Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedances
for input: 1,38 kOhm // -1,5 pF
for output: 1,38 kOhm // -1,5 pF

Characteristics

Remark:
Reference level for the relative attenuation a_{rel} of the TFS 235A is the insertion loss. The insertion loss a_e is defined as the minimum of attenuation in pass band. 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 on 235,008 MHz without tolerance. The given values for the relative attenuation a_{rel} and for the group delay ripple have to be reached at the frequencies given below also 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**		**tolerance/limit**		
Insertion loss (Reference level)	a_e	5,3	dB	max. 8		dB
Nominal frequency	f_N	-		235,008		MHz
Centre frequency	f_C	235,02	MHz	-		
3 dB bandwidth	BW	-		min. 150		kHz
Relative attenuation	a_{rel}					
f_N ... $f_N \pm 30$ kHz		0.4	dB	max. 1		dB
$f_N \pm 30$ kHz ... $f_N \pm 75$ kHz		1,3	dB	max. 3		dB
$f_N \pm 200$ kHz ... $f_N \pm 4$ MHz		16...50	dB	min. 11		dB
$f_N \pm 4$ MHz ... $f_N \pm 10$ MHz		53	dB	min. 50		dB
$f_N \pm 10$ MHz ... $f_N \pm 12$ MHz		55	dB	min. 40		dB
Group delay	GD	3,2	µs	max. 5		µs
ripple f_N ... $f_N \pm 25$ kHz		0,4	µs	max. 1,5		µs
Operating temperature range				- 25 °C ... + 75 °C		
Storage temperature range				- 40 °C ... + 85 °C		
Temperature coefficient of frequency	TC	ca. – 0,036	ppm/K²			
Frequency inversion temperature		+ 25 °C				

Generated:

Checked / approved:

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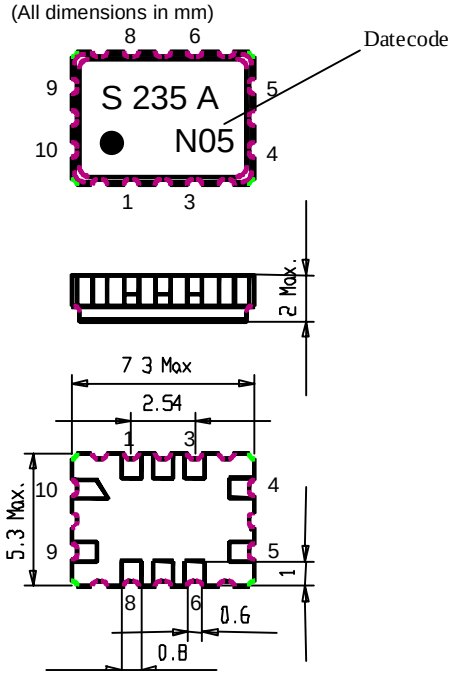
Construction, pin configuration and 50 Ω - matching network

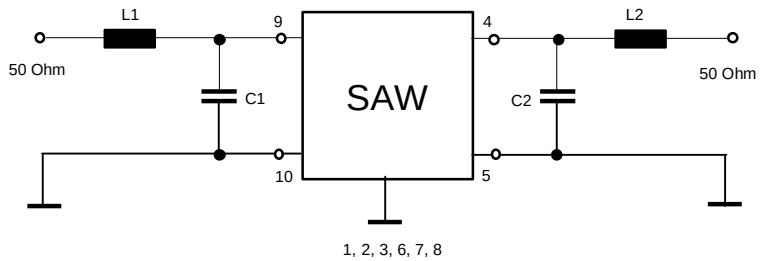
(All dimensions in mm)



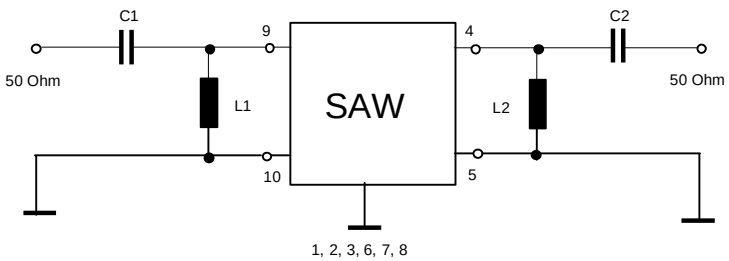
1	Ground
2	Ground
3	Ground
4	Output
5	Output RF Return
6	Ground
7	Ground
8	Ground
9	Input
10	Input RF Return

Datecode:	Year+week
L	1999
M	2000
N	2001
...	

