

Microchip**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 .

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)	$a_e = a_{min}$	9,0	dB	max.	13,0	dB
Nominal frequency	f_N	-			456,0	MHz
Centre frequency	f_c	456,05	MHz		-	
Passband		-			$f_N \pm 1,575$	MHz
Pass band ripple		0,3	dB	max.	1,0	dB
1dB bandwidth		3,6	MHz	min.	3,15	MHz
				max.	3,75	MHz
Relative attenuation	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
Group delay ripple		150	ns	max.	200	ns
Return loss within PB		15	dB	min.	10	dB
Input power level		-		max.	15	dBm
Operating temperature range	OTR	-		- 40 °C ... + 85°C		
Storage temperature range		-		- 45 °C ... + 85°C		
Frequency inversion temperature		30	°C			
Temperature coefficient of frequency	TC_f **	-0,04	ppm/K ²			

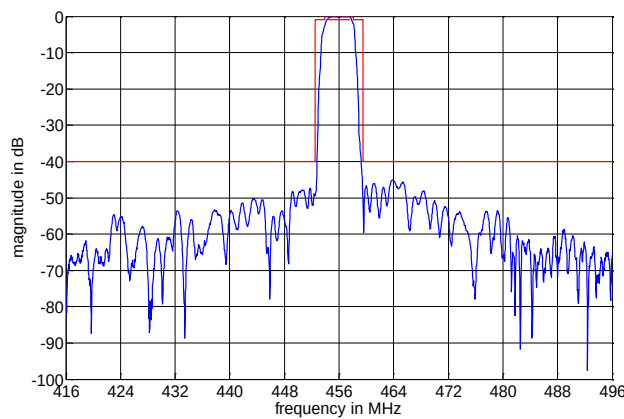
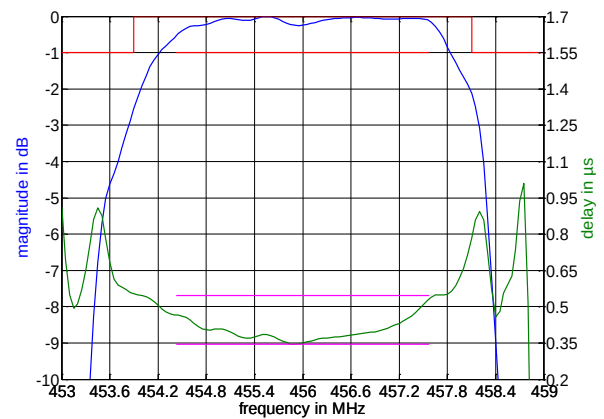
*) The terminating impedances depend on parasitics and q-values of matching elements and the board used, and are to be understood as reference values only. Should there be additional questions do not hesitate to ask for an application note or contact our design team.

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

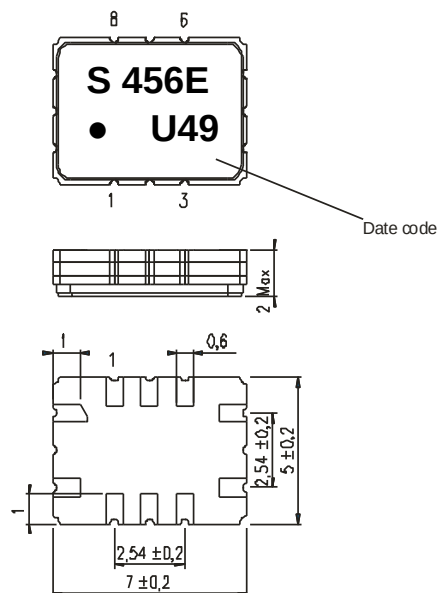
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Microchip Frequency Technology GmbH
Potsdamer Straße 18
D 14 513 TELTOW / Germany
Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30

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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

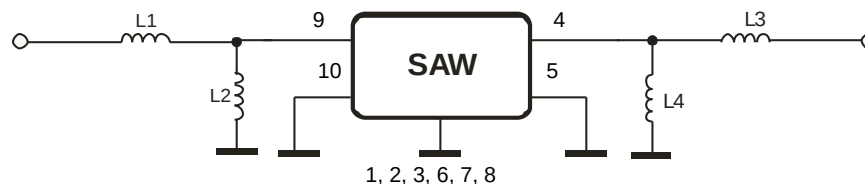
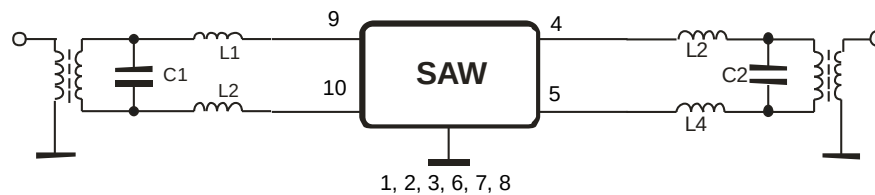
Date code: Year + week

