

Vectron International**Filter specification****TFS 160U****1/5****Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
source impedance (balanced):	200 Ω	
load impedance (balanced):	200 Ω	
Terminating impedance: *		
Input:	310 Ω -4.8 pF	
Output:	358 Ω -5.3 pF	

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS160U 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 160,5 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	14,4	dB	max.	15,5 dB
Nominal frequency	f_N				160,5 MHz
Passband	PB			$f_N \pm$	8,5 MHz
Pass band ripple		0,2	dB	max.	2,0 dB
Bandwidth					
3 dB		20	MHz	min.	17 MHz
Relative attenuation	a_{rel}				
$f_N - 8,5$ MHz ... $f_N + 8,5$ MHz		2,6	dB	max.	3 dB
$f_N - 50$ MHz ... $f_N - 35$ MHz		49	dB	min.	40 dB
$f_N \pm 35$ MHz ... $f_N \pm 25$ MHz		42	dB	min.	30 dB
$f_N \pm 25$ MHz ... $f_N \pm 15$ MHz		12	dB	min.	10 dB
$f_N + 35$ MHz ... $f_N + 50$ MHz		46	dB	min.	40 dB
Group delay ripple in $f_N \pm 4$ MHz *)	GDR	6	ns	max.	± 8 ns
Group delay ripple in PB *)	GDR	6	ns	max.	± 9 ns
Group delay variation (unit to unit *) ,**)				max.	$\pm 2,5$ ns
Return loss within PB		13	dB	min.	6 dB
Input power level				max.	10 dBm
Operating temperature range	OTR				- 40 °C ... + 85 °C
Storage temperature range					- 45 °C ... + 85 °C
Temperature coefficient of frequency	TC_f ***)	-94	ppm/K		

*) time gating window 0 ... 0.5 μ s

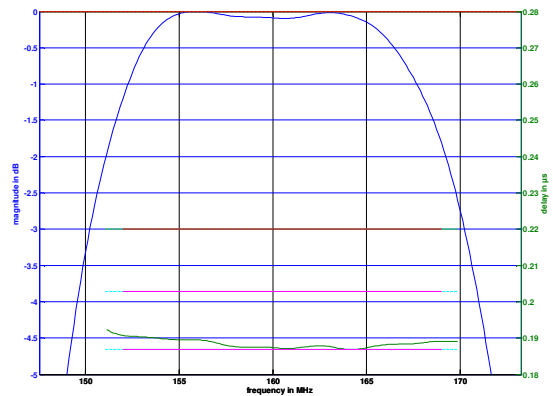
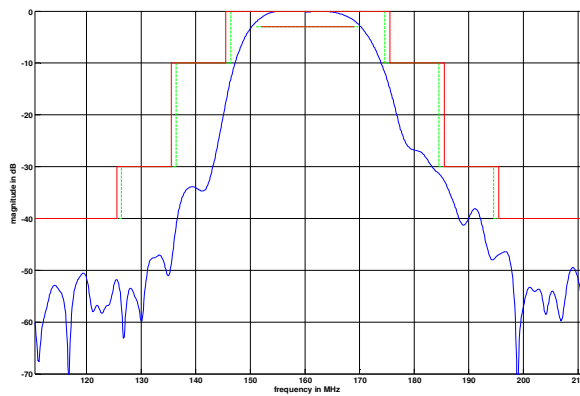
**) Measured at centre frequency, and averaged value to account for unit to unit variation and different bandwidth variants

) $\Delta f_c(\text{Hz}) = TC_f(\text{ppm/K}) \times (T - T_o) \times f_{CAT}(\text{MHz})$.**Generated:*Checked / Approved:**

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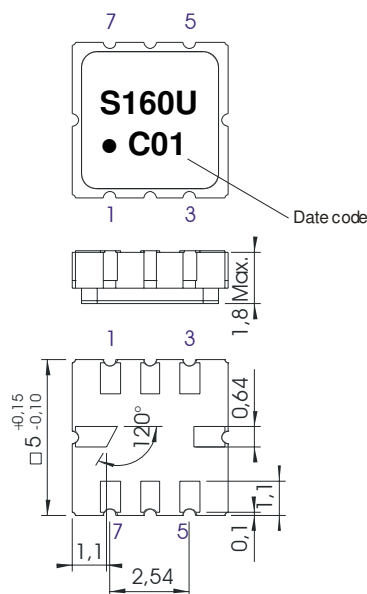
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Filter characteristic



Construction and pin connection

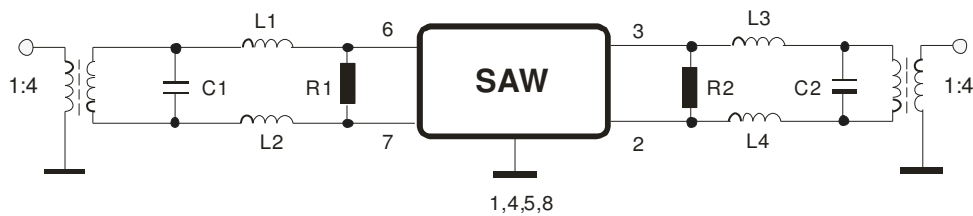
(All dimensions in mm)



- 1 Ground
- 2 Output 2
- 3 Output 1
- 4 Ground
- 5 Ground
- 6 Input 2
- 7 Input 1
- 8 Ground

Date code: Year + week
 C 2012
 D 2013
 E 2014
 ...

