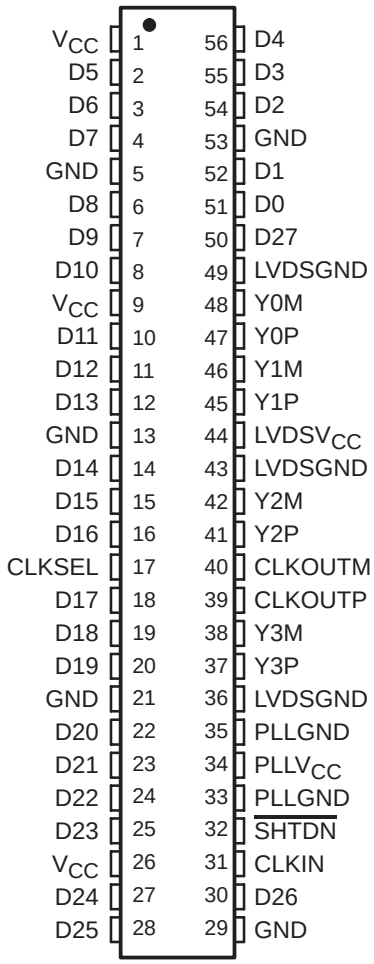
SN75LVDS83
FlatLink™ TRANSMITTER

SLLS271I − MARCH 1997 − REVISED MAY 2009

- **4:28 Data Channel Compression at up to 238 MBytes/s Throughput**
- **Suited for SVGA, XGA, or SXGA Display Data Transmission From Controller to Display With Very Low EMI**
- **28 Data Channels and Clock-In Low-Voltage TTL**
- **4 Data Channels and Clock-Out Low-Voltage Differential**
- **Operates From a Single 3.3-V Supply With 250 mW (Typ)**
- **ESD Protection Exceeds 6 kV**
- **5-V Tolerant Data Inputs**
- **Selectable Rising or Falling Edge-Triggered Inputs**
- **Packaged in Thin Shrink Small-Outline Package With 20-Mil Terminal Pitch**
- **Consumes Less Than 1 mW When Disabled**
- **Wide Phase-Lock Input Frequency Range . . . 31 MHz to 68 MHz**
- **No External Components Required for PLL**
- **Outputs Meet or Exceed the Requirements of ANSI EIA/TIA-644 Standard**
- **Improved Replacement for the DS90C581**

DGG PACKAGE
(TOP VIEW)



description

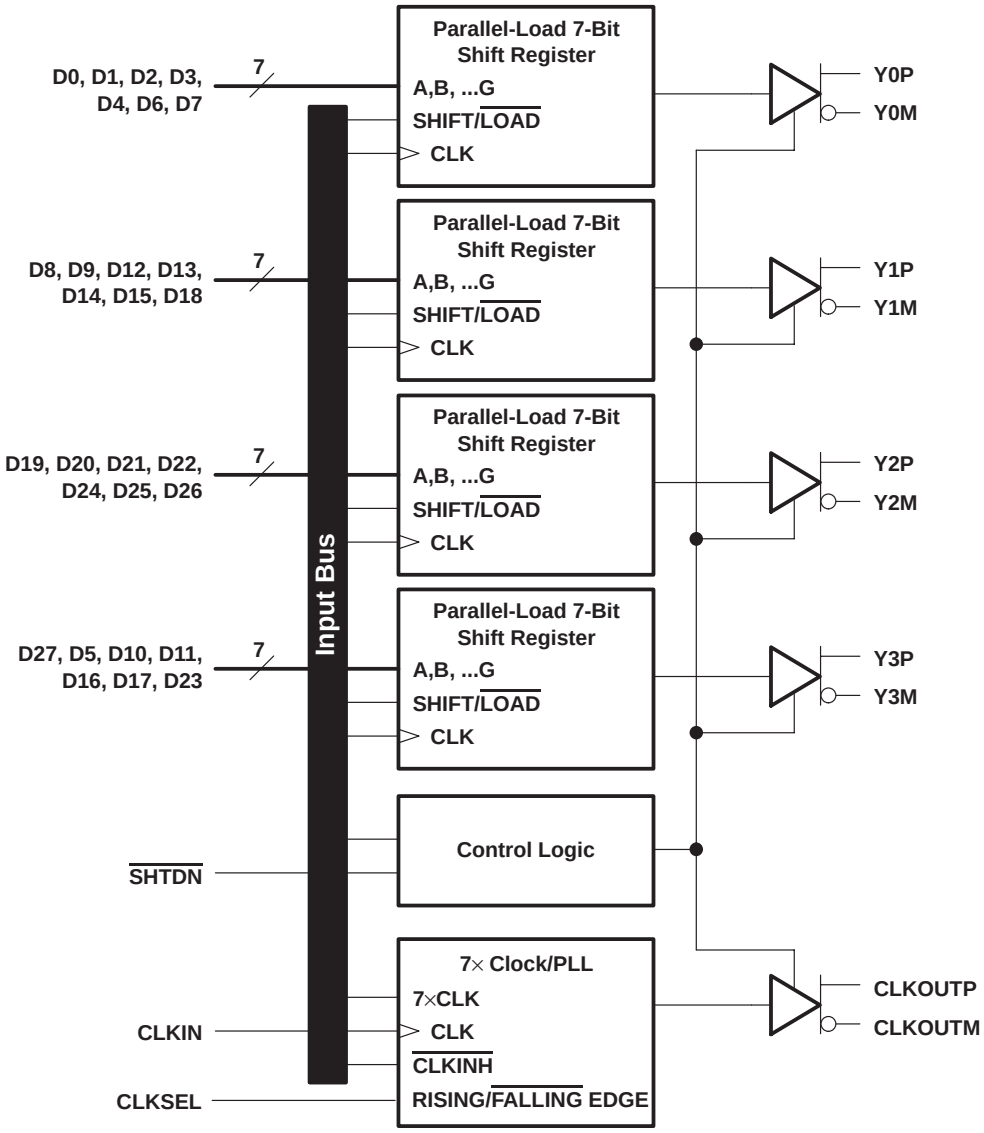
The SN75LVDS83 FlatLink transmitter contains four 7-bit parallel-load serial-out shift registers, a 7× clock synthesizer, and five low-voltage differential-signaling (LVDS) line drivers in a single integrated circuit. These functions allow 28 bits of single-ended low-voltage TTL (LVTTL) data to be synchronously transmitted over five balanced-pair conductors for receipt by a compatible receiver, such as the SN75LVDS82. The SN75LVDS83 can also be used in 21-bit links with the SN75LVDS86 receiver.

When transmitting, data bits D0 through D27 are each loaded into registers upon the edge of the input clock signal (CLKIN). The rising or falling edge of the clock can be selected by way of the clock select (CLKSEL) terminal. The frequency of CLKIN is multiplied seven times (7×) and then used to unload the data registers in 7-bit slices and serially. The four serial streams and a phase-locked clock (CLKOUT) are then output to LVDS output drivers. The frequency of CLKOUT is the same as the input clock, CLKIN.

The SN75LVDS83 requires no external components and little or no control. The data bus appears the same at the input to the transmitter and output of the receiver with the data transmission transparent to the user. The only user intervention is the possible use of the shutdown/clear ($\overline{\text{SHTDN}}$) active-low input to inhibit the clock and shut off the LVDS output drivers for lower power consumption. A low-level signal on $\overline{\text{SHTDN}}$ clears all internal registers to a low level.

