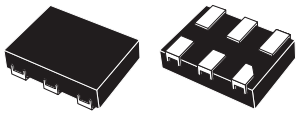
74AUP1G04

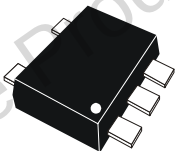
Low power single inverter gate

Features

- High speed: t_{PD} = 4.3 ns (max.) at V_{CC} = 2.3 V
- Power down protection on inputs and outputs
- Balanced propagation delays:
  $t_{PLH} \approx t_{PHL}$
- Operating voltage range:
  V_{CC} (opr) = 1.2 to 3.6 V
- Low power dissipation:
  I_{CC} = 1 µA (max.) at T_A = 85 °C
- Latch-up performance exceeds 300 mA (JESD 78, Class II)
- ESD performance:
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)



DFN6L



SOT-665

Applications

- Mobile phones
- Personal digital assistants (PDAs)

Description

The 74AUP1G04 is a low voltage CMOS single inverter gate fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It is ideal for 1.2 to 3.6 V operations and low power and low noise applications.

All inputs and outputs are equipped with protection circuits against static discharge, giving them 2kV ESD immunity and transient excess voltage.

Obsolete Product(s) - Obsolete Product(s)

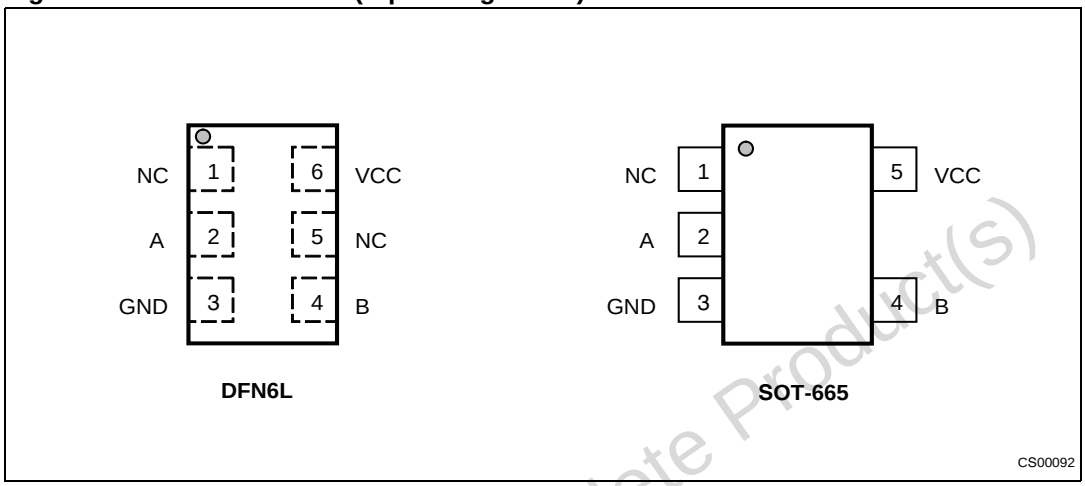
Table 1. Device summary

Order code	Package	Packing
74AUPG04DTR	DFN6L (1.2 x 1 mm)	Tape and reel
74AUPG04GTR	SOT-665 (1.6 x 1.6 mm)	Tape and reel

1 Pin settings

1.1 Pin connection

Figure 1. Pin connection (top through view)



1.2 Pin description

Table 2. Pin assignment

DFN pin number	SOT pin number	Symbol	Name and function
1	1	NC	Not connected
2	2	A	Data input
3	3	GND	Ground (0V)
4	4	B	Data output
5	-	NC	Not connected
6	5	V_{CC}	Positive supply voltage

Obsolete Product(s) - Obsolete Product(s)

