Wire Wound Common Mode Filter

EMI Suppression Filter

WCM Series

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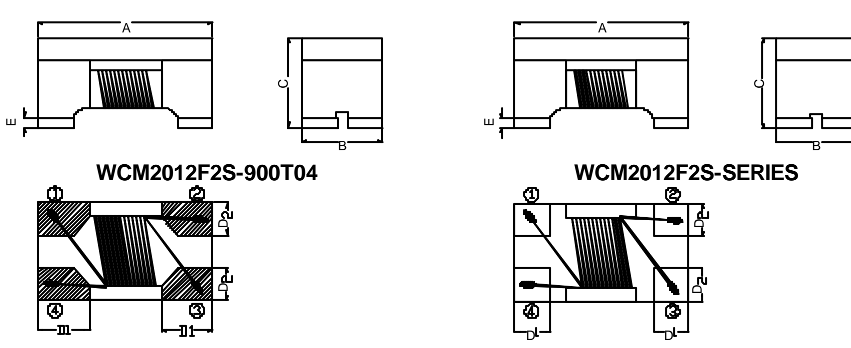
Wire Wound Type Common Mode Filter

WCM2012F2S-SS

1.Features

1. High common mode impedance at high frequency effects excellent noise suppression performance.
2. WCM2012F2S series realizes small size and low profile. 2.0x1.2x1.2 mm.

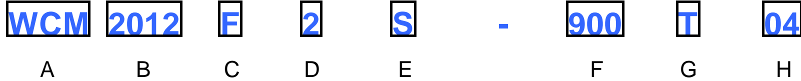
2.Dimension



Series	A(mm)	B(mm)	C(mm)	D1(mm)	D2(mm)	E(mm)
2012F2S-900T04	2.0±0.2	1.2±0.2	1.2±0.2	0.55±0.1	0.46±0.1	0.15±0.1
2012F2S-SERIES	2.0±0.2	1.2±0.2	1.2±0.2	0.4±0.1	0.4±0.1	0.15±0.1

