

VI TELEFILTER**Filter specification****TFS 228****1/5****Measurement condition**

Ambient temperature: 25 ± 5 °C
 Input power level: 5 ± 2 dBm
 terminating impedances
 Source: $220 \Omega \parallel -14.3 \text{ pF}$
 Load: $225 \Omega \parallel -13.5 \text{ pF}$

Characteristics

Remark:

Reference level for the relative attenuation a_{rel} of the TFS 228 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 1 dB filter attenuation level relative to the insertion loss a_e . 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		limit	
Insertion loss	$a_e = a_{min}$	5	dB	max.	8,0 dB
Nominal frequency	f_N	-			228,6 MHz
Relative attenuation	a_{rel}				
$f_N \dots\dots\dots f_N \pm 665$	kHz	0,4	dB	max.	1,0 dB
$f_N - 5,73 \text{ MHz} \dots f_N - 188$	MHz	45	dB	min.	40 dB
$f_N + 5,73 \text{ MHz} \dots f_N + 72$	MHz	45	dB	min.	40 dB
VSWR ratio	$f_N - 665 \text{ kHz} \dots f_N + 665 \text{ kHz}$	1,6 : 1		max.	2 : 1
Group delay mean value	$f_N - 665 \text{ kHz} \dots f_N + 665 \text{ kHz}$	710	ns	max.	± 20 ns
Group delay ripple GD	$f_N - 665 \text{ kHz} \dots f_N + 665 \text{ kHz}$	100	ns	max.	200 ns
Phase linearity	φ				
$f_N \pm 0,665 \text{ MHz}$		1,0	°rms	max.	2,5 °rms
Input power level		-		max.	+ 10 dBm
Operating temperature range					- 30 °C ... + 80 °C
Storage temperature range					- 40 °C ... + 85 °C
Temperature coefficient	TC	- 18	ppm/K 1)		

Note 1) - Δf (Hz) = TC (ppm/K) x (T - T₀) x F₀ (MHz)**Generated:** _____**Checked / approved:** _____

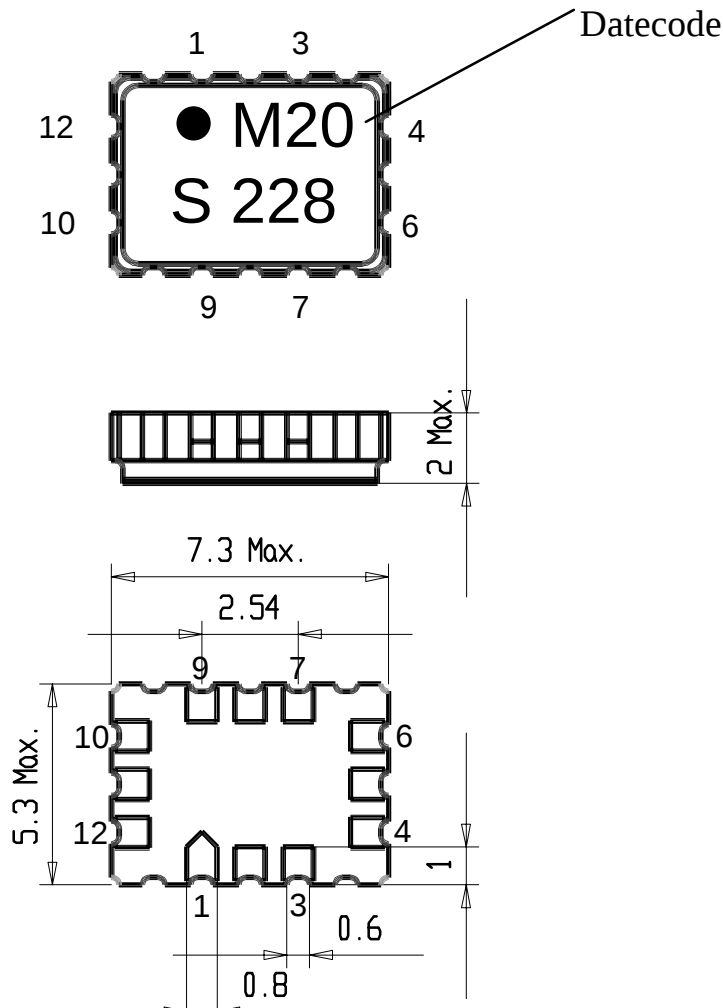
VI TELEFILTER
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30
E-Mail: tft@telefilter.com

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.

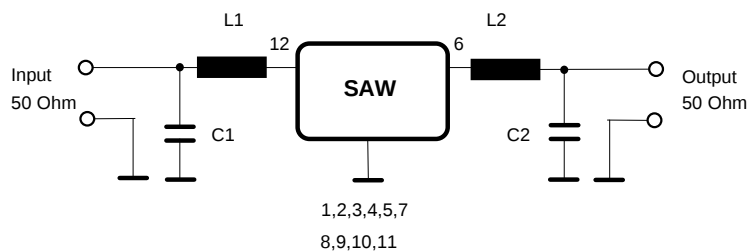
VI TELEFILTER**Filter specification****TFS 228****2/5****Construction and pin connection**

(All dimensions in mm)



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

Datecode:	Year+week
K	1998
L	1999
M	2000
...	

