

Features and Benefits

- Chopper stabilized amplifier stage
- Optimized for BDC motor applications
- New miniature package / thin, high reliability package
- Operation down to 3.5V
- CMOS for optimum stability, quality, and cost
- Ultra low I_{DD} current

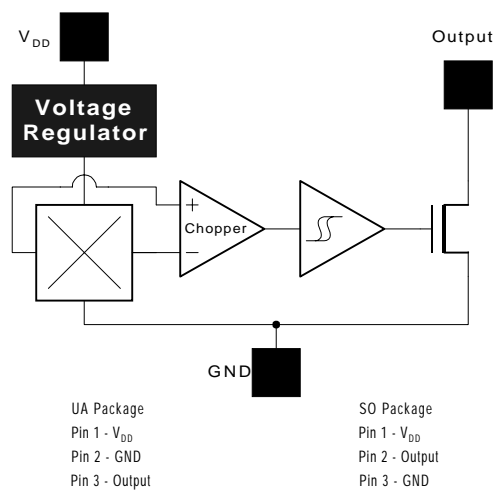
Applications

- Solid state switch
- Brushless DC motor commutation
- Speed sensing
- Linear position sensing
- Angular position sensing
- Current sensing

Ordering Information

| Part No. | Temperature Suffix | Package | Temperature Range |
|-----------------|--------------------|----------|---------------------------|
| US2881 / US2882 | C | SO or UA | 0°C to 70°C Commercial |
| US2881 / US2882 | S | SO or UA | -20°C to 85°C Industrial |
| US2881 / US2882 | E | SO or UA | -40°C to 85°C Extended |
| US2881 / US2882 | K | SO or UA | -40°C to 125°C Severe |
| US2881 / US2882 | L | SO or UA | -40°C to 150°C Full Temp. |

Functional Diagram



Note: Static sensitive device; please observe ESD precautions. Reverse V_{DD} protection is not included. For reverse voltage protection, a 100 Ω resistor in series with V_{DD} is recommended.

Description

The above table provides six selections of Hall effect device sensor ICs, in two package styles, based on guaranteed temperature specifications. The temperature ranges are defined by room temperature (25°C) test guardbands and are not 100% tested at either temperature extreme. Special testing is available as in the case of the MLX series. Contact the Melexis marketing office with any questions. Though there are many other applications for this sensor, the design specifications and performance have been optimized for commutation applications in brushless DC motors and automotive speed sensing.

The output transistor will be latched 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 latched off (B_{RP}) in the presence of a North field. The SOT-23 device is reversed from the UA package. The SOT-23 output transistor will be latched on (B_{OP}) in the presence of a sufficiently strong North pole magnetic field subjected to the marked face.

US2881 and US2882 Electrical Specifications

DC operating parameters: $T_A = 25^{\circ}\text{C}$, $V_{DD} = 12V_{DC}$ (unless otherwise specified).

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|--------------------|--------------|---|-----|------|-----|---------------|
| Supply Voltage | V_{DD} | Operating | 3.5 | | 27 | V |
| Supply Current | I_{DD} | $B < B_{OP}$ | 1.5 | 2.0 | 4.0 | mA |
| Saturation Voltage | $V_{DS(on)}$ | $I_{OUT} = 20\text{ mA}$, $B > B_{OP}$ | | 0.4 | 0.5 | V |
| Output Leakage | I_{OFF} | $B < B_{RP}$, $V_{OUT} = 27V$ | | 0.01 | 5.0 | μA |
| Output Rise Time | t_r | $V_{DD} = 12V$, $R_L = 1.1K\Omega$, $C_L = 20\text{pf}$ | | 0.04 | | μs |
| Output Fall Time | t_f | $V_{DD} = 12V$, $R_L = 1.1K\Omega$, $C_L = 20\text{pf}$ | | 0.18 | | μs |

US2881 Magnetic Specifications

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|-----------------|-----------|-----------------|------|------|------|-------|
| Operating Point | B_{OP} | | 0.5 | 2.0 | 4.5 | mT |
| Release Point | B_{RP} | | -4.5 | -2.0 | -0.5 | mT |
| Hysteresis | B_{hys} | | 3.0 | 4.0 | 5.0 | mT |