The SN75LVDS83 is characterized for operation over free-air temperature ranges of 0°C to 70°C.

functional block diagram



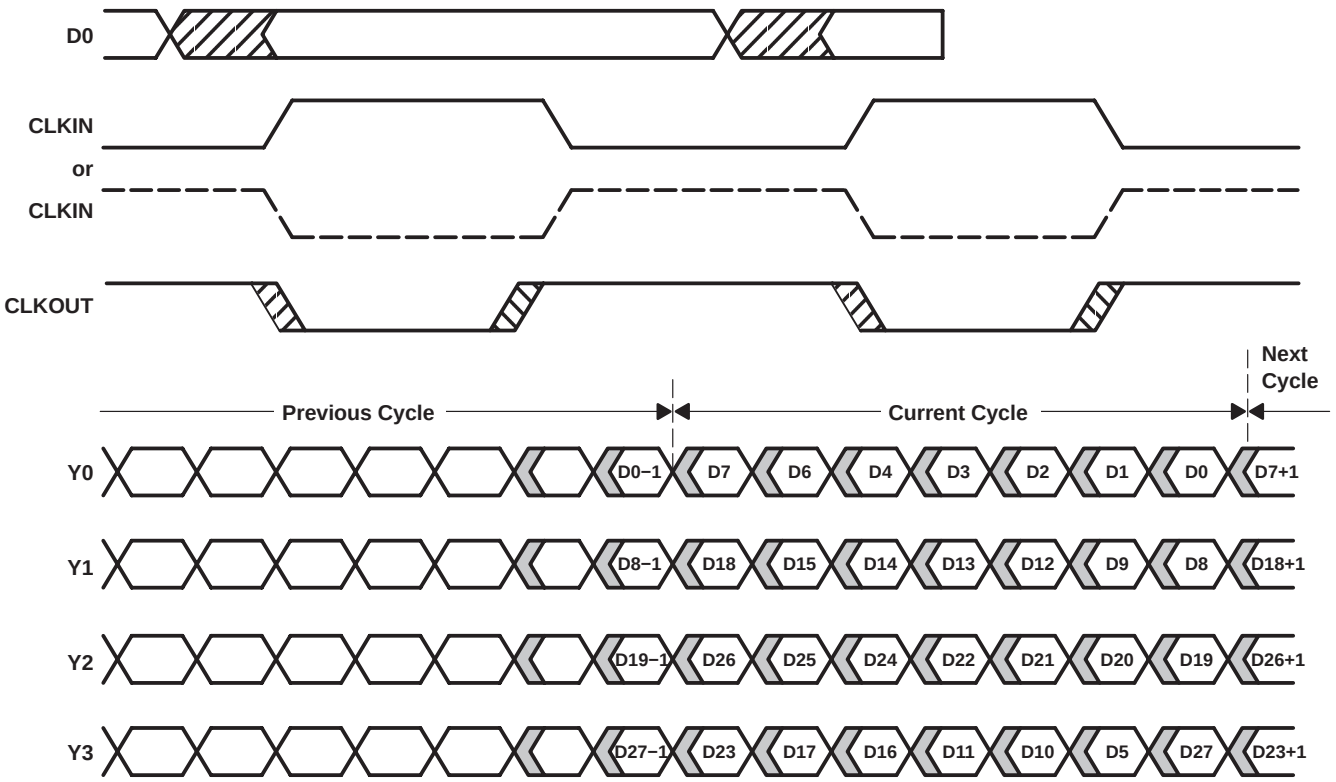
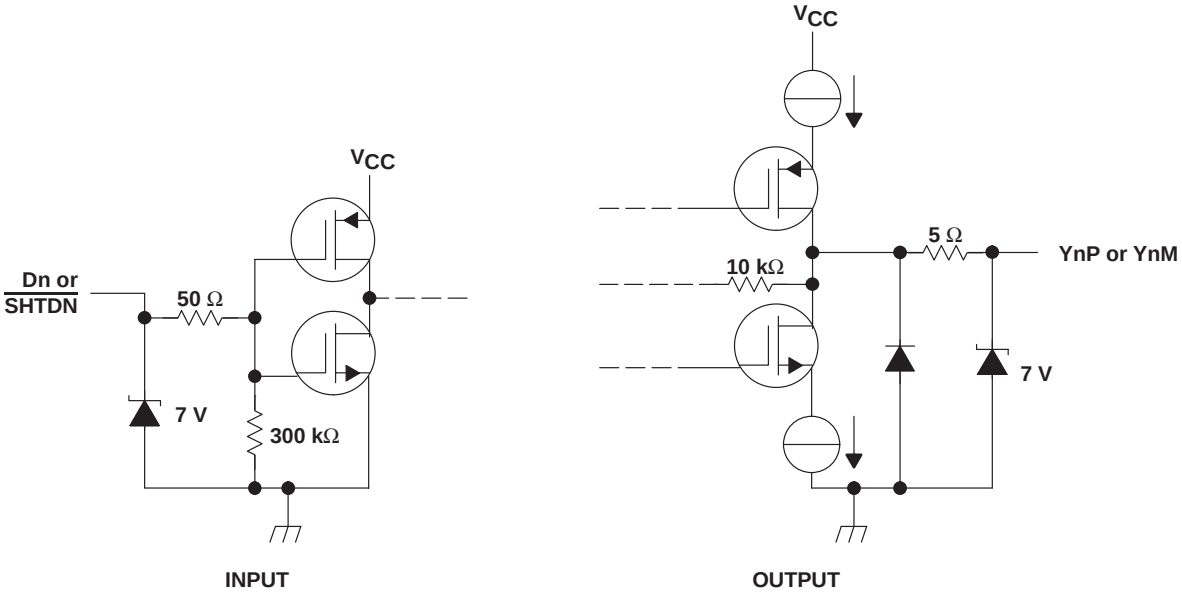


Figure 1. SN75LVDS83 Load and Shift Timing Sequences

equivalent input and output schematic diagrams



absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage range, V_{CC} (see Note 1) . . . . . −0.5 V to 4 V
Output voltage range, V_O (all terminals) . . . . . −0.5 V to V_{CC} + 0.5 V
Input voltage range, V_I (all terminals) . . . . . −0.5 V to 5.5 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Storage temperature range, T_{stg} . . . . . −65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to the GND terminals.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR‡ ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
DGG	1377 mW	11.0 mW/°C	822 mW

‡ This is the inverse of the junction-to-ambient thermal resistance when board mounted and with no air flow.

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	3	3.3	3.6	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
Differential load impedance, Z_L	90		132	Ω
Operating free-air temperature, T_A	0		70	°C

timing requirements

		MIN	NOM	MAX	UNIT
t_c	Cycle time, input clock	14.7		32.3	ns
t_w	Pulse duration, high-level input clock	$0.4\,t_c$		$0.6\,t_c$	ns
t_t	Transition time, input signal			5	ns
t_{su}	Setup time, data, D0 − D27 valid before CLKIN↑ or CLKIN↓ (see Figure 2)	3			ns
t_h	Hold time, data, D0 − D27 valid after CLKIN↑ or CLKIN↓ (see Figure 2)	1.5			ns

electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IT}	Input threshold voltage			1.4		V
$\|V_{OD}\|$	Differential steady-state output voltage magnitude	R_L = 100 Ω, See Figure 3	247		454	mV
$\Delta\|V_{OD}\|$	Change in the steady-state differential output voltage magnitude between opposite binary states				50	mV
$V_{OC(SS)}$	Steady-state common-mode output voltage	See Figure 3	1.125		1.375	V
$V_{OC(PP)}$	Peak-to-peak common-mode output voltage				150	mV
I_{IH}	High-level input current	$V_{IH} = V_{CC}$			25	µA
I_{IL}	Low-level input current	V_{IL} = 0			±10	µA
I_{OS}	Short-circuit output current	$V_{O(Yn)}$ = 0			±24	mA
		V_{OD} = 0			±12	mA
I_{OZ}	High-impedance state output current	V_O = 0 to V_{CC}			±10	µA
I_{CC}	Quiescent supply current	Disabled, All inputs at GND			280	µA
		Enabled, R_L = 100 Ω, Gray-scale pattern (see Figure 4), V_{CC} = 3.3 V, t_c = 15.38 ns		72	90	mA
		Enabled, R_L = 100 Ω, Worst-case pattern (see Figure 5), t_c = 15.38 ns		85	110	mA
C_I	Input capacitance			3		pF

