Serial No. : 2013-0486
DATE : 2013/05/08

Shanghai Winson Electronics Co.,LTD

ITEM : CRYSTAL OSCILLATOR

TYPE :	DSA535SG
NOMINAL FREQUENCY :	20.000MHz
SPEC No. :	1XTQ20000EEA

Please acknowledge receipt of this specification by signing and returning a copy to us.

RECEIPT	
DATE	
RECEIVED	(signature) (name)

General Manufacturer of Quartz Devices
DAISHINKU CORP.
1389 Shinzaike, Hiraoka-cho, Kakogawa, Hyogo
675-0194 Japan
Phone (81)79-425-3141 Fax (81)79-425-1134
http://www.kds.info/index_en.htm

C.ENG. T. Okishio

ENG. S. Sakamoto

1. Device Name VC-TCXO
2. Model Name DSA535SG
3. Nominal Frequency 20.000 MHz
4. Weight 0.08g max.
5. Absolute Maximum Value

	Item	Symbol	Rating	Unit
1	Supply Voltage	V_{CC}	-0.3 ~ +6.0	V
2	Storage Temperature Range	$T_{_STG}$	-40 ~ +85	°C

6. Recommended Operating Conditions

	Item	Symbol	min.	typ.	max.	Unit
1	Supply Voltage	V_{CC}	+3.135	+3.3	+3.465	V
2	Frequency Control Voltage Range	V_{CONT}	+0.5	+1.5	+2.5	V
3	Output Enable					
	1. “L” level	V_{IL}	–	–	V_{CC}x0.3	V
	2. “H” level	V_{IH}	V_{CC}x0.7	–	–	V
4	Operable Temperature Range	$T_{_OPR}$	-40	–	+85	°C
5	Load impedance (resistance part)	$L_{_CMOS}$	–	15	–	pF

7. Electrical Characteristics

(T_A =-40 ~ +85 °C, $L_{_CMOS}$ =15pF, V_{CC}=+3.3V, V_{CONT}=+1.5V, Output Enable="H"or "Open" unless otherwise noted)

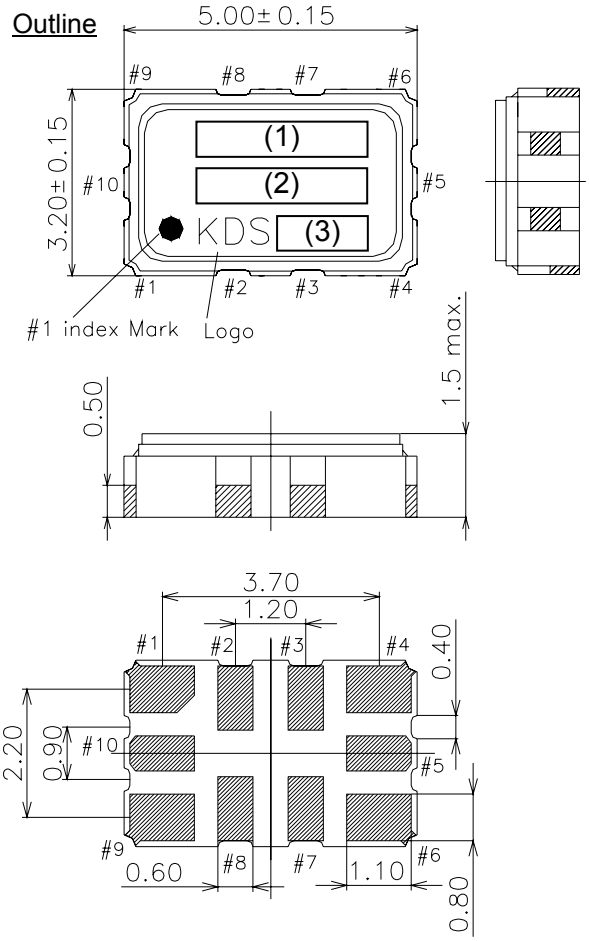
	Item	Conditions	Limits			Unit	Notes
			min.	typ.	max.		
1	Current consumption		–	–	3.5	mA	
2	Output						1
	1. Rise Time	V_{CC}x0.1 ~ V_{CC}x0.9	–	–	7	ns	
	2. Fall Time	V_{CC}x0.9 ~ V_{CC}x0.1	–	–	7	ns	
	3. Low Level		–	–	V_{CC}x0.1	V	
	4. High Level		V_{CC}x0.9	–	–	V	
	5. Symmetry	V_{CC}x0.5 Level	40/60	50	60/40	%	
3	Frequency Stability						
	1.Tolerance	After 2 times reflow(T_A = +25 °C)	–	–	±1.50	ppm	2,3
	2.vs Temperature	T_A =-40 ~ +85 °C	–	–	±0.30	ppm	4
	3.vs Slope		–	–	±0.10	ppm	
	4.vs Supply Voltage	V_{CC}=+3.3V±5%	–	–	±0.10	ppm	
	5.vs Load Variation	$L_{_CMOS}$ =15pF ±5%	–	–	±0.10	ppm	
	6.vs Aging	T_A = Room ambient	–	–	±0.70	ppm/1years	
		T_A = Room ambient	–	–	±1.30	ppm/3years	
		T_A = Room ambient	–	–	±2.50	ppm/10years	
4	Start up time	@90% of Final Vout level	–	–	1.0	ms	
5	Frequency Control						
	1.Control Range	V_{CONT}=+1.5V ± 1.0V	±5.0	–	±9.0	ppm	5
	2.Input Resistance		100	–	–	kΩ	
6	SSB Phase Noise	Relative to F0 Level Offset 100Hz	–	–	-110	dBc/Hz	
		Relative to F0 Level Offset 1kHz	–	–	-135	dBc/Hz	6
		Relative to F0 Level Offset 10kHz	–	–	-150	dBc/Hz	

