




**SPECIFICATION SHEET**

|                                |  |
|--------------------------------|--|
| <b>SPECIFICATION SHEET NO.</b> | Q0130- XF12M28800S412  |
| <b>DATE</b>                    | Jan. 30, 2023  |
| <b>REVISION</b>                | A0   |
| <b>DESCRIPTION</b>             | MHz SMD Crystal, L3.2*W2.5*H0.7mm, Seam Seal, 4 Pads, CM32 series<br>12.28800MHz, Tolerance +/-10ppm, Load Capacitor 12pF,<br>Frequency stability +/-30ppm @Operating Temp. Range -40°C ~+85°C,<br>ESR 100 ohm Max, Reflow Profile Condition 260 °C Max.<br>Tape/Reel, 3000pcs/Reel<br>RoHS/RoHS III compliant |
| <b>CUSTOMER</b>                |  |
| <b>CUSTOMER PART NUMBER</b>    |  |
| <b>CROSS REF. PART NUMBER</b>  |  |
| <b>ORIGINAL PART NUMBER</b>    | TGS CM32 12M288A10-12-30-40-100 TLF  |
| <b>PART CODE</b>               | XF12M28800S412   |

|                         |   |  |   |
|-------------------------|---|--|---|
| <b>VENDOR APPROVE</b>   |   |  |   |
| Issued/Checked/Approved |  |  |  |
| DATE: Jan. 30, 2023     |   |  |   |

|                         |  |
|-------------------------|--|
| <b>CUSTOMER APPROVE</b> |  |
|                         |  |
| DATE:                   |  |

1/30/2023

**MAIN FEATURE**

- SMD Crystal, Seam Seal, L3.2\*W2.5\*H0.7mm, 4 pads
- Low cost, High precision, High frequency stability
- Reflow Profile Condition 260 °C Max.
- Cross more competitors part
- RoHS/RoHS III compliant



**APPLICATION**

- Bluetooth, wireless communication set
- Communication Electronics

**PART CODE GUIDE**

**RFQ**  
Request For Quotation

| XF | 12M28800 | S | 412 |
|----|----------|---|-----|
| 1  | 2        | 3 | 4   |

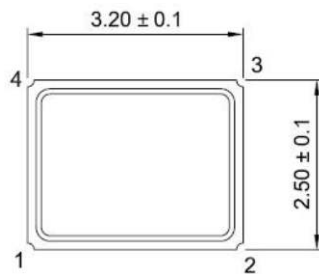
- 1) XF: Part family Code for SMD Crystal, Seam Seal, L3.2\*W2.5\*H0.7mm, 4 pads (CM32)
- 2) 12M28800: Frequency range code for 12.2880000MHz
- 3) S: SMD type, Package Tape/Reel, 3000pcs/Reel
- 4) 412: Specification code for original part No.: **TGS CM32 12M288A10-12-30-40-100 TLF**

