APX9140

Hall Effect Sensor IC

Features

- 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

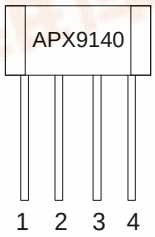
Applications

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

General Description

The APX9140 is an integrated Hall Effect Sensor IC designed for electric commutation of DC brushless motor applications. The APX9140 still can operate at as low as 3 volts. The APX9140 is available in low cost TO -92M package with 3 different magnetic ranks.

Pin Description



Front View

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

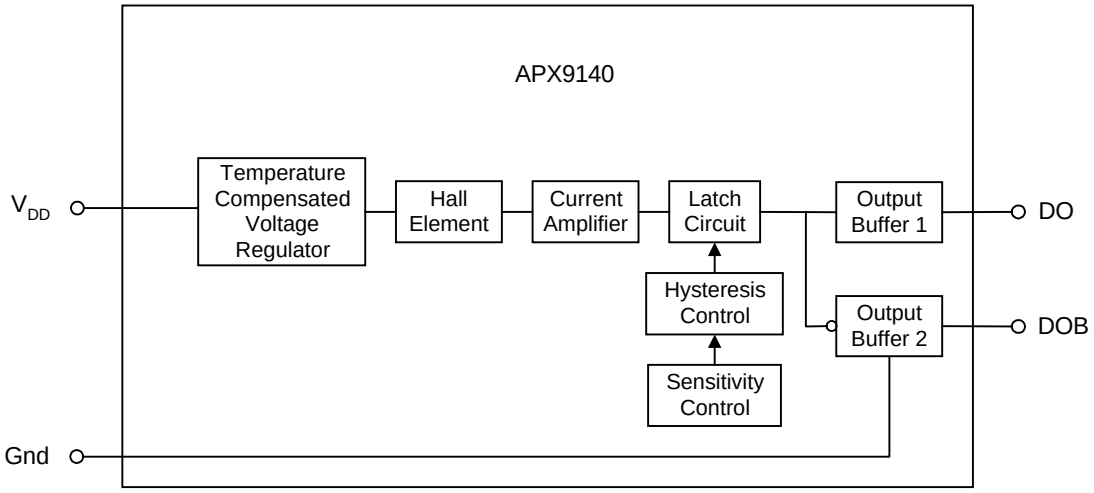
Ordering Information

APX9140 □□□-□□

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

Magnetic Rank
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 ℃
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}=14V unless otherwise noted

Symbol	Parameter	Test Condition	APX9140			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		18	25	mA
I_{Leak}	Output Leakage Current	V_{OUT}=20V, V_{DD}=20V, B<Brp		<0.1	10	µA
t_r [a]	Output Rise Time	V_{DD} =14V, R_L=820Ω C_L=20pF		1.0	5	µs
t_f [a]	Output Fall Time			0.1	1	µs
Δt [a]	Switch Time Different			3.5	7	µs

Notes [a] : 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
A	+70	-70	Gauss
B	+100	-100	
D	+150	-150	

