

**dBi Corporation**

**CE Mark Report  
Dallas Semiconductor DS1921  
Thermochron iButton  
Report Number 99dBi016**

**dB**i Corporation  
131 French Ave.  
Winchester, KY., USA

July 31, 1999

Dallas Semiconductor, Inc.  
4401 S. Beltwood Parkway  
Dallas, Texas, 75244-3292, USA

Gentlemen:

Please find attached the report containing the results of the testing performed by dB*i* Corporation on the Dallas Semiconductor, Inc. DS1921 Thermochron iButton.

The Dallas Semiconductor iButton was evaluated according to EN 55024 (1997) and EN 55022 (Class B) (1997) in order to determine its compliance with European Union (EU) requirements so that the CE Mark may be attached. As evidenced by the test data in the attached report, the Dallas Semiconductor DS1921 Thermochron iButton meets the provisions of EN 55024 (1997) and EN 55022 (Class B) (1997) and therefore may legally display the CE Mark as a Class B approved device.

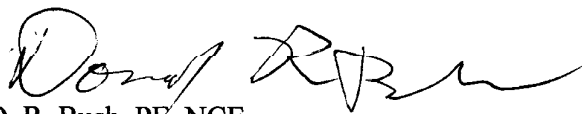
Because the subject iButton does not have a power cord, its effect on conducted interference was determined by measuring the conducted interference of the host PC with the iButton plugged into the PC.

In the report you will find:

- Administrative information
- Conformance Letter.
- Suppression components, clock frequencies and shielded cable information
- IEC 1000-4-2, 1000-4-3 and 1000-4-4 test results. (EN 55024) (1997)
- Radiated Interference test results (EN 55022) (Class B) (1997)
- Conducted Interference test results (EN 55022) (Class B) (1997)
- Test and measuring equipment used and pictures of the test setups

If you should find that additional information or explanation is required, please do not hesitate to contact me.

Sincerely,



D. R. Bush, PE, NCE  
**President dB*i* Corporation**

<b>ADMINISTRATIVE INFORMATION</b>
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**Historical record:**

Because dB i Corporation is a testing entity and not a manufacturer, this original test report of the subject product is being transmitted to the Manufacturer (Dallas Semiconductor, Inc). However, dB i Corporation will keep a copy of this report for historical record only.

**DOC records:**

Please be informed that for all products bearing a European Union Declaration of Conformity (CE Mark), the declaration and all supporting data must be kept available to the enforcement authorities, for inspection purposes, for a period of ten years after the last product has been manufactured.

**Measurement uncertainties:**

The Lexmark Electromagnetic Compatibility Laboratory (EMC Lab.) has a documented calculation of the measurement uncertainties associated with the tests performed at the Lexmark site.

**Ongoing compliance:**

The manufacturer has full responsibility to insure that the subject product continues to maintain compliance with the EU requirements during the manufacturing life of the product, and should check all changes to the product that may cause the interference profile to change.

**ADMINISTRATIVE DATA**

**Manufacturer:**

Dallas Semiconductor, Inc.  
4401 S. Beltwood Parkway  
Dallas, Texas, 75244-3292, USA

**Product:** Dallas Semiconductor DS1921 Thermochron iButton

**Rating:** Power supplied by PC

**Measurement Equipment used:** see-attached sheet

**Measurements According to:** EN 55024 (1997) and EN 55022 (Class B) (1997)

**Report Prepared by:** D. R. Bush

**Testing; Who, When, Where:**

Testing performed by:

dBi Corporation  
131 French Ave.  
Winchester, KY. 40391, USA

Date:

July 25, 26 and 27, 1999

Testing performed at:

EN 55024 and EN 55022

Lexmark International, Inc.  
Development Lab.  
Lexington, KY. 40550  
USA

**Suppression Components:** See attached sheet

**dB i Corporation**

July 31, 1999

To whom it may concern:

We, **Dallas Semiconductor, Inc.**, declare under our sole responsibility that the **Dallas Semiconductor, Inc. DS1921 Thermochron iButton**, to which this declaration relates, is in conformity with the protection requirements of the Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic Compatibility.

