	-170	-	-25	
		OHN3175	-180	-	-15	
		OHS3175	-260	-	-10	
B <sub>H</sub>	Magnetic Hysteresis	OH_3075	100	200	500	Gauss +25°C +25°C -20°C to +85°C -40°C to +125°C
		OH_3175	100	-	-	
		OHN3175	80	-	-	
		OHS3175	50	-	-	
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ -250 Gauss
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 250 Gauss
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ -250 Gauss
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs	

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## Electrical Characteristics (V<sub>CC</sub> = 4.5 V to 24 V, T<sub>A</sub> = 25° C unless otherwise noted)

### OHN3177U, OHS3177U Bi-Polar Latch

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
B <sub>OP</sub>	Magnetic Operate Point <sup>(1)</sup>	OH_3177	50	-	150	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3177	25	-	150	
		OHS3177	25	-	200	
B <sub>RP</sub>	Magnetic Release Point	OH_3177	-150	-	-50	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3177	-150	-	-25	
		OHS3177	-200	-	-25	
B <sub>H</sub>	Magnetic Hysteresis	OH_3177	100	-	-	Gauss +25°C -20°C to +85°C -40°C to +125°C
		OHN3177	50	-	-	
		OHS3177	50	-	-	
I <sub>CC</sub>	Supply Current	-	4	7	mA	V <sub>CC</sub> = 24 V, Output Off, B ≤ -250 Gauss
V <sub>OL</sub>	Output Saturation Voltage	-	100	400	mV	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, B ≥ 250 Gauss
I <sub>OH</sub>	Output Leakage Current	-	0.1	10.0	μA	V <sub>CC</sub> = 24 V, V <sub>OUT</sub> = 24 V, B ≤ -250 Gauss
t <sub>r</sub>	Output Rise Time	-	0.21	1.00	μs	R <sub>L</sub> = 820 Ω, C <sub>L</sub> = 20 pF, V <sub>CC</sub> = 12 V
t <sub>f</sub>	Output Fall Time	-	0.10	1.00	μs	

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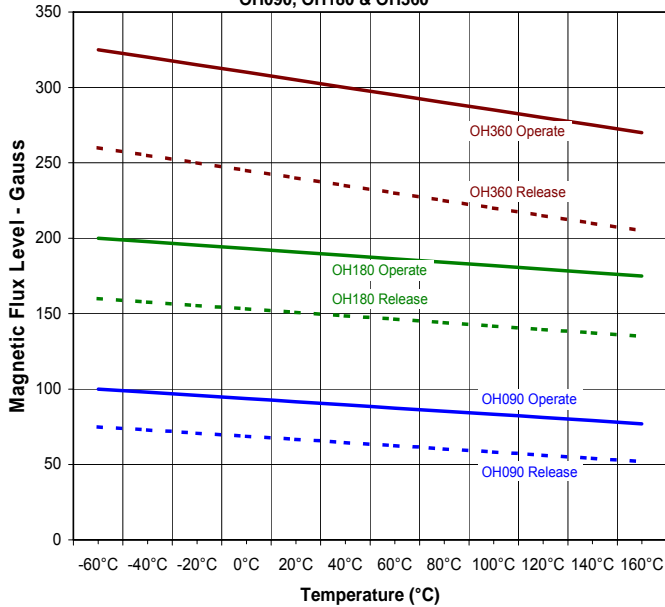
OHN3100 Series, OHS3100 Series



## Typical Operate & Release Points

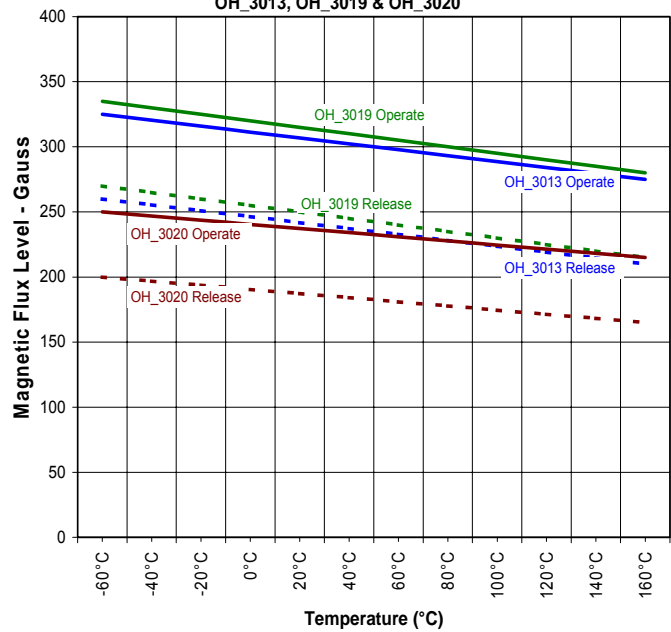
Magnetic Operate & Release Points vs Temperature

