Hall Effect Sensor IC with Reverse Voltage Protection

Features

- On-chip Reverse Voltage Protection
- On-chip Hall Sensor
- Low Operating Supply Voltage : 3 V
- High Output Sinking Capability up to 400mA
- Versatile sensitivity and hysteresis setting
- Reliable and Rugged
- 4 pin TO-92M Package

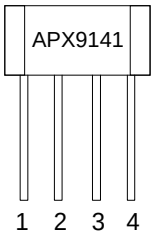
Applications

- Brushless DC Fan
- Revolution Counting
- Brushless DC Motor
- Speed Measurement

General Description

The APX9141 is an integrated Hall Effect Sensor IC designed for electric commutation of DC brushless motor applications. The APX9141 still can operate at as low as 3 volts. The APX9141 is available in low cost TO -92M4 package with 3 different magnetic ranks.

Pin Description



Front View

1 : V_{DD}
2 : DO
3 : DOB
4 : GND

Ordering Information

APX9141 □□□-□□

- Handling Code
- Temp. Range
- Package Code
- Magnetic Rank

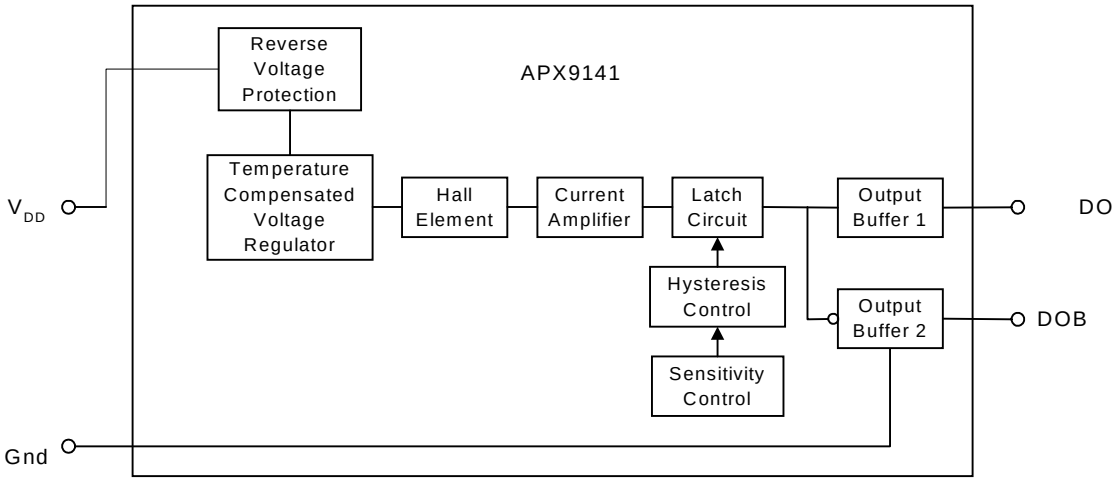
Magnetic Rank
- AT : | Bop , Brp | < 50 Gauss
- A : | Bop , Brp | < 70 Gauss
- B : | Bop , Brp | < 100 Gauss
- D : | Bop , Brp | < 150 Gauss

Package Code
- E : TO - 92M4

Temp. Range
- E : -20 to 85 °C

Handling Code
- PB : Plastic Bag
- TB : Tape & Box
- TR : Tape & Reel

Block Diagram



Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DD}	Supply Voltage	20	V
V_{BD}	Output Breakdown Voltage	55	V
I_{DD}	Supply Current	25	mA
I_{OUT}	Output Current – Continuous Hold Current Peak (Start Up)	400 600 800	mA
P_D	Maximum Power Dissipation	500	mW
T_A	Operating Ambient Temperature	-20 to 85	°C
T_{STG}	Storage Temperature Range	-65 to 150	
T_{SOL}	Soldering Temperature (10 Sec.)	260	

Electrical Characteristics T_A = 25°C, V_{DD}=20V unless otherwise noted

Symbol	Parameter	Test Condition	APX9141			Unit
			Min.	Typ.	Max.	
V_{DD}	Supply Voltage	Operating	3		20	V
V_{SAT}	Output Saturation Voltage	V_{DD}=14V, I_{OUT}=400mA, B>Bop		250	500	mV
I_{DD}	Supply Current	V_{DD}=20V, Output Open		20	25	mA
I_{Leak} [a]	Output Leakage Current	V_{OUT}=20V, V_{DD}=20V, B<Brp		<0.1	10	µA
t_r [b]	Output Rise Time	V_{DD}=14V, R_L=820Ω C_L=20pF		0.8	5	µs
t_f [b]	Output Fall Time			0.1	1	µs
Δt [b]	Switch Time Different			3.5	7	µs

Note [a] : No leakage current spike when IC start-up

[b] : use Figure 1

Magnetic Characteristics T_A = 25°C, V_{DD}=14V unless otherwise noted

Rank	Maximum Operate Point Bop	Maximum Release Point Brp	Unit
AT	+50	-50	Gauss
A	+70	-70	
B	+100	-100	
D	+150	-150	

Note : For 5cm and below DC fan application, grade A/AT device is recommended to avoid magnetic sensitivity problem. For above 5cm DC fan application, grade B device is acceptable for most cases.

