



CYPRESS

COMLINK™ SERIES  
CY2LL8422

High Drive Dual 2-Channel LVDS Repeater/Mux

Features

- ANSI TIA/EIA-644-1995 Compliant
- Designed for Data rates to 650 MBps = (325 MHz)
- Dual 2x2
  - Low Voltage Differential Signaling with output voltages of  $\pm 350$  mV into 100-ohm load version (Std)
- Single 3.3V supply
- Accepts  $\pm 35$  mV differential inputs
- Output drivers are high impedance when disabled or when  $V_{DD} \leq 1.5V$
- 28-pin SSOP/TSSOP packages
- Industrial version available

Description

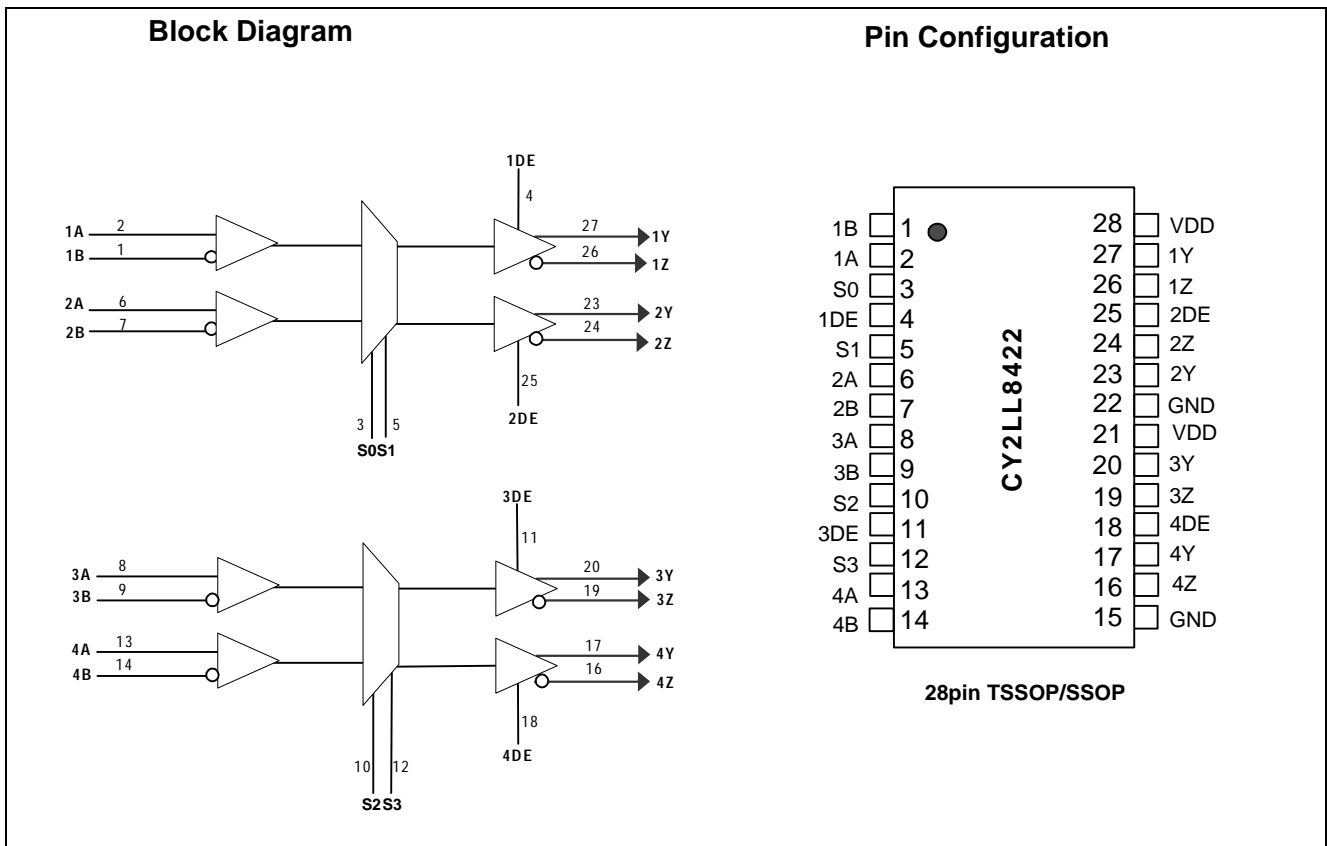
The Cypress CY2LL8422 are differential line drivers and receivers that utilize Low Voltage Signaling or LVDS, to achieve signaling rates of 650 MBps. The receiver outputs can be switched to either or both drivers through the multiplexer control signals S2/S3. This provides flexibility in application for either a splitter or router configuration with a single device.

The Cypress CY2LL8422 are configured as dual 2-channel repeaters/Muxes.

The LVDS standard provides a minimum differential output voltage of 247 mV into a 100-ohm load and receipt of as little as 100 mV signals with up to 1V of DC offset between transmitter and receiver.

A doubly terminated Bus LVDS line enables multipoint configurations.

Designed for both point-to-point based-band multipoint data transmission over controlled impedance lines.



