Crystal Oscillator (SPXO)

- Package size (5.0 mm × 3.2 mm × 1.1 mm)
- · Fundamental mode SPXO
- · Output: CMOS
- · Reference weight Typ.52 mg

[1] Product Number / Product Name / Marking

(1-1) Product Number / Ordering Code

X1G0044510029xx

Last 2 digits code(**xx**) defines Quantity. The standard is "00", 1 000 pcs/Reel.

(1-2) Product Name / Model Name

SG5032CAN 24.576000 MHz TJGA

[2] Operating Range

| [2] Operating Name | | | | | | | |
|-----------------------------|----------|----------------|------|------|-------|------------|--|
| Parameter | Symbol | Specifications | | | Unit | Conditions | |
| Farameter | Symbol | Min. | Тур. | Max. | Offic | Conditions | |
| Supply voltage | V_{CC} | 1.60 | - | 3.63 | V | - | |
| Supply voltage | GND | 0 | - | 0 | V | - | |
| Operating temperature range | T_use | -40 | - | +85 | °C | - | |
| CMOS load condition | L_CMOS | - | - | 15 | pF | - | |

[3] Frequency Characteristics

(Unless stated otherwise [2] Operating Range)

| Parameter | Symbol | Specifications | | Unit | Conditions | |
|------------------------|--------|----------------|-----------|------|-------------------|--------------------|
| Parameter | Symbol | Min. | Тур. | Max. | Offic | Conditions |
| Output frequency | fo | - | 24.576000 | - | MHz | - |
| Frequency tolerance *1 | f_tol | -50 | - | +50 | ×10 ⁻⁶ | T_use |
| Frequency aging | f_age | -3 | - | +3 | ×10 ⁻⁶ | +25 °C, First year |

^{*1} Frequency tolerance includes Initial frequency tolerance, Frequency / temperature characteristics, Frequency / voltage coefficient and Frequency / load coefficient.

[4] Electrical Characteristics

(Unless stated otherwise [2] Operating Range)

| [4] Electrical Characteristics (Onless stated otherwise [2] Operating Range) | | | | | | |
|--|-----------------|---------------|------|----------|------|--|
| Doromotor | Cymbol | Specification | | ications | | Conditions |
| Parameter | Symbol | Min. | Тур. | Max. | Unit | Conditions |
| Start-up time | t_str | - | - | 3.0 | ms | t = 0 at 90 % Vcc |
| Current consumption | I _{cc} | - | - | 2.2 | mA | No load condition, Vcc = 3.3 V |
| Stand-by current | I_std | - | - | 2.7 | μΑ | ST = GND, Vcc = 3.3 V |
| Output valtage | V _{OH} | 90 % Vcc | - | - | V | Iон = -4 mA @Vcc = 3.3 V |
| Output voltage | V _{OL} | - | - | 10 % Vcc | V | IoL = 4 mA @Vcc = 3.3 V |
| Rise time | tr | - | - | 3.5 | ns | 20 % Vcc to 80 % Vcc Level, L_CMOS = 15 pF, Vcc = 1.8 V ± 10 % |
| Fall time | tf | - | - | 3.5 | ns | 80 % Vcc to 20 % Vcc Level, L_CMOS = 15 pF, Vcc = 1.8 V ± 10 % |
| Symmetry | SYM | 45 | - | 55 | % | 50 % Vcc Level, L_CMOS ≤ 15 pF |
| Input voltage | V_{IH} | 80 % Vcc | - | - | V | ST terminal |
| | V _{IL} | - | - | 20 % Vcc | V | ST terminal |
| Output disable time (ST) | tstp_st | - | - | 100 | ns | ST terminal HIGH → LOW |
| Output enable time (ST) | tsta_st | - | - | 3 | ms | ST terminal LOW → HIGH |

[For other general specifications, please refer to the attached Full Data Sheet below]

Crystal oscillator: SG2016/3225/5032/7050CAN & SG-210STF

Features

Crystal oscillator (SPXO)

Frequency: 20 standard frequencies

(4 MHz to 72 MHz)

Output: CMOS

Supply voltage: 1.6 V to 3.63 V
 Operating temperature: -20 °C to +70 °C

-40 °C to +105 °C

Applications

- IoT, Wearable device
- Data center, Storage
- Medical, Industrial automation



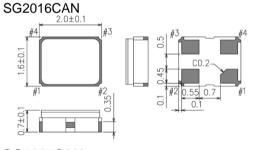
Description

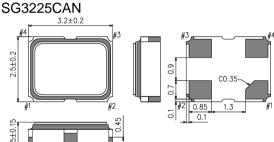
Epson's SGxxxxCAN & SG-210STF are Simple Packaged Crystal Oscillator (SPXO) series with CMOS output. These SPXO's are ideal for variety of applications from IoT, wearables, medical, industrial automation, etc.

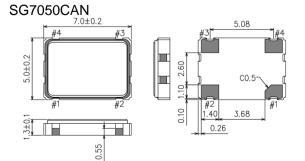
These SPXO have low current consumption, wide operating voltage from 1.6 V to 3.63 V and wide operating temperature range from -40 °C to 85 °C, in addition operation up to 105 °C is available.

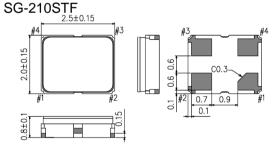
These SPXO's are available in five different package size from 2.0×1.6 mm to 7.0×5.0 mm and available in standard pin out's.

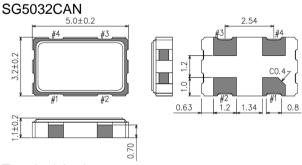
Outline Drawing and Terminal Assignment











Terminal Assignment

| Pin # | Connection | Function | | | | |
|-------|------------|--------------------------|--------------------------|------------------------------|--|--|
| | ST | ST terminal | ST terminal | | | |
| #1 | | ST function | Osc. Circuit | Output | | |
| #1 | | "H" or OPEN | Oscillation | Specified frequency : Enable | | |
| | | "L" | Oscillation stop | High impedance : Disable | | |
| #2 | GND | GND terminal | | | | |
| #3 | OUT | Output terminal | | | | |
| #4 | Vcc | V _{CC} terminal | V _{CC} terminal | | | |

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[1] Product Name / Product Number

(1-1) SG2016CAN

(1) Product Name (Standard Form)

SG2016 CAN 25.000000MHz TJHA

1 2

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4567

 $\textcircled{1} \textbf{Model} \quad \textcircled{2} \textbf{Output} \ (\textbf{C:CMOS}) \quad \textcircled{3} \textbf{Frequency} \quad \textcircled{4} \textbf{Supply voltage}$

⑤Frequency tolerance ⑥Operating temperature ⑦Internal identification code ("A" is default)

| | | | _ |
|---|----------------|-----------------|---|
| | | Refer to Figure | 1 |
| Т | 1.8 V to 3.3 \ | / Тур. | |
| K | 2.5 V to 3.3 \ | / Typ. | |

| ⑤Frequency tolerance / ⑥Operating temperature | | | | |
|---|--|--|--|--|
| | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C | | | |
| JG | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C | | | |
| | " | | | |

*Figure 1 is on the next page

JH $\pm 50 \times 10^{-6}$ / -40 °C to +105 °C

(2) Product Number / Ordering Code

| | Frequency tolerance / Operating temperature | | | | |
|-----------------|---|------------------------|------------------------|--|--|
| Eroguopov [MUz] | DB | JG | JH | | |
| Frequency [MHz] | ±25 × 10 ⁻⁶ | ±50 × 10 ⁻⁶ | ±50 × 10 ⁻⁶ | | |
| | -20 °C to +70 °C | -40 °C to +85 °C | -40 °C to +105 °C | | |
| 4 | - | X1G004801003000 | X1G004801004900 | | |
| 8 | - | X1G004801004500 | X1G004801004600 | | |
| 10 | • | X1G004801002900 | X1G004801002700 | | |
| 12 | X1G004801005000 | X1G004801000700 | X1G004801005100 | | |
| 12.288 | X1G004801005200 | X1G004801004400 | X1G004801005300 | | |
| 14.7456 | - | X1G004801005400 | X1G004801005500 | | |
| 16 | - | X1G004801001400 | X1G004801005600 | | |
| 20 | X1G004801005700 | X1G004801005800 | X1G004801001800 | | |
| 24 | X1G004801005900 | X1G004801000200 | X1G004801004000 | | |
| 24.576 | - | X1G004801006000 | X1G004801003100 | | |
| 25 | X1G004801002400 | X1G004801001200 | X1G004801003500 | | |
| 26 | - | X1G004801000300 | X1G004801003900 | | |
| 27 | • | X1G004801006100 | X1G004801002100 | | |
| 32 | - | X1G004801006200 | X1G004801006300 | | |
| 33.33 | • | X1G004801006400 | X1G004801006500 | | |
| 33.3333 | - | X1G004801002600 | X1G004801006600 | | |
| 40 | - | X1G004801006700 | X1G004801003600 | | |
| 48 | X1G004801006800 | X1G004801002000 | X1G004801006900 | | |
| 50 | X1G004801007000 | X1G004801001300 | X1G004801002800 | | |
| 72 | X1G004801007100 | X1G004801007200 | X1G004801007300 | | |

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(1-2) SG-210STF

(1) Product Name (Standard Form)

SG-210 STF 25.000000MHz Y

1 23

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(5)

①Model ②Function (S:Standby) ③Supply voltage

③Supply voltage Refer to Figure 1T 1.8 V to 3.3 V Typ.

