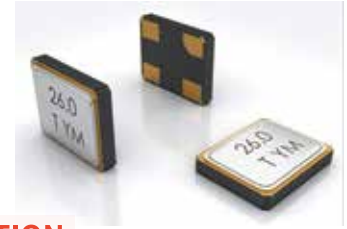


MHz Crystal (SMD)

2.1 M3225

Metal Can Type Crystals M3225 Series



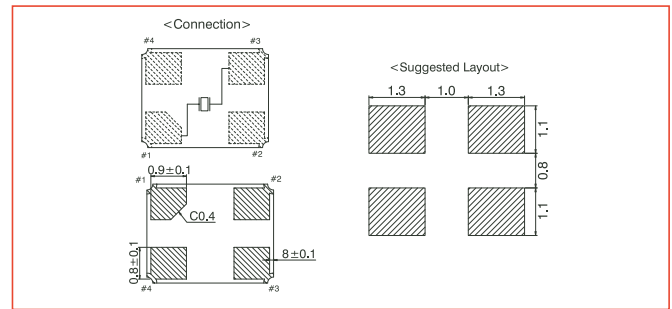
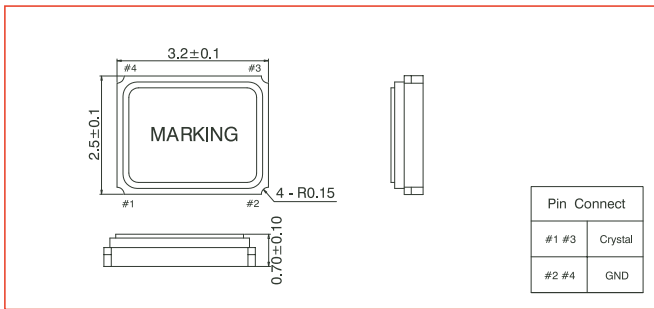
FEATURES

- Reflow resistance type crystal units
- Higher frequency pullability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer
TV, STB, LCDM and Cable Modem

DIMENSIONS



ELECTRICAL SPECIFICATION

| Item/Type | M3225 |
|--|---|
| Frequency Range | 8 ~ 54 MHz |
| Frequency Tolerance (at 25°C) | ±10 ppm, or specify |
| Frequency Stability Over Operating Temperature Range | ±10 ppm, or specify |
| Operating Temperature Range | -10 ~ +60°C, or specify |
| Shunt Capacitance (C ₀) | 3pF Max. |
| Drive Level | 100μW (typical) |
| Load Capacitance | Series, 6pF, 10pF, 12pF, 16pF, or specify |
| Aging (at 25°C) | ±3 ppm/year Max. |
| Storage Temperature Range | -40 ~ +125°C |

EQUIVALENT SERIES RESISTANCE(ESR)

| Frequency | Resistance |
|----------------------------------|------------|
| 8MHz ≤ F ₀ < 10MHz | 300 Ω Max. |
| 10MHz ≤ F ₀ < 15MHz | 150 Ω Max. |
| 15MHz ≤ F ₀ < 19.5MHz | 80 Ω Max. |
| 19.5MHz ≤ F ₀ < 27MHz | 60 Ω Max. |
| 27MHz ≤ F ₀ < 54MHz | 50 Ω Max. |

FREQ. STABILITY vs. TEMP. RANGE

| Temp.(°C) | ppm | | Temp.(°C) | ppm | | |
|-----------|-----|-----|------------|-----|-----|-----|
| | ±10 | ±15 | | ±20 | ±30 | ±50 |
| -10 ~ +60 | ○ | ○ | -40 ~ +105 | △ | ○ | ○ |
| -20 ~ +70 | ○ | ○ | -40 ~ +125 | × | × | ○ |
| -40 ~ +85 | × | △ | | | | |

