## I²C-Bus Programmable Crystal Oscillator (SPXO)

**Output: LV-PECL**

# SG-8506CA

- Frequency range : 50 MHz to 800 MHz
- Supply voltage : 2.5 V to 3.3 V
- External dimensions : 7.0 × 5.0 × 1.5 mm (8 pins)

Features
- User-specified one startup frequency, 7-bit I²C
- User Programming: I²C Interface
- High frequency fundamental tone crystal, Low jitter PLL technology
- Available field oscillator programmer "SG-Writer Ⅱ"

Application
- OTN, BTS, Test Instrument

*The I2C-Bus is a trademark of NXP Semiconductors

Pb Free RoHS Compliant

**Product Number (please contact us)**
**X1G005031xxxx00**

Actual size

## Specifications (characteristics)

| Item | Symbol | Specifications | Conditions / Remarks |
|---|---|---|---|
| Output frequency range | $f_0$ | 50 MHz to 800 MHz | It can be changed by I²C |
| Supply voltage | $V_{CC}$ | 2.5 V - 0.125 V to 3.3 V + 0.33 V | - |
| Storage temperature | T_stg | -55 ºC to +125 ºC | Store as bare product after packing |
| Operating temperature | T_use | -40 ºC to +85 ºC | - |
| Frequency tolerance *1 | f_tol | K : ±31.5 × $10^{-6}$ | Customized Product (Option) |
| | | L : ±50 × $10^{-6}$ | |
| Current consumption | $I_{CC}$ | 90 mA Max. | OE Active, L_ECL=50 Ω |
| Disable current | I_dis | 40 mA Max. | OE Inactive, Output Standby: Hi-Z mode |
| | | 70 mA Max. | OE Inactive, Output Standby: Fix mode |
| Symmetry | SYM | 45 % to 55 % | At outputs crossing point |
| Output voltage | $V_{OH}$ | Vcc - 1.025 V Min. | DC characteristics |
| | $V_{OL}$ | Vcc - 1.62 V Max. | |
| Output load condition | L_ECL | 50 Ω | Termination to Vcc - 2.0 V |
| Input voltage | $V_{IH}$ | 70% Vcc Min. | OE, SDA and SCL |
| | $V_{IL}$ | 30% Vcc Max. | |
| Rise time / Fall time | tr/tf | 400 ps Max. | Between 20% and 80% of ($V_{OH}$ - $V_{OL}$) |
| Start-up time | t_str | 10 ms Max. | Time at minimum supply voltage to be 0 s |
| Setting time for frequency change | $t_{SET1}$ | 1.5 ms Max. | From setting NEW_FREQ bit to output new frequency |

*1 Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage change, reflow drift and 10 years aging at +25 ºC.

Product Name (Standard form): SG-8506 CA 156.2MHz 0x37 A P R L Z
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Model, ② Package type,
③ Power-on default output frequency (50 ~ 800 MHz), ④ I²C slave address, ⑤ Internal crystal frequency,
⑥ Output enable pin Polarity, ⑦ Supply voltage/Output format, ⑧ Frequency tolerance/Operating temperature, ⑨ Output standby type

| ⑤ Internal crystal frequency | |
|---|---|
| A | 114.1444 MHz |

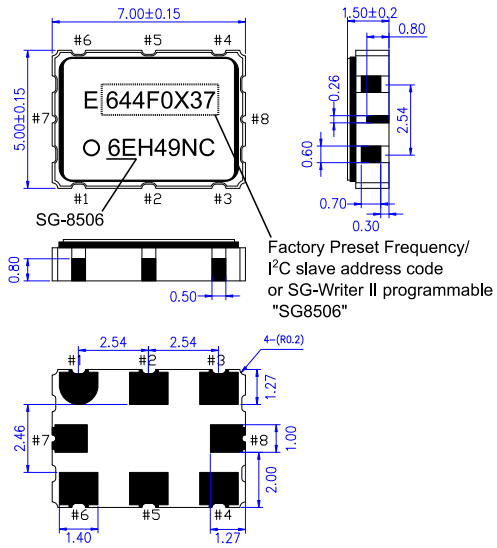
| ⑥ Output enable pin Polarity | |
|---|---|
| P | Active High |
| Q | Active Low |

| ⑦ Supply voltage/ Output format | |
|---|---|
| R | 2.5 V ~ 3.3 V/LVPECL |

| ⑧ Frequency tolerance/ Operating temperature | |
|---|---|
| K | ±31.5 × $10^{-6}$/-40 to +85 °C |
| L | ±50 × $10^{-6}$/-40 to +85 °C |

