

# **Product/Process Change Notification**

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<b>Initiation Date</b>	May 1, 2019	Notification No.	20190417
<b>Implementation Date</b>	June 1, 2019	Initiator's Name	F. Plameran
<b>Beginning Date Code of 1</b>	ange	NA	

#### **CHANGE DESCRIPTION:**

Knowles qualified the new wire supplier for below listed wires used in telecoil assemblies. There is no change to bare wire and enamel coating materials and no change to fit, form and function of the finished goods assemblies. The new supplier's wires meet wire drawing specification. The assemblies built with new supplier's wires meet assembly drawing specifications.

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

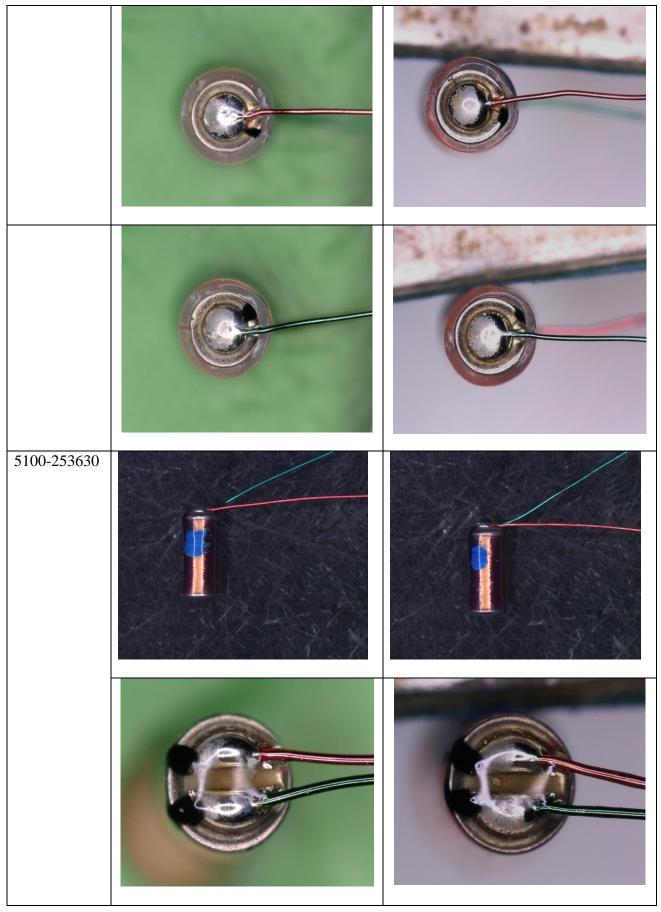
#### **MODELS AFFECTED:**

MODELD MITECIED,		
Telecoil PN	Wire PN	wire AWG#/color
5100-253446	5100-029-111-4	#36/red
3100-233446	5100-029-211-4	#36/green
5100-253604	5100-029-119-2	#36/red
3100-233004	5100-029-219-2	#36/green
5100 252620	5100-029-150-1	#36/red
5100-253630	5100-029-250-1	#36/green
5100.254056	5100-043-170-1	#40/green
5100-254056	5100-043-270-1	#40/red
	5100-029-150-1	#36/red
5300-253485	5100-029-250-1	#36/green
	5100-029-350-1	#36/yellow

