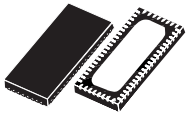
STMUX1000L

GIGABIT LAN ANALOG SWITCH 16-BIT TO 8-BIT MULTIPLEXER

- LOW R_{ON}: 5.5 Ω TYPICAL
- V_{CC} OPERATING RANGE: 3.0 TO 3.6 V
- LOW CURRENT CONSUMPTION: 20 µA
- ESD HBM MODEL: > 2 KV
- CHANNEL ON CAPACITANCE: 7.5 pF TYPICAL
- SWITCHING TIME SPEED: 9 ns
- NEAR TO ZERO PROPAGATION DELAY: 250 ps
- VERY LOW CROSS TALK: -40 dB AT 250MHz
- BIT TO BIT SKEW: 200 ps
- > 450 MHZ -3db TYPICAL BANDWIDTH
- THREE SWITCH S.P.D.T FOR LED SUPPORTING
- PACKAGE: QFN56
- Pb FREE



QFN56

Table 1: Order Codes

PACKAGE	T & R
QFN	STMUX1000LQTR

DESCRIPTION

The STMUX1000L is a 16 to 8 Bit multiplexer/ demultiplexer low R_{ON} bidirectional LAN Switch designed for various standard, such as 10/100/ 1000 Ethernet.

It is designed for very low Cross Talk, low bit to bit skew and low I/O capacitance.
The differential signal from the Gigabit Ethernet Transceiver is multiplexed in one of two selected output while the unselected switch go to Hi-Z status.
The device integrates three 16Ω switches, S.P.D.T. (Single Pole Dual Throw Channel), for LED supporting.

Figure 1: Pin Connection (Top Through View)