US2882 Magnetic Specifications

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|-----------------|-----------|-----------------|------|------|-----|-------|
| Operating Point | B_{OP} | | -2.0 | 2.0 | 6.0 | mT |
| Release Point | B_{RP} | | -6.0 | -2.0 | 2.0 | mT |
| Hysteresis | B_{hys} | | 3.0 | 4.0 | 5.0 | mT |

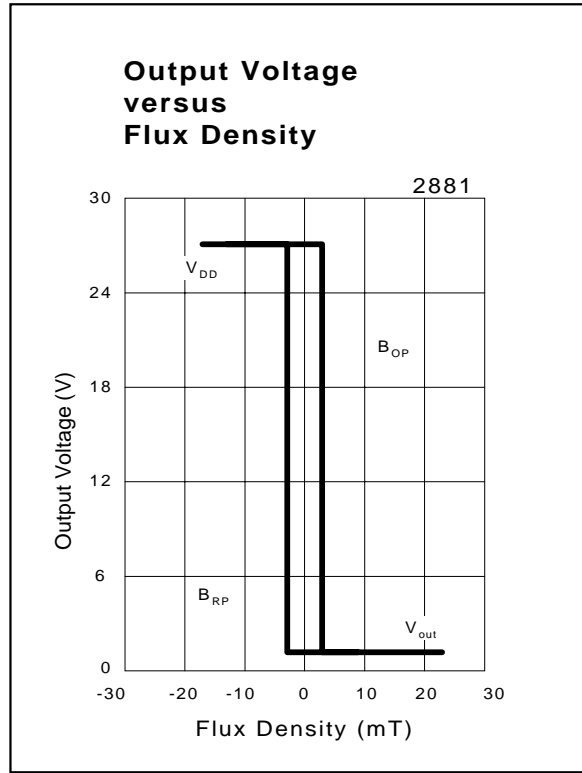
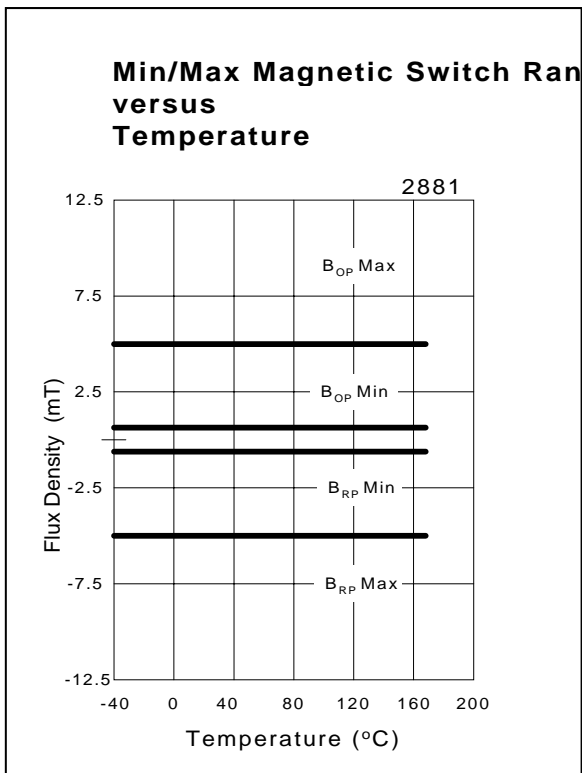
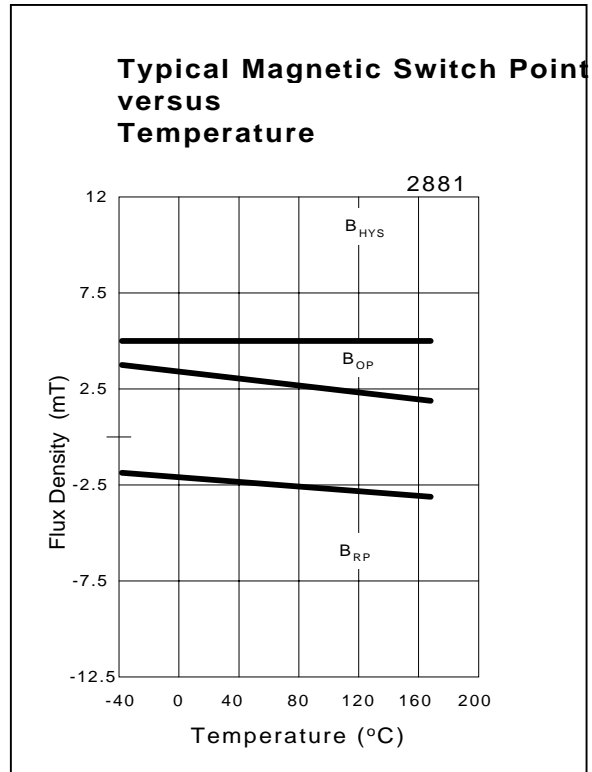
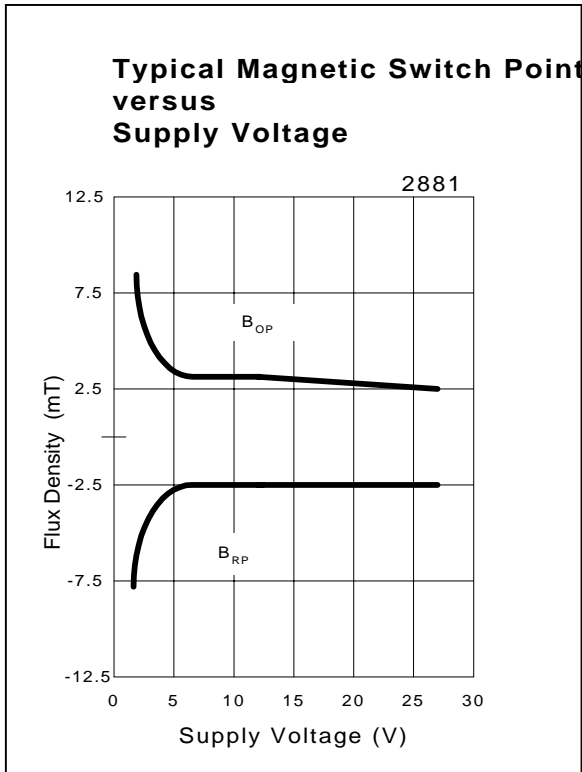
Note: 1 mT = 10 Gauss.