Units: mm

3.Part Numbering



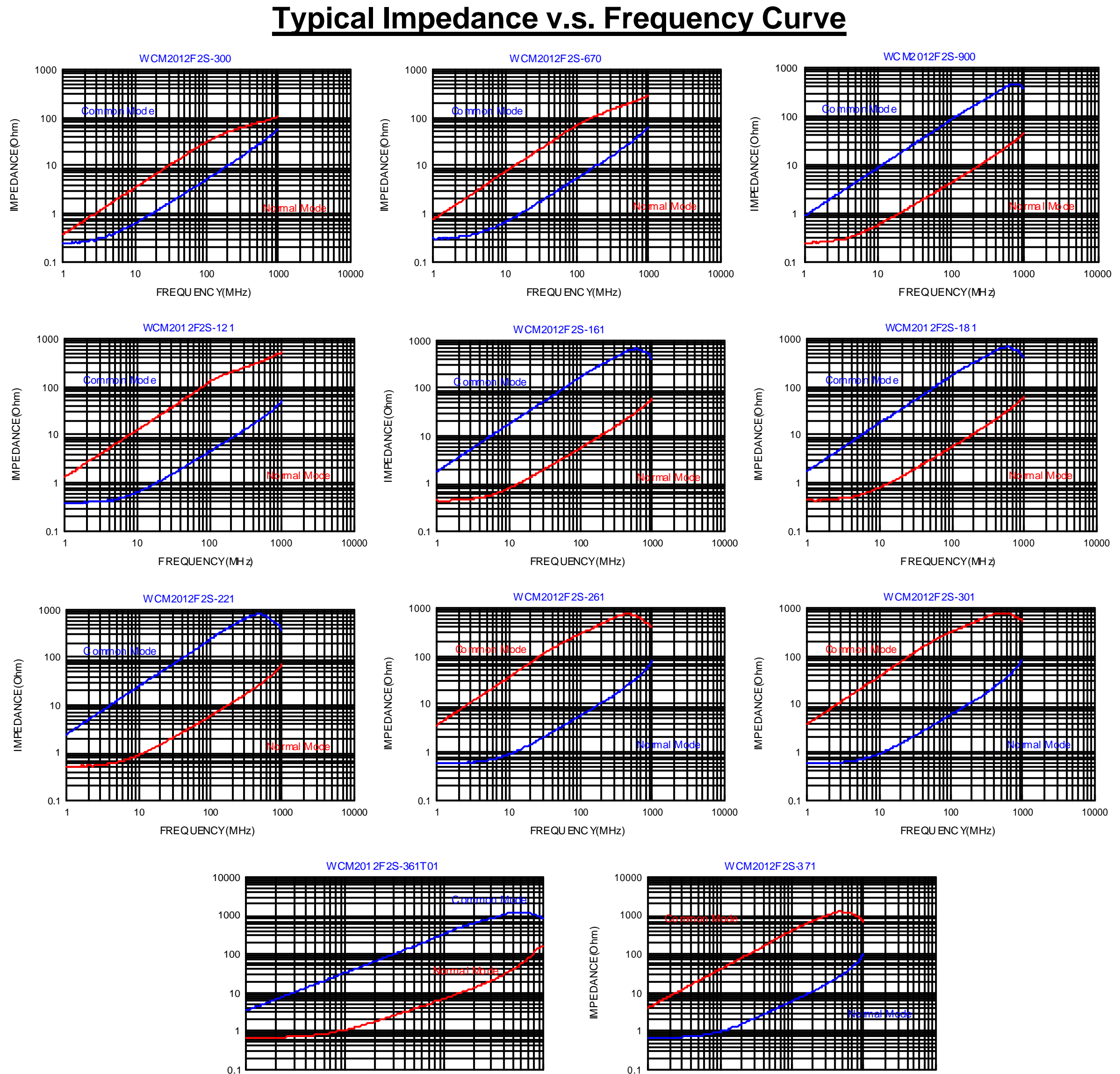
A B C D E F G H

A: Series
B: Dimension
C: Material Ferrite
D: Number of Lines 2=2 lines
E: Type S=One Circuit Type , N=Unshielded
F: Impedance 900=90Ω
G: Packaging T=Taping and Reel, B=Bulk
H: Rated Current 04=400mA

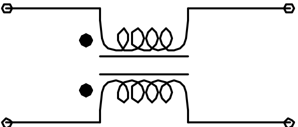
4.Specification

YOSONIC Part Number	Common mode Impedance (Ω)	Test Frequency (MHz)	DC Resistance (Ω) max.	Rated Current (mA)	Rated Volt. (Vdc)	Withstand Volt. (Vdc)	IR (Ω) min.
WCM2012F2S-300T04	30±25%	100	0.20	400	50	125	10M
WCM2012F2S-670T04	67±25%	100	0.25	400	50	125	10M
WCM2012F2S-900T04	90±25%	100	0.30	400	50	125	10M
WCM2012F2S-121T04	120±25%	100	0.30	400	50	125	10M
WCM2012F2S-161T03	160±25%	100	0.35	350	50	125	10M
WCM2012F2S-181T03	180±25%	100	0.35	350	50	125	10M
WCM2012F2S-221T03	220±25%	100	0.40	300	50	125	10M
WCM2012F2S-261T03	260±25%	100	0.40	300	50	125	10M
WCM2012F2S-301T03	300±25%	100	0.45	300	50	125	10M
WCM2012F2S-361T01	360±25%	100	0.50	100	50	125	10M
WCM2012F2S-371T01	370±25%	100	0.50	100	50	125	10M