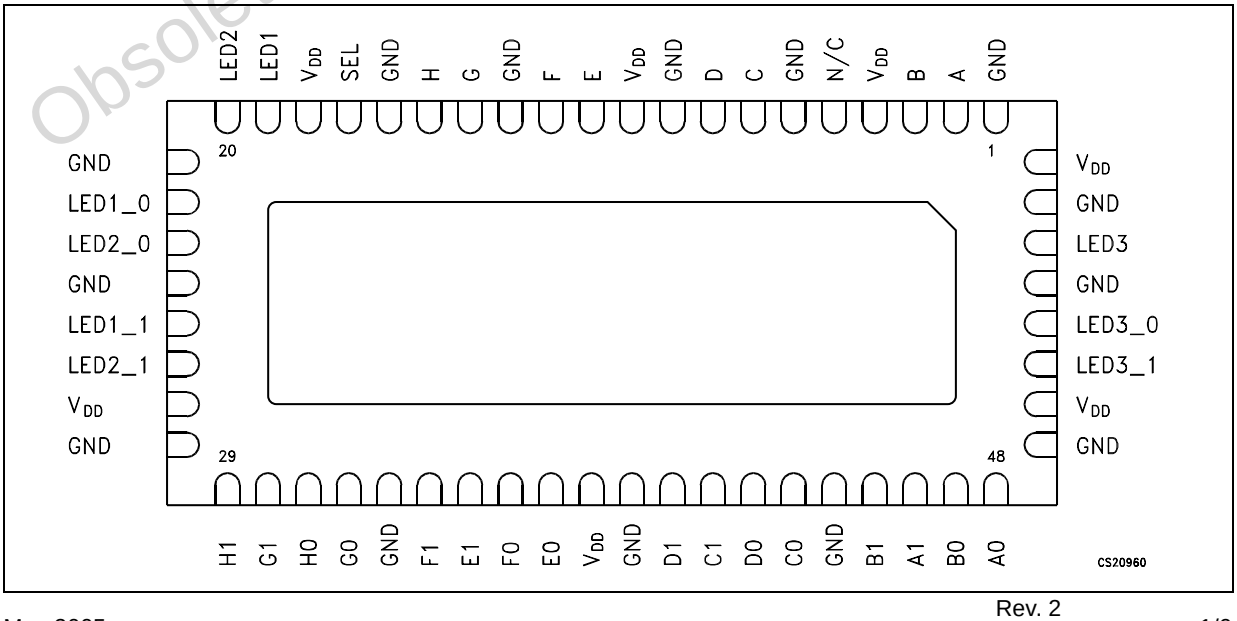


Figure 2: Input Equivalent Circuit

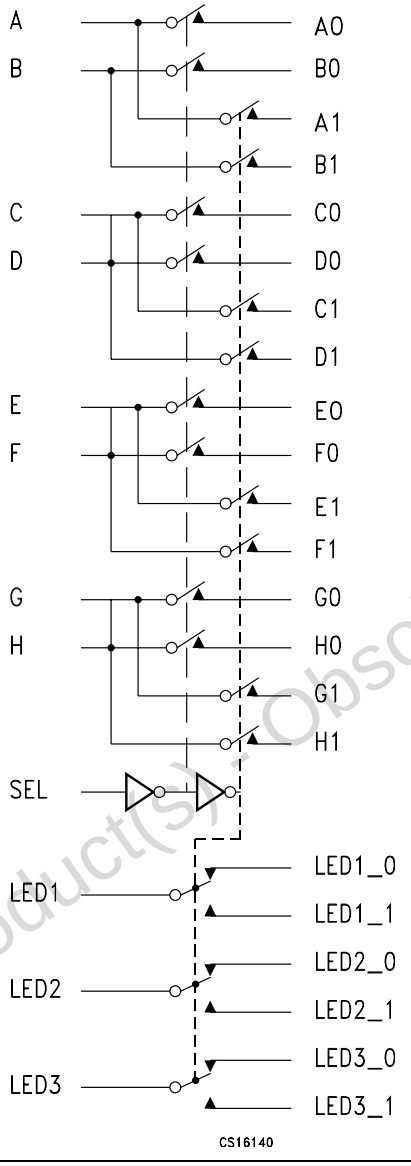


Table 2: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
2, 3, 7, 8, 11, 12, 14, 15	A, B, C, D, E, F, G, H	8 Bit Bus
48, 47, 43, 42, 37, 36, 32, 31	A0, B0, C0, D0, E0, F0, G0, H0	8 Bit Multiplexed to Bus 0
46, 45, 41, 40, 35, 34, 30, 29	A1, B1, C1, D1, E1, F1, G1, H1	8 Bit Multiplexed to Bus 1
5	N/C	Not Connected
17	SEL	BUS and LED Switch Selection
19, 20, 54	LED1, LED2, LED3	LED Switch Input
22, 23, 25, 26, 51, 52	LED1_0, LED2_0, LED1_1, LED2_1, LED3_0, LED3_1	LED Switch Output
4, 10, 18, 27, 38, 50, 56	V_{DD}	Supply Voltage
1, 6, 9, 13, 16, 21, 24, 28, 33, 39, 44, 49, 53, 55	GND	Ground

Table 3: Lan Switch Function Table

SE	FUNCTION
L	8 Bit Bus to 8 Bit Multiplexed Bus 0
H	8 Bit Bus to 8 Bit Multiplexed Bus 1

Table 4: Led Switch Function Table

SE	FUNCTION
L	Led Switch Input connected to Led Switch Output X_0
H	Led Switch Input connected to Led Switch Output X_1

Table 5: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage to Ground	-0.5 to 4	V
V_I	DC Input Voltage	-0.5 to 4	V
V_{IC}	DC Control Input Voltage	-0.5 to 4	V
I_O	DC Output Current (*)	120	mA
P_D	Power Dissipation	0.5	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.
(*) If not exceed the max limit of P_D.

