ENERTRON

Heat Pipe Test Report

Manufacturer	Enertron	**Test conditions**		Test date	10/21/2011
Wick structure/ Working fluid	Sintered Powder Metal/ Water	Effective area (m2)	2.83E-05	Note:	
Pipe specification	C110 Copper 0.3mm thickness	Heat load (W)	30	ev- Evaporator of heat pipe	
Diameter (mm)	6	Contact length of ev/cd (mm)	50	cd- Condenser of heat pipe	
Length (mm)	250	At 90˚ the evaporator is directly below the condenser; 0˚ is horizontal.		eb- Evaporator Block	
Flatten thickness (mm)	n/a			cb- Condenser Block	
Bend angle (deg)	n/a				

coolant temp (˚C)	Inclination Angle (˚)	dT ev-cd (˚C)	Thermal resistance ev-cd (˚C/W)	Thermal conductivity ev-cd (W/mK)	dT eb-cb (˚C)	Thermal resistance eb-cb (˚C/W)	Thermal Conductivity eb-cb (W/mK)	Measured Temperature T (˚C)					
								ev	cd	eb1	eb2	cb1	cb2
5	90	16.89	0.56	12564	18.62	0.62	11395	26.13	9.24	27.40	26.39	7.43	9.11
	60	17.42	0.58	12184	19.14	0.64	11085	26.56	9.15	27.76	26.91	7.37	9.01
	30	22.76	0.76	9325	24.19	0.81	8774	31.72	8.96	32.58	32.05	7.59	8.66
10	90	14.29	0.48	14849	15.80	0.53	13429	29.21	14.92	30.32	29.35	13.40	14.67
	60	14.47	0.48	14670	16.05	0.53	13224	29.47	15.01	30.51	29.64	13.39	14.67
	30	15.85	0.53	13388	17.49	0.58	12134	30.88	15.03	31.95	31.21	13.49	14.69
	0	33.84	1.13	6271	36.20	1.21	5862	48.76	14.92	50.24	49.97	13.09	14.72
20	90	10.87	0.36	19515	12.54	0.42	16926	35.57	24.69	36.86	35.55	23.18	24.16
	60	11.14	0.37	19051	12.65	0.42	16781	35.52	24.38	36.72	35.56	22.95	24.04
	30	11.75	0.39	18066	13.46	0.45	15772	35.96	24.21	37.11	36.08	22.68	23.60
	0	14.37	0.48	14767	15.98	0.53	13280	38.52	24.15	39.53	38.96	22.65	23.88
30	90	7.87	0.26	26971	10.08	0.34	21061	43.28	35.41	45.43	43.83	34.16	34.95
	60	8.11	0.27	26163	10.23	0.34	20742	43.26	35.14	45.28	43.72	33.86	34.68
	30	9.49	0.32	22363	10.98	0.37	19330	44.40	34.92	45.74	44.37	33.69	34.47
	0	10.61	0.35	20001	11.99	0.40	17703	45.58	34.97	46.62	45.53	33.70	34.47
	-30	24.33	0.81	8724	26.02	0.87	8154	58.36	34.03	59.34	59.06	32.50	33.85
40	90	7.22	0.24	29396	9.46	0.32	22425	51.59	44.37	53.75	52.04	43.12	43.74
	60	7.21	0.24	29453	9.38	0.31	22618	51.46	44.26	53.59	51.89	43.06	43.65
	30	7.66	0.26	27703	9.68	0.32	21922	51.84	44.18	53.89	52.22	43.05	43.70
	0	9.12	0.30	23271	10.54	0.35	20139	53.35	44.23	54.61	53.21	43.11	43.64
	-30	12.53	0.42	16936	13.86	0.46	15311	56.65	44.12	57.55	56.79	42.93	43.68
50	90	7.06	0.24	30049	9.11	0.30	23294	60.93	53.87	63.05	61.41	52.89	53.35
	60	6.91	0.23	30692	8.98	0.30	23644	60.78	53.87	62.84	61.21	52.80	53.29
	30	6.80	0.23	31230	8.97	0.30	23660	60.70	53.90	62.85	61.19	52.83	53.27
	0	7.89	0.26	26906	9.67	0.32	21947	61.87	53.98	63.52	61.99	52.85	53.32
	-30	9.16	0.31	23169	10.58	0.35	20057	63.09	53.93	64.22	62.98	52.75	53.29
	-60	20.66	0.69	10270	22.16	0.74	9577	74.33	53.67	75.28	74.83	52.37	53.43
60	90	6.61	0.22	32123	8.70	0.29	24392	70.10	63.49	72.22	70.56	62.56	62.82
	60	6.49	0.22	32708	8.58	0.29	24721	69.98	63.49	72.09	70.43	62.51	62.85
	30	6.35	0.21	33429	8.41	0.28	25221	69.89	63.54	72.00	70.31	62.53	62.95