Notes

1. CMOS Output
2. Ref. to Nominal Frequency.
3. Please leave after Reflow in 2-hour or more at room ambient.
4. Ref. to Frequency(T_A=+25 °C)
5. Positive slope (Frequency becomes high in proportion to frequency control voltage.)
6. Standard mode : without VC_FILTER (terminal #7 : N.C.)

8. Outline, Pin Connections

Outline



Pin Connections

Pin No.	Connection
#1	V_{CONT}
#2	GND (N.C.)
#3	Output Enable
#4	GND
#5	GND (N.C.)
#6	Output
#7	N.C.
#8	GND (N.C.)
#9	V_{CC}
#10	GND (N.C.)

Marking

(1) Frequency 20000 (kHz, 5digits)

(2) Model code A535SG

(3) Date code Year (1digit) + Week (2digits)

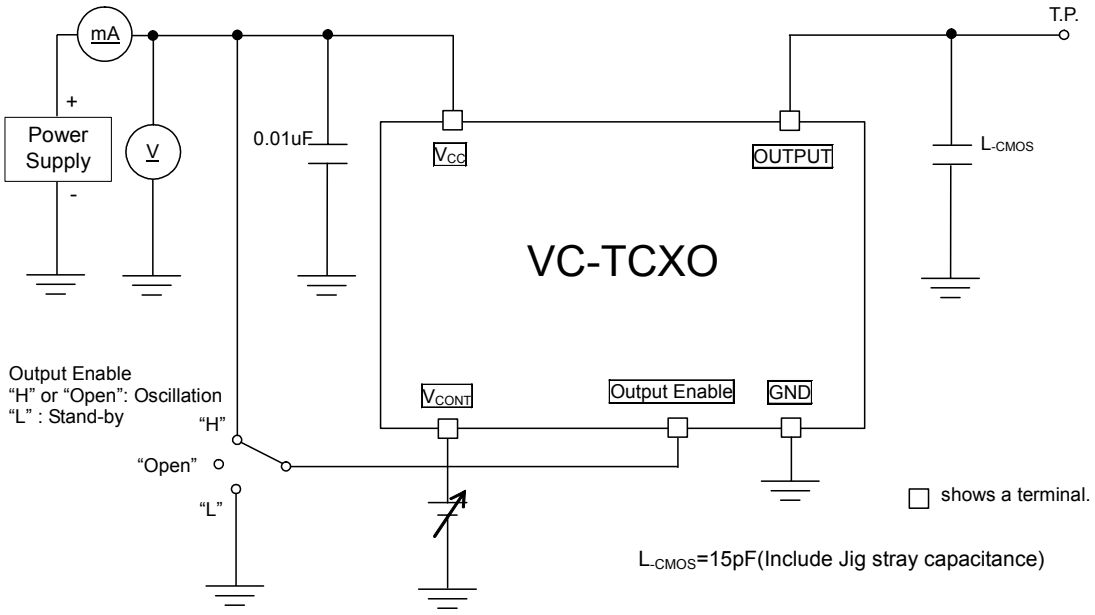
e.g. 2013/1/1 → 301

unit:mm

Dimensional Tolerance: ±0.15

(Unless otherwise noted)

