

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

**TC74VHCT125AF,TC74VHCT125AFN,TC74VHCT125AFT,TC74VHCT125AFK
TC74VHCT126AF,TC74VHCT126AFN,TC74VHCT126AFT,TC74VHCT126AFK**

TC74VHCT125AF/AFN/AFT/AFK Quad Bus Buffer
TC74VHCT126AF/AFN/AFT/AFK Quad Bus Buffer

The TC74VHCT125A/126A are high speed CMOS QUAD BUS BUFFERS fabricated with silicon gate C²MOS technology.

They achieve the high speed operation similar to equivalent Bipolar Shottky TTL while maintaining the CMOS low power dissipation.

The TC74VHCT125A requires the 3-state control input \bar{G} to be set high to place the output into the high impedance state, whereas the TC74VHCT126A requires the control input G to be set low to place the output into high impedance.

The input voltage are compatible with TTL output voltage.

This device may be used as a level converter for interfacing 3.3 V to 5 V system.

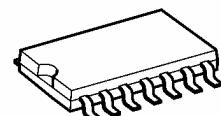
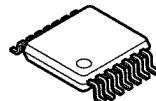
Input protection and output circuit ensure that 0 to 5.5 V can be applied to the input and output ^(Note) pins without regard to the supply voltage. There structure prevents device destruction due to mismatched supply and input/output voltages such as battery back up, hot board insertion, etc.

Note: $V_{CC} = 0$ V

Features

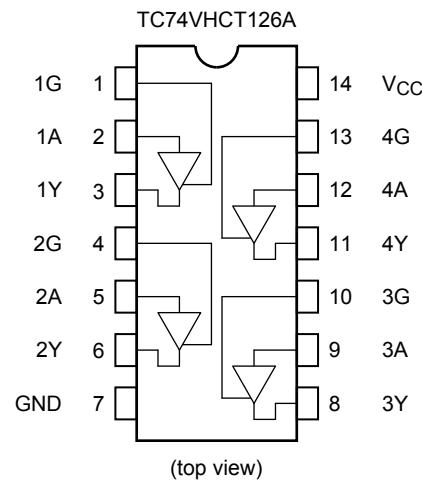
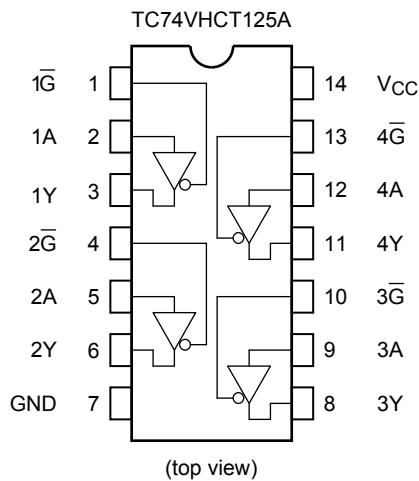
- High speed: $t_{pd} = 3.8$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 4 \mu A$ (max) at $T_a = 25^\circ C$
- Compatible with TTL outputs: $V_{IL} = 0.8$ V (max)
 $V_{IH} = 2.0$ V (min)
- Power down protection is provided on all inputs and outputs.
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Low noise: $VO_{LP} = 0.8$ V (max)
- Pin and function compatible with the 74 series
(74AC/HC/F/ALS/LS etc.) 125/126 types.

Note: xxxFN (JEDEC SOP) is not available in Japan.

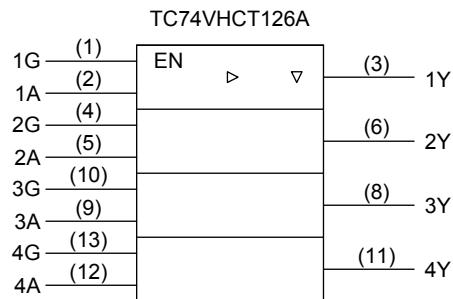
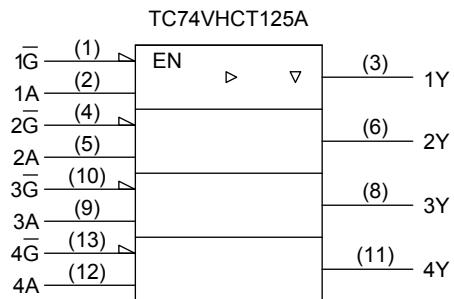
TC74VHCT125AF, TC74VHCT126AF**SOP14-P-300-1.27A****TC74VHCT125AFN, TC74VHCT126AFN****SOL14-P-150-1.27****TC74VHCT125AFT, TC74VHCT126AFT****TSSOP14-P-0044-0.65A****TC74VHCT125AFK, TC74VHCT126AFK****VSSOP14-P-0030-0.50****Weight**

SOP14-P-300-1.27A	: 0.18 g (typ.)
SOL14-P-150-1.27	: 0.12 g (typ.)
TSSOP14-P-0044-0.65A	: 0.06 g (typ.)
VSSOP14-P-0030-0.50	: 0.02 g (typ.)

