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# ACT320SMX-4

The **ACT320SMX-4** is a low cost, 4 pad, high quality, low aging 3X2.5mm SMD Crystal in a ceramic base / metal lid package, seam welded for good long term reliability. The device has the lid grounded via the package to reduce EMI issues. The wide frequency range and specification options ensure suitability for many applications.

**APPLICATIONS:**

Bluetooth, WLAN, PDA, Pagers, Card readers, Cellular, PC Accessories, Notebook, Audio-visual, PCMCIA, MP3, Consumer & Communications.

Compatible with Eu Directive 2002/EC - RoHS


## Specification

| Parameter | Symbol | Specification | Condition |
|---|---|---|---|
| Frequency Range | fo | 12.000MHz~ 54.000MHz | Please specify |
| Frequency Tolerance (@25°C) | Δf/fo | ±10,±15,±20,±30 & ±50ppm(Std ) | Please specify |
| Stability over temp range | Tc | ±5ppm ~ 50ppm (See table 1&2) | Please specify |
| Temp Operating Range | Topr | 0~+50°C ~ -40~+85°C ( See table 1& 2) | Please specify |
| Temp Storage Range | Tstg | -40 ~+85°C | |
| Equivalent Series Resistance | ESR | See table 1 | |
| Load Capacitance | CL | 8pF ~ 50pF & Series | (16,20 & 30pF Std. Please specify ) |
| Shunt Capacitance | C0 | 5pF max | |
| Drive Level | DL | 10 μW Typ, 100μW max | (Custom to 150μW available - Enquire) |
| Drive Level Dependency | DLD | DLD2 <10Ω (min-max ratio)<br>FDLD <10ppm | 0.01, ~100μW 6 steps minimum |
| Insulation Resistance | IR | 500MΩ min | @100V DC |
| Aging | Fa | ±3ppm per year ** | (First year max @ 25°C) |

** aging ±1.00ppm /year device available, to order, as a "semi-custom" part - Please enquire.

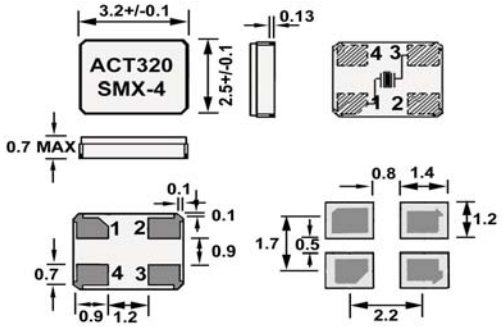
**Table 1***

**ESR and available stabilities for temperature range -40 to+85°C**

| Frequency range | Max ESR | Min Tolerance Available | Tightest Stability v Temperature Available |
|---|---|---|---|
| 12MHz ≤ fo <15MHz | 80Ω | ±10ppm | -40~+85°C // ±30ppm<br>-20~+70°C // ±10ppm |
| 15MHz ≤ fo <19MHz | 70Ω | ±10ppm | -40~+85°C // ±20ppm<br>-20~+70°C // ±10ppm |
| 19MHz ≤ fo <22MHz | 50Ω | ±10ppm | -40~+85°C // ±20ppm<br>-20~+70°C // ±10ppm |
| 22MHz ≤ fo <25MHz | 40Ω | ±10ppm | -40~+85°C // ±20ppm<br>-20~+70°C // ±10ppm |
| 25MHz ≤ fo <32MHz | 30Ω | ±10ppm | -40~+85°C // ±15ppm<br>-20~+70°C // ±10ppm |
| 32MHz ≤ fo <54MHz | 25Ω | ±10ppm | -40~+85°C // ±15ppm<br>-20~+70°C // ±10ppm |

* Tighter ESR may be available please enquire.

**Dimensions (mm)**




Pad Surface Material: Gold (Au)

**Connections**
**#1. Crystal**
**#2. Grounded to lid**
**#3. Crystal**
**#4. Grounded to lid**

**Table 2 Available stabilities**

| Temp \ Stability | +/- 5ppm | +/- 10ppm | +/- 15ppm | +/- 20ppm | ≥+/- 30ppm |
|---|---|---|---|---|---|
| 0~+50°C | ✓ | ✓ | ✓ | ✓ | ✓ |
| -10+60°C | ✓ | ✓ | ✓ | ✓ | ✓ |
| -20~+70°C | | ✓ | ✓ | ✓ | ✓ |
| -20~+85°C | | | ✓ | ✓ | ✓ |
| -30~+80°C | | | ✓ | ✓ | ✓ |
| -40~+85°C | | | ✓ | ✓ | ✓ |

✓ Available stabilities

✓ Only available for frequencies ≥30MHz

✓ See Table 1

Please note that all parameters can not necessarily be specified in the same device

