

Microchip**Filter specification****TFS140AS****1/5****Measurement condition**

Ambient temperature T_A :	25	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	230 Ω	-12 pF
Output:	170 Ω	-15 pF

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 140AS 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 20 dB filter attenuation level relative to the insertion loss a_e . The nominal frequency f_N is fixed at 140.0 MHz without any tolerance. The shift of the filter band width in the operating temperature range (OTR) is included in the production tolerance scheme.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	a_e	12.1	dB	max.	13.5	dB
Nominal frequency	f_N	-			140.0	MHz
Centre frequency	f_c	140.0	MHz	\pm	0.4	MHz
Passband	PB	-		f_c	\pm 10	MHz
Pass band ripple		0.3	dB	max.	1	dB
Pass band variation		1	dB	max.	1.5	dB
Bandwidth	BW					
1 dB		23.8	MHz	min.	19.12	MHz
1.5 dB		24.4	MHz	min.	20	MHz
Relative attenuation	a_{rel}					
f_c	$f_c \pm 9.56$ MHz	0.3	dB	max.	1	dB
$f_c \pm 9.56$ MHz	$f_c \pm 10$ MHz	0.4	dB	max.	1.5	dB
$f_c - 130.0$ MHz	$f_c - 17.2$ MHz	45	dB	min.	42	dB
$f_c + 17.2$ MHz	$f_c + 360.0$ MHz	43	dB	min.	40	dB
Group delay ripple within PB	p-p	55	ns	max.	70	ns
Absolute group delay within PB		600	ns	max	825	ns
Phase linearity within PB	p-p	7	deg	max.	10	deg
Input power level		-		max.	10	dBm
Operable temperature range		-			- 40 °C ... + 85°C	
Operating temperature range	OTR	-			+25 °C	
Storage temperature range		-			- 55 °C ... + 125°C	
Temperature coefficient of frequency	TC_f **	-94	ppm/K			

*) 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.

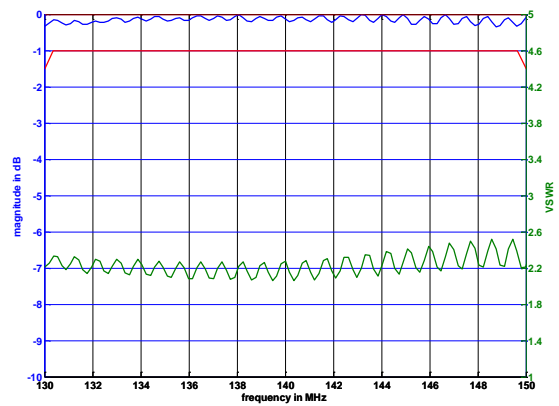
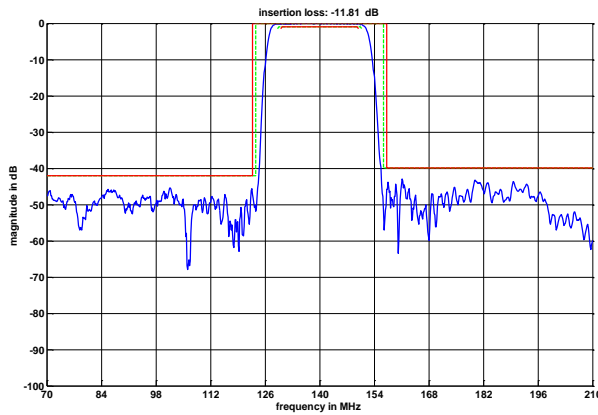
**) $\Delta f = TC_f(T - T_A)f_N$

Generated:**Checked / Approved:**

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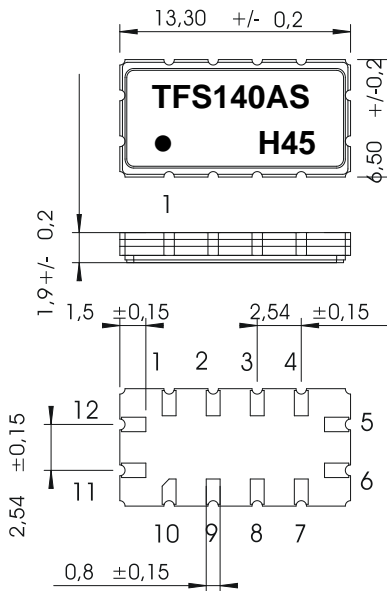
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Filter characteristic