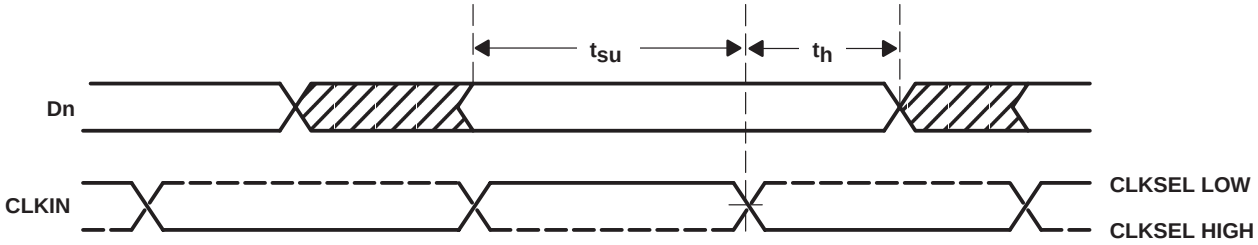
† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

switching characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{d0}	Delay time, CLKOUT↑ to serial bit position 0	t_c = 15.38 ns (± 0.2%), |Input clock jitter| < 50 ps‡, See Figure 6	−0.2	0	0.2	ns
t_{d1}	Delay time, CLKOUT↑ to serial bit position 1		$\frac{1}{7}t_c$ − 0.2		$\frac{1}{7}t_c$ + 0.2	ns
t_{d2}	Delay time, CLKOUT↑ to serial bit position 2		$\frac{2}{7}t_c$ − 0.2		$\frac{2}{7}t_c$ + 0.2	ns
t_{d3}	Delay time, CLKOUT↑ to serial bit position 3		$\frac{3}{7}t_c$ − 0.2		$\frac{3}{7}t_c$ + 0.2	ns
t_{d4}	Delay time, CLKOUT↑ to serial bit position 4		$\frac{4}{7}t_c$ − 0.2		$\frac{4}{7}t_c$ + 0.2	ns
t_{d5}	Delay time, CLKOUT↑ to serial bit position 5		$\frac{5}{7}t_c$ − 0.2		$\frac{5}{7}t_c$ + 0.2	ns
t_{d6}	Delay time, CLKOUT↑ to serial bit position 6		$\frac{6}{7}t_c$ − 0.2		$\frac{6}{7}t_c$ + 0.2	ns
$t_{sk(o)}$	Output skew, $t_n - \frac{n}{7}t_c$		−0.2		0.2	ns
t_{d7}	Delay time, CLKIN↓ to CLKOUT↑	t_c = 18.51 ns (± 0.2%), |Input clock jitter| < 50 ps‡, See Figure 6	3.75	5.6	7.75	ns
$\Delta t_{c(o)}$	Cycle time, output clock jitter§	t_c = 15.38 ± 0.75 sin (2π500E3t) + 0.05 ns, See Figure 7		±70		ps
		t_c = 15.38 ± 0.75 sin (2π3E6t) + 0.05 ns, See Figure 7		±187		ps
t_w	Pulse duration, high-level output clock			$\frac{4}{7}t_c$		ns
t_t	Transition time, differential output (t_r or t_f)	See Figure 3	260	700	1500	ps
t_{en}	Enable time, $\overline{SHTDN}$↑ to phase lock (Yn valid)	See Figure 8		1		ms
t_{dis}	Disable time, $\overline{SHTDN}$↓ to off state (CLKOUT low)	See Figure 9		250		ns

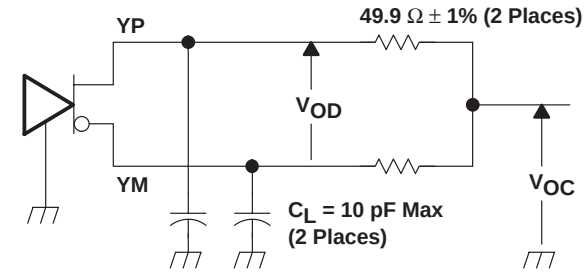
† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.
‡ |Input clock jitter| is the magnitude of the change in the input clock period.
§ Output clock jitter is the change in the output clock period from one cycle to the next cycle observed over 15000 cycles.

PARAMETER MEASUREMENT INFORMATION



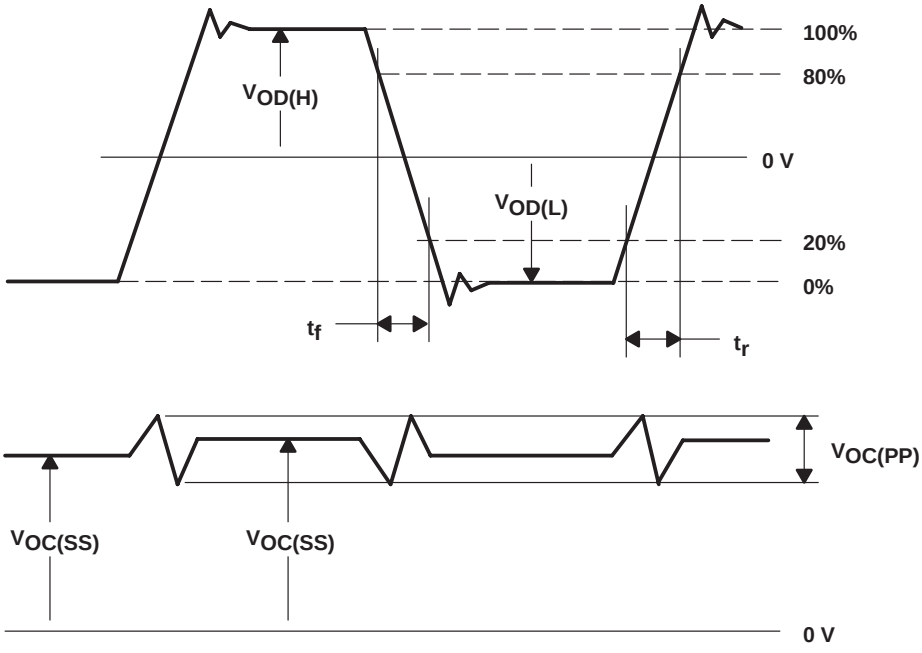
NOTE A: All input timing is defined at 1.4 V on an input signal with a 10%-to-90% rise or fall time of less than 5 ns.

Figure 2. Setup and Hold Time Waveforms



NOTE A: The lumped instrumentation capacitance for any single-ended voltage measurement is less than or equal to 10 pF. When making measurements at YP or YM, the complementary output is similarly loaded.

