Hydrochloric Acid
VLSI

Material No.: 5367-03
Batch No.: 0000058917
Manufactured Date: 2013/08/22
Retest Date: 2018/08/21

Certificate of Analysis

Test	Specification	Result
Assay (as HCl) (by acid-base titrn)	37.0 - 38.0 %	37.4
Color (APHA)	<= 10	6
Residue after Ignition	<= 3 ppm	1
Extractable Organic Substances	<= 3 ppm	< 3
Bromide (Br)	<= 0.005 %	< 0.005
Free Halogen (as Cl_2)	Passes Test	PT
Ammonium (NH_4)	<= 1 ppm	< 1
Phosphate (PO_4)	<= 0.05 ppm	< 0.03
Sulfate (SO_4)	<= 0.3 ppm	< 0.3
Sulfite (SO_3)	<= 0.8 ppm	< 0.3
Trace Impurities - Aluminum (Al)	<= 100.0 ppb	5.4
Arsenic and Antimony (as As)	<= 5 ppb	< 3
Trace Impurities - Barium (Ba)	<= 20.0 ppb	< 1.0
Trace Impurities - Beryllium (Be)	<= 10.0 ppb	< 1.0
Trace Impurities - Bismuth (Bi)	<= 20.0 ppb	< 10.0
Trace Impurities - Boron (B)	<= 20.0 ppb	< 5.0
Trace Impurities - Cadmium (Cd)	<= 5.0 ppb	< 1.0
Trace Impurities - Calcium (Ca)	<= 100.0 ppb	28.5
Trace Impurities - Chromium (Cr)	<= 50.0 ppb	< 1.0
Trace Impurities - Cobalt (Co)	<= 5.0 ppb	< 1.0
Trace Impurities - Copper (Cu)	<= 5.0 ppb	< 1.0
Trace Impurities - Gallium (Ga)	<= 20.0 ppb	< 1.0
Trace Impurities - Germanium (Ge)	<= 20.0 ppb	< 10.0
Trace Impurities - Gold (Au)	<= 20.0 ppb	< 5.0

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.573.2600
Avantor ™ Performance Materials Inc.
3477 Corporate Parkway. Suite #200. Center Valley, PA 18034. U.S.A. Phone: 610.573.2600 . Fax: 610.573.2610

Material No.: 5367-03
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Test	Specification	Result
Heavy Metals (as Pb)	<= 100 ppb	<5
Trace Impurities - Iron (Fe)	<= 50.0 ppb	7.0
Trace Impurities - Lead (Pb)	<= 25.0 ppb	< 10.0
Trace Impurities - Lithium (Li)	<= 50.0 ppb	< 1.0
Trace Impurities - Magnesium (Mg)	<= 50.0 ppb	1.2
Trace Impurities - Manganese (Mn)	<= 5.0 ppb	< 1.0
Trace Impurities - Molybdenum (Mo)	<= 10.0 ppb	< 5.0
Trace Impurities - Nickel (Ni)	<= 10.0 ppb	< 5.0
Trace Impurities - Niobium (Nb)	<= 10.0 ppb	< 1.0
Trace Impurities - Potassium (K)	<= 100.0 ppb	< 10.0
Trace Impurities - Silicon (Si)	<= 100.0 ppb	< 10.0
Trace Impurities - Silver (Ag)	<= 20.0 ppb	< 1.0
Trace Impurities - Sodium (Na)	<= 100.0 ppb	16.1
Trace Impurities - Strontium (Sr)	<= 20.0 ppb	< 1.0
Trace Impurities - Tantalum (Ta)	<= 10.0 ppb	< 5.0
Trace Impurities - Thallium (Tl)	<= 20.0 ppb	< 5.0
Trace Impurities - Tin (Sn)	<= 50.0 ppb	< 10.0
Trace Impurities - Titanium (Ti)	<= 10.0 ppb	< 1.0
Trace Impurities - Vanadium (V)	<= 10.0 ppb	< 1.0
Trace Impurities - Zinc (Zn)	<= 50.0 ppb	23.0
Trace Impurities - Zirconium (Zr)	<= 10.0 ppb	< 0.1
Particle Count - 0.5 µm and greater	<= 50 par/ml	8
Particle Count - 1.0 µm and greater	<= 10 par/ml	3

For Microelectronic Use
Reported value is the average of all samples counted for this lot number,with no individual sample value exceeding the specification.

Country of Origin: US
Packaging Site: Paris Mfg Ctr & DC

ISO
Phillipsburg, NJ 9001:2008, 14001:2004
Paris, KY 9001:2008
Mexico City, Mexico 9001:2008
Deventer, The Netherlands 9001:2008, 14001:2004, 13485:2003
Gliwice, Poland 9001:2008, 17025:2005
Selangor, Malaysia 9001:2008
Dehradun, India, 9001:2008, 14001:2004, 13485:2003
Mumbai, India, 9001:2008, 17025:2005
Panoli, India 9001:2008

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Global Director of Quality Assurance

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