

Microchip**Filter specification****TFS 90E****1/5****Measurement condition**

Ambient temperature T_A :	25	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	1078 Ω	-12.4 pF
Output:	1220 Ω	-11.8 pF

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS 90E 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 90 MHz without any tolerance. The values of relative attenuation a_{rel} are guaranteed over the whole operating temperature range. The frequency shift of the filter within the operating temperature range is included in the production tolerance scheme.

D a t a		typ. value		tolerance / limit		
Insertion loss (reference level)		a_e	4.3 dB	max.	7.0	dB
Nominal frequency		f_N	-		90.0	MHz
Passband		PB		f_N ±	50	kHz
Pass band ripple		p-p	0.4 dB	max.	1.0	dB
Relative attenuation		a_{rel}				
f_N	... f_N ± 25 kHz	0.35 dB		max.	0.5	dB
f_N ± 25 kHz	... f_N ± 40 kHz	0.55 dB		max.	0.8	dB
f_N ± 40 kHz	... f_N ± 50 kHz	0.70 dB		max.	1.0	dB
0.3 MHz	... f_N - 5 MHz	54 dB		min.	40	dB
f_N - 0.3 MHz	... f_N - 5.0 MHz	35 dB		min.	30	dB
f_N + 0.3 MHz	... f_N + 0.5 MHz	35 dB		min.	30	dB
f_N + 0.5 MHz	... f_N + 0.7 MHz	29 dB		min.	28	dB
f_N + 0.7 MHz	... f_N + 5.0 MHz	35 dB		min.	30	dB
f_N + 5 MHz	... f_N + 410 MHz	54 dB		min.	40	dB
Group delay ripple within PB		211 ns		max.	300	ns
Operating temperature range		OTR	-	- 20 °C ... + 70 °C		
Storage temperature range			-	- 55 °C ... +125 °C		
Temperature coefficient of frequency		TC_f **	-0.035 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.

**) $\Delta f = TC_f(T - T_0)^2 f_N$

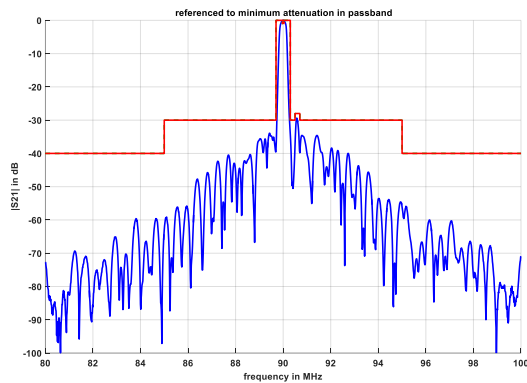
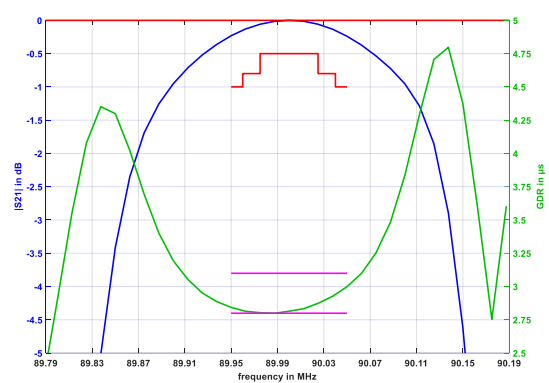
Generated:

Checked / Approved:

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

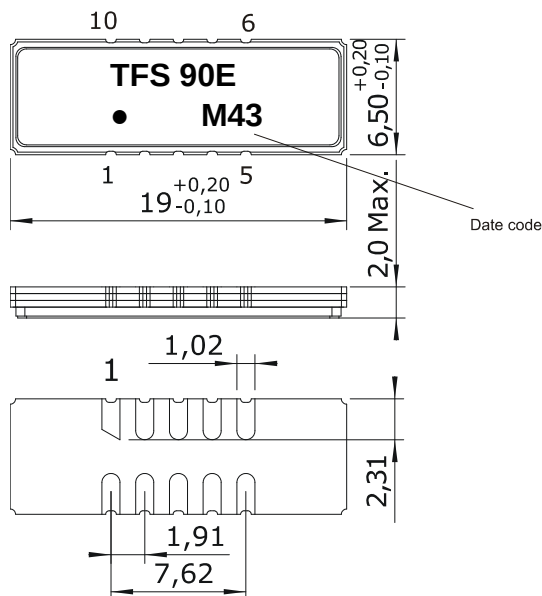
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Filter characteristic



Construction and pin connection

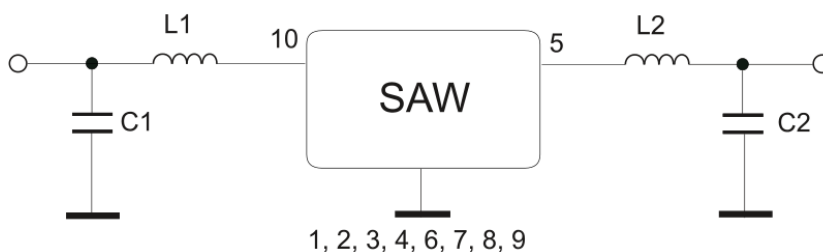
(All dimensions in mm)



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

Date code: Year + week
M 2020
N 2021
P 2022
...

