THE AH3365Q IS NOT RECOMMENDED FOR NEW DESIGNS.
PLEASE USE THE AH3325Q.

AH3365Q

Lead-free Green

HIGH-VOLTAGE MEDIUM SENSITIVITY AUTOMOTIVE HALL EFFECT UNIPOLAR SWITCH

Description

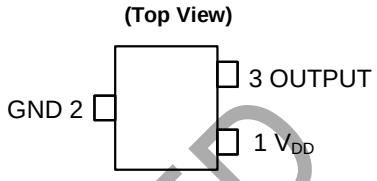
The AH3365Q is an AECQ100 qualified high-voltage medium sensitivity Hall Effect Unipolar switch IC designed for position and proximity sensing in automotive applications such as in seat and seatbelt buckle, steering lock/immobilisation, gear stick, transmission actuator and gear position, HVAC compression, wiper, door/trunk closure, etc. To support wide range of demanding applications, the design has been optimized to operate over the supply range of 3.0V to 28V. With chopper stabilized architecture and an internal bandgap regulator to provide temperature compensated supply for internal circuits, the AH3365Q provides a reliable solution over the whole operating range. For robustness and protection, the device has a reverse blocking diode with a Zener clamp on the supply. The output has an over current limit and a Zener clamp.

The single open drain output can be switched on with South pole of sufficient strength. When the magnetic flux density (B) perpendicular to the package is larger than the operate point (B_{OP}) the output is switched on (pulled low) and is held on until magnetic flux density B is lower than the release point (B_{RP}). The output remains switched off for North pole fields to or no magnetic fields.

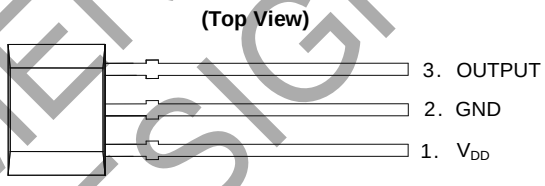
Features

- Unipolar Operation
- Medium Sensitivity: B_{OP} and B_{RP} of 100G and 80G typical
- Single Open Drain Output with Over Current Limit
- 3.0V to 28V Operating Voltage Range
- Chopper Stabilized Design Provides
  - Superior Temperature Stability
  - Minimal Switch Point Drift
  - Enhanced Immunity to Stress
- Good RF Noise Immunity
- Reverse Blocking Diode
- Zener Clamp on Supply and Output Pins
- -40°C to +150°C Operating Temperature
- ESD: HBM > 8kV, CDM > 2kV
- AECQ100 Grade 0 Qualified
- Industry Standard SOT23 and SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The AH3365Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Pin Assignments



SOT23



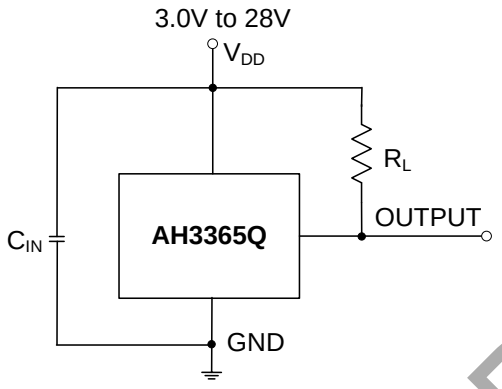
SIP-3 (Bulk Pack)

Applications

- Position and proximity sensing in automotive applications
- Seat positions
- Seatbelt buckles
- Steering locks/immobilisations
- Gear sticks
- HVAC compressions
- Transmission actuators
- Transmission gear positions
- Wipers
- Sunroofs and windows
- Door/Trunk closures
- Door locks
- Contact-Less switches

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Typical Applications Circuit (Note 4)



