



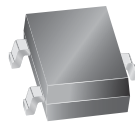
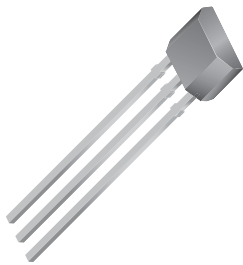
Micropower Ultra-Sensitive Hall-Effect Switches

Features and Benefits

- Micropower operation
- Operate with north or south pole
- 2.4 to 5.5 V battery operation
- Chopper stabilized
 - Superior temperature stability
 - Extremely low switchpoint drift
 - Insensitive to physical stress
- High ESD protection
- Solid state reliability
- Small size
- Easily assembly into applications due to magnetic pole independence

Packages

3 lead ultramini SIP



SOT23-W

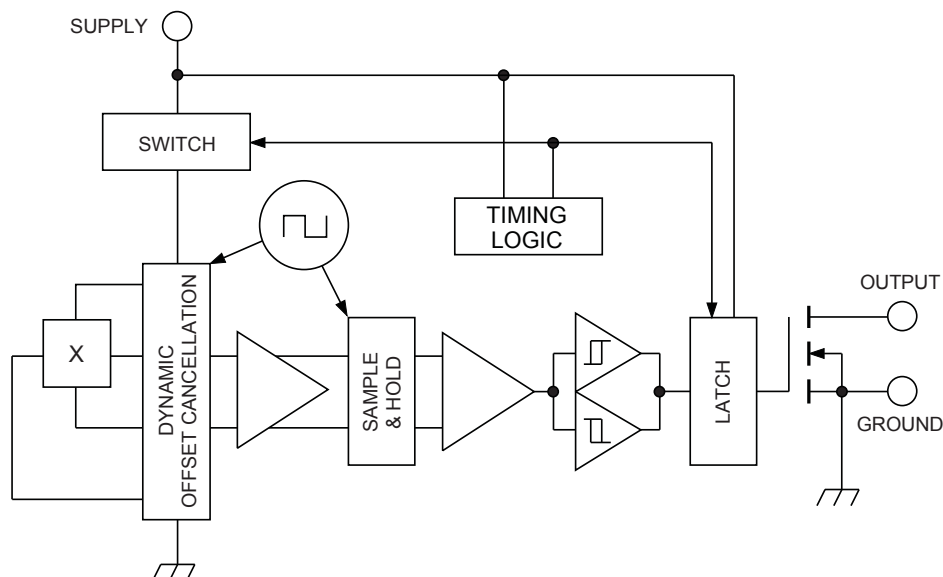
Description

Both of them hea6213/4 integrated circuits are ultra-sensitive pole independent Hall-effect switches with a latched digital output. They are especially suited for operation in battery-operated, hand-held equipment such as cellular and cordless telephones, pagers, and palmtop computers. A 2.4 to 5.5 V operation and a unique clocking scheme reduce the average operating power requirements – the HEA6213 to 825 μ W, the hea6214 to 14 μ W (typical, at 2.75 V)! Except for operating duty cycle and average operating current, the hea6213 and HEA6214 are identical.

Unlike other Hall-effect switches, either a north or south pole of sufficient strength will turn the output on; in the absence of a magnetic field, the output is off. The polarity independence and minimal power requirement allows these devices to easily replace reed switches for superior reliability and ease of manufacturing, while eliminating the requirement for signal conditioning.

Improved stability is made possible through chopper stabilization (dynamic offset cancellation), which reduces the residual offset voltage normally caused by device overmolding, temperature dependencies, and thermal stress.

Functional Block Diagram



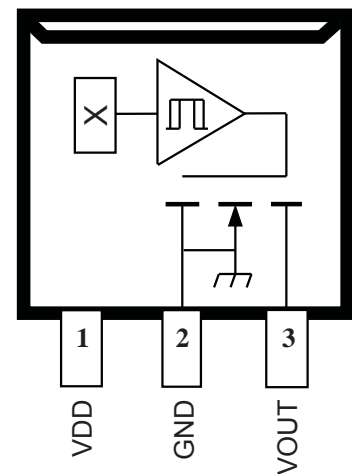
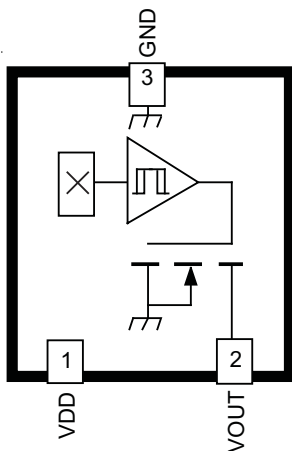
HEA6213 and HEA6214

Absolute Maximum Ratings

Characteristic	Symbol	Notes	Rating	Units
Supply Voltage	V_{DD}		6	V
Magnetic Flux Density	B		Unlimited	G
Output Off Voltage	V_{OUT}		6	V
Output Current	I_{OUT}		1	mA
Operating Ambient Temperature	T_A	Range E	-40 to 85	°C
		Range L	-40 to 150	°C
Maximum Junction Temperature	$T_{J(max)}$		165	°C
Storage Temperature	T_{stg}		-65 to 170	°C

Pin-out Diagrams

Number		Name	Description
EL, LH	UA		
1	1	VDD	Input power supply; tie to GND with bypass capacitor
3	2	GND	Ground
2	3	VOUT	Output signal



HEA6213 and HEA6214

ELECTRICAL CHARACTERISTICS valid over operating voltage and temperature range, unless otherwise noted

