



Taiwan

**TEST REPORT
IEC 60825-1**

Safety of laser products

Part 1: Equipment classification, requirements and user's guide

Section two: Manufacturing requirements

Report reference No. : 61100801101

Tested by (printed name and signature) : Brian Shen

Approved by (printed name and signature) : Jay Chen

Date of issue : 2009-01-16

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator

Testing Laboratory name : TÜV SÜD Asia Ltd. Taiwan Branch

Address : 7F., No. 37, Sec. 2, Zhongyang S., Rd., Beitou District, Taipei City, 11270, Taiwan

Testing location : CBTL SMT TMP

Applicant's name : GlacialTech Inc.

Address : 9Fl., No.352, Sec. 2, Jung Shan Rd., Jung He City, Taipei, Taiwan, 235, R.O.C.

Test specification

Standard : IEC 60825-1:1993 + A1:1997 + A2:2001
EN 60825-1:1994 + A2:2001 + A1:2002

Test procedure : N/A

Non-standard test method : N/A

Test Report Form

Test Report Form No. : IEC60825_1C / 01-04

TRF originator : Underwriters Laboratories Inc., modified by TÜV PS to IEC/EN TRF

Master TRF : Dated 2001-04

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Test item description : LED Bulb

Trademark :

Model and/or type reference : GL-BR40-18, GL-BR40-15, GL-BR40-9, GL-BR30-9, GL-BR30-6

Rating(s) : 100-240 Vac, 50/60 Hz
MAX 25.2 W (for GL-BR40-18, GL-BR40-15, GL-BR40-9)
MAX 12.6 W (for GL-BR30-9, GL-BR30-6)

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Report Reference No.: 61100801101
GL-BR40 & GL-BR30 series_LED TR.DOC
2009-01-16
Project Manager: Jay Chen
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Test item particulars

Equipment mobility : **movable** / stationary / fixed / permanent connection / for building-in
Protection Class of equipment..... : Class I / **Class II** / Class III
Mass of equipment (kg) : 0.45

Classification of laser product

Laser and/or LED product class of the equipment : 2
Laser and/or LED class of the radiation employed : 2
Maximum class of the embedded laser/LED (if an embedded laser/LED is employed) : 2

Test case verdicts

Test case does not apply to the test object .. : N/A
Test item does meet the requirement : P(ass)
Test item does not meet the requirement : F(ail)

Testing

Date of receipt of test item : 2008-12-19
Date(s) of performance of test : 2009-01-16

General remarks:

This test report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IEC60950-1.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item(s) tested.

"(see remark #)" refers to a remark appended to the report.

"(see Annex #)" refers to an annex appended to the report.

Throughout this report a point is used as the decimal separator.

List of test equipment must be kept on file and available for review.

This report contains a total of 19 pages, including Enclosure 1 which consists of views of item tested.
(9 pages of photos)

General product information:

- 1. Class II LED self-ballast lamp.
- 2. All models are identical in design and construction except the color and number of LEDs.

Copy of the Marking Plate and Warning Labels:

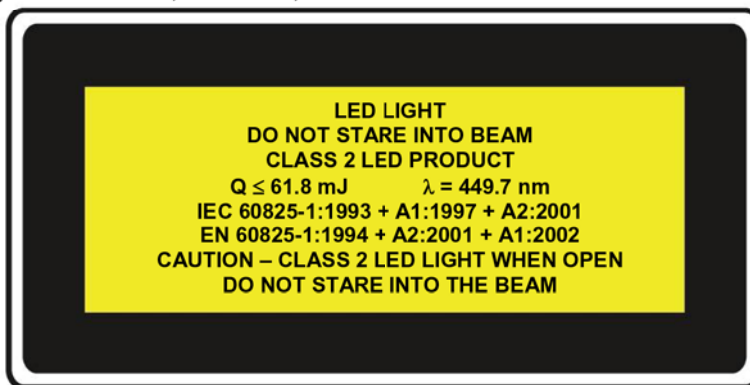
Example 1:

for LED self-ballast lamp with white LED (type no. EDEW-1LA5 LED)

GlacialTech Inc.

Model no.: GL-BR40-18

Rating: 100-240 Vdc, 50/60 Hz, MAX 25.2 W



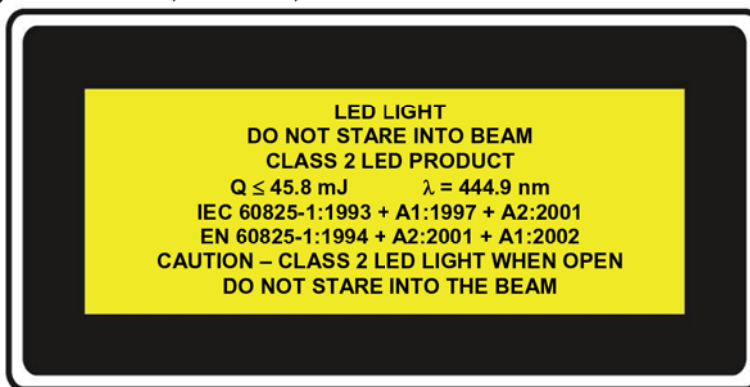
Example 2:

for LED self-ballast lamp with warm white LED (type no. EDEX-1LA5-E1)

GlacialTech Inc.

Model no.: GL-BR40-18

Rating: 100-240 Vdc, 50/60 Hz, MAX 25.2 W



Summary of testing:

1. Tested on model GL-BR40-18 to represent all models.
2. The items tested are found to be in conformity with the requirements of Class 2 LED Product of the specified standards.



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Cl.	Requirement – Test	Result	Verdict
4	ENGINEERING SPECIFICATIONS		—
4.1	General remarks		—
4.1.1	Modification		P
4.2	Protective housing		—
4.2.1	General		P
4.2.2	Service		P
4.2.3	Removable laser system		N/A
4.3	Access panels and safety interlocks		—
4.3.1	Access panels of protective housing		N/A
	Product Class.....:		—
	Accessible emission during removal of access panel.....:		N/A
	The access panel intended to be removed during maintenance or operation		N/A
	The removal of the panel gives access to laser radiation levels designated by “X” in the table		N/A
	Accessible emissions after removal.....:		—
4.3.2	Deliberate override mechanism		N/A
4.4	Remote interlock connector	CLASS 2 LED PRODUCT	N/A
4.5	Key control	CLASS 2 LED PRODUCT	N/A
4.6	Laser radiation emission warning		—
4.6.1	Audible or visible warning	CLASS 2 LED PRODUCT	N/A
4.6.2	Operational control and laser aperture		N/A
4.6.3	Laser emission distributed through more than one output		N/A
4.7	Beam stop or attenuation	CLASS 2 LED PRODUCT	N/A
4.8	Controls		N/A
4.9	Viewing optics		N/A
	a) human access to laser radiation in excess of Class 1M prevented when the shutter is opened or attenuation varied		N/A
	b) opening of the shutter or variation of the attenuation prevented when exposure to laser radiation in excess of Class 1M is possible		N/A
4.10	Scanning safeguard		N/A
4.11	Alignment aids		N/A
4.12	Walk-in access		—

Cl.	Requirement – Test	Result	Verdict
	a). Means provided so that any person inside the housing can prevent activation of a Class 3B or 4 laser hazard		N/A
	b). A warning device provides adequate warning of emission to any person within the housing		N/A
4.13	Environmental conditions		—
	- climatic conditions		N/A
	- vibration and shock		N/A
4.14	Protection against other hazards		—
4.14.1	Non-optical hazards		N/A
	- electrical hazards;		N/A
	- excessive temperature;		N/A
	- spread of fire from the equipment;		N/A
	- sound and ultrasonic;		N/A
	- harmful substances;		N/A
	- explosion;		N/A
4.14.2	Collateral radiation		N/A
5	LABELLING		—
5.1	General		P
	LASER PRODUCT CLASS: CLASS 2 LED PRODUCT		P
5.2	Class 1 explanatory label provided on the product		N/A
	Optional: Class 1 explanatory label provided in the user manual		N/A
	Class 1M explanatory label provided on the product		N/A
	Optional: Class 1M explanatory label provided in the user manual		N/A
5.3	Class 2 explanatory and warning label		P
	Class 2M explanatory and warning label		N/A
5.4	Class 3R explanatory and warning label		N/A
5.5	Class 3B explanatory and warning label		N/A
5.6	Class 4 explanatory and warning label		N/A
5.7	Aperture label: :		N/A
5.8	Radiation output and standards information		—
	Maximum output of laser radiation: :	See Appendix 1	—
	Pulse duration: :	N/A	—
	Emitted wavelength(s): :	See Appendix 1	P