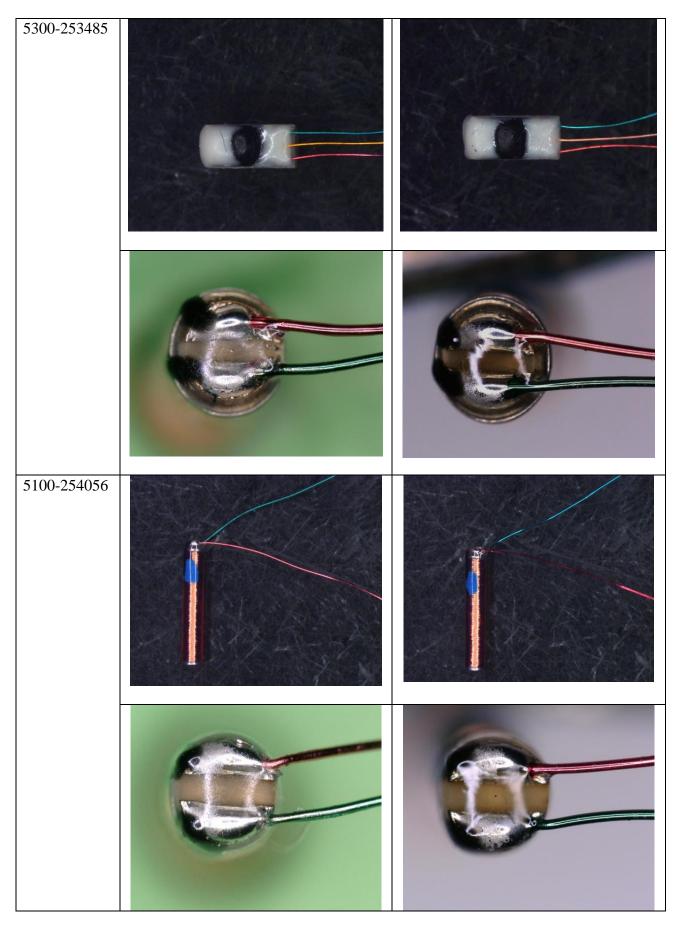
# Comparable photos of assembled finished goods for new (trial lot) and current

(control lot) wire manufacturer

	ire manufacturer	
Finished	New wire supplier	Current wire supplier
Goods	(Trial lot)	(Control lot)
Comparison 5100-253446	(11101101)	(0011201100)
5100-253446		
5100-253604		



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### **SUPPORT INFORMATION:**

The following qualification tests have been performed per Qualification Plan Number: R-18015

<u>Tested models</u>: 5100-253446, 5100-253604, 5100-253630, 5300-253485, 5100-254056

Control lot: Assemblies built with current supplier telecoil wire.

<u>Trial lot</u>: Assemblies built with new supplier telecoil wire.

## **Reliability Test Results: 5100-253446**

Test Item	Sample size	Acceptance Criteria	Test Result		
Damp Heat  Temperature = $40^{\circ}$ C ± $2^{\circ}$ C; Humidity = $93^{\circ}$ %	Control Lot: 20pcs Trial Lot: 20pcs	Criteria  Trial group performance must be	Pass - The trial lot the control lot.  Initial  Test item  DCR (1620-1980Ω)  Inductance (144.5- 195.5 mH)  10 days  Test item  DCR (1620-1980Ω)	Group Control lot Trial lot Control lot Trial lot Group Control lot Trial lot	Average 1791 1796 165 165.1  Average 1795.2
± 3 % RH, 21days; Recovery time 24 hrs.		equal or better compared to control group.	Inductance	Trial lot Control lot	1801 164.52
$@ 23^{\circ}C \pm 5^{\circ}C.$			(144.5- 195.5 mH)	Trial lot	164.41
			21 days		
			Test item	Group	Average
			DCR	Control lot	1796.9
			$(1620-1980\Omega)$	Trial lot	1795.6
			Inductance	Control lot	164
			(144.5- 195.5 mH)	Trial lot	164.27

Test Item	Sample size	Acceptance Criteria		Test Result	
		Pass - The trial lot performance is comparable the control lot.  Initial			
		Test item	Group	Average	
			DCR	Control lot	1784
Thermal Shock	Thermal Shock	Trial group performance must be	$(1620-1980\Omega)$	Trial lot	1795
100 C	G . 11 . 20		Inductance	Control lot	165
Low temp: -40° C, High temp: 63 ° C, 30	Control Lot: 20pcs Trial group Trial Lot: 20pcs performance must be			(144.5-195.5 mH)	Trial lot
min for each duration,	_	equal or better	Final		
totally 7 cycles		compared to control	Test item	Group	Average
		group.	DCR (1620-1980Ω)	Control lot	1781
				Trial lot	1801
			Inductance	Control lot	165
			(144.5-195.5 mH)	Trial lot	165
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## **Reliability Test Results: 5100-253604**

Test Item	Sample size	Acceptance Criteria	Test Result			
Damp Heat  Temperature = 40° C ± 2° C; Humidity = 93 % ± 3 % RH, 21days; Recovery time 24 hrs	Control Lot: 20pcs Trial Lot: 20pcs		Pass - The trial lot the control lot.  Initial  Test item  DCR $(810-990 \Omega)$ Inductance $(120.7-163.3 \text{ mH})$ 10 days  Test item  DCR $(810-990 \Omega)$ Inductance		Average 902 887 140.4 139.6 Average 883.7 883.7 139.78	
@ $23^{\circ}$ C $\pm 5^{\circ}$ C.				(120.7-163.3 mH)	Trial lot	139.78
			21 days			
			Test item	Group	Average	
			DCR	Control lot	902	
			(810-990 Ω)	Trial lot	886.3	
			Inductance	Control lot	139.46	
			(120.7-163.3 mH)	Trial lot	138.96	

