



ACE Royal Tech Inc.

T. 82-31-383-0969 F. 82-2-6230-9269

<http://www.aceroyal.co.kr>

e-mail; marketing@aceroyal.co.kr



Lighting the New World



ACE Royal Tech Inc.

T. 82-31-383-0969 F. 82-2-6230-9269

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Company Profile



ACE Royal Tech Inc.

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Chairman	Bosco Foo (傅佩文)
Capital	NTD 2.83 billion (dt. on 2008)
Sales Revenue	NTD 4.12 billion (Y2007)
Employees	700 (Taiwan) 200 (Shengzeng , China) 250 (Wuhan , China)
Locations	SBIP, Taiwan : Headquarters/R&D Center Chunan fab. Taiwan : LED and Silicon devices Shengzeng factory : chip inspection Wuhan factory :wafer process & chip inspection
Capacity	2200 million chips per month (current) 2600 million chips per month (from Q4/2008)



Milestones



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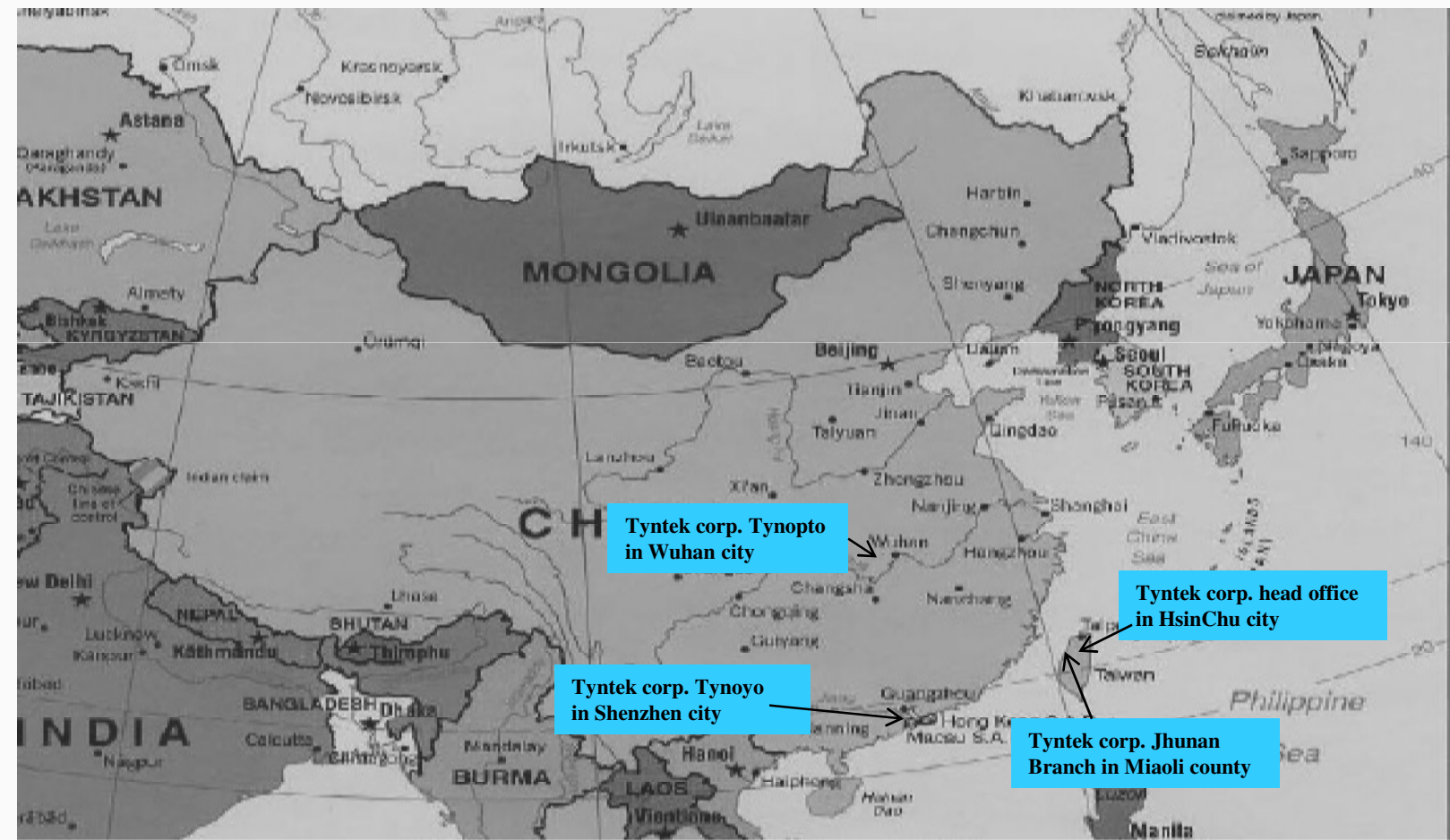
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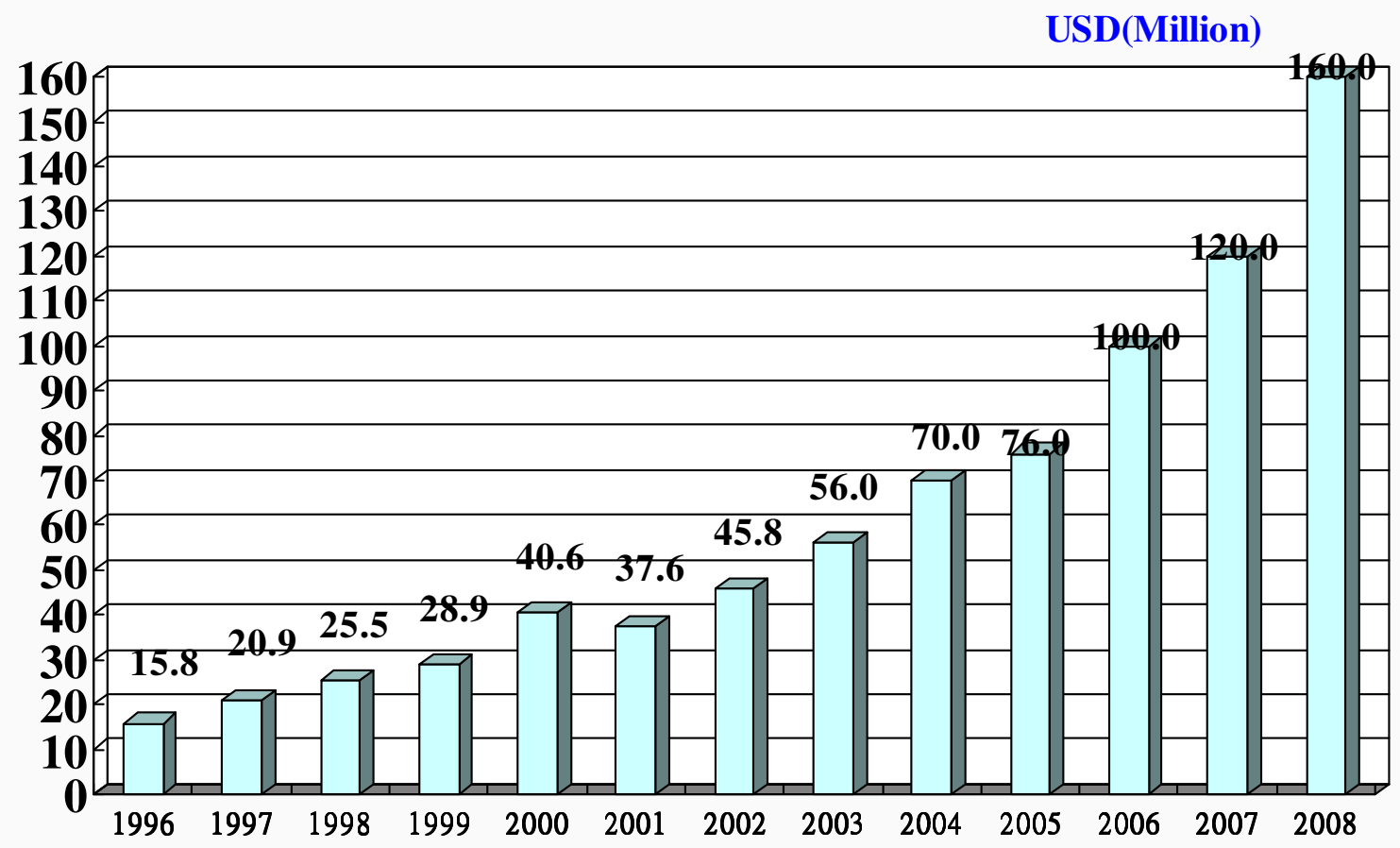
1987/4/4	Founded in SBIP, Hsinchu, Taiwan.
1989/6/17	Technology transferred from Industrial Technology Research Institute .
1997/8/28	Mass Production (Silicon device) .
1998/11/25	ISO 9001 Certificated.
1999/4/25	Chunan factory operation .
2000/9/11	Became GTSM Listed Companies Taiwan.
2003/11/01	QS 9000 Certificated.
2005/01/15	ISO 14001 & OHSAS18001 Certificated.
2006/11/15	TS16949 Certificated.
2007/06/25	Wuhan factory operation .