*Figure 1 is on the next page

| ⑤Fr | ⑤Frequency tolerance / Operating temperature | | | | | |
|-----|--|--|--|--|--|--|
| S | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C | | | | | |
| L | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C | | | | | |
| Υ | $\pm 50 \times 10^{-6}$ / -40 °C to +105 °C | | | | | |

(2) Product Number / Ordering Code

| | Frequency | tolerance / Operating to | emperature |
|---------------------|------------------------|--------------------------|-------------------------|
| Frequency [MHz] | S | L | Υ |
| Frequency [ivii iz] | ±25 × 10 ⁻⁶ | $\pm 50 \times 10^{-6}$ | $\pm 50 \times 10^{-6}$ |
| | -20 °C to +70 °C | -40 °C to +85 °C | -40 °C to +105 °C |
| 4 | • | X1G004171000900 | X1G004171029900 |
| 8 | • | X1G004171001500 | X1G004171006900 |
| 10 | • | X1G004171001600 | X1G004171036500 |
| 12 | X1G004171016300 | X1G004171001800 | X1G004171028000 |
| 12.288 | X1G004171006100 | X1G004171001900 | X1G004171036600 |
| 14.7456 | • | X1G004171002500 | X1G004171036700 |
| 16 | • | X1G004171002700 | X1G004171015400 |
| 20 | X1G004171021800 | X1G004171002900 | X1G004171023800 |
| 24 | X1G004171015600 | X1G004171003100 | X1G004171019700 |
| 24.576 | - | X1G004171003200 | X1G004171036800 |
| 25 | X1G004171007700 | X1G004171003300 | X1G004171005900 |
| 26 | - | X1G004171003400 | X1G004171024400 |
| 27 | • | X1G004171003500 | X1G004171025000 |
| 32 | - | X1G004171004000 | X1G004171012700 |
| 33.33 | - | X1G004171011900 | X1G004171030000 |
| 33.3333 | - | X1G004171012000 | X1G004171007500 |
| 40 | - | X1G004171004500 | X1G004171020600 |
| 48 | X1G004171007800 | X1G004171004600 | X1G004171036900 |
| 50 | X1G004171007900 | X1G004171004700 | X1G004171012600 |
| 72 | X1G004171037000 | X1G004171012400 | X1G004171037100 |

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(1-3) SG3225CAN

(1) Product Name (Standard Form)

SG3225 C AN 25.000000MHz T J H A

1) (2)

3

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①Model ②Output (C:CMOS) ③Frequency ④Supply voltage

⑤ Frequency tolerance ⑥ Operating temperature ⑦ Internal identification code ("A" is default)

| | upply voltage Refer to Figure 1 |
|---|---------------------------------|
| T | 1.8 V to 3.3 V Typ. |
| | 2.5 V to 3.3 V Typ. |

| 1 | ⑤Frequency tolerance / ⑥Operating temperature | | | | | |
|---|---|---|--|--|--|--|
| | DB | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C | | | | |
| | JG | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C | | | | |
| | JH | $\pm 50 \times 10^{-6}$ / -40 °C to +105 °C | | | | |

*Figure 1 is on the next page

(2) Product Number / Ordering Code

| | Frequency | tolerance / Operating to | emperature |
|---------------------|------------------------|--------------------------|-------------------------|
| Frequency [MHz] | DB | JG | JH |
| riequency [ivii iz] | ±25 × 10 ⁻⁶ | $\pm 50 \times 10^{-6}$ | $\pm 50 \times 10^{-6}$ |
| | -20 °C to +70 °C | -40 °C to +85 °C | -40 °C to +105 °C |
| 4 | • | X1G005961001115 | X1G005961001215 |
| 8 | • | X1G005961000415 | X1G005961001315 |
| 10 | - | X1G005961000515 | X1G005961001415 |
| 12 | X1G005961001515 | X1G005961000615 | X1G005961001615 |
| 12.288 | X1G005961001715 | X1G005961001815 | X1G005961001915 |
| 14.7456 | - | X1G005961002015 | X1G005961002115 |
| 16 | - | X1G005961002215 | X1G005961002315 |
| 20 | X1G005961002415 | X1G005961000715 | X1G005961002515 |
| 24 | X1G005961002615 | X1G005961000115 | X1G005961002715 |
| 24.576 | - | X1G005961000815 | X1G005961002815 |
| 25 | X1G005961002915 | X1G005961000215 | X1G005961003015 |
| 26 | - | X1G005961003115 | X1G005961003215 |
| 27 | • | X1G005961003315 | X1G005961003415 |
| 32 | - | X1G005961003515 | X1G005961003615 |
| 33.33 | • | X1G005961003715 | X1G005961003815 |
| 33.3333 | - | X1G005961003915 | X1G005961004015 |
| 40 | - | X1G005961000915 | X1G005961004115 |
| 48 | X1G005961004215 | X1G005961000315 | X1G005961004315 |
| 50 | X1G005961004415 | X1G005961001015 | X1G005961004515 |
| 72 | X1G005961004615 | X1G005961004715 | X1G005961004815 |

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(1-4) SG5032CAN

(1) Product Name (Standard Form)

<u>SG5032 C AN</u> <u>25.000000MHz</u> <u>T J H A</u>

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①Model ②Output (C:CMOS) ③Frequency ④Supply voltage

⑤ Frequency tolerance ⑥ Operating temperature ⑦ Internal identification code ("A" is default)

| Supply voltage Refer to Figure 1 | | | | | |
|----------------------------------|---------------------|--|--|--|--|
| Т | 1.8 V to 3.3 V Typ. | | | | |
| | 2.5 V to 3.3 V Typ. | | | | |

| (5) Fi | ⑤ Frequency tolerance / ⑥ Operating temperature | | | | | |
|--------|---|--|--|--|--|--|
| DB | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C | | | | | |
| JG | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C | | | | | |
| ЛH | +50 × 10 ⁻⁶ / -40 °C to +105 °C | | | | | |

*Figure 1 is on the next page

(2) Product Number / Ordering Code

| | Frequency tolerance / Operating temperature | | | | | |
|-----------------|---|------------------------|------------------------|--|--|--|
| Frequency [MHz] | DB | JG | JH | | | |
| | ±25 × 10 ⁻⁶ | ±50 × 10 ⁻⁶ | ±50 × 10 ⁻⁶ | | | |
| | -20 °C to +70 °C | -40 °C to +85 °C | -40 °C to +105 °C | | | |
| 4 | - | X1G004451003400 | X1G004451019600 | | | |
| 8 | - | X1G004451002100 | X1G004451019700 | | | |
| 10 | - | X1G004451001300 | X1G004451017800 | | | |
| 12 | X1G004451019800 | X1G004451002800 | X1G004451019900 | | | |
| 12.288 | X1G004451020000 | X1G004451000100 | X1G004451020100 | | | |
| 14.7456 | - | X1G004451001900 | X1G004451020200 | | | |
| 16 | - | X1G004451000200 | X1G004451020300 | | | |
| 20 | X1G004451020400 | X1G004451001100 | X1G004451020500 | | | |
| 24 | X1G004451017200 | X1G004451000300 | X1G004451020600 | | | |
| 24.576 | - | X1G004451002900 | X1G004451020700 | | | |
| 25 | X1G004451009700 | X1G004451000400 | X1G004451020800 | | | |
| 26 | - | X1G004451008200 | X1G004451020900 | | | |
| 27 | • | X1G004451000500 | X1G004451021000 | | | |
| 32 | - | X1G004451001400 | X1G004451021100 | | | |
| 33.33 | • | X1G004451021200 | X1G004451021300 | | | |
| 33.3333 | - | X1G004451016700 | X1G004451021400 | | | |
| 40 | - | X1G004451001200 | X1G004451021500 | | | |
| 48 | X1G004451014900 | X1G004451000700 | X1G004451011200 | | | |
| 50 | X1G004451011500 | X1G004451000800 | X1G004451003600 | | | |
| 72 | X1G004451021600 | X1G004451021700 | X1G004451021800 | | | |

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(1-5) SG7050CAN

(1) Product Name (Standard Form)

<u>SG7050 C AN</u> <u>25.000000MHz</u> <u>T J H A</u>

1) (2)

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①Model ②Output (C:CMOS) ③Frequency ④Supply voltage

⑤ Frequency tolerance ⑥ Operating temperature ⑦ Internal identification code ("A" is default)

| Supply voltage Refer to Figure 1 | | | | | |
|----------------------------------|---------------------|--|--|--|--|
| Т | 1.8 V to 3.3 V Typ. | | | | |
| | 2.5 V to 3.3 V Typ. | | | | |

