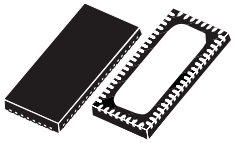
ST3DV520

High bandwidth analog switch with 16-to-8 bit MUX/DEMUX

Preliminary Data

Features

- 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 250 MHz
- Bit-to-bit skew: 200 ps
- > 450 MHz -3db typical bandwidth
- Package: QFN56
- Pb free



QFN56

Description

The ST3DV520 is a 16-to-8 bit bidirectional multiplexer/demultiplexer low R_{ON} and high bandwidth switch suitable for analog video applications.

The ST3DV520 supports high definition (HD) analog video switching standards and is also suitable for general purpose switching that requires high signal integrity.

The device is designed for very low crosstalk, low bit-to-bit skew and low I/O capacitance. The signal from each input is multiplexed into one of two selected outputs while the unselected switch goes to HI-Z status.

Table 1. Device summary

Order code	Package	Packing
ST3DV520QTR	QFN56	Tape and reel

1 Pin description

Figure 1. Pin connection (top through view)

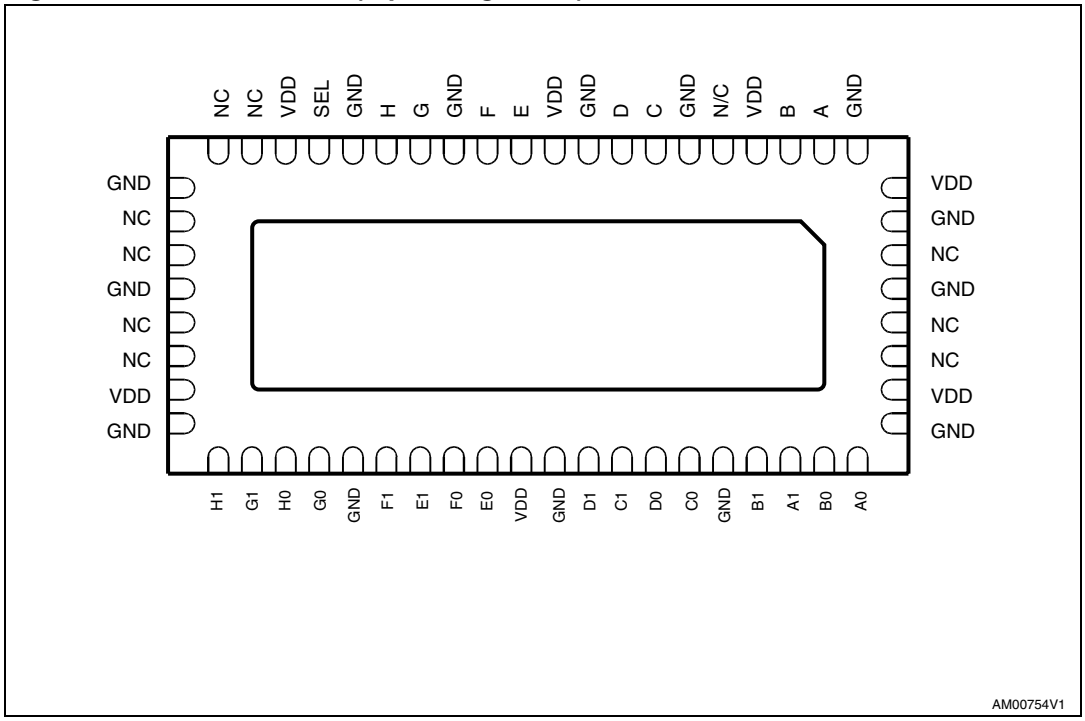


Table 2. Pin description

Pin number	Symbol	Name and function
2, 3, 7, 8, 11, 12, 14, 15	A, B, C, D, E, F, G, H	8 bit bus
31, 32, 36, 37, 42, 43, 47, 48	A0, B0, C0, D0, E0, F0, G0, H0	8 bit multiplexed to bus 0
29, 30, 35, 40, 41, 45, 46	A1, B1, C1, D1, E1, F1, G1, H1	8 bit multiplexed to bus 1
17	SEL	Bus switch selection
5, 19, 20, 22, 23, 25, 26, 51, 52, 54	N/C	Not connected
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

