Product Configuration Guide

CRYSTALS

- 32.768kHz Crystals
- Standard kHz Crystals
- MHz Crystals

EPSON

NOTE: Use this updated PCS for all NEW crystal part numbers from May 2016

NEW CRYSTAL MICRO DEVICES

Product Configuration Guide

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Product Configuration System

32.768 kHz Crystal Unit

FC1610AN **32.768K** – **C5NN90KC5**

1. Model
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

32.7680kHz Crystal Package Type:

1.60 x 1.00 x 0.5 mm

1 Model	**2 Frequency**	**3 Load Cap**	**4 Frequency Tolerance**	**5 ESR**	**6 ESR Unit**	**7 Drive level**	**8 Tape & Reel**
FC1610AN	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF 60 = 6.0 pF	NN = +/-20 ppm AA = +/- 10 ppm	90 = 90 kΩ	K = kΩ	C = 0.5 µW	B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pc/reel

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NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System

32.768 kHz Crystal Unit

FC1610BN **32.768K** – **C5NN60KC5**

1. Model
   - **32.7680kHz Crystal Package Type:**
   - **1.60 x 1.00 x 0.5 mm**
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

Preliminary

1. **Model**
   FC1610AN
2. **Frequency**
   32.768kHz
3. **Load Cap**
   C5 = 12.5 pF
   90 = 9.0 pF
4. **Frequency Tolerance**
   NN = +/-20 ppm
5. **ESR**
   60 = 60 kΩ
   - @ -40C to +85C
   70 = 70kΩ
   - @ -40 to +105C
6. **ESR Unit**
   K = kΩ
7. **Drive level**
   C = 0.5 µW
8. **Tape & Reel**
   B = Bulk
   0 = 1000pcs/reel
   5 = 3000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC2012AN **32.768K** – **90NN50KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
   - **2.05 x 1.2 x 0.6 mm**
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1 Model	**2 Frequency**	**3 Load Cap**	**4 Frequency Tolerance**	**5 ESR**	**6 ESR Unit**	**7 Drive level**	**8 Tape & Reel**
FC2012AN	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF	NN = +/-20 ppm	60 = 60 kΩ - @-40 to +105C 50 = 50 kΩ - @-40 to +85C	K = kΩ	C = 0.5 µW	B = Bulk 7=5000pc/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC2012SN **32.768K** – **90NN90KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
   - **2.05 x 1.2 x 0.6 mm**
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1 Model	2 Frequency	3 Load Cap	4 Frequency Tolerance	5 ESR	6 ESR Unit	7 Drive level	8 Tape & Reel
FC2012SN	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF	NN = +/-20 ppm	A0 = 100 kΩ - @-40 to +105C 90 = 90 kΩ - @-40 to +85C	K = kΩ	C = 0.5 µW	B = Bulk 0 = 1000pcs/reel 7 = 5000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC2012AA **32.768K** – **90NN70KCB**

1. Model
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

32.7680kHz Crystal Package Type:
2.05 x 1.2 x 0.6 mm

Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

1. **Model**
FC2012AN

2. **Frequency**
32.768kHz

3. **Load Cap**
C5 = 12.5 pF
90 = 9.0 pF
70 = 7.0 pF

4. **Frequency Tolerance**
NN = +/-20 ppm

5. **ESR**
70 = 70 kΩ
-@-40 to +105C
75 = 75 kΩ
-@-40 to +105C

6. **ESR Unit**
K = kΩ

7. **Drive level**
C = 0.5 µW

8. **Tape & Reel**
B = Bulk
7=5000pc/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC3215AN **32.768K** – **90NN50KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
   - **3.2 x 1.5 x 0.9 mm**
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1 Model	2 Frequency	3 Load Cap	4 Frequency Tolerance	5 ESR	6 ESR Unit	7 Drive level	8 Tape & Reel
FC3215AN	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF	NN = +/-20 ppm	60 = 60 kΩ - @-40 to +105C 50 = 50 kΩ - @-40 to +85C	K = kΩ	C = 0.5 µW	B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC-135 **32.768K** – **90NN70KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
   - **3.2 x 1.5 x 0.9 mm**
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1 Model	2 Frequency	3 Load Cap	4 Frequency Tolerance	5 ESR	6 ESR Unit	7 Drive level	8 Tape & Reel
FC-135	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF	NN = +/-20 ppm AA = +/-10 ppm	70 = 70 kΩ	K = kΩ	C = 0.5 µW	B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC-135R **32.768K** – **90NN50KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
     3.2 x 1.5 x 0.9 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1	2	3	4	5	6	7	8
Model FC-135R	**Frequency** 32.768kHz	**Load Cap** C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF 60 = 6.0 pF	**Frequency Tolerance** NN = +/-20 ppm AA = +/-10 ppm	**ESR** 50 = 50 kΩ	**ESR Unit** K = kΩ	**Drive level** C = 0.5 µW	**Tape & Reel** B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC-12M **32.768K** – **90NN90KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
     2.05 x 1.2 x 0.6 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

1 Model	**2 Frequency**	**3 Load Cap**	**4 Frequency Tolerance**	**5 ESR**	**6 ESR Unit**	**7 Drive level**	**8 Tape & Reel**
FC-12M	32.768kHz	C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF 60 = 6.0 pF	NN = +/-20 ppm AA = +/-10 ppm	90 = 90 kΩ	K = kΩ	C = 0.5 µW	B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pcs/reel

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Product Configuration System

32.768 kHz Crystal Unit

FC-13A **32.768K** – **90NN70KCB**

1. Model
   - **32.7680kHz Crystal Package Type:**
     3.2 x 1.5 x 0.9 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. ESR
6. ESR unit (K = kΩ)
7. Drive level
8. Tape & Reel

Non Promotional

Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

1. **Model**
   FC-13A
2. **Frequency**
   32.768kHz
3. **Load Cap**
   C5 = 12.5 pF
   90 = 9.0 pF
   70 = 7.0 pF
   60 = 6.0 pF
4. **Frequency Tolerance**
   NN = +/-20 ppm
   AA = +/-10 ppm
5. **ESR**
   70 = 70 kΩ
6. **ESR Unit**
   K = kΩ
7. **Drive level**
   C = 1.0 µW
8. **Tape & Reel**
   B = Bulk
   0 = 1000pcs/reel
   5 = 3000pcs/reel

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MHZ Crystal Product Configuration Guide

Product Configuration System

MHz Range Crystal Units

FA-238 **25.00M** – **90NNYYB80RG5**

1 → Model

Crystal Package Type:
3.2 x 2.5 x 0.7 mm

2 → Frequency

3 → Load capacitance
4 → Frequency tolerance
5 → Frequency temp. char.
6 → Temperature range
7 → ESR
8 → ESR unit (R = Ω)
9 → Drive level
0 → Tape & reel

1 Model
FA-238

2 Frequency
16 ~ 50 MHz

3 Load cap
N0=20pF
J0 = 18 pF
G0 = 16 pF
C5 = 12.5 pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0pF
80 = 8.0 pF
70 = 7.0 pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
TT = +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
TT = +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm

6 Temp. range
B = -20 to +70C
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
80 = 80 Ω
60 = 60 Ω
50 = 50 Ω
40 = 40 Ω

9 Drive level
G = 200 µW
E = 100 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
6 = 2000pcs/reel
5 = 3000pcs/reel

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System

MHz Range Crystal Units

FA-238V 12.00M – 90NNYYBA0RG5

1 → Model

Crystal Package Type:
3.2 x 2.5 x 0.7 mm

2 → Frequency

3 → Load capacitance

4 → Frequency tolerance

5 → Frequency temp. char.