**Pin Description**

Pin Number	Pin Name	Description
15, 22	GND	Ground
2, 1	1A, 1B	Differential Input Channel 1
3	S0	Function Select Channel 1&2
4	1DE	Data Enable Channel 1
5	S1	Function Select Channel 1 & 2
6, 7	2A, 2B	Differential Input Channel 2
21, 28	VDD	Power Supply
8, 9	3A, 3B	Differential Input Channel 3
10	S2	Function Select Channel 3 & 4
11	3DE	Data Enable Channel 3
12	S3	Function Select Channel 3 & 4
13, 14	4A, 4B	Differential Input Channel 4
17, 16	4Y, 4Z	Differential Output Channel 4
18	4DE	Data Enable Channel 4
20, 19	3Y, 3Z	Differential Output Channel 3
23, 24	2Y, 2Z	Differential Output Channel 2
25	2DE	Data Enable Channel 2
27, 26	1Y, 1Z	Differential Output Channel 1

**Table 1. Mux Function Table**

Input		Output		Function
S0	S1	1Y/1Z	2Y/2Z	
0	0	1A/1B	1A/1B	Splitter A
1	0	2A/2B	2A/2B	Splitter B
0	1	1A/1B	2A/2B	Pass Thru Router
1	1	2A/2B	1A/1B	Cross Point Router
S2	S3	3Y/3Z	4Y/4Z	
0	0	3A/3B	3A/3B	Splitter A
1	0	4A/4B	4A/4B	Splitter B
0	1	3A/3B	4A/4B	Pass Thru Router
1	1	4A/4B	3A/3B	Cross Point Router

**Table 2. Absolute Maximum Rating Over Operating Free-Air Temperature<sup>[1]</sup>**

Supply Voltage Range, $V_{DD}(1)$	-0.5V to 4V
Voltage Range (DE,S0,S1)	-0.5V to 6.0V
Input Voltage Range, $V_{IN}$ (A or B)	-0.5V to $V_{DD} + 0.5V$
ESD (All pins)	Class 3, A: 2KV, B:500V
Storage Temperature Range	-65°C to 150°C

**Table 3. Recommended Operating Conditions**

Parameter	Description	Min.	Typ.	Max.	Unit
$V_{DD}$	Supply Voltage	3	3.3	3.6	V
$V_{IH}$	High Level Input Voltage (S0,S1,1DE,2DE) (S2,S3,3DE,4DE)	2			
$V_{IL}$	Low Level Input Voltage (S0,S1,1DE,2DE) (S2,S3,3DE,4DE)			0.8	
$V_{ID}$	Magnitude of Differential Input Voltage	0.1		0.6	
$V_{IC}$	Common Mode Input Voltage	$V_{ID}/2$		$2.4 - (V_{ID}/2)$	
$T_A$	Operating Free Air Temperature	Industrial	-40	85	°C
		Commercial	0	70	

**Table 4. Receiver Electrical Characteristics Over Recommended Operating Conditions**

Parameter	Description	Condition	Min.	Typ.	Max.	Unit
$V_{ITH+}$	Positive-going Differential Input Voltage Threshold	$V_{CM} = 1.2V$			100	mV
$V_{ITH-}$	Negative-going Differential Input Voltage Threshold	$V_{CM} = 1.2V$	-100			mV
$I_I$	Input Current (A Inputs) [Fail Safe]	$V_I = 0V$	-0.5		-10	$\mu A$
		$V_I = 2.4V$			-10	$\mu A$
$I_I$	Input Current (B Inputs) [Fail Safe]	$V_I = 0.8V$	0.5		10	$\mu A$
		$V_I = 2.4V$			10	$\mu A$
$I_I$ (Off)	Power Off Current (A or B Inputs)	$V_{DD} = 0V$		0.1	10	$\mu A$

**Note:**

- Stresses greater than those listed under absolute maximum ratings may cause permanent damage to the device. This is intended to be a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**Table 5. Receiver Electrical Characteristics Over Recommended Operating Conditions**