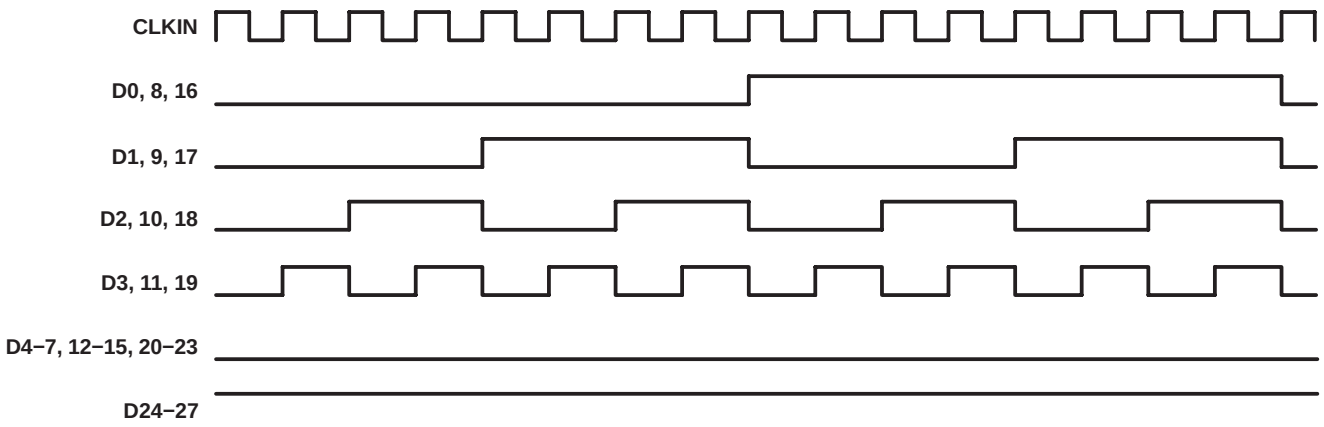
(a) SCHEMATIC



(b) WAVEFORMS

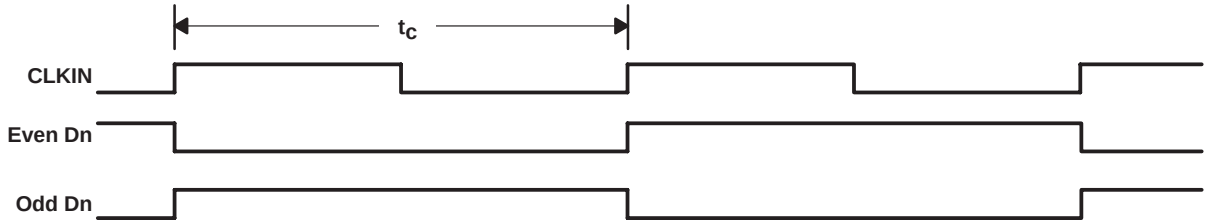
Figure 3. Test Load and Voltage Waveforms for LVDS Outputs

PARAMETER MEASUREMENT INFORMATION



NOTE A: The 16-grayscale test-pattern test device power consumption for a typical display pattern. Pattern with CLKSEL low shown.

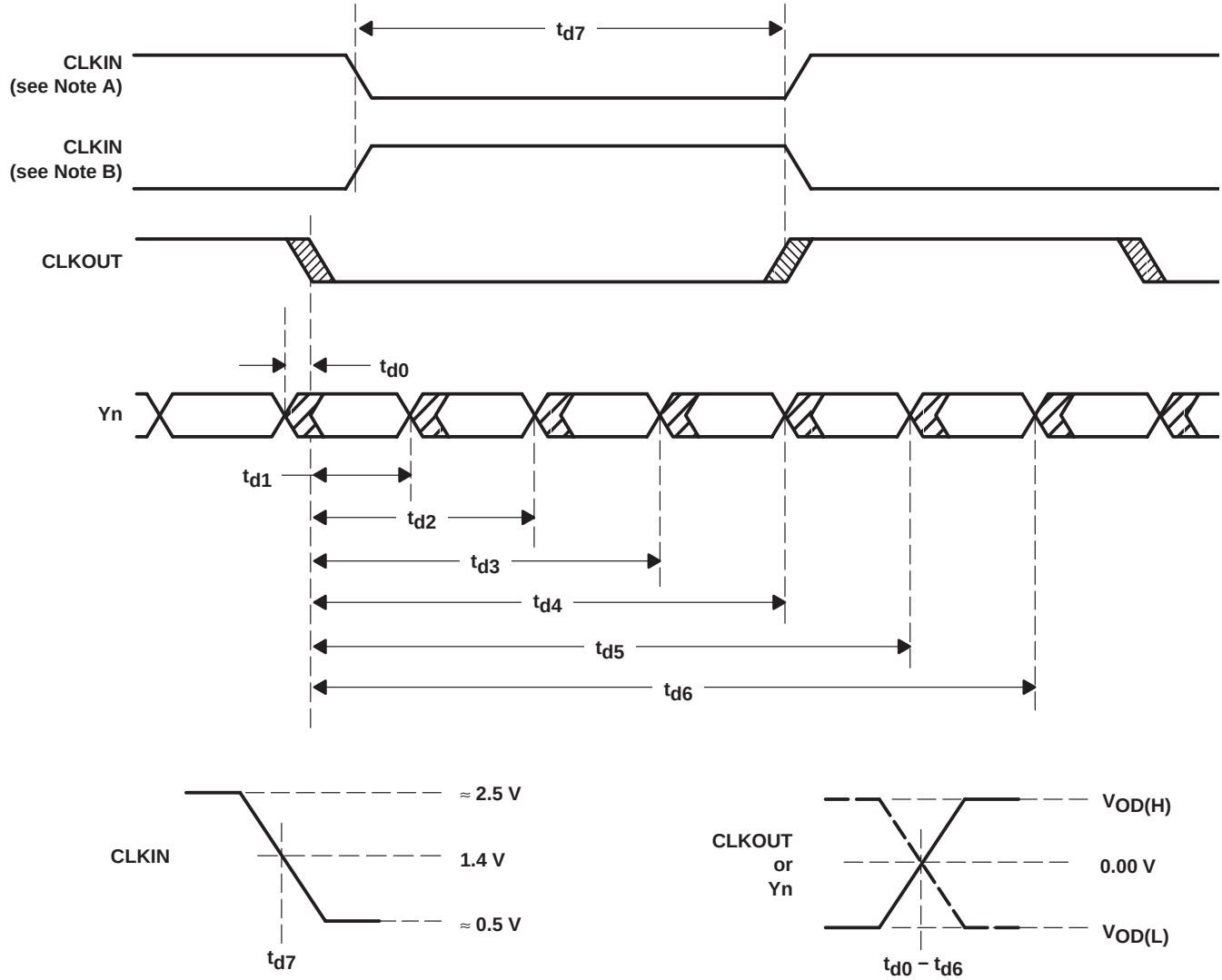
Figure 4. 16-Grayscale Test-Pattern Waveforms



NOTE A: The worst-case test pattern produces nearly the maximum switching frequency for all of the LVDS outputs. Pattern with CLKSEL low shown.

Figure 5. Worst-Case Test-Pattern Waveforms

PARAMETER MEASUREMENT INFORMATION



NOTES: A. This wave form is valid when CLKSEL is low.
B. This wave form is valid when CLKSEL is high.

