



To Customer: _____

Temperature Compensated Crystal Oscillator (TCXO)

INS9A8804

Datasheet

Document Version 1.0

Released on November 16th, 2023

Ordering Information

| Manufacture Part Number | Product Name | Description |
|-------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| INS9A8804-6BWY000N00SA | INS9A8804 | SMD3225, $\pm 5\text{ppm}$ @ $-40^{\circ}\text{C} \sim +90^{\circ}\text{C}$ $\pm 20\text{ppm}$ @ $+90^{\circ}\text{C} \sim +105^{\circ}\text{C}$ |
| | | |

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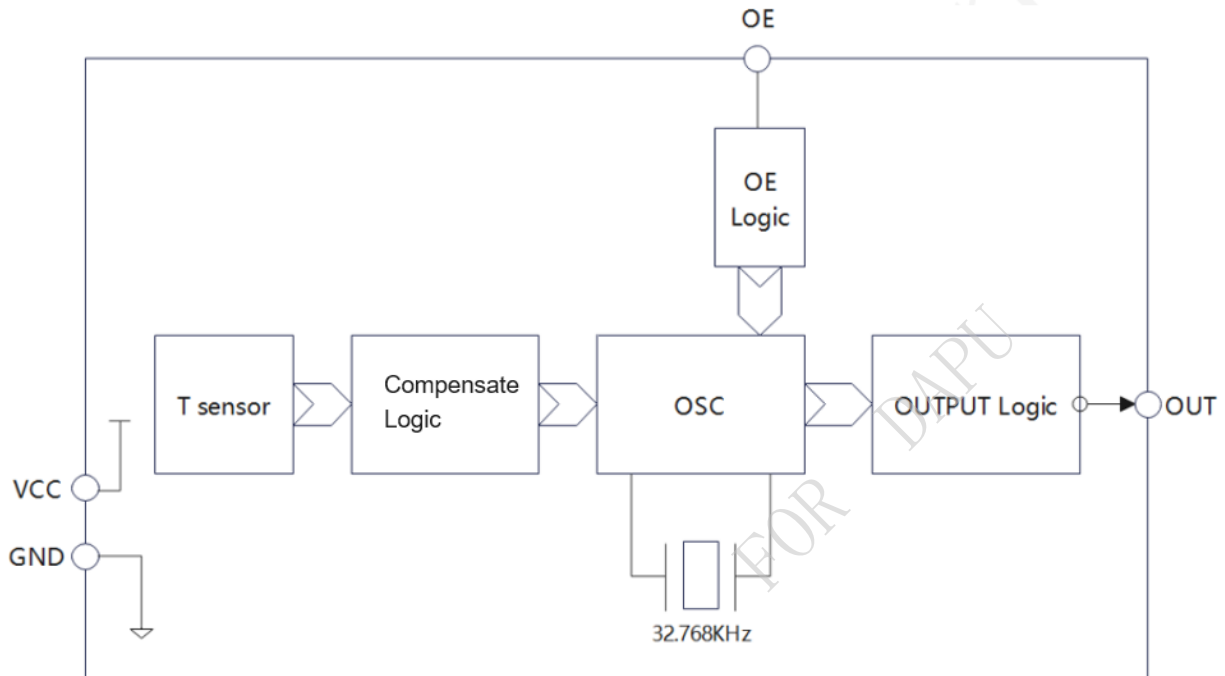
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Key Features

- Low current consumption: 1.8uA (Typ.)
- High stability:
 - ±5ppm @ -40°C~+90°C
 - ±20ppm @ +90°C~+105°C
- Power Supply Voltage: 1.8V~5.5V
- Operation Temperature Range: -40°C~+105°C
- Package: 3.2mm × 2.5mm × 0.9mm
- AEC-Q100 Compliant
- RoHS2.0 & REACH compliant

Block Diagram



Overview

INS9A8804 is a low power consumption and wide temperature range TCXO. The SMD3225 package with only 0.9mm thickness and AEC-Q100 compliant makes it suitable for automotive applications.