OH090, OH180 & OH360



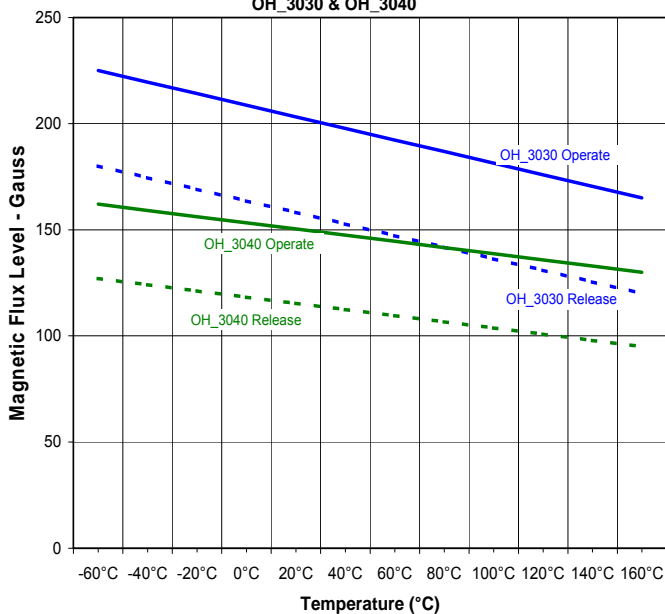
Magnetic Operate & Release Points vs Temperature

OH\_3013, OH\_3019 & OH\_3020



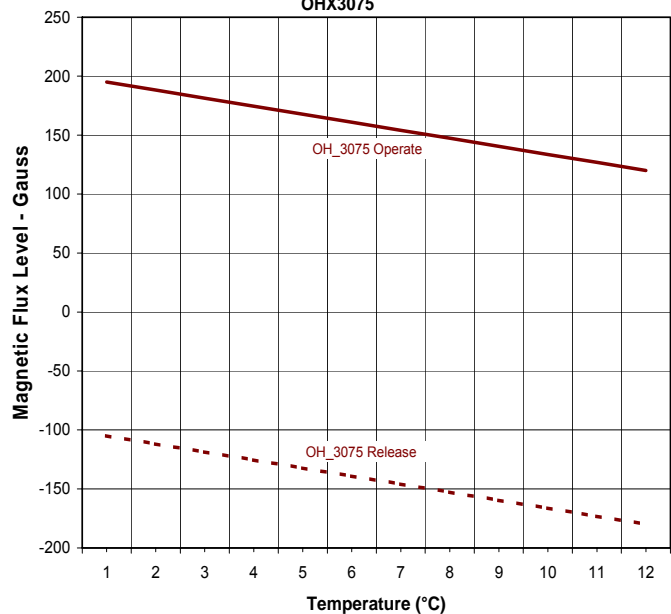
Magnetic Operate & Release Points vs Temperature

OH\_3030 & OH\_3040



Magnetic Operate & Release Points vs Temperature

OHX3075



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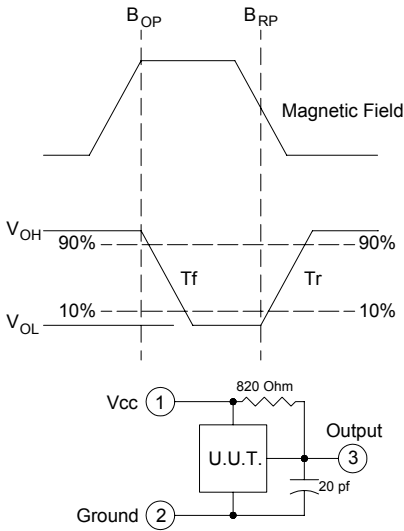


