Welcome to the 22nd Annual IEEE SW Test Workshop

IEEE

IEEE COMPONENTS, PACKAGING AND
MANUFACTURING TECHNOLOGY SOCIETY

Jerry Broz, Ph.D.

SW Test General Chair

SWTW

IEEE SW Test Workshop
Semiconductor Wafer Test Workshop
June 10 - 13, 2012 | San Diego, California

Twenty-Two Years of Probe Technology

Many thanks to all of the 5000+ attendees from around the world !

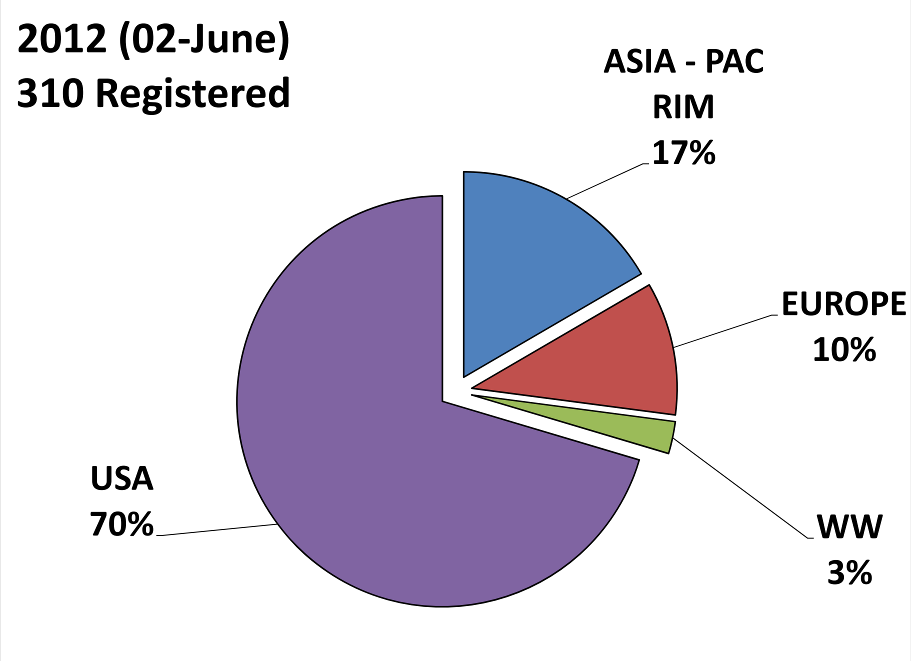
IEEE SW-Test Workshop

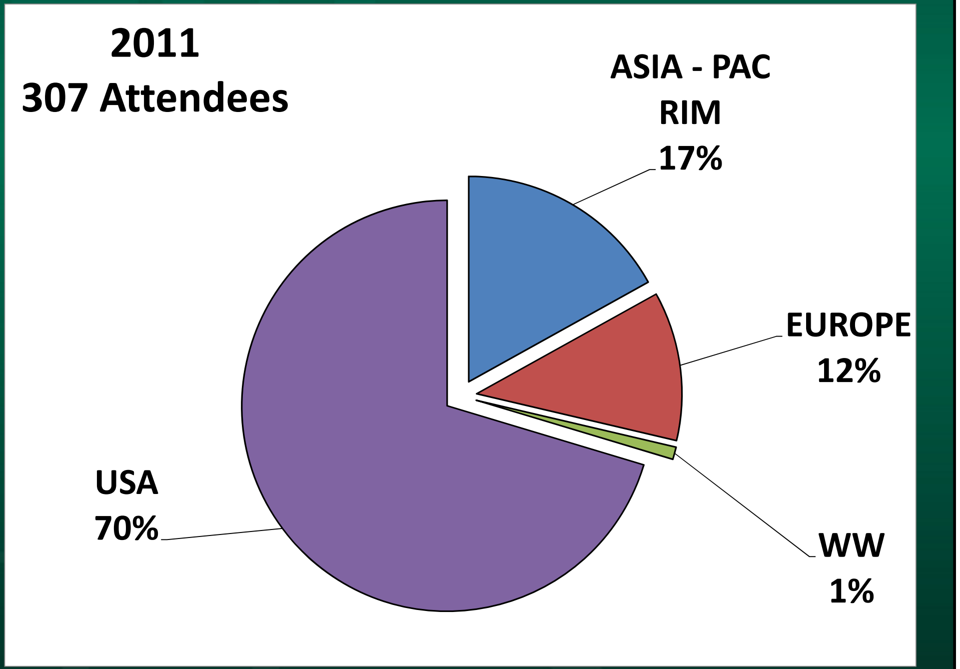
- **SW Test IS a Probe Technology Forum …**
  - It is "***THE***" Conference for Wafer Test Professionals
  - Practical solutions to real problems
  - A balance mixture of semiconductor manufacturer and supplier presentations

- **Informal Conference …**
  - Grass roots workshop focused technical exchange
  - Great social activities and informal discussions
  - Meet new people and have a little fun !

- **Adopting a "Green Initiative" …**
  - E-Proceedings and enviro-friendly practices

Attendance is UP !