Cl.	Requirement – Test	Result	Verdict
	The name and publication date of the standard :	IEC 60825-1:1993 + A1:1997 + A2:2001 EN 60825-1:1994 + A2:2001 + A1:2002	P
5.9	Labels for access panels		—
	RADIATION CLASS	Class 2 LED Product	N/A
5.9.1	Labels for panels		—
	Warning used	CAUTION – CLASS 2 LED LIGHT WHEN OPEN DO NOT STARE INTO THE BEAM	—
5.9.2	Labels for safety interlocked panels		—
	Warning used		—
5.10	Warning for invisible laser radiation		N/A
5.11	Warning for visible laser radiation	see “Copy of marking plate”	P
5.12	Warning for LED radiation	LED LIGHT	P
6	OTHER INFORMATIONAL REQUIREMENTS		—
6.1	Information for the user		N/A
	a) adequate instructions for proper assembly, maintenance and safe use		N/A
	b) warning for Class 1M and 2M		N/A
	c) laser beam parameters		N/A
	d) reproduction of labels		N/A
	e) location of laser apertures		N/A
	f) listing of controls, adjustment of procedures and warning statement		N/A
	g) information about laser energy source if not incorporated in the manual		N/A
6.2	Purchasing and service information		N/A
	a). Safety classification of each laser product stated in descriptive material		N/A
	b). Adequate instructions for servicing available		N/A
7	ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS		—
7.1	Medical laser products		N/A
	Class 3B and Class 4 medical laser products comply with IEC 60601-2-22		N/A
	Medical laser products provided with instructions for calibration of measurement system		N/A

Cl.	Requirement – Test	Result	Verdict
7.2	Applicable other parts of the standard series IEC 60825		N/A
	IEC 60825-2 (OFCSs)		N/A
	IEC 60825-4 (guards)		N/A
	IEC/TR 60825-3 (laser shows)		N/A
	IEC/TR 60825-5 (manf.'s checklist)		N/A
	IEC/TS 60825-6 (visible info transmission)		N/A
	IEC/TS 60825-7 (non-visible info transmission)		N/A
	IEC 60825-8 (medical equipment)		N/A
	IEC/TR 60825-9 (incoherent MPEs)		N/A
8	CLASSIFICATION		—
8.2	Description of laser classes		P
8.3	Classification responsibilities		P
8.4	Classification rules		P
8.4a	Radiation of a single wavelength		P
8.4b	Radiation of multiple wavelengths		N/A
	1). Laser product emission two or more wavelengths in spectral regions shown as additive in Table 5		N/A
	2). Laser product emission two or more wavelengths in spectral regions not shown as additive in Table 5		N/A
8.4c	Radiation from extended sources		P
	Value of angular subtense α (mrad)	> 100	—
8.4d	Non-circular and multiple sources		N/A
8.4e	Time basis		P
	i) 0.25s		N/A
	ii) 100s		P
	iii) 30000s		N/A
8.4f	Repetitively pulsed or modulated lasers		N/A
	i) exposure from a single pulse not exceeding the AEL for a single pulse		N/A
	ii) average power for a pulse train		N/A
	iii) the average pulse energy from pulses within a pulse train not exceeding the AEL for a single pulse multiplied by the correction factor C_5		N/A
	AEL for continued operation used		N/A
	Total-on-time-pulse (TOTP) method used		N/A



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Cl.	Requirement – Test	Result	Verdict
9	MEASUREMENTS FOR CLASSIFICATION		—
9.1	Tests		P
9.2	Test conditions per Clause 9.2 applied		P
	Measured laser radiation.....:	See Appendix 1 for detail	—
9.3	Measurement geometry		P
	a) aperture diameter (mm).....:	7	P
	b) measurement distance (mm).....:	100	P
	c) angle of acceptance		P
	i) photochemical limits.....:	11mrad	P
	ii) all other limits.....:	100mrad	P

Supplementary information:		
EQUIPMENT MANUFACTURE INFORMATION (DATA SHEET) ABOUT THE COMPONENT CONTAINING LASER		—
Manufacturer	-	—
Type designation	-	—
Structure	-	—
Wavelength	-	—
Output power (min. and max.)	-	—
Radiation	-	—
Continuous	-	—
Pulsed	-	—
Pulse time	-	—
Pulse repetition frequency	-	—
Others	-	—
MEASUREMENT EQUIPMENT		—
Type of equipment.....	Fiber Optic Spectrometer	—
Manufacturer	Stellar Net Inc.	—
Type designation	EPP2000-UV-VIS	—
Others	Laser power & energy meter, Photo detector	—
LEDs		—
Manufacturer	Edison Opto Corporation	—
Type designation	EDEW-1LA5 (for white LED) EDEX-1LA5-E1 (for warm white LED)	—
Wavelength	Measured peak wavelength: 449.7 + 538.7 nm (for white LED) 444.1 + 565.0 nm (for warm white LED)	—
Others	MAX 4 V _f @ 350 mA	—

