



CONSUMER PRODUCTS SERVICES DIVISION

GUANG DONG XIN YU TECHNOLOGY INDUSTRIAL CO LTD

Technical Report: (8517)054-0482

Date Received: March 17, 2017

March 17, 2017

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黄小姐

GUANG DONG XIN YU TECHNOLOGY INDUSTRIAL CO LTD
LAIMEI INDUSTRIAL DISTRICT
CHENGHAI
SHANTOU
GUANGDONG
CHINA

Sample Description: RC TOYS

- 1.) A
- 2.) B
- 3.) C
- 4.) D
- 5.) E
- 6.) F
- 7.) G
- 8.) H
- 9.) I
- 10.) J
- 11.) K
- 12.) L
- 13.) M
- 14.) N
- 15.) O
- 16.) P
- 17.) Q
- 18.) R
- 19.) S
- 20.) T
- 21.) U
- 22.) V
- 23.) W
- 24.) X
- 25.) Y
- 26.) Z
- 27.) AA
- 28.) AB
- 29.) AC
- 30.) AD
- 31.) AE
- 32.) AF
- 33.) AG
- 34.) AH
- 35.) AI
- 36.) AJ
- 37.) AK
- 38.) AL
- 39.) AM
- 40.) AN
- 41.) AO
- 42.) AP
- 43.) AQ



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Vendor:	N/A	Sample Size:	43
Manufacturer:	N/A	Style No(s):	3485 , 3759 , 3296 , 3760 , 3512 , 3391 , 3571 , XD10-3 , 3574 , 3260 , 3604 , 3605 , RC12-8 , 3519 , RC16- 10 , 3092 , RC16-3 , 3078 , 3606 , 3607 , RC24-13 , 3706 , 3707 , RC12-2AA , 3623 , RC-3AA , 3624 , RC-7AA , 3627 , 3751 , RC12- 17AA , 3633 , RC16- 4AA , 3081 , 3344 , RC18-2AA , 3647 , RC18-2PAA , 3648 , RC18-18AA , 3665 , 3491 , 3708 , 3709 , RC18-4AA , 3650 , RC24-3AA , 3143 , 3710 , 3711 , RC24- 5AA , 3147 , 3431 , 3727 , XS24-1AAA , 3182 , 3768 , 3767 , RC32-1AAA , 3156 , RC32-2AAA , 3157 , RC32-3AAA , 3158 , RC32-5AAA , 3160 , RC32-9AAA , 3164 , RC32-10AAA , 3738 , 3712 , 3713 , RC32- 11AAA , 3739 , RC32- 6AAA , 3161 , RC32- 7AAA , 3162 , 3433 , 3740 , 3501 , WR14- 1 , 3781 , CA32- 1AAA , 3790 , 3434 , 3745 , 3755 , 3486 , 3431 , XQRC24-3AA , XQRC24-5AA , 3353
Buyer:	N/A	SKN/SKU No.:	N/A
Labeled Age Grade:	N/A	PO No.:	N/A
Appropriate Age Grade:	N/A	Ref #:	N/A
Client Specified Age Grade:	N/A	Country of Origin:	N/A
Tested Age Grade:	OVER 3 YEARS OF AGE	Assortment No.:	N/A
UPC Code:	N/A	Rated Voltage:	9.0V, 3V, 6V, 7.5V, 7.2V, 3.2V



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EXECUTIVE SUMMARY:

The sample(s) was tested to the following requirement(s) and the data provided is for informational purposes only:

- The classification in accordance with standard EN 60825-1 .

BUREAU VERITAS SHENZHEN CO.,LTD

Lung Cheong Ming, Nick
Assistant Manager
Electrical Department
Toys, Premiums & Juvenile Products Division

NL / jm



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SUMMARY OF TEST RESULTS

The sample is classified as class 1 Laser Product according to EN60825-1.