6 → Temperature range

7 → ESR

8 → ESR unit (R = Ω)

9 → Drive level

0 → Tape & reel

1 Model
FA-238V

2 Frequency
12 ~ 15.999 MHz

3 Load cap
N0 = 20 pF
J0 = 18 pF
F0 = 15 pF
C5 = 12.5 pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0pF
80 = 8.0 pF
70 = 7.0 pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

6 Temp. range
B = -20 to +70C
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
A0 = 100 Ω
80 = 80 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel

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Product Configuration System

MHz Range Crystal Units

TSX-3225 25.00M – 90NNYYU60RG5

1 → Model

Crystal Package Type:
3.2 x 2.5 x 0.6 mm

2 → Frequency

3 → Load capacitance

4 → Frequency tolerance

5 → Frequency temp. char.

6 → Temperature range

7 → ESR

8 → ESR unit (R = Ω)

9 → Drive level

0 → Tape & reel

1 Model
TSX-3225

2 Frequency
16 ~ 48 MHz

3 Load cap
Q0=22pF
N0 = 20 pF
J0 = 18 pF
G0 = 16pF
F0 = 15pF
C5 = 12.5pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0 pF
80 = 8.0 pF
70 = 7.0 pF
D0= 13.0pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm
77 =+/- 7ppm

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

6 Temp. range
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
60 = 60 Ω
40 = 40 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
6 = 2000pcs/reel
5 = 3000pcs/reel

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System

MHz Range Crystal Units

FA-20H **25.00M** – **60NNYYU80RE5**

1 → Model

Crystal Package Type:
2.5 x 2.0 x 0.55 mm

2 → Frequency

3 → Load capacitance

4 → Frequency tolerance

5 → Frequency temp. char.

6 → Temperature range

7 → ESR

8 → ESR unit (R = Ω)

9 → Drive level

0 → Tape & reel

1 Model
FA-20H

2 Frequency
12 ~ 54 MHz

3 Load cap
N0 = 20 pF
J0 = 18 pF
G0 = 16pF
F0 = 15pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0 pF
80 = 8.0 pF
70 = 7.0 pF
60 = 6.0 pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

6 Temp. range
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
A5 = 150 Ω
80 = 80 Ω
60 = 60 Ω
50 = 50 Ω
40 = 40 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel

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Product Configuration System

MHz Range Crystal Units

FA-118T 25.00M – 60NNYYUA0RE5

1. Model
   - **Crystal Package Type:** 1.6 x 1.2 x 0.35 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. Frequency temp. char.
6. Temperature range
7. ESR
8. ESR unit (R = Ω)
9. Drive level
0. Tape & reel

1 Model
FA-118T

2 Frequency
24 ~ 54 MHz

3 Load cap
N0 = 20 pF
G0 = 16pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0 pF
80 = 8.0 pF
70 = 7.0 pF
60 = 6.0 pF

4 Frequency tolerance
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

5 Freq. temp. char.
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

6 Temp. range
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
B0 = 200 Ω
A0 = 100 Ω
80 = 80 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel
8 = 6000pcs/reel

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System

MHz Range Crystal Units

FA-128 **25.00M** – **60NNYYUA0RE5**

1. Model
   - **Crystal Package Type:** 2.0 x 1.6 x 0.5 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. Frequency temp. char.
6. Temperature range
7. ESR
8. ESR unit (R = Ω)
9. Drive level
0. Tape & reel

1 Model
FA-128

2 Frequency
19.2 ~ 54 MHz

3 Load cap
N0 = 20 pF
J0 = 18 pF
G0 = 16pF
F0 = 15pF
C5 = 12.5pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0 pF
80 = 8.0 pF
70 = 7.0 pF
60 = 6.0 pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm

6 Temp. range
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C

7 8 ESR = Ω
A5 = 150 Ω
A0 = 100 Ω
80 = 80 Ω
60 = 60 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel
7 = 5000pcs/reel

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Product Configuration System

MHz Range Crystal Units

FA1008AN 52.00M – 80AANNG60RGB

1 → Model

Crystal Package Type:
1.0 x 0.8 x 0.3 mm

2 → Frequency

3 → Load capacitance

4 → Frequency tolerance

5 → Frequency temp. char.

6 → Temperature range

7 → ESR

8 → ESR unit (R = Ω)

9 → Drive level

0 → Tape & reel

1 Model
FA1008AN

2 Frequency
40 ~ 100 MHz

3 Load cap
80 = 8.0 pF

4 Frequency tolerance
AA = +/- 10 ppm

5 Freq. temp. char.
NN = +/-20 ppm
(-40 to +85C)
FF = +/-15 ppm
(-30 to +85C)
AA = +/- 10 ppm
(-20 to +75C)

6 Temp. range
G = -40 to +85C
H = -40 to 105C
(Contact Epson)

7 8 ESR = Ω
60 = 60 Ω

9 Drive level
G = 200 µW

0 Tape & reel
B = Bulk

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System

MHz Range Crystal Units

FA2016AA 40.00M – 80AAbbJ60RG7

1 → Model

2 → Frequency

Crystal Package Type:

FA2016AA: 2.0 x 1.6 x 0.5 mm

FA2016ASA: 2.0 x 1.6 x 0.5 mm (w/ Thermistor)

FA1612AA: 1.6 x 1.2 x 0.35 mm

3 → Load capacitance

4 → Frequency tolerance

5 → Frequency temp. char.

6 → Temperature range

7 → ESR

8 → ESR unit (R = Ω)

9 → Drive level

0 → Tape & reel

1 Model
FA2016AA
FA2016ASA
FA1612AA

2 Frequency
19.2 ~ 54 MHz

3 Load cap
N0 = 20 pF
J0 = 18 pF
G0 = 16pF
F0 = 15pF
C5 = 12.5pF
C0 = 12 pF
A0 = 10 pF
90 = 9.0 pF
80 = 8.0 pF
70 = 7.0 pF
60 = 6.0 pF

4 Frequency tolerance
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm
ZZ = Others

5 Freq. temp. char.
bb = +/-50 ppm
YY= +/-30 ppm
TT= +/-25 ppm
NN = +/-20 ppm
FF = +/-15 ppm
AA = +/- 10 ppm
ZZ = Others

6 Temp. range
U = -20 to +75C
N = -30 to +85C
G = -40 to +85C
H = -40 to 105C
J = -40 to 125C

7 8 ESR = Ω
A5 = 150 Ω
A0 = 100 Ω
80 = 80 Ω
60 = 60 Ω

9 Drive level
E = 100 µW
G = 200 µW

0 Tape & reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel
7 = 5000pcs/reel

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Product Configuration System

MHz Range Crystal Units

FA1210AN 32.00M – 80AAFFBA0REB

1. Model
   - **Crystal Package Type:** 1.0 x 0.8 x 0.3 mm
2. Frequency
3. Load capacitance
4. Frequency tolerance
5. Frequency temp. char.
6. Temperature range
7. ESR
8. ESR unit (R = Ω)
9. Drive level
0. Tape & reel

1 Model
FA1210AN

2 Frequency
32 ~ 100 MHz

3 Load cap
60 = 7.0 pF
80 = 8.0 pF

4 Frequency tolerance
AA = +/- 10 ppm

5 Freq. temp. char.
YY = +/- 30 ppm
NN = +/-20 ppm
FF = +/-15 ppm

6 Temp. range
B = -20 to 70C
G = -40 to +85C

7 8 ESR = Ω
A0 = 100 Ω

9 Drive level
E = 100 µW

0 Tape & reel
B = Bulk

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August 2024

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

NOTE: This PCS applies to crystal part numbers before May 2016

LEGACY CRYSTAL MICRO DEVICES

Product Configuration Guide

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Product Configuration System

kHz Range Crystal Units

FC-135	32.7680K	A	-	AC	5

Frequency
32.7680kHz
K: In kHz

Frequency Tolerance@25C
A: +/-20ppm (Std for FC-135/135R/145)
Blank: +/-20ppm (Std for FC-255)
D: +/-30ppm (Std for FC-12M)

