

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 .

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

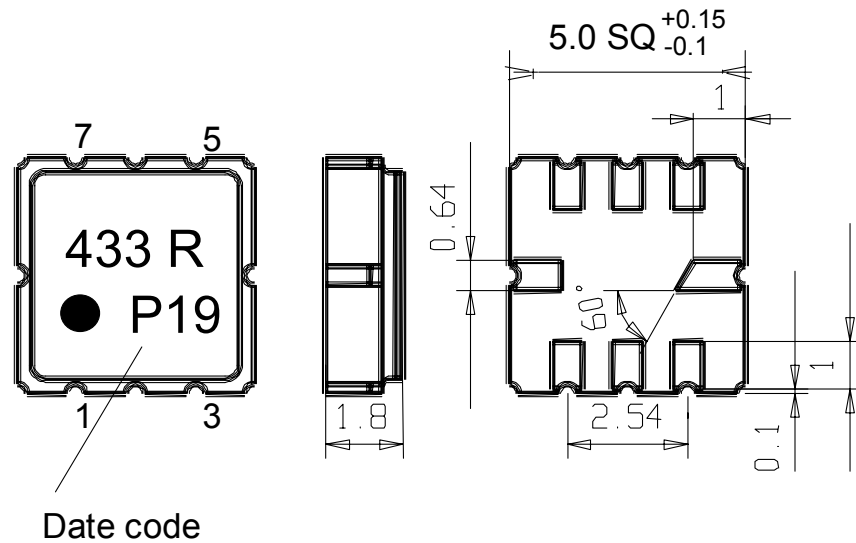
VI TELEFILTER
 Potsdamer Straße 18
 D 14 513 TELTOW / Germany
 Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
 E-Mail: tft@telefilter.com

Vectron International Inc.
 267 Lowell Road
 Hudson, NH 03051 / USA
 Tel: (603) 598-0070 Fax: (603) 598-0075
 E-Mail: vti@vtinh.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

VI TELEFILTER**Filter Specification****TFS 433 R****2/5****Construction, pin configuration and 50 Ω - matching network**

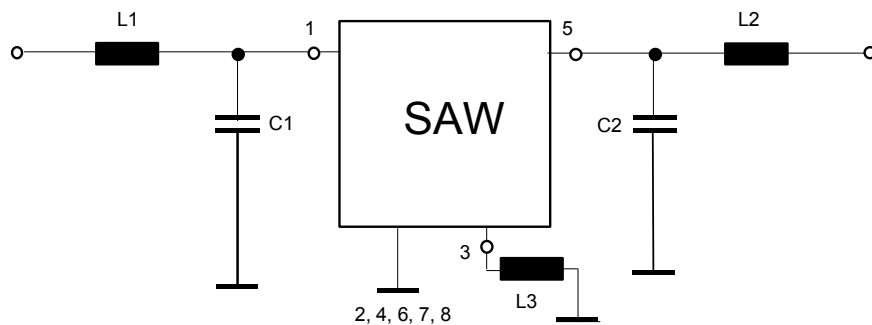
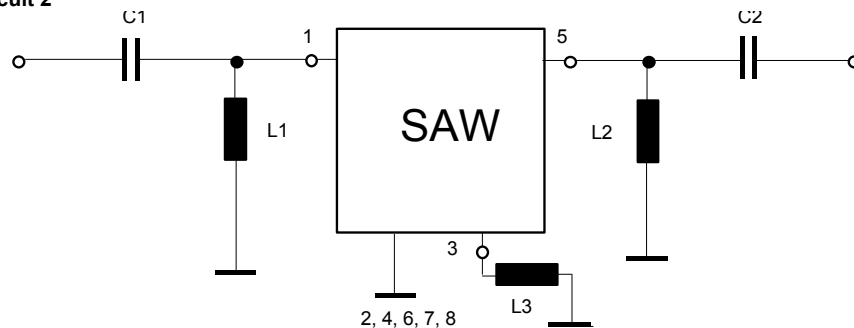
(All dimensions in mm)



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**

VI TELEFILTER
 Potsdamer Straße 18
 D 14 513 TELTOW / Germany
 Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
 E-Mail: tft@telefilter.com

Vectron International Inc.
 267 Lowell Road
 Hudson, NH 03051 / USA
 Tel: (603) 598-0070 Fax: (603) 598-0075
 E-Mail: vti@vtinh.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

VI TELEFILTER**Filter Specification****TFS 433 R****3/5****Stability Characteristics**

