

Description

The AH9281/82 is a one-chip solution for driving two-coil brushless DC motors and fans.

Based on the advanced CDMOS process, the IC contains a Hall-effect sensor, dynamic offset correction and powerful output drivers with 1200mA peak output current capability.

Specially designed for driving large fans, the device is optimized for low start-up voltage. Frequency Generator or Rotation Detection is available. The open drain output makes easier the connectivity with any external interface such as hardware monitoring or Super I/O IC.

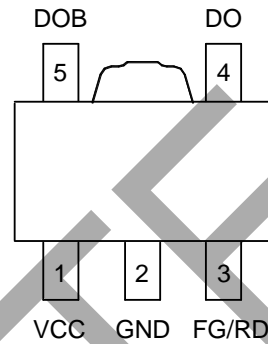
The AH9281/82 is available in SOT-89-5 package.

Features

- High Sensitivity Integrated Hall Sensor
- Low Start-up Voltage
- 5V and 12V Operation
- Peak Output Current up to 1200mA
- Power Efficient CMOS and Power MOSFETs
- Built-in Output Protection Clamping Diode
- Locked Rotor Shutdown and Auto-Restart
- Integrated Tachometer (AH9281) or Alarm (AH9282) Signal Output
- ESD Rating: 6000V (Human Body Model)
400V (Machine Model)

Pin Assignments

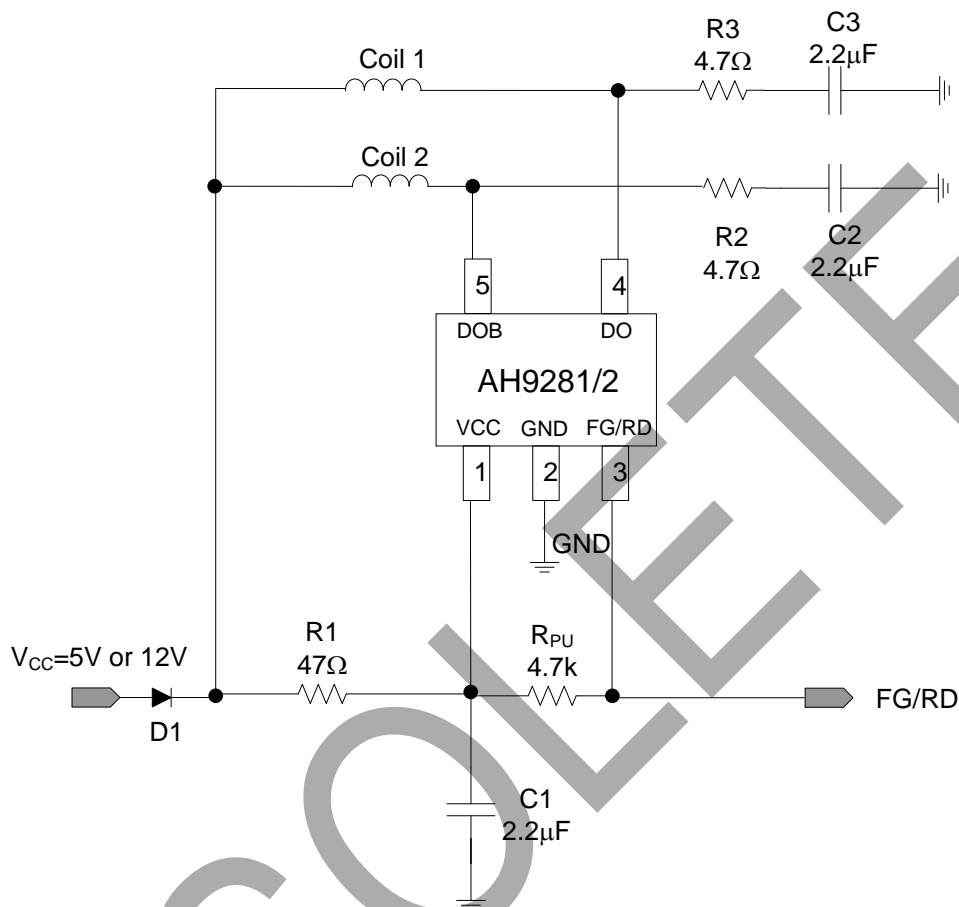
(Top View)