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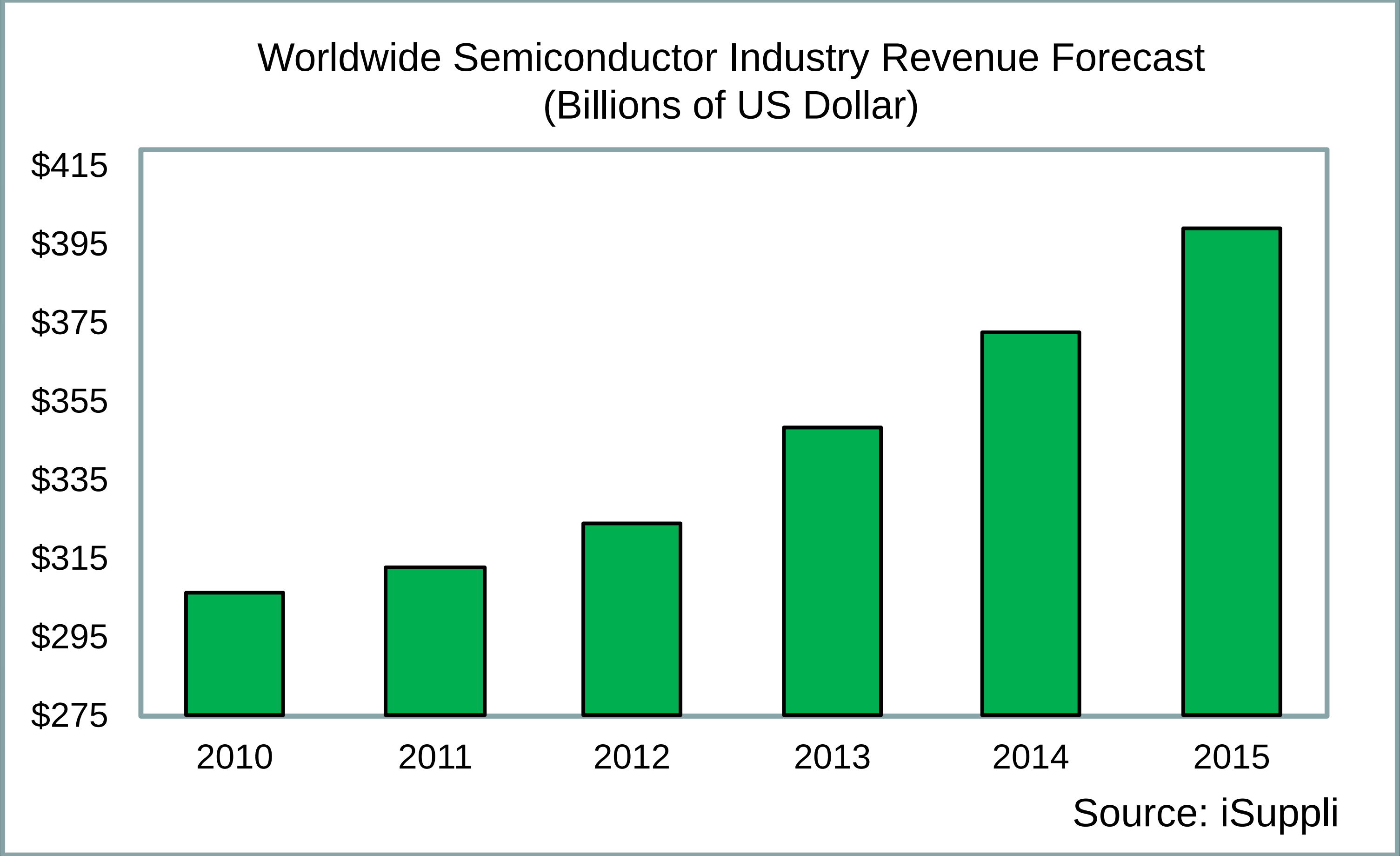
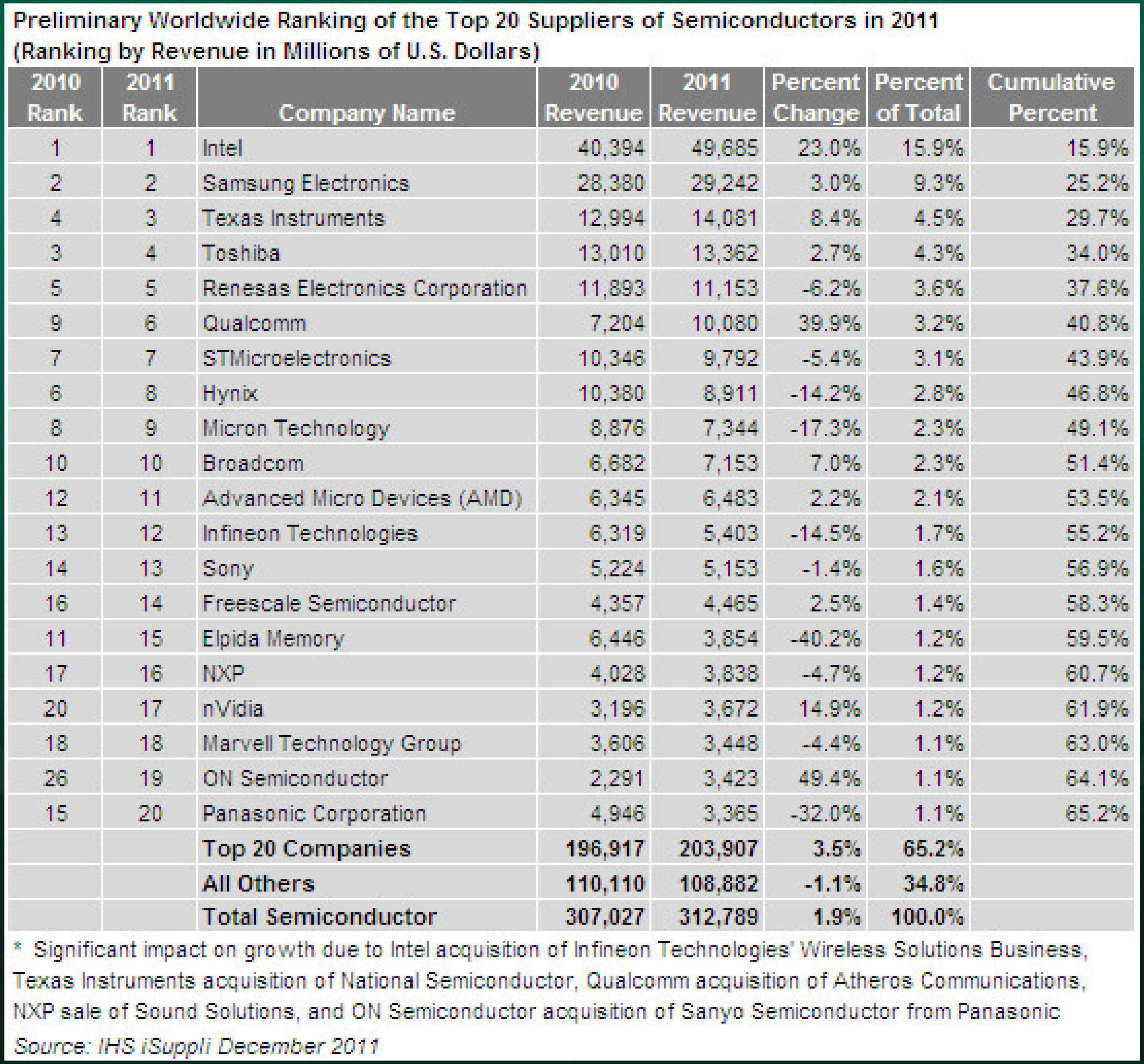
Semiconductor Revenue is Up !



Source: iSuppli

Top 20 IC Suppliers in 2011



Preliminary Worldwide Ranking of the Top 20 Suppliers of Semiconductors in 2011
(Ranking by Revenue in Millions of U.S. Dollars)

2010 Rank	2011 Rank	Company Name	2010 Revenue	2011 Revenue	Percent Change	Percent of Total	Cumulative Percent
1	1	Intel	40,394	49,685	23.0%	15.9%	15.9%
2	2	Samsung Electronics	28,380	29,242	3.0%	9.3%	25.2%
4	3	Texas Instruments	12,994	14,081	8.4%	4.5%	29.7%
3	4	Toshiba	13,010	13,362	2.7%	4.3%	34.0%
5	5	Renesas Electronics Corporation	11,893	11,153	-6.2%	3.6%	37.6%
9	6	Qualcomm	7,204	10,080	39.9%	3.2%	40.8%
7	7	STMicroelectronics	10,346	9,792	-5.4%	3.1%	43.9%
6	8	Hynix	10,380	8,911	-14.2%	2.8%	46.8%
8	9	Micron Technology	8,876	7,344	-17.3%	2.3%	49.1%
10	10	Broadcom	6,682	7,153	7.0%	2.3%	51.4%
12	11	Advanced Micro Devices (AMD)	6,345	6,483	2.2%	2.1%	53.5%
13	12	Infineon Technologies	6,319	5,403	-14.5%	1.7%	55.2%
14	13	Sony	5,224	5,153	-1.4%	1.6%	56.9%
16	14	Freescale Semiconductor	4,357	4,465	2.5%	1.4%	58.3%
11	15	Elpida Memory	6,446	3,854	-40.2%	1.2%	59.5%
17	16	NXP	4,028	3,838	-4.7%	1.2%	60.7%
20	17	nVidia	3,196	3,672	14.9%	1.2%	61.9%
18	18	Marvell Technology Group	3,606	3,448	-4.4%	1.1%	63.0%
26	19	ON Semiconductor	2,291	3,423	49.4%	1.1%	64.1%
15	20	Panasonic Corporation	4,946	3,365	-32.0%	1.1%	65.2%
		Top 20 Companies	**196,917**	**203,907**	**3.5%**	**65.2%**	
		All Others	**110,110**	**108,882**	**-1.1%**	**34.8%**	
		Total Semiconductor	**307,027**	**312,789**	**1.9%**	**100.0%**	

* Significant impact on growth due to Intel acquisition of Infineon Technologies' Wireless Solutions Business, Texas Instruments acquisition of National Semiconductor, Qualcomm acquisition of Atheros Communications, NXP sale of Sound Solutions, and ON Semiconductor acquisition of Sanyo Semiconductor from Panasonic

Source: IHS iSuppli December 2011

Counterfeit Parts are UP !

