

AUTOMOTIVE QUARTZ CRYSTALS



ACCORDING TO AEC-Q200 STANDARD



RELIABLE QUALITY FOR EVERY APPLICATION

From synthetic quartz bar manufacturing to small batches for prototypes up to large scale production in ever constant quality: Jauch offers top-rate services for both large as well as small and medium-sized enterprises. Our high degree of flexibility in layout and production volume allows us to cover a wide spectrum of customers and branches and to deliver complete process control for all of our products.



- Professional engineering support
- Crystal circuit design advice
- Customer training courses
- Technical documentation support
- Customer application check & verification
- Fault finding at component level
- Oscillator circuit safety factor measurement
- Quartz crystal power measurement












- Production locations in Germany and Asia
- State-of-the-art production lines
- Complete process control
- Highest quality levels
- Excellent product availability
- Millions of crystals & oscillators ex stock
- Fully automated warehouse system
- Worldwide shipping logistics

Key Features AEC-Q200 quartz crystals

- AEC-Q200 compliant
- SMD Full Metal Packages, Ceramic Packages and Metal/Ceramic Packages
- Shock: >100 g (6.0 ms; half sine)
- Vibration >5 g (10~ 2000 Hz)

QUARTZ CRYSTALS ACCORDING TO AEC-Q200 STANDARD

Quartz Crystals for Automotive Applications

	Type	Version	Frequency Range	L x W x H in mm	Page
	JAS32P4	4 Pad Version	10.0 ~ 50.0 MHz (fund. AT-cut)	3.2 x 2.5 x 0.7	5
	JAS53P4	4 Pad Version	8.0 ~ 56.0 MHz (fund. AT-cut)	5.0 x 3.2 x 0.9	6
	JAS75P4	4 Pad Version	4.0 ~ 54.0 MHz (fund. AT-cut) 24.0 ~ 150.0 MHz (3rd OT AT-cut)	7.0 x 5.0 x 1.3	7
	JAG32P4	4 Pad Version	12.0 ~ 50.0 MHz (fund. AT-cut) (lower frequencies upon request)	3.2 x 2.5 x 1.0	8
	JAG53P2	2 Pad Version	8.0 ~ 50.0 MHz (fund. AT-cut) 45.0 ~ 60.0 MHz (3rd OT AT-cut)	5.0 x 3.2 x 1.5	9
	JAG53P4	4 Pad Version	8.0 ~ 50.0 MHz (fund. AT-cut) 45.0 ~ 60.0 MHz (3rd OT AT-cut)	5.0 x 3.2 x 1.5	10
	JAG75P2	2 Pad Version	5.0 ~ 50.0 MHz (fund. AT-cut) 30.0 ~ 70.0 MHz (3rd OT AT-cut)	7.0 x 5.0 x 1.8	11
	JAG75P4	4 Pad Version	5.0 ~ 50.0 MHz (fund. AT-cut) 30.0 ~ 70.0 MHz (3rd OT AT-cut)	7.0 x 5.0 x 1.8	12
	JAG84P2	2 Pad Version	5.0 ~ 50.0 MHz (fund. AT-cut) 30.0 ~ 60.0 MHz (3rd OT AT-cut)	8.0 x 4.5 x 1.4	13
	SMU2	2 Pad Version	7.680 ~ 33.0 MHz (fund. AT-cut) 27.0 ~ 60.0 MHz (3rd OT AT-cut)	11.5 x 4.8 x 3.0	14
	SMU3	2 Pad Version	3.2768 ~ 33.0 MHz (fund. AT-cut) 27.0 ~ 60.0 MHz (3rd OT AT-cut)	11.5 x 4.8 x 4.0	15



actual size

JAS32P4 · AEC-Q200

4 Pad Version · 3.2 x 2.5 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- metal/ceramic package



General Data

type	JAS32P4	
frequency range	10.0 ~ 50.0 MHz	(fund. AT-cut)
frequency tolerance at 25 °C	± 10 ppm, ± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 32 pF / series)
shunt capacitance C_0	< 5 pF	
storage temperature	-40 °C ~ +125 °C	
drive level max.	100 µW	(10 µW recommended)
aging	< ± 3 ppm first year	

ESR (series resistance R_s) at max. temp. range

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
10.0 ~ 11.999	fund.-AT	200	100
12.0 ~ 12.999	fund.-AT	100	50
13.0 ~ 15.999	fund.-AT	100	40
16.0 ~ 18.999	fund.-AT	80	40
19.0 ~ 21.999	fund.-AT	70	30
22.0 ~ 29.999	fund.-AT	70	25
30.0 ~ 50.000	fund.-AT	50	20

Frequency Stability vs. Temperature

		± 15 ppm	± 20 ppm	± 30 ppm	± 50 ppm	± 100 ppm
-20 °C ~ +70 °C	STD.	○	○	○	○	○
-30 °C ~ +85 °C	T (-30/+85)	□	○	○	○	○
-40 °C ~ +85 °C	T1	◇	○	○	○	○
-40 °C ~ +105 °C	T2				○	○
-40 °C ~ +125 °C	T3					○

○ available ◇ for frequencies > 20 MHz, ask if available < 20 MHz □ for frequencies < 20 MHz

Marking

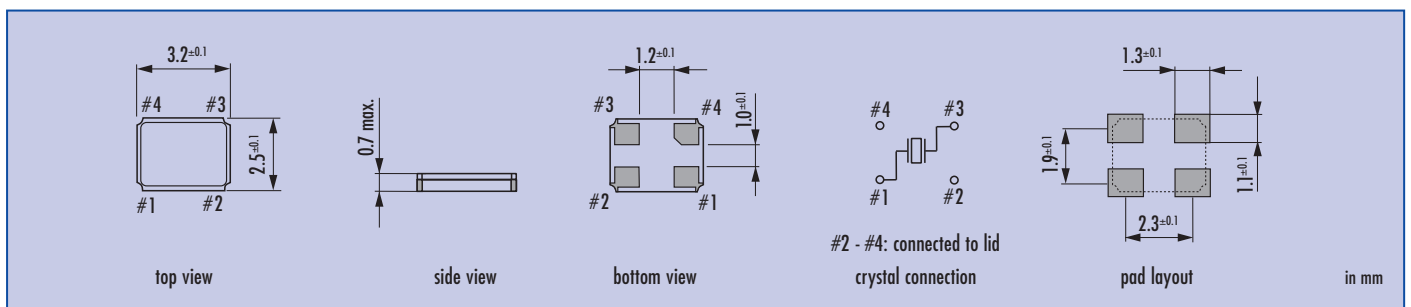
frequency with load capacitance code
company code / date code / internal code

date code: year / month
example: OA = 2010 January

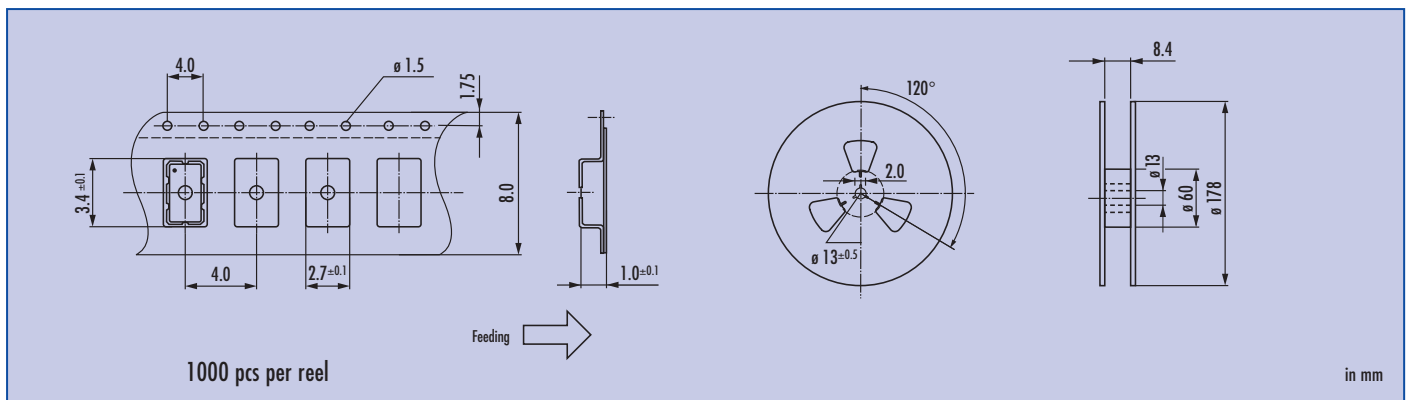
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





