

#### **Features and Benefits**

- Chopper stabilized amplifier stage
- New miniature package / thin, high reliability package
- Operation down to 3.5V
- CMOS for optimum stability, quality and cost

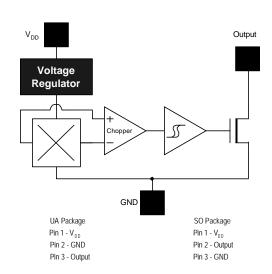
#### **Applications**

- Solid state switch
- Limit switch
- Current limit
- Interrupter
- Current sensing

#### **Ordering Information**

Part No.	Temperature Suffix	Package	Temperature Range
US5881	E	SO or UA	-40°C to 85°C Extended
US5881	L	SO or UA	-40°C to 150°C Automotive
	*Contact factory	or sales representa	tive for legacy temperature options

# **Functional Diagram**



### **Description**

The US5881 is a unipolar Hall effect sensor IC fabricated from mixed signal CMOS technology. It incorporates advanced chopper stabilization techniques to provide accurate and stable magnetic switch points. There are many applications for this sensor in addition to those listed above. The design, specifications and performance have been optimized for applications of solid state switches.

The output transistor will be switched on  $(B_{OP})$  in the presence of a sufficiently strong South pole magnetic field facing the marked side of the package. Similarly, the output will be switched off  $(B_{RP})$  in the presence of a weaker South field and remain off with "0" field. The SOT-23 device is reversed from the UA package. The SOT-23 output transistor will be switched on  $(B_{OP})$  in the presence of a sufficiently strong North pole magnetic field subjected to the marked face.

**Note:** This is a static-sensitive device; please observe ESD precautions. Reverse  $V_{DD}$  protection is not included. For reverse voltage protection, a 100 **W**resistor in series with  $V_{DD}$  is recommended.



# **US5881 Electrical Specifications**

Parameter	Symbol	Test Conditions	Min	Тур	Max	Units
Supply Voltage	$V_{DD}$	Operating	3.5		24	V
Supply Current	I <sub>DD</sub>	B <b<sub>RP</b<sub>	1.5	2.5	4.0	mA
Saturation Voltage	V <sub>DS(on)</sub>	$I_{OUT} = 20 \text{ mA}, B>B_{OP}$		0.4	0.5	V
Output Leakage	l <sub>OFF</sub>	$B < B_{RP}$ , $V_{OUT} = 20V$		0.01	5.0	ìΑ
Output Rise Time	tr	$V_{DD} = 12V$ , $R_L = 1.1K\dot{U}$ , $C_L = 20pf$		0.04		ÌS
Output Fall Time	tr	$V_{DD} = 12V, R_L = 1.1 \text{KÙ}, C_L = 20 \text{pf}$		0.18		ÌS

# **US5881 Magnetic Specifications**

Parameter	Symbol Test Conditions	Min	Тур	Max	Units
Operating Point <sup>3</sup>	Вор	15	25	30	mT
Release Point	B <sub>RP</sub>	9.5	20	-	mT
Hysteresis	B <sub>hys</sub>	2.0	4.3	5.5	mT

#### Notes:

- 1. 1 mT = 10 Gauss.
- 2. The SOT-23 device is reversed from the UA package. The SOT-23 output transistor will be switched on (BOP) in the presence of a sufficiently strong North pole magnetic field subjected to the markedface.
- 3. At -40°C, maximum B<sub>OP</sub> = 35 mT.

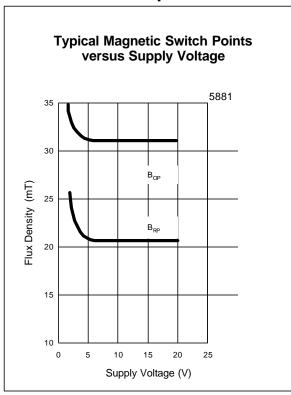
# **Absolute Maximum Ratings**

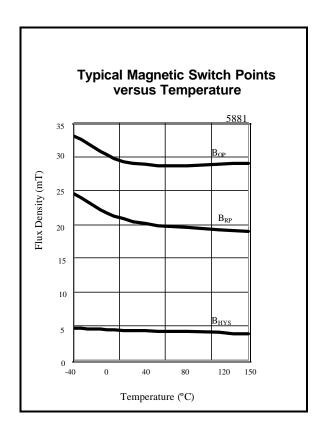
Supply Voltage (Operating), V <sub>DD</sub>	24V			
Supply Current (Fault), IDD	50mA			
Output Voltage, V <sub>OUT</sub>	24V			
Output Current (Fault), IouT	50mA			
Power Dissipation, P <sub>D</sub>	100mW			
Operating Temperature Range, T <sub>A</sub>	-40°C to 150°C			
Storage Temperature Range, T <sub>S</sub>	-65°C to 150°C			
Maximum Junction Temp, T <sub>J</sub>	175°C			
ESD Sensitivity (All Pins)	+/- 4KV			

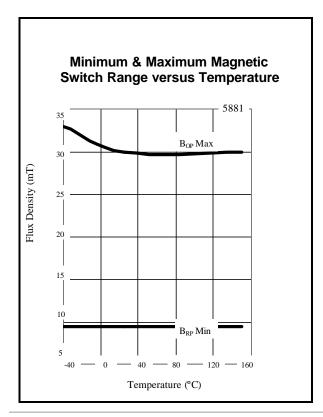
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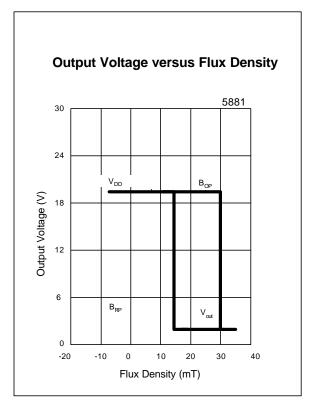


