



June 2009



*AML program*

*< D4 bulb >*

*HARISON TOSHIBA LIGHTING Corp.*



## Feature of HTL D4 Bulb

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**HTL bulb has several advantages compared with competitor's.**

- \* **Higher Performance**
- \* **Smaller dispersion with each performance parameter**

**HTL bulb keeps high quality from the start of mass-production.**

- \* **HTL bulb keeps zero-defect at the customer's process & market**



# Initial Characteristics of D4S

n=190p ( 10p×19Lot )

## Characteristics of D4S (Mar. 2009 lot)

Items.	Our Spec.	Mar. 2009 ( D4S )				
		AVG	MAX	MIN	$\sigma$	Cpk
Bulb voltage(V)	42±3	41.7	43.4	40.2	0.68	1.34
Luminous flux (lm)	3200±450	3159	3267	3094	30.2	>2.00
Colour co-ordinate	0.395 ≥ x ≥ 0.360 0.392 ≥ y ≥ 0.362 ECE Reg.99	0.376 0.386	0.381 0.390	0.373 0.384	0.0012 0.0010	>2.00 1.72
Arc bending (mm)	0.5±0.25	0.60	0.69	0.51	0.038	1.27
Arc diffusion (mm)	1.1 +0.25/-0.4	0.75	0.80	0.71	0.014	1.07
Breakdown voltage (kV)	≤19	15.8	17.5	14.3	0.63	1.70