Test Executed	Test Standard	Limit
Tests for Classification of Laser Products	Sec. 8, Sec. 9, EN 60825-1: 1994 + A11: 1996 + A2: 2001 + A1: 2002	Table 1, EN 60825-1: 1994 + A11: 1996 + A2: 2001 + A1: 2002



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Test method and equipment:

The following test equipment are applied for the tests:

Equip. No	Equipment Name	Brand Name	Model
M006003L	Digital Light Meter	TES	TES-1336A
M006004L	Digital Light Meter	Sper Scientific	840020
M008005L	Digital Caliper (0-12")	Mitutoyo	CD-12"C
M008006L	Digital Caliper (0-12")	Mitutoyo	CD-12"C
M015003L	Stainless Steel Ruler (0-12")	Endo Keiki	NIL
M019001L	Optical Sensor Head	Advantest	Q82214
M019002L	Optical Power Meter + Optical Sensor Interface Unit	Advantest	Q8221 / Q82203
M019003L	Optical Spectrum Analyzer	Advantest	Q8341
M019004L	Optical Sensor Head	Advantest	Q82214
M019005L	Optical Power Meter + Optical Sensor Interface Unit	Advantest	Q8221 / Q82203
T031001L	Laser Test Fixture + Sample Platform	NIL	NIL
T032001L	7mm Sensor Aperture Stop	NIL	NIL
T032003L	Ø0.5mm Field Stop Aperture	NIL	NIL
T032004L	Ø5mm Field Stop Aperture	NIL	NIL
T033001L	Filter (Yellow)	Lee Filter	101
T033002L	Filter (Green)	Lee Filter	124
T033003L	Filter (Red)	Lee Filter	182
T033004L	Filter (Blue)	Lee Filter	195

The measurements are carried out with the measurement set up following Section 9 of EN 60825-1.

The measurement condition 2 specified in Section 9.3 and Table 10 of EN 60825-1 is adopted.

Description of the lasers or LEDs under test:

Source No.	Feature
Led 1	CW, Single-λ, red led, controller 3606, 3607, 3608, 3609, 3741, XQRC18-2PAA, XQRC18-2AA, 3431, 3711, 3710, 3727, 3738, 3713, 3712, 3745, 3755, 3767, 3768, 3574
Led 2	CW, Single-λ, CAR3606, 3607, RED LED
Led 3	CW, Single-λ, CAR-XQRC18-2AA-3647, BLUE LED
Led 4	CW, Single-λ, CONTROLLER-3147, XQRC24-3AA, 3131, 3353, RED LED
Led 5	CW, Single-λ, CONTROLLER-3157, 3156, RED LED
Led 6	CW, Single-λ, RED LED CONTROLLER 3504, 3627, 3633, 3706, 3707, 3624, 3623, 3605, 3604, 3571
Led 7	CW, Single-λ, RED LED, CAR 3627
Led 8	CW, Single-λ, RED LED, CAR 3623
Led 9	CW, Single-λ, RED LED, CAR 3624



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Description of the lasers or LEDs under test:

Source No.	Feature
Led 10	CW, Single- λ , RED LED, CAR 3633
Led 11	CW, Single- λ , RED LED, CAR 3504
Led 12	CW, Single- λ , RED LED, CAR3706
Led 13	CW, Single- λ , RED LED, CAR 3707
Led 14	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3627
Led 15	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3633
Led 16	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3707
Led 17	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3624
Led 18	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3706
Led 19	CW, Multi- λ additive , BLUE/ GREEN LED, CAR 3623
Led 20	CW, Multi- λ additive , CAR 3504, BLUE/ GREEN LED
Led 21	CW, Single- λ , RED LED, CAR 3604
Led 22	CW, Single- λ , RED LED, CAR 3605
Led 23	CW, Multi- λ additive , CAR 3604, BLUE/ GREEN LED
Led 24	CW, Multi- λ additive , CAR 3605, BLUE/ GREEN LED
Led 25	CW, Multi- λ additive ,CAR 3344, BLUE GREEN LED
Led 26	CW, Multi- λ additive ,BLUE/ GREEN LED, CAR RC16-3
Led 27	CW, Single- λ , RED LED, CONTROLLER 3344, RC16-3
Led 28	CW, Multi- λ additive , CAR 3571, BLUE/GREEN LED



