### Measurement condition

Ambient temperature $T_A$: 23 °C
Input power level: 0 dBm
Terminating impedance: *)
Source: 50 Ω
Load: 50 Ω

Input: 190 Ω || -2.14 pF
Output: 190 Ω || -2.14 pF

### Characteristics

Remark:
The reference level for the relative attenuation $a_{rel}$ of the TFS640A is the minimum of the passband attenuation $a_{min}$. The minimum of the passband attenuation $a_{min}$ is defined as the insertion loss $a_e$. The centre frequency $f_C$ is the arithmetic mean value of the upper and lower frequencies at the 3 dB filter attenuation level relative to the insertion loss $a_e$. The nominal frequency $f_N$ is fixed at 640 MHz without any tolerance. The given values for both the relative attenuation $a_{rel}$ and the group delay ripple have to be achieved at the frequencies given below even if the centre frequency $f_C$ is shifted due to the temperature coefficient of frequency $TC_f$ in the operating temperature range and due to a production tolerance for the centre frequency $f_C$.

| **D a t a** | | **typ. value** | | **tolerance / limit** | | |
|---|---|---|---|---|---|---|
| **Insertion loss** | $a_e$ | 3.5 | dB | max. | 6 | dB |
| **Nominal frequency** | $f_N$ | - | | | 640 | MHz |
| **Centre frequency** | $f_C$ | 640 | MHz | | | |
| **Passband** | PB | - | | $f_N$ ± | 37.5 | kHz |
| **Passband ripple** | p-p | 0.5 | dB | max. | 2 | dB |
| **Relative attenuation** | $a_{rel}$ | | | | | |
| $f_N$ ± 1.4 MHz ... $f_N$ ± 5 MHz | | 16 | dB | min. | 6 | dB |
| $f_N$ ± 5 MHz ... $f_N$ ± 20 MHz | | 24 | dB | min. | 12 | dB |
| $f_N$ + 20 MHz ... $f_N$ + 180 MHz | | 38 | dB | min. | 30 | dB |
| $f_N$ - 20 MHz ... $f_N$ - 590 MHz | | 40 | dB | min. | 30 | dB |
| **Group delay ripple within PB** | | 15 | ns | max. | 100 | ns |
| **Input power level** | | - | | max. | 18 | dBm |
| **Operating temperature range** | OTR | - | | -40 °C ... +91 °C | | |
| **Storage temperature range** | | - | | -55 °C ... +125 °C | | |
| **Frequency inversion temperature** | $T_0$ | 39 | °C | | - | |
| **Temperature coefficient of frequency** | $TC_f$ **) | 0.045 | ppm/K$^2$ | | - | |

*) The terminating impedances depend on parasitics and q-values of matching elements and the board used, and are to be understood as reference values only. Should there be additional questions do not hesitate to ask for an application note or contact our design team.
**) $\Delta f = TC_f(T - T_0)^2 f_N$

**Generated:**

**Checked / Approved:**

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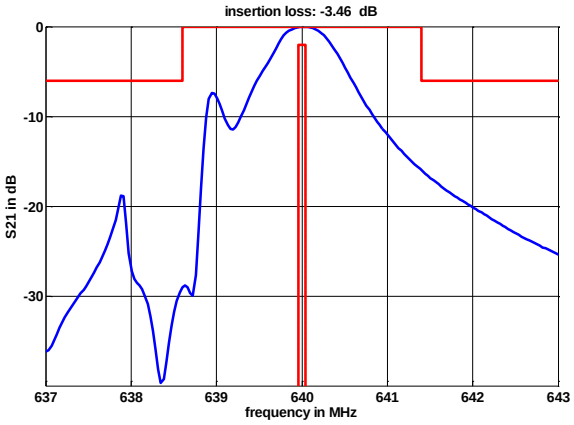
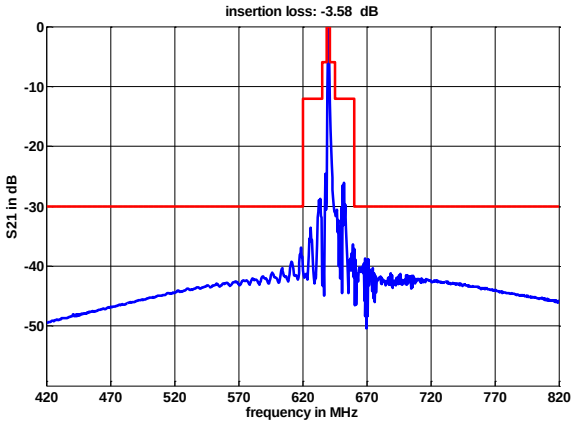
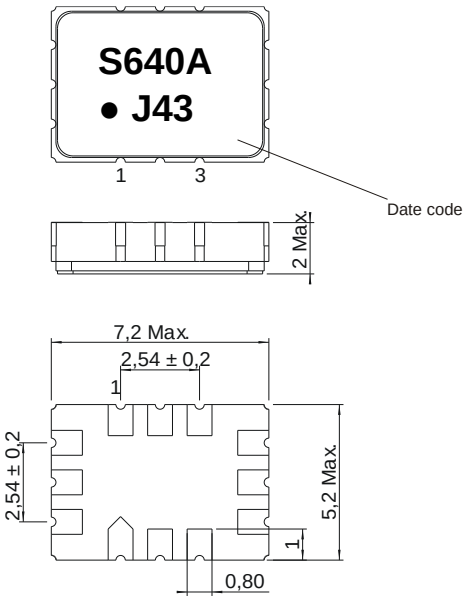
## Filter characteristic