50 Ohm Test circuit 1



50 Ohm Test circuit 2



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Stability characteristics

After the following tests the filter shall meet the whole specification:

1. Shock:	500g, 18 ms, half sine wave, 3 shocks each plane; DIN IEC 68 T2 - 27
2. Vibration:	10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans; DIN IEC 68 T2 - 6
3. Damp heat: (cycle)	25 °C to 55°C / 95% r.H. / 10 cycles DIN IEC 68 - 2 – 30 Db
4. Resistance to solder heat (reflow):	max. 2 times reflow process; for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

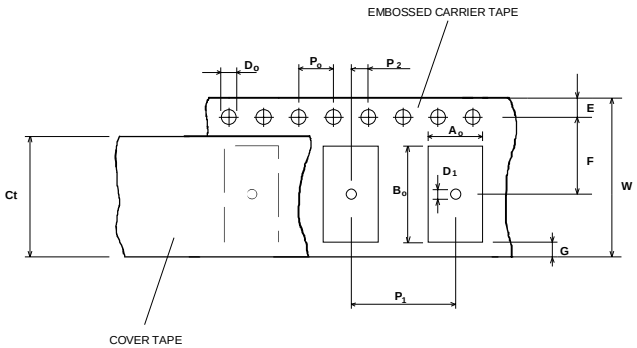
Packing:

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

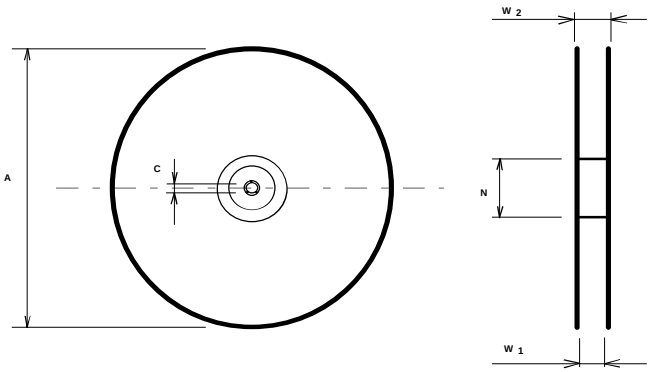
Tape (all dimensions in mm)

W	:	16	± 0,3
Po	:	4	± 0,1
Do	:	1,5	+ 0,1
E	:	1,75	± 0,1
F	:	7,5	± 0,1
G (min)	:	0,6	
P2	:	2	± 0,1
P1	:	8	± 0,1
D1(min)	:	1,5	
Ao	:	5,5	± 0,1
Bo	:	7,5	± 0,1
Ct	:	13,5	+/-0,1



Reel (all dimensions in mm):

A	:	330	
W1	:	16,4	+2
W2 (max)	:	22,4	
N (min)	:	50	
C	:	13	+ 0,5 / - 0,2



The minimum bending radius is 45 mm. The mounting surface of the filters faces the bottom side of the embossed carrier tape. The marking of the filters is readable if the sprocket holes are on the left side of the tape, i.e. pin 1 identifier is close to the sprocket holes.

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Air reflow temperature conditions

1st and 2nd air reflow profile

Name:	pre-heating periods	main-heating periods	peak temperature
Temperature:	150 °C - 170 °C	over 200 °C	255 °C ± 5 °C
Time:	60 sec. - 90 sec.	20 sec. - 25 sec.	

Chip-mount air reflow profile

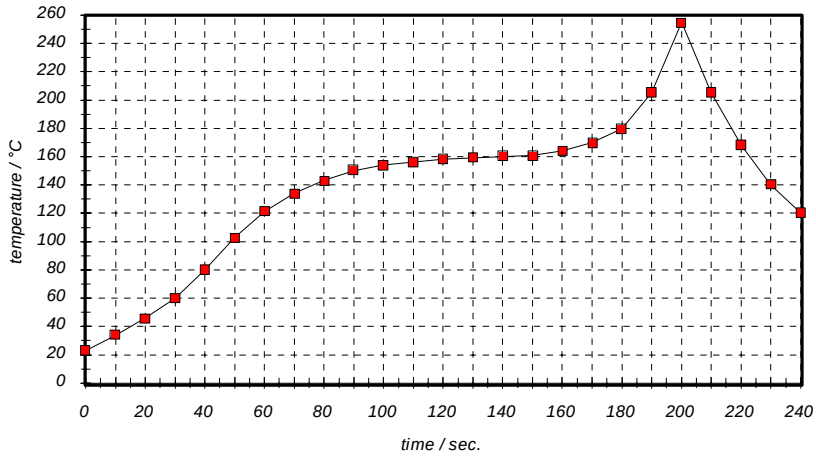

Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

time / sec.	temperature / °C	time / sec.	temperature / °C
0	23	140	160
10	34	150	161
20	46	160	164
30	60	170	170
40	80	180	180
50	103	190	205
60	121	195	230
70	134	200	255
80	143	205	230
90	150	210	205
100	154	215	180
110	156	220	165
120	158	230	140
130	159	240	120

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History

Version	Reason of Changes	Name	Date
1.0	Generation of specification according to customer requirements	Dr. Wall	06.11.2000
1.1	Change frequency range for group delay ripple from ± 12,5 kHz to ± 25 kHz	Dr. Wall	09.11.2000
1.2	Change package, pinning and electrical parameters according to discussion with the customer.	Dr. Wall	04.12.2000
1.3	Correct operating temperature range. Add relative attenuation of 1 dB for f_N ± 30 kHz.	Dr. Wall	20.12.2000
1.4	Add typical filter data Add termination impedances	Dr. Wall	29.01.2001
1.5	Change termination impedance.	Dr. Wall	26.03.2001
1.6	Change nominal frequency from 235 MHz to 235,008 MHz. Change typical value of centre frequency from 235,01 MHz to 235,02 MHz.	Dr. Wall	01.06.2001

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