Initial Release

32-Channel 256 Gray-Shade High Voltage Driver

Features

- ❏ HVCMOS® technology
- ❏ 5V CMOS inputs
- ❏ Up to 80V output voltage
- ❏ PWM gray shade conversion
- ❏ Capable of 256 levels of gray shading
- ❏ 10MHz shift and count clock frequency
- ❏ 20MHz data throughput rate
- ❏ 8 bit data bus
- ❏ 32 outputs per device
- ❏ BLANK function
- ❏ Output polarity control

Applications

- ❏ Field Emission Displays (FED)
- ❏ Polymer Liquid Crystal Displays (PLCD)
- ❏ Vacuum Fluorescent Displays (VFD)

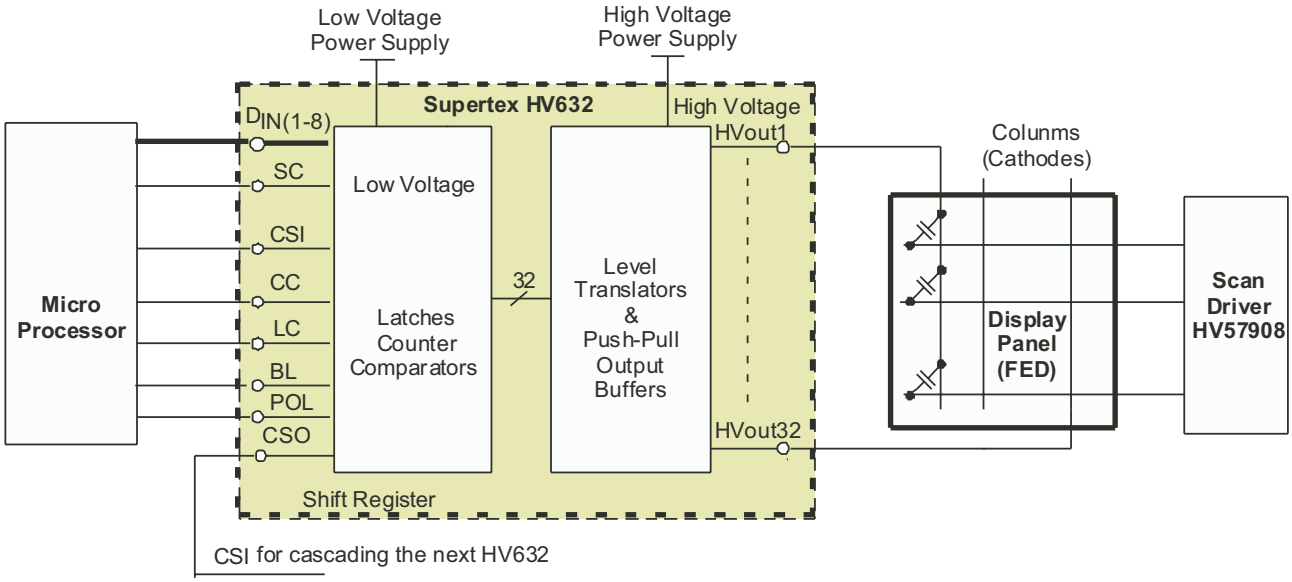
General Description

The HV632 is a 32-channel gray-shade column driver IC designed for driving electrofluorescent displays. Using Supertex's unique HVCMOS® technology, it is capable of 256 levels of gray shading by PWM conversion.

Input data, in groups of eight, is latched into a set of data latches on both edges of the shift clock. The data shifted in the first data latch corresponds to $HV_{OUT}1$, the second data latch corresponds to $HV_{OUT}2$, and so on. These data are compared to the contents of the master binary counter which counts on both edges of the count clock. Each time the master counter begins to decrement from 1111 1111, the data in the data latches are compared with the contents of the counter; if they match, the corresponding outputs will go high. The master counter counts down to 0000 0001 and then starts to count up again. The outputs that are at high will stay at high until the contents of the counter match the data in the data latches again. Therefore, the higher the binary data in the data latches, the longer the outputs will stay at high. Thus, different high voltage pulse widths are produced. When the counter reaches its 1111 1111 count while counting up, the device is ready for the next operation cycle. A data value of 0000 0000 produces no pulse; the output stays low.