## Construction and pin connection

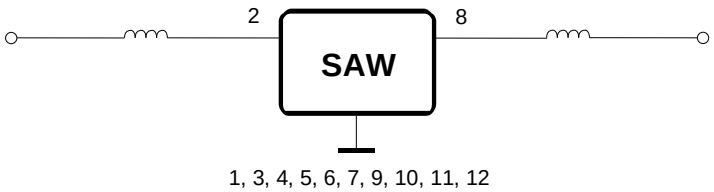
(All dimensions in mm)




| | |
|---|---|
| 1 | Ground |
| 2 | Input |
| 3 | Ground |
| 4 | Ground |
| 5 | Ground |
| 6 | Ground |
| 7 | Ground |
| 8 | Output |
| 9 | Ground |
| 10 | Ground |
| 11 | Ground |
| 12 | Ground |

| Date code: | Year + week |
|---|---|
| J | 2017 |
| K | 2018 |
| L | 2019 |
| ... | |

## 50 Ω Test circuit

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### Stability characteristics, reliability

After the following tests the filter shall meet the whole specification:

1. Shock: 500g, 1 ms, half sine wave, 3 shocks each plane;
   DIN IEC 68 T2 - 27

2. Vibration: 10 Hz to 2000 Hz, 0.35 mm or 5 g respectively, 1 octave per min, 10 cycles per plane, 3 planes; DIN IEC 68 T2 - 6

3. Change of temperature: -55 °C to 125°C / 15 min. each / 100 cycles
   DIN IEC 68 part 2 – 14 Test N

4. Resistance to solder heat (reflow): reflow possible: three times max.;
   for temperature conditions, see page 4: "Air reflow temperature conditions"

5. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

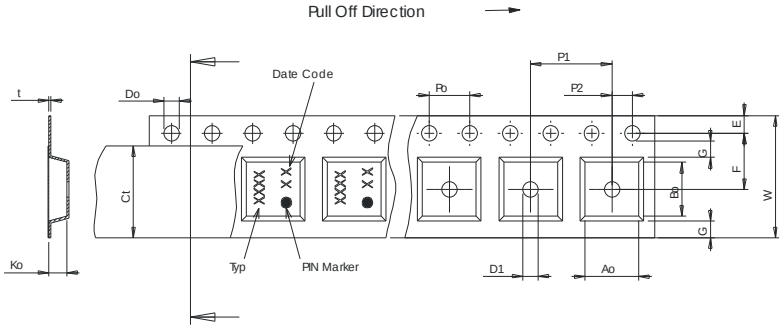
| ESD SIMULATION MODEL | CLASSIFICATION LEVEL | CRITERIA |
|---|---|---|
| Human Body Model (HBM) acc. to ANSI/ESDA/JEDEC JS-001-2014 | Class 1A | 1 positive + 1 negative pulse 125 … 250 Volts |

This filter is RoHS compliant (2011/65/EU)

### Packing

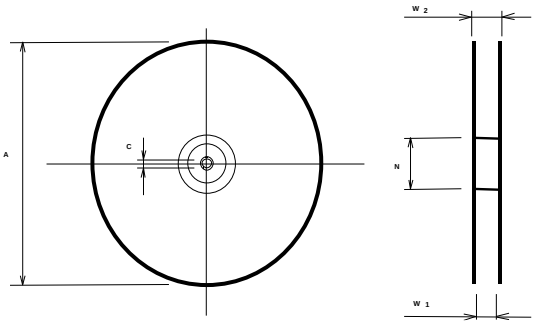
Tape & Reel: IEC 286 – 3, with exception of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

| | |
|---|---|
| reel of empty components at start: | min. 300 mm |
| reel of empty components at start including leader: | min. 500 mm |
| trailer: | min. 300 mm |