9. Measurement Circuit



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10. Mechanical Characteristics

All test is performed after 3times reflow (Clause.13) except 10.10 (Resistance to soldering heat)

	Item	Description	Requirements
1	Drop	Natural drop (On concrete) Mounting on the set or test fixture.(Total weight 100g) Height : 150cm Direction : X,Y,Z, 6directions Test cycle : 3cycles Reference specification : EIAJ-ED-4702A Method5	df/f=<±1.0ppm
2	Vibration	Sweep range : 10~500Hz Sweep speed : 11min/cycle Amplitude : 1.5mm (10~55Hz) Acceleration : 200m/s^2 (55~500Hz) Direction : X,Y,Z, 3directions Test cycle : 10cycles Reference specification : IEC 60068-2-6	df/f=<±0.5ppm
3	Shock	Acceleration : 1000m/s^2 Direction : X,Y,Z, 6directions Duration : 6ms Test cycle : 3cycles/each directions Reference specification : IEC 60068-2-27	df/f=<±0.5ppm
4	PCB bend strength	PWB : t=1.6mm Pressure speed : 1.0mm/s Bend width : 1→2→3mm Duration : 10±1s Reference specification : IEC 60068-2-21 Ue1	df/f=<±0.5ppm No visible damage. No leak damage.
5	Adherence nature	PWB : t=1.6mm Direction : X,Y, 2directions Pressure : 10N Duration : 10±1s Reference specification : IEC 60068-2-21 Ue3	df/f=<±0.5ppm No visible damage. No leak damage.
6	Package strength	Pressure : 10N Duration : 10±1s Reference specification : IEC 60068-2-77	df/f=<±0.5ppm No mechanical damage. No leak damage.
7	Gross leak	It is immersed for 3min into +125±5°C Chlorofluorocarbon (CFCs) liquid. Reference specification : IEC 60068-2-17	No continuous air bubbles.
8	Fine leak	It shall be measured by the helium leak detector after pressurization for 60min by the pressure of (3.92±0.49) x10^5 Pa in a helium gas atmosphere. Reference specification : IEC 60068-2-17	Less than 1.0x10^{-9}Pa m^3/s.
9	Solderability	Solder bath temperature : +245±5°C Duration : 3±0.3s Reference specification : IEC 60068-2-58	A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.
10	Resistance to soldering heat	1) Solder iron method Bit size : B(φ3) Bit temperature : +350±10°C Duration : 3+1/-0s /each terminal It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-20	df/f=<±0.5ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ No visible damage.
		2) Reflow In refer to temperature profile shown in clause13. Test cycle : 3cycles It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-58	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ No visible damage.

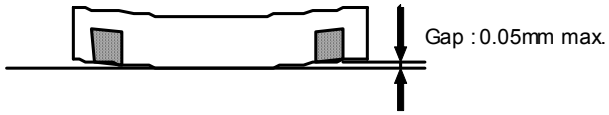
11. Environmental Characteristics

All test is performed after 3times reflow (Clause13)