Typical Impedance v.s. Frequency Curve



5.Schematic Diagram



6.Reliability and Test Condition

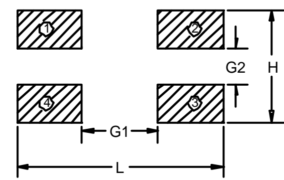
Item	Performance	Test Condition
Electrical Characteristics Test		
Z(common mode)	Refer to standard electrical characteristics list.	HP-4291A+HP-16092A
DCR		HP-4338B
I.R.		Zentech 702A(Ultra High Resistance Meter)
Rated Current		Applied the current to coils the impedance change should be less than ±25% to initial value and temperature rise should not be more than 30℃.
Operating Temperature	-40℃~+85℃	
Storage Temperature	-40℃~+85℃	
Temperature Rise Test	30℃ max.(Δt)	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Mechanical Performance Test		
Solderability Test	More than 90% of terminal electrode should be covered with solder.	Preheating Dipping Natural cooling 230℃ 150℃ 60 second 3±0.6 second After fluxing,component shall be dipped in a melted solder bath at 230±5℃ for 5 seconds.
Solder Heat Resistance	1.Components should have not evidence of electrical and mechannical damage. 2. Impedance:within ±25% of initial value.	Preheating Dipping Natural cooling 260℃ 150℃ 60 second 10±0.5 second Preheat:150℃ 60sec. Solder:(63Sn/37Pb) Solder temperature: 260±5℃ Flux:rosin. Dip time:10±5 sec.
Component Adhesion (Push test)	Series No. / F(Kg): WCM3216F2S 0.8(min.) WCM2012F2S 0.5(min.) WCM3216F2N 0.8(min.) WCM2012F2N 0.5(min.)	The device should be reflow soldered(230±5℃ for 10sec.)to a tinned copper substrate.A dynometer force gauge should be applied the side of the component.The device must with-ST-F Kg without ailure of the termination attached to component. Core Glass Epoxy Substrate with Copper Clad
Component Adhesion (Pull test)	Series No. / F(Kg): WCM3216F2S 0.8(min.) WCM2012F2S 0.5(min.) WCM3216F2N 0.8(min.) WCM2012F2N 0.5(min.)	1.Insert 10cm wire into the remaining open eye bend ,the ends of even wire lengths upward and wind together. 2.Terminal shall not be remarkably damaged.

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td colspan="3">Reliability Test</td></tr>
<tr><td>High Temperature Life Test</td><td rowspan="4">1. Appearance:No damage.
2. Impedance:within ±25% of initial value.
No disconnection or short circuit.</td><td>Temperature:85±5℃
Time:500±12hr.
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Low Temperature Life Test</td><td>Temperature:-40±5℃
Time: 500±12hr.
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Thermal Shock</td><td><table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-40±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within 3</td></tr><tr><td>3</td><td>85±3</td><td>30±3</td></tr><tr><td>4</td><td>Room Temperature</td><td>Within 3</td></tr></table>Conditions of 1 cycle
Total:10 cycle
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Humidity Resistance</td><td>Temperature:40±5℃
Humidity:90 to 95%
Applied current:Rated current
Time:500±12hr.
Recovery:4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
</table>

7.Soldering and Mounting

7-1. Recommended PC Board Pattern

	WCM2012F2S/F2N	WCM3216F2S/F2N
L	2.60	3.70
H	1.25	1.60
G1	1.10	1.90
G2	0.45	0.40



PC board should be designed so that products are not sufficient under mechanical stress as warping the board.
Products shall be positioned in the sideway direction against the mechanical stress to prevent failure.

7-2. Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. YOSONIC terminations are suitable for all wave and re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

7-2.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

7-2.2 Solder Wave:

Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave , typical at 240℃. Due to the risk of thermal damage to products, wave soldering of large size products is discouraged. Recommended temperature profile for wave soldering is shown in Figure 2.

7-2.3 Soldering Iron(Figure 3):

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

Note： · Preheat circuit and products to 150℃ · Never contact the ceramic with the iron tip · Use a 20 watt soldering iron with tip diameter of 1.0mm
· 280℃ tip temperature (max) · 1.0mm tip diameter (max) · Limit soldering time to 3 sec.

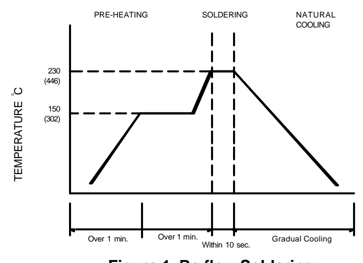


Figure 1. Re-flow Soldering

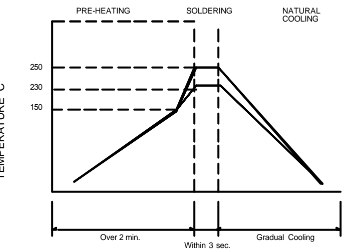


Figure 2. Wave Soldering

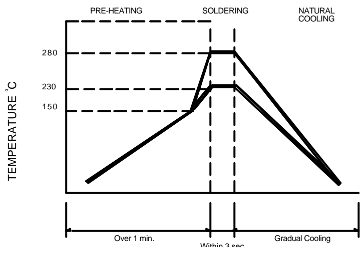
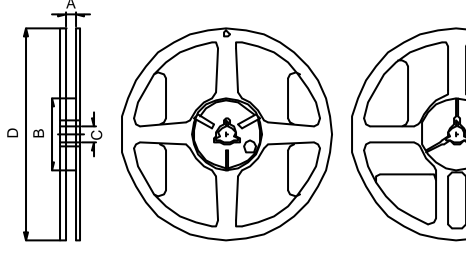
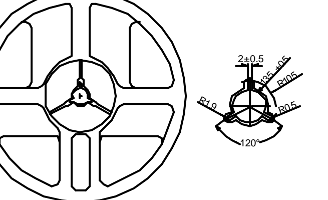


