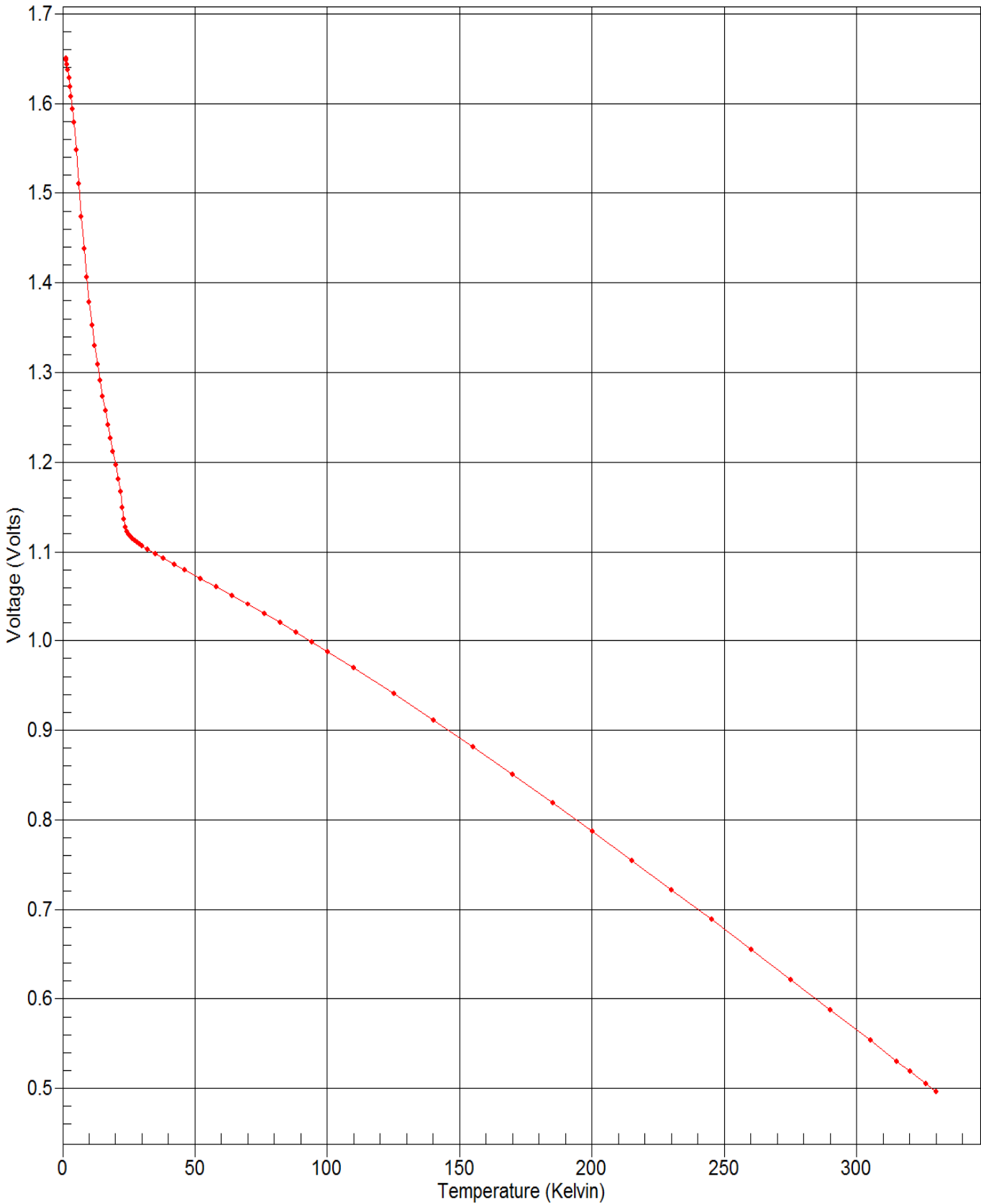


# DATA PLOT

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K



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# TEST DATA

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Index	Temp. (K)	Voltage (V)	Excitation	Index	Temp. (K)	Voltage (V)	Excitation
1	1.20184	1.65059	10µA±0.1%	41	35.1478	1.09732	10µA±0.1%
2	1.29674	1.64944	10µA±0.1%	42	38.1493	1.09239	10µA±0.1%
3	1.39834	1.64809	10µA±0.1%	43	42.1538	1.08601	10µA±0.1%
4	1.70202	1.64329	10µA±0.1%	44	46.1543	1.07968	10µA±0.1%
5	2.00066	1.63746	10µA±0.1%	45	52.1554	1.07009	10µA±0.1%
6	2.40102	1.62832	10µA±0.1%	46	58.1478	1.06041	10µA±0.1%
7	2.80156	1.61829	10µA±0.1%	47	64.1391	1.05058	10µA±0.1%
8	3.19872	1.60787	10µA±0.1%	48	70.1298	1.04058	10µA±0.1%
9	3.70188	1.59389	10µA±0.1%	49	76.1241	1.03040	10µA±0.1%
10	4.20401	1.57841	10µA±0.1%	50	82.1135	1.02005	10µA±0.1%
11	5.08961	1.54760	10µA±0.1%	51	88.1101	1.00949	10µA±0.1%
12	6.08228	1.51064	10µA±0.1%	52	94.1067	0.998759	10µA±0.1%
13	7.09522	1.47317	10µA±0.1%	53	100.106	0.987842	10µA±0.1%
14	8.10255	1.43800	10µA±0.1%	54	110.109	0.969268	10µA±0.1%
15	9.11184	1.40647	10µA±0.1%	55	125.090	0.940646	10µA±0.1%
16	10.1277	1.37831	10µA±0.1%	56	140.082	0.911159	10µA±0.1%
17	11.1477	1.35294	10µA±0.1%	57	155.088	0.880922	10µA±0.1%
18	12.1616	1.33006	10µA±0.1%	58	170.087	0.850071	10µA±0.1%
19	13.1661	1.30941	10µA±0.1%	59	185.078	0.818698	10µA±0.1%
20	14.1622	1.29061	10µA±0.1%	60	200.086	0.786811	10µA±0.1%
