

## Product/Process Change Notification

This document contains confidential, proprietary, trade secret information of Knowles Electronics, LLC or its affiliated entities.  
Any unauthorized use or dissemination is strictly prohibited

<b>Initiation Date</b>	24 Jan 2022	<b>Notification No.</b>	20220125
<b>Implementation Date</b>	31 Jan 2022	<b>Initiator's Name</b>	Johanns Ocaba
<b>Beginning Date Code of Implemented Change</b>			Wk'05 2022

### **CHANGE DESCRIPTION:**

Knowles Electronics has qualified new source of FB Microphone Assembly's Bush, Housing and Connector components due to closure of previous material source. Parts meet drawing specification. There is no change in fit, form and functions of complete Boom Assembly.

Please continue to work with your local sales manager if you have questions or concerns related to this product change notification.

### **MATERIAL AFFECTED:**

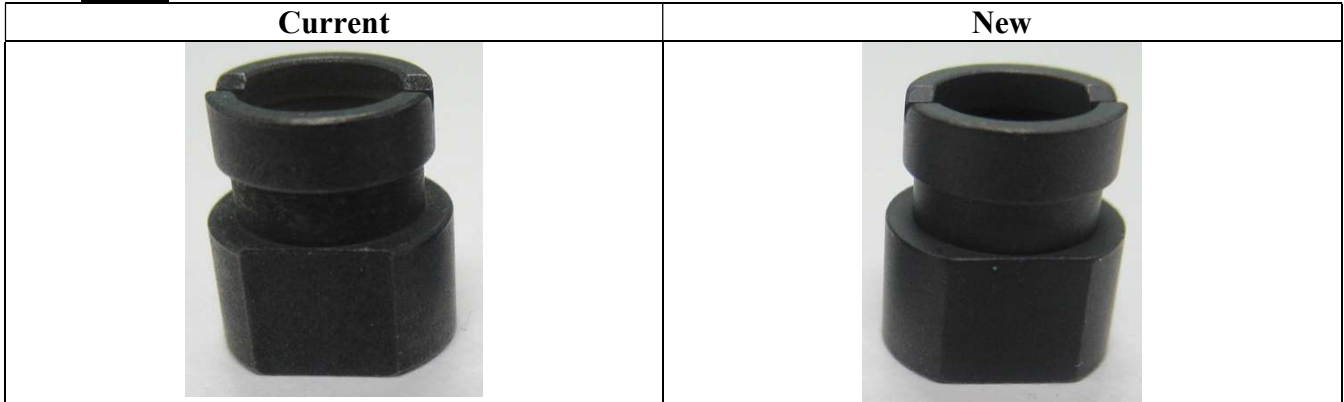
Part Number	Description
FB-021	BUSH
FB-001	HOUSING
FB-025	CONNECTOR

### **MODELS AFFECTED:**

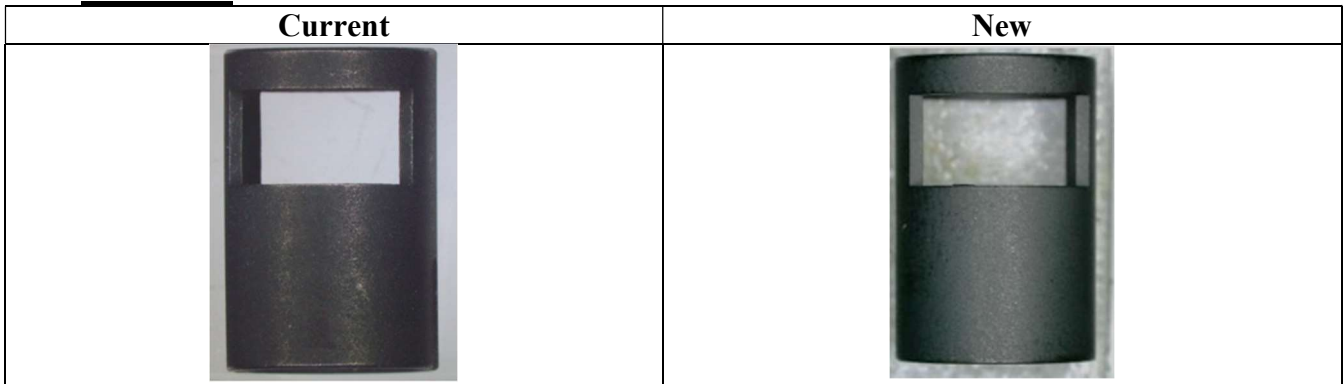
Part Number	Description
FB-FO-23225-000	BOOM MICROPHONE
FB-FO-25383-000	BOOM MICROPHONE

**MATERIAL PHOTOS**

**BUSH**



**HOUSING**



**CONNECTOR**



**SUPPORT INFORMATION:**

Knowles Qualification Plan Number: R-P-22010

Below parts were used as Qualification representatives. The result of the qualification of this representative is the basis in qualifying the rest of the affected models.