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1 Pin definition

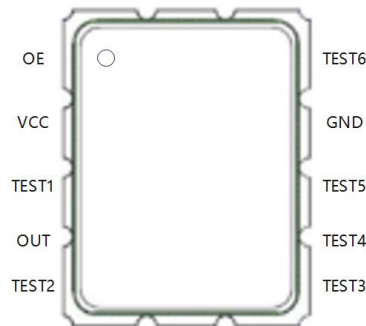


Table1. Pin Definition

| Pin Number | Pin Name | I/O | Description |
|------------|-----------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | OE | In | OUT control pin. “1”- enable OUT, “0”-OUT Hi-Z. OE pin is active HIGH input, Do not leave floating. |
| 2 | V _{cc} | - | Power supply |
| 3 | TEST1 | - | For manufacture test, suggest to connect to GND or keep floating. If this pin connects to VCC, the power consumption will increase to about 8uA. |
| 4 | OUT | Out | Frequency output (CMOS). Controlled by OE. |
| 5 | TEST2 | - | For manufacture test, connect to GND. |
| 6 | TEST3 | - | For manufacture test, connect to GND or keep floating. |
| 7 | TEST4 | - | For manufacture test, connect to GND. |
| 8 | TEST5 | - | For manufacture test, connect to GND or keep floating. |
| 9 | GND | - | Ground |
| 10 | TEST6 | - | For manufacture test, connect to GND or keep floating. |



2 Electrical Characteristics

2.1 Absolute Maximum Ratings

Table2. Absolute Maximum Ratings

| Parameter | Symbol | Value | | | Unit | Notes |
|----------------------|------------------|---------|------|----------------------|------|-------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | V _{cc} | -0.3 | | 6.5 | V | |
| Input Voltage | V _{IN} | GND-0.3 | | 6.5 | V | OE |
| Output Voltage | V _{OUT} | GND-0.3 | | V _{DD} +0.3 | V | OUT |
| Storage temperature | T _{STG} | -55 | | 125 | °C | |

2.2 Recommended Operating Conditions

Table3. Recommended Operating Conditions

| Parameter | Symbol | Value | | | Unit | Notes |
|-----------------------|-------------------|-------|------|------|------|----------------------------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | V _{CC} | 1.8 | 3.0 | 5.5 | V | |
| Current consumption | I _{DD} | | 1.8 | | uA | @25°C, V _{CC} =3V |
| Operation temperature | T _{OPR} | -40 | 25 | 105 | °C | |
| Output Load | L _{CMOS} | | | 30 | pF | |

Note 1: After power off, ensure that V_{CC}=GND for more than 10 seconds before next power on cycle.

2.3 Frequency Characteristics

Table4. Frequency Characteristics

| Parameter | Symbol | Value | | | Unit | Notes |
|------------------------|------------------|-------|--------|------|------|-----------------------------------|
| | | Min. | Typ. | Max. | | |
| Output Frequency | f _{out} | - | 32.768 | - | kHz | |
| Frequency stability | Δf/f | -5 | | +5 | ppm | -40°C~+90°C |
| Frequency stability | Δf/f | -20 | | +20 | ppm | +90°C~+105°C |
| Frequency vs voltage | f-vcc | -1 | | +1 | ppm | V _{cc} =1.8V~5.5V |
| Oscillation start time | t _{STA} | | | 1 | s | @25°C, V _{cc} =3V |
| | | | | 3 | | @-40°C~105°C, V _{cc} =3V |
| Year Aging | f _a | -5 | | +5 | ppm | @25°C, First year |



| Parameter | Symbol | Value | | | Unit | Notes |
|----------------|-----------|-------|------|------|------|-------|
| | | Min. | Typ. | Max. | | |
| OUT duty cycle | $t_{w/t}$ | 40 | 50 | 60 | % | |

2.4 DC Characteristics

Table5. DC Characteristics

| Parameter | Symbol | Value | | | Unit | Notes | |
|------------------------------|-----------|--------------|------|--------------|------|--------------------------------|----------------------------------------|
| | | Min. | Typ. | Max. | | | |
| Average Current consumption1 | I_{CC1} | | 1.9 | 26 | uA | $V_{CC}=5.0V$ | OE=GND, OUT: Hi-Z |
| Average Current consumption2 | I_{CC2} | | 1.8 | 25 | | $V_{CC}=3.0V$ | |
| Average Current consumption3 | I_{CC3} | | 4.8 | 30 | uA | $V_{CC}=5.0V$ | OE= V_{CC} , OUT:32.768kHz, no load; |
| Average Current consumption4 | I_{CC4} | | 2.8 | 28 | | $V_{CC}=3.0V$ | |
| High-level input voltage | V_{IH} | $0.8*V_{CC}$ | | V_{CC} | V | OE pin | |
| Low-level input voltage | V_{IL} | GND-0.3 | | $0.2*V_{CC}$ | V | | |
| High-level output voltage | V_{OH1} | 4.0 | | 5.0 | V | $V_{CC}=5.0V, I_{OH}=-1mA$ | OUT pin |
| | V_{OH2} | 2.2 | | 3.0 | | $V_{CC}=3.0V, I_{OH}=-1mA$ | |
| Low-level output voltage | V_{OL1} | GND | | GND+0.5 | V | $V_{CC}=5.0V, I_{OL}=1mA$ | OUT pin |
| | V_{OL2} | GND | | GND+0.8 | | $V_{CC}=3.0V, I_{OL}=1mA$ | |
| Input leakage current | I_{LK} | -0.5 | | 0.5 | uA | OE pin, $V_{IN}=V_{CC}$ or GND | |



