100314 Low Power Quint Differential Line Receiver

Check for Samples: 100314

FEATURES

- **35% Power Reduction of the 100114**
- **2000V ESD Protection**
- **Pin/Function Compatible with 100114**
- **Voltage Compensated Operating Range = −4.2V to −5.7V**
- **Standard Microcircuit Drawing**
  - **(SMD) 5962-9162901**

DESCRIPTION

The 100314 is a monolithic quint differential line receiver with emitter-follower outputs. An internal reference supply (V_{BB}) is available for single-ended reception. When used in single-ended operation the apparent input threshold of the true inputs is 25 mV to 30 mV higher (positive) than the threshold of the complementary inputs. Unlike other F100K ECL devices, the inputs do not have input pull-down resistors.

Active current sources provide common-mode rejection of 1.0V in either the positive or negative direction. A defined output state exists if both inverting and non-inverting inputs are at the same potential between $\underline{V_{EE}}$ and V_{CC}. The defined state is logic HIGH on the $\overline{O}_a$–$\overline{O}_e$ outputs.

Logic Symbol

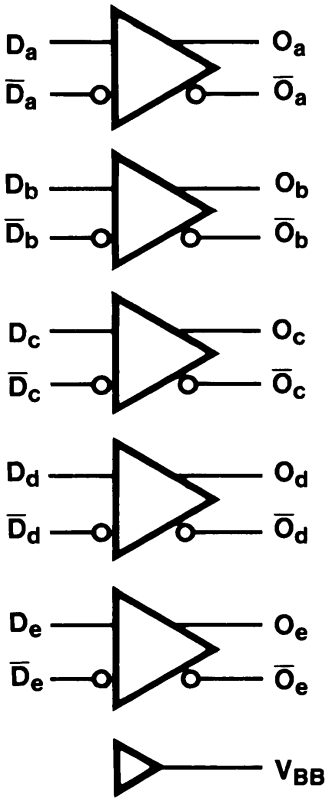


Table 1. PIN DESCRIPTIONS

Pin Names	Description
D_a–D_e	Data Inputs
$\overline{D}_a$–$\overline{D}_e$	Inverting Data Inputs
O_a–O_e	Data Outputs
$\overline{O}_a$–$\overline{O}_e$	Complementary Data Outputs

Connection Diagrams

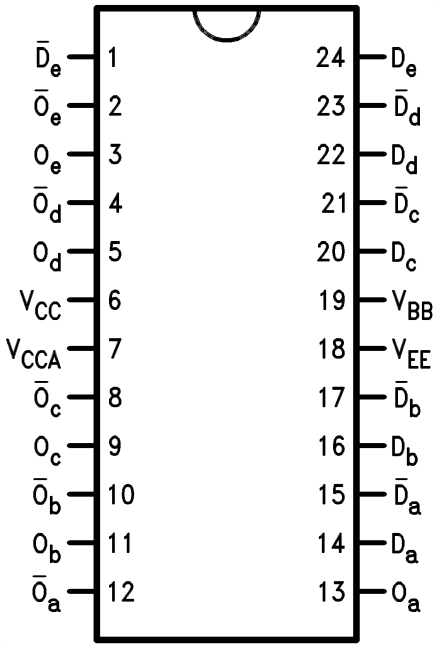


Figure 1. 24-Pin CERDIP

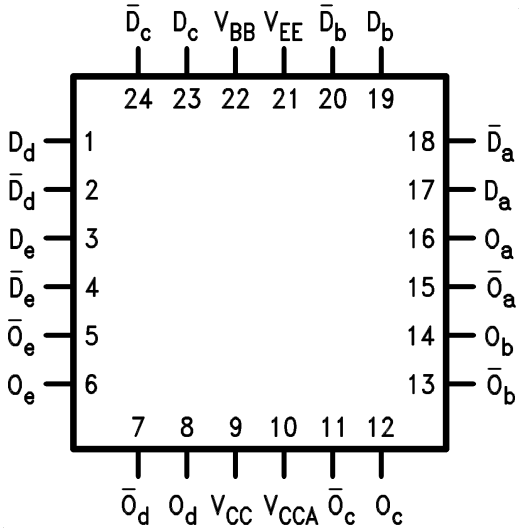


Figure 2. 24-Pin CPGA
See NAQ0024C Package

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

ABSOLUTE MAXIMUM RATINGS (1)(2)

Above which the useful life may be impaired

Storage Temperature (T_{STG})		−65°C to +150°C
Maximum Junction Temperature (T_J)	Ceramic	+175°C
Pin Potential to Ground Pin (V_{EE})		−7.0V to +0.5V
Input Voltage (DC)		V_{EE} to +0.5V
Output Current (DC Output HIGH)		−50 mA
ESD (3)		≥2000V

(1) Absolute Maximum Ratings are those values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
(3) ESD testing conforms to MIL-STD-883, Method 3015.