Part Number	Description
FB-021	BUSH
FB-001	HOUSING
FB-025	CONNECTOR

Finished Goods Part Number	Part Description
FB-FO-23225-000	BOOM MICROPHONE

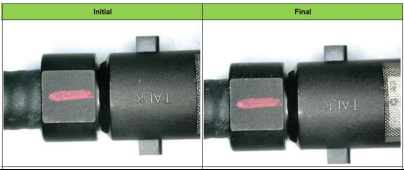
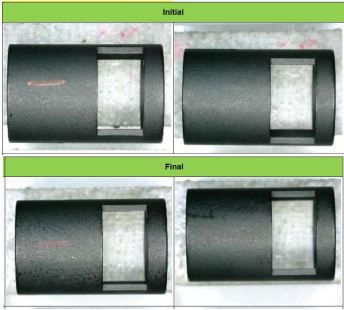

**KNOWLES CONFIDENTIAL AND PROPRIETARY**

**RELIABILITY TEST:**

**SUMMARY OF TEST SUITE:**

Item	Test item	Test condition	Acceptance Criteria	Sample size	Result
1	Boom and bush pull test (Assy)	Pull to 100N and keep 1 min .speed is 2.5mm.	Product have no mechanical damage. No bush and gooseneck separation.	10	PASS (See Appendix A)
2	Aggressive Acidic Sweat, Vaporized. (material level)	Vaporized, 38°C, PH 1.8, Exposure for 10 Days and 24 hours recovery.	No Visual corrosion/discoloration, black spots/peeled-off coating, etc.	10	PASS (See Appendix A)
3	Peel test (material level)	Apply 3M tape to surface, press tape for 3s, and strip-off tape quickly	No Plating Peel-off	10	PASS (See Appendix A)
4	Continuity test (material level)	Set DMM to continuity mode and connect the contact probes to the material surface,	Hear continuous beeping sound indicating good continuity	10	PASS (See Appendix A)

**APPENDIX A:**

<u>Test</u>	<u>Acceptance Criteria</u>	<u>Model Tested</u>	<u>Sample Size</u>	<u>Result</u>	<u>Data</u>
Boom and bush pull test (Assy)	Product have no mechanical damage. No bush and gooseneck separation.	FB-FO-23225-000	10	PASS	
Aggressive Acidic Sweat, Vaporized. (material level)	No Visual corrosion/discoloration, black spots/peeled-off coating, etc.	FB-001	10	PASS	
Peel test (material level)	No Plating Peel-off	FB-001	10	PASS	

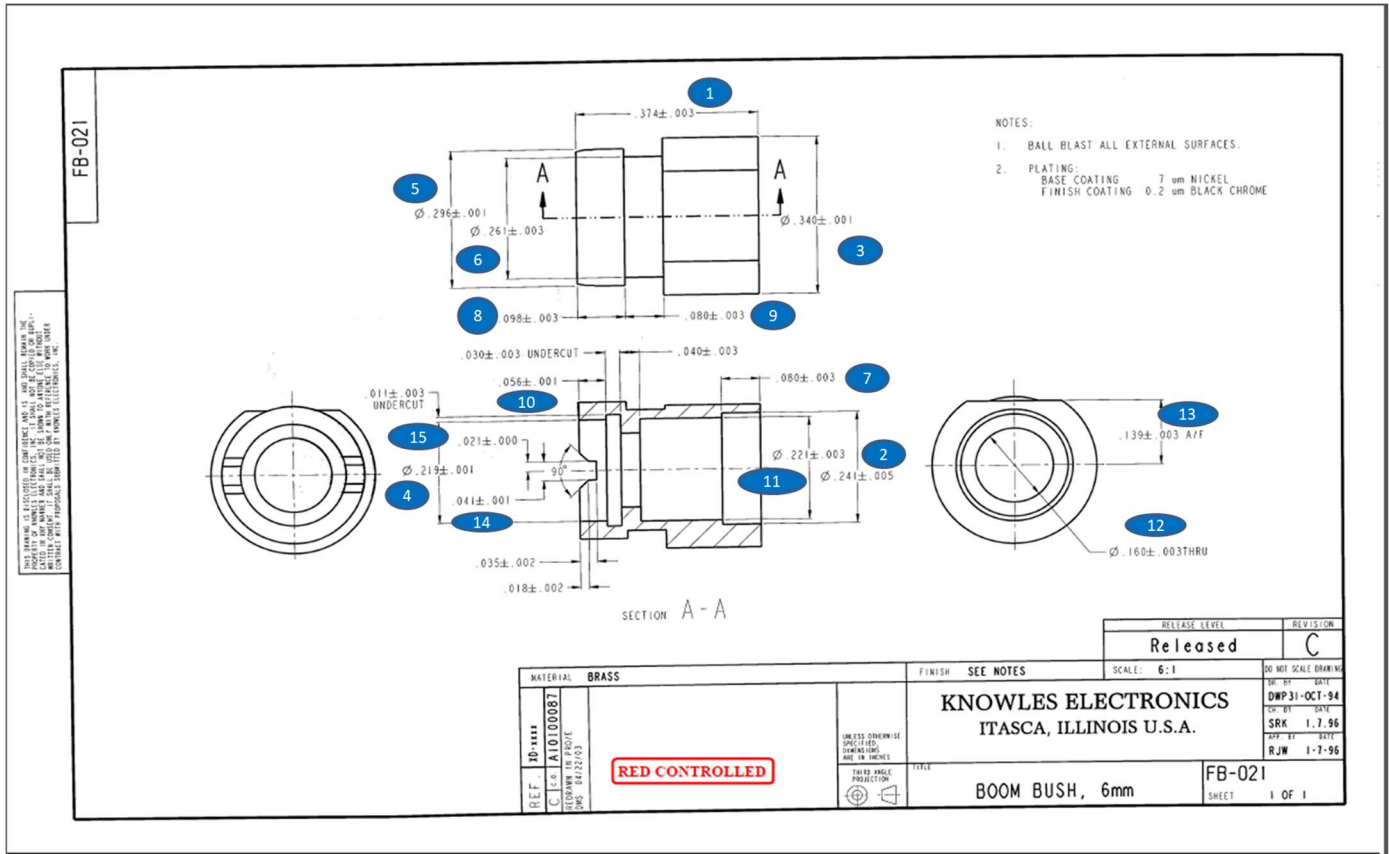
**KNOWLES CONFIDENTIAL AND PROPRIETARY**