Construction and pin connection

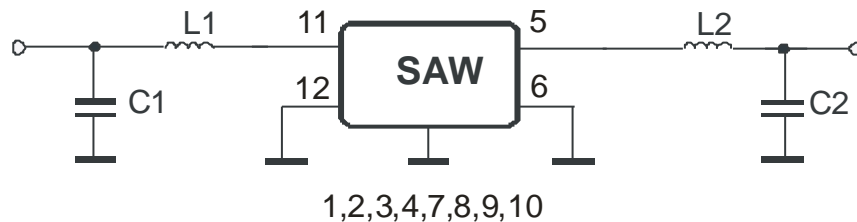
(All dimensions in mm)



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

Date code: Year + week
 H 2016
 J 2017
 K 2018
 ...

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)

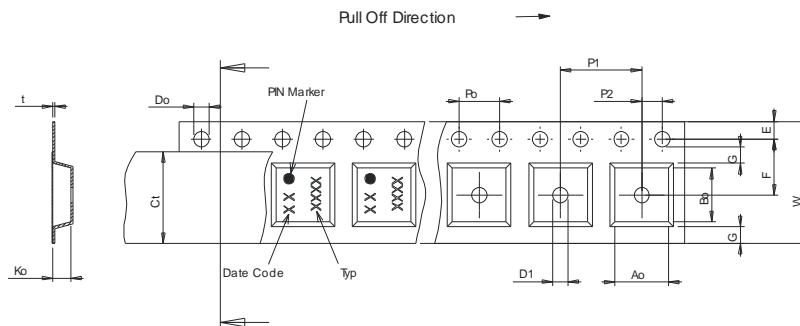
Packing

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:	1700
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

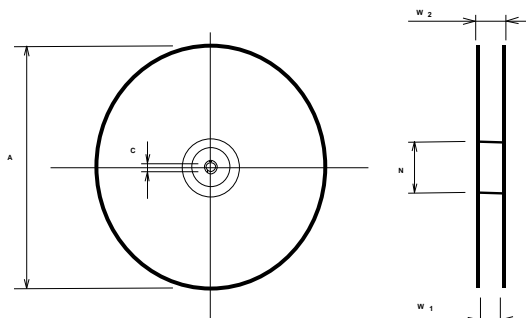
Tape (all dimensions in mm)

- W : 24.00 +0.30/-0.10
- Po : 4.00 ±0.1
- Do : 1.50 +0.1/0
- E : 1.75 ±0.10
- F : 11.50 ±0.10
- G(min) : 0.60
- P2 : 2.00 ±0.1
- P1 : 12.00 ±0.1
- D1(min) : 1.50
- Ao : 7.00 ±0.10
- Bo : 13.80 ±0.10
- Ct : 21.00 ±0.1
- Ko : 2.10 ±0.10
- t : 0.30 ±0.05



Reel (all dimensions in mm)

- A : 330 or 180
- W1 : 24.4 +2/-0
- W2(max) : 30.40
- N(min) : 60.00
- C : 13.0 +0.5/-0.2



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



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Microchip**Filter specification****TFS140AS****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Strehl	17.05.2006
1.1	- changed insertion lossChilla - changed pass band - changed relative attenuation - changed group delay ripple - introduced absolute group delay - changed phase linearity - changed input power level	26.06.2006	
1.2	- stopband attenuation updated	Chilla	29.06.2006
1.3	- passband extended	Chilla	06.07.2006
1.4	- changed relative attenuation temporary - changed group delay ripple - changed characteristics and passband	Strehl	18.10.2006
1.5	- Created filter specification - Added terminating impedances - Added typical values - Added filter characteristic - Changed construction - Added test circuit - Changed packing	Chilla	21.12.2006
1.6	- Test circuit corrected	Chilla	30.09.2009
2.0	- Change tape & reel dimensions - Update header and footer sections - Update data section - Update storage temperature range - Update stability characteristics, reliability	Bonnen	02.11.2016

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