

Ultra Low Power Microprocessor Reset Circuit

■ Features

- AEC-Q100 qualified:
 - Device ambient temperature: $-40^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$
 - Device junction temperature: $-40^{\circ}\text{C} \leq T_J \leq 150^{\circ}\text{C}$
- Operation voltage range: 1.0 V to 5.5 V
- Threshold voltage available: 1.1 V to 5 V
- Built-in hysteresis (V_{HYST}): 20 mV (Typ.)
- Reset time delay 23 μs (Typ.)
- Reset pulse width selectable
- Typical 1.3 μA supply current at $V_{\text{RES}} = 1.6 \text{ V}$
- Power supply transient immunity

■ Applications

- Surround view system, front camera
- Automotive gateway
- Radar ECU
- Automotive head unit
- ADAS controller
- Emergency call
- Telematics control unit

■ Package Information

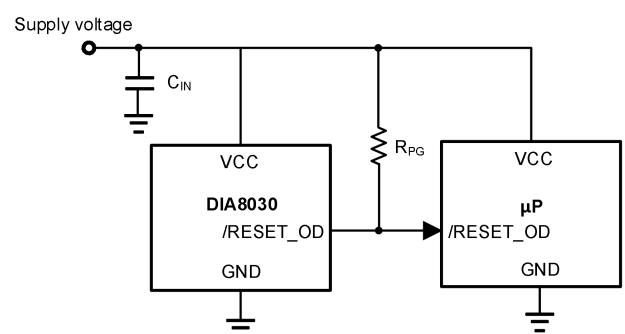
Part Number	Package	Body Size
DIA8030	SOT23-3	2.9 mm × 1.6 mm

■ Description

The DIA8030 device is a low power consumption voltage supervisor and reset IC with high accuracy detection. The device operates with a supply voltage range from 1.0 V to 5.5 V while maintaining very low supply current across the whole V_{CC} and temperature range. The DIA8030 offers flexibility threshold that is available from 1.1 V to 5 V with 0.1 V increments. Reset output signal is asserted when the voltage at V_{CC} drops below the reset threshold (V_{RES}), the reset signal is released once the V_{CC} rises above reset threshold (V_{RES}) and the reset time delay expires. The reset comparator is designed to ignore fast transients on V_{CC} , and the outputs are guaranteed to be in the correct logic state. The DIA8030 is a perfect voltage monitoring solution for automotive applications and battery-powered low-power applications.

The DIA8030 is available in SOT23-3 package. It is specified over ambient temperature range of -40°C to 125°C , which meets the requirements of automotive applications.

■ Simplified Schematic



■ Ordering Information

Ordering Part No.	Top Marking	MSL	RoHS	T _A	Package	
DIA8030AXaaSU3	WAXZ	1	Green	-40 to 125°C	SOT23-3	Tape & Reel, 3000
DIA8030BXaaSU3	WBXZ	1	Green	-40 to 125°C	SOT23-3	Tape & Reel, 3000

Ordering Part No.

Part No.	Open-drain	X: Reset Active Timeout Period	aa: Threshold Voltage ⁽¹⁾	Package code
DIA8030	A: RESET_OD B: RESET_OD	A: 0 ms B: 10 ms C: 51 ms D: 102 ms E: 204 ms F: 300 ms G: 409 ms	11: 1.1 V 12: 1.2 V 16: 1.6 V 26: 2.6 V 27: 2.7 V 28: 2.8 V 30: 3.0 V 31: 3.1 V 40: 4 V 49: 4.9 V	SU3: SOT23-3

Top Marking

W	Open-drain	X: Reset Active Timeout Period	Z: Threshold Voltage ⁽¹⁾
Week	A: RESET_OD B: RESET_OD	A: 0 ms B: 10 ms C: 51 ms D: 102 ms E: 204 ms F: 300 ms G: 409 ms	A: 1.1 V B: 1.2 V C: 1.6 V D: 2.6 V E: 2.7 V F: 2.8 V K: 3.0 V G: 3.1 V H: 4 V J: 4.9 V

For example:

Ordering Part No. = DIA8030AA11SU3 means “DIA8030 + RESET_OD + 0 ms + 1.1 V + SOT23-3”
 Its Top Marking = WAAA

Note:

(1) The threshold voltage ranging from 1.1 V to 5 V (Increased by 0.1 V) are all supported.