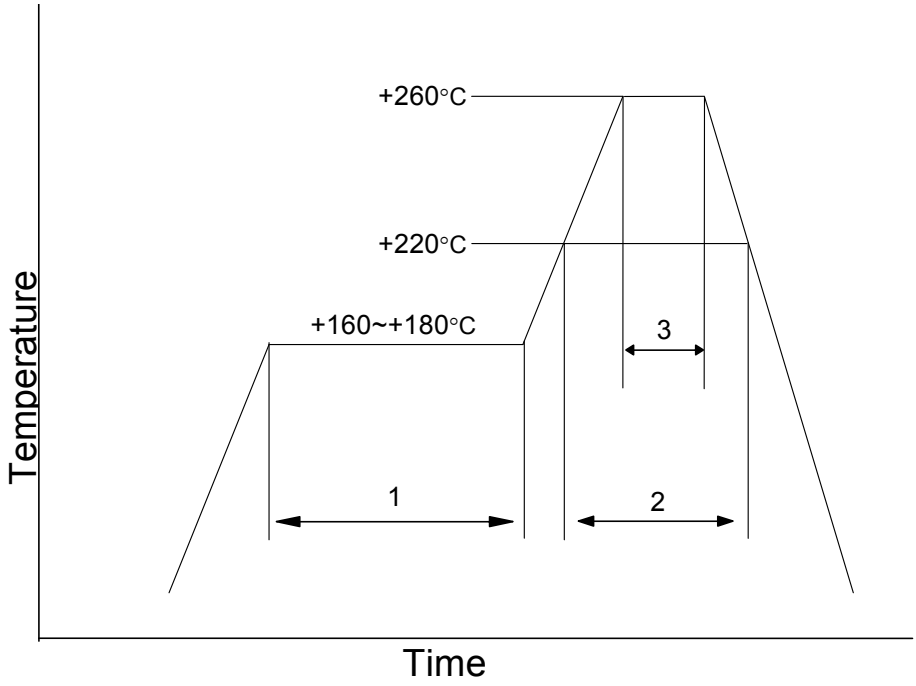
	Item	Description	Requirements
1	Low temperature storage	Temperature : -40±3°C Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-1 Ab	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
2	High temperature storage	Temperature : +85±2°C Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-2 Bb	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
3	Humidity	Temperature : +85±2°C R.H. 85±5% Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-3	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
4	HTB	Temperature : +85±2°C Duration : 1000h BIAS : Max value of supply voltage It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-2 Bb	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
5	THB	Temperature : +40±2°C R.H. 90~95% Duration : 1000h BIAS : Max value of supply voltage It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-3	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
6	Thermal shock	Thermal shock : -40±3°C : 0.5h ⇔ +85±2°C : 0.5h Test cycle : 200cycles Shift time : 2~3min It shall be measured after 2h at room temperature, humidity. Reference specification : IEC pub.68-2-14.Na	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
7	ESD	Model : Machine Model (MM) V=±200V (C1=200pF, R1=0Ω) Number of times : 3times Each terminal except common terminal. (Connect to test terminal) Reference specification : EIA/JESD22-A114	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.
		Model : Human Body Model (HBM) V=±1500V (C1=100pF, R1=1500Ω) Number of times : 3times Each terminal except common terminal. (Connect to test terminal) Reference specification : EIA/JESD22-A115	df/f=<±1.0ppm $\Delta V_{OUT} \leqq \pm 0.2 V_{P-P}$ The electrical characteristics are satisfied.

12. Flatness of Terminal

When the component is placed on the flat surface, the gap from the connecting terminal shall not exceed 0.05 mm.



13. Reflow Profile

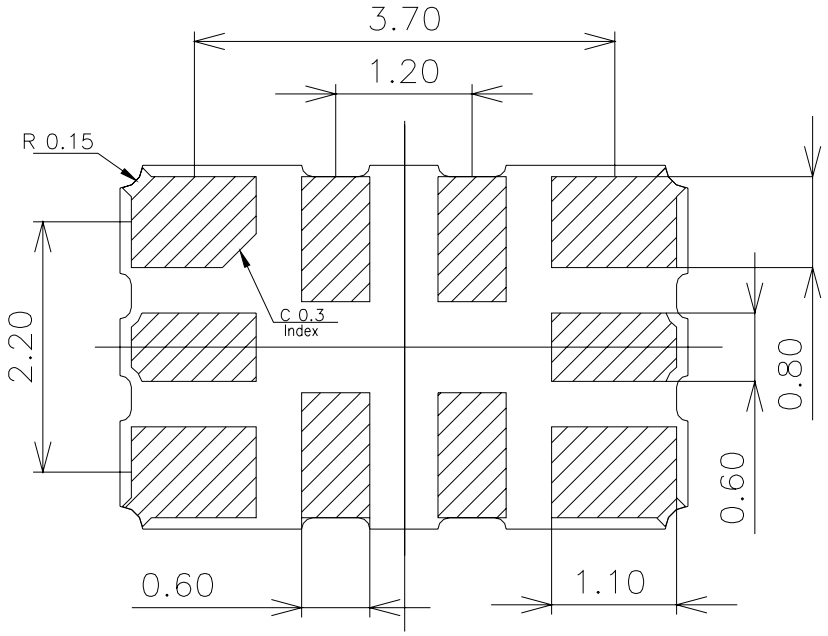


1	Preheat	+160~+180°C	120s
2	Primary Heat	+220°C	60s
3	Peak	+260°C	10s max.

14. Bottom View / Land Pattern Layout

(1) Bottom View

A through hole is not located on the bottom (mounting side).