Business Network



Sales Revenue





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Product - LEDs

❑ VISIBLE

- ❖ GaP Red, Green LED
- ❖ GaAsP Yellow, Orange, Red LED
- ❖ AlGaAs SH, DH, DDH high brightness Red LED
- ❖ AlGaInP Yellow Green, Yellow, Orange, Red, high brightness LED
- ❖ AlGaInP Wafer Bonding Red , Amber LED
- ❖ InGaN Blue, Cyan, Green , UV LED (for OEM projects)

❑ INFRARED

- ❖ GaAs/GaAs 940nm IRED
- ❖ AlGaAs/GaAs 940nm IRED
- ❖ AlGaAs/AlGaAs 850, 870nm , 880nm high power / high speed IRED



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Products - Silicon devices

❑ Photo-Transistor (PT)

- ❖ Photo-coupler
- ❖ Photo-interrupter

❑ Photo-Diode (PD)

- ❖ Standard Type / remote controller
- ❖ High Speed / Sensitivity Type for wireless data communication (IrDA)

❑ Zener-Diode (ZD)

- ❖ Single / Twin / Three Pads for InGaN ESD protection



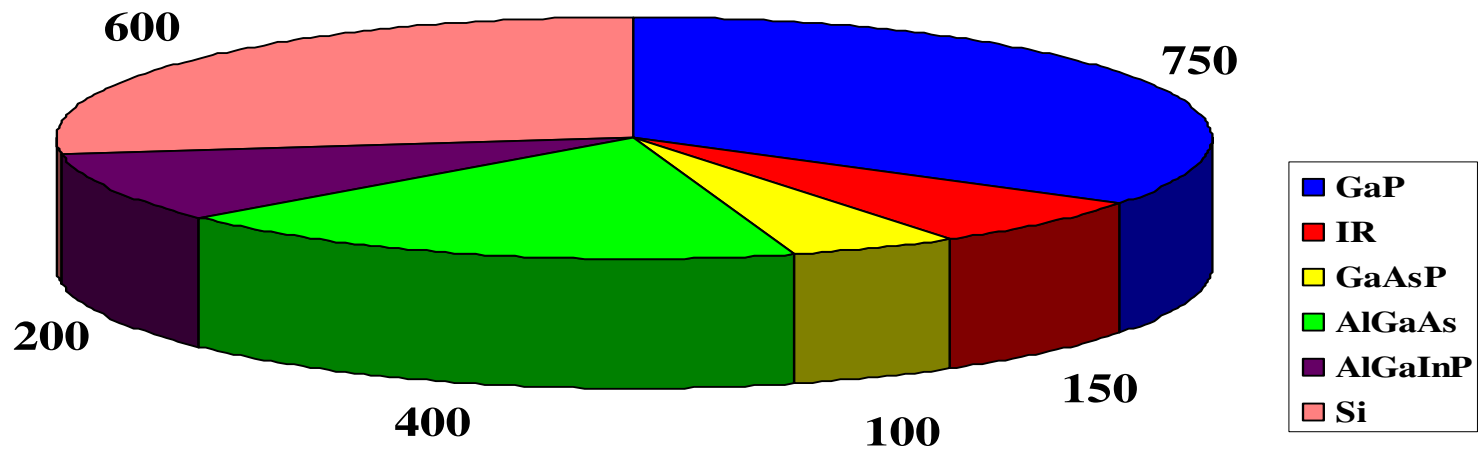
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The distribution of Tyntek's capacity in 2008





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Products - Silicon Device

- Photo diode
- Photo transistor
- Zener diode
- Ambient light sensor
- R.G.B.sensor



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Capacity of Silicon Device

- ❑ Front End Equipment Capacity :
 - ❖ 30 kpcs/m(5'') → 30 kpcs/m(4''/5''/6'') by 4Q'08

- ❑ Back End Equipment Capacity :
 - ❖ 35 kpcs/m(4''/5''/6'') → 40kpcs/m by 4Q'08

- ❑ Testing Equipment Capacity :
 - ❖ 600kk/m → 800kk/m by 4Q'08



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Capacity of Silicon Device

- ❑ Current Capacity : 600kk/m
 - ❖ PD : 50 kk/m
 - ❖ PT : 100 kk/m
 - ❖ ZD : 450 kk/m

- ❑ By Q4 Capacity : 800 kk/m
 - ❖ PD : 60 kk/m
 - ❖ PT : 200 kk/m
 - ❖ ZD : 540 kk/m



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Products Roadmap of Silicon Device

- ❑ PD/PT/Darlington – Red/Blue/UV enhanced , Red/Green/Blue individual & combined , Ambient/Sunlight , High speed , PSD , Multi-elements .
- ❑ Photo Triac & SCR – High sensitivity & High voltage (800V).
- ❑ Zenner Diode – Single & Bi-direction , Multi-elements , Extra low voltage (3V) , Low capacitance , Power .



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Tyntek Ambient light Photo transistor

Conclusion

- ❑ According to the electro-opto characteristic table, TKA124PT have better I_{ceo} , BV_{ceo} and BV_{eco} characteristic.
- ❑ Tungsten/Fluorescent value also shows, TKA124PT have better Infra-red blocking.
- ❑ As the relative spectrum, TKA124PT the responsively is below 20% from 650nm to 1100nm.



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Tyntek Ambient light Photo diode

- ❑ PIN silicon photo diode with IR cut.
- ❑ Chip size: 40mil, 43mil ,60mil , 80mil , 90mil
- ❑ IR cut @ 620nm
- ❑ Peak of wavelength : 620nm , 580nm , 550nm
- ❑ Spectral bandwidth : 400nm-700nm



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Next step Ambient light Sensor

- Ambient silicon photo-Darlington chips apply for high hFE use.
- Sensitivity for IR blocking 3%-5% below (Now 10%).
- Sun light detector.