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Test Results:

I) TESTS DURING OPERATION

Basic Parameters of the lasers or LEDs

Single-wavelength source:

Parameters	Unit	LED 6	LED 7	LED 8	LED 9	LED 10
Color of the laser/LED	(e.g. Red / Amber / Yellow / Green / Blue, etc.)	Red	Red	Red	Red	Red
Wavelength (λ) measured / Given by manufacturer	(nm)	627	628	628	628	628
Time Base estimated	(sec)	100	100	100	100	100
Apparent source size (a) measured	(mm)	0.21	5.84	4.25	5.84	4.78
Angular subtense (α) estimated	(mrad)	2.14	58.39	42.46	58.39	47.77
Is the laser or LED continuous wave or pulsed?		CW	CW	CW	CW	CW
Break Point (T_2)	(second)	10.15	37.80	26.05	37.08	29.50

Multi-Wavelength Source (Additive):

Parameters	Unit	Led 16		Led 17	
Color of the laser/LED	(e.g. White)	Blue	Green	Blue	Green
Wavelength (λ) measured / Given by manufacturer	(nm)	454	540	454	540
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	4.78		5.52	
Angular subtense (α) estimated	(mrad)	47.77		55.20	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	29.50		35.09	



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Test Results:

I) TESTS DURING OPERATION

Basic Parameters of the lasers or LEDs

Single-wavelength source:

Parameters	Unit	LED 11	LED 12	LED 13	LED 21	LED 22
Color of the laser/LED	(e.g. Red / Amber / Yellow / Green / Blue, etc.)	Red	Red	Red	Red	Red
Wavelength (λ) measured / Given by manufacturer	(nm)	628	628	628	628	628
Time Base estimated	(sec)	100	100	100	100	100
Apparent source size (a) measured	(mm)	6.37	5.41	4.56	6.69	7.01
Angular subtense (α) estimated	(mrad)	63.69	54.14	45.56	66.88	70.06
Is the laser or LED continuous wave or pulsed?		CW	CW	CW	CW	CW
Break Point (T_2)	(second)	42.80	34.23	28.07	46.10	49.67

Multi-Wavelength Source (Additive):

Parameters	Unit	Led 18		Led 19	
Color of the laser/LED	(e.g. White)	Blue	Green	Blue	Green
Wavelength (λ) measured / Given by manufacturer	(nm)	454	540	454	540
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	5.84		4.78	
Angular subtense (α) estimated	(mrad)	58.39		47.77	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	37.80		29.50	



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Test Results:

I) TESTS DURING OPERATION

Basic Parameters of the lasers or LEDs

Single-wavelength source:

Parameters	Unit	LED 27				
Color of the laser/LED	(e.g. Red / Amber / Yellow / Green / Blue, etc.)	Red				
Wavelength (λ) measured / Given by manufacturer	(nm)	628				
Time Base estimated	(sec)	100				
Apparent source size (a) measured	(mm)	1.74				
Angular subtense (α) estimated	(mrad)	17.40				
Is the laser or LED continuous wave or pulsed?		CW				
Break Point (T_2)	(second)	14.50				

Multi-Wavelength Source (Additive):

Parameters	Unit	Led 20		Led 23	
Color of the laser/LED	(e.g. White)	Blue	Green	Blue	Green
Wavelength (λ) measured / Given by manufacturer	(nm)	454	540	454	540
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	6.90		5.84	
Angular subtense (α) estimated	(mrad)	69.00		58.39	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	48.45		37.80	



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Test Results:

I) TESTS DURING OPERATION

Multi-Wavelength Source (Additive):