Table 6: DC Electrical Characteristics For Gigabit Ethernet LAN8/16MUX/DEMUX
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{IH}	Voltage Input High	High Level Guaranteed	2			V
V_{IL}	Voltage Input Low	Low Level Guaranteed	-0.5		0.8	V
V_{IK}	Clamp Diode Voltage	V_{CC} = 3.6V, I_{IN} = -18mA		-0.8	-1.2	V
I_{IH}	Input High Current	V_{CC} = 3.6V, V_{IN} = V_{CC}			±5	µA
I_{IL}	Input Low Current	V_{CC} = 3.6V, V_{IN} = GND			±5	µA
I_{OFF}	Power Down Leakage Current	V_{CC} = 0V, A to H V = 0V, A0 to H0 and A1 to H1 ≤ 3.6V			±5	µA
R_{ON}	Switch ON Resistance (1)	V_{CC} = 3.0 V, V_{IN} = 1.5 to V_{CC} I_{IN} = -40mA		5.5	7.5	Ω
R_{FLAT}	ON Resistance FLATNESS (1, 2)	V_{CC} = 3.0 V, V_{IN} @ 1.5 and V_{CC} I_{IN} = -40mA		0.8		Ω
ΔR_{ON}	ON Resistance Match between channel $\Delta R_{ON} = R_{ONMAX}-R_{ONMIN}$ (1,3)	V_{CC} = 3.0 V, V_{IN} = 1.5 to V_{CC} I_{IN} = -40mA		0.5	1	Ω

Note 1: Measured by voltage drop between Channels @ indicated current trough the switch. On-Resistance is determinate by the lower the voltage on the two.
Note 2: Flatness is defined as the difference the R_{ONMAX} and R_{ONMIN} of On-Resistance over the specified range condition.
Note 3: ΔR_{ON} measured @ same V_{CC}, temperature and voltage level.

Table 7: DC Electrical Characteristics For 10/100 Ethernet LAN8/16MUX/DEMUX
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{IH}	Voltage Input High	High Level Guaranteed	2			V
V_{IL}	Voltage Input Low	Low Level Guaranteed	-0.5		0.8	V
V_{IK}	Clamp Diode Voltage	V_{CC} = 3.6V, I_{IN} = -18mA		-0.7	-1.2	V
I_{IH}	Input High Current	V_{CC} = 3.6V, V_{IN} = V_{CC}			±5	µA
I_{IL}	Input Low Current	V_{CC} = 3.6V, V_{IN} = GND			±5	µA
I_{OFF}	Power Down Leakage Current	V_{CC} = 0V, A to H V = 0V, A0 to H0 and A1 to H1 ≤ 3.6V			±5	µA
R_{ON}	Switch ON Resistance (1)	V_{CC} = 3.0 V, V_{IN} = 1.25 to V_{CC} I_{IN} = -40mA		5.5	7.5	Ω
R_{FLAT}	ON Resistance FLATNESS (1, 2)	V_{CC} = 3.0 V, V_{IN} @ 1.25 and V_{CC} I_{IN} = -40mA		0.9		Ω
ΔR_{ON}	ON Resistance Match between channel $\Delta R_{ON} = R_{ONMAX}-R_{ONMIN}$ (1, 3)	V_{CC} = 3.0 V, V_{IN} = 1.25 to V_{CC} I_{IN} = -40mA		0.5	1	Ω

Note 1: Measured by voltage drop between Channels @ indicated current trough the switch. On-Resistance is determinate by the lower the voltage on the two.
Note 2: Flatness is defined as the difference the R_{ONMAX} and R_{ONMIN} of On-Resistance over the specified range condition.
Note 3: ΔR_{ON} measured @ same V_{CC}, temperature and voltage level.