U 2006

V 2007

W 2008

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50 Ohm Test circuit**single ended:****balanced:****Microchip Frequency Technology GmbH****Potsdamer Straße 18****D 14 513 TELTOW / Germany****Tel: (+49) 3328 4784-0 / Fax: (+49) 3328 4784-30**

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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)

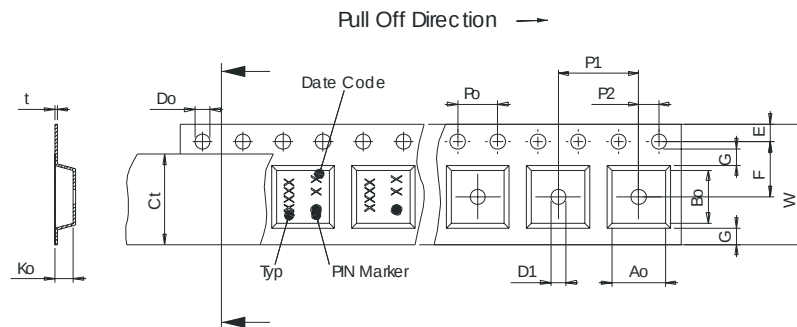
Packing

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;

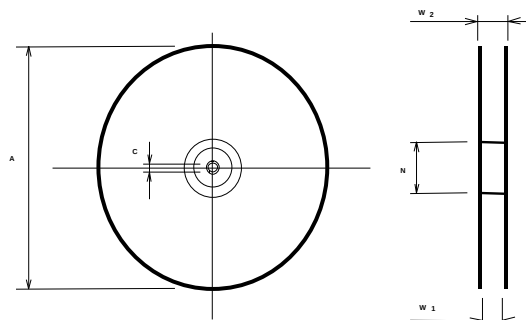
max. pieces of filters peer reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

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)**

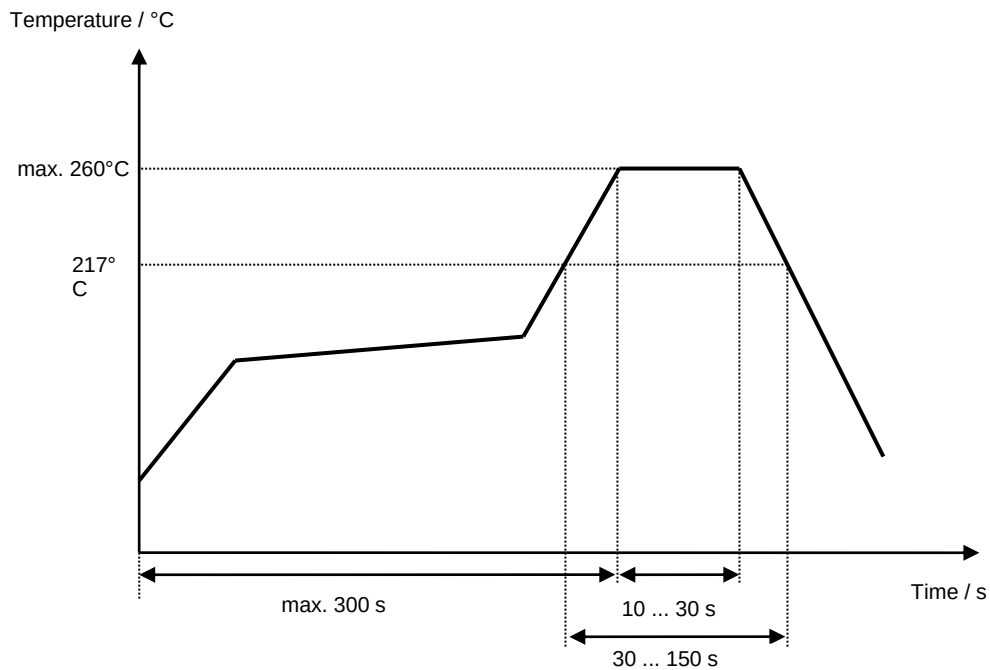
A	: 330
W1	: 16,4 +2/-0
W2(max)	: 22,4
N(min)	: 50
C	: 13,0 +0,5/-0,2



The minimum bending radius is 45 mm.

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

Microchip**Filter specification****TFS 456E****5/5****History**

Version	Reason of Changes	Name	Date
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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