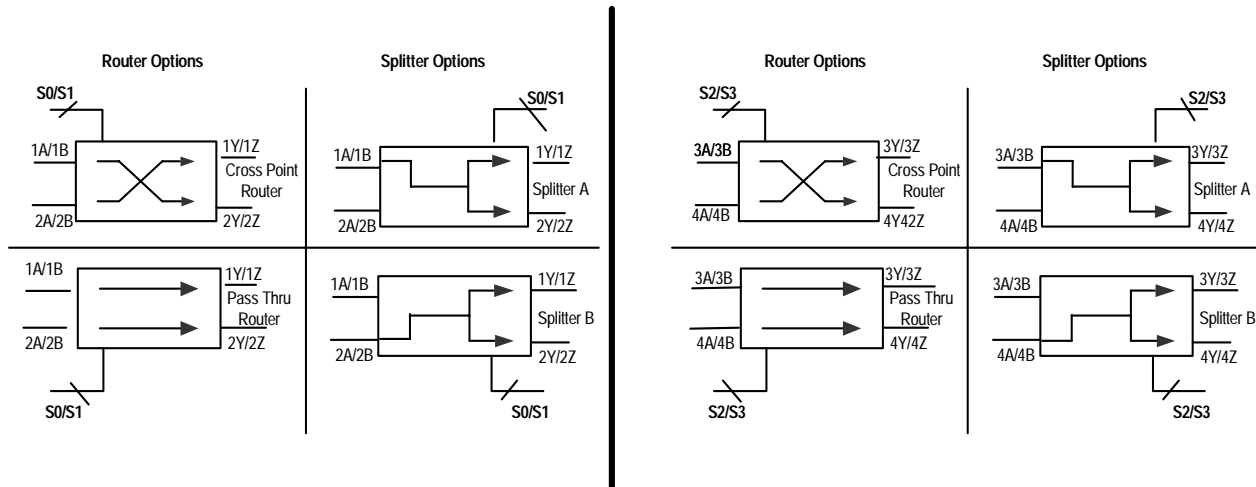
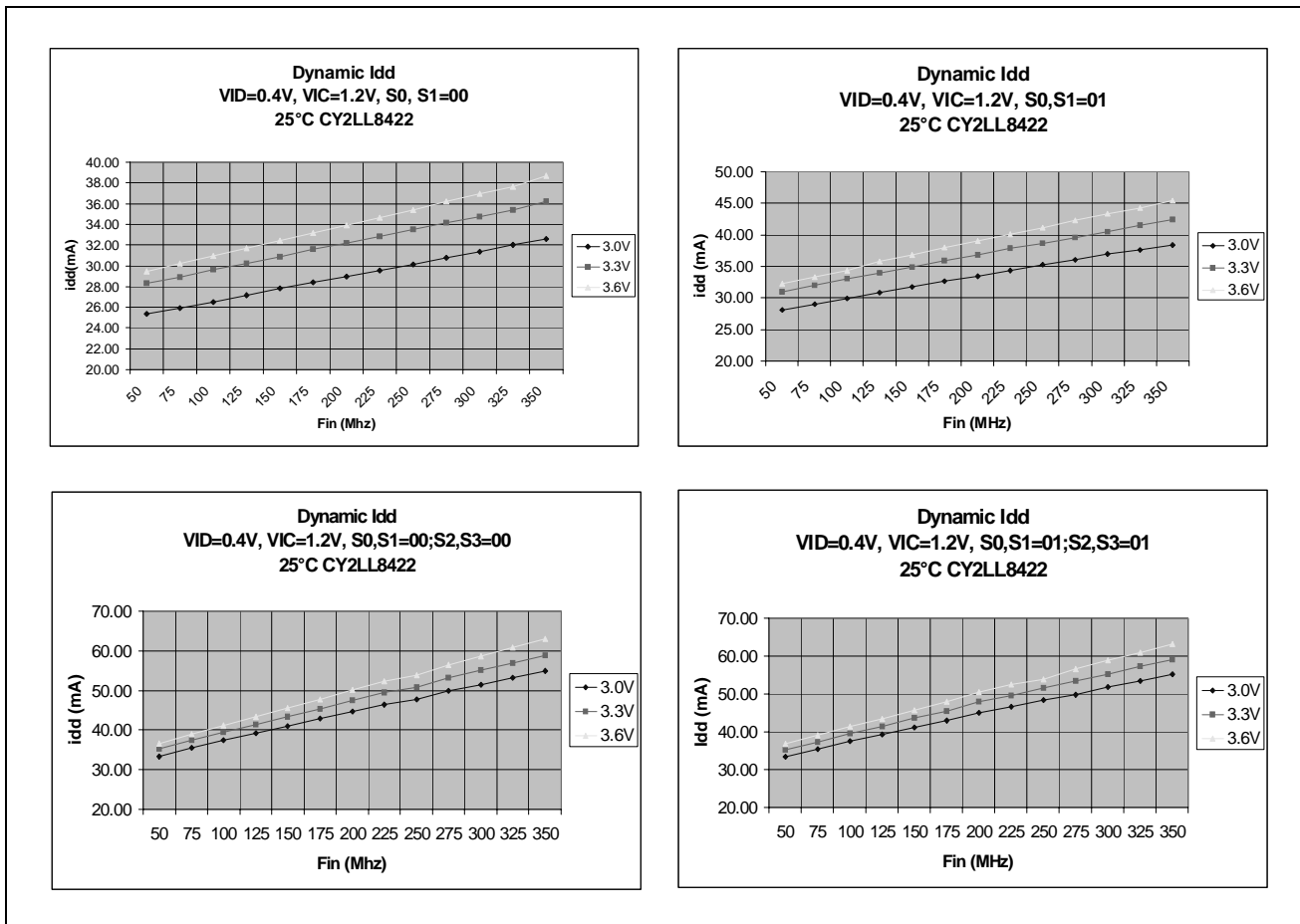
Parameter	Description	Condition		Min.	Typ.	Max.	Unit
$V_{OD}$	Differential Output Voltage Swing	RL = 100 ohm	See Figure 6	247	340	454	mV
$-V_{OD}$	Change in differential Output Voltage Swing between Logic States			-50		50	mV
$V_{OC(SS)}$	Steady State Common-mode output voltage		See Figure 6	1.125		1.375	V
$-V_{OC(SS)}$	Change in Steady State Common-mode output between Logic States			-50	3	50	mV
$V_{OC(PP)}$	Peak to Peak Common-mode output voltage					150	mV
$I_{CC}$	Supply Current	No load			20	28	mA
		RL = 100 ohm	@3.3V, $F_{IN} = 75$ MHz			50	mA
		Both Channels Disabled			16	24	mA
$I_{IH}$	High-Level Input Current	s0,s1,S2, S3, 1de,2de,3DE, 4DE	$V_{IH} = 5V$		15		$\mu A$
$I_{IL}$	Low-Level Input Current	s0,s1,S2, S3, 1de,2de,3DE, 4DE	$V_{IL} = 0.8V$		5		$\mu A$
$I_{OS}$	Short Circuit Current	$V_{OY}$ or $V_{OZ} = 0V$				20	mA
		$V_{OD} = 0V$				20	
$I_{OZ}$	High Impedance Output Current	$V_{OD} = 600$ mV			0.1	1	$\mu A$
		$V_O = 0V$ or $V_{DD}$			0.1	1	
$I_{O(off)}$	Power-Off Output Current	$V_{DD} = 0V$ , $V_O = 3.6V$			0.1	10	$\mu A$
$C_{in}$	Input Capacitance	1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B			3		pF
	Control Input Capacitance	s0,s1,S2, S3, 1de,2de,3DE, 4DE			6		pF