JAS53P4 · AEC-Q200

4 Pad Version · 5.0 x 3.2 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- metal/ceramic package



General Data

type	JAS53P4	
frequency range	8.0 ~ 56.0 MHz	(fund. AT-cut)
frequency tolerance at 25 °C	± 10 ppm, ± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 8 pF ~ 32 pF / series)
shunt capacitance C_0	< 7 pF	
storage temperature	-40 °C ~ +125 °C	
drive level max.	500 µW	(10 µW recommended)
aging	< ± 3 ppm first year	

ESR (series resistance R_s) at max. temp. range

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
8.0 ~ 9.999	fund.-AT	100	50
10.0 ~ 10.999	fund.-AT	50	30
11.0 ~ 11.999	fund.-AT	40	25
12.0 ~ 21.999	fund.-AT	40	20
22.0 ~ 24.999	fund.-AT	40	15
25.0 ~ 49.999	fund.-AT	30	15
50.0 ~ 56.000	fund.-AT	40	20

Frequency Stability vs. Temperature

		± 15 ppm	± 20 ppm	± 30 ppm	± 50 ppm	± 100 ppm
-20 °C ~ +70 °C	STD.	○	○	○	○	○
-40 °C ~ +85 °C	T1	○	○	○	○	○
-40 °C ~ +105 °C	T2				○	○
-40 °C ~ +125 °C	T3					○

○ available

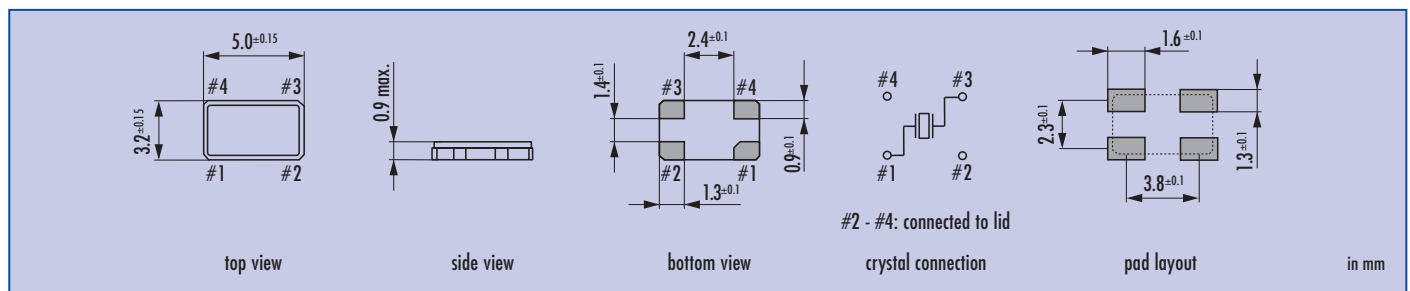
Marking

frequency with load capacitance code
 company code / date code / internal code
 date code: year / month
 example: OA = 2010 January

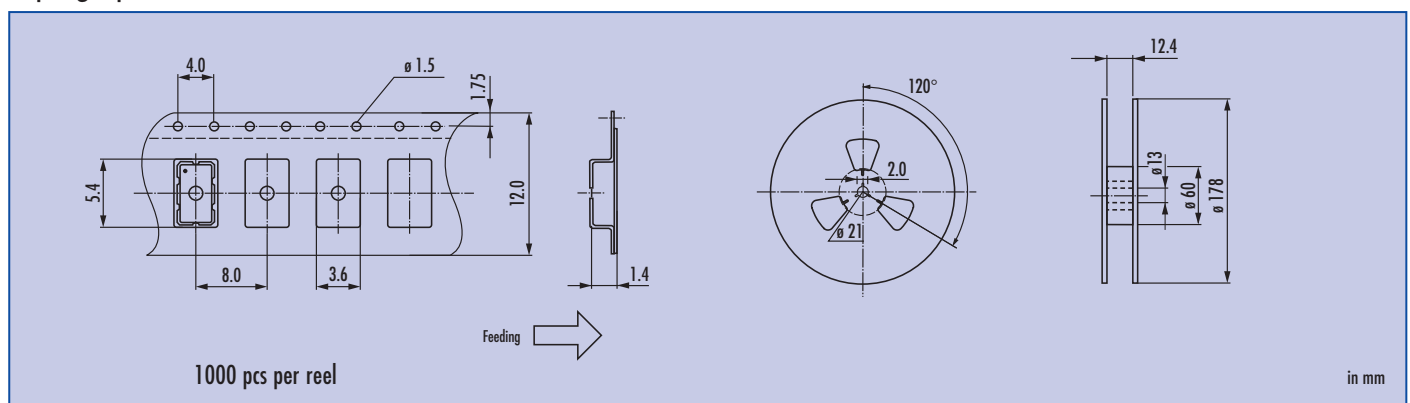
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAS75P4 · AEC-Q200

4 Pad Version · 7.0 x 5.0 mm

- AEC-Q200 qualified
- recommended for automotive applications
- wave soldering temperature: 260 °C max.
- metal/ceramic package



General Data

type	JAS75P4	
frequency range	4.0 ~ 54.0 MHz	(fund. AT-cut)
	24.0 ~ 150.0 MHz	(3rd OT AT-cut)
frequency tolerance at 25 °C	± 10 ppm, ± 20 ppm, ± 30 ppm	
load capacitance C_L	12 pF standard	(option: 8 pF ~ 32 pF / series)
shunt capacitance C_0	< 7 pF	
storage temperature	-40 °C ~ +125 °C	
drive level max.	100 µW	
aging	< ± 3 ppm first year	

ESR (series resistance R_s) at max. temp. range

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
4.0 ~ 4.999	fund.-AT	200	150
5.0 ~ 5.999	fund.-AT	150	80
6.0 ~ 6.999	fund.-AT	100	60
7.0 ~ 9.999	fund.-AT	80	20
10.0 ~ 15.999	fund.-AT	60	20
16.0 ~ 21.999	fund.-AT	50	15
22.0 ~ 24.999	fund.-AT	40	15
25.0 ~ 54.000	fund.-AT	30	15
24.0 ~ 150.000	3rd OT-AT	on request	on request

Frequency Stability vs. Temperature

		± 15 ppm	± 20 ppm	± 30 ppm	± 50 ppm	± 100 ppm
-20 °C ~ +70 °C	STD.	○	○	○	○	○
-40 °C ~ +85 °C	T1	○	○	○	○	○
-40 °C ~ +105 °C	T2				○	○
-40 °C ~ +125 °C	T3					○

