Clock OSC   SG-210STF   **SEIKO EPSON CORPORATION**

Product name   SG-210STF   20.000000 MHz L
Product Number / Ordering code   X1G0041710029xx

Please refer to the 8.Packing information about xx (last 2 digits)

Output waveform   CMOS
Pb free / Complies with EU RoHS directive
Reference weight Typ. 12 mg

1.Absolute maximum ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Remarks
Maximum supply voltage	Vcc-GND	-0.3	-	+4	V	-
Storage temperature	T_stg	-40	-	+125	ºC	Storage as single product
Input voltage	Vin	-0.3	-	Vcc+0.3	V	ST terminal

2.Specifications(characteristics)

| Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Remarks
Output frequency	f_0		20.000000		MHz	
Supply voltage	Vcc	1.6	-	3.6	V	-
Operating temperature	T_use	-40	-	+85	ºC	-
Frequency tolerance	f_tol	-50	-	50	$\times 10^{-6}$	T_use
Current consumption	Icc	-	-	1.8	mA	No load condition Vcc = 3.6V
Stand-by current	I_std	-	-	2.7	µA	Vcc = 3.6V , ST = GND
Symmetry	SYM	45	-	55	%	50% Vcc Level L_CMOS=<15pF
Output voltage	V_{OH}	Vcc-0.4	-	-		-
	V_{OL}	-	-	0.4		-
Output load condition	L_CMOS	-	-	15	pF	CMOS Load
Input voltage	V_{IH}	0.8Vcc	-	-		ST terminal
	V_{IL}	-	-	0.2Vcc		ST terminal
Rise time	t_r	-	-	4	ns	Vcc1.6V : 0.2Vcc to 0.8Vcc Level, L_CMOS=15pF
Fall time	tf	-	-	4	ns	Vcc1.6V : 0.2Vcc to 0.8Vcc Level, L_CMOS=15pF
Start-up time	t_str	-	-	3	ms	t = 0 at 0.9Vcc
Jitter	t_{DJ}	-	0	-	ps	Deterministic Jitter Vcc=3.3V
	t_{RJ}	-	2.4	-	ps	Random Jitter Vcc=3.3V
	t_{RMS}	-	2.3	-	ps	δ(RMS of total distribution) Vcc=3.3V
	t_{p-p}	-	20	-	ps	Peak to Peak Vcc=3.3V
	t_{acc}	-	2.5	-	ps	Accumulated Jitter(δ) n=2 to 50000 cycles
Phase jitter	t_{PJ}	-	0.5	-	ps	Off set Frequency: 12kHz to 20MHz, Vcc=3.3V
Phase noise	L(f)	-	-	-	dBc/Hz	-
		-	-96	-	dBc/Hz	Off set 10Hz Vcc=3.3V
		-	-125	-	dBc/Hz	Off set 100Hz Vcc=3.3V
		-	-146	-	dBc/Hz	Off set 1kHz Vcc=3.3V
		-	-155	-	dBc/Hz	Off set 10kHz Vcc=3.3V
		-	-158	-	dBc/Hz	Off set 100kHz Vcc=3.3V
		-	-159	-	dBc/Hz	Off set 1MHz Vcc=3.3V
Frequency aging	f_age	-3	-	3	$\times 10^{-6}$	@+25ºC first year
		-	-	-		-