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

Test Information

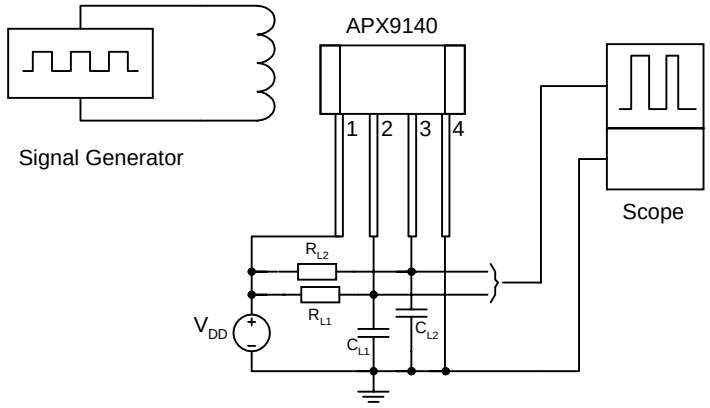


Figure 1 : Switching Circuit for Output Rise Time and Fall Time Measurement

Application Circuit

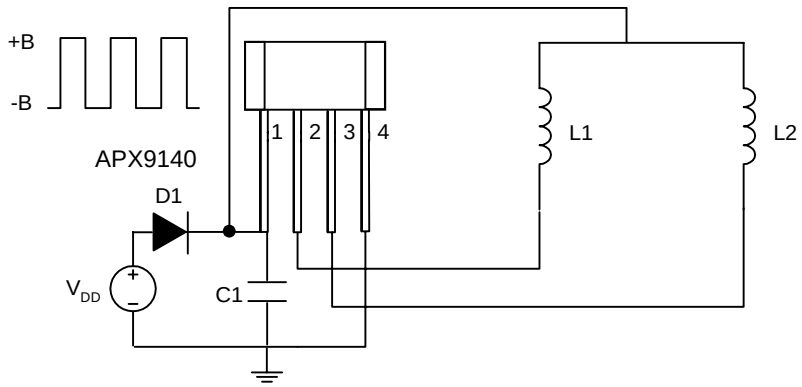
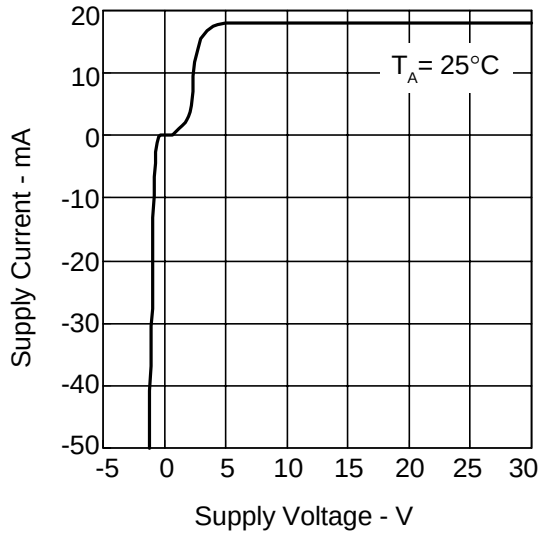


Figure 2 Typical DC brushless fan application circuit

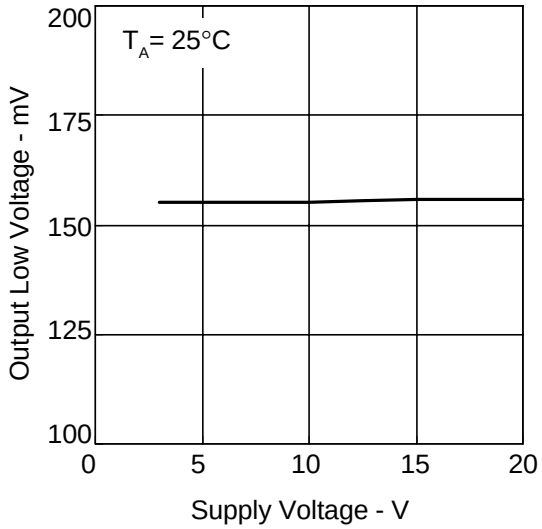
Note: Add diode(D1) for reverse voltage protection and add capacitor (C1) to eliminate high voltage spike into Hall IC.

