1. Measurement condition

Ambient temperature $\mathbf{T_A}$: 23 °C
Input power level: 0 dBm.
Terminating impedances at f_C: for input: 890 Ω | - 5,6 pF .
for output: 680 Ω | - 5,9 pF .

Characteristics

Remark:
Reference level for the relative attenuation $\mathbf{a_{rel}}$ of the **TFS 111** is the minimum of the pass band attenuation $\mathbf{a_{min}}$. The minimum of the pass band attenuation $\mathbf{a_{min}}$ is defined as the insertion loss $\mathbf{a_e}$. The reference frequence $\mathbf{f_C}$ is the arithmetic mean value of the upper and lower frequencies at the **30 dB** filter attenuation level relative to the insertion loss $\mathbf{a_e}$. The temperature coefficient of frequency $\mathbf{Tc_f}$ is valid both for the reference frequency $\mathbf{f_C}$ and the frequency response of the filter in the operating temperature range.

Data		**typ. value**		**tolerance / limit**	
Insertion loss (Reference level)	$\mathbf{a_e}$	11,9	dB	max. 14	dB
Centre frequency	$\mathbf{f_C}$ at ambient temperature T_A ($\mathbf{f_{CAT}}$)	111	MHz	111,0 ± 0,06	MHz
Pass band at ambient temperature T_A:			f_C - 0,425 MHz	.....f_C + 0,475	MHz
Relative attenuation	$\mathbf{a_{rel}}$				
f_C - 425 kHz	f_C + 475 kHz	-		max. 3	dB
f_C - 800 kHz	f_C - 425 kHz	-		max. 10	dB
f_C + 475 kHz	f_C + 800 kHz	-		max. 10	dB
f_C - 1395 kHz	f_C - 1210 kHz	-		min. 20	dB
f_C + 1200 kHz	f_C + 1375 kHz	-		min. 20	dB
f_C - 1535 kHz	f_C - 1395 kHz	-		min. 30	dB
f_C + 1375 kHz	f_C + 1500 kHz	-		min. 30	dB
f_C - 10 MHz	f_C - 1535 kHz	60...45	dB	min. 40	dB
f_C + 1500 kHz	f_C + 10 MHz	45...55	dB	min. 40	dB
Group delay (mean value in pass band):		1,13	µs		
Group delay ripple (p-p) :	f_C - 800 kHz...f_C + 800 kHz	160	ns	max 300	ns
Deviation from linear phase (p-p):	f_C - 800 kHz...f_C + 800 kHz	3 °			
Frequency inversion temperature (T_o)		10° C			
Temperature coefficient:	**1-st order [$Tc_f(1)$]**	+ 1,7	ppm/K		
	2-st order [$Tc_f(2)$]	- 0,06	ppm/K²		
Frequency deviation of f_C over temperature: *)	$\Delta f_C(Hz) = [\ Tc_f(1) \times (T - T_o) + Tc_f(2) \times (T - T_o)^2\ ] \times f_{To}$ (MHz)				
Operating temperature range		- 10 °C ... + 60 °C			
Storage temperature range		- 40 °C ... + 85 °C			
Input power level				max. + 10	dBm.

***)** $\mathbf{f_{To}}$ is reference frequence $\mathbf{f_C}$ at frequency inversion temperature ($\mathbf{T_o}$)

Generated: Dunzow W.P.

Checked/Approved: Dr. Bert Wall

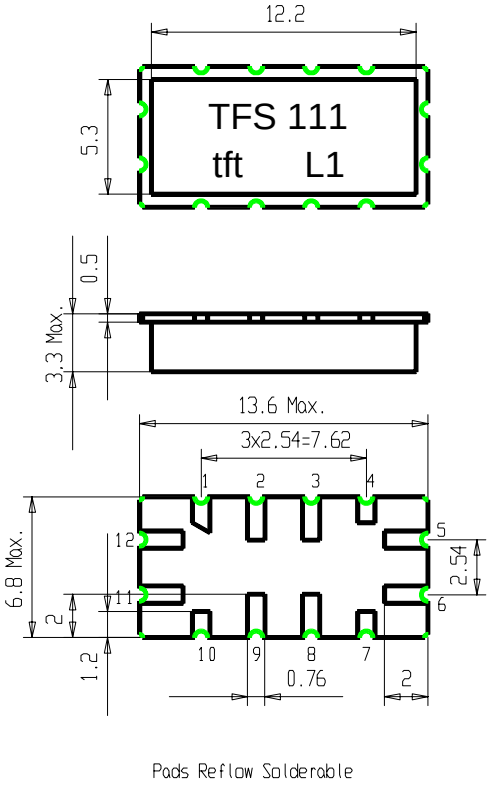
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3. Package and 50 Ω - matching network (see Application Note):

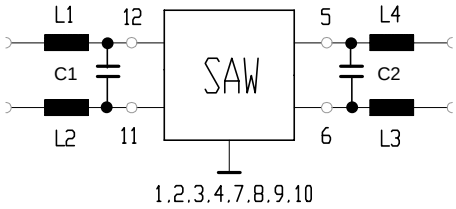
(All dimensions in mm)