This EC Declaration of Conformity is based on compliance of the product with the following harmonized standards:

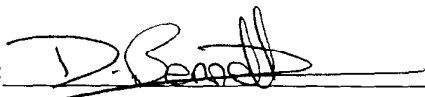
**EN 55024** (1997)

**EN 55022** (Class B) (1997)

The performance of the tests to verify the conformity of this product to these standards was supervised and/or performed by:

**dB i Corporation**  
131 French Avenue  
Winchester, Kentucky 40391, USA

The product utilized for this evaluation is representative of those that will be manufactured for sale by **Dallas Semiconductor, Inc.**

Signed: 

Dallas Semiconductor, Inc.  
4401 S. Beltwood Parkway  
Dallas, Texas, 75244-3292, USA

<b>INFORMATION RELATING TO PRODUCT RF INTERFERENCE</b>
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**Appliance/Product:**

Dallas Semiconductor DS 1921 Thermochron iButton

**Suppression Components:**

None

**Clock Frequencies:**

32.768 kHz Osc.

**Cables:**

Printer, parallel, 9 ft. shielded  
Mouse, 10 ft. shielded  
Keyboard, 8 ft. shielded  
Display, 6 ft. shielded  
Serial, 1.0 meter, shielded

The keyboard cable has a toroid at the PC end.

The display cable has a toroid at both ends for a total of two.

**Electronic Circuit Boards:**

**Size of Product:**

17.35 mm dia. by 5.89 mm high

## IEC 1000-4-2

## Voltage Test Levels

## Comments

		Voltage Test Levels												Comments
		2		3		4		6		8		X		
		+	-	+	-	+	-	+	-	+	-	+	-	
Horizontal Coupling Plane	Front					B	B							Drops out of overdrive, but data is o.k.
	Back					B	B							
	Right					B	B							
	Left					B	B							

<b>Vertical Coupling Plane</b>	Front					B	B							Stops during test , but recovers.
	Back					B	B							
	Right					B	B							
	Left					B	B							

Direct Discharge	kV			+ -		+ -		+ -		
		2	3	4	6	8	X			
1) Button ground				B B						
2) Button center				B B						
3)										
4)										
5)										
6)										
7)										
8)										
9)										
10)										

		Voltage Test Levels												Comments
		2		3		4		8		15		30		
Air Discharge	kV					+	-	+	-	+	-	+	-	
1)														Not applicable.
2)														
3)														
4)														
5)														
6)														
7)														
8)														
9)														
10)														

## CODES

A-Normal performance within the specification limits.

B-Temporary degradation or loss of function or performance which is self-recoverable.

C-Temporary degradation or loss of function or performance, which requires operator intervention or system, reset.

Machine: Dallas Semiconductor 1921 DS1921 Thermochron iButton.

Mode: Reading and recording with 9092 and 9097.

Operator: D. R. Bush, John Compton Date: July 26, 1999

S/N: E000000000F2E21

## IEC 1000-4-3 DATA SHEET

**Front Side:**

Frequency (MHz)	Pol	Level (V/m)	Pass	Fail	Notes
27-200	V	3.0	A		
27-200	H	3.0	A		
200-1000	C	4.2	A		

**Back Side:**

Frequency (MHz)	Pol	Level (V/m)	Pass	Fail	Notes
27-200	V	3.0	A		
27-200	H	3.0	A		
200-1000	C	4.2	A		

**Left Side:**

Frequency (MHz)	Pol	Level (V/m)	Pass	Fail	Notes
27-200	V	3.0	A		
27-200	H	3.0	A		
200-1000	C	4.2	A		

**Right Side:**

Frequency (MHz)	Pol	Level (V/m)	Pass	Fail	Notes
27-200	V	3.0	A		
27-200	H	3.0	A		
200-1000	C	4.2	A		

**Product:** Dallas Semiconductor DS1921 Thermochron iButton**Mode of Operation:** Reading Button.**Operator:** D. R. Bush, John Compton **Date:** July 26, 1999 **Serial Number:** E000000000F2E21**Notes:** (27 to 200 MHz in 0.1 MHz steps, 200 to 1000 MHz in 0.2 MHz steps) and 1 kHz 80% am modulation unless otherwise indicated.

With HP Pavilion PC, HP Display, IBM Mouse HP 500C Printer. Dallas Semiconductor 9092 and 9097U.