⑤Frequency tolerance / ⑥Operating temperature

DB ±25 × 10⁻⁶ / -20 °C to +70 °C

JG ±50 × 10⁻⁶ / -40 °C to +85 °C

JH ±50 × 10⁻⁶ / -40 °C to +105 °C

*Figure 1 is on the next page

(2) Product Number / Ordering Code

| | Frequency tolerance / Operating temperature | | | | | | |
|-----------------|---|-------------------------|-------------------------|--|--|--|--|
| Frequency [MHz] | DB | JG | JH | | | | |
| | ±25 × 10 ⁻⁶ | $\pm 50 \times 10^{-6}$ | $\pm 50 \times 10^{-6}$ | | | | |
| | -20 °C to +70 °C | -40 °C to +85 °C | -40 °C to +105 °C | | | | |
| 4 | • | X1G004481005100 | X1G004481025200 | | | | |
| 8 | • | X1G004481001400 | X1G004481025300 | | | | |
| 10 | - | X1G004481000500 | X1G004481025400 | | | | |
| 12 | X1G004481025500 | X1G004481000600 | X1G004481025600 | | | | |
| 12.288 | X1G004481025700 | X1G004481000100 | X1G004481025800 | | | | |
| 14.7456 | - | X1G004481002500 | X1G004481025900 | | | | |
| 16 | - | X1G004481000700 | X1G004481026000 | | | | |
| 20 | X1G004481012800 | X1G004481000800 | X1G004481026100 | | | | |
| 24 | X1G004481002200 | X1G004481000200 | X1G004481026200 | | | | |
| 24.576 | - | X1G004481001600 | X1G004481026300 | | | | |
| 25 | X1G004481011600 | X1G004481000300 | X1G004481026400 | | | | |
| 26 | - | X1G004481003500 | X1G004481026500 | | | | |
| 27 | • | X1G004481000400 | X1G004481026600 | | | | |
| 32 | • | X1G004481000900 | X1G004481026700 | | | | |
| 33.33 | - | X1G004481017900 | X1G004481026800 | | | | |
| 33.3333 | - | X1G004481003300 | X1G004481026900 | | | | |
| 40 | - | X1G004481001500 | X1G004481027000 | | | | |
| 48 | X1G004481022600 | X1G004481001100 | X1G004481027100 | | | | |
| 50 | X1G004481011200 | X1G004481001200 | X1G004481016000 | | | | |
| 72 | X1G004481027200 | X1G004481018300 | X1G004481027300 | | | | |

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[2] Absolute Maximum Ratings

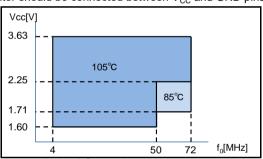
| Parameter | Symbol | Specification | | | Unit | Conditions |
|---------------------------|----------|---------------|------|----------------|-------|-------------|
| raiametei | Symbol | Min. | Тур. | Max. | Offic | Conditions |
| Maximum supply voltage | V_{CC} | -0.3 | - | 4 | V | |
| Input voltage | Vin | -0.3 | - | $V_{CC} + 0.3$ | V | ST terminal |
| Storage temperature range | Tota | -55 | - | +125 | °C | SG2016CAN |
| Storage temperature range | T_stg | -40 | - | +125 | ۰C | All other |

[3] Operating Range

| Parameter | Symbol | Specification | | | Unit | Conditions |
|---|-----------------|---------------|------|------|-------|--------------------------------------|
| Farameter | Symbol | Min. | Тур. | Max. | Offic | Conditions |
| Supply voltage | V _{CC} | 1.6 | - | 3.63 | V | fo ≤ 50 MHz, T_use = +105 °C Max. |
| | | 1.71 | ı | 3.63 | ٧ | fo = 72 MHz, T_use = +85 °C Max. |
| | | 2.25 | ı | 3.63 | V | fo = 72 MHz, T_use = +105 °C Max. |
| Supply voltage | GND | 0.0 | 0.0 | 0.0 | V | |
| | T_use | -20 | +25 | +70 | °C | |
| Operating temperature range (Refer to Figure 1) | | -40 | +25 | +85 | °C | |
| (itelef to riguie 1) | | -40 | +25 | +105 | °C | |
| CMOS load condition | L_CMOS | - | - | 15 | pF | |

 $^{^*}$ Power supply startup time (0 $\%V_{CC} \rightarrow 90~\%V_{CC})$ should be more than 150 μs

^{*} A 0.01 µF to a 0.1 µF bypass capacitor should be connected between V_{CC} and GND pins located close to the device



Please note that Supply voltage range (V_{CC}) depends on Output frequency(fo) and upper limit of Operating temperature(T_{use} Max.).

Figure 1: The upper limit of Operating temperature and the related conditions

[4] Frequency Characteristics

(Unless stated otherwise [3] Operating Range)

| | _ | | | , | | |
|------------------------|--------|---------------|---|------------|-------------------|--|
| Parameter | Symbol | Specification | | | Unit | Conditions |
| Farameter | Symbol | Min. | Тур. | Max. | Offic | Conditions |
| Output frequency | fo | 20, 24, 2 | 2, 12.288, 14 4.576, 25, 26 3.3333, 40, 4 | 6, 27, 32, | MHz | |
| | | -50 | - | +50 | ×10 ⁻⁶ | T_use = -20 °C to +70 °C |
| Frequency tolerance *1 | f_tol | -100 | | +100 | ×10 ⁻⁶ | T_use = -40 °C to +105 °C T_use = -40 °C to +85 °C *2 |
| Frequency aging | f_age | -3 | | +3 | ×10 ⁻⁶ | +25 °C, First year |

^{*1} Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage change and load drift.

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^{*2} This temperature range is only for fo = 75 MHz

[5] Electrical Characteristics

(Unless stated otherwise [3] Operating Range)

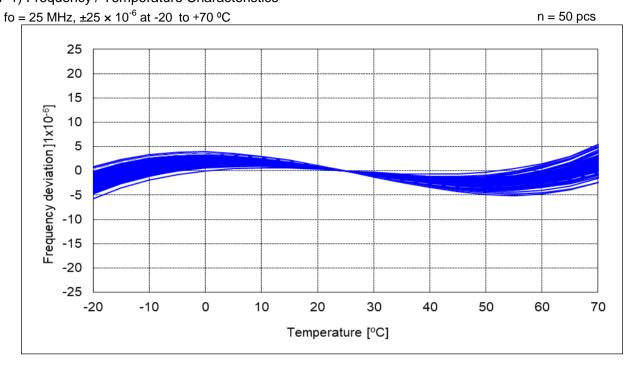
| Dave meeter. | Symbol | Specification | | | l last | Conditions |
|--|-----------------|-----------------------|------|----------------------|--------|---|
| Parameter | | Min. | Тур. | Max. | Unit | Conditions |
| Start-up time | t_str | - | - | 3 | ms | t = 0 at 90 %V _{CC} |
| Comment of the second s | | - | - | 1.5 | mA | 1 MHz \leq fo \leq 20 MHz |
| Current consumption (No load) $V_{CC} = 1.8 \text{ V} \pm 10 \text{ \%}$ | | - | - | 1.8 | mA | 20 MHz < fo ≤ 40 MHz |
| V CC = 1.0 V ± 10 70 | | - | - | 2.1 | mA | 40 MHz < fo ≤ 50 MHz |
| V _{CC} = 1.8 V ± 5 % | | - | - | 2.4 | mA | fo = 72 MHz |
| | | - | - | 1.6 | mA | 1 MHz \leq fo \leq 20 MHz |
| Current consumption (No load) | | - | - | 2.0 | mA | 20 MHz < fo ≤ 40 MHz |
| $V_{CC} = 2.5 \text{ V} \pm 10 \%$ | I _{cc} | - | - | 2.4 | mA | 40 MHz < fo ≤ 50 MHz |
| | | - | - | 2.8 | mA | fo = 72 MHz |
| | | - | - | 1.8 | mA | 1 MHz \leq fo \leq 20 MHz |
| Current consumption (No load) | | - | - | 2.2 | mA | 20 MHz < fo ≤ 40 MHz |
| $V_{CC} = 3.3 \text{ V} \pm 10 \%$ | | - | - | 2.6 | mA | 40 MHz < fo ≤ 50 MHz |
| | | - | - | 3.0 | mA | fo = 72 MHz |
| | I_std | - | - | 2.1 | μA | $V_{CC} = 1.8 \text{ V} \pm 10 \text{ % or } \pm 5 \text{ %},$ $\overline{ST} = \text{GND}$ |
| Stand-by current | | - | - | 2.5 | μΑ | $V_{CC} = 2.5 \text{ V} \pm 10 \%, \overline{ST} = \text{GND}$ |
| | | - | - | 2.7 | μΑ | $V_{CC} = 3.3 \text{ V} \pm 10 \%, \overline{ST} = \text{GND}$ |
| | V_{OH} | 90 % V _{CC} | - | - | V | Load current condition 1.8 V ± 10 % 2.5 V ± 10 % 3.3 V ± 10 % |
| Output voltage | V _{OL} | - | - | 10 % V _{CC} | V | OH |
| Cutput voltage | V _{OH} | V _{CC} - 0.4 | - | - | V | |
| | V _{OL} | - | - | 0.4 | V | I _{OH} -1.5 mA -3 mA -4 mA I _{OL} 1.5 mA 3 mA 4 mA |
| Symmetry | SYM | 45 | 50 | 55 | % | 50 % V _{CC} level, L_CMOS ≤ 15 pF |
| Rise time / Fall time | tr / tf | - | - | 3 | ns | $V_{CC} = 2.5 \text{ V or } 3.3 \text{ V } \pm 10 \text{ %},$ $20 \text{ % } V_{CC} \text{ to } 80 \text{ % } V_{CC} \text{ Level},$ $L_\text{CMOS} = 15 \text{ pF}$ |
| INISE UITIE / FAII UITIE | u / u | - | - | 3.5 | ns | $V_{CC} = 1.8 \text{ V} \pm 10 \text{ % or } \pm 5 \text{ %},$ 20 % V_{CC} to 80 % V_{CC} Level, $L_CMOS = 15 \text{ pF}$ |
| Input voltage | V_{IH} | 80 % Vcc | - | - | V | |
| Input voltage | V _{IL} | - | - | 20 % Vcc | V | 31 terminai |
| Output disable time (ST) | tstp_st | - | - | 100 | ns | ST terminal HIGH → LOW |
| Output enable time (ST) | tsta_st | - | - | 3 | ms | ST terminal LOW → HIGH |