Parameters	Unit	Led 24		Led 25	
Color of the laser/LED	(e.g. White)	Blue	Green	Blue	Green
Wavelength (λ) measured / Given by manufacturer	(nm)	454	540	456	548
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	5.31		5.84	
Angular subtense (α) estimated	(mrad)	53.08		58.39	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	33.39		37.80	

Multi-Wavelength Source (Additive):

Parameters	Unit	Led 26		Led 28	
Color of the laser/LED	(e.g. White)	Blue	Green	Blue	Green
Wavelength (λ) measured / Given by manufacturer	(nm)	456	548	453	548
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	6.37		8.28	
Angular subtense (α) estimated	(mrad)	63.69		82.80	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	42.80		66.90	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Single-wavelength source:

Parameters	Unit	Led 1	Led 2	Led 3	Led 4	Led 5
Limiting angle of acceptance (θ_p)	(mrad)	NA	NA	NA	NA	NA
Measurement aperture (d)	(mm)	NA	NA	NA	NA	NA
Measurement distance (r)	(mm)	NA	NA	NA	NA	NA
Exposure time (t)	(sec)	NA	NA	NA	NA	NA
Radiant power (P)	(μ W)	NA	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	NA	NA	NA	NA	NA
The corresponding RPH AEL for Class __ Laser	< μ W or μ J>	NA	NA	NA	NA	NA

Multi-wavelength source (Additive):

Parameters	Unit	LED 14		LED 15	
Wavelength (λ)	(nm)	454	540	454	540
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	2.90	1.82	2.67	1.68
The corresponding RPH AEL for Class _1_ Laser	μ J	4756.25	246073.4	4756.25	246073.4
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Single-wavelength source:

Parameters	Unit	Led 6	Led 7	Led 8	Led 9	Led 10
Limiting angle of acceptance (θ_p)	(mrad)	NA	NA	NA	NA	NA
Measurement aperture (d)	(mm)	NA	NA	NA	NA	NA
Measurement distance (r)	(mm)	NA	NA	NA	NA	NA
Exposure time (t)	(sec)	NA	NA	NA	NA	NA
Radiant power (P)	(μ W)	NA	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	NA	NA	NA	NA	NA
The corresponding RPH AEL for Class __ Laser	< μ W or μ J>	NA	NA	NA	NA	NA

Multi-wavelength source (Additive):

Parameters	Unit	LED 16		LED 17	
Wavelength (λ)	(nm)	454	540	454	540
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	3.16	1.88	2.55	1.60
The corresponding RPH AEL for Class _1_ Laser	μ J	4756.25	246073.4	4756.25	246073.4
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Single-wavelength source:

Parameters	Unit	Led 11	Led 12	Led 13	Led 21	Led 22
Limiting angle of acceptance (θ_p)	(mrad)	NA	NA	NA	NA	NA
Measurement aperture (d)	(mm)	NA	NA	NA	NA	NA
Measurement distance (r)	(mm)	NA	NA	NA	NA	NA
Exposure time (t)	(sec)	NA	NA	NA	NA	NA
Radiant power (P)	(μ W)	NA	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	NA	NA	NA	NA	NA
The corresponding RPH AEL for Class __ Laser	< μ W or μ J>	NA	NA	NA	NA	NA

Multi-wavelength source (Additive):

Parameters	Unit	LED 18		LED 19	
Wavelength (λ)	(nm)	454	540	454	540
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	2.55	1.61	3.47	1.98
The corresponding RPH AEL for Class _1_ Laser	μ J	4756.25	246073.4	4756.25	246073.4
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Single-wavelength source:

Parameters	Unit	Led 27				
Limiting angle of acceptance (θ_p)	(mrad)	NA				
Measurement aperture (d)	(mm)	NA				
Measurement distance (r)	(mm)	NA				
Exposure time (t)	(sec)	NA				
Radiant power (P)	(μ W)	NA				
Radiant energy (Q)	(μ J)	NA				
The corresponding RPH AEL for Class __ Laser	< μ W or μ J>	NA				

