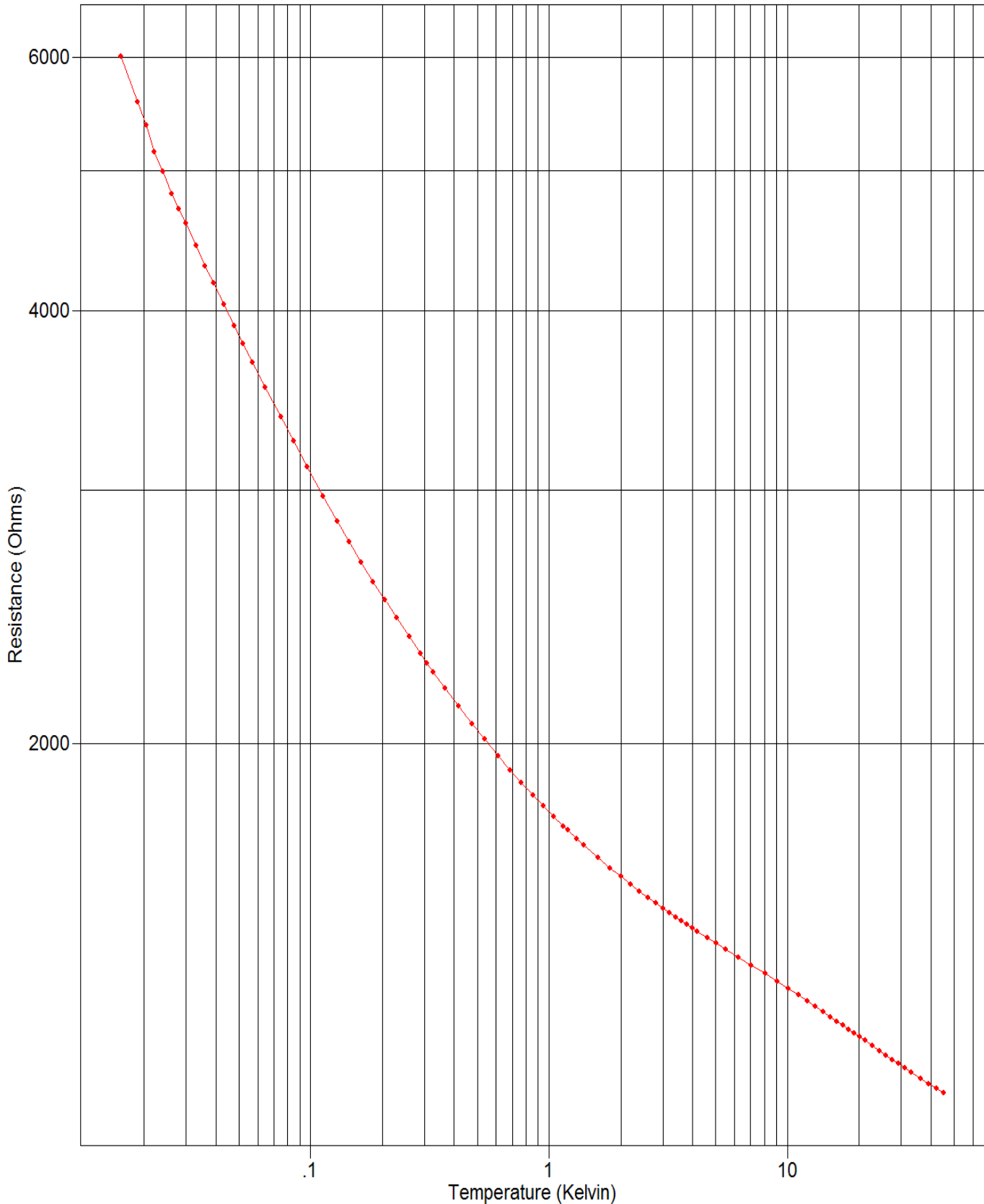


DATA PLOT

Calibration Report: 673413
Sensor Model: RX-102B-CB-0.02B
Sensor Type: Rox Resistor