Applications

- 5V/12V DC Brushless Motor/Fan
- PC, Server, Laptop Cooling Fan
- Power Supply Cooling Fan
- Large or Small Fans

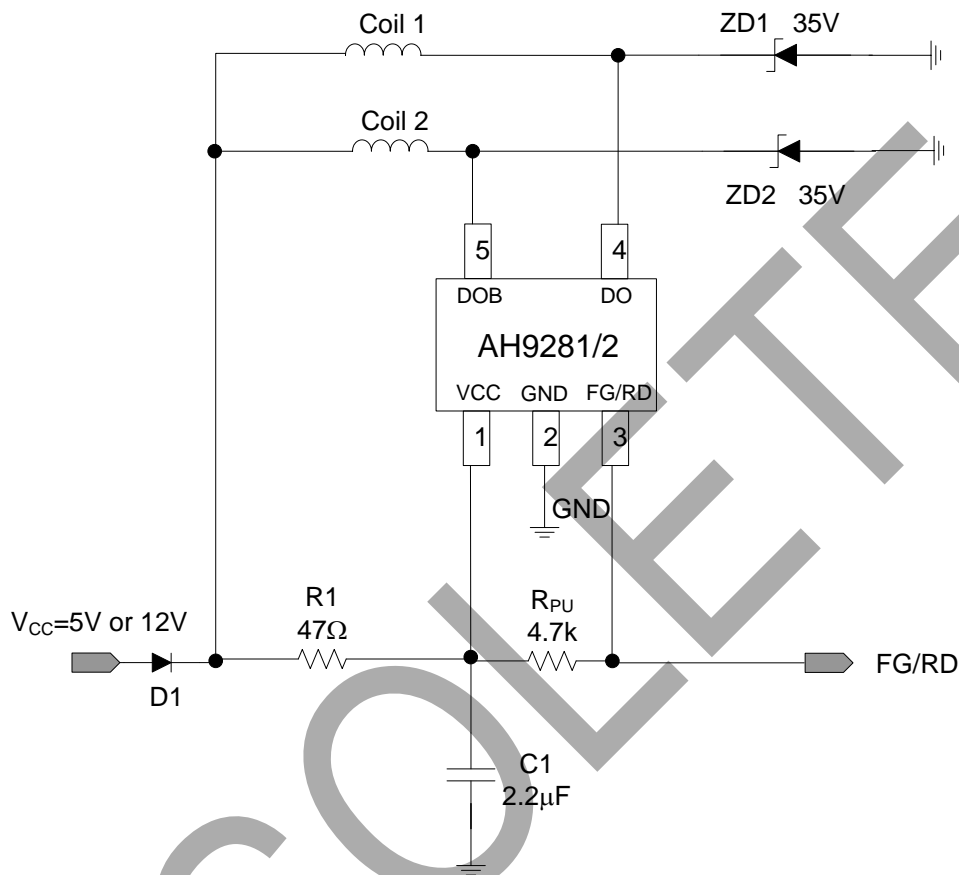
Typical Applications Circuit



Note 1:

1. D1 is an ordinary diode used to filter the noise from VCC and protect IC if VCC and GND are plugged reversed.
2. R1=47Ω typical.
3. C1=C2=C3=2.2μF typical, electrolytic capacitors are better. They should be fine tuned based on system design.
4. R2=R3=4.7Ω typical. They can be cancelled according to system requirement.
5. R_{PU}=4.7kΩ typical.

Typical Applications Circuit (Cont.)