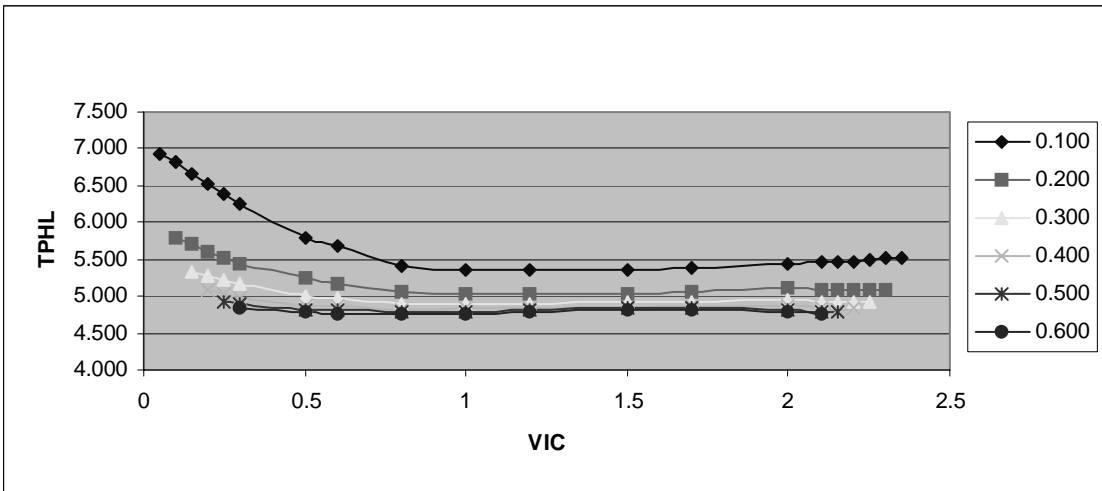
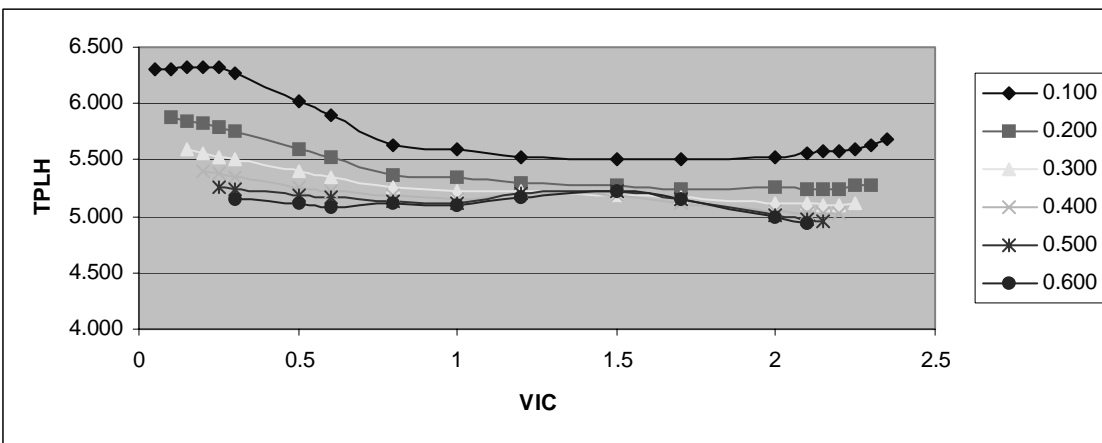
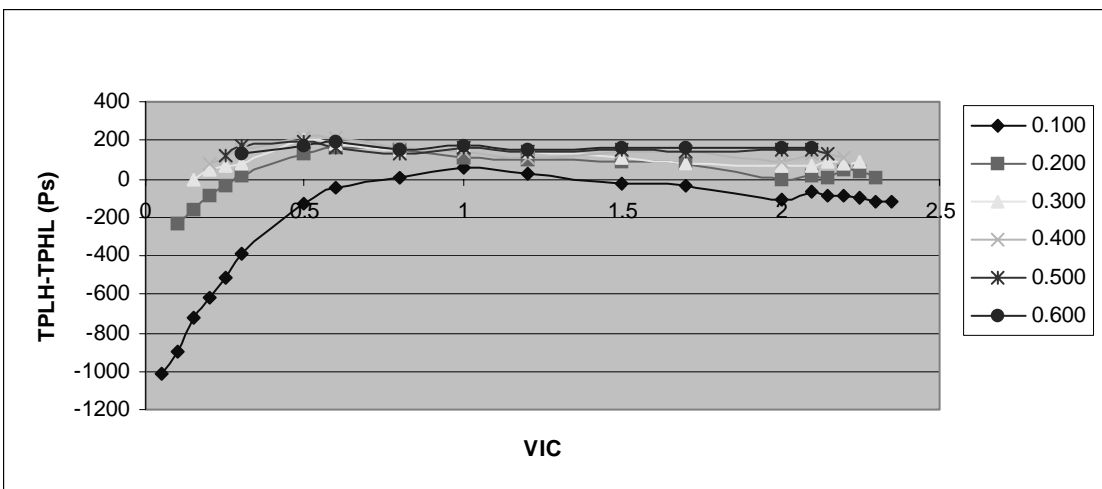
**Table 6. Differential Receiver to Driver Switching Characteristics Over Recommended Operating Conditions<sup>[2]</sup>**