○ available

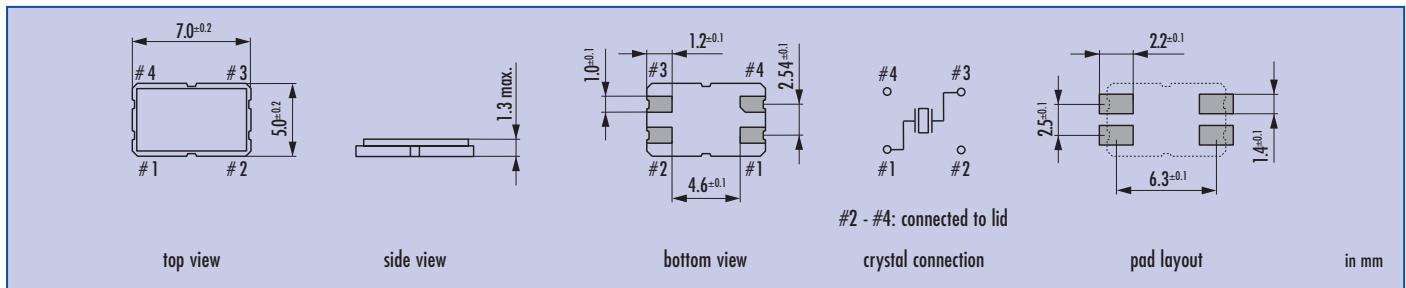
Marking

frequency with load capacitance code
 company code / date code / internal code
 date code: year / month
 example: 0A = 2010 January

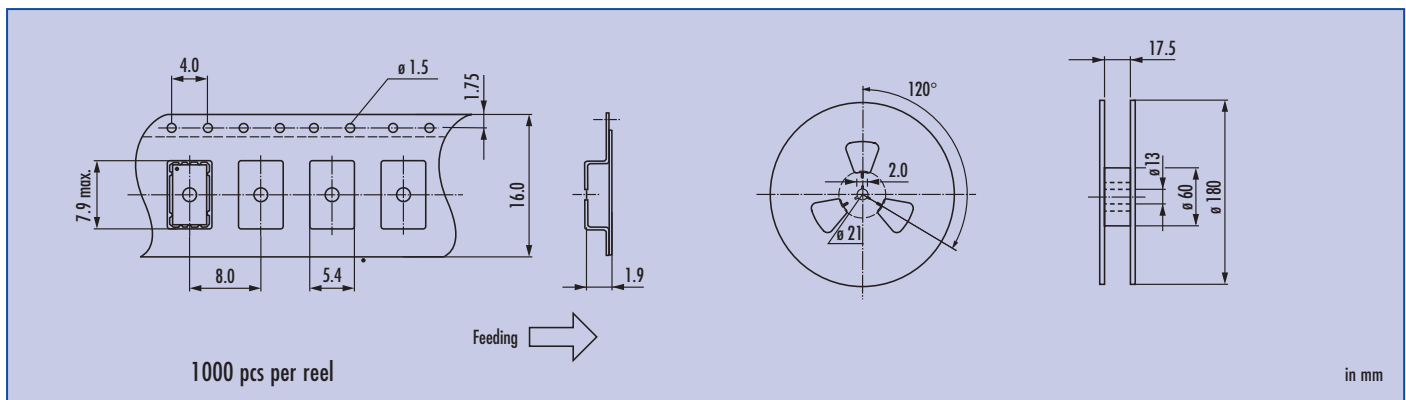
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG32P4 · AEC-Q200

4 Pad Version · 3.2 x 2.5 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG32P4		
frequency range	12.0 ~ 50.0 MHz	(fund. AT-cut)	lower frequencies upon request
frequency stability at 25 °C	± 30 ppm, ± 50 ppm		
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30.0 pF / series)	
shunt capacitance C_0	7 pF max.		
storage temperature	-40 °C ~ +125 °C		
shock resistance	> 100 g	(half sine pulse, 6.0 ms)	
drive level max.	100 µW	(10 µW recommended)	
aging	< ± 3 ppm first year		

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
12.0 ~ 12.999	fund.-AT	200	90
13.0 ~ 13.999	fund.-AT	150	70
14.0 ~ 15.999	fund.-AT	100	40
16.0 ~ 18.999	fund.-AT	80	35
19.0 ~ 21.999	fund.-AT	70	30
22.0 ~ 29.999	fund.-AT	70	25
30.0 ~ 50.000	fund.-AT	50	20

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	○	○	○		
-40 °C ~ +85 °C	T1	○	○	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

○ available

Marking

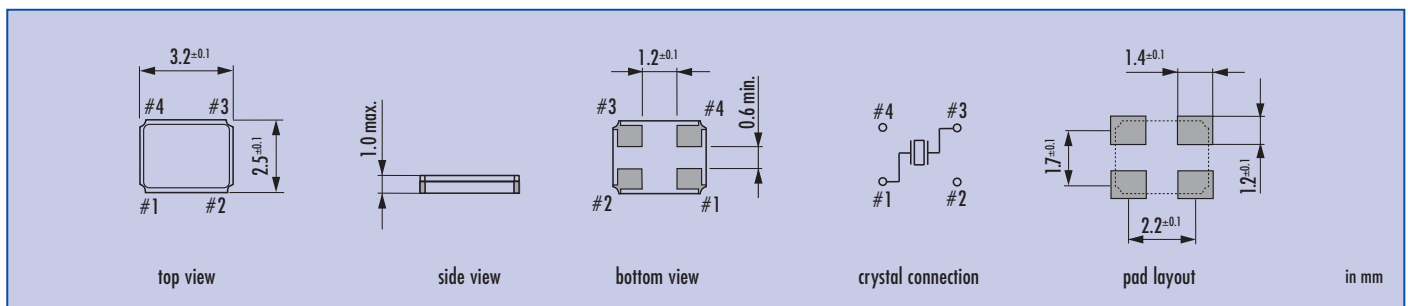
frequency with load capacitance code
company code / date code / internal code

date code: year / month
example: OA = 2010 January

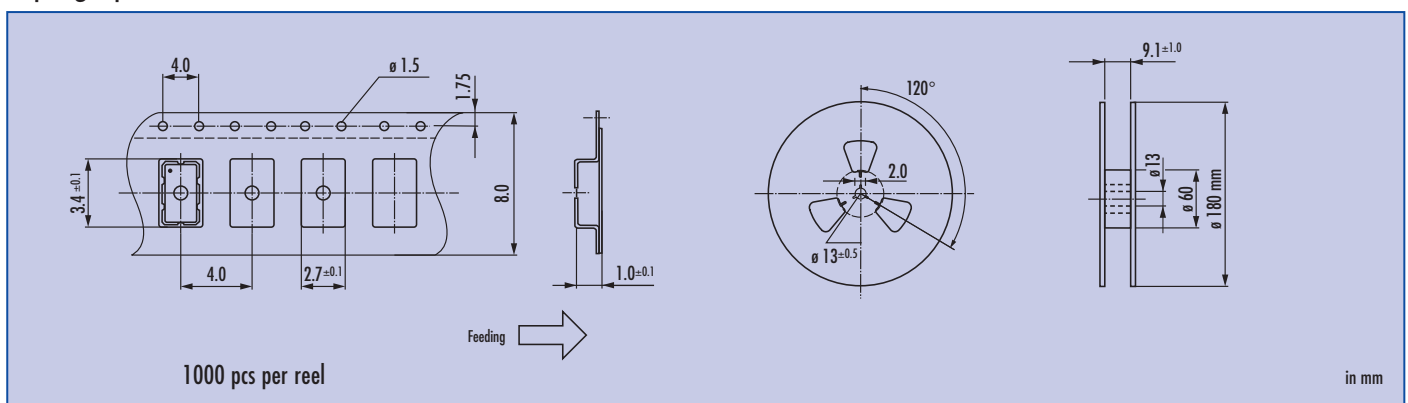
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG53P2 · AEC-Q200