Sales Order: 76077
Serial Number: U03411
Temperature Range: 0.02K to 40.0K



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TEST DATA

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Index	Temp. (K)	Resistance (Ω)	Excitation	Index	Temp. (K)	Resistance (Ω)	Excitation
1	1.60315e-2	6008.00	< 20 μ V	51	2.79921	1548.85	2mV \pm 25%
2	1.87508e-2	5580.80	< 20 μ V	52	2.99964	1536.35	2mV \pm 25%
3	2.03650e-2	5378.50	< 20 μ V	53	3.19915	1524.99	2mV \pm 25%
4	2.20887e-2	5156.06	< 20 μ V	54	3.39977	1514.46	2mV \pm 25%
5	2.39291e-2	4993.81	< 20 μ V	55	3.59974	1504.83	2mV \pm 25%
6	2.60886e-2	4820.46	< 20 μ V	56	3.80043	1495.90	2mV \pm 25%
7	2.80425e-2	4707.96	< 20 μ V	57	3.99882	1487.60	2mV \pm 25%
8	3.00262e-2	4600.91	< 20 μ V	58	4.19489	1479.94	2mV \pm 25%
9	3.30138e-2	4439.21	< 20 μ V	59	4.62538	1464.47	2mV \pm 25%
10	3.61136e-2	4293.68	< 20 μ V	60	5.02768	1451.72	2mV \pm 25%
11	3.90416e-2	4181.87	< 20 μ V	61	5.53030	1437.37	2mV \pm 25%
12	4.32095e-2	4037.69	< 20 μ V	62	6.23534	1419.75	2mV \pm 25%
13	4.76116e-2	3901.43	< 20 μ V	63	7.05098	1401.93	2mV \pm 25%
14	5.18665e-2	3792.97	< 20 μ V	64	8.06215	1382.52	2mV \pm 25%
15	5.67922e-2	3682.29	< 20 μ V	65	9.07102	1365.64	2mV \pm 25%
16	6.44895e-2	3535.13	< 20 μ V	66	10.0857	1350.34	2mV \pm 25%
17	7.49324e-2	3373.03	< 20 μ V	67	11.1062	1336.11	2mV \pm 25%
18	8.45889e-2	3247.90	< 20 μ V	68	12.1200	1323.33	2mV \pm 25%
19	9.67875e-2	3113.39	< 20 μ V	69	13.1328	1311.59	2mV \pm 25%
20	0.112756	2971.77	< 63 μ V	70	14.1287	1300.86	2mV \pm 25%
21	0.128957	2857.60	< 63 μ V	71	15.1201	1290.88	2mV \pm 25%
22	0.145026	2763.91	< 63 μ V	72	16.1094	1281.64	2mV \pm 25%
23	0.163323	2674.91	< 63 μ V	73	17.0914	1273.03	2mV \pm 25%
24	0.183102	2592.92	< 63 μ V	74	18.0762	1264.92	2mV \pm 25%
25	0.204457	2518.62	< 63 μ V	75	19.0602	1257.28	2mV \pm 25%
26	0.229769	2443.75	< 63 μ V	76	20.0450	1250.09	2mV \pm 25%
27	0.259211	2371.89	< 63 μ V	77	21.1313	1242.51	2mV \pm 25%
28	0.288635	2309.69	< 63 μ V	78	22.7178	1232.30	2mV \pm 25%
29	0.307980	2273.80	< 63 μ V	79	24.3259	1222.75	2mV \pm 25%
30	0.327475	2240.85	< 63 μ V	80	25.9397	1213.90	2mV \pm 25%
31	0.365279	2184.93	< 63 μ V	81	27.5722	1205.54	2mV \pm 25%
32	0.415769	2122.62	< 63 μ V	82	29.1911	1197.82	2mV \pm 25%
33	0.474661	2063.12	< 63 μ V	83	31.0164	1189.75	2mV \pm 25%
34	0.535206	2012.50	< 63 μ V	84	33.1304	1181.14	2mV \pm 25%
35	0.610638	1960.11	< 63 μ V	85	36.1421	1169.86	2mV \pm 25%
36	0.686234	1916.55	< 63 μ V	86	39.1361	1159.76	2mV \pm 25%
37	0.766127	1877.46	< 63 μ V	87	42.1355	1150.60	2mV \pm 25%
38	0.855196	1841.03	< 63 μ V	88	45.1279	1142.24	2mV \pm 25%
39	0.949374	1808.03	< 63 μ V				
40	1.04850	1778.17	< 63 μ V				
41	1.14831	1751.88	< 63 μ V				
42	1.19919	1739.80	< 63 μ V				
43	1.30312	1716.62	2mV \pm 25%				
44	1.40027	1697.88	2mV \pm 25%				
45	1.60070	1665.27	2mV \pm 25%				
46	1.80098	1638.30	2mV \pm 25%				
47	2.00073	1615.34	2mV \pm 25%				
48	2.20024	1595.56	2mV \pm 25%				
49	2.39999	1578.14	2mV \pm 25%				
50	2.60027	1562.65	2mV \pm 25%				



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F010-04-00_B 06/21/2011

UNCERTAINTY ANALYSIS

Calibration Report: 673413
 Sensor Model: RX-102B-CB-0.02B
 Sensor Type: Rox Resistor

