




SPECIFICATION SHEET

| | | |
|---|--|-------------------------------|
| SPECIFICATION SHEET NO. | R0716-FM450K0000S115 | |
| DATE | July 16, 2024 | |
| REVISION | A2 | Updated With Most Recent Data |
| DESCRIPTION AND MAIN PARAMETRICS | <p>SMD Ceramic Filter 12065 Type L12.0*W6.5*H3.0mm 4 Pads FM Series 450KHz, Insertion Loss. 4.0dB Max.; 6dB Bandwidth: ± 6.0KHz Min.</p> <p>Group Delay Time (GDT) Ripple Deviation: 40μSec. Max. within f0 ± 4KHz</p> <p>Input/Output Impedance: 1500 ohm, Operating Temp. Range -20°C ~+85°C, Reflow Profile Condition 260 °C Max. Tape/Reel,</p> <p>RoHS/RoHS III compliant, RoHS Annex III lead Exemption (exempt per RoHS EU 2015/863)</p> | |
| CUSTOMER | | |
| CUSTOMER PART NO. | | |
| CROSS REF. PART NO. | | |
| ORIGINAL MFG/PART NO. | TGS/CFTC 450KFW TLH/LTWC450KFx | |
| PART CODE | FM450K0000S115 | |

| | | | |
|-------------------------|---|--|---|
| VENDOR APPROVE | | | |
| Issued/Checked/Approved |  |  |  |
| DATE: July 16, 2024 | | | |

| | |
|-------------------------|--|
| CUSTOMER APPROVE | |
| | |
| DATE: | |

7/16/2024

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

MAIN FEATURE

- KHz SMD Ceramic Filter 12065 Type 4 pads
- White case L12.0*W6.5*H3.0mm
- Group Delay Time (GDT)
- Cross More Competitors Part CFWKG Series
- RoHS/RoHS III compliant, RoHS Annex III lead Exemption (exempt per RoHS EU 2015/863)



APPLICATION

- Communication Electronics

HOW TO ORDER

- Please follow up Part Code Guide and Indicate Part Code When You Order Or RFQ.

RFQ
Request For Quotation

PART CODE GUIDE

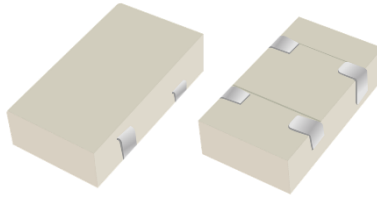
| | | | |
|----|----------|---|-----|
| FM | 450K0000 | S | 115 |
| 1 | 2 | 3 | 4 |

1. FM: Part family Code for KHz SMD Ceramic Filter 12065 Type L12.0*W6.5*H3.0mm 4 Pads
2. 450K0000: Frequency Range Code For 450KHz
3. S: SMD type, Package Tape/Reel, 1000pcs/Reel
4. 115: Internal Control Code and Special Parameters Code Letter A~Z, a~z or digits (0-9)

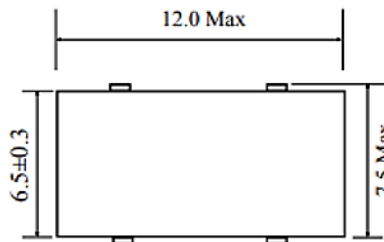
KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

DIMENSION (Unit: mm)

Image for reference



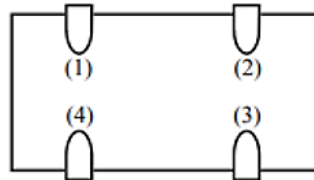
Top View



Marking

Line 1: Series Code
Line 2: Frequency Range
+Internal Code

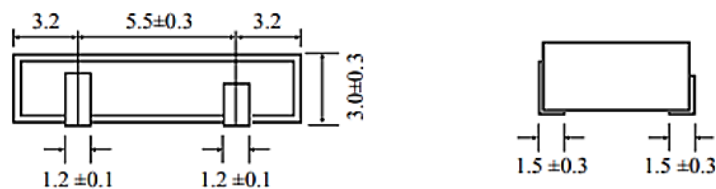
Bottom View



Connection

Pad (1): Input
Pad (2): Output
Pad (3): Ground
Pad (4): Ground

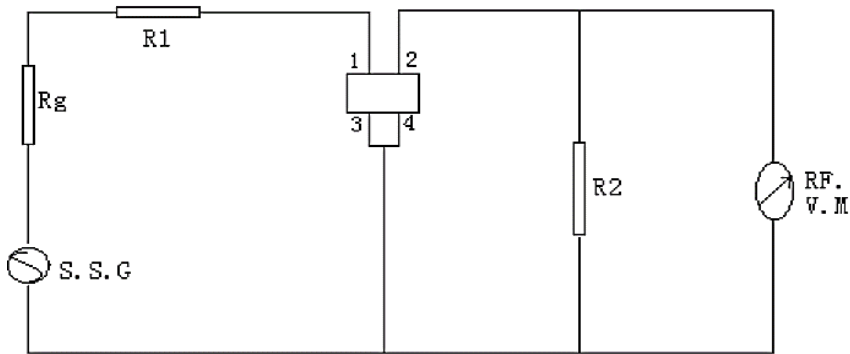
Side View



KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

MEASUREMENT

- Measurement shall be carried out at the standard temperature of 25±2°C. If no specific requirements, Test can be carried out under 5-35°C.
- Measuring Circuit



