



Taiwan

TEST REPORT**IEC / EN 60825-1****Safety of laser products****Part 1: Equipment classification, requirements and user's guide****Section two: Manufacturing requirements****Report reference No.** : 611060904101**Tested by (printed name and signature)** : Jack Tsai**Approved by (printed name and signature)** : Joseph Lu**Date of issue** : 2009-06-26

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 No.** : IEC60825_1C / 01-04**TRF originator** : Underwriters Laboratories Inc., modified by TÜV PS to IEC/EN TRF**Master TRF** : Dated 2001-04

Copyright © 2001 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description : MR16 LED Bulb

Trademark : (1) (2)



GlacialLightTM

Model and/or type reference : GL-MR1603xy (x: 0-9, A-Z or Blank; y: 0-9, A-Z or Blank)

Rating(s) : 12 Vac/ Vdc, 3 W

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) :

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 : 2009-06-15

Date(s) of performance of test : 2009-06-18 to 2009-06-25

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 IECEE 02.

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 13 pages, including Enclosure 1 which consists of views of item tested.

(3 pages of photos)

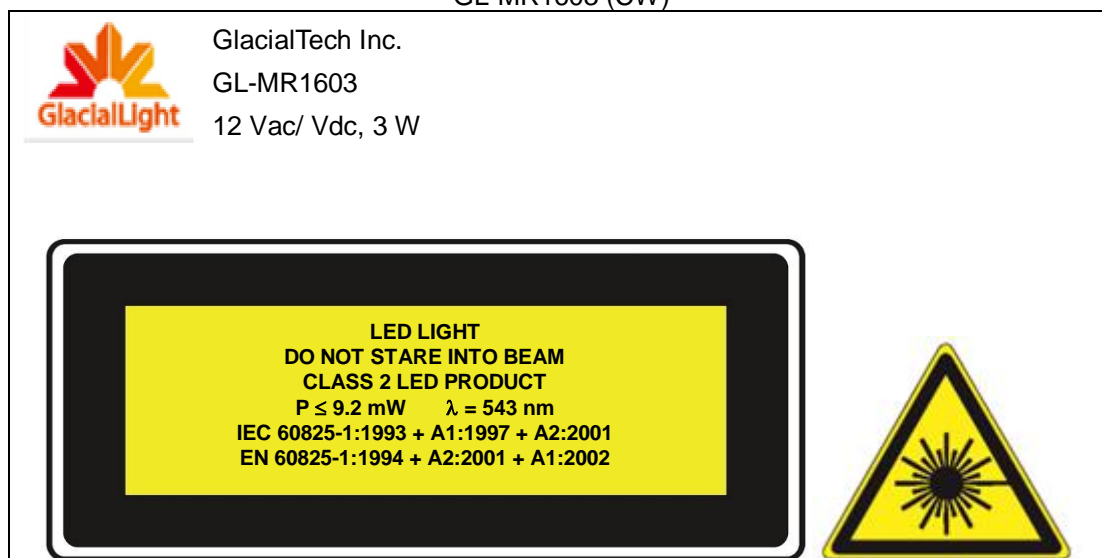
General product information:

MR16 LED Bulb

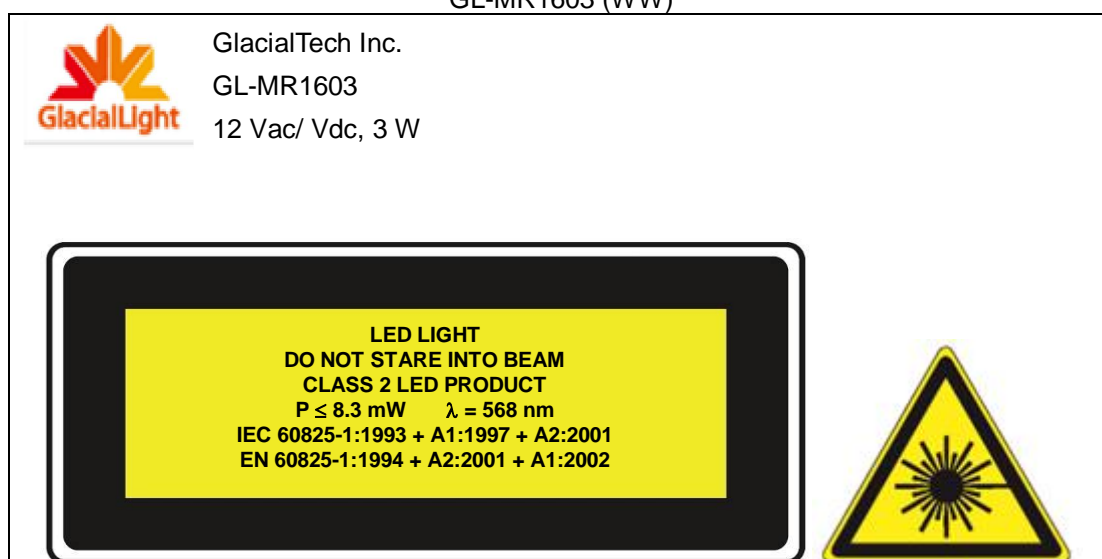
Copy of the Marking Plate and Warning Labels:

Example in English:

GL-MR1603 (CW)



GL-MR1603 (WW)



Summary of testing:

The model GL-MR1603 of LED Bulb is complied with the requirements of CLASS 2 LED PRODUCT as specified in IEC 60825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994 + A2:2001 + A1:2002.

IEC/EN 60825-1			
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		N/A
4.5	Key control		N/A
4.6	Laser radiation emission warning		—
4.6.1	Audible or visible warning		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		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		—

IEC/EN 60825-1			
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	See “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	—

IEC/EN 60825-1			
Cl.	Requirement – Test	Result	Verdict
	Emitted wavelength(s)	See Appendix 1	P
	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		N/A