Figure 2. Input equivalent circuit

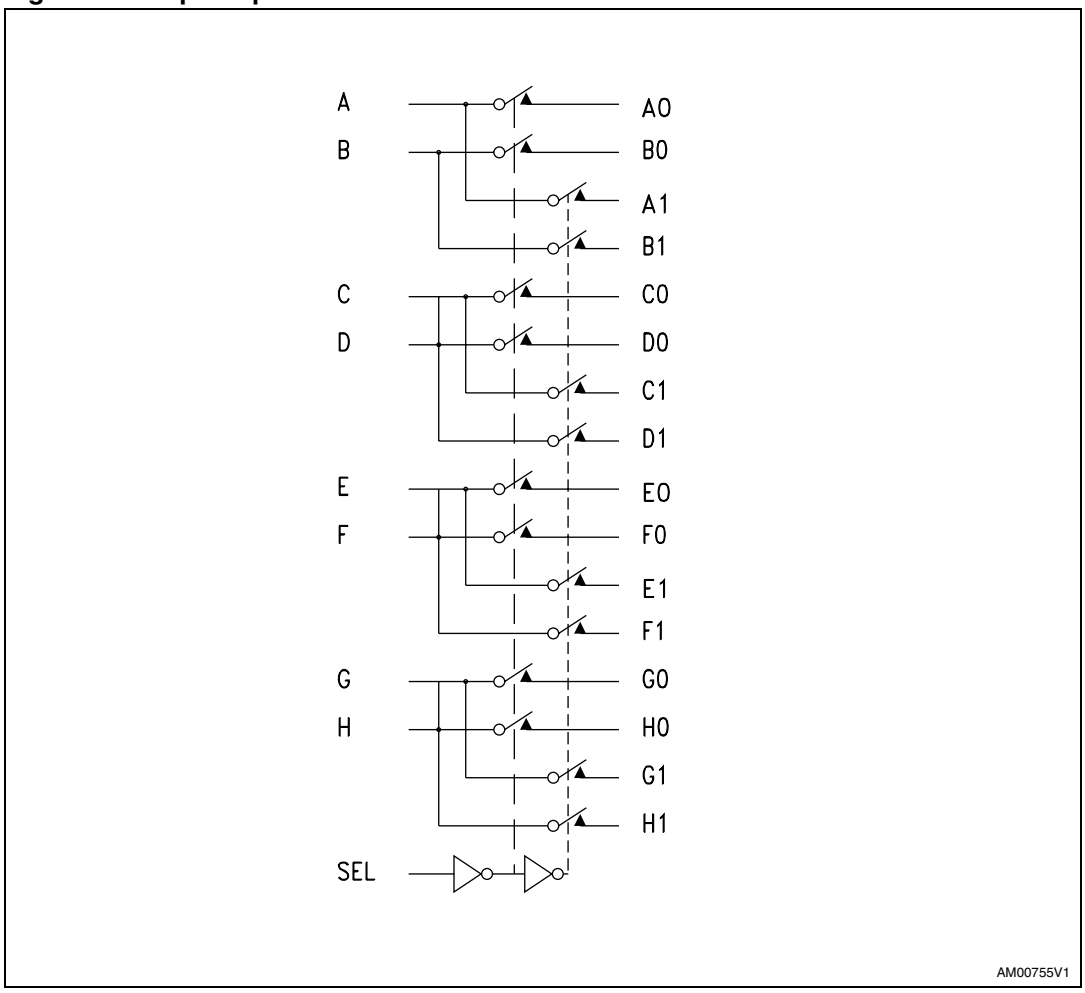


Table 3. Switch function table

SE	Function
L	8 bit bus to 8 bit multiplexed bus 0
H	8 bit bus to 8 bit multiplexed bus 1

2 Maximum rating

Stressing the device above the rating listed in the “Absolute Maximum Ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the Operating sections of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE Program and other relevant quality documents.

