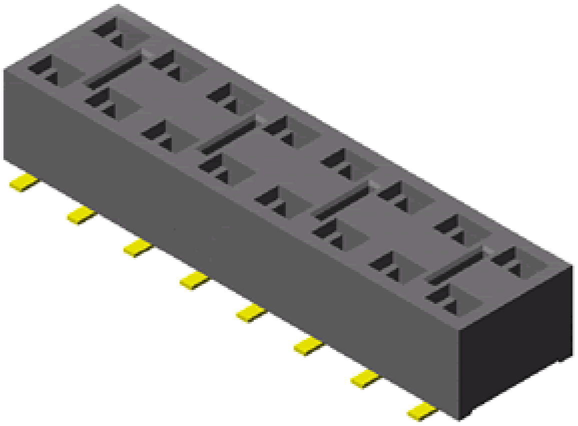
Project Number: Lead Free	Tracking Code: TC0310-Lead Free-0125		
Requested by: John Schmelz	Date: 3/4/2003	Product Rev: T	
Part #: HLE-150-02-S-DV	Lot #: NA	Tech: J.S.	Eng: J.S.
Part description: HLE	Qty to test: 10		
Test Start: 3/4/2003	Test Completed: 3/6/2003		



Perform Solder Heat Resistance using three temperature profiles: 230°C, 260°C and 280°C.
Summary Report

PART DESCRIPTION

HLE-150-02-S-DV

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

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SCOPE

Perform Solder Heat Resistance using three temperature profiles: 230° C, 260° C and 280° C.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION.

1) Parts are visually inspected for cleanliness.

FLOWCHART

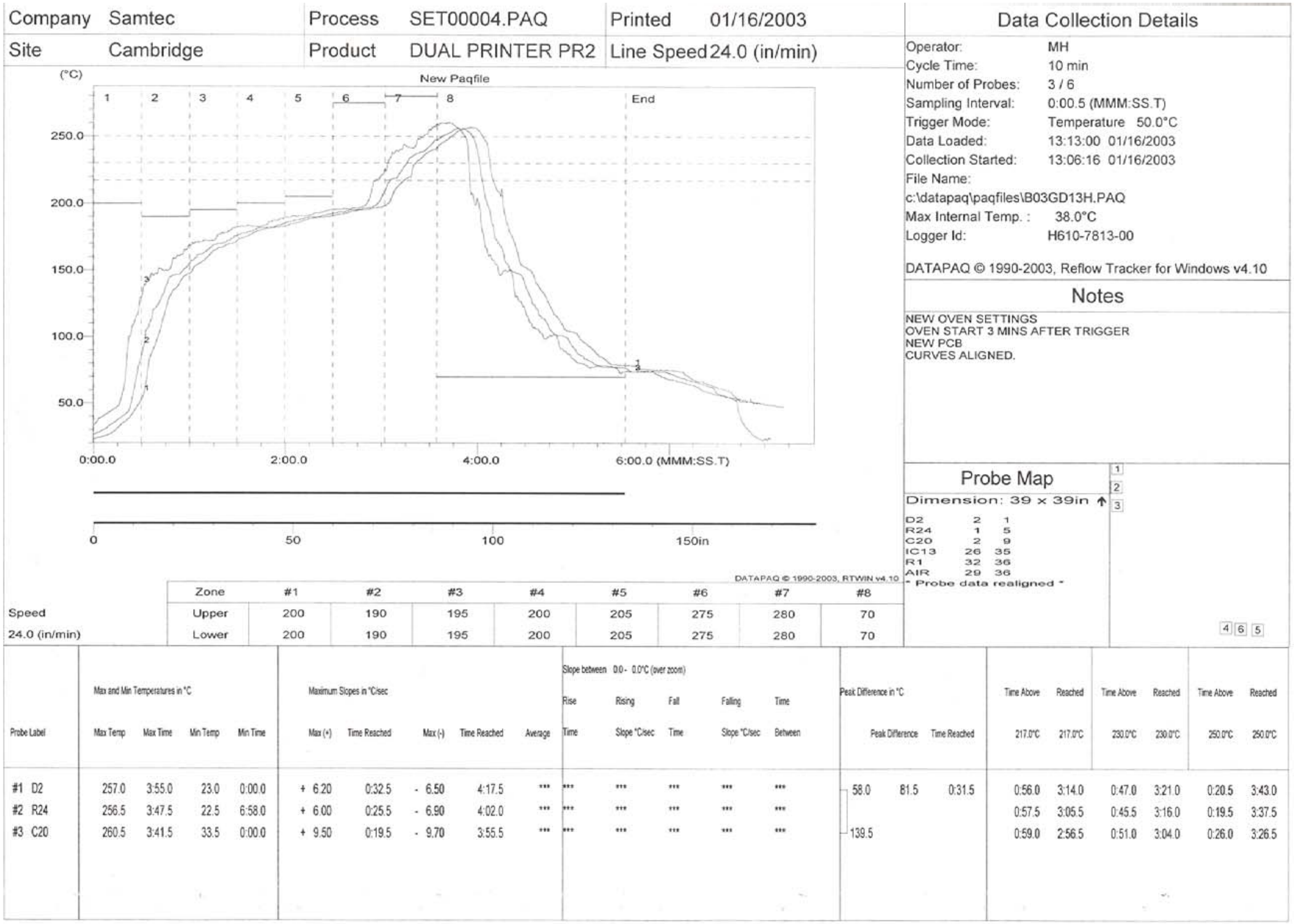
TEST STEP	**260 °C**		**280 °C** **GROUP D**	**230 °C** **GROUP E** **Control**
01	1 Pass	**Group A**	1 Pass	1 Pass
02	Solder Heat Resistance		Solder Heat Resistance	Solder Heat Resistance
03	2nd Pass	**Group B**		
04	Solder Heat Resistance			
05	3rd Pass	**Group C**		
06	Solder Heat Resistance			

