




**SPECIFICATION SHEET**

<b>SPECIFICATION SHEET NO.</b>	P0125- XF13M82400S002
<b>DATE</b>	Jan. 25, 2022
<b>REVISION</b>	A0
<b>DESCRIPTION</b>	SMD Crystal, Seam Seal, 3225 Type, 4 pads, 13.82400MHz, +/-10ppm, CL 12pF, Stability +/-30ppm @Operating Temp. Range -40°C ~+85°C, ESR 60 ohm Max, Tape/Reel, Reflow Profile Condition 260 °C Max. 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 13M824A10-12-30-40-60TLF
<b>PART CODE</b>	XF13M82400S002

<b>VENDOR APPROVE</b>			
Issued/Checked/Approved			
DATE: Jan. 25, 2022			

<b>CUSTOMER APPROVE</b>	
DATE:	

1/25/2022

**SMD CRYSTAL 3225 TYPE 4 PADS**

**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	13M82400	S	002
1	2	3	4

- 1) XF: Part family Code for SMD Crystal, Seam Seal, L3.2\*W2.5\*H0.7mm, 4 pads (CM32)
- 2) 13M82400: Frequency range code for 13.82400MHz
- 3) S: SMD type, Package Tape/Reel, 3000pcs/Reel
- 4) 002: Specification code for original part No.: **TGS CM32 13M824A10-12-30-40-60TLF**

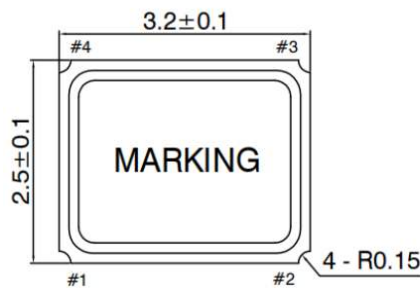
**SMD CRYSTAL 3225 TYPE 4 PADS**

**DIMENSION (Unit: mm)**

Image for reference

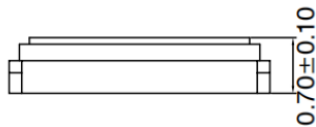


CM32



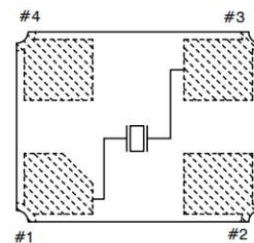
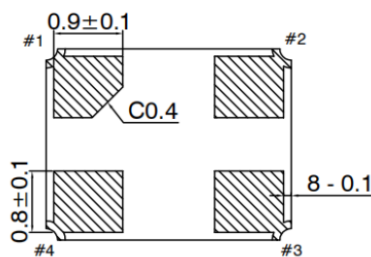
**Marking**

Line 1: Frequency Range  
Line 2: Internal Control Code

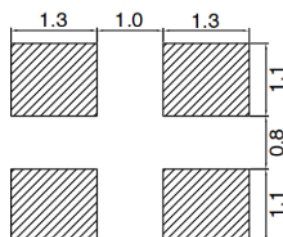


**Connection**

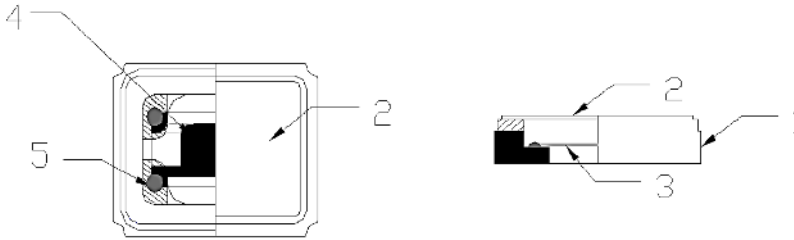
- #1 Crystal
- #2 Ground
- #3 Crystal
- #4 Ground



**Recommend Pad Layout**

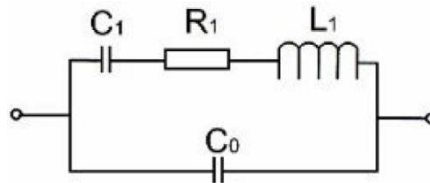


**STRUCTURE**



No.	Components	Material
1	Base	Ceramic (Al2O3)
2	Cover	KV (Fe/Co/Ni)
3	Blank	Sio2
4	Electrode	Noble Metal Ag)
5	Adhesive	Resin. Ag

**EQUIVALENT CIRCUIT**



**NOTES BEFORE USE**

**Ultrasonic Cleaning:**

General cleaning solutions or ultrasonic cleaning method may be used to clean our products. However, under certain circumstances, ultrasonic cleaning machine could generate resonance at the oscillation frequency of our products and thus deteriorate the electrical characteristics in device and even damage the overall structure of device. Therefore, verification test is recommended before cleaning.