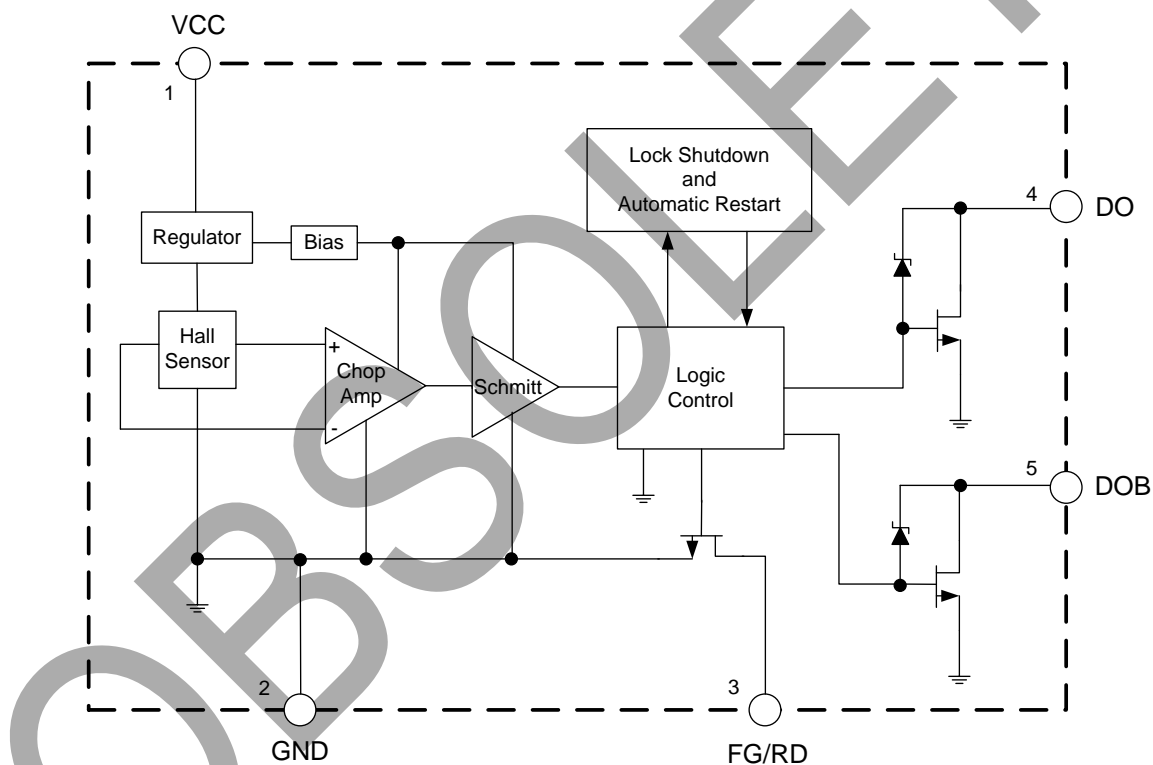
Note 2:

1. D1 is an ordinary diode used to filter the noise from VCC and protect IC if VCC and GND are plugged reversed.
2. R1=47Ω typical.
3. C1=2.2μF typical, electrolytic capacitors are better. They should be fine tuned based on system design.
4. ZD1 and ZD2 breakdown voltage are 35V.
5. R_{PU}=4.7kΩ typical.

Pin Descriptions

Pin Number	Pin Name	Function
1	VCC	Power supply pin
2	GND	Ground pin
3	FG/RD	Frequency Generator (Rotation Detection) open drain output
4	DO	Output pin 1
5	DOB	Output pin 2

Functional Block Diagram



Absolute Maximum Ratings (Note 3, $T_A=+25^{\circ}\text{C}$)

Symbol	Parameter	Rating	Unit
V_{CC}	Supply Voltage	18	V
I_{CC}	Supply Current (Fault)	6	mA
I_{OUT_P}	Peak Output Current	1200	mA
I_{OUT_C}	Continuous Output Current	600	mA
V_{FG}/V_{RD}	FG/RD Pull-up Voltage	28	V
P_D	Power Dissipation	800	mW
θ_{JA}	Thermal Resistance (Junction to Ambient)	156	$^{\circ}\text{C}/\text{W}$
T_{STG}	Storage Temperature	-55 to +150	$^{\circ}\text{C}$
ESD	ESD (Human Body Model)	6000	V
ESD	ESD (Machine Model)	400	V