Test Item	Sample size	Acceptance Criteria	Test Result							
			Pass - The trial lothe control lot.  Initial	ot performance is	comparable to					
			Test item	Group	Average					
	Control Lot: 20pcs Trial Lot: 20pcs	Trial group performance must be equal or better compared to control group.	DCR	Control lot	890					
Thermal Shock			(810-990 Ω)	Trial lot	886					
100 C			Inductance	Control lot	140					
Low temp: -40° C, High temp: 63 ° C, 30			equal or better	equal or better	equal or better	equal or better	Opcs equal or better	Trial Lot: 20pcs   equal or better   (120.7-16	(120.7-163.3 mH)	Trial lot
min for each duration,			Final							
totally 7 cycles			Test item	Group	Average					
			DCR	Control lot	885					
			(810-990 Ω)	Trial lot	888					
			Inductance	Control lot	140					
			(120.7-163.3 mH)	Trial lot	140					

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# Reliability Test Results: 5100-253630

Test Item	Sample size	Acceptance Criteria		Test Result	
			Pass-The trial lot the control lot.  Initial  Test item	performance is of Group	Comparable to  Average
			DCR	Control lot	5282
			$(4860-5940 \Omega)$	Trial lot	5305
			Inductance	Control lot	494.2
,		Trial group performance must be equal or better compared to control group.	(433.5 - 586.8 mH)	Trial lot	489.4
Damp Heat			10 days		
Temperature = $40^{\circ} \text{ C} \pm$	Control Lot: 20pcs Trial Lot:		Test item	Group	Average
2° C; Humidity = 93 %			DCR	Control lot	5278.2
± 3 % RH, 21days;	20pcs		$(4860-5940 \Omega)$	Trial lot	5311.5
Recovery time 24 hrs	-		Inductance	Control lot	489.57
@ $23^{\circ}$ C ± $5^{\circ}$ C.			(433.5 - 586.8 mH)	Trial lot	490.61
			21 days		
			Test item	Group	Average
			DCR	Control lot	5287.1
			$(4860-5940 \Omega)$	Trial lot	5312.0
			Inductance	Control lot	493.32
		1	(433.5 - 586.8 mH)	Trial lot	490.92

Test Item	Sample size	Acceptance Criteria	Test Result		
		Pass-The trial lot performance i the control lot.  Initial			
			Test item	Group	Average
Thermal Shock	Thermal Shock		DCR	Control lot	5304
	Control Lot: 20pcs	Trial group	$(4860-5940 \Omega)$	Trial lot	5274
Low temp: -40° C,	Trial Lot: 20pcs	performance must be equal or better	Inductance	Control lot	488
High temp: 63 ° C, 30 min for each duration,			(433.5 - 586.8 mH)	Trial lot	488
totally 7 cycles		compared to control	Final		
		group.	Test item	Group	Average
			DCR	Control lot	5331
			$(4860-5940 \Omega)$	Trial lot	5314
			Inductance	Control lot	488
			(433.5-586.8 mH)	Trial lot	489

