ROGERS CORPORATION
Advanced Connectivity Solutions

100 South Roosevelt Avenue / Chandler, AZ 85226-3415 / 480.961.1382 / Fax: 480.961.4533

PRODUCT CHANGE NOTIFICATION:
RO4003C™ Laminate Conversion to Arsenic Free Copper Foils

April 10th, 2020

Dear valued customer,

In accordance with European Union and REACH regulations, copper foil manufacturers are eliminating the use of arsenic acid in their copper foil manufacturing processes. REACH aims to limit occupational exposure of Arsenic metal (As) and Arsenic Trichloride (AsCl3). This legislation is making it difficult to use arsenic compounds in the manufacturing of copper foil, ultimately banning the purchase of arsenic within the EU altogether. RO4003C™ laminates currently supplied by Rogers Corporation are impacted by this mandate. During 2020, the standard electrodeposited copper foil that Rogers Corporation currently purchases to manufacture RO4003C laminates will be replaced by a new copper foil grade compliant with EU regulations.

Rogers' internal qualification efforts indicate that RO4003C laminates utilizing the replacement foils meet current performance specifications. As always, we encourage our customers to determine the suitability of Rogers' materials for their specific application. To assist you in doing so, enclosed are Rogers' property comparisons for the existing and new versions of RO4003C laminates supplied from our Rogers Suzhou factory. Samples of the new version are available upon request. For RO4003C laminates manufactured with arsenic free copper foils from our Rogers US and Belgium facilities, our internal qualification work will be complete by June 1, 2020.

Due to the decreasing availability of the current copper foil grade, we request that you prioritize an assessment of this change to mitigate supply disruptions and protect against rising costs anticipated with the legacy product.

Please contact your local Sales Engineer if you have any questions or concerns regarding this notification.
Sincerely,

Tony Mattingly
Director, Global Product Management

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			Typical Values				
Test	**Units**	**RO4003C™ Data Sheet**	**LEGACY**	**NEW**	**IPC Spec**	**Test Method**	**Condition**
Dielectric Constant		3.38 +/- 0.05	3.35	3.35		IPC TM-650 2.5.5.5	10GHz, 23°C/50%RH
Loss Tangent		0.0027	0.0028	0.0026		IPC TM-650 2.5.5.5	10GHz, 23°C/50%RH
Peel Strength (1oz ED)	lbs./in.	6.0	6.4	6.4		IPC TM-650 2.4.8	10 sec, 550°F solder float
Peel Strength (1/2 oz ED)	lbs./in.		5.2	5.4		IPC TM-650 2.4.8	10 sec, 550°F solder float
Dim. Stab. MD (0.020", 1oz)	%	<0.3	0.00	0.00	<0.3 mils/inch**	IPC TM-650 2.4.39	after etch +E4/105
Dim. Stab. CMD (0.020", 1oz)	%	<0.3	0.01	0.01	<0.3 mils/inch**	IPC TM-650 2.4.39	after etch +E4/105
Dielectric Strength	V/mil	780	770	753		IPC TM-650 2.5.6	D-48/50 + D-0.5/23
Water Absorption	%	0.060	0.023	0.022		IPC TM-650 2.6.2.1	48 hrs @ 50°C
Surface Resistivity	MΩ	4.2E+09	1.1E+12	1.2E+12		IPC TM-650 2.5.17.1	Condition A
Volume Resistivity	MΩ -cm	1.7E+10	1.1E+14	9.0E+13		IPC TM-650 2.5.17.1	Condition A
CTE, X-axis	ppm/°C	11				IPC TM-650 2.4.41	-55°C to 288°C
CTE, Y-axis	ppm/°C	14				IPC TM-650 2.4.41	-55°C to 288°C
CTE, Z-axis	ppm/°C	46				IPC TM-650 2.4.41	-55°C to 288°C
Tensile Modulus, MD	kpsi	20.2				ASTM D-638	ambient
Tensile Modulus, CMD	kpsi	14.5				ASTM D-638	ambient
Tensile Strength, MD	kpsi	2850				ASTM D-638	ambient
Tensile Strength, CMD	kpsi	2821				ASTM D-638	ambient
Flex Modulus, MD	kpsi					ASTM D-790	ambient
Flex Modulus, CMD	kpsi					ASTM D-790	ambient
Flex Strength, MD	kpsi					ASTM D-790	ambient
Flex Strength, CMD	kpsi					ASTM D-790	ambient