3 Reflow Soldering Curve

Standard: IPC/JEDEC J-STD-020

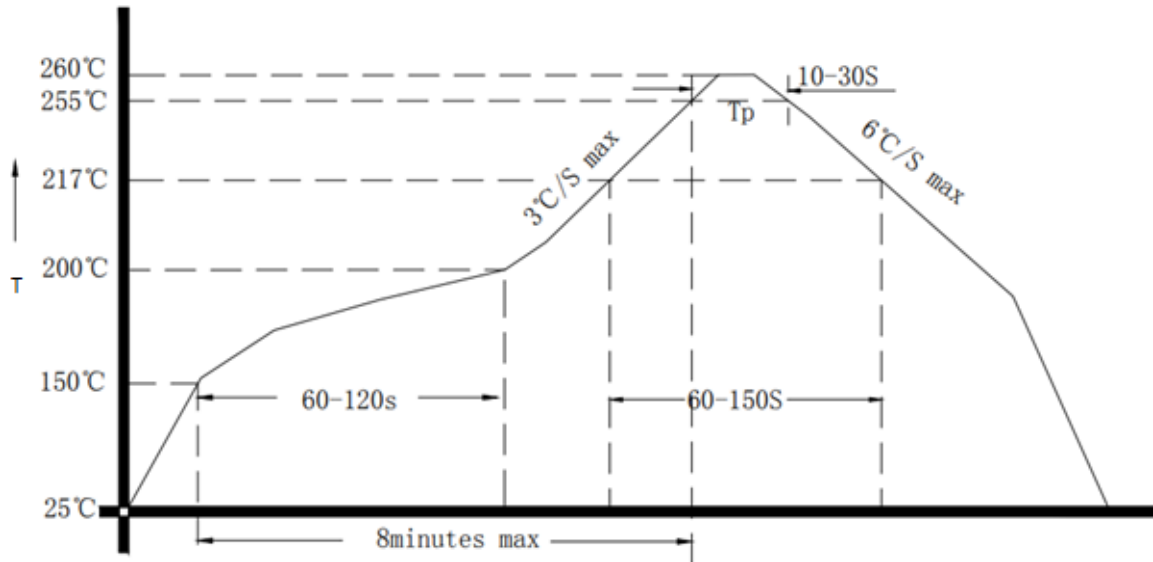
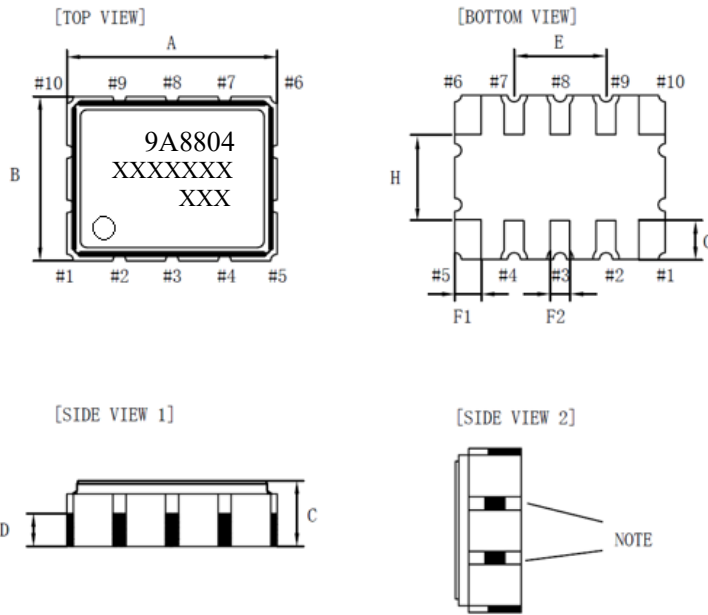


Figure 1. Reflow Soldering Curve

Note: It is suggested to solder IC under the condition shown in the curve above. Must pay attention to the temperature and time when manual soldering, if the temperature over +260°C, or you will make the xo performance bad, even damage it.