2 Pad Version · 5.0 x 3.2 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG53P4	
frequency range	8.0 ~ 50.0 MHz	(fund. AT-cut)
	45.0 ~ 60.0 MHz	(3rd OT AT-cut)
frequency stability at 25 °C	± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30 pF / series)
shunt capacitance C_0	< 7 pF max.	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	100 µW	(10 µW recommended)
aging	< ± 3 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
8.0 ~ 8.999	fund.-AT	300	120
9.0 ~ 9.999	fund.-AT	250	100
10.0 ~ 11.999	fund.-AT	60	35
12.0 ~ 15.999	fund.-AT	60	25
16.0 ~ 21.999	fund.-AT	50	20
22.0 ~ 24.999	fund.-AT	40	20
25.0 ~ 50.000	fund.-AT	30	20
45.0 ~ 60.000	3rd OT-AT	90	65

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	○	○	○		
-40 °C ~ +85 °C	T1	○	○	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

○ available

Marking

frequency with load capacitance code
company code / date code / internal code

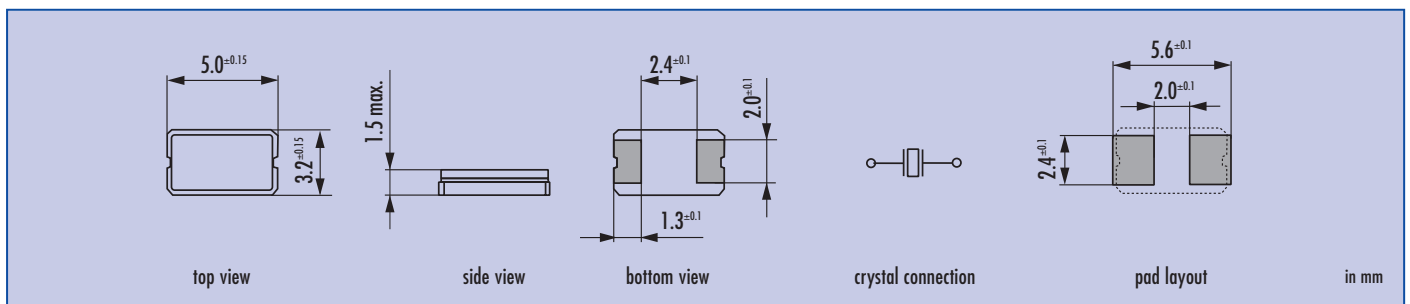
date code: year / month

example: OA = 2010 January

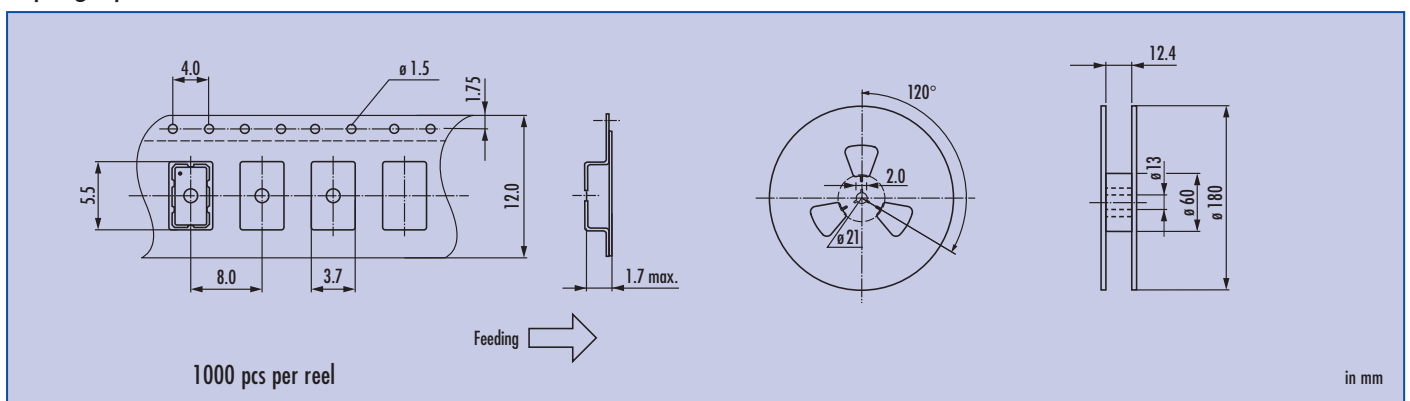
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG53P4 · AEC-Q200

4 Pad Version · 5.0 x 3.2 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG53P4	
frequency range	8.0 ~ 50.0 MHz	(fund. AT-cut)
	45.0 ~ 60.0 MHz	(3rd OT AT-cut)
frequency stability at 25 °C	± 30 ppm , ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30 pF / series)
shunt capacitance C_0	< 7 pF max.	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	100 μ W	(10 μ W recommended)
aging	< ± 3 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
8.0 ~ 8.999	fund.-AT	300	120
9.0 ~ 9.999	fund.-AT	250	100
10.0 ~ 11.999	fund.-AT	60	35
12.0 ~ 15.999	fund.-AT	60	25
16.0 ~ 21.999	fund.-AT	50	20
22.0 ~ 24.999	fund.-AT	40	20
25.0 ~ 50.000	fund.-AT	30	20
45.0 ~ 60.000	3rd OT-AT	90	65

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	○	○	○		
-40 °C ~ +85 °C	T1	○	○	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

○ available

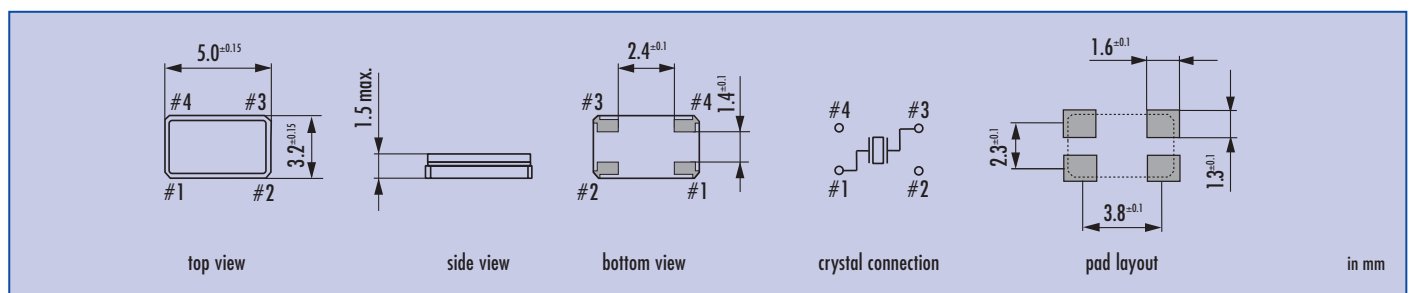
Marking

frequency with load capacitance code
 company code / date code / internal code
 date code: year / month
 example: OA = 2010 January