The BLANK input signal will reset the master counter to all ones (1111 1111) and set all high voltage outputs to low, or will set all high voltage outputs to high state, when the POL is low. The POL input signal, forced low, will invert the polarity of the output pulse. If left unconnected, POL input will be pulled high to V_{DD} by an on-chip resistor.

Typical Application



07/08/03

Ordering Information

Device	Package Option	
	64-Lead 3-Sided Plastic Gullwing	Die
HV632	HV632PG	HV632X

Absolute Maximum Ratings

Supply voltage, V_{DD}	-0.5V to +7.5V
Supply voltage, V_{PP}	-0.5V to +90V
Logic input levels	-0.5 to V_{DD} + 0.5V
Continuous total power dissipation	1.2W
Operating temperature range	-40°C to +85°C
Storage temperature range	-65°C to +150°C

Notes:

All voltages are referenced to GND.

For operation above 25°C ambient derate linearly to 85°C at 20mW/°C.

Electrical Characteristics

(Over recommended conditions of V_{DD} = 5V, V_{PP} = 80V, T_A = 25°C unless otherwise noted)

Low-Voltage DC Characteristics (Digital)

Symbol	Parameter	Min	Max	Units	Conditions
V_{DD}	Low-voltage digital supply voltage	4.5	5.5	V	
I_{DD}	V_{DD} supply current		25	mA	f_{SC} = 10MHz, f_{CC} = 10MHz
I_{DDQ}	Quiescent V_{DD} supply current		150	µA	All V_{IN} = GND, Count Clock = V_{DD}
I_{IH}	High-level input current		10	µA	V_{IN} = V_{DD}
I_{IL}	Low-level input current		-10	µA	V_{IL} = GND
I_{OH}	High-level output current	-1.0		mA	V_{OUT}=0.9 V_{DD}
I_{OL}	Low-level ouptut current	1.0		mA	V_{OUT}=0.1 V_{DD}

High-Voltage DC Characteristics

Symbol	Parameter	Min	Max	Units	Conditions
I_{PPQ}	Quiescent V_{PP} supply current		100	µA	All HV_{OUT} low or high
$I_{OUT(p)}$	P-channel output current	-4.0		mA	HV_{OUT}=75V
$I_{OUT(n)}$	N-channel output current	4.0		mA	HV_{OUT}=5V
I_{PP}	V_{PP} supply current		1.1	mA	C_L=0pF, F_{CC}=10Mhz

Electrical Characteristics

(Over recommended conditions of V_{DD} = 5V, V_{PP} = 80V, T_A = 25°C unless otherwise noted)

AC Characteristics

Symbol	Parameter	Min	Max	Units	Conditions
f_{SC}	Shift clock frequency		10	MHz	
f_{CC}	Count clock frequency		10	MHz	
f_{DIN}	Data In frequency		20	MHz	
t_{CW}	Chip select pulse width	80		ns	
t_{CSS}	Chip select to shift clock set-up time	5.0		ns	
t_{CSH}	Chip select to shift clock hold time	15		ns	
t_{SCC}	Shift clock cycle time	100		ns	
t_{DSS}	Data to shift clock set-up time	10		ns	
t_{DSH}	Data to shift clock hold time	40		ns	
t_{DW}	Data In pulse width	50		ns	
t_{LCW}	Load count pulse width	75		ns	
t_{CCW}	Count clock pulse width	50		ns	
t_{CCC}	Count clock cycle time	100		ns	
t_{LCD}	Load count to count clock delay	100		ns	
t_{CCD}	Count clock to HV_{OUT} turn-on/turn-off		300	ns	C_L = 15pF
t_{BLW}	BLANK pulse width	700		ns	
t_{BLD}	BLANK to HV_{OUT} delay		500	ns	C_L = 15pF
t_{CDD}	Count clock delay between count down and count up cycles	150		ns	
t_{CSOH}	CSO delay output for High		40	ns	C_L=15pF
t_{CSOL}	CSO delay output for Low		40	ns	C_L=15pF