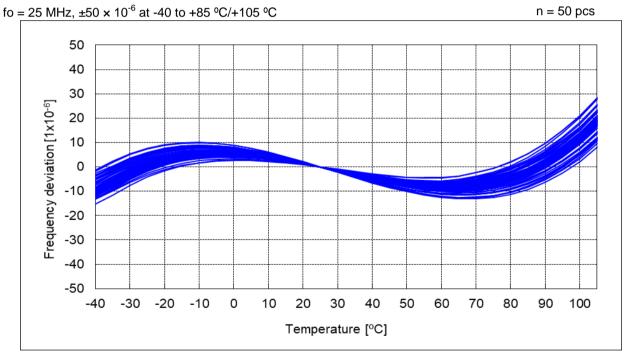
[6] Thermal resistance (For reference only)

| Parameter | Cymbol | Specification | | | Unit | Conditions |
|----------------------|--------|---------------|------|------|-------|------------|
| Falametei | Symbol | Min. | Тур. | Max. | Offic | Conditions |
| Junction temperature | Tj | - | - | +125 | °C | |
| | | - | 10 | - | °C/W | SG2016CAN |
| | | - | 15 | - | °C/W | SG-210STF |
| Junction to case | θјс | - | 28 | - | °C/W | SG3225CAN |
| | | - | 16 | - | °C/W | SG5032CAN |
| | | - | 23 | - | °C/W | SG7050CAN |
| | θja | - | 100 | - | °C/W | SG2016CAN |
| | | - | 92 | - | °C/W | SG-210STF |
| Junction to ambient | | - | 79 | - | °C/W | SG3225CAN |
| | | - | 82 | - | °C/W | SG5032CAN |
| | | - | 104 | - | °C/W | SG7050CAN |

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[7] Typical Performance Characteristics (For reference only)
 The following data shows typical performance characteristics
 (7-1) Frequency / Temperature Characteristics





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(7-2) Current Consumption No load, T_use = +25 °C, Freq. Dependency L_CMOS = 15 pF, T_use = +25 °C, Freq. Dependency 2.0 6.0 Current consumption (I_{CC}) [mA] consumption (Icc) [mA] 5.0 1.5 4.0 3.0 2.0 Current 0.5 Vcc=1.8 V Vcc=2.5 V 1.0 Vcc=2.5 V Vcc=3.3 V Vcc=3.3 V 0.0 0.0 15 20 25 30 35 40 45 50 55 60 65 20 30 35 40 fo [MHz] fo [MHz] fo = 20 MHzL_CMOS = 5 pF, Temperature Characteristic T_use = +25 °C, Output load(L_CMOS) Characteristics 4.5 45 4.0 -Vcc=2.5.V [mA] 4.0 (lcc) Vcc=3.3 V 3.5 3.5 (lcc) 3.0 3.0 Current consumption 2.5 2.5 2.0 2.0 1.5 1.5 1.0 1.0 -Vcc=2.5 V 0.5 0.5 Vcc=3.3 V 0.0 -40 -30 -20 -10 0 10 20 30 40 50 10 Temperature [°C] Output load [pF] fo = 40 MHzT_use = +25 °C, Output load(L_CMOS) Characteristics L CMOS = 5 pF, Temperature Characteristic 10.0 10.0 9.0 9.0 M. 8.0 ► Vcc=2.5 V <u>M</u> 8.0 (lcc) Vcc=3.3 V 7.0 7.0 (lcc) 6.0 6.0 Current consumption 5.0 5.0 4.0 4.0 3.0 3.0 Current 2.0 2.0 1.0 1.0 Vcc=3.3 V 0.0 -40 -30 -20 -10 20 30 40 50 70 0 10 Temperature [°C] fo = 72 MHzL_CMOS = 5 pF, Temperature Characteristic T_use = +25 °C, Output load(L_CMOS) Characteristics 14.0 14.0 -Vcc=1.8 V 至 12.0 12.0 -Vcc=2.5 V <u></u> 10.0 Vcc=3.3 V 10.0 consumption Current consumption 8.0 8.0 6.0 6.0 Current 4.0 4.0 2.0 Vcc=2.5 V 2.0

0.0

-40 -30 -20 -10 0

10

20 30 40

50

70 80

The actual current consumption is the total of the current under the condition of no load and the current to drive the output load (fo \times L_CMOS \times V_{CC}). To reduce the current consumption, it is effective to use lower frequency, lower supply voltage and lower output load.

0.0

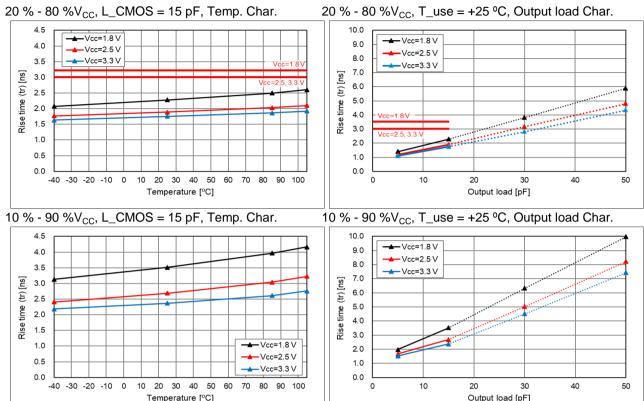
Output load [pF]

-Vcc=3.3 V

^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference.

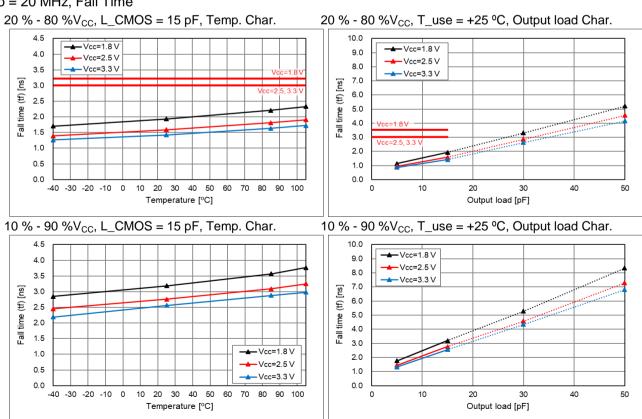
(7-3) Rise Time / Fall Time

fo = 20 MHz, Rise Time



^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference.

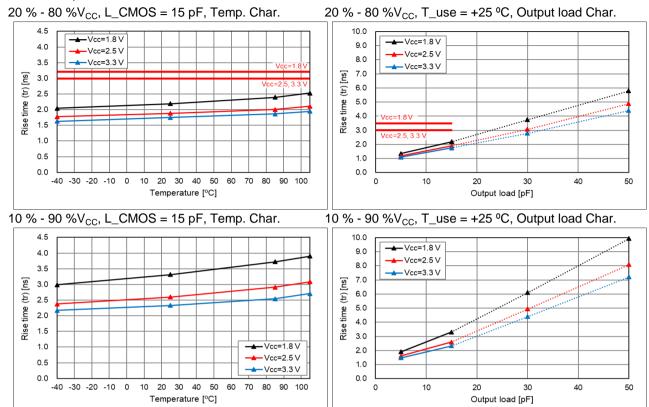
fo = 20 MHz, Fall Time



^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference.

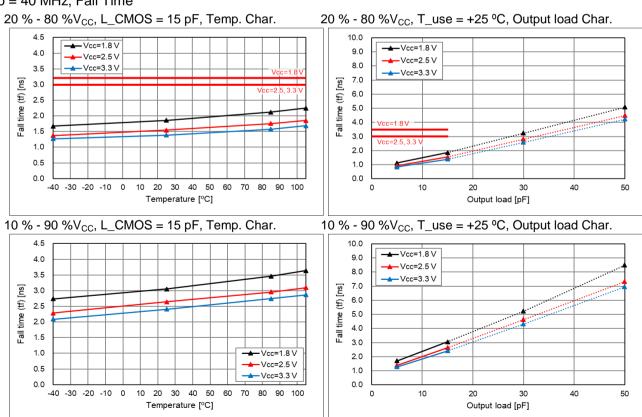
(7-3) Rise Time / Fall Time [cont'd]

fo = 40 MHz, Rise Time



^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference.

fo = 40 MHz, Fall Time



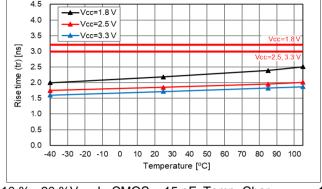
^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference.