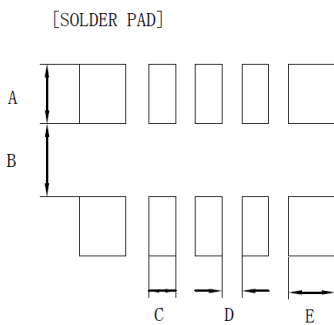


4 Dimensions



| Dimension | Min. | Typ. | Max. |
|-----------|------|------|------|
| A | 3.1 | 3.2 | 3.3 |
| B | 2.4 | 2.5 | 2.6 |
| C | 0.8 | 0.9 | 1.0 |
| D | -- | 0.45 | -- |
| E | -- | 1.4 | -- |
| F1 | -- | 0.4 | -- |
| F2 | -- | 0.3 | -- |
| G | -- | 0.6 | -- |
| H | -- | 1.3 | -- |

unit: mm



| Dimension | Recommend |
|-----------|-----------|
| A | 0.9 |
| B | 1.1 |
| C | 0.4 |
| D | 0.3 |
| E | 0.7 |

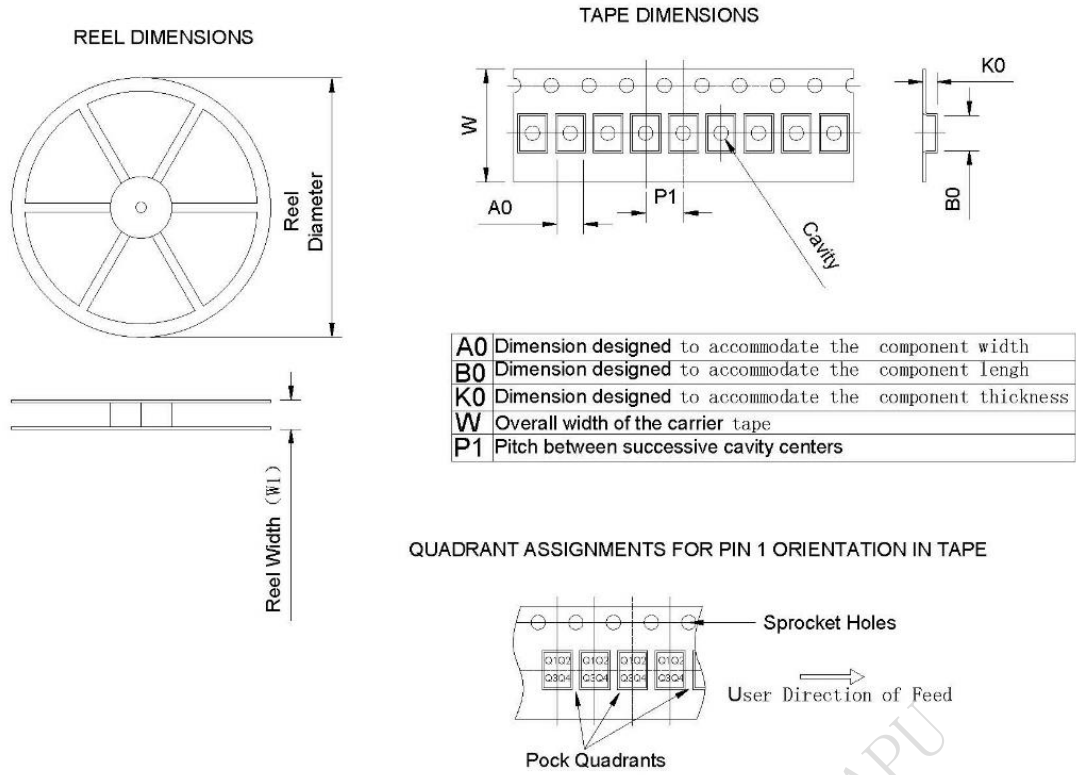
unit: mm

Note: The metal surface on the side shown in the figure is used for crystal test. Please avoid short circuit caused by contact between the metal surface and other electrical networks or other device surfaces during design and assembly.

Figure 2. Recommended Solder Pad and Dimensions



5 Package



| Device | Package Type | Pins | SPQ | Reel Diameter (mm) | Reel Width W1(mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | PIN1 Quadrant |
|-----------|--------------|------|------|--------------------|-------------------|---------|---------|---------|---------|--------|---------------|
| INS9A8804 | Ceramic | 10 | 3000 | 180 | 11.6±2.0 | 3.00 | 3.70 | 1.50 | 4 | 8.00 | Q1 |

Figure 3. Package



6 Revision History

| Version | Change Contents | Prepared by | RevisedDate |
|---------|-----------------|-------------|-------------|
| V1.0 | First issued | | 2023.11.16 |
| | | | |
| | | | |

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