Note 3: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

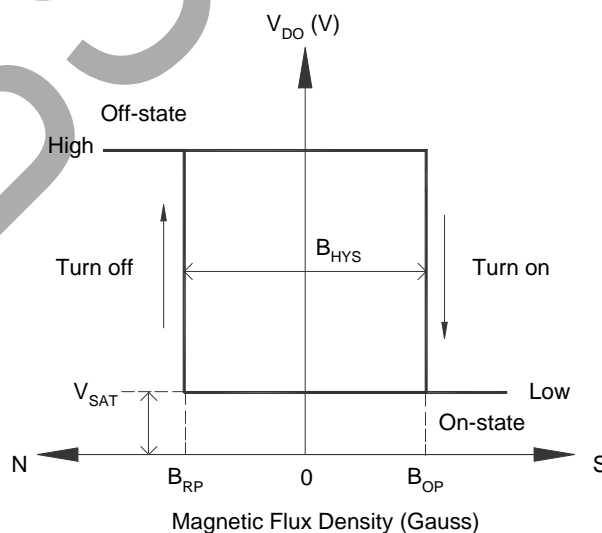
Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	2.5	16	V
T_A	Operating Ambient Temperature	-40	+125	$^{\circ}\text{C}$

Electrical Characteristics ($V_{CC}=12V$, $T_A=+25^{\circ}C$, unless otherwise specified.)

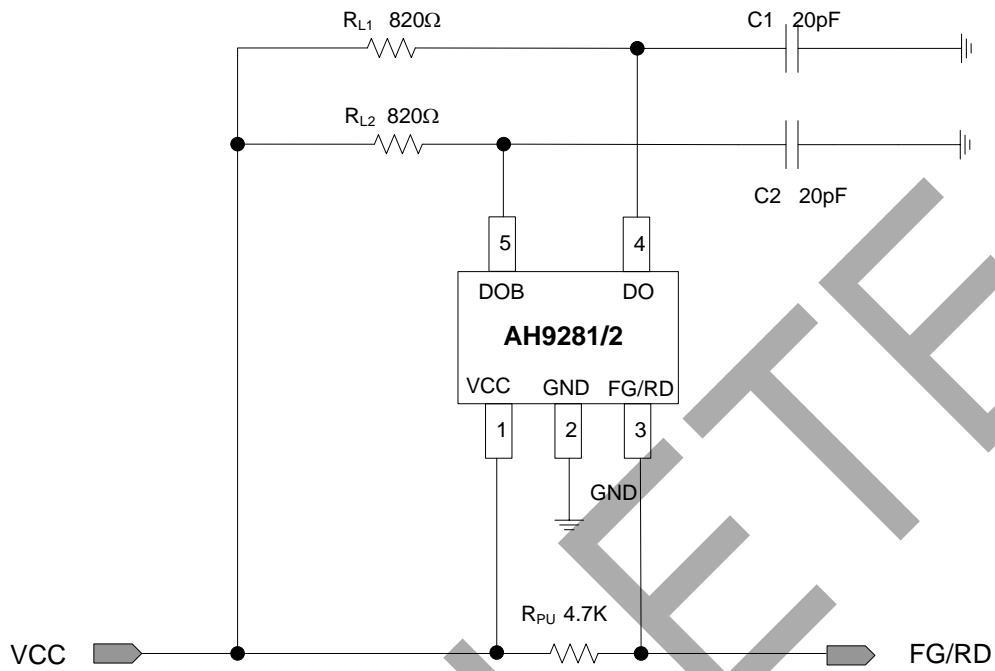
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	2.5	12	16	V
I_{CC}	Supply Current	Average	–	4	6	mA
I_{OUT}	Output Current	–	–	–	500	mA
$I_{LEAKAGE}$	Output Leakage Current	–	–	0.1	10	μA
V_{SAT}	Saturation Voltage	$I_{OUT}=350mA$	–	600	1000	mV
t_{ON}	Output ON Time	–	–	0.8	–	s
t_{OFF}	Output OFF Time	–	–	5	–	s
V_{FGL}/V_{RDL}	FG/RD Output Low Voltage	$I_{FG}=5mA$	–	0.1	0.2	V
I_{FGLK}/I_{RDLK}	FG/RD Output Leakage Current	$V_{FG}/V_{RD}=12V$	–	0.1	10	μA
I_{FGLIM}/I_{RDLIM}	FG/RD Output Current Limit	$V_{FG}/V_{RD}=12V$	–	30	–	mA
V_Z	Output Zener Break-down Voltage	–	–	35	–	V