3.Timing chart
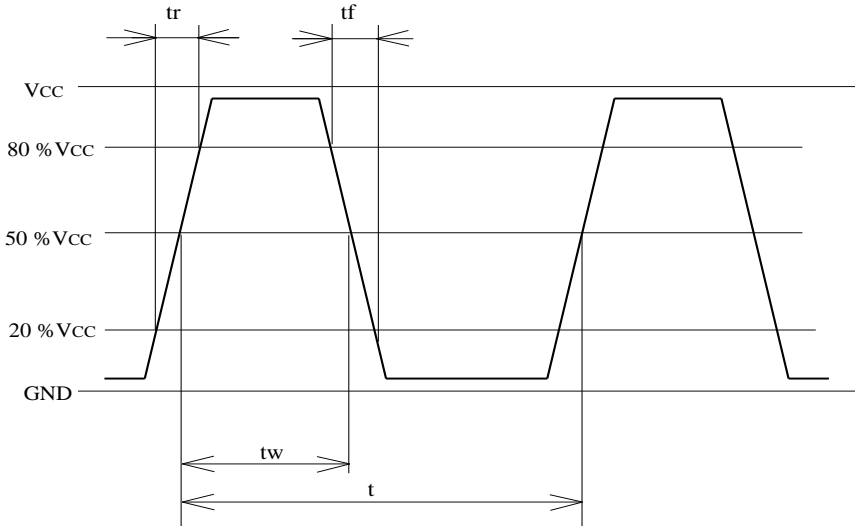
4.Test circuit

1) Waveform observation
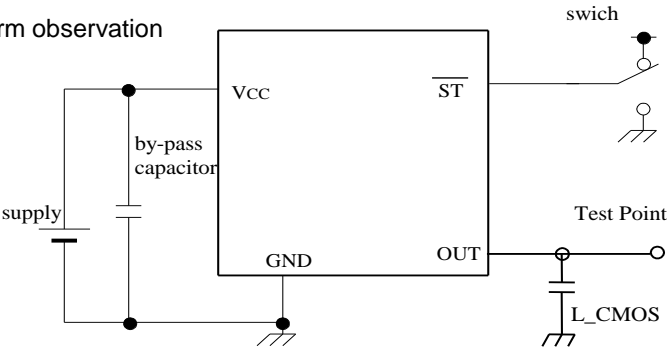
2) Current consumption
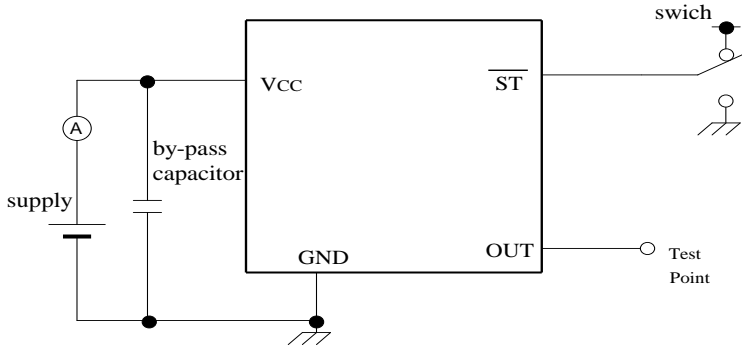
*Current consumption under the disable function should be = GND.

3) Condition

(1) Oscilloscope

· Band width should be minimum 5 times higher (wider) than measurement frequency.

· Probe earth should be placed closely from test point and lead length should be as short as possible

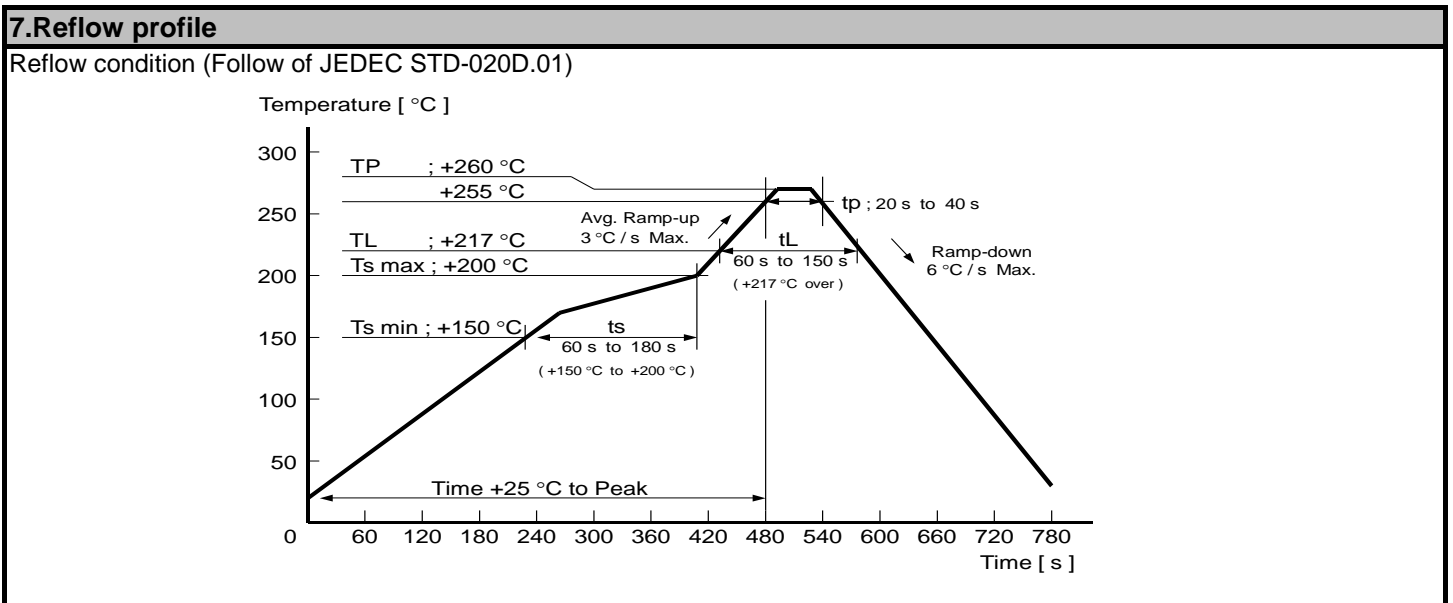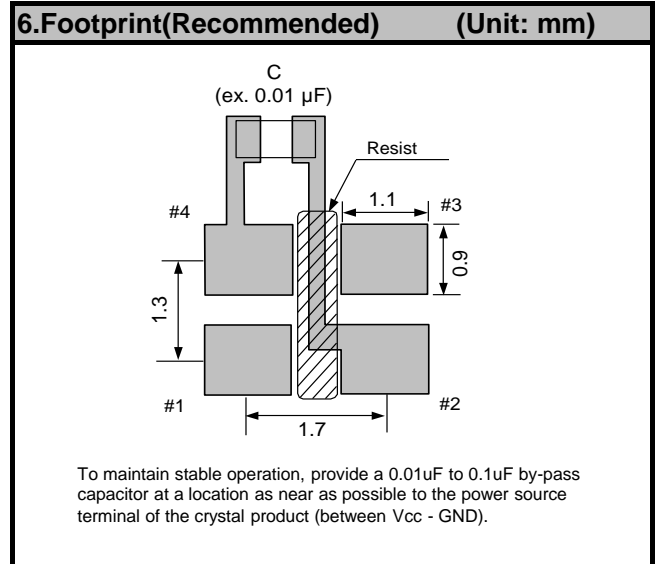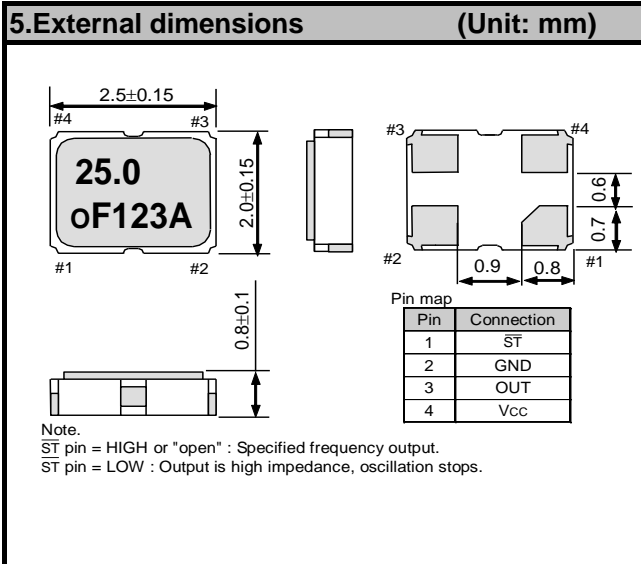* Recommendable to use miniature socket. (Don't use earth lead.)

