

Vectron International**Filter specification****TFS 211-1****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	10	dBm
Terminating impedance:		
Input:	280 Ω -3,7 pF	
Output:	280 Ω -3,7 pF	
External Coil:	127 nH	

The filter supports bursted GMSK and EDGE modulation.

Characteristics**Remark:**

The reference level for the relative attenuation a_{rel} of the TFS 211-1 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 211 MHz without any tolerance. The given values for both the relative attenuation a_{rel} and the group delay ripple have to be achieved 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 for the centre frequency f_c .

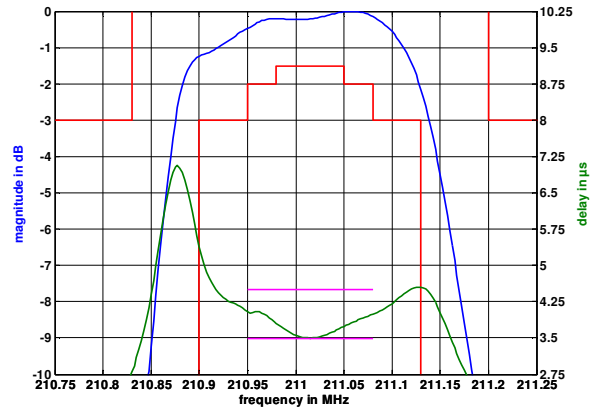
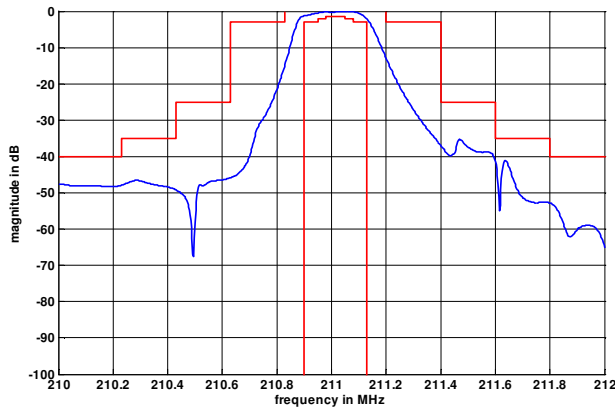
D a t a		typ. value		tolerance / limit		
Insertion loss (Reference level)	$a_e = a_{min}$	4,5	dB	max	6,5	dB
Centre frequency	f_c	211,0	MHz	211,0 MHz ± 25 kHz		
Nominal frequency	f_N	211,0 MHz				
3dB Bandwidth		270	kHz	min	215	kHz
Relative attenuation	a_{rel}					
f_N	... $f_N \pm 50$ kHz	-		max	1,5	dB
$f_N \pm 50$ kHz	... $f_N \pm 80$ kHz	-		max	2	dB
$f_N \pm 80$ kHz	... $f_N \pm 100$ kHz	-		max	3	dB
$f_N \pm 200$ kHz	... $f_N \pm 400$ kHz	-		min	3	dB
$f_N \pm 400$ kHz	... $f_N \pm 600$ kHz	-		min	25	dB
$f_N \pm 600$ kHz	... $f_N \pm 800$ kHz	-		min	35	dB
$f_N \pm 800$ kHz	... $f_N \pm 100$ MHz	-		min	40	dB
Group delay at f_N	GD	3,4	µs	max	5	µs
Group delay ripple	$f_N \pm 50$ kHz	-		max	1,0	µs
Out of band intermodulation						
Input signals at 211,8 and 212,6 MHz at +10 dBm		-71	dBm	-		
Input signals at 210,2 and 209,4 MHz at +10 dBm		-71	dBm	-		
Input power level		-		max	7	dBm
Return loss (S11/S22)	$f_N \pm 100$ kHz			min	10	dB
Operating temperature range				- 5 °C ... + 80 °C		
Storage temperature range				- 40 °C ... + 85 °C		
Temperature coefficient of frequency		ca. - 0,036	ppm/K			
Frequency inversion temperature		+ 20	°C			