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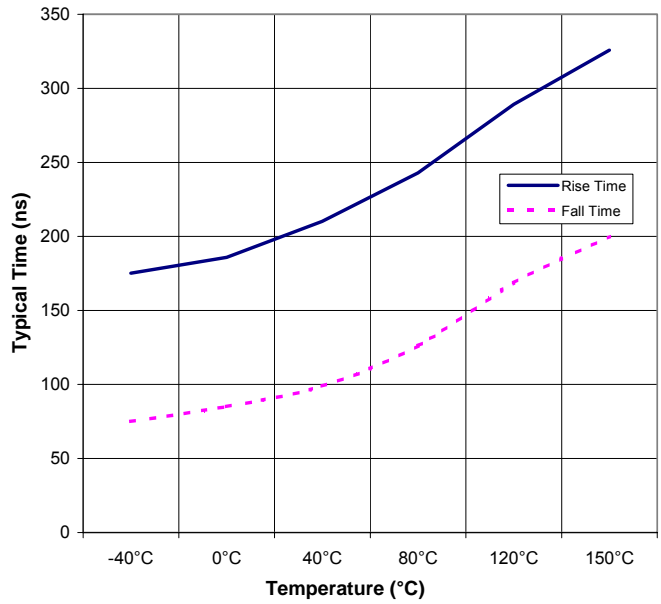
OH090U, OH180U, OH360U

OHN3000 Series, OHS3000 Series

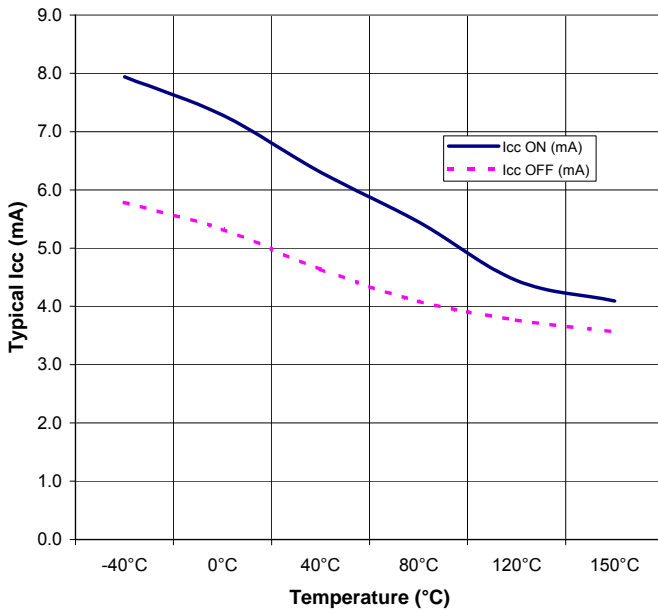
OHN3100 Series, OHS3100 Series



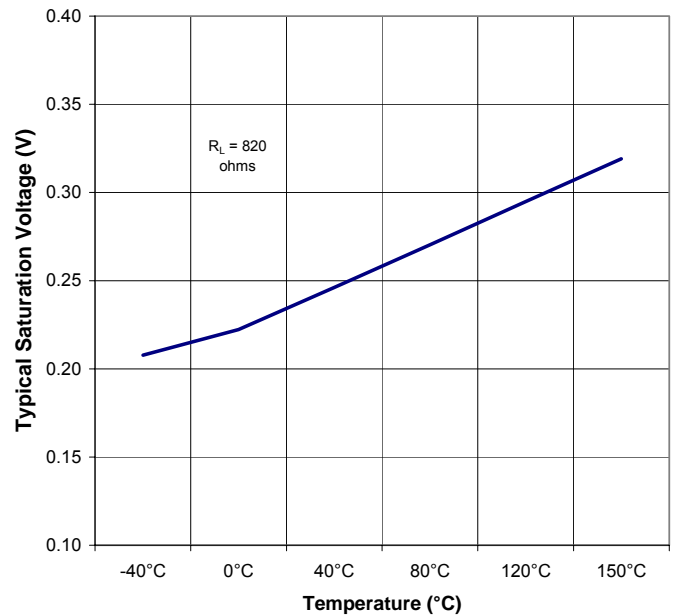
Rise & Fall Time vs Temperature



Icc vs Temperature



Saturation Voltage vs Temperature



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