

Microchip**Filter specification****TFS 350M****1/5****Measurement condition**

Ambient temperature T_A :	23	°C
Input power level:	0	dBm
Terminating impedance: *		
Input:	216 Ω 7.4 pF	
Output:	205 Ω 6.7 pF	

Characteristics

Remark:

The reference level for the relative attenuation a_{rel} of the TFS350M 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 350.0 MHz without any tolerance. The values of relative attenuation a_{rel} are guaranteed for the whole operating temperature range. The frequency shift of the filter in 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	9	dB	max.	11.5	dB
Nominal frequency	f_N				350.0	MHz
Passband	PB	-	MHz	$f_N \pm$	21.5	MHz
Pass band ripple		0.5	dB	max.	1.0	dB
Relative attenuation	a_{rel}					
$f_N - 21.5$ MHz ... $f_N + 21.5$ MHz		0.5	dB	max.	1.0	dB
$f_N - 100$ MHz ... $f_N - 47$ MHz		48	dB	min.	40	dB
$f_N - 47$ MHz ... $f_N - 35$ MHz		44	dB	min.	25	dB
$f_N + 35$ MHz ... $f_N + 47$ MHz		33	dB	min.	25	dB
$f_N + 47$ MHz ... $f_N + 100$ MHz		46	dB	min.	40	dB
$f_N + 100$ MHz ... $f_N + 270$ MHz		58	dB	min.	50	dB
$f_N + 270$ MHz ... $f_N + 410$ MHz		90	dB	min.	80 **	dB
$f_N + 410$ MHz ... $f_N + 2650$ MHz		75	dB	min.	50	dB
Absolute group delay within PB		0.31	μ s	max.	0.5	μ s
Group delay ripple within PB		29	ns	max.	100	ns
Return loss within PB		11	dB	min.	7	dB
IIP3	***	-	dBm	min.	40	dBm
Input power level				max.	10	dBm
Operating temperature range	OTR			- 30 °C ... + 60 °C		
Operable temperature range				- 40 °C ... + 85 °C		
Storage temperature range				- 55 °C ... + 125 °C		
Temperature coefficient of frequency	TC_f ****	-94	ppm/K			

*) 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.

**) This rejection limit is to be accomplished by the cascaded response from matching topologies 1 (this has to achieve 45dB min) and 2 (this has to achieve 35dB min). Please note that topology 1 will be used for device testing in production.

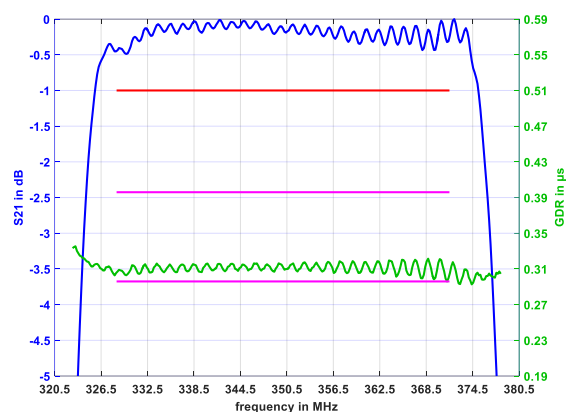
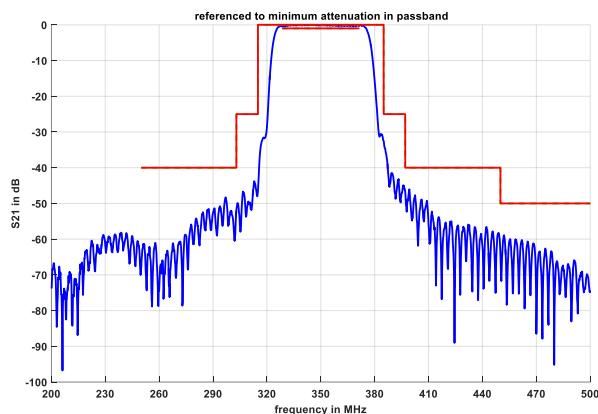
***) $f_{in1} = 340$ MHz; $f_{in2} = 345$ MHz; $P_{in} = 0$ dBm $f_{measurement} = 335$ MHz

****) $\Delta f = TC_f(T - T_A)f_N$

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**

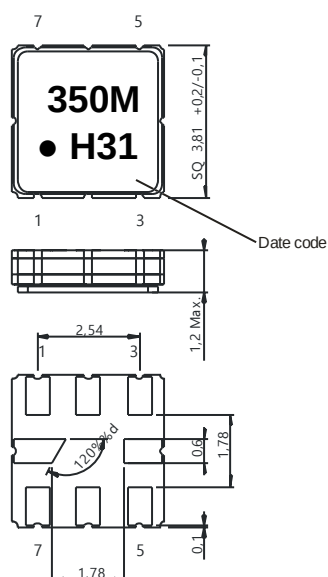
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Filter characteristic



Construction and pin connection

(All dimensions in mm)



1	Ground
2	Ground
3	Input
4	Ground
5	Ground
6	Output or Ground
7	Output
8	Ground

Date code: Year + week

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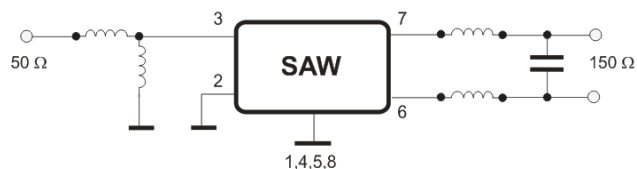
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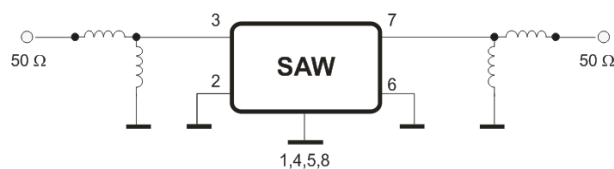
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Test circuit