Customer to specify : Frequency, Frequency Tolerance, Temperature Stability, Operating Temperature & Load Capacitance

In line with our ongoing policy of product evolvement and improvement, the above specification may subject to change without notice

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For quotations or further information please contact us at:

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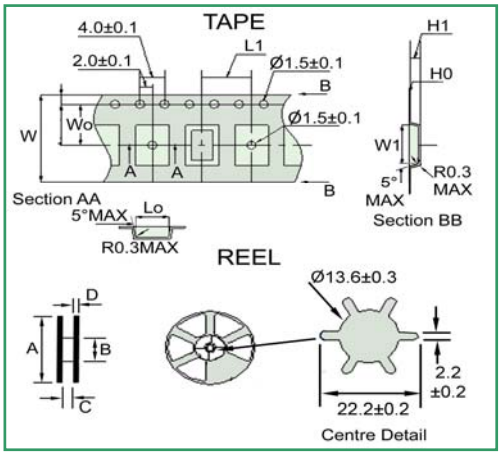
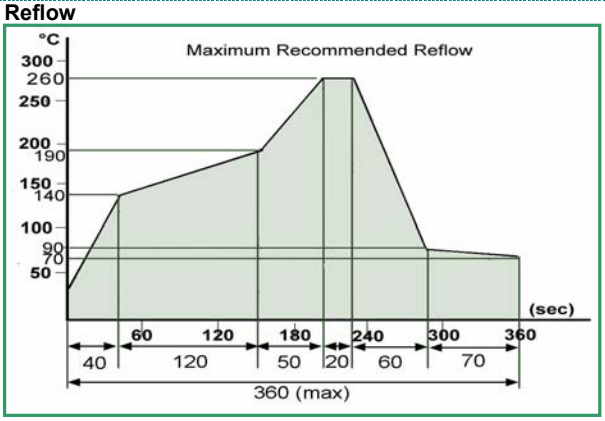
**Tape & Reel Dimensions (mm)**

| | TAPE | | | | | | | REEL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | Wo | W1 | Lo | L1 | | H1 | A | B | C | D |
| Tolerance | ±0.2 | ±0.05 | ±0.1 | ±0.1 | ±0.1 | | ±0.1 | +0/-1 | +1/-0 | ±1.5 | ±0.5 |
| Dimension | 8.0 | 3.5 | 3.5 | 2.8 | 4.0 | | 1.0 | ## | 60 | 9.5 | 2.0 |

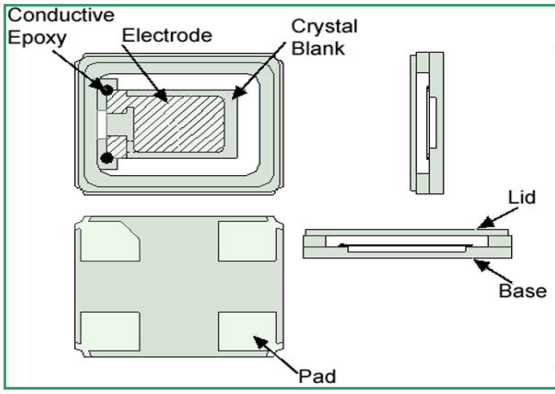



**Reflow**




**Material Content / RoHS**

Compatible with Eu Directive 2002/EC - RoHS




Material content

| | | | | | |
|---|---|---|---|---|---|
| Ceramic | package | Aluminum oxide | 1344-28-1 | 86.2 | % |
| | | Silicon oxide | 14808-60-7 | 4 | % |
| | | Calcium carbonate | 471-34-1 | 4 | % |
| | | Magnesium carbonate | 23389-33-5 | 5 | |
| | | Gold | 7440-57-5 | 0.32 | % |
| | | Tungsten | 7440-33-7 | 0.18 | % |
| | | Nickel | 7440-02-0 | 0.3 | % |
| Conductive epoxy | Bonding | Silver | 7440-22-4 | 80 | % |
| | | Dodecane | 112-40-3 | 10 | % |
| | | Aromatic hydrocarbons | 63231-51-6 | 10 | % |
| Iron Alloy | Lid | Cobalt | 7440-48-4 | 17.5 | % |
| | | Nickel | 7440-02-0 | 30 | % |
| | | Iron | 7439-89-6 | 52.5 | % |
| Silver | Electrode | Silver | 7440-22-4 | 100 | % |
| Synthetic Quartz | Blank | Silicon dioxide, synthetic | 112926-00-8 | 100 | % |