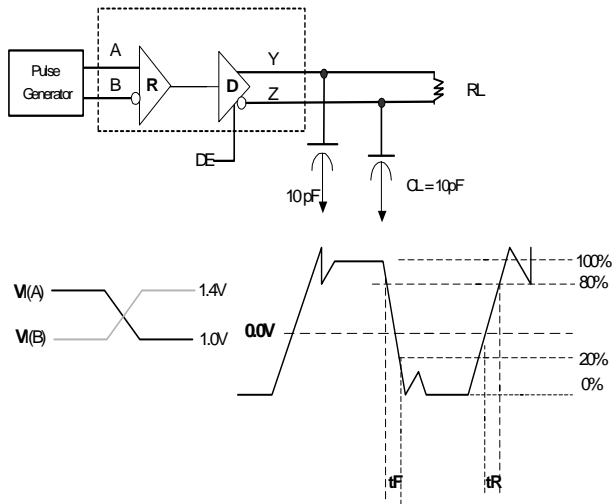
Parameter	Description	Condition	Min.	Typ. <sup>[3]</sup>	Max.	Unit
T <sub>PLH</sub>	Differential Propagation delay, low to high	CL = 10 pF (see Figure 8)		4	6	ns
T <sub>PHL</sub>	Differential Propagation delay, high to low			4	6	ns
T <sub>sk(p)</sub>	Pulse Skew (T <sub>PHL</sub> -T <sub>PLH</sub> )			0.2		ns
T <sub>r</sub>	Transition Low to High			800	1500	ps
T <sub>f</sub>	Transition High to Low			800	1500	ps
T <sub>PHZ</sub>	Propagation delay, high level to high impedance output	(see Figure 8)		4	10	ns
T <sub>PLZ</sub>	Propagation delay, low level to high impedance output			4.3	10	ns
T <sub>PZH</sub>	Propagation delay, high impedance to high level output			3	10	ns
T <sub>PZL</sub>	Propagation delay, high impedance to low level output			2	10	ns
T <sub>PHL_skR1_Dx</sub>	Channel to Channel skew-receiver 1 to Any mux related drivers			95		ps
T <sub>PLH_skR1_Dx</sub>	Channel to Channel skew-receiver 1 to Any mux related drivers			95		ps
T <sub>PPHL_skR2_Dx</sub>	Channel to Channel skew-receiver 2 to Any mux related drivers			95		ps
T <sub>PLH_skR2_Dx</sub>	Channel to Channel skew-receiver 2 to Any mux related drivers			95		ps
T <sub>PHL_skR3_Dx</sub>	Channel to Channel skew-receiver 3 to Any mux related drivers			95		ps
T <sub>PLH_skR3_Dx</sub>	Channel to Channel skew-receiver 3 to Any mux related drivers			95		ps
T <sub>PHL_skR4_Dx</sub>	Channel to Channel skew-receiver 4 to Any mux related drivers			95		ps
T <sub>PLH_skR4_Dx</sub>	Channel to Channel skew-receiver 4 to Any mux related drivers			95		ps

**Note:**

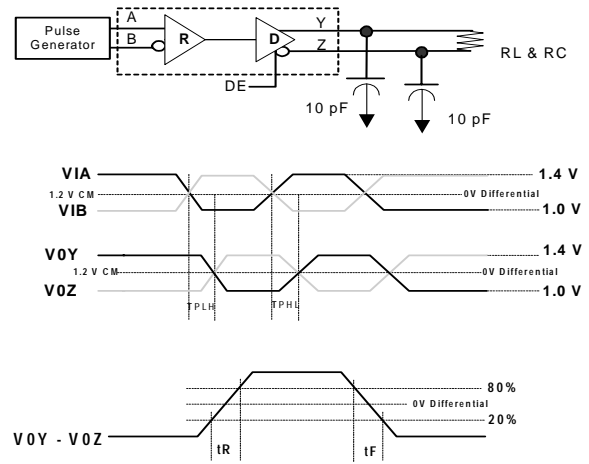
2. These parameters are measured over supply voltage and temperature ranges recommended for the device.
3. All typical values are measured at 25°C with a 3.3V supply.