Topology 1 (default):



Topology 2:



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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)

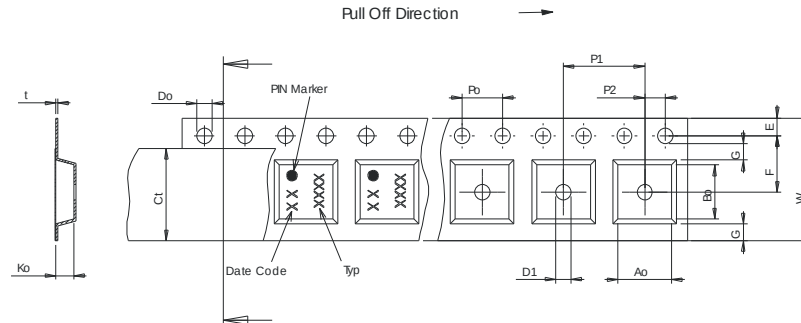
Packing

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;

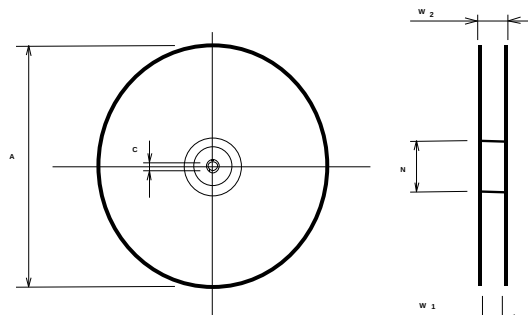
max. pieces of filters per reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

Tape (all dimensions in mm)

W	: 12.00 ±0.3
Po	: 4.00 ±0.1
Do	: 1.50 +0.1/-0
E	: 1.75 ±0.1
F	: 5.50 ±0.05
G(min)	: 0.75
P2	: 2.00 ±0.05
P1	: 8.00 ±0.1
D1(min)	: 1.50
Ao	: 4.30 ±0.1
Bo	: 4.30 ±0.1
Ct	: 9.2 ±0.1

**Reel (all dimensions in mm)**

A	: 330 or 180
W1	: 12.4 +2/-0
W2(max)	: 18.40
N(min)	: 50.00
C	: 13.0 +0.5/-0.2



The minimum bending radius is 45 mm.

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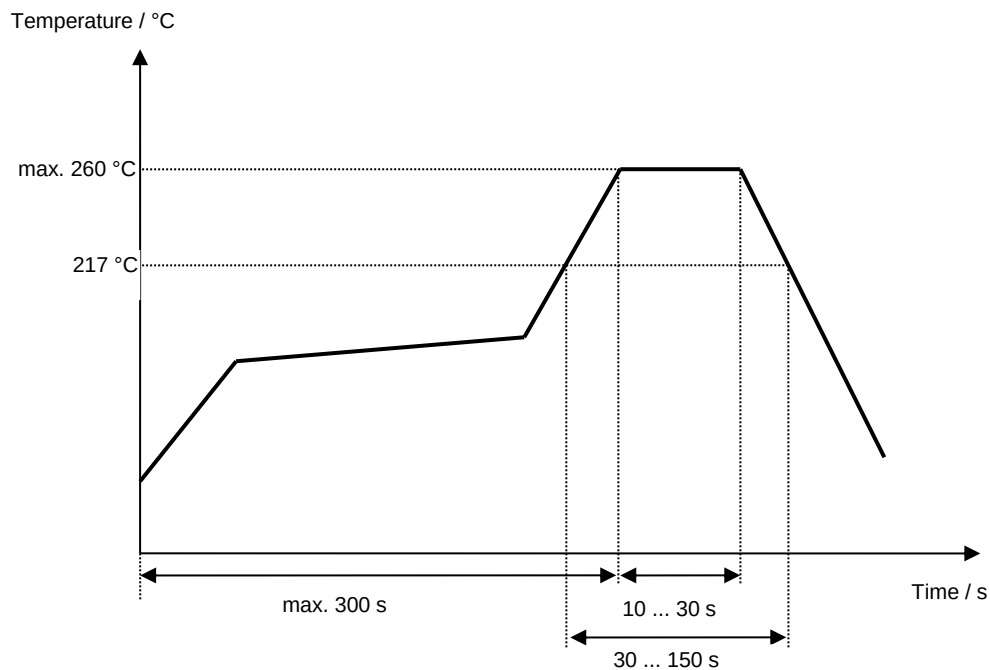
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Air reflow temperature conditions

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****TFS 350M****5/5****History**

Version	Reason of Changes	Name	Date
1.0	- Generation of development specification	Bonnen	29.07.2016
1.1	- Correct typo in data section	Bonnen	08.08.2016
1.2	- Add rejection, f_N+100 MHz... f_N+2650 MHz, min. 50 dB	Jaffer	10.08.2016
1.3	- Add rejection limit for f_N+280 MHz... f_N+400 MHz and update pinning and port designators.	Jaffer	18.10.2016
1.4	- Confirm topology 1 will be used for device testing in production.	Jaffer	19.10.2016
1.5	- Customer request to add Operable temperature range -40°C...+85°C	Jaffer	01.11.2016
1.6	- Add typ values, move from development to filter specification	Jaffer	05.12.2016

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