Pads Reflow Solderable

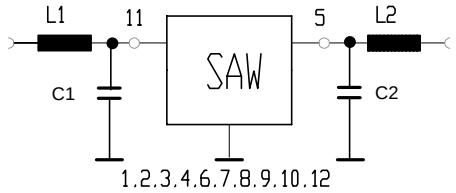
Balanced

1 Not Connected Ground	2 Package Ground	3 Package Ground
4 Not Connected Ground	5 Sym.Output	6 Sym.Output
7 Not Connected Ground	8 Package Ground	9 Package Ground
10 Not Connected Ground	11 Sym. Input	12 Sym. Input



Unbalanced

1 Not Connected Ground	2 Package Gound	3 Package Ground
4 Not Connected Ground	5 Output	6 Output RF-Return
7 Not Connected Ground	8 Package Ground	9 Package Ground
10 Not Connected Ground	11 Input	12 Input RF-Return



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4. 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;

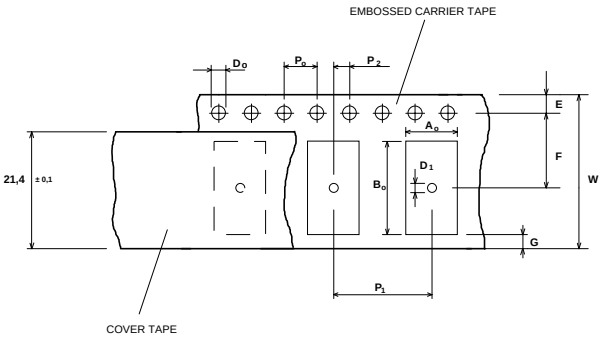
Packing:

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:	1700
Real of empty components at start:	min 300 mm
Real of empty components at start including leader:	min 500 mm
Trailer	min 300 mm

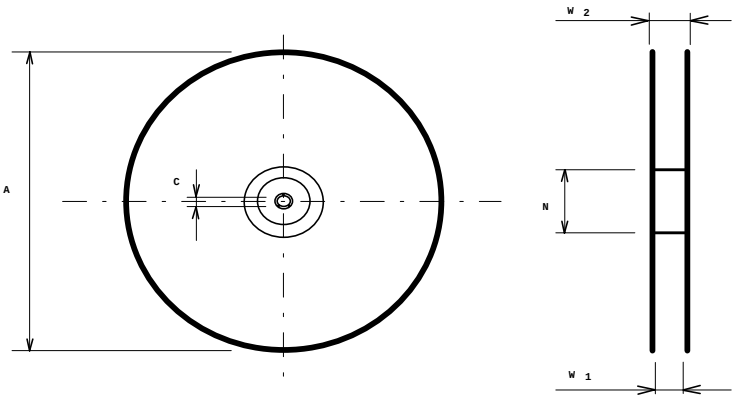
Tape (all dimensions in mm)

W	:	24	± 0,3
Po	:	4	± 0,1
Do	:	1,5	+ 0,5
D1	:	1,5	+ 0,5
E	:	1,75	± 0,1
F	:	11,5	± 0,1
G (min)	:	0,75	
P2	:	2	± 0,1
P1	:	12	± 0,1
D1(min)	:	1,5	
Ao	:	7,1	± 0,2
Bo	:	13,9	± 0,2



Reel (all dimensions in mm):

A	:	330	
W1	:	24,4	+2
W2 (max)	:	30,4	
N (min)	:	>= 90	
C	:	13	± 0,25



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 able to read if the view is directed on the upper side of the carrier tape with the sprocket holes on the right side of the tap

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5. 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.	

Air reflow profile

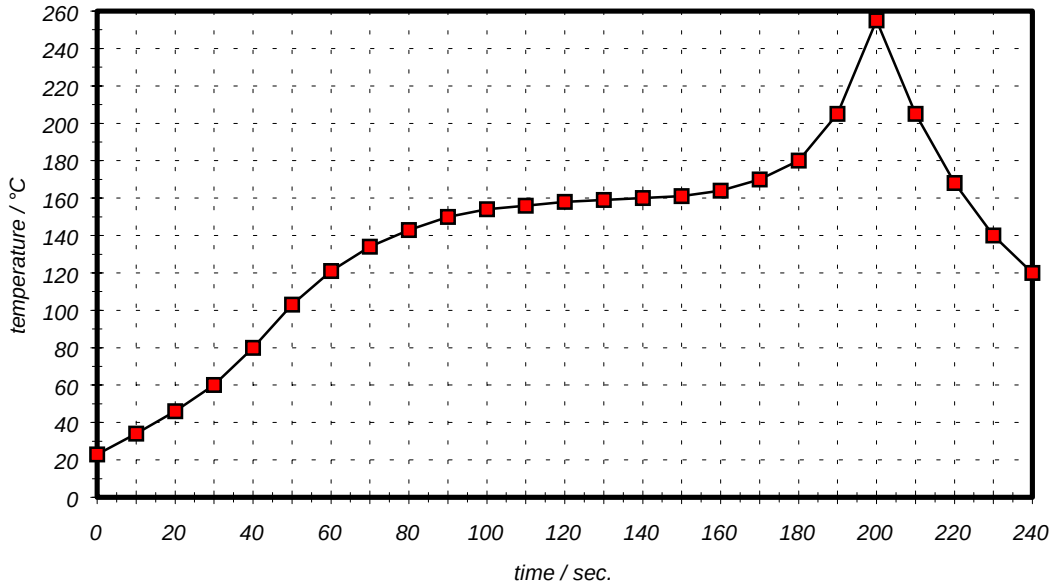


Table for temperature vs. time during the air reflow process

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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