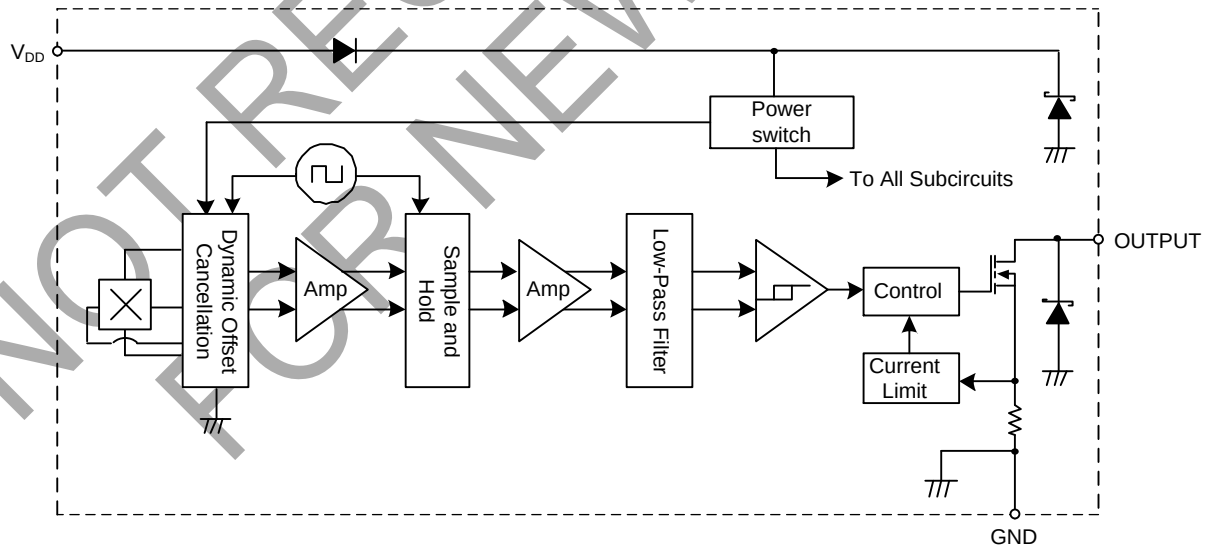
Note: 4. C_{IN} is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF ~ 100nF.
R_L is the pull-up resistor.

Pin Descriptions

Package: SOT23 and SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

Pin Number	Pin Name	Function
1	V_{DD}	Power Supply Input
2	GND	Ground
3	OUTPUT	Output Pin

Functional Block Diagram



Absolute Maximum Ratings (Notes 5 & 6) (@T_A = +25°C, unless otherwise specified.)

Symbol	Characteristic		Value	Unit
V_{DD}	Supply Voltage (Note 6)		32	V
V_{DDR}	Reverse Supply Voltage (Note 6)		-32	V
V_{OUT_MAX}	Output Off Voltage (Note 6)		32	V
I_{OUT}	Continuous Output Current		60	mA
I_{OUT_R}	Reverse Output Current		-50	mA
B	Magnetic Flux Density		Unlimited	
P_D	Package Power Dissipation	SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)	550	mW
		SOT23	230	
Ts	Storage Temperature Range		-65 to +165	°C
T_J	Maximum Junction Temperature		+150	°C
ESD HBM	Electros Static Discharge Withstand - Human Body Model (HBM)		8	kV
ESD MM	Electros Static Discharge Withstand - Machine Model (MM)		800	V
ESD CDM	Electros Static Discharge Withstand - Charged Device Model (CDM)		2	kV

Notes:
5. Stresses greater than the 'Absolute Maximum Ratings' specified above can cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions exceeding those indicated in this specification is not implied. Device reliability can be affected by exposure to absolute maximum rating conditions for extended periods of time.
6. The absolute maximum V_{DD} of 32V is a transient stress rating and is not meant as a functional operating condition. It is not recommended to operate the device at the absolute maximum rated conditions for any period of time.

Recommended Operating Conditions (@T_A = -40°C to +150°C, unless otherwise specified.)

Symbol	Parameter	Condition	Rating	Unit
V_{DD}	Supply Voltage	Operating	3.0 to 28	V
T_A	Operating Temperature Range	Operating	-40 to +150	°C

Electrical Characteristics (Notes 7 & 8) (@T_A = -40°C to +150°C, V_{DD} = 3V to 28V, unless otherwise specified.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{OUT_ON}	Output ON Voltage	I_{OUT} = 20mA, B > Bop	—	0.2	0.4	V
I_{LKG}	Output Leakage Current (When output is off)	V_{OUT} = 28V, B < Brp, Output off	—	<0.1	10	μA
I_{DD}	Supply Current	Output open, T_A = +25°C	—	3	3.5	mA
		Output open, T_A = -40°C to +150°C	—	—	4	mA
I_{DD_R}	Reverse Supply Current	V_{DD} = -18V, T_A = +25°C	—	0.6	—	μA
		V_{DD} = -18V, T_A = -40°C to +150°C	—	0.6	1500	μA
		V_{DD} = -28V, T_A = +25°C	—	1.6	—	μA
		V_{DD} = -28V, T_A = -40°C to +150°C	—	1.6	2500	μA
t_{P_ON}	Device Power-On Time (Start-up time)	V_{DD} >= 3V, B > Bop (Note 7)	—	10	—	μs
f_C	Chopping Frequency	—	—	800	—	kHz
t_D	Response Time Delay (Time from magnetic threshold reached to the start of the output rise or fall)	(Note 9)	—	3.75	—	μs
t_R	Output Rising Time (External pull-up resistor R_L and load capacitance dependent)	R_L = 1kΩ, C_L = 20pF	—	0.2	1	μs
t_F	Output Falling Time (Internal switch resistance and load capacitance dependent)	R_L = 1kΩ, C_L = 20pF	—	0.1	1	μs
I_{OCL}	Output Current Limit	B > Bop (Note 10)	30	—	55	mA
V_Z	Zener Clamp Voltage	I_{DD} = 5mA	28	—	—	V