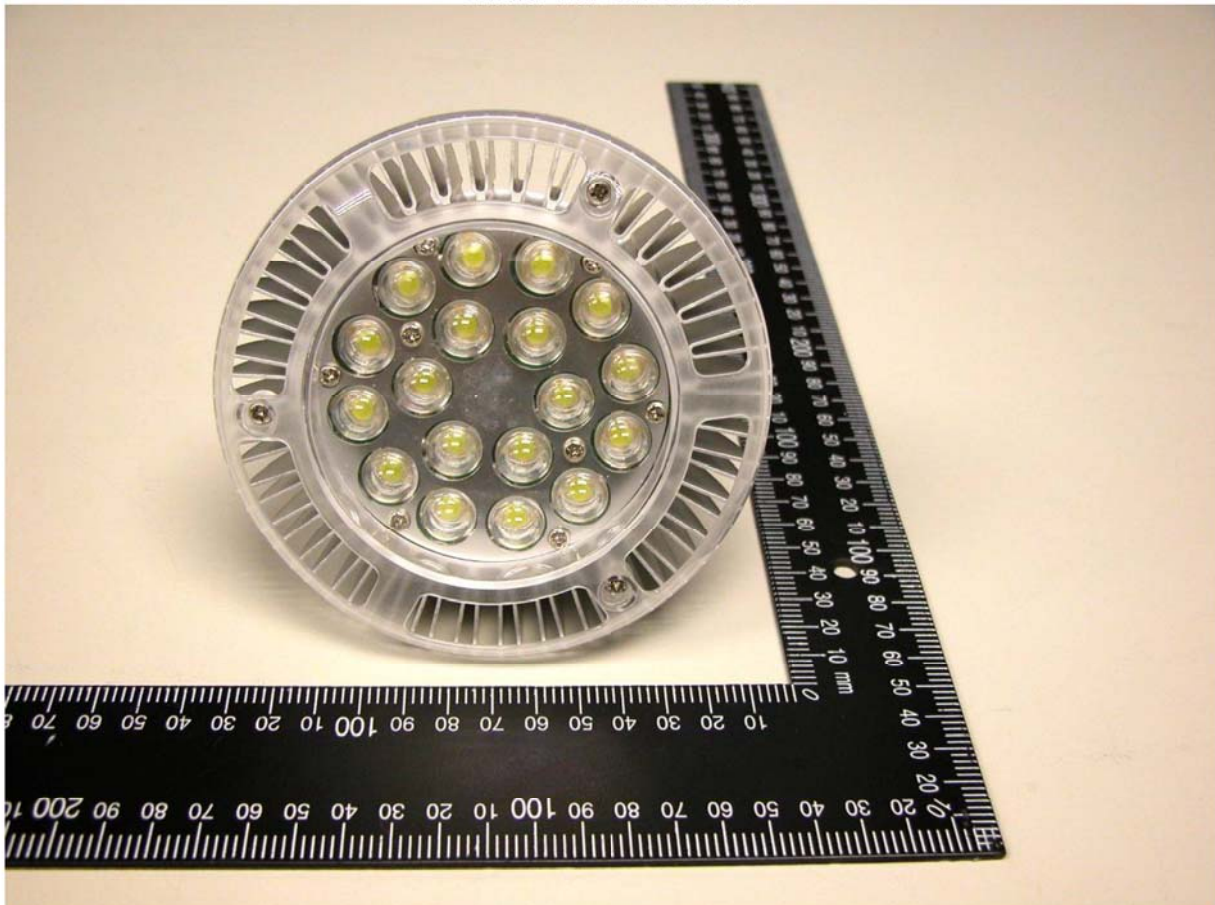
Appendix 1: Test Result

Model	Accessible Emission Level	Accessible Emission Limit	CLASS
For retinal thermal hazard			
GL-BR40-18 with white LED (type no. EDEW-1LA5)	61.8 mJ @ 449.7 nm	262.6 mJ	1
	42.6 mJ @ 538.7 nm	262.6 mJ	1
GL-BR40-18 with warm white LED (type no. EDEX-1LA5-E1)	45.8 mJ @ 444.1 nm	262.6 mJ	1
	24.6 mJ @ 565.0 nm	262.6 mJ	1
For retinal photochemical hazard			
GL-BR40-18 with white LED (type no. EDEW-1LA5)	61.8 mJ @ 449.7 nm	3.9 mJ	> 1
	42.6 mJ @ 538.7 nm	232.1 mJ	1
GL-BR40-18 with warm white LED (type no. EDEX-1LA5-E1)	45.8 mJ @ 444.9 nm	3.9 mJ	> 1
	24.6 mJ @ 565.0 nm	779.6 mJ	1
Notes:			
(1) All models are tested under normal operation and single fault conditions as below: <ul style="list-style-type: none"> a. Normal operation: The product is simulated normal using to emit intentional LED light power and energy that is not including maintenance procedure. All controls and adjustment are set to the default position by manufacturer and are combined to emit a maximum output of LED light power and energy. b. Single fault condition: The product is simulated a single failure of electrical components to emit a maximum LED light power and energy, which could cause the increase of LED output power and energy under normal operation condition. 			
(2) See below for determination of retinal thermal hazard as specified in Table 1 in IEC/EN 60825-1: Since $t \leq T_2 = 100s$, $\alpha > 100\text{mrad}$ Formula for class 1 AEL = $7 \times 10^{-4} \times t^{0.75} \times C_6 \text{ J} = 262.6 \text{ mJ}$ where $C_6 = 66.7$, since $\alpha \geq \alpha_{\text{max}}$			
(3) See below for determination of retinal photochemical hazard as specified in Table 1 in IEC/EN 60825-1: Formula: class 1 AEL = $3.9 \times 10^{-3} \times C_3 \text{ J}$ where $C_3 = 10^{0.02(\lambda-450)}$			
Conclusion: The "LED self-ballast lamp, models GL-BR40 Series and GL-BR30 Series" were classified as Class 2 LED Product .			