**Initial characteristics are inspected 100% by testing M/C.  
Cpk of luminous flux is over 2.00 .**

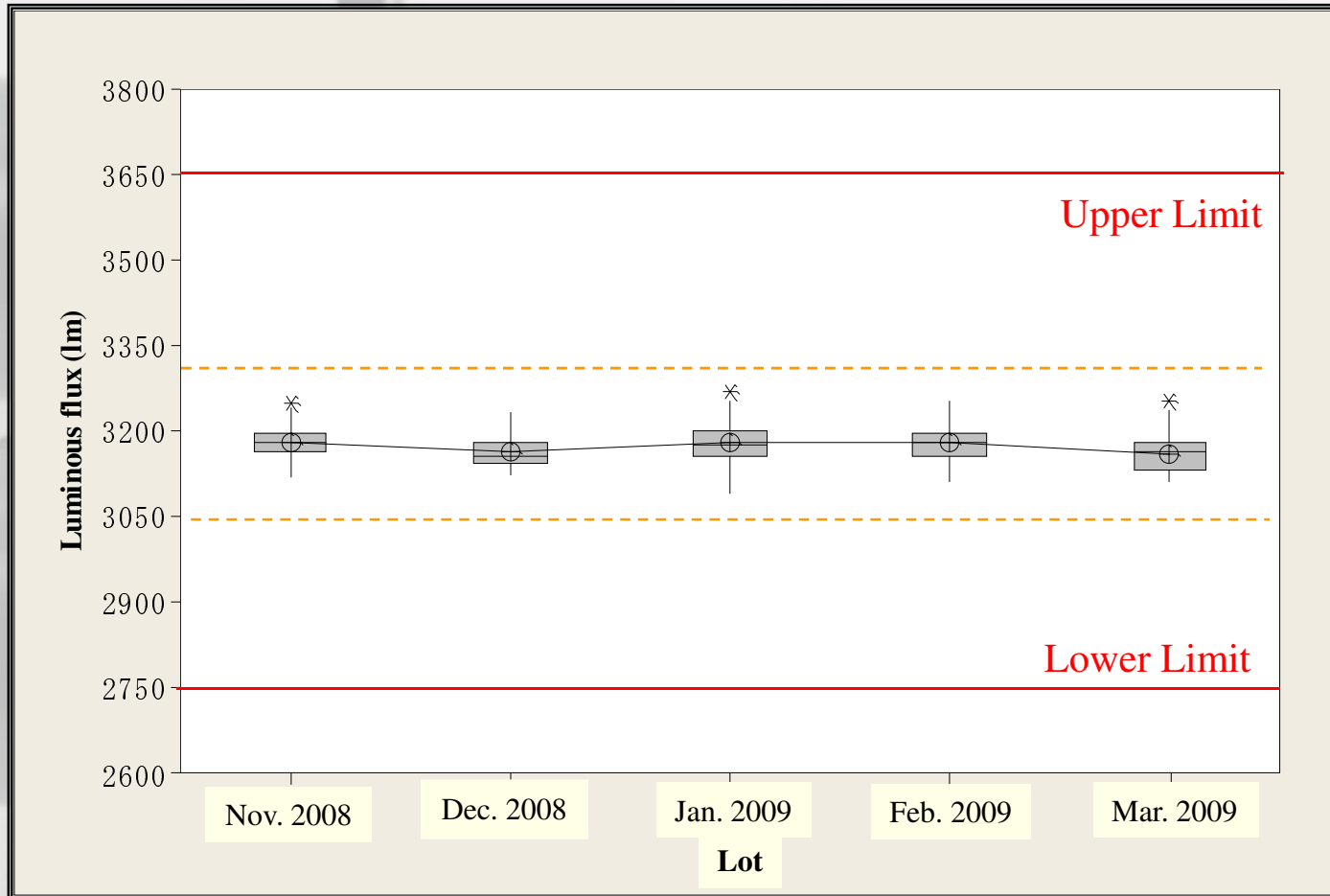


# Monthly D4S characteristics

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## Luminous flux

n=100p



Range of Luminous flux is 3050lm-3300lm.

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# Life Characteristics of D4S

Products		Apr. 2008 (n=12)	May 2008 (n=12)	Jun. 2008 (n=12)	Jul. 2008 (n=12)	Aug. 2008 (n=12)					
<b>L I F E</b>	<b>Our Spec.</b>										
	Weibull Distribution B3 :1500h Tc :2500h	Apr.2008 – Aug.2008 n=60p B3 : 2339 h Tc : 3211 h					O K				
	Lumen Maintenance Over 60% at 2000h	1000h : 89% 2000h : 84% 2500h : 82%	O K	1000h : 89% 2000h : 84% 2500h : 81%	O K	1000h : 88% 2000h : 82% 2500h : 79%	O K	1000h : 90% 2000h : 84% 2500h : 82%	O K	1000h : 87% 2000h : 83% 2500h : 80%	O K
	Colour Co-ordinate x 0.345<=x<= 0.405 at 0-2000h	Max=0.375 Min =0.364	O K	Max=0.375 Min =0.364	O K	Max=0.375 Min =0.364	O K	Max=0.377 Min =0.364	O K	Max=0.372 Min =0.361	O K
	Bulb Voltage Shift <60V at 2000h	Avg =49.7V Max=51.5V	O K	Avg =51.1V Max=52.8V	O K	Avg =51.7V Max=53.0V	O K	Avg =51.5V Max=54.2V	O K	Avg =51.5V Max=53.4V	O K
	Breakdown Voltage <=19kV at 0 ~ 2000h	Max17.5kV	O K	Max17.5kV	O K	Max17.5kV	O K	Max17.5kV	O K	Max17.3kV	O K
<b>Total Characteristic</b>		<b>OK</b>	<b>OK</b>	<b>OK</b>	<b>OK</b>	<b>OK</b>					

