

Microchip**Filter specification****TFS 150AL****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	68 Ω	-17,4 pF
Output:	67 Ω	-17,4 pF

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 150AL 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 temperature coefficient of frequency TC_f is valid for both the reference frequency f_c and the frequency response of the filter in the operating temperature range. The frequency shift of the filter in the operating temperature range is not included in the production tolerance scheme.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	a_e	24	dB	max.	26,0	dB
Nominal frequency	f_N	-			150,0	MHz
Centre frequency at ambient temperature	f_c	150,0	MHz	±	0,1	MHz
Passband	PB			f_c	±	12,06 MHz
Pass band ripple	p-p	0,55	dB	max.	1,0	dB
Bandwidth	BW					
3	dB	25,07	MHz	min.	25,0	MHz
20	dB	25,80	MHz	max.	26,0	MHz
50	dB	26,34	MHz	max.	27,2	MHz
Relative attenuation	a_{rel}					
f_c	... f_c ±	12,06	MHz	0,55	dB	max. 1,0 dB
f_c ± 13,0	MHz ... f_c ±	13,6	MHz	23	dB	min. 20 dB
f_c ± 13,6	MHz ... f_c ±	17,6	MHz	55	dB	min. 50 dB
f_c ± 17,6	MHz ... f_c ±	50,0	MHz	57	dB	min. 53 dB
Group delay	mean value in PB	2,5	µs	max.	4	µs
Group delay ripple within PB		100	ns	max.	150	ns
Return loss within PB		12	dB	min.	8	dB
Operating temperature range	OTR	-			0 °C ... + 85 °C	
Storage temperature range		-			- 40 °C ... + 85 °C	
Temperature coefficient of frequency	TC_f **	-81	ppm/K		-	

*) The terminating impedances depend on parasites 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.

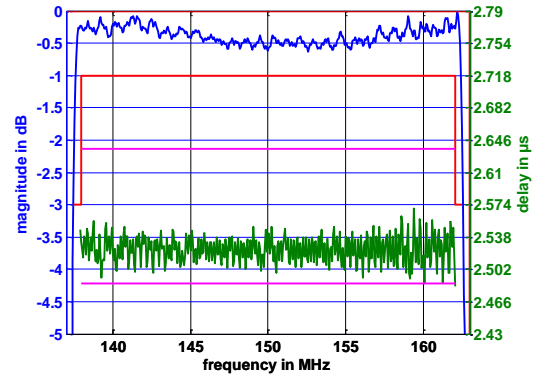
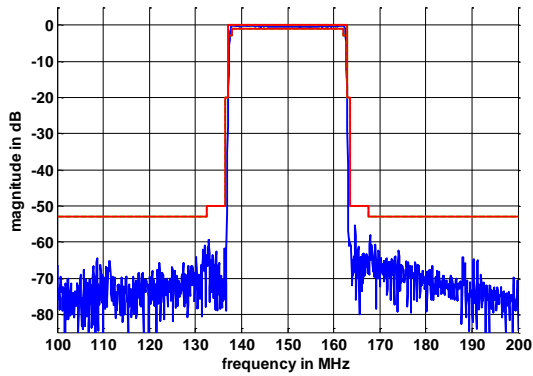
**) $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_0) \times f_{T0}(\text{MHz})$

Generated:**Checked / Approved:**

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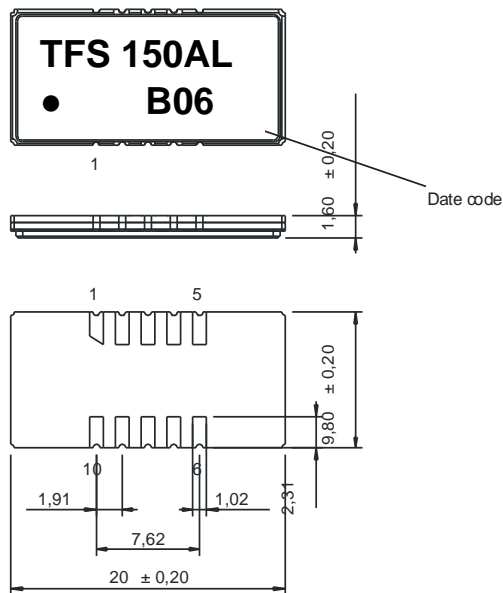
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Filter characteristic



Construction and pin connection

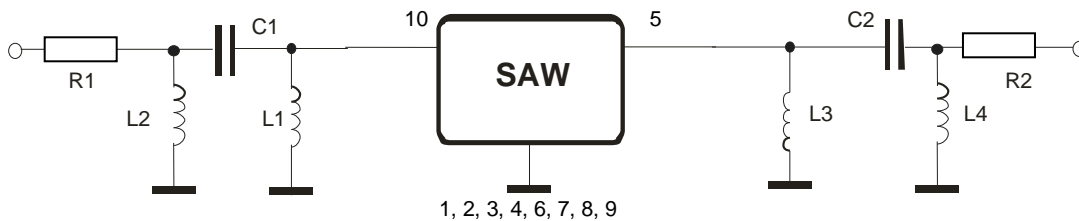
(All dimensions in mm)



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

Date code: Year + week
 X 2009
 A 2010
 B 2011
 ...

