Measurement condition

Ambient temperature T_A:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	570 Ω || -1.2 pF	
Output:	570 Ω || -1.2 pF	
External Coil:	97	nH

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS400T 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 400 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 within 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
Nominal frequency	f_N	-			400.000	MHz
Centre frequency	f_C	400.008	MHz			
Guaranteed 1.5 dB signal band width	BW	270	kHz	min.	160	kHz
Relative attenuation	a_{rel}					
$f_N \pm$ 80 kHz		0.5	dB	max.	1.5	dB
$f_N \pm$ 200 kHz ... $f_N \pm$ 400 kHz		5	dB	min.	2	dB
$f_N \pm$ 400 kHz ... $f_N \pm$ 600 kHz		30	dB	min.	25	dB
$f_N \pm$ 600 kHz ... $f_N \pm$ 1 MHz		50...70	dB	min.	40	dB
f_N - 1 MHz ... f_N - 13 MHz		57	dB	min.	50	dB
f_N + 1 MHz ... f_N + 2 MHz		65	dB	min.	50	dB
f_N + 2 MHz ... f_N + 5 MHz		53	dB	min.	47	dB
$f_N \pm$ 5 MHz ... $f_N \pm$ 13 MHz		56	dB	min.	50	dB
Group delay ripple $f_N \pm$ 70 kHz	GD	0.5	µs	max.	2	µs
Input power level ***		-		max.	17	dBm
Operating temperature range				- 10 °C ... + 55		°C
Temperature coefficient of frequency	TC_f **	− 0.030	ppm/K²			
Frequency inversion temperature		+ 7	°C			

*)   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.

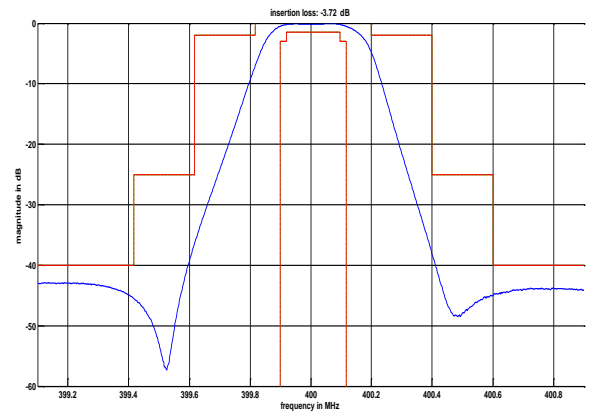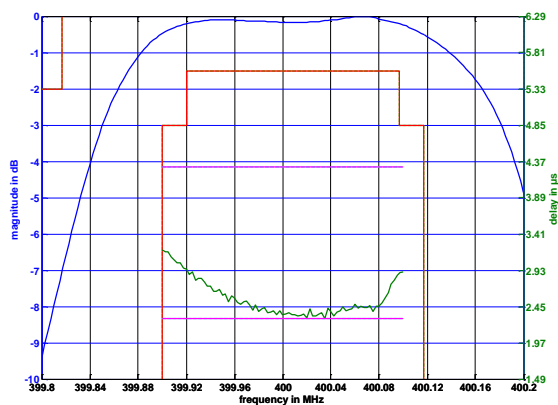**) $\Delta f = TC_f (T - T_0)^2 f_N$

***) Input power level for operation with continuous wave signal at 400 MHz for 15 years at 55°C

Generated:

Checked / Approved:

Filter characteristic

Construction and pin connection

(All dimensions in mm)

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

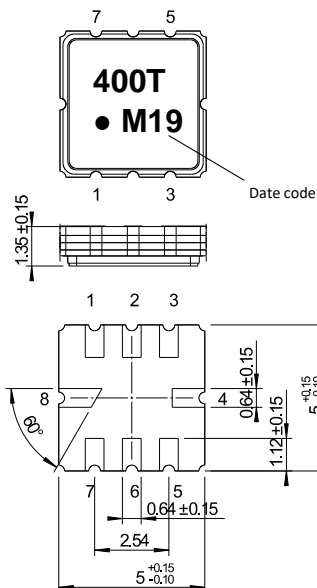| Date code:	Year + week
M	2020
N	2021
P	2022
...	