If you encounter any issue in the process of using the device, please contact our customer service at Juneketing@dioo.com or phone us at (+86)-21-62116882. If you have any improvement suggestions regarding the datasheet, we encourage you to contact our technical writing team at docs@dioo.com. Your feedback is invaluable for us to provide a better user experience.

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1. Pin Assignment and Functions

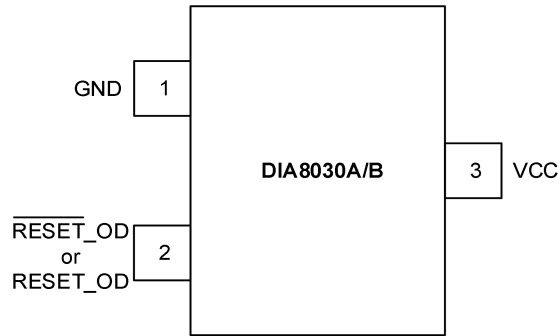


Figure 1. SOT23-3 (Top view)

Pin No.	Name	I/O	Description
1	GND	-	Ground terminal.
2	$\overline{\text{RESET_OD}}$	O	Open-drain output. This output remains low if V_{CC} drops below V_{RES} , and for the setting time length after V_{CC} rises above V_{RES} .
	RESET_OD		Open-drain output. This output remains high if V_{CC} drops below V_{RES} , and for the setting time length after V_{CC} rises above V_{RES} .
3	VCC	I	Analog input. This pin is both the power supply to internal circuit and the voltage to be monitored.

2. Absolute Maximum Ratings

Exceeding the maximum ratings listed under Absolute Maximum Ratings when designing is likely to damage the device permanently. Do not design to the maximum limits because long-time exposure to them might impact the device's reliability. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V _{CC}	Terminal voltage (with respect to GND)	-0.3 to 6.0	V
$\overline{\text{RESET_OD}}$	Terminal voltage (with respect to GND)	-0.3 to 6.0	V
V _{CC}	Input current	20	mA
$\overline{\text{RESET_OD}}$	Input current	20	mA
T _A	Operating temperature	-40 to 125	°C
T _L	Lead temperature range (soldering 10 s)	300	°C
T _{STG}	Storage temperature	-65 to 150	°C

3. Recommended Operating Conditions

Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V _{CC}	Supply voltage	1 to 5.5	V
T _A	Operating free-air temperature	-40 to 125	°C

4. ESD Ratings

When a statically-charged person or object touches an electrostatic discharge sensitive device, the electrostatic charge might be drained through sensitive circuitry in the device. If the electrostatic discharge possesses sufficient energy, damage might occur to the device due to localized overheating.

Model	Condition	Value	Unit
HBM	ANSI/ESDA/JEDEC JS-001	±4500	V

5. Thermal Considerations

The thermal resistance determines the heat insulation property of a material. The higher the thermal resistance is, the lower the heat loss. Accumulation of heat energy degrades the performance of semiconductor components.

Symbol	Metric	Value	Unit
R _{θJA}	Junction-to-ambient thermal resistance	300	°C/W

6. Electrical Characteristics

The values are obtained under these conditions unless otherwise specified: typical values at $V_{CC} = 1.8\text{ V}$, $T_A = 25^\circ\text{C}$.

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$V_{CCMAX}^{(1)}$	Maximum input voltage				5.5	V
$V_{CCMIN}^{(1)}$	Minimum input voltage		1.0			V
I_{VCC}	Supply current	$V_{RES} = 1.6\text{ V}$		1.3		μA
$V_{RES}^{(1)}$	Reset threshold voltage	$T_A = 25^\circ\text{C}$	1.1		5	V
	Reset threshold voltage accuracy	$V_{RES} = 1.1\text{ to }1.5\text{ V}$	-14		14	mV
		$V_{RES} = 1.6\text{ to }5\text{ V}$	-1		1	%
V_{HYST}	Reset threshold hysteresis			20		mV
	V_{CC} to $\overline{\text{RESET_OD}}$ delay	V_{CC} transitions from $(V_{RES} + 0.1)\text{ V}$ to $(V_{RES} - 0.1)\text{ V}$		23		μs
t_{RP}	Reset active timeout period	DIA8030AA/ BA		0		ms
		DIA8030AB/ BB		10		
		DIA8030AC/ BC		51		
		DIA8030AD/ BD		102		
		DIA8030AE/ BE		204		
		DIA8030AF/ BF		300		
		DIA8030AG/ BG		409		
$V_{OL}^{(1)}$	$\overline{\text{RESET_OD}}$ output voltage low	$V_{CC} = 1.55\text{ V}$, $V_{RES} = 1.6\text{ V}$, $I_{SINK} = 1\text{ mA}$			0.3	V

Note:

- (1) Guaranteed by design.
- (2) Specifications subject to change without notice.