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Products – Visible LEDs and Infrared LEDs

- GaP
- GaAsP
- AlGaAs
- Infrared LED



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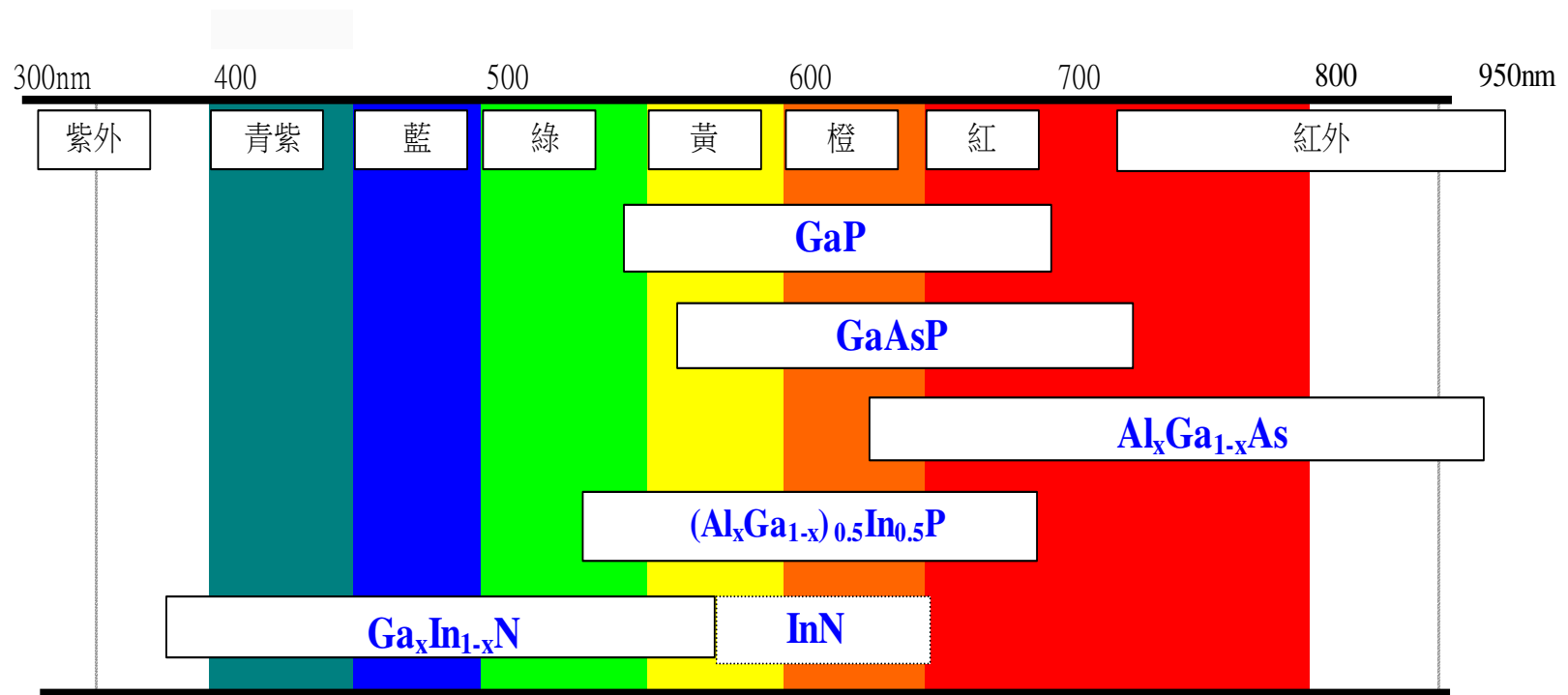
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ASPI 22, 2008

Spectrum range of compound semiconductor LEDs





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Summarize table for GaP & GaAsP

NO	Material	Color	Type	Wd(nm)	Chip size(mil)	Main Application
1	GaP/GaP	Red	RD	610~630	8~11	Lamp,Display
		Pure green	PG	556~564	10~11	"
		Standard green	SG	564~569	10~11	"
		Medium green	MG	567~571	8~12	"
		Yellow green (P-up)	YGU	568~575	7~14	Lamp,Display,SMD
		Yellow green (N-up)	YG	568~575	10~11	Back light Bi-color lamp
2	GaAsP/GaP	Yellow	HY	580~595	7~12,14	Lamp,Display
		Soft orang	SO	600~615	8~12	"
		Orange	HO	614~626	8~12	"
		Red orange	HOD	622~633	7~12	Lamp,Display,Matrix



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Summarize table for AlGaAs red & IR

NO	Material	Color	Type	Wd(nm)	Chip size(mil)	Main Application
3	AlGaAs	Red	SR	635~648	8~11	Lamp,Display,Matrix
		Deep red	NR	640~660	8~11	Lamp,display
		Red	DR (N-up)	635~648	10~12	Lamp,Display,Matrix
		Red	DR (P-up)	635~648	10,11	Lamp,Display
		Red	UR	635~648	12,14	Lamp
		Red	URL	635~648	12,24,40	Lamp
4	IR	GaAs/GaAs	IRG	940	9~12	Photo-coupler
		AlGaAs/GaAs	IRA	940	9~12,14,24,40	Remote control.
		AlGaAs/AlGaAs	IRP	850	10~14,16,24,40	Lamp
		AlGaAs/AlGaAs	IRS	870	12,14,16,	IrDA
		AlGaAs/AlGaAs	IRP (N-up)	880	11,13	Lamp



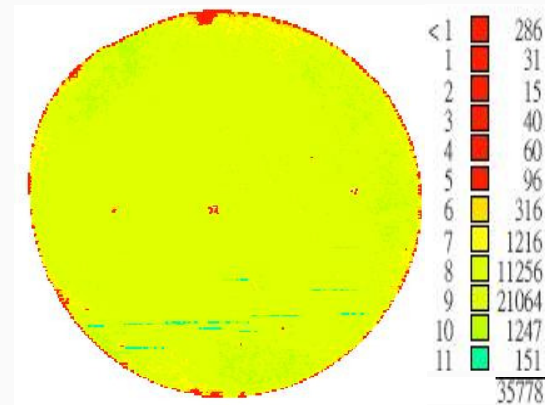
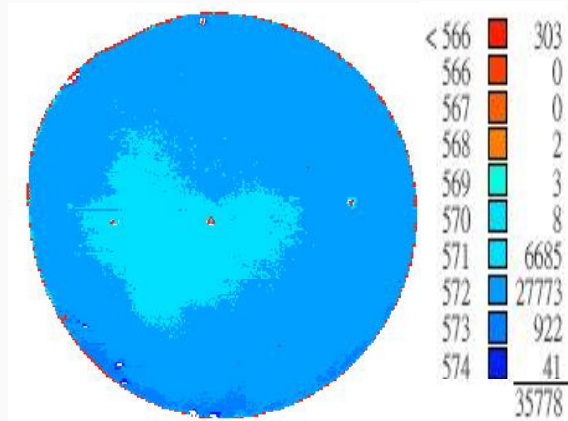
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Good uniformity for GaP product



□ Good LOP & WLD uniformity for display use.