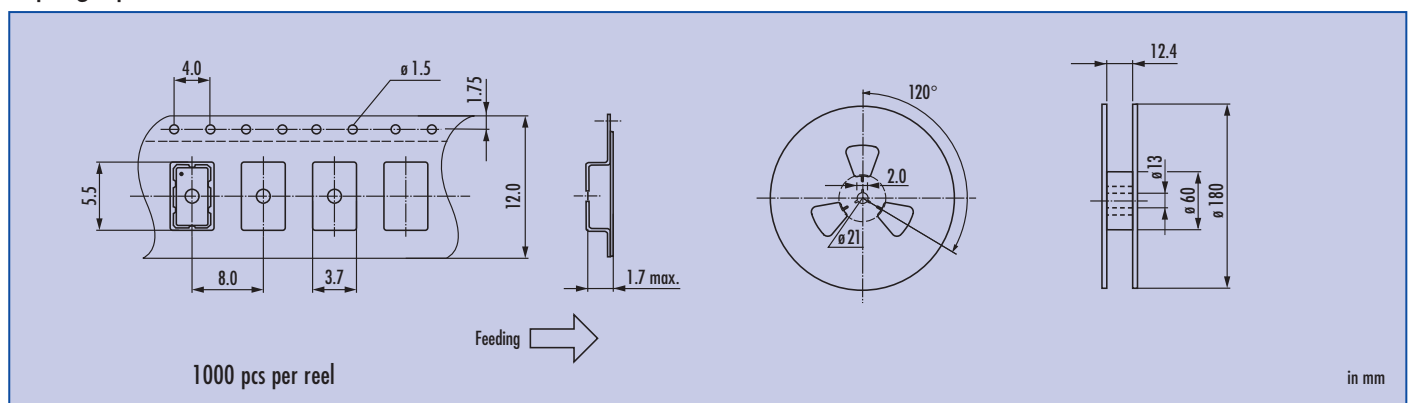
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG75P2 · AEC-Q200

2 Pad Version · 7.0 x 5.0 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG75P2	
frequency range	5.0 ~ 50.0 MHz	(fund. AT-cut)
	30.0 ~ 70.0 MHz	(3rd OT AT-cut)
frequency stability at 25 °C	± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30 pF / series)
shunt capacitance C_0	< 7 pF max.	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	100 μ W	(10 μ W recommended)
aging	< ± 3 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
5.0 ~ 5.999	fund.-AT	200	130
6.0 ~ 6.999	fund.-AT	100	70
7.0 ~ 9.999	fund.-AT	80	35
10.0 ~ 15.999	fund.-AT	60	25
16.0 ~ 21.999	fund.-AT	50	20
22.0 ~ 24.999	fund.-AT	40	20
25.0 ~ 50.000	fund.-AT	30	15
30.0 ~ 44.999	3rd OT-AT	80	60
45.0 ~ 70.000	3rd OT-AT	70	55

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	●	○	○		
-40 °C ~ +85 °C	T1	○	●	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

● standard
 ○ available

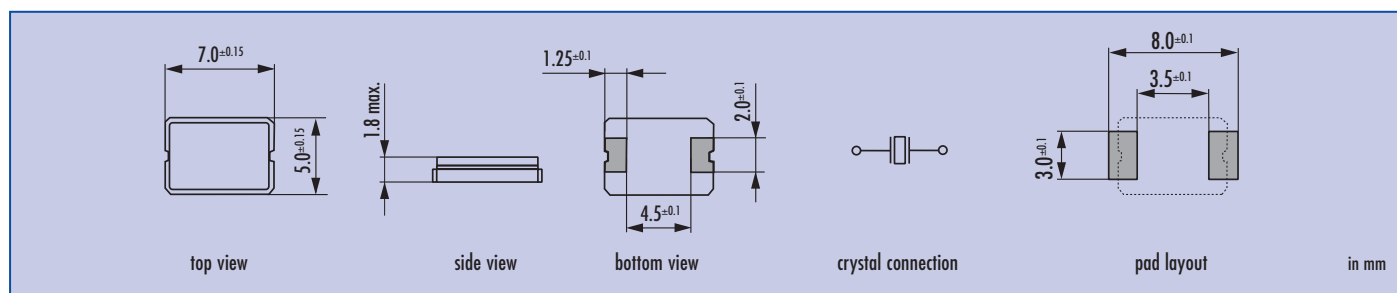
Marking

frequency with load capacitance code
 company code / date code / internal code
 date code: year / month
 example: 0A = 2010 January

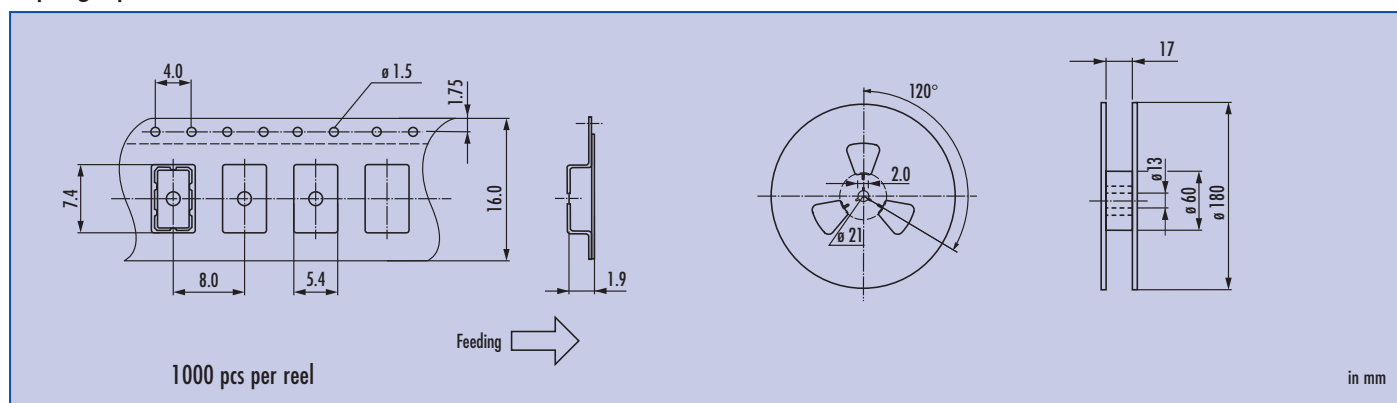
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG75P4 · AEC-Q200

4 Pad Version · 7.0 x 5.0 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG75P4	
frequency range	5.0 ~ 50.0 MHz	(fund. AT-cut)
	30.0 ~ 70.0 MHz	(3rd OT AT-cut)
frequency stability at 25 °C	± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30 pF / series)
shunt capacitance C_0	< 7 pF max.	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	100 μ W	(10 μ W recommended)
aging	< ± 3 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
5.0 ~ 5.999	fund.-AT	200	130
6.0 ~ 6.999	fund.-AT	100	70
7.0 ~ 9.999	fund.-AT	80	35
10.0 ~ 15.999	fund.-AT	60	25
16.0 ~ 21.999	fund.-AT	50	20
22.0 ~ 24.999	fund.-AT	40	20
25.0 ~ 50.000	fund.-AT	30	15
30.0 ~ 44.999	3rd OT-AT	80	60
45.0 ~ 70.000	3rd OT-AT	70	55

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	●	○	○		
-40 °C ~ +85 °C	T1	○	●	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

