

Microchip**Filter specification****TFS 110X****1/5****: Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	1,96 kΩ	-9,2 pF
Output:	2,22 kΩ	-8,6 pF

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 110X 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 30 dB filter attenuation level relative to the insertion loss a_e . The nominal frequency f_N is fixed at 110,592 MHz without any tolerance.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	a_e	6,5	dB	max.	10	dB
Nominal frequency	f_N	-			110,592	MHz
Centre frequency	f_c	110,592	MHz	±	60	kHz
Passband shape (3dB-BW)	PB	Gaussian			-	
Bandwidth	BW					
3	dB	1,26	MHz		-	
10	dB	1,75	MHz		-	
20	dB	2,17	MHz		-	
30	dB	2,51	MHz		-	
40	dB	2,85	MHz		-	
Relative attenuation	a_{rel}					
f_c	...	$f_c + 475$	kHz	1	dB	max. 3 dB
f_c	...	$f_c - 425$	kHz	1	dB	max. 3 dB
$f_c + 475$	kHz	$f_c + 800$	kHz	7,8	dB	max. 10 dB
$f_c - 425$	kHz	$f_c - 800$	kHz	7,8	dB	max. 10 dB
$f_c + 1200$	kHz	$f_c + 1375$	kHz	26	dB	min. 20 dB
$f_c - 1210$	kHz	$f_c - 1395$	kHz	26	dB	min. 20 dB
$f_c + 1375$	kHz	$f_c + 1500$	kHz	36	dB	min. 30 dB
$f_c - 1395$	kHz	$f_c - 1535$	kHz	36	dB	min. 30 dB
$f_c + 1500$	kHz	$f_c + 5$	MHz	43	dB	min. 35 dB
$f_c + 5$	MHz	$f_c + 10$	MHz	48	dB	min. 30 dB
$f_c - 1535$	kHz	$f_c - 10$	MHz	46	dB	min. 40 dB
Group delay ripple within $f_c \pm 576$ kHz		220	ns	max.	400	ns
Group delay ripple within $f_c \pm 64$ kHz		15	ns	max.	45	ns
Input power level		-		max.	10	dBm
Operating temperature range	OTR	-		- 20 °C ... + 70 °C		
Storage temperature range		-		- 60 °C ... + 85 °C		
Frequency inversion temperature		25	°C		-	
Temperature coefficient of frequency	TC_f **	- 0,04	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.

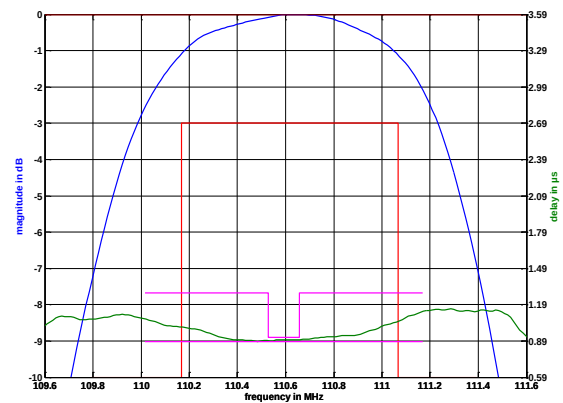
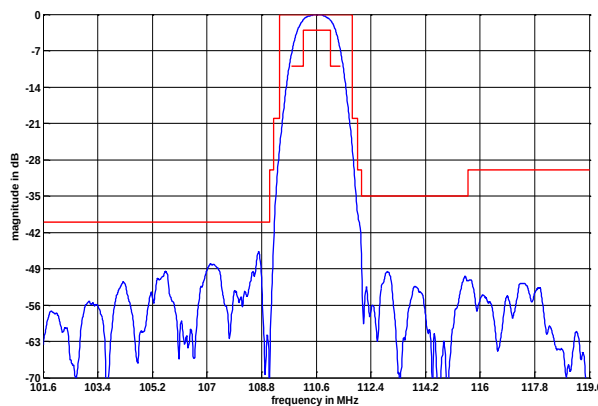
**) $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$

Generated:

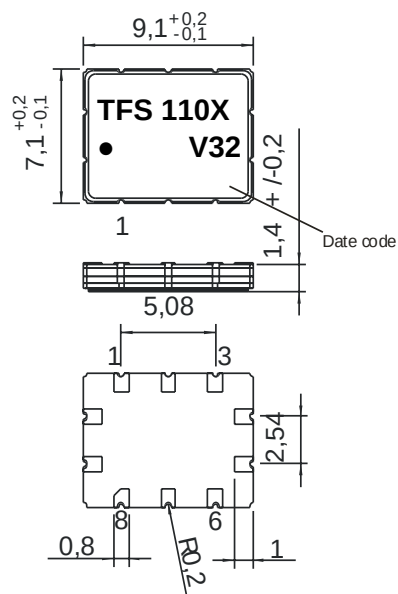
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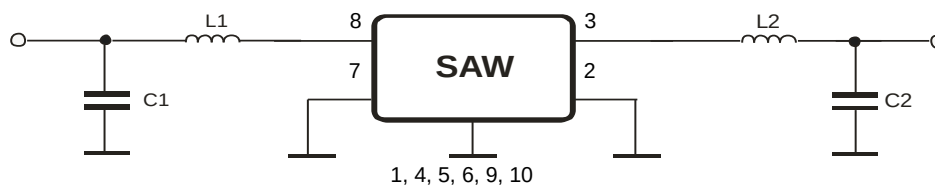
Filter characteristic**Construction and pin connection**

(All dimensions in mm)



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

Date code: Year + week
 V 2007
 W 2008
 X 2009
 ...