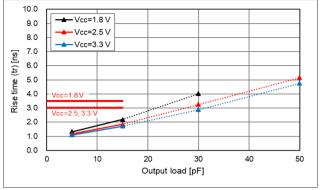
(7-3) Rise Time / Fall Time [cont'd]

fo = 72 MHz, Rise Time

 $20 \% - 80 \%V_{CC}$, L_CMOS = 15 pF, Temp. Char.

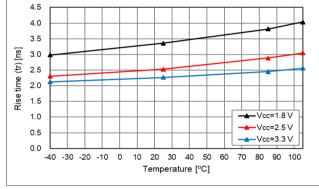
20 % - 80 %V_{CC}, T_use = +25 °C, Output load Char.

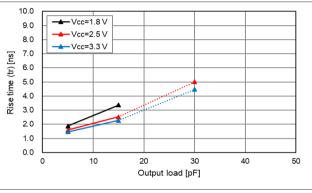




10 % - 90 %V_{CC}, L_CMOS = 15 pF, Temp. Char.

10 % - 90 % V_{CC} , $T_use = +25$ °C, Output load Char.



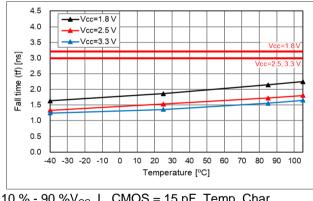


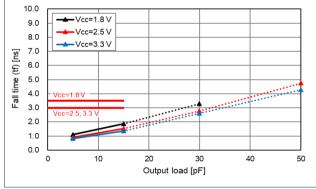
^{*} Output load condition under L CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference. There are some missing data in the graph. It is unmeasurable because of low amplitude under the condition of L CMOS > 15 pF.

fo = 72 MHz, Fall Time

20 % - 80 %V_{CC}, L_CMOS = 15 pF, Temp. Char.

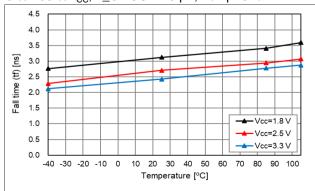
20 % - 80 % V_{CC} , $T_use = +25$ °C, Output load Char.

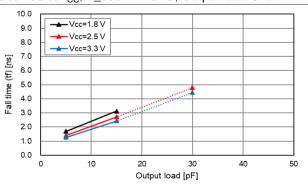




10 % - 90 %V_{CC}, L_CMOS = 15 pF, Temp. Char.

10 % - 90 % V_{CC} , $T_use = +25$ °C, Output load Char.



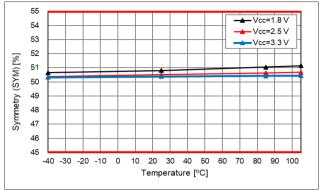


^{*} Output load condition under L_CMOS > 15 pF (dotted line area) is not guaranteed, and the data is for reference. There are some missing data in the graph. It is unmeasurable because of low amplitude under the condition of $L_CMOS > 15 pF.$

(7-4) Symmetry

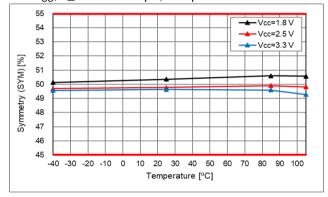
fo = 20 MHz

50 % V_{CC} , L_CMOS = 15 pF, Temp. Char.



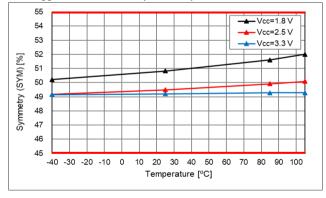
fo = 40 MHz

50 % V_{CC} , L_CMOS = 15 pF, Temp. Char.



fo = 72 MHz

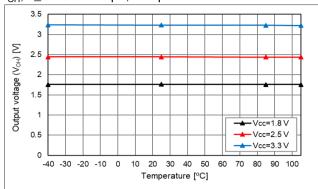
50 % V_{CC} , L_CMOS = 15 pF, Temp. Char.



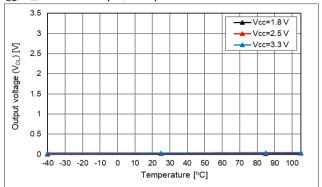
(7-5) Output Voltage

fo = 20 MHz

V_{OH}, L_CMOS = 15 pF, Temp. Char.

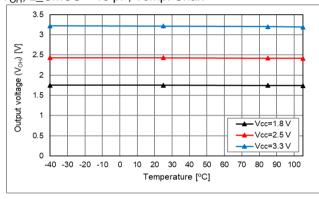


V_{OL}, L_CMOS = 15 pF, Temp. Char.

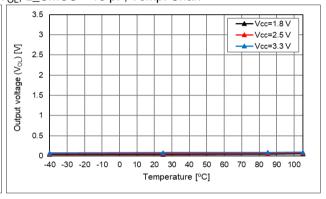


fo = 40 MHz

V_{OH}, L_CMOS = 15 pF, Temp. Char.

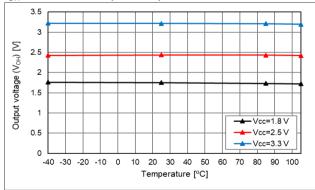


 V_{OL} , L_CMOS = 15 pF, Temp. Char.

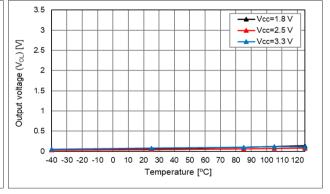


fo = 72 MHz

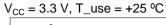
V_{OH}, L_CMOS = 15 pF, Temp. Char.

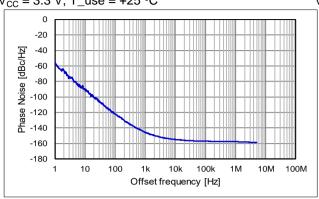


 V_{OL} , L_CMOS = 15 pF, Temp. Char.

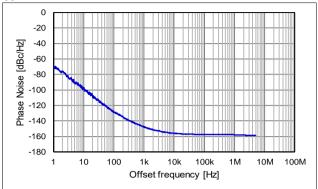


(7-6) Phase Noise, Phase Jitter, and Jitter fo = 20 MHz

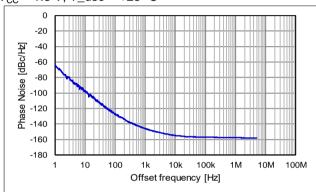








 $V_{CC} = 1.8 \text{ V}, T_{use} = +25 \, {}^{\circ}\text{C}$



Phase Jitter (Offset frequency: 12 kHz to 5 MHz)

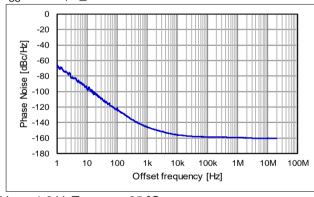
| V _{CC} | Phase Jitter |
|-----------------|--------------|
| 3.3 V | 0.31 ps |
| 2.5 V | 0.31 ps |
| 1.8 V | 0.32 ps |

Jitter (T_use = +25 $^{\circ}$ C, V_{CC} = 3.3 V)

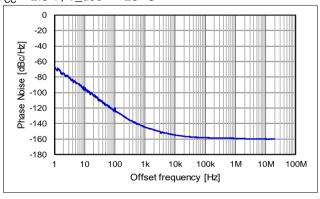
| Total jitter (BER = 10 ⁻¹²) | 31.3 ps |
|---|---------|
| RMS jitter | 1.8 ps |
| Peak to peak jitter | 15 ps |

fo = 40 MHz

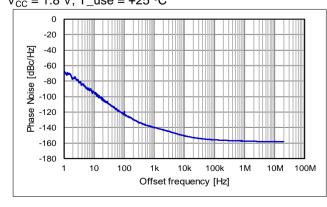
 $V_{CC} = 3.3 \text{ V}, T_{use} = +25 \, ^{\circ}\text{C}$



 $V_{CC} = 2.5 \text{ V}, T_{use} = +25 \, ^{\circ}\text{C}$



 $V_{CC} = 1.8 \text{ V}, T_use = +25 \, ^{\circ}\text{C}$



Phase Jitter (Offset frequency: 12 kHz to 20 MHz)

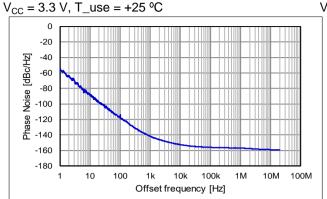
| V_{CC} | Phase Jitter |
|----------|--------------|
| 3.3 V | 0.24 ps |
| 2.5 V | 0.26 ps |
| 1.8 V | 0.32 ps |

Jitter (T_use = +25 $^{\circ}$ C, V_{CC} = 3.3 V)

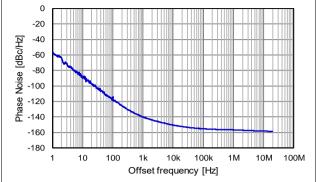
| Total jitter (BER = 10 ⁻¹²) | 22.3 ps |
|---|---------|
| RMS jitter | 1.8 ps |
| Peak to peak jitter | 16 ps |

