

**VI TELEFILTER****Filter Specification****TFS 433 R****1/5****Measurement condition**

Ambient temperature: 23 °C  
 Input power level: 0 dBm  
 Terminating impedances\*  
     for input: 560 Ω || -1,25 pF  
     for output: 560 Ω || -1,25 pF  
 Coupling coil: 47 nH

**Characteristics****Remark:**

Reference level for the relative attenuation  $a_{rel}$  of the TFS 433 R 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 433,92 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 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 of centre frequency  $f_c$ .

<b>D a t a</b>		<b>typ. value</b>	<b>tolerance/limit</b>
<b>Insertion loss</b> (Reference level)	$a_e = a_{min}$	3,8 dB	max. 6,5 dB
<b>Nominal frequency</b>	$f_N$	-	433,920 MHz
<b>Centre frequency</b>	$f_c$	433,95 MHz	
<b>Guaranteed 1,5 dB signal band width</b>	BW	-	min. 160 kHz
<b>Relative attenuation</b>	$a_{rel}$		
$f_N \pm 80$ kHz		0,8 dB	max. 1,5 dB
$f_N \pm 460$ kHz ... $f_N \pm 660$ kHz		32 dB	min. 25 dB
$f_N \pm 660$ kHz ... $f_N \pm 1$ MHz		50 dB	min. 40 dB
$f_N - 1$ MHz ... $f_N - 13$ MHz		58 dB	min. 50 dB
$f_N + 1$ MHz ... $f_N + 2$ MHz		61 dB	min. 50 dB
$f_N + 2$ MHz ... $f_N + 5$ MHz		53 dB	min. 47 dB
$f_N \pm 5$ MHz ... $f_N \pm 13$ MHz		58 dB	min. 50 dB
<b>Group delay ripple</b>	GD		
$f_N \pm 70$ kHz		0,5 μs	max. 2 μs
<b>Operating temperature range</b>		-	- 40 °C ... + 85 °C
<b>Storage temperature range</b>		-	- 40 °C ... + 85 °C
<b>Temperature coefficient of frequency</b>	TC **	-0.036 ppm/K <sup>2</sup>	-
<b>Frequency inversion temperature</b>		+ 20 °C	-

\*) 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:****Checked / approved:**

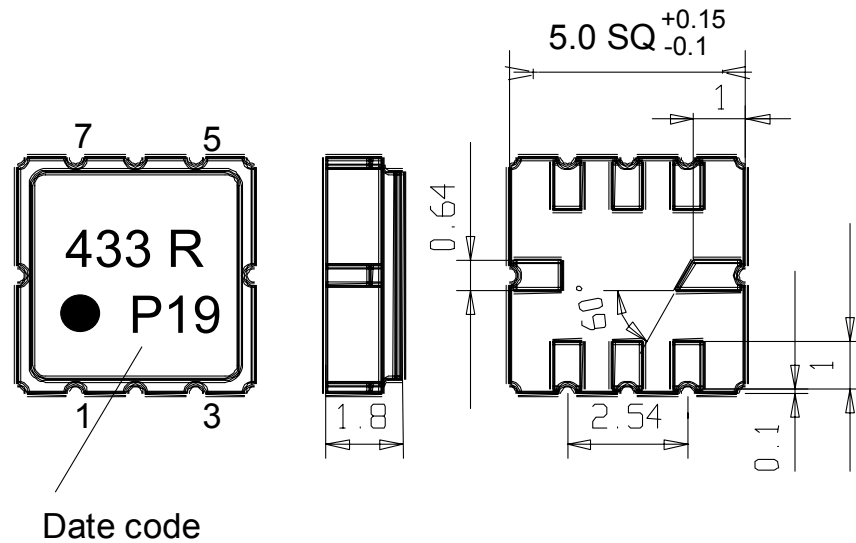
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**Construction, pin configuration and 50 Ω - matching network**

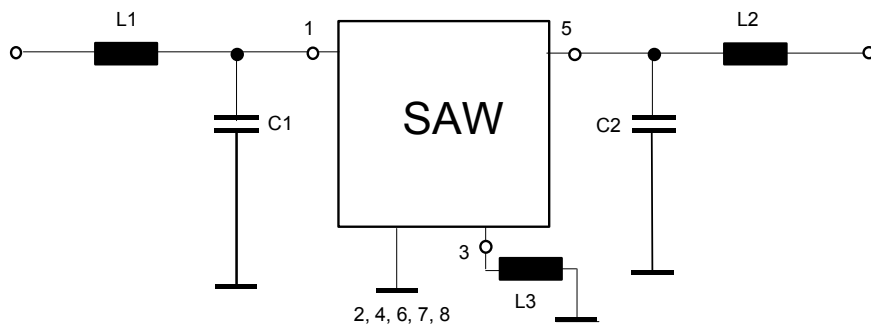
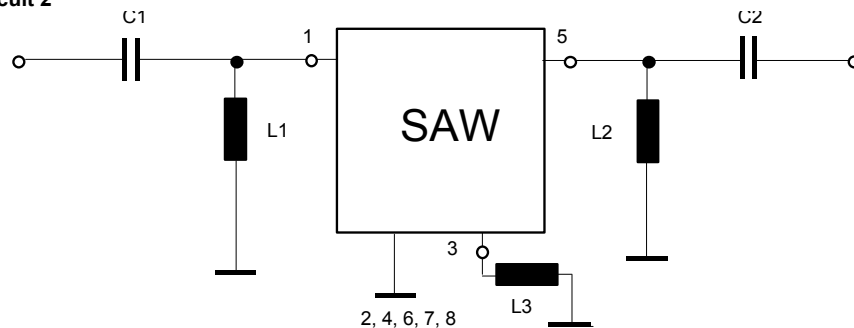
(All dimensions in mm)



Pin 1 Input  
 Pin 2 Input RF Return  
 Pin 3 External Coil  
 Pin 4,8 Package Ground

Pin 5 Output  
 Pin 6 Output RF Return  
 Pin 7 Ground

Date code: Year + week  
 M 2000  
 N 2001  
 P 2002  
 ...