Pin Assignment



IEC Logic Symbol



Truth Table

TC74VHCT125A

Inputs		Output
\bar{G}	A	Y
H	X	Z
L	L	L
L	H	H

X: Don't care

Z: High impedance

TC74VHCT126A

Inputs		Output
G	A	Y
L	X	Z
H	L	L
H	H	H

X: Don't care

Z: High impedance

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	–0.5 to 7.0	V
DC input voltage	V_{IN}	–0.5 to 7.0	V
DC output voltage	V_{OUT}	–0.5 to 7.0 (Note 2)	V
		–0.5 to V_{CC} + 0.5 (Note 3)	
Input diode current	I_{IK}	–20	mA
Output diode current	I_{OK}	±20 (Note 4)	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC} /ground current	I_{CC}	±50	mA
Power dissipation	P_D	180	mW
Storage temperature	T_{STG}	–65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Note 2: Output in off-state

Note 3: High or low state. I_{OUT} absolute maximum rating must be observed.

Note 4: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

Operating Ranges (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.5 to 5.5	V
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to 5.5 (Note 2)	V
		0 to V_{CC} (Note 3)	
Operating temperature	T_{OPR}	–40 to 85	°C
Input rise and fall time	dt/dv	0 to 20	ns/V

Note 1: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either V_{CC} or GND.

Note 2: Output in off-state

Note 3: High or low state

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit
				Min	Typ.	Max	Min	Max	
High-level input voltage	V _{IH}	—	4.5 to 5.5	2.0	—	—	2.0	—	V
Low-level input voltage	V _{IL}	—	4.5 to 5.5	—	—	0.8	—	0.8	V
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 μA	4.5	4.40	4.50	—	4.40	V
			I _{OH} = -8 mA	4.5	3.94	—	—	3.80	
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 μA	4.5	—	0.0	0.1	—	V
			I _{OL} = 8 mA	4.5	—	—	0.36	—	
Input leakage current	I _{IN}	V _{IN} = 5.5 V or GND	0 to 5.5	—	—	±0.1	—	±1.0	μA
3-state output off-state current	I _{OZ}	V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND	5.5	—	—	±0.25	—	±2.50	μA
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	4.0	—	40.0	μA
	I _{CCT}	Per input: V _{IN} = 3.4 V Other input: V _{CC} or GND	5.5	—	—	1.35	—	1.50	mA
Output leakage current	I _{OPD}	V _{OUT} = 5.5 V	0	—	—	0.5	—	5.0	μA

AC Characteristics (input: t_r = t_f = 3 ns)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit	
		V _{CC} (V)	C _L (pF)	Min	Typ.	Max	Min	Max		
Propagation delay time	t _{pLH} t _{pHL}	—	5.0 ± 0.5	15	—	3.8	5.5	1.0	ns	
				50	—	5.3	7.5	1.0		
Output enable time	t _{pZL} t _{pZH}	R _L = 1 kΩ	5.0 ± 0.5	15	—	3.6	5.1	1.0	ns	
				50	—	5.1	7.1	1.0		
Output disable time	t _{pLZ} t _{pHZ}	R _L = 1 kΩ	5.0 ± 0.5	50	—	6.1	8.8	1.0	10.0	ns
Output to output skew	t _{osLH} t _{osHL}	(Note 1)	5.0 ± 0.5	50	—	—	1.0	—	1.0	ns
Input capacitance	C _{IN}	—			—	4	10	—	10	pF
Output capacitance	C _{OUT}	—			—	6	—	—	—	pF
Power dissipation capacitance	C _{PD} (Note 2)	TC74VHCT125A			—	14	—	—	—	pF
		TC74VHCT126A			—	15	—	—	—	

Note 1: Parameter guaranteed by design.