(7-6) Phase Noise and Phase Jitter [cont'd]

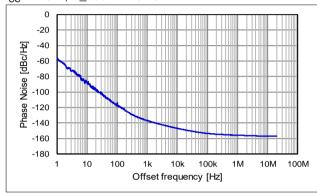
fo = 72 MHz











Phase Jitter (Offset frequency: 12 kHz to 20 MHz)

| V _{CC} | Phase Jitter | | |
|-----------------|--------------|--|--|
| 3.3 V | 0.16 ps | | |
| 2.5 V | 0.17 ps | | |
| 1.8 V | 0.20 ps | | |

Jitter (T_use = +25 °C, $V_{CC} = 3.3$ V)

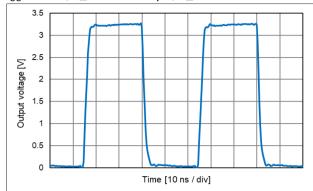
| (1200) = 0, 166 010 17 | | | |
|---|---------|--|--|
| Total jitter (BER = 10 ⁻¹²) | 21.8 ps | | |
| RMS jitter | 1.8 ps | | |
| Peak to peak jitter | 16 ps | | |

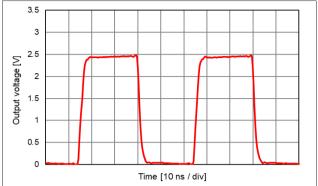
(7-7) Output Waveform

fo = 20 MHz

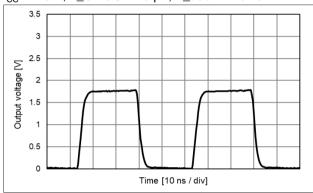
 V_{CC} = 3.3 V, L_CMOS = 15 pF, T_use = +25 °C

 $V_{CC} = 2.5 \text{ V}$, L_CMOS = 15 pF, T_use = +25 °C





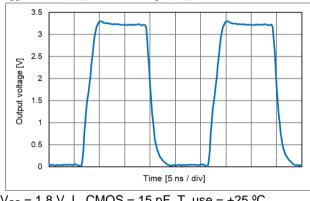
 $V_{CC} = 1.8 \text{ V}, L_CMOS = 15 \text{ pF}, T_use = +25 ^{\circ}C$

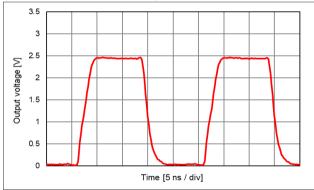


fo = 40 MHz

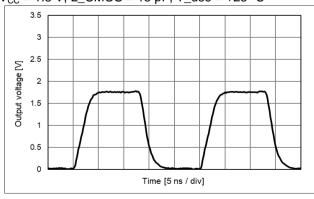
 $V_{CC} = 3.3 \text{ V}, L_CMOS = 15 \text{ pF}, T_use = +25 \, ^{\circ}C$

 $V_{CC} = 2.5 \text{ V}, \text{ L_CMOS} = 15 \text{ pF}, \text{T_use} = +25 \, {}^{\circ}\text{C}$





 $V_{CC} = 1.8 \text{ V}, L_CMOS = 15 \text{ pF}, T_use = +25 ^{\circ}C$

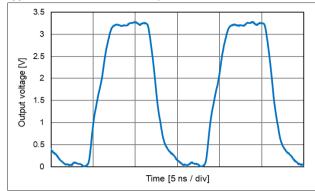


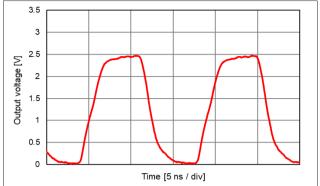
(7-7) Output Waveform [cont'd]

fo = 72 MHz

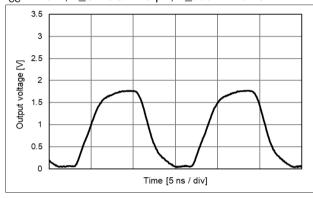
$$V_{CC} = 3.3 \text{ V}, L_CMOS = 15 \text{ pF}, T_use = +25 \, ^{\circ}C$$

 $V_{CC} = 2.5 \text{ V}, \text{ L_CMOS} = 15 \text{ pF}, \text{T_use} = +25 \text{ }^{\circ}\text{C}$





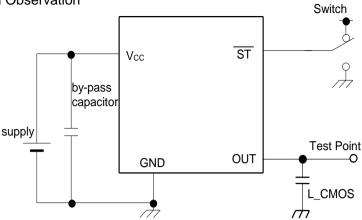
 V_{CC} = 1.8 V, L_CMOS = 15 pF, T_use = +25 °C



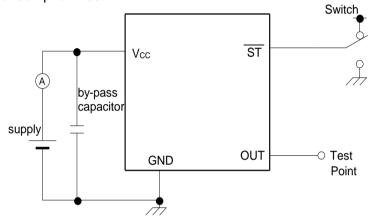
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[8] Test Circuit

(8-1) Waveform Observation



(8-2) Current Consumption Test



*Standby current test should be $\overline{ST} = GND$.

(8-3) Condition

(1) Oscilloscope

The bandwidth should be minimum 5 times wider than measurement frequency

The probe ground should be placed closely to the test point and the lead length should be
as short as possible

- * It is recommended to use miniature socket. (Don't use earth lead.)
- (2) L_CMOS includes probe capacitance.
- (3) A 0.01 μF to a 0.1 μF bypass capacitor should be connected between V_{CC} and GND pins located close to the device
- (4) Use a current meter with a low internal impedance
- (5) Power Supply

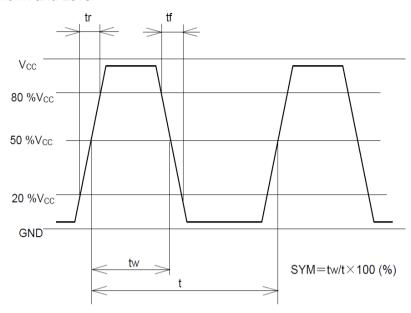
Power supply startup time (0 %V_{CC} \to 90 %V_{CC}) should be more than 150 µs Power supply impedance should be as low as possible

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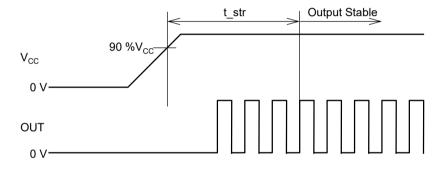
Spec No : SGxxxxCAN_E_Ver1.94

(8-4) Timing Chart

(1) Output Waveform and Level

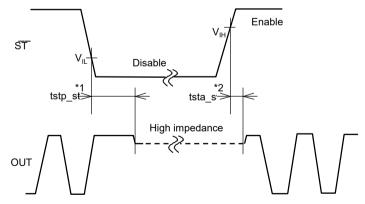


(2) Output Frequency Timing



(3) ST Function and Timing

| ST Terminal | Osc. circuit | Output status |
|-------------|------------------|-----------------------------|
| "H" or OPEN | Oscillation | Specified frequency: Enable |
| "L" | Oscillation stop | High impedance: Disable |



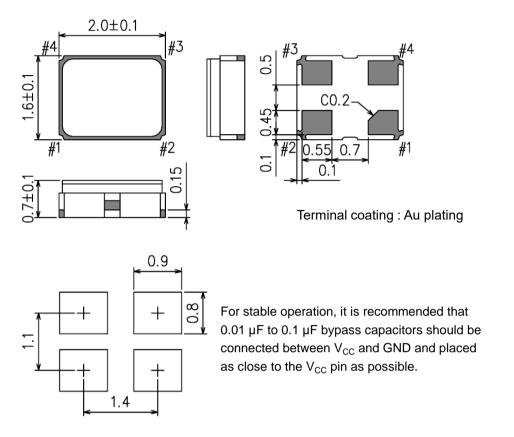
- *1 The period from $\overline{ST} = V_{IL}$ to OUT = High impedance (Disable)
- *2 The period from $\overline{ST} = V_{IH}$ to OUT = Enable
- * Judge of starting output: $V_{OH} \ge 80 \ \% V_{CC}, \ V_{OL} \le 20 \ \% Vcc, \ fout is within fo <math>\pm \ 1 \ 000 \times 10^{-6}$
- * ST terminal voltage level should not exceed supply voltage when using ST function.

 Please note that ST rise time should not exceed supply voltage rise time at the start-up.