Continuity test (material level)	Hear continuous beeping sound indicating good continuity	FB-001	10	PASS		<b>Continuity</b>
						<b>DCR</b>
						PASS
						PASS
						PASS
						PASS
						PASS
						PASS
						PASS
						PASS
						PASS
						PASS

**MATERIAL DATA:**

**DIMENSIONAL DATA:**

- **FB-021 Bush**



<u>Dim No.</u>	<u>Measurements (mm)</u>	<u>Graph</u>	<u>Results</u>
1	0.375		PASSED
	0.375		
	0.375		
	0.375		
	0.375		
	0.375		
	0.375		
	0.375		

**KNOWLES CONFIDENTIAL AND PROPRIETARY**

<b>Dim No.</b>	<b>Measurements (mm)</b>	<b>Graph</b>	<b>Results</b>
2	0.241		PASSED
	0.241		
	0.241		
	0.241		
	0.240		
	0.241		
	0.242		
	0.241		
	0.241		
	0.242		
3	0.341		PASSED
	0.340		
	0.341		
	0.340		
	0.340		
	0.340		
	0.340		
	0.341		
	0.341		
	0.340		
4	0.219		PASSED
	0.220		
	0.219		
	0.219		
	0.219		
	0.218		
	0.220		
	0.219		
	0.219		
	0.220		
5	0.296		PASSED
	0.296		
	0.295		
	0.296		
	0.295		
	0.296		
	0.296		
	0.296		
	0.296		
	0.296		

<b>Dim No.</b>	<b>Measurements (mm)</b>	<b>Graph</b>	<b>Results</b>
6	0.262	<p><b>Boxplot of Dim6</b></p> <p>0.264in USL 0.261in Nom 0.258in LSL</p>	PASSED
	0.262		
	0.262		
	0.262		
	0.262		
	0.262		
	0.262		
	0.262		
	0.262		
	0.262		
7	0.080	<p><b>Boxplot of Dim7</b></p> <p>0.083in USL 0.080in Nom 0.077in LSL</p>	PASSED
	0.082		
	0.082		
	0.082		
	0.081		
	0.080		
	0.081		
	0.080		
	0.080		
	0.080		
8	0.098	<p><b>Boxplot of Dim8</b></p> <p>0.101in USL 0.098in Nom 0.095in LSL</p>	PASSED
	0.098		
	0.098		
	0.098		
	0.098		
	0.098		
	0.098		
	0.098		
	0.098		
	0.098		
9	0.080	<p><b>Boxplot of Dim9</b></p> <p>0.083in USL 0.080in Nom 0.077in LSL</p>	PASSED
	0.080		
	0.080		
	0.079		
	0.080		
	0.080		
	0.080		
	0.080		
	0.080		
	0.080		
10	Not feasible to measure		