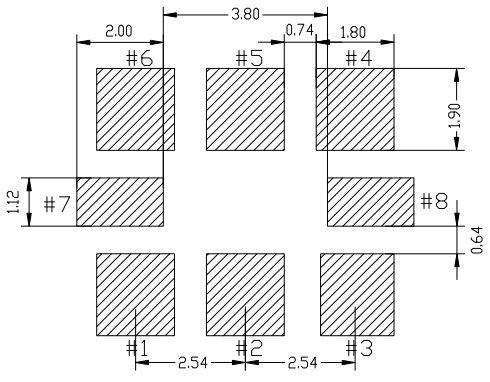
| ⑨ Output standby type | |
|---|---|
| F | Fix (OUT="L", OUTN="H") |
| Z | High-Z |

## External dimensions (Unit: mm)



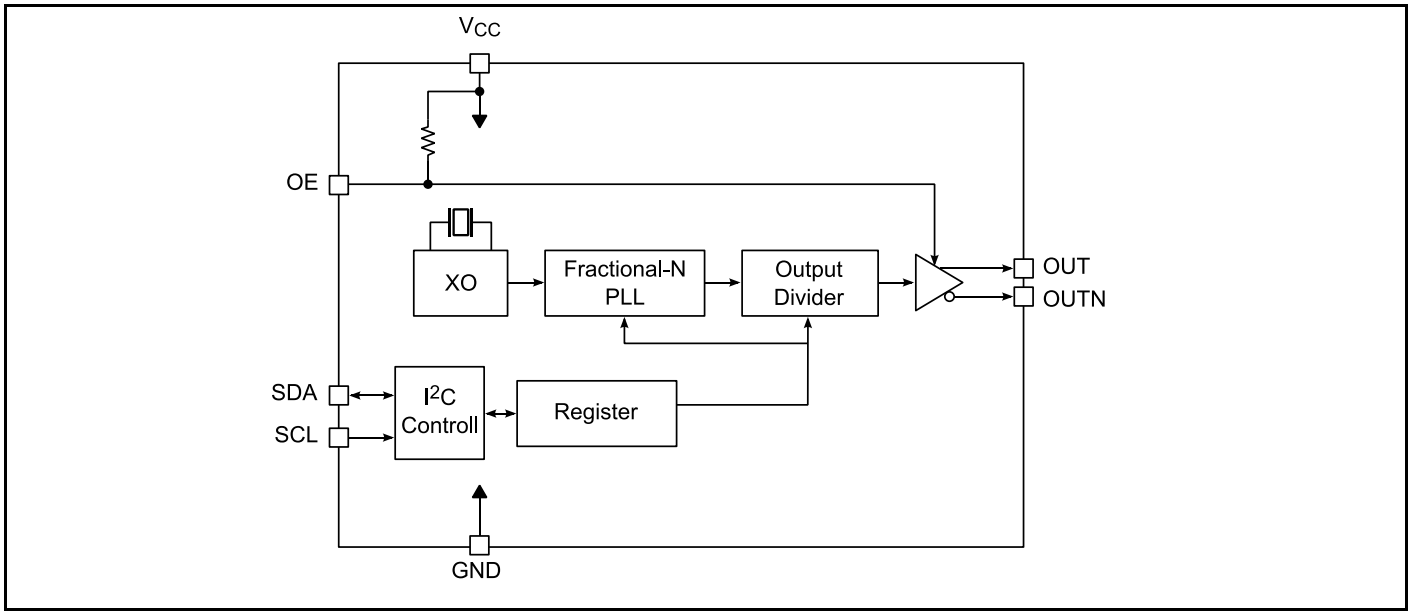

| Pin | Connection |
|---|---|
| 1 | NC |
| 2 | OE |
| 3 | GND |
| 4 | OUT |
| 5 | OUTN |
| 6 | Vcc |
| 7 | SDA |
| 8 | SCL |