Figure 6. SN75LVDS83 Timing Waveforms

PARAMETER MEASUREMENT INFORMATION

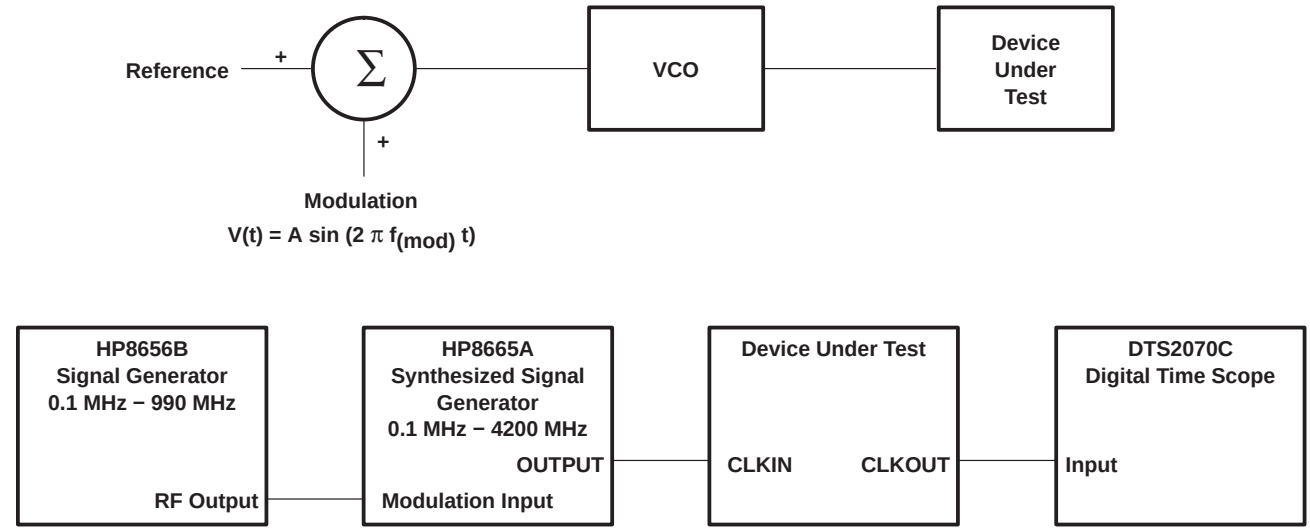


Figure 7. Output Clock Jitter Testing

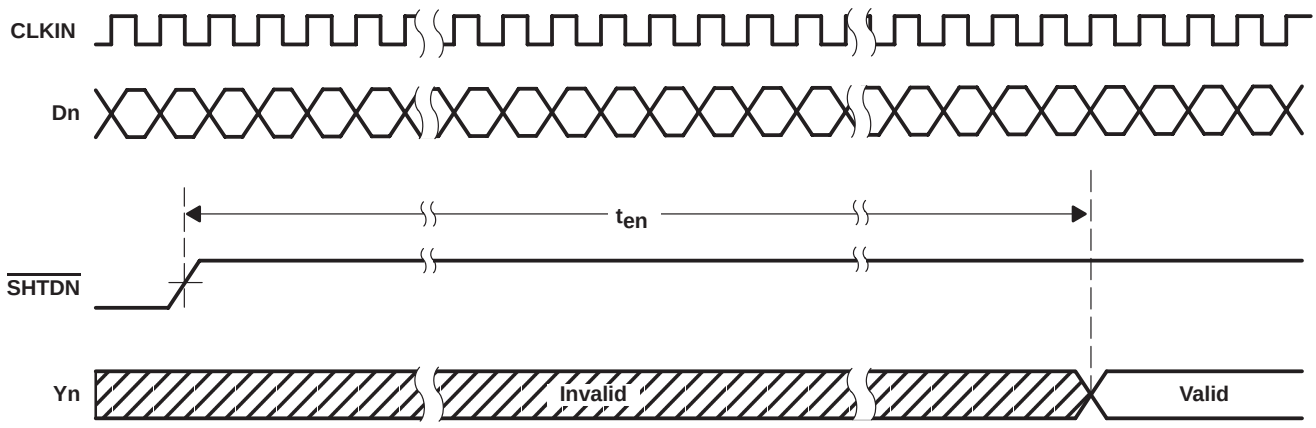


Figure 8. Enable Time Waveforms

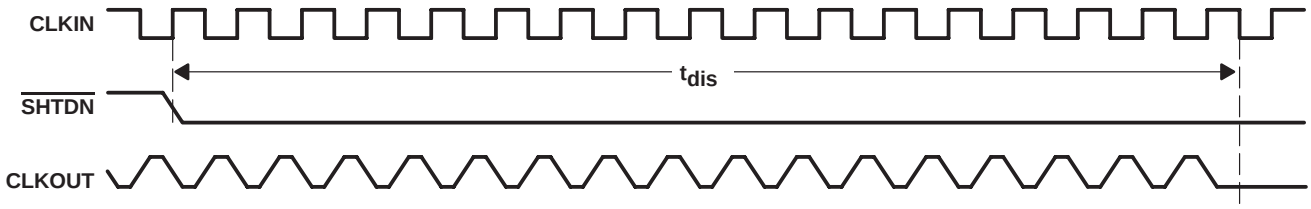


Figure 9. Disable Time Waveforms

TYPICAL CHARACTERISTICS

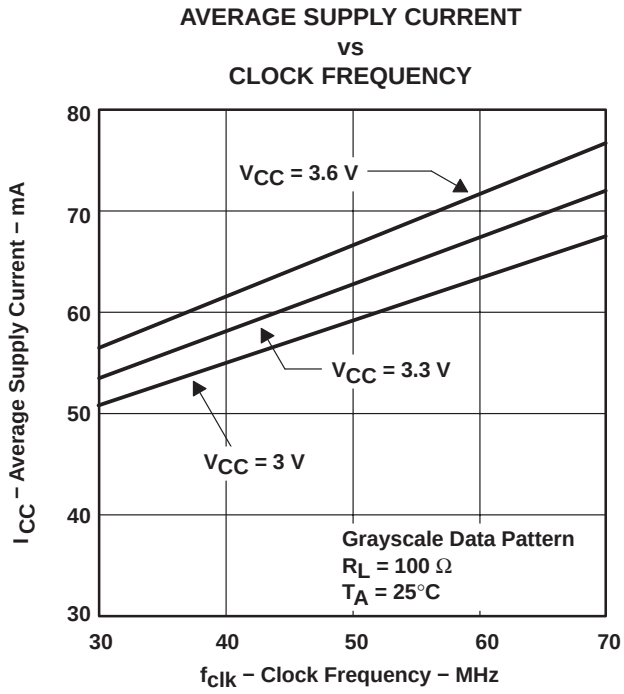