50 Ω test circuit

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 228****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): max. 2 times reflow process;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

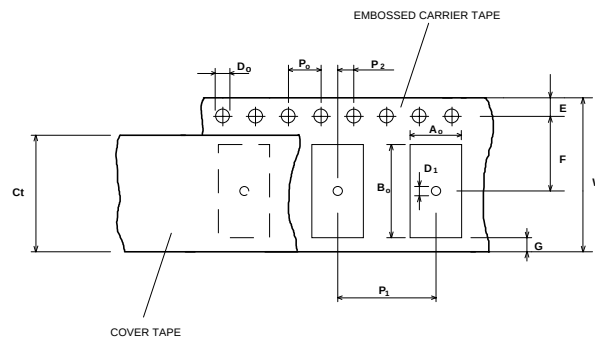
Packing:

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;

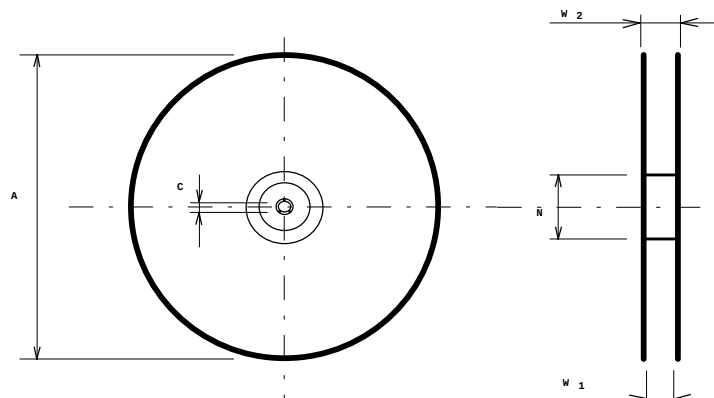
max. pieces of filters per reel: 3000
Reel of empty components at start: min 300 mm
Reel of empty components at start including leader: min 500 mm
Trailer min 300 mm

Tape (all dimensions in mm)

W : 16 ± 0,3
Po : 4 ± 0,1
Do : 1,5 + 0,5
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.

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

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

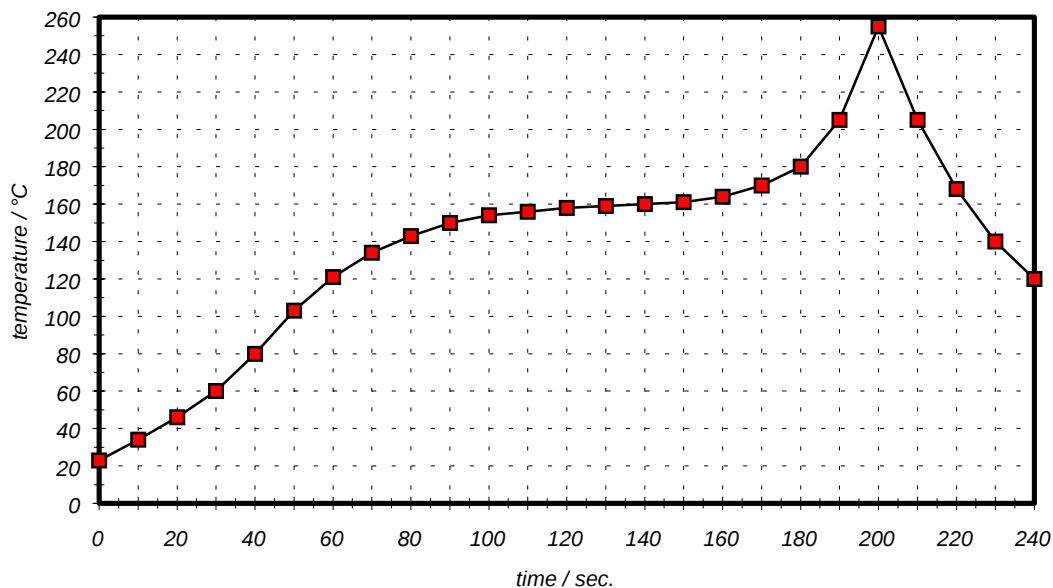


Table for temperature vs. time during the air reflow process

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

VI TELEFILTER		Filter specification	TFS 228	5/5
Version	Reason of Changes	Name	Date	
1.2	- pinning rotated	Steiner	15.05.2000	
1.3	- TTS suppression removed	Steiner	02.10.2000	
	- group delay mean value limits added			
	- stopband attenuation decrease removed			
	- new terminating impedances added			

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.