50 Ω Test circuit
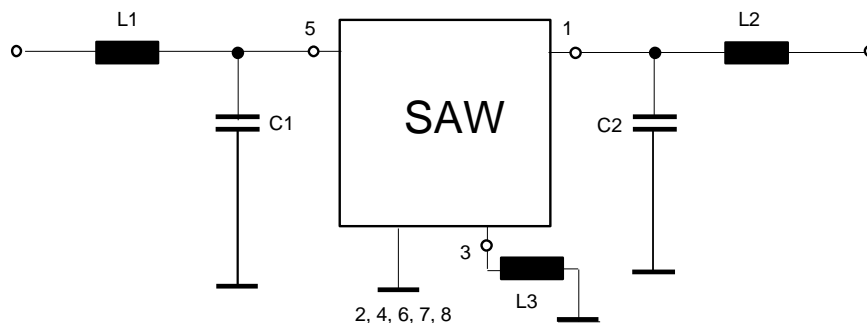
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Stability characteristics, reliability

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

1. Shock:	500 g, 1 ms, half sine wave, 3 shocks each plane; DIN IEC 60068 T2 - 27
2. Vibration:	10 Hz to 2000 Hz, 0.35 mm or 5 g respectively, 1 octave per min, 10 cycles per plane, 3 planes; DIN IEC 60068 T2 - 6
3. Change of temperature:	-55 °C to 125 °C / 15 min. each / 100 cycles DIN IEC 60068 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. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

This filter is RoHS compliant (2011/65/EU+2015/863/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;	
	reel of empty components at start:	min. 300 mm
	reel of empty components at start including leader:	min. 500 mm
	trailer:	min. 300 mm

Pull Off Direction

Tape (all dimensions in mm)
W	:	12.00 +0.3/-0.1
Po	:	4.00 ±0.1
Do	:	1.50 ±0.10
E	:	1.75 ±0.1
F	:	5.50
G(min)	:	0.75
P2	:	2.00 ±0.1
P1	:	8.00
D1(min)	:	1.50
Ao	:	5.30 ±0.1
Bo	:	5.30 ±0.1
Ct	:	9.2 ±0.1
Ko	:	2.10 ±0.1
t	:	0.30 ±0.05

Reel (all dimensions in mm)
A	:	330 or 180
W1	:	12.4 +2/-0
W2(max)	:	18.40
N(min)	:	50.00
C	:	13.0
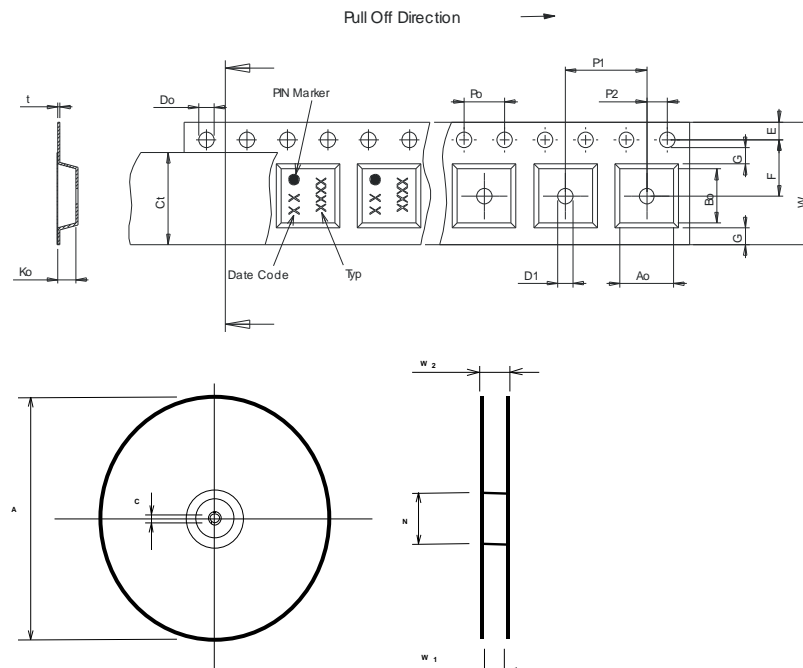
The minimum bending radius is 45 mm.