**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:

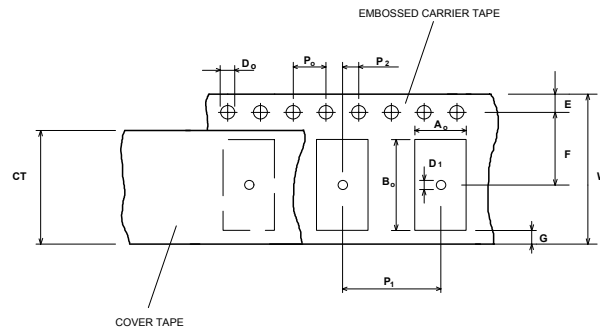
1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans;  
DIN IEC 68 T2 - 6
3. Damp heat: 25 °C to 55°C / 95% r.H. / 10 cycles  
(cycle) DIN IEC 68 - 2 - 30 Db
4. Resistance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

**Packing**

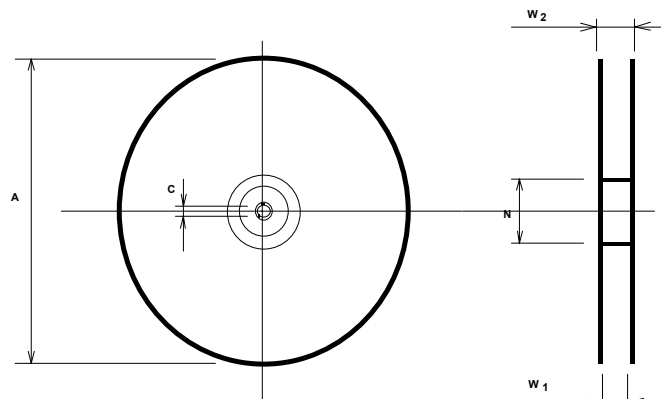
Tape & Reel:	IEC 286 - 3, with exception of value for N and minimum bending radius; tape type II, embossed carrier tape with top cover tape on the upper side;	
	max. pieces of filters per reel:	3000
	Reel of empty components at start:	min 300 mm
	Reel of empty components at start including leader:	min 500 mm
	Trailer	min 300 mm

**Tape (all dimensions in mm)**

W	: 12 ± 0,3
Po	: 4 ± 0,1
Do	: 1,5 + 0,1
E	: 1,75 ± 0,1
F	: 5,5 ± 0,05
G (min)	: 0,75
P2	: 2 ± 0,05
P1	: 8 ± 0,1
D1(min)	: 1,5
Ao	: 5,3 ± 0,1
Bo	: 5,3 ± 0,1
CT	: 9,5 ± 0,1

**Reel (all dimensions in mm):**

A	: 330
W1	: 12,4 + 0,2
W2 (max)	: 18,4
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. Markings on the filters can be read if the upper side of the carrier tape is regarded with the sprocket holes on its right.

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**Air reflow temperature conditions**

## 1st and 2nd air reflow profile

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

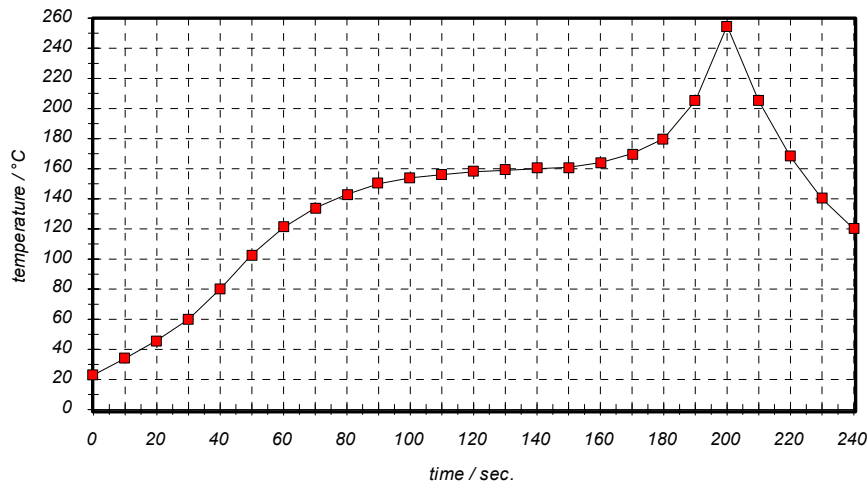
**Chip-mount air reflow profile**

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

**VI TELEFILTER****Filter Specification****TFS 433 R****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generate specification according to customer requirements	Dr. Wall	14.03.2002
1.1	- Change pinning according to discussion with customer.	Dr. Wall	21.03.2002
1.2	- Change development specification to preliminary specification. - Add termination impedances. - Add typical data.	Dr. Wall	22.04.2002
1.3	- Position of coupling coil changed from pin 7 to pin 3	Dr. Wall	23.04.2002
3.0	- Change starting frequency for 25 dB selection from $f_N \pm 400$ kHz to $f_N \pm 460$ kHz. - Change starting frequency for 40 dB selection from $f_N \pm 600$ kHz to $f_N \pm 660$ kHz. - Change typical values. - Change termination impedances.	Dr. Wall	29.04.2002
3.1	- Change preliminary specification to filter specification.	Dr. Wall	24.05.2002

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