Figure 3. Hand Soldering

8.Packaging Information

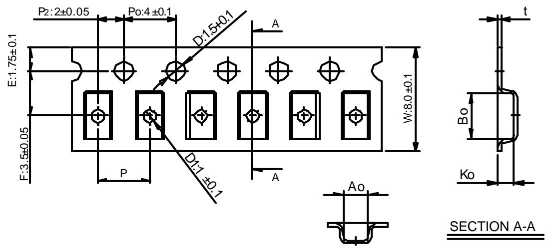
8-1. Reel Dimension





Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2

8-2. Tape Dimension / 8mm

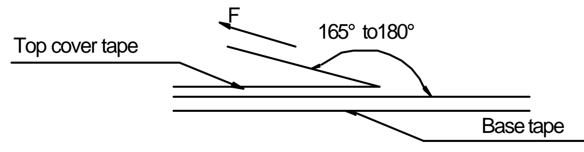


Series	size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
WCM2012F2S	201212	2.35±0.1	1.50±0.1	1.45±0.1	4.0±0.1	0.22±0.05
WCM3216F2S	321620	3.50±0.1	1.88±0.1	2.10±0.1	4.0±0.1	0.22±0.05
WCM2012F2N	201209	2.50±0.1	1.60±0.1	1.25±0.1	4.0±0.1	0.22±0.05
WCM3216F2N	321615	3.50±0.1	1.88±0.1	1.80±0.1	4.0±0.1	0.22±0.05

8-3. Packaging Quantity

Chip size	Chip/Reel	Inner Box	Middle Box	Carton
WCM2012F2S/F2N	2000/3000	10000/15000	50000/75000	100000/150000
WCM3216F2S/F2N	2000	10000	50000	100000

8-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

Room Temp. (℃)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

Application Notice

・Storage Conditions

To maintain the solderability of terminal electrodes:

1. Temperature and humidity conditions: Less than 40℃ and 70% RH.
2. Recommended products should be used within 6 months form the time of delivery.
3. The packaging material should be kept where no chlorine or sulfur exists in the air.

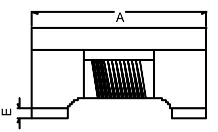
・Transportation

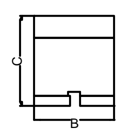
1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

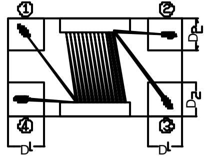
Wire Wound Type Common Mode Filter
WCM3216F2S-SS

1. Features
1. High common mode impedance at high frequency effects excellent noise suppression performance.
2. WCM3216F2S series realizes small size and low profile. 3.2x1.6x2.0 mm.

2. Dimension



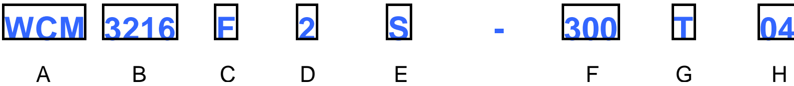




Series	A(mm)	B(mm)	C(mm)	D1(mm)	D2(mm)	E(mm)
3216F2S	3.2±0.2	1.6±0.2	2.0±0.2	0.5±0.1	0.5±0.1	0.15±0.1

