

Specifications

1.0 SPECIFICATION REFERENCE

Line	Parameter	Description
1.1	Model description	RXT2016AT 19.200 MHz
1.2	RoHS compliant	Yes
1.3	Reference number	RXT2016AT-03
1.4	Rakon part number	509232
1.5	Current Version	1.03

2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Frequency		19.200	MHz
2.2	Calibration tolerance	Frequency at 25°C ±3°C and specified load capacitance	±10 max	ppm
2.3	Reflow shift	Frequency shift after reflow with 4 hours settling at 25°C	±2 max	ppm
2.4	Frequency stability over temperature	Referenced to frequency reading at 32°C and the specified load capacitance over -30°C to 85°C	±12 max	ppm
2.5	Temperature range	Operating temperature	-30 to 105	°C
2.6	Residual frequency stability slope	Slope of the residual error to a 5th order polynomial. Measured every 1°C from -30°C to 85°C at a minimum rate of 1°C/minute.	50 max	ppb/°C
2.7	Small thermal cycle residual slope	Slope of the residual error to the 5th order polynomial (Note 2). Measured at 0.5°C intervals over any 5°C heating and 5°C cooling cycle, at a minimum rate of 1°C/minute within the operating temperature range. (Note 3)	50 max	ppb/°C
2.8	Small thermal cycle hysteresis	Difference in frequency measurements over any 5°C heating and 5°C cooling cycle, at a minimum rate of 1°C/minute within the operating temperature range. (Note 3)	50 max	ppb pkpk
2.9	Spurious mode series resistance	Within ±1 MHz	1100 min	Ω
2.10	Long term stability	Frequency drift over 1 year at 25°C	±0.7 max	ppm
2.11	G sensitivity	Gamma vector of all three axes from 30Hz to 1500Hz	2 max	ppb/g

3.0 ELECTRICAL

Line	Parameter	Test Condition	Value	Unit
3.1	Load capacitance (CL)	Frequency is calibrated at room temperature	7	pF
3.2	Shunt capacitance (C0)	Operating specification	0.3 to 1.3	pF
3.3	Motional capacitance (C1)	Operating specification	1.2 to 3.1	fF
3.4	Drive level	Operating specification	10 to 100	μW
3.5	Equivalent series resistance (ESR)		80 max	Ω
3.6	Q factor		75 min	k
3.7	Insulation resistance (IR)	100V ±15V at 25°C	500 min	MΩ
3.8	F-DLD	Power swept from 0.01μW to 100μW	3 max	ppm pkpk
3.9	F-DLD2	Power swept from 0.01μW to 100μW to 0.01μW	0.7 max	ppm pkpk
3.10	R-DLD	Power swept from 0.01μW to 100μW, change from nominal ESR	20 max	%
3.11	R-DLD2	Power swept from 0.01μW to 100μW to 0.01μW, relative to nominal ESR	10 max	%

4.0 FREQUENCY VS TEMPERATURES CURVE FIT COEFFICIENTS

Line	Parameter	Test Condition	Value	Unit
4.1	Inflection Temperature		30.5 to 33.5	°C
4.2	Offset	Typical frequency offset referenced to 32°C. Referred to as C0 by Qualcomm (Note 1)	-10 to 10	ppm
4.3	First order coefficient	Typical value using third order curve fitting referenced to 32°C. Calculated over -30°C to 105°C. Referred to as C1 by Qualcomm (Note 1)	-0.40 to -0.10	ppm/°C
4.4	Second order coefficient	Typical value using third order curve fitting referenced to 32°C. Calculated over -30°C to 105°C. Referred to as C2 by Qualcomm (Note 1)	-4.5e-4 to 4.5e-4	ppm/°C ²
4.5	Third order coefficient	Specification value using third order curve fitting referenced to 32°C. Calculated over -30°C to 105°C. Referred to as C3 by Qualcomm (Note 1)	8.5e-5 to 11.5e-5	ppm/°C ³