Load Capacitance
A: 12.5pf
AC: 9.0pf
AG: 7pF

Packaging
Tape & Reel
Blank: Bulk
0: 1000pcs/reel
5: 3000pcs/reel

32.7680kHz Crystal Package Type:
FC-135: Ceramic SMD, 3.2 x 1.5 x 0.9mm Height
FC-135R: Ceramic SMD, 3.2 x 1.5 x 0.9mm Height
FC-145: Ceramic SMD, 4.1 x 1.5 x 0.9mm Height - Discontinued
FC-255: Ceramic SMD, 4.9 x 1.8 x 0.9mm Height - Discontinued
FC-12M: Ceramic SMD, 2.05 x 1.2 x 0.6mm Height

NOTES:

1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

32.768 kHz Crystal Unit with 0.35mm height for Smart Card

Discontinued

FC-12D	32.7680K	A	-	AC	5

FC-12D

32.7680kHz Crystal Package Type:

2.05x 1.2 x 0.35 t (mm)

32.7680K

Frequency

32.7680kHz

K: In kHz

A

Frequency Tolerance@25C

A: +/-20ppm

AC

Load Capacitance

A: 12.5pf

AG: 7pF

AC: 9pF

5

Packaging

Tape & Reel

Blank: Bulk

0: 1000pcs/reel

5: 3000pcs/reel

NOTES:

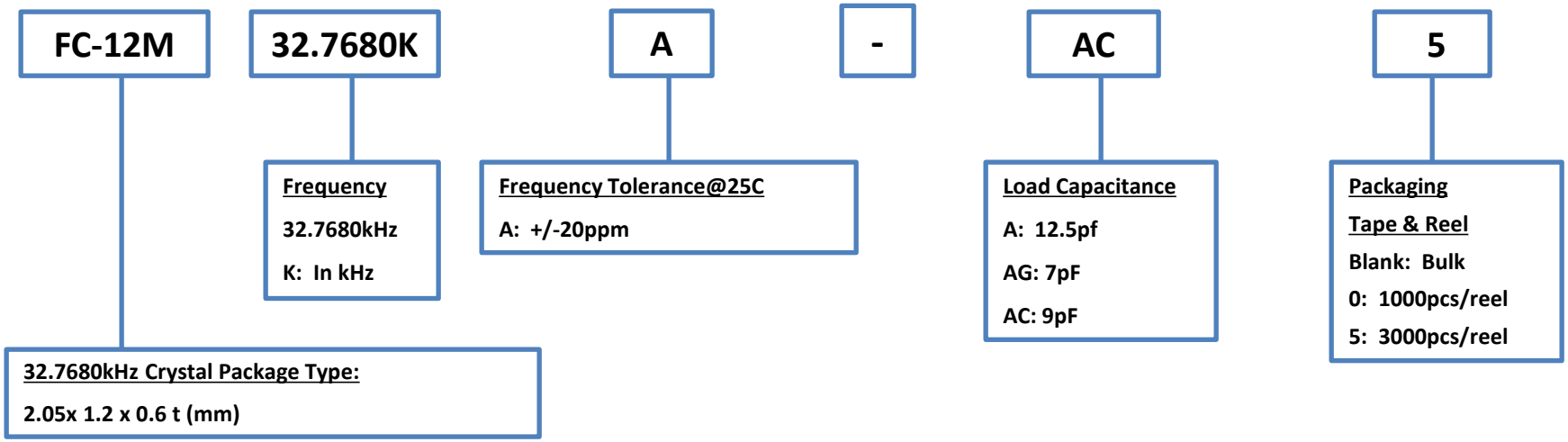
1) If your application for this part is not a Smart Card, please contact your Epson representative for assistance.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystal Units



NOTES:

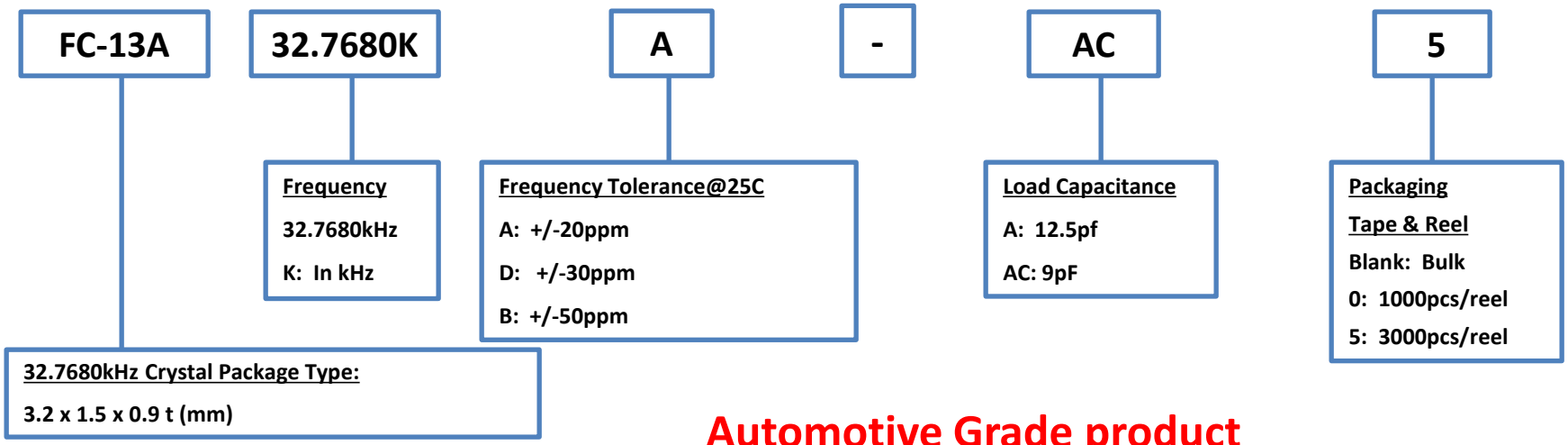
1) If you require a frequency or tolerance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystal Units

Non Promotional



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTES:

1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystal Units

Discontinued

FC-13F	32.7680K	A	-	AC	5

FC-13F

32.7680kHz Crystal Package Type:

3.2 x 1.5 x 0.55 t (mm)