1.3 Truth table

Figure 2. Truth table

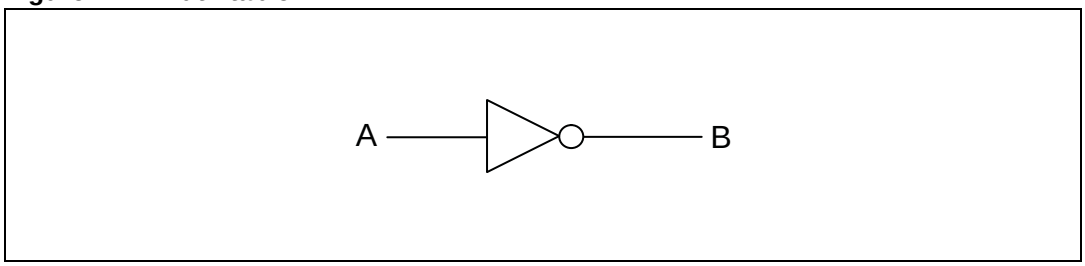
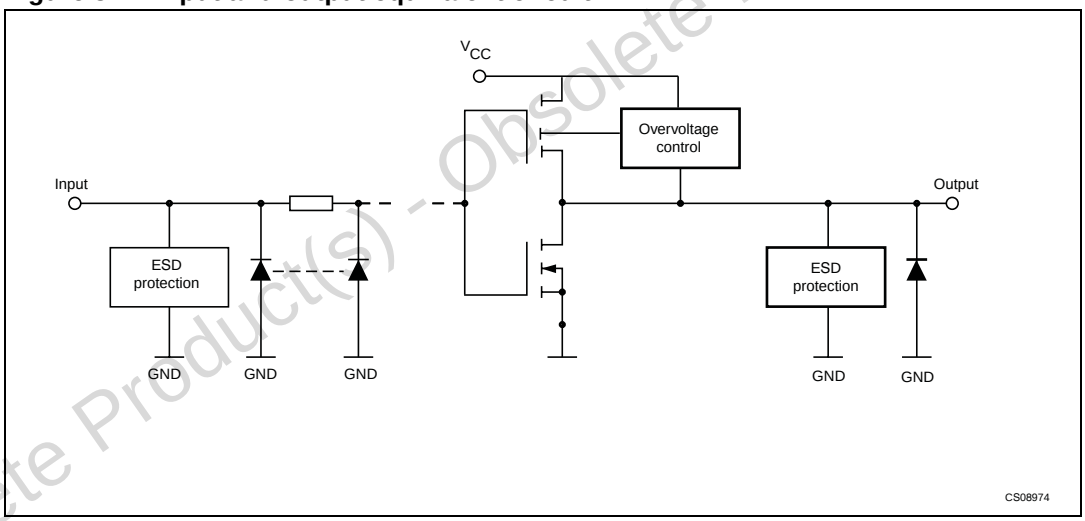


Table 3. Truth table

A	B
L	H
H	L

Figure 3. Input and output equivalent circuit



Obsolete Product(s) - Obsolete Product(s)

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.

Table 4. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	-0.5 to +4.6	V
V_I	DC input voltage	-0.5 to +4.6	V
V_O	DC output voltage (V_{CC} = 0 V)	-0.5 to +4.6	V
V_O	DC output voltage (high or low state)	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC input diode current	-20	mA
I_{OK}	DC output diode current	-50	mA
I_O	DC output current	±50	mA
I_{CC}	DC supply current per supply pin	±100	mA
I_{GND}	DC ground current per supply pin	±100	mA
P_D	Power dissipation	200	mW
T_{stg}	Storage temperature	-65 to +150	°C
T_L	Lead temperature (10 sec)	260	°C

2.1 Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter		Value	Unit
V_{CC}	Supply voltage		1.2 to 3.6	V
V_I	Input voltage		0 to V_{CC}	V
V_O	Output voltage		0 to V_{CC}	V
T_{op}	Operating temperature		-40 to 85	°C
dt/dv	Input rise and fall time	V_{CC} = 3.0 to 3.6 V	10	ns/V
		V_{CC} = 2.3 to 2.7 V	20	ns/V
		V_{CC} = 1.2 to 1.95 V	100	ns/V

Obsolete Product(s) - Obsolete Product(s)