- **Top 5 Most Counterfeited Parts Represent a $169 Billion Potential Challenge for Global Semiconductor Market**

RANK	COMMODITY TYPE	% of REPORTED INCIDENTS
1	Analog IC	25.2%
2	Microprocessor IC	13.4%
3	Memory IC	13.1%
4	Programmable Logic IC	8.3%
5	Transistor	7.6%

Source: IHS Parts Management

WSTS Lost Two Key Members

- **World Semiconductor Trade Statistics (WSTS) gathers data about unit sales and revenues from member companies in the U.S., Asia and Europe.**

- **Intel and Advanced Micro Devices (AMD) withdrew from WSTS in 1Q2012**

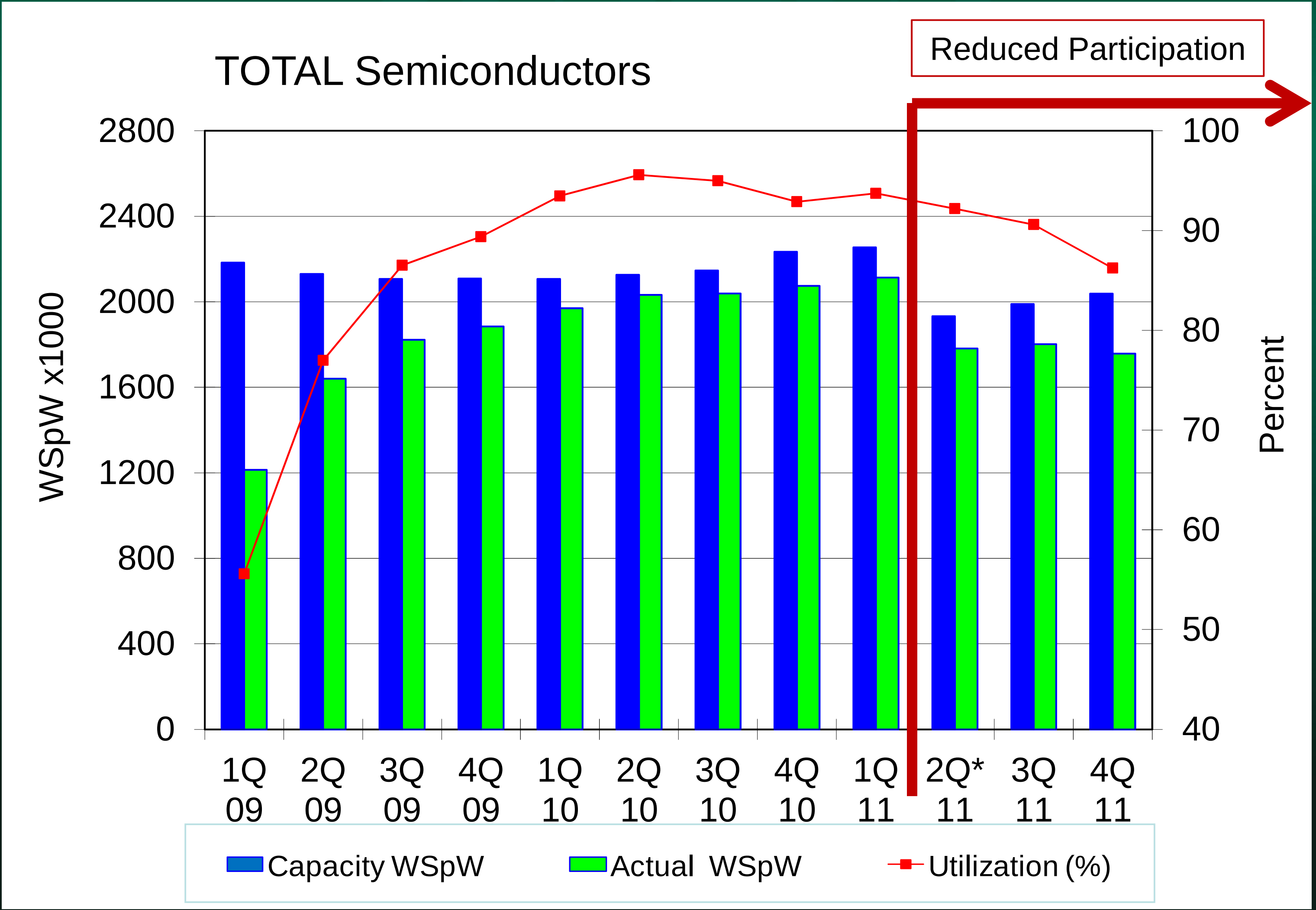
- **Without Intel and AMD, it will be extremely difficult for WSTS to report accurate statistics for microprocessors.**
  - Intel and AMD accounted for over 90% of the microprocessor market and microprocessors account for about 15% of the semiconductor market.
  - WSTS may need to drop microprocessors from its product coverage, which would result in WSTS no longer being a reliable source on overall semiconductor market.

- **Data from WSTS and Semiconductor Industry Association, or SIA, are used by Wall Street as an indicator of the market's health.**

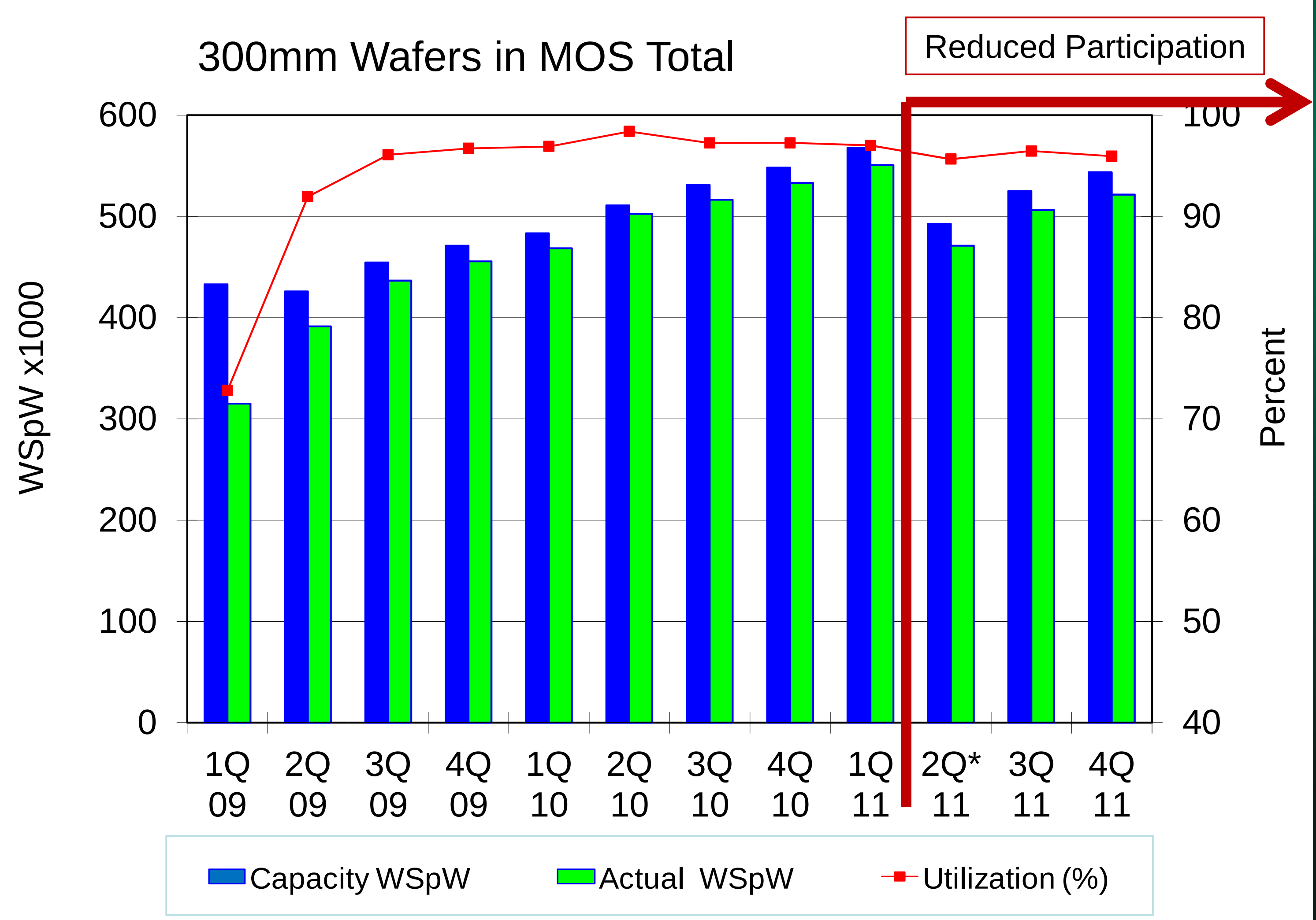
End of SICAS

- SICAS (Semiconductor Industry Capacity Statistics) program was discontinued after the release of the 4Q2011 data
- SICAS lost the Taiwanese companies Nanya Technology, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC) and United Microelectronics Corporation (UMC) beginning in 2Q2011.
- SICAS members questioned the value of continued participation without the two largest wafer foundry companies.
- The semiconductor industry lost the definitive source of capacity and utilization data, a key component in determining current and near term industry conditions.