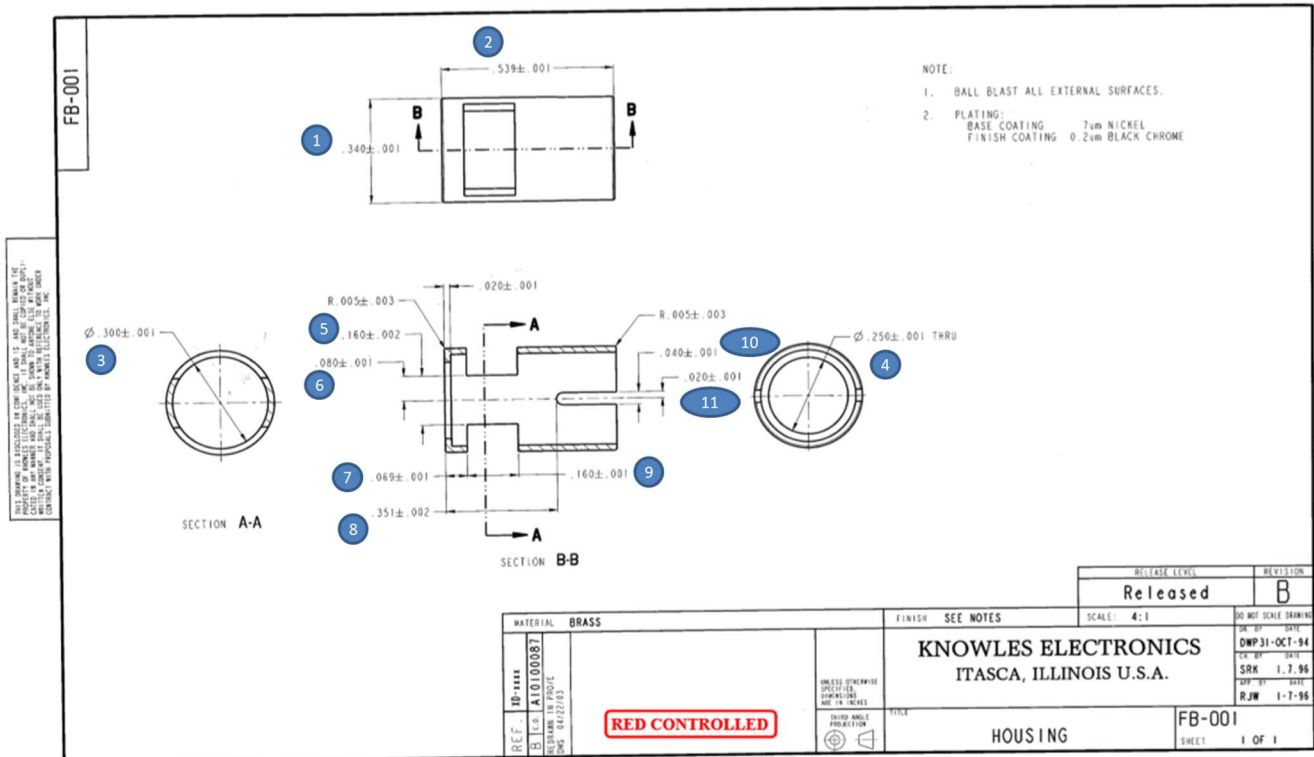
<u>Dim No.</u>	<u>Measurements (mm)</u>		<u>Graph</u>	<u>Results</u>
11	0.223			PASSED
	0.223			
	0.224			
	0.223			
	0.223			
	0.223			
	0.224			
	0.224			
	0.222			
	0.222			
12	0.160			PASSED
	0.160			
	0.160			
	0.160			
	0.160			
	0.160			
	0.160			
	0.160			
	0.160			
	0.160			
13	0.140			PASSED
	0.140			
	0.140			
	0.140			
	0.140			
	0.140			
	0.140			
	0.140			
	0.140			
	0.140			
14	0.041	0.041		PASSED
	0.041	0.040		
	0.041	0.040		
	0.041	0.041		
	0.040	0.041		
	0.041	0.041		
	0.041	0.040		
	0.040	0.041		
	0.041	0.040		
	0.041	0.041		

**KNOWLES CONFIDENTIAL AND PROPRIETARY**



Dim No.	Measurements (mm)		Graph	Results
15	0.020	0.020		PASSED
	0.020	0.020		
	0.020	0.020		
	0.021	0.021		
	0.020	0.021		
	0.021	0.021		
	0.021	0.020		
	0.020	0.020		
	0.021	0.020		
	0.021	0.021		

- FB-001 Housing



Dim No.	Measurements (mm)		Graph	Results
1	0.340			PASSED
	0.339			
	0.340			
	0.340			
	0.340			
	0.340			
	0.340			
	0.340			
	0.340			

