

**VI TELEFILTER**

**Filter specification**

**TFS 456E**

**1/5**

**Measurement condition**

Ambient temperature:	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	780 Ω	-4,0 pF
Output:	660 Ω	-4,0 pF

**Characteristics**

Remark:

Reference level for the relative attenuation  $a_{rel}$  of the TFS 456E 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 1dB filter attenuation level relative to the insertion loss  $a_e$ . The nominal frequency  $f_N$  is fixed on 456,0 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 also 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  $f_c$ .

<b>D a t a</b>		<b>typ. value</b>		<b>tolerance / limit</b>	
<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>Centre frequency</b>	$f_c$	456,05	MHz		-
<b>Passband</b>		-			$f_N \pm 1,575$ MHz
<b>Pass band ripple</b>		0,3	dB	max.	1,0 dB
<b>1dB bandwidth</b>		3,6	MHz	min.	3,15 MHz
				max.	3,75 MHz
<b>Relative attenuation</b>	$a_{rel}$				
$f_N - 200$ MHz ... $f_N - 96$ MHz		65	dB	min.	40 dB
$f_N - 96$ MHz ... $f_N - 47$ MHz		60	dB	min.	50 dB
$f_N - 47$ MHz ... $f_N - 3,5$ MHz		43	dB	min.	40 dB
$f_N + 3,5$ MHz ... $f_N + 192$ MHz		43	dB	min.	40 dB
$f_N + 192$ MHz ... $f_N + 200$ MHz		80	dB	min.	30 dB
<b>Group delay ripple</b>		150	ns	max.	200 ns
<b>Return loss within PB</b>		15	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>Frequency inversion temperature</b>		30	°C		
<b>Temperature coefficient of frequency</b>	$TC_f$ **	-0,04	ppm/K <sup>2</sup>		

\*) 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.

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

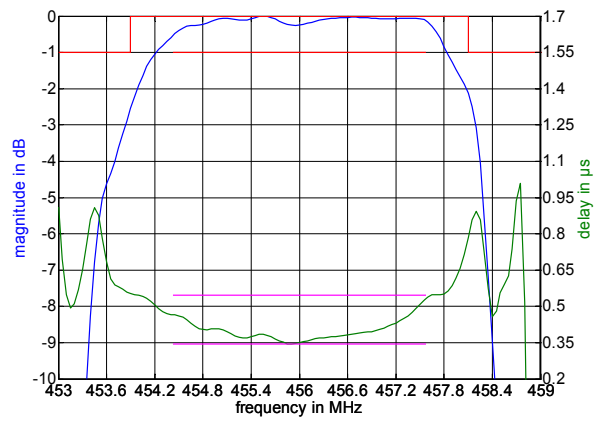
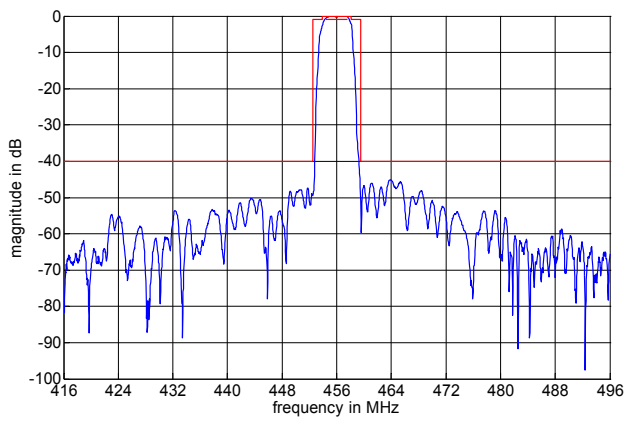
**Generated:**

**Checked / Approved:**

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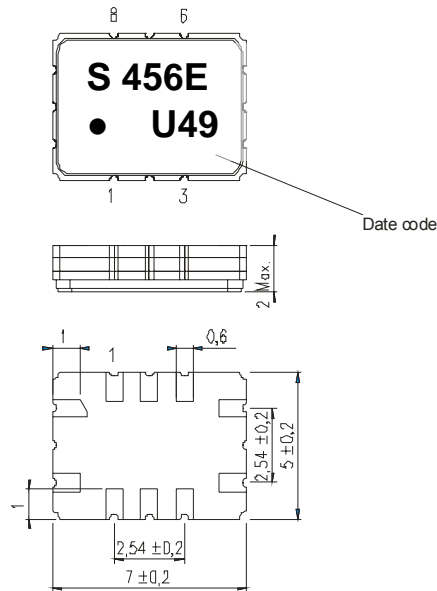
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**Filter characteristic**



**Construction and pin connection**

(All dimensions in mm)

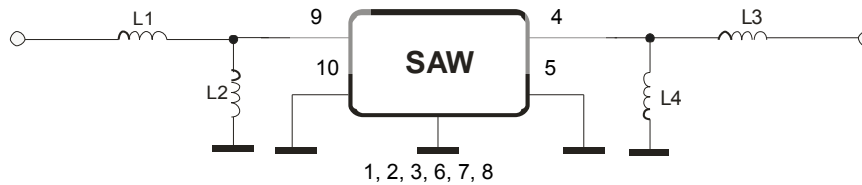


- 1 Ground
- 2 Ground
- 3 Ground
- 4 Output
- 5 Output RF Return / Output
- 6 Ground
- 7 Ground
- 8 Ground
- 9 Input
- 10 Input RF Return / Input