Figure 10

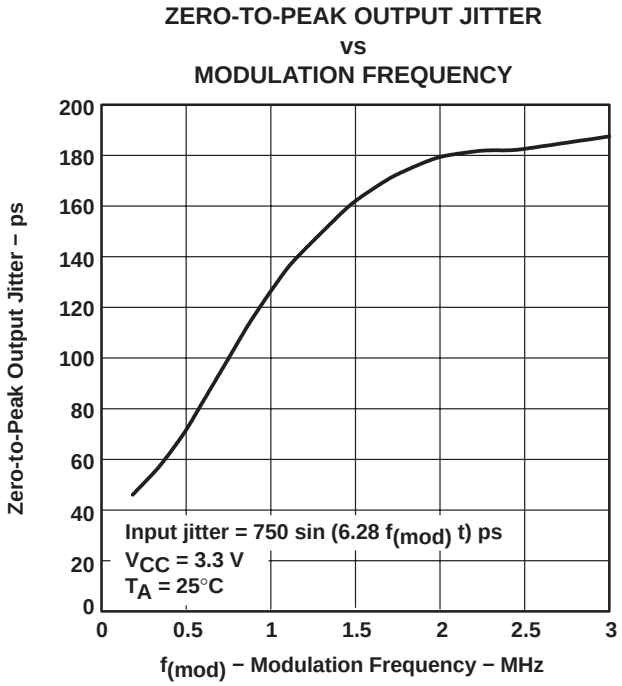
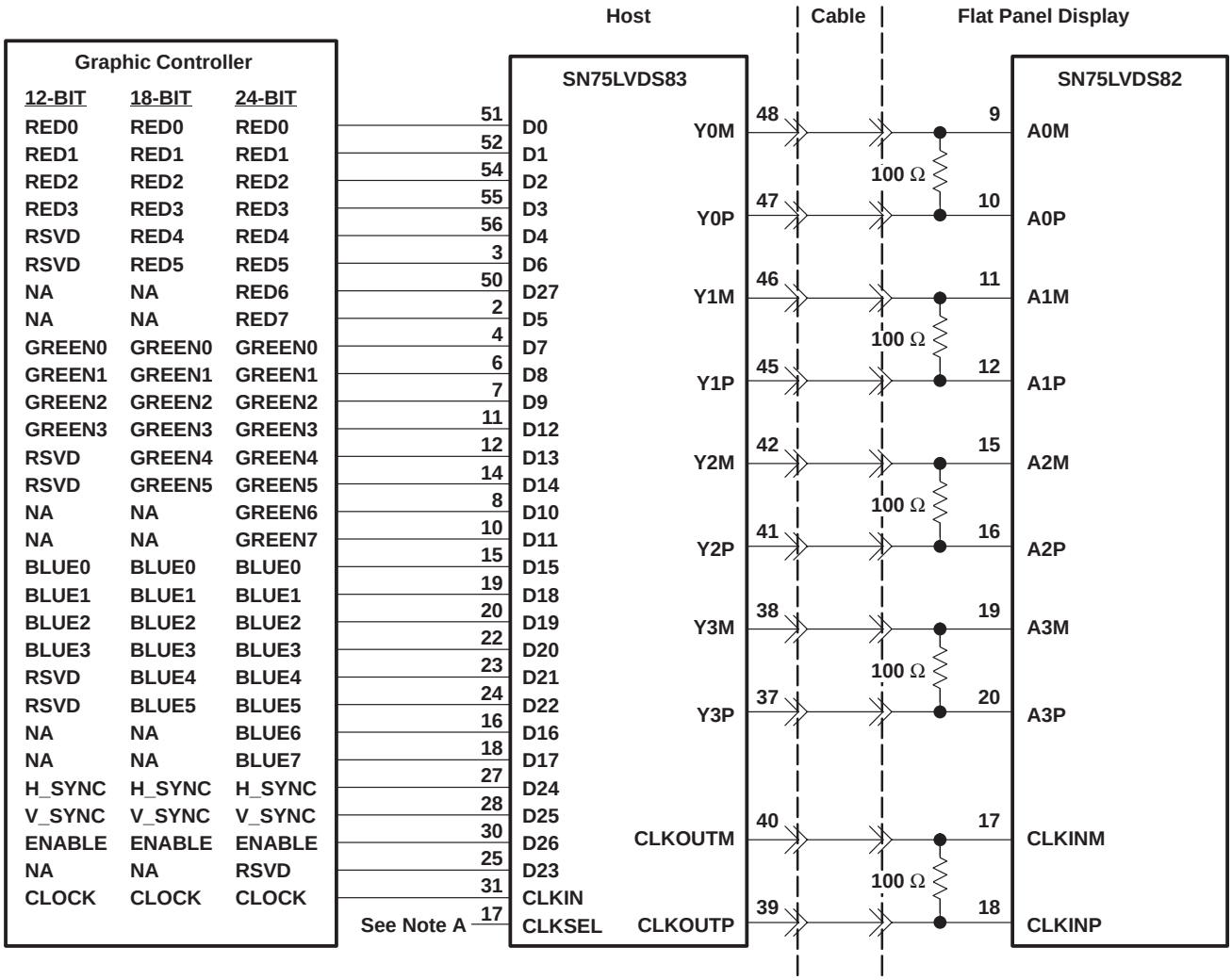


Figure 11

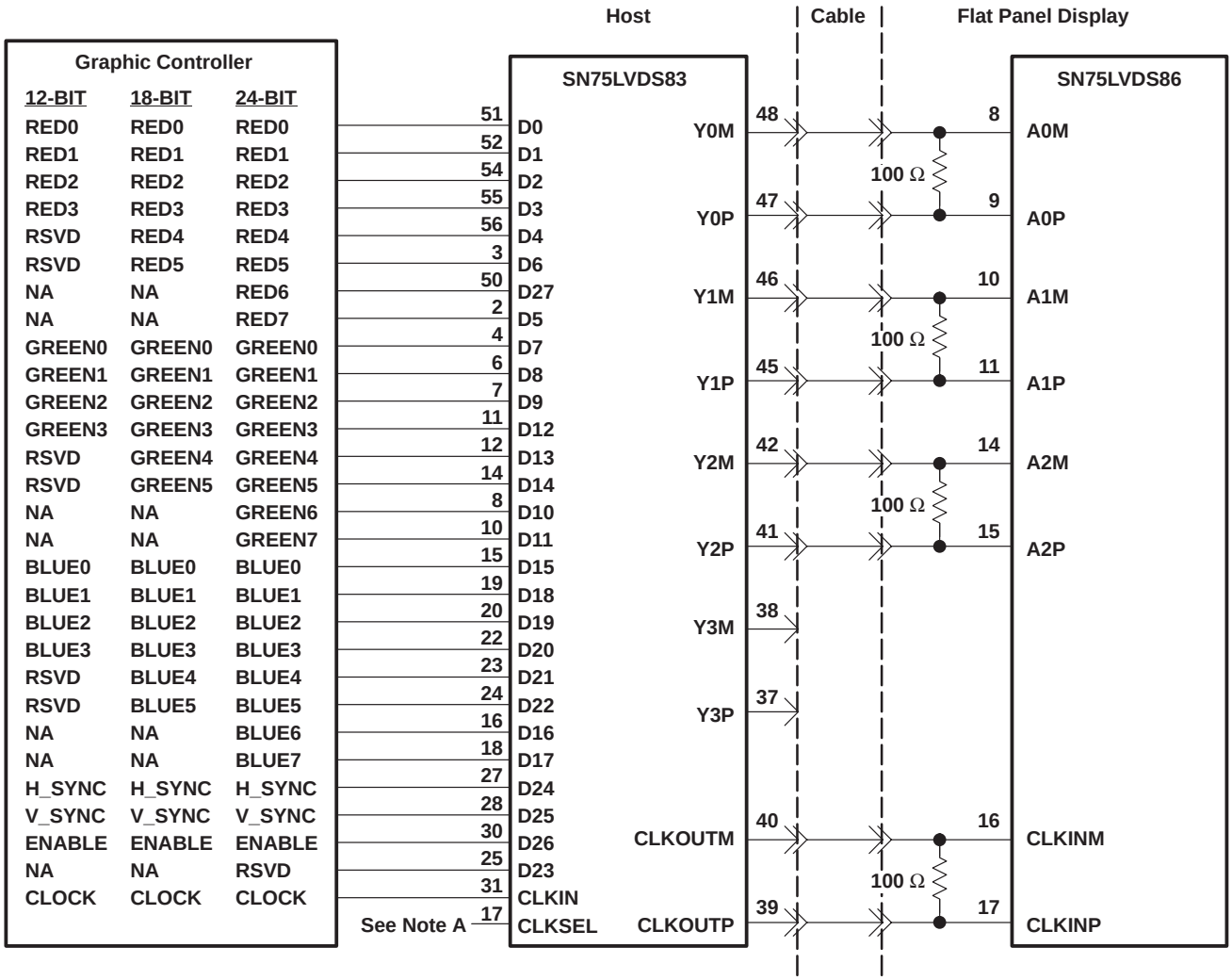
APPLICATION INFORMATION



NOTES: A. Connect this terminal to V_{CC} for triggering to the rising edge of the input clock and to GND for the falling edge.
B. The five 100-Ω terminating resistors are recommended to be 0603 types.