Sales Order: 76077
 Serial Number: U03411
 Temperature Range: 0.02K to 40.0K

Calibration Data Uncertainty

The uncertainties of the measured calibration data for Lake Shore's sensors are summarized in the table below. The values given are the combined uncertainty of the temperature measurement and the resistance or voltage measurement expressed as an equivalent temperature uncertainty in millikelvin (mK). Note that the values are the calibration uncertainty only and do not include the stability of the temperature sensor. The uncertainty analysis has followed the guidelines for determining measurement uncertainty as outlined in the ISO Guide to the Expression of Uncertainty in Measurement, NIST Technical Note 1297, and ANSI/NCSL Z540-2-1997. Since the uncertainty varies with temperature due to the variation of the sensor sensitivity and excitation, the table gives typical values at several different temperatures throughout the range of the calibration. The uncertainty is based on an approximate 95% confidence level with a coverage factor $k = 2$.

T (K)	Uncertainty (\pm mK)												
	GR	Cernox (CX)					RX			Platinum		RF-800	Diode
		1010	1030	1050	1070	1080	102A	103A	202A	100 Ω	25 Ω	27 Ω	
1.4	4	4	4	4			4	4	4			5	7
4.2	4	4	4	4	4		4	6	5			5	5
10	4	5	5	4	4		10	15	12			7	6
20	8	10	9	8	8	8	35	35	28	9	10	13	9
30	9	13	11	9	9	9	76	61	46	9	9	14	31
50	11	18	14	12	12	11				10	10	13	37
100	20	29	22	17	16	14				11	12	12	32
300		78	60	46	45	36				24	24	25	35
400		124	94	74	72	60				45	45	45	49
500										51	51		54

Polynomial Fit Uncertainty

When a sensor is used to measure temperature, a polynomial fit to the measured calibration data is often used to convert the sensor resistance (R) or voltage (V) to a temperature (T). How well the polynomial represents the sensor calibration data is another source of uncertainty when using the sensor. In the polynomials provided with this set of calibration data, the standard deviation of the fit can be used as an estimate of this additional temperature uncertainty. The standard deviation of fit is determined from the following equation:

$$\sigma_{fit}^2 = \frac{\sum_{i=1}^N (T_i - T_{i,calc})^2}{N - n} = \frac{N}{N - n} (\Delta T_{RMS})^2$$

where

- σ_{fit} = standard deviation of the fit
- T_i = measured temperature for point i
- $T_{i,calc}$ = the temperature calculated from the polynomial equation for point i
- N = number of data points in fit range
- n = number of fit coefficients
- ΔT_{RMS} = root mean square deviation of fit

A value of ΔT_{RMS} is given for each range of fit.

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F010-04-00_B 06/21/2011

POLYNOMIAL EQUATION

Calibration Report: 673413
Sensor Model: RX-102B-CB-0.02B
Sensor Type: Rox Resistor

Sales Order: 76077
Serial Number: U03411
Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev
Useful Range of Fit:

2.00e-2 K to 0.328 K
5407. Ohms to 2241. Ohms

Lower and Upper limits of Log(Resistance) used in computing Chebychev coefficients:
ZL = 3.32687225197 ZU = 3.778729924

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	0.130026	4.1688E-05	3119.03
1	-0.169496	6.9259E-05	-2447.29
2	0.075923	6.3121E-05	1202.82
3	-0.027273	5.5552E-05	-490.95
4	0.009103	5.1345E-05	177.28
5	-0.002800	4.9579E-05	-56.47
6	0.000716	4.8851E-05	14.66
7	-0.000209	4.9342E-05	-4.23
8	0.000070	5.1821E-05	1.36

$Z = \text{Log}(\text{Resistance})$

$k = ((Z - Z_L) - (Z_U - Z)) / (Z_U - Z_L)$

Temp. (K) = $\sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$, where $0 \leq i \leq 8$
and the A_i 's are the coefficients in the table above.