Magnetic Characteristics ($V_{CC}=12V$, $T_A=+25^{\circ}C$, unless otherwise specified.)

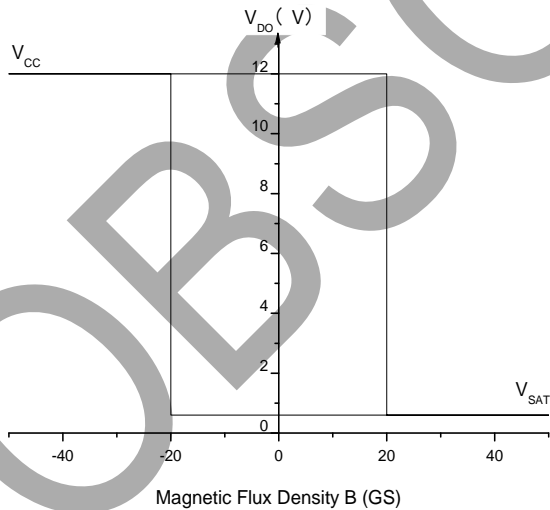
Symbol	Parameter	Min	Typ	Max	Unit
B_{OP}	Operating Point	0	20	50	Gauss
B_{RP}	Releasing Point	-50	-20	0	Gauss
B_{HYS}	Hysteresis	–	40	–	Gauss



