

Vectron International**Filter specification****TFS 216****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	760 Ω	$\parallel$ -1,8 pF
Output:	770 Ω	$\parallel$ -1,4 pF
External Coil:	135	nH

Characteristics**Remark:**

The reference level for the relative attenuation a_{rel} of the TFS 216 is the minimum of the pass band attenuation. This value is defined as the insertion loss a_e . The nominal frequency f_N is fixed at 216,9 MHz without any tolerance. The values of relative attenuation a_{rel} are guaranteed for the whole operating temperature range. The frequency shift of the filter in the operating temperature range is included in the production tolerance scheme.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	a_e	2,8	dB	max.	5	dB
Nominal frequency	f_N	216,914	MHz		216,9	MHz
Passband	PB	-		f_N	$\pm 60,0$	kHz
Pass band ripple		1	dB	max.	2	dB
Bandwidth	BW					
2 dB		330	kHz	min.	120	kHz
Relative attenuation	a_{rel}					
f_N	$\dots f_N \pm 60$ kHz	1	dB	max.	2	dB
$f_N \pm 216$ kHz	$\dots f_N \pm 400$ kHz	14	dB	min.	10	dB
$f_N \pm 400$ kHz	$\dots f_N \pm 600$ kHz	43	dB	min.	40	dB
	$f_N - 600$ kHz	57	dB	min.	50	dB
	$f_N + 600$ kHz	72	dB	min.	50	dB
$f_N \pm 600$ kHz	$\dots f_N \pm 3$ MHz	53**	dB	min.	45**	dB
	$f_N - 1,2$ MHz	77	dB	min.	50	dB
	$f_N + 1,2$ MHz	75	dB	min.	50	dB
$f_N - 30,0$ MHz	$\dots f_N - 3,0$ MHz	64	dB	min.	53	dB
$f_N + 3,0$ MHz	$\dots f_N + 30,0$ MHz	62	dB	min.	53	dB
Group delay ripple within PB ****		0,9	μ s	max.	1,2	μ s
Return loss within PB		13	dB	min.	10	dB
Input power level		-		max.	10	dBm
Operating temperature range	OTR	-		- 40 °C ... + 85 °C		
Storage temperature range		-		- 40 °C ... + 85 °C		
Frequency inversion temperature		26	°C	-		
Temperature coefficient of frequency	TC_f ***	-0,036	ppm/K ²	-		

*) 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.

**) two narrow band distortions acceptable in total

***) $\Delta f(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$

****) value has to be achieved in any 42kHz segment of the passband

Generated:**Checked / Approved:**

Vectron International GmbH & Co. KG

Potsdamer Straße 18

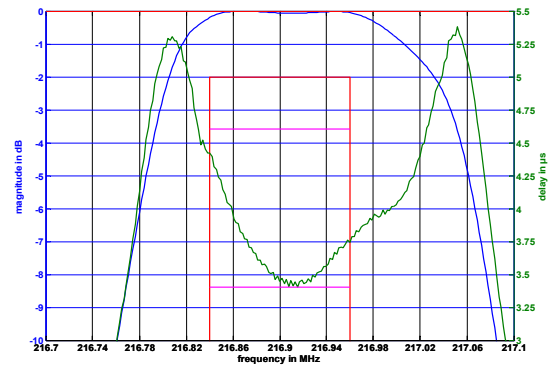
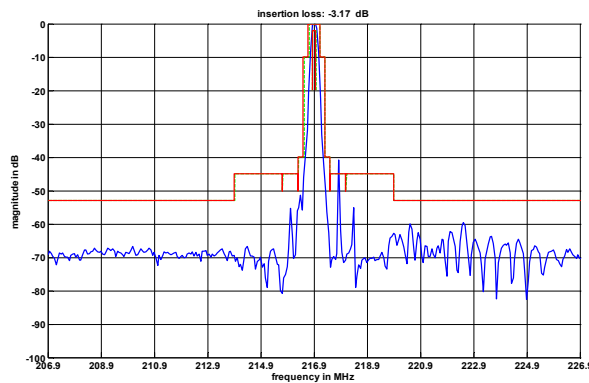
D 14 513 TELTOW / Germany

Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30

E-Mail: tft@vectron.com

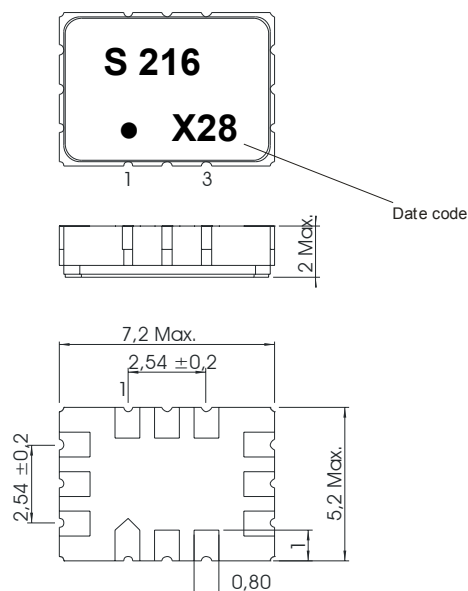
Vectron International GmbH & Co. KG reserves the right to make changes to the product(s) and/or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.

Filter characteristic



Construction and pin connection

(All dimensions in mm)



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

Date code: Year + week

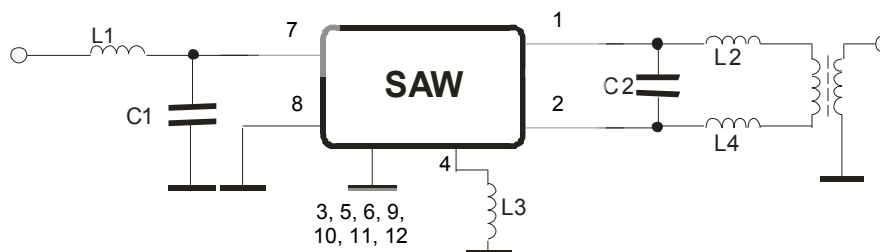
X 2009

A 2010

B 2011

...

50 Ω test circuit



Vectron International GmbH & Co. KG

Potsdamer Straße 18

D 14 513 TELTOW / Germany

Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30

E-Mail: tft@vectron.com

Vectron International GmbH & Co. KG 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.

Stability characteristics, reliability

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

1. Shock: 500g, 1 ms, half sine wave, 3 shocks each plane;
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5 g respectively, 1 octave per min, 10 cycles per plan, 3 plans;
DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 30 min. each / 10 cycles
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: three times max.;
for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;
5. ESD MIL-STD-883E using coupling network of ISO 10605 and EN 6100-4-2
HBM:250V;

This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

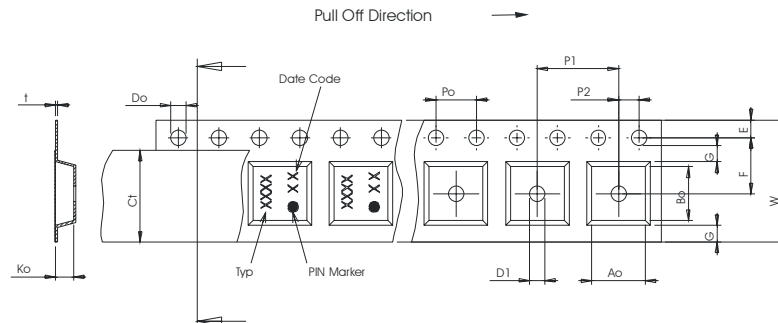
Packing

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;

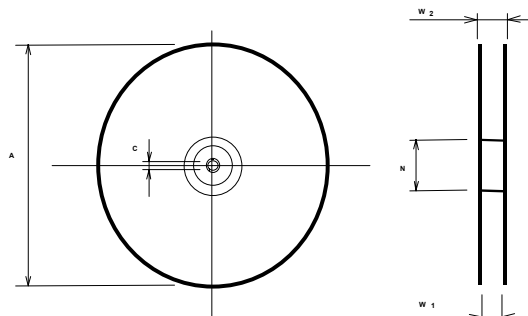
max. pieces of filters per reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

Tape (all dimensions in mm)

W	: 16,00 +0,3/-0,1
Po	: 4,00 ± 0,1
Do	: 1,50 +0,1/-0
E	: 1,75 ± 0,1
F	: 7,50 ± 0,1
G(min)	: 0,75
P2	: 2,00 ± 0,1
P1	: 8,00 ± 0,1
D1(min)	: 1,50
Ao	: 5,40 ± 0,1
Bo	: 7,60 ± 0,1
Ct	: 13,5 ± 0,1

**Reel (all dimensions in mm)**

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



The minimum bending radius is 45 mm.