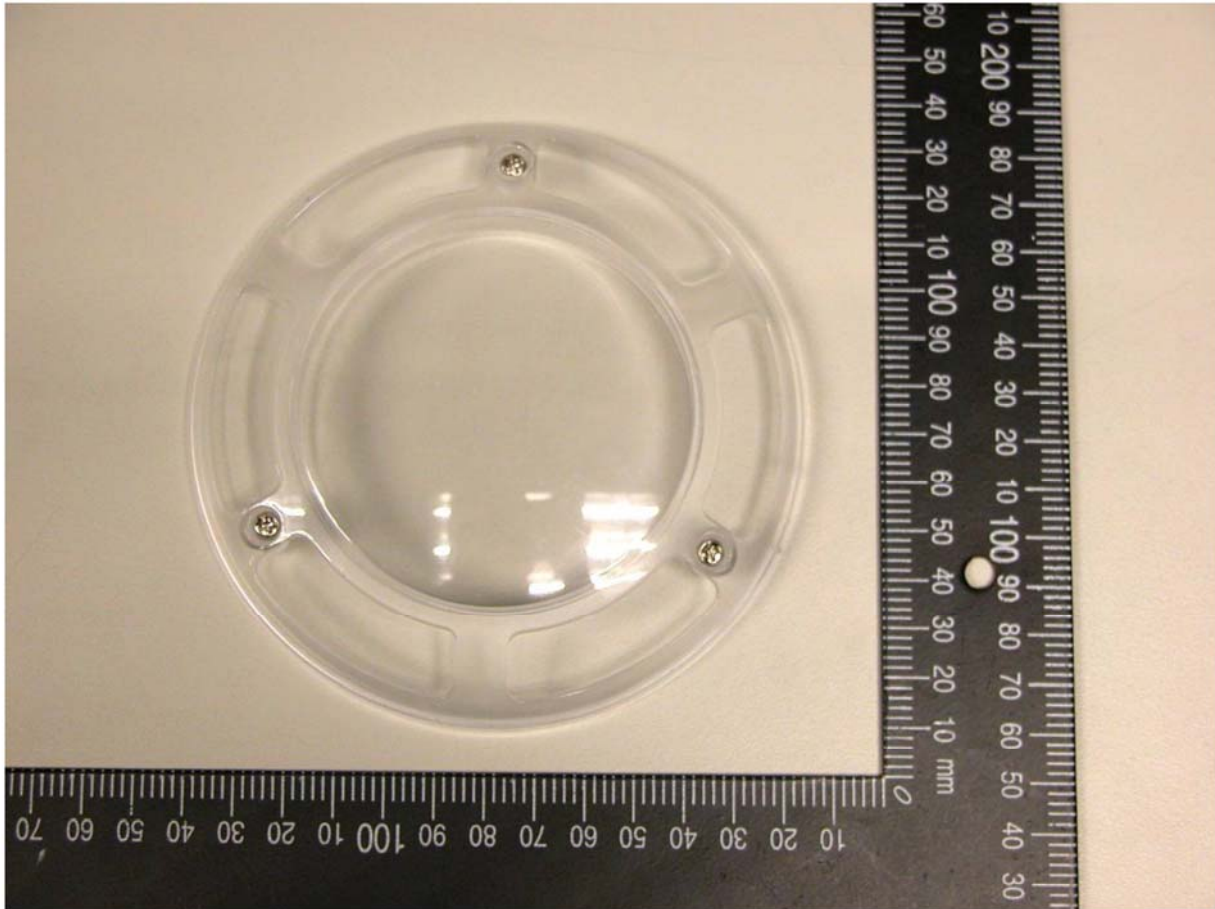
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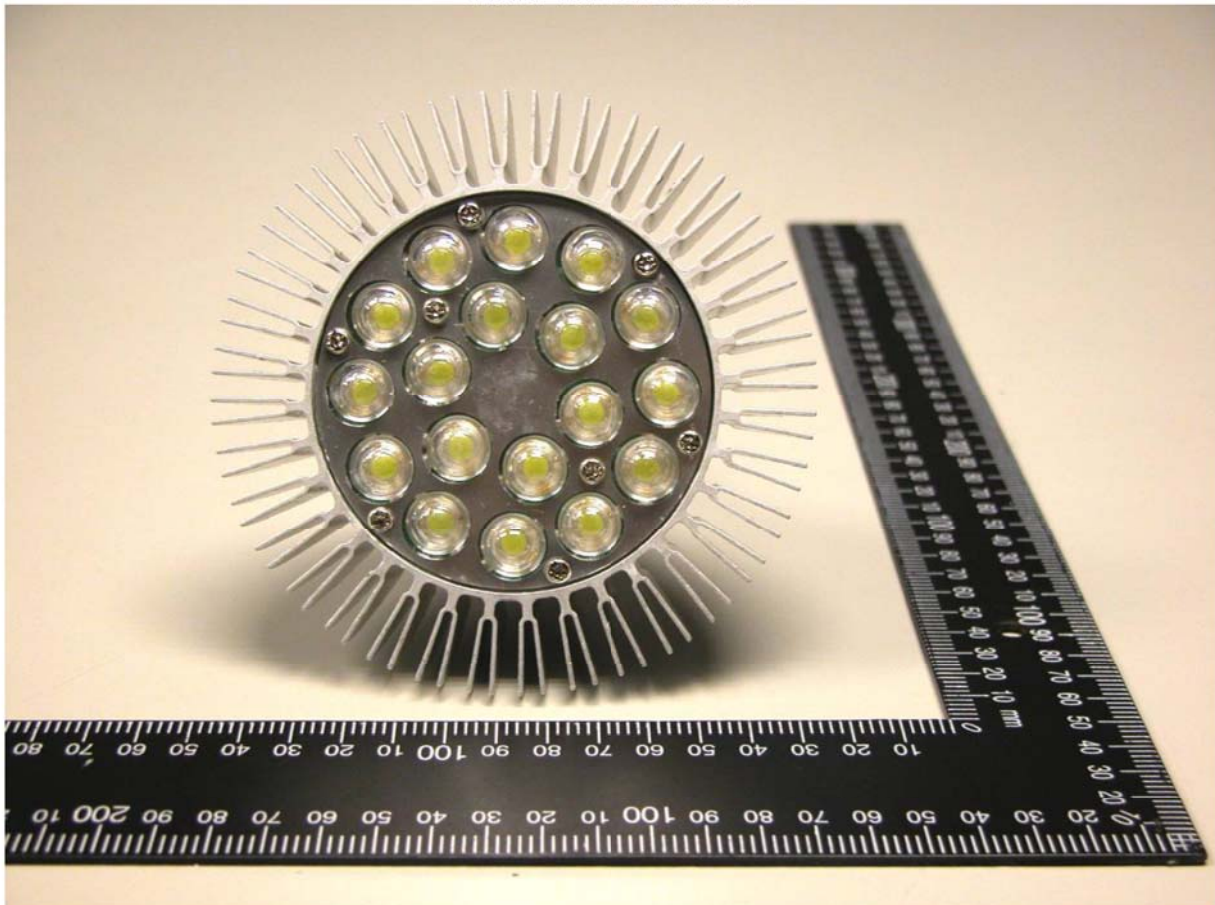
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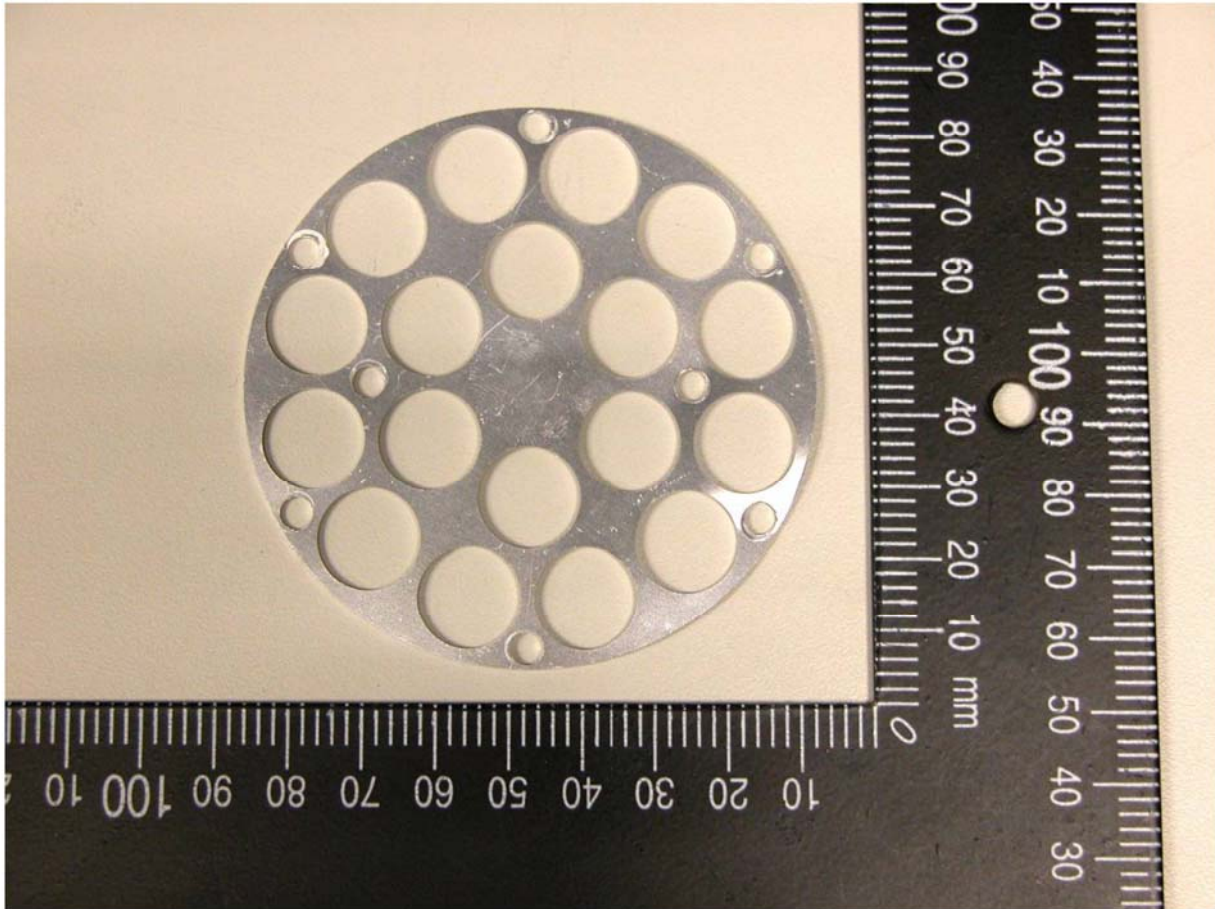
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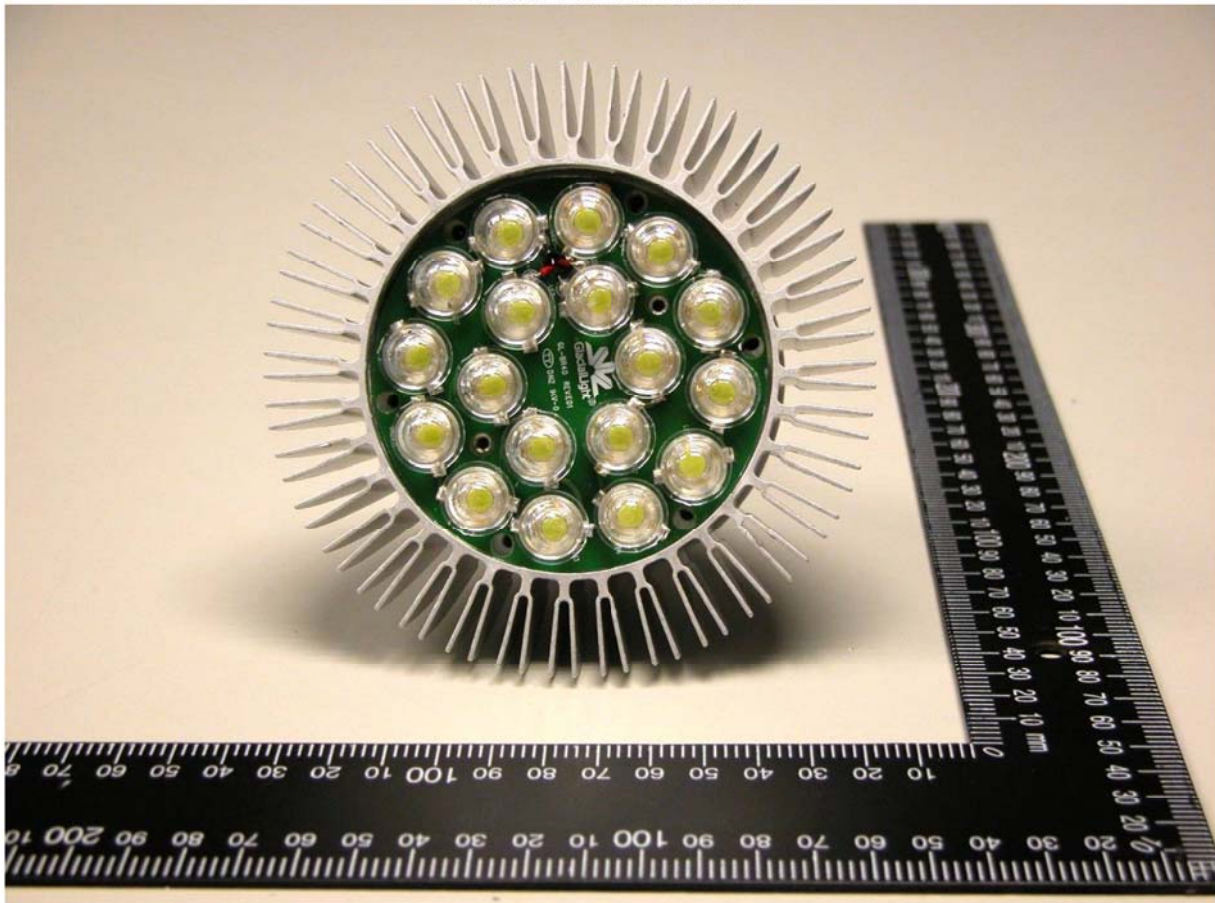
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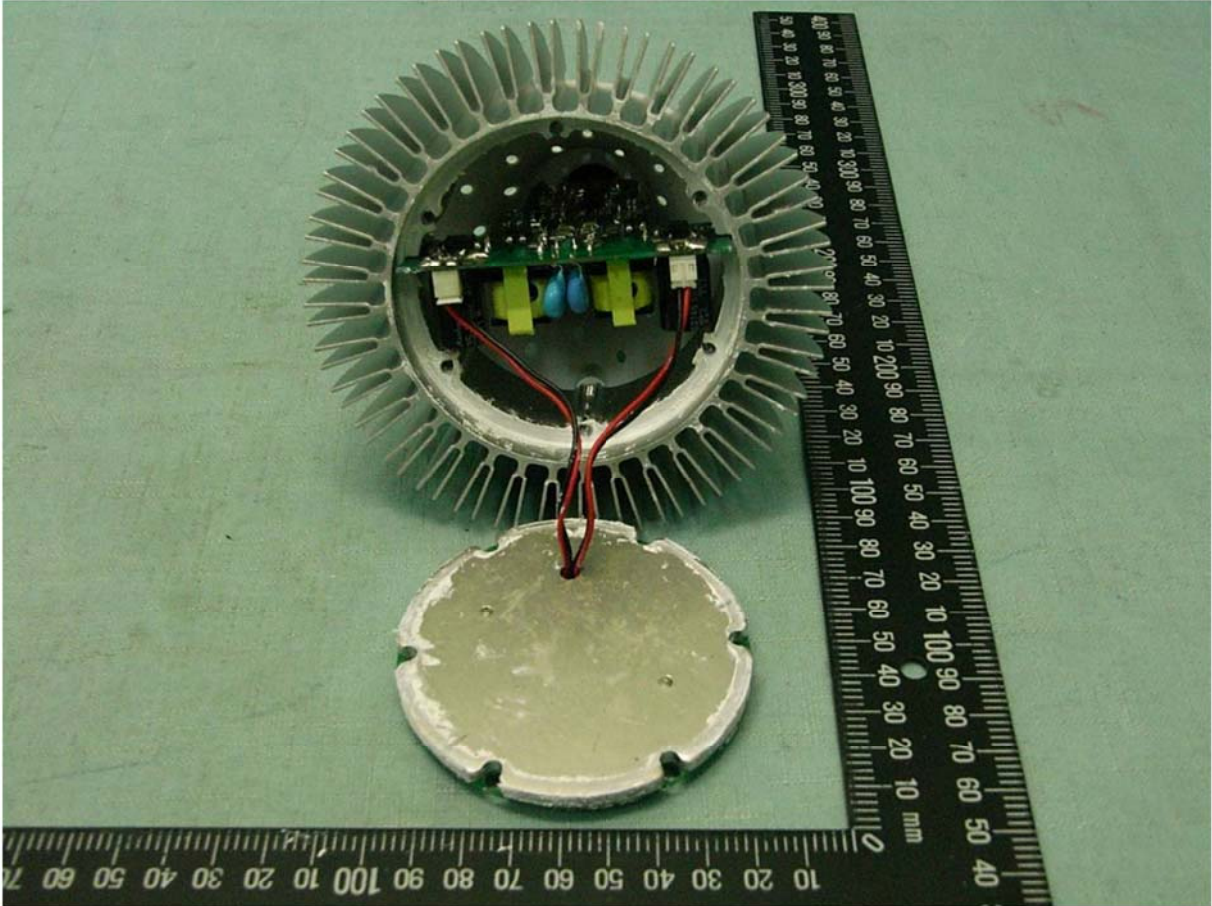