5.0 TEMPERATURE SENSOR CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
5.1	Resistance (Ro)	Resistance at 25°C (To)	100	kΩ
5.2	Resistance tolerance		±1 max	%
5.3	Beta constant (25 - 50°C) 100kΩ	Calculated between two specified temperatures points R and Ro. T and To are absolute temperature (K). $\text{Beta} = \ln(R/R_o) / (1/T - 1/T_o)$	4250	K
5.4	Beta tolerance		±1 max	%
5.5	Thermistor size	0201		

6.0 ENVIRONMENTAL

Line	Parameter	Description
6.1	Shock	Half sine-wave acceleration of 3000g peak amplitude. Duration: 0.3ms, Velocity: 12.3 ft/s [MIL-STD-202 M213]
6.2	Moisture resistance	1000 hours at 85°C, 85% Relative Humidity. Biased. [MIL-STD-202 M106G]
6.3	Temperature cycling	1000 temperature cycles, where each cycle consists of a 25 minute soak time at -40°C followed by a 25 minute soak time at 85°C, with a 60 second maximum transition time between temperatures. Air to air transition. [JESD22 METHOD JA-104C]
6.4	Vibration	5g for 20 minutes. 12 cycles in each of 3 orientations. Test from 10-2000Hz [JESD22-B103-B]
6.5	Storage temperature	-40 to 105°C

7.0 MANUFACTURING INFORMATION

Line	Parameter	Description
7.1	Washing	Able to withstand aqueous washing process
7.2	Reflow	Able to withstand reflow process
7.3	Packaging description	Tape and reel. Standard packing quantity is 3000 units per reel

8.0 MARKING

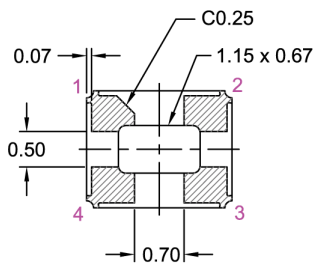
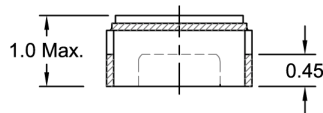
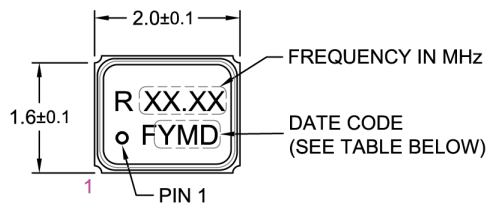
Line	Parameter	Description
8.1	Type	Laser engraved
8.2	Line 1	R and frequency in MHz [XX.XX]
8.3	Line 2	Pin 1 and date code

9.0 SPECIFICATION NOTES

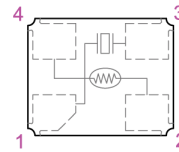
Line	Parameter	Description
9.1	Note 1	Qualcomm Document: GPS Quality, 19.2 MHz 2016 Package Size, TH+Xtal, Mini-specification 80-V9690-26 Rev. D
9.2	Note 2	Referenced to the 5th order polynomial used to calculate the "Residual frequency stability slope".
9.3	Note 3	Discard the first 0.5°C interval of each heating and cooling cycle

Drawing Name: RXT2016AT Model Drawing (Type 2)

MODEL OUTLINE



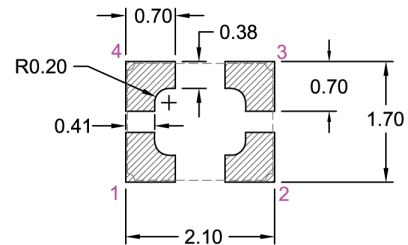
EQUIVALENT CIRCUIT - TOP VIEW



PIN CONNECTIONS

1	CRYSTAL
2	GND
3	CRYSTAL
4	THERM

RECOMMENDED PAD LAYOUT - TOP VIEW



Y - Year Code

Code	Year	Code	Year
A	2010	N	2023
B	2011	O	2024
C	2012	P	2025
D	2013	Q	2026
E	2014	R	2027
F	2015	S	2028
G	2016	T	2029
H	2017	U	2030
I	2018	V	2031
J	2019	W	2032
K	2020	X	2033
L	2021	Y	2034
M	2022	Z	2035