7. Block Diagram

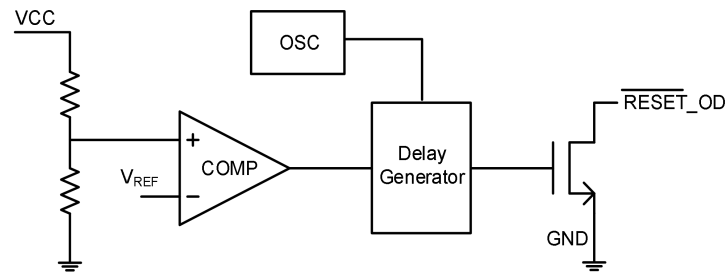


Figure 2. Block diagram ($\overline{\text{RESET_OD}}$)

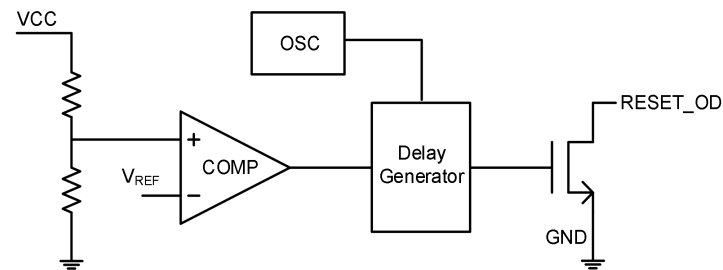


Figure 3. Block diagram (RESET_OD)

8. Function Description

A microprocessor's (μP 's) reset input starts the μP in a known state. The DIA8030 asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. The device consists of a comparator, a low current high precision voltage reference, a voltage divider, an output delay circuit, and an output driver. The DIA8030 has an active-low (or active-high) reset output to assert a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for the setting time length after V_{CC} has risen above the reset threshold.

The DIA8030 has an open-drain output which requires an external pull-up resistor connected to power supply. This feature offers high flexibility to reset systems with various supply voltages. The reset comparator is designed to ignore fast transients on V_{CC} , and the outputs are guaranteed to be in the correct logic state for V_{CC} down to 1.0 V over the temperature range.

The operation of the device (e.g. $\overline{\text{RESET_OD}}$) can be best understood by referring to Figure 4.

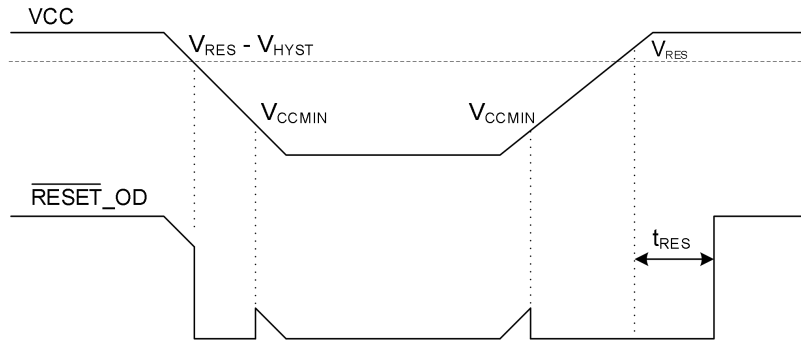


Figure 4. Reset timing ($\overline{\text{RESET_OD}}$)

High-accuracy reference

The comparator in DIA8030 has a bandgap reference of 0.8 V. The bandgap reference provides a stable reference voltage that is relatively independent of temperature, making it ideal for use in high-precision voltage regulators.