Units: mm

3. Part Numbering

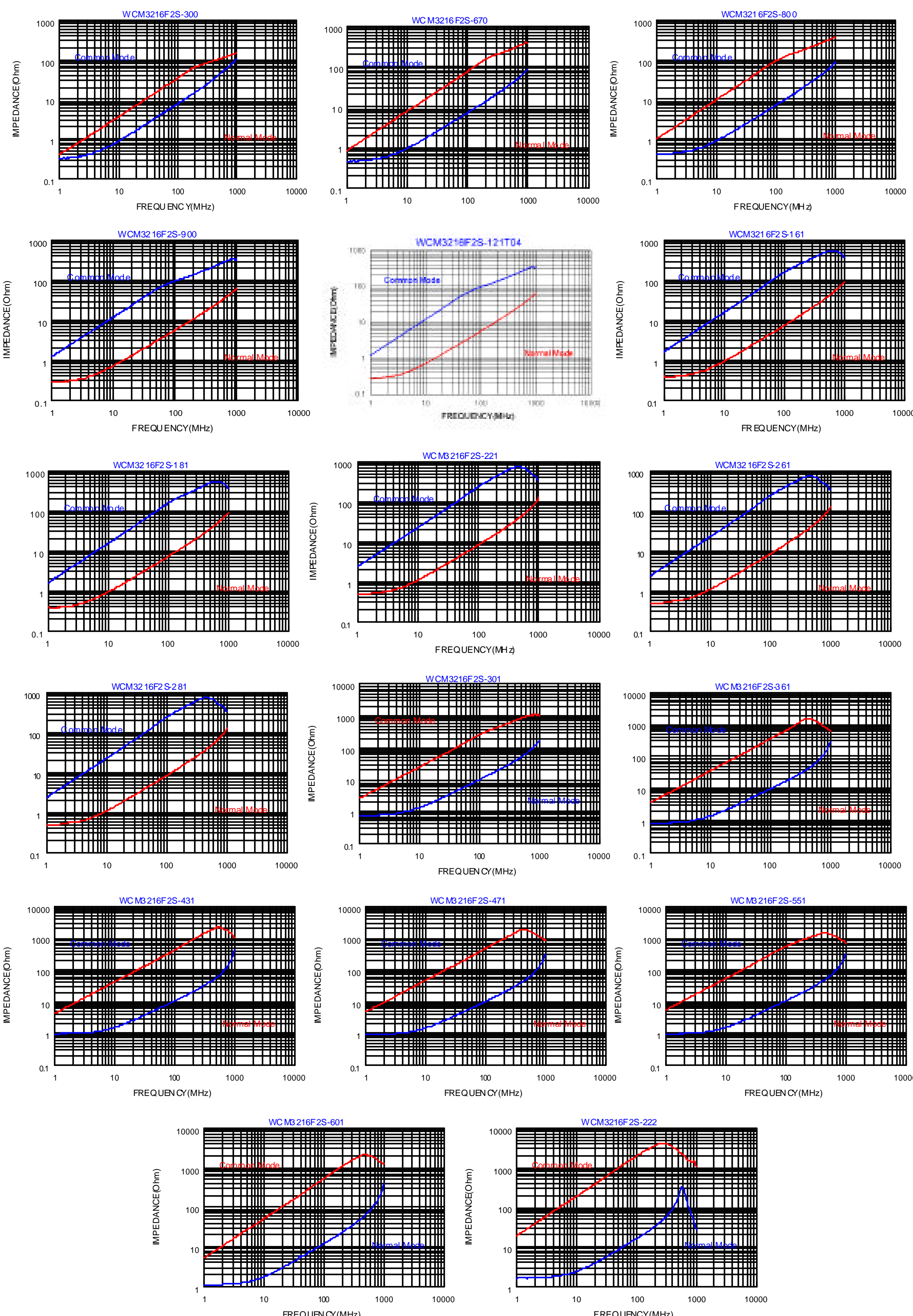


A: Series
B: Dimension
C: Material Ferrite
D: Number of Lines 2=2 lines
E: Type S=One Circuit Type , N=Unshielded
F: Impedance 300=30Ω
G: Packaging T=Taping and Reel, B=Bulk
H: Rated Current 04=400mA

4.Specification

YOSONIC Part Number	Common mode Impedance (Ω)	Test Frequency (MHz)	DC Resistance (Ω) max.	Rated Current (mA)	Rated Volt. (Vdc)	Withstand Volt. (Vdc)	IR (Ω) min.
WCM3216F2S-300T04	30±25%	100	0.20	400	50	125	10M
WCM3216F2S-670T04	67±25%	100	0.30	400	50	125	10M
WCM3216F2S-800T04	80±25%	100	0.30	400	50	125	10M
WCM3216F2S-900T04	90±25%	100	0.30	400	50	125	10M
WCM3216F2S-121T04	120±25%	100	0.30	400	50	125	10M
WCM3216F2S-161T03	160±25%	100	0.35	350	50	125	10M
WCM3216F2S-181T03	180±25%	100	0.35	350	50	125	10M
WCM3216F2S-221T03	220±25%	100	0.45	300	50	125	10M
WCM3216F2S-261T03	260±25%	100	0.45	300	50	125	10M
WCM3216F2S-281T03	280±25%	100	0.45	300	50	125	10M
WCM3216F2S-301T03	300±25%	100	0.50	300	50	125	10M
WCM3216F2S-361T03	360±25%	100	0.6	300	50	125	10M
WCM3216F2S-431T03	430±25%	100	0.6	300	50	125	10M
WCM3216F2S-471T03	470±25%	100	0.7	300	50	125	10M
WCM3216F2S-551T03	550±25%	100	0.75	300	50	125	10M
WCM3216F2S-601T03	600±25%	100	0.80	300	50	125	10M
WCM3216F2S-222T02	2200±25%	100	1.2	200	50	125	10M

