

**Microchip****Filter specification****TFS 156A****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	615 Ω    -1,25 pF	
Output:	615 Ω    -1,25 pF	

**Characteristics**

## Remark:

Reference level for the relative attenuation  $a_{rel}$  of the TFS156A 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 3dB filter attenuation level relative to the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed at 156,525 MHz without any tolerance. The given values for the relative attenuation  $a_{rel}$  have to be reached 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> (reference level)	$a_e$	2,6 dB -	max. 5 dB -
<b>Nominal frequency</b>	$f_N$	-	156,525 MHz
<b>Centre frequency</b>	$f_c$	156,538 MHz	-
<b>Relative attenuation</b>	$a_{rel}$		
$f_N \pm 25$ kHz		1,1 dB	max. 3 dB
$f_N \pm 125$ kHz ... $f_N \pm 450$ kHz		31 dB	min. 20 dB
@ $f_N \pm 450$ kHz		65 dB	min. 60 dB
<b>Operating temperature range</b>	OTR	-	-40 °C ... + 85 °C
<b>Storage temperature range</b>		-	-54 °C ... + 100 °C
<b>Frequency inversion temperature</b>		22 °C	-
<b>Temperature coefficient of frequency</b>	$TC_f$ **	-0,036 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.

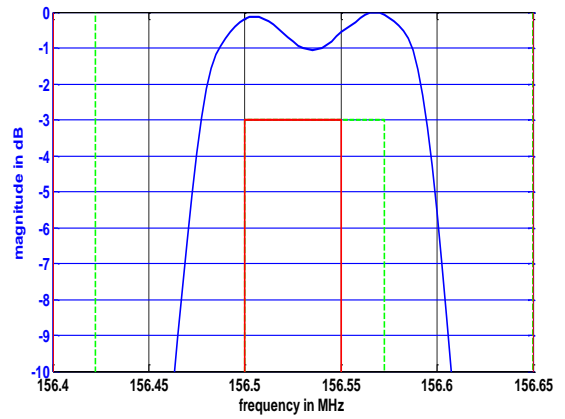
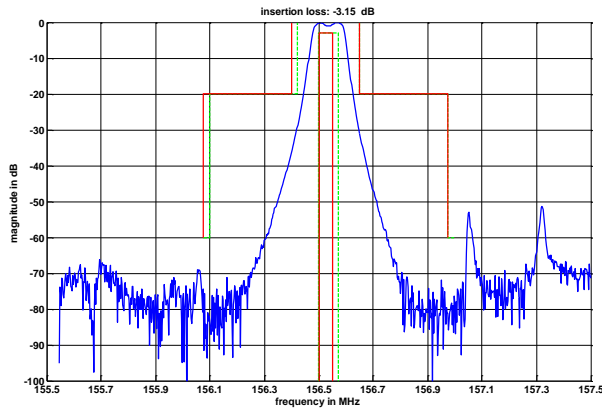
\*\*\*)  $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$ .

**Generated:****Checked / Approved:**

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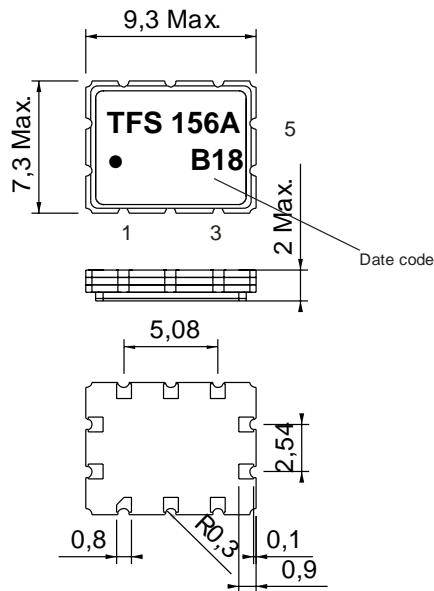
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**Filter characteristic**



**Construction and pin connection**

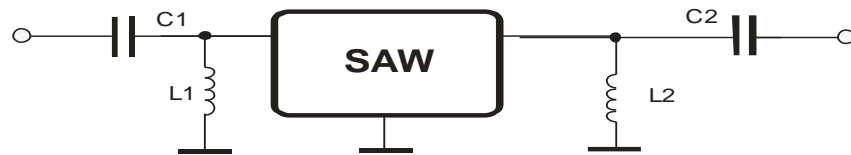
(All dimensions in mm)



1	Ground
2	Output
3	Ground
4	Ground
5	Ground
6	Ground
7	Input
8	Ground
9	Ground
10	Ground

Date code: Year + week  
 B 2011  
 C 2012  
 D 2013  
 ...