Table 8: Led Switches DC Electrical Characteristics
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{IH}	Voltage Input High	High Level Guaranteed	2			V
V_{IL}	Voltage Input Low	Low Level Guaranteed	-0.5		0.8	V
V_{IK}	Clamp Diode Voltage	V_{CC} = 3.6V, I_{IN} = -18mA		-0.7	-1.2	V
I_{IH}	Input High Current	V_{CC} = 3.6V, V_{IN} = V_{CC}			±5	µA
I_{IL}	Input Low Current	V_{CC} = 3.6V, V_{IN} = GND			±5	µA
R_{ON}	Switch ON Resistance (1)	V_{CC} = 3.0 V, V_{IN} = 1.25 to V_{CC} I_{IN} = -40mA		16	25	Ω
R_{FLAT}	ON Resistance FLATNESS (1, 2)	V_{CC} = 3.0 V, V_{IN} @ 1.25 and V_{CC} I_{IN} = -40mA		8		Ω
ΔR_{ON}	ON Resistance Match between channel $\Delta R_{ON} = R_{ONMAX}-R_{ONMIN}$ (1, 3)	V_{CC} = 3.0 V, V_{IN} = 1.25 to V_{CC} I_{IN} = -40mA		1	2	Ω

Note 1: Measured by voltage drop between Channels @ indicated current trough the switch. On-Resistance is determinate by the lower the voltage on the two.
Note 2: Flatness is defined as the difference the R_{ONMAX} and R_{ONMIN} of On-Resistance over the specified range condition.
Note 3: ΔR_{ON} measured @ same V_{CC}, temperature and voltage level.

Table 9: Capacitance Lan 8/16 MUX/DEMUX (T_A = 25°C, f = 1 MHz)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{IN}	Input Capacitance (Note 4)	V_{IN} = 0 V		2	3	pF
C_{OFF}	Port x0 to Port x1, Switch Off (Note 4)	V_{IN} = 0 V		4	6	pF
C_{ON}	Capacitance Switch On (x to x0 or x to x1) (Note 4)	V_{IN} = 0 V		7.5	11	pF

Note 4: x = A to H, x0 = A0 to H0, x1 = A1 to H1.

Table 10: Capacitance Led Switches (T_A = 25°C, f = 1 MHz)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0 V			10	pF
C_{OFF}	Port x0 to Port x1, Switch Off	V_{IN} = 0 V		4	10	pF
C_{ON}	Capacitance Switch On	V_{IN} = 0 V		11	20	pF

Table 11: Power Supply Characteristics (T_A = -40 to 85°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Quiescent Power Supply	V_{CC} = 3.6 V, V_{IN} = V_{CC} or GND		150	500	µA

Table 12: LAN 8/16 MUX/DEMUX Dynamic Electrical CharacteristicS
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Xtalk	Cross-Talk	R_L= 100 Ω, f = 250 MHz		-40		dB
OIRR	Off Isolation	R_L= 100 Ω, f = 250 MHz		-36		dB
BW	-3dB Bandwidth	R_L= 100 Ω		450		MHz

Table 13: LAN 8/16 MUX/DEMUX Switching Characteristics
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{PD}	Propagation Delay	V_{CC} = 3 V to 3.6 V		0.25		ns
t_{PZH}, t_{PZL}	Line Enable Time, SE to x to x0 or x to x1	V_{CC} = 3 V to 3.6 V	0.5	6.5	9	ns
t_{PHZ}, t_{PLZ}	Line Disable Time, SE to x to x0 or x to x1	V_{CC} = 3 V to 3.6 V	0.5	6.5	8.5	ns
$t_{SK(O)}$	Output Skew between center port to any other port	V_{CC} = 3 V to 3.6 V		0.1	0.2	ns
$t_{SK(P)}$	Skew between opposite transition of the same output (t_{PHL}, t_{PLH})	V_{CC} = 3 V to 3.6 V		0.1	0.2	ns

Note 4: x = A to H, x0 = A0 to H0, x1 = A1 to H1.