## **Reliability Test Results: 5300-253485**

Test Item	Sample size	Acceptance Criteria		Test Result		
			Pass - The trial lot performance is comparable to the control lot.  Initial			
			Test item	Group	Average	
			Sensitivity	Control lot	-14.4435	
			(200Hz)	Trial lot	-14.4275	
			Sensitivity	Control lot	-53.454	
			(1000Hz)	Trial lot	-53.3515	
			Sensitivity	Control lot	6.4450	
			(5000Hz)	Trial lot	6.4480	
			371	Control lot	0.5515	
			VL	Trial lot	0.5530	
			7017	Control lot	3921.30	
			ZOUT	Trial lot	3914.65	
			10 days			
			Test item	Group	Average	
Damp Heat		Trial group performance must be equal or better compared to control	Sensitivity (200Hz)	Control lot	-14.4605	
T 400 C	G . 11 . 20			Trial lot	-14.4670	
Temperature = $40^{\circ}$ C ± $2^{\circ}$ C; Humidity = $93^{\circ}$ %	Control Lot: 20pcs Trial Lot: 20pcs		Sensitivity (1000Hz)	Control lot	-53.507	
± 3 % RH, 21days;	That Lot. 20pes			Trial lot	-53.5155	
Recovery time 24 hrs.			Sensitivity (5000Hz)	Control lot	6.564	
@ $23^{\circ}$ C $\pm 5^{\circ}$ C.		group.		Trial lot	6.5735	
			777	Control lot	0.5445	
			VL	Trial lot	0.5470	
			ZOLE	Control lot	3932.45	
			ZOUT	Trial lot	3925.85	
			21 days			
			Test item	Group	Average	
			Sensitivity	Control lot	-14.4720	
			(200Hz)	Trial lot	-14.4635	
			Sensitivity	Control lot	-53.4735	
			(1000Hz)	Trial lot	-53.2425	
			Sensitivity	Control lot	6.5325	
			(5000Hz)	Trial lot	6.5255	
			X 7T	Control lot	0.5475	
			VL	Trial lot	0.5490	
			70.	Control lot	3932.7	
			ZOUT	Trial lot	3938.00	
			L	1		

Test Item	Sample size	Acceptance Criteria	Test Result			
			Pass-The trial lot performance is comparable to the control lot.  Initial			
			Test item	Group	Average	
			Sensitivity	Control lot	-14.4390	
			(200Hz)	Trial lot	-14.4575	
			Sensitivity	Control lot	-52.9195	
			(1000Hz)	Trial lot	-52.9310	
		Trial group performance must be	Sensitivity	Control lot	6.4425	
			(5000Hz)	Trial lot	6.4020	
Thermal Shock			VL	Control lot	0.5545	
	Control Lot: 20pcs Trial Lot: 20pcs			Trial lot	0.5595	
Low temp: $-40^{\circ}$ C,			ZOUT	Control lot	3925.35	
High temp: 63 ° C, 30		equal or better		Trial lot	3928.15	
min for each duration, totally 7 cycles		compared to control	Final			
totally / cycles		group.	Test item	Group	Average	
			Sensitivity	Control lot	-14.4390	
			(200Hz)	Trial lot	-14.4325	
			Sensitivity (1000Hz)	Control lot	-52.9555	
				Trial lot	-52.9640	
			Sensitivity	Control lot	6.4445	
			(5000Hz)	Trial lot	6.4075	
			371	Control lot	0.5550	
			VL	Trial lot	0.5565	
			7017	Control lot	3923.10	
			ZOUT	Trial lot	3928.15	

## **Reliability Test Results of 5100-254056:**

Test Item	Sample size	Acceptance Criteria	Test Result		
Test Item  Damp Heat  Temperature = 40° C ± 2° C; Humidity = 93 % ± 3 % RH, 21days; Recovery time 24 hrs. @ 23°C ± 5°C.	Control Lot: 20pcs Trial Lot: 20pcs		Pass-The trial lot the control lot.  Initial  Test item  DCR  (1980-2420 $\Omega$ )  Inductance  (97.75-132.25 mH)  10 days  Test item  DCR  (1980-2420 $\Omega$ )  Inductance  (97.75-132.25 mH)		Average  2246  2256  110.2  110.5  Average  2253  2235.7  110.69  110.68
			Test item  DCR (1980-2420 Ω)  Inductance (97.75-132.25 mH)	Group Control lot Trial lot Control lot Trial lot	Average 2232.7 2235.7 113.16 112.31

Test Item	Sample size	Acceptance Criteria	Test Result		
Thermal Shock  Low temp: -40° C,  High temp: 63 ° C, 30  min for each duration,  totally 7 cycles	Control Lot: 20pcs Trial Lot: 20pcs	Trial group performance must be equal or better compared to control group.	Pass-The trial lot performance is comparable to the control lot.  Initial		
			Test item	Group	Average
			DCR (1980-2420 Ω)	Control lot	2263
				Trial lot	2244
			Inductance (97.75-132.25 mH)	Control lot	111
				Trial lot	111
			Final		
			Test item	Group	Average
			DCR (1980-2420 Ω)	Control lot	2262
				Trial lot	2263
			Inductance	Control lot	110
			(97.75-132.25 mH)	Trial lot	110

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