$$t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|$$

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per gate)}$$

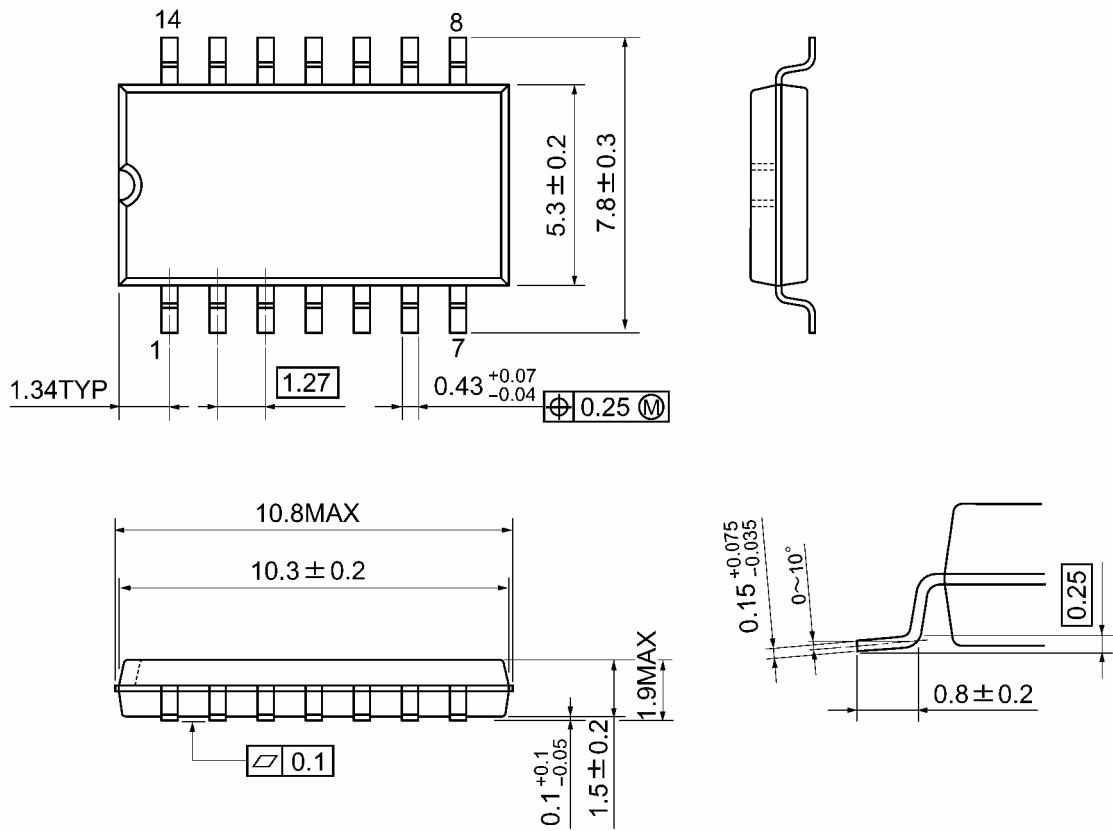
Noise Characteristics (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Unit
			V _{CC} (V)	Typ.	Limit	
Quiet output maximum dynamic V _{OL}	V _{OLP}	C _L = 50 pF	5.0	0.5	0.8	V
Quiet output minimum dynamic V _{OL}	V _{OLV}	C _L = 50 pF	5.0	-0.5	-0.8	V
Minimum high level dynamic input voltage	V _{IHD}	C _L = 50 pF	5.0	—	2.0	V
Maximum low level dynamic input voltage	V _{ILD}	C _L = 50 pF	5.0	—	0.8	V