3 Electrical characteristics

Table 6. DC specifications

Symbol	Parameter	V_{CC} (V)	Test condition	Value		Value		Unit
				25 °C		-40 to 85 °C		
				Min	Max	Min	Max	
V_{IH}	High level input voltage	1.2 to 1.95		0.65 V_{CC}		0.65 V_{CC}		V
		2.0 to 2.7		1.6		1.6		
		2.75 to 3.6		2.0		2.0		
V_{IL}	Low level input voltage	1.2 to 1.95			0.35 V_{CC}		0.35V_{CC}	V
		2.0 to 2.7			0.7		0.7	
		2.75 to 3.6			0.8		0.8	
V_{OH}	High level output voltage	1.2 to 3.6	I_{OH} = -100 µA	V_{CC} – 0.2		V_{CC} – 0.2		V
		3.0	I_{OH} = -10 mA	2.45		2.4		
		2.3	I_{OH} = -6 mA	1.85		1.8		
		1.65	I_{OH} = -4 mA	1.30		1.25		
		1.4	I_{OH} = -2 mA	1.10		1.05		
		1.2	I_{OH} = -1 mA	1.00		0.95		
V_{OL}	Low level output voltage	1.2 to 3.6	I_O = 100 µA		0.15		0.20	V
		3.0	I_O = 10 mA		0.50		0.55	
		2.3	I_O = 6 mA		0.35		0.40	
		1.65	I_O = 4 mA		0.35		0.40	
		1.4	I_O = 2 mA		0.25		0.30	
		1.2	I_O = 1 mA		0.20		0.25	
I_I	Input leakage current	0 to 3.6	V_I = GND to 3.6		±0.1		±0.5	µA
I_{off}	Power off leakage current	0	V_I or V_O = 0 to 3.6 V		±0.1		±1.0	µA
I_{CC}	Quiescent supply current	1.2 to 3.6	V_I = V_{CC} or GND		0.1		1	µA
ΔI_{CC}	I_{CC} increment per input	3.3	V_I = V_{CC} - 0.6V, I_O = 0		80		100	µA

Obsolete Product(s) - Obsolete Product(s)

Table 7. AC electrical characteristics

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
			C_L (pF)	25 °C	-40 to 85 °C		
				Typ	Min	Max	
t_{PLH}, t_{PHL}	Propagation delay time	1.1 to 1.3	5	8.0		12.4	ns
		1.4 to 1.6		4.2		6.6	
		1.65 to 1.95		3.2		5.1	
		2.3 to 2.7		2.3		3.1	
		3.0 to 3.6		1.9		2.5	
		1.1 to 1.3	10	8.6		13	
		1.4 to 1.6		4.6		7	
		1.65 to 1.95		3.5		5.3	
		2.3 to 2.7		2.4		3.5	
		3.0 to 3.6		2.0		2.9	
		1.1 to 1.3	15	9.1		13.3	
		1.4 to 1.6		5.6		7.5	
		1.65 to 1.95		3.8		5.7	
		2.3 to 2.7		2.6		3.7	
		3.0 to 3.6		2.2		3.1	
		1.1 to 1.3	30	10.5		16	
		1.4 to 1.6		5.5		9	
		1.65 to 1.95		4.3		6.7	
		2.3 to 2.7		3.1		4.3	
		3.0 to 3.6		2.7		3.8	

Table 8. Capacitive characteristics

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
				T_A = 25 °C			
				Min	Typ	Max	
C_I	Input capacitance	0	V_I = 0 or V_{CC}		3		pF
		3.6	V_I = 0 or V_{CC}		6		
C_O	Output capacitance	3.6	V_I = 0 or V_{CC}		6		pF
C_{PD}	Power dissipation capacitance	3.6	f = 10 MHz		32		pF

Obsolete Product(s) - Obsolete Product(s)