21	15.1526	1.27328	10µA±0.1%	61	215.087	0.754501	10µA±0.1%
22	16.1301	1.25718	10µA±0.1%	62	230.088	0.721802	10µA±0.1%
23	17.1066	1.24180	10µA±0.1%	63	245.086	0.688741	10µA±0.1%
24	18.0818	1.22688	10µA±0.1%	64	260.081	0.655356	10µA±0.1%
25	19.0593	1.21211	10µA±0.1%	65	275.083	0.621646	10µA±0.1%
26	20.0365	1.19714	10µA±0.1%	66	290.098	0.587625	10µA±0.1%
27	21.0211	1.18115	10µA±0.1%	67	305.103	0.553394	10µA±0.1%
28	21.8127	1.16658	10µA±0.1%	68	315.124	0.530410	10µA±0.1%
29	22.6051	1.14930	10µA±0.1%	69	320.122	0.518915	10µA±0.1%
30	23.2062	1.13644	10µA±0.1%	70	326.119	0.505110	10µA±0.1%
31	23.8058	1.12768	10µA±0.1%	71	330.126	0.495862	10µA±0.1%
32	24.4058	1.12262	10µA±0.1%				
33	25.0109	1.11938	10µA±0.1%				
34	25.6253	1.11696	10µA±0.1%				
35	26.4308	1.11446	10µA±0.1%				
36	27.2510	1.11233	10µA±0.1%				
37	28.0649	1.11045	10µA±0.1%				
38	29.0811	1.10831	10µA±0.1%				
39	30.0965	1.10630	10µA±0.1%				
40	32.1261	1.10255	10µA±0.1%				



# UNCERTAINTY ANALYSIS

Calibration Report: 679223  
 Sensor Model: DT-670-SD-1.4L  
 Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
 Serial Number: D6026628  
 Temperature Range: 1.40K to 325K

## 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 $\Omega$	25 $\Omega$	27 $\Omega$		
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

- $\sigma_{fit}$  = 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
- $\Delta T_{RMS}$  = root mean square deviation of fit

A value of  $\Delta T_{RMS}$  is given for each range of fit.