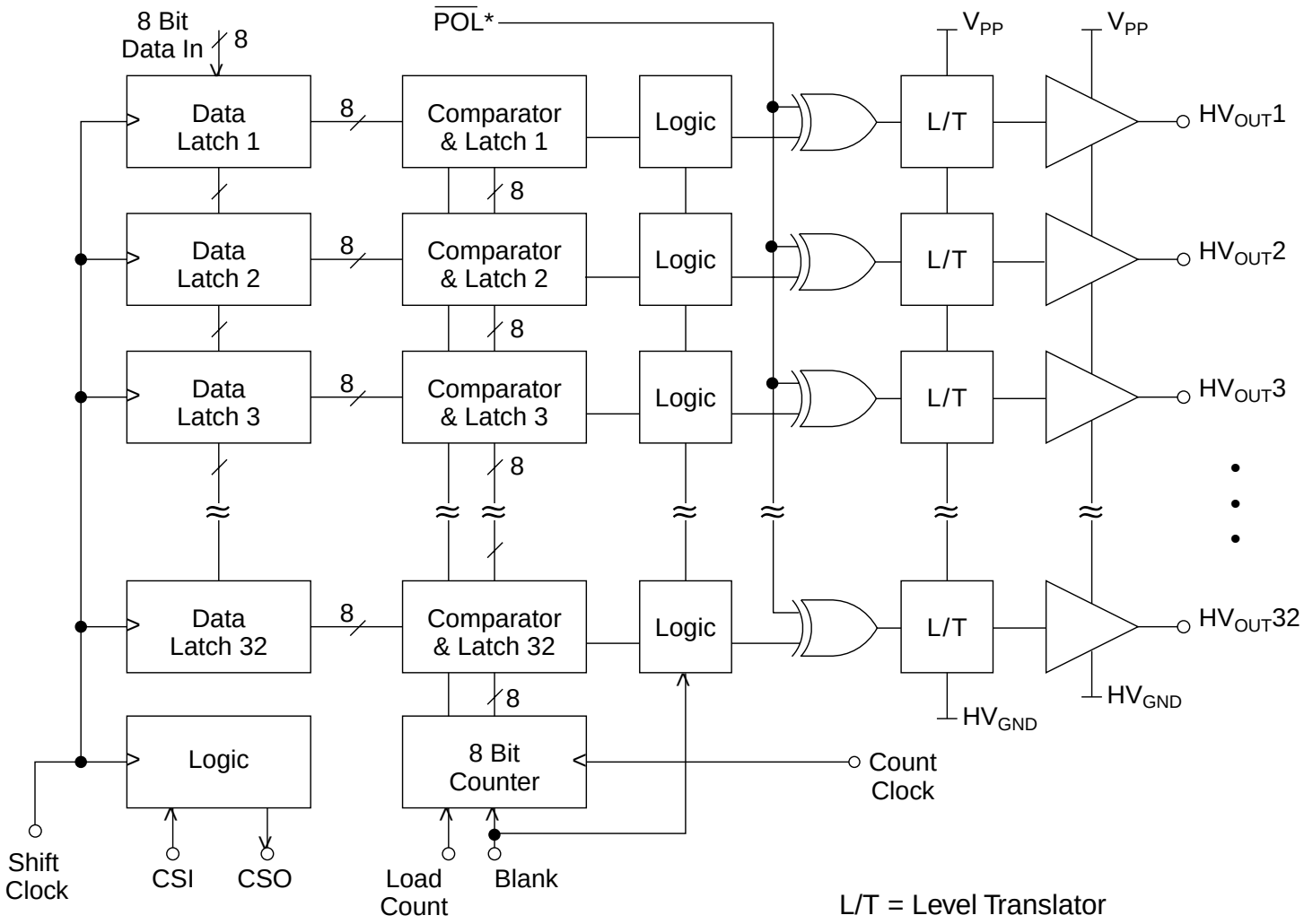
Recommended Operating Conditions

Symbol	Parameter	Min	Max	Units	Conditions
V_{DD}	Logic supply voltage	4.5	5.5	V	
V_{PP}	Positive high-voltage supply	12	80	V	
V_{IL}	Low-level input voltage	0	1	V	
V_{IH}	High-level input voltage	V_{DD}–1	V_{DD}	V	
T_A	Operating temperature	-40	+85	°C	