**Tape (all dimensions in mm)**

| | | |
|---|---|---|
| W | : | 16.00 ± 0.3 |
| Po | : | 4.00 ± 0.1 |
| Do | : | 1.50 + 0.1/-0 |
| E | : | 1.75 ± 0.1 |
| F | : | 7.50 ± 0.1 |
| G(min) | : | 0.6 |
| P2 | : | 2.00 ± 0.1 |
| P1 | : | 8.00 ± 0.1 |
| D1(min) | : | 1.50 |
| Ao | : | 5.50 ± 0.1 |
| Bo | : | 7.50 ± 0.1 |
| Ct | : | 13.5 ± 0.1 |




**Reel (all dimensions in mm)**

| | | |
|---|---|---|
| A | : | 330 or 180 |
| W1 | : | 16.4 +2/-0 |
| W2(max) | : | 22.4 |
| N(min) | : | 50 |
| C | : | 13.0 +0.5/-0.2 |

The minimum bending radius is 45 mm.

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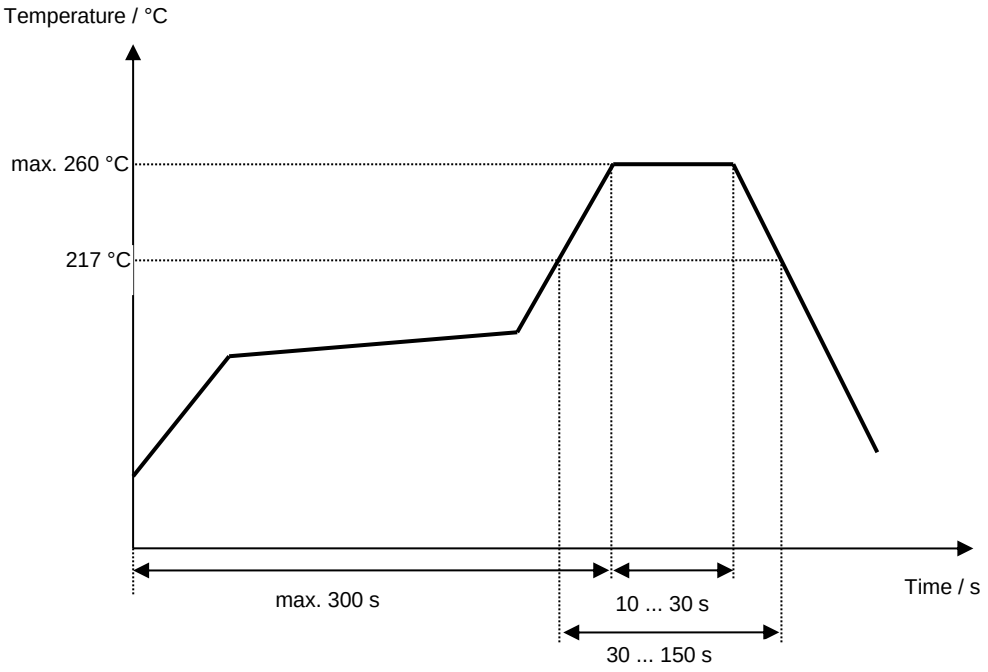
### Air reflow temperature conditions

| **Conditions** | **Exposure** |
|---|---|
| Average ramp-up rate (30 °C to 217 °C) | less than 3 °C / second |
| > 100 °C | between 300 and 600 seconds |
| > 150 °C | between 240 and 500 seconds |
| > 217 °C | between 30 and 150 seconds |
| Peak temperature | max. 260 °C |
| Time within 5 °C of actual peak temperature | between 10 and 30 seconds |
| Cool-down rate (Peak to 50 °C) | less than 6 °C / second |
| Time from 30 °C to Peak temperature | no greater than 300 seconds |

**Chip-mount air reflow profile**

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## History

| Version | Reason of Changes | Name | Date |
|---|---|---|---|
| 1.0 | - Generation of development specification | S. Channaa | 15.02.2010 |
| 1.1 | - Add typical values and filter characteristic<br>- Generation of filter specification | S. Channaa | 15.02.2010 |
| 2.0 | - Operating temperature range extended<br>- Storage temperature range extended<br>- Limits for passband ripple relaxed<br>- Update of typical values and filter characteristic<br>- Update of stability characteristics | A. Molke | 13.10.2015 |
| 2.1 | - Update storage temperature range<br>- Update formula for $\Delta f$ | P. Jaster | 21.09.2017 |
| 3.0 | - changed operating temperature range | P. Jaster | 23.10.2017 |

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