F008-04-00\_B (01/17/11)



# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Useful Range of Fit:

1.40 K to 12.2 K  
1.648 Volts to 1.330 Volts

Lower and Upper limits of Voltage used in computing Chebychev coefficients:  
ZL = 1.290610573      ZU = 1.650592937

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	7.502768	2.0417E-03	3674.79
1	-6.047912	2.9567E-03	-2045.51
2	0.285075	3.0253E-03	94.23
3	-0.381277	2.8365E-03	-134.42
4	-0.065254	2.7068E-03	-24.11
5	-0.025406	2.6520E-03	-9.58
6	-0.014115	2.6298E-03	-5.37
7	-0.011281	2.6249E-03	-4.30
8	-0.009269	2.6826E-03	-3.46
9	-0.009789	2.8315E-03	-3.46
10	-0.013232	2.8244E-03	-4.69

Z = Voltage

$$k = ((Z-ZL)-(ZU-Z))/(ZU-ZL)$$

Temp. (K) =  $\sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$ , where  $0 \leq i \leq 10$   
and the  $A_i$ 's are the coefficients in the table above.

# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Temp. (K) vs. Voltage

	V Meas. (V)	T Meas. (K)	T Eq. (K)	T diff. (mK)
1	1.650593	1.20184	1.21031	-8.47
2	1.649438	1.29674	1.29658	0.16
3	1.648086	1.39834	1.39231	6.03
4	1.643290	1.70202	1.69366	8.36
5	1.637464	2.00066	2.00102	-0.37
6	1.628318	2.40102	2.40872	-7.70
7	1.618291	2.80156	2.80599	-4.43
8	1.607875	3.19872	3.19551	3.21
9	1.593888	3.70188	3.69390	7.98
10	1.578411	4.20401	4.20603	-2.02
11	1.547602	5.08961	5.09716	-7.55
12	1.510644	6.08228	6.07396	8.32
13	1.473172	7.09522	7.09864	-3.42
14	1.438002	8.10255	8.10619	-3.64
15	1.406467	9.11184	9.10539	6.44
16	1.378314	10.12765	10.12933	-1.68
17	1.352940	11.14774	11.15257	-4.83
18	1.330057	12.16161	12.15566	5.95
19	1.309406	13.16611	13.16900	-2.88
20	1.290611	14.16218	14.16164	0.54

Order of Fit = 10                      RMS error of fit = 5.47 mK  
Largest absolute error = -8.47 mK at data point no. 1



# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Useful Range of Fit:

12.2 K to 25.0 K  
1.330 Volts to 1.119 Volts

Lower and Upper limits of Voltage used in computing Chebychev coefficients:  
ZL = 1.114460481      ZU = 1.378314463

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	17.216815	8.9256E-03	1928.93
1	-7.717727	1.6264E-02	-474.51
2	0.468742	1.3673E-02	34.28
3	-0.009140	1.0593E-02	-0.86
4	0.213351	7.1093E-03	30.01
5	-0.275935	6.0104E-03	-45.91
6	0.223548	8.2494E-03	27.10
7	-0.118402	1.1482E-02	-10.31
8	0.106537	1.2458E-02	8.55
9	-0.024930	1.1992E-02	-2.08
10	0.044912	9.3136E-03	4.82

Z = Voltage

$$k = ((Z-ZL)-(ZU-Z))/(ZU-ZL)$$

Temp. (K) =  $\sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$ , where  $0 \leq i \leq 10$   
and the  $A_i$ 's are the coefficients in the table above.

# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Temp. (K) vs. Voltage

	V Meas. (V)	T Meas. (K)	T Eq. (K)	T diff. (mK)
16	1.378314	10.12933	10.12777	-0.12
17	1.352940	11.15257	11.14631	1.43
18	1.330057	12.15566	12.16819	-6.58
19	1.309406	13.16611	13.15238	13.73
20	1.290611	14.16218	14.17161	-9.43
21	1.273280	15.15261	15.16065	-8.05
22	1.257179	16.13014	16.12161	8.53
23	1.241799	17.10662	17.09639	10.23
24	1.226878	18.08185	18.08681	-4.96
25	1.212113	19.05933	19.07255	-13.21
26	1.197139	20.03652	20.03647	0.06
27	1.181147	21.02112	21.00350	17.62
28	1.166579	21.81272	21.81398	-1.26
29	1.149301	22.60509	22.63072	-25.63
30	1.136438	23.20616	23.18581	20.35
31	1.127676	23.80582	23.78903	16.79
32	1.122618	24.40579	24.41997	-14.18
33	1.119385	25.01087	25.02544	-14.57
34	1.116962	25.62532	25.62687	-1.54
35	1.114460	26.43083	26.42004	10.79

Order of Fit = 10                      RMS error of fit = 12.17 mK  
Largest absolute error = -25.63 mK at data point no. 29



# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Useful Range of Fit:

25.0 K to 88.1 K  
1.119 Volts to 1.009 Volts

Lower and Upper limits of Voltage used in computing Chebychev coefficients:  
ZL = 0.9878420794      ZU = 1.127675732

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	60.089717	8.9006E-03	6751.17
1	-39.938395	1.5745E-02	-2536.50
2	1.053260	1.4905E-02	70.67
3	1.496943	1.0709E-02	139.79
4	0.847439	7.7765E-03	108.97
5	0.338990	3.6006E-03	94.15
6	0.073078	4.0605E-03	18.00
7	-0.022596	7.5459E-03	-2.99
8	-0.059302	1.0664E-02	-5.56
9	-0.022525	1.1561E-02	-1.95
10	-0.032506	1.1856E-02	-2.74
11	-0.003118	9.2877E-03	-0.34
12	-0.016103	6.5485E-03	-2.46

Z = Voltage

$$k = ((Z-ZL)-(ZU-Z))/(ZU-ZL)$$

Temp. (K) =  $\sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$ , where  $0 \leq i \leq 12$   
and the  $A_i$ 's are the coefficients in the table above.



# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Temp. (K) vs. Voltage

	V Meas. (V)	T Meas. (K)	T Eq. (K)	T diff. (mK)
31	1.127676	23.78903	23.80488	0.94
32	1.122618	24.41997	24.41501	-9.22
33	1.119385	25.02544	24.99579	15.08
34	1.116962	25.62532	25.62047	4.85
35	1.114460	26.43083	26.43866	-7.83
36	1.112329	27.25101	27.26225	-11.24
37	1.110455	28.06488	28.07023	-5.34
38	1.108309	29.08114	29.07805	3.09
39	1.106305	30.09655	30.08721	9.33
40	1.102549	32.12608	32.11618	9.91
41	1.097317	35.14777	35.15497	-7.20
42	1.092388	38.14927	38.15901	-9.73
43	1.086014	42.15380	42.14758	6.22
44	1.079679	46.15429	46.14856	5.72
45	1.070092	52.15536	52.16242	-7.06
46	1.060407	58.14779	58.14612	1.68
47	1.050580	64.13910	64.13606	3.04
48	1.040583	70.12980	70.13376	-3.97
49	1.030404	76.12407	76.12156	2.51
50	1.020046	82.11346	82.11445	-0.99
51	1.009494	88.11009	88.10984	0.24
52	0.9987586	94.10669	94.10673	-0.04
53	0.9878421	100.10629	100.10628	0.00