5.9.1	Labels for panels		—
	Warning used.....		—
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

IEC/EN 60825-1			
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		N/A
8.4b	Radiation of multiple wavelengths		P
	1). Laser product emission two or more wavelengths in spectral regions shown as additive in Table 5.....:		P
	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 mrad	—
8.4d	Non-circular and multiple sources		N/A
8.4e	Time basis		P
	i) 0.25s		P
	ii) 100s		N/A
	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

IEC/EN 60825-1			
Cl.	Requirement – Test	Result	Verdict
	Total-on-time-pulse (TOTP) method used		N/A
9	MEASUREMENTS FOR CLASSIFICATION		—
9.1	Tests		P
9.2	Test conditions per Clause 9.2 applied		P
	Measured laser radiation		—
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	11 mrad	P
	ii) all other limits.....	100 mrad	P

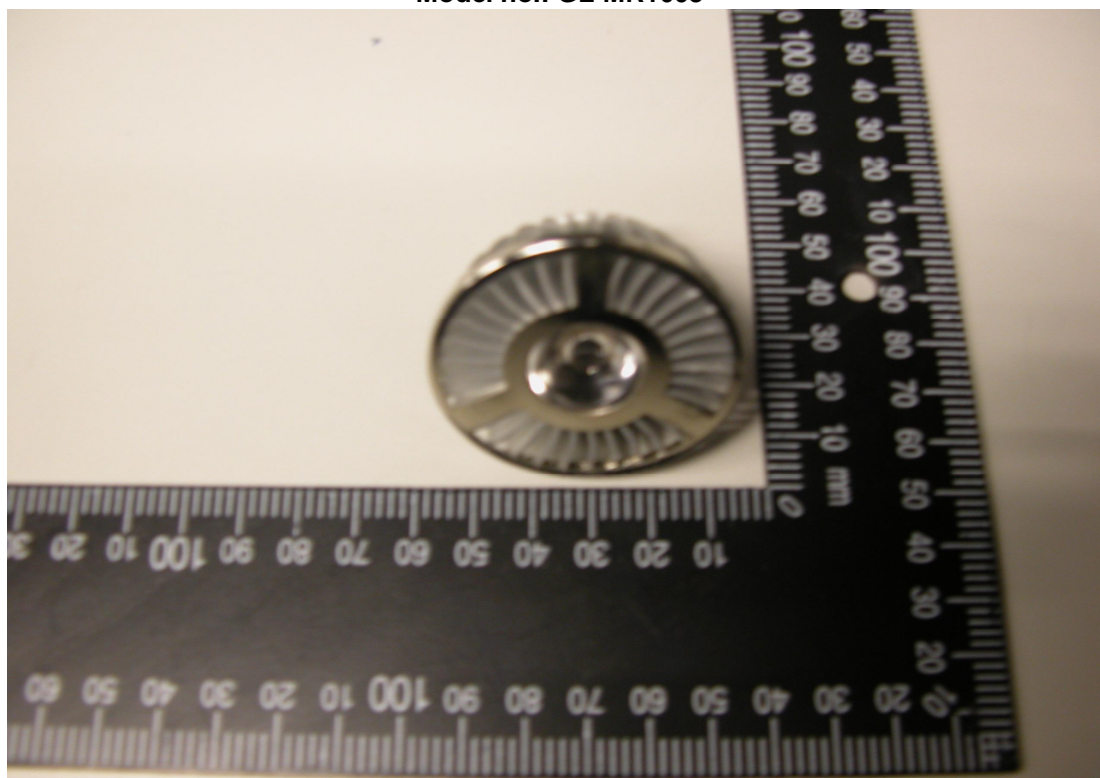
Supplementary information:

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-3LE5-B3 (CW) EDEX-3LA1-E3 (WW)		—
Wavelength	GL-MR1603(CW) 442nm& 543nm GL-MR1603(WW) 447nm& 568nm		—
Others			—

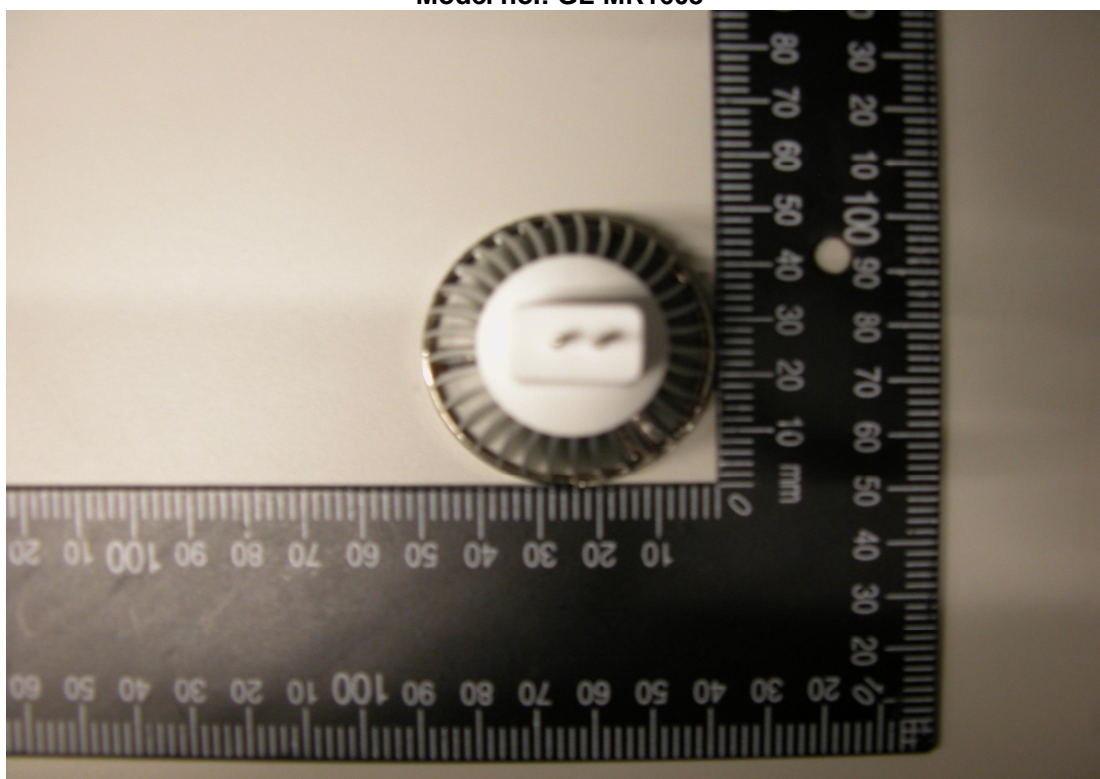
Appendix 1: Test result

Model / Condition	Accessible Emission Level	Accessible Emission Limit	CLASS
(a)For retinal Photochemical hazard			
GL-MR1603(CW)	5.2 mW @ 442 nm	66.7 mW	<2
GL-MR1603(CW)	6.8 mW @ 543 nm	66.7 mW	<2
GL-MR1603(WW)	5.3 mW @ 447 nm	66.7 mW	<2
GL-MR1603(WW)	5.9 mW @ 568 nm	66.7 mW	<2
(b)For retinal photochemical hazard			
GL-MR1603(CW)	6.9 mW @ 442 nm	66.7 mW	<2
GL-MR1603(CW)	9.2 mW @ 543 nm	66.7 mW	<2
GL-MR1603(WW)	6.8 mW @ 447 nm	66.7 mW	<2
GL-MR1603(WW)	8.3 mW @ 568 nm	66.7 mW	<2
(a)For retinal Thermal hazard			
GL-MR1603(CW)	5.2 mW @ 442 nm	66.7 mW	<2
GL-MR1603(CW)	6.8 mW @ 543 nm	66.7 mW	<2
GL-MR1603(WW)	5.3 mW @ 447 nm	66.7 mW	<2
GL-MR1603(WW)	5.9 mW @ 568 nm	66.7 mW	<2
(b)For retinal Thermal hazard			
GL-MR1603(CW)	6.9 mW @ 442 nm	66.7 mW	<2
GL-MR1603(CW)	9.2 mW @ 543 nm	66.7 mW	<2
GL-MR1603(WW)	6.8 mW @ 447 nm	66.7 mW	<2
GL-MR1603(WW)	8.3 mW @ 568 nm	66.7 mW	<2
Note: (1) All models are tested under normal operation and single fault conditions as below: 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 photochemical hazard as specified in Table 2 in IEC/EN 60825-1: Since $0.25 \leq t, \alpha > 100 \text{ mrad}$, $C_6 = 66.7$ Formula: $AEL \text{ Class 2} = C_6 \times 10^{-3} \text{ W} = 66.7 \text{ mW}$ (3) See below for determination of retinal thermal hazard as specified in Table 2 in IEC/EN 60825-1: Formula: $AEL \text{ Class 2} = C_6 \times 10^{-3} \text{ W} = 66.7 \text{ mW}$ Conclusion: The AEL Class 2 is not exceeding.			

