

**Microchip**

**Filter specification**

**TFS 420K**

**Measurement condition**

Ambient temperature $T_A$ :	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	604 $\Omega$    -1.14 pF	
Output:	604 $\Omega$    -1.14 pF	
External Coil:	68 nH	

**Characteristics**

**Remark:**

The reference level for the relative attenuation  $a_{rel}$  of the TFS 420K is the minimum of the pass band attenuation  $a_{min}$ . The minimum of the pass band 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 420 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>Data</b>			<b>typ. value</b>		<b>tolerance / limit</b>	
<b>Insertion loss</b> (reference level)	$a_e$		3.9		max.	6.5 dB
<b>Nominal frequency</b>	$f_N$		-		420.0	MHz
<b>Centre frequency</b>	$f_c$		420.0		MHz	
<b>Passband</b>	PB		-		$f_N$	$\pm$ 77.0 kHz
<b>Bandwidth</b> 3 dB	BW		373		kHz	
<b>Relative attenuation</b>	$a_{rel}$					
$f_N$ - 100.0 MHz ... $f_N$ - 80.0 MHz			61	dB	min.	48 dB
$f_N$ - 80.0 MHz ... $f_N$ - 14.0 MHz			46	dB	min.	34 dB
$f_N$ - 14.0 MHz ... $f_N$ - 2.2 MHz			54	dB	min.	48 dB
$f_N$ - 2.2 MHz ... $f_N$ - 1.4 MHz			47	dB	min.	40 dB
$f_N \pm 1.0$ MHz ... $f_N \pm 1.4$ MHz			43	dB	min.	35 dB
$f_N + 1.4$ MHz ... $f_N + 1.8$ MHz			43	dB	min.	38 dB
$f_N + 1.8$ MHz ... $f_N + 3.0$ MHz			45	dB	min.	40 dB
$f_N + 3.0$ MHz ... $f_N + 6.0$ MHz			52	dB	min.	45 dB
$f_N + 6.0$ MHz ... $f_N + 100.0$ MHz			60	dB	min.	54 dB
<b>Group delay ripple within PB</b>			0.3	$\mu$ s	max.	2 $\mu$ s
<b>Input power</b>					max.	0 dBm
<b>Operating temperature range</b>	OTR		-		- 20 °C ... + 70°C	
<b>Storage temperature range</b>			-		- 55 °C ... + 125°C	
<b>Frequency inversion temperature</b>			30	°C	-	
<b>Temperature coefficient of frequency</b>	$TC_f$ **		-0.03	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.

\*\*)  $\Delta f = TC_f(T - T_0)^2 f_N$

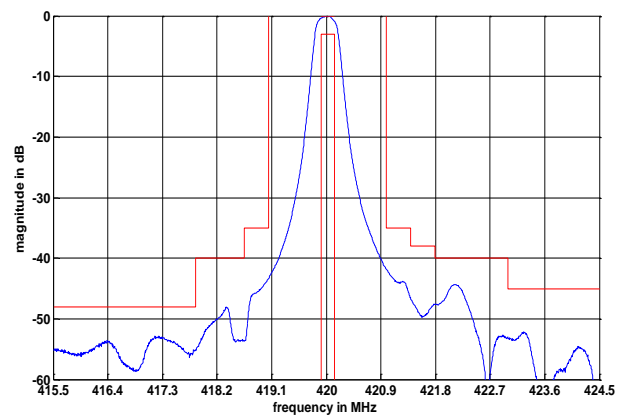
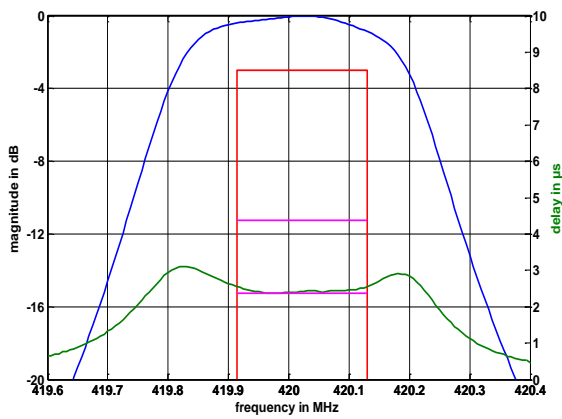
**Generated:**