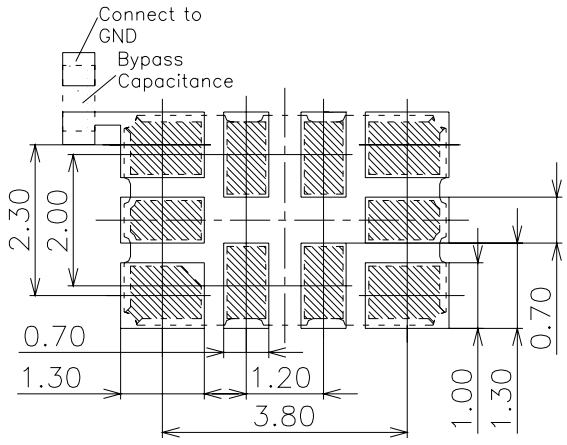


unit : mm
Dimensional Tolerance: ±0.15mm

Mounting terminal

(2) Land Pattern Layout

The following land pattern is reference design.
The electrical characteristic clause7 shall be satisfied with mounting to this land.
The land pattern can be changed in the limits to which a test land and a mounting land are not connected.
And it does not any effect to the electrical characteristics. Mask thickness recommends 0.12mm.



(Top View)

TOP VIEW
unit: mm
Dimensional Tolerance: ±0.15mm

Land Pattern

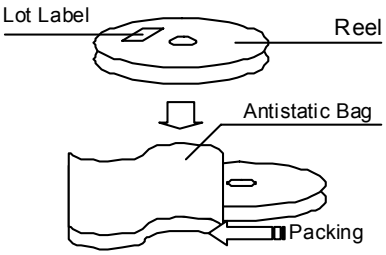
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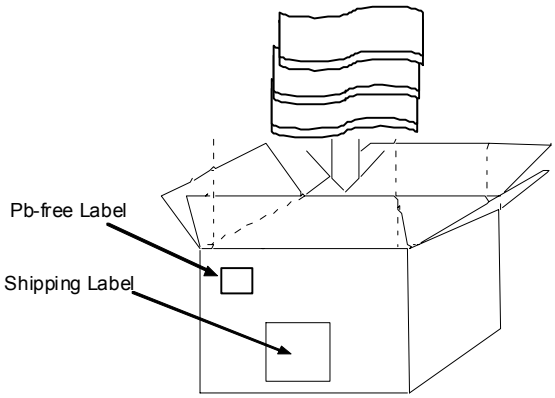
15. Packing Specification

15.1 Taping specifications
See Fig.1.
15.2 Emboss tape format and dimensions
See Fig.2.
15.3 Reel specifications
See Fig.3.
15.4 Quantity
1000pcs. max. per Reel.
15.5 Taping material List
See right table
15.6 Packaging Procedure
See below figure
15.7 Moisture Sensitivity
Moisture Sensitivity Level of this part is MSL = 1 (No dry pack required)
Refer to IPC/JEDEC J-STD-033

Taping material List

Item	Materials	Disposition
Cover Tape:	PET + Olefinic Resin (Conductive layer)	Conductive
Emboss tape	PS	Conductive
Reel	PS	Conductive





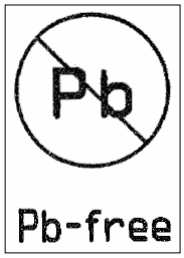
Lot label detail

TYPE	(Model Name)
SPEC No.	(Spec. Number)
Parts No.	(User's Parts Number)
Lot No.	(Lot Number)
FREQ.	(Nominal Frequency)
Q'TY	(Quantity)
KDS	DAISHINKU CORP.

Shipping label detail

ITEM	(Model Name)
SPEC	(Spec. Number)
DELIVERY DATE	(Delivery Date)
Q'TY	(Quantity)
NOTES	(User's Parts Number)
DAISHINKU CORP.	

Pb-free Label



Lot label (Example)

TYPE	XXXXXXXX
SPEC NO.	XXXXXXXXXXXX
PARTS NO.	XXXXXXXXXXXX
LOT NO.	XXXXXXXXX
FREQ.	XX.XXXMHz
Q'TY	1000pcs.