Typical Impedance v.s. Frequency Curve



5. Reliability and Test Condition

Item	erformance	Test Condition
Electrical Characteristics Test		
Z(common mode)	Refer to standard electrical characteristics list.	HP-4291A+HP-16092A
DCR		HP-4338B
I.R.		Zentech 702A(Ultra High Resistance Meter)
Rated Current		Applied the current to coils the impedance change should be less than ±25% to initial value and temperature rise should not be more than 30℃.
Temperature Rise Test	30℃ max.(Δt)	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Mechanical Performance Test		
Solderability Test	More than 90% of terminal electrode should be covered with solder.	Preheating Dipping Natural cooling; 230℃; 150℃; 60 second; 5±0.5 second After fluxing,component shall be dipped in a melted solder bath at 230±5℃ for 5 seconds.
Solder Heat Resistance	1.Components should have not evidence of electrical and mechannical damage. 2. Impedance:within ±25% of initial value.	Preheating Dipping Natural cooling; 260℃; 150℃; 60 second; 10±0.5 second Preheat:150℃ 60sec. Solder:(63Sn/37Pb) Solder temperature: 260±5℃ Flux:rosin. Dip time:10 ±5 sec.
Component Adhesion (Push test)	Series No. / F(Kg): WCM3216F2S 0.8(min.); WCM2012F2S 0.5(min.); WCM3216F2N 0.8(min.); WCM2012F2N 0.5(min.)	The device should be reflow soldered(230±5℃ for 10sec.)to a tinned copper substrate.A dynometer force gauge should be applied the side of the component.The device must with-ST-F Kg without ailure of the termination attached to component. Core; Glass Epoxy Substrate with Copper Clad
Component Adhesion (Pull test)	Series No. / F(Kg): WCM3216F2S 0.8(min.); WCM2012F2S 0.5(min.); WCM3216F2N 0.8(min.); WCM2012F2N 0.5(min.)	1.Insert 10cm wire into the remaining open eye bend ,the ends of even wire lengths upward and wind together. 2.Terminal shall not be remarkably damaged.

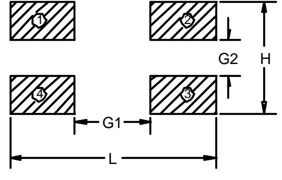
Series No.	F(Kg)
WCM3216F2S	0.8(min.)
WCM2012F2S	0.5(min.)
WCM3216F2N	0.8(min.)
WCM2012F2N	0.5(min.)

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td colspan="3">Reliability Test</td></tr>
<tr><td>High Temperature Life Test</td><td rowspan="4">1. Appearance:No damage.
2. Impedance:within ±25% of initial value.
No disconnection or short circuit.</td><td>Temperature:85±5℃
Time:500±12hr.
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Low Temperature Life Test</td><td>Temperature:-40±5℃
Time: 500±12hr.
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Thermal Shock</td><td><table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-40±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within 3</td></tr><tr><td>3</td><td>85±3</td><td>30±3</td></tr><tr><td>4</td><td>Room Temperature</td><td>Within 3</td></tr></table>Conditions of 1 cycle
Total:10 cycle
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Humidity Resistance</td><td>Temperature:40±5℃
Humidity:90 to 95%
Applied current:Rated current
Time:500±12hr.
Recovery:4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
</table>

6. Soldering and Mounting

6-1. Recommended PC Board Pattern

	WCM2012F2S/F2N	WCM3216F2S/F2N
L	2.60	3.70
H	1.25	1.60
G1	1.10	1.90
G2	0.45	0.40



PC board should be designed so that products are not sufficient under mechanical stress as warping the board.
Products shall be positioned in the sideway direction against the mechanical stress to prevent failure.

