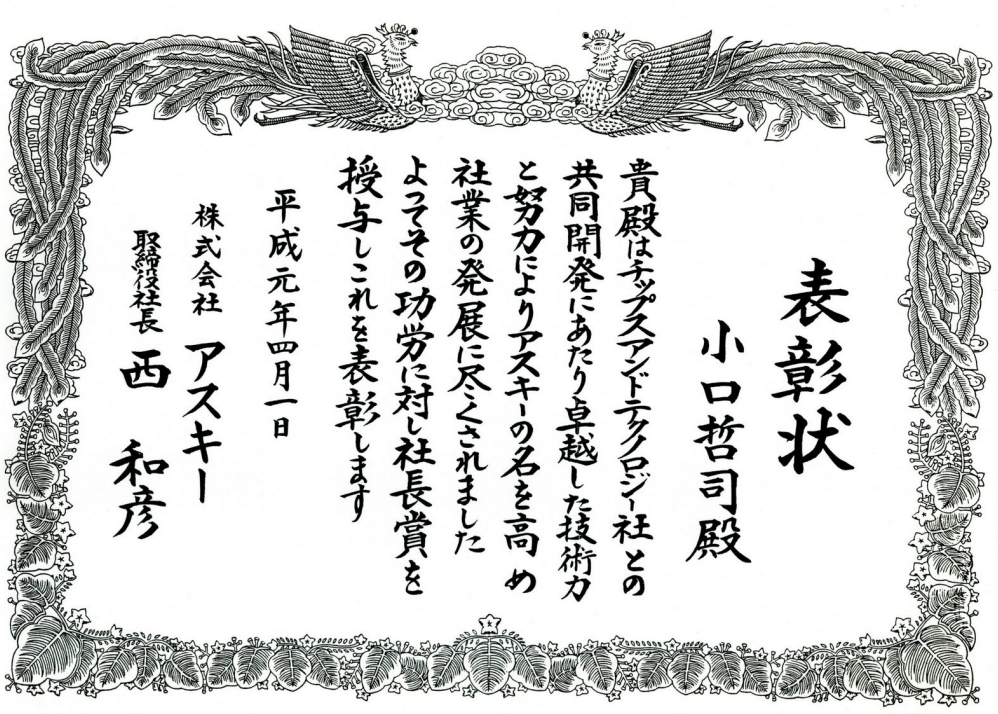
Development history of Chips and Technologies 82C455, 82C456, and 82C457

Chips & Technologies graphics group started the following IBM VGA graphics LSI design in early 1988 after IBM VGA released in April, 1987.

Product name	Code name	Sesame Street Character	Leading engineer	Function
82C451	**Ernie**		Ed Hutchins	Equivalent with IBM VGA CRT controller LSI
82C452	**Grover**		Minjhing Hsieh	Enhanced IBM VGA CRT controller LSI supporting SVGA (800 x 600)
82C455	**Bert**		Tetsuji Oguchi	World's first IBM VGA flat panel controller LSI

CHIPS
IN APPRECIATION FOR
OUTSTANDING CONTRIBUTION
TO THE
CHIPS/450 PROJECT
Mr. OGUCHI, Ascii Corporation
SEPTEMBER, 1988



ASCII President Prize

Tetsuji Oguchi
April 1, 1989
President Kazuhiko Nishi

Company Visit

In late 1987, Japanese flat panel manufacturers occupied almost 100% of the worldwide flat panel market share making small size black and white LCD flat panels without backlight which physical size was less than 320 (H) x 200 (V) for mainly portable Japanese word processor installed a low cost heat sensitive paper printer and a 3.5" floppy disk drive.

LCD flat panels with backlight of 640 (H) x 480 (V) physical display size equivalent of display resolution of IBM VGA, did not exist. This meant that the functional verification of IBM VGA flat panel controller LSI we were planning to develop was impossible running in actual IBM PC as well as the VGA lap-top PC (calling a notebook PC nowadays) market itself was none.

