Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedances*): input: 680 Ω ‖ -1.8 pF
output: 680 Ω ‖ -1.8 pF

Characteristics

Remark:
Reference level for the relative attenuation a_{rel} of the TFS224 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 224.0 MHz without 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.

D a t a		**typ. value**		**Variation/ Limitation**		
Insertion loss (Reference level)	$a_e = a_{min}$	3.5	dB	max	5.2	dB
Nominal frequency	f_N	-			224.0	MHz
Centre frequency	f_c	224.015	MHz		-	
2 dB bandwidth	BW	178	kHz	min	100	kHz
Relative attenuation	a_{rel}					
f_N ... $f_N \pm$ 50 kHz		1	dB	max	2	dB
$f_N \pm 0.5$ MHz ... $f_N \pm$ 1 MHz		41	dB	min	10	dB
$f_N \pm$ 1 MHz ... $f_N \pm$ 5 MHz		46	dB	min	20	dB
$f_N \pm$ 5 MHz ... $f_N \pm$200 MHz		56	dB	min	40	dB
Temperature coefficient of the frequency	TC_f**)	-0.036	ppm/K^2		-	
Frequency inversion temperature	To	13	°C		-	
Operating temperature range		-		- 45 °C ... + 75 °C		
Storage temperature range		-		- 40 °C ... + 85 °C		
Input power level		-		max	10	dBm

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

Generated:

Checked / Approved:

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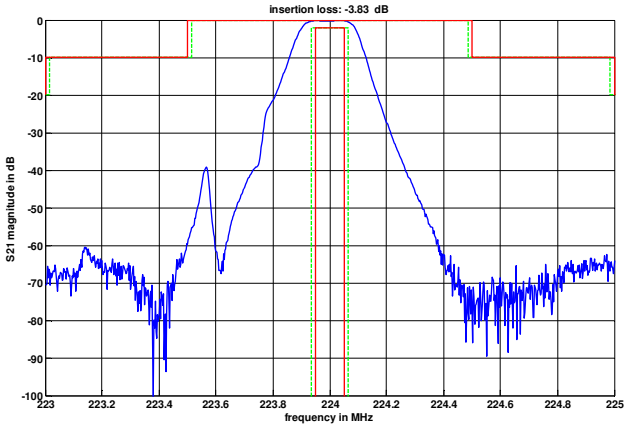
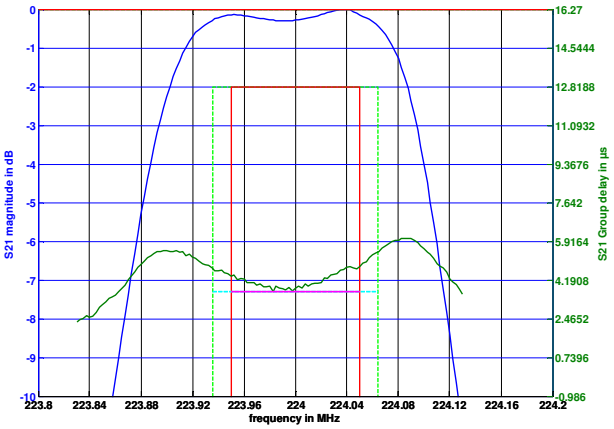
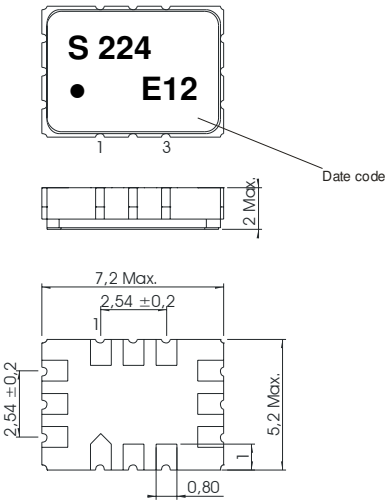
Filter characteristic





Construction and pin connection

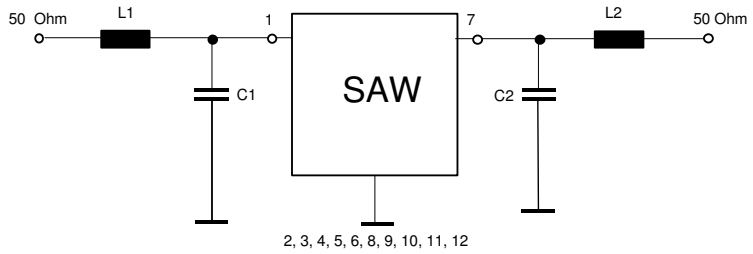
(All dimensions in mm)



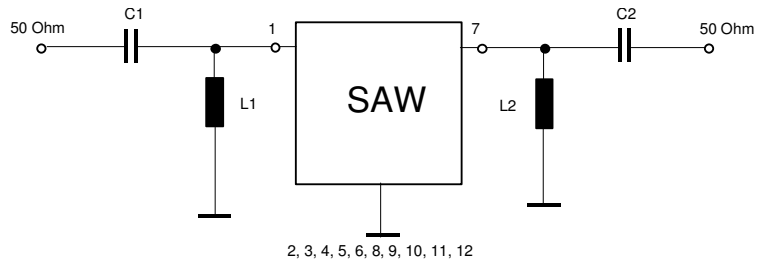
1	Input
2	Input RF Return
3	Ground
4	Ground
5	Ground
6	Ground
7	Output
8	Output RF Return
9	Ground
10	Ground
11	Ground
12	Ground

Date code:	Year + week
E	2014
F	2015
G	2016
...	