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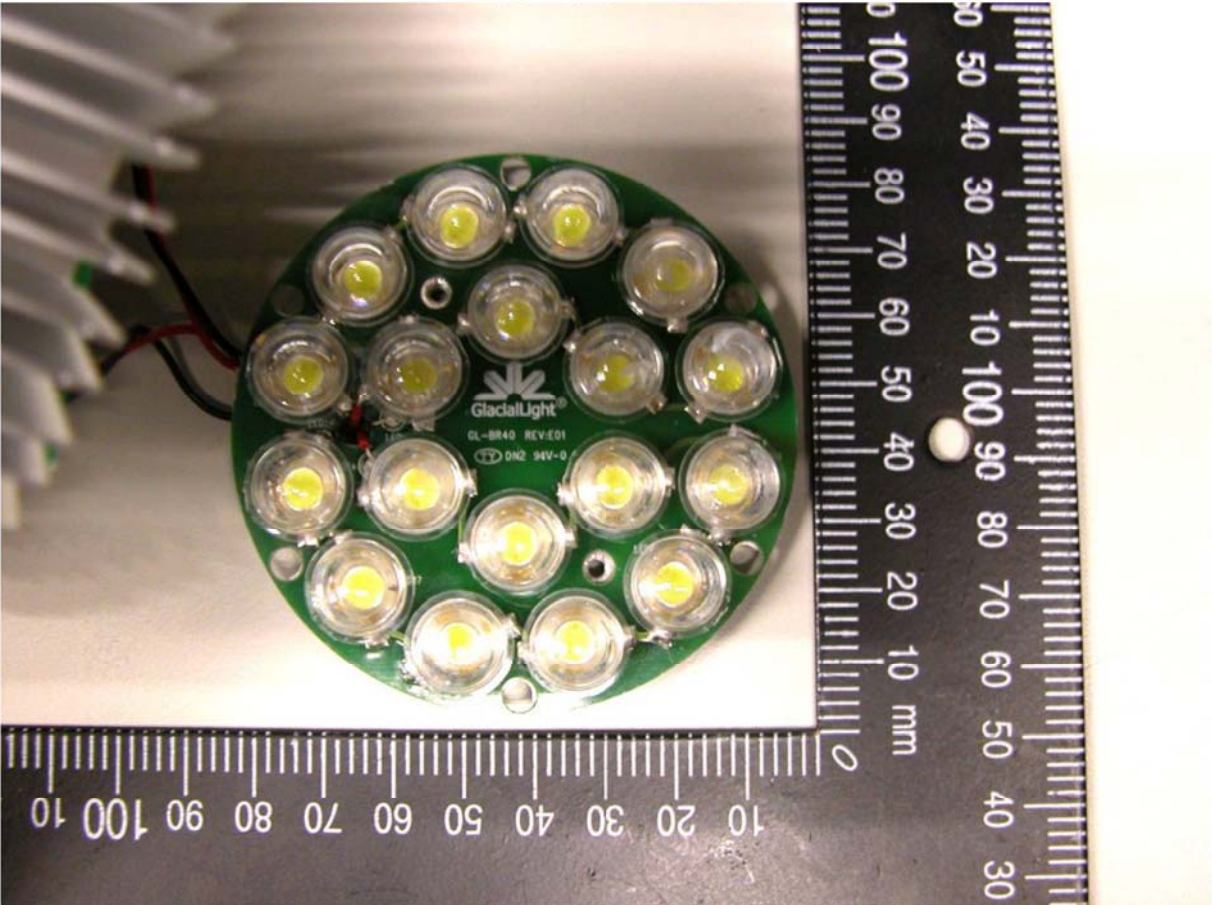