We had to kick off a promotional campaign visiting Japanese flat panel vendors and customers to let them recognize that VGA resolution flat panel (640 x 480) creates a big potential market soon in a year.

In December, 1987, I and Keith Angelo, a Chips and Technologies graphics marketing, started visiting Japanese flat panel vendors and customers announcing that we plan to design IBM VGA flat panel controller LSI at Chips and Technologies who already have a working IBM VGA CRT controller core made by reverse engineering by John Kimbery, a Chips and Technologies graphics engineering, and requested to manufacture VGA resolution flat panels and give us the sample panels to demonstrate the working system with IBM VGA flat panel controller LSI (named 82C455 later on) at coming COMDEX Fall (One of largest computer trade shows in the world) held in Las Vegas in November, 1988.

We visited following total 23 flat panel vendors and 8 customers, nook and cranny desperately, as below.

Flat panel vendors		**Customers**
Company name	**Flat panel**	**Company name**
Citizen, Tanashi	LCD	Funai Electronics, Daito
Kyocera, Ise		Hitachi, Narashino
Kyocera, Yoga		IBM Japan, Yamato
Matsusita Electronics, Kadoma		NEC, Fuchu
Optrex, Tokyo		NEC Home Electronics, Kawasaki
Seiko Epson, Toyoshina		Sharp, Yamato Koriyama
Seiko Epson, Kawasaki		Sony, Kitashinagawa
Seiko Instrument, Matsudo		Tottori Sanyo, Tottori
Sharp, Yamato Koriyama		
Stanley Electric, Hadano		
Toshiba, Kawasaki		
Tottori Sanyo, Tottori		
Hitachi, Mobara	TFT	
Optrex, Tokyo		
Sharp, Tenri		
Hosiden, Kobe	TFD	
Sharp, Tenri	EL	
Matsusita Electronics, Takatsuki	Plasma	
Oki, Hachioji		
Hitachi, Musashi	Driver	
Texas Instrument, Tokyo		
Hitachi, Takasaki	Color palette	
Hitachi, Marunouchi	Panel Planning	

As the result, we successfully obtained various kinds of flat panels from many Japanese flat panel manufacturers and the panel interface methods along with the flat panel parameter settings to be programmed on graphics BIOS ROM were thoroughly described on Chips and Technologies 82C455/456/457 data sheets.

奈良交通定期観光バス

奈良名所観光記念

春日大社

奈良に都ができた頃、茨城県鹿島より武甕槌命を白鹿の背にいただき、都の東方霊山と崇める御蓋山の頂き浮雲の峰にお祀りし、国土の安泰と国民の繁栄を祈念したのが始まりです。

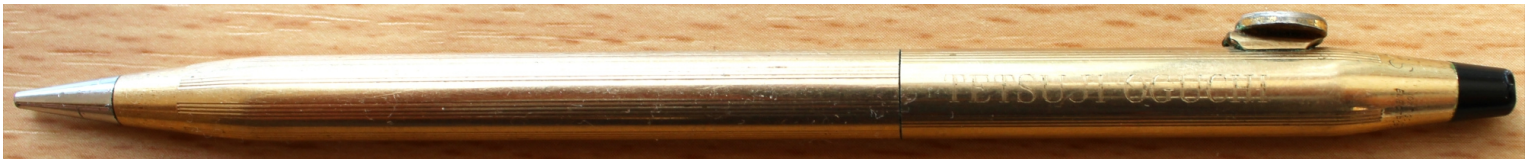
Tetsuji Oguchi & Keith Angelo (Chips and Technologies graphics marketing)

We enjoyed one day tour bus trip at Nara, a Japanese historical ancient city, at the middle of busy two week business trip to Japanese flat panel vendors and customers on 12/12/1987 (Sat) before starting world's first VGA flat panel controller LSI (82C455) design at Chips and Technologies in San Jose, California, USA.