4 Test circuit

Figure 4. Test circuit

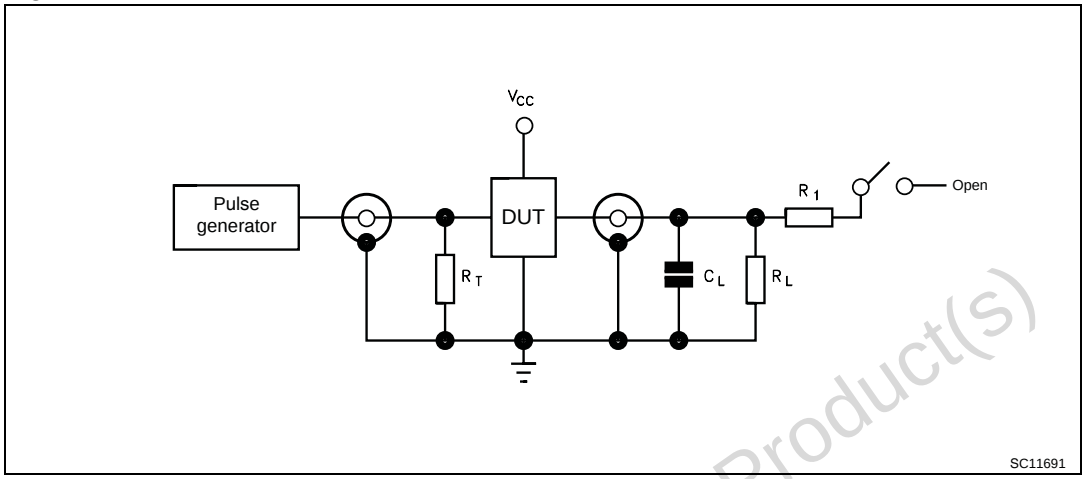


Table 9. Test setting

Test	Switch
t_{PLH}, t_{PHL}	Open

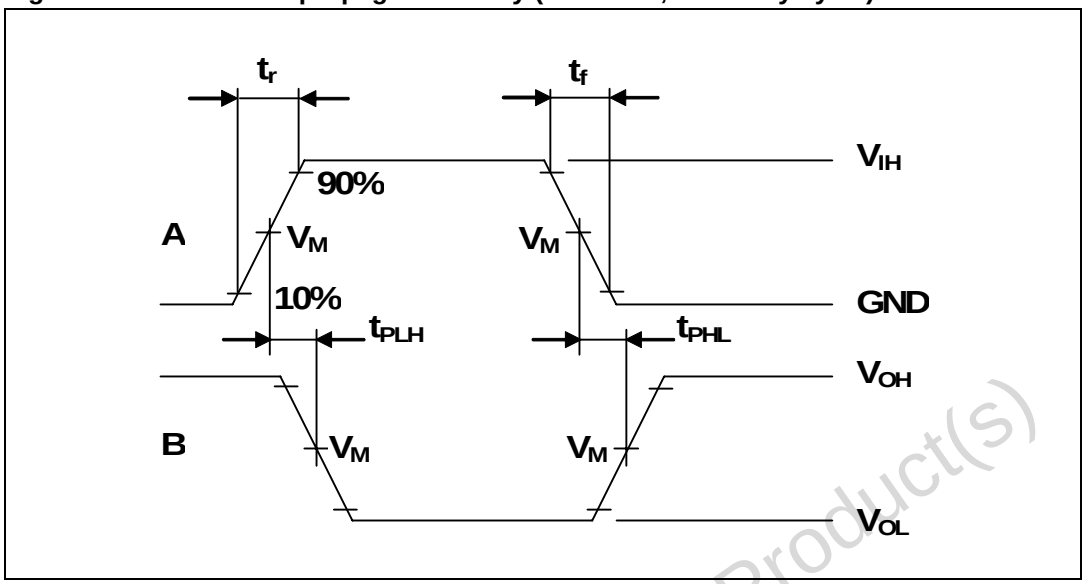
Table 10. Symbol and values for test circuit and waveform

Symbol	V_{CC}				
	1.2 ± 0.1 V	**1.5 ± 0.1 V**	**1.8 ± 0.15 V**	**2.5 ± 0.2 V**	**3.3 ± 0.3 V**
C_L	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
R_L	500 Ω	500 Ω	500 Ω	500 Ω	500 Ω
V_M	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	1.5
V_{IH}	V_{CC}	V_{CC}	V_{CC}	V_{CC}	V_{CC}
$t_r = t_f$	≤ 2 ns	≤ 2 ns	≤ 2 ns	≤ 2 ns	≤ 2 ns

$R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Obsolete Product(s) - Obsolete Product(s)

Figure 5. Waveform: propagation delay (f = 1 MHz; 50% duty cycle)