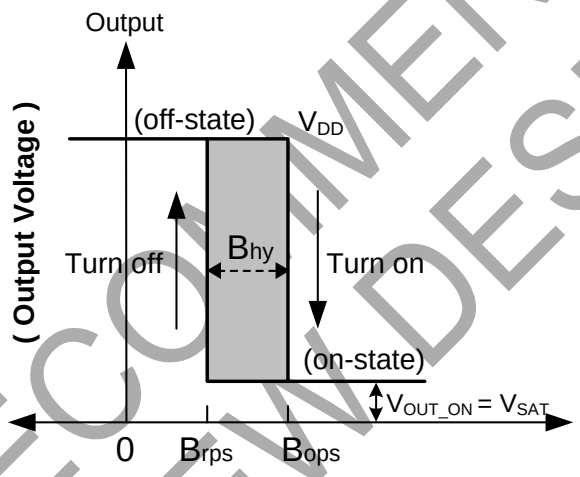
Notes:
7. When power is initially turned on, V_{DD} must be within its correct operating range (3.0V to 28V) to guarantee the output sampling. The output state is valid after the start-up time of 10μs typical from the operating voltage reaching 3V.
8. Typical values are defined at T_A = +25°C, V_{DD} = 12V. Maximum and minimum values over the operating temperature range is not tested in production but guaranteed by design, process control and characterization.
9. Guaranteed by design, process control and characterization, Not tested in production.
10. The device will limit the output current I_{OUT} to current limit of I_{OCL}.

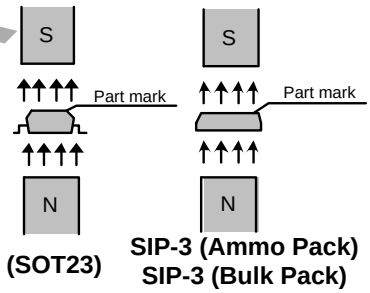
Magnetic Characteristics (Notes 11 & 12) (T_A = -40°C to +150°C, V_{DD} = 3.0V to 28V, unless otherwise specified.)

(1mT=10 Gauss)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
B_{OPS} (South pole to the part marking side of SOT23 and SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) packages)	Operation Point	V_{DD} = 12V, T_A = +25°C	—	100	—	Gauss
		T_A = -40°C to +150°C	80	100	120	
B_{RPS} (South pole to the part marking side of SOT23 and SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) packages)	Release Point	V_{DD} = 12V, T_A = +25°C	—	80	—	
		T_A = -40°C to +150°C	60	80	100	
B_{HY} ($\|B_{OPX}\|$-$\|B_{RPX}\|$)	Hysteresis (Note 13)	V_{DD} = 12V, T_A = +25°C	—	20	—	
		T_A = -40°C to +150°C	15	20	31	

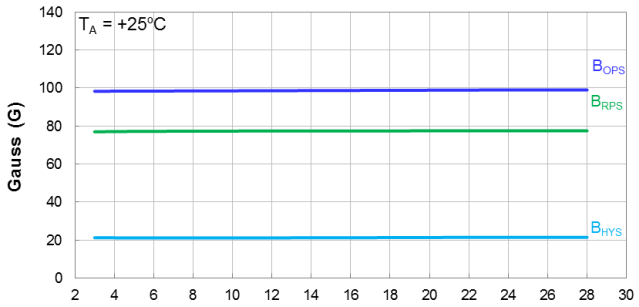
Notes:
11. When power is initially turned on, V_{DD} must be within its correct operating range (3.0V to 28V) to guarantee the output sampling. The output state is valid after the start-up time of 10us typical from the operating voltage reaching 3V.
12. Typical values are defined at T_A = +25°C, V_{DD} = 12V. Maximum and minimum values over the operating temperature range is not tested in production but guaranteed by design, process control and characterization.
13. Maximum and minimum hysteresis is guaranteed by design, process control and characterization.