**Figure 1. 2-Channel Cross Point Switch/Mux**

**Figure 2. Dynamic IDD Diagrams**

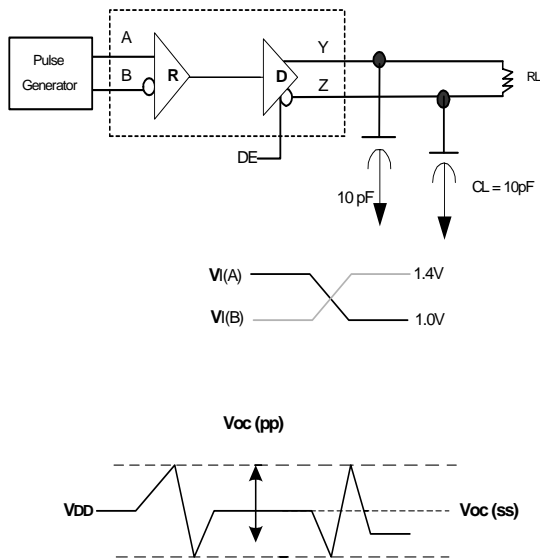

**Figure 3. TPHL vs. VIC**

**Figure 4. TPLH vs. VIC**

**Figure 5. TPLH- TPHL vs. VIC**



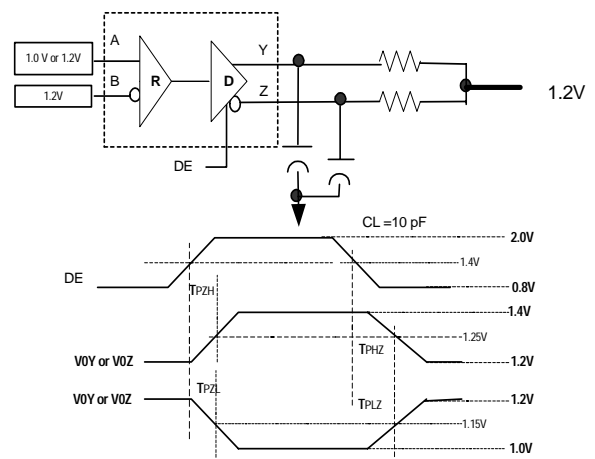
**Figure 6. Test Circuit & Voltage Definitions for the Differential Output Signal**<sup>[4,5,6]</sup>



**Figure 8. Differential Receiver to Driver Propagation Delay and Driver Transition Time**<sup>[4,8,9]</sup>



**Figure 7. Test Circuit & Voltage Definitions for the Driver Common-Mode Output Voltage**<sup>[4,5,6,7]</sup>

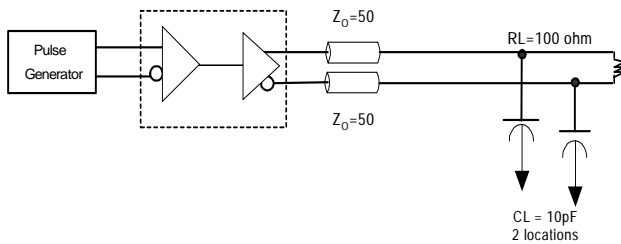
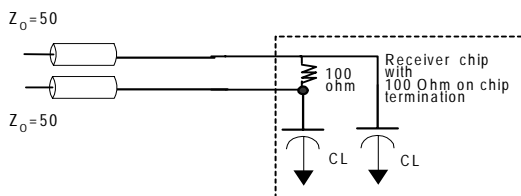
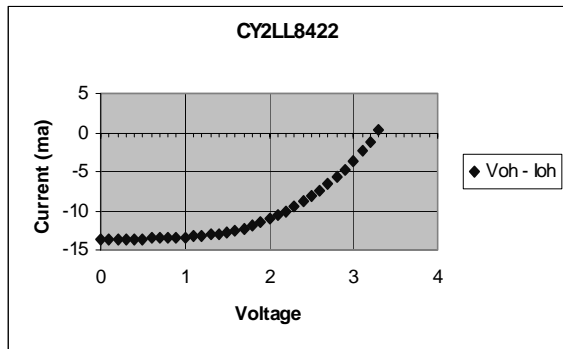
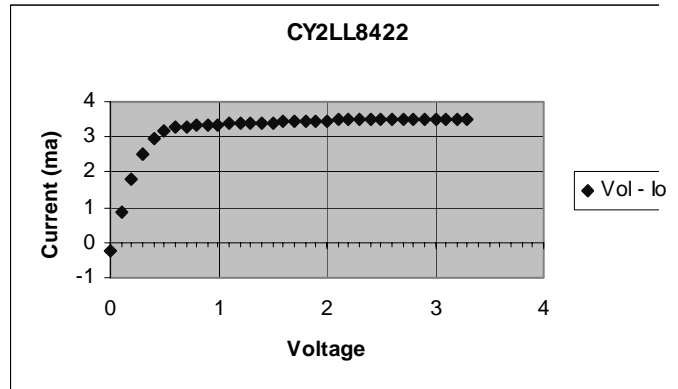