**Codes**

A-Normal performance within the specification limits.

B-Temporary degradation or loss of function or performance which is self-recoverable.

C-Temporary degradation or loss of function or performance which requires oper. intervention or system reset.



## IEC 1000-4-4 DATA SHEET

## Input and Output AC Power Ports:

Application	Polarity	Voltage (kV)	Pass	Fail	Comments
Line-Gnd	+	2.0	A		O.K. no data errors. Data acquisition was o.k. during test.
Line-Gnd	-	2.0	A		
Neutral-Gnd	+	2.0	A		
Neutral-Gnd	-	2.0	A		
P.E.-Gnd	+	2.0	A		
P.E.-Gnd	-	2.0	A		

## Signal and Control Lines: (Level 2)

Application	Polarity	Voltage (kV)	Pass	Fail	Comments
					Not applicable, all cables are shorter than 3 meters.

**Product:** Dallas Semiconductor DS1921 Thermochron iButton with 9092 and 9097U.

**Mode of Operation:** Reading and recording data.

**Operator:** D. R. Bush, John Compton **Date:** July 26, 1999 **S/N:** E000000000F2E21

**Comments:**

**Codes:**

A-Normal performance within the specification limits.

B-Temporary degradation or loss of function or performance which is self-recoverable.

C-Temporary degradation or loss of function or performance which requires oper. intervention or system reset.

<b>RADIO INTERFERENCE FIELD STRENGTH 30 - 1000 MHz</b>
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**Appliance:** Dallas Semiconductor Thermochron iButton**Model/Type Number:** DS1921**Rating:** Power supplied by host PC.**CISPR 22 (Class B)**

<b>Meas Freq. MHz</b>	<b>Receiver Reading dB/uv</b>		<b>Correction Factors</b>	<b>Radiated Interference Field Strength dB/uv/m</b>		<b>Class B Limit</b>
	<b>Vert. Pol</b>	<b>Horz. Pol</b>		<b>Vert Pol</b>	<b>Horz Pol</b>	
32.02	11.40	-----	17.26	28.66	-----	30.00
33.99	10.40	-----	16.63	27.03	-----	30.00
35.97	13.50	-----	15.96	29.46	-----	30.00
74.24	15.40	-----	8.53	23.93	-----	30.00
114.51	14.50	-----	12.59	27.09	-----	30.00
173.28	-----	13.60	11.45	-----	25.05	30.00
198.05	-----	7.50	10.59	-----	18.09	30.00
222.81	-----	6.50	11.68	-----	18.18	30.00
257.70	-----	5.00	15.41	-----	20.41	37.00
433.31	4.00	-----	17.62	21.62	-----	37.00

**Note:** All measurements performed at Lexmark 10 meters open field test site located at Lexington, Kentucky.

**CONDUCTED INTERFERENCE 150 kHz - 30 MHz**

**Appliance:** Dallas Semiconductor Thermochron iButton

**Model/Type Number:** DS1921

**Rating:** Power supplied by host PC.

**CISPR 22 (Class B)**

<b>FREQ. (MHz)</b>	<b>WORST CASE, PHASE/NEUTRAL QP (dB/uv)</b>	<b>CLASS B LIMIT (dB/uv)</b>
0.190	37.77	54.85
0.314	35.67	51.32
0.545	29.80	46.00
0.625	26.01	46.00
0.949	15.73	46.00
1.812	17.92	46.00
12.004	39.27	50.00
16.004	44.10	50.00
20.004	36.83	50.00
28.003	32.25	50.00

**Note:** Both phase and neutral power lines were measured. Only the worst case interference is listed.

When the quasi-peak values of the interference are below the average limit, no average values are listed.