Pin Definitions

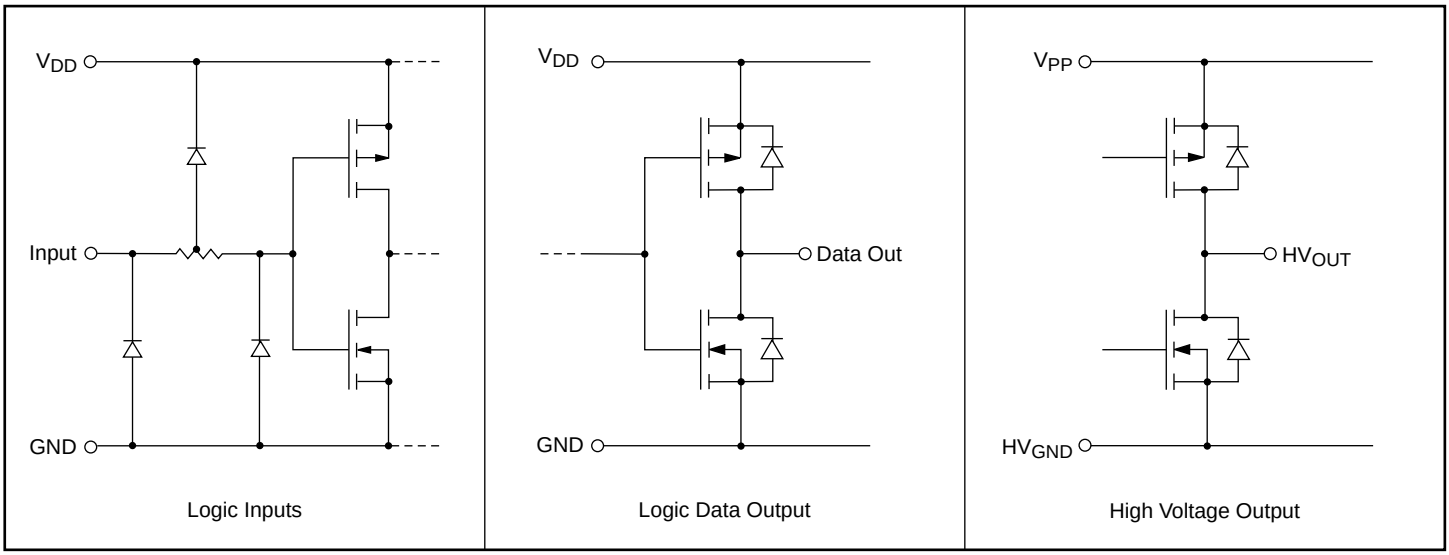
Pin #	Name	I/O	Function
27-30 36-39	D1 – D8	I	Inputs for binary-format parallel data (D8 is the most significant bit)
34	Shift Clock	I	Triggers data on both edges
31	Count Clock	I	Input to the counter
32	$\overline{POL}$	I	Output polarity control
24	CSI	I	Chip select input to enable the device to accept data
25	CSO	O	Chip select output to enable the next device
33	Load Count	I	Input to initiate the counting
26	Blank	I	Input to reset the counter and HV_{OUT}
4-19 46-61	$HV_{OUT}1$ – $HV_{OUT}32$	O	High-voltage outputs
23,43	V_{PP}	—	Positive high-voltage supply
40	V_{DD}	—	Low-voltage digital supply voltage
22,44	HV_{GND}	—	High voltage ground
20-21	GND	—	Digital ground