(2) L_CMOS also includes probe capacitance.

(3) By-pass capacitor (0.01 µF to 0.1 µF) is placed closely between VCC and GND.

(4) Use the current meter whose internal impedance value is small.

(5) Power supply

· Start up time (0 %VCC to 90 %VCC) of power source should be more than 150 µs.

· Impedance of power supply should be as lowest as possible.

5.External dimensions   (Unit: mm)

25.0
oF123A

2.5±0.15

2.0±0.15

0.8±0.1

0.6

0.7

0.9   0.8

Pin map

Pin	Connection
1	$\overline{ST}$
2	GND
3	OUT
4	Vcc

Note.
$\overline{ST}$ pin = HIGH or "open" : Specified frequency output.
ST pin = LOW : Output is high impedance, oscillation stops.

6.Footprint(Recommended)   (Unit: mm)

C
(ex. 0.01 µF)

Resist

1.1

0.9

1.3

1.7

To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

7.Reflow profile

Reflow condition (Follow of JEDEC STD-020D.01)

Temperature [°C]

TP   ; +260 °C
+255 °C

tp ; 20 s to 40 s

TL   ; +217 °C

Avg. Ramp-up
3 °C / s Max.

tL
60 s to 150 s
(+217 °C over)

Ramp-down
6 °C / s Max.

Ts max ; +200 °C

Ts min ; +150 °C

ts
60 s to 180 s
(+150 °C to +200 °C)

Time +25 °C to Peak

Time [s]

8.Packing information

[1]Product number last 2 digits code(xx) description   The recommended code is "00"