Multi-wavelength source (Additive):

Parameters	Unit	LED 20		LED 23	
Wavelength (λ)	(nm)	454	540	454	540
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	17.37	1.60	3.26	1.78
The corresponding RPH AEL for Class _1_ Laser	μ J	4756.25	246073.4	4688.83	246073.4
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Multi-wavelength source (Additive):

Parameters	Unit	LED 24		LED 25	
Wavelength (λ)	(nm)	454	540	456	548
Limiting angle of acceptance (γ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	3.41	1.86	2.88	2.03
The corresponding RPH AEL for Class _1_ Laser	μ J	4688.83	246073.4	5061.33	350481.1
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	

Multi-wavelength source (Additive):

Parameters	Unit	LED 26		LED 28	
Wavelength (λ)	(nm)	456	548	453	548
Limiting angle of acceptance (γ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	3.71	2.30	5.37	2.67
The corresponding RPH AEL for Class _1_ Laser	μ J	5061.33	540481.1	4462.15	350481.1
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Single-wavelength source:

Parameters	Unit	LED 1	LED 2	LED 3	LED 4	LED 5
Angle of acceptance (γ)	(mrad)	≥ 2.92	≥ 17.39	100	≥ 2.39	≥ 17.37
Measurement aperture (d)	(mm)	7	7	7	7	7
Measurement distance (r)	(mm)	18.38	42.25	100	16.88	42.22
Exposure time (t)	(sec)	100	100	0.50	100	100
Radiant power (P)	(μW)	0.51	1.67	NA	0.93	0.33
Radiant energy (Q)	(μJ)	NA	NA	0.30	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μW	759.78 μW	4158.56 μW	27956.02 μJ	623.57 μW	4154 μW

Multi-wavelength source (Additive):

Parameters	Unit	LED 14		LED 15	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 63.69	≥ 63.69	≥ 50.96	≥ 50.96
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	80.10	80.10	71.70	71.70
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μW)	1.79	1.42	1.60	1.26
Radiant energy (Q)	(μJ)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μW	11621.26	11621.26	10015.56	10015.56
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Single-wavelength source:

Parameters	Unit	LED 6	LED 7	LED 8	LED 9	LED 10
Angle of acceptance (γ)	(mrad)	≥ 2.14	≥ 58.39	≥ 42.46	≥ 58.39	≥ 47.77
Measurement aperture (d)	(mm)	7	7	7	7	7
Measurement distance (r)	(mm)	16.14	76.71	65.52	76.71	69.54
Exposure time (t)	(sec)	100	100	0.50	100	100
Radiant power (P)	(μ W)	0.35	0.19	0.18	0.16	0.18
Radiant energy (Q)	(μ J)	NA	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	560.62	10988.45	8771	10988.45	9565.99

Multi-wavelength source (Additive):

Parameters	Unit	LED 16		LED 17	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 47.77	≥ 47.77	≥ 55.20	≥ 55.20
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	69.45	69.45	74.61	74.61
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	1.71	1.35	1.50	1.18
Radiant energy (Q)	(μ J)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	9565.99	9565.99	10584.25	10584.25
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Single-wavelength source:

Parameters	Unit	LED 11	LED 12	LED 13	LED 21	LED 22
Angle of acceptance (γ)	(mrad)	≥ 63.69	≥ 54.14	≥ 45.65	≥ 66.88	≥ 70.06
Measurement aperture (d)	(mm)	7	7	7	7	7
Measurement distance (r)	(mm)	80.10	73.89	67.90	82.06	83.98
Exposure time (t)	(sec)	100	100	0.50	100	100
Radiant power (P)	(μ W)	0.15	0.19	0.20	0.13	0.14
Radiant energy (Q)	(μ J)	NA	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	11621.26	10445.31	8254.96	11977.32	12316.29

Multi-wavelength source (Additive):