Package Dimensions

SOP14-P-300-1.27A

Unit: mm

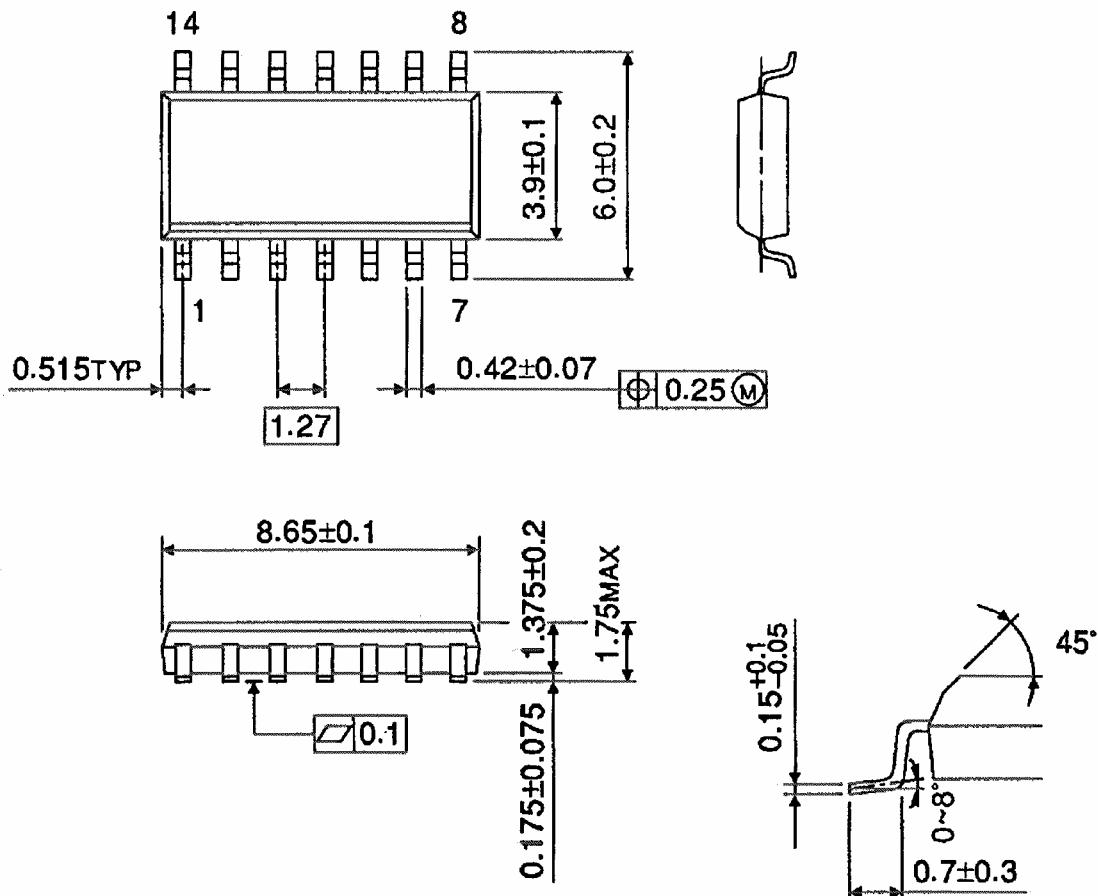


Weight: 0.18 g (typ.)

Package Dimensions (Note)

SOL14-P-150-1.27

Unit : mm



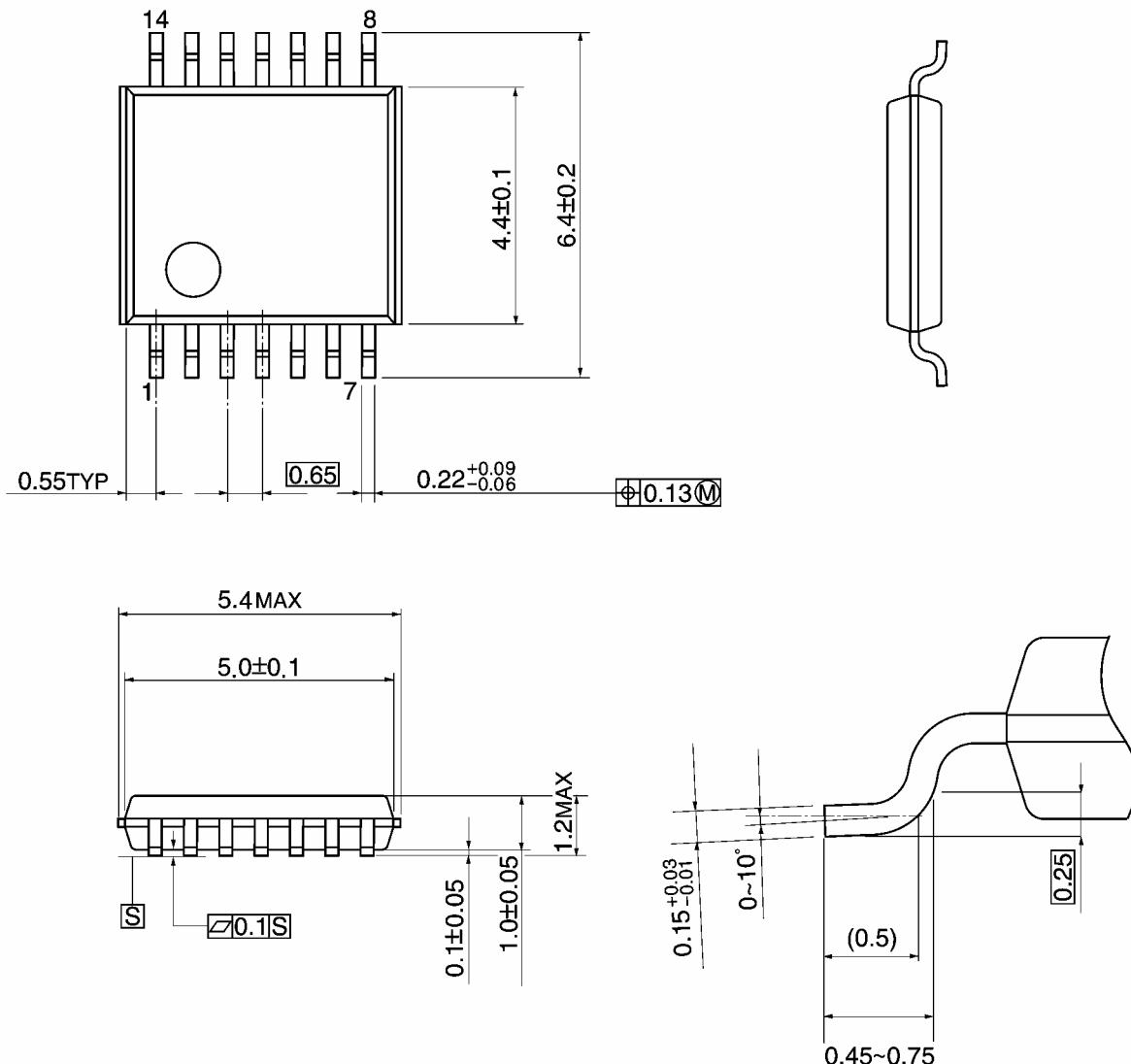
Note: This package is not available in Japan.