**Banned substances content: none detected (detection limits below)**

| | Product | Packaging | | Product | Packaging |
|---|---|---|---|---|---|
| Banned substances | Maximum concentration (ppm) | Maximum concentration (ppm) | Banned substances | Maximum concentration (ppm) | Maximum concentration (ppm) |
| Cadmium & compounds | 2 | 100 | Chlorinated Parafin | 5 | 5 |
| Lead & compounds | 2 | | Other chlorinated organic compounds | 5 | 5 |
| Mercury & compounds | 2 | | Other brominated organic compounds | 5 | 5 |
| Hexavalent Chromium | 2 | | Organic tin compounds | 5 | 5 |
| PBB | 5 | | Asbestos | 5 | 5 |
| PBDE | 5 | | Azo compounds | 5 | 5 |
| PCB | 5 | 5 | Formaldehyde | 5 | 5 |
| PCN | 5 | 5 | PVC | 5 | 5 |

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# SERIES : ACT320SMX-4 Part numbering code is BN

Example :

| BN | 1200 | I | K | G | RO | F | D | (#) | - PF |
|---|---|---|---|---|---|---|---|---|---|
| (320SMX-4) | (12.000MHz ) | (±30ppm) | (±30ppm) | (-20+70) | (16pF) | (Fund') | (3K Reel ) | | (RoHS) |

| Frequency |
|---|
| To 54MHz 1st four digits of Frequency |

| Examples |
|---|
| 12.000MHz=1200 |
| 54.9999MHz=5499 |

**NB:** It is important to suffix the above part number with the full frequency required to give a completed part number as illustrated below

Commodity Code 854160 00 00

| Tolerance (±pm) @ 25ºC | |
|---|---|
| E | 10 |
| F | 15 |
| G | 20 |
| H | 25 |
| I | 30 |
| L | 50 |

| Stability Over Operating Temperature (ºC) | |
|---|---|
| F | 10 |
| G | 15 |
| I | 20 |
| J | 25 |
| K | 30 |
| O | 50 |

| Operating Temperature Range (ºC) | |
|---|---|
| G | -20+70 |
| M | -40+85 |

| Load Capacitance ( pF or Series Resonance) | |
|---|---|
| GO | 8 |
| JO | 9 |
| KO | 10 |
| MO | 11 |
| OO | 12 |
| ZO | 14 |
| PO | 15 |
| RO | 16 |
| TO | 18 |
| VO | 20 |
| AA | 24 |
| BA | 25 |
| DA | 30 |
| SR | SR |

| Mode | |
|---|---|
| F | Fundamental |

( Enquire )
Std

| Package |
|---|
| L = Loose |
| C =1K Reels |
| D= 3K Reel |

Tighter aging may be available please enquire. Leave blank for standard aging.

| RoHS Comp' |
|---|
| - PF |

**Full Example Part Number**

BN1200IKGROFD-PF 12.00MHz

**Table 1: Available stabilities:**

| Stability / Temp | +/- 5ppm | +/- 10ppm | +/- 15ppm | +/- 20ppm | ≥+/- 30ppm |
|---|---|---|---|---|---|
| 0~+50°C | ✓ | ✓ | ✓ | ✓ | ✓ |
| -10+60°C | ✓ | ✓ | ✓ | ✓ | ✓ |
| -20~+70°C | | ✓ | ✓ | ✓ | ✓ |
| -20~+85°C | | | ✓ | ✓ | ✓ |
| -30~+80°C | | | ✓ | ✓ | ✓ |
| -40~+85°C | | | ✓ | ✓ | ✓ |

✓ Available stabilities

✓ Only available for frequencies ≥30MHz

✓ See Table 2

**Table 2: Available stabilities for temperature range -40+85°C**

| Frequency range | Max ESR | Min Tolerance Available | Tightest Stability v Temperature Available |
|---|---|---|---|
| 12MHz ≤ fo <15MHz | 80Ω | ±10ppm | -40~+85°C // ±30ppm |
| | | | -20~+70°C // ±10ppm |
| 15MHz ≤ fo <19MHz | 70Ω | ±10ppm | -40~+85°C // ±20ppm |
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| | | | -20~+70°C // ±10ppm |
| 32MHz ≤ fo <54MHz | 25Ω | ±10ppm | -40~+85°C // ±15ppm |
| | | | -20~+70°C // ±10ppm |

## NOTES :

1) Tighter Tolerances and Stabilities and other Operating Temperature Ranges may be available.

2) ACT are always happy to consider truly custom specification parts which may require non-standard specification parameters, specific testing, customer requested AQL requirements, non standard packaging or taping and reeling and custom marking. Such devices would normally be allocated a custom specification part number which is wholly customer specific.

3) A guide to availability of tighter stabilities appears on page one of this data sheet in Table 2

4) Frequencies below 10.000MHz are prefixed with a "0" (eg: 0900 = 9MHz.Whereas 10.000MHz is 1000 )

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