Parameters	Unit	LED 18		LED 19	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 58.39	≥ 58.39	≥ 47.77	≥ 47.77
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	76.71	76.71	69.45	69.45
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	1.50	1.18	2.05	1.62
Radiant energy (Q)	(μ J)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	10988.45	10988.45	9565.99	9565.99
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Single-wavelength source:

Parameters	Unit	LED 27				
Angle of acceptance (γ)	(mrad)	≥ 17.40				
Measurement aperture (d)	(mm)	7				
Measurement distance (r)	(mm)	42.26				
Exposure time (t)	(sec)	100				
Radiant power (P)	(μ W)	0.32				
Radiant energy (Q)	(μ J)	NA				
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	4160.84				

Multi-wavelength source (Additive):

Parameters	Unit	LED 20		LED 23	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 69	≥ 69	≥ 58.39	≥ 58.39
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	83.34	83.34	76.71	76.71
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	7.18	1.32	2.18	1.52
Radiant energy (Q)	(μ J)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	12205.17	12205.17	10988.45	10988.45
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Multi-wavelength source (Additive):

Parameters	Unit	LED 24		LED 25	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 53.08	≥ 53.08	≥ 58.39	≥ 58.39
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	73.17	73.17	76.71	76.71
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μW)	2.43	1.63	1.44	0.98
Radiant energy (Q)	(μJ)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μW	10304.23	10304.23	10988.45	10988.45
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	

Multi-wavelength source (Additive):

Parameters	Unit	LED 26		LED 28	
Wavelength (λ)	(nm)	456	548	453	548
Angle of acceptance (γ)	(mrad)	≥ 63.69	≥ 63.69	≥ 82.80	≥ 82.80
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	80.10	80.10	91.25	91.25
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μW)	1.55	1.10	3.43	2.33
Radiant energy (Q)	(μJ)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μW	11621.26	11621.26	13511.35	13511.35
$\Sigma[(P/AEL)],$ or $\Sigma[(Q/AEL)]$	None	< 1		< 1	



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II) TESTS WITH PARTS SUCH AS LENSES, REFLECTORS OR FILTERS THAT COULD AFFECT FOCUSING REMOVED

Basic Parameters of the lasers or LEDs

Single-wavelength source:

Parameters	Unit	LED 3	LED 7	LED 21		
Color of the laser/LED	(e.g. Red / Amber / Yellow / Green / Blue, etc.)	BLUE	RED	RED		
Wavelength (λ) measured / Given by manufacturer	(nm)	456	628	628		
Time Base estimated	(sec)	100	100	100		
Apparent source size (a) measured	(mm)	0.46	1.74	1.75		
Angular subtense (α) estimated	(mrad)	4.60	17.36	17.53		
Is the laser or LED continuous wave or pulsed?		CW	CW	CW		
Break Point (T_2)	(second)	10.75	14.49	14.54		

Multi-Wavelength Source (Additive):

Parameters	Unit	LED 14		LED 23	
Color of the laser/LED	(e.g. White)	BLUE	GREEN	BLUE	GREEN
Wavelength (λ) measured / Given by manufacturer	(nm)	454	540	454	540
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	1.84		1.79	
Angular subtense (α) estimated	(mrad)	18.37		17.90	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	14.83		14.67	



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II) TESTS WITH PARTS SUCH AS LENSES, REFLECTORS OR FILTERS THAT COULD AFFECT FOCUSING REMOVED

Multi-Wavelength Source (Additive):

Parameters	Unit	LED 25		LED 26	
Color of the laser/LED	(e.g. White)	BLUE	GREEN	BLUE	GREEN
Wavelength (λ) measured / Given by manufacturer	(nm)	456	548	456	548
Time Base estimated	(sec)	100		100	
Apparent source size (a) measured	(mm)	1.85		1.85	
Angular subtense (α) estimated	(mrad)	18.52		18.55	
Is the laser or LED continuous wave or pulsed?		CW		CW	
Break Point (T_2)	(second)	14.89		14.90	

Multi-Wavelength Source (Additive):