Generated:**Checked / Approved:**

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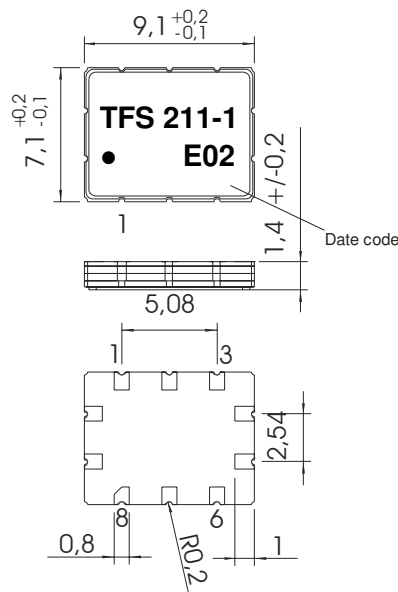
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Filter characteristic



Construction and pin connection

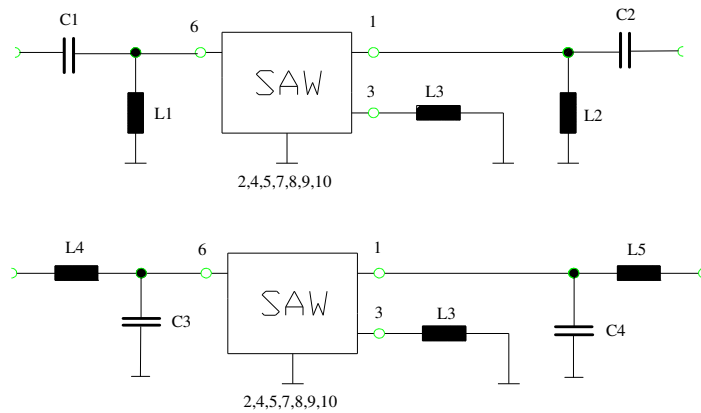
(All dimensions in mm)



1	Output
2	Ground
3	External Coil
4	Ground
5	Ground
6	Input
7	Ground
8	Ground
9	Ground
10	Ground

Date code: Year + week
 E 2014
 F 2015
 G 2016
 ...

50 Ω Test circuit



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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 g respectively, 1 octave per min, 10 cycles per plane, 3 planes; DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 15 min. each / 100 cycles
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: three times max.;
for temperature conditions, see page 4: "Air reflow temperature conditions"

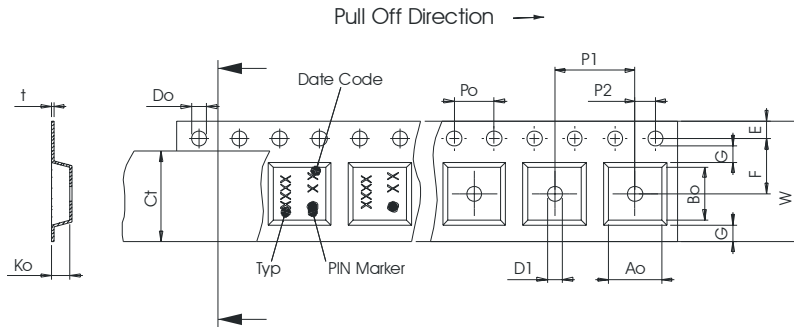
This filter is RoHS compliant (2011/65/EU)

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 peer reel: | 2000 |
| reel of empty components at start: | min. 300 mm |
| reel of empty components at start including leader: | min. 500 mm |
| trailer: | min. 300 mm |