KDS Made in Japan

Formation of a lot number

e.g. AH3101201

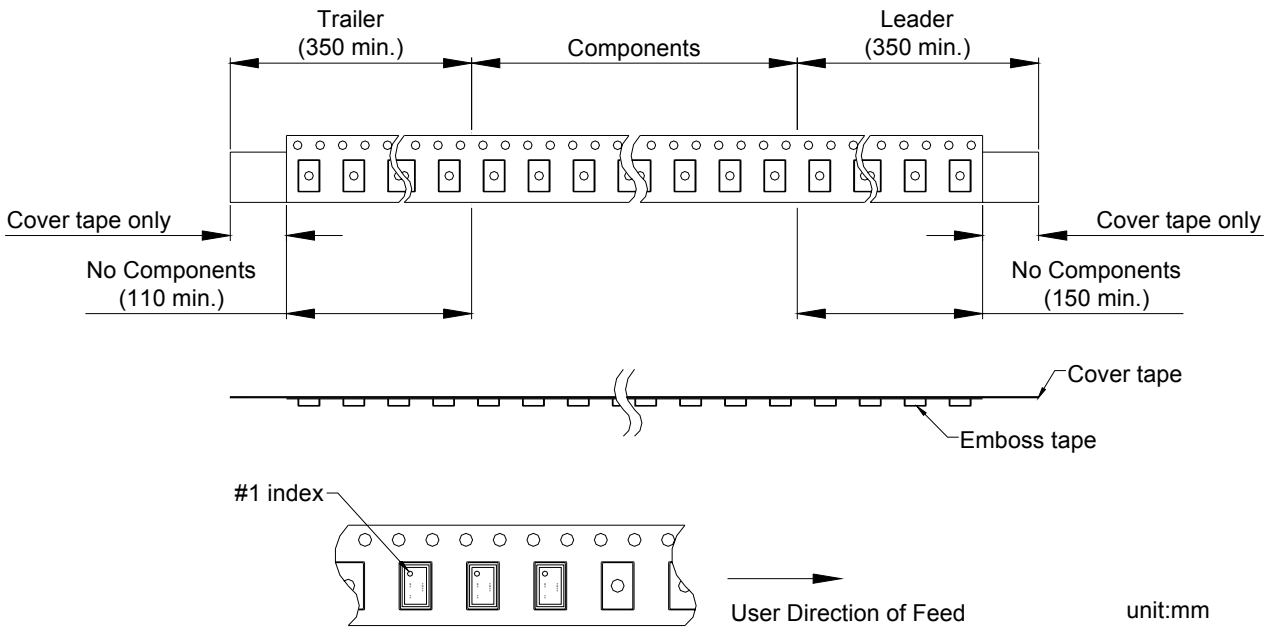
A	H	3101	201
Manufacturing site code	Product code	year/ month/ day	Serial No.

The notation method of a manufacture year, month, and day. (4digits alphanumeric character)

YMDD (4digits) e.g.) 2013 /01 /01→ 3101

Y Year 1digit (Last digit of Year)
M Month 1digit alphanumeric symbol
DD Day 2digits numerical characters of day

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jly.	Aug.	Sep.	Oct.	Nov.	Dec.
Symbol	1	2	3	4	5	6	7	8	9	O	N	D



Direction of taking up reel is clock-wise as above.
There are sprocket holes on the right hand side of the tape when it is pulled out as shown above.

Peel strength
Pulling angle 165 ~ 180°, pulling speed at 300mm/min, strength should be 0.2 ~ 0.7N.