32.7680K

Frequency

32.7680kHz

K: In kHz

A

Frequency Tolerance@25C

A: +/-20ppm

AC

Load Capacitance

AG: 7pf

A: 12.5pf

AC: 9pf

5

Packaging

Tape & Reel

Blank: Bulk

0: 1000pcs/reel

5: 3000pcs/reel

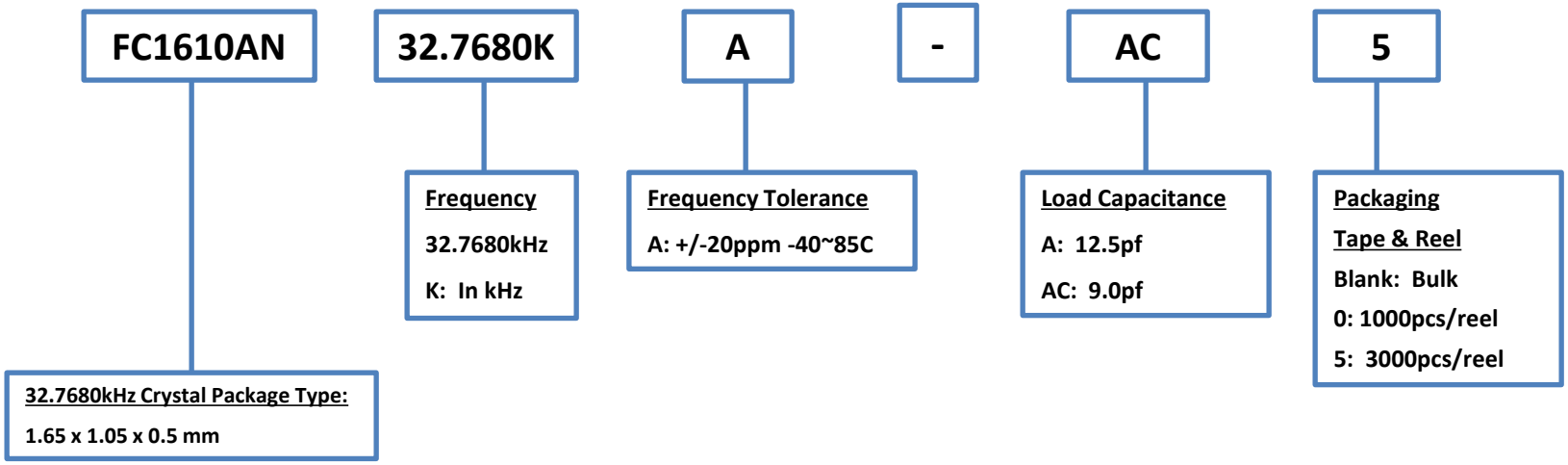
NOTES:

1) If you require a frequency or tolerance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystal Unit



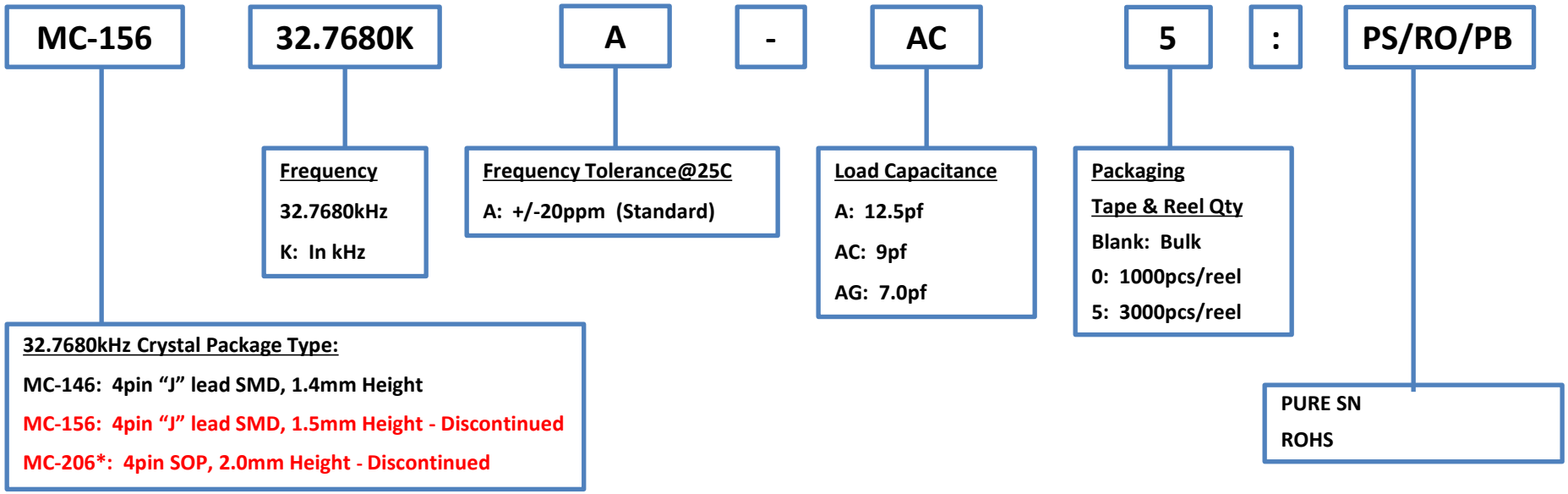
NOTES:

1) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystals Units



NOTES:

1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystals Units

MC-306 | **76.8000K** | **A** | **-** | **AC** | **5** | **:** | **PS/RO/PB**

Frequency Range:

K: In kHz to 4 Decimal Places
FC-135: 32 ~ 77.5kHz
FC-255: 32 ~ 100kHz - Discontinued
C-2: 20~120KHz - Discontinued
C-4: 32~120 / 192KHz - Discontinued
MC-206*: 32 ~ 100kHz - Discontinued
MC-306: 20 ~ 120kHz
MC-405/406: 20 ~ 120kHz - Discontinued

Frequency Tolerance@25C

A: +/-20ppm
B: +/-50ppm
Blank: +/-100ppm

Load Capacitance

A: 12.5pF
AC: 9.0pF
AG: 7.0pF
E: 6.0pF

Packaging

C-2 / C-4
Blank: Bulk
Tape & Reel
MC 405/406
Blank: Bulk
0: 1000pcs/reel
MC-206/306 & FC-135/255
Blank: Bulk
0: 1000pcs/reel
5: 3000pcs/reel

Crystal Package Type:

C-2	2.0 x 6.0mm - Discontinued
C-4	1.5 x 5.0mm - Discontinued
FC-135:	3.2 x 1.5 x 0.9mm
FC-255	4.9 x 1.8 x 0.9mm - Discontinued
MC-206*:	4pin SOP, 2.0mm Ht. - Discontinued
MC-306	4pin "J" Lead SMD, 2.54mm Ht.
MC-405/406	4pin "J" Lead SMD, 3.6mm Ht. - Discontinued

Blank = Not RoHs Compliant
PB FREE (C-Type Series)
PURE SN & ROHS (MC Series)
FC-135/255 already RoHs Compliant, so above codes do not apply.

*MC-206: Not Recommended for New Designs

NOTES:

1) This product configuration guide is NOT applicable to 32.768kHz Crystals.
2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystals Units

MC-405	32.7680K	T	-	AC	5	:	PS/RO/PB

32.7680kHz Crystal Package Type:

MC-306: 4pin "J" lead SMD, 2.54mm Height

MC-30A: 4pin "J" lead SMD, 2.54mm Height - Discontinued

MC-30AY: 4pin "J" lead SMD, 2.54mm Height - Discontinued

MC-405: 4pin "J" lead SMD, 3.6mm Height - Discontinued

MC-406: 4pin "J" lead SMD, 3.6mm Height - Discontinued

Frequency

32.7680kHz

K: In kHz

Frequency Tolerance@25C

Blank: +/-20ppm (Standard)

Load Capacitance

A: 12.5pf

AC: 9pf

E: 6pf

F: Series

K: 10pf

AG: 7.0pf

Packaging

Tape & Reel Qty

Blank: Bulk

0: 1000pcs/reel

5: 3000pcs/reel (MC-306 only)

PURE SN

ROHS

NOTES:

1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

kHz Range Crystals Units

Discontinued

C-002RX	32.7680K	T	-	L	P	:	PS/RO/PB

C-002RX

32.7680kHz Crystal Pkg Type (diameter x length):

- C-001R: 3.1 x 8.0mm - Discontinued
- C-002RX: 2.0 x 6.0mm - Discontinued
- C-004R: 1.5 x 5.0mm - Discontinued
- C-005R: 1.2 x 4.6mm - Discontinued

32.7680K

Frequency
32.7680kHz
K: In kHz

T

Frequency Tolerance @25C
Blank : +/-20ppm (Std)

L

Load Capacitance
- A: 12.5pF
- AC: 9.0pF
- D: 22.0pF
- E: 6.0pF
- F: Series
- H: 32.0pF
- AG: 7.0pF

P

Packaging
Blank: Bulk

PS/RO/PB

PB FREE

NOTES:

1) This product configuration guide is applicable only to 32.7680kHz crystals. For other frequencies, please refer to the Standard kHz Crystal Product Configuration System.