50 Ω Test circuit 1



50 Ω Test circuit 2



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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 / 15 min. each / 100 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 (2011/65/EU)

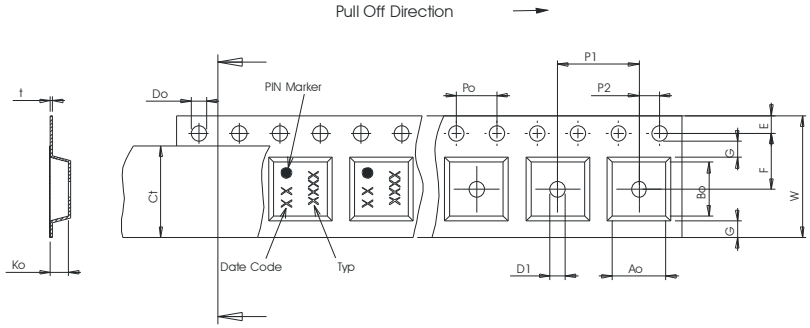
Packing

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

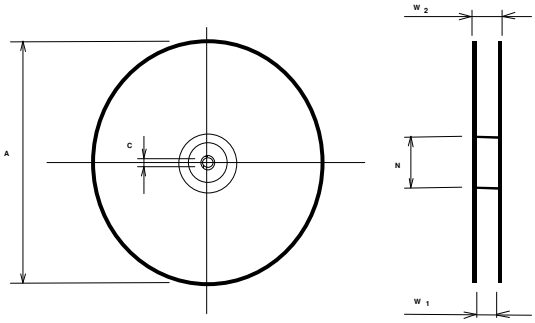
Tape (all dimensions in mm)

W	:16.00	+0.3/-0.1
Po	:4.00	± 0.1
Do	:1.50	+0.1/-0
E	:1.75	± 0.1
F	:7.50	± 0.1
G(min)	:0.75	
P2	:2.00	± 0.1
P1	:8.00	± 0.1
D1(min)	:1.50	
Ao	:5.40	± 0.1
Bo	:7.60	± 0.1
Ct	:13.3	± 0.1



Reel (all dimensions in mm)

A	:330	
W1	:16.4	+2/-0
W2(max)	:22.4	
N(min)	: 50	
C	:13.0	+0.5/-0.2



The minimum bending radius is 45 mm.

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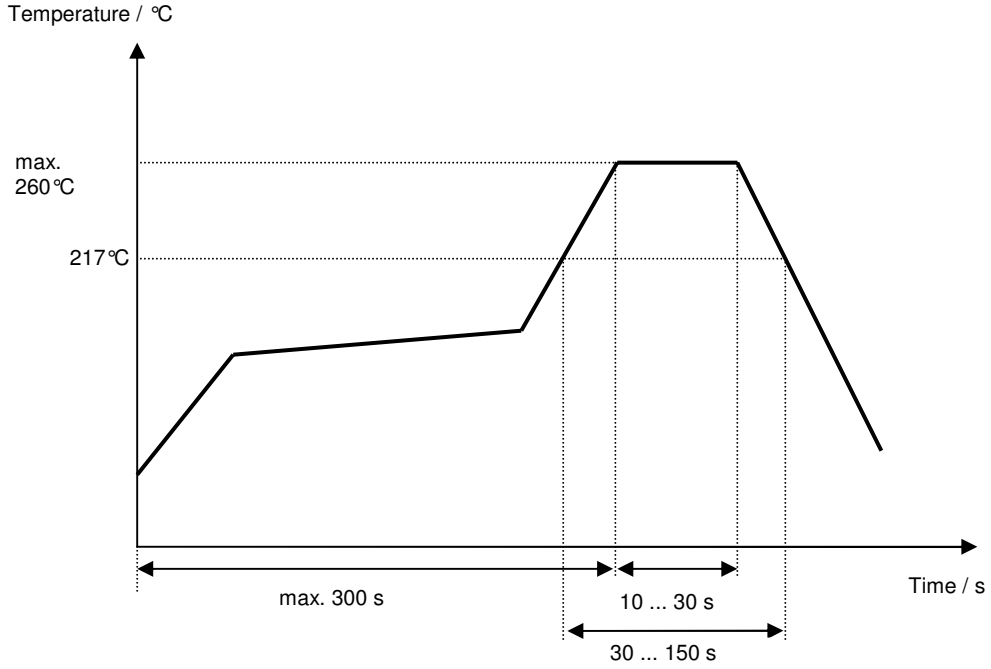
Air reflow temperature conditions

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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History

Version	Reason of Changes	Name	Date
1.0	- Generate development specification according to customers requirement.	Sabah	08.07.2002
1.1	- Correct span for relative attenuation of 2 dB. - Correct attenuation in lower stop band.	Dr. Wall	11.11.2002
1.2	- Change from development to filter specification. - Add termination impedance for input and output. - Add typical data. - Add 50 Ω test circuits.	Dr. Wall	05.02.2003
2.0	- Updated filter specification header and footer. - Included filter characteristics. - Updated construction and pin connection. - Corrected 50 Ω Test circuit 1 header. - Updated stability characteristics, reliability. - Updated air reflow temperature conditions.	Raura	21.03.2014

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