KNOWLES CONFIDENTIAL AND PROPRIETARY

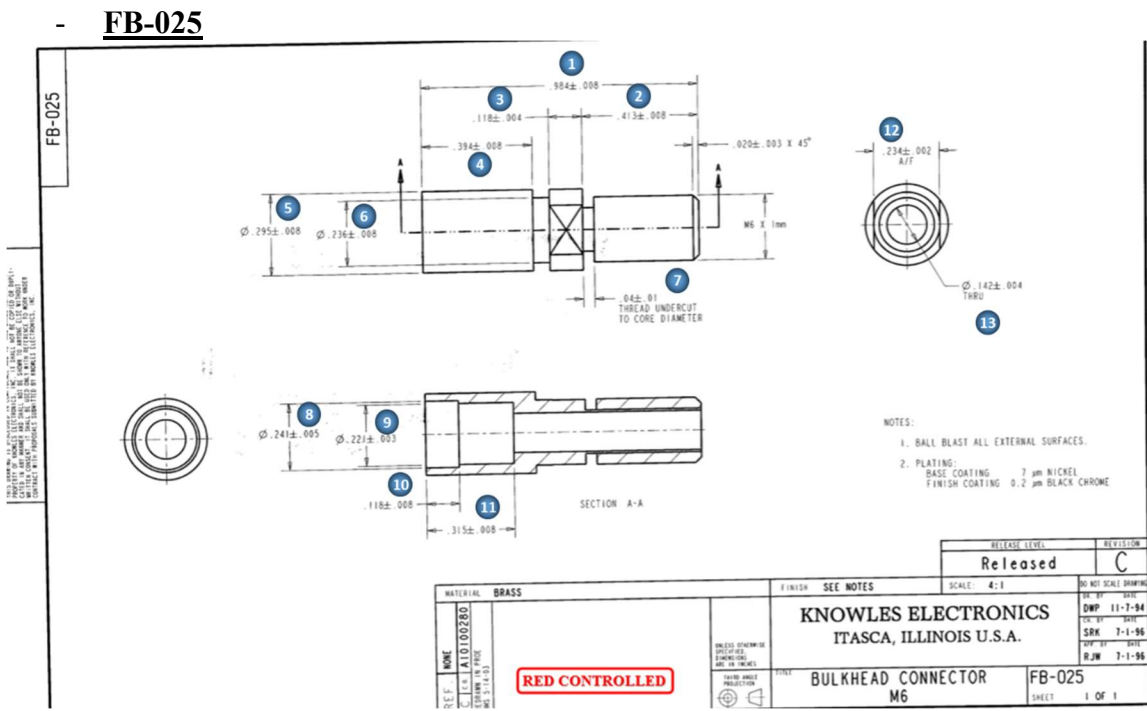
<u>Dim No.</u>	<u>Measurements (mm)</u>	<u>Graph</u>	<u>Results</u>																				
2	<table border="1"> <tr><td>0.540</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> <tr><td>0.540</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> <tr><td>0.539</td></tr> </table>	0.540	0.539	0.539	0.539	0.539	0.539	0.540	0.539	0.539	0.539		PASSED										
0.540																							
0.539																							
0.539																							
0.539																							
0.539																							
0.539																							
0.540																							
0.539																							
0.539																							
0.539																							
3	<table border="1"> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.300</td></tr> <tr><td>0.299</td></tr> <tr><td>0.300</td></tr> </table>	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.299	0.300		PASSED									
0.300																							
0.300																							
0.300																							
0.300																							
0.300																							
0.300																							
0.300																							
0.300																							
0.300																							
0.299																							
0.300																							
4	<table border="1"> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> <tr><td>0.251</td></tr> <tr><td>0.250</td></tr> <tr><td>0.250</td></tr> </table>	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.251	0.250	0.250		PASSED									
0.250																							
0.250																							
0.250																							
0.250																							
0.250																							
0.250																							
0.250																							
0.250																							
0.251																							
0.250																							
0.250																							
5	<table border="1"> <tr><td>0.160</td><td>0.161</td></tr> <tr><td>0.161</td><td>0.161</td></tr> <tr><td>0.161</td><td>0.161</td></tr> <tr><td>0.161</td><td>0.161</td></tr> <tr><td>0.161</td><td>0.162</td></tr> <tr><td>0.161</td><td>0.160</td></tr> <tr><td>0.160</td><td>0.160</td></tr> <tr><td>0.160</td><td>0.159</td></tr> <tr><td>0.160</td><td>0.159</td></tr> <tr><td>0.160</td><td>0.160</td></tr> </table>	0.160	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.162	0.161	0.160	0.160	0.160	0.160	0.159	0.160	0.159	0.160	0.160		PASSED
0.160	0.161																						
0.161	0.161																						
0.161	0.161																						
0.161	0.161																						
0.161	0.162																						
0.161	0.160																						
0.160	0.160																						
0.160	0.159																						
0.160	0.159																						
0.160	0.160																						
6	Not Feasible to measure																						