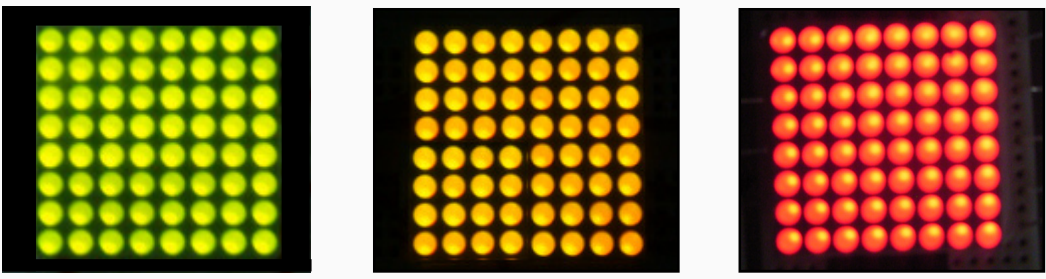
- ❖ High yield rate for production line
- ❖ Higher than 98% for display use, Matrix might higher than 95%.
- ❖ Chip size from 7 mil to 14 mil
- ❖ More choice for :
- ❖ Backlight (4 side roughing and 5 side wall roughing)
- ❖ SMD (Thickness : 6 ± 1 mil, 7 ± 1 mil, 8 ± 1 mil)



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Good uniformity for dual color matrix



Green 單色示意 2 colors 混色示 red 單色示意

Dual color matrix solution :

570 nm (YGM) 配對 **628 nm (HOD)**

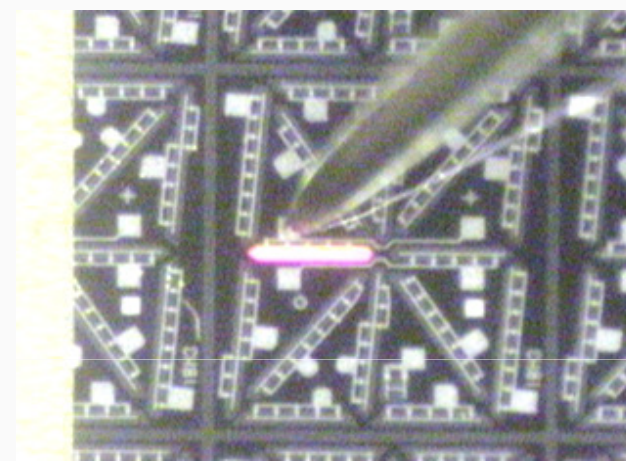
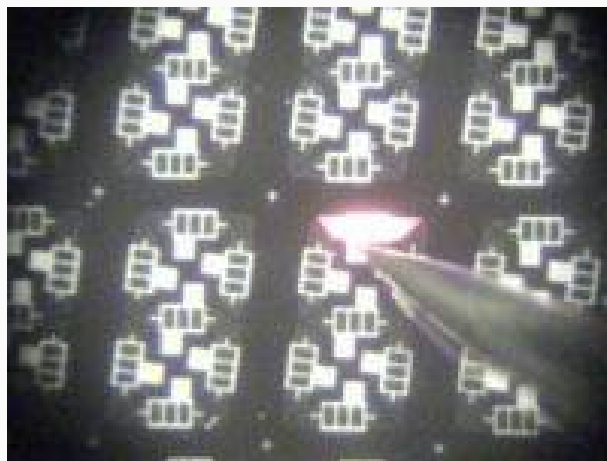
570 nm (YGM) 配對 **640 nm (SRM)**

exact spec. of RED and GREEN

For ex. YGM :

$V_f \text{ std} \leq 0.03 \text{ V}$, $I_v \text{ C.V.} \% \leq 8 \%$, $\text{WLD max-min} \leq 2 \text{ nm}$

Monolithic chips for GaAsP product



- ❑ 7 segment or others. => 1 chip화
- ❖ Color from 640nm ~ 660nm.
- ❖ 100% segment control available for :
- ❖ LOP, Forward voltage, Leakage current, Reverse voltage.
- ❖ Special chip size design. => custom design



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IR product in TYNTEK

□ Advantage :

- ❖ Good mass production ability and capability
- ❖ High power performance around IR chip competitors
- ❖ Best infrared LED chips from qualified epi source .



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IR product :

- 940 nm GaAs/GaAs IRED
- 940 nm AlGaAs/GaAs IRED
- 850 nm/870nm AlGaAs/AlGaAs IRED
P-up & N-up DDH structure
- 880nm AlGaAs/AlGaAs IRED
- Others IRED



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940 nm GaAs/GaAs IRED

□ Advantage :

- ❖ Low Vf control $\leq 1.30V$ (9 mil)
- ❖ High power performance 1.0 mW~ 1.45mW (9 mil)
- ❖ Special high Vbr type available : Vr (10uA) $\geq 20V$ control.

□ Application:

- ❖ Photo coupler, Remote control (short distance)
- ❖ Standard: TK109IRG, TK110IRG, TK111IRG, TK112IRG
- ❖ Special : TK108IRG.





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940 nm AlGaAs/GaAs IRED

□ Advantage:

- ❖ High power performance ≥ 1.6 mW/sr (12 mil)
- ❖ Stable Vf control ≤ 1.70 V (250mA,10ms pulse) (12 mil)

□ Application:

- ❖ Remote control (short / long distance), ,IrDA module
- ❖ Standard: TK109 IRA,TK111IRA,TK112IRA(for Wii),TK114IRA
- ❖ Special : TK108IRA



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850 nm/870nm AlGaAs IRED

P-up & N-up DDH structure

□ Advantage :

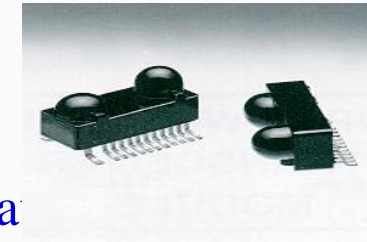
❖ Best power performance (Min \geq 3.8 mW/sr a

□ Application:

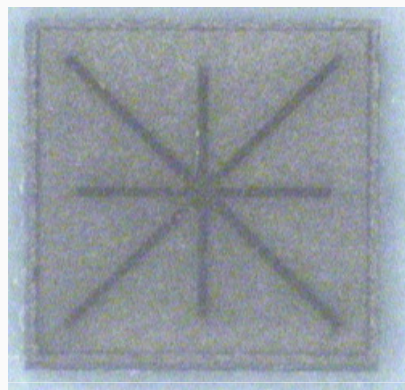
❖ CDD night vision system, IrDA module

❖ Standard : 12, 14, 16, 24, 40 mil

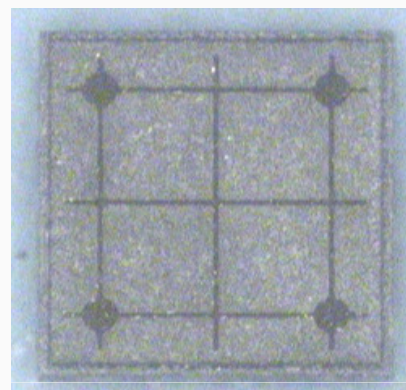
❖ ETC system : Super low voltage type 870nm



High power Infrared product (40 mil)