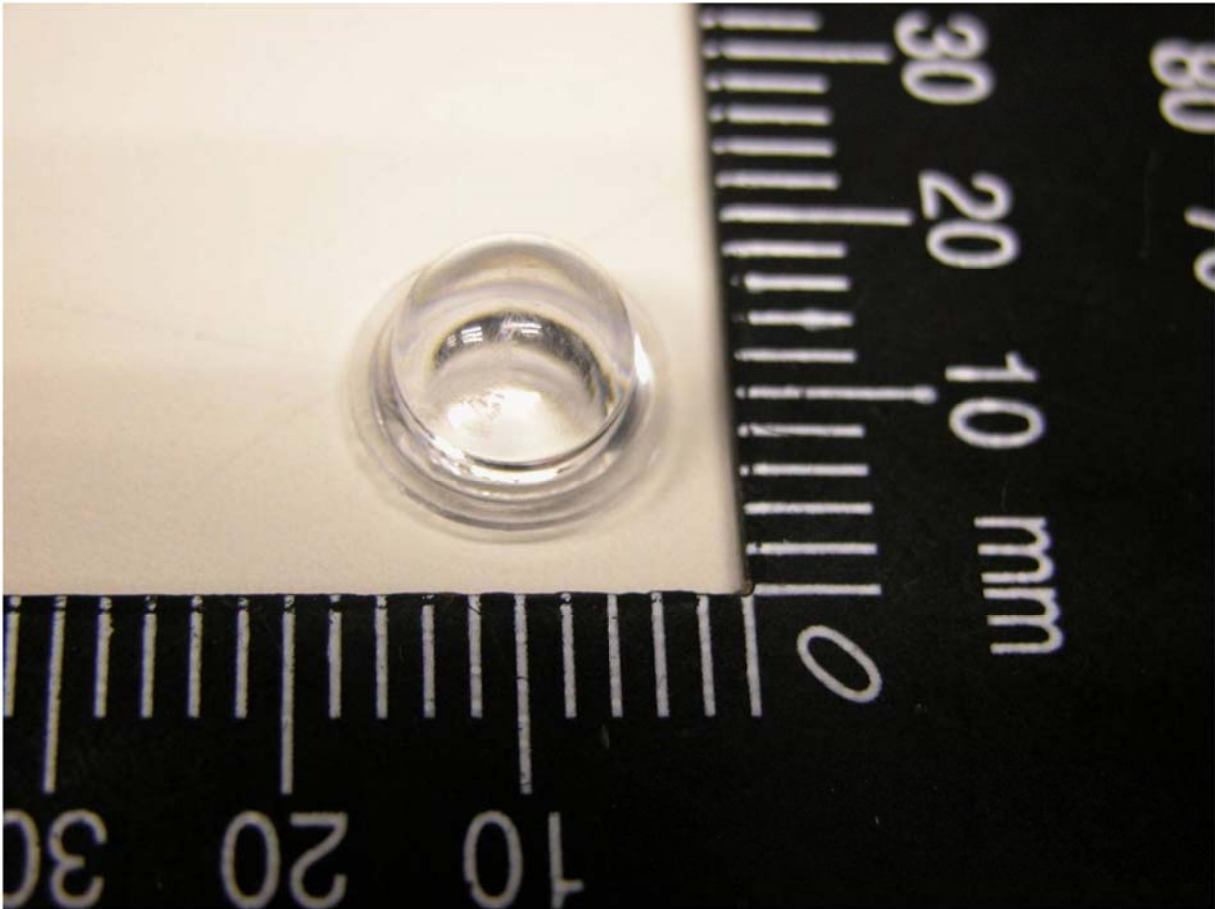
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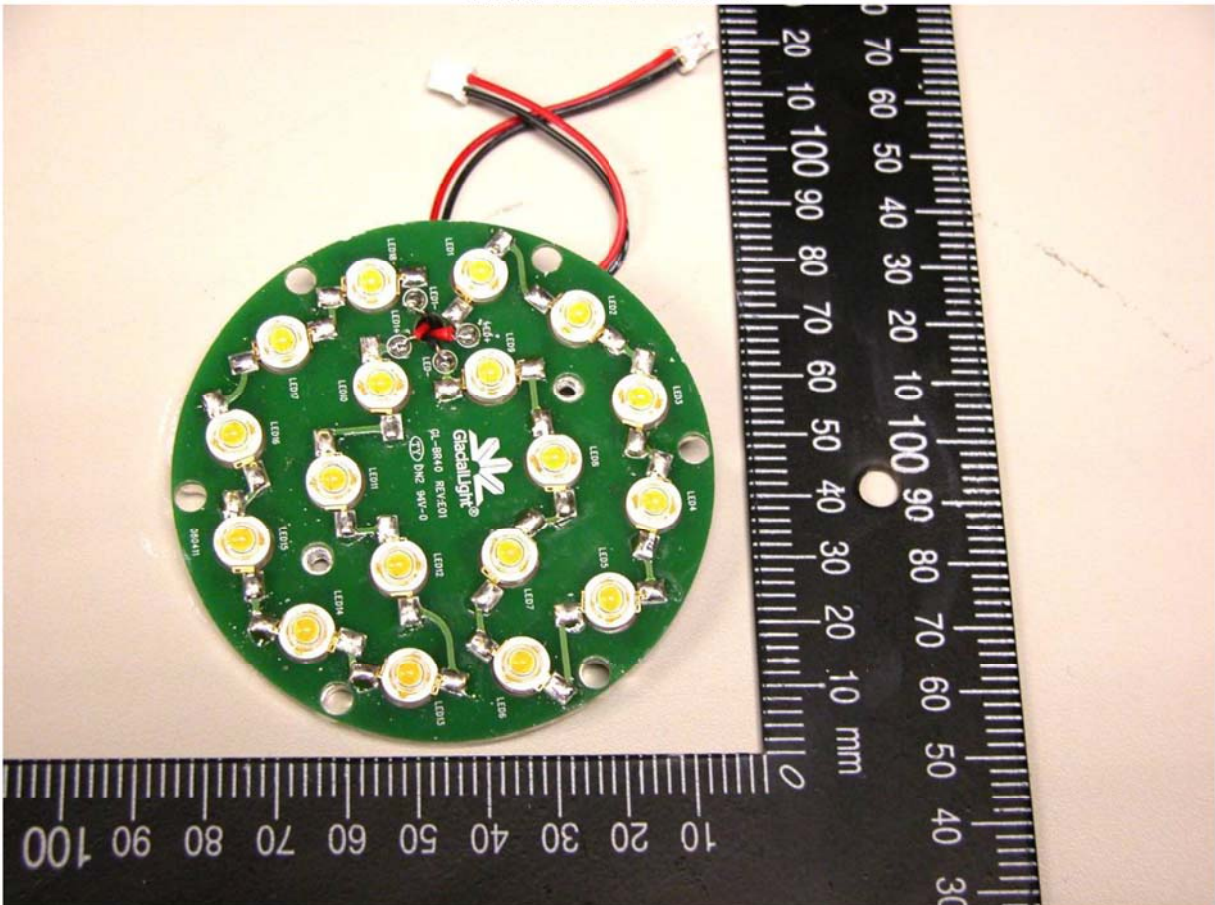
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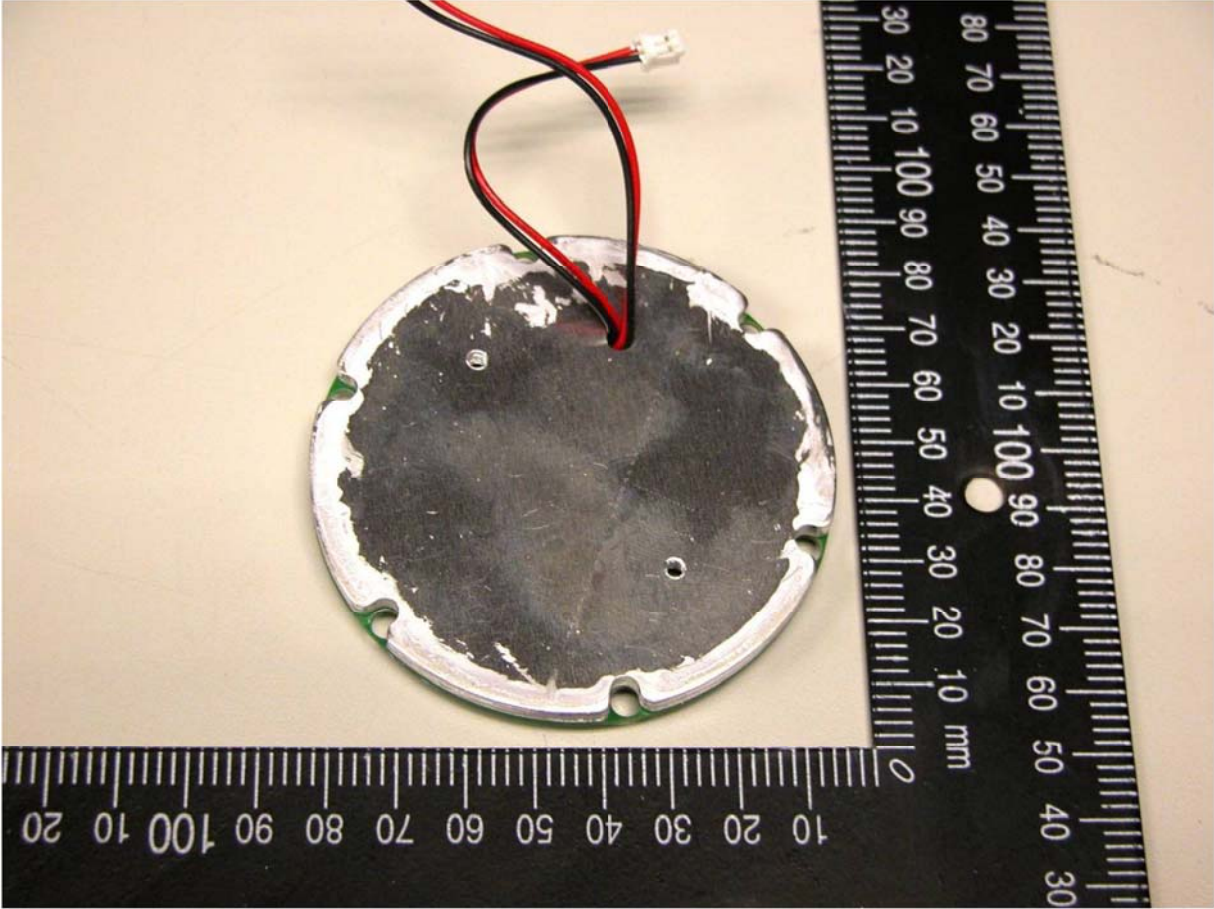
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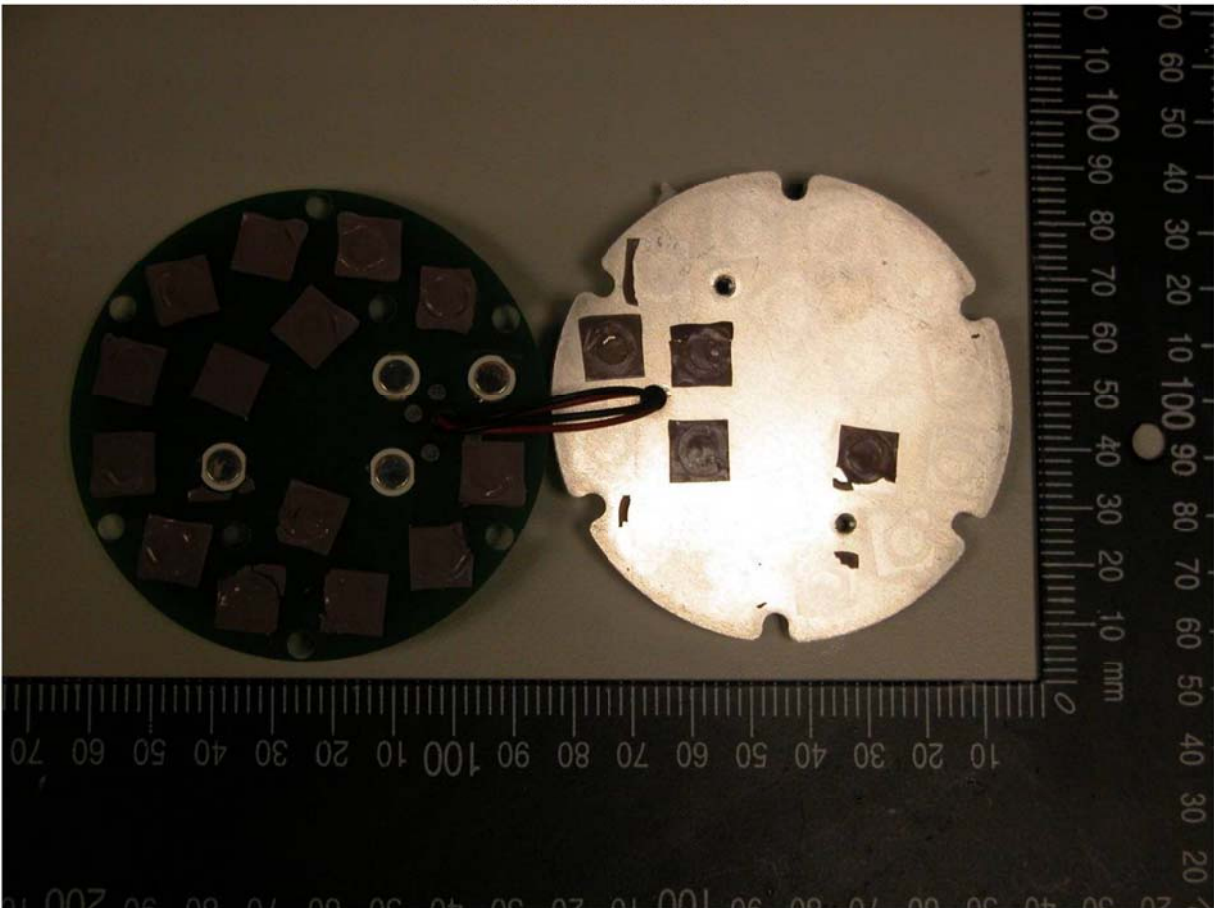