2.1 Absolute maximum rating

Table 4. 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(1)	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

1. If V_{IO} x I_O does not exceed the maximum limit of P_D.

Table 5. DC electrical characteristics (T_A = -40 to 85°C, V_{CC} = 3.3 V ±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} = 3.6 V, I_{IN} = -18 mA		-0.8	-1.2	V
I_{IH}	Input high current	V_{CC} = 3.6 V, V_{IN} = V_{CC}			±5	µA
I_{IL}	Input low current	V_{CC} = 3.6 V, V_{IN} = GND			±5	µA
I_{OFF}	Power down leakage current	V_{CC} = 0 V, A to H V = 0 V, A0 to H0 and A1 to H1 ≤ 3.6 V			±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

Table 5. DC electrical characteristics (T_A = -40 to 85°C, V_{CC} = 3.3 V ±10%) (continued)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
R_{FLAT}	ON resistance flatness(1)(2)	V_{CC} = 3.0 V, V_{IN} at 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

1. Measured by voltage drop between channels at indicated current trough the switch. ON resistance is determined by the lower of the voltage.
2. Flatness is defined as the difference between the R_{ONMAX} and R_{ONMIN} of ON resistance over the specified range.
3. ΔR_{ON} measured at same V_{CC}, temperature and voltage level.

Table 6. Capacitance specifications (T_A = 25°C, f = 1 MHz)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
C_{IN}	Input capacitance(1)	V_{IN} = 0 V		2	3	pF
C_{OFF}	Port x0 to Port x1, switch off	V_{IN} = 0 V		4	6	pF
C_{ON}	Capacitance switch on (x to x0 or x to x1)	V_{IN} = 0 V		7.5	11	pF

1. x = A to H, x0 = A0 to H0, x1 = A1 to H1

Table 7. 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 8. Dynamic electrical characteristics (T_A = -40 to 85°C, V_{CC} = 3.3V ±10%)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
X_{talk}	Crosstalk	R_L= 100 Ω, f = 250 MHz		-40		dB
O_{IRR}	Off isolation	R_L= 100 Ω, f = 250 MHz		-36		dB
BW	-3dB bandwidth	R_L= 100 Ω		450		MHz

Table 9. 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.

Figure 3. Bandwidth

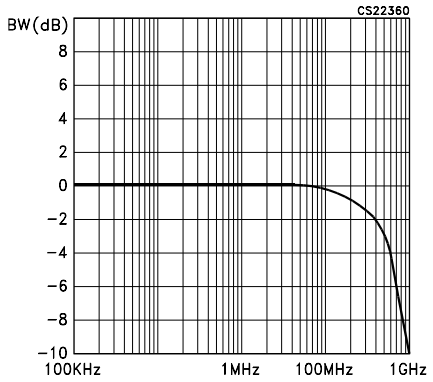
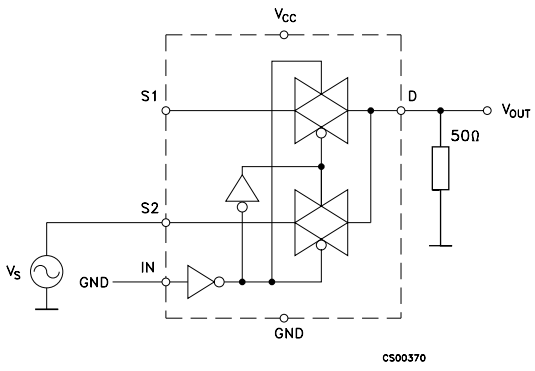


Figure 4. Schematic bandwidth



3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Figure 5. QFN56 (11 x 5 mm) package outline