Typical Characteristics

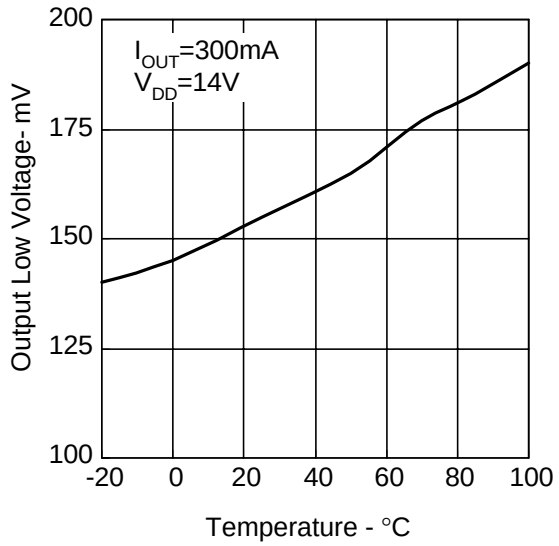
Supply Current Vs Supply Voltage



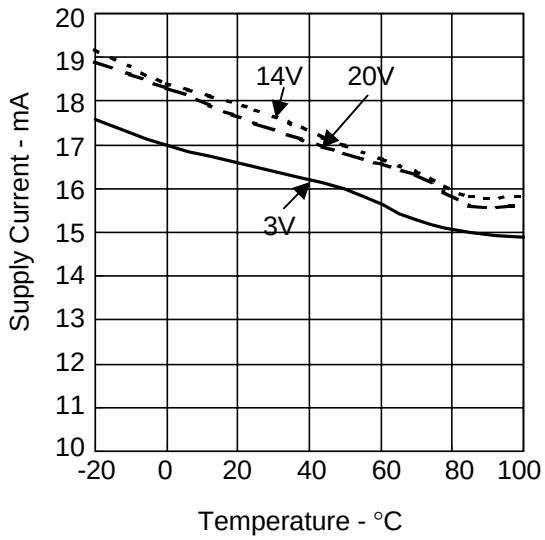
Output Low Voltage Vs Supply Voltage



Output Low Voltage vs Ambient Temperature

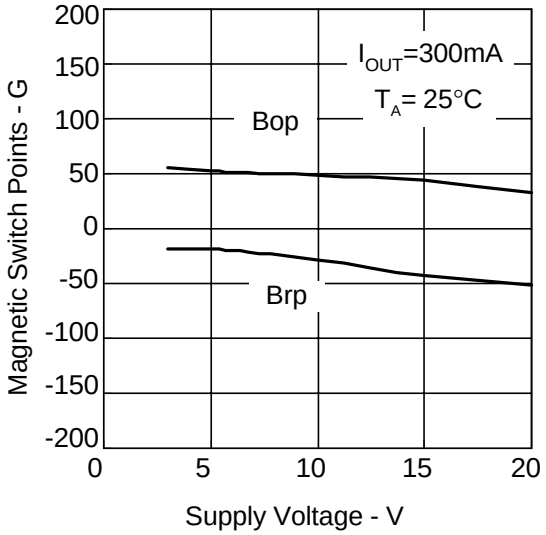


Supply Current vs Temperature

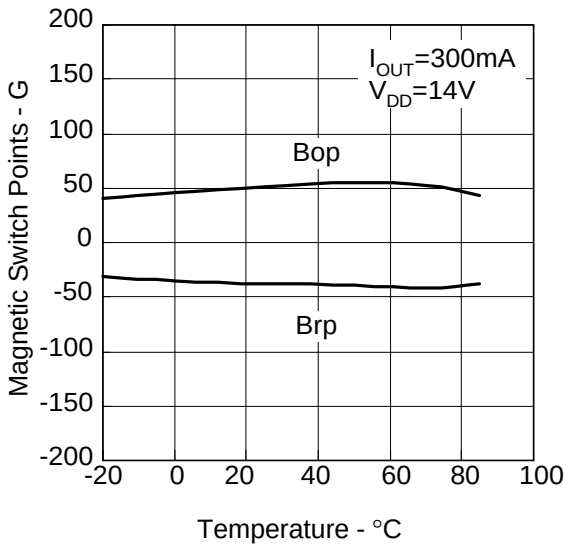


Typical Characteristics (Cont.)

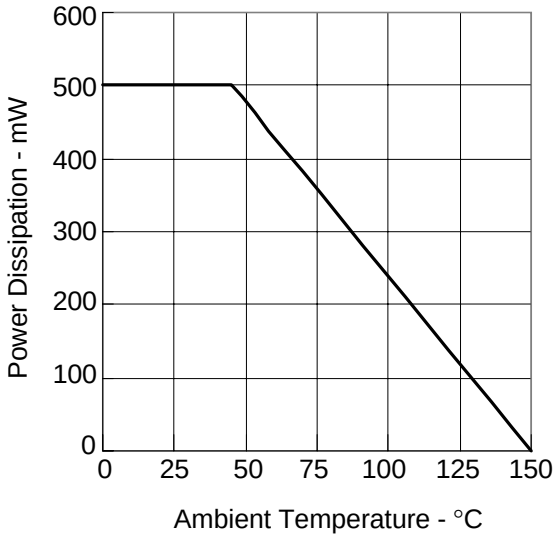
Magnetic Switch Points vs Supply Voltage



