

**VI TELEFILTER****Filter specification****TFS 65****1/3****1. Measurement condition****Package, pin connection and 50 Ω matching network**  
see page 2.

Ambient temperature  $T_A$ : 23 °C  
 Input power level: 0 dBm (typ.) Max 10 dBm.  
 Terminating impedances at  $f_C$ : for input:  $\approx 2650 \Omega$  | -17,9 pF (has to be adjusted)  
 for output: 1950  $\Omega$  | -5,62 pF

**2. Characteristics**

Remark:

Reference level for the relative attenuation  $a_{rel}$  of the **TFD 65** 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 reference frequency  $f_C$  is the arithmetic mean value of the upper and lower frequencies at the **20 dB** filter attenuation level relative to the insertion loss  $a_e$ .

Data	typ. value	tolerance / limit
<b>Insertion loss</b> (Reference level) $a_e$	23,2 dB	max 25 dB
<b>Reference frequency</b> $f_C$ at ambient temperature ( $f_{CTA}$ )	65,90 MHz	65,90 ± 0,2 MHz
<b>Relative frequency distance of <math>f_{CTA}</math> within one set of 3 filters</b>		
2nd filter with $f_{COT} = 75,3 \text{ MHz} \pm 200 \text{ kHz}$ *)	9400 kHz *)	max ± 20 kHz
3rd filter with $f_{CTA} = 87,1 \text{ MHz} \pm 200 \text{ kHz}$	21200 kHz	max ± 20 kHz
1 dB - band width	3,52 MHz	
3 dB - band width	3,64 MHz	
20 dB - band width	3,97 MHz	
40 dB - band width	4,11 MHz	

<b>Amplitude ripple (p-p):</b> $f_C \dots f_C \pm 1,7 \text{ MHz}$	0,5 dB	max 1,0 dB
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Relative attenuation $a_{rel}$		
$f_C$	$f_C \pm 1,7 \text{ MHz}$	-
$f_C \pm 1,7 \text{ MHz}$	$f_C \pm 1,8 \text{ MHz}$	-
$f_C \pm 2,1 \text{ MHz}$		42 dB
In the frequency range $f_C \pm 2,1 \text{ MHz} \dots f_C \pm 25 \text{ MHz}$ the limit line is of type SLOPING LINE.		
$f_C \pm 25 \text{ MHz}$		65 dB
$f_C \pm 25 \text{ MHz}$	$f_C \pm 50 \text{ MHz}$	75 dB

<b>Group delay (mean value in BW(-3dB) )</b>	3,92 $\mu\text{s}$	max 5,0 $\mu\text{s}$
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<b>Group delay ripple (p-p):</b> $f_C \dots f_C \pm 1,8 \text{ MHz}$	± 75 ns	± max 100 ns
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<b>Deviation from linear phase (p-p):</b> $f_C \dots f_C \pm 1,6 (1,8) \text{ MHz}$	2° (3,8°)	
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<b>Triple transit attenuation compared to main signal</b>	50 dB	
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<b>Input/Output return loss with matching network (S11/S22):</b>	4,0/2,4 dB	
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<b>Crosstalk</b>	67 dB	
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<b>Substrate material</b>	Quartz	
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<b>Frequency inversion temperature ( <math>T_o</math> )</b>	15°	
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<b>Temperature coefficient of frequency ( <math>T_{c_f}</math> )</b>	-0,054 ppm/K <sup>2</sup>	
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<b>Frequency deviation of <math>f_C</math> over temperature</b>	$\Delta f_C(\text{Hz}) = T_{c_f}(\text{ppm/K}) \times (T - T_o)^2 \times f_{CTA} (\text{MHz})$	
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<b>Operating temperature range</b>	- 25 °C ... + 80 °C	
<b>Storage temperature range</b>	- 40 °C ... + 85 °C	

\*) For the 2nd filter  $f_{COT}$  is its reference frequency  $f_C$  at the operation temperature  $OT = 70 \text{ °C} \pm 1 \text{ °C}$ . The reference frequency at ambient temperature  $f_{CAT}$  for this 2nd filter and the from it resulting relative frequency distance have to be determined.