**KNOWLES CONFIDENTIAL AND PROPRIETARY**

<b>Dim No.</b>	<b>Measurements (mm)</b>		<b>Graph</b>	<b>Results</b>
7	0.070		<p><b>Boxplot of Dim7</b></p> <p>0.0700 0.070in USL 0.0695 0.0690 0.069in Nom 0.0685 0.0680 0.068in LSL</p>	PASSED
	0.070			
	0.070			
	0.070			
	0.070			
	0.070			
	0.070			
	0.070			
	0.070			
	0.069			
8	0.351	0.351	<p><b>Boxplot of Dim8-1, Dim8-2</b></p> <p>0.353 0.353in USL 0.352 0.351 0.351in Nom 0.350 0.349 0.349in LSL</p> <p>Dim8-1 Dim8-2</p>	PASSED
	0.351	0.352		
	0.349	0.352		
	0.350	0.351		
	0.351	0.353		
	0.351	0.352		
	0.350	0.352		
	0.351	0.351		
	0.351	0.352		
	0.350	0.352		
9	0.160	0.160	<p><b>Boxplot of Dim9-1, Dim9-2</b></p> <p>0.1610 0.161in USL 0.1605 0.1600 0.160in Nom 0.1595 0.1590 0.159in LSL</p> <p>Dim9-1 Dim9-2</p>	PASSED
	0.160	0.160		
	0.160	0.160		
	0.160	0.160		
	0.160	0.160		
	0.160	0.161		
	0.160	0.161		
	0.160	0.160		
	0.160	0.160		
	0.160	0.160		
10	0.040	0.040	<p><b>Boxplot of Dim10-1, Dim10-2</b></p> <p>0.0410 0.041in USL 0.0405 0.0400 0.040in Nom 0.0395 0.0390 0.039in LSL</p> <p>Dim10-1 Dim10-2</p>	PASSED
	0.039	0.040		
	0.039	0.040		
	0.039	0.040		
	0.039	0.040		
	0.039	0.040		
	0.040	0.040		
	0.039	0.040		
	0.039	0.040		
	0.040	0.040		

**KNOWLES CONFIDENTIAL AND PROPRIETARY**

Dim No.	Measurements (mm)		Graph	Results
11	0.020	0.020		PASSED
	0.020	0.020		
	0.019	0.020		
	0.019	0.020		
	0.020	0.020		
	0.020	0.020		
	0.020	0.020		
	0.020	0.020		
	0.020	0.020		
	0.020	0.020		



Dim No.	Measurements (mm)		Graph	Results
1	0.985			PASSED
	0.985			
	0.984			
	0.984			
	0.985			
	0.985			
	0.984			
	0.984			
	0.986			
	0.985			

**KNOWLES CONFIDENTIAL AND PROPRIETARY**

<u>Dim No.</u>	<u>Measurements (mm)</u>	<u>Graph</u>	<u>Results</u>
2	0.414	<p><b>Boxplot of Dim2</b></p> <p>0.4225 0.4200 0.4175 0.4150 0.4125 0.4100 0.4075 0.4050</p> <p>inch</p> <p>0.421in USL 0.413in Nom 0.405in LSL</p>	PASSED
	0.413		
	0.413		
	0.414		
	0.413		
	0.413		
	0.413		
	0.412		
	0.413		
	0.412		
3	0.118	<p><b>Boxplot of Dim3</b></p> <p>0.122 0.121 0.120 0.119 0.118 0.117 0.116 0.115 0.114 0.113</p> <p>inch</p> <p>0.122in USL 0.118in Nom 0.114in LSL</p>	PASSED
	0.117		
	0.119		
	0.118		
	0.119		
	0.119		
	0.118		
	0.119		
	0.118		
	0.118		
4	0.394	<p><b>Boxplot of Dim4</b></p> <p>0.4025 0.4000 0.3975 0.3950 0.3925 0.3900 0.3875 0.3850</p> <p>inch</p> <p>0.402in USL 0.394in Nom 0.386in LSL</p>	PASSED
	0.393		
	0.393		
	0.393		
	0.394		
	0.393		
	0.394		
	0.393		
	0.394		
	0.393		
5	0.293	<p><b>Boxplot of Dim5</b></p> <p>0.305 0.300 0.295 0.290 0.285</p> <p>inch</p> <p>0.303in USL 0.295in Nom 0.287in LSL</p>	PASSED
	0.293		
	0.293		
	0.293		
	0.293		
	0.293		
	0.293		
	0.293		
	0.293		
	0.293		