**Each lot meet our specification.**

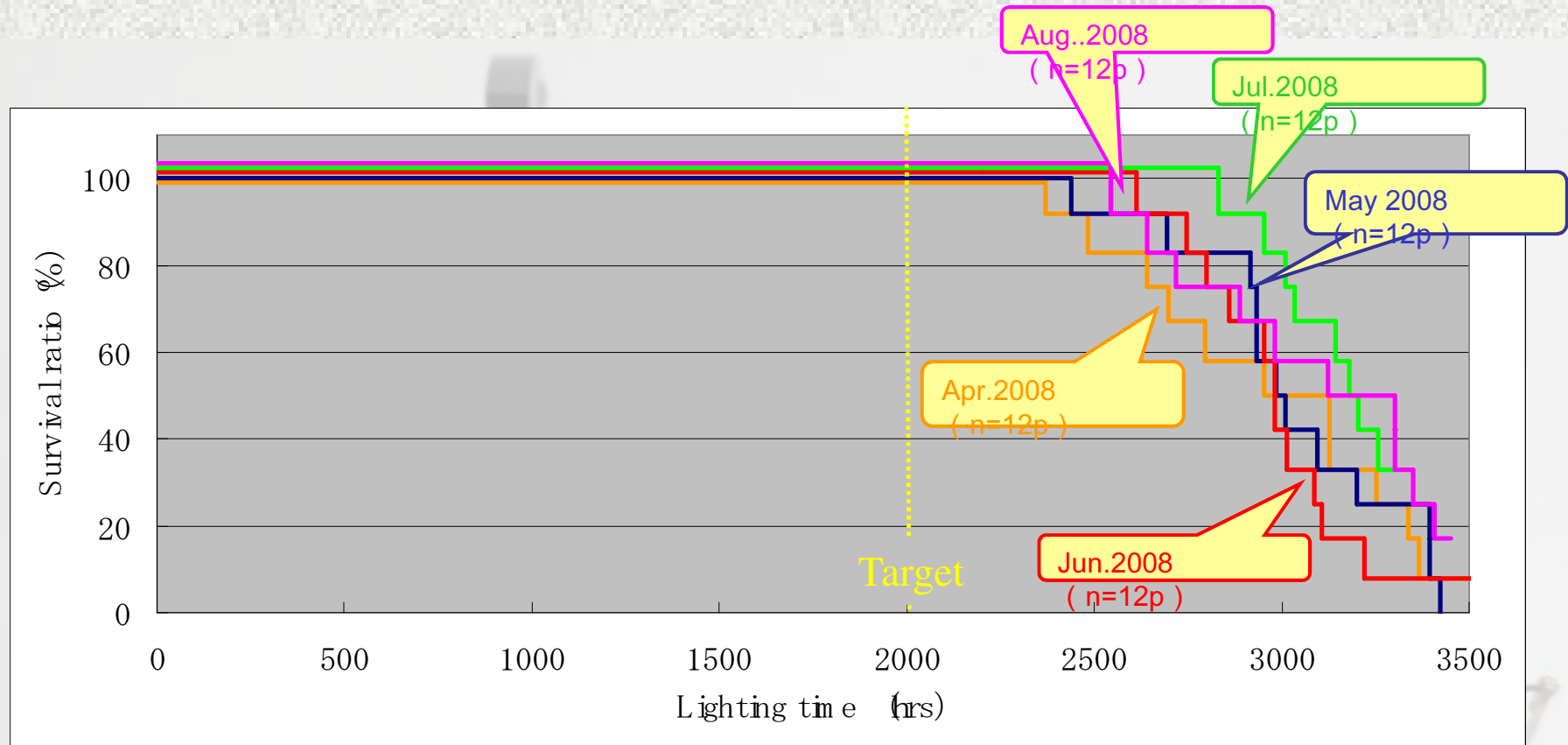


# Bench mark data of D4S

		Ph D4S ( 2007 lot )		Ph D4S (Th- free) ( 2008 lot )		Os D4S ( 2008 lot )		HTL D4S ( 2008 lot )	
Initial	Luminous flux	3280lm	○	2960lm	△	3150lm	○	3200lm	○
	Arc bending (mm)	0.60	○	0.60	○	0.63	○	0.63	○
	Arc diffusion (mm)	0.70	○	0.73	○	0.75	○	0.75	○
	Breakdown voltage	Max > 19kV	×	Max > 19kV	×	Max > 19kV	×	Max < 18kV	◎
	Noise during start time	Max > -80dB	×	-80 ~ 90dB	○	-90dB	◎	-90dB	◎
Life-Time	Weibull distribution ( Gas-leak· Flicker )	B3: 388hr Tc:1141hr	×	B3 : 355hr Tc : 2467hr	×	B3:1693hr Tc : 2957hr	○	B3:2200hr Tc:3190hr	◎
	Lumen maintenance	1000h : 83% 2000h : 69%	○	1000h : 89% 2000h : 86%	◎	1000h : 77% 2000h : 70%	×	1000h : 89% 2000h : 84%	◎
	Colour shift ( Δx )	Max:-0.008	◎	Max : -0.015	○	Max:-0.012	◎	Max:-0.010	◎
	Bulb voltage at 2000hrs ( V )	>60V	×	58V	△	55V	△	50V	◎
	Breakdown voltage	Max > 19kV	×	14 ~ 17.5kV	◎	Max > 19kV	×	14 ~ 17.5 kV	◎