Wafer Starts

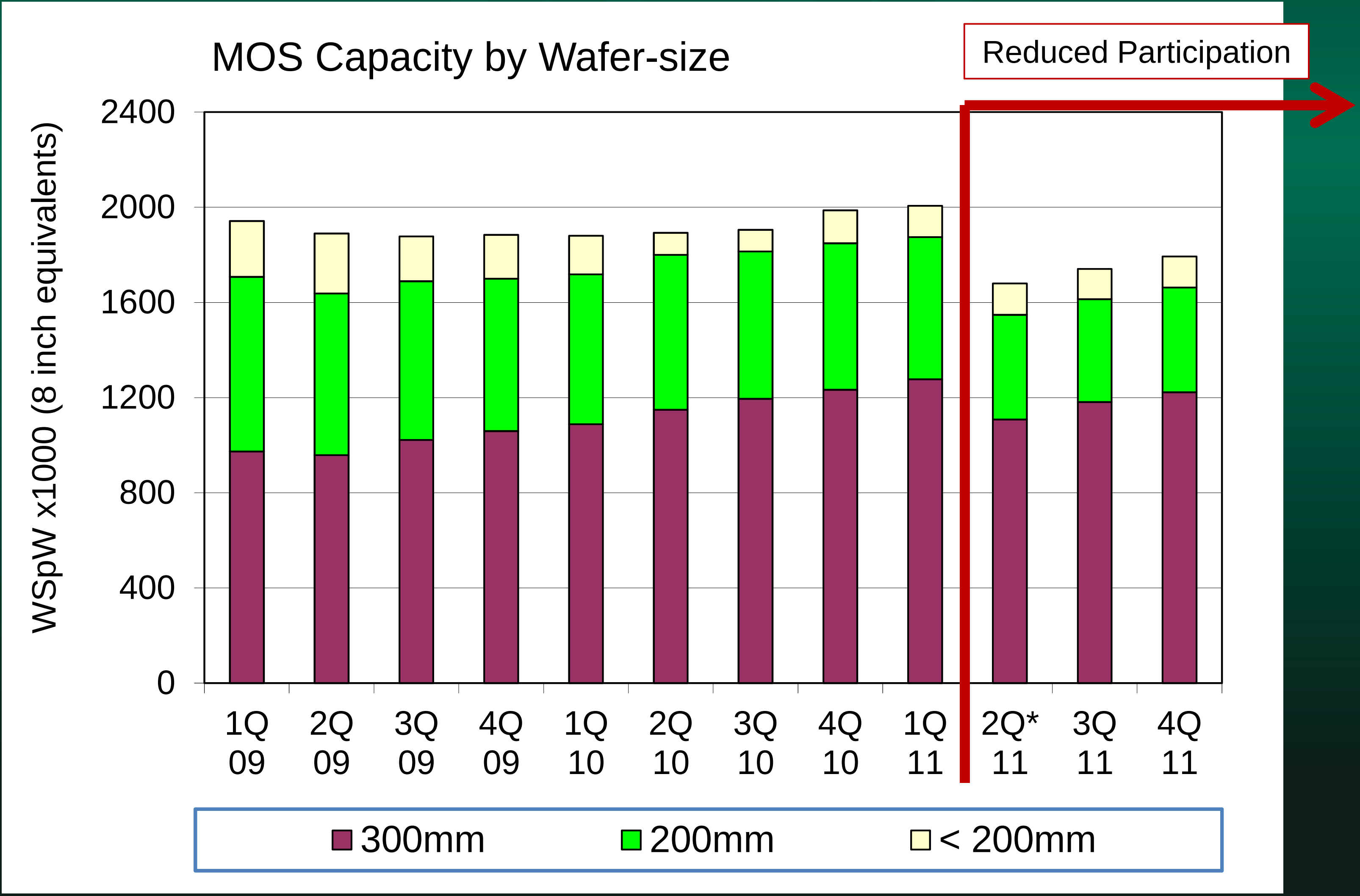


300-mm Wafers Produced

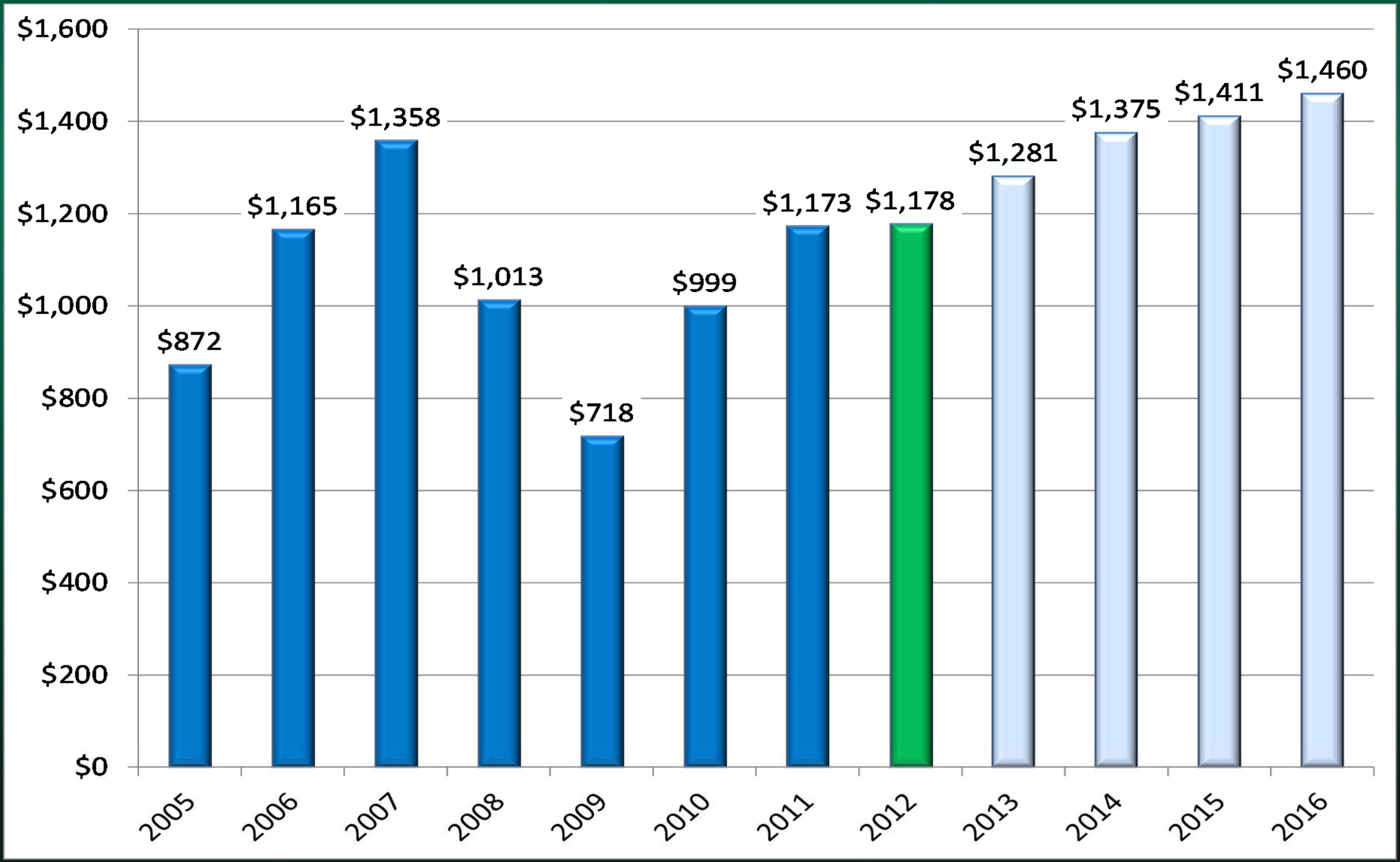


Reduced Participation

WW Capacity 300-mm Wafers



Probe Card Revenue

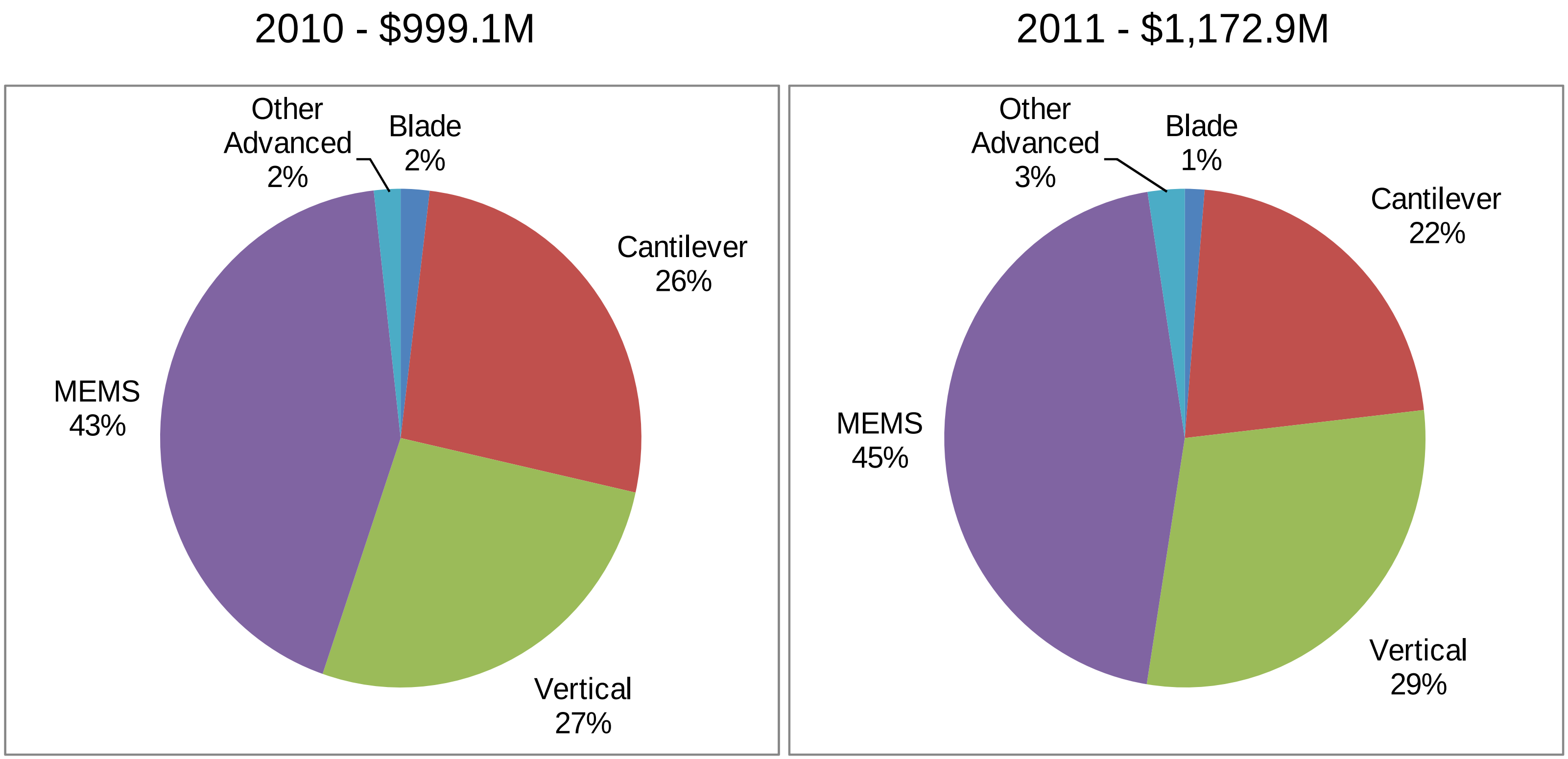


Thanks to John West and Risto Puhakka!

Revenue by Technology

Blade, Cantilever & Advanced Probe Card Revenue by Technology

Semiconductor

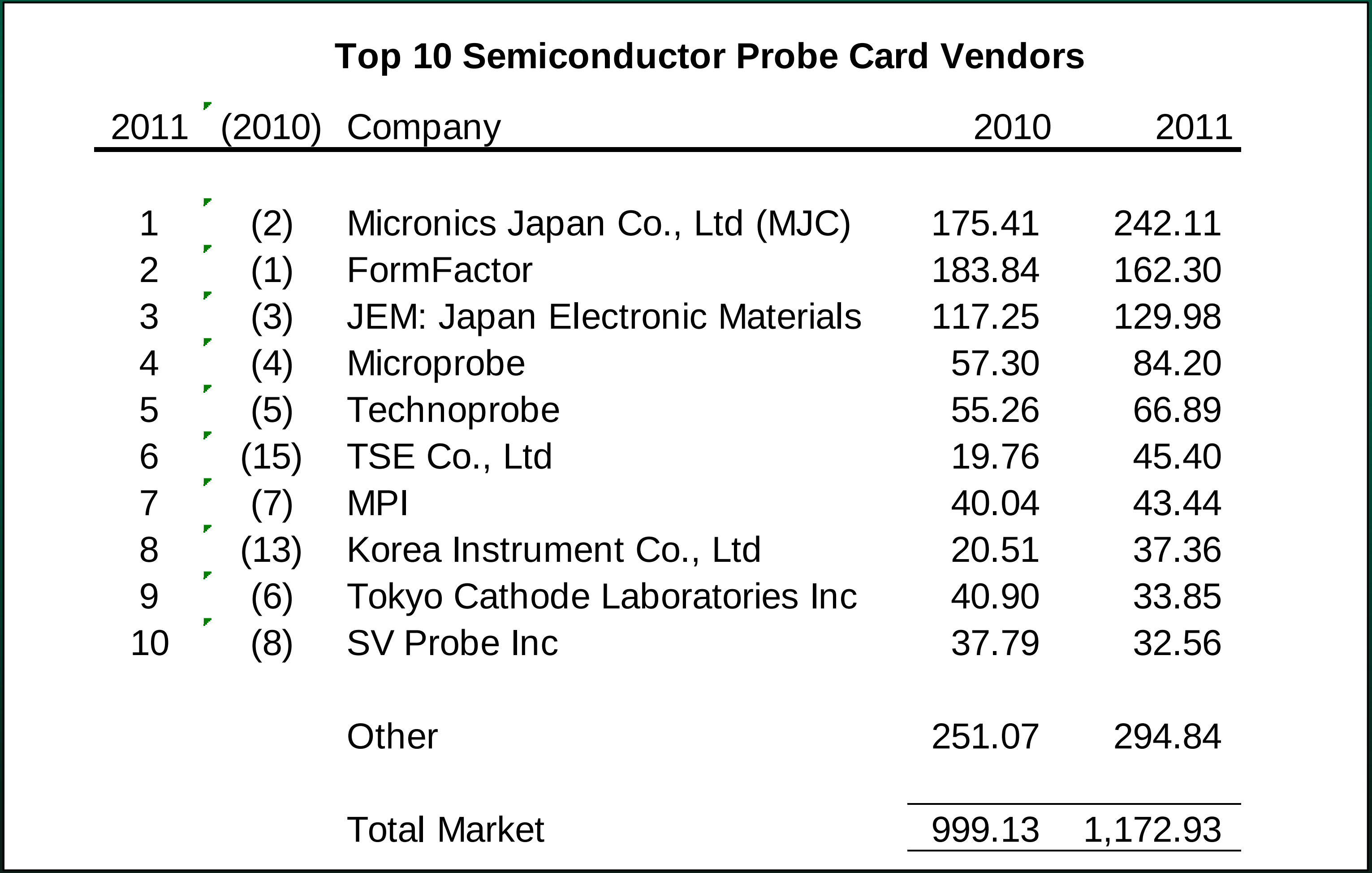


RESTRICTED DATA: Limited Distribution per T&Cs

Source: VLSI Research Inc
Doc:458330.9, v12.04, April 2012

Thanks to John West and Risto Puhakka!

Top Probe Card Vendors



Top 10 Semiconductor Probe Card Vendors

2011	(2010)	Company	2010	2011
1	(2)	Micronics Japan Co., Ltd (MJC)	175.41	242.11
2	(1)	FormFactor	183.84	162.30
3	(3)	JEM: Japan Electronic Materials	117.25	129.98
4	(4)	Microprobe	57.30	84.20
5	(5)	Technoprobe	55.26	66.89
6	(15)	TSE Co., Ltd	19.76	45.40
7	(7)	MPI	40.04	43.44
8	(13)	Korea Instrument Co., Ltd	20.51	37.36
9	(6)	Tokyo Cathode Laboratories Inc	40.90	33.85
10	(8)	SV Probe Inc	37.79	32.56
		Other	251.07	294.84
		Total Market	999.13	1,172.93

Thanks to John West and Risto Puhakka!