Solder Heat Resistance (Visual): Blistering, Distortion (Bowed or Twisted), Discoloration

Tracking Code: TC0310-Lead Free-0125	Part #: HLE-150-02-S-DV
Part description: HLE	

OVEN THERMAL PROFILE (Control):

1) The Following Thermal Profiles were used to stress the parts.



Company	Samtec	Process	SET00004.PAQ	Printed	01/16/2003
Site	Cambridge	Product	DUAL PRINTER PR2	Line Speed	24.0 (in/min)

DATAPAQ © 1990-2003, RTWIN v4.10

Speed	Zone	#1	#2	#3	#4	#5	#6	#7	#8
	Upper	200	190	195	200	205	275	280	70
24.0 (in/min)	Lower	200	190	195	200	205	275	280	70

Data Collection Details

Operator:	MH
Cycle Time:	10 min
Number of Probes:	3 / 6
Sampling Interval:	0:00.5 (MMM:SS.T)
Trigger Mode:	Temperature 50.0°C
Data Loaded:	13:13:00 01/16/2003
Collection Started:	13:06:16 01/16/2003
File Name:	

c:\datapaq\paqfiles\B03GD13H.PAQ

Max Internal Temp. :	38.0°C
Logger Id:	H610-7813-00

DATAPAQ © 1990-2003, Reflow Tracker for Windows v4.10

Notes

NEW OVEN SETTINGS
OVEN START 3 MINS AFTER TRIGGER
NEW PCB
CURVES ALIGNED.