**Ultrasonic Welding**

Avoid mounting and processing by Ultrasonic welding this method has a possibility of an excessive vibration spreading inside the crystal products and become the cause of characteristic deterioration and not oscillating.

**Storage Temperature Description**

Storage Temperature is only for the product itself, the temperature for the packing material is 5~40°C

**Recommended Conditions for Manual Welding** Max. Temperature: 350±10°C, Time: 3 sec Max., Re-solder time: twice Max.

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

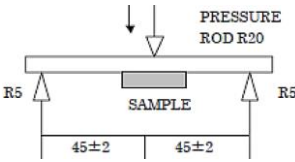
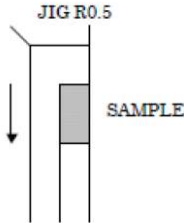
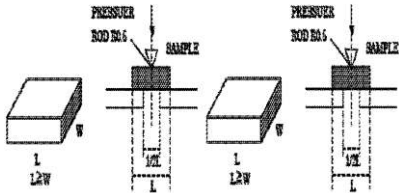
Parameter	Part No. Symbol	Units	Value			Condition
			Min.	Typical	Max.	
<b>Original Manufacturer (Note 1)</b>	TGS	TGS Crystals				
<b>Holder Type</b>	CM32	SMD Crystal, Seam Seal, L3.2*W2.5*H0.7mm, 4 pads				
<b>Frequency Range</b>	13M824	MHz	13.82400			
<b>Mode of Oscillation</b>	A		AT Fundamental			
<b>Frequency Tolerance</b>	10	ppm	-10		+10	@25°C
<b>Load Capacitance</b>	-12	pF	12			
<b>Stability over Operation Temperature</b>	-30	ppm	-30		+30	
<b>Operation Temperature</b>	-40	°C	-40		+85	
<b>Storage Temperature</b>		°C	-55		+125	
<b>Equivalent Series Resistance (ESR)</b>	-60	Ω			60	
<b>Drive Level</b>		μW			100	
<b>Shunt Capacitance (C0)</b>		pF	0		3.0	
<b>Motional Capacitance (C1)</b>		fF	N/A			
<b>DLD2</b>		Ω	N/A			
<b>FLD2</b>		ppm	N/A			
<b>RDL2</b>		Ω	N/A			
<b>SPDB</b>		dB	N/A			
<b>Aging</b>		ppm/year			±3	@1 <sup>st</sup> year
<b>Insulation Resistance</b>		MΩ	500			@100Vdc ± 15Vdc
<b>Others</b>	<b>Package</b>	T	Tape/Reel			
	<b>RoHS Status</b>	LF	RoHS III compliant			
	<b>Add Value</b>		N/A			
	<b>Special Code</b>		Internal Control Code- 2 letter or digits; Blank: N/A			

 Note: 1) Original Part Number: **TGS CM32 13M824A10-12-30-40-60TLF**

**RELIABILITY**

Test Items	Test Method And Conditions	Test Standard
<b>High Temperature</b>	Stored at 125± 2 °C for 720±12 Hours, The characteristic parameters of 250B must be tested in 24H after being static for more than 2 hours 25°C ± 2 °C, If customer's temperature requested is higher than the standard Temperature test must be done for customer requirements.	A, C
<b>Low Temperature Storage</b>	Temperature: -40°C ± 2°C Time: 500 ± 12 Hours. The characteristic parameters of 250B must be tested in 24H after being static for more than 2 hours 25°C ± 2 °C, If customer's temperature requested is higher than the standard Temperature test must be done for customer requirements.	A, C
<b>High Temperature &amp; Humidity</b>	Stored at 85°C ± 2°C and Humidity 85% for 500± 12 Hours. The characteristic parameters of 250B must be tested in 24H after being static for more than 2 hours 25°C ± 2 °C	A, C,D
<b>Temperature Shock</b>	The crystal unit shall be subjected to 100 successive change of temperature cycles. The characteristic parameters of 250B must be tested in 24H after being static for more than 2 hours 25°C ± 2 °C Temperature Range 1) -40+ 0/-6 °C. 30± 3 minutes 2) 25+/-2 °C. 2~3 minutes 3) -125+ 4/-0 °C. 30± 3 minutes 4) 25+/-2 °C. 2~3 minutes	A, C
<b>Solderability</b>	The solder pot temperature is 260±5°C , dwell time 2±0.6sec	G
<b>Drop Test</b>	Height: 100 cm; Dropped Cycle: 3 cycles	A, C
<b>Vibration</b>	Frequency Range: 10Hz ~ 55Hz Amplitude: 1.5mm±15%; Sweep time: 2~3 Minutes, 2 Hours in each direction, total 6 Hours	A, C
<b>Leakage Test</b>	Standard part of automatic gross leakage detector, test pressure: 0.2 mpa Helium Bombing 5.0 ~5.5 Kg/cm <sup>2</sup> ; for 2 hours	E, F