**Checked / Approved:**

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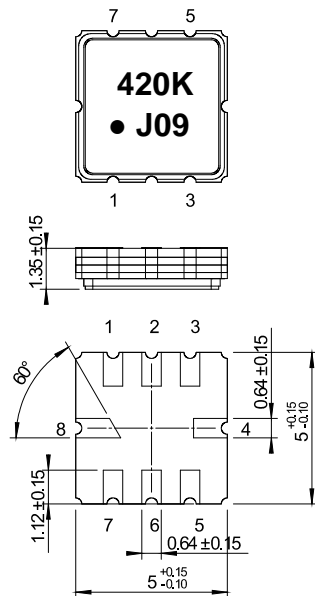
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**Filter characteristic**



**Construction and pin connection**

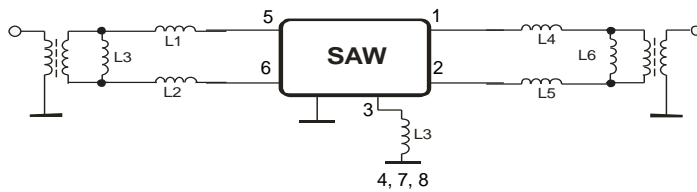
(All dimensions in mm)



- 1 Output
- 2 Output
- 3 External Coil
- 4 Ground
- 5 Input
- 6 Input
- 7 Ground
- 8 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: 500 g, 1 ms, half sine wave, 3 shocks each plane;  
DIN IEC 60068 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 60068 T2 - 6
3. Change of temperature: -55 °C to 125 °C / 15 min. each / 100 cycles  
DIN IEC 60068 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: three times max.;  
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;
5. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

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

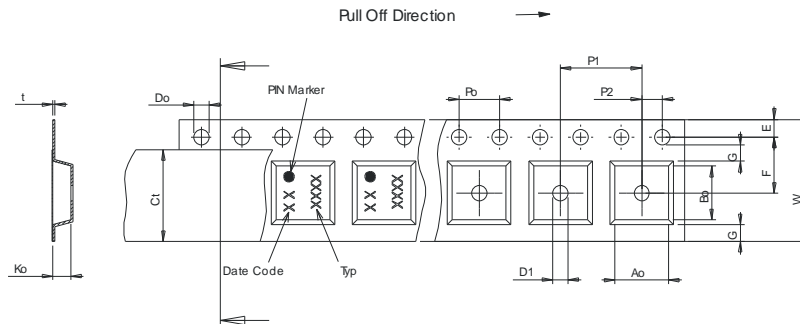
**Packing**

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;

max. pieces of filters per reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

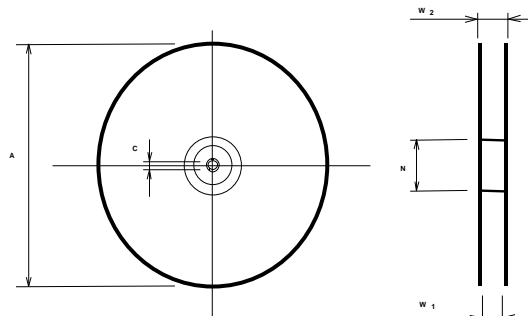
**Tape (all dimensions in mm)**

- W : 12.00 +0.3/-0.1
- Po : 4.00 ±0.1
- Do : 1.50 ±0.10
- E : 1.75 ±0.1
- F : 5.50
- G(min) : 0.75
- P2 : 2.00 ±0.1
- P1 : 8.00
- D1(min) : 1.50
- Ao : 5.30 ±0.1
- Bo : 5.30 ±0.1
- Ct : 9.2 ±0.1
- Ko : 2.10 ±0.1
- t : 0.30 ±0.05



**Reel (all dimensions in mm)**

- A : 330 or 180
- W1 : 12.4 +2/-0
- W2(max) : 18.40
- N(min) : 50.00
- C : 13.0



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****TFS 420K****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification.	Strehl	04.03.2008
1.1	- Generation of filter specification	Strehl	07.05.2008
2.0	- Change typo in measurement condition - Update data section - Update stability characteristics - Update frequency inversion temperature - Add maximum input power	Bonnen	03.03.2017

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