POLYNOMIAL EQUATION

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev

Temp. (K) vs. Log(Resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
1	6008.000	0.01603	0.01606	-0.03
2	5580.800	0.01875	0.01866	0.09
3	5378.500	0.02037	0.02023	0.13
4	5156.060	0.02209	0.02229	-0.20
5	4993.810	0.02393	0.02407	-0.14
6	4820.460	0.02609	0.02630	-0.21
7	4707.960	0.02804	0.02797	0.07
8	4600.910	0.03003	0.02975	0.28
9	4439.210	0.03301	0.03284	0.17
10	4293.680	0.03611	0.03610	0.02
11	4181.870	0.03904	0.03896	0.08
12	4037.690	0.04321	0.04319	0.02
13	3901.430	0.04761	0.04783	-0.22
14	3792.970	0.05187	0.05206	-0.19
15	3682.290	0.05679	0.05695	-0.16
16	3535.130	0.06449	0.06454	-0.05
17	3373.030	0.07493	0.07472	0.21
18	3247.900	0.08459	0.08427	0.32
19	3113.390	0.09679	0.09667	0.12
20	2971.770	0.11276	0.11290	-0.14
21	2857.600	0.12896	0.12911	-0.15
22	2763.910	0.14503	0.14515	-0.13
23	2674.910	0.16332	0.16330	0.03
24	2592.920	0.18310	0.18317	-0.06
25	2518.620	0.20446	0.20444	0.01
26	2443.750	0.22977	0.22982	-0.05
27	2371.890	0.25921	0.25883	0.39
28	2309.690	0.28863	0.28854	0.10
29	2273.800	0.30798	0.30802	-0.04
30	2240.850	0.32748	0.32767	-0.20
31	2184.930	0.36528	0.36549	-0.21
32	2122.620	0.41577	0.41562	0.15

Order of Fit = 8

RMS error of fit = 0.16 mK

Largest absolute error = 0.39 mK at data point no. 27



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POLYNOMIAL EQUATION

Calibration Report: 673413
Sensor Model: RX-102B-CB-0.02B
Sensor Type: Rox Resistor

Sales Order: 76077
Serial Number: U03411
Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev
Useful Range of Fit:

0.328 K to 4.19 K
2241. Ohms to 1480. Ohms

Lower and Upper limits of Log(Resistance) used in computing Chebychev coefficients:
ZL = 3.16188382175 ZU = 3.36355369404

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	1.662726	2.2553E-04	7372.66
1	-2.011117	3.5156E-04	-5720.57
2	0.882517	3.2817E-04	2689.21
3	-0.328723	3.2654E-04	-1006.69
4	0.107254	3.1567E-04	339.76
5	-0.029182	3.0082E-04	-97.01
6	0.005570	2.9258E-04	19.04
7	-0.000513	2.7696E-04	-1.85

$Z = \text{Log}(\text{Resistance})$

$k = ((Z - Z_L) - (Z_U - Z)) / (Z_U - Z_L)$

$\text{Temp. (K)} = \sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$, where $0 \leq i \leq 7$
and the A_i 's are the coefficients in the table above.

POLYNOMIAL EQUATION

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev

Temp. (K) vs. Log(Resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
28	2309.690	0.28854	0.28853	0.01
29	2273.800	0.30802	0.30802	0.01
30	2240.850	0.32767	0.32764	0.03
31	2184.930	0.36528	0.36542	-0.14
32	2122.620	0.41577	0.41578	-0.01
33	2063.120	0.47466	0.47446	0.20
34	2012.500	0.53521	0.53495	0.25
35	1960.110	0.61064	0.61069	-0.06
36	1916.550	0.68623	0.68653	-0.29
37	1877.460	0.76613	0.76706	-0.94
38	1841.030	0.85520	0.85532	-0.12
39	1808.030	0.94937	0.94885	0.52
40	1778.170	1.04850	1.04723	1.27
41	1751.880	1.14831	1.14704	1.27
42	1739.800	1.19919	1.19777	1.42
43	1716.619	1.30312	1.30511	-1.99
44	1697.879	1.40027	1.40291	-2.64
45	1665.266	1.60070	1.60174	-1.04
46	1638.301	1.80098	1.80017	0.81
47	1615.337	2.00073	1.99966	1.07
48	1595.561	2.20024	2.19883	1.41
49	1578.141	2.39999	2.39922	0.77
50	1562.653	2.60027	2.60023	0.04
51	1548.850	2.79921	2.80012	-0.91
52	1536.349	2.99964	3.00025	-0.60
53	1524.986	3.19915	3.19971	-0.56
54	1514.461	3.39977	3.40098	-1.21
55	1504.828	3.59974	3.60046	-0.71
56	1495.900	3.80043	3.79956	0.87
57	1487.597	3.99882	3.99797	0.85
58	1479.936	4.19489	4.19323	1.66
59	1464.468	4.62538	4.62669	-1.30
60	1451.723	5.02768	5.02760	0.08

Order of Fit = 7

RMS error of fit = 0.99 mK

Largest absolute error = -2.64 mK at data point no. 44



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POLYNOMIAL EQUATION

Calibration Report: 673413
Sensor Model: RX-102B-CB-0.02B
Sensor Type: Rox Resistor

Sales Order: 76077
Serial Number: U03411
Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev
Useful Range of Fit:

4.19 K to 40.0 K
1480. Ohms to 1157. Ohms

Lower and Upper limits of Log(Resistance) used in computing Chebychev coefficients:

ZL = 3.05775581603 ZU = 3.17490250108

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	18.719224	7.7940E-04	24017.38
1	-19.471739	1.2431E-03	-15663.66
2	5.461955	1.1350E-03	4812.30
3	-1.140428	1.1077E-03	-1029.57
4	0.279502	1.0702E-03	261.16
5	-0.047641	1.0577E-03	-45.04
6	0.002137	1.0350E-03	2.06
7	-0.004441	1.0028E-03	-4.43

$Z = \text{Log}(\text{Resistance})$

$k = ((Z - Z_L) - (Z_U - Z)) / (Z_U - Z_L)$

$\text{Temp. (K)} = \sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$, where $0 \leq i \leq 7$
and the A_i 's are the coefficients in the table above.



POLYNOMIAL EQUATION

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Polynomial Type: Chebychev

Temp. (K) vs. Log(Resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
56	1495.900	3.79956	3.79857	0.99
57	1487.597	3.99797	3.99895	-0.98
58	1479.936	4.19323	4.19417	-0.94
59	1464.468	4.62538	4.62578	-0.39
60	1451.723	5.02768	5.02555	2.13
61	1437.370	5.53030	5.53002	0.28
62	1419.755	6.23534	6.23495	0.39
63	1401.933	7.05098	7.05170	-0.72
64	1382.525	8.06215	8.06831	-6.16
65	1365.637	9.07102	9.06896	2.06
66	1350.342	10.08570	10.07670	9.00
67	1336.115	11.10619	11.10896	-2.78
68	1323.330	12.12003	12.12250	-2.47
69	1311.594	13.13284	13.13202	0.83
70	1300.863	14.12871	14.12822	0.49
71	1290.884	15.12014	15.12364	-3.49
72	1281.638	16.10939	16.11113	-1.74
73	1273.025	17.09141	17.09268	-1.27
74	1264.922	18.07622	18.07525	0.97
75	1257.282	19.06022	19.05854	1.68
76	1250.092	20.04503	20.03845	6.57
77	1242.513	21.13127	21.13328	-2.01
78	1232.296	22.71780	22.71896	-1.16
79	1222.751	24.32585	24.32595	-0.10
80	1213.896	25.93973	25.93685	2.88
81	1205.541	27.57224	27.57391	-1.67
82	1197.816	29.19109	29.19870	-7.61
83	1189.754	31.01639	31.01917	-2.78
84	1181.135	33.13042	33.12045	9.97
85	1169.859	36.14212	36.14049	1.63
86	1159.761	39.13609	39.14012	-4.03
87	1150.598	42.13547	42.13590	-0.43
88	1142.236	45.12792	45.12707	0.86