Responsible:

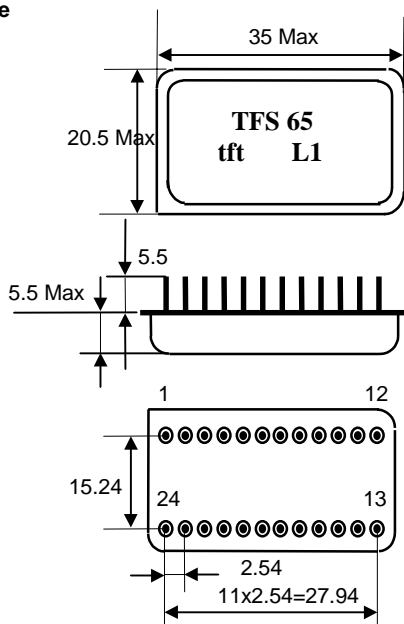
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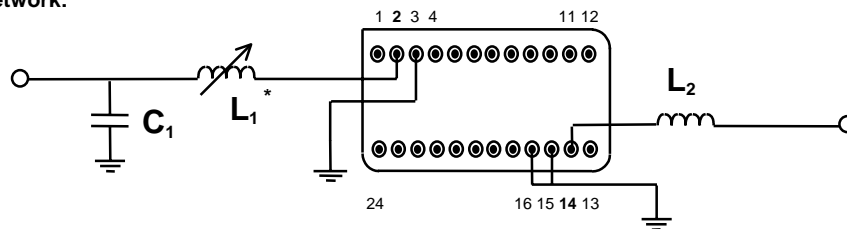
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## 3. Package



Pin 2	<b>Input</b>
Pin 3	Input RF Return
Pin 14	<b>Output</b>
Pin 15	Output RF Return
Pin 16	Package Ground

## 4. 50 Ω matching network:



$$C_1 = 130 \text{ pF.}$$

$$L_1 = 345 \text{ nH.}$$

$$L_2 = 800 \text{ nH.}$$

$$*) L_1: f_{\min}(S_{11}) = f_c$$

Remark:

L1 has to be adjusted.

## Air reflow temperature conditions

1st and 2nd air reflow profile

<b>Name:</b>	pre-heating periods	main-heating periods	peak temperature
<b>Temperature:</b>	150 °C - 170 °C	over 200 °C	255 °C ± 5 °C
<b>Time:</b>	60 sec. - 90 sec.	20 sec. - 25 sec.	

## Chip-mount air reflow profile

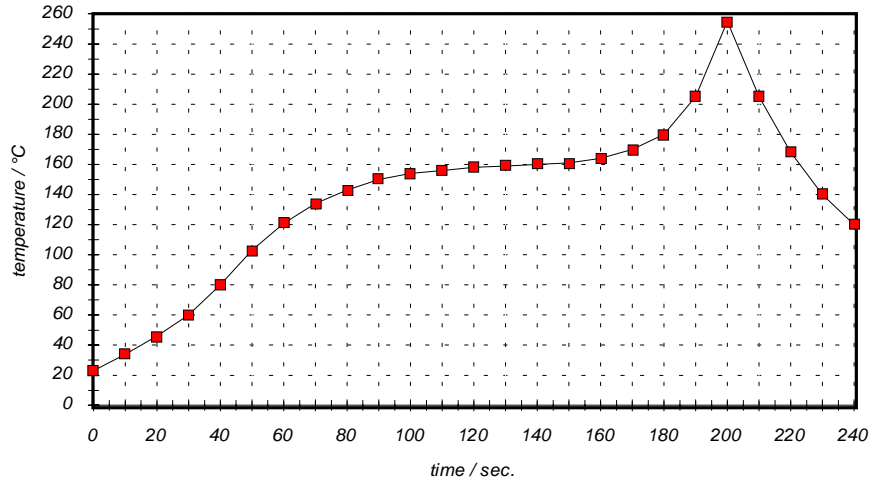


Table for temperature vs. time during the air reflow process

Tolerance of temperatures: ± 5 °C

time / sec.	temperature / °C	time / sec.	temperature / °C
0	23	140	160
10	34	150	161
20	46	160	164
30	60	170	170
40	80	180	180
50	103	190	205
60	121	195	230
70	134	200	255
80	143	205	230
90	150	210	205
100	154	215	180
110	156	220	165
120	158	230	140
130	159	240	120