2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystals Units

FA-118T

Crystal Package Type:
Ultra Miniature Low Profile
Ceramic SMD
1.6 X 1.2 X 0.35 mm

24.0000M

Frequency
24.000 ~ 54.000 MHz

D

Freq. Tolerance@25C
F: +/-10ppm
24 MHz<= F =< 40MHz
E: +/-15ppm
40MHz<F=<54MHz
D: +/-30ppm
All Freq. Range

30Y

Freq. Temp Char Op Temp Range	All Freq Range	24MHz<=F<32MHz	32MHz<=F=<54MHz
-20C to +75C	+/-30ppm = 30Z	+/-12ppm = 12Z	+/-12ppm = 12Z
-30C to +85C	+/-30ppm = 30Y	+/-16ppm = 16Y	+/-15ppm = 15Y
-40C to +85C	+/-30ppm = 30X	+/-20ppm = 20X	+/-19ppm = 19X

-

AC

Load Capacitance:
AG: 7pF
AJ: 8pF
AC: 9pF
W: 12pF
C: 18pf

5

Tape & Reel Qty
Blank: Bulk
0: 1000pcs/reel
5: 3000pcs/reel
8: 6000pcs/reel

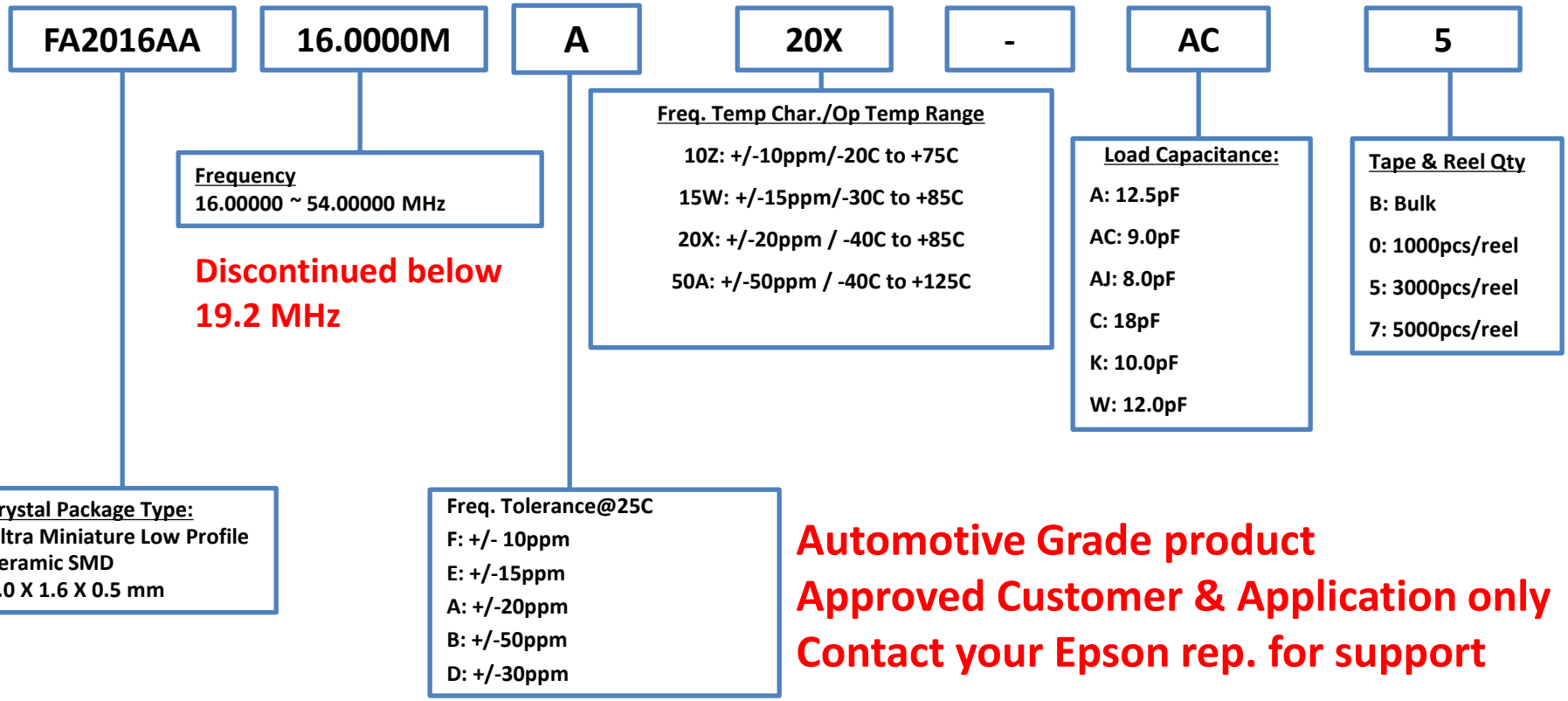
NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units

NRND

FA2016AN	24.0000M	T	S	-	L	P

Crystal Package Type:
Ultra Miniature Low Profile
Ceramic SMD
2.0 X 1.6 X 0.5 mm

Frequency
24.00000 ~ 54.00000 MHz

Freq. Tolerance@25C
F: +/- 10ppm, 24<= F =<40MHz
E: +/-15ppm, 40<= F =<54MHz
D: +/-30ppm , All Freq. Range

Freq. Temp Char./Op Temp Range
10Z: +/-10ppm/-20C to +75C
30Z: +/-30ppm / -20C to +75C
14Y: +/-14ppm / -30C to +85C
50Y +/-50ppm / -30C to 85C

Load Capacitance:
A: 12.5pF
E: 6.pF
K: 10.0pF
W: 12.0pF

Tape & Reel Qty
B: Bulk
3: 250pcs/reel
0: 1000pcs/reel
5: 3000pcs/reel

NOTES:

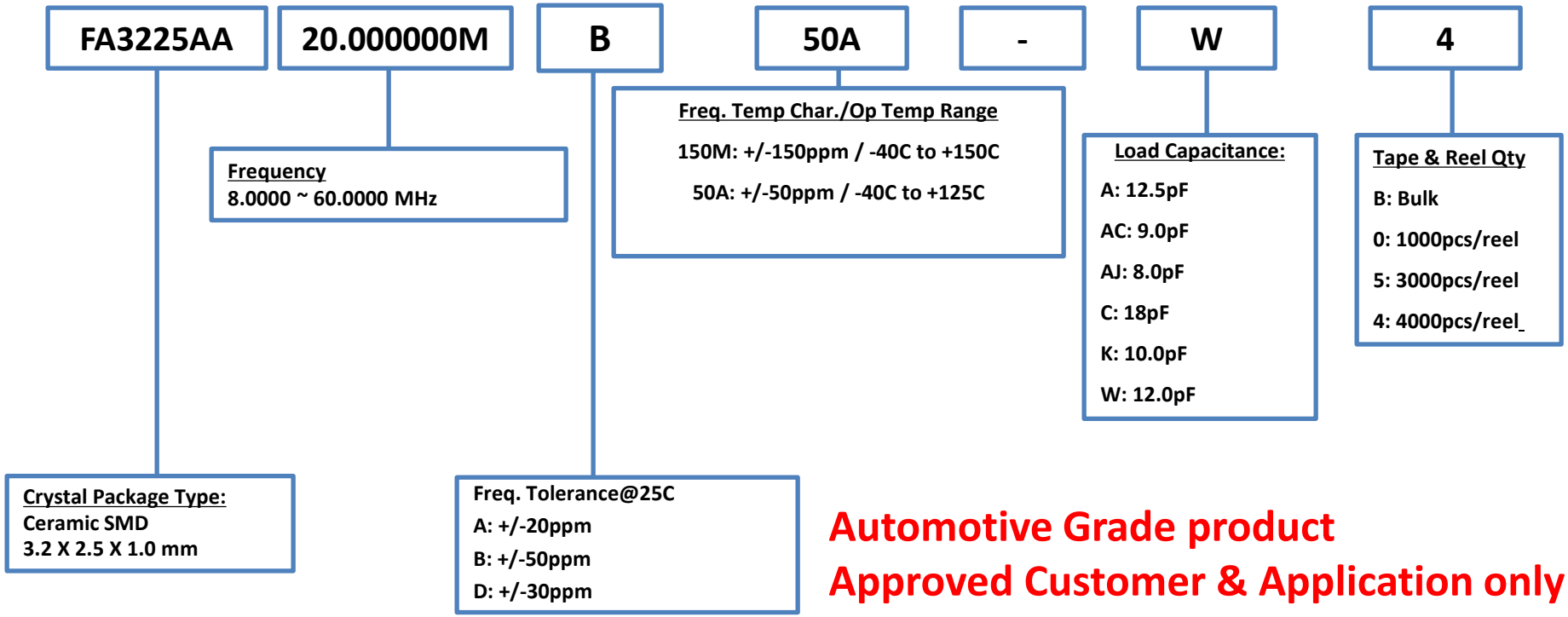
1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units