Order of Fit = 7

RMS error of fit = 3.53 mK

Largest absolute error = 9.97 mK at data point no. 84



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INTERPOLATION TABLE

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT	Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT
2.000e-2	5406.68	-1.2163e+5	-0.44993	0.5000	2040.62	-846.89	-0.20751
2.200e-2	5184.75	-1.0109e+5	-0.42897	0.5500	2001.23	-733.34	-0.20154
2.400e-2	4999.39	-85019.	-0.40814	0.6000	1966.90	-643.38	-0.19626
2.600e-2	4842.07	-72833.	-0.39108	0.6500	1936.59	-571.36	-0.19177
2.800e-2	4706.16	-63475.	-0.37765	0.7000	1909.55	-512.11	-0.18773
3.000e-2	4586.81	-56169.	-0.36737	0.7500	1885.22	-462.49	-0.18399
3.200e-2	4480.53	-50313.	-0.35933	0.8000	1863.17	-420.62	-0.18060
3.400e-2	4384.80	-45570.	-0.35335	0.8500	1843.06	-384.58	-0.17736
3.600e-2	4297.74	-41614.	-0.34858	0.9000	1824.63	-353.44	-0.17434
3.800e-2	4217.93	-38282.	-0.34489	0.9500	1807.66	-326.19	-0.17143
4.000e-2	4144.29	-35430.	-0.34197	1.000	1791.96	-302.21	-0.16865
4.200e-2	4075.97	-32942.	-0.33944	1.050	1777.39	-280.96	-0.16598
4.400e-2	4012.30	-30773.	-0.33746	1.100	1763.82	-262.03	-0.16341
4.600e-2	3952.72	-28842.	-0.33566	1.150	1751.15	-245.07	-0.16094
4.800e-2	3896.79	-27122.	-0.33408	1.200	1739.29	-229.86	-0.15859
5.000e-2	3844.12	-25575.	-0.33265	1.300	1717.66	-203.62	-0.15411
5.500e-2	3724.74	-22306.	-0.32937	1.400	1698.41	-182.03	-0.15005
6.000e-2	3619.98	-19688.	-0.32632	1.500	1681.13	-163.94	-0.14628
6.500e-2	3527.08	-17543.	-0.32330	1.600	1665.53	-148.68	-0.14283
7.000e-2	3443.96	-15754.	-0.32021	1.700	1651.32	-135.72	-0.13972
7.500e-2	3369.07	-14246.	-0.31713	1.800	1638.32	-124.56	-0.13685
8.000e-2	3301.13	-12962.	-0.31411	1.900	1626.36	-114.90	-0.13424
8.500e-2	3239.16	-11857.	-0.31114	2.000	1615.30	-106.48	-0.13184
9.000e-2	3182.33	-10896.	-0.30816	2.100	1605.03	-99.095	-0.12965
9.500e-2	3129.99	-10057.	-0.30525	2.200	1595.45	-92.568	-0.12764
0.1000	3081.58	-9324.1	-0.30258	2.300	1586.49	-86.775	-0.12580
0.1100	2994.75	-8089.0	-0.29712	2.400	1578.08	-81.602	-0.12410
0.1200	2918.93	-7109.5	-0.29228	2.500	1570.15	-76.963	-0.12254
0.1300	2851.96	-6311.0	-0.28767	2.600	1562.67	-72.781	-0.12110
0.1400	2792.25	-5651.6	-0.28336	2.700	1555.58	-68.999	-0.11976
0.1500	2738.56	-5101.3	-0.27941	2.800	1548.86	-65.562	-0.11852
0.1600	2689.95	-4633.5	-0.27560	2.900	1542.46	-62.429	-0.11737
0.1700	2645.66	-4235.0	-0.27213	3.000	1536.36	-59.562	-0.11630
0.1800	2605.08	-3889.5	-0.26875	3.100	1530.54	-56.931	-0.11531
0.1900	2567.71	-3589.9	-0.26564	3.200	1524.97	-54.507	-0.11438
0.2000	2533.16	-3326.1	-0.26261	3.300	1519.63	-52.271	-0.11351
0.2100	2501.08	-3094.4	-0.25981	3.400	1514.51	-50.204	-0.11270
0.2200	2471.19	-2887.4	-0.25706	3.500	1509.59	-48.282	-0.11194
0.2300	2443.26	-2703.3	-0.25448	3.600	1504.85	-46.485	-0.11120
0.2400	2417.06	-2538.3	-0.25204	3.700	1500.29	-44.822	-0.11054
0.2500	2392.44	-2389.0	-0.24964	3.800	1495.88	-43.304	-0.11001
0.2600	2369.23	-2254.6	-0.24742	3.900	1491.62	-41.836	-0.10938
0.2700	2347.31	-2132.3	-0.24527	4.000	1487.51	-40.325	-0.10843
0.2800	2326.55	-2020.2	-0.24313	4.200	1479.72	-37.869	-0.10749
0.2900	2306.87	-1917.9	-0.24110	4.400	1472.33	-35.946	-0.10742
0.3000	2288.17	-1824.9	-0.23926	4.600	1465.34	-33.973	-0.10665
0.3200	2253.33	-1662.6	-0.23611	4.800	1458.74	-32.066	-0.10551
0.3400	2221.54	-1520.0	-0.23264	5.000	1452.50	-30.404	-0.10466
0.3600	2192.41	-1395.4	-0.22914	5.200	1446.56	-28.947	-0.10405
0.3800	2165.61	-1286.7	-0.22578	5.400	1440.91	-27.626	-0.10353
0.4000	2140.86	-1190.3	-0.22239	5.600	1435.51	-26.437	-0.10313
0.4200	2117.92	-1105.1	-0.21916	5.800	1430.33	-25.355	-0.10282
0.4400	2096.59	-1029.3	-0.21600	6.000	1425.36	-24.372	-0.10259
0.4600	2076.70	-961.40	-0.21296	6.500	1413.71	-22.301	-0.10254
0.4800	2058.09	-901.16	-0.21017	7.000	1402.99	-20.611	-0.10283