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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
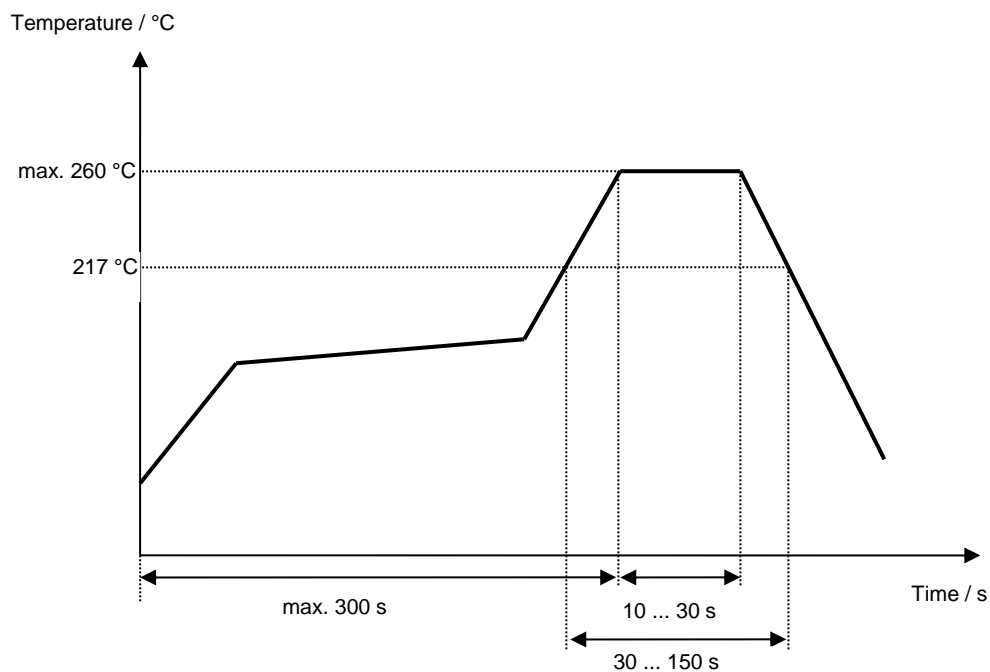
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History

Version	Reason of Changes	Name	Date
1.0	- Generation of specification	Dr. Wall	28.07.2000
1.1	- Add values for termination impedance and coupling coil - Add typical filter data - Change relative attenuation in stop band - Correct pinning and matching information	Dr. Wall	11.10.2000
1.2	- Header of page one and page two corrected	Dr. Wall	02.11.2000
1.3	- Maximum input power of 15 dBm added. - Remark concerning termination impedance added. - Remark concerning temperature of centre frequency added.	Dr. Wall	03.06.2002
1.4	- Reworked specification according to new specification layout	Martens	29.04.2011
1.5	- Change company name from "Vectron International GmbH & Co. KG" to "Vectron International GmbH" - Change maximum input power from 15 dBm to 10 dBm - Define measurement conditions for maximum input power	Dr. Wall	30.05.2013
2.0	- Code name changed from TFS400F to TFS400T for high power version - RoHS compliance updated	Dr. Wall	16.08.2013
3.0	- Change frequency inversion temperature	Bonnen	04.05.2020