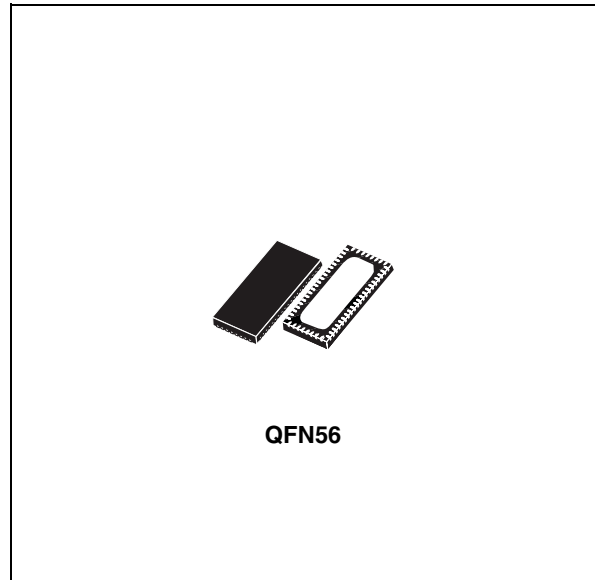


## High bandwidth analog switch with 16-to-8 bit MUX/DEMUX

### Features

- Low  $R_{ON}$ : 5.5  $\Omega$  typical
- $V_{CC}$  operating range: 3.0 to 3.6 V
- Low current consumption: 20  $\mu$ A
- 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 -3 db typical bandwidth
- Package: QFN56
- Lead-free



**Table 1. Device summary**

Order code	Package	Packing
ST3DV520QTR	QFN56	Tape and reel

# 1 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.

# 2 Pin description

Figure 1. Pin connection (top through view)

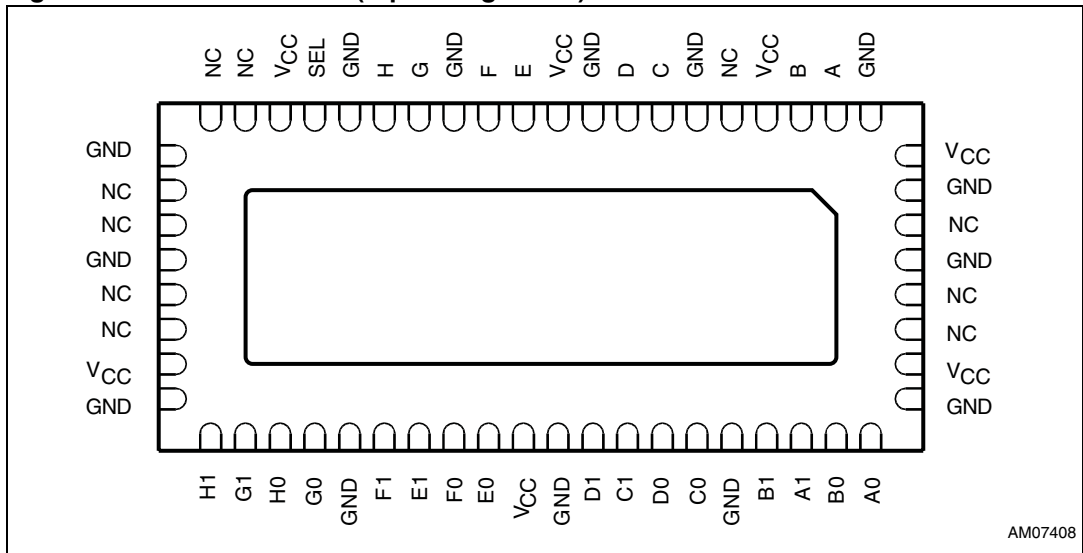


Table 2. Pin description

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	NC	Not connected
4, 10, 18, 27, 38, 50, 56	V <sub>CC</sub>	Supply voltage
1, 6, 9, 13, 16, 21, 24, 28, 33, 39, 44, 49, 53, 55	GND	Ground