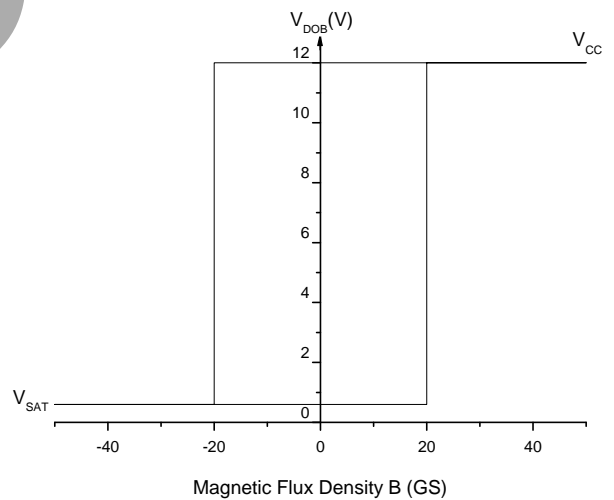
Test Circuit



Basic Test Circuit



V_{DO} vs. Magnetic Flux Density

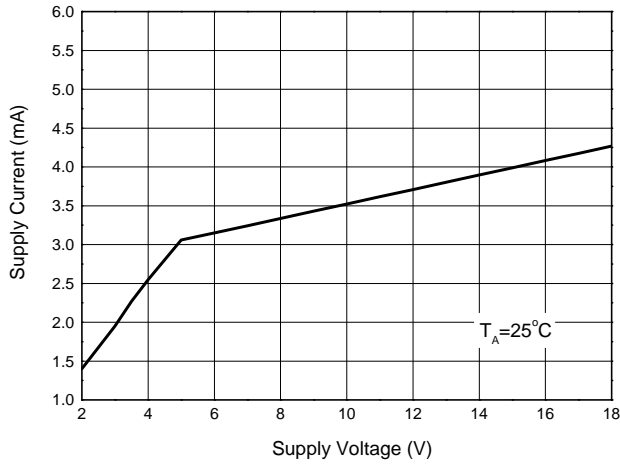


V_{DOB} vs. Magnetic Flux Density

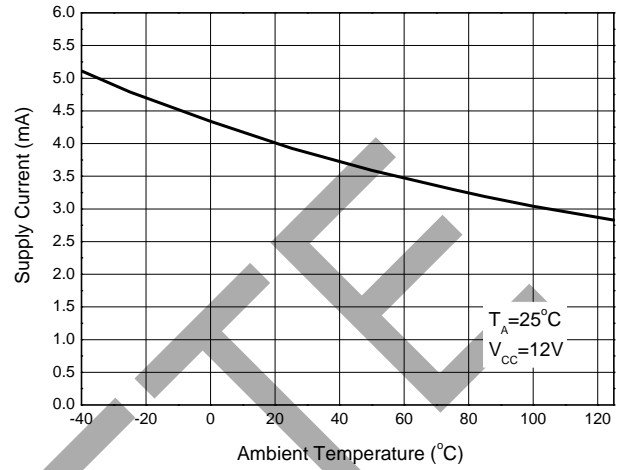
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Performance Characteristics

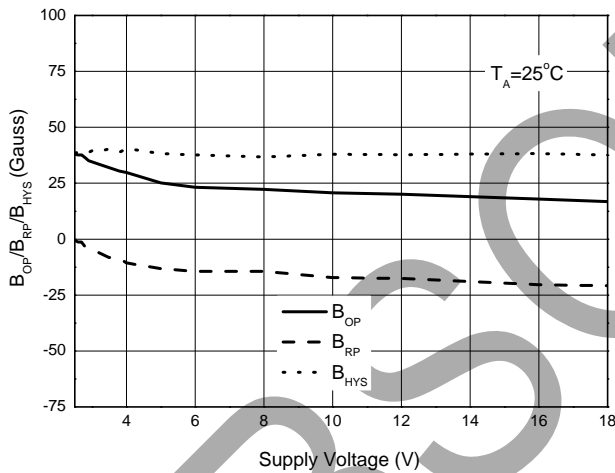
Supply Current vs. Supply Voltage



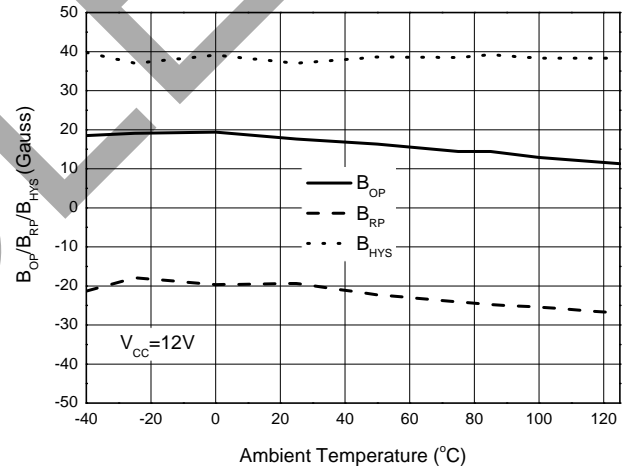
Supply Current vs. Ambient Temperature



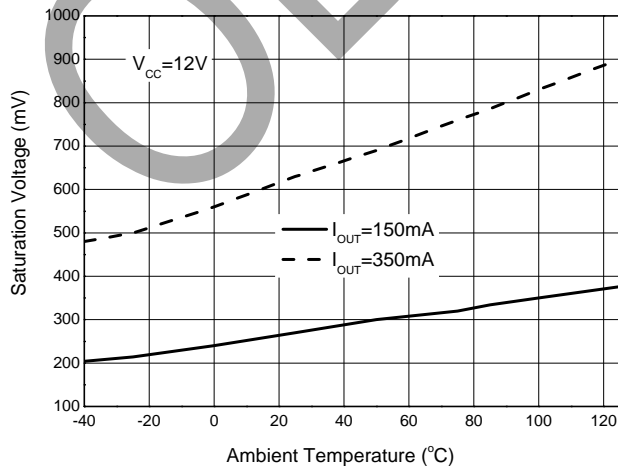
$B_{OP}/B_{RP}/B_{HYS}$ vs. Supply Voltage