22st Annual SW Test Workshop

- **Technical Program for 2012**
  - Technical Tutorial on Sunday
  - Nine Focused Technical Sessions across three days
  - 31 Podium Presentations

- **Products / Services EXPO**
  - 37 full size booths … **SOLD OUT !**
  - EXPO that does not compete with Technical Program

- **Corporate Support Program … MANY THANKS !**
  - Platinum: FormFactor, International Test Solutions, JEM, MJC
  - Gold : Rudolph Technology, Teradyne, MultiTest, T.I.P.S.
  - Silver: Advanced Probing Systems

Platinum Supporters

JEM

FORMFACTOR®

international TEST SOLUTIONS

MJC

Gold Supporters

multitest
A DOVER COMPANY

TERADYNE

RUDOLPH™
TECHNOLOGIES

T. I. P. S.

Silver Supporter

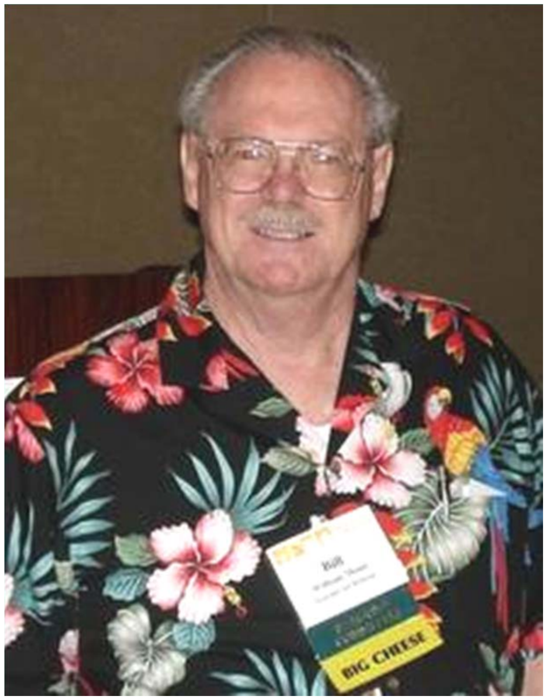
ADVANCED PROBING SYSTEMS, INC.

Corporate Supporter Golf Scramble

- **SW Test Corporate Supporter and Invitees**

Only golf course in San Diego to have hosted both PGA, LPGA, and Collegiate events

William R. Mann Student Grant



William R. Mann
(1943 to 2010)
Founder of SW Test
Sr. Member IEEE

- **William R. Mann Student Grant supports student participation at IEEE conferences and encourages interaction between the student and technologists.**

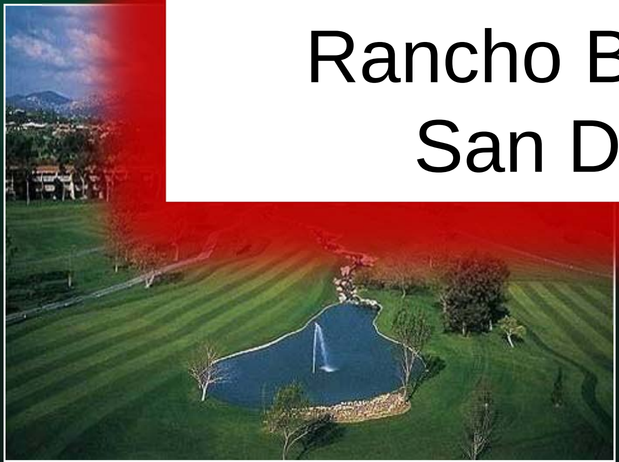
- **Grants are awarded to undergraduate or graduate students who will present a paper or participate at either the IEEE ITC or IEEE SW Test (one grant per conference per year).**

- **Mr. Soheil Khavandi from University of Nevada, Reno was awarded the student grant for IEEE SW Test Workshop 2012.**

- **Student Grant is still available for IEEE ITC !**

Rancho Bernardo 2012

IEEE SW Test 2013
June 9 to 12, 2013
Rancho Bernardo Inn
San Diego, CA



A few words about 2012 …

- **SW Test is an IEEE sponsored and 100% non-profit activity.**
- **SW Test is a workshop held on a "resort-style" property with a "food heavy" program designed to promote and encourage relaxed networking.**
- **Registration fee covers <u>ONLY the food and beverages</u> …**
  - Sunday reception and dinner
  - Daily breakfast, lunches
  - Daily AM and PM coffee breaks
  - EXPO reception, social function and dinner
- **All other costs are covered by Corporate Support and the Exhibitors at the EXPO !**
- **No other IEEE conference provides this type of focused, grassroots program.**

What's the "Competition" Doing ?

- **IEEE ECTC 2012 (CPMT conference at the Sheraton Hotel – San Diego Airport)**
  - Attendees = 1000 to 1250
  - Average registration fee $725 (advanced) and $870 (onsite) per attendee
  - Registration fee includes e-proceedings (hardcopy at $100), daily lunch, and daily coffee breaks
  - All other meals (breakfast, dinner, etc.) and social events (drinks, etc.) are "ala carte" and/or individually sponsored by suppliers.
  - Room rate = $189 per night

- **IEEE Holm 2012 (CPMT conference at the Doubletree Inn in Portland, OR)**
  - Attendees = 100 to 150
  - Average registration fee $750 (advanced) and $825 (onsite) per attendee
  - Registration fee includes e-proceedings (hardcopy for sale), Sunday welcome reception, Monday conference banquet and Tuesday Awards Lunch.
  - All other meals (breakfast, dinner, etc.) and social events (drinks, etc.) are "ala carte" and/or individually sponsored by suppliers.
  - Estimated Room Rate = $179 per night

“We’re not in it for the money …”

- **Organization and Technical Program …**
  - Jerry Broz, Ph.D., General Chair and IEEE Sr. Member
  - Rey Rincon, Freescale Semiconductor, Technical Program Chair
  - Maddie Harwood, CEM Inc., Finance Chair
  - Meredith Griffith, CEM Inc., EXPO / Registration Coordinator

“Who’s to Blame …”

- **Returning Program Committee Members …**
  - Darren James (Rudolph Technologies) – Program Committee
  - Jan Martens (NXP Semiconductor) – Program Committee
  - Patrick Mui (JEM) – Program Committee
  - Fred Taber (BiTS Workshop) – Proceedings Coordinator

- **Workshop Steering Committee …**
  - Gunther Boehm (FeinMetall GmbH)
  - John Caldwell (Micron Technology)
  - Boyd Daniels (Texas Instruments)
  - Michael Huebner, Ph.D. (FormFactor)
  - Tatsuo Inoue (MJC)
  - Amy Leong (Microprobe)
  - Mark Ojeda (Spansion)
  - Matt Zeman, Ph.D. (Intel)

Technical Program / Agenda

- **Sunday, June 10**
  - PCS Fundamentals Tutorial
    - Doug Sottaway (Intel)
  - Registration and Cocktails
  - Buffet Dinner
  - Keynote Presentation …

"Emerging High Density 3D Through Silicon Stacking (TSS) – What's Next?"

Matt Nowak

Senior Director, Advanced Technology
Qualcomm CDMA Technologies

Technical Program / Agenda

- **Monday, June 11**
  - Registration and Breakfast
  - Process Improvements for HVM
  - Optimizing Probe Depth Performance
  - Lunch (Aragon Lawn)
  - Probe Potpourri
  - New Contactor Technologies and RF PCB Design
  - EXPO 2012 w/ Dinner at Reception Stations
  - Networking at La-Taberna Bar