**DIMENSION (Unit: mm)**

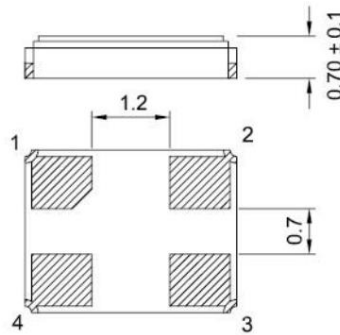
Image for reference



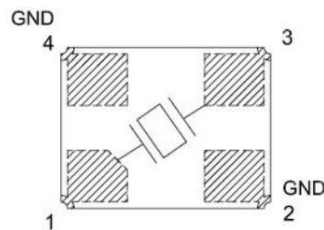
CM32



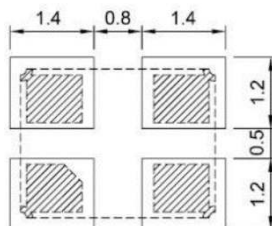
**Marking**  
Frequency Range



**Connection**  
#1 Crystal  
#2 Ground  
#3 Crystal  
#4 Ground



Recommend Pad Layout



**SMD CRYSTAL 3225 TYPE 4 PADS**
**ELECTRICAL PARAMETERS**

| Parameter                            | Part No. Symbol         | Units  | Value              |         |      | Condition             |
|--------------------------------------|-------------------------|--|--------------------|---------|------|-----------------------|
|                                      |                         |  | Min.               | Typical | Max. |                       |
| Original Manufacturer                | TGS                     | TGS Crystals                                     |                    |         |      |                       |
| Holder Type                          | CM32                    | SMD Crystal, Seam Seal, L3.2*W2.5*H0.7mm, 4 pads |                    |         |      |                       |
| Frequency Range                      | 12M288                  | MHz  | 12.288000          |         |      |                       |
| Mode of Oscillation                  | A                       | AT Fundamental                                   |                    |         |      |                       |
| Frequency Tolerance                  | 10                      | ppm  | -10                |         | +10  | @25°C                 |
| Load Capacitance                     | -12                     | pF   | 12                 |         |      |                       |
| Stability over Operation Temperature | -30                     | ppm  | -30                |         | +30  |                       |
| Operation Temperature                | -40                     | °C   | -40                |         | +85  |                       |
| Storage Temperature                  |                         | °C   | -55                |         | +105 |                       |
| Equivalent Series Resistance (ESR)   | -100                    | Ω  |                    |         | 100  |                       |
| Drive Level                          |                         | μW   |                    |         | 300  |                       |
| Shunt Capacitance (C0)               |                         | pF   |                    |         | 5.0  |                       |
| Motional Capacitance (C1)            |                         | fF   | N/A                |         |      |                       |
| DLD2                                 |                         | Ω  | N/A                |         |      |                       |
| FLD2                                 |                         | ppm  | N/A                |         |      |                       |
| RDL2                                 |                         | Ω  | N/A                |         |      |                       |
| SPDB                                 |                         | dB   | N/A                |         |      |                       |
| Aging                                |                         | ppm/year   |                    |         | ±3   | @1 <sup>st</sup> year |
| Insulation Resistance                |                         | MΩ   | 500                |         |      | @100VDC<br>± 15Vdc    |
| Others                               | Package                 | T  | Tape/Reel          |         |      |                       |
|                                      | RoHS Status             | LF   | RoHS III compliant |         |      |                       |
|                                      | Add Value               |  | N/A                |         |      |                       |
|                                      | Internal Control Code * |  | N/A                |         |      |                       |

Note: 1) Original Part Number: **TGS CM32 12M288A10-12-30-40-100 TLF**

2) \* Internal Control Code- 2 letter or digits; Blank: N/A

1/30/2023

**SMD CRYSTAL 3225 TYPE 4 PADS**
**RELIABILITY**

| Test Items                             | Test Method And Conditions  | Reference Documents                       |
|--|---|---|
| High Temperature High Humidity Storage | Temperature: 85°C±3°C<br>Relative Humidity:85%RH<br>Time: 96 Hours  | JIS C5023                                 |
| High Temperature Storage               | Temperature: 125°C±3°C<br>Time: 96 Hours.   | MIL-STD-883E<br>Method 1005.8             |
| Low Temperature Storage                | Temperature: -40°C±3°C<br>Time: 96 Hours.   | MIL-STD-883E<br>Method 1013               |
| Thermal Shock                          | Temperature 1: -55°C±5°C<br>Temperature 2: 85°C±5 °C<br>Temperature change between T1 and T2 5 min<br>10cycles maintain T1 and T2 for 30 minutes each cycle | MIL-STD-202F<br>Method 107<br>Condition A |
| Resistance to Solder Heat              | Solder Temperature: 260°C±5°C<br>Time: 10±1 Seconds   | MIL-STD-202F<br>Method 210E               |
| Solderability                          | The solder pot temperature is 245±5°C , dwell time 5±0.5sec   | J-STD-002B                                |
| Drop Test                              | 3 Times Free Fall from 50cm height table to 3cm thickness hard wood board   | J-STD-002B                                |
| Mechanical Shock                       | Half sine wave,1000 G<br>3 Times for all 3 directions(X,Y Z)  | MIL STD 202F<br>Method 213B               |
| Vibration                              | Frequency Range: 10Hz ~ 55Hz<br>Amplitude: 0.75mm<br>2 Hours in each direction, total 6 Hours   | MIL-STD-883E<br>Method 2007.3             |
| Leakage Test                           | Take measurements with a helium Leakage detector<br>Leakage Rate≤1×10 <sup>-3</sup> Pa cm <sup>3</sup> /s   | MIL-STD-883E                              |