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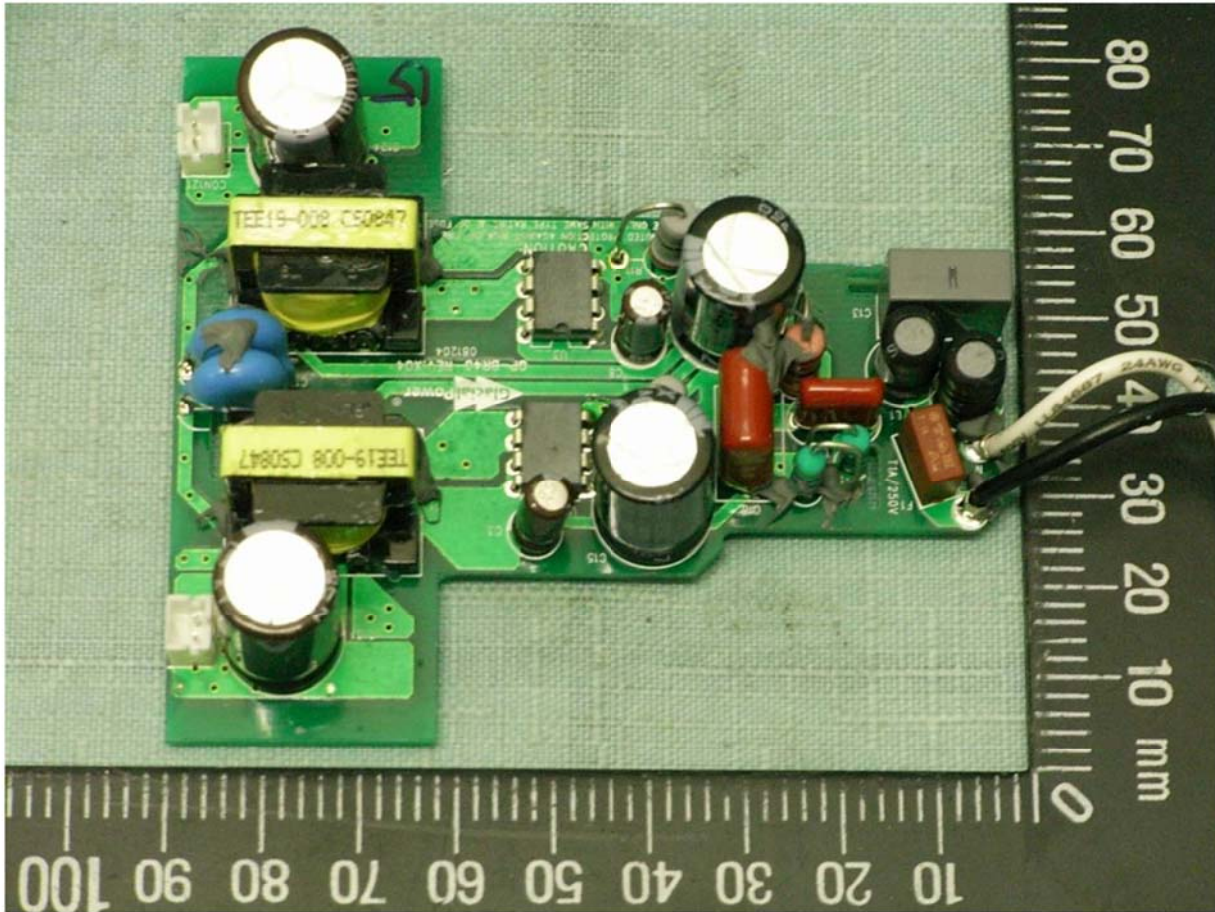
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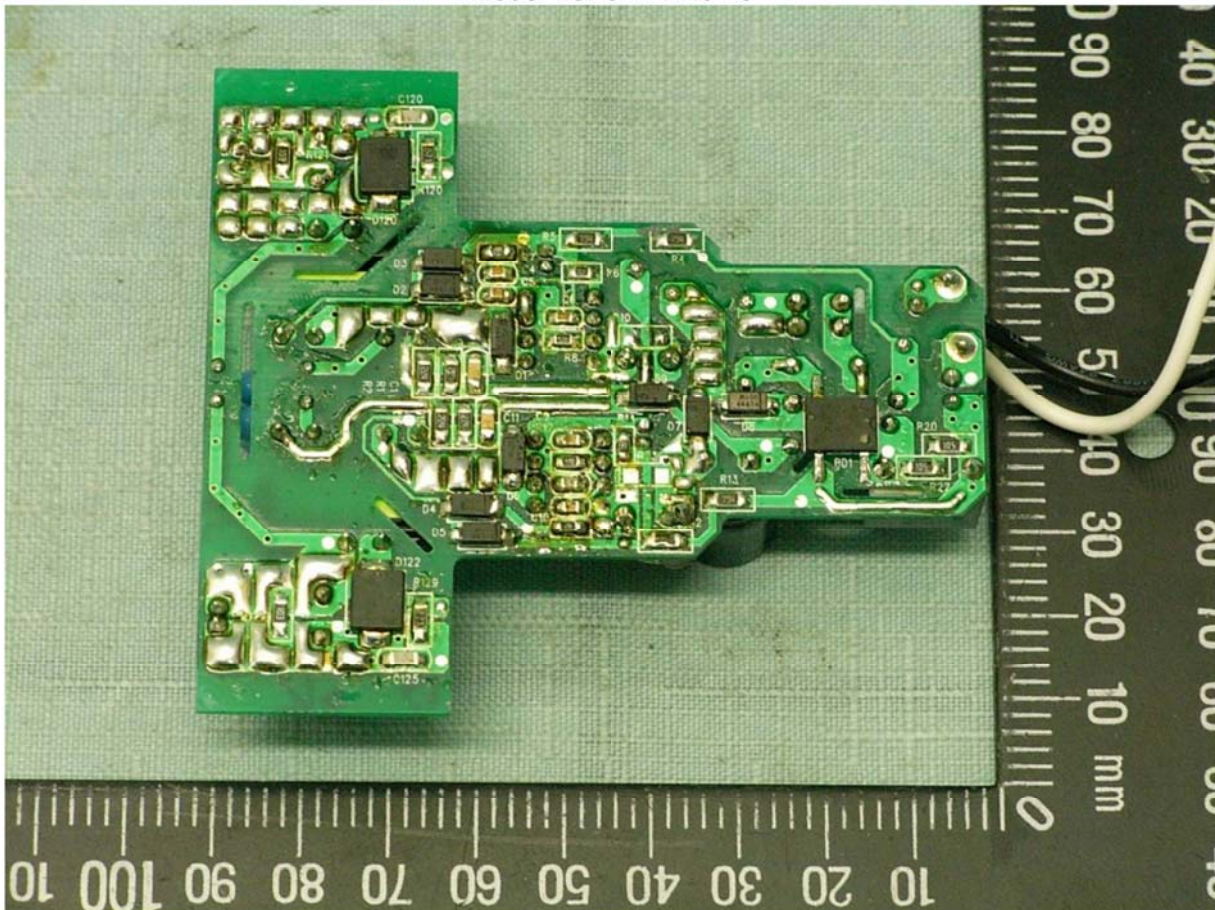
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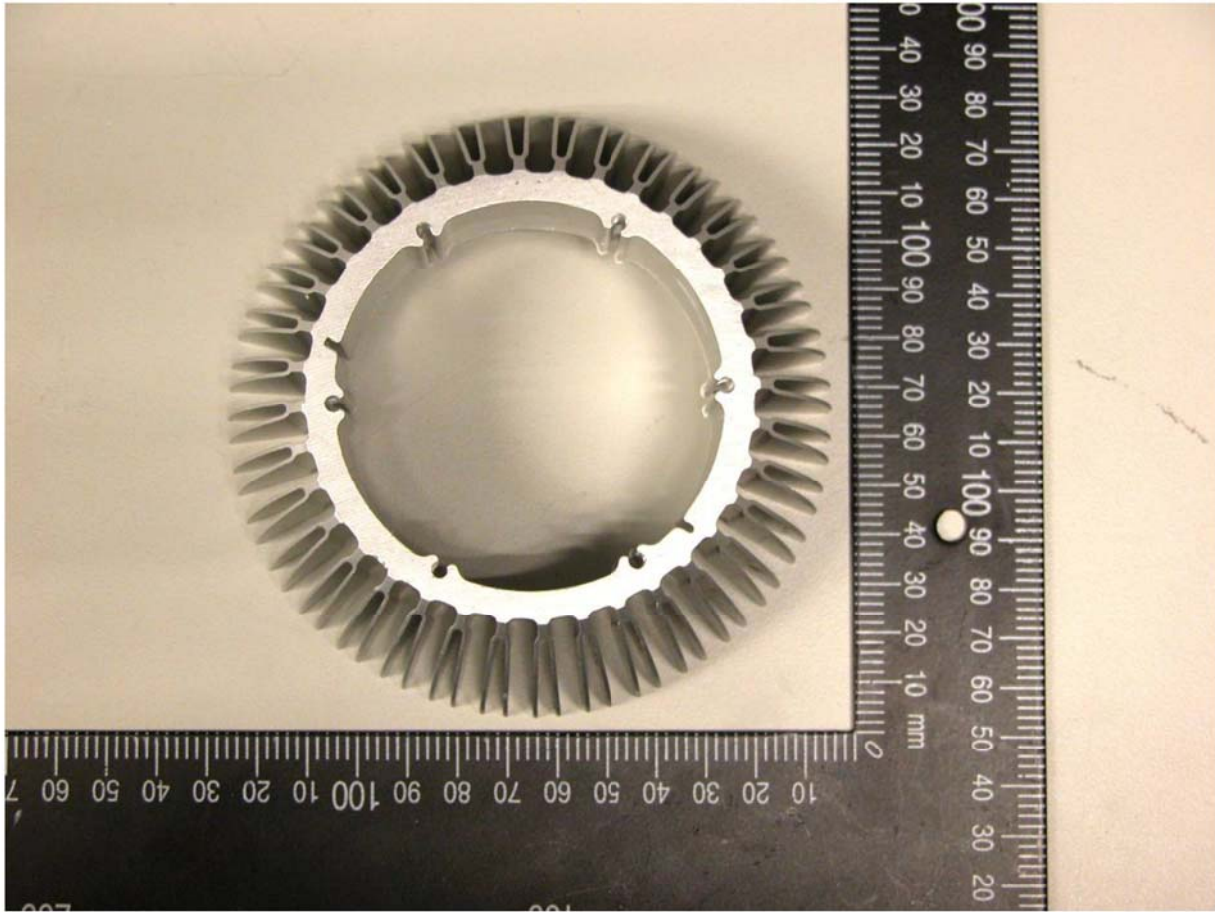