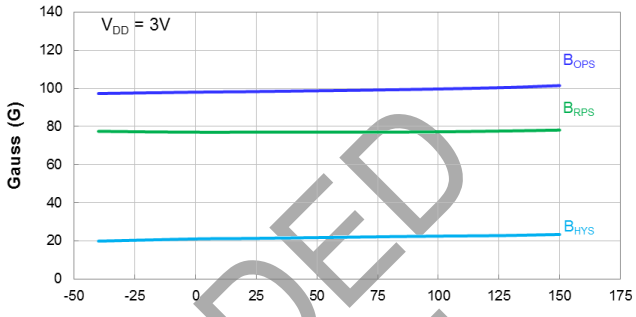


Typical Operating Characteristics

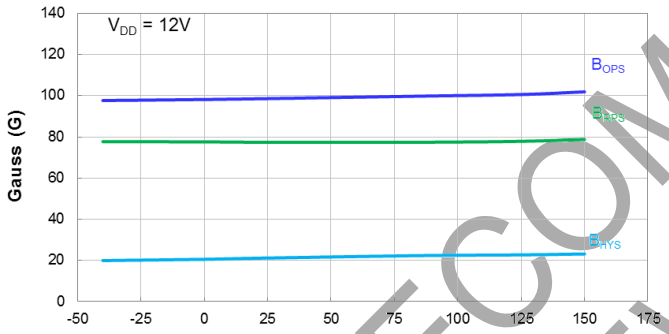
Output Switch Operate and Release Points (Magnetic Thresholds) – B_{OPS} and B_{RPS}



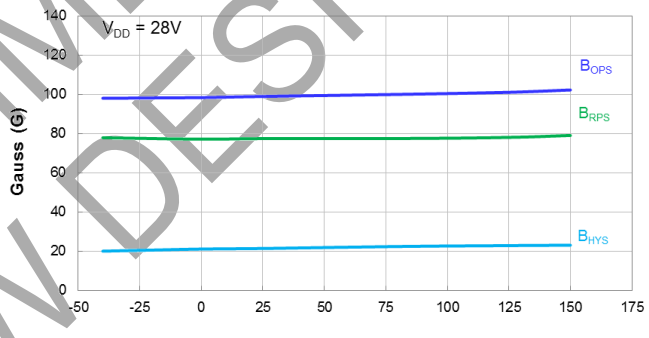
Switch Points B_{OPS} and B_{RPS} vs Supply Voltage



Switch Points B_{OPS} and B_{RPS} vs Temperature

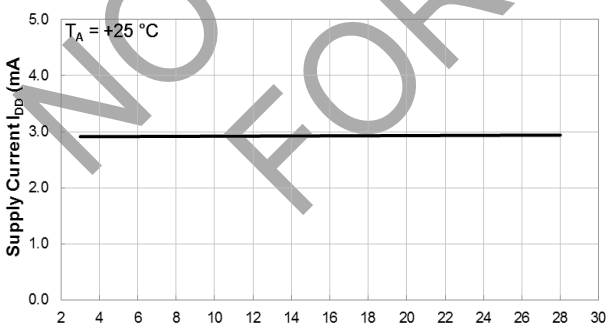


Switch Points B_{OPS} and B_{RPS} vs Temperature

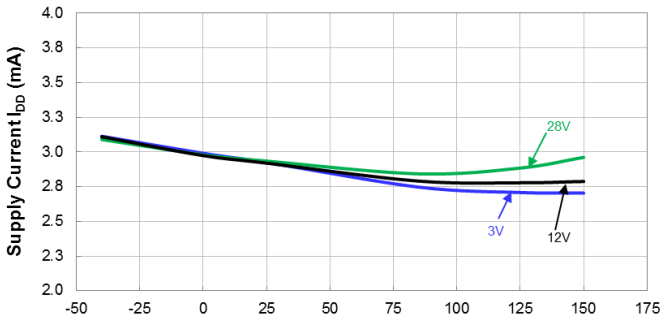


Switch Points B_{OPS} and B_{RPS} vs Temperature

Supply Current



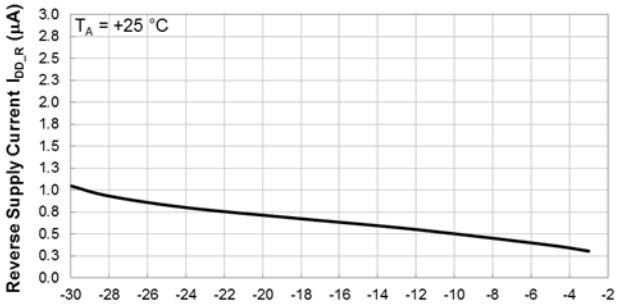
Supply Current vs Supply Voltage



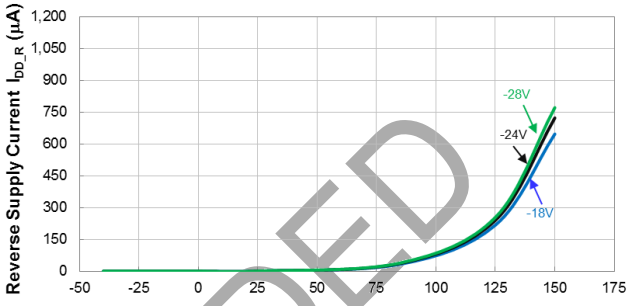
Supply Current vs Temperature

Typical Operating Characteristics (continued)