● standard
○ available

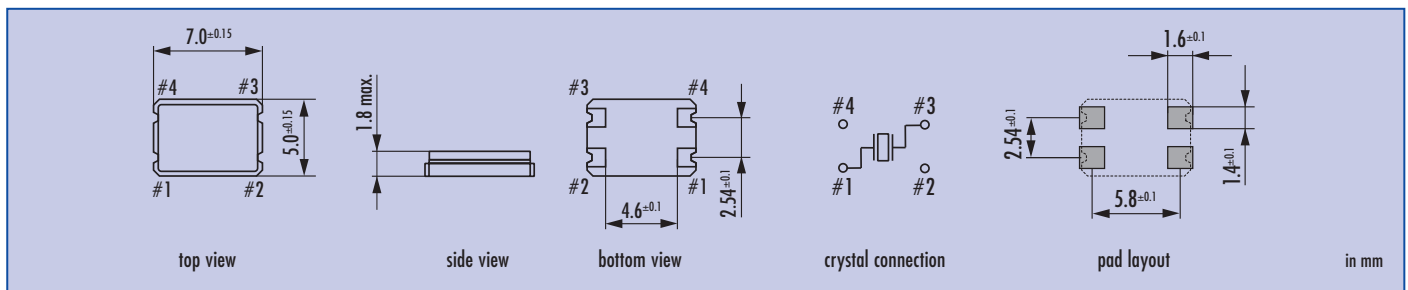
Marking

frequency with load capacitance code
company code / date code / internal code
date code: year / month
example: OA = 2010 January

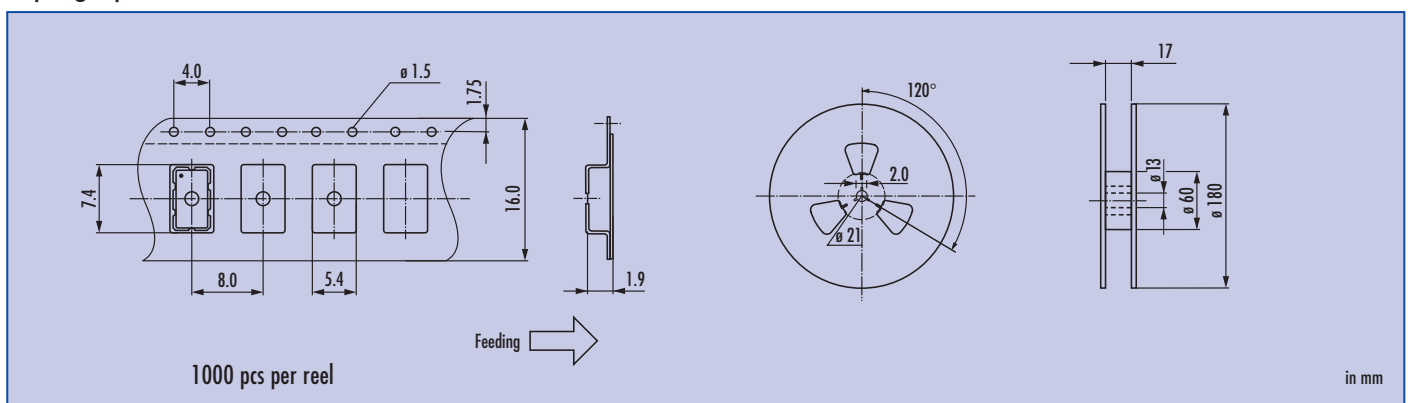
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

JAG84P2 · AEC-Q200

2 Pad Version · 8.0 x 4.5 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- ceramic package



General Data

type	JAG84P2	
frequency range	5.0 ~ 50.0 MHz	(fund. AT-cut)
	30.0 ~ 60.0 MHz	(3rd OT AT-cut on request)
frequency stability at 25 °C	± 30 ppm, ± 50 ppm	
load capacitance C_L	12 pF standard	(option: 10 pF ~ 30 pF / series)
shunt capacitance C_0	7 pF max.	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	300 µW	(100 µW recommended)
aging	< ± 3 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
5.0 ~ 5.999	fund.-AT	150	80
6.0 ~ 6.999	fund.-AT	100	50
7.0 ~ 9.999	fund.-AT	80	25
10.0 ~ 15.999	fund.-AT	60	20
16.0 ~ 21.999	fund.-AT	50	15
22.0 ~ 39.999	fund.-AT	40	15
40.0 ~ 50.000	fund.-AT	30	13
30.0 ~ 44.999	3rd OT AT	80	60
45.0 ~ 60.000	3rd OT AT	70	55

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm		
-20 °C ~ +70 °C	STD.	○	○	○		
-40 °C ~ +85 °C	T1	○	○	○		
-40 °C ~ +105 °C	T2		○	○		
-40 °C ~ +125 °C	T3			○		

○ available

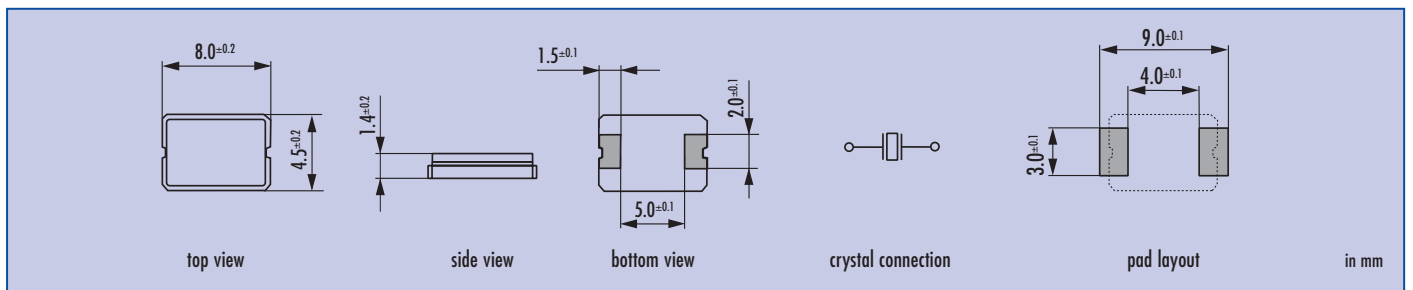
Marking

frequency with load capacitance code
 company code / date code / internal code
 date code: year / month
 example: 0A = 2010 January

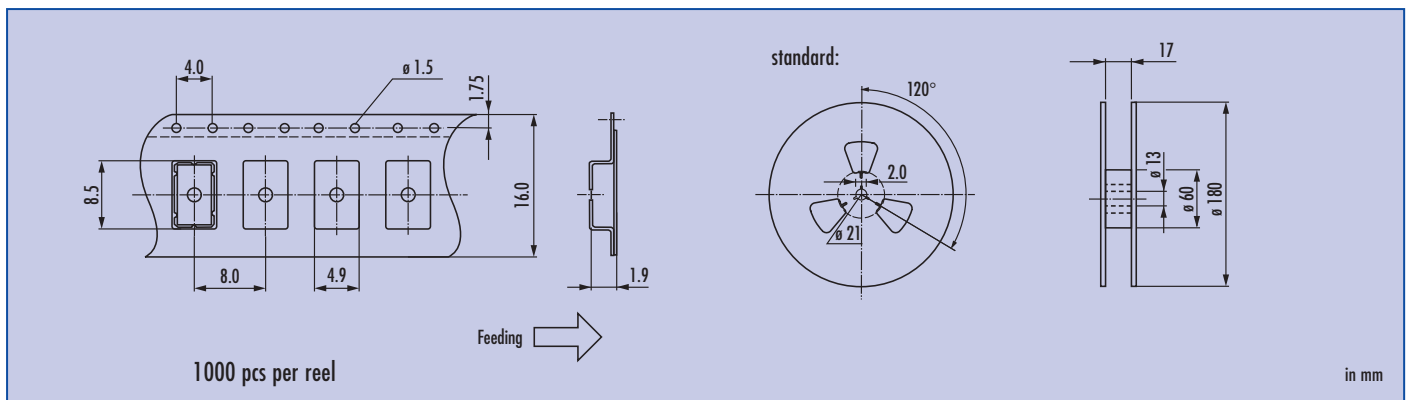
Jan.	Febr.	Mar.	Apr.	May	June
A	B	C	D	E	F