Probe Map

Dimension: 39 x 39in ↑

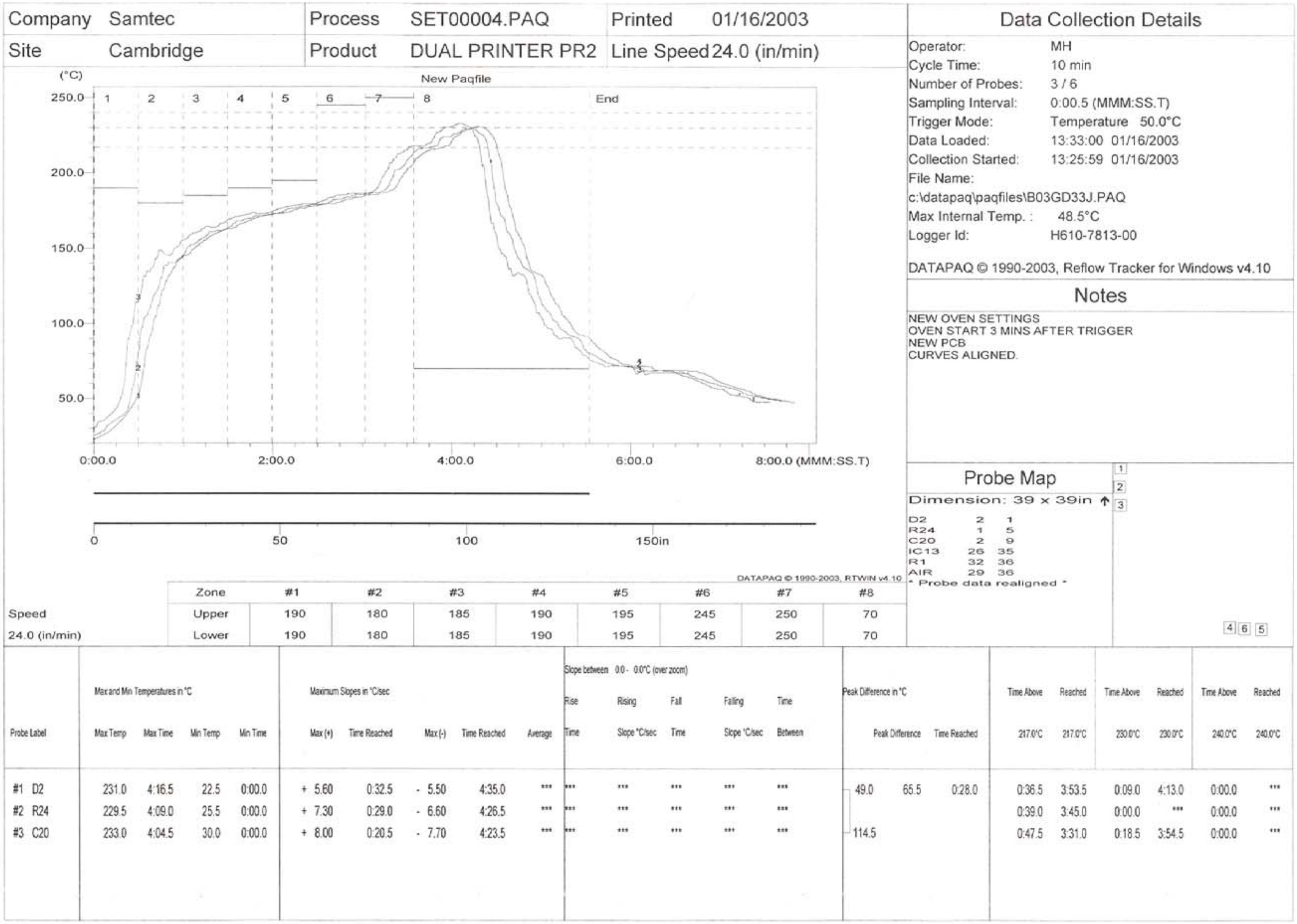
D2	2	1
R24	1	5
C20	2	9
IC13	26	35
R1	32	36
AIR	29	36

* Probe data realigned *

	Max and Min Temperatures in °C				Maximum Slopes in °C/sec					Slope between 0.0 - 0.0°C (over zoom)					Peak Difference in °C								
Probe Label	Max Temp	Max Time	Min Temp	Min Time	Max (+)	Time Reached	Max (-)	Time Reached	Average	Rise Time	Rising Slope °C/sec	Fall Time	Falling Slope °C/sec	Time Between		Peak Difference	Time Reached	Time Above 217.0°C	Reached 217.0°C	Time Above 230.0°C	Reached 230.0°C	Time Above 250.0°C	Reached 250.0°C
#1 D2	257.0	3:55.0	23.0	0:00.0	+ 6.20	0:32.5	- 6.50	4:17.5	***	***	***	***	***	***	58.0	81.5	0:31.5	0:56.0	3:14.0	0:47.0	3:21.0	0:20.5	3:43.0
#2 R24	256.5	3:47.5	22.5	6:58.0	+ 6.00	0:25.5	- 6.90	4:02.0	***	***	***	***	***	***				0:57.5	3:05.5	0:45.5	3:16.0	0:19.5	3:37.5
#3 C20	260.5	3:41.5	33.5	0:00.0	+ 9.50	0:19.5	- 9.70	3:55.5	***	***	***	***	***	***	139.5			0:59.0	2:56.5	0:51.0	3:04.0	0:26.0	3:26.5