Functional Block Diagram

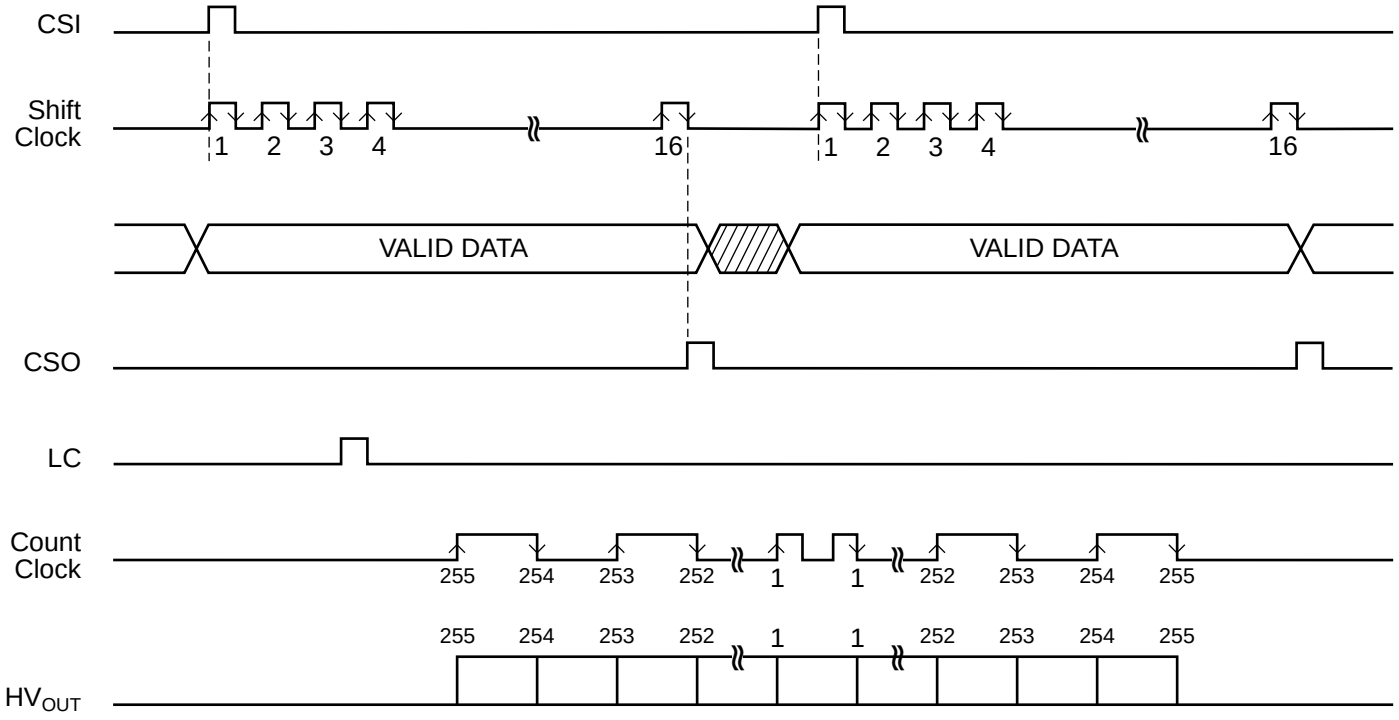


* Internal pull-up resistor

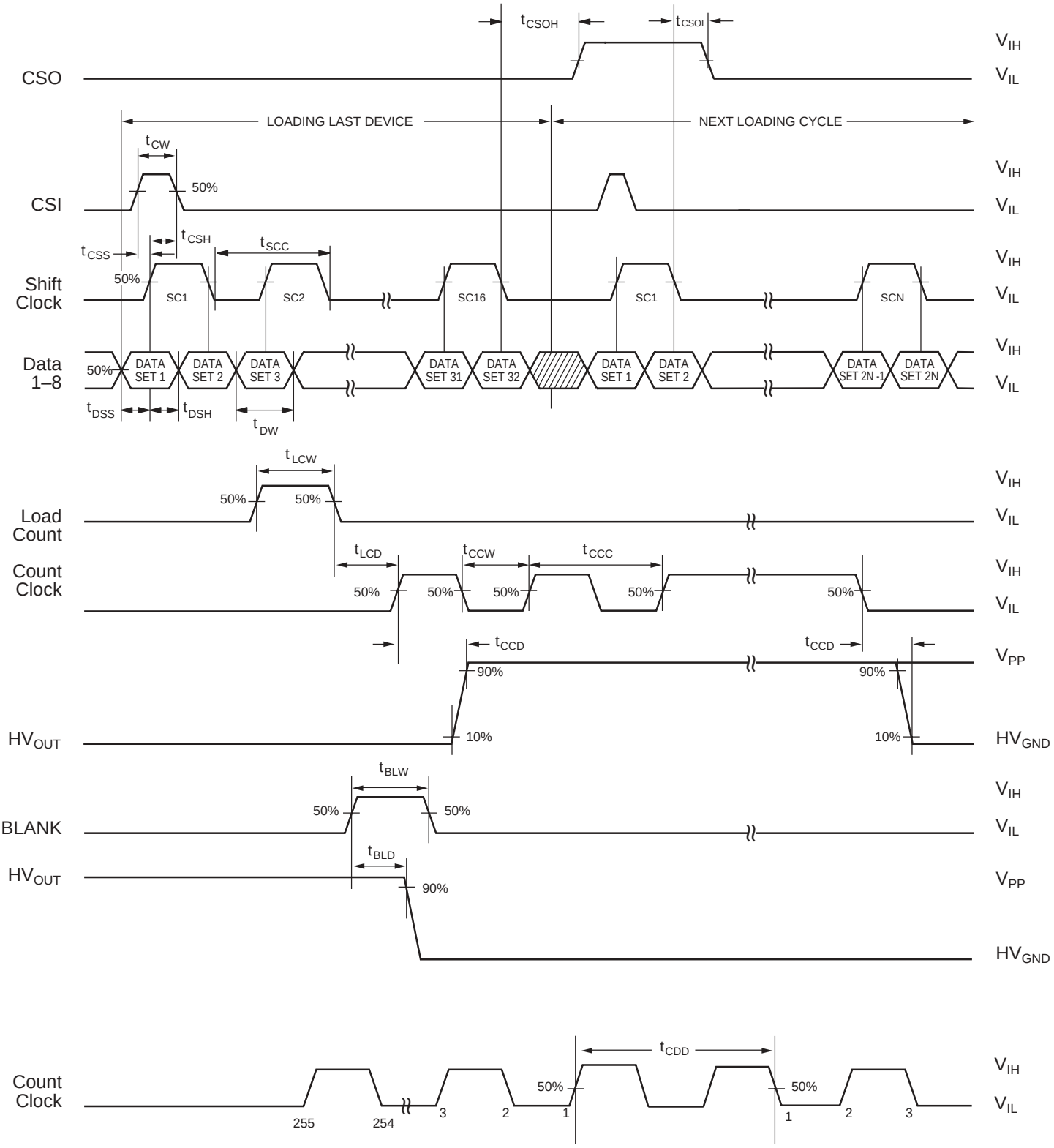
Input and Output Equivalent Circuits



Timing Diagrams



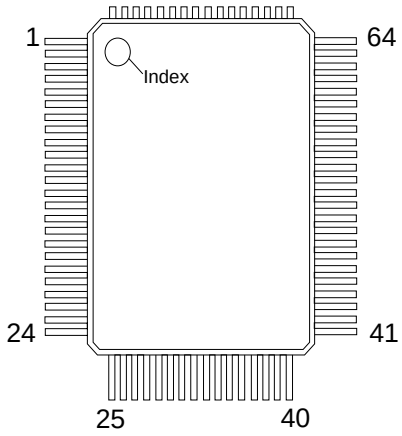
Timing Diagrams



Pin Configurations

Pin	Function	Pin	Function
1	N/C	33	Load Count
2	N/C	34	Shift Clock
3	N/C	35	N/C
4	$HV_{OUT}17$	36	D5
5	$HV_{OUT}18$	37	D6
6	$HV_{OUT}19$	38	D7
7	$HV_{OUT}20$	39	D8
8	$HV_{OUT}21$	40	V_{DD}
9	$HV_{OUT}22$	41	NC
10	$HV_{OUT}23$	42	NC
11	$HV_{OUT}24$	43	V_{PP}
12	$HV_{OUT}25$	44	HV_{GND}
13	$HV_{OUT}26$	45	N/C
14	$HV_{OUT}27$	46	$HV_{OUT}1$
15	$HV_{OUT}28$	47	$HV_{OUT}2$
16	$HV_{OUT}29$	48	$HV_{OUT}3$
17	$HV_{OUT}30$	49	$HV_{OUT}4$
18	$HV_{OUT}31$	50	$HV_{OUT}5$
19	$HV_{OUT}32$	51	$HV_{OUT}6$
20	GND	52	$HV_{OUT}7$
21	GND	53	$HV_{OUT}8$
22	HV_{GND}	54	$HV_{OUT}9$
23	V_{PP}	55	$HV_{OUT}10$
24	CSI	56	$HV_{OUT}11$
25	CSO	57	$HV_{OUT}12$
26	Blank	58	$HV_{OUT}13$
27	D1	59	$HV_{OUT}14$
28	D2	60	$HV_{OUT}15$
29	D3	61	$HV_{OUT}16$
30	D4	62	N/C
31	Count Clock	63	N/C
32	$\overline{POL}$	64	N/C