Type A

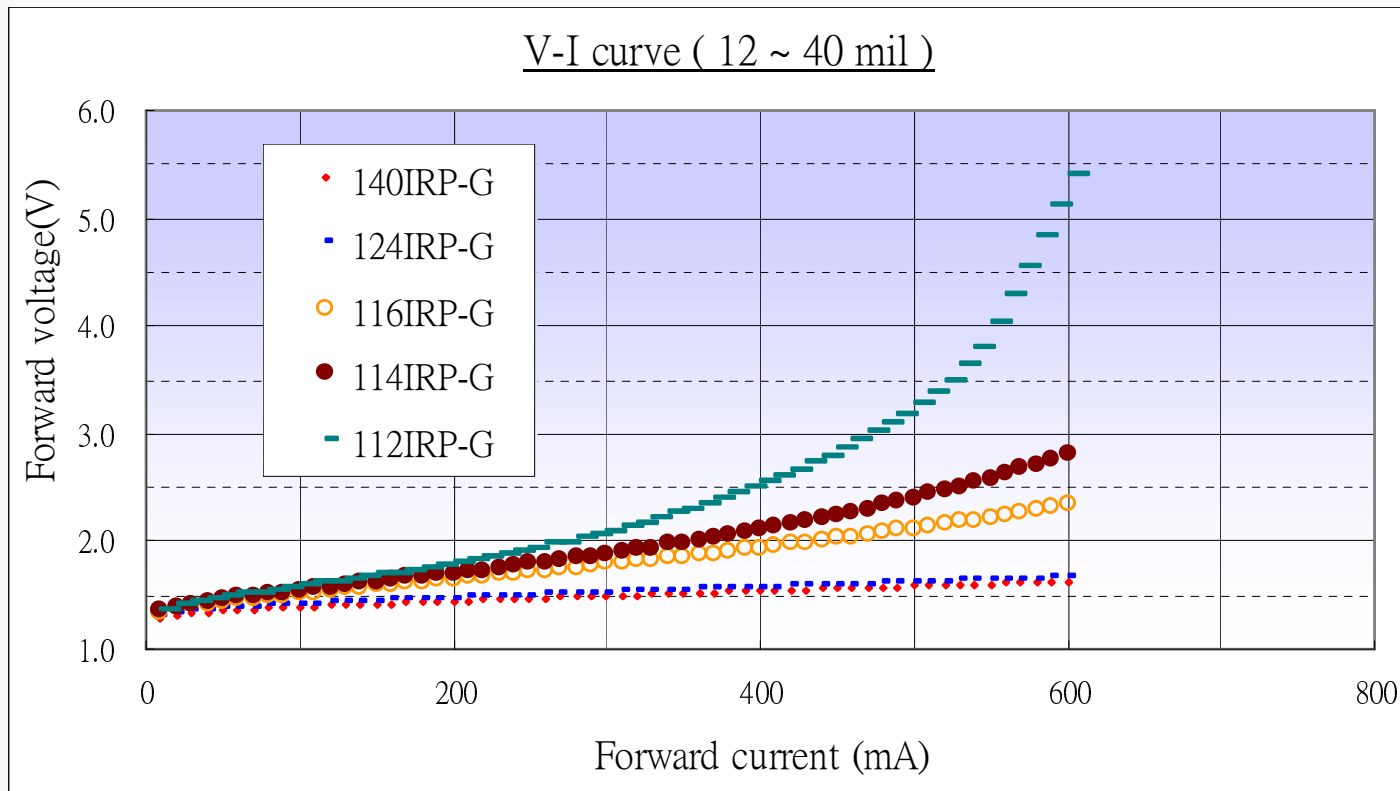


Type B

	Type A			Type B		
	Vf (V)	Po (mW/Sr)	WLP (nm)	Vf (V)	Po (mW/Sr)	WLP (nm)
Min	1.322	5.053	844.2	1.323	4.868	843.6
Avg	1.325	5.312	845.4	1.325	5.355	844.6
Max	1.329	5.489	848.7	1.326	5.793	846.6
Std	0.002	0.126	1.447	0.001	0.301	1.058

Design for mobile night vision system or high current use (above 2A design is available with type B)

V-I Characteristics curve (0 ~ 600 mA)





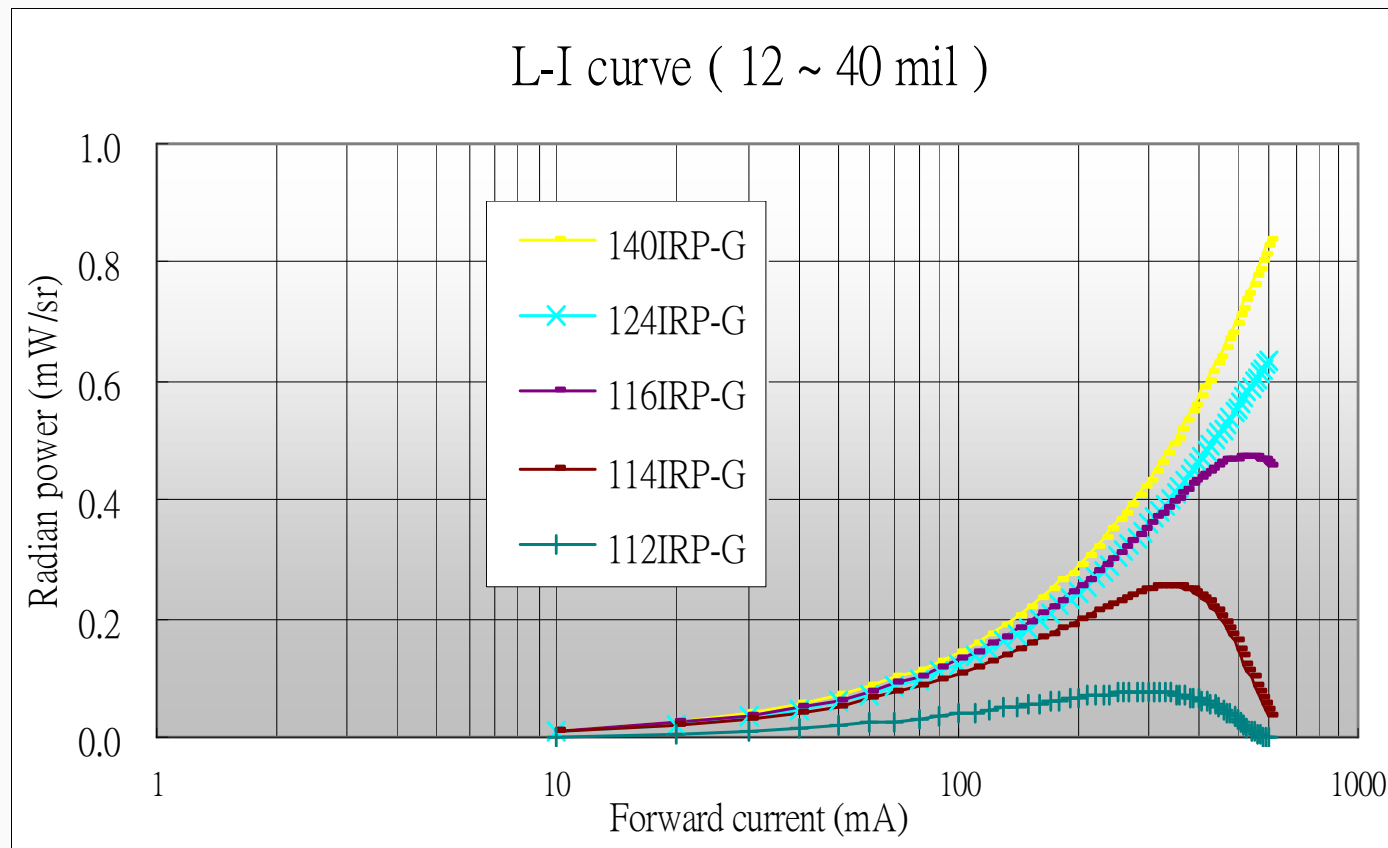
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L-I Characteristics curve (0 ~ 600mA)