X1G0041710029xx

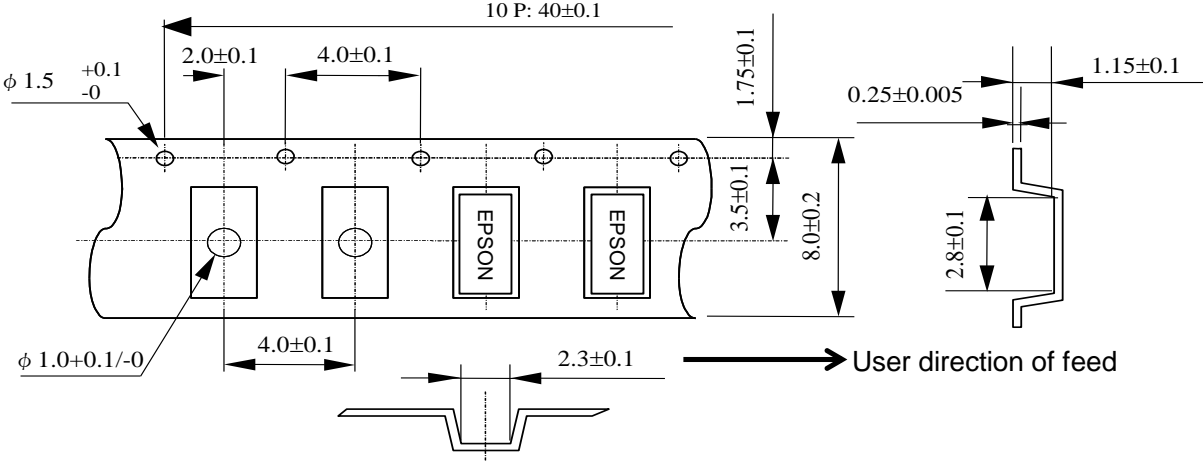| Code	Condition	Code	Condition
01	Any Q'ty vinyl bag(Tape cut)	14	1000pcs / Reel
11	Any Q'ty / Reel	15	2000pcs / Reel
12	250pcs / Reel	00	3000pcs / Reel

[2] Taping specification

Subject to EIA-481 & IEC-60286

(1) Tape dimensions

Material of the Carrier Tape : PS
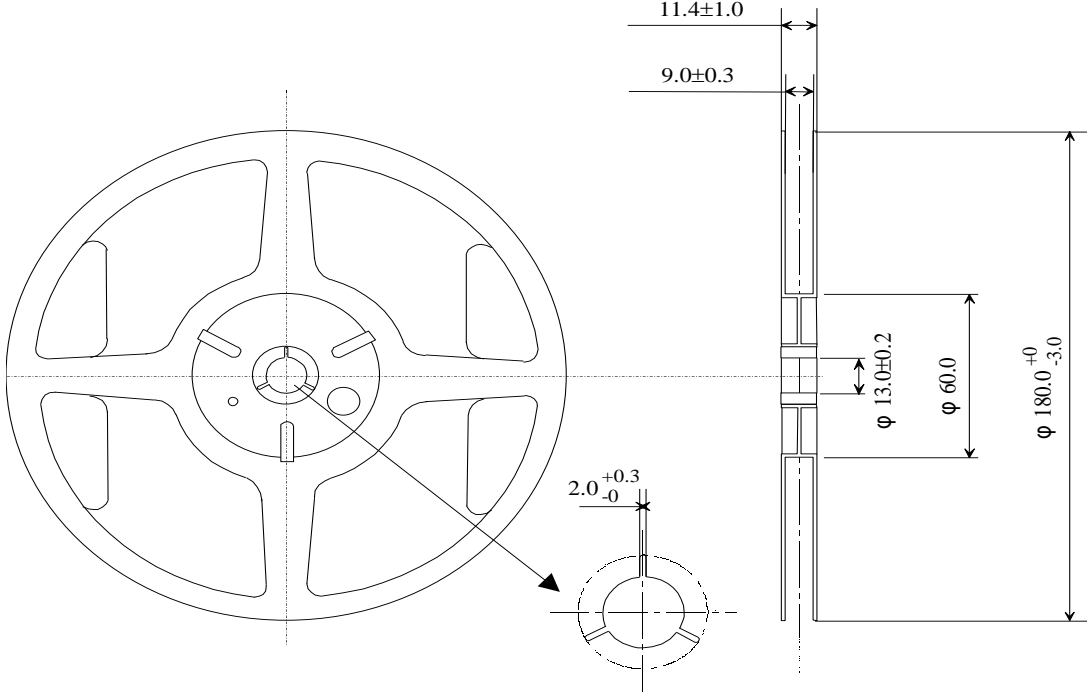
Material of the Top Tape : PET+PE

Unit: mm

10 P: 40±0.1

2.0±0.1   4.0±0.1

φ 1.5 +0.1/-0

1.75±0.1

0.25±0.005   1.15±0.1

3.5±0.1

8.0±0.2

2.8±0.1

EPSON   EPSON

φ 1.0+0.1/-0

4.0±0.1

2.3±0.1

User direction of feed

(2) Reel dimensions

Center material : PS

Material of the Reel : PS

Unit: mm

11.4±1.0

9.0±0.3

φ 13.0±0.2

φ 60.0

φ 180.0 +0/-3.0

2.0 +0.3/-0

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