Order of Fit = 12                      RMS error of fit = 6.76 mK  
Largest absolute error = 15.08 mK at data point no. 33



# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Useful Range of Fit:

88.1 K to 325. K  
1.009 Volts to 0.5077 Volts

Lower and Upper limits of Voltage used in computing Chebychev coefficients:  
ZL = 0.4958619847      ZU = 1.03040363

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	207.345027	2.0410E-04	1015897.50
1	-126.036612	2.9488E-04	-427412.20
2	-3.971856	2.8854E-04	-13765.48
3	-0.889674	2.9843E-04	-2981.17
4	-0.234205	2.9699E-04	-788.60
5	-0.074814	2.8519E-04	-262.33
6	-0.014912	2.7451E-04	-54.32
7	-0.000927	2.7424E-04	-3.38
8	0.000861	2.7791E-04	3.10
9	0.000745	2.7762E-04	2.68

Z = Voltage

$$k = ((Z-ZL)-(ZU-Z))/(ZU-ZL)$$

Temp. (K) =  $\sum A_i \cdot \text{COS}(i \cdot \text{ARCCOS}(k))$ , where  $0 \leq i \leq 9$   
and the  $A_i$ 's are the coefficients in the table above.

# POLYNOMIAL EQUATION

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev  
Temp. (K) vs. Voltage

	V Meas. (V)	T Meas. (K)	T Eq. (K)	T diff. (mK)
49	1.030404	76.12156	76.12363	0.44
50	1.020046	82.11445	82.11436	-0.89
51	1.009494	88.10984	88.10994	0.14
52	0.9987586	94.10669	94.10663	0.07
53	0.9878421	100.10629	100.10585	0.44
54	0.9692683	110.10858	110.10835	0.24
55	0.9406459	125.09035	125.09098	-0.64
56	0.9111593	140.08240	140.08279	-0.38
57	0.8809219	155.08840	155.08719	1.21
58	0.8500706	170.08677	170.08743	-0.66
59	0.8186982	185.07800	185.07817	-0.17
60	0.7868112	200.08589	200.08539	0.50
61	0.7545009	215.08729	215.08787	-0.58
62	0.7218017	230.08788	230.08735	0.53
63	0.6887410	245.08552	245.08609	-0.57
64	0.6553559	260.08090	260.08039	0.51
65	0.6216463	275.08274	275.08249	0.24
66	0.5876254	290.09814	290.09930	-1.16
67	0.5533936	305.10318	305.10188	1.30
68	0.5304101	315.12439	315.12424	0.16
69	0.5189148	320.12230	320.12386	-1.56
70	0.5051099	326.11857	326.11741	1.15
71	0.4958620	330.12588	330.12620	-0.31

Order of Fit = 9                      RMS error of fit = 0.73 mK  
Largest absolute error = -1.56 mK at data point no. 69