<b>TESTING AND MEASURING EQUIPMENT USED BY LEXMARK</b>
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**Conducted Interference: 0.15 - 30 MHz**

Hewlett Packard EMI Test Receiver RF Filter Section	85462A/85460A, S/N 3807A00448/3704A00386 (Cal date: 6/98, Cal due date: 6/00)
Rohde & Schwarz Artificial-Mains Network	ESH2-Z5, 150 kHz-30 MHz, S/N 890484012 (Cal date: 5/99, Cal due date: 5/00)
Rohde & Schwarz Artificial-Mains Network	ESH2-Z5, 150 kHz-30 MHz, S/N DF25128 (Cal date: 5/99, Cal due date: 5/00)

**Radiated Interference: 30...1,000 MHz**

Hewlett Packard EMI Test Receiver RF Filter Section	85462A/85460A, S/N 3549A00280/3448A00261 (Cal date: 6/99, Cal due date: 6/00)
Hewlett Packard EMI Test Receiver RF Filter Section	85462A/85460A, S/N 3807A00454/3704A00416 (Cal date: 6/99, Cal due date: 6/00)
Schaffner-Chase Model CBL6111C	Bi-Log Antenna 30 to 1000 MHz (Cal date: 5/99, Cal due date: 5/00)

**Calibration:** The measuring equipment used at Lexmark is calibrated according to the instruction manual once a day. Once a week the accuracy of the test system is checked. This includes the test equipment, associated cables, and antennas. This is accomplished with a calibrated radiating source for the radiated portion and a synthesized signal generator for the conducted measurements.

**Please note,** all of the above equipment and all associated accessories are verified by Lexmark International.

<b>TESTING AND MEASURING EQUIPMENT USED BY LEXMARK</b>
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**Calibration Status**

**IEC 801.2 Test Equipment (IEC 1000-4-2)**

Haefly PSD 25B ESD Tester  
S/N 082999-37

See note below.

**IEC 801.3 Test Equipment (ENV 50140)**

RF Semi-Anechoic Chamber  
Hewlett-Packard 8662A Synthesized  
Signal Generator  
IFI Model M5540 Wideband Power Amp.  
IFI EFS-5 Sensor  
  
IFI D301-5 Isotropic Probe, S/N 01004

See note below.

See note below.

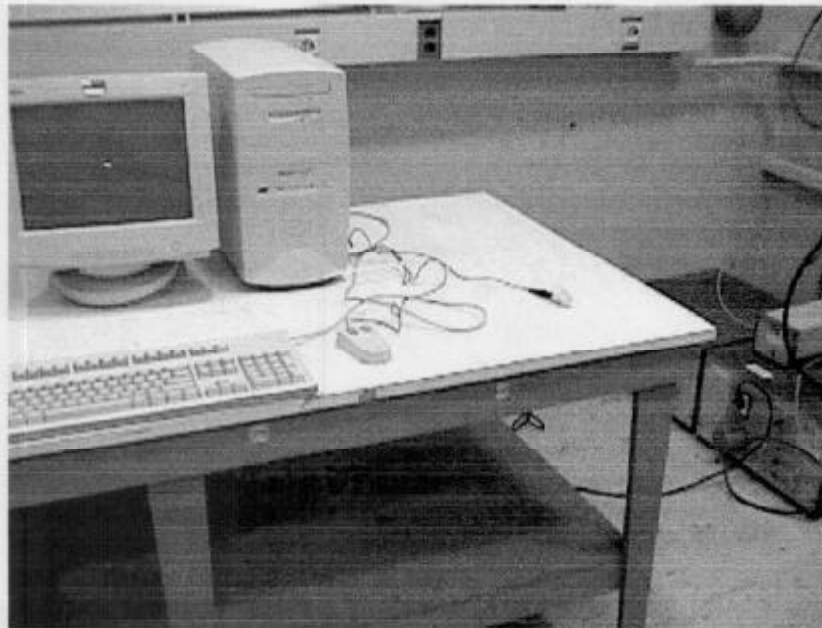
See note below.

**IEC 801.4 Test Equipment (IEC 1000-4-4)**

Velonex Model V-3300 Fast Transient  
Burst Generator, S/N 16442

See note below.

**Please note**, most of this equipment is calibrated in house by Lexmark at least once a year, otherwise it is sent to a calibration vendor. All associated accessories are verified by Lexmark International.