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

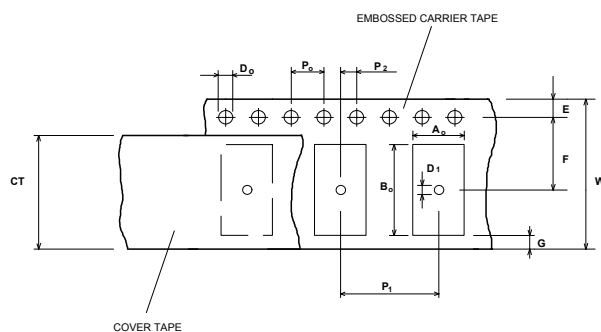
1. Shock: 500g, 18 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5g respectively, 1 octave per min, 10 cycles per plan, 3 plans;
DIN IEC 68 T2 - 6
3. Damp heat: 25 °C to 55°C / 95% r.H. / 10 cycles
(cycle) DIN IEC 68 - 2 - 30 Db
4. Resistance to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

Packing

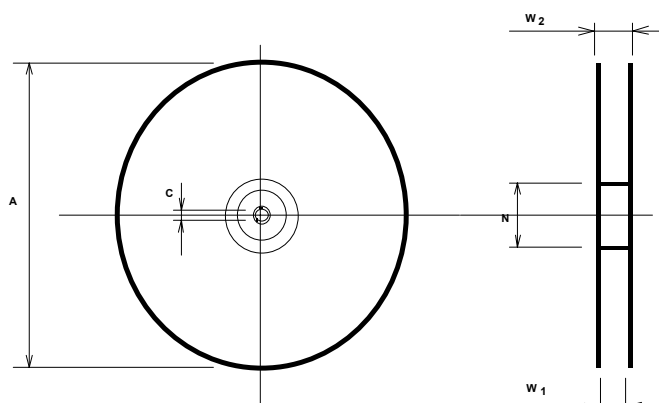
Tape & Reel:	IEC 286 - 3, with exception of value for N and minimum bending radius; tape type II, embossed carrier tape with top cover tape on the upper side;	
	max. pieces of filters per reel:	3000
	Reel of empty components at start:	min 300 mm
	Reel of empty components at start including leader:	min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

VI TELEFILTER**Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****E-Mail: tft@telefilter.com****Vectron International Inc.****267 Lowell Road****Hudson, NH 03051 / USA****Tel: (603) 598-0070 Fax: (603) 598-0075****E-Mail: vti@vtinh.com**

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

VI TELEFILTER**Filter Specification****TFS 433 R****4/5****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.	

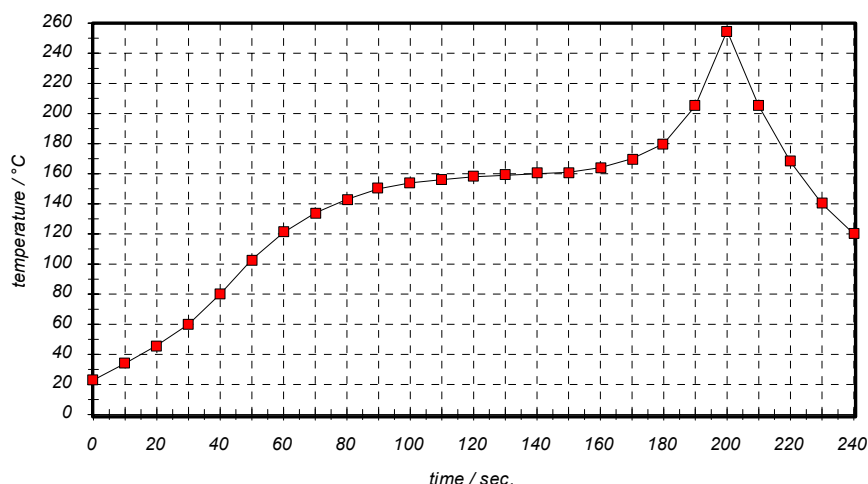
Chip-mount air reflow profile

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
 Potsdamer Straße 18
 D 14 513 TELTOW / Germany
 Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
 E-Mail: tft@telefilter.com

Vectron International Inc.
 267 Lowell Road
 Hudson, NH 03051 / USA
 Tel: (603) 598-0070 Fax: (603) 598-0075
 E-Mail: vti@vtinh.com

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

Version	Reason of Changes	Name	Date
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

VI TELEFILTER
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
E-Mail: tft@telefilter.com

Vectron International Inc.
267 Lowell Road
Hudson, NH 03051 / USA
Tel: (603) 598-0070 Fax: (603) 598-0075
E-Mail: vti@vtinh.com

VI TELEFILTER reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.