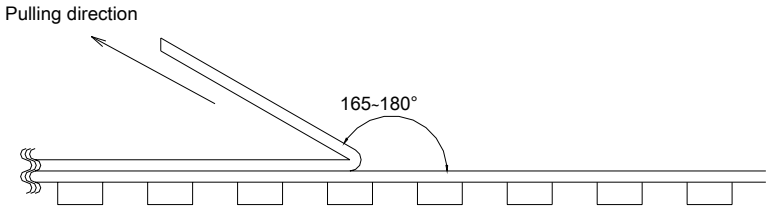
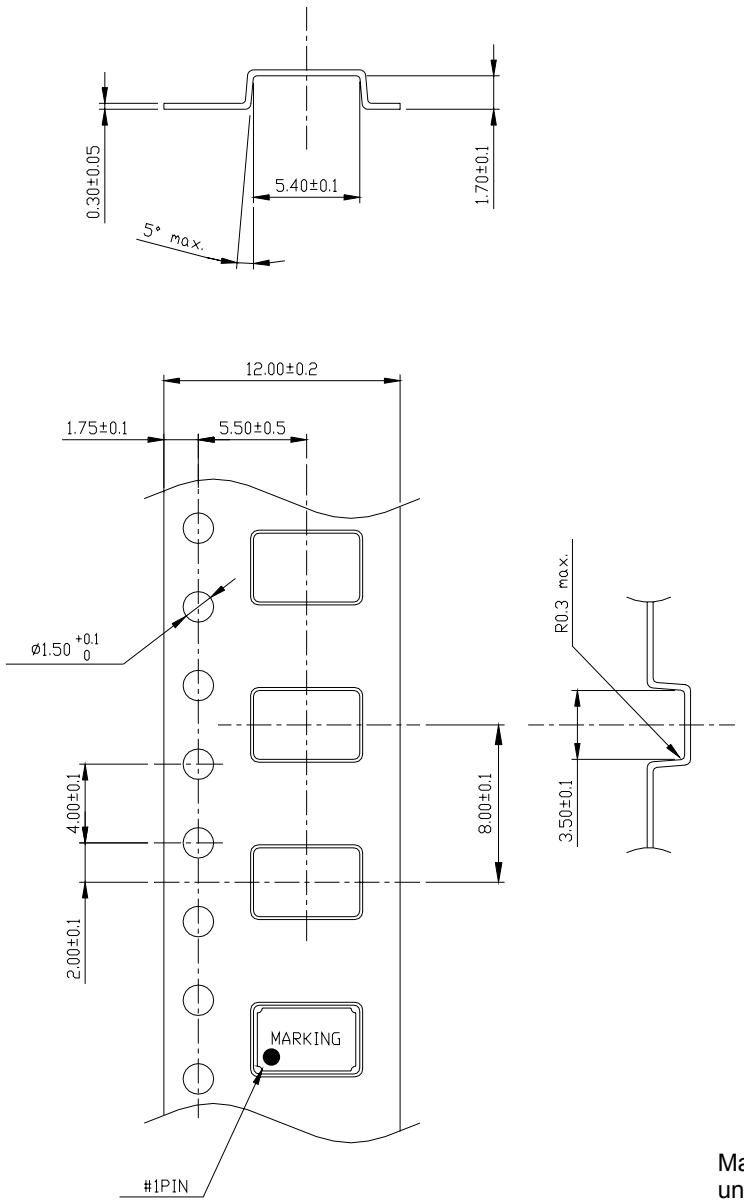


Fig.1.Taping specifications



1) Clearance of an embossing tape, and a product unit : mm

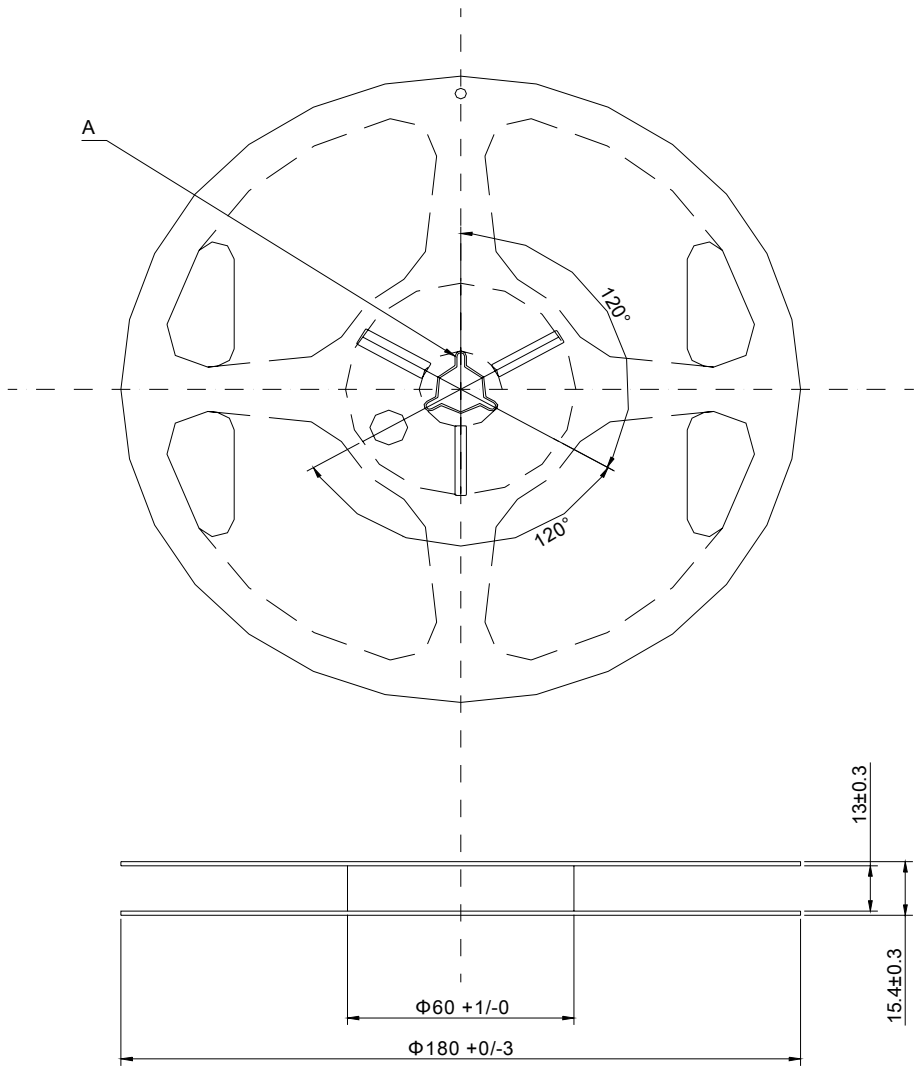
Direction	Pocket size	TCXO size	Clearance
L	5.4±0.1	5.0±0.15	0.4±0.25
W	3.5±0.1	3.2±0.15	0.3±0.25
H	1.7±0.1	1.5 max.	0.2 min.