$R_g + R_1 = R_2 = \text{Output/input Impedance}$

GENERAL ELECTRICAL PARAMETERS

| PARAMETER | UNITS | VALUE | | | CONDITION |
|-----------------------|-------|-------|---------|------|------------------|
| | | MIN. | TYPICAL | MAX. | |
| Operation Temperature | °C | -20 | | +85 | |
| Storage Temperature | °C | -40 | | +85 | |
| Temperature Stability | % | | | ±0.5 | @ -20°C ~+85°C |
| Insulation Resistance | MΩ | 100 | | | @DC 25V 1 minute |

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ELECTRICAL PARAMETERS – FOR DIFFERENT PART CODE

| Part Code | Center Freq.(f0) (Center of 6dB Bandwidth) | 3dB Bandwidth | 6dB Bandwidth | 50dB Bandwidth | Stop Band Attenuation |
|-----------------------|--|------------------|------------------|-------------------|--------------------------------|
| | KHz | KHz | KHz | KHz | dB |
| FM450K0000S111 | 450±1.0 | ±11.5 Min. | ±13.0 Min. | ±30.0 Min. | 45 Min. (within f0± 100KHz) |
| FM450K0000S112 | 450±1.0 | ±10.0 Min. | ±12.0 Min. | ±30.0 Min. | 45 Min. (within f0± 100KHz) |
| FM450K0000S113 | 450±1.0 | ±7.0 Min. | ±10.0 Min. | ±25.0 Min. | 45 Min. (within f0± 100KHz) |
| FM450K0000S114 | 450±1.0 | ±5.0 Min. | ±7.5 Min. | ±20.0 Min. | 45 Min. (within f0± 100KHz) |
| FM450K0000S115 | 450±1.0 | ±4.0 Min. | ±6.0 Min. | ±17.5 Min. | 45 Min. (within f0± 100KHz) |
| FM450K0000S116 | 450±1.0 | ±3.0 Min. | ±4.5 Min. | ±15.0 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S111 | 455±1.0 | ±11.5 Min. | ±15.0 Min. | ±35.0 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S112 | 455±1.0 | ±10.0 Min. | ±12.0 Min. | ±30.0 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S113 | 455±1.0 | ±7.0 Min. | ±10.0 Min. | ±25.0 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S114 | 455±1.0 | ±5.0 Min. | ±7.5 Min. | ±20.0 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S115 | 455±1.0 | ±4.0 Min. | ±6.0 Min. | ±17.5 Min. | 45 Min. (within f0± 100KHz) |
| FM455K0000S116 | 455±1.0 | ±3.0 Min. | ±4.5 Min. | ±15.0 Min. | 45 Min. (within f0± 100KHz) |

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES
ELECTRICAL PARAMETERS – FOR DIFFERENT PART CODE

| Part Code | Ripple | Insertion Loss @ Min. Loss Point | Spurious Response (0.1~1MHz) | GDT Ripple Deviation | Input/ Output Impedance |
|-----------------------|-------------------------------|-------------------------------------|---------------------------------|------------------------------|----------------------------|
| | dB | dB | dB | µsec. | Ω |
| FM450K0000S111 | 1.0 Max. (within f0±10KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±10KHz) | 1000 |
| FM450K0000S112 | 1.0 Max. (within f0±8KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±8KHz) | 1000 |
| FM450K0000S113 | 1.0 Max. (within f0±7KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±7KHz) | 1500 |
| FM450K0000S114 | 1.0 Max. (within f0±5KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±5KHz) | 1500 |
| FM450K0000S115 | 1.0 Max. (within f0±4KHz) | 4.0 Max. | 20 Min. | 40 Max. (within fo±4KHz) | 1500 |
| FM450K0000S116 | 1.0 Max. (within f0±3KHz) | 4.0 Max. | 20 Min. | 40 Max. (within fo±3KHz) | 1500 |
| FM455K0000S111 | 1.0 Max. (within f0±10KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±10KHz) | 1000 |
| FM455K0000S112 | 1.0 Max. (within f0±8KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±8KHz) | 1000 |
| FM455K0000S113 | 1.0 Max. (within f0±7KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±7KHz) | 1500 |
| FM455K0000S114 | 1.0 Max. (within f0±5KHz) | 4.0 Max. | 20 Min. | 30 Max. (within fo±5KHz) | 1500 |
| FM455K0000S115 | 1.0 Max. (within f0±4KHz) | 4.0 Max. | 20 Min. | 40 Max. (within fo±4KHz) | 1500 |
| FM455K0000S116 | 1.0 Max. (within f0±3KHz) | 4.0 Max. | 20 Min. | 40 Max. (within fo±3KHz) | 1500 |