July	Aug.	Sept.	Oct.	Nov.	Dec.
G	H	J	K	L	M

Dimensions



Taping Specification





actual size

SMU2 · AEC-Q200

2 Pad Version · 11.5 x 4.8 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- package height 3.0 mm max.



General Data

type	SMU2	
frequency range	7.680 ~ 33.0 MHz	(fund. AT-cut)
	27.0 ~ 60.0 MHz	(3rd OT AT-cut)
frequency tolerance at 25 °C	± 20 ppm / ± 30 ppm / ± 50 ppm	
load capacitance C_L	12 pF ~ 32 pF or series	
shunt capacitance C_0	< 5 pF	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	300 µW	(100 µW recommended)
aging	< ± 5 ppm first year	

ESR (series resistance Rs)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
8.0 ~ 9.999	fund.-AT	50	25
10.0 ~ 13.999	fund.-AT	35	15
14.0 ~ 33.000	fund.-AT	30	10
27.0 ~ 60.000	3rd OT-AT	100	60

Frequency Stability vs. Temperature

		± 30 ppm	± 50 ppm	± 100 ppm	± 150 ppm
-20 °C ~ +70 °C	STD.	○	●		
-40 °C ~ +85 °C	T1	○	○	●	
-40 °C ~ +105 °C	T2		○	○	
-40 °C ~ +125 °C	T3				○

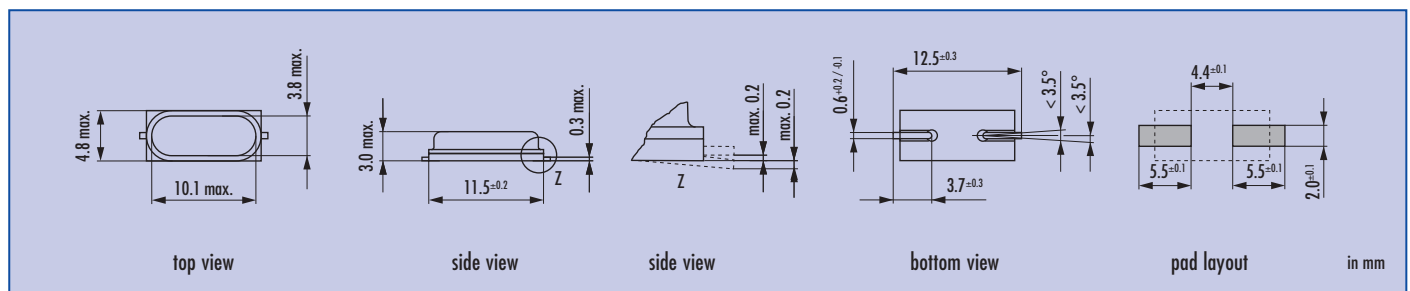
● standard
○ available

Marking

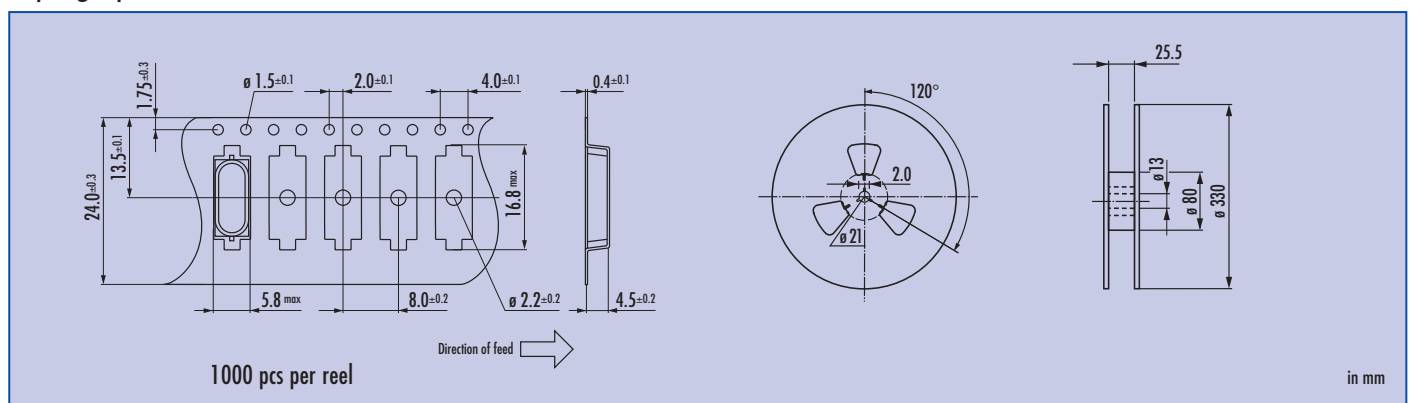
frequency with load capacitance code
company code / date code / internal code

	Jan.	Febr.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2008	n	p	q	r	s	t	u	v	w	x	y	z
2009	A	B	C	D	E	F	G	H	J	K	L	M
2010	N	P	Q	R	S	T	U	V	W	X	Y	Z
2011	a	b	c	d	e	f	g	h	i	k	l	m

Dimensions



Taping Specification





actual size

SMU3 · AEC-Q200

2 Pad Version · 11.5 x 4.8 mm

- AEC-Q200 qualified
- recommended for automotive applications
- reflow soldering temperature: 260 °C max.
- package height 4.0 mm max.



RoHS compliant



Pb free: pins / pads

General Data

type	SMU3	
frequency range	3.2768 ~ 33.0 MHz	(fund. AT-cut)
	27.0 ~ 60.0 MHz	(3rd OT AT-cut)
frequency tolerance at 25 °C	± 20 ppm / ± 30 ppm / ± 50 ppm	
load capacitance C_L	12 pF ~ 32 pF or series	
shunt capacitance C_0	< 5 pF	
storage temperature	-40 °C ~ +125 °C	
shock resistance	> 100 g	(half sine pulse, 6.0 ms)
drive level max.	300 µW	(100 µW recommended)
aging	< ± 5 ppm first year	

ESR (series resistance R_s)

frequency in MHz	vibration mode	ESR max. in Ω	ESR typ. in Ω
3.276 ~ 3.499	fund.-AT	200	100
3.579 ~ 3.999	fund.-AT	120	80
4.000 ~ 5.999	fund.-AT	80	60
6.000 ~ 6.999	fund.-AT	70	35
7.000 ~ 8.999	fund.-AT	50	25
9.000 ~ 13.99	fund.-AT	35	15
14.00 ~ 33.00	fund.-AT	30	10
27.00 ~ 60.00	3rd OT-AT	100	60

Frequency Stability vs. Temperature

		± 20 ppm	± 30 ppm	± 50 ppm	± 100 ppm	± 150 ppm
-20 °C ~ +70 °C	STD.	○	○	●		
-40 °C ~ +85 °C	T1			○	●	
-40 °C ~ +105 °C	T2			○	○	
-40 °C ~ +125 °C	T3					○