**Figure 9. Test Circuit & Voltage Definitions for the Driver Common-Mode Output Voltage**<sup>[4,8]</sup>

**Notes:**

4. All input pulses are supplied by a frequency generator with the following characteristics:  $t_R$  &  $t_F \leq 1\text{ns}$ ; Pulse rep rate = 50 Mpps; Pulse width =  $10 \pm 0.2\text{ ns}$ .
5.  $R_L = 100\text{ Ohm}$ .
6.  $C_L$  includes instrumentation and fixture capacitance within 6 mm of the DUT.
7. VOC measurement requires equipment with a 3-dB bandwidth of at least 300 MHz.
8.  $R_L = 100\text{ Ohm} \pm 1\%$ .
9. Point to Point:  $R_L = 100\text{ Ohm} \pm 1\%$   $C_L 3\text{ pF}$ .

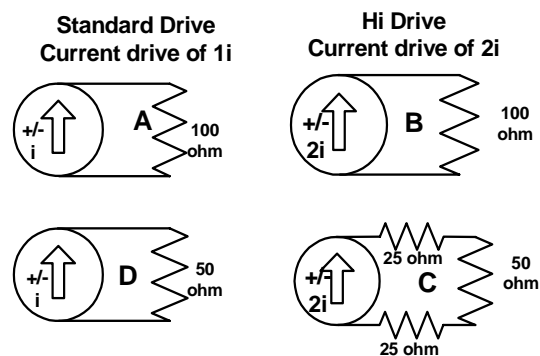


**Application Engineering**

**Figure 10. Termination Scheme for 100-Ohm External Termination**

**Figure 11. Termination Scheme for 100-Ohm Self Termination Interface Chip**
**Typical Characteristics (@VDD=3.3V/TA = 25°C)**

**Figure 12. VOH vs. IOH**

**Figure 13. VOL vs. IOL**
**Table 7. Technical Notes on STD Drive (LL842, A & D) vs. High Drive (LL843, B & C)<sup>[10]</sup>**

	A	B	C	D	Unit
VOX	1.2	1.2	1.2	1.2	V
DC Offset	1.0	1.0	1.0	1.0	V
VOD Min	0.25	0.5	0.25	0.125	V
VOD Max	0.45	0.9	0.45	0.225	V
T/Rise	1.4	1.4	0.6	0.6	ns
T/Fall	1.4	1.4	0.6	0.6	ns