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

PHYSICAL CHARACTERISTICS

| TEST ITEMS | MEASUREMENT CONDITION | REQUIREMENT |
|------------------------|---|---|
| Random Drop | Filter shall be measured after 3 times random drops from the height of 30cm on concrete floor | No visible damage and it meet Table at Page 4/5/6 |
| Vibration | Filter shall be measured after being applied vibration of amplitude of 1.5mm with 10-55Hz band of vibration frequency to each of 3 perpendicular directions for 2 hours | No damage and it meet Table at Page 4/5/6 |
| Solderability | Lead terminals are immersed in aide solder for 5 sec and then immersed in soldering bath of 230±5°C, for 3±0.5 sec. | At least 95% lead terminals shall be covered with solder. |
| Substrate Bending Test | Apply pressure in the direction of arrow at a rate of about 0.5mm per second until it reaches a bend of 3mm and hold for 30s. | No damage, no cut-off and it meet Table at Page 4/5/6 |
| Adhesion | A static load of 20N to the direction of the arrow shall be applied on the core of the component and hold for 10 seconds. Filter shall be soldered correctly and tightly to PCB. | No damage, no cut-off and it meet Table at Page 4/5/6 |
| Reflow Soldering | Put on the solder paste on the printed wiring board the samples shall be mounted and soldered under the condition, then it shall be subjected to the room atmosphere for 24 hours prior to the measurement. | No damage, no cut-off and it meet Table at Page 4/5/6 |

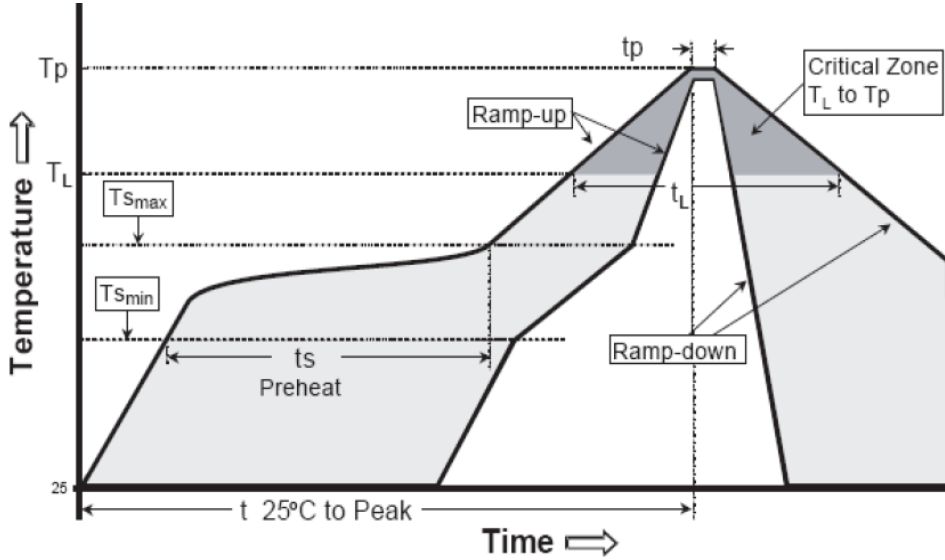
KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

ENVIRONMENTAL CHARACTERISTICS

| TEST ITEMS | MEASUREMENT CONDITION | REQUIREMENT |
|---------------------------|---|-----------------------------------|
| Humidity | After being placed in a chamber with 90-95% R.H. at 40±2°C for 100 hours and then being placed in room temperature for 1 hour, filter shall be measured. | It shall meet Table at Page 4/5/6 |
| Resistance to Solder Heat | After being placed in a chamber with 80±2°C, for 100 hours and then being placed in room temperature for 1 hour, filter shall be measured. | It shall meet Table at Page 4/5/6 |
| High Temperature | After being placed in a chamber with 80±2°C, for 100 hours and then being placed in room temperature for 1 hour, filter shall be measured. | It shall meet Table at Page 4/5/6 |
| Low Temperature | After being placed in a chamber with -20±2°C, for 100 hours and then being placed in room temperature for 1 hour, filter shall be measured. | It shall meet Table at Page 4/5/6 |
| Heat Shock | After being kept at room temperature, filter shall be placed at temperature of -55 °C, for 30 minutes, then be placed at temperature. 85°C, for 30 minutes. After that returned to -55°C again. Repeated above cycle for 5 times. After being kept in room temp. for 1 hour, filter shall be measured | It shall meet Table at Page 4/5/6 |