Non Promotional



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystals Units

FA-128	16.0000M	F	12Z	-	AC	0

Crystal Package Type:
Ultra Miniature Low Profile Ceramic SMD
FA-128: 2.0 X 1.6 X 0.5 mm
FA-128S: 2.0 x 1.6 x 0.9 mm - NRND
FA-2016AS: 2.0 x 1.6 x 0.65 mm

Frequency
16 ~ 54 MHz

Freq. Tolerance@25C
F: +/-10ppm
16 MHz<= F =< 40MHz
E: +/-15ppm
40MHz<F=<54MHz
D: +/-30ppm
All Freq. Range

Load Capacitance:
AC: 9pF
AS: 8.5pF
AJ: 8pF
B: 16pF
G: 20pF
W: 12pF

Tape & Reel Qty
B: Bulk
0: 1000pcs/reel
5: 3000pcs/reel

Freq. Temp Char Op Temp Range	All Freq Range	16MHz<=F=<20MHz	20MHz<F=54MHz
-20C to +75C	+/-20ppm = 20Z	+/-12ppm = 12Z	+/-10ppm = 10Z
-20C to +80C	+/-20ppm = 20K	+/-12ppm = 12K	+/-10ppm = 10K
-20C to +85C	+/-20ppm = 20P	+/-12ppm = 12P	+/-12ppm = 12P
- 30C to +70C	+/-28ppm = 28R	+/-17ppm = 17R	+/-14ppm = 14R
-30C to +75C	+/-28ppm = 28E	+/-17ppm = 17E	+/-14ppm = 14E
-30C to +80C	+/30ppm =30W	+/-17ppm = 17W	+/-14ppm = 14W
-30C to +85C	+/-30ppm =30Y	+/-17ppm = 17Y	+/-14ppm = 14Y
-30C to +85C	+/-50ppm =50Y	+/-17ppm = 17Y	+/-14ppm = 14Y
-40C to +85C	+/-40ppm = 40X	+/-22ppm = 22X	+/-20ppm = 20X

NOTE: 81Z = +8/-10ppm / -20C to +75C

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System

MHz Range Crystals Units

FA-20H	16.0000M	F	12V	-	AC	0

Crystal Package Type:
Ultra Miniature Low Profile
Ceramic SMD
2.5 X 2.0 X 0.55 mm

Frequency
12.000 ~ 54.0000MHz

Freq. Tolerance@25C
F: +/-10ppm
A: +/-20ppm
D: +/-30ppm
L: +11/-9ppm

Load Capacitance:
AC: 9pF
AS: 8.5pF
B: 16pF
G: 20pF
W: 12pF

Tape & Reel Qty
Blank: Bulk
0: 1000pcs/reel
5: 3000pcs/reel

Freq. Temp Char Op Temp Range	All Freq Range	16MHz<=F=<20MHz	20MHz<F=<54MHz
-20C to +70C	+/-20ppm = 20V	+/-12ppm = 12V	+/-10ppm = 10V
-20C to +70C	+/-30ppm = 30V	+/-12ppm = 12V	+/-10ppm = 10V
-20C to +75C	+/-20ppm = 20Z	+/-12ppm = 12Z	+/-10ppm = 10Z
-20C to +80C	+/-20ppm = 20K	+/-12ppm = 12K	+/-10ppm = 10K
-20C to +85C	+/-20ppm = 20P	+/-12ppm = 12P	+/-12ppm = 12P
- 30C to +70C	+/-28ppm = 28R	+/-17ppm = 17R	+/-14ppm = 14R
-30C to +75C	+/-28ppm = 28E	+/-17ppm = 17E	+/-14ppm = 14E
-30C to +80C	+/30ppm =30W	+/-17ppm = 17W	+/-14ppm = 14W
-30C to +85C	+/-30ppm =30Y	+/-17ppm = 17Y	+/-14ppm = 14Y
-30C to +85C	+/-50ppm =50Y	+/-17ppm = 17Y	+/-14ppm = 14Y
-40C to +85C	+/-40ppm = 40X	+/-22ppm = 22X	+/-20ppm = 20X

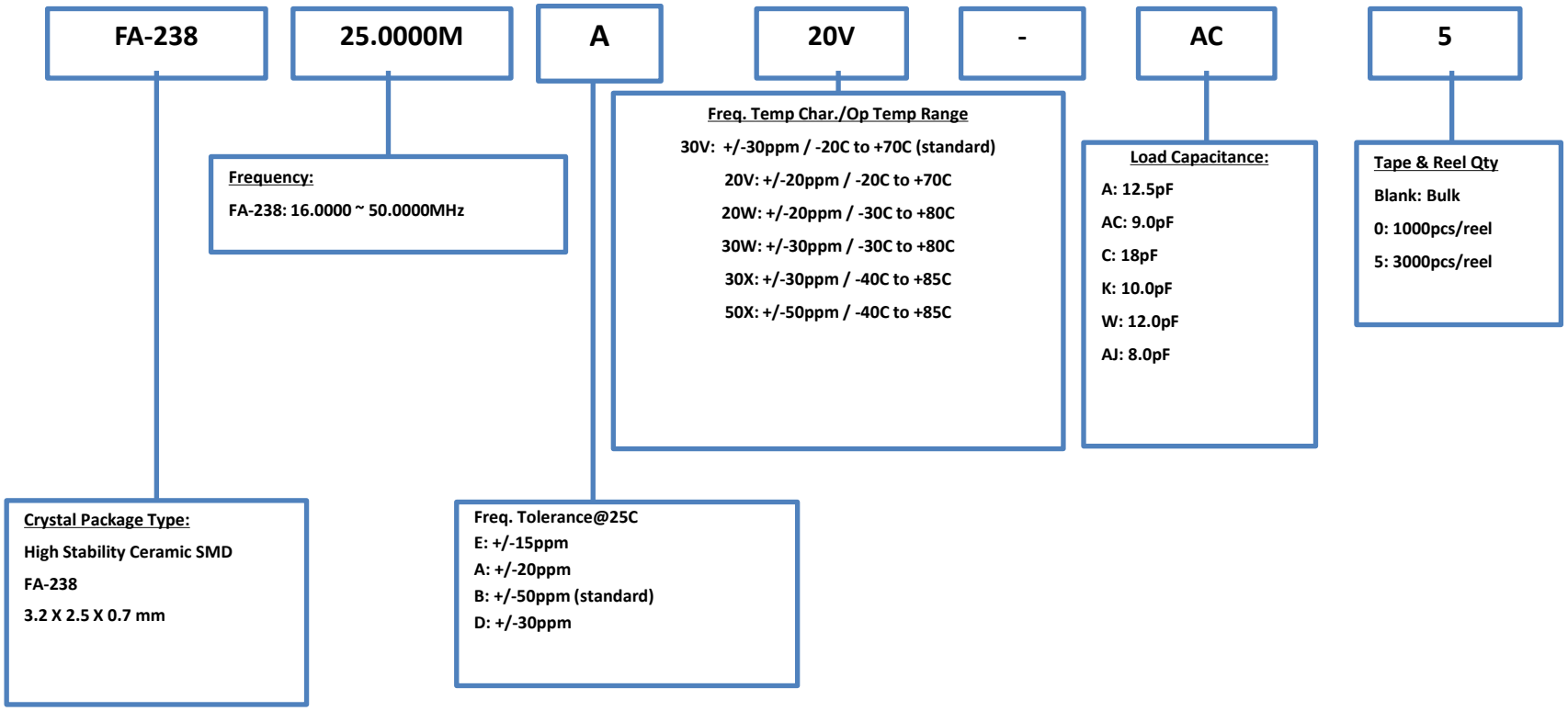
NOTE: **81Z** = +8/-10ppm / -20C to +75C

