

**VI TELEFILTER**

**Filter specification**

**TFS 456M**

**Measurement condition**

Ambient temperature: 23 °C  
 Input power level: 0 dBm  
 Terminating impedance: \*  
     Input: 343 Ω || -4,8 pF  
     Output: 458 Ω || -3,6 pF

**Characteristics**

**Remark:**

The reference level for the relative attenuation  $a_{rel}$  of the TFS 456M 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 456,0 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	
<b>Insertion loss</b> (reference level)	$a_e = a_{min}$	9,0	dB	max.	13,0 dB
<b>Nominal frequency</b>	$f_N$	-			456,0 MHz
<b>Passband</b>		-			$f_N \pm 3,4$ MHz
<b>Pass band ripple</b>		0,6	dB	max.	1,0 dB
<b>Relative attenuation</b>	$a_{rel}$				
$f_N - 3,4$ MHz ... $f_N + 3,4$ MHz		0,6	dB	max.	1 dB
$f_N - 3,7$ MHz ... $f_N + 3,7$ MHz		1	dB	max.	3 dB
$f_N - 455$ MHz ... $f_N - 200$ MHz		60	dB	min.	30 dB
$f_N - 200$ MHz ... $f_N - 44$ MHz		50	dB	min.	40 dB
$f_N - 44$ MHz ... $f_N - 36$ MHz		52	dB	min.	45 dB
$f_N - 36$ MHz ... $f_N - 6,7$ MHz		45	dB	min.	40 dB
$f_N + 6,7$ MHz ... $f_N + 36$ MHz		44	dB	min.	40 dB
$f_N + 36$ MHz ... $f_N + 44$ MHz		52	dB	min.	45 dB
$f_N + 44$ MHz ... $f_N + 200$ MHz		52	dB	min.	40 dB
$f_N + 200$ MHz ... $f_N + 490$ MHz		60	dB	min.	30 dB
<b>Absolute Group Delay</b>	at $f_N$	0,65	µs	max.	1 µs
<b>Group delay ripple</b>		70	ns	max.	250 ns
<b>Return loss within PB</b>		13	dB	min.	10 dB
<b>Input power level</b>		-		max.	15 dBm
<b>Operating temperature range</b>	OTR	-			- 40 °C ... + 85 °C
<b>Storage temperature range</b>		-			- 45 °C ... + 85 °C
<b>Temperature coefficient of frequency</b>	$TC_f$ **	-18	ppm/K		

\*) 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.

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

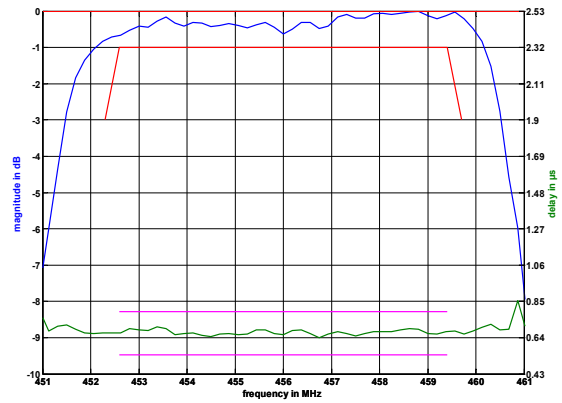
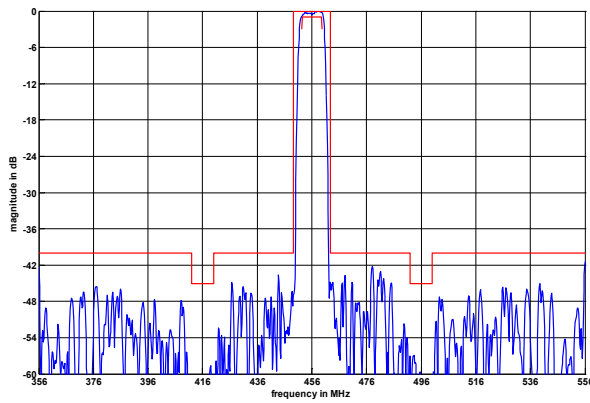
**Generated:**

