

Vectron International**Filter specification****TFS 167G****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	325 Ω -8,0 pF	
Output:	325 Ω -8,0 pF	

Characteristics**Remark:**

The reference level for the relative attenuation a_{rel} of the TFS 167G is the maximum of the pass band attenuation a_{max} . The maximum of the pass band attenuation a_{max} 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 167,0 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 for the centre frequency f_c .

D a t a		typ. value		tolerance / limit
Insertion loss (reference level)	a_e	1,4	dB	max. 3,0 -
Nominal frequency	f_N	-		167 MHz
Pass band	PB	318	kHz	$f_N \pm 75$ kHz
Amplitude variation in PB		-		max. 1,0 dB
Amplitude ripple in PB	p-p	-		max. 0,5 dB
Relative attenuation	a_{rel}			
$f_N \pm 0,4$ MHz ... $f_N \pm 0,6$ MHz		9	dB	min. 5 dB
$f_N \pm 0,6$ MHz ... $f_N \pm 20,0$ MHz		18	dB	min. 10 dB
$f_N - 20$ MHz ... $f_N - 137$ MHz		40	dB	min. 30 dB
$f_N + 20$ MHz ... $f_N + 103$ MHz		40	dB	min. 30 dB
$f_N + 103$ MHz ... $f_N + 105$ MHz		65	dB	min. 40 dB
$f_N + 105$ MHz ... $f_N + 833$ MHz		40	dB	min. 30 dB
Absolute group delay in PB		1,71	µs	max. 2,0 µs
Group delay ripple in PB		240	ns	max. 300 ns
Input return loss		18,0	dB	max. 10,0 dB
Output return loss		20,0	dB	min. 10,0 dB
Intermodulation ratio For two -20dBm input signals @ $f_N + 0,800$ MHz and $f_N + 1,600$ MHz @ $f_N - 0,800$ MHz and $f_N - 1,600$ MHz		-		min. 100 dB
Input power level		-		max. 7 dBm
Operating temperature range	OTR	-		- 5 °C ... + 85 °C
Storage temperature range		-		- 40 °C ... + 90 °C
Frequency inversion temperature		40	°C	
Temperature coefficient of frequency	TC_f **	-0,032	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.

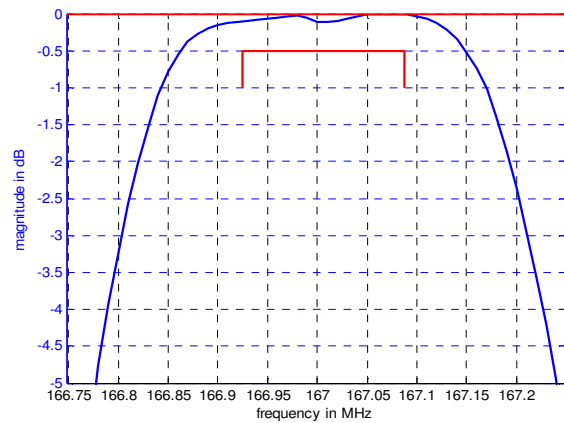
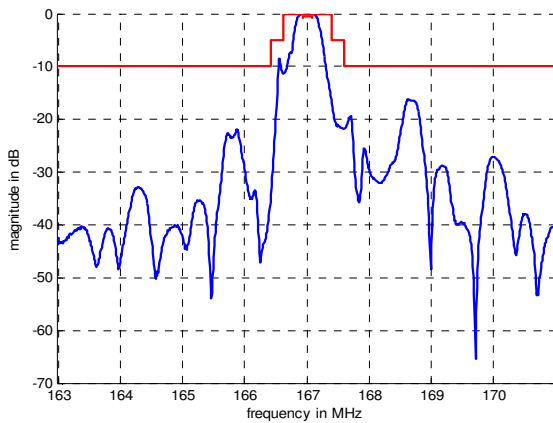
***) $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}^2) \times (T - T_0)^2 \times f_{T0}(\text{MHz})$.

Generated:**Checked / Approved:**

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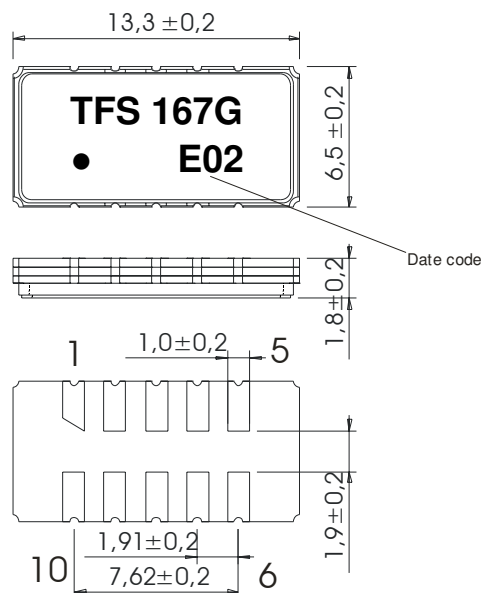
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Filter characteristic



Construction and pin connection

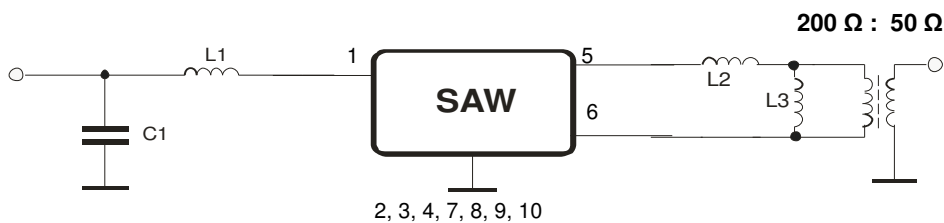
(All dimensions in mm)