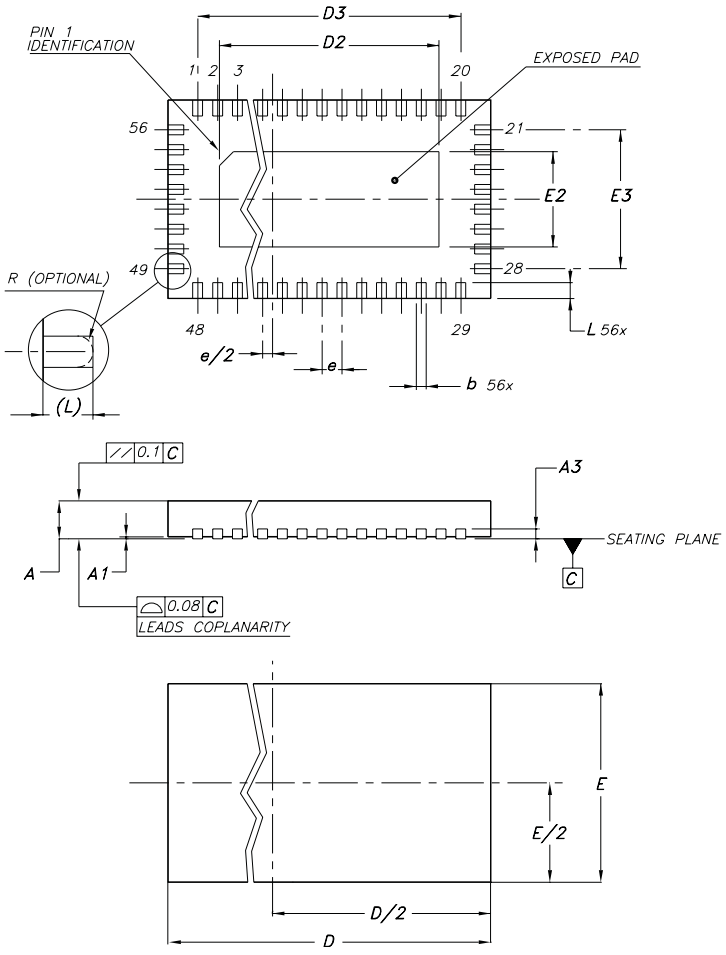
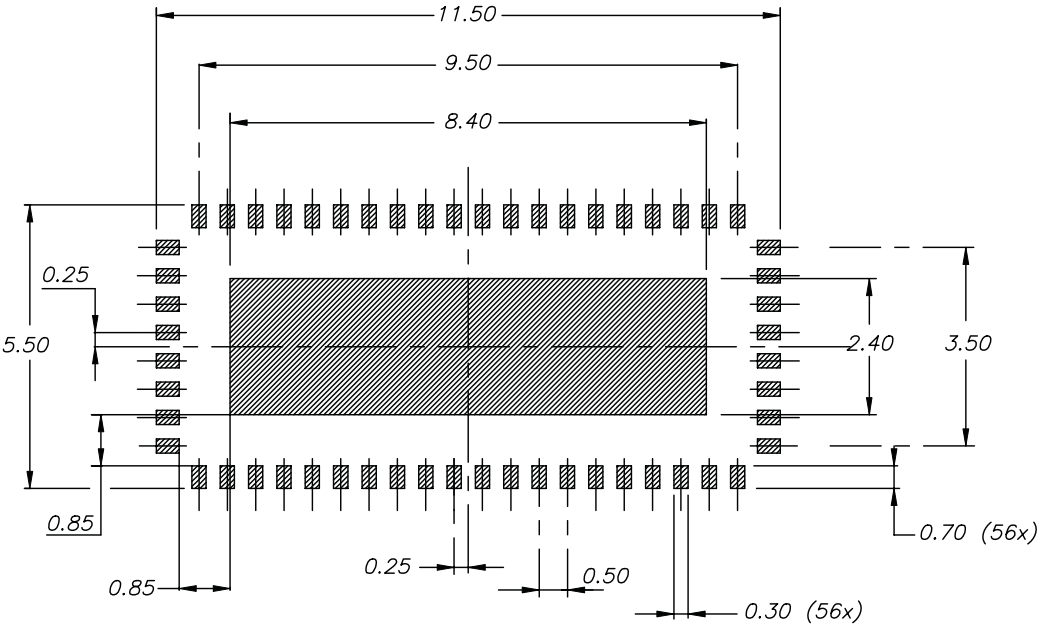


Table 10. QFN56 (11 x 5 mm) mechanical data

Symbol	millimeters			inches		
	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

Figure 6. Footprint recommendation



4 Revision history

Table 11. Document revision history

Date	Revision	Changes
12-Jun-2007	1	Initial release.
09-Oct-2008	2	Modified: title and pinout configuration. Added: *Figure 6: Footprint recommendation on page 8*.

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