50 Ω Test circuit



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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 60068 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 60068 T2 - 6
3. Change of temperature: -55 °C to 125 °C / 15 min. each / 100 cycles
DIN IEC 60068 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+2015/863/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;

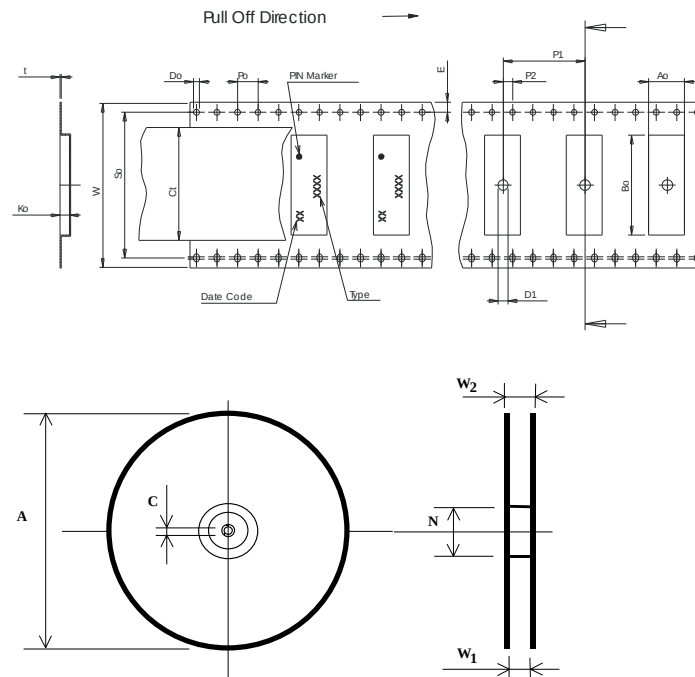
reel of empty components at start: min. 300 mm
reel of empty components at start including leader: min. 500 mm
trailer: min. 300 mm

Tape (all dimensions in mm)

W	: 32.00 ±0.3
Po	: 4.00 ±0.1
Do	: 1.50 +0.1/-0
E	: 1.75 ±0.1
F	: 14.20 ±0.1
G(min)	:
P2	: 2.00 ±0.1
P1	: 12.00 ±0.1
D1(min)	: 2.00
Ao	: 7.10 ±0.1
Bo	: 19.60 ±0.1
Ct	: 25.50 ±0.1
Ko	: 2.00 ±0.1
t	: 0.30 ±0.05

Reel (all dimensions in mm)

A	: 330 or 180
W1	: 32.4 +2/-0
W2(max)	: 38.40
N(min)	: 100.00
C	: 13.0 +0.5/-0.2



The minimum bending radius is 45 mm.

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Potsdamer Straße 18

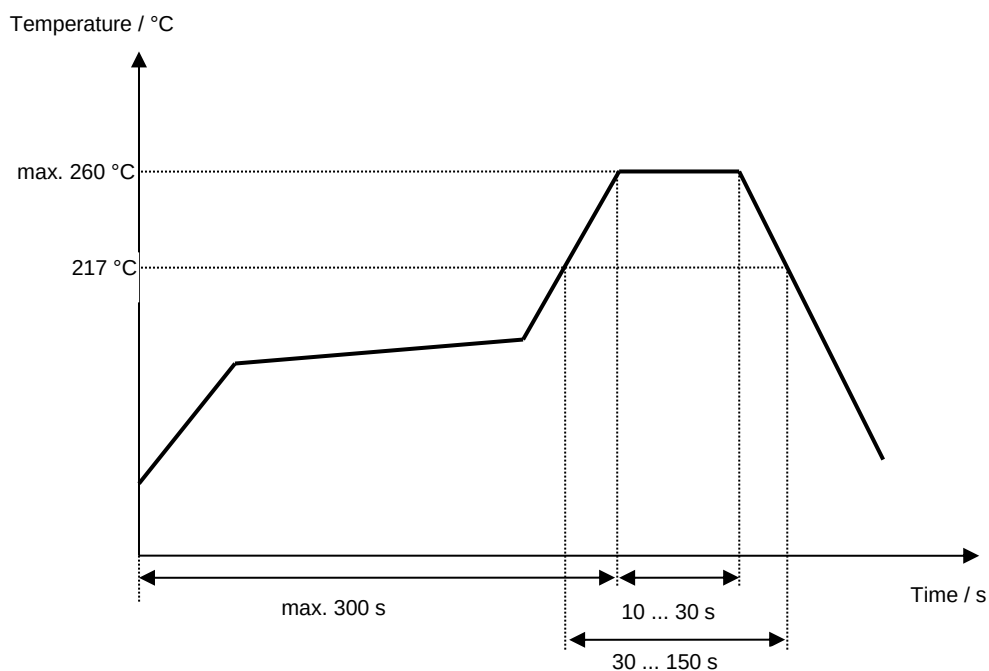
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Air reflow temperature conditions

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****TFS 90E****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Strehl	22.09.2006
1.1	- Change passband	Strehl	28.09.2006
1.2	- Change from development specification to filter specification - Add terminating impedances - Add typical values - Add filter characteristics - Add matching circuit - Correct temperature coefficient of frequency unit	Alawneh	31.05.2007
2.0	- Add limit line for $f_N + 0.5 \text{ MHz} \dots f_N + 0.7 \text{ MHz}$ from min. 30dB to min. 28dB	Bonnen	19.10.2020