Figure 2. Input equivalent circuit

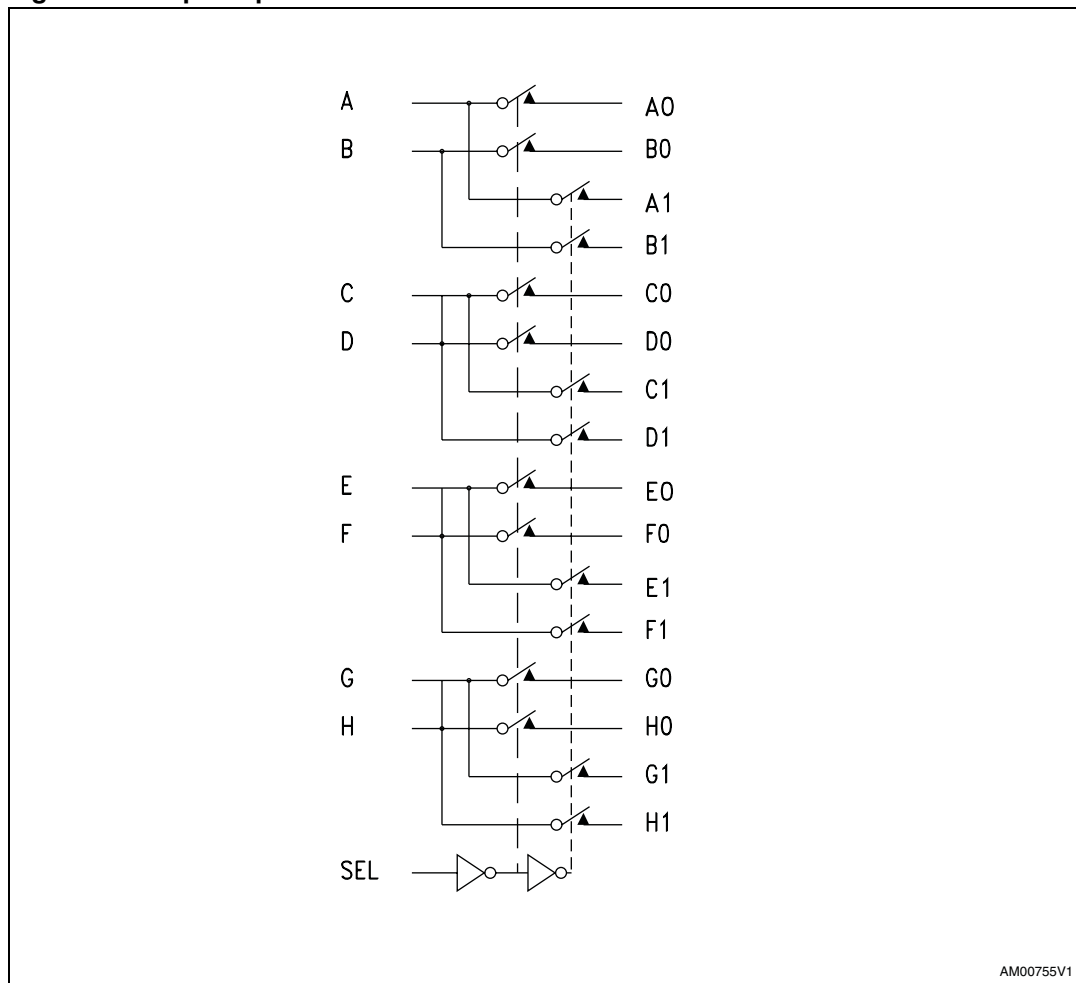


Table 3. Switch function table

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

### 3 Maximum ratings

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.