# **Performance Graphs**



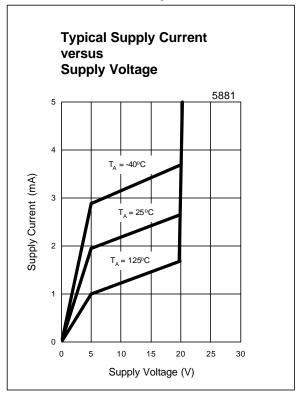


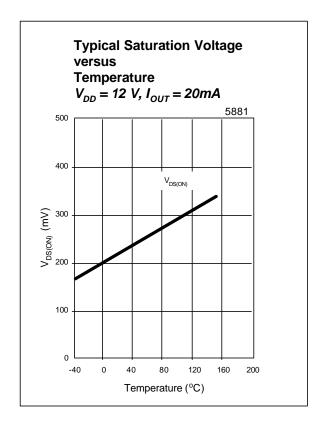


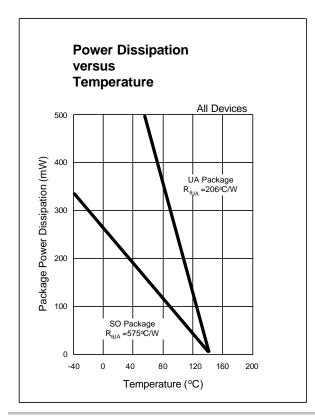


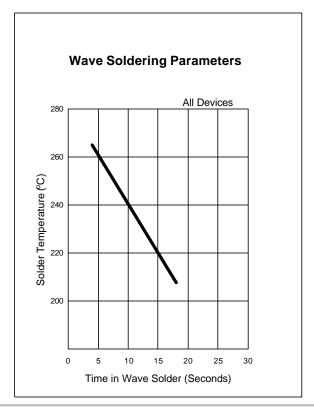


# **Performance Graphs**











# Unique Features CMOS Hall IC Technology

The chopper stabilized amplifier uses switched capacitor techniques to eliminate the amplifier offset voltage, which, in bipolar devices, is a major source of temperature sensitive drift. CMOS makes this advanced technique possible.

The CMOS chip is also much smaller than a bipolar chip, allowing very sophisticated circuitry to be placed in less space. The small chip size also contributes to lower physical stress and less power consumption.

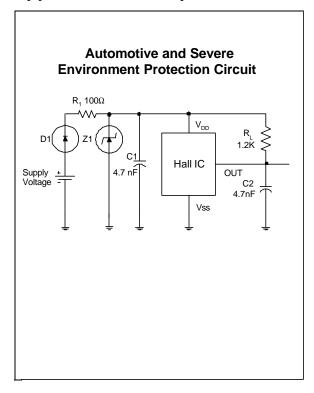
#### Installation

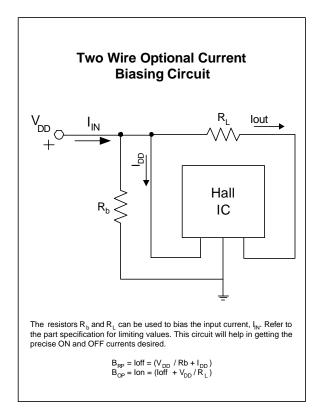
Consider temperature coefficients of Hall IC and magnetics, as well as air gap life time variations. Observe temperature limits during wave soldering.

#### **Application Comments**

If reverse supply protection is desired, use a resistor in series with the  $V_{DD}$  pin. The resistor will limit the supply current (Fault),  $I_{DD}$ , to 50 mA. For severe EMC conditions, use the application circuit below.

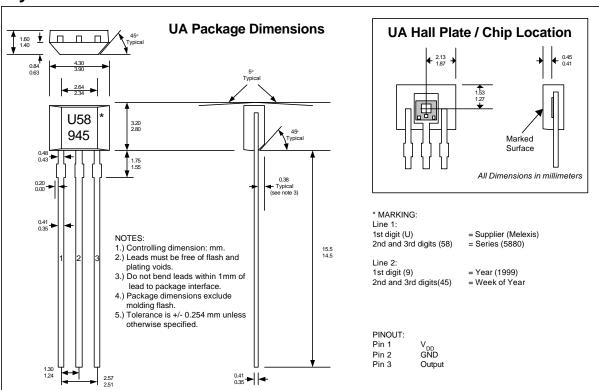
### **Applications Examples**

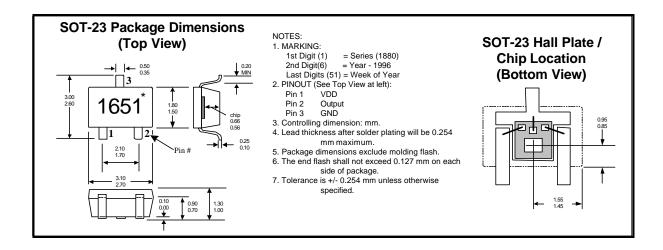






### **Physical Characteristics**





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