Characteristic	Symbol	Test Conditions	Min.	Typ. ¹	Max.	Units
Supply Voltage Range	V _{DD}	Operating ¹)	2.4	3.0	5.5	V
Output Leakage Current	I _{OFF}	V _{OUT} = 5.5 V, B _{RPx} < B < B _{RPS}	–	<1.0	1.0	μA
Output On Voltage	V _{OUT}	I _{OUT} = 1 mA, V _{DD} = 3.0 V	–	100	300	mV
Awake Time	t _{awake}		–	60	90	μs
Period	t _{period}	HEA6213	–	240	360	μs
		HEA6214, T _A = 25°C, V _{DD} = 3 V	–	60	90	ms
Duty Cycle	DC	HEA6213	–	25	–	%
		HEA6214	–	0.10	–	%
Chopping Frequency	f _C		–	340	–	kHz
Supply Current	I _{DD(EN)}	Chip awake (enabled)	–	–	2.0	mA
	I _{DD(DIS)}	Chip asleep (disabled)	–	–	8.0	μA
	I _{DD(AVG)}	HEA6213	–	460	850	μA
		HEA6214	–	11	22	μA

¹Typical Data is at T_A = 25°C and V_{DD} = 3.0 V and is for design information only.

²Operate and release points will vary with supply voltage. B_{OPx} = operate point (output turns ON); B_{RPx} = release point (output turns OFF).

MAGNETIC CHARACTERISTICS valid over operating voltage and temperature range, unless otherwise noted¹

Characteristic	Symbol ²	Test Conditions	Min.	Typ. ³	Max.	Units ⁴
Operate Points	B _{OPS}	South pole to branded side	–	42	70	G
	B _{OPN}	North pole to branded side	–70	–48	–	G
Release Points	B _{RPS}	South pole to branded side	10	32	–	G
	B _{RPN}	North pole to branded side	–	–38	–10	G
Hysteresis	B _{hys}	B _{OPx} - B _{RPx}	–	10	–	G

¹As used here, negative flux densities are defined as less than zero (algebraic convention) and -50 G is less than +10 G.

²B_{OPx} = operate point (output turns ON); B_{RPx} = release point (output turns OFF).

³Typical Data is at T_A = 25°C and V_{DD} = 3.0 V and is for design information only.

⁴1 gauss (G) is exactly equal to 0.1 millitesla (mT).



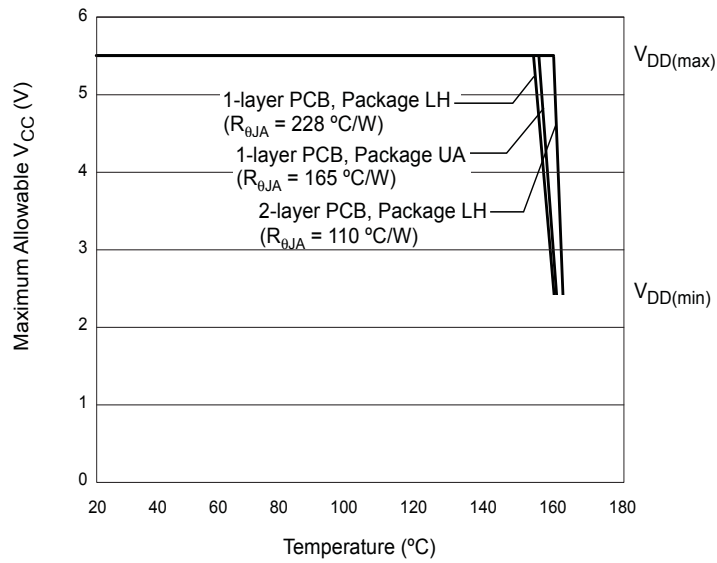
HEA6213 and HEA6214

THERMAL CHARACTERISTICS may require derating at maximum conditions, see application information

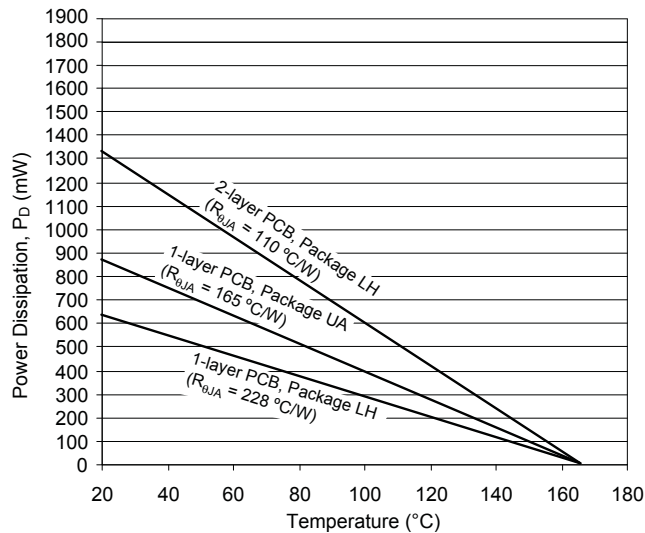
Characteristic	Symbol	Test Conditions*	Value	Units
Package Thermal Resistance	$R_{\theta JA}$	Package LH, 1-layer PCB with copper limited to solder pads	228	$^{\circ}\text{C}/\text{W}$
		Package LH, 2-layer PCB with 0.463 in. ² of copper area each side connected by thermal vias	110	$^{\circ}\text{C}/\text{W}$
		Package UA, 1-layer PCB with copper limited to solder pads	165	$^{\circ}\text{C}/\text{W}$

*Additional thermal information available on Allegro website.

Power Derating Curve



Power Dissipation versus Ambient Temperature



HEA6213 and HEA6214

TYPICAL OPERATING CHARACTERISTICS
as a function of temperature ($V_{DD} = 3\text{ V}$)