2) Quality : Polystyrene(Conductivity)

3) Tensile strength of an embossing tape : more than 14N

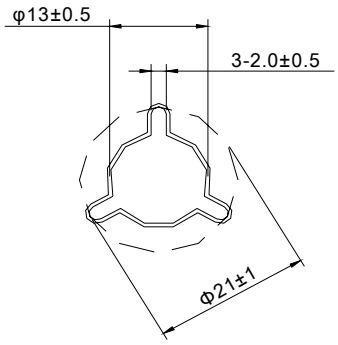
Material: Polystyrene (Conductivity)
unit: mm

Fig.2. Emboss tape format and dimensions



Material:Polystyrene (Conductivity)
unit:mm

Section A



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16. Notes on mounting and handling

16.1 Storage environment

(1) The temperature and humidity of a storage place, Please give +5 ~ +40˚C and 40 ~ 85% as a standard.

(2) Please use this product within one year from the packing label date of issue.

(3) Please avoid the place which generates corrosive gas, and the place with much dirt.

(4) Please keep it in a place with little temperature change.

Dew condensation arises owing to a rapid temperature change and solderability becomes bad.

16.2 Be cautions to static electricity and high voltage.

16.3 This product has sufficient durability to fall and vibration. However, conditions may change to the fall after mounting to a PWB, and vibration. When you should drop on a floor the PWB which mounted the product or too much shock is added. Please use after a performance check.

16.4 Please check that the curvature of the substrate at the time of substrate cutting does not affect a product. Moreover, especially when a product is near the position of a PWB guide pin, and the position of a PWB break, be careful.

16.5 The part concerned does not correspond to washing.

16.6 Please repair at +260˚C in 10s with hot air or +350˚C in 5s with solder Iron.

17. Mandatory control

17.1 Ozone-depleting substance

It regulates by the U.S. air purifying method (November, 1990 establishment). ODS of CLASS1 and CLASS2 is not contained or used.

17.2 PBDE, PBBs

PBDE, PBBs are not contained into all the material currently used for this product.

17.3 RoHS

Following material restricted by RoHS is not included or used. Lead, mercury, cadmium, hexavalent chromium ,PBB and PBDE.

17.4 Law Concerning Examination and Regulation of Manufacture, etc. of Chemical Substances

All the material currently used for this product is based on "Law Concerning Examination and Regulation of Manufacture, etc. of Chemical Substances". It is a registered material.

17.5 Lead

Leads, such as solder, are not used for this product.(Lead Free)

17.6 About the existence of silver and mercury use

The silver of very small quantity is contained in the conductive adhesives used for adhesion of Blank. Moreover, mercury is used. It does not get down.

18. The country of origin / factory name / address

Country of origin : Japan

Factory name : DAISHINKU Corp. Tottori Production Div.

Address : 7-3-21 Wakabadai minami, Tottori 689-1112

2013-0486 REVERSION RECORD

Rev. No.	Date	Reason	Contents	Approved	Checked	Drawn
-	2013/05/08	-	Initial Release	T.Okishio	S.Sakamoto	S.Fujihira