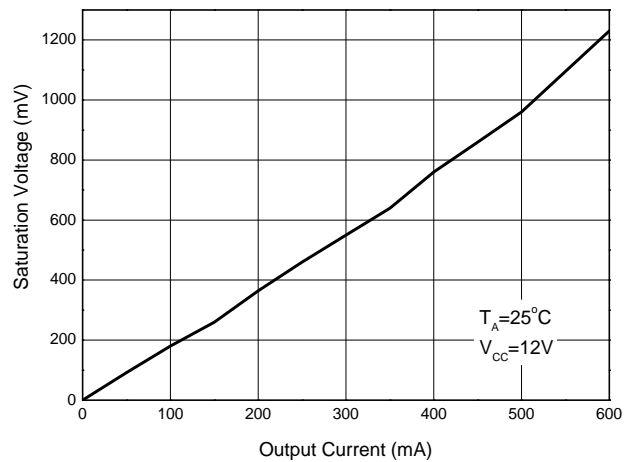
$B_{OP}/B_{RP}/B_{HYS}$ vs. Ambient Temperature



Saturation Voltage vs. Ambient Temperature



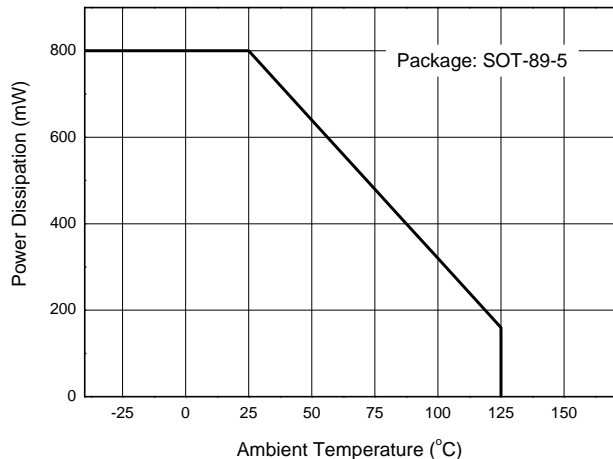
Saturation Voltage vs. Output Current



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Performance Characteristics (Cont.)

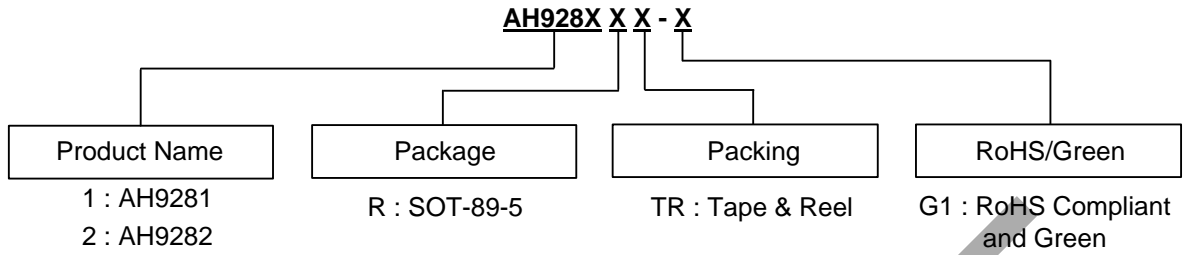
Power Dissipation vs. Ambient Temperature