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

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

50 Ohm 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"

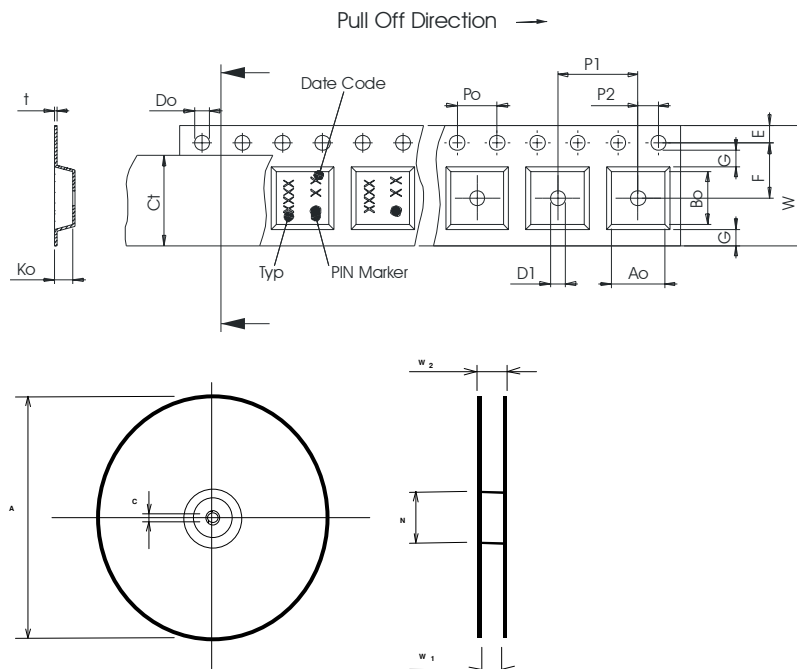
This filter is RoHS compliant (2011/65/EU)

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 per reel: | 1700 |
| 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 : 24,00 +0,30/-0,10
- Po : 4,00 ± 0,1
- Do : 1,50 +0,1/-0
- E : 1,75 ± 0,10
- F : 11,50 ± 0,10
- G(min) : 0,60
- P2 : 2,00 ± 0,1
- P1 : 12,00 ± 0,1
- D1(min) : 1,50
- Ao : 7,10 ± 0,10
- Bo : 13,90 ± 0,10
- Ct : 21,5 ± 0,1



The minimum bending radius is 45 mm.

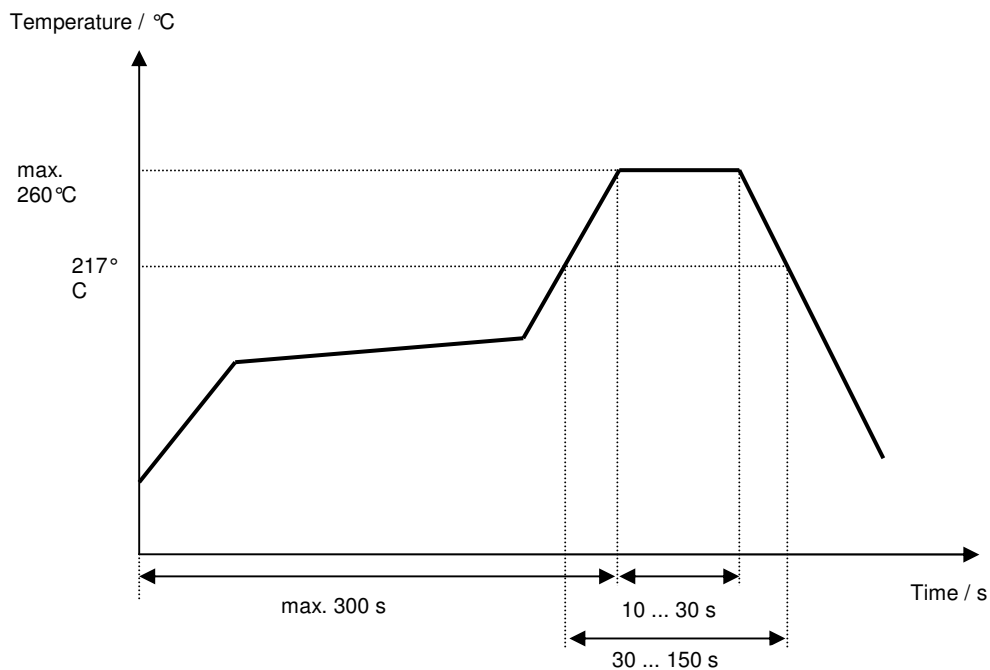
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Air reflow temperature conditions

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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Version	Reason of Changes	Name	Date
1.0	generate development specification according to customer requirements	Dr. S. Sabah	24.04.2003
2.0	generate Filter specification; add of typ. values and terminating impedance	Dr. S. Sabah	23.07.2003
2.1	change of relative attenuation	Roizengaft	07.11.2003
2.2	change of relative attenuation, change of definition of insertion loss, add amplitude ripple in passband	Roizengaft	14.11.2003
2.3	add filter characteristic, add reliability	S. Channaa	01.08.2007
2.4	maximum input power updated	Kortenbeutel	06.01.2014