Absolute Maximum Ratings

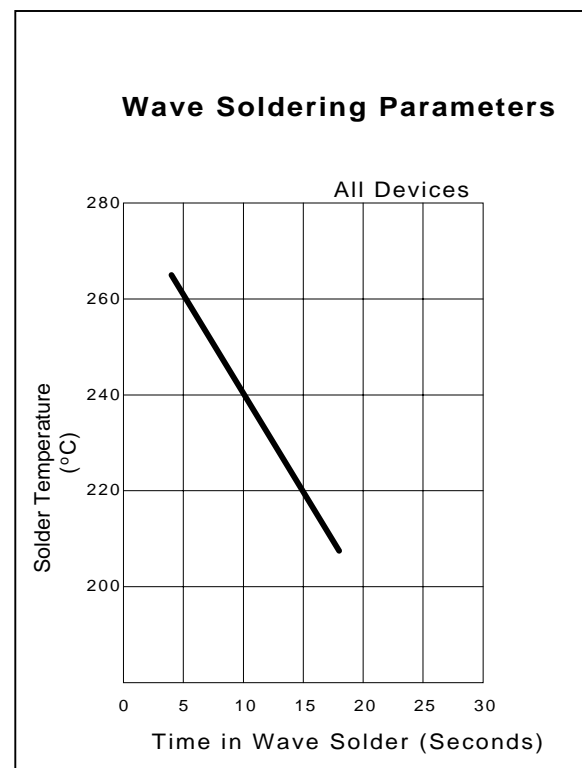
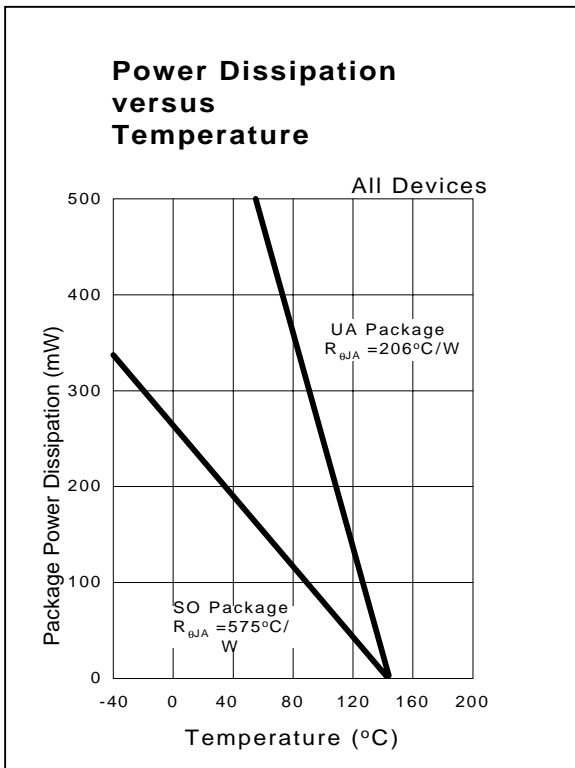
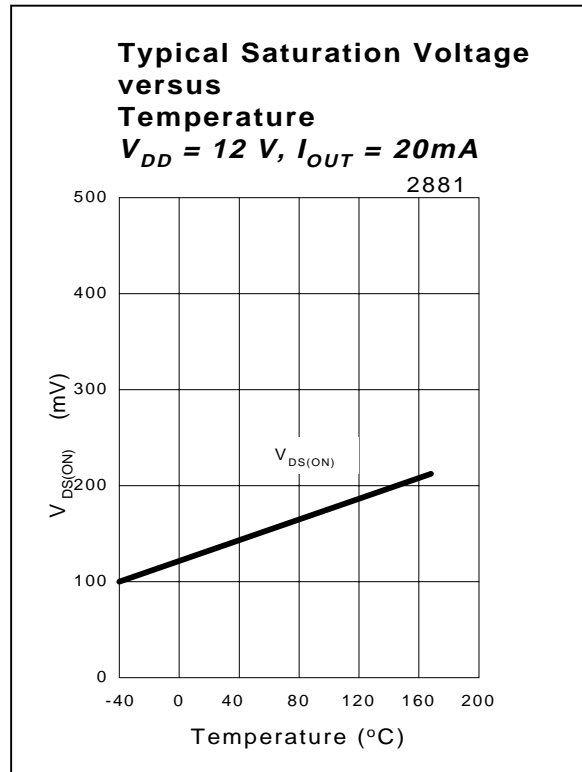
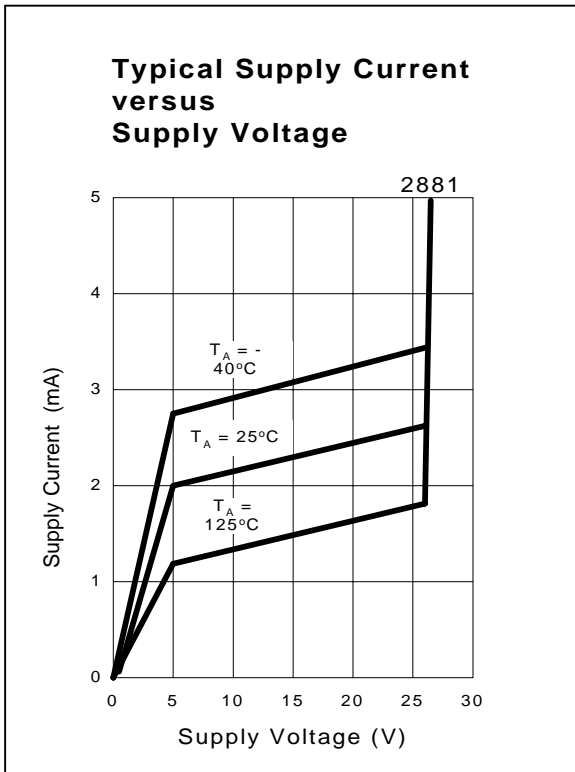
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|--------------------------------------|--------------|
| Supply Voltage (Operating), V_{DD} | 3.5V to 27V |
| Supply Current (Fault), I_{DD} | 50mA |
| Output Voltage, V_{OUT} | 3.5V to 27V |
| Output Current (Fault), I_{OUT} | 50mA |
| Power Dissipation, P_D | 100mW |
| Operating Temperature Range, T_A | -40 to 150°C |
| Storage Temperature Range, T_S | -65 to 150°C |
| Maximum Junction Temp, T_J | 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, using switched capacitor techniques, eliminates 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 the 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 and life time variations. Observe temperature limits during wave soldering.