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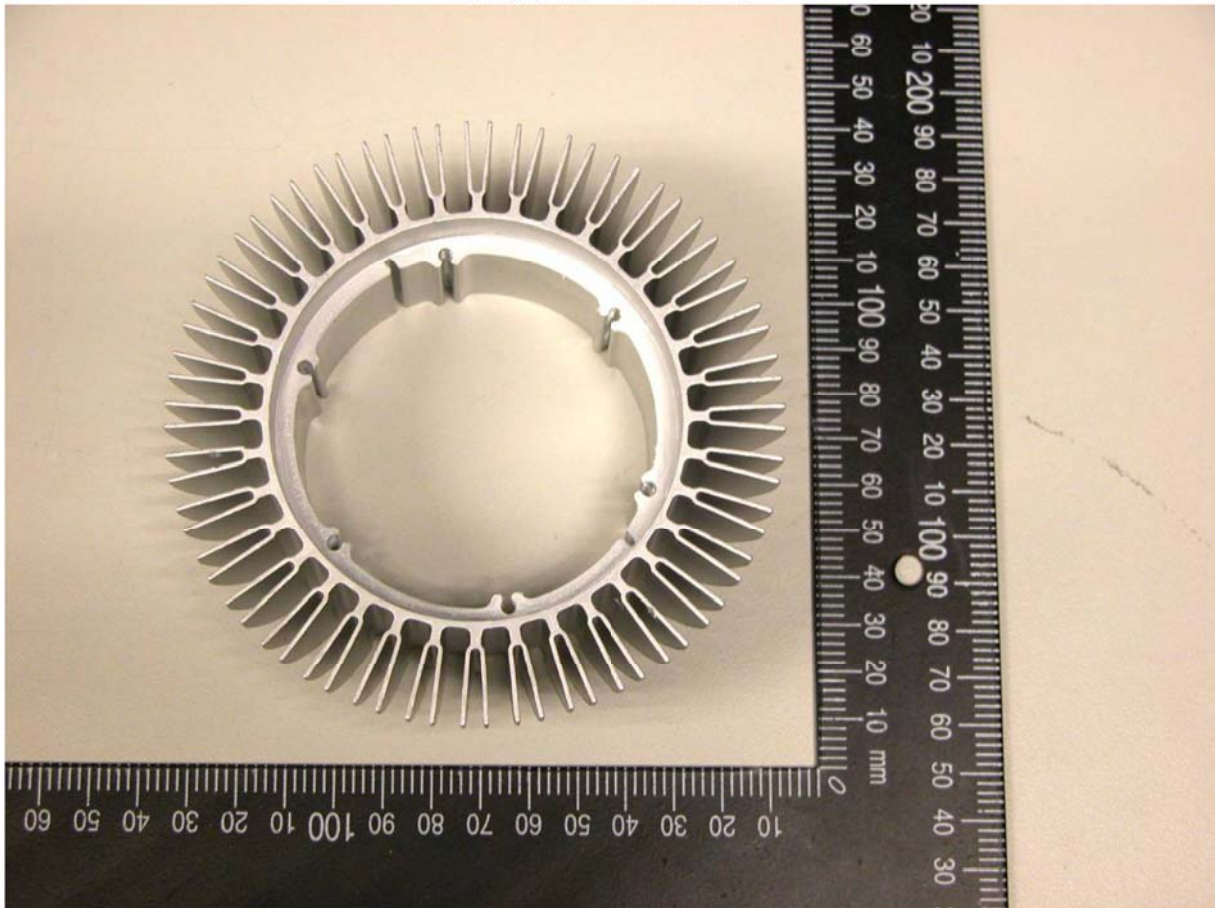


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Model no. GL-BR40-18



Model no. GL-BR40-18



Model no. GL-BR30-9



Model no. GL-BR30-9

