

Microchip	Filter specification	TFS140E	1/5
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Measurement condition

Ambient temperature T_0 :	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	860 Ω	-1.2 pF
Output:	860 Ω	-1.2 pF

Characteristics

Remark:

Reference level for the relative attenuation a_{rel} of the TFS140E 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 140.455 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 even 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	2.9 dB	max.	5	dB
Nominal Frequency		f_N	-		140.455	MHz
Relative Attenuation		a_{rel}				
$f_N \pm 25$ kHz			0.4 dB	max.	3	dB
$f_N \pm 75$ kHz ... $f_N \pm 125$ kHz			15 dB	min.	8	dB
$f_N \pm 125$ kHz ... $f_N \pm 455$ kHz			35 dB	min.	20	dB
$f_N \pm 455$ kHz			68 dB	min.	60	dB
Intermodulation ***			-	max.	-88	dB
Input power			-	max.	5	dBm
Operating Temperature Range		OTR	-	- 40 °C ... + 85 °C		
Frequency Inversion Temperature			25 °C	-		
Temperature Coefficient of Frequency		TC_f **	-0.035 ppm/K ²	-		
Storage Temperature Range			-	- 54 °C ... + 100 °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.

**) $\Delta f_c[\text{Hz}] = TC_f[\text{ppm/K}^2] \times (T[K] - T_0[K])^2 \times f_{c,T_0}[\text{MHz}]$

***) For two - 20dBm input signals

@ $f_N + 0.060$ MHz and $f_N + 0.120$ MHz

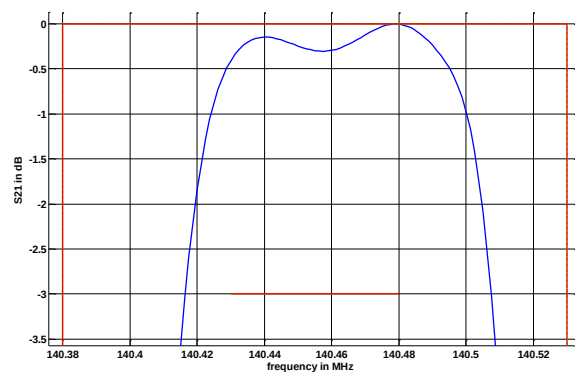
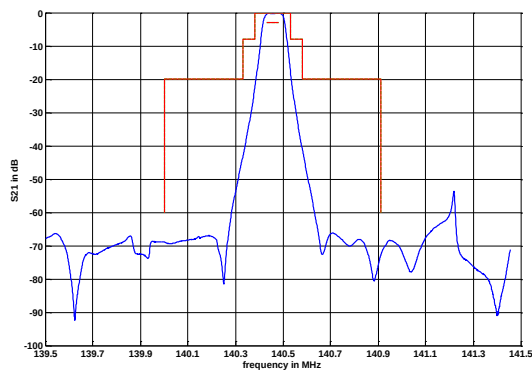
@ $f_N - 0.060$ MHz and $f_N - 0.120$ MHz

Generated:**Checked / Approved:**

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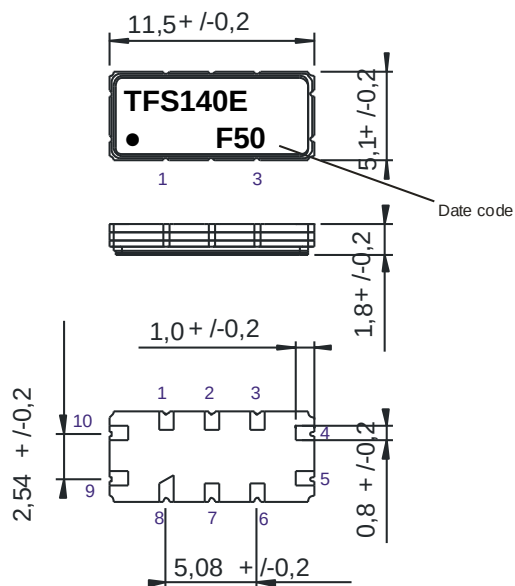
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Filter characteristic



Construction and pin connection

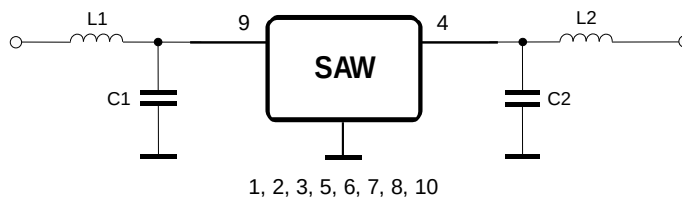
(All dimensions in mm)



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

Date code:	Year + week
F	2015
G	2016
H	2017
...	

50 Ω matching circuit



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 68 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 68 T2 - 6
3. Change of temperature: -55 °C to 125 °C / 15 min. each / 100 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;
5. SAW devices are Electrostatic Discharge (ESD) sensitive devices.