Figure 12. 24-Bit Color Host To 24-Bit LCD Panel Display Application

APPLICATION INFORMATION



NOTES: A. Connect this terminal to V_{CC} for triggering to the rising edge of the input clock and to GND for the falling edge.
B. The four 100-Ω terminating resistors are recommended to be 0603 types.

Figure 13. 24-Bit Color Host To 18-Bit LCD Panel Display Application

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN75LVDS83DGG	NRND	Production	TSSOP (DGG) | 56	35 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	SN75LVDS83
SN75LVDS83DGG.B	NRND	Production	TSSOP (DGG) | 56	35 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	SN75LVDS83
SN75LVDS83DGGG4	NRND	Production	TSSOP (DGG) | 56	35 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	SN75LVDS83
SN75LVDS83DGGR	NRND	Production	TSSOP (DGG) | 56	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	SN75LVDS83
SN75LVDS83DGGR.B	NRND	Production	TSSOP (DGG) | 56	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	SN75LVDS83

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

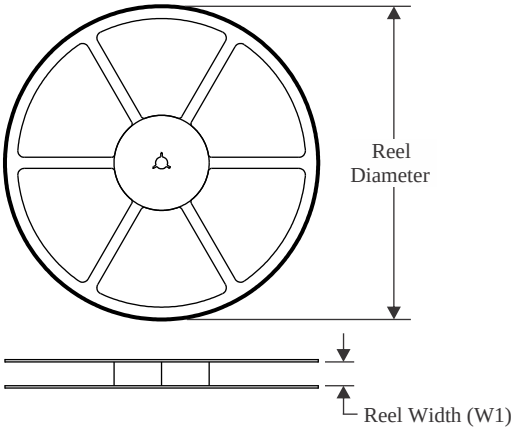
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

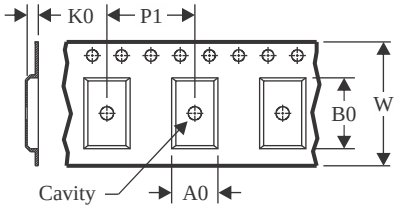
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

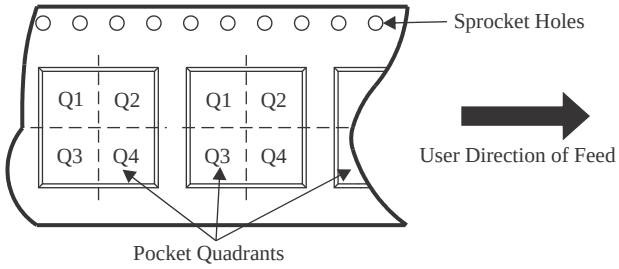


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

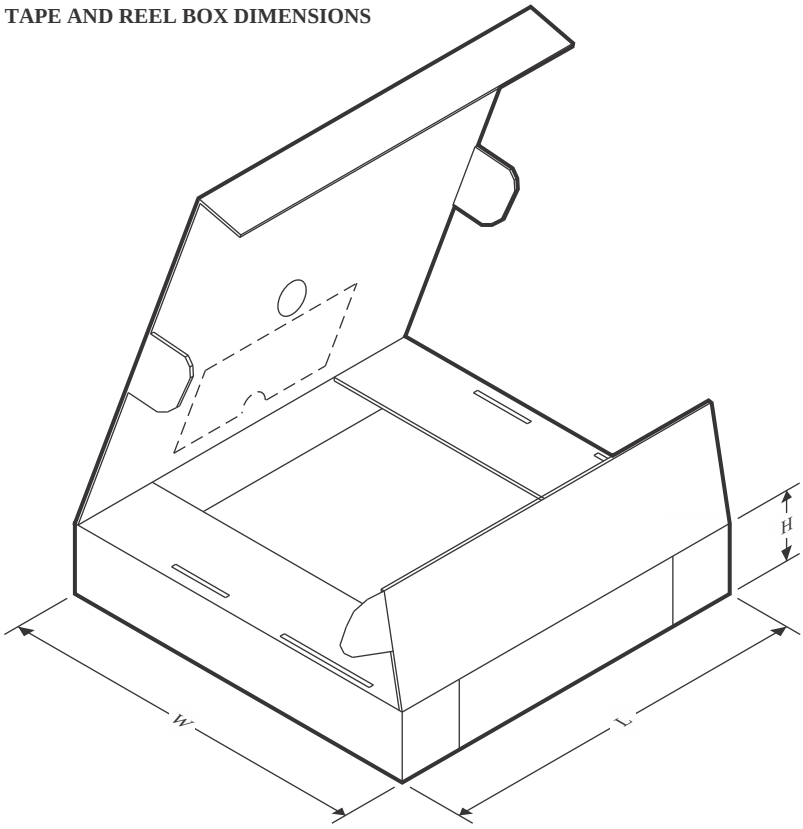
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75LVDS83DGGR	TSSOP	DGG	56	2000	330.0	24.4	8.6	15.6	1.8	12.0	24.0	Q1

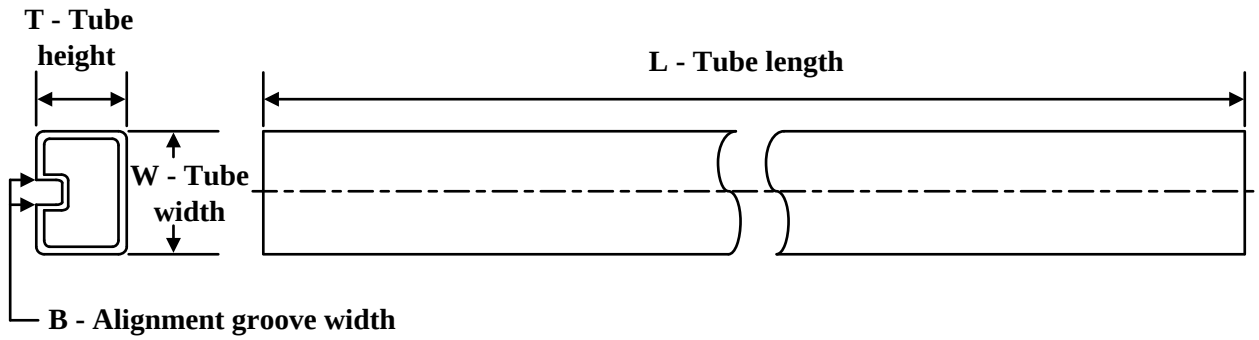
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75LVDS83DGGR	TSSOP	DGG	56	2000	350.0	350.0	43.0