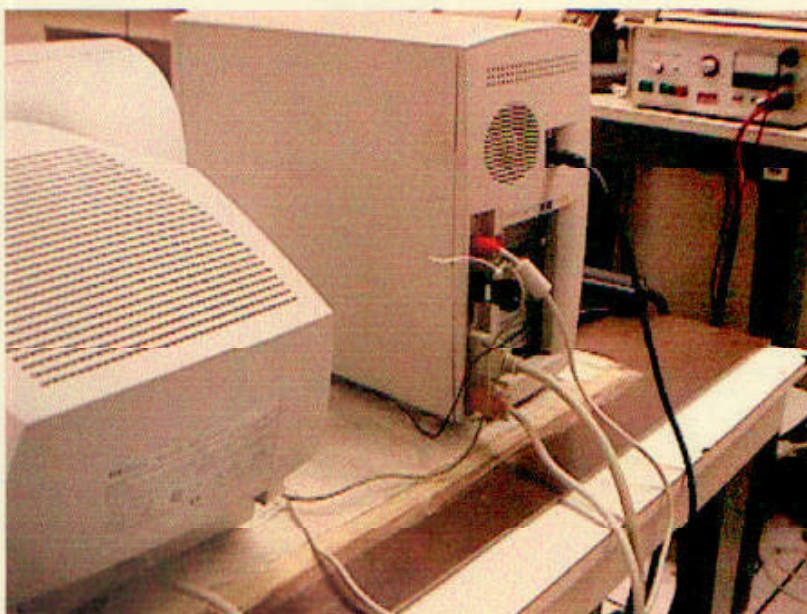
**CONDUCTED TEST CONFIGURATION  
DALLAS SEMICONDUCTOR DS1921 THERMOCHRON IBUTTON  
DEVELOPMENT LAB. SHIELDED ROOM  
LEXMARK INTERNATIONAL, LEXINGTON KY.**



**RADIATED TEST CONFIGURATION  
DALLAS SEMICONDUCTOR DS1921 THERMOCHRON IBUTTON  
LEXMARK OPEN FIELD TEST SITE  
LEXINGTON, KENTUCKY**



dBi Corporation



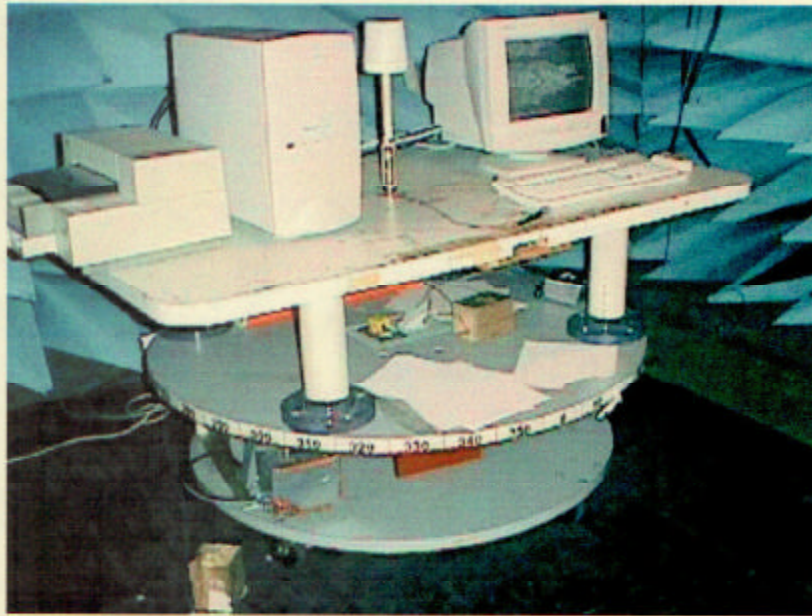
**IEC 1000-4-2 TEST SETUP  
DALLAS SEMICONDUCTOR DS1921 THERMOCHRON IBUTTON  
LEXMARK DEVELOPMENT LAB  
LEXINGTON, KENTUCKY**

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**IEC 1000-4-3 TEST SETUP  
DALLAS SEMICONDUCTOR DS1921 THERMOCHRON IBUTTON  
LEXMARK DEVELOPMENT LAB  
LEXINGTON, KENTUCKY**

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**IEC 1000-4-4 TEST SETUP  
DALLAS SEMICONDUCTOR DS1921 THERMOCHRON IBUTTON  
LEXMARK DEVELOPMENT LAB  
LEXINGTON, KENTUCKY**