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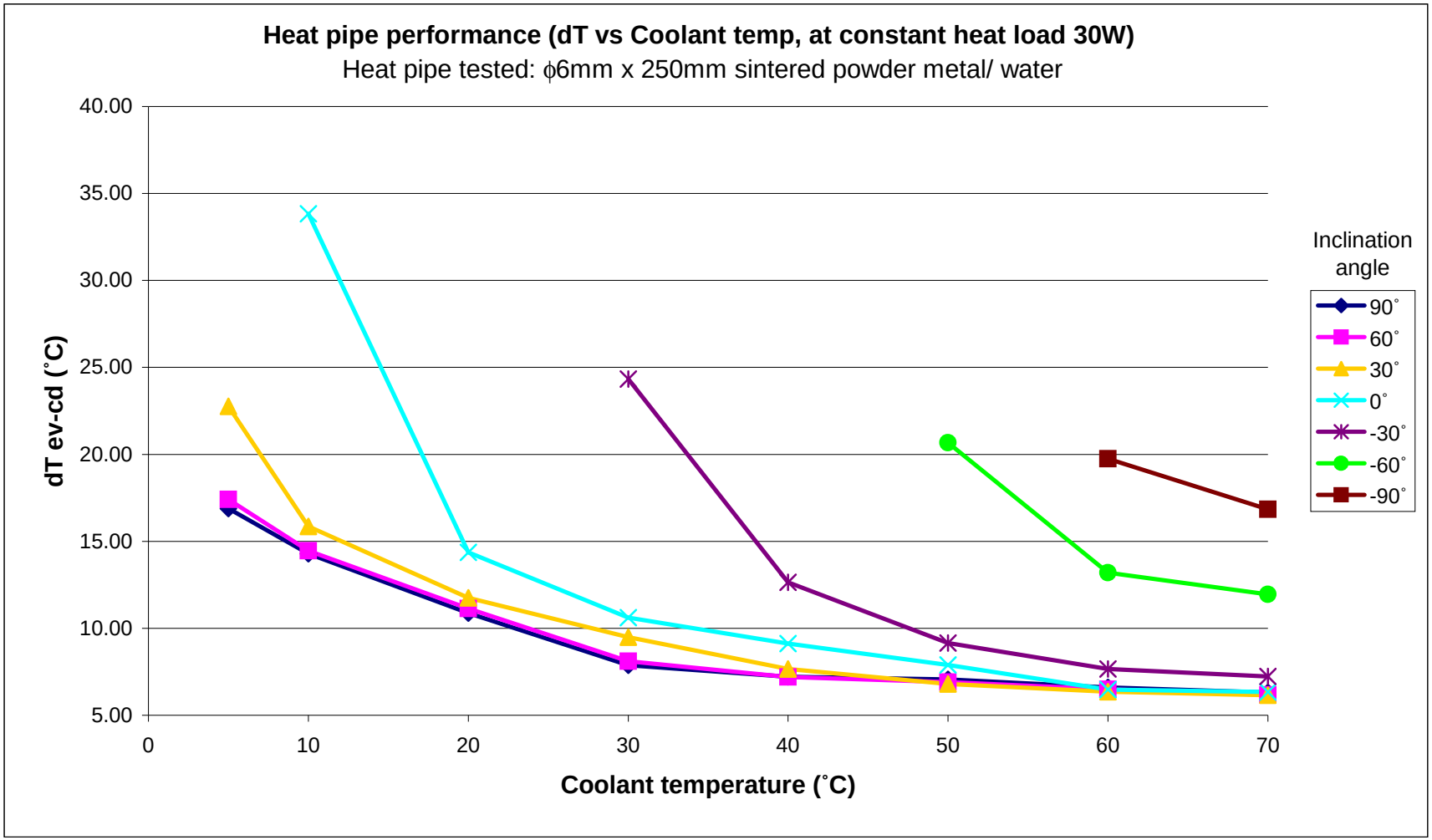
coolant temp (˚C)	Inclination Angle (˚)	dT ev-cd (˚C)	Thermal resistance ev-cd (˚C/W)	Thermal conductivity ev-cd (W/mK)	dT eb-cb (˚C)	Thermal resistance eb-cb (˚C/W)	Thermal Conductivity eb-cb (W/mK)	Measured Temperature T (˚C)					
								ev	cd	eb1	eb2	cb1	cb2
60	0	6.48	0.22	32748	8.75	0.29	24260	72.21	65.73	74.36	72.75	64.64	64.98
	-30	7.66	0.26	27714	9.28	0.31	22862	73.30	65.65	74.89	73.41	64.68	65.05
	-60	13.20	0.44	16075	14.48	0.48	14651	78.67	65.47	79.56	78.99	64.44	65.13
	-90	19.75	0.66	10744	21.26	0.71	9982	85.31	65.56	86.33	85.77	64.27	65.31
70	90	6.31	0.21	33625	8.42	0.28	25206	80.01	73.70	82.14	80.55	72.78	73.07
	60	6.17	0.21	34377	8.34	0.28	25454	79.86	73.69	82.03	80.43	72.75	73.04
	30	6.15	0.21	34505	8.27	0.28	25657	79.82	73.67	81.92	80.35	72.71	73.02
	0	6.33	0.21	33513	8.49	0.28	24995	79.94	73.61	82.06	80.55	72.66	72.97
	-30	7.23	0.24	29339	9.02	0.30	23537	80.60	73.37	82.30	80.89	72.42	72.74
	-60	11.95	0.40	17762	13.27	0.44	15994	85.40	73.46	86.40	85.67	72.45	73.10
	-90	16.84	0.56	12603	18.20	0.61	11660	90.25	73.41	91.19	90.61	72.29	73.11