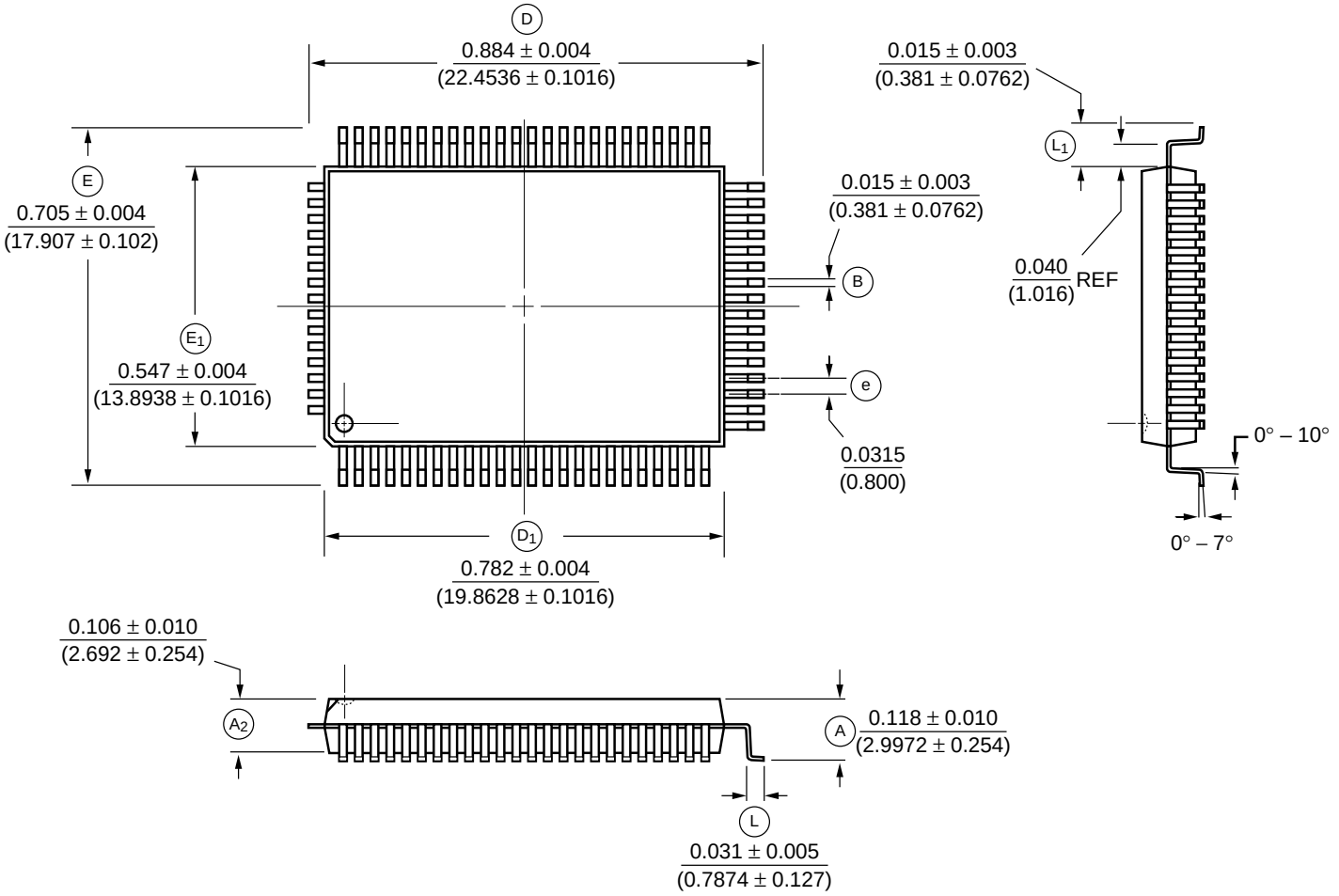
Package Outline



top view

3-sided Plastic 64-pin Gullwing Package

64-LEAD 3-SIDED PLASTIC QUAD FLAT PACKAGE (PG) ("GULLWING" PACKAGE)



Note: Circle (e.g. (B)) indicates JEDEC Reference.

Measurement Legend = Dimensions in Inches / (Dimensions in Millimeters)

07/08/03rev.2

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