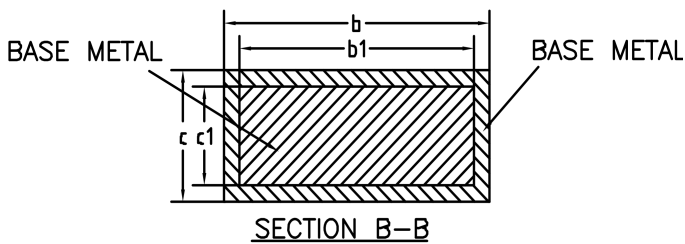
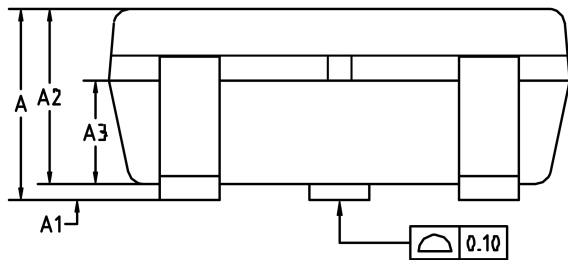
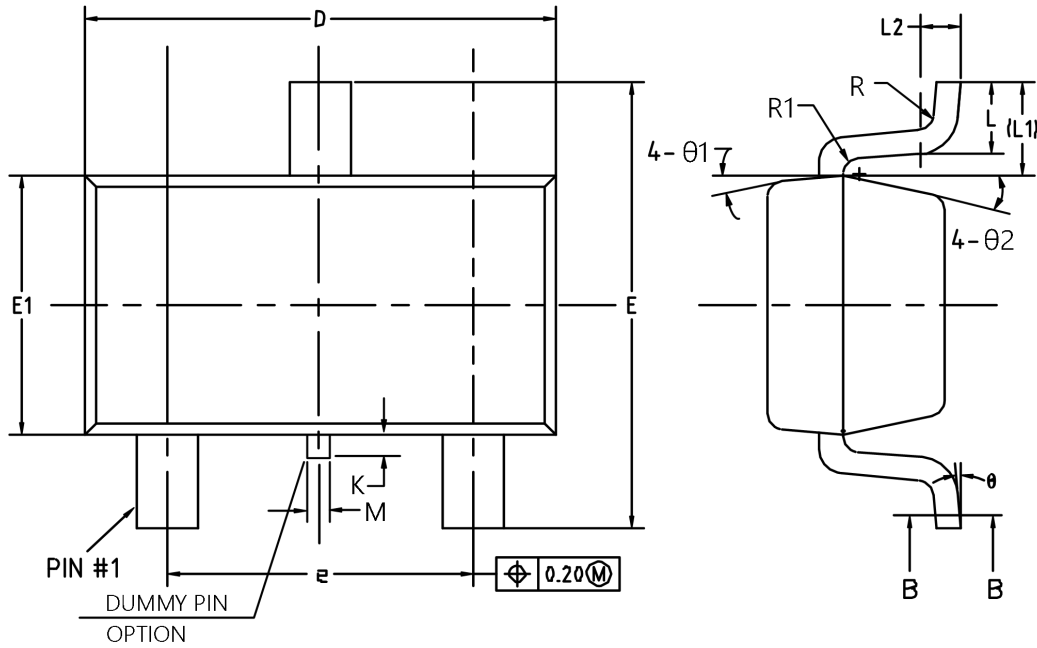
9. Application Information

Important notice: Validation and testing are the most reliable ways to confirm system functionality. The application information is not part of the specification and is for reference purposes only.

Negative-going V_{CC} transients

In addition to issuing a reset to the μP during power-up, power-down, and brownout conditions, the DIA8030 series is relatively immune to short-duration negative-going V_{CC} transients (glitches). As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, a V_{CC} transient that goes 100 mV below the reset threshold and lasts approximately 20 μs or less will not cause a reset pulse. A 0.1 μF bypass capacitor mounted as close as possible to the VCC pin provides additional transient immunity.

10. Physical Dimensions: SOT23-3



Common Dimensions (Units of measure = Millimeter)			
Symbol	Min	Nom	Max
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.34	-	0.45
b1	0.34	0.38	0.41
c	0.12	-	0.20
c1	0.12	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.700
e	1.80	1.90	2.00
K	0	-	0.20
L	0.30	0.40	0.60
L1	0.59 REF		
L2	0.25 BSC		
M	0.10	0.15	0.20
R	0.05	-	0.20
R1	0.05	-	0.20
θ	0°	-	8°
θ1	8°	10°	12°
θ2	10°	12°	14°

Disclaimer

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