6-2. Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. YOSONIC terminations are suitable for all wave and re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

6-2.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

6-2.2 Solder Wave:

Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave , typical at 240℃. Due to the risk of thermal damage to products, wave soldering of large size products is discouraged. Recommended temperature profile for wave soldering is shown in Figure 2.

6-2.3 Soldering Iron(Figure 3):

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

Note：
- Preheat circuit and products to 150℃
- 280℃ tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 3 sec.

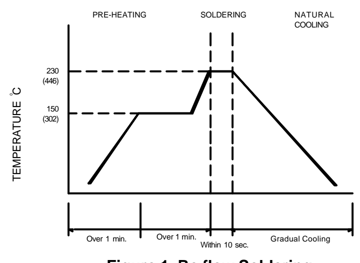


Figure 1. Re-flow Soldering

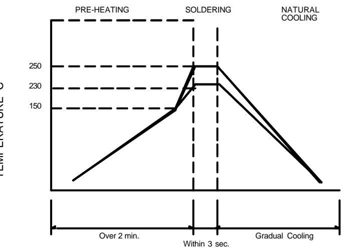


Figure 2. Wave Soldering

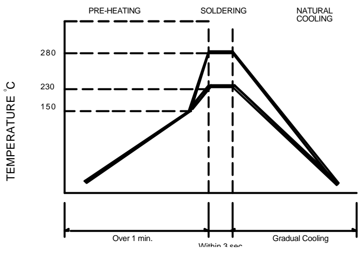
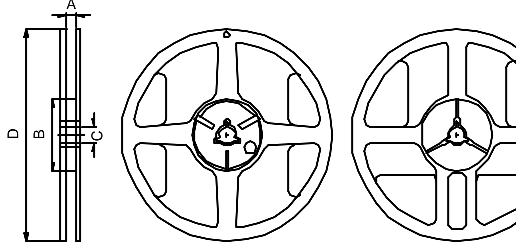
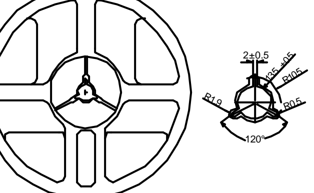


Figure 3. Hand Soldering

7. Packaging Information

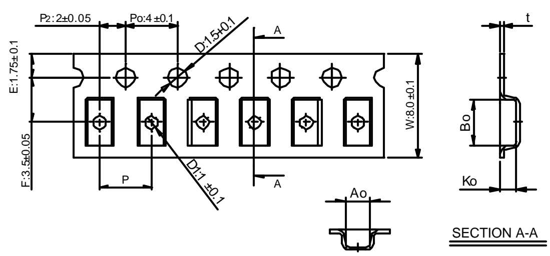
7-1. Reel Dimension





Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2

7-2. Tape Dimension / 8mm

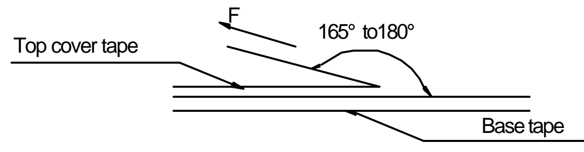


Series	size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
WCM2012F2S	201212	2.35±0.1	1.50±0.1	1.45±0.1	4.0±0.1	0.22±0.05
WCM3216F2S	321620	3.50±0.1	1.88±0.1	2.10±0.1	4.0±0.1	0.22±0.05
WCM2012F2N	201209	2.50±0.1	1.60±0.1	1.25±0.1	4.0±0.1	0.22±0.05
WCM3216F2N	321615	3.50±0.1	1.88±0.1	1.80±0.1	4.0±0.1	0.22±0.05

7-3. Packaging Quantity

Chip size	Chip/Reel	Inner Box	Middle Box	Carton
WCM2012F2S/F2N	2000/3000	10000/15000	50000/75000	100000/150000
WCM3216F2S/F2N	2000	10000	50000	100000

7-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

Room Temp. (℃)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

Application Notice

・Storage Conditions
To maintain the solderability of terminal electrodes:
1. Temperature and humidity conditions: Less than 40℃ and 70% RH.
2. Recommended products should be used within 6 months form the time of delivery.
3. The packaging material should be kept where no chlorine or sulfur exists in the air.

・Transportation
1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.