Visit Date	Chips and Technologies	ASCII
Dec, 1987	Keith Angelo	Tetsuji Oguchi
Feb, 1989		
May, 1990	Bob Conner	
May, 1991	Keith Angelo	

Supplementary Prize

Sample of CROSS Pen



↑ "TETSUJI OGUCHI" is engraved

↑ A clip under the customized CHIPS logo was broken out due to intensive use.

← At top portion under black, the following have been engraved.

10KT GOLD FILLED · USA
ELECTROPLATED EMBLEM
CROSS

Customized circular CHIPS logo →

Zoom up photos.

Extension Registers (XR50 - XR6E) for Flat Panel Control

I specified and implemented programmable parameter registers for flat panel control (XR50 – XR6E) on 82C455, 82C456, and 82C457.

Concerning the detailed function of each parameter register, refer to "455 Datasheet", "456 Datasheet", and "457 Datasheet" respectively.

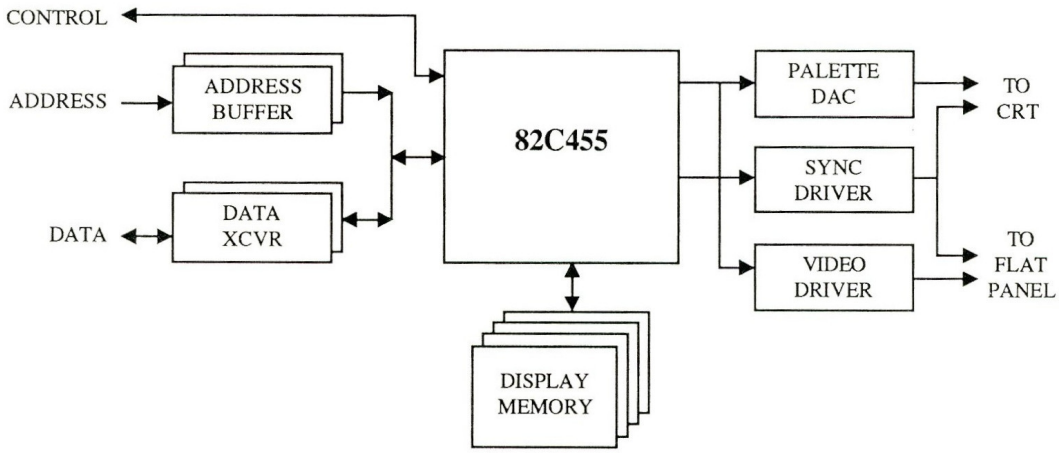
Reg	Parameter register name	Bits	Access	I/O Port	Initial Reset Value	CRT controller 82C				Flat panel controller 82C		
						450	451	452	453	455	456	457
XR50	Panel Format	8	R/W	3B7 / 3D7	x0xxxxxx	--	--	--	--	√	√	√
XR51	Display Type	7			00xx010-							
XR52	Panel Size	6			-xxxx-xx							
XR53	Line Graphics Override	2			------xx							
XR54	Alternate Misc Output	5			xx--10-0							
XR55	Text Mode 350_A Compensation				---1xxxx							
XR56	Text Mode 350_B Compensation				---1xxxx							
XR57	Text Mode 400 Compensation				---1xxxx							
XR58	Graphics Mode 350 Compensation	7			-xx0xxxx							
XR59	Graphics Mode 400 Compensation				-xx0xxxx							
XR5A	Flat Panel Vertical Display Start 400	8			xxxxxxxx							
XR5B	Flat Panel Vertical Display End 400				xxxxxxxx							
XR5C	Weight Control Clock A	6			--xxxxxx							--
XR5D	Weight Control Clock B				--xxxxxx							
XR5E	ACDCLK Control	8			xxxxxxxx							√
XR5F	Power Down Mode Refresh				xxxxxxxx							
XR60	Blink Rate Control				10000011							
XR61	Text Color Mapping Control	7			-xxxxxxx							--
XR62	Text Color Shift Parameter	8			xxxxxxxx							
XR63	Graphics Color Mapping Control				000xxxxx							
XR64	Alternate Vertical Total				xxxxxxxx							√
XR65	Alternate Overflow	6			xxx--xxx							
XR66	Alternate Vertical Sync Start	8			xxxxxxxx							
XR67	Alternate Vertical Sync End	4			----xxxx							
XR68	Alternate Vertical Display Enable End	8			xxxxxxxx							
XR69	Flat Panel Vertical Display Start 350				xxxxxxxx							
XR6A	Flat Panel Vertical Display End 350				xxxxxxxx							
XR6B	Flat Panel Vertical Overflow 2				xxxxxxxx							
XR6C	Weight Control Clock C	6			--xxxxxx							--
XR6D	FRC & External Palette Control	8			01000011					--		√
XR6E	Polynomial FRC Control				10111101						--	