Application Comments

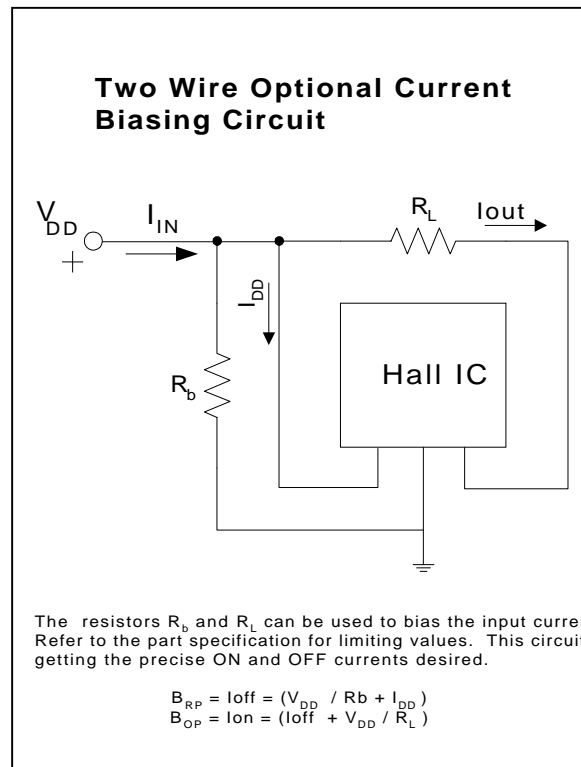
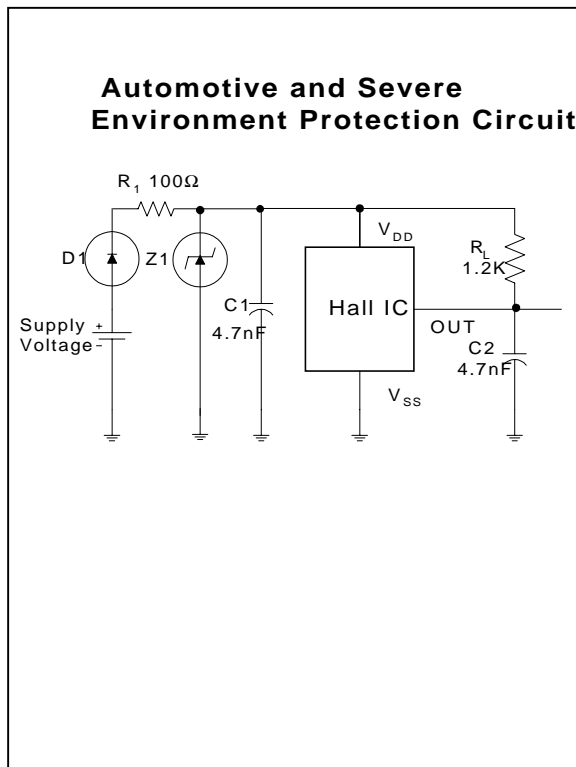
If reverse supply protection is desired, use a resistor in series with the V_{DD} pin. The resistor will limit the Supply Current (Fault), I_{DD} , to 50mA. For severe EMC conditions, use the application circuit below.