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F010-04-00_B 06/21/2011

INTERPOLATION TABLE

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

<u>Temp (K)</u>	<u>Res. (Ω)</u>	<u>dR/dT (Ω/K)</u>	<u>dlogR/dlogT</u>	<u>Temp (K)</u>	<u>Res. (Ω)</u>	<u>dR/dT (Ω/K)</u>	<u>dlogR/dlogT</u>
7.500	1393.05	-19.211	-0.10343	20.00	1250.37	-7.1499	-0.11437
8.000	1383.75	-18.015	-0.10415	21.00	1243.41	-6.7659	-0.11427
8.500	1375.00	-16.988	-0.10502	22.00	1236.82	-6.4153	-0.11411
9.000	1366.74	-16.081	-0.10589	23.00	1230.57	-6.0945	-0.11391
9.500	1358.91	-15.275	-0.10679	24.00	1224.63	-5.7997	-0.11366
10.00	1351.45	-14.548	-0.10765	25.00	1218.96	-5.5286	-0.11339
10.50	1344.35	-13.890	-0.10849	26.00	1213.56	-5.2783	-0.11308
11.00	1337.56	-13.285	-0.10926	27.00	1208.40	-5.0466	-0.11276
11.50	1331.05	-12.730	-0.10999	28.00	1203.46	-4.8319	-0.11242
12.00	1324.82	-12.215	-0.11064	29.00	1198.73	-4.6323	-0.11206
12.50	1318.83	-11.737	-0.11124	30.00	1194.19	-4.4464	-0.11170
13.00	1313.08	-11.290	-0.11177	31.00	1189.84	-4.2729	-0.11133
13.50	1307.54	-10.872	-0.11225	32.00	1185.64	-4.1106	-0.11094
14.00	1302.20	-10.480	-0.11267	33.00	1181.61	-3.9587	-0.11056
14.50	1297.05	-10.111	-0.11303	34.00	1177.72	-3.8162	-0.11017
15.00	1292.09	-9.7628	-0.11334	35.00	1173.98	-3.6819	-0.10977
15.50	1287.29	-9.4346	-0.11360	36.00	1170.36	-3.5557	-0.10937
16.00	1282.65	-9.1242	-0.11382	37.00	1166.86	-3.4369	-0.10898
16.50	1278.16	-8.8306	-0.11400	38.00	1163.48	-3.3245	-0.10858
17.00	1273.82	-8.5522	-0.11413	39.00	1160.21	-3.2184	-0.10819
17.50	1269.61	-8.2881	-0.11424	40.00	1157.04	-3.1180	-0.10779
18.00	1265.53	-8.0373	-0.11432				
18.50	1261.57	-7.7989	-0.11436				
19.00	1257.72	-7.5720	-0.11439				
19.50	1253.99	-7.3559	-0.11439				



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THERMAL CYCLE TESTING

Sensor Model: RX-102B-CB-0.02B

Serial Number: U03411

Sensor Type: Rox Resistor

This sensor was tested for repeatability through rapid thermal cycles from room temperature into liquid helium. During this test, the following four lead resistance values were recorded:

Approximately 305 K:	1006 Ω
Liquid Nitrogen:	1085 Ω
Liquid Helium:	1481 Ω

The nitrogen and helium values were recorded in OPEN dewars, so precision comparisons with calibration values or other thermal cycle test values should not be made.

Recommended Operating Parameters:

For sensors calibrated by LSCI, the current to the sensor is adjusted to maintain the sensor output voltage or power at the values listed on the Test Data page.