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[9] Outline Drawing and Recommended Footprint (9-1) SG2016CAN

Units: mm

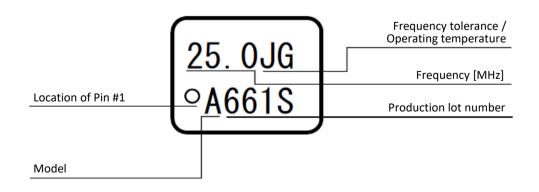


Reference Weight Typ.: 9.9 mg

Terminal Assignment

| Pin # | Connection | Function | | |
|-------|-----------------|--------------------------|------------------|-----------------------------|
| | | ST terminal | | |
| #1 | ST | ST function | Osc. Circuit | Output |
| #1 | #1 51 | "H" or OPEN | Oscillation | Specified frequency: Enable |
| | | "L" | Oscillation stop | High impedance: Disable |
| #2 | GND | GND terminal | | |
| #3 | OUT | Output terminal | | |
| #4 | V _{cc} | V _{CC} terminal | | |

Marking



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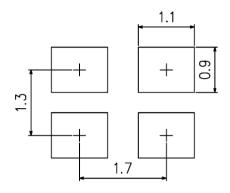
(9-2) SG-210STF

2.5±0.15

#4

CO.3

Terminal coating : Au plating



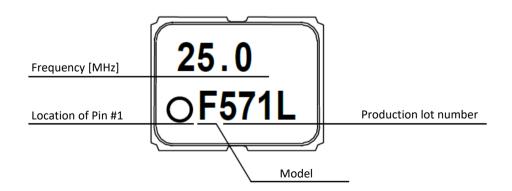
For stable operation, it is recommended that 0.01 μ F to 0.1 μ F bypass capacitors should be connected between V_{CC} and GND and placed as close to the V_{CC} pin as possible.

Reference Weight Typ.: 14 mg

Terminal Assignment

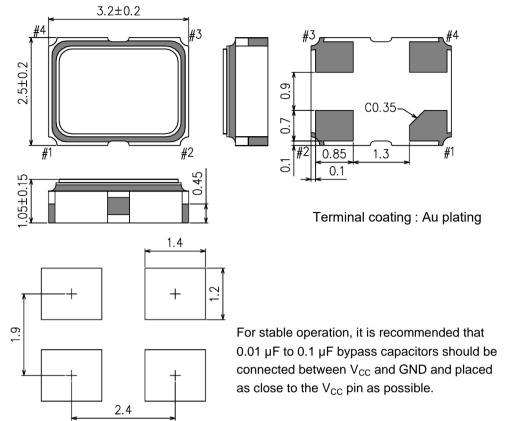
| Pin # | Connection | Function | | |
|-------|-----------------|--------------------------|------------------|-----------------------------|
| | | ST terminal | | |
| #1 | ST | ST function | Osc. Circuit | Output |
| #1 | 51 | "H" or OPEN | Oscillation | Specified frequency: Enable |
| | | "L" | Oscillation stop | High impedance: Disable |
| #2 | GND | GND terminal | | |
| #3 | OUT | Output terminal | | |
| #4 | V _{CC} | V _{CC} terminal | | |

Marking



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(9-3) SG3225CAN

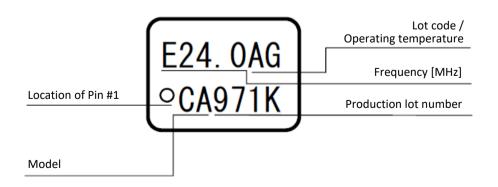


Reference Weight Typ.: 25 mg

Terminal Assignment

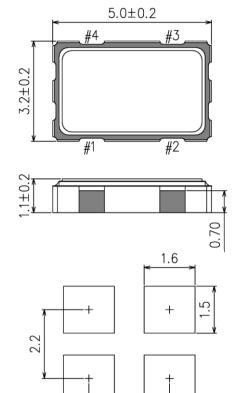
| Pin # | Connection | Function | | | |
|-------|-----------------|--------------------------|--------------|-----------------------------|------------------|
| | | | ST terminal | | |
| #1 | ST | ST function | Osc. Circuit | Output | |
| #1 | | "H" or OPEN | Oscillation | Specified frequency: Enable | |
| | | | | "L" | Oscillation stop |
| #2 | GND | GND terminal | | | |
| #3 | OUT | Output terminal | | | |
| #4 | V _{CC} | V _{CC} terminal | | | |

Marking

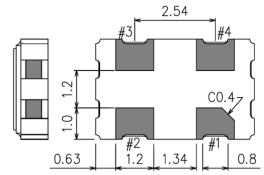


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(9-4) SG5032CAN



2.54



Terminal coating: Au plating

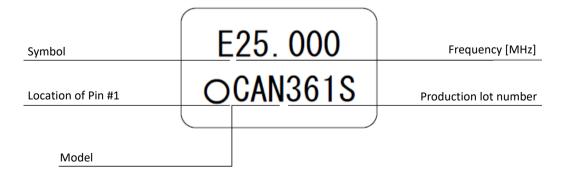
For stable operation, it is recommended that 0.01 μ F to 0.1 μ F bypass capacitors should be connected between V_{CC} and GND and placed as close to the V_{CC} pin as possible.

Reference Weight Typ.: 52 mg

Terminal Assignment

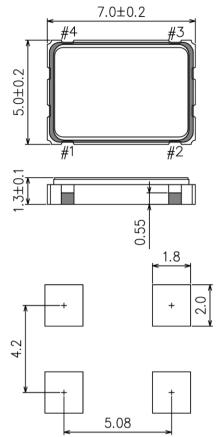
| Pin # | Connection | Function | | | |
|-------|-----------------|--------------------------|------------------|-----------------------------|--|
| | | | ST terminal | | |
| #1 | ST | ST function | Osc. Circuit | Output | |
| #1 | | "H" or OPEN | Oscillation | Specified frequency: Enable | |
| | | "L" | Oscillation stop | High impedance: Disable | |
| #2 | GND | GND terminal | | | |
| #3 | OUT | Output terminal | | | |
| #4 | V _{CC} | V _{CC} terminal | | | |

Marking



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(9-5) SG7050CAN



5.08 #3 092 01: 1.40 0.26

Terminal coating: Au plating

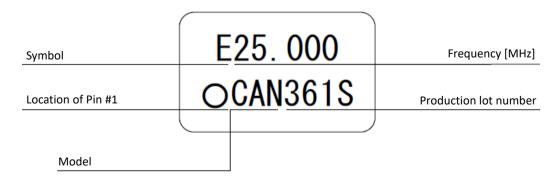
For stable operation, it is recommended that 0.01 μ F to 0.1 μ F bypass capacitors should be connected between V_{CC} and GND and placed as close to the V_{CC} pin as possible.

Reference Weight Typ.: 147 mg

Terminal Assignment

| Pin # | Connection | Function | | | |
|-------|-----------------|--------------------------|------------------|-----------------------------|--|
| | | | ST terminal | | |
| #1 | ST | ST function | Osc. Circuit | Output | |
| #1 | | "H" or OPEN | Oscillation | Specified frequency: Enable | |
| | | "L" | Oscillation stop | High impedance: Disable | |
| #2 | GND | GND terminal | | | |
| #3 | OUT | Output terminal | | | |
| #4 | V _{CC} | V _{CC} terminal | | | |

Marking



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[10] Moisture Sensitivity Level and Electro-Static Discharge Ratings

(10-1) Moisture Sensitivity Level (MSL)

| Parameter | Specification | Conditions |
|-----------|---------------|------------------------|
| MSL | LEVEL 1 | IPC/JEDEC J-STD-020D.1 |

(10-2) Electro-Static Discharge (ESD)

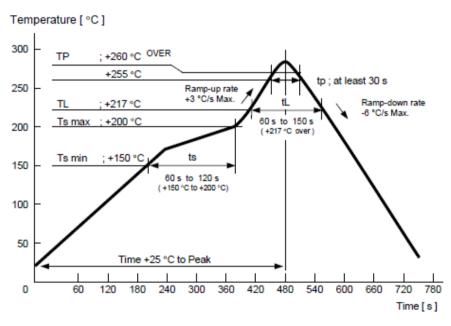
| Parameter | Specification | Conditions |
|-----------|---------------|---|
| НВМ | 2 000 V Min. | EIAJ ED-4701-1 C111A, 100 pF, 1.5 kΩ, 3 times |
| MM | 200 V Min. | EIAJ ED-4701-1 C111, 200 pF, 0 Ω, 1 time |
| CDM | 750 V Min | AEC-Q100-011 (DCDM) * only for SG2016CAN |

(10-3) Latch-Up

| Parameter | Specification | Conditions |
|-----------|---------------|---------------------|
| Latch-up | 100 mA Min. | EIAJ ED-4701-1 C113 |

[11] Reflow Profiles

IPC/JEDEC J-STD-020D.1



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Spec No: SGxxxxCAN_E_Ver1.94

[12] Packing Information

(12-1) SG2016CAN

(1) Packing Quantity

The last two digits of the Product Number (X1G004801xxxxxxx) are a code that defines the packing quantity. The standard is "00" for a 3 000 pcs/Reel.

(2) Taping Specification

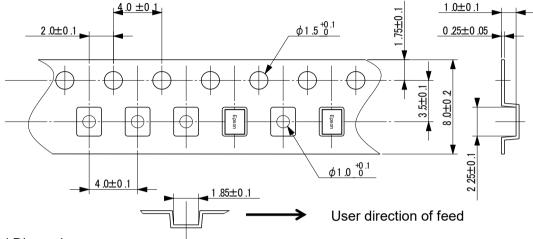
Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: PS (Polystyrene)

Top Tape Material: PET (Polyethylene Terephthalate) +PE (Polyethylene)

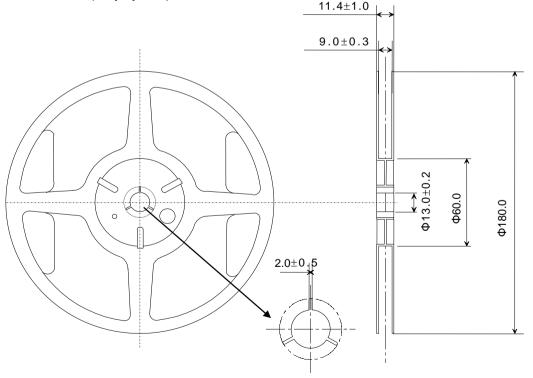
Units: mm



2) Reel Dimensions

Center Material: PS (Polystyrene) Reel Material: PS (Polystyrene)

Units: mm



3) Storage Environment

We recommend to keep less than +30 °C and 85 %RH of humidity in a packed condition, and to use it less than 6 months after delivery.