# INTERPOLATION TABLE

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Temp (K)	Volts (V)	dV/dT (mV/K)	Temp (K)	Volts (V)	dV/dT (mV/K)
1.400	1.64806	-13.935	15.50	1.26746	-16.587
1.500	1.64661	-15.158	16.00	1.25928	-16.162
1.600	1.64503	-16.410	16.50	1.25129	-15.811
1.700	1.64333	-17.689	17.00	1.24345	-15.533
1.800	1.64149	-18.938	17.50	1.23574	-15.324
1.900	1.63954	-20.093	18.00	1.22812	-15.170
2.000	1.63748	-21.152	18.50	1.22056	-15.091
2.100	1.63531	-22.101	19.00	1.21301	-15.119
2.200	1.63306	-22.923	19.50	1.20542	-15.274
2.300	1.63073	-23.618	20.00	1.19771	-15.591
2.400	1.62834	-24.187	21.00	1.18151	-17.035
2.500	1.62590	-24.659	22.00	1.16270	-21.169
2.600	1.62341	-25.070	23.00	1.14054	-21.013
2.700	1.62089	-25.417	24.00	1.12572	-9.1387
2.800	1.61833	-25.702	25.00	1.11943	-4.5008
2.900	1.61575	-25.958	26.00	1.11573	-3.1100
3.000	1.61314	-26.222	27.00	1.11295	-2.5229
3.100	1.61050	-26.492	28.00	1.11060	-2.2136
3.200	1.60784	-26.769	29.00	1.10847	-2.0440
3.300	1.60515	-27.090	30.00	1.10649	-1.9318
3.400	1.60242	-27.487	31.00	1.10460	-1.8547
3.500	1.59965	-27.962	32.00	1.10277	-1.7974
3.600	1.59683	-28.513	33.00	1.10100	-1.7542
3.700	1.59394	-29.142	34.00	1.09926	-1.7163
3.800	1.59100	-29.810	35.00	1.09757	-1.6836
3.900	1.58798	-30.475	36.00	1.09590	-1.6559
4.000	1.58490	-31.138	37.00	1.09425	-1.6329
4.200	1.57854	-32.457	38.00	1.09263	-1.6145
4.400	1.57192	-33.682	39.00	1.09102	-1.6004
4.600	1.56508	-34.722	40.00	1.08943	-1.5902
4.800	1.55805	-35.578	42.00	1.08626	-1.5814
5.000	1.55086	-36.249	44.00	1.08309	-1.5828
5.200	1.54356	-36.746	46.00	1.07992	-1.5875
5.400	1.53617	-37.116	48.00	1.07674	-1.5940
5.600	1.52872	-37.368	50.00	1.07355	-1.6002
5.800	1.52123	-37.500	52.00	1.07034	-1.6061
6.000	1.51373	-37.513	54.00	1.06712	-1.6121
6.500	1.49505	-37.157	56.00	1.06389	-1.6190
7.000	1.47663	-36.434	58.00	1.06065	-1.6267
7.500	1.45868	-35.292	60.00	1.05739	-1.6351
8.000	1.44143	-33.622	65.00	1.04915	-1.6582
8.500	1.42512	-31.632	70.00	1.04080	-1.6826
9.000	1.40977	-29.770	75.00	1.03233	-1.7078
9.500	1.39532	-28.062	77.35	1.02830	-1.7202
10.00	1.38168	-26.543	80.00	1.02372	-1.7338
10.50	1.36875	-25.198	85.00	1.01499	-1.7590
11.00	1.35646	-23.988	90.00	1.00613	-1.7848
11.50	1.34474	-22.890	95.00	0.997144	-1.8095
12.00	1.33356	-21.844	100.0	0.988037	-1.8334
12.50	1.32289	-20.852	105.0	0.978812	-1.8566
13.00	1.31269	-19.942	110.0	0.969472	-1.8789
13.50	1.30293	-19.113	115.0	0.960024	-1.9002
14.00	1.29357	-18.358	120.0	0.950472	-1.9205
14.50	1.28456	-17.679	125.0	0.940821	-1.9398
15.00	1.27588	-17.089	130.0	0.931076	-1.9581