Cross Reference

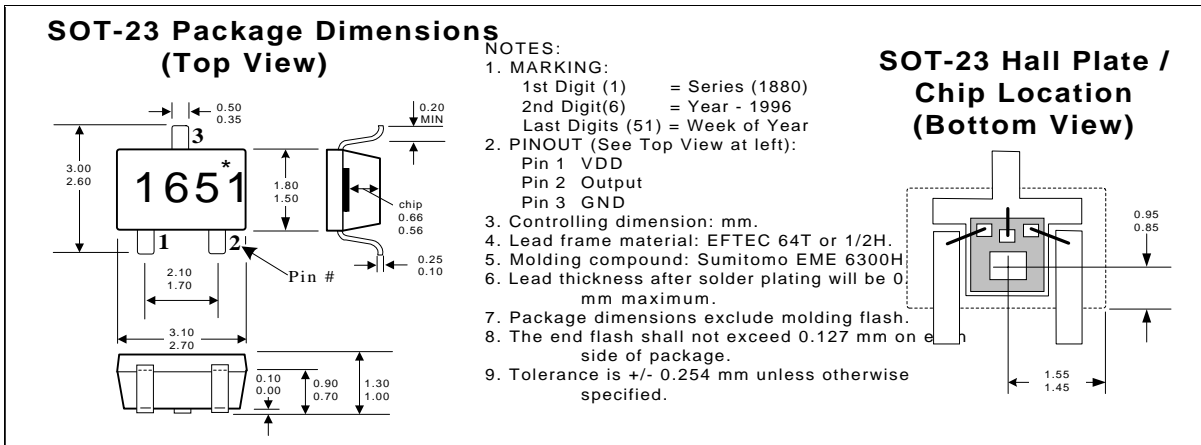
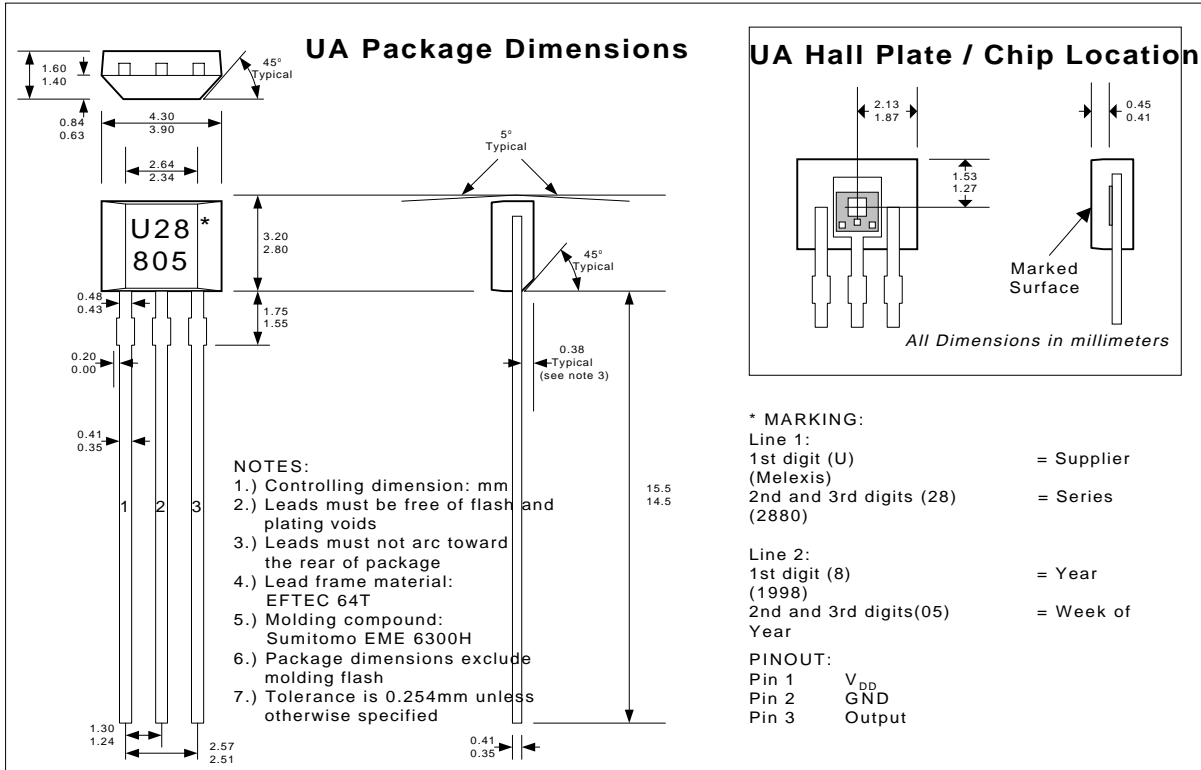
Highly advanced CMOS technology results in a Hall IC small enough to fit inside of a SOT package. Due to its extraordinary small size, the US2881SO series has no equivalent. The US2881UA series can replace the following:

- Allegro & Sprague - UGN3132/33/34UA.
- ITT - HAL105, HAL115, HAL125.
- Honeywell - SS41, SS400 series.
- Siemens - TLE4905/35/45.

Applications Examples



Physical Characteristics



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