M - Month Code

Code	Month
1	Jan
2	Feb
3	Mar
4	Apr
5	May
6	Jun
7	Jul
8	Aug
9	Sep
A	Oct
B	Nov
C	Dec

D - Day Code

Code	Day	Code	Day	Code	Day
1	1	E	14	R	27
2	2	F	15	S	28
3	3	G	16	T	29
4	4	H	17	U	30
5	5	I	18	V	31
6	6	J	19		
7	7	K	20		
8	8	L	21		
9	9	M	22		
A	10	N	23		
B	11	O	24		
C	12	P	25		
D	13	Q	26		

TITLE: RXT2016AT MODEL (Type 2)

RELATED DRAWINGS:

FILENAME: CAT700

REVISION: A

DATE: 11-Jul-12

SCALE: 10 : 1

Millimetres

TOLERANCES:

XX =

X.X =

X.XX = ±0.10

X.XXX = ±0.05

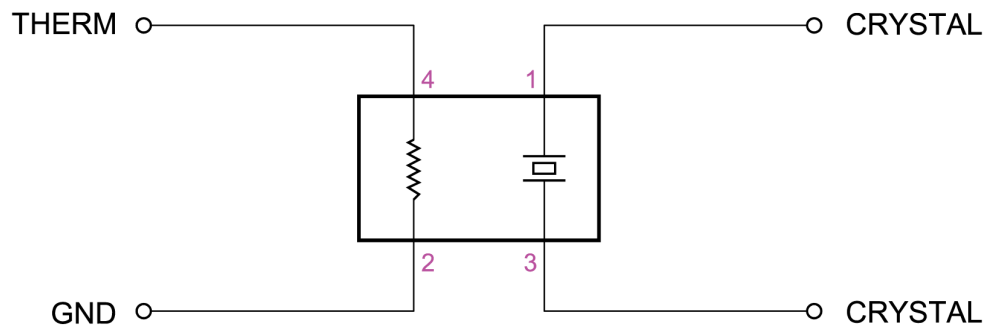
X° =

Hole =

rakon

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Drawing Name: RXT2520AT Series Electrical Circuit



TITLE: RXT-AT SERIES ELECTRICAL CIRCUIT

RELATED DRAWINGS:

FILENAME: CAT590

REVISION: D

DATE: 18-Apr-12

SCALE: NTS

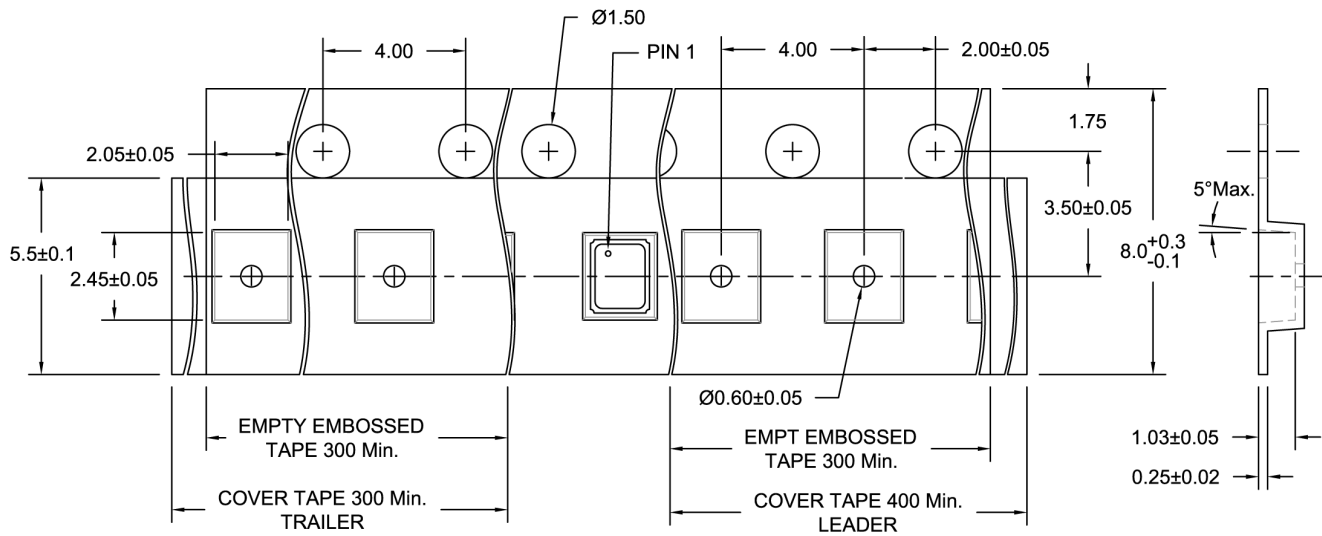
Millimetres

rakon

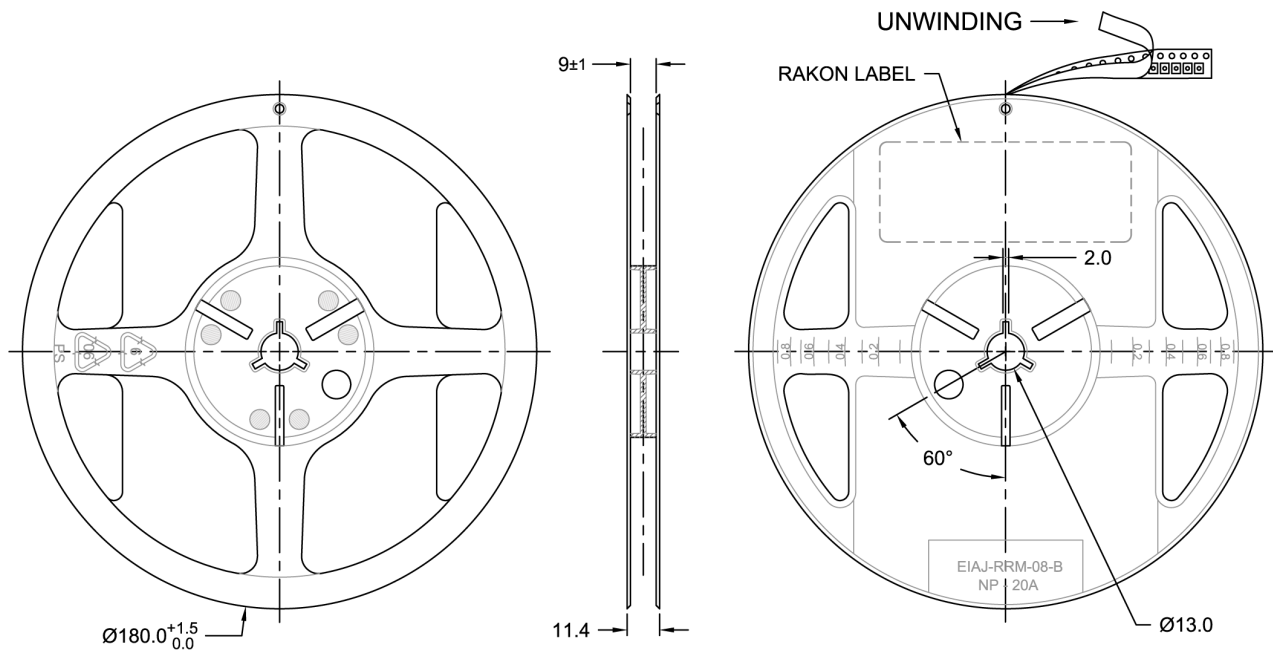
© 2009 Rakon Limited

Drawing Name: 2016 Series Crystal Tape & Reel

TAPE DETAIL (Scale 5 : 1)



REEL DETAIL (Scale 1 : 2.5)



TITLE: 2016 SERIES CRYSTAL TAPE & REEL

RELATED DRAWINGS:

FILENAME: CAT682

REVISION: A

DATE: 18-Apr-12

SCALE: 5 : 1

Millimetres

TOLERANCES:

XX =

X.X = ±0.2

X.XX = ±0.10

X.XXX =

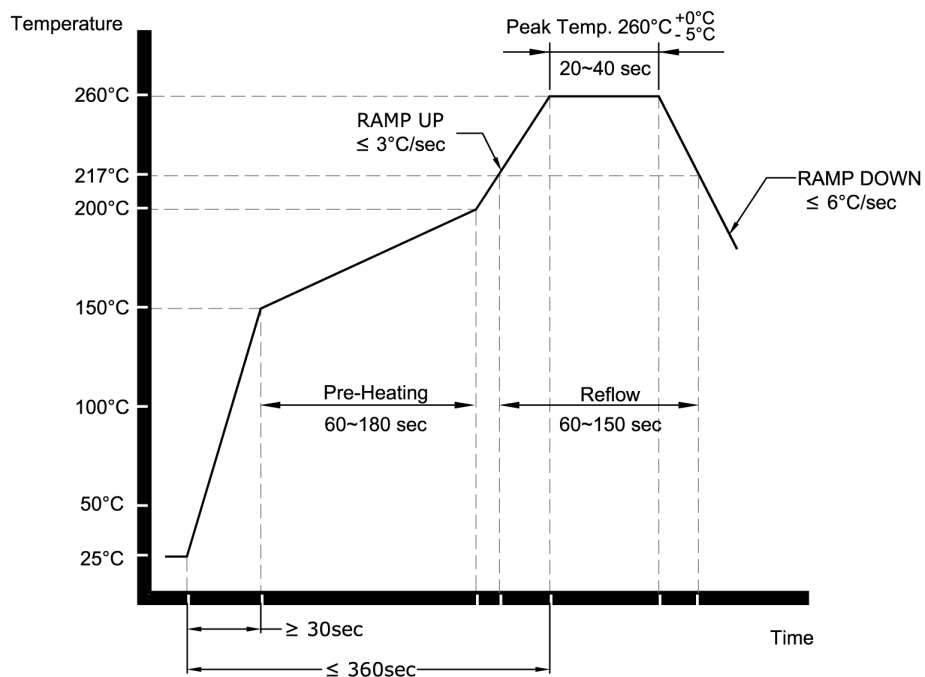
X° =

Hole =

rakon

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Drawing Name: Pb-Free Reflow



NOTE:

The product has been tested to withstand the Reflow Profile shown. The Reflow Profile used to solder Rakon products is determined by the solder paste Manufacturer's specification. It is recommended that the Reflow Profile used does not exceed the one shown above.

TITLE: Pb-FREE REFLOW

RELATED DRAWINGS:

FILENAME: CAT541

REVISION: B

DATE: 05-Sep-11

SCALE: NTS

Millimetres

rakon

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Specification History

Current Version : 1.03

Version	User	Change	Note	Date
1.0	System	Specification Created		2012-07-11 09:48
1.01	andrew.daken	<ul style="list-style-type: none"> Added line '4.1' Inflection Temperature Changed TestCondition on line 9.1 From: Qualcomm Document: GPS Quality, 19.2 MHz 2016 Package Size, TH+Xtal, Mini-specification 80-V9690-26 Rev. C To: Qualcomm Document: GPS Quality, 19.2 MHz 2016 Package Size, TH+Xtal, Mini-specification 80-V9690-26 Rev. D Changed TestCondition on line 1.1 From: RXT2016AT 19.200 MHz (Preliminary) To: RXT2016AT 19.200 MHz 	Updated as per customer request.	2013-03-07 13:37
1.02	sowmya.injeti	<ul style="list-style-type: none"> Changed TestCondition on line 7.3 From: Tape and reel. Standard packing quantity is 4000 units per reel To: Tape and reel. Standard packing quantity is 3000 units per reel 		2013-05-03 10:51
1.03	sowmya.injeti	<ul style="list-style-type: none"> Deleted line '1.6' Customer Part Number 		2013-06-12 09:10