Table 14: Three Channel Switches Switching Characteristics
(T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{ON}	Propagation Delay	V_{CC} = 3 V to 3.6 V			50	ns
t_{OFF}	Propagation Delay	V_{CC} = 3 V to 3.6 V			30	ns

Figure 3: Bandwidth

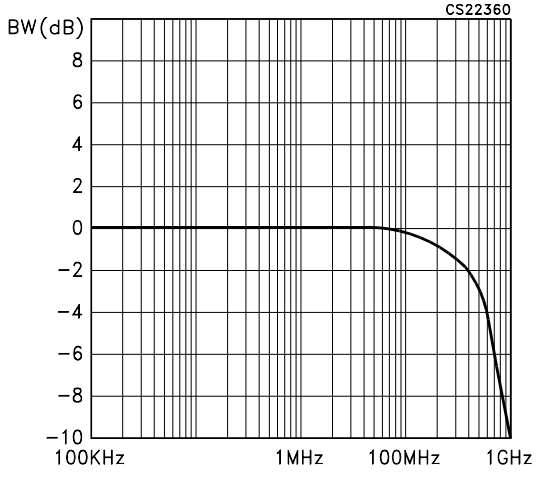
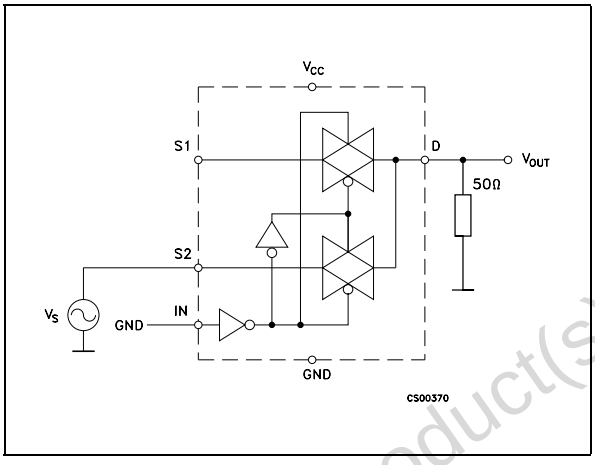


Figure 4: Schematic Bandwidth



QFN56 (11x5) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1			0.05			0.002
A3		0.20			0.008	
b	0.20	0.25	0.30	0.008	0.010	0.012
D	10.90	11.00	11.10	0.429	0.433	0.437
D2	8.30	8.40	8.50	0.327	0.331	0.335
D3		9.50			0.374	
E	4.90	5.00	5.10	0.193	0.197	0.201
E2	2.30	2.40	2.50	0.091	0.094	0.098
E3		3.50			0.138	
e		0.50			0.020	
L	0.30	0.40	0.50	0.012	0.016	0.020

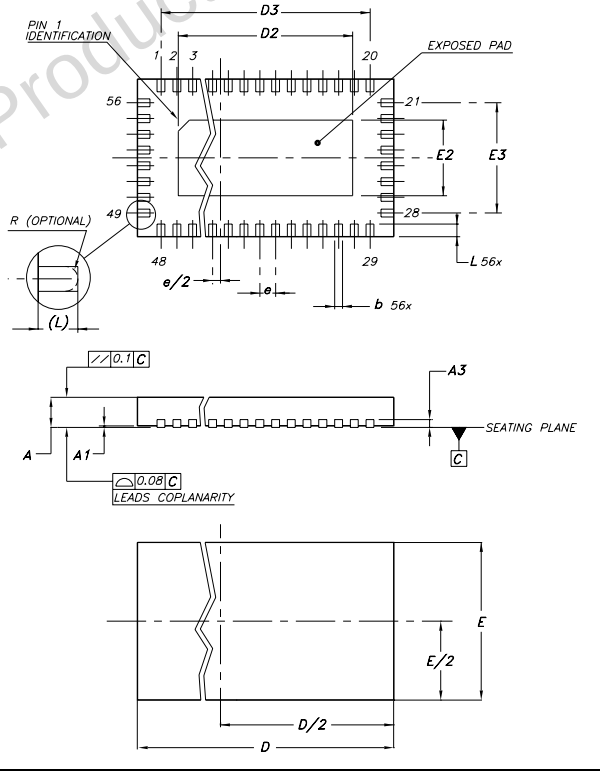


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Table 15: Revision History

Date	Revision	Description of Changes
08-Apr-2005	1	First Release.
03-May-2005	2	Maturity Code.