Vectron International GmbH & Co. KG

Potsdamer Straße 18

D 14 513 TELTOW / Germany

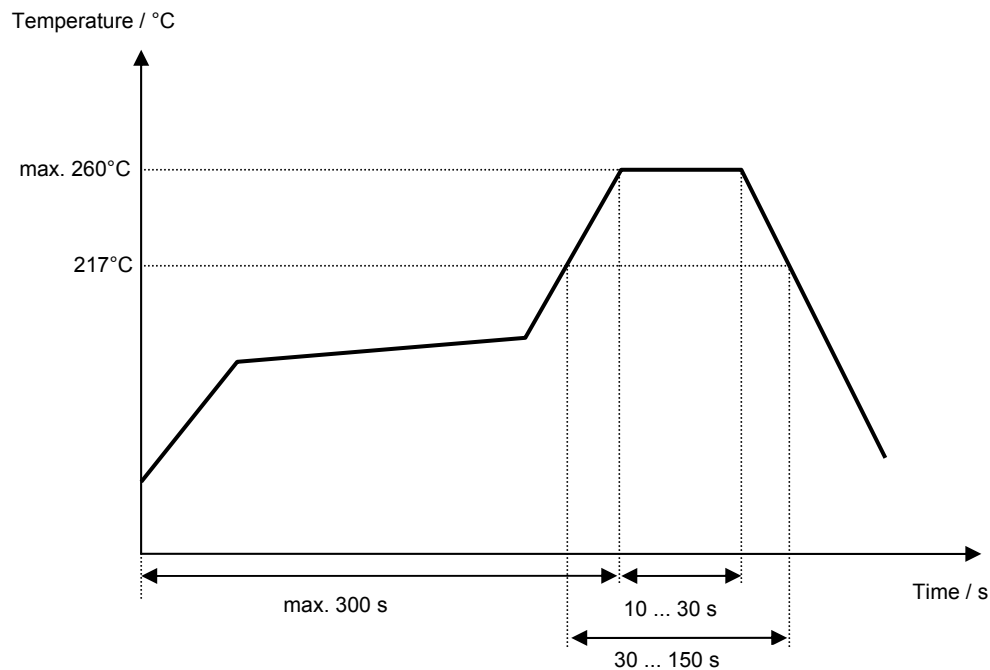
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30

E-Mail: tft@vectron.com

Vectron International GmbH & Co. KG 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.

Air reflow temperature conditions

Conditions	Exposure
Average ramp-up rate (30°C to 217°C)	less than 3°C/second
> 100°C	between 300 and 600 seconds
> 150°C	between 240 and 500 seconds
> 217°C	between 30 and 150 seconds
Peak temperature	max. 260°C
Time within 5°C of actual peak temperature	between 10 and 30 seconds
Cool-down rate (Peak to 50°C)	less than 6°C/second
Time from 30°C to Peak temperature	no greater than 300 seconds

Chip-mount air reflow profile**Vectron International GmbH & Co. KG****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****E-Mail: tft@vectron.com**

Vectron International GmbH & Co. KG 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.

Vectron International**Filter specification****TFS 216****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Strehl	02.02.2009
1.1	- Add return loss - Change relative attenuation	Strehl	16.02.2009
1.2	- Change definition of group delay ripple	Martens	07.07.2009
2.0	- Change from development specification to filter specification - Add terminating impedance, typical values and filter characteristic	Dr. Wall	15.07.2009

Vectron International GmbH & Co. KG**Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30****E-Mail: tft@vectron.com**

Vectron International GmbH & Co. KG 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.