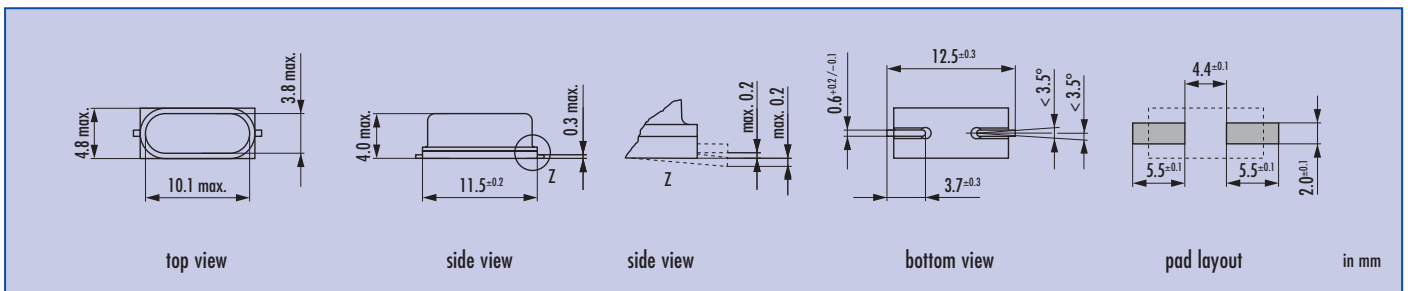
● standard
○ available

Marking

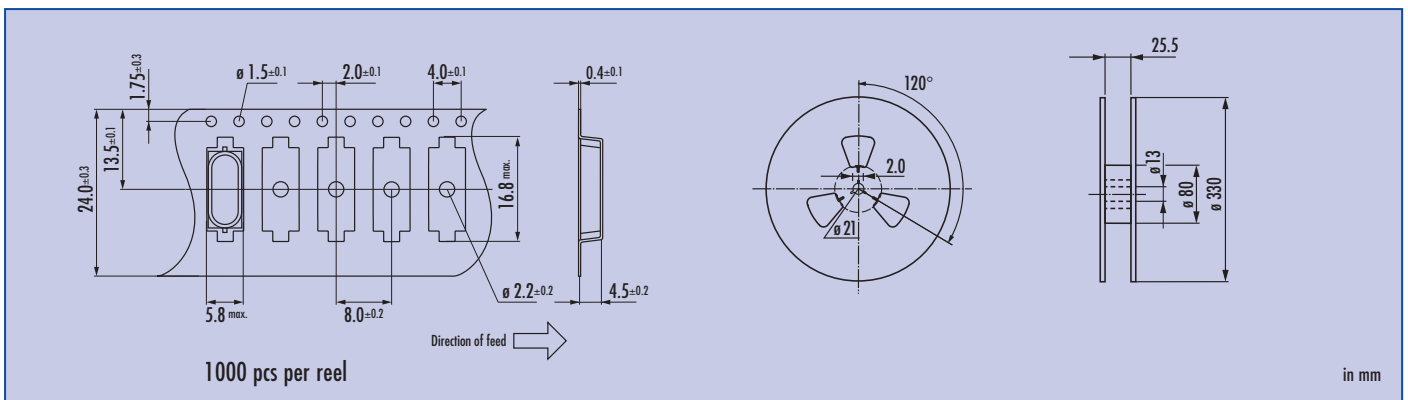
frequency with load capacitance code
company code / date code / internal code

	Jan.	Febr.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2008	n	p	q	r	s	t	u	v	w	x	y	z
2009	A	B	C	D	E	F	G	H	J	K	L	M
2010	N	P	Q	R	S	T	U	V	W	X	Y	Z
2011	a	b	c	d	e	f	g	h	i	k	l	m

Dimensions



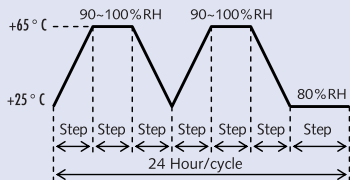
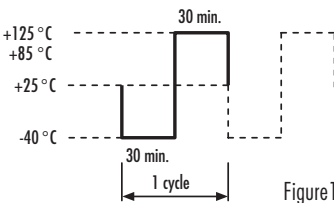
Taping Specification



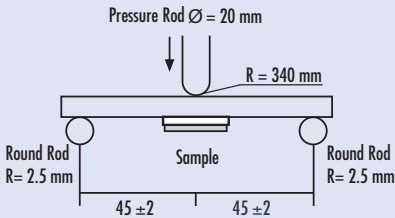
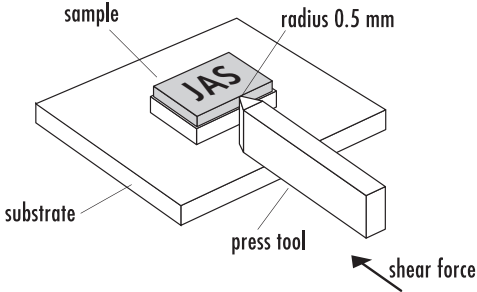
ABSTRACT OF QUALIFICATION TEST ITEMS FOR AEC-Q200 COMPLIANT TYPES

List of extended test specifications for quartz crystals according to AEC-Q200

Electrical and mechanical performance

	Items	AEC-Q200 compliant type
1	High temperature storage	Temperature: at rated operating temp. (+85 °C/+125 °C) Time: 1000 h
2	Low temperature storage	Not specified
3	Biased Humidity	Temperature: +85 °C Humidity: 85% RH Time: 1000 h
4	Moisture Resistance	<p>Time: 24hour/cycle</p>  <p>The diagram shows a 24-hour cycle with the following steps: 25°C, 90-100%RH, 65°C, 90-100%RH, 25°C, 80%RH. Each step is labeled 'Step' and the total cycle is '24 Hour/cycle'. Measurement is taken at 24±2 hours after test conclusion. [MIL-STD-202 Method 106]</p>
5	Temperature Cycling	<p>Temperature/Time: Figure 1 Cycle time: 1000 cycles (-40 °C to +85 °C/+125 °C)</p>  <p>The diagram shows a square wave between -40°C and +125°C with a dwell time of 30 minutes at each temperature. The total cycle time is 1 minute. Figure 1</p>
6	Thermal Shock	<p>Temperature: -55 °C/+85 °C or +125 °C Dwell time: 5 minutes each temperature Cycles: 300 cycles Max. transfer time: 20 seconds (according to MIL-STD 202F Method 107 Cond. A)</p>
7	Vibration	<p>Peak acceleration: 5 g Frequency: 10 ~ 2000 Hz Sweep time: 20 minutes Duration: 4 hours each for X, Y, Z axis (according to MIL-STD 202F Method 204)</p>
8	Shock	<p>Peak acceleration: 100 g Pulse: half sine, 6.0 ms Repetition: 3 pulses each for X, Y, Z axis (according to MIL-STD 202F Method 213B, Cond. C)</p>

Test method in accordance with AEC-Q200. Remarks: The tests are performed after the devices have passed the reflow process twice. The measurements have been performed after keeping the components for more than 24 hours at room temperature after passing the reflow process.

	Items	AEC-Q200 compliant type
9	Drop test	Not specified for quartz crystals
10	Solderability (according to JESD22-B-102D)	Solder bath temp.: $+257.5 \pm 2.5 \text{ }^\circ\text{C}$ Dip time: $5 \pm 0.5 \text{ s}$ Solder: Sn-Ag-Cu Flux: ROL1 (per J-STD-004) Degree of coverage: $> 95\%$
11	Leakage	Not specified for AEC-Q200 quartz crystals
12	Board Flex Test (Terminal Bond Strength Test)	Bending depth: 2 mm Bending duration: 60 seconds 
13	Terminal Strength (SMD) (Shear Stress Test)	Force: 18 N Duration: 60 seconds 

* Test condition

Mechanical: unchanged appearance

Electrical: max. frequency change ΔF : $\pm 5 \text{ ppm}$;

max. change of series resistance ΔR_s : $\pm 5.0 \text{ Ohm}$ or $\pm 20\%$, whichever is larger

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