Parameters	Unit	LED 28			
Color of the laser/LED	(e.g. White)	BLUE	GREEN		
Wavelength (λ) measured / Given by manufacturer	(nm)	453	548		
Time Base estimated	(sec)	100			
Apparent source size (a) measured	(mm)	1.89			
Angular subtense (α) estimated	(mrad)	18.86			
Is the laser or LED continuous wave or pulsed?		CW			
Break Point (T_2)	(second)	15.01			



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Single-wavelength source:

Parameters	Unit	LED 3	LED 7	LED 21		
Limiting angle of acceptance (θ_p)	(mrad)	NA	NA	NA		
Measurement aperture (d)	(mm)	NA	NA	NA		
Measurement distance (r)	(mm)	NA	NA	NA		
Exposure time (t)	(sec)	NA	NA	NA		
Radiant power (P)	(μ W)	NA	NA	NA		
Radiant energy (Q)	(μ J)	NA	NA	NA		
The corresponding RPH AEL for Class <u>≤ fill in</u> Laser	< μ W or μ J>	NA	NA	NA		

Multi-wavelength source (Additive):

Parameters	Unit	LED 14		LED 23	
Wavelength (λ)	(nm)	454	540	454	540
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	17.37	10.91	22.14	12.11
The corresponding RPH AEL for Class <u>1</u> Laser	μ J	4756.25	246073.4	4688.83	246073.4
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1		<1	



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For continuous wave (CW) lasers or LEDs:

Note: a laser or LED operating with a continuous output for a period equal to or greater than 0.25 second.

A) TESTS AGAINST RETINAL PHOTOCHEMICAL HAZARD (RPH):

Multi-wavelength source (Additive):

Parameters	Unit	LED 25		LED 26	
Wavelength (λ)	(nm)	456	548	456	548
Limiting angle of acceptance (θ_p)	(mrad)	11	11	11	11
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	100	100	100	100
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	NA	NA	NA	NA
Radiant energy (Q)	(μ J)	22.98	14.21	22.28	13.82
The corresponding RPH AEL for Class <u>1</u> Laser	μ J	5061.33	350481.1	5061.33	350481.1
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1		<1	

Multi-wavelength source (Additive):

Parameters	Unit	LED 28			
Wavelength (λ)	(nm)	453	548		
Limiting angle of acceptance (θ_p)	(mrad)	11	11		
Measurement aperture (d)	(mm)	7	7		
Measurement distance (r)	(mm)	100	100		
Exposure time (t)	(sec)	100	100		
Radiant power (P)	(μ W)	NA	NA		
Radiant energy (Q)	(μ J)	16.21	8.01		
The corresponding RPH AEL for Class <u>1</u> Laser	μ J	4402.15	350481.1		
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1			



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Single-wavelength source:

Parameters	Unit	LED 3	LED 7	LED 21		
Angle of acceptance (γ)	(mrad)	≥ 4.60	≥ 17.36	≥ 17.53		
Measurement aperture (d)	(mm)	7	7	7		
Measurement distance (r)	(mm)	22.49	42.21	42.41		
Exposure time (t)	(sec)	0.50	100	100		
Radiant power (P)	(μW)	NA	1.49	1.28		
Radiant energy (Q)	(μJ)	3.14	NA	NA		
The corresponding RTH AEL for Class <u>1</u> Laser	< μW or μJ >	1285.03 μJ	4151.72 μW	4188.19		

Multi-wavelength source (Additive):

Parameters	Unit	LED 14		LED 23	
Wavelength (λ)	(nm)	454	540	454	540
Angle of acceptance (γ)	(mrad)	≥ 18.37	≥ 18.37	≥ 17.90	≥ 17.90
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	43.39	43.39	42.85	42.85
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μW)	7.18	5.68	10.46	7.32
Radiant energy (Q)	(μJ)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μW	4367.13	4367.13	4267.70	4267.70
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1		<1	