**RELIABILITY**

Test Items	Test Method And Conditions	Test Standard
<b>Terminal Strength</b>	Shall be pressurized at a speed of approx. 0.5mm/sec. in the direction indicated by the arrow unit the bending width reaches 3mm and held for 5 sec. 	A, C
<b>Sticking Tendency</b>	A R0.5 Jig shall be used to apply a 10N dead load in the direction indicated by the arrow to the element and retain it for 10 sec. 	A, C
<b>Element Assembly Strength</b>	A R0.5 Jig shall be used to apply a 10N dead load in the direction indicated by the arrow to the element and retain it for 10 sec. 	A, C

**TEST STANDARD**

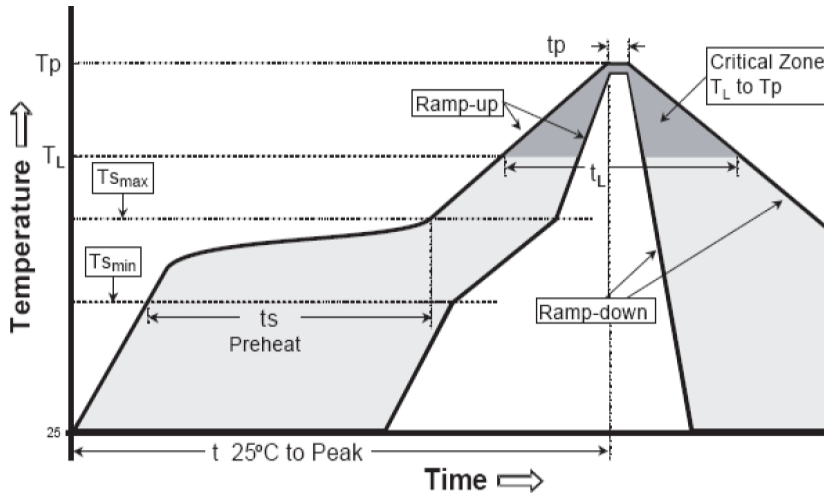
Test Standard Symbol	Specification	Value
A	Frequency Change permitted	$\Delta F \leq 5\text{ppm}$
B	Frequency Change permitted	$\Delta F \leq 10\text{ppm}$
C	Equivalent Series Resistance Change Permitted	$\Delta CI \leq 5K\Omega$ or 20%
D	Insulation Resistance	$>500 \text{ M}\Omega$
E, F	Leak Rate Less than	$<1*1 \text{ E-9 Pa} \cdot \text{m}^3/\text{sec.}$
G	A new uniform coating of solder shall cover a Min 95% of the crystal surface	

**RELIABILITY**

Test Items	Test Method And Conditions	Reference Documents
High Temperature High Humidity Storage	Temperature: 85°C±3°C Relative Humidity:85%RH Time: 96 Hours	JIS C5023
High Temperature Storage	Temperature: 125°C±3°C Time: 96 Hours.	MIL-STD-883E Method 1005.8
Low Temperature Storage	Temperature: -40°C±3°C Time: 96 Hours.	MIL-STD-883E Method 1013
Thermal Shock	Temperature 1: -55°C±5°C Temperature 2: 85°C±5 °C Temperature change between T1 and T2 5 min 10cycles maintain T1 and T2 for 30 minutes each cycle	MIL-STD-202F Method 107 Condition A
Resistance to Solder Heat	Solder Temperature: 260°C±5°C Time: 10±1 Seconds	MIL-STD-202F 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 3 Times for all 3 directions(X,Y Z)	MIL STD 202F Method 213B
Vibration	Frequency Range: 10Hz ~ 55Hz Amplitude: 0.75mm 2 Hours in each direction, total 6 Hours	MIL-STD-883E Method 2007.3
Leakage Test	Take measurements with a helium Leakage detector Leakage Rate≤1×10 <sup>-3</sup> Pa cm <sup>3</sup> /s	MIL-STD-883E