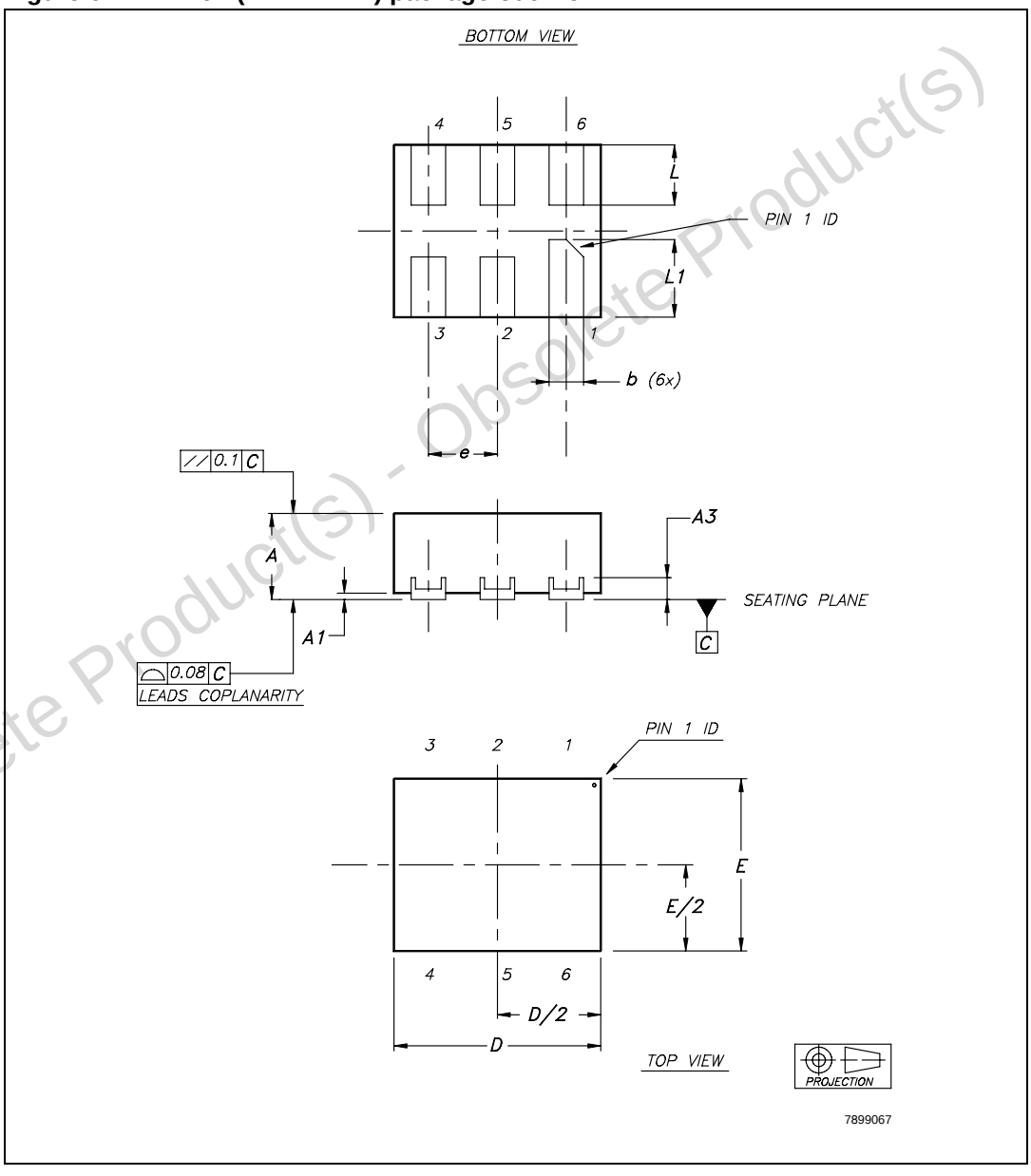


Obsolete Product(s) - Obsolete Product(s)

5 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 6. DFN6L (1.2 x 1 mm) package outline