**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 500 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 / 30 min. each / 10 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. ESD ANSI/ESD S20.20-1999, class 1A for HBM

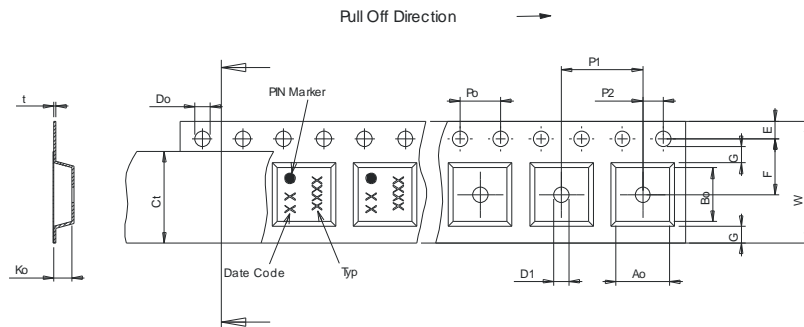
This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

**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:                    | 2000        |
| reel of empty components at start:                  | min. 300 mm |
| reel of empty components at start including leader: | min. 500 mm |
| trailer:  | min. 300 mm |

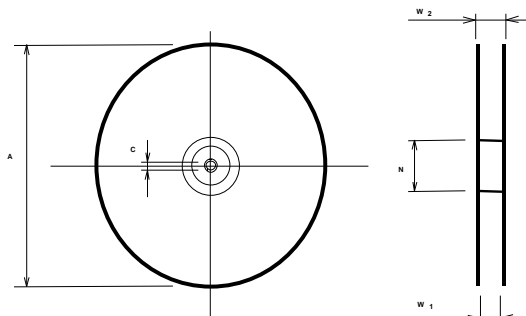
**Tape (all dimensions in mm)**

- W : 16,00 ± 0,3
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 7,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50
- Ao : 7,60 ± 0,10
- Bo : 9,60 ± 0,10
- Ct : 13,3



**Reel (all dimensions in mm)**

- A : 330
- W1 : 16,4
- W2(max) : 22,4
- N(min) : 50
- C : 13,0



The minimum bending radius is 45 mm.

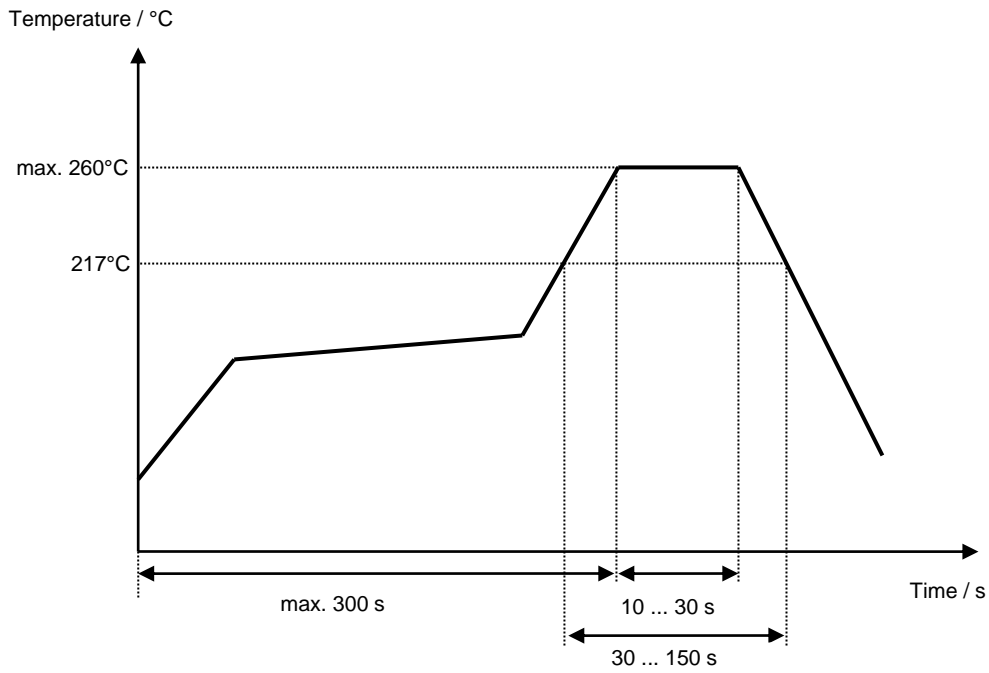
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**Air reflow temperature conditions**

<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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**History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	Generation of specification according to customer requirement specification.	Pfeiffer	22.06.2001
1.1	Correct frequency for 60 dB attenuation.	Dr Wall	25.06.2001
1.2	Change from development specification to filter specification. Add termination impedances. Add typical data. Correct pinning in matching network.	Dr. Wall	30.01.2002
1.3	Reworked specification according to new specification layout	Martens	29.4.2011