Tracking Code: TC0310-Lead Free-0125	Part #: HLE-150-02-S-DV
Part description: HLE	

OVEN THERMAL PROFILE, SUPPLEMENTAL TEST:
Solder Heat Resistance (Visual) at 230 °C



Company	Samtec	Process	SET00004.PAQ
Site	Cambridge	Product	DUAL PRINTER PR2
Printed	01/16/2003	Line Speed	24.0 (in/min)

Data Collection Details

Operator:	MH
Cycle Time:	10 min
Number of Probes:	3 / 6
Sampling Interval:	0:00.5 (MMM:SS.T)
Trigger Mode:	Temperature 50.0°C
Data Loaded:	13:33:00 01/16/2003
Collection Started:	13:25:59 01/16/2003
File Name:	c:\datapaq\paqfiles\B03GD33J.PAQ
Max Internal Temp. :	48.5°C
Logger Id:	H610-7813-00

DATAPAQ © 1990-2003, Reflow Tracker for Windows v4.10

Notes

NEW OVEN SETTINGS
OVEN START 3 MINS AFTER TRIGGER
NEW PCB
CURVES ALIGNED.

Probe Map

Dimension: 39 x 39in ↑

D2	2	1
R24	1	5
C20	2	9
IC13	26	35
R1	32	36
AIR	29	36

* Probe data realigned *

1 2 3

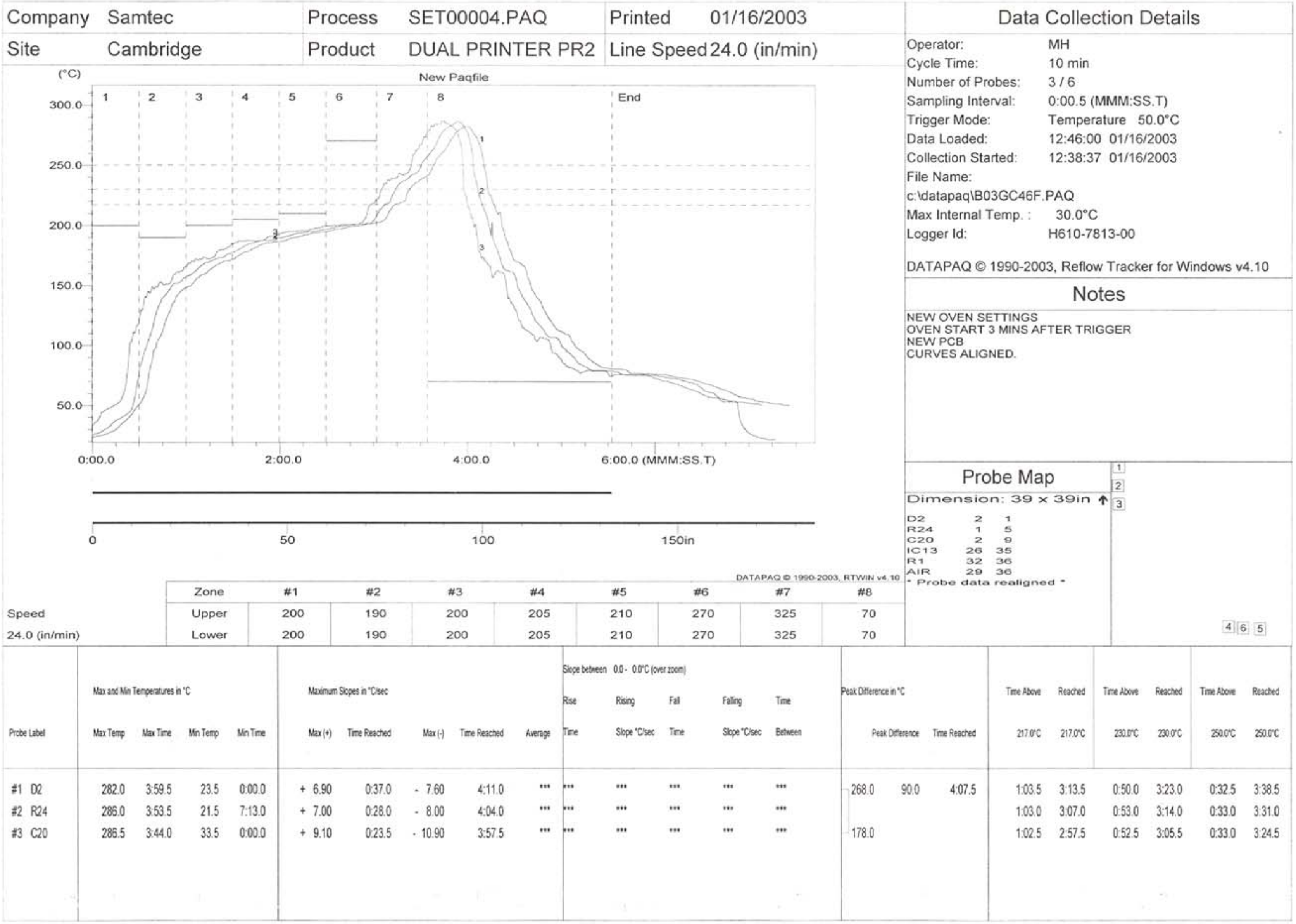
4 6 5

Speed 24.0 (in/min)	Zone	#1	#2	#3	#4	#5	#6	#7	#8
	Upper	190	180	185	190	195	245	250	70
	Lower	190	180	185	190	195	245	250	70

	Max and Min Temperatures in °C				Maximum Slopes in °C/sec					Slope between 0.0 - 0.0°C (over zoom)					Peak Difference in °C								