# INTERPOLATION TABLE

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

<u>Temp (K)</u>	<u>Volts (V)</u>	<u>dV/dT (mV/K)</u>	<u>Temp (K)</u>	<u>Volts (V)</u>	<u>dV/dT (mV/K)</u>
135.0	0.921242	-1.9754	235.0	0.711012	-2.2005
140.0	0.911323	-1.9918	240.0	0.699990	-2.2082
145.0	0.901325	-2.0074	245.0	0.688931	-2.2156
150.0	0.891250	-2.0224	250.0	0.677835	-2.2227
155.0	0.881102	-2.0368	255.0	0.666703	-2.2298
160.0	0.870883	-2.0505	260.0	0.655537	-2.2368
165.0	0.860598	-2.0634	265.0	0.644336	-2.2436
170.0	0.850251	-2.0755	270.0	0.633101	-2.2503
175.0	0.839844	-2.0870	273.15	0.626006	-2.2544
180.0	0.829381	-2.0982	275.0	0.621833	-2.2568
185.0	0.818863	-2.1090	280.0	0.610534	-2.2629
190.0	0.808291	-2.1195	285.0	0.599205	-2.2686
195.0	0.797668	-2.1297	290.0	0.587849	-2.2738
200.0	0.786995	-2.1396	295.0	0.576467	-2.2788
205.0	0.776273	-2.1492	300.0	0.565060	-2.2837
210.0	0.765504	-2.1583	305.0	0.553630	-2.2886
215.0	0.754690	-2.1670	310.0	0.542175	-2.2934
220.0	0.743834	-2.1755	315.0	0.530696	-2.2982
225.0	0.732935	-2.1839	320.0	0.519196	-2.3009
230.0	0.721994	-2.1923	325.0	0.507687	-2.3035



## THERMAL CYCLE TESTING

Sensor Model: DT-670-SD-1.4L

Serial Number: D6026628

Sensor Type: Silicon Diode

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

Approximately 305 K:	0.554 V
Liquid Nitrogen:	1.028 V
Liquid Helium:	1.579 V

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 diode sensors calibrated by LSCI, the current is maintained at the constant values listed on the Test Data page. In order to minimize calibration offsets due to the nonlinear voltage-current relationship in the diode sensor, these same guidelines should be followed in using the sensor.



# BREAKPOINTS 340 FORMAT

Calibration Report: 679223

Sensor Model: DT-670-SD-1.4L

Sensor Type: Silicon Diode

Sales Order: 74557-D6026628

Serial Number: D6026628

Temperature Range: 1.40K to 325K

Name: DT-670-SD-1.4L

Serial number: D6026628

Format: 2 ;Volts/Kelvin

Limit: 325.0

Coefficient: 1 ;Negative

Point 1: 9.06000e-02,500.000	Point 56: 1.12143, 24.600
Point 2: .110239,491.000	Point 57: 1.12330, 24.300
Point 3: .136555,479.500	Point 58: 1.12484, 24.100
Point 4: .179181,461.500	Point 59: 1.12667, 23.900
Point 5: .265393,425.500	Point 60: 1.12889, 23.700
Point 6: .349522,390.000	Point 61: 1.13156, 23.500
Point 7: .452797,346.000	Point 62: 1.13474, 23.300
Point 8: .507706,325.000	Point 63: 1.14046, 23.000
Point 9: .550217,306.500	Point 64: 1.16062, 22.100
Point 10: .587870,290.000	Point 65: 1.16887, 21.700
Point 11: .621853,275.000	Point 66: 1.17813, 21.200
Point 12: .653320,261.000	Point 67: 1.18985, 20.500
Point 13: .683407,247.500	Point 68: 1.20161, 19.750
Point 14: .712133,234.500	Point 69: 1.22512, 18.200
Point 15: .739500,222.000	Point 70: 1.23571, 17.500
Point 16: .766604,209.500	Point 71: 1.24889, 16.650
Point 17: .791290,198.000	Point 72: 1.26006, 15.950
Point 18: .814660,187.000	Point 73: 1.27077, 15.300
Point 19: .836730,176.500	Point 74: 1.28102, 14.700
Point 20: .857519,166.500	Point 75: 1.29080, 14.150
Point 21: .877041,157.000	Point 76: 1.30099, 13.600
Point 22: .895307,148.000	Point 77: 1.31166, 13.050
Point 23: .912336,139.500	Point 78: 1.32182, 12.550
Point 24: .928152,131.500	Point 79: 1.33243, 12.050
Point 25: .943746,123.500	Point 80: 1.34356, 11.550
Point 26: .958139,116.000	Point 81: 1.35522, 11.050
Point 27: .971365,109.000	Point 82: 1.36745, 10.550
Point 28: .984379,102.000	Point 83: 1.38030, 10.050
Point 29: .994432, 96.500	Point 84: 1.39249, 9.600
Point 30: 1.00256, 92.000	Point 85: 1.40530, 9.150
Point 31: 1.01058, 87.500	Point 86: 1.41881, 8.700
Point 32: 1.01851, 83.000	Point 87: 1.43309, 8.250
Point 33: 1.02632, 78.500	Point 88: 1.44817, 7.800
Point 34: 1.03404, 74.000	Point 89: 1.46752, 7.250
Point 35: 1.04165, 69.500	Point 90: 1.49498, 6.500
Point 36: 1.04916, 65.000	Point 91: 1.53995, 5.300
Point 37: 1.05657, 60.500	Point 92: 1.55953, 4.760
Point 38: 1.06455, 55.600	Point 93: 1.57333, 4.360
Point 39: 1.07356, 50.000	Point 94: 1.58433, 4.020
Point 40: 1.08247, 44.400	Point 95: 1.58612, 3.960
Point 41: 1.09006, 39.600	Point 96: 1.59132, 3.790
Point 42: 1.09408, 37.100	Point 97: 1.59799, 3.560
Point 43: 1.09739, 35.100	Point 98: 1.60545, 3.290
Point 44: 1.10029, 33.400	Point 99: 1.61447, 2.950
Point 45: 1.10295, 31.900	Point 100: 1.62293, 2.620
Point 46: 1.10534, 30.600	Point 101: 1.62909, 2.370
Point 47: 1.10746, 29.500	Point 102: 1.63377, 2.170
Point 48: 1.10930, 28.600	Point 103: 1.63750, 2.000
Point 49: 1.11104, 27.800	Point 104: 1.64055, 1.850
Point 50: 1.11269, 27.100	Point 105: 1.64298, 1.720
Point 51: 1.11426, 26.500	Point 106: 1.64504, 1.600
Point 52: 1.11572, 26.000	Point 107: 1.64692, 1.480
Point 53: 1.11704, 25.600	Point 108: 1.64807, 1.400
Point 54: 1.11856, 25.200	
Point 55: 1.11989, 24.900	