NOTES: ** Default IPC spec is Range B * Specification only applies to below 0.030", materials tested in this qualification were 0.020"**

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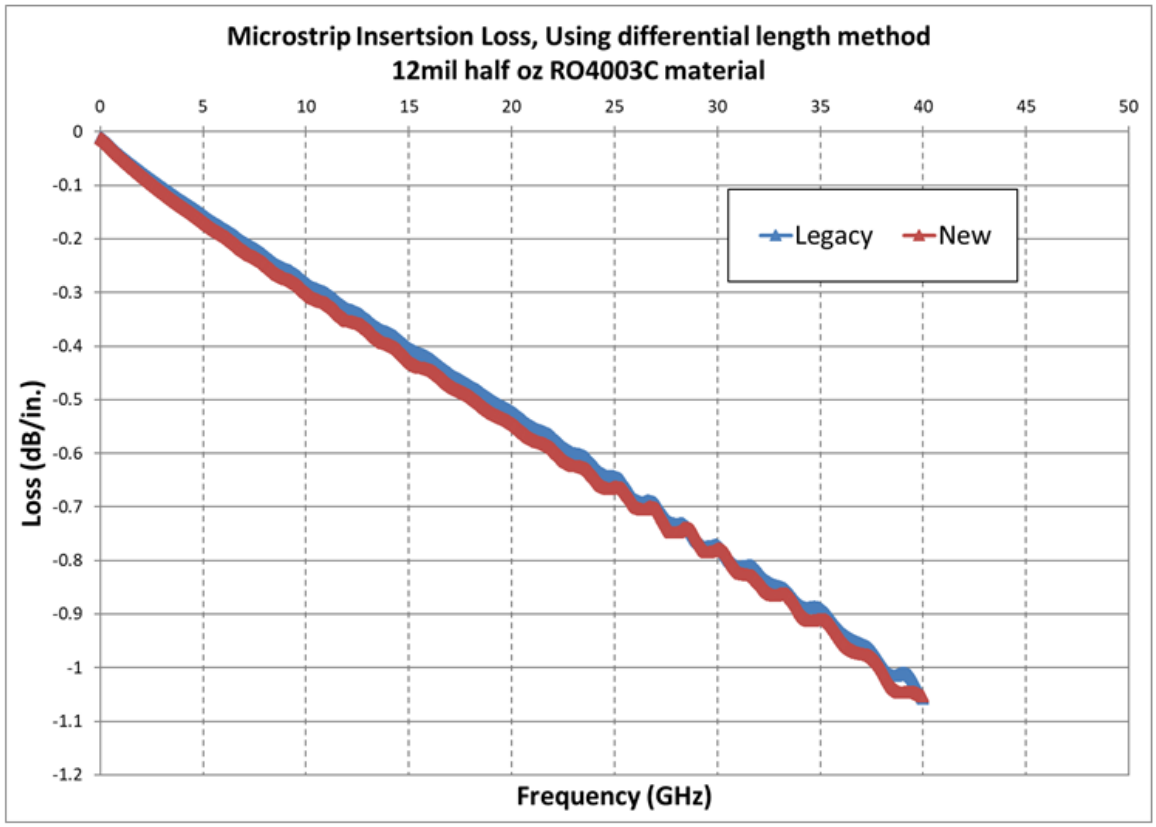
12mil RO4003C™ Legacy vs. 12mil RO4003C™ New

Insertion Loss vs. Frequency Comparison



Insertion Loss @10GHz	Insertion Loss @20GHz	Insertion Loss @39GHz	Version
-0.2815	-0.5220	-1.0098	Legacy
-0.2996	-0.5436	-1.0461	New