**SUGGESTED REFLOW PROFILE (For Reference Only)**

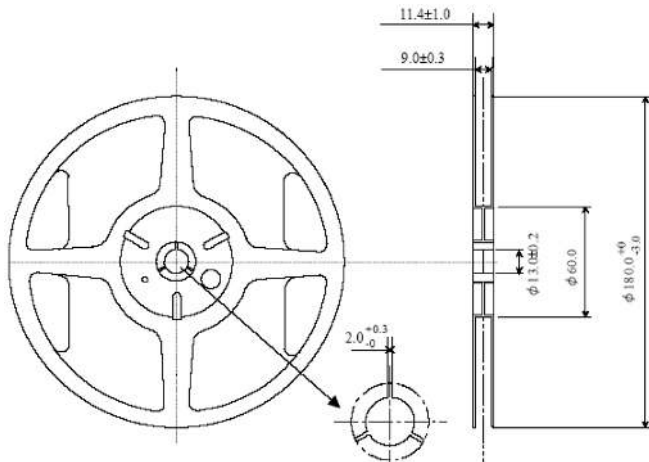
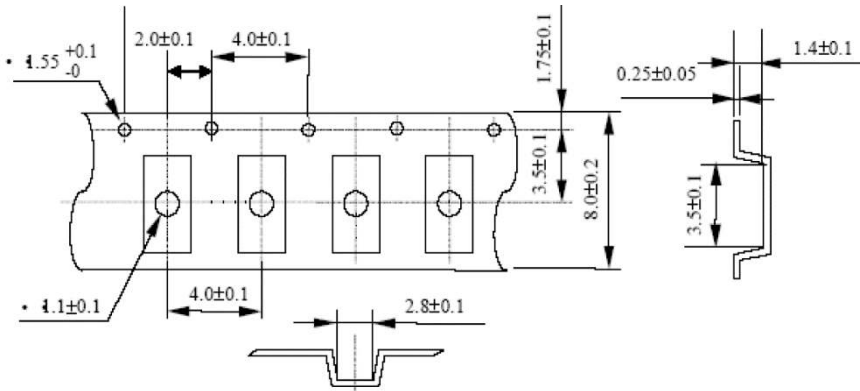
Total time: 200 Sec. Max. Solder melting point: 220°C



|  |                                  |                   |
|--|----------------------------------|-------------------|
| <b>Profile Feature</b>                                 |                                  | Pb-Free Assembly  |
| <b>Average Ramp-up Rate (Ts Max to Tp)</b>             |                                  | 3°C/second Max    |
| <b>Preheat</b>   | <b>Temperature Min (Ts Min.)</b> | 125°C             |
|  | <b>Temperature Max (Ts Max.)</b> | 200°C             |
|  | <b>Time (ts Min. to ts Max.)</b> | 60 ~ 180 seconds  |
| <b>Time maintained above</b>                           | <b>Temperature (Tl)</b>          | 217°C             |
|  | <b>Time (tl)</b>                 | 60 ~ 150 seconds  |
| <b>Peak/Classification Temperature (Tp)</b>            |                                  | 260 °C            |
| <b>Time within 5°C of actual Peak Temperature (tp)</b> |                                  | 20 ~ 40 seconds   |
| <b>Ramp-down rate</b>                                  |                                  | 6 °C /Second Max. |
| <b>Time 25 °C to Peak Temperature</b>                  |                                  | 8 minutes Max.    |
| <b>Suggest reflow times</b>                            |                                  | 3 Times Max.      |

**TAPE/REEL (Unit: mm)**

All Devices are packed in accordance with EIA standard RS-481-2 and specifications., 3000pcs/Reel



**DISCLAIMER**

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1/30/2023