Supply Reverse Current

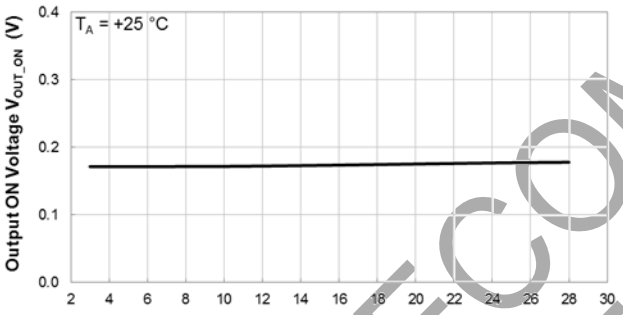


Reverse Supply Current vs Supply Voltage

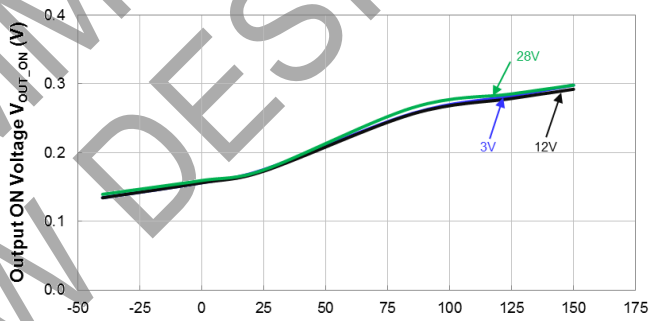


Reverse Supply Current vs Temperature

Output Switch On Voltage

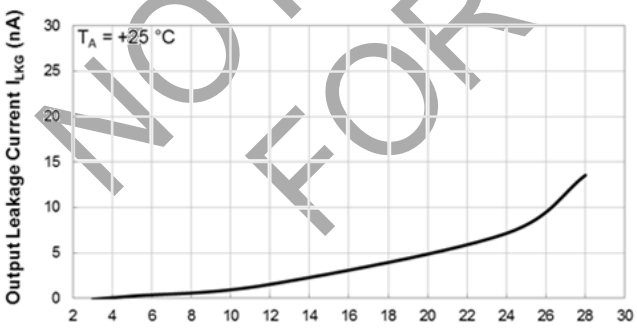


Output ON Voltage vs Supply Voltage

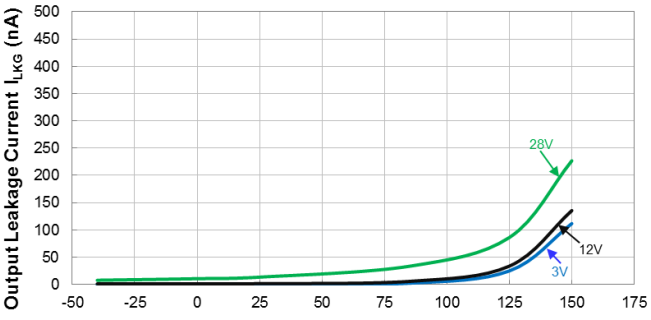


Output ON Voltage vs Temperature

Output Switch Leakage Current



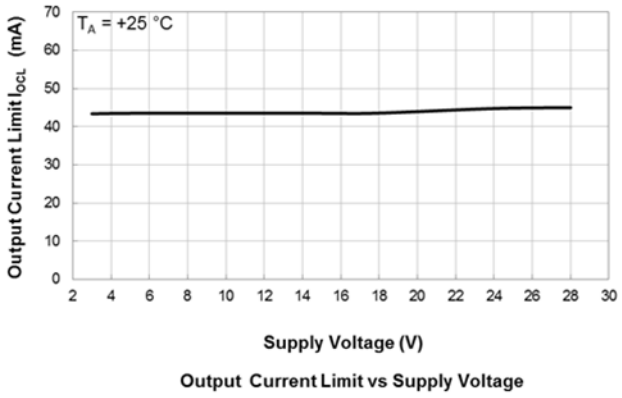
Output Leakage Current vs Supply Voltage