Probe Label	Max Temp	Max Time	Min Temp	Min Time	Max (+)	Time Reached	Max (-)	Time Reached	Average	Rise Time	Rising Slope °C/sec	Fall Time	Falling Slope °C/sec	Time Between		Peak Difference	Time Reached	Time Above 217.0°C	Reached 217.0°C	Time Above 230.0°C	Reached 230.0°C	Time Above 240.0°C	Reached 240.0°C
#1 D2	231.0	4:16.5	22.5	0:00.0	+ 5.60	0:32.5	- 5.50	4:35.0	***	***	***	***	***	***	49.0	65.5	0:28.0	0:36.5	3:53.5	0:09.0	4:13.0	0:00.0	***
#2 R24	229.5	4:09.0	25.5	0:00.0	+ 7.30	0:29.0	- 6.60	4:26.5	***	***	***	***	***	***				0:39.0	3:45.0	0:00.0	***	0:00.0	***
#3 C20	233.0	4:04.5	30.0	0:00.0	+ 8.00	0:20.5	- 7.70	4:23.5	***	***	***	***	***	***	114.5			0:47.5	3:31.0	0:18.5	3:54.5	0:00.0	***

Tracking Code: TC0310-Lead Free-0125	Part #: HLE-150-02-S-DV
Part description: HLE	

OVEN THERMAL PROFILE, SUPPLEMENTAL TEST Continued: Solder Heat Resistance (Visual) at 280 °C



Company	Samtec	Process	SET00004.PAQ	Printed	01/16/2003
Site	Cambridge	Product	DUAL PRINTER PR2	Line Speed	24.0 (in/min)

Data Collection Details

Operator:	MH
Cycle Time:	10 min
Number of Probes:	3 / 6
Sampling Interval:	0:00.5 (MMM:SS.T)
Trigger Mode:	Temperature 50.0°C
Data Loaded:	12:46:00 01/16/2003
Collection Started:	12:38:37 01/16/2003
File Name:	c:\datapaq\B03GC46F.PAQ
Max Internal Temp. :	30.0°C
Logger Id:	H610-7813-00

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Notes

NEW OVEN SETTINGS
OVEN START 3 MINS AFTER TRIGGER
NEW PCB
CURVES ALIGNED.