RECOMMENDED OPERATING CONDITIONS

Case Temperature (T_C)	Military	−55°C to +125°C
Supply Voltage (V_{EE})		−5.7V to −4.2V

DC ELECTRICAL CHARACTERISTICS - MILITARY VERSION

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND, T_C = −55°C to +125°C (1)

Symbol	Parameter	Min	Typ	Max	Units	T_C	Conditions		Notes
V_{OH}	Output HIGH Voltage	−1025		−870	mV	0°C to +125°C	V_{IN} = V_{IH} (Max) or V_{IL} (Min)	Loading with 50Ω to −2.0V	See (1)(2)(3)
		−1085		−870	mV	−55°C			
V_{OL}	Output LOW Voltage	−1830		−1620	mV	0°C to +125°C			
		−1830		−1555	mV	−55°C			
V_{OHC}	Output HIGH Voltage	−1035			mV	0°C to +125°C	V_{IN} = V_{IH} (Max) or V_{IL} (Min)	Loading with 50Ω to −2.0V	See (1)(2)(3)
		−1085			mV	−55°C			
V_{OLC}	Output LOW Voltage			−1610	mV	0°C to +125°C			
				−1555	mV	−55°C			
V_{BB}	Output Reference Voltage			−1260	mV	0°C to +125°C	I_{VBB} = 0 µA, V_{EE} = 4.2V		See (1)(2)(3)
		−1380		−1260	mV	0°C to +125°C	I_{VBB} = −250 µA, V_{EE} = −5.7V		
		−1396			mV	−55°C	I_{VBB} = −350 µA, V_{EE} = −5.7V		See (1)(2)(3)
V_{DIFF}	Input Voltage Differential	150			mV	−55°C to +125°C	Required for Full Output Swing		See (4)(5)(6)
V_{CM}	Common Mode Voltage	V_{CC} − 2.0		V_{CC} − 0.5	V	−55°C to +125°C			See (4)(5)(6)
V_{IH}	Single-Ended Input High Voltage	−1165		−870	mV	−55°C to +125°C	Ensured HIGH Signal for All Inputs (with $\overline{D_n}$ tied to V_{BB})		See (4)(5)(6)(7)
V_{IL}	Single-Ended Input Low Voltage	−1830		−1475	mV	−55°C to +125°C	Ensured LOW Signal for All Inputs (with $\overline{D_n}$ tied to V_{BB})		See (4)(5)(6)(7)
I_{IH}	Input HIGH Current			50	µA	0°C to +125°C	V_{IN} = $V_{IH\ (Max)}$, D_a–D_e = V_{BB}, $\overline{D_a}$–$\overline{D_e}$ = $V_{IL\ (Min)}$		See (4)(5)(6)
				70	µA	−55°C			
I_{CBO}	Input Leakage Current	−10			µA	−55°C to +125°C	V_{IN} = V_{EE}, D_a–D_e = V_{BB}, $\overline{D_a}$–$\overline{D_e}$ = $V_{IL\ (Min)}$		See (4)(5)(6)
I_{EE}	Power Supply Current	−65		−25	mA	−55°C to +125°C	D_a–D_e = V_{BB}, $\overline{D_a}$–$\overline{D_e}$ = $V_{IL\ (Min)}$		See (4)(5)(6)

(1) Sample tested (Method 5005, Table I) on each manufactured lot at −55°C, +25°C, and +125°C, Subgroups A1, 2, 3, 7, and 8.
(2) F100K 300 Series cold temperature testing is performed by temperature soaking (to ensure junction temperature equals −55°C), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides “cold start” specs which can be considered a worst case condition at cold temperatures.
(3) Screen tested 100% on each device at −55°C, +25°C, and +125°C, Subgroups 1, 2, 3, 7, and 8.
(4) Sample tested (Method 5005, Table I) on each manufactured lot at −55°C, +25°C, and +125°C, Subgroups A1, 2, 3, 7, and 8.
(5) F100K 300 Series cold temperature testing is performed by temperature soaking (to ensure junction temperature equals −55°C), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides “cold start” specs which can be considered a worst case condition at cold temperatures.
(6) Screen tested 100% on each device at −55°C, +25°C, and +125°C, Subgroups 1, 2, 3, 7, and 8.
(7) Ensured by applying specified input condition and testing V_{OH}/V_{OL}.