*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.2 M2520

Metal Can Type Crystals M2520 Series



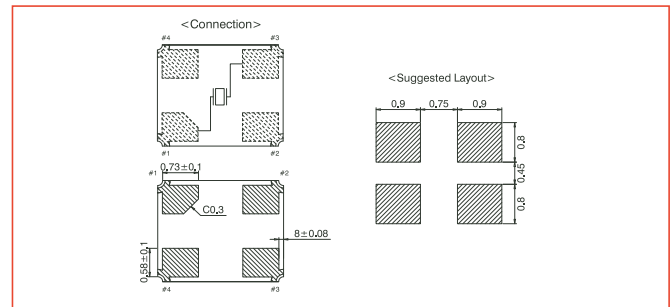
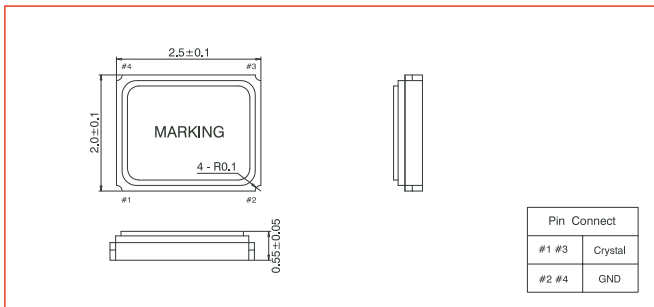
FEATURES

- Reflow resistance type crystal units
- Higher frequency pullability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS



ELECTRICAL SPECIFICATION

| Item/Type | M2520 |
|--|-------------------------------------|
| Frequency Range | 12 ~ 54 MHz |
| Frequency Tolerance (at 25°C) | ±10 ppm, or specify |
| Frequency Stability Over Operating Temperature Range | ±10 ppm, or specify |
| Operating Temperature Range | -10 ~ +60°C, or specify |
| Shunt Capacitance (C ₀) | 3pF Max. |
| Drive Level | 10μW (100μW Max.) |
| Load Capacitance | Series, 6pF, 12pF, 16pF, or specify |
| Aging (at 25°C) | ±3 ppm/year Max. |
| Storage Temperature Range | -40 ~ +125°C |

EQUIVALENT SERIES RESISTANCE(ESR)

| Frequency | Resistance |
|--------------------------------|------------|
| 12MHz ≤ F ₀ < 20MHz | 150 Ω Max. |
| 20MHz ≤ F ₀ ≤ 30MHz | 80 Ω Max. |
| 30MHz < F ₀ < 54MHz | 60Ω Max. |

FREQ. STABILITY vs. TEMP. RANGE

| ppm Temp.(°C) | ppm | | | | ppm Temp.(°C) | ppm | | | |
|------------------|-----|-----|-----|------------|------------------|-----|-----|-----|--|
| | ±5 | ±10 | ±15 | ±15 | | ±20 | ±30 | ±50 | |
| -10 ~ +60 | △ | ○ | ○ | -40 ~ +105 | △ | ○ | ○ | ○ | |
| -20 ~ +70 | × | △ | ○ | -40 ~ +125 | × | × | × | ○ | |
| -40 ~ +85 | × | × | △ | | | | | | |

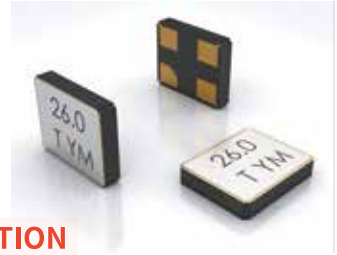
*o: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.3 M2016

Metal Can Type Crystals M2016 Series



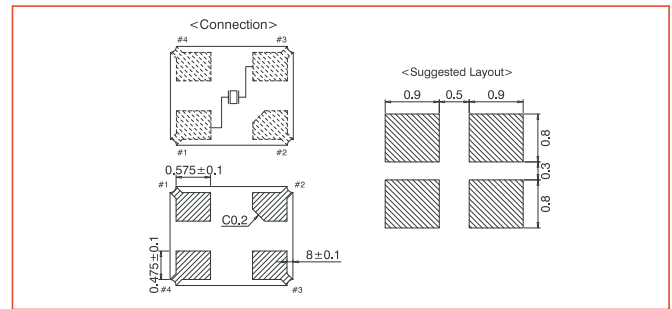
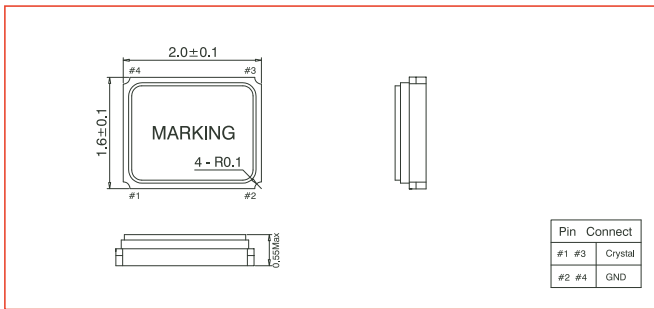
FEATURES