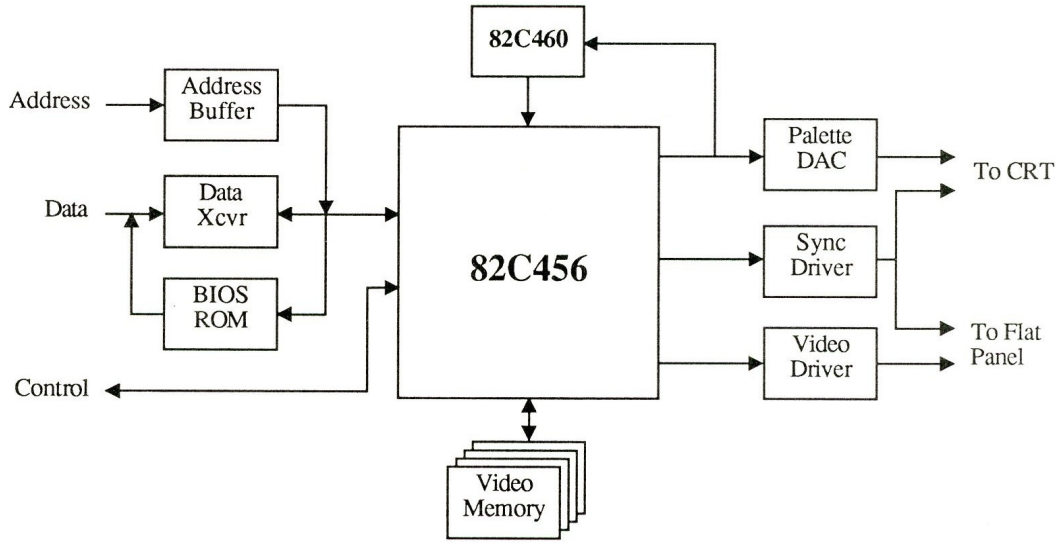
XR50 to XR6C were implemented on 82C455.
XR6D (FRC & External Palette Control) was newly implemented on 82C456.
XR6E (Polynomial FRC Control) was newly implemented on 82C457.

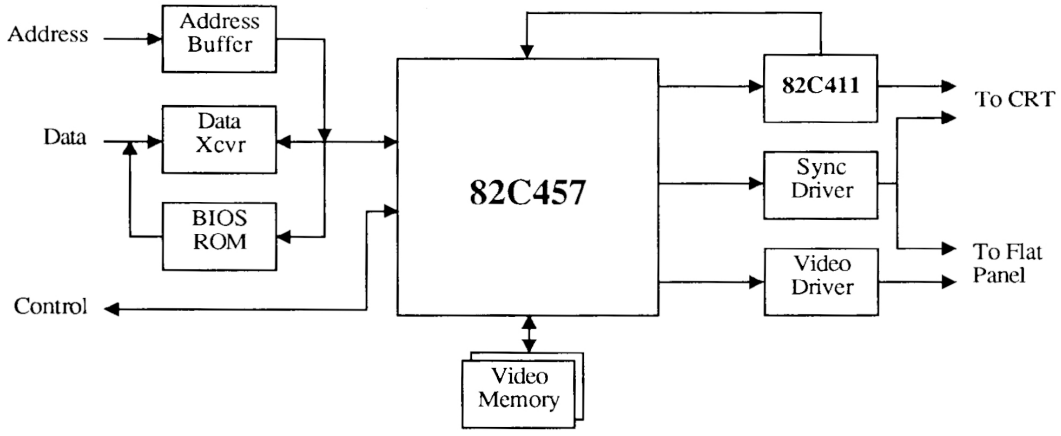
Concerning FRC (Frame Rate Control) as well as Dithering, I made an evaluation software written in 8086 assembly language and then implemented the related logic.