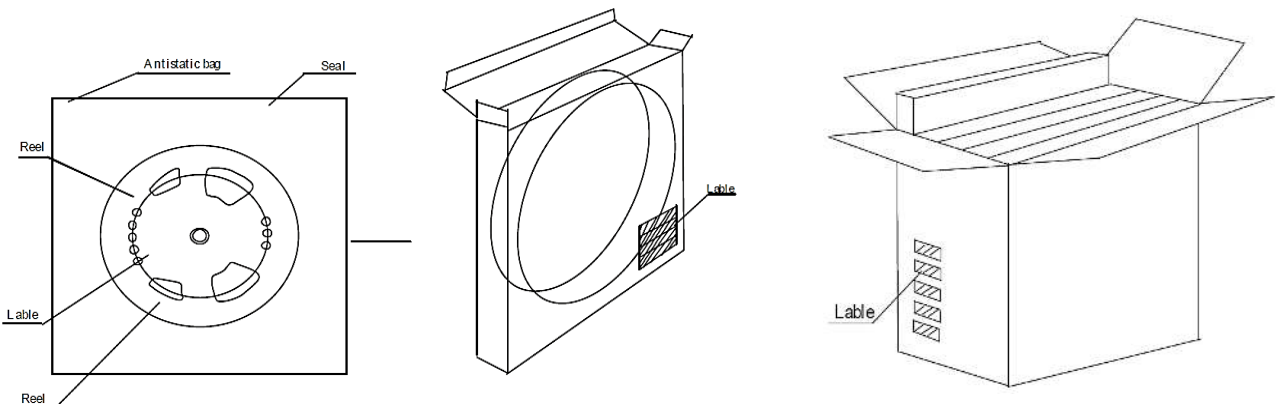
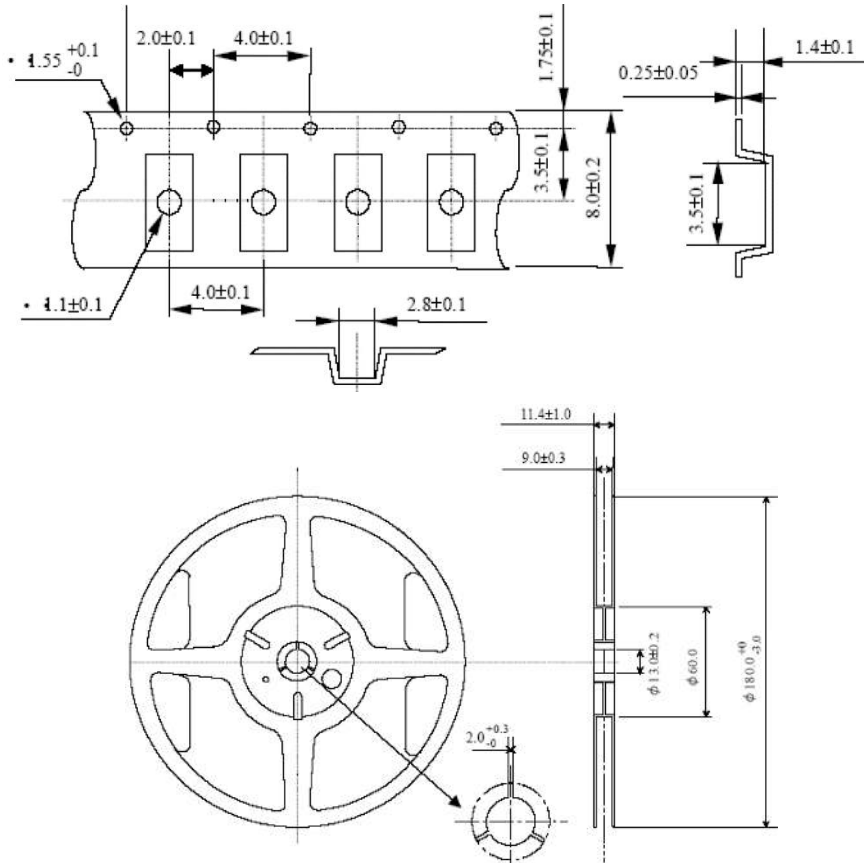
**SUGGESTED REFLOW PROFILE (For Reference Only)**



<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 ~ 120 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



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