Weight: 0.12 g (typ.)

Package Dimensions

TSSOP14-P-0044-0.65A

Unit: mm

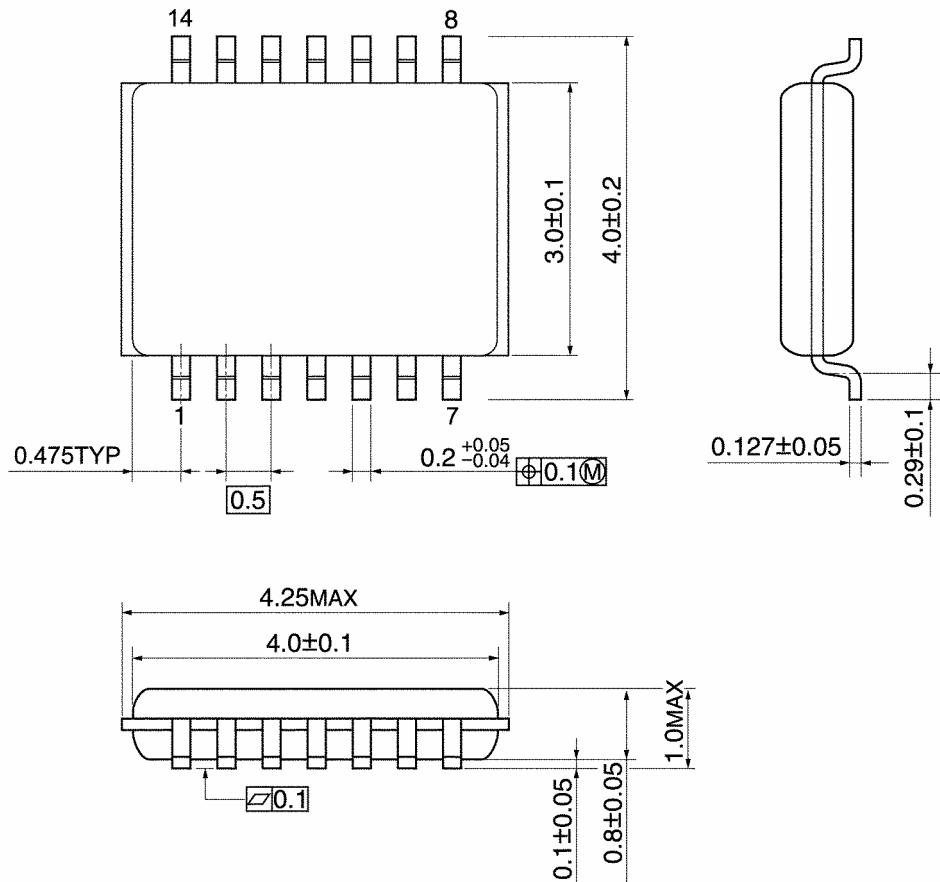


Weight: 0.06 g (typ.)

Package Dimensions

VSSOP14-P-0030-0.50

Unit: mm



Weight: 0.02 g (typ.)

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20070701-EN GENERAL

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