<u>Dim No.</u>	<u>Measurements (mm)</u>	<u>Graph</u>	<u>Results</u>
6	0.241	<p><b>Boxplot of Dim6</b></p> <p>0.245 0.240 0.235 0.230</p> <p>inch</p> <p>0.244in USL 0.236in Nom 0.228in LSL</p>	PASSED
	0.242		
	0.241		
	0.241		
	0.241		
	0.241		
	0.241		
	0.241		
	0.241		
	0.240		
7	0.044	<p><b>Boxplot of Dim7</b></p> <p>0.050 0.045 0.040 0.035 0.030</p> <p>inch</p> <p>0.050in USL 0.040in Nom 0.030in LSL</p>	PASSED
	0.045		
	0.044		
	0.044		
	0.045		
	0.045		
	0.045		
	0.044		
	0.044		
	0.045		
8	0.241	<p><b>Boxplot of Dim8</b></p> <p>0.2475 0.2450 0.2425 0.2400 0.2375 0.2350</p> <p>inch</p> <p>0.246in USL 0.241in Nom 0.236in LSL</p>	PASSED
	0.242		
	0.242		
	0.241		
	0.241		
	0.241		
	0.240		
	0.241		
	0.241		
	0.241		
9	0.222	<p><b>Boxplot of Dim9</b></p> <p>0.224 0.223 0.222 0.221 0.220 0.219 0.218</p> <p>inch</p> <p>0.224in USL 0.221in Nom 0.218in LSL</p>	PASSED
	0.222		
	0.222		
	0.221		
	0.221		
	0.222		
	0.221		
	0.221		
	0.222		
	0.221		

<u>Dim No.</u>	<u>Measurements (mm)</u>	<u>Graph</u>	<u>Results</u>										
10	<table border="1"> <tr><td>0.115</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> <tr><td>0.117</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> <tr><td>0.118</td></tr> </table>	0.115	0.118	0.118	0.117	0.118	0.118	0.118	0.118	0.118	0.118		PASSED
0.115													
0.118													
0.118													
0.117													
0.118													
0.118													
0.118													
0.118													
0.118													
0.118													
11	<table border="1"> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.312</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> <tr><td>0.315</td></tr> </table>	0.315	0.315	0.312	0.315	0.315	0.315	0.315	0.315	0.315	0.315		PASSED
0.315													
0.315													
0.312													
0.315													
0.315													
0.315													
0.315													
0.315													
0.315													
0.315													
12	<table border="1"> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.235</td></tr> <tr><td>0.234</td></tr> <tr><td>0.234</td></tr> <tr><td>0.233</td></tr> </table>	0.234	0.234	0.234	0.234	0.234	0.234	0.235	0.234	0.234	0.233		PASSED
0.234													
0.234													
0.234													
0.234													
0.234													
0.234													
0.235													
0.234													
0.234													
0.233													
13	<table border="1"> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> <tr><td>0.141</td></tr> </table>	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141		PASSED
0.141													
0.141													
0.141													
0.141													
0.141													
0.141													
0.141													
0.141													
0.141													
0.141													