50 Ohm 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 plan, 3 plans;
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 refer to the attached "Air reflow temperature conditions" on page 4;

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

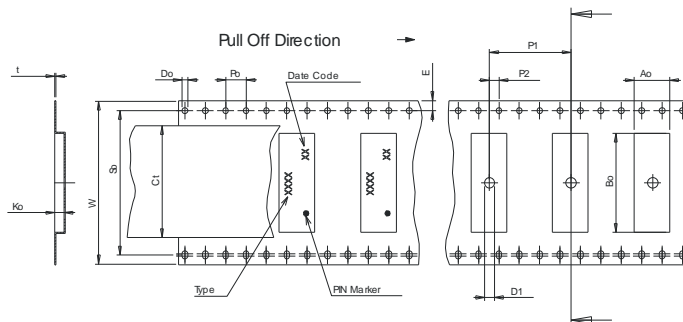
Packing

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

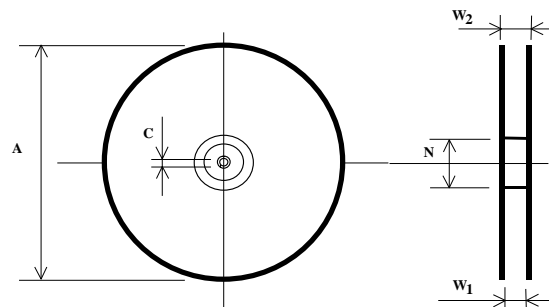
Tape (all dimensions in mm)

- W : 32,00
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,1
- F : 14,20 ± 0,1
- G(min) :
- P2 : 2,00 ± 0,1
- P1 : 16,00 ± 0,1
- D1(min) : 2,00
- Ao : 10,25 ± 0,1
- Bo : 20,45
- Ct : 25,5



Reel (all dimensions in mm)

- A : 330
- W1 : 32,4
- W2(max) : 38,4
- N(min) : 100
- C : 13,0



The minimum bending radius is 45 mm.

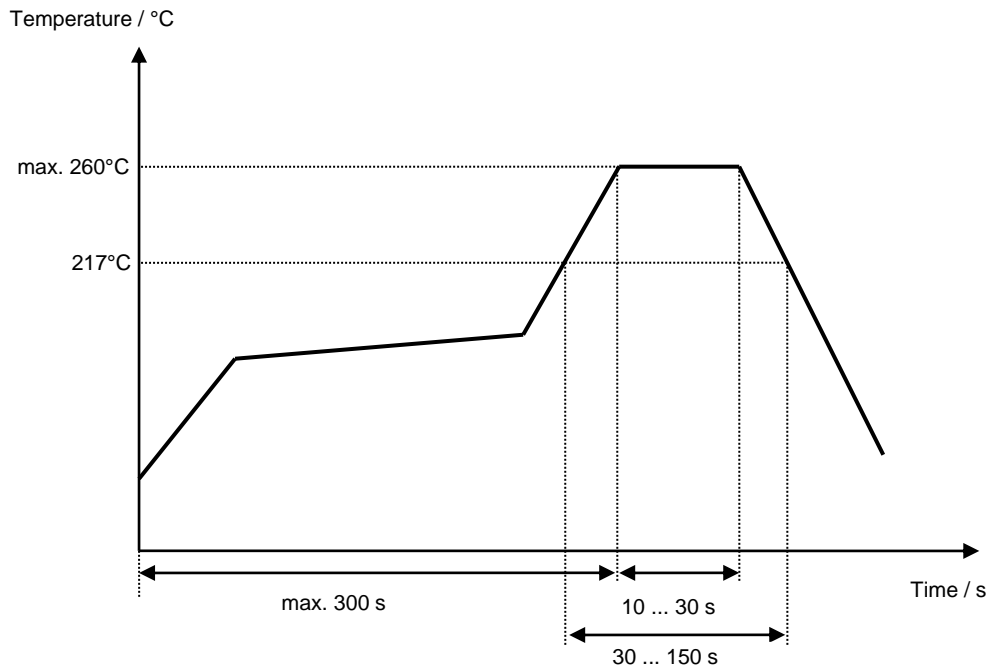
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Air reflow temperature conditions

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



Microchip**Filter specification****TFS 150AL****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Strehl	21.12.2006
1.1	- Change insertion loss and relative attenuation - Add return loss	Strehl	16.01.2007
1.2	- change of relative attenuation, packages and tape & reel dimensions	Pfeiffer	02.10.2007
1.3	- pin functions corrected	Pfeiffer	12.10.2007
1.4	- 'remark' corrected	Pfeiffer	18.10.2007
1.5	- change bandwidths	Strehl	01.04.2008
1.6	- add of terminating impedances, typical values, filter characteristics and matching configuration	Pfeiffer	14.07.2008
2.0	- change of 3 dB bandwidth, typical values and matching configuration	Pfeiffer	19.11.2009
2.1	- terminating impedances and filter characteristics added, typical values updated	Pfeiffer	04.12.2009
2.2	- Customer suggested changes (27/07/2010), - pass band ripple changed to 1dB max (was 1.5dB), typ value updated, - relative attenuation fc...fc±12.06MHz to 1dB max (was 1.5dB), - operating temperature range to 0 °C ... + 85 °C, (was -35 °C ... + 85 °C), - update filter characteristic plots	Jaffer	09.09.2010
2.3	- Updating the tape dimensions	S.Springf.	23.02.2011

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