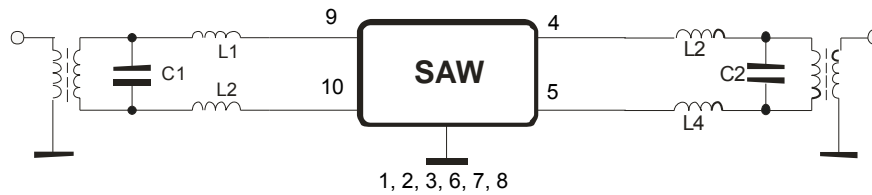
Date code: Year + week  
 U 2006  
 V 2007  
 W 2008  
 ...

**50 Ohm Test circuit**

**single ended:**



**balanced:**



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**Stability characteristics, reliability**

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

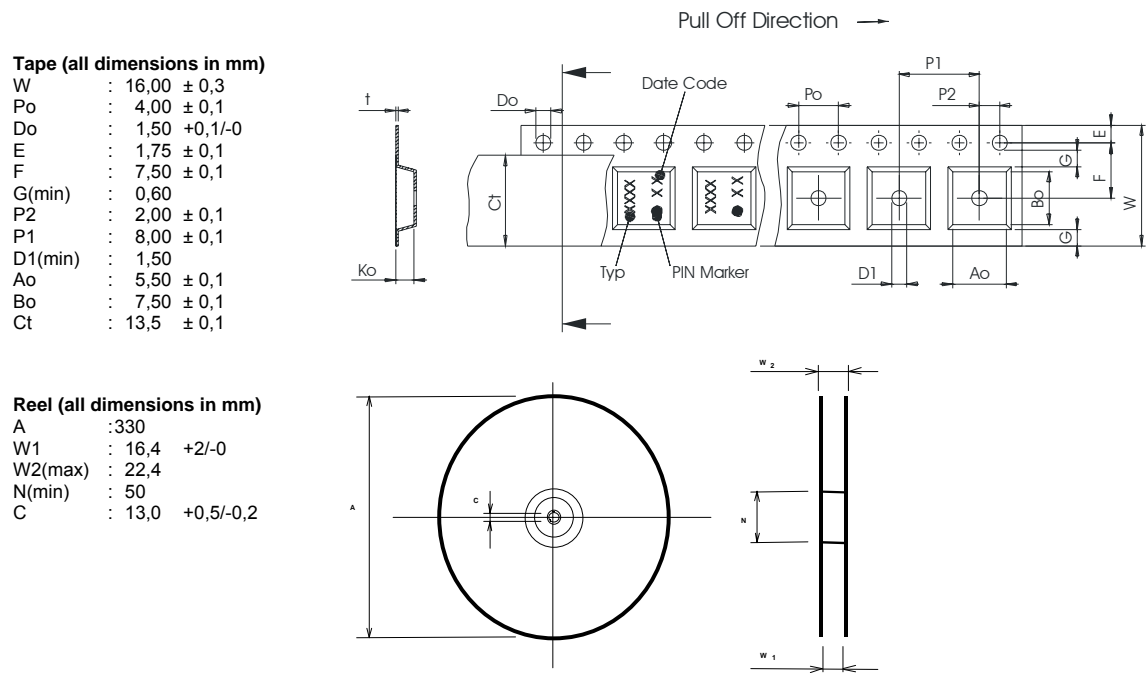
1. Shock: 500g, 1 ms, half sine wave, 3 shocks each plane;  
DIN IEC 68 T2 - 27
2. Vibration: 10 Hz to 500 Hz, 0,35 mm or 5 g respectively, 1 octave per min, 10 cycles per plan, 3 plans;  
DIN IEC 68 T2 - 6
3. Change of temperature: -55 °C to 125°C / 30 min. each / 10 cycles  
DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow): reflow possible: twice 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 exeption 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: 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



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 456E****5/5****History**

<b>Version</b>	<b>Reason of Changes</b>	<b>Name</b>	<b>Date</b>
1.0	- Generation of development specification	Noack	17.06.2004
1.1	- Change the passband to +/-1.575MHz from +/-1.65MHz	Noack	30.06.2004
1.2	- Added 1dB bandwidth	Noack	05.07.2004
1.3	- Change Construction and pin connection	Springfeldt	15.07.2004
1.4	- terminating impedance, typical values, filter characteristic added - matching configuration, pinning, air reflow temperature conditions changed	Pfeiffer	12.10.2004
1.5	- stability characteristics modified - air reflow temperature conditions corrected	Pfeiffer	16.11.2005
1.6	- matching configuration for single ended applications added - terminating impedance corrected - typical values changed	Pfeiffer	30.11.2005
1.7	- add input power level	Strehl	08.12.2006

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