#### 3.1 Absolute maximum ratings

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 <sup>(1)</sup>	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  $V_{IO} \times I_O$  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  $\pm$  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, $V_{IN} = V_{CC}$			$\pm 5$	$\mu$ A
$I_{IL}$	Input low current	$V_{CC} = 3.6$ V, $V_{IN} = GND$			$\pm 5$	$\mu$ A
$I_{OFF}$	Power down leakage current	$V_{CC} = 0$ V, A to H $V = 0$ V, A0 to H0 and A1 to H1 $\leq 3.6$ V			$\pm 5$	$\mu$ A
$R_{ON}$	Switch ON resistance <sup>(1)</sup>	$V_{CC} = 3.0$ V, $V_{IN} = 1.5$ to $V_{CC}$ $I_{IN} = -40$ mA		5.5	7.5	$\Omega$
$R_{FLAT}$	ON resistance flatness <sup>(1)(2)</sup>	$V_{CC} = 3.0$ V, $V_{IN}$ at 1.5 and $V_{CC}$ $I_{IN} = -40$ mA		0.8		$\Omega$
$\Delta R_{ON}$	ON resistance match between channel $\Delta R_{ON} = R_{ONMAX} - R_{ONMIN}$ <sup>(1)(3)</sup>	$V_{CC} = 3.0$ V, $V_{IN} = 1.5$ to $V_{CC}$ $I_{IN} = -40$ mA		0.5	1	$\Omega$

1. Measured by voltage drop between channels at indicated current through 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.  $\Delta R_{ON}$  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 <sup>(1)</sup>	$V_{IN} = 0$ 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	$\mu$ A

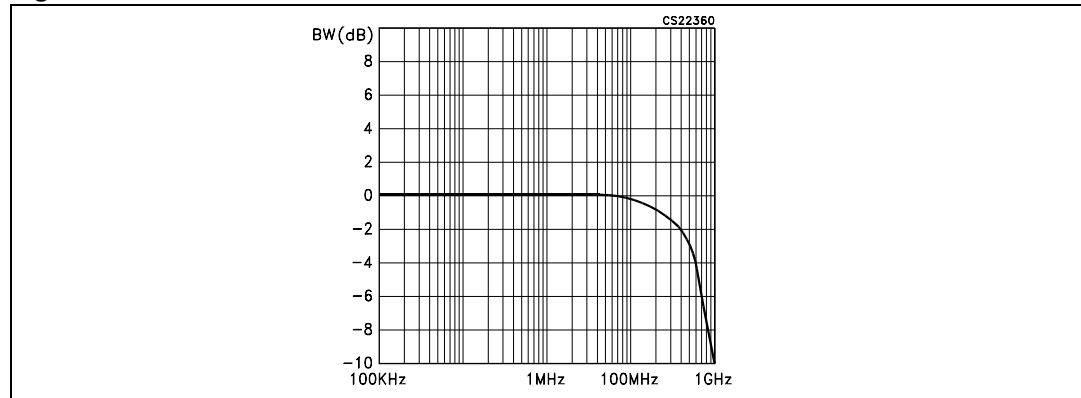
**Table 8. Dynamic electrical characteristics ( $T_A = -40$  to  $85$  °C,  $V_{CC} = 3.3$  V  $\pm$  10%)**

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

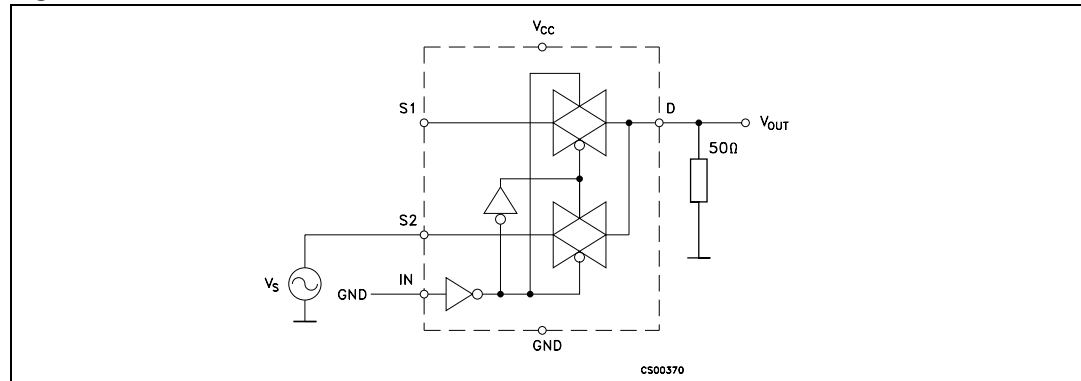
**Table 9. Switching characteristics ( $T_A = -40$  to  $85$  °C,  $V_{CC} = 3.3$  V  $\pm$  10%)**