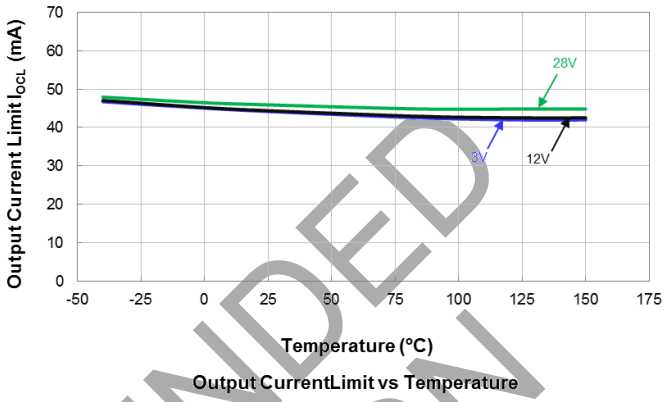
Output Leakage Current vs Temperature

Typical Operating Characteristics (continued)

Output Current Limit



Output Current Limit vs Supply Voltage

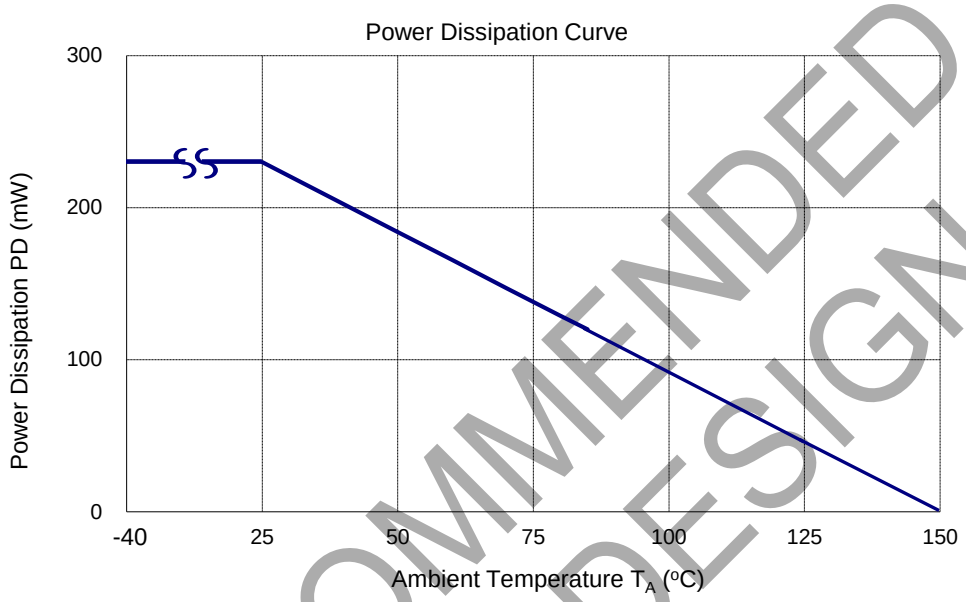


Output CurrentLimit vs Temperature

Thermal Performance Characteristics

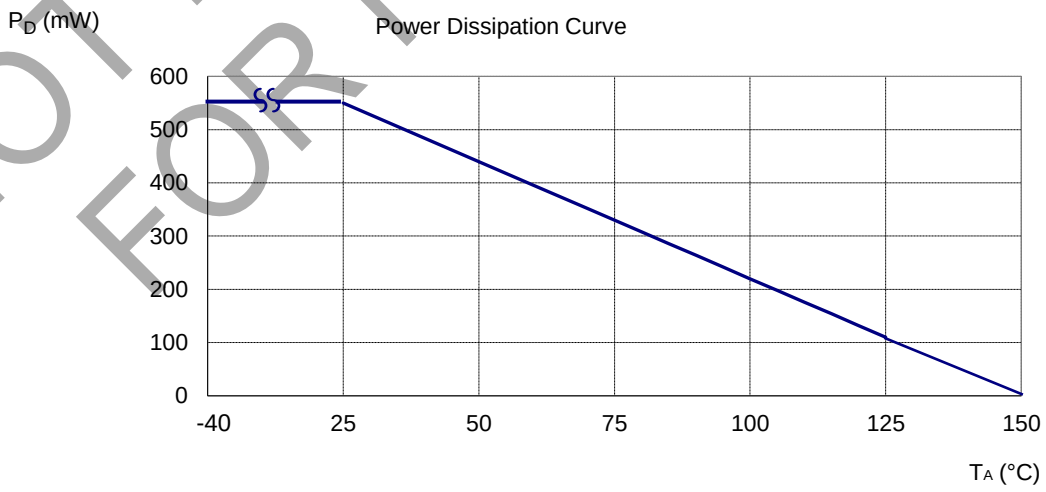
(1) Package type: SOT23

T_A (°C)	25	50	60	70	80	85	90	100	105	110	120	125	130	140	150
P_D (mW)	230	184	166	147	129	120	110	92	83	74	55	46	37	18	0