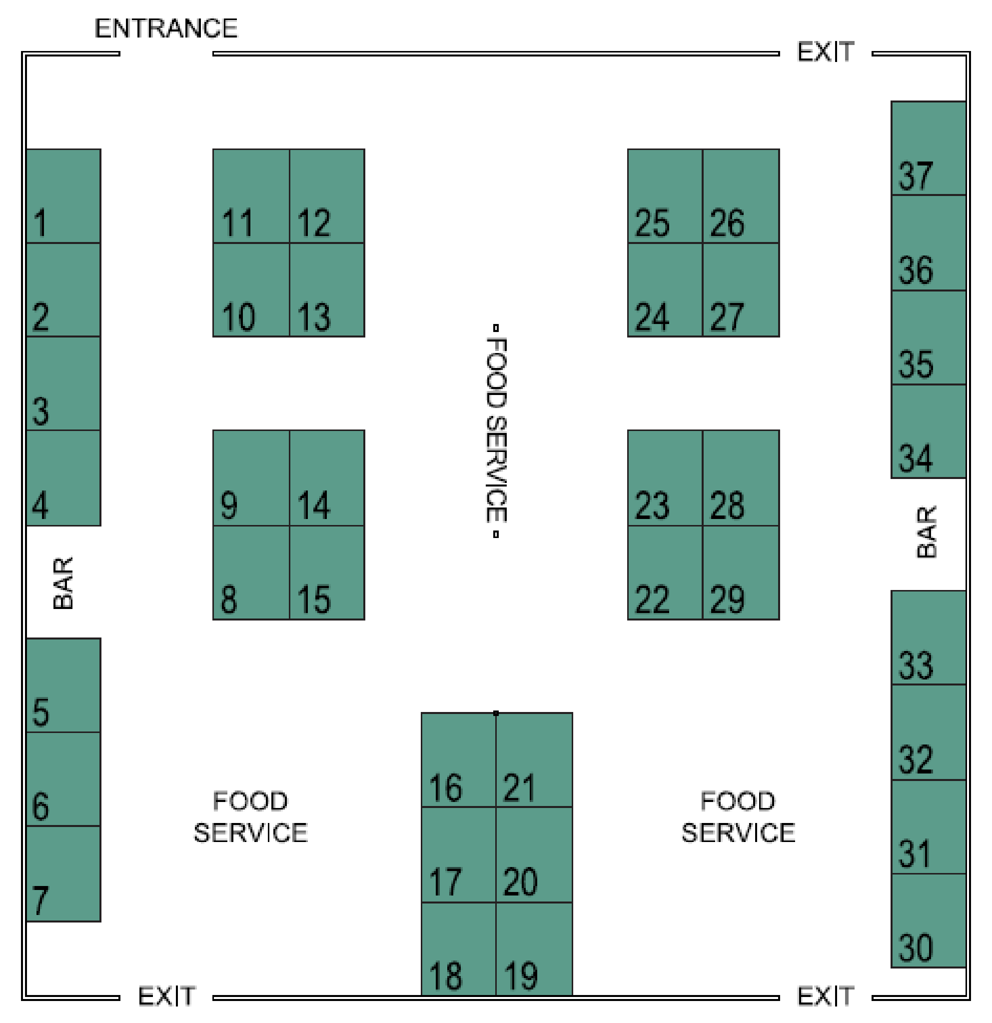
IEEE SW Test EXPO 2012

- Advanced Probing Systems, Inc. … SILVER
- AEHR Test Systems
- BucklingBeam Solutions, LLC
- Cascade Microtech, Inc.
- Complete Probe Solutions, Inc.
- DCG Systems
- ERS America
- Feinmetall GmbH
- Ferrotec (USA) Corporation
- FormFactor, Inc. … PLATINUM
- Hitachi Chemical Co. America, Ltd.
- Integrated Technology Corporation
- Integrated Test Corporation
- Interconnect Devices, Inc.
- International Test Solutions, Inc. … PLATINUM
- IWIN
- JEM America Corp. … PLATINUM
- Kanematsu USA
- Kyocera America, Inc.
- MarTek, Inc.
- MICROCONNEX
- Micronics Japan Co., Ltd. … PLATINUM
- MicroProbe, Inc.
- Multitest … GOLD
- Nomura Plating Co., Ltd.
- Oxford Lasers, Inc.
- Plastronics/H-Pin
- Prober.com
- Rika Denshi America, Inc.
- Rosenberger
- Rudolph Technology, Inc. … GOLD
- Semiconductor Consultants, LLC
- SV Probe - An Ellipsiz Company
- T.I.P.S. Messtechnik GmbH … GOLD
- Technoprobe America, Inc.
- TekniProbe Intl.
- Teradyne … GOLD
- Tokyo Electron Limited
- Vermont Microdrilling
- Wentworth Laboratories, Inc.

QR Code on Badges

- **QR codes on the backside of the badges**
  - First and Last Name
  - Organization
  - Email Address
- **Suggested Free Readers**
  - QRReader (TapMedia)
  - ScanLife (Scanbuy)
  - Many more free Apps are available
- **Download App and Test before entering the EXPO**

IEEE SW Test EXPO 2012



Technical Program / Agenda

- **Tuesday, June 12**
  - Registration and Continental Breakfast
  - New Probe Card and Contact Technologies
  - Meet the Challenge: Lead Time, Fine Pitch, and Low Pad Damage
  - Lunch (Aragon Lawn)
  - Fine Pitch Probing Challenges
  - EXPO 2012 w/ Refreshments will be served
  - Hawaiian Luau at RBI Lawn and Pool

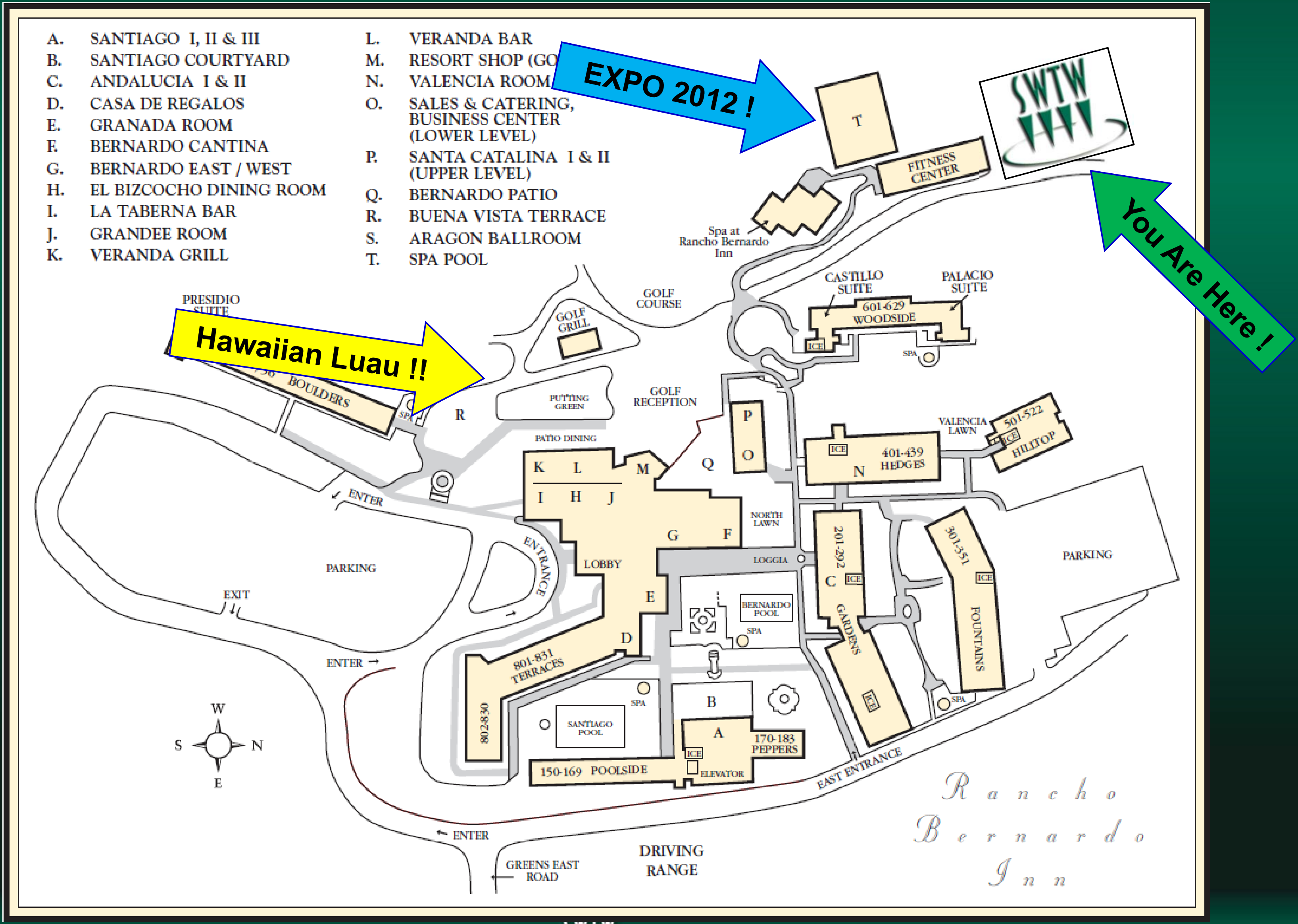
Tuesday Social at Hawaiian Luau at RBI

- Hawaiian Greeting and Mai Tai Cocktails
- Dinner and Relaxed Networking
- Islanders Luau Show (Kids come for free)
- Fun, Prizes, Dancing, and Tropical Atmosphere

Technical Program / Agenda

- **Wednesday, June 13**
  - Registration
  - Probe Process and Metrology
  - Novel Probe Challenges
  - Awards and Adjournment
  - Box Lunch (Aragon Lawn)

Map of the Area



A.	SANTIAGO I, II & III
B.	SANTIAGO COURTYARD
C.	ANDALUCIA I & II
D.	CASA DE REGALOS
E.	GRANADA ROOM
F.	BERNARDO CANTINA
G.	BERNARDO EAST / WEST
H.	EL BIZCOCHO DINING ROOM
I.	LA TABERNA BAR
J.	GRANDEE ROOM
K.	VERANDA GRILL
L.	VERANDA BAR
M.	RESORT SHOP (GO
N.	VALENCIA ROOM
O.	SALES & CATERING, BUSINESS CENTER (LOWER LEVEL)
P.	SANTA CATALINA I & II (UPPER LEVEL)
Q.	BERNARDO PATIO
R.	BUENA VISTA TERRACE
S.	ARAGON BALLROOM
T.	SPA POOL

EXPO 2012 !