- Reflow resistance type crystal units
- Higher frequency pullability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer
TV, STB, LCDM and Cable Modem

DIMENSIONS



ELECTRICAL SPECIFICATION

| Item/Type | M2016 |
|--|-------------------------------------|
| Frequency Range | 16 ~ 54 MHz |
| Frequency Tolerance (at 25°C) | ±10 ppm, or specify |
| Frequency Stability Over Operating Temperature Range | ±10 ppm, or specify |
| Operating Temperature Range | -10 ~ +60°C, or specify |
| Shunt Capacitance (C ₀) | 3pF Max. |
| Drive Level | 10μW (100μW Max.) |
| Load Capacitance | Series, 6pF, 12pF, 16pF, or specify |
| Aging (at 25°C) | ±3 ppm/year Max. |
| Storage Temperature Range | -40 ~ +125°C |

EQUIVALENT SERIES RESISTANCE(ESR)

| Frequency | Resistance |
|--------------------------------|------------|
| 16MHz ≤ F ₀ < 20MHz | 150 Ω Max. |
| 20MHz ≤ F ₀ < 30MHz | 100 Ω Max. |
| 30MHz ≤ F ₀ < 60MHz | 80 Ω Max. |
| 60MHz ≤ F ₀ < 96MHz | 60 Ω Max. |

FREQ. STABILITY vs. TEMP. RANGE

| ppm Temp.(°C) | ppm | | | ppm Temp.(°C) | ppm | | | |
|------------------|-----|-----|-----|------------------|-----|-----|-----|-----|
| | ±5 | ±10 | ±15 | | ±15 | ±20 | ±30 | ±50 |
| -10 ~ +60 | △ | ○ | ○ | -40 ~ +105 | △ | ○ | ○ | ○ |
| -20 ~ +70 | × | △ | ○ | -40 ~ +125 | × | × | × | ○ |
| -40 ~ +85 | × | × | △ | | | | | |

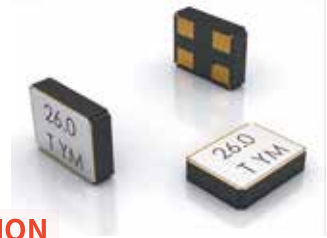
*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.4 M1612

SMD AT cut crystal unit M1612 series



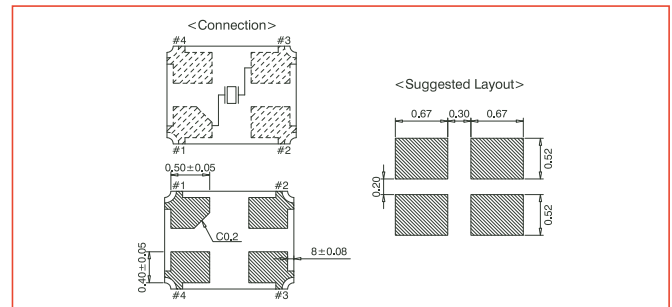
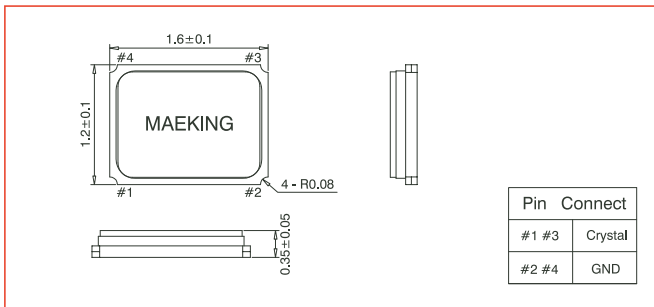
FEATURES

- Ultra-small size: 1.6 × 1.2 × 0.35 mm
- Ceramic seam welding package
- High stability and low aging
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS



ELECTRICAL SPECIFICATION

| Item/Type | M1612 |
|--|-------------------------------|
| Frequency Range | 24 ~ 96MHz |
| Frequency Tolerance (at 25°C) | ±10 ppm, or specify |
| Frequency Stability Over Operating Temperature Range | ±10ppm, ±15ppm, or specify |
| Operating Temperature Range | -40 ~ +85°C |
| Shunt Capacitance (C ₀) | 3pF Max. |
| Drive Level | 10μW (100μW Max.) |
| Load Capacitance | Series, 8pF, 10pF, or specify |
| Aging (at 25°C) | ±3 ppm/year Max. |
| Storage Temperature Range | -40 ~ +125°C |