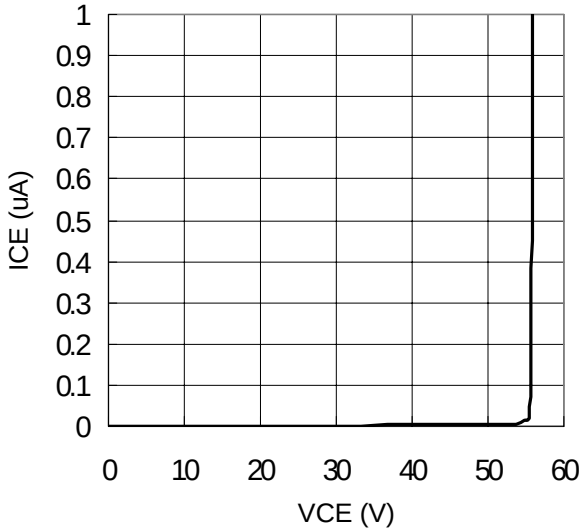
Magnetic Switch Points vs Temperature



Power Dissipation vs. Ambient Temperature

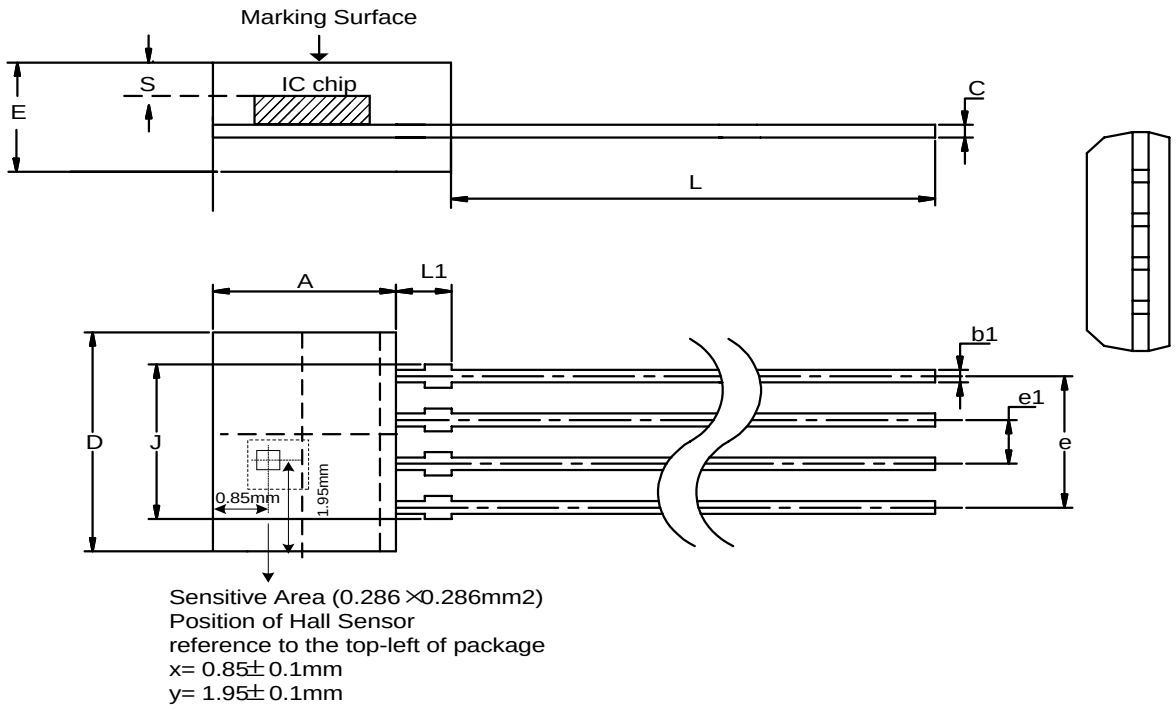


Output Breakdown Voltage



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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