

**Microchip**

**Filter specification**

**TFS640A**

**1/5**

**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  $f_c$ .

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

\*) 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:**

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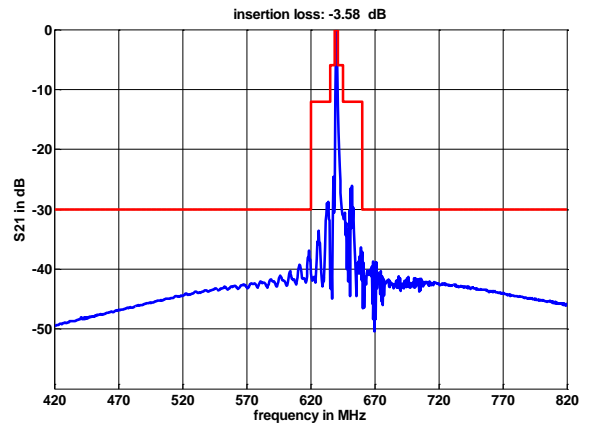
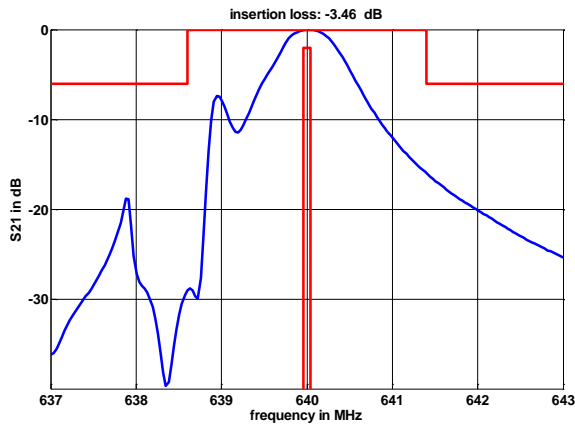
**Checked / Approved:**

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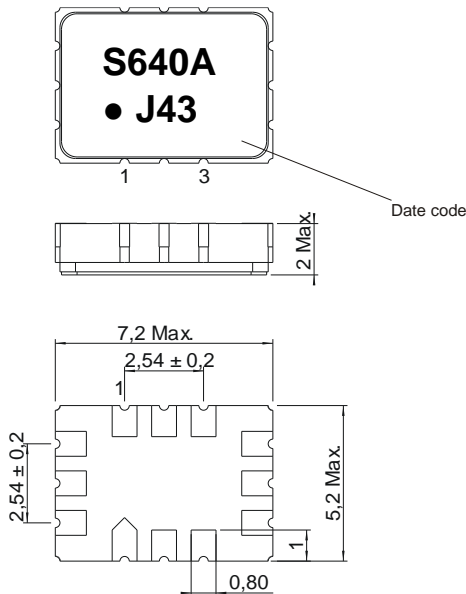
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**Filter characteristic**



**Construction and pin connection**

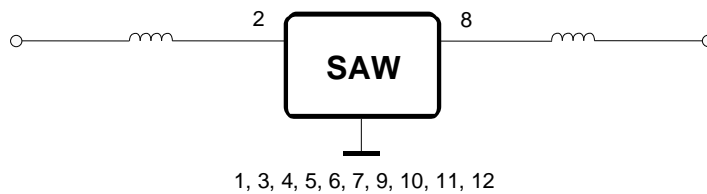
(All dimensions in mm)



- 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

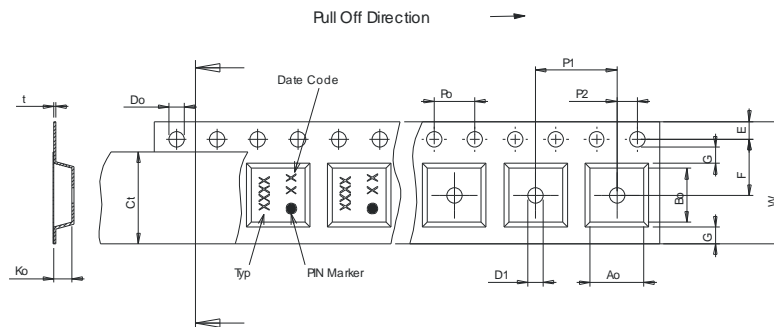
This filter is RoHS compliant (2011/65/EU)

**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

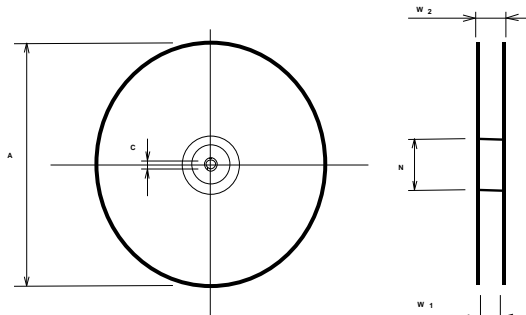
**Tape (all dimensions in mm)**

- 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**

<b>Conditions</b>	<b>Exposure</b>
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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**Microchip****Filter specification****TFS640A****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification	S. Channaa	15.02.2010
1.1	- Add typical values and filter characteristic - Generation of filter specification	S. Channaa	15.02.2010
2.0	- Operating temperature range extended - Storage temperature range extended - Limits for passband ripple relaxed - Update of typical values and filter characteristic - Update of stability characteristics	A. Molke	13.10.2015
2.1	- Update storage temperature range - 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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