Difference between 82C455, 82C456, and 82C457

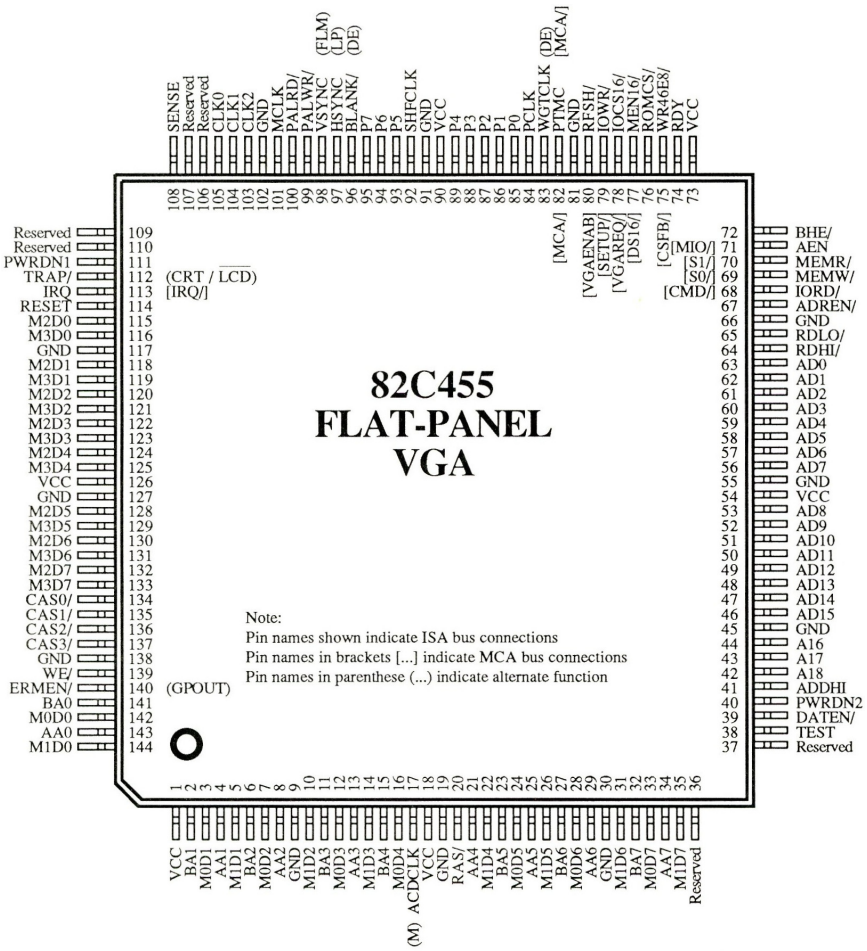
(1) System Block Diagram

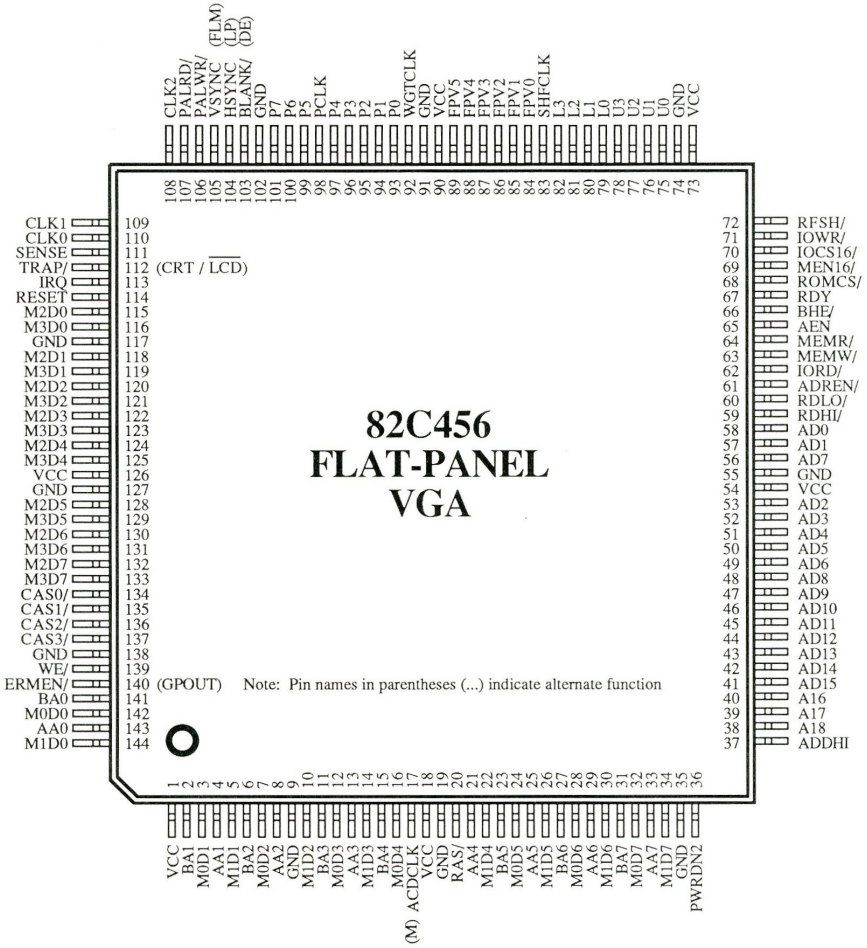


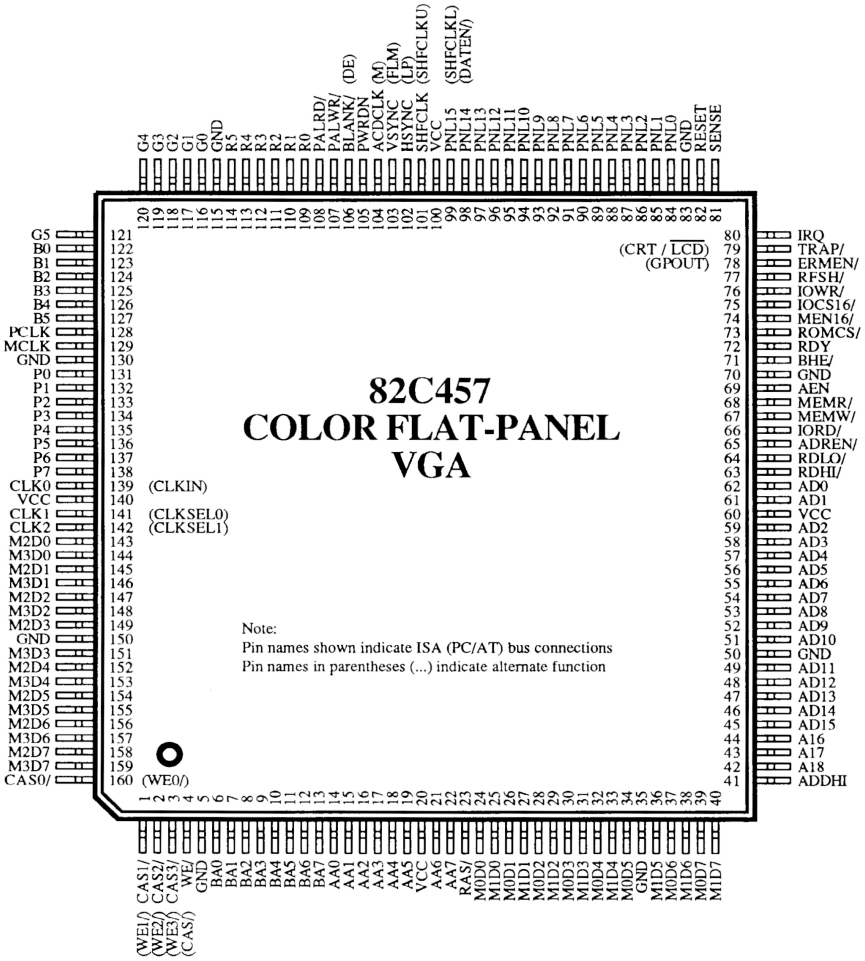




(2) Pin Connection







Because 82C455/456/457 were made by Toshiba TC110G 51k gates CMOS gate array, I was able to easily enhance the function updating the pin function and the connection unlike NEC μPD7220/72120 which logic and mask layout design were done manually by hand, not by computer. It is known that such handicraft industry-wise manual LSI design makes hard to change even small logic and pin function due to the time consuming work.

	82C455	**82C456**	**82C457**
Year	1988	1989	1990
Exhibited at COMDEX Las Vegas	Nov, 1988	Nov, 1989	Nov, 1990
Package	144 pin plastic QFP		160 pin plastic QFP
Gate Array	Toshiba CMOS gate array TC110G 51 (51k gates)		
	1.5 micron		1.2 micron