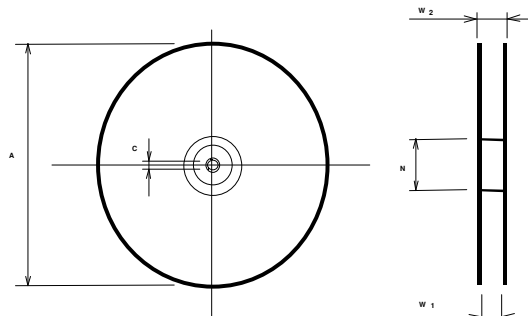
Tape (all dimensions in mm)

- W : 16,00 ± 0,3
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 7,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50 +0,1/-0
- Ao : 7,60 ± 0,10
- Bo : 9,60 ± 0,10
- Ct : 13,5



Reel (all dimensions in mm)

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



The minimum bending radius is 45 mm.

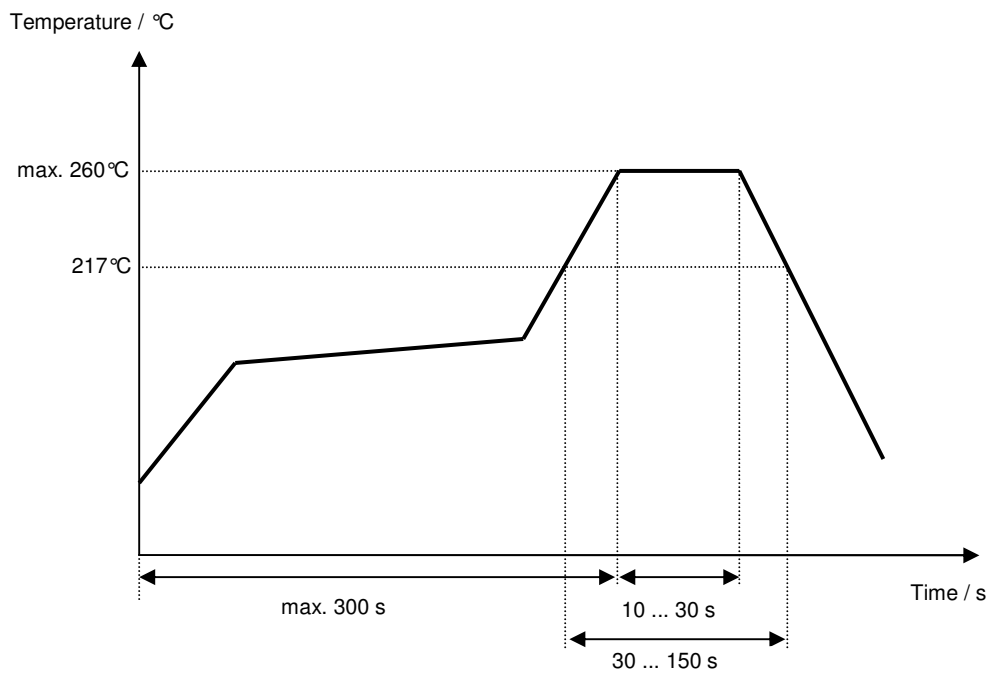
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Air reflow temperature conditions

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



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History

Version	Reason of Changes	Name	Date
1.3	Change date code to weekly date code. Change filter labelling. Correct tape and reel information.	Dr. Wall	13.07.2000
1.4	Change stop band attenuation and operating temperature range according to customer's request.	Dr. Wall	20.12.2000
1.5	Change stop band attenuation in frequency range $f_N \pm 600$ kHz ... $f_N \pm 800$ kHz according to customer requests. Add maximum input power. Add support of bursted GMSK and EDGE modulation.	Dr. Wall	22.01.2001
1.6	Change power handling, intermodulation and operating temperature range according to customer's request.	Dr. Wall	15.02.2001
1.7	Change input power level for final test from 0 dBm to 10 dBm	Dr. Wall	27.02.2001
1.8	ESD limits added	Strehl	03.09.2004
1.9	Change construction and pin connection. Add filter characteristic. Change stability characteristics to stability characteristics, reliability	Channaa	18.11.2005
1.10	maximum input power updated	Kortenbeutel	06.01.2014