50 Ω Test circuit

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Microchip**Filter specification****TFS 110X****3/5****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)

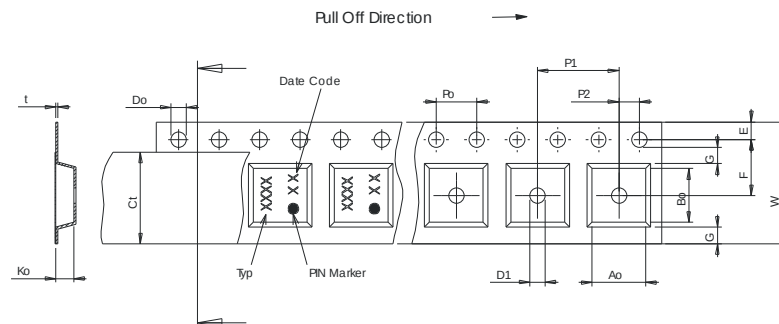
Packing

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;

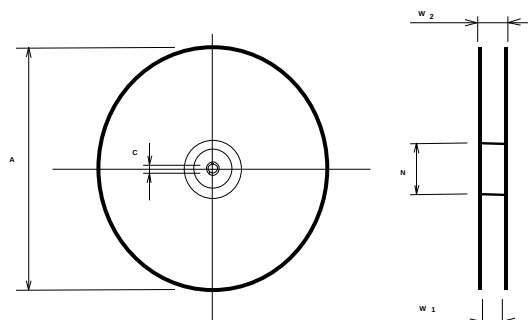
max. pieces of filters per reel:	2000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

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 +0,1/-0
Ao	: 7,60 ± 0,10
Bo	: 9,60 ± 0,10
Ct	: 13,5

**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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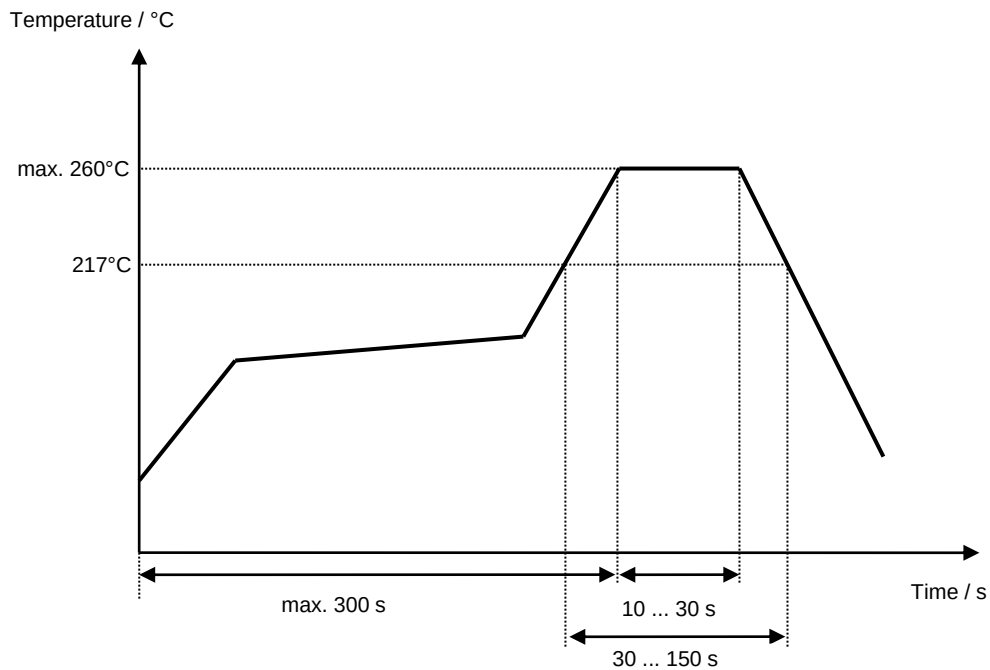
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Air reflow temperature conditions

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 110X****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of filter specification	Strehl	12.02.2007
1.1	- Correct terminating impedances	Strehl	14.02.2007
1.2	- add of 'group delay ripple' – limits within $f_C \pm 64$ kHz	Pfeiffer	06.03.2007
1.3	- Change storage temperature range	Strehl	13.03.2007
1.4	- Change construction - reduce group delay ripple - correct typo for 10 dB attenuation	Strehl	03.04.2007
1.5	- add of terminating impedances, typical values and filter characteristics	Pfeiffer	09.08.2007