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

**Figure 3. Bandwidth**



**Figure 4. Schematic bandwidth**



## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

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

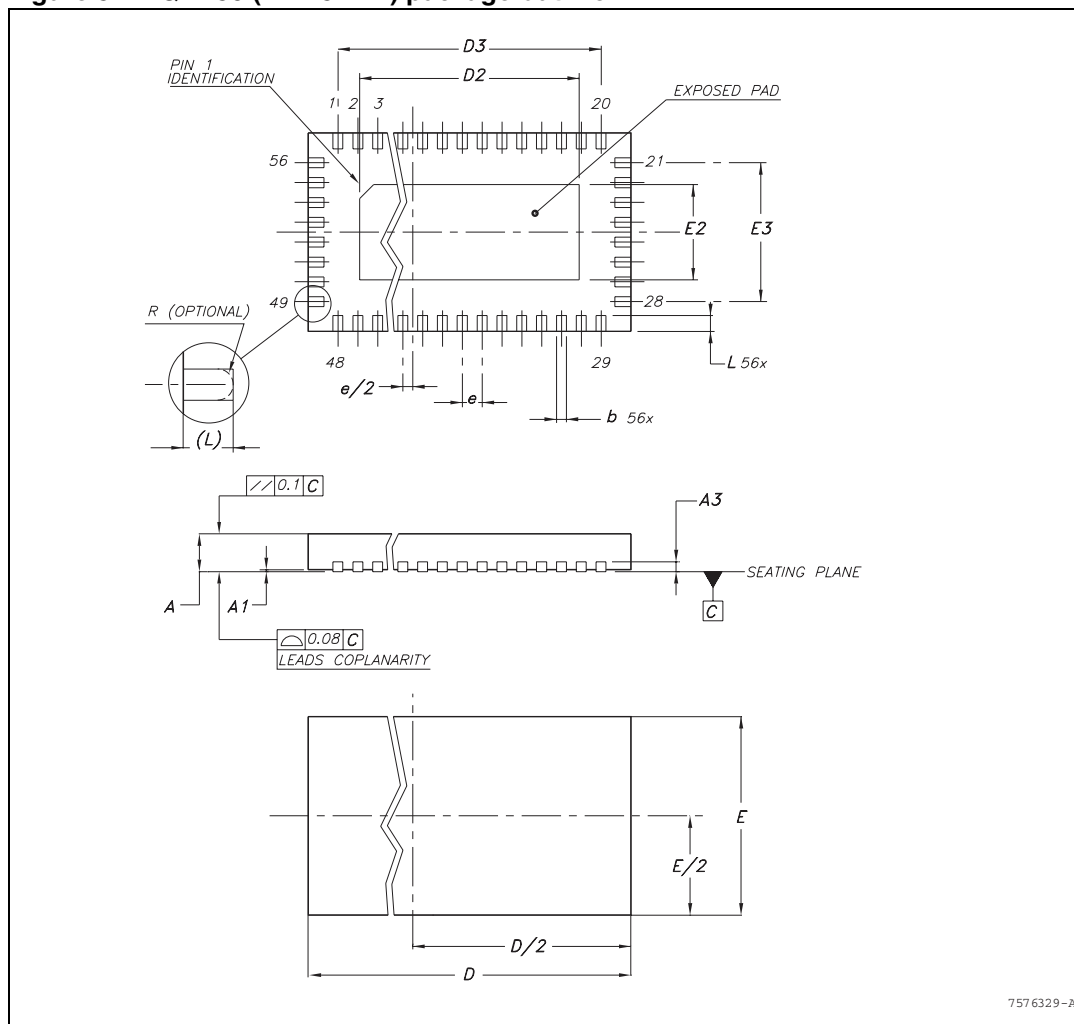
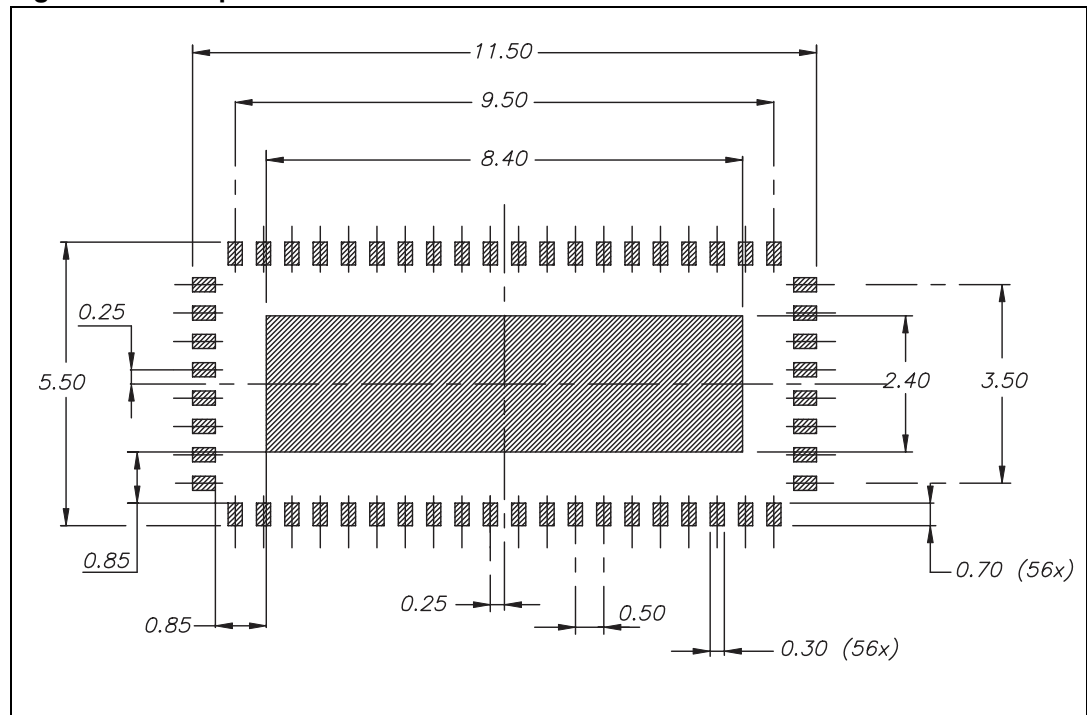


Table 10. QFN56 (11 x 5 mm) mechanical data

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





## 5 Revision history

Table 11. Document revision history

Date	Revision	Changes
12-Jun-2007	1	Initial release.
9-Oct-2008	2	Modified: title and pinout configuration. Added: <a href="#">Figure 6: Footprint recommendation on page 8</a> .
30-Nov-2010	3	Removed status "Preliminary Data", document reformatted, replaced $V_{DD}$ by $V_{CC}$ in <a href="#">Figure 1</a> , <a href="#">Table 2</a> , updated text ECOPACK <sup>®</sup> in <a href="#">Section 4</a> , corrected typo in <a href="#">Features</a> , <a href="#">Description</a> , <a href="#">Table 2</a> , <a href="#">Table 3</a> , <a href="#">Table 5</a> to <a href="#">Table 9</a> , removed note below <a href="#">Table 9</a> .

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