EQUIVALENT SERIES RESISTANCE(ESR)

| Frequency | Resistance |
|--------------------------------|------------|
| 24MHz ≤ F ₀ < 32MHz | 120 Ω Max. |
| 32MHz ≤ F ₀ < 52MHz | 80Ω Max. |
| 52MHz ≤ F ₀ ≤ 96MHz | 50 Ω Max. |

FREQ. STABILITY vs. TEMP. RANGE

| ppm Temp.(°C) | ppm | | | ppm Temp.(°C) | ppm | | | |
|------------------|-----|-----|-----|------------------|-----|-----|-----|-----|
| | ±5 | ±10 | ±15 | | ±15 | ±20 | ±30 | ±50 |
| -10 ~ +60 | △ | ○ | ○ | -40 ~ +105 | △ | ○ | ○ | ○ |
| -20 ~ +70 | × | △ | ○ | -40 ~ +125 | × | × | × | ○ |
| -40 ~ +85 | × | × | △ | | | | | |

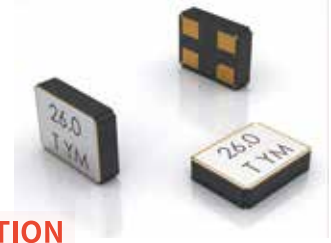
*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.5 M1210

SMD AT cut crystal unit
M1210 series



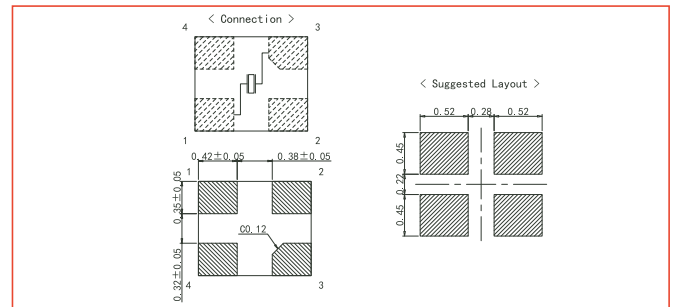
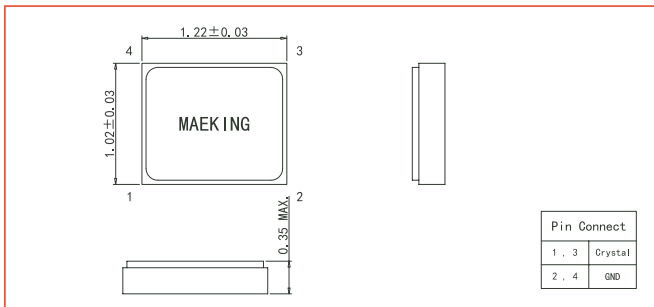
FEATURES

- Ultra-small size: 1.2 × 1.0 × 0.3 mm
- Sealing with gold-tin preform ceramic package
- High stability and low aging
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS



ELECTRICAL SPECIFICATION

| Item/Type | M1210 |
|--|-------------------------------|
| Frequency Range | 32 ~ 96MHz |
| Frequency Tolerance (at 25°C) | ±10 ppm, or specify |
| Frequency Stability Over Operating Temperature Range | ±10 ppm, or specify |
| Operating Temperature Range | -40 ~ +85°C |
| Shunt Capacitance (C ₀) | 3.0pF Max. |
| Drive Level | 10μW (100μW Max.) |
| Load Capacitance | Series, 8pF, 10pF, or specify |
| Aging (at 25°C) | ±3 ppm/year Max. |
| Storage Temperature Range | -40 ~ +125°C |

EQUIVALENT SERIES RESISTANCE(ESR)

| Frequency | Resistance |
|--------------------------------|------------|
| 32MHz ≤ F ₀ ≤ 48MHz | 80Ω Max. |
| 48MHz ≤ F ₀ ≤ 96MHz | 100Ω Max. |

FREQ. STABILITY vs. TEMP. RANGE

| ppm Temp.(°C) | ppm | | | ppm Temp.(°C) | ppm | | | |
|------------------|-----|-----|-----|------------------|-----|-----|-----|-----|
| | ±5 | ±10 | ±15 | | ±15 | ±20 | ±30 | ±50 |
| -10 ~ +60 | △ | ○ | ○ | -40 ~ +105 | △ | ○ | ○ | ○ |
| -20 ~ +70 | × | △ | ○ | -40 ~ +125 | × | × | × | ○ |
| -40 ~ +85 | × | × | △ | | | | | |

*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.