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System

MHz Range Crystal Units



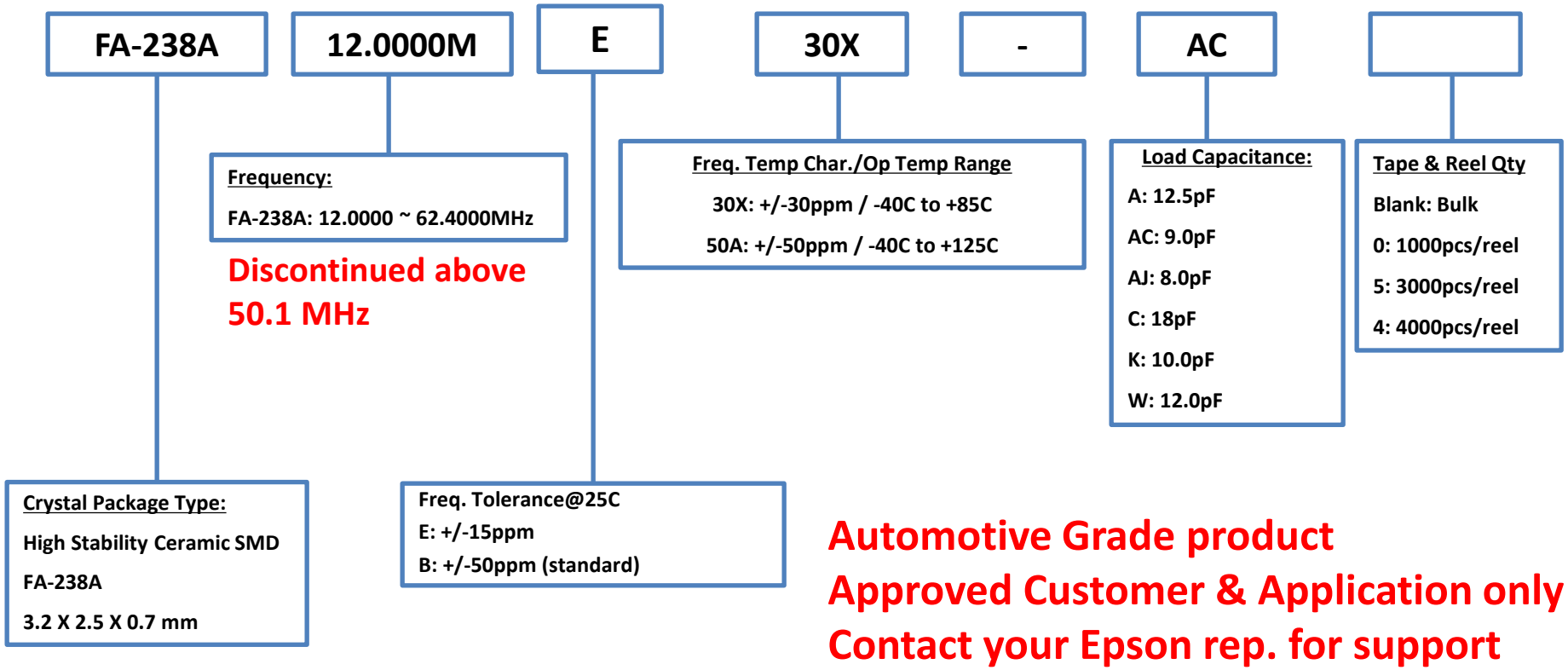
NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

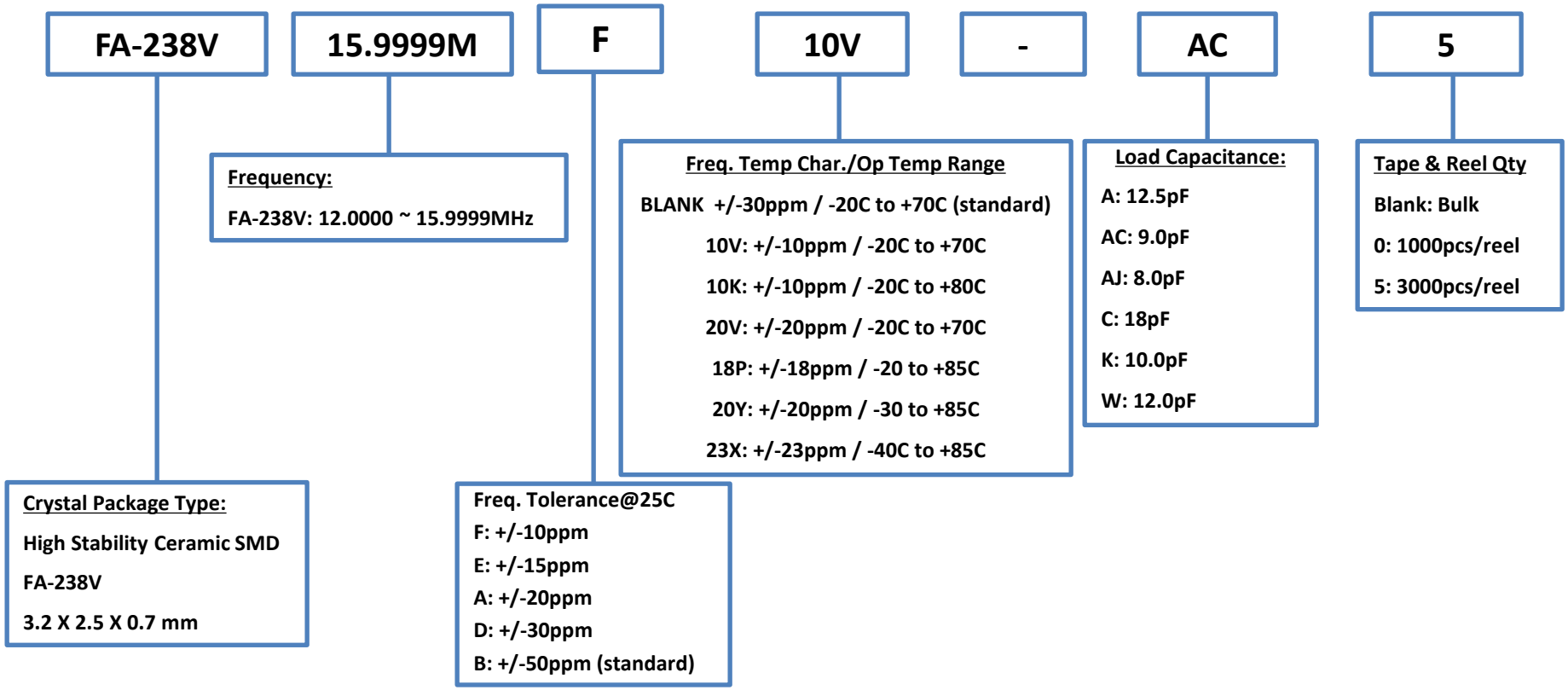
NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units



NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units

TSX-3225 | **16.0000M** | **F** | **10U** | **-** | **AC** | **0**

Crystal Package Type:
Miniature Size Low Profile Ceramic SMD
3.2 X 2.5 X 0.6 mm

Frequency
16.000 ~ 48.000 MHz

Freq. Tolerance@25C
F: +/-10ppm
E: +/-15ppm

Freq. Temp Char Op Temp Range	16MHz<=F=<26.99MHz	27MHz<F=<48MHz
-10C to 60C	+/-10ppm = 10U	+/-10ppm = 10U
-20C to +75C	+/-9ppm = 09Z	+/-9ppm = 09Z (for <40MHz)
-20C to +75C	+/-10ppm = 10Z	+/-10ppm = 10Z
-20C to +85C	+/-10ppm = 10P	+/-10ppm = 10P
-30C to +85C	+/-13ppm = 13Y	+/-15ppm = 15Y
-40C to +85C	+/-18ppm = 18X	+/-18ppm = 18X
-40C to +105C	+/-20ppm = 20G (for 20MHz and 24MHz only)	

Load Capacitance:
AC: 9pF
AJ: 8pF
AS: 8.5pF
B: 16pF
C: 18pF
W: 12pF

Tape & Reel Qty
Blank: Bulk
0: 1000pcs/reel
6: 2000pcs/reel

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System

MHz Range Crystal Units

Discontinued

MA-306	25.0000M		-	C	0	:	PURE SN

Crystal Package Type:
MA-306: Miniature 4pin "J" lead SMD, 2.54mm Ht.

Frequency Range
14.31818 & 17.7340 ~ 41.0000MHz
M: In MHz to 4 Decimal Places

Frequency Tolerance@25C
Blank: +/-50ppm

Load Capacitance
B: 16.0pF
C: 18.0pF
F: Series
G: 20.0pF
K: 10.0pF
W: 12.0pF
AJ: 8.0pF

Packaging
Tape and Reel Qty
Blank: Bulk
3: 250pcs/reel
0: 1000pcs/reel
5: 3000pcs/reel

PURE SN
ROHS

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

EPSON

Product Configuration System

MHz Range Crystal Units

Discontinued

MA-406	30.0000M		50X	-	A	0	:	PURE SN

Crystal Package Type:

MA-505: 4pin "J" lead SMD, 4.6mm Ht.

MA-506: 4pin "J" lead SMD, 4.6mm Ht.

MA-406: 4pin "J" lead SMD, 3.7mm Ht.

Frequency Range

M: In MHz to 4 Decimal Places

4.0000, 4.0320, 4.0960, 4.1900, 4.194304, 4.433619, 4.5000, 4.8000, 4.9152MHz

5.5000 ~ 64.0000MHz
Except 8.0001 ~ 8.1999MHz

26.0000~29.9999MHZ *

Frequency Tolerance@25C

Blank: +/-50ppm (Std)

Freq. Temp Char./Op Temp Range

Blank (Std): +/-30ppm / -20C to +70C (>5.5MHz)
+/-50ppm / -20C to +70C (<5.5MHz)

50X: +/-50ppm / -40C to +85C

Load Capacitance

A: 12.5pF
B: 16.0pF
C: 18.0pF
D: 22.0pF
F: Series
G: 20.0pF
H: 32.0pF
K: 10.0pF
W: 12.0pF
AB: 30.0pF
AD: 50.0pF
AJ: 8.0pF

Packaging

Tape & Reel Qty

Blank: Bulk

3: 250pcs/reel

0: 1000pcs/reel

PURE SN
ROHS

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

2) For frequencies between 26.0000MHz and 29.9999MHz, please specify "(FUND)" at end of part number if fundamental mode required. Otherwise, 3rd Overtone is default.

EPSON

Product Configuration System

MHz Range Crystal Units

Discontinued

CA-301	30.0000M		-	A		:	PB FREE

Crystal Package Type:

CA-301: 3.1mm diameter metal can

Frequency Range

M: In MHz to 4 Decimal Places

4.0000, 4.0320, 4.0960, 4.1900, 4.194304, 4.433619, 4.5000, 4.8000, 4.9152MHz

5.5000 ~ 64.0000MHz
Except 8.0001 ~ 8.1999MHz

26.0000~29.9999MHZ *

Frequency Tolerance@25C

4.0000~5.5000MHz

Blank : +/-50ppm (Standard)

5.5001~64.0000MHz

Blank: +/-30ppm (Standard)

Load Capacitance

B: 16.0pF
C: 18.0pF
D: 22.0pF
F: Series
G: 20.0pF
H: 32.0pF
K: 10.0pF
W: 12.0pF
AB: 30.0pF
AD: 50.0pF
AJ: 8.0pF

Packaging

Blank: Bulk

PB FREE

NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

2) For frequencies between 26.0000MHz and 29.9999MHz, please specify "(FUND)" at end of part number if fundamental mode required. Otherwise, 3rd Overtone is default.

EPSON

Product Configuration System

Crystal Units Load Cap Codes and Values (as of March 2014)

Load Cap Code	Load Cap Value
AZ	3.5
VJ	4.0
EE	4.4
AT	4.8
X	5.0
JJ	5.4
E	6.0
FF	6.4
DD	6.5
VC	6.7
AG	7.0
AR	7.1
JK	7.4
VB	7.6
AN	7.8
AJ	8.0
AS	8.5
CC	8.7
GG	8.8
AC	9.0
AM	9.2

Load Cap Code	Load Cap Value
AL	9.5
S	9.6
VF	9.8
K	10.0
HH	10.4
AK	10.5
AP	10.7
P	11.0
AY	11.2
AW	11.5
W	12.0
A	12.5
T	13.0
N	13.5
Y	14.0
VH	14.5
R	15.0
B	16.0
AV	17.0
C	18.0
L	18.3

Load Cap Code	Load Cap Value
J	18.5
AQ	19.0
G	20.0
AF	21.5
D	22.0
AU	22.5
AE	22.9
AH	23.0
V	24.0
AI	25.0
Z	26.0
AA	27.0
Q	28.0
AB	30.0
H	32.0
I	33.0
U	47.0
AD	50.0
M	100.0
F	Series

Product Configuration Guide

Appendix

Product Configuration System

Crystal Units Load Cap Codes and Values

Load Cap Code	Load Cap Value
AZ	3.5
VJ	4.0
EE	4.4
AT	4.8
X	5.0
JJ	5.4
E	6.0
FF	6.4
DD	6.5
VC	6.7
AG	7.0
AR	7.1
JK	7.4
VB	7.6
AN	7.8
AJ	8.0
AS	8.5
CC	8.7
GG	8.8
AC	9.0
AM	9.2

Load Cap Code	Load Cap Value
AL	9.5
S	9.6
VF	9.8
K	10.0
HH	10.4
AK	10.5
AP	10.7
P	11.0
AY	11.2
AW	11.5
W	12.0
A	12.5
T	13.0
N	13.5
Y	14.0
VH	14.5
R	15.0
B	16.0
AV	17.0
C	18.0
L	18.3

Load Cap Code	Load Cap Value
J	18.5
AQ	19.0
G	20.0
AF	21.5
D	22.0
AU	22.5
AE	22.9
AH	23.0
V	24.0
AI	25.0
Z	26.0
AA	27.0
Q	28.0
AB	30.0
H	32.0
I	33.0
U	47.0
AD	50.0
M	100.0
F	Series