Probe Map

Dimension: 39 x 39in ↑

D2	2	1
R24	1	5
C20	2	9
IC13	26	35
R1	32	36
AIR	29	36

* Probe data realigned *

Speed	Zone	#1	#2	#3	#4	#5	#6	#7	#8
	Upper	200	190	200	205	210	270	325	70
24.0 (in/min)	Lower	200	190	200	205	210	270	325	70

	Max and Min Temperatures in °C				Maximum Slopes in °C/sec					Slope between 0.0 - 0.0°C (over zoom)					Peak Difference in °C								
Probe Label	Max Temp	Max Time	Min Temp	Min Time	Max (+)	Time Reached	Max (-)	Time Reached	Average	Rise Time	Rising Slope °C/sec	Fall Time	Falling Slope °C/sec	Time Between		Peak Difference	Time Reached	Time Above 217.0°C	Reached 217.0°C	Time Above 230.0°C	Reached 230.0°C	Time Above 250.0°C	Reached 250.0°C
#1 D2	282.0	3:59.5	23.5	0:00.0	+ 6.90	0:37.0	- 7.60	4:11.0	***	***	***	***	***	***	268.0	90.0	4:07.5	1:03.5	3:13.5	0:50.0	3:23.0	0:32.5	3:38.5
#2 R24	286.0	3:53.5	21.5	7:13.0	+ 7.00	0:28.0	- 8.00	4:04.0	***	***	***	***	***	***				1:03.0	3:07.0	0:53.0	3:14.0	0:33.0	3:31.0
#3 C20	286.5	3:44.0	33.5	0:00.0	+ 9.10	0:23.5	- 10.90	3:57.5	***	***	***	***	***	***	178.0			1:02.5	2:57.5	0:52.5	3:05.5	0:33.0	3:24.5

Tracking Code: TC0310-Lead Free-0125	Part #: HLE-150-02-S-DV
Part description: HLE	

ATTRIBUTE DEFINITION

SOLDER HEAT RESISTANCE (Visual):

1) Blistering
   a) Pass/Fail
2) Distortion
   a) Bowed or Twisted
3) Discoloration
   a) Pass/Fail

RESULTS

Solder Heat Resistance, 260 °C Thermal Stressing

- **Blistering**
  - **One Thermal Stress--------------------------------Pass**
  - **Two Thermal Stresses-----------------------------Pass**
  - **Three Thermal Stresses---------------------------Pass**
- **Distortion**
  - **One Thermal Stress--------------------------------Pass**
  - **Two Thermal Stresses-----------------------------Pass**
  - **Three Thermal Stresses---------------------------Pass**
- **Discoloration**
  - **One Thermal Stress--------------------------------Pass**
  - **Two Thermal Stresses-----------------------------Pass**
  - **Three Thermal Stresses---------------------------Pass**

Supplemental Tests

Solder Heat Resistance, 230°C Thermal Stressing

- **Blistering**
  - **One Thermal Stress--------------------------------Pass**
- **Distortion**
  - **One Thermal Stress--------------------------------Pass**
- **Discoloration**
  - **One Thermal Stress--------------------------------Pass**

Solder Heat Resistance, 280 °C Thermal Stressing

- **Blistering**
  - **One Thermal Stress--------------------------------Pass**
- **Distortion**
  - **One Thermal Stress--------------------------------Pass**
- **Discoloration**
  - **One Thermal Stress--------------------------------Pass**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: THL-01
Description: Temperature/Humidity Chart Recorder
Manufacturer: Dickson
Model: THDX
Serial #: 9316255
Accuracy: Temp: +/- 1C; Humidity: +/-2% RH (0 - 60%) +/- 3% RH (61 - 95%).
… Last Cal: 7/15/02, Next Cal: 7/15/03

Equipment #: OV-5
Description: Nitrongen Purge IR Reflow
Manufacturer: Vitronics Soltec
Model: XPM-730
Serial #: XN 70328
Accuracy: + / - 5° C