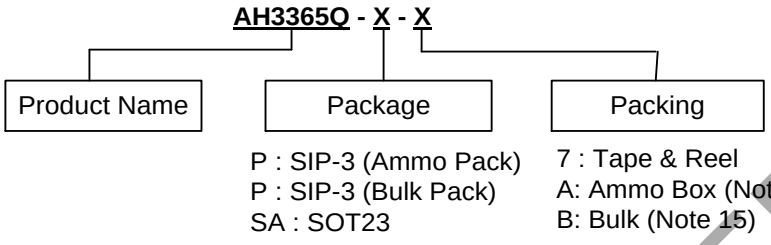


(2) Package type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

T_A (°C)	25	50	60	70	80	85	90	100	105	110	120	125	130	140	150
P_D (mW)	550	440	396	362	308	286	264	220	198	176	132	110	88	44	0



Ordering Information



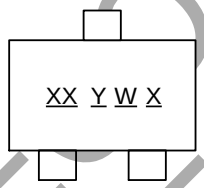
Part Number	Package Code	Package	Packing	
			Qty.	Carrier
AH3365Q-P-A	P	SIP-3 (Ammo Pack)	4000	Ammo Box
AH3365Q-P-B	P	SIP-3 (Bulk Pack)	1000	Bulk
AH3365Q-SA-7	SA	SOT23	3000	7" Tape & Reel

Notes: 14. Ammo Box is for SIP-3 (Ammo Pack) Spread Lead.
15. Bulk is for SIP-3 (Bulk Pack) Straight Lead.

Marking Information

(1) Package Type: SOT23

(Top View)

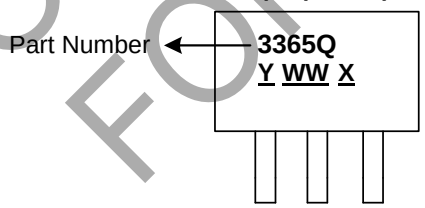


XX : Identification code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents
52 and 53 week
X : Internal code

Part Number	Package	Identification Code
AH3365Q	SOT23	MH

(2) Package Type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

(Top View)



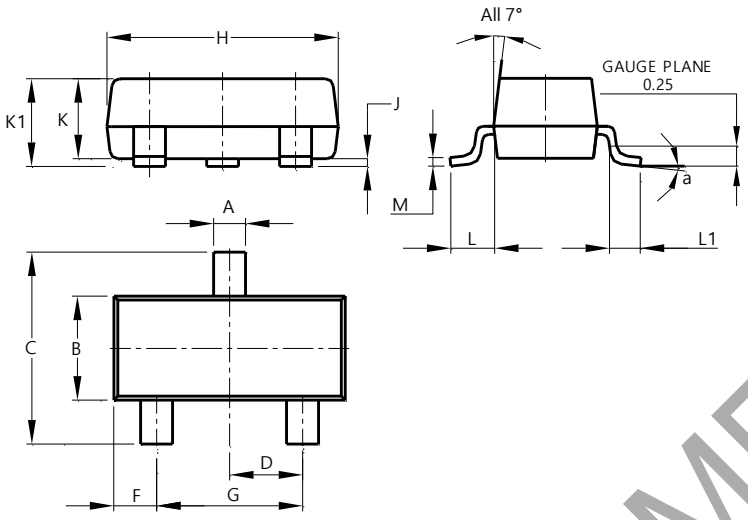
Y : Year : 0~9
WW : Week : 01~52, "52" represents
52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AH3365Q	SIP-3 (Ammo Pack)	3365Q
AH3365Q	SIP-3 (Bulk Pack)	3365Q

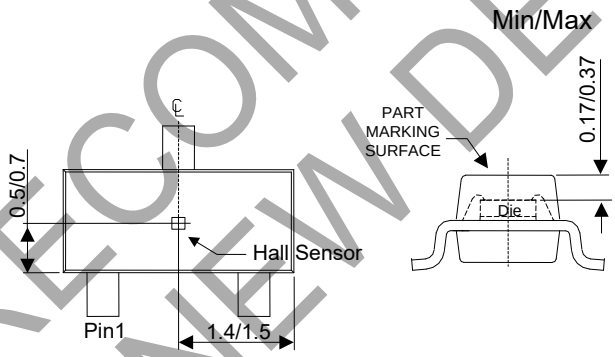
Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT23



SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	-
All Dimensions in mm			

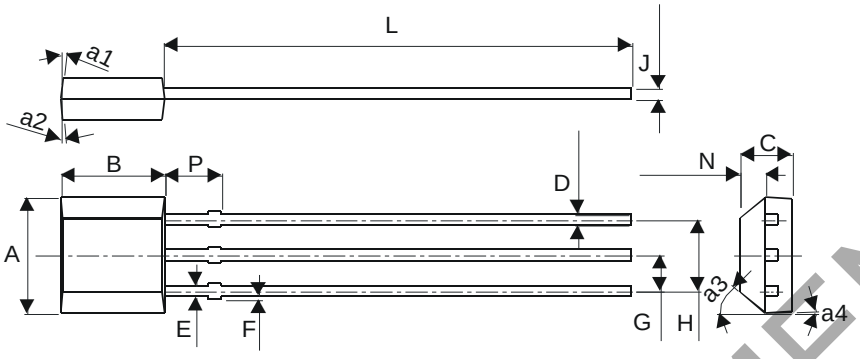


Sensor Location

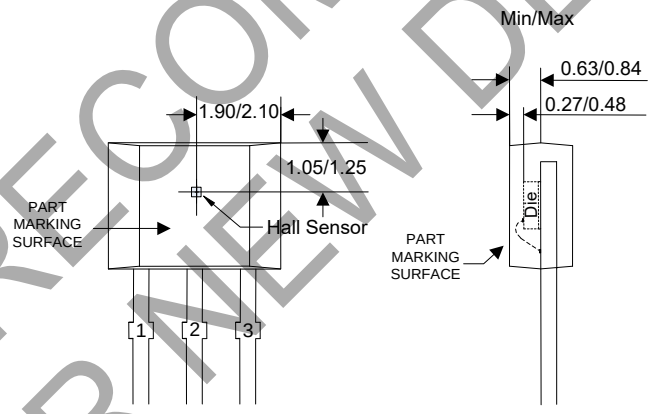
Package Outline Dimensions (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(2) Package Type: SIP-3 (Bulk Pack)



SIP-3 (Bulk Pack)		
Dim	**Min**	**Max**
A	3.9	4.3
a1	5° Typ	
a2	5° Typ	
a3	45° Typ	
a4	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.33	0.432
E	0.40	0.508
F	0	0.2
G	1.24	1.30
H	2.51	2.57
J	0.35	0.43
L	14.0	15.0
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

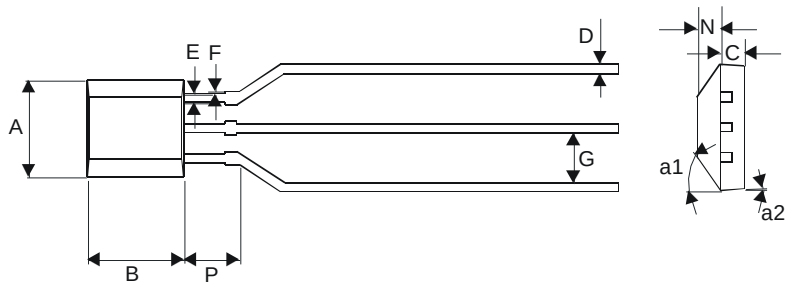


Sensor Location

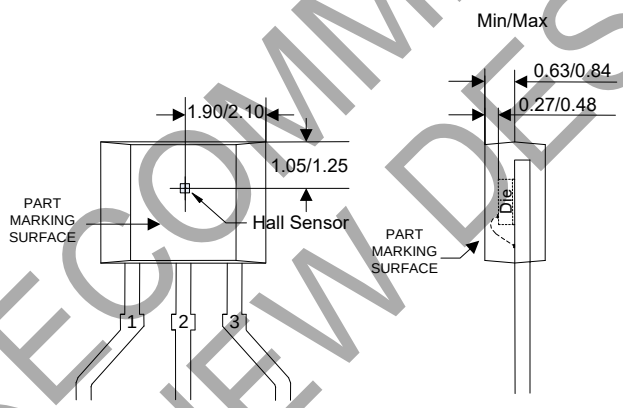
Package Outline Dimensions (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(3) Package Type: SIP-3 (Ammo Pack)



SIP-3 (Ammo Pack)		
Dim	**Min**	**Max**
A	3.9	4.3
a1	45° Typ	
a2	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.35	0.41
E	0.43	0.48
F	0	0.2
G	2.4	2.9
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

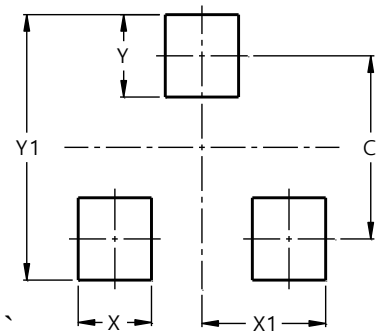


Sensor Location

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

www.diodes.com