## Footprint (Recommended) (Unit: mm)

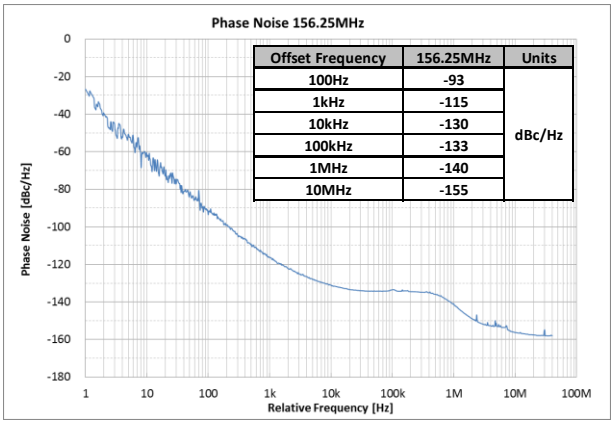


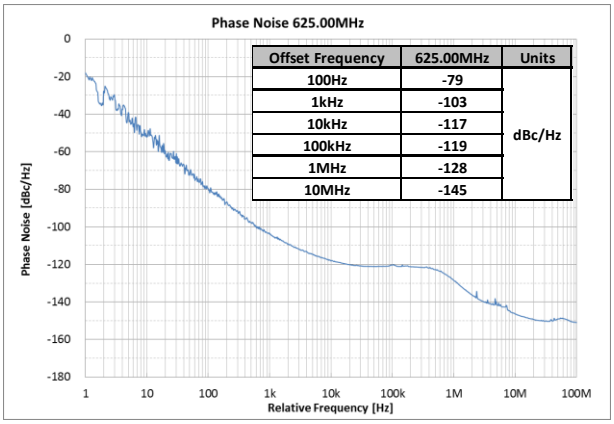

In order to achieve optimum jitter performance, it is recommended that the capacitor (0.1 µF + 10 µF) between $V_{CC}$ and GND pin should be placed as close to the $V_{CC}$ pin as possible.

## Block diagram




## Phase Noise




## Phase Jitter

| | Offset Frequency | 100.00 MHz | 125.00 MHz | 156.25 MHz | 250.00 MHz | 312.50 MHz | 500.00 MHz | 625.00 MHz |
|---|---|---|---|---|---|---|---|---|
| Phase jitter *2 Typ. | 12 kHz to 20 MHz | 0.31 ps | 0.30 ps | 0.26 ps | 0.26 ps | 0.29 ps | 0.28 ps | 0.29 ps |

*2 In order to achieve optimum jitter performance, it is recommended that the capacitor (0.1 µF + 10 µF) between $V_{CC}$ and GND pin should be placed as close to the $V_{CC}$ pin as possible.

## Simulation Model

- IBIS model is available. Please contact us.

## ESD Rating

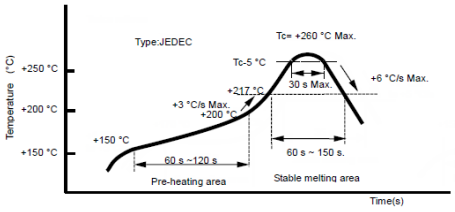
| | |
|---|---|
| Human Body Model (HBM) | 2000 V |
| Machine Model (MM) | 200 V |

## Device Material & Environmental Information

| Model | Package Dimensions | # of Pins | Reference Weight (Typ.) | Terminal Material | Terminal Plating | Complies With EU RoHS | Pb Free | MSL Rating | Peak Temp (Max) |
|---|---|---|---|---|---|---|---|---|---|
| SG-8506CA | 7.0 x 5.0 x 1.5 mm | 8 | 167 mg | W | Au | Yes | Yes | 1 | 260 °C |