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- ❑ AlGaAs/AlGaAs N-up 880 nm IRED
- ❑ Application : Copy machine, smoke detector
- ❑ Wavelength : 880 nm
- ❑ Standard: 11mil, 13 mil



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- ❑ Others IRED AlGaAs/AlGaAs N-up
- ❑ Application : by customer
- ❑ Wavelength : 730 nm, 780nm, 830nm, 910nm
- ❑ Standard: 13mil,14 mil



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Products – Visible LEDs for High brightness

 AlInGaP

-- C.C. Yu --



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Quaternary AlGaInP in TYNTEK

- ❑ In 2007, Tyntek produce 200kk/M quaternary AlGaInP(AS&WB)
- ❑ Under the strong support of Hitachi material, In 2008, Tyntek quaternary AlGaInP sale target is 300kk/M



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Strong Relation with Hitachi

© Hitachi Cable

Messrs. TYNTEK CORPORATION

Cooperation of Epi-wafer Supplies

On the basis of long-term mutual cooperation business relationship between Tyntek Corporation and Hitachi Cable, Ltd. Hitachi makes best efforts to stably supply its epi-wafer (AlGaAs & AlGaInP) to Tyntek Corporation and will provide its best price (under the terms of same or similar epi-wafer in similar quantities), quality and quantity to Tyntek Corporation efficiently.

Sincerely Yours,

M. Fujii

Masakazu Fujii

General Manager

Semiconductor Materials & Packaging Dept.

Kansai Regional Operation

Hitachi Cable Ltd.

Date: October 25, 2007



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No patent infringement

Hitachi Cable
Empowering Energy & Communication

Takasago Works, 880, Isagozawa-cho, Hitachi-shi, Ibaraki-ken, 319-1418 JAPAN
Tel: +81-294-42-5025 Fax: +81-294-42-6410

May 23, 2007

TYNTEK CORPORATION
16 Industry E. Rd. IV.
Science-Based Industrial Park
Hsinchu 300
Taiwan, R.O.C.

Dear Sir/Madam,

With respect to 4-elements Epi Wafer (AS Type) that we manufactured or manufacture for you (the "Product"), we hereby agree as follows:

1. Subject to the terms below, we will defend, indemnify and hold you harmless against any and all damages, costs, liabilities, expenses (excluding attorneys' fees) and settlement amounts incurred in connection with any suit, claim, or action by any third party alleging that the Product infringes such third party's patent or copyright.
2. The foregoing indemnity obligation shall not extend to any claims of infringement arising out of or related to (i) any modification of or addition to the Product by anyone other than us or our authorized representatives; (ii) any combination of the Product with any third party product where such combination is the cause of such infringement; or (iii) our compliance with your design, pattern or specifications for the Product.
3. Our obligation to indemnify hereunder is subject to you (a) giving us prompt written notice of any such claim; (b) giving us sole control over the defense and settlement of any such claim; (c) providing full cooperation for the defense of any such claim; and (d) not entering into any settlement or compromise of any such claim without our prior written approval. Upon notice of an alleged infringement or if in our opinion such a claim is likely, we shall have the right, at our sole option and expense, to (x) obtain for you the continuing right to use the Product; or (y) modify the Product or substitute other non-infringing product with similar properties.
4. THE FOREGOING SETS FORTH OUR SOLE AND EXCLUSIVE LIABILITY AND YOUR SOLE AND EXCLUSIVE REMEDIES FOR INFRINGEMENT BY THE PRODUCT OF THIRD PARTY PATENT OR COPYRIGHT.

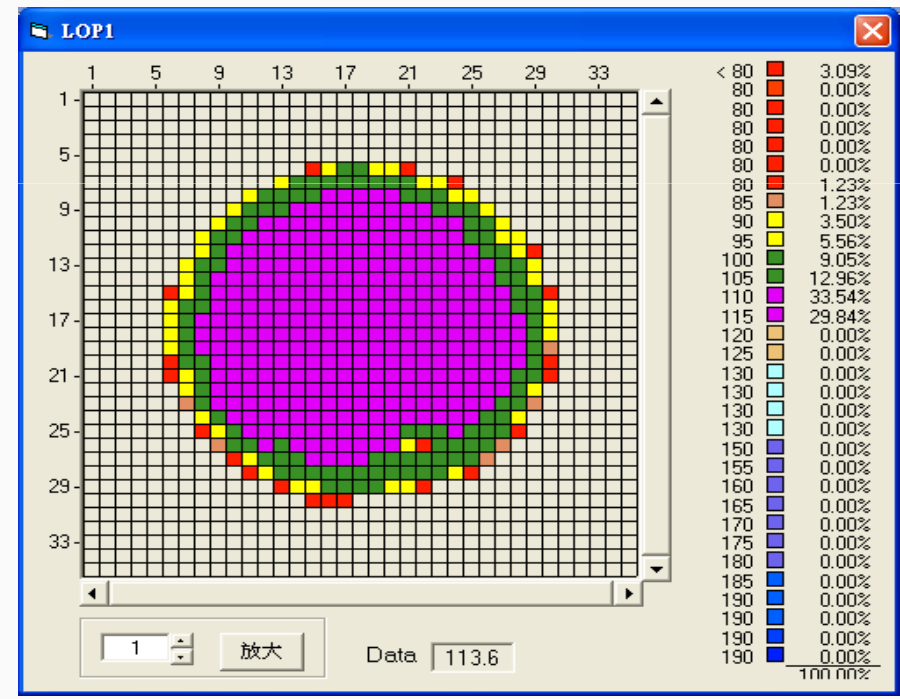
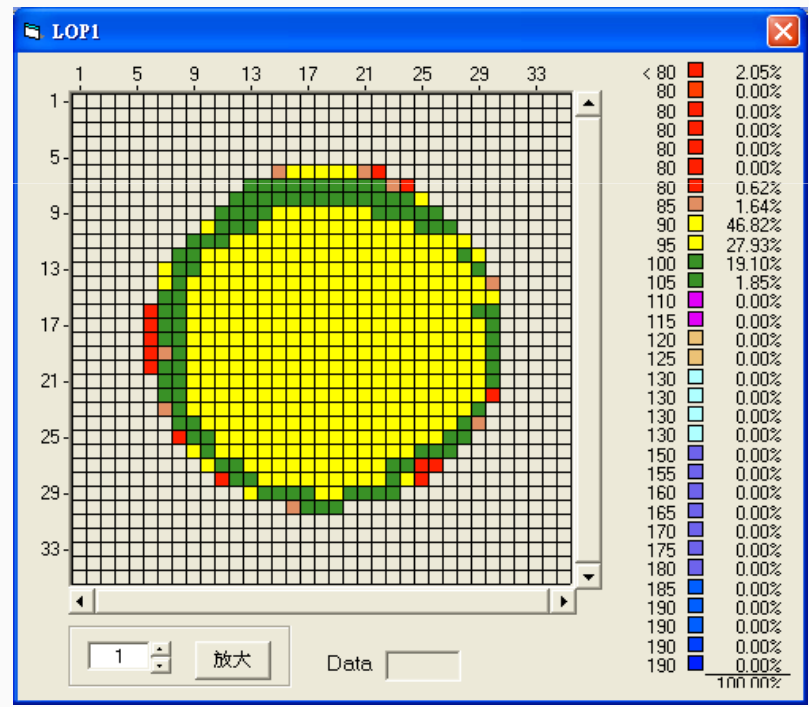
Sincerely yours,

for Eiichi Hunitake
Yukio Sasaki
General manager
Compound Semiconductor Production Div.

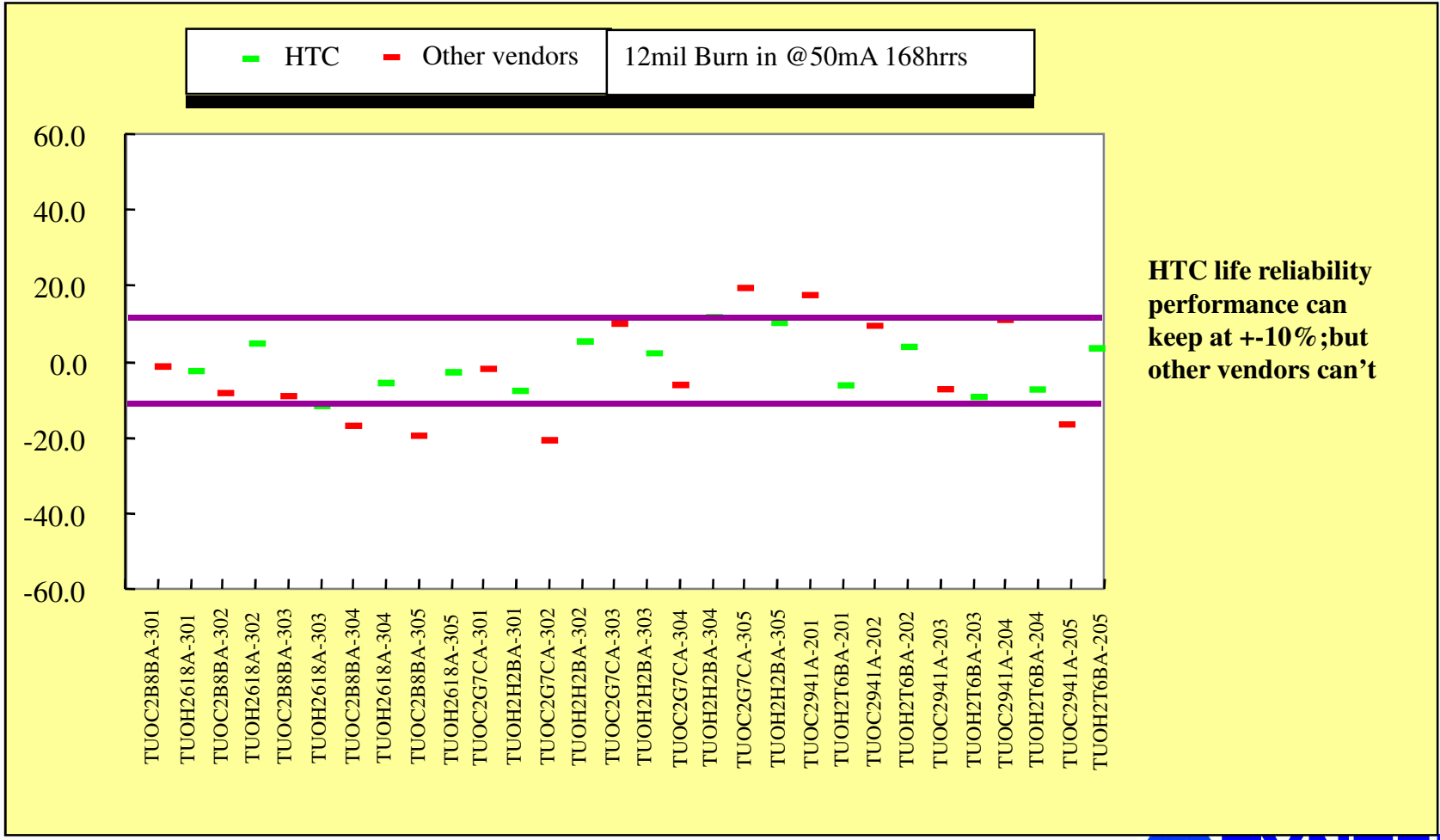
Strength in AS-better uniformity

<i>Iv distribution within wafer---Hitachi $\pm 5\text{mcd} \sim 5\%$

compare with other vender within wafer-- $\pm 10\text{mcd} \sim 10\%$



Better reliability





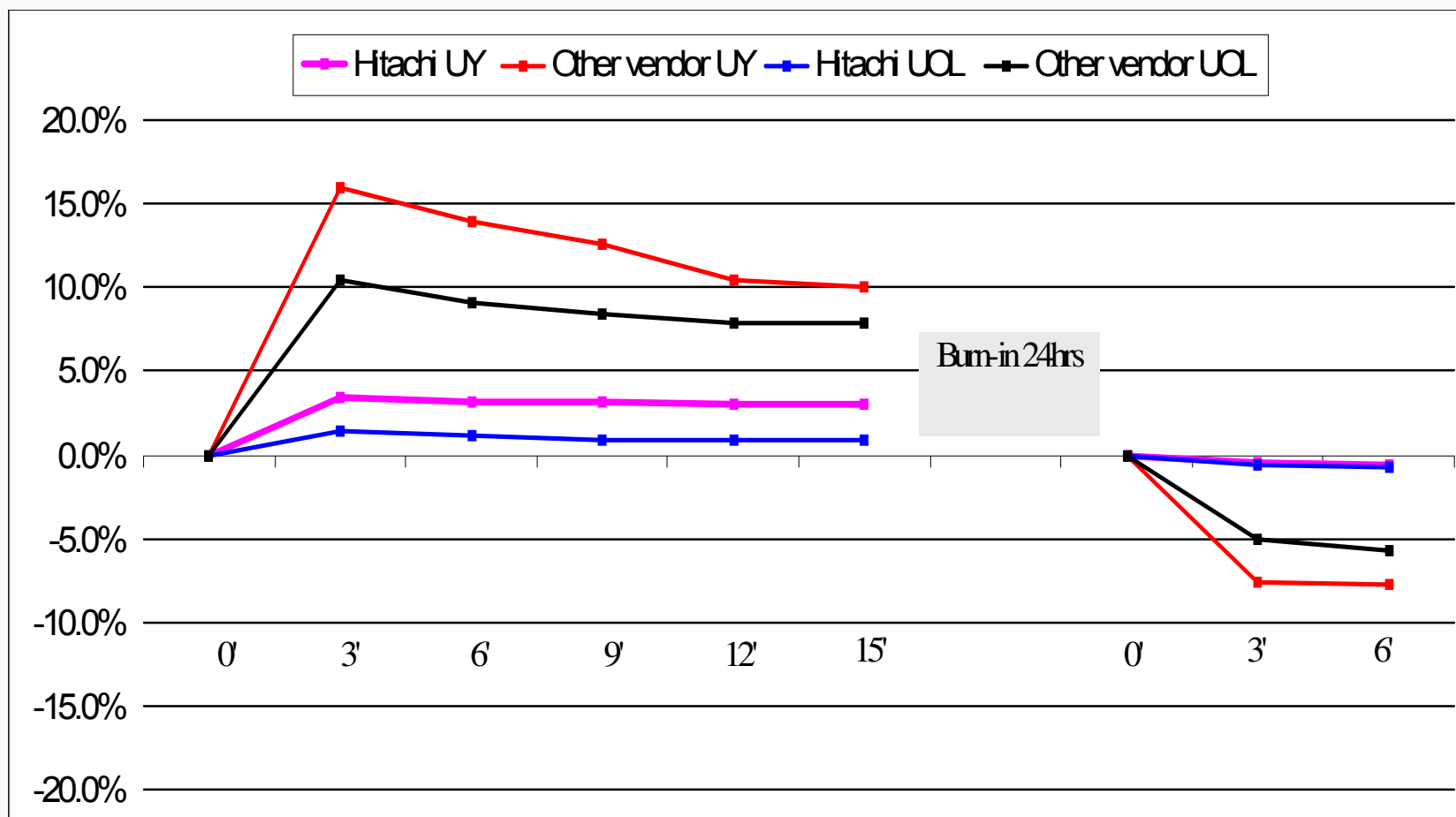
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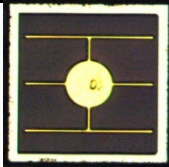
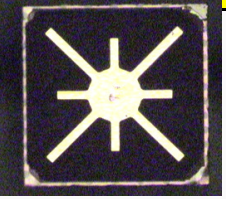
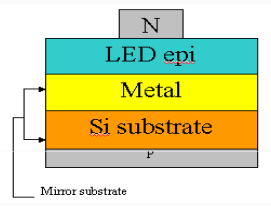
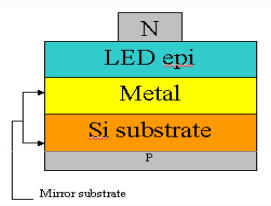
Better Iv stability






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Products – Visible LEDs for Ultra High brightness

Product Type	5xx U □ T-series	5xx U □ H-series	
Top-view Appearance			
Epi source	Hitachi	Vpec.	
Manufacturing method			
	Metal-bonding(WB)	Metal-bonding (WB)	
Die Size/W _d range/Product code/Typ brightness@20mA	9/ 12/14 mil	9/12/14/20/30/40/45/60mil	
	588/ 623nm	588/ 605/618/624/650nm	
	UYT/UOT	UYH/YOH/SOH/UOH/DRH	
Allowable currents	50/70/70mA	30/70/70/150/350/350/700/700 mA	
Emitting Pattern	Axial light	Axial light	



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<http://www.aceroyal.co.kr>

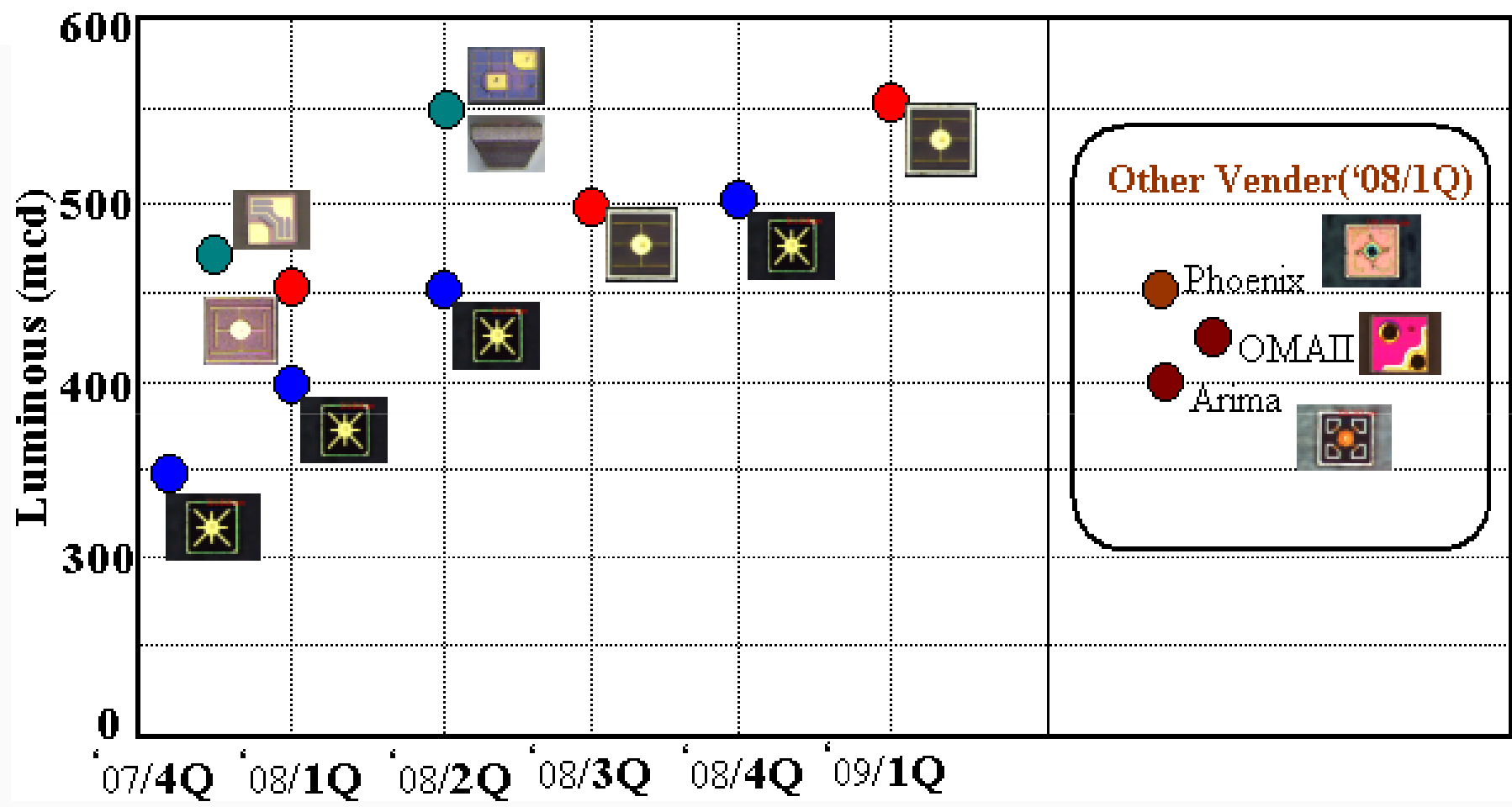
e-mail; marketing@aceroyal.co.kr

	5xx U□T -series	5xx U□H-series	
ESD	High (HBM~2000 V)	medium (HBM~1000 V)	
Reliability	514UOT/UYT 70mA 1000hours<20%	515UOH/UYH 70mA 1000hours<20%	
Iv –screening method	100% probing	100% probing	
Patent .	Under the patent license agreement with LumiLeds Ligating,U.S	American No.6287882 Japan. No.3460019	
Advantage	Higher ESD NO IP issue	Better dissipation NO IP issue	
Disadvantage (Quality issues)			

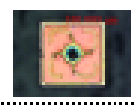







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Other Vender('08/1Q)

- Phoenix 
- OMAI 
- Arma 

(Chip size=14mil ; WLD=624nm)

- VPEC
- Hitachi
- Showa
- Other vender





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Strength of Tyntek

❑ Wide Range Opto-Electronic Products

- ❖ LEDs & Si Devices
- ❖ Total product solution

❑ High Volume Production Capability

- ❖ 2600 million pcs chips/month (Q4 Y2008)
- ❖ Flexibility in manufacturing

❑ Good Quality

- ❖ ISO 9001 & QS9000 & ISO 14001 and TS-16949 Approved system
- ❖ Products with conformable quality



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Strength of Tyntek

- ❑ **Resources Integration**
 - ❖ **Ensure customers always get what they need**

- ❑ **Strong Developing & Engineering Capacity**
 - ❖ **Well educated & experienced engineers**
 - ❖ **Cooperate with R&D institutes & universities**
 - ❖ **Customized products**



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