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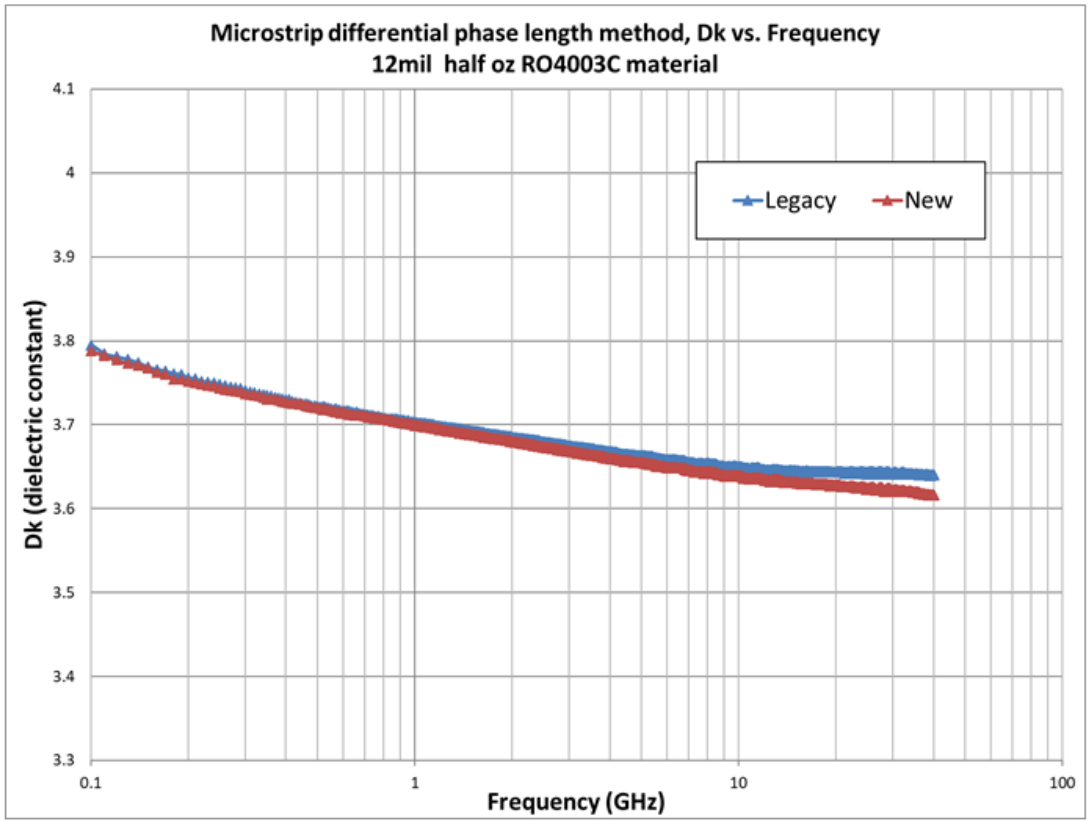
12mil RO4003C™ Legacy vs. 12mil RO4003C™ New

Dk vs. Frequency comparison



Design DK @2GHz	Design DK @10GHz	Design DK AVG 1-40GHz	Revision
3.682	3.650	3.649	Legacy
3.678	3.639	3.634	New

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LEGACY = Current product manufactured at Rogers Suzhou factory, using existing copper foil
NEW = New manufactured at Rogers Suzhou factory, using “arsenic free” copper foil

INSERTION LOSS COMPARISON SUMMARY

- There are normal variations of Df and copper surface roughness which can impact insertion loss comparisons.
- The differences of the insertion loss curves shown here are within the normal variation of insertion loss for these materials.
- There is no significant difference in insertion loss for these materials.

Dk vs FREQUENCY COMPARISON SUMMARY

- There are normal variations for Dk and copper surface roughness that can impact Dk vs. Frequency comparisons.
- The Dk vs. Frequency curves shown here are within the normal variation.
- There is no significant difference in Dk for these materials.

Reference, test method

The test method used in this report is the:

- Microstrip differential length method for insertion loss
- Microstrip differential phase length method for Dk vs. Frequency

Reference:

- Nirod K. Das, Susanne M. Voda and David M. Pozar, “Two Methods for the Measurement of Substrate Dielectric Constant”, IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-35, No. 7, July 1987.