Heat pipe performance (dT vs Coolant temp, at constant heat load 30W)
Heat pipe tested: ϕ6mm x 250mm sintered powder metal/ water
dT ev-cd (˚C)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0
10
20
30
40
50
60
70
Coolant temperature (˚C)
Inclination angle
90˚
60˚
30˚
0˚
-30˚
-60˚
-90˚

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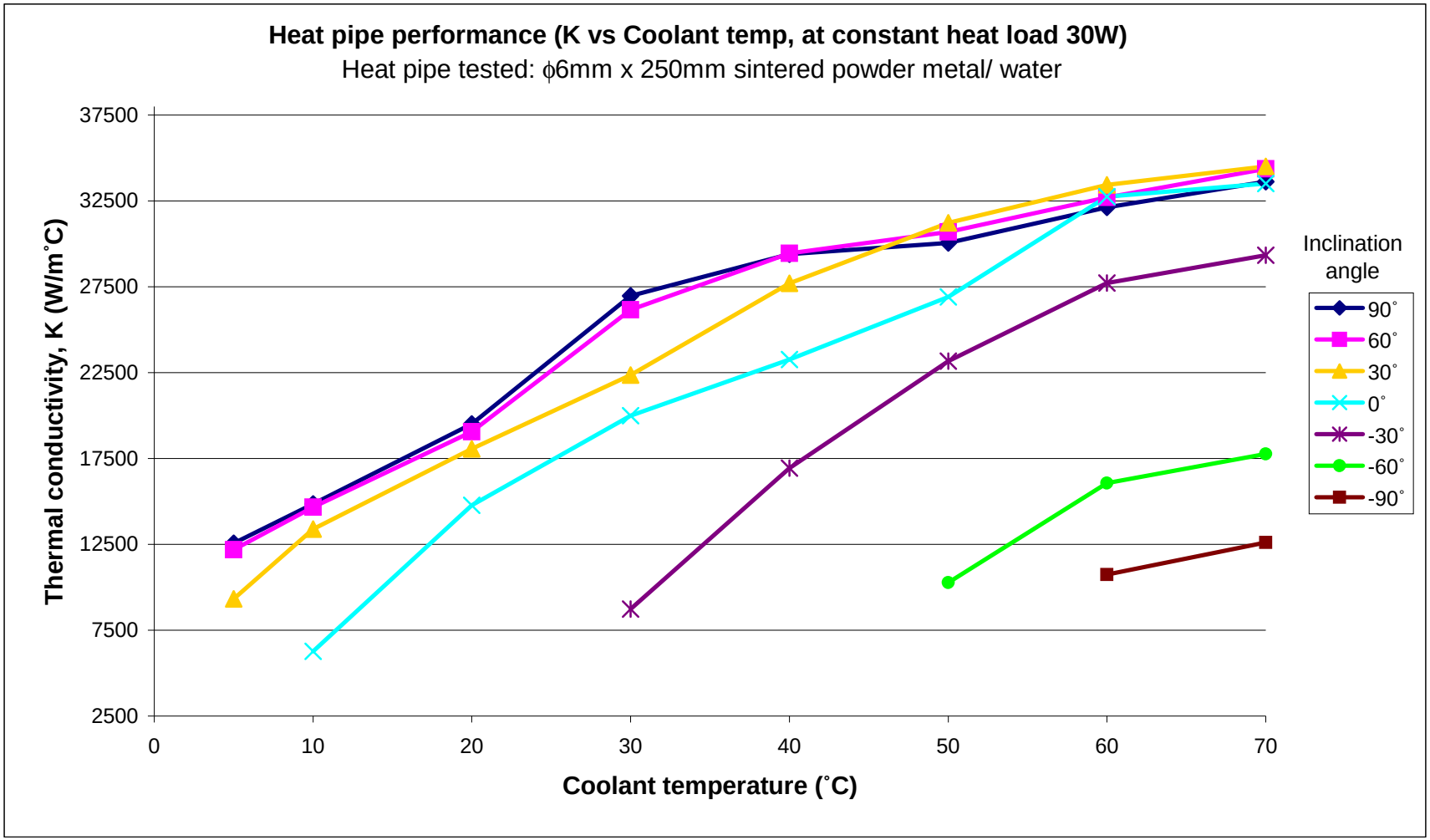
Heat pipe performance (K vs Coolant temp, at constant heat load 30W)
Heat pipe tested: ϕ6mm x 250mm sintered powder metal/ water
Thermal conductivity, K (W/m˚C)
37500
32500
27500
22500
17500
12500
7500
2500
0
10
20
30
40
50
60
70
Coolant temperature (˚C)
Inclination angle
90˚
60˚
30˚
0˚
-30˚
-60˚
-90˚