**Checked / Approved:**

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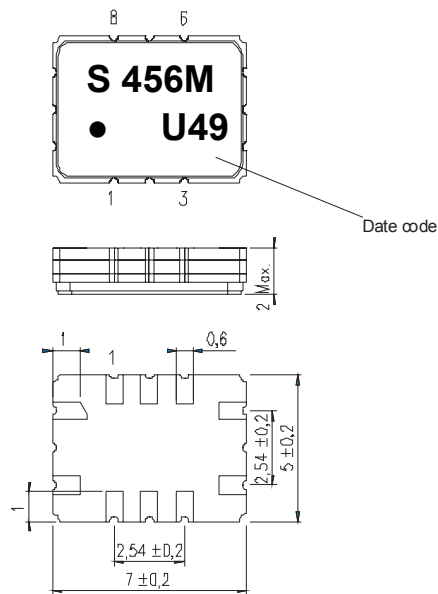
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**Filter characteristic**



**Construction and pin connection**

(All dimensions in mm)

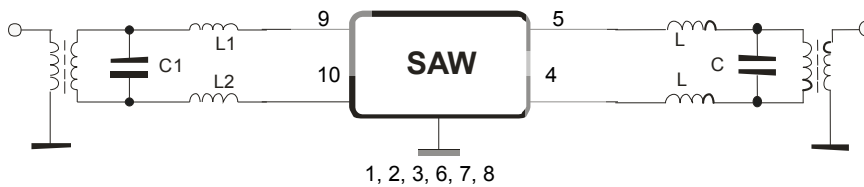


1	Ground
2	Ground
3	Ground
4	Output
5	Output
6	Ground
7	Ground
8	Ground
9	Input
10	Input

Date code: Year + week

U	2006
V	2007
W	2008
...	

**200 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 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;

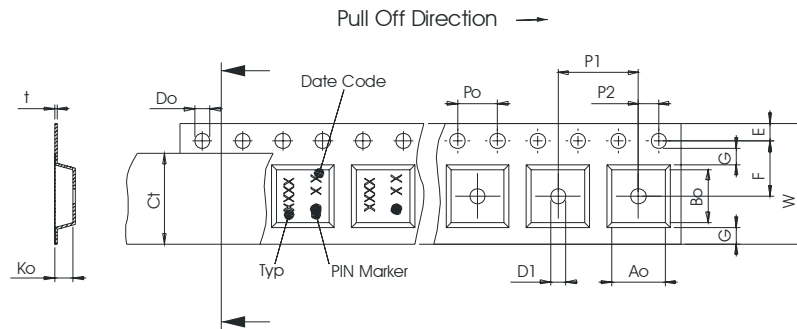
This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

**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 |

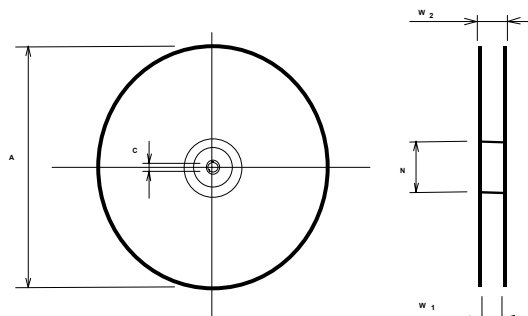
**Tape (all dimensions in mm)**

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

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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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**VI TELEFILTER****Filter specification****TFS 456M****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification	Strehl	11.08.2005
1.1	- terminating impedance, typical values and filter characteristic added	Pfeiffer	09.09.2005
1.2	- change of terminating impedance, typical values and filter characteristic	Pfeiffer	02.06.2006
1.3	- matching drawing changed (pin connection)	Pfeiffer	20.09.2006
1.4	- change of absolute group delay	Pfeiffer	29.09.2006
1.5	- change input power level and stability characteristics	Strehl	08.12.2006

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