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Ordering Information



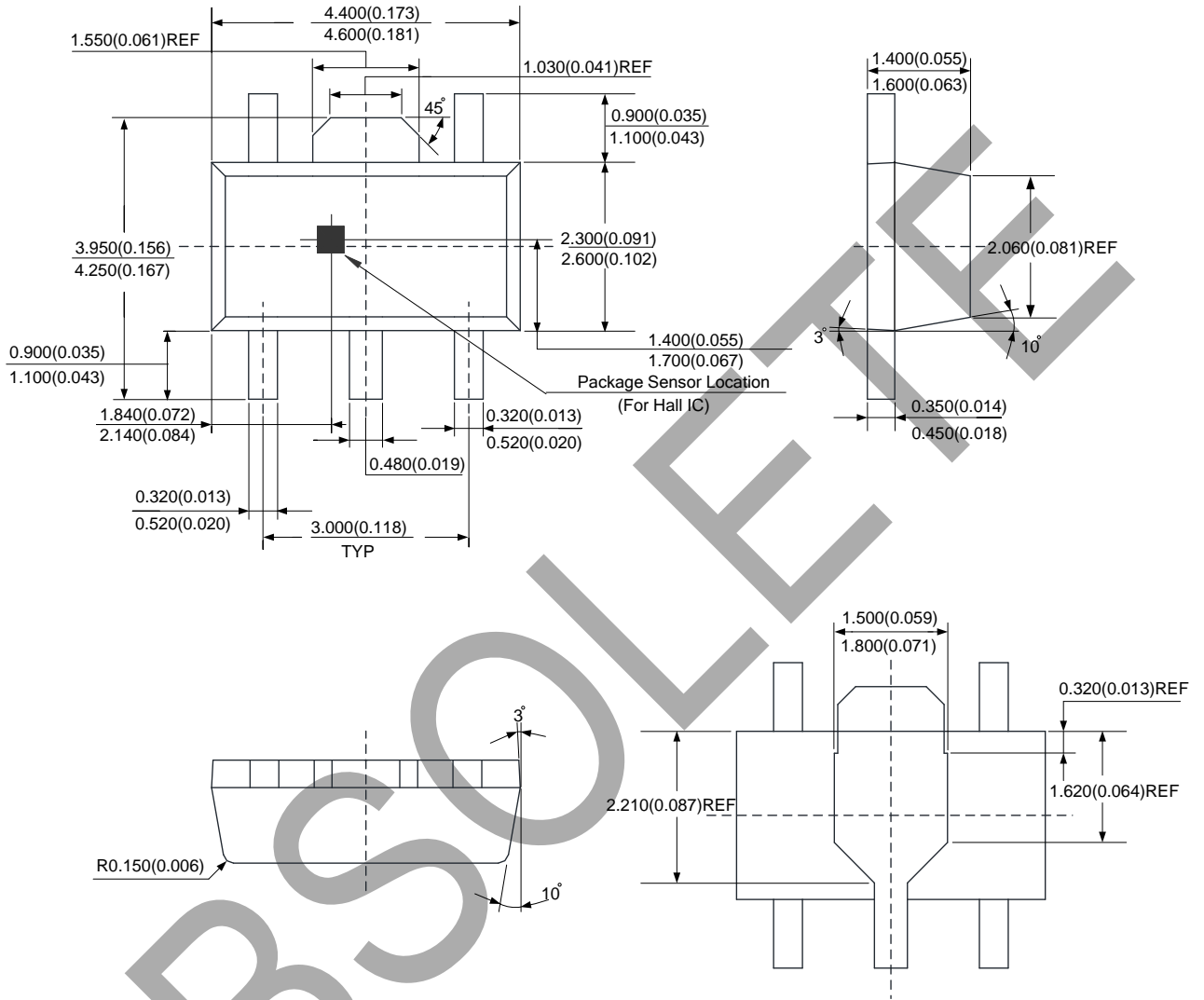
Package	Temperature Range	Output Signal	Part Number	Marking ID	Packing
SOT-89-5	-40 to +125°C	FG	AH9281RTR-G1	G41C	Tape & Reel
		RD	AH9282RTR-G1	G41D	Tape & Reel

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Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SOT-89-5



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