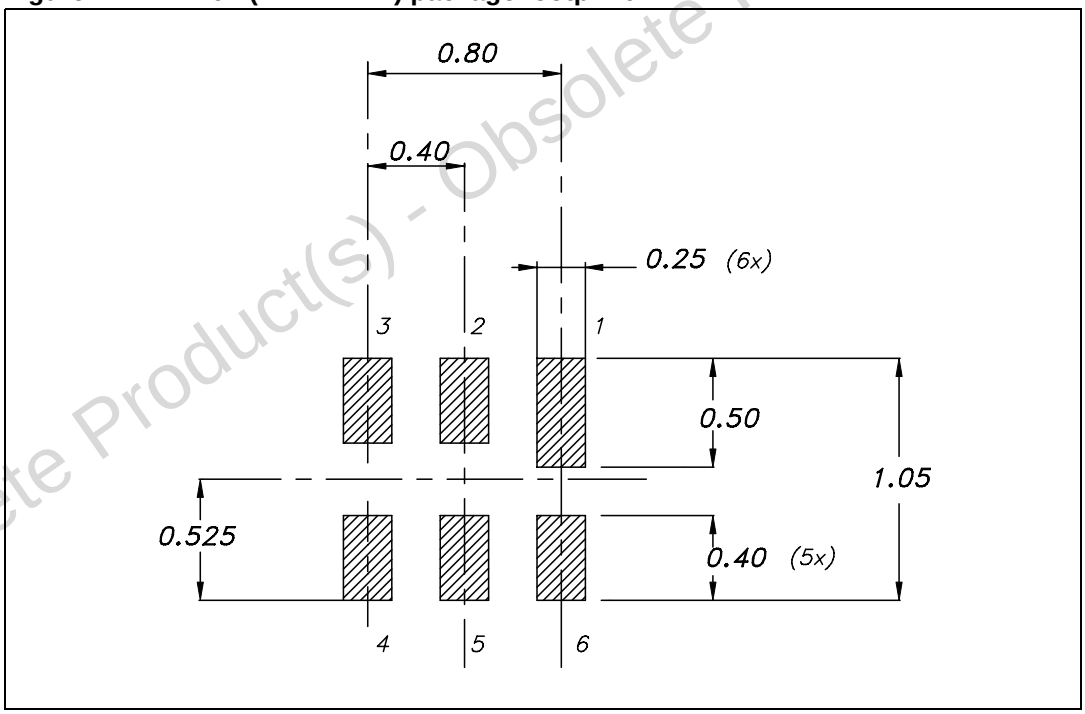


Obsolete Product(s) - Obsolete Product(s)

Table 11. DFN6L (1.2 x 1 mm) package mechanical data

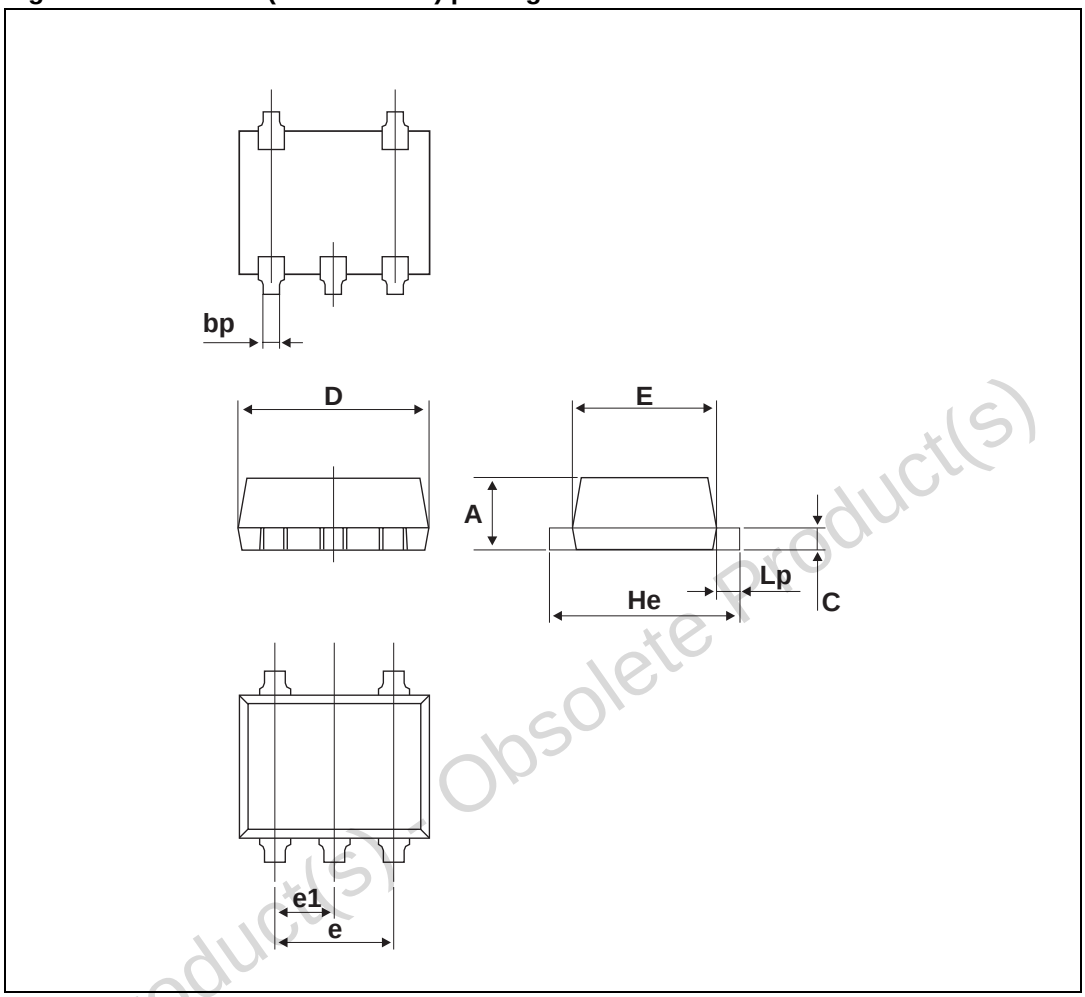
Symbol	Millimeters		
	Typ	Min	Max
A	0.50	0