Test Information

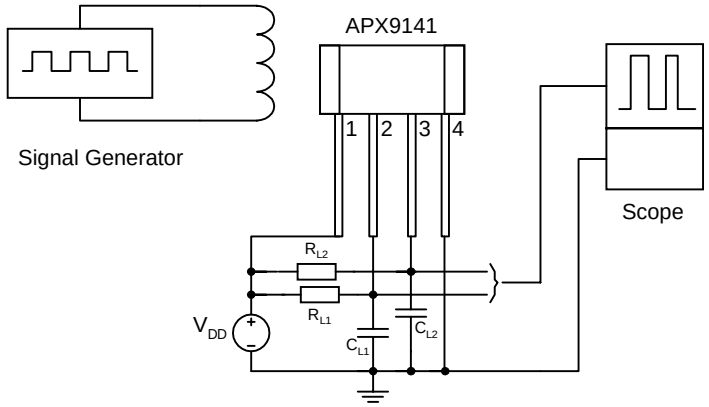


Figure 1 : Switching Circuit for Output Rise Time and Fall Time Measurement

Application Circuit

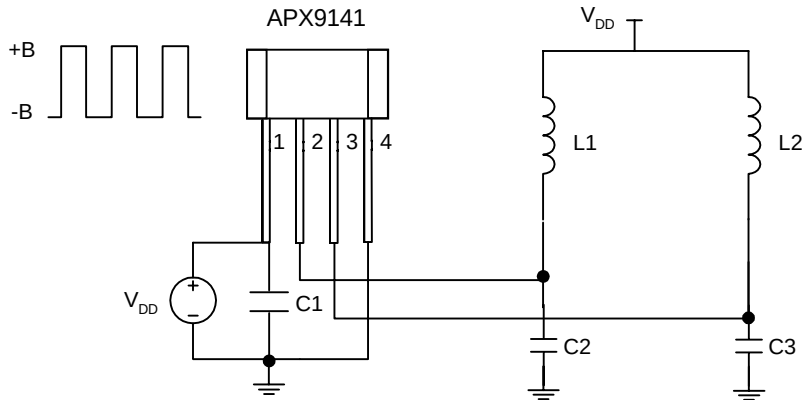
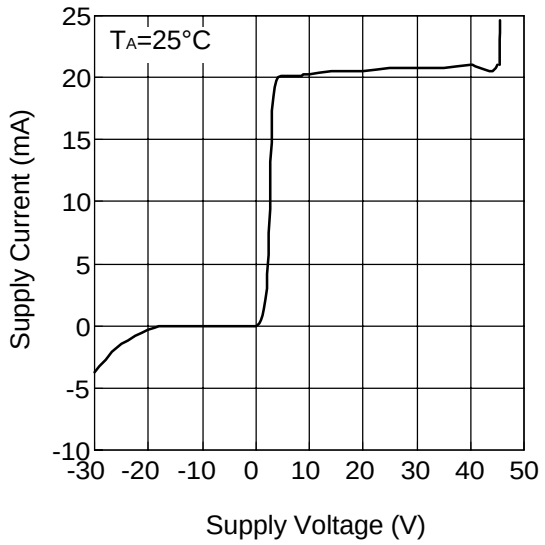


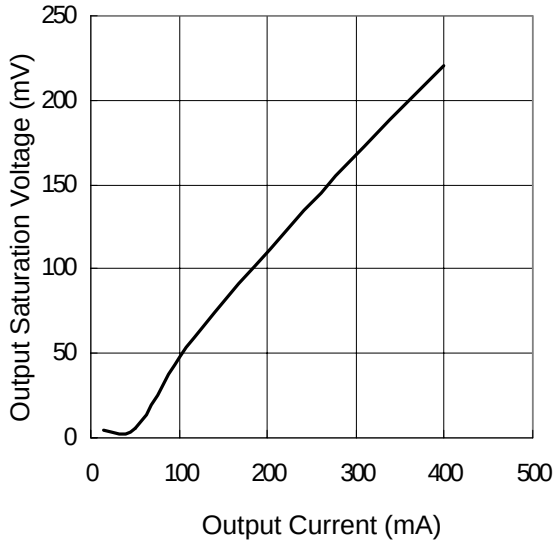
Figure 2 Typical DC brushless fan application circuit