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B) TESTS AGAINST RETINAL THERMAL HAZARD (RTH):

Multi-wavelength source (Additive):

Parameters	Unit	LED 25		LED 26	
Wavelength (λ)	(nm)	456	548	456	548
Angle of acceptance (γ)	(mrad)	≥ 18.52	≥ 18.52	≥ 18.55	≥ 18.55
Measurement aperture (d)	(mm)	7	7	7	7
Measurement distance (r)	(mm)	43.57	43.57	43.60	43.60
Exposure time (t)	(sec)	100	100	100	100
Radiant power (P)	(μ W)	6.47	4.42	6.21	4.39
Radiant energy (Q)	(μ J)	NA	NA	NA	NA
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	4400.90	4400.90	4405.4	4405.4
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1		<1	

Multi-wavelength source (Additive):

Parameters	Unit	LED 28			
Wavelength (λ)	(nm)	453	548		
Angle of acceptance (γ)	(mrad)	≥ 18.86	≥ 18.86		
Measurement aperture (d)	(mm)	7	7		
Measurement distance (r)	(mm)	43.96	43.96		
Exposure time (t)	(sec)	100	100		
Radiant power (P)	(μ W)	6.87	4.65		
Radiant energy (Q)	(μ J)	NA	NA		
The corresponding RTH AEL for Class <u>1</u> Laser	μ W	4472.72	4472.7		
$\Sigma[(P/AEL)]$, or $\Sigma[(Q/AEL)]$	None	<1			

III) TESTS UNDER FAULT CONDITIONS

Details: No electronic component can be short-circuited.

N/A = Not Applicable

RESULTS:



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Sample Number:
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Sample Number:
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Sample Number:
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Sample Number:
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Sample Number:
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RESULTS:



Sample Number:
(8517)054-0482



Sample Number:
(8517)054-0482



Sample Number:
(8517)054-0482



Sample Number:
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Sample Number:
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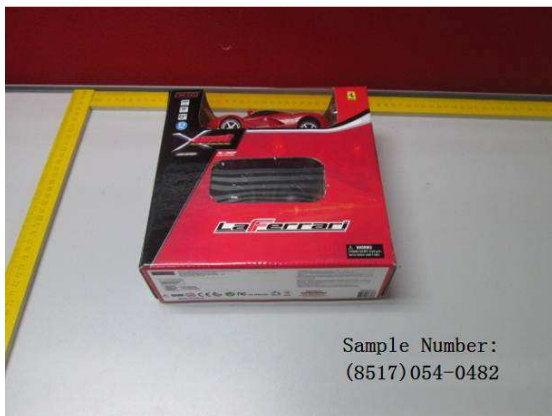


Sample Number:
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RESULTS:



RESULTS:



RESULTS:



Sample Number:
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Sample Number:
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Sample Number:
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Sample Number:
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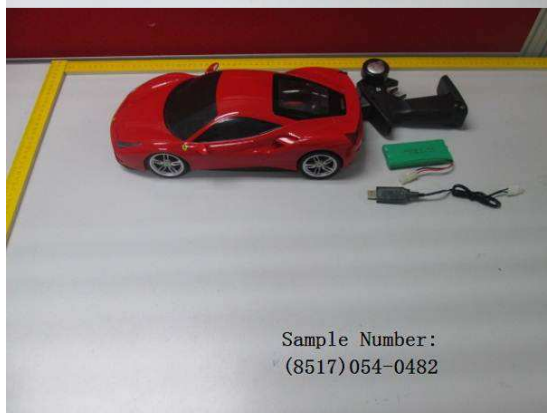


Sample Number:
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Sample Number:
(8517)054-0482

RESULTS:



RESULTS:



Sample Number:
(8517) 054-0482



Sample Number:
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Sample Number:
(8517) 054-0482



Sample Number:
(8517) 054-0482

RESULTS:



Sample Number:
(8517)054-0482



Sample Number:
(8517)054-0482



Sample Number:
(8517)054-0482

END