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 5 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 / 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;

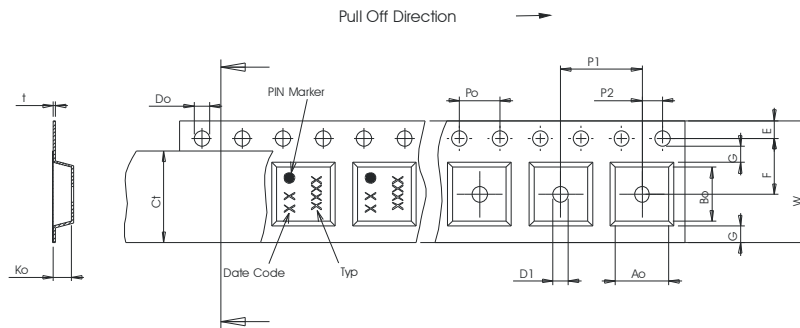
This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

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 |

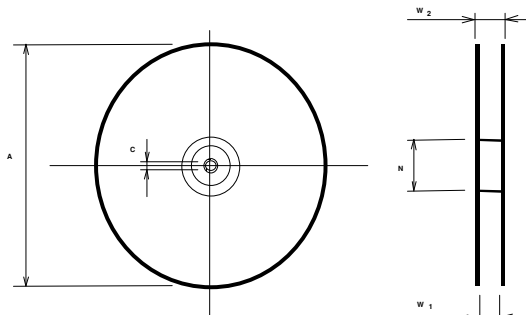
Tape (all dimensions in mm)

- W : 12,00
- Po : 4,00
- Do : 1,50
- E : 1,75
- F : 5,50
- G(min) : 0,75
- P2 : 2,00
- P1 : 8,00
- D1(min) : 1,50
- Ao : 5,30
- Bo : 5,30
- Ct : 9,2 ± 0,1



Reel (all dimensions in mm)

- A : 330
- W1 : 12,4 +2/-0
- W2(max) : 18,4
- N(min) : 50
- C : 13,0



The minimum bending radius is 45 mm.

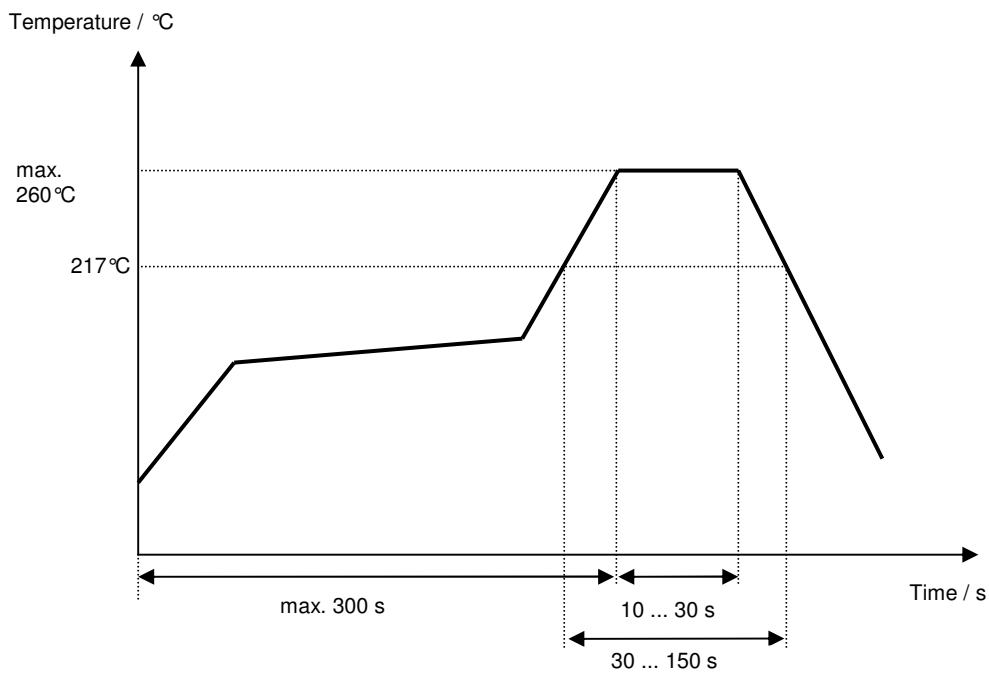
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Air reflow temperature conditions

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
1.0	- Generation of development specification	Chilla	14.02.2011
1.1	- Changed pin connection	Chilla	21.06.2011
1.2	- Created filter specification - Added terminating impedance - Added typical values - Changed triple transit delay - Added filter characteristic - Added test circuit - Changed packing	Chilla	11.01.2012
1.3	- Changed input power level	Chilla	27.03.2012
2.0	- Added time gating window - Removed triple transit level and triple transit delay	Chilla	02.11.2012