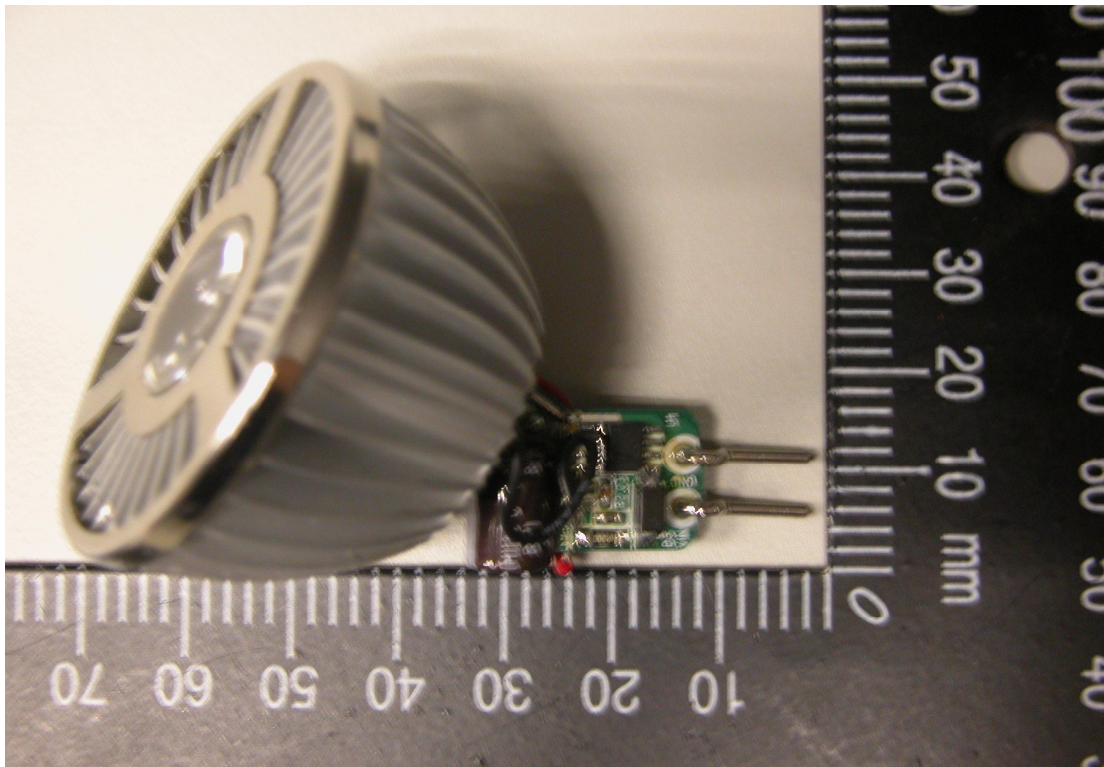
Model no.: GL-MR1603



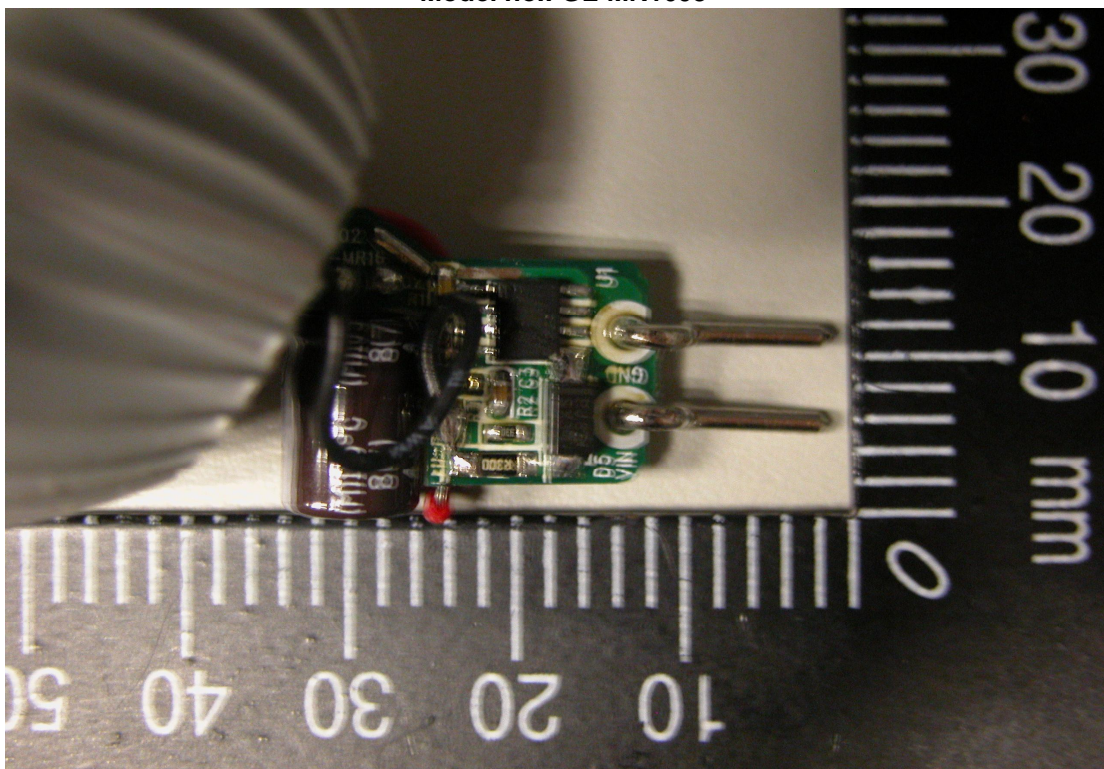
Model no.: GL-MR1603



Model no.: GL-MR1603



Model no.: GL-MR1603



Model no.: GL-MR1603 (CW)



Model no.: GL-MR1603 (WW)