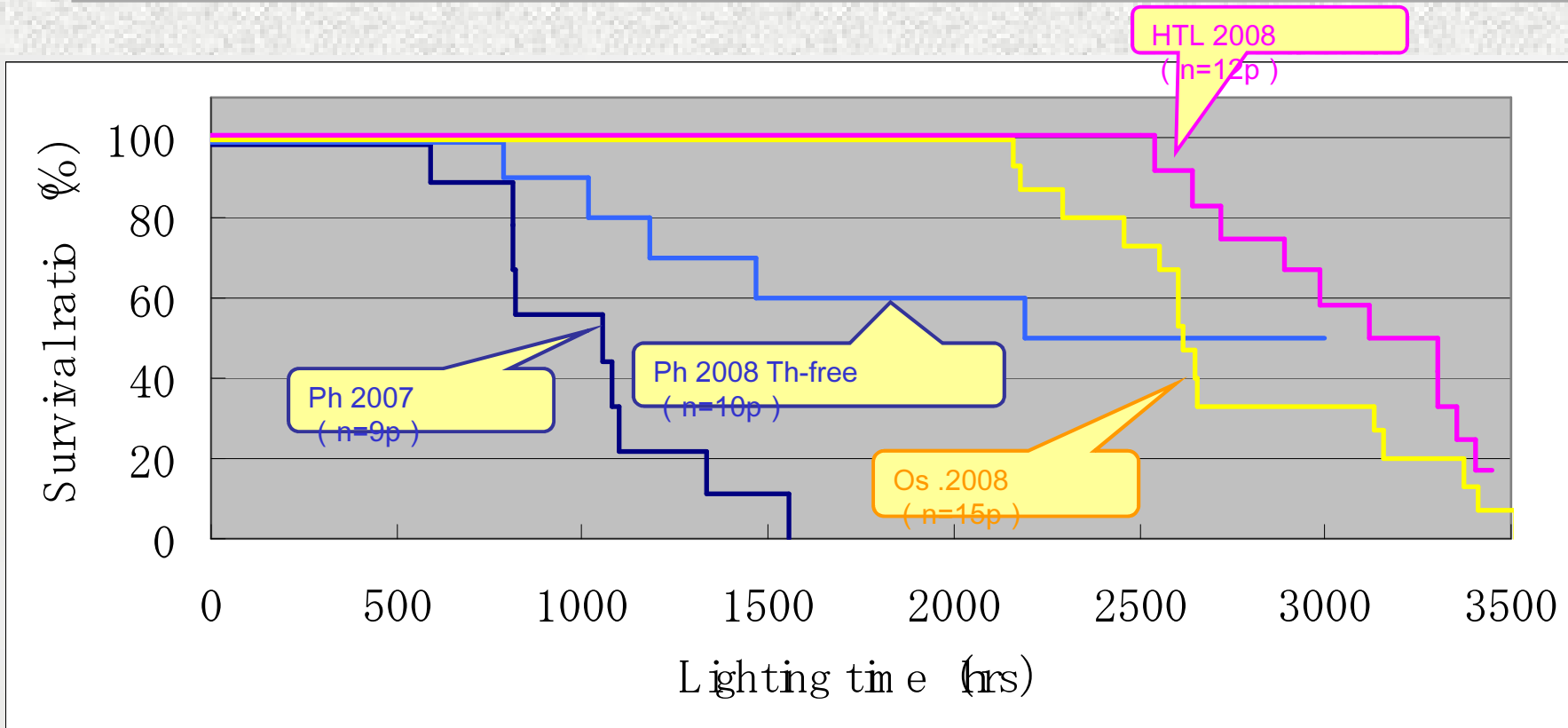
# Survival ratio of D4S



**Our D4S can be alive over 2000hrs.**



# Bench mark (Survival ratio)



**Life time of HTL D4S is longer than those of other competitors.**