TUBE



*All dimensions are nominal

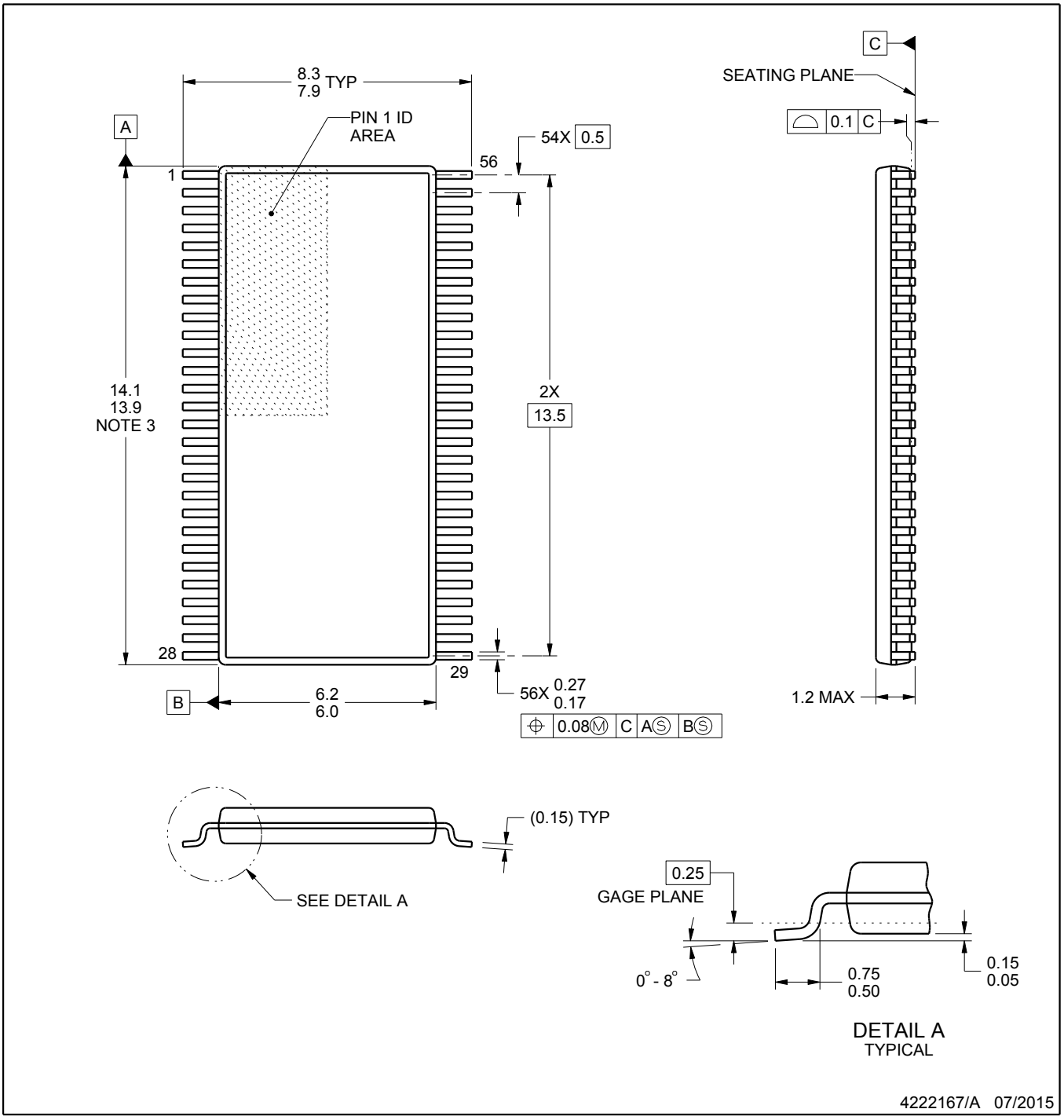
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
SN75LVDS83DGG	DGG	TSSOP	56	35	530	11.89	3600	4.9
SN75LVDS83DGG.B	DGG	TSSOP	56	35	530	11.89	3600	4.9
SN75LVDS83DGGG4	DGG	TSSOP	56	35	530	11.89	3600	4.9

PACKAGE OUTLINE

DGG0056A

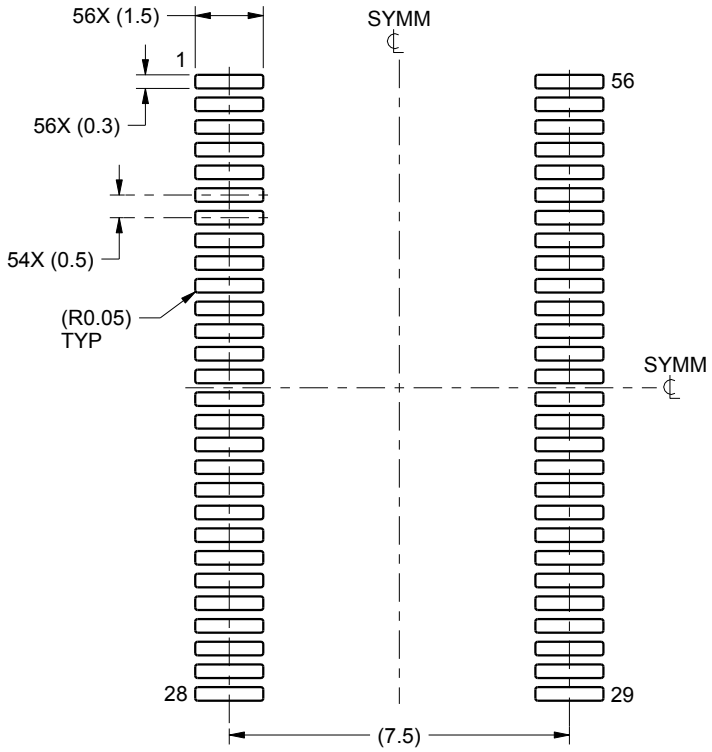
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

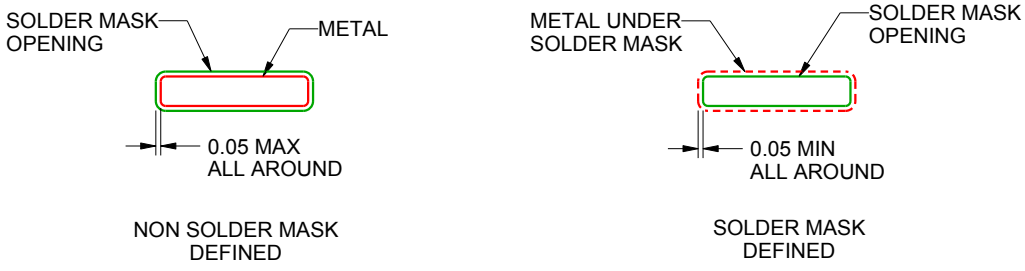


NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-153.



LAND PATTERN EXAMPLE
SCALE:6X

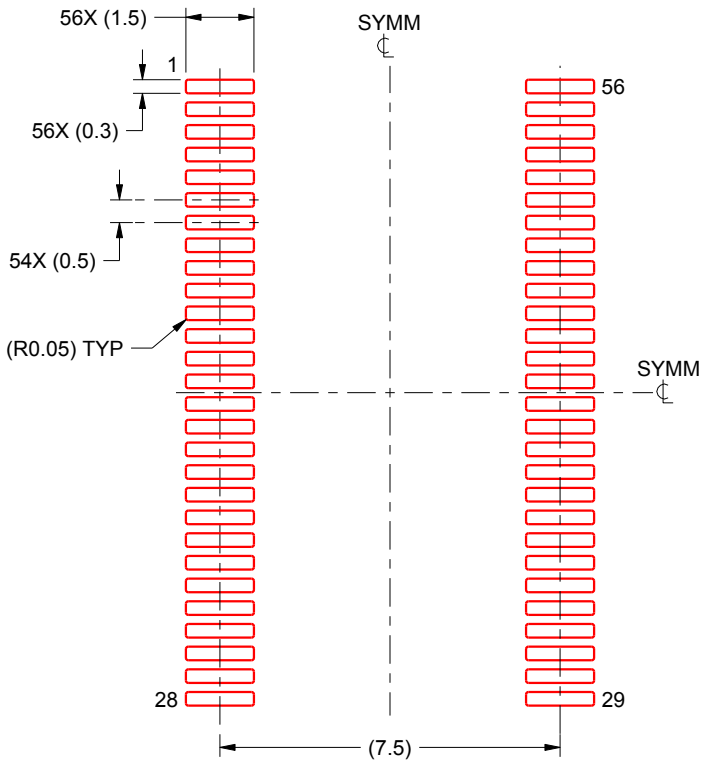


SOLDER MASK DETAILS

4222167/A 07/2015

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4222167/A 07/2015

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Last updated 10/2025