**PLATING /COATING DATA:**

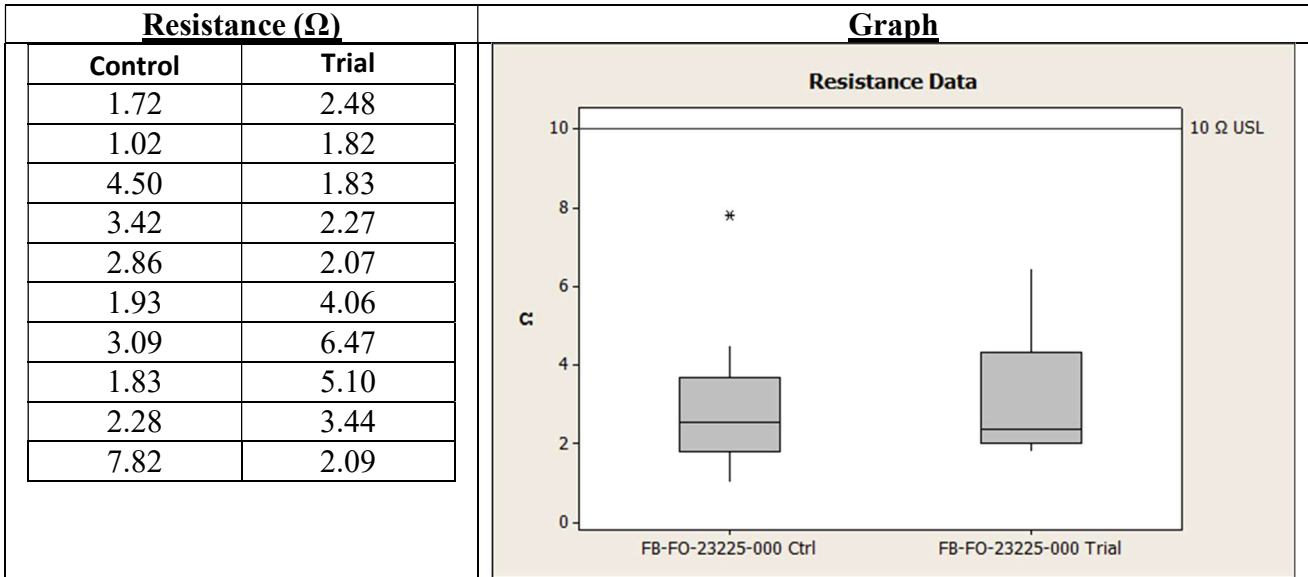
<b><u>Plating/ Coating</u></b>	<b><u>Measurements (um)</u></b>	<b><u>Graph</u></b>										
Nickel	<table border="1"> <tr><td>6.72</td></tr> <tr><td>6.59</td></tr> <tr><td>6.48</td></tr> <tr><td>6.56</td></tr> <tr><td>6.64</td></tr> <tr><td>6.36</td></tr> <tr><td>6.18</td></tr> <tr><td>6.08</td></tr> <tr><td>6.02</td></tr> <tr><td>6.39</td></tr> </table>	6.72	6.59	6.48	6.56	6.64	6.36	6.18	6.08	6.02	6.39	<p style="text-align: center;"><b>Nickel Thickness</b></p> <p style="text-align: right;">7um Ref</p>
6.72												
6.59												
6.48												
6.56												
6.64												
6.36												
6.18												
6.08												
6.02												
6.39												
Trivalent Black Chrome Coating	<table border="1"> <tr><td>0.38</td></tr> <tr><td>0.33</td></tr> <tr><td>0.31</td></tr> <tr><td>0.47</td></tr> <tr><td>0.39</td></tr> <tr><td>0.38</td></tr> <tr><td>0.50</td></tr> <tr><td>0.48</td></tr> <tr><td>0.44</td></tr> <tr><td>0.48</td></tr> </table>	0.38	0.33	0.31	0.47	0.39	0.38	0.50	0.48	0.44	0.48	<p style="text-align: center;"><b>Black Chrome Thickness</b></p> <p style="text-align: right;">0.2um Ref</p>
0.38												
0.33												
0.31												
0.47												
0.39												
0.38												
0.50												
0.48												
0.44												
0.48												

**KNOWLES CONFIDENTIAL AND PROPRIETARY**



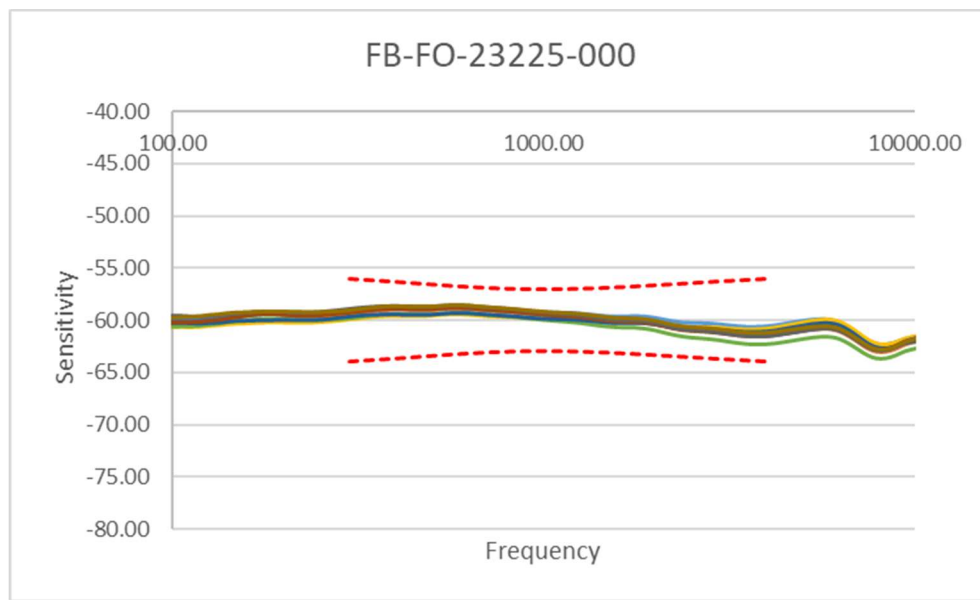
## FUNCTIONAL DATA:

### Assembly Resistance



### Acoustic Performance

- Acoustic test data is within specs.



**KNOWLES CONFIDENTIAL AND PROPRIETARY**

- Process Capability at 1Khz Sensitivity is good.