Color information feedback	None (Quasi Black and white)	82C460 (Color-based Black and white)	82C411 (True color)

COMDEX (COMputer Dealer's EXhibition) Fall in Las Vegas was one of the largest computer trade shows in the world held in November from 1979 to 2003.

Now we have TWO reasons to celebrate!

Please join the graphics group as we express our concerns and console each other over pitchers of amber and port at....

"I CAN'T BELIEVE WE'RE ACTUALLY SHUTTING DOWN"

and

"I CAN'T BELIEVE I'M ONLY GETTING 65% OF MY STOCK PURCHASE"

Night.

This is the next installment in the continuing series of GRAPHICS CULTURE NIGHTS. So mark your calendar. Thursday, June 27 at 7:00pm at the TIED HOUSE in Mountain View. Left off Central Expy. onto Castro Street and it's somewhere in there.

Comments on "I CAN'T BELIEVE WE'RE ACTUALLY SHUTTING DOWN" and "I CAN'T BELIEVE I'M ONLY GETTING 65% OF MY STOCK PURCHASE" Night:

"Gosh, I hope I can make it, but the pinouts in the 453 data sheet may keep me here all night."

- Dean Hays

"Well, the doctor said a little beer wouldn't hurt."

- Sandra Towner

"Gee, I don't know. Is that on the way to San Francisco?"

- Amanda Potter

"Sorry, can't make it. The Purple Axolotls are playing at Slim's that night."

- Bob Brummer

"Sorry, can't make it. I'm in Taiwan."

- Minjhing Hsieh

"The Tied House? As in "tied up"? Count me in!"

- Bob Conner

"Do they let new initiates of the Graphics Motorcycle Gang into the Tied House?"

- Djan Irani

"Let's rock!"

- Tetsuji Oguchi

https://goodip.io/iq/assignee/chips-tech-inc

Top inventors of Chips and Technologies, Inc.

Rank	Name	Patents
1	Johary Arun	13
2	Catlin Robert W	10
3	Pleva Robert M	9
4	Oguchi Tetsuji	8
5	Jones Jr Morris E	6
6	Blomgren James S	6
7	Randall Martin	4
8	Fung Michael G	3
9	Khan Rashid N	3
10	Picard James A	3