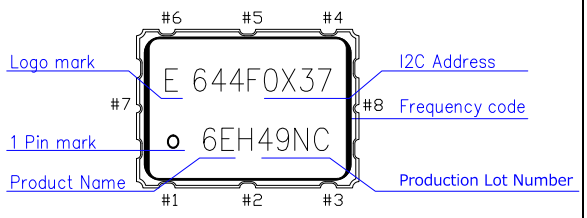
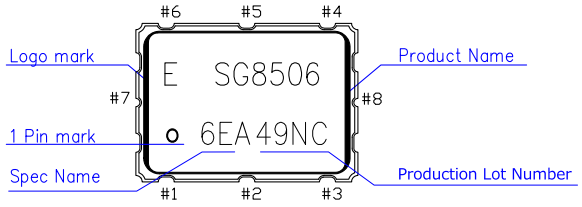
SMD products Reflow profile (example)

The availability of the heat resistance for reflow conditions of JEDEC-STD-020D.01 is judged individually. Please inquire




| | |
|---|---|
| Pb Free | ●Pb free. |
| RoHS Compliant | ●Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(Contains Pb in sealing glass, high melting temperature type solder or other.) |

## Device Marking

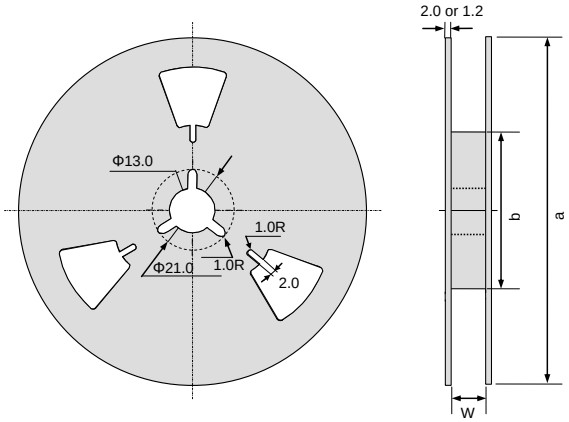
| Model | Factory Programmed Part Marking | Field Programmable Part Marking (Blank Samples) |
|---|---|---|
| SG-8506CA |  |  |



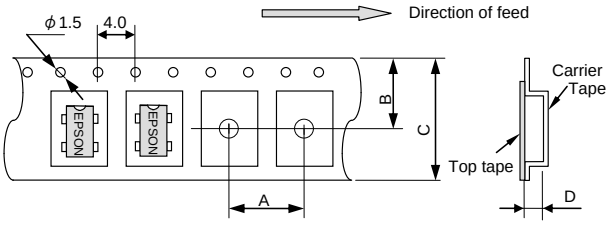


## Standard Packing Specification

SMD products are packed in the shipping carton as below table in accordance with taping standards EIA-481 and IEC-60286









## Standard Packing Quantity and Dimension (Unit: mm)

| Model | Quantity (pcs/Reel) | Reel dimension | | | Career Tape dimension | | | | Direction of feed (L=left direction) |
|---|---|---|---|---|---|---|---|---|---|
| | | a | b | W | A | B | C | D | |
| SG-8506CA | 1000 | Φ180 | Φ60 | 17 | 8 | 9.25 | 16 | 2.1 | L |

## Application Documents

- Application Manual (1.5MB)
  http://www5.epsondevice.com/en/products/crystal_oscillator/sg8506ca.html#

- Evaluation Board Manual (1.1MB)
  http://www5.epsondevice.com/en/information/support/pdf/sg8506ca_eva-board_e.pdf

## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

## WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,

Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

**►Explanation of the mark that are using it for the catalog**

| | |
|---|---|
| Pb Free | ►Pb free. |
| RoHS Compliant | ►Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(Contains Pb in sealing glass, high melting temperature type solder or other.) |
| For Automotive | ►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc. |
| Automotive Safety | ►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc ). |

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