Typical Characteristics

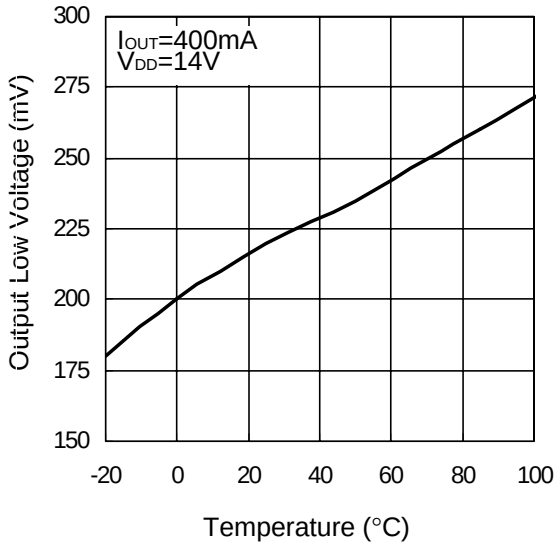
Supply Current vs. Supply Voltage



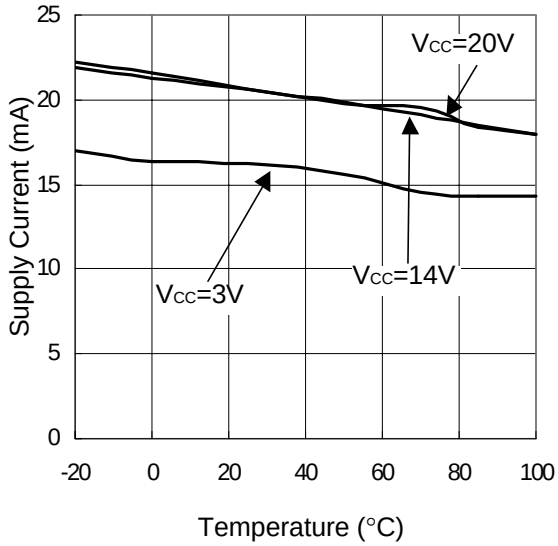
Output Saturation Voltage vs. Output Current



Output Low Voltage vs Ambient Temperature

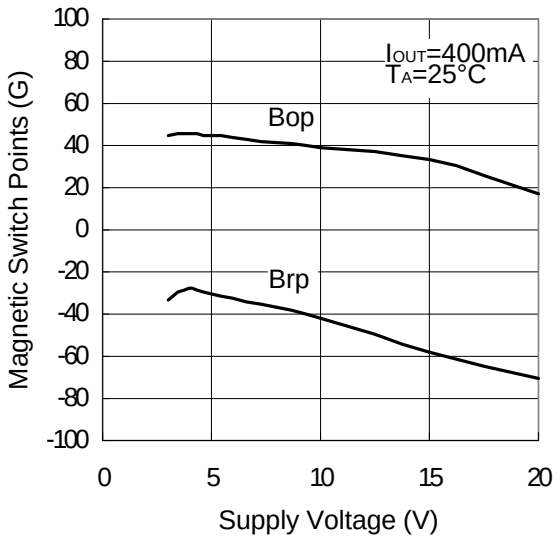


Supply Current vs Temperature

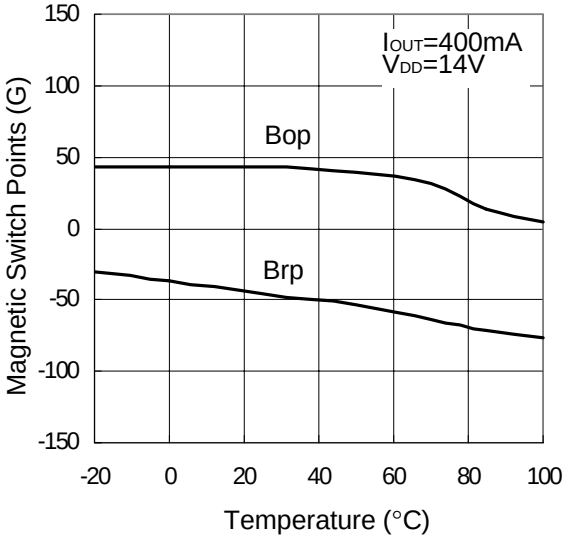


Typical Characteristics (Cont.)