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BREAKPOINTS 340 FORMAT

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Name: RX-102B-CB-0.02B

Serial number: U03411

Format: 4 ;Log Ohms/Kelvin

Limit: 40.0

Coefficient: 1 ;Negative

Point 1: 3.06333, 40.000	Point 56: 3.20546, 2.100	Point 111: 3.54092, 0.068
Point 2: 3.06587, 37.900	Point 57: 3.20910, 1.970	Point 112: 3.55851, 0.060
Point 3: 3.06844, 35.900	Point 58: 3.21307, 1.840	Point 113: 3.57754, 0.053
Point 4: 3.07103, 34.000	Point 59: 3.21744, 1.710	Point 114: 3.59822, 0.046
Point 5: 3.07379, 32.100	Point 60: 3.22191, 1.590	Point 115: 3.62089, 0.039
Point 6: 3.07658, 30.300	Point 61: 3.22642, 1.480	Point 116: 3.64612, 0.033
Point 7: 3.07955, 28.500	Point 62: 3.23142, 1.370	Point 117: 3.67222, 0.028
Point 8: 3.08274, 26.700	Point 63: 3.23699, 1.260	Point 118: 3.70201, 0.024
Point 9: 3.08597, 25.000	Point 64: 3.24094, 1.190	Point 119: 3.73244, 0.020
Point 10: 3.08924, 23.400	Point 65: 3.24362, 1.145	
Point 11: 3.09274, 21.800	Point 66: 3.24644, 1.100	
Point 12: 3.09652, 20.200	Point 67: 3.24943, 1.055	
Point 13: 3.09717, 19.950	Point 68: 3.25259, 1.010	
Point 14: 3.09829, 19.500	Point 69: 3.25556, 0.970	
Point 15: 3.09998, 18.850	Point 70: 3.25869, 0.930	
Point 16: 3.10172, 18.200	Point 71: 3.26201, 0.890	
Point 17: 3.10352, 17.550	Point 72: 3.26552, 0.850	
Point 18: 3.10539, 16.900	Point 73: 3.26926, 0.810	
Point 19: 3.10734, 16.250	Point 74: 3.27325, 0.770	
Point 20: 3.10935, 15.600	Point 75: 3.27697, 0.735	
Point 21: 3.11145, 14.950	Point 76: 3.28091, 0.700	
Point 22: 3.11346, 14.350	Point 77: 3.28512, 0.665	
Point 23: 3.11555, 13.750	Point 78: 3.28963, 0.630	
Point 24: 3.11773, 13.150	Point 79: 3.29447, 0.595	
Point 25: 3.11999, 12.550	Point 80: 3.29969, 0.560	
Point 26: 3.12235, 11.950	Point 81: 3.30454, 0.530	
Point 27: 3.12461, 11.400	Point 82: 3.30885, 0.505	
Point 28: 3.12695, 10.850	Point 83: 3.31269, 0.484	
Point 29: 3.12941, 10.300	Point 84: 3.31656, 0.464	
Point 30: 3.13197, 9.750	Point 85: 3.32065, 0.444	
Point 31: 3.13442, 9.250	Point 86: 3.32499, 0.424	
Point 32: 3.13697, 8.750	Point 87: 3.32961, 0.404	
Point 33: 3.13965, 8.250	Point 88: 3.33453, 0.384	
Point 34: 3.14219, 7.800	Point 89: 3.33926, 0.366	
Point 35: 3.14486, 7.350	Point 90: 3.34429, 0.348	
Point 36: 3.14769, 6.900	Point 91: 3.34965, 0.330	
Point 37: 3.15035, 6.500	Point 92: 3.35540, 0.312	
Point 38: 3.15317, 6.100	Point 93: 3.36156, 0.294	
Point 39: 3.15589, 5.740	Point 94: 3.36744, 0.278	
Point 40: 3.15862, 5.400	Point 95: 3.37375, 0.262	
Point 41: 3.16138, 5.080	Point 96: 3.38055, 0.246	
Point 42: 3.16415, 4.780	Point 97: 3.38745, 0.231	
Point 43: 3.16715, 4.480	Point 98: 3.39491, 0.216	
Point 44: 3.17060, 4.160	Point 99: 3.40248, 0.202	
Point 45: 3.17328, 3.930	Point 100: 3.41071, 0.188	
Point 46: 3.17577, 3.730	Point 101: 3.41906, 0.175	
Point 47: 3.17829, 3.540	Point 102: 3.42819, 0.162	
Point 48: 3.18084, 3.360	Point 103: 3.43746, 0.150	
Point 49: 3.18356, 3.180	Point 104: 3.44764, 0.138	
Point 50: 3.18631, 3.010	Point 105: 3.45896, 0.126	
Point 51: 3.18909, 2.850	Point 106: 3.47055, 0.115	
Point 52: 3.19207, 2.690	Point 107: 3.48229, 0.105	
Point 53: 3.19529, 2.530	Point 108: 3.49542, 0.095	
Point 54: 3.19856, 2.380	Point 109: 3.50950, 0.086	
Point 55: 3.20187, 2.240	Point 110: 3.52463, 0.077	



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F010-04-00_B 06/21/2011

BREAKPOINTS 234 FORMAT

Calibration Report: 673413

Sensor Model: RX-102B-CB-0.02B

Sensor Type: Rox Resistor

Sales Order: 76077

Serial Number: U03411

Temperature Range: 0.02K to 40.0K

Maximum Temperature Error:

1.4 - 10K: 0.231K
10 - 20K: 0.862K
20 - 40K: 1.015K
40 - 100K: -
> 100K: -

<u>BP #</u>	<u>Temp. (K)</u>	<u>Res. (Ω)</u>	<u>Log10 Res.</u>	<u>BP #</u>	<u>Temp. (K)</u>	<u>Res. (Ω)</u>	<u>Log10 Res.</u>
1	28.249	1202.264	3.080	11	0.107	3019.952	3.480
2	12.549	1318.257	3.120	12	0.079	3311.311	3.520
3	5.239	1445.440	3.160	13	0.059	3630.781	3.560
4	2.319	1584.893	3.200	14	0.045	3981.072	3.600
5	1.207	1737.801	3.240	15	0.034	4365.158	3.640
6	0.708	1905.461	3.280	16	0.027	4786.301	3.680
7	0.447	2089.296	3.320	17	0.021	5248.075	3.720
8	0.299	2290.868	3.360	18	0.017	5754.399	3.760
9	0.207	2511.886	3.400				
10	0.147	2754.229	3.440				



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