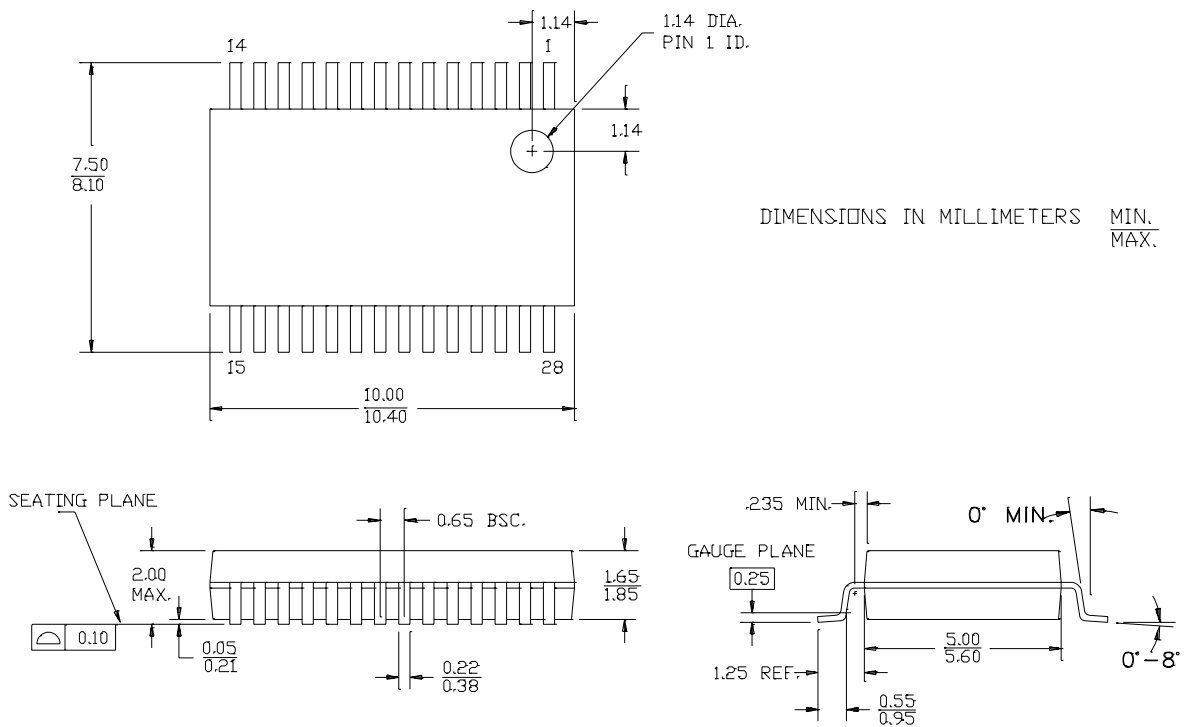
**Note:**

10. See Figure 14.


**Figure 14.**

**Ordering Information**

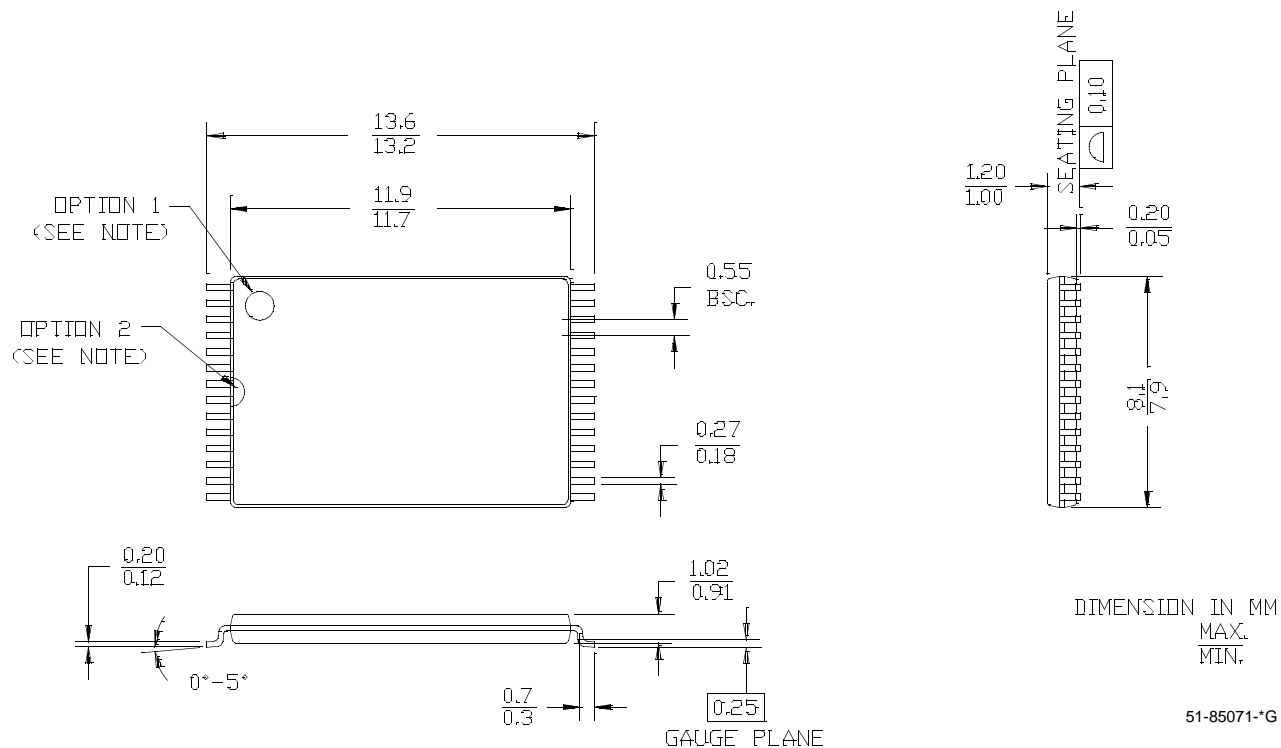
Part Number	Package Type	Product Flow
CY2LL8422ZI	28-pin TSSOP	Industrial, -40° to 85°C
CY2LL8422ZIT	28-pin TSSOP -Tape and Reel	Industrial, -40° to 85°C
CY2LL8422ZC	28-pin TSSOP	Commercial, 0°C to 70°C
CY2LL8422ZCT	28-pin TSSOP -Tape and Reel	Commercial, 0°C to 70°C
CY2LL8422OI	28-pin SSOP	Industrial, -40° to 85°C
CY2LL8422OIT	28-pin SSOP -Tape and Reel	Industrial, -40°C to 85°C
CY2LL8422OC	28-pin SSOP	Commercial, 0°C to 70°C
CY2LL8422OCT	28-pin SSOP -Tape and Reel	Commercial, 0°C to 70°C

**Package Diagrams**
**28-Lead (5.3 mm) Shrunken Small Outline Package O28**


51-85079-°C

**28-Lead Thin Small Outline Package Type 1 (8x13.4 mm) Z28**

NOTE: ORIENTATION I.D. MAY BE LOCATED EITHER AS SHOWN IN OPTION 1 OR OPTION 2



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**	116743	07/05/02	HWT	New Data Sheet