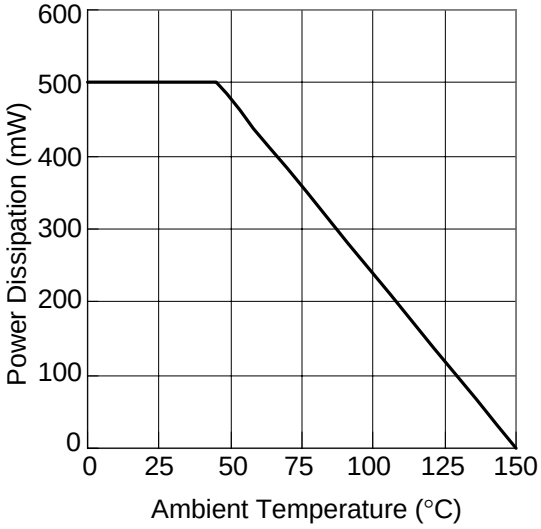
Magnetic Switch Points vs Supply Voltage



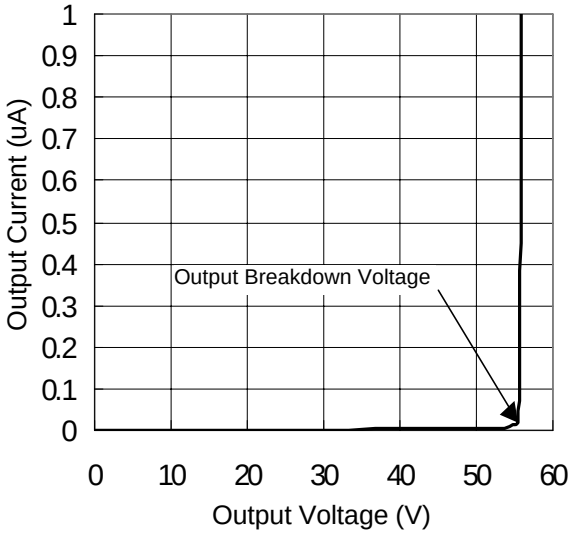
Magnetic Switch Points vs Temperature



Power Dissipation vs. Ambient Temperature

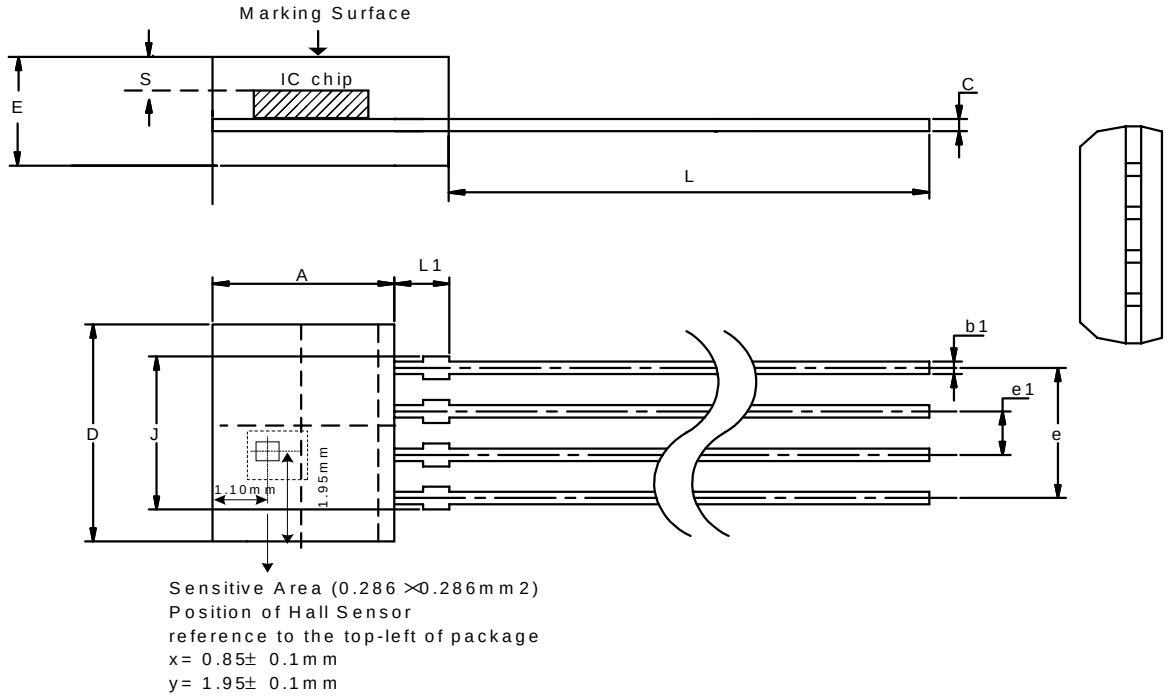


Output Breakdown Voltage vs. Current



Package Information

TO-92M4



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.60	3.70	0.141	0.145
b1	0.35	0.41	0.014	0.016
C	0.351	0.411	0.014	0.016
D	5.17	5.27	0.203	0.207
e	3.78	3.84	0.148	0.150
e1	1.24	1.30	0.049	0.051
E	1.50	1.60	0.059	0.063
J	4.04	4.34	0.158	0.170
L	14.0	15.0	0.549	0.588
L1	1.342	1.542	0.053	0.060
S	0.45	0.55	0.018	0.022

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