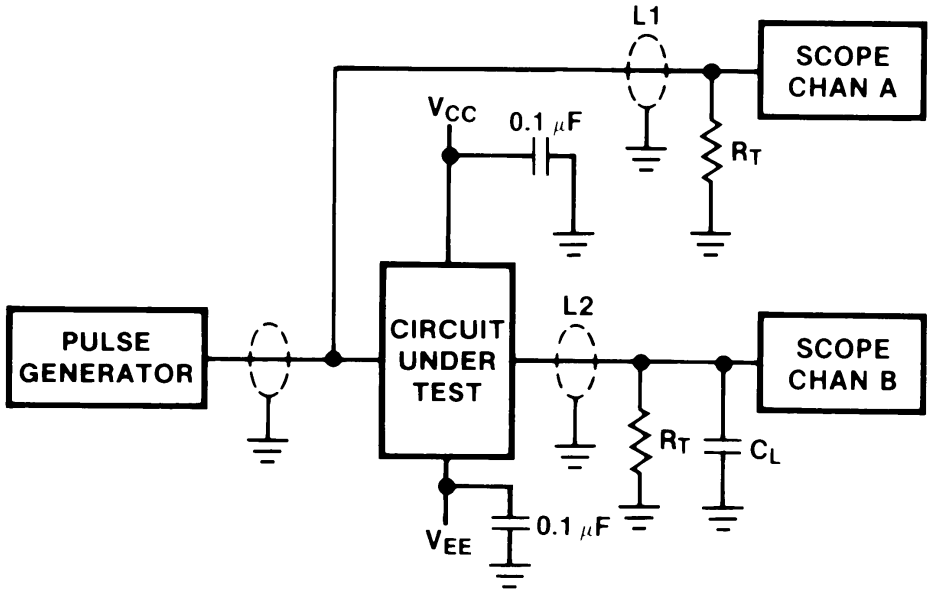
AC ELECTRICAL CHARACTERISTICS

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = −55°C		T_C = +25°C		T_C = +125°C		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.40	2.30	0.60	2.20	0.60	2.70	ns	See Figure 3 and Figure 4	See (1)(2)(3)
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.20	1.40	0.20	1.40	0.20	1.40	ns		See (4)

(1) F100K 300 Series cold temperature testing is performed by temperature soaking (to ensure junction temperature equals −55°C), then testing immediately after power-up. This provides “cold start” specs which can be considered a worst case condition at cold temperatures.
(2) Screen tested 100% on each device at +25°C temperature only, Subgroup A9.
(3) Sample tested (Method 5005, Table I) on each manufactured lot at +25°C, Subgroup A9, and at +125°C and −55°C temperatures, Subgroups A10 and A11.
(4) Not tested at +25°C, +125°C and −55°C temperature (design characterization data).

TEST CIRCUIT



V_{CC}, V_{CCA} = +2V, V_{EE} = −2.5V
L1 and L2 = equal length 50Ω impedance lines
R_T = 50Ω terminator internal to scope
Decoupling 0.1 μF from GND to V_{CC} and V_{EE}
All unused outputs are loaded with 50Ω to GND
C_L = Fixture and stray capacitance ≤ 3 pF

Figure 3. AC Test Circuit

Switching Waveforms

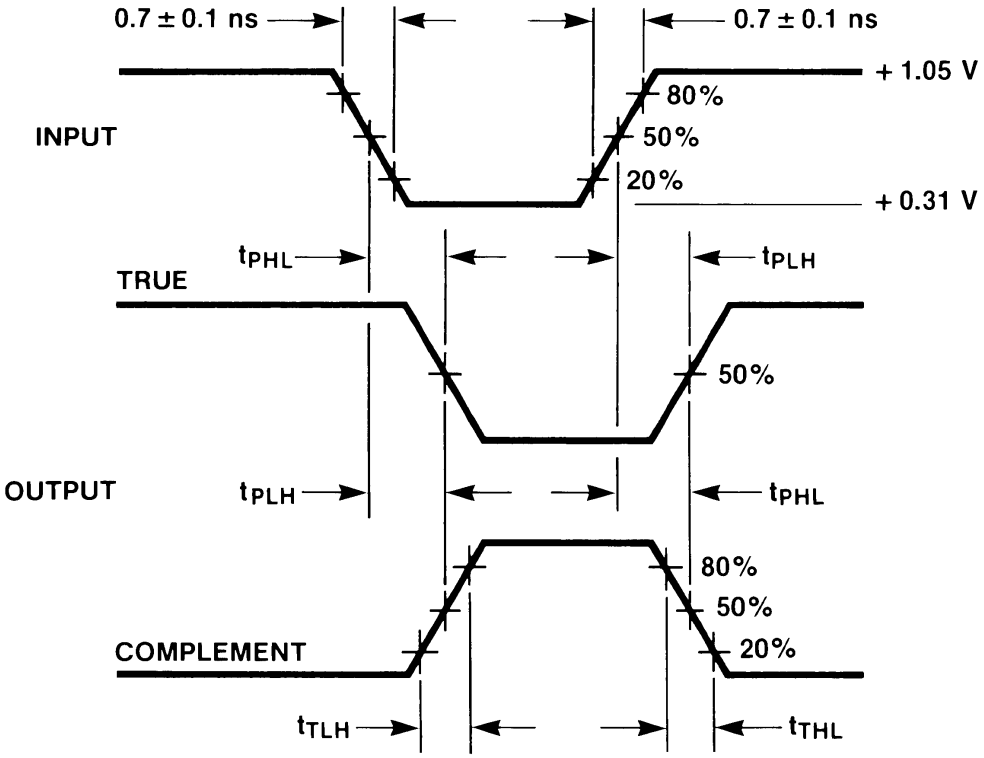


Figure 4. Propagation Delay and Transition Times

REVISION HISTORY

Changes from Revision A (April 2013) to Revision B	Page
• Changed layout of National Data Sheet to TI format	5

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