This filter is RoHS compliant (2011/65/EU)

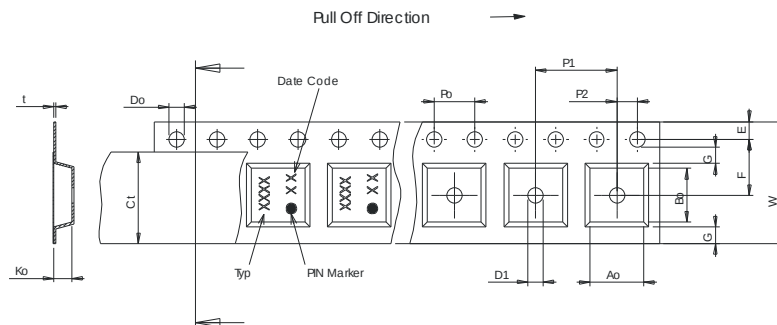
Packing

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;

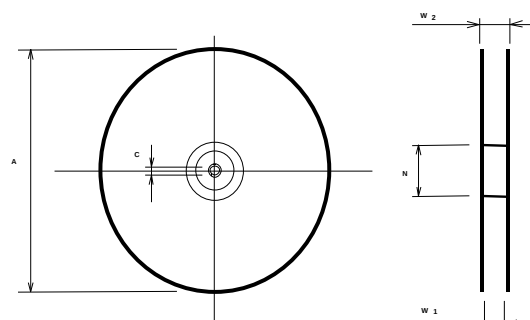
max. pieces of filters per reel: 3000
reel of empty components at start: min. 300 mm
reel of empty components at start including leader: min. 500 mm
trailer: min. 300 mm

Tape (all dimensions in mm)

W	: 24.00 ± 0.3
Po	: 4.00 ± 0.1
Do	: 1.50 +0.1/-0
E	: 1.75 ± 0.1
F	: 11.50 ± 0.1
G(min)	: 0.60
P2	: 2.00 ± 0.1
P1	: 8.00 ± 0.1
D1(min)	: 1.50
Ao	: 5.60 ± 0.1
Bo	: 11.80 ± 0.1
Ct	: 21 ± 0.1

**Reel (all dimensions in mm)**

A	: 330 or 180
W1	: 24.4 +2/-0
W2(max)	: 30.4
N(min)	: 60
C	: 13.0 +0.5/-0.2



The minimum bending radius is 45 mm.

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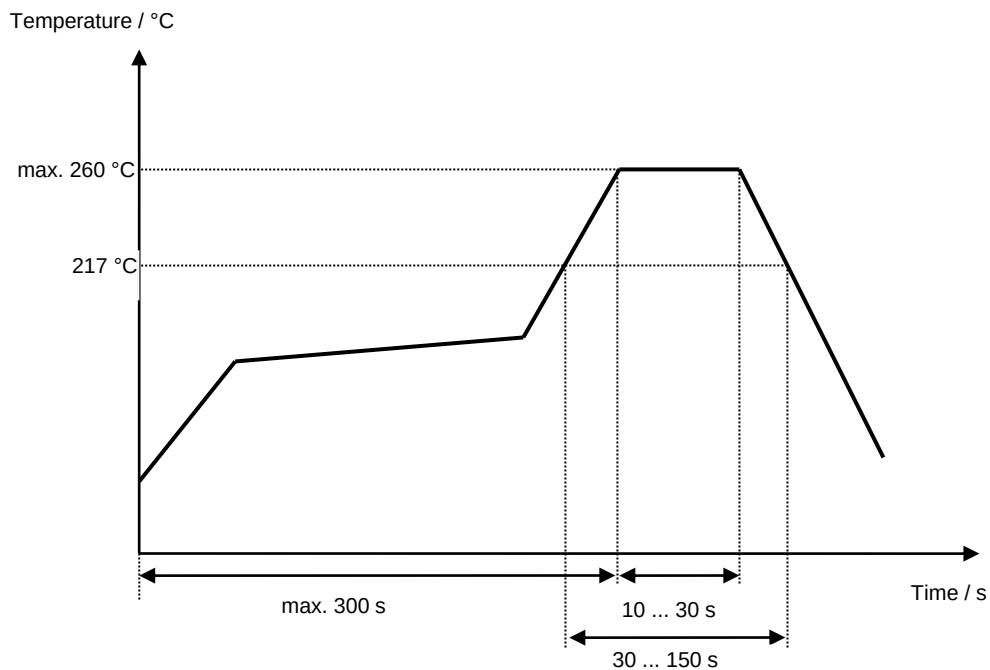
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Air reflow temperature conditions

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

Microchip**Filter specification****TFS140E****5/5****History**

Version	Reason of Changes	Name	Date
1.4	- Add history - Change date code from month to week. - Change pin 1 marker from tft to a filled point. - Change stability characteristics. - Change packing information. - Add maximum input power.	Dr. Wall	19.05.2003
1.5	- Add typical plots - Update header and footer - Add typical values	Bonnen	07.12.2015