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

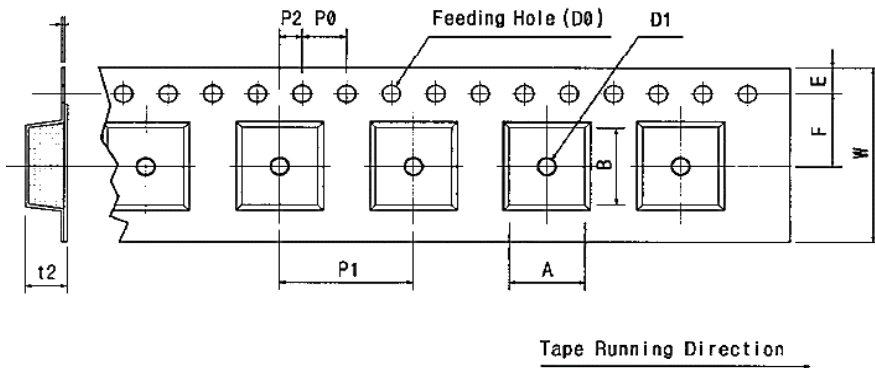
SUGGESTED REFLOW PROFILE (For Reference Only)



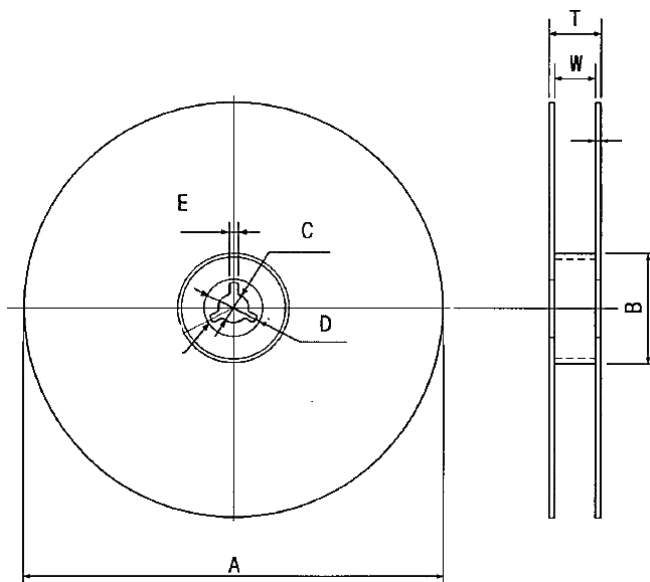
| PROFILE FEATURE | | PB-FREE ASSEMBLY |
|---|---------------------------|-------------------|
| Average Ramp-up Rate (Ts Max to Tp) | | 3°C/second Max |
| Preheat | Temperature Min (Ts Min.) | 125°C |
| | Temperature Max (Ts Max.) | 200°C |
| | Time (ts Min. to ts Max.) | 60~180 seconds |
| Time maintained above | Temperature (Tl) | 217°C |
| | Time (tl) | 60~150 seconds |
| Peak/Classification Temperature (Tp) | | 260 °C |
| Time within 5°C of actual Peak Temperature (tp) | | 20~40 seconds |
| Ramp-down rate | | 6 °C /Second Max. |
| Time 25 °C to Peak Temperature | | 8 minutes Max. |
| Suggest reflow times | | 2 Times Max. |

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

REEL AND TAPE DIMENSION (Unit: mm, 1000pcs/Reel)



| Code | Dimension |
|------|-------------|
| W | 24.0+/-0.30 |
| F | 11.5+/-0.05 |
| E | 1.75+/-0.10 |
| P 0 | 4.00+/-0.10 |
| P 1 | 12.0+/-0.10 |
| P 2 | 2.00+/-0.05 |
| D 0 | Ø1.5+/-0.10 |
| D 1 | Ø1.0+/-0.25 |
| t 1 | 0.35+/-0.10 |
| t 2 | 3.20+/-0.10 |
| A | 7.70+/-0.10 |
| B | 12.0+/-0.10 |



| Code | Dimension |
|------|-------------|
| A | Ø180+/-1.0 |
| B | Ø60+/-0.5 |
| C | Ø13.0+/-0.5 |
| E | 2.00+/-0.5 |
| W | 17.0+/-1.0 |
| T | 19.4+/-0.3 |

KHZ SMD CERAMIC FILTER GDT TYPE FM SERIES

IMPORTANT NOTES AND DISCLAIMER

1. **ROHS COMPLIANCE:** The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained at Download Center.
2. **REACH COMPLIANCE:** REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained at Download Center.
3. All Product parametric performance is indicated in the Electrical Characteristics for the listed herein test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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