Note: Breakpoints outside of the calibration range were added from the standard curve. These extra points conform to reduced accuracy specifications and are added as a convenience to the customer.



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F010-04-00\_B 06/21/2011

# BREAKPOINTS 91C/93C/330 FORMAT

Calibration Report: 679223  
Sensor Model: DT-670-SD-1.4L  
Sensor Type: Silicon Diode

Sales Order: 74557-D6026628  
Serial Number: D6026628  
Temperature Range: 1.40K to 325K

Interpolation Method: Straight Line  
Limit: 325.0 (Kelvin)  
Format: 2 (Volts/Kelvin)  
Number of Breakpoints: 36

No.	Units	Temperature (K)	No.	Units	Temperature (K)
1	0.147030	475.0	21	1.11054	28.0
2	0.218700	445.0	22	1.11295	27.0
3	0.326000	400.0	23	1.11573	26.0
4	0.490260	330.0	24	1.11943	25.0
5	0.507800	325.0	25	1.12572	24.0
6	0.587910	290.0	26	1.14054	23.0
7	0.655620	260.0	27	1.16270	22.0
8	0.722090	230.0	28	1.18151	21.0
9	0.776340	205.0	29	1.27513	15.0
10	0.829470	180.0	30	1.32229	12.5
11	0.870930	160.0	31	1.38061	10.0
12	0.911410	140.0	32	1.45700	7.5
13	0.950560	120.0	33	1.57316	4.4
14	0.978850	105.0	34	1.62456	2.6
15	1.00620	90.0	35	1.64551	1.6
16	1.03239	75.0	36	1.64799	1.4
17	1.05745	60.0			
18	1.08633	42.0			
19	1.09583	36.0			
20	1.10453	31.0			

Note: Breakpoints outside of the calibration range were added from the standard curve. These extra points conform to reduced accuracy specifications and are added as a convenience to the customer.