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(12-2) SG-210STF

(1) Packing Quantity

The last two digits of the Product Number (X1G004171xxxxxxx) are a code that defines the packing quantity. The standard is "00" for a 3 000 pcs/Reel.

(2) Taping Specification

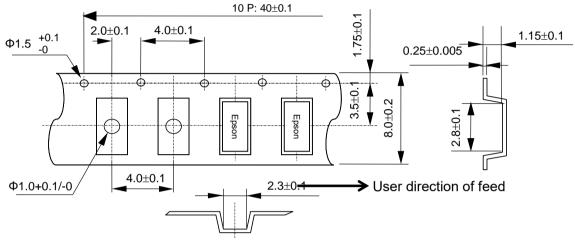
Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: PS (Polystyrene)

Top Tape Material: PET (Polyethylene Terephthalate) +PE (Polyethylene)

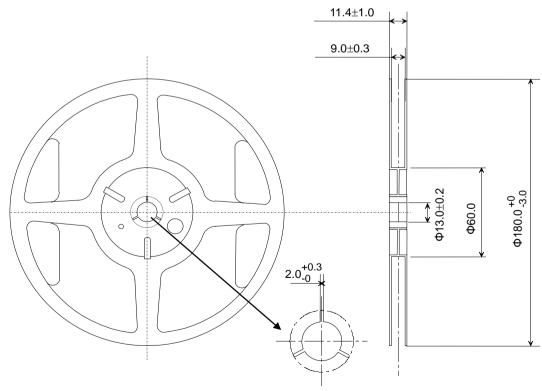
Units: mm



2) Reel Dimensions

Center Material: PS (Polystyrene) Reel Material: PS (Polystyrene)

Units: mm



3) Storage Environment

We recommend to keep less than +30 °C and 85 %RH of humidity in a packed condition, and to use it less than 6 months after delivery.

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(12-3) SG3225CAN

(1) Packing Quantity

The last two digits of the Product Number (X1G005961xxxxxxx) are a code that defines the packing quantity. The standard is "15" for a 2 000 pcs/Reel.

(2) Taping Specification

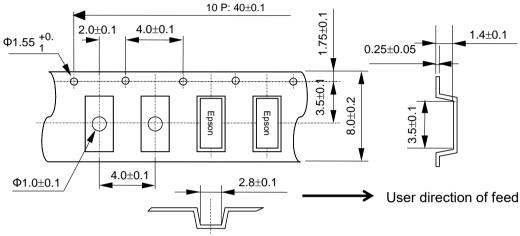
Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: PS (Polystyrene)

Top Tape Material: PET (Polyethylene Terephthalate) +PE (Polyethylene)

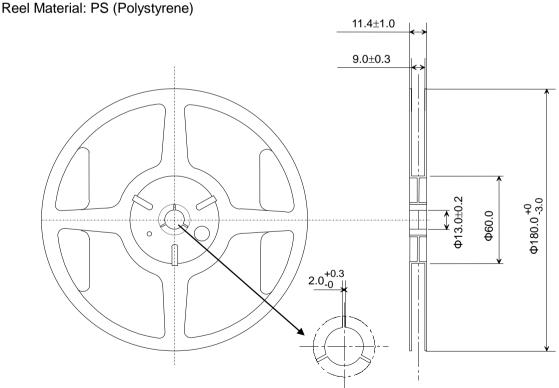
Units: mm



2) Reel Dimensions

Center Material: PS (Polystyrene)

Units: mm



3) Storage Environment

We recommend to keep less than +30 °C and 85 %RH of humidity in a packed condition, and to use it less than 6 months after delivery.

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Units: mm

(12-4) SG5032CAN

(1) Packing Quantity

The last two digits of the Product Number (X1G004451xxxxxxx) are a code that defines the packing quantity. The standard is "00" for a 1 000 pcs/Reel.

(2) Taping Specification

Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: PS (Polystyrene)

Top Tape Material: PET (Polyethylene Terephthalate) +PE (Polyethylene)

User direction of feed 0 0 0 0 Carrier tape Top tape Symbol Α В С D Е Value φ1.5 4.0±0.1 8.0±0.1 7.25±0.2 12.0±0.2 1.40±0.1 +0.1/-0

2) Reel Dimensions

Center Material: PS (Polystyrene) Reel Material: PS (Polystyrene)

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13.0±1.0

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3) Storage Environment

We recommend to keep less than +30 °C and 85 %RH of humidity in a packed condition, and to use it less than 6 months after delivery.

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Units: mm

(12-5) SG7050CAN

(1) Packing Quantity

The last two digits of the Product Number (X1G004481xxxxxxx) are a code that defines the packing quantity. The standard is "00" for a 1 000 pcs/Reel.

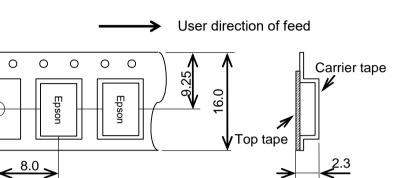
(2) Taping Specification

Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: PS (Polystyrene)

Top Tape Material: PET (Polyethylene Terephthalate) +PE (Polyethylene)



2) Reel Dimensions

Center Material: PS (Polystyrene) Reel Material: PS (Polystyrene)

17.4±1.0

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17.4±1.0

3) Storage Environment

We recommend to keep less than +30 °C and 85 %RH of humidity in a packed condition, and to use it less than 6 months after delivery.

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[13] Handling Precautions

Prior to using this product, please carefully read the section entitled "Precautions" on our Web site (https://www5.epsondevice.com/en/information/#precaution) for instructions on how to handle and use the product properly to ensure optimal performance of the product in your equipment.

Before using the product under any conditions other than those specified therein, please consult with us to verify and confirm that the performance affected by use under such conditions.

In addition to the foregoing precautions, in order to avoid the deteriorating performance of the product, we strongly recommend that you DO NOT use the product under ANY of the following conditions:

- (1) Mounting the product on a board using water-soluble solder flux and using the product without removing the residue of the flux completely from the board. The residue of such flux that is soluble in water or water-soluble cleaning agent, especially the residues which contains active halogens, will negatively affect the performance and reliability of the product.
- (2) Using the product in any manner that will result in any shock or impact to the product.
- (3) Using the product in places where the product is exposed to water, chemicals, organic solvent, sunlight, dust, corrosive gasses, or other materials.
- (4) Using the product in places where the product is exposed to static electricity or electromagnetic waves.
- (5) Applying ultrasonic cleaning without advance verification and confirmation that the product will not be affected by such a cleaning process, because it may damage the crystal,
- (6) Using the product under any other conditions that may negatively affect the performance and/or reliability of the product.
- (7) Power supply with ripple may cause of incorrect operation or degradation of phase noise characteristics, so please evaluate before use.
- (8) Supply voltage should be increased monotonically.
 In addition, please do not power on at midpoint potential since that may cause malfunction or not output.
- (9) Frequency aging is from environmental tests results to the expectation of the amount of the frequency variation. This doesn't guarantee the product-life cycle.

Should any customer use the product in any manner contrary to the precautions and/or advice herein, such use shall be done at the customer's own risk.

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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 IATF 16949 certification that is requested strongly by major manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

■ Explanation of marks used in this datasheet



●Pb free.



●Complies with EU RoHS directive.

*About the products without the Pb-free mark.

Contains Pb in products exempted by EU RoHS directive

(Contains Pb in sealing glass, high melting temperature type solder or other)

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Largest Supplier of Electrical and Electronic Components

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40.0M-T1K F335-24 F335-40 F535L-10 F535L-12 F535L-16 F535L-24 F535L-27 F535L-48 PE7744DW-100.0M ASF1-3.686MHZ-N-K
S ASV-4.000MHZ-LCS-T XLH735025.000JU4I8 XLP725125.000JU6I8 XO57CTECNA3M6864 ECS-2100A-147.4 601251

EP16E7E2H26.000MTR SiT8503AI-18-33E-0.200000X SIT8918AA-11-33S-16.000000G SIT9122AI2C233E300.000000X

XO37CTECNA20M XO3003 9120AC-2D2-33E212.500000 9102AI-243N25E100.00000 8208AC-82-18E-25.00000 ASDK2-32.768KHZ
LR-T3 8008AI-72-XXE-24.545454E 8004AC-13-33E-133.33000X AS-4.9152-16-SMD-TR ASFL1-48.000MHZ-LC-T 632L3I004M00000

SIT8920AM-31-33E-25.0000 DSC1028DI2-019.2000 9121AC-2C3-25E100.00000 9102AI-233N33E100.00000X 9102AI
233N25E200.00000 9102AI-232H25S125.00000 9102AI-133N25E200.00000