Hawaiian Luau !!

You Are Here !

Recognition & Awards

- Best Overall Presentation
- Best Data Presented
- Most “Inspirational” Presentation
- Best Presentation, Tutorial in Nature

- Some other “Special Awards”

SWTW-2011 Awards

Most Inspirational Presentation

"Novel Carbonaceous Film with High Electrical Conductivity and Super High Hardness for Semiconductor Test Probes"

Teruyuki Kitagawa, Ph.D.
Nomura Plating Co., Ltd. – Japan

Best Presentation, Tutorial in Nature

"Key Design Parameters to Maximize Probe Current Carrying Capability"

January Kister
MicroProbe, Inc.

"Electromagnetic Analysis and Verification of Probe Card Performance for First Pass System Success"

Cristian Gozzi
TechnoProbe – Italy

SWTW-2011 Awards

Best Data Presentation

"Use of Harsh Wafer Probing to Evaluate Various Bond Pad Structures"

Stevan Hunter, Troy Ruud
Bryce Rasmussen, Vail McBride
ON Semiconductor – USA

Best Overall Presentations

"Identification, Analysis, and Control of High Temperature on Wafer Test Process"

Marcel Bleyl, Jan Martens
NXP Semiconductors

Darren James
Rudolph Technologies

"Contact Formation in Wafer Probing: Fritting, Breakdown, Damage and Conduction"

Jörg Seekamp, Gunther Böhm
Feinmetall GmbH
Jan Martens
NXP Semiconductors
Marcel Mittag
Fraunhofer Institut

That “Special” Award …

“What A Load Of Crap !”

For the Poorest Disguised Sales Pitch

“What happens at SWTW stays at SWTW !”

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Want to Learn More ?

- **Electronic Components and Technology Conference**

  2012 held at San Diego, CA on 29-May to 01-June
  2013 to be held in Las Vegas, NV, on 25-May to 02-June

  http://www.ectc.net

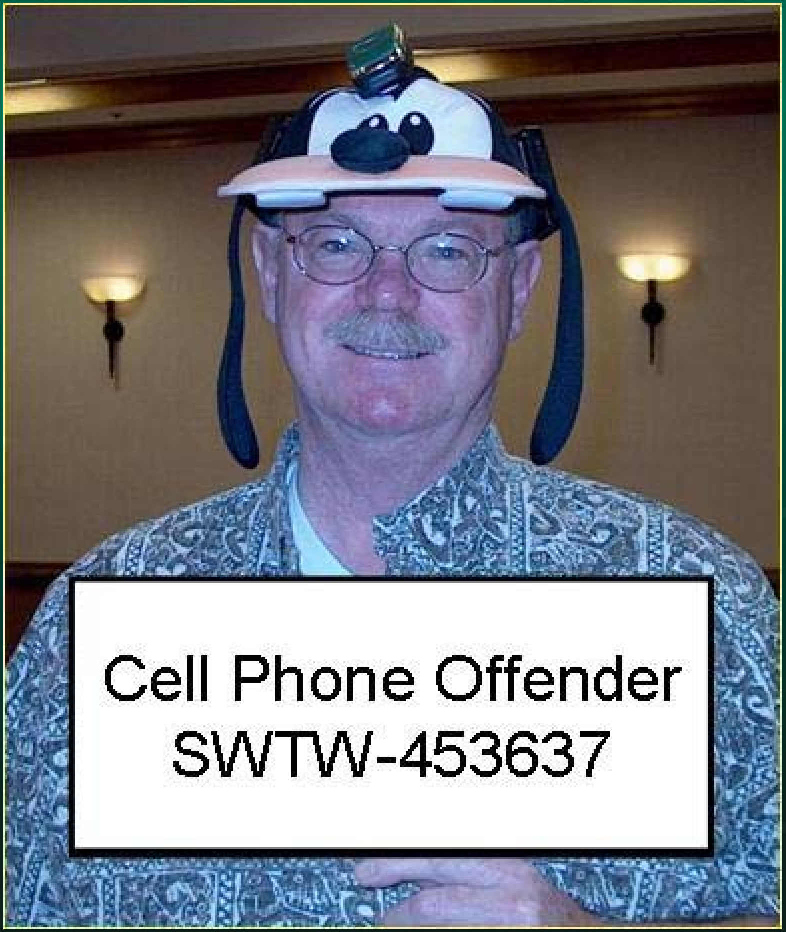
- **Burn In & Test Strategies Workshop**

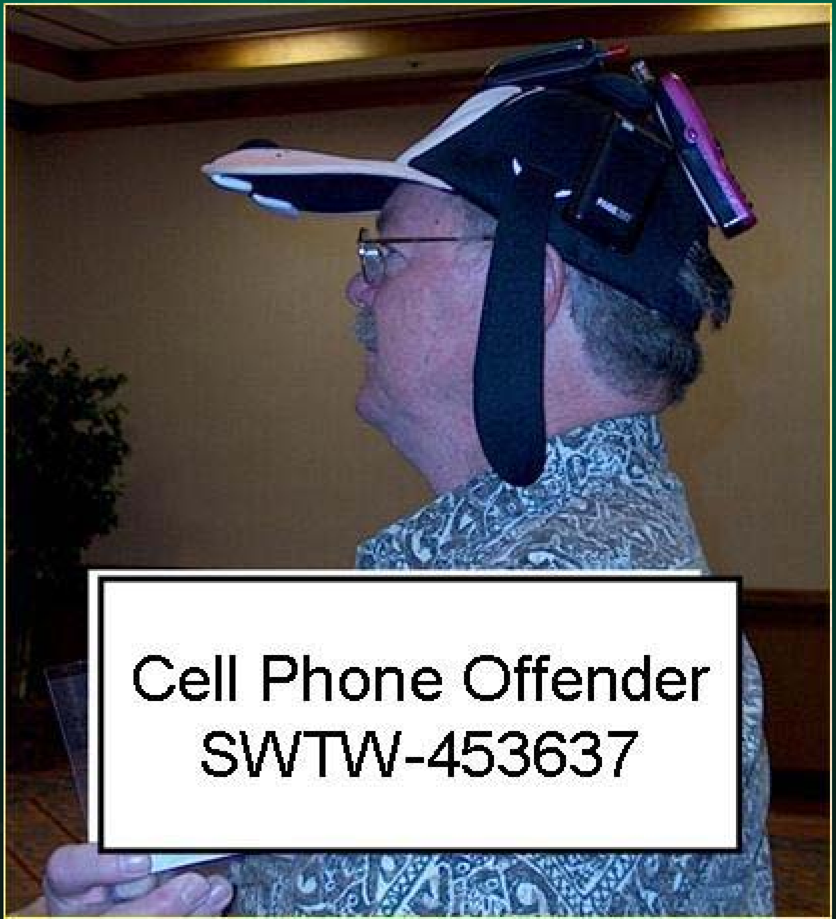
  March 3-6, 2013 at the Hilton Phoenix East / Mesa Hotel
  Mesa, Arizona
  http://www.bitsworkshop.org

- **IS-Test Workshop**

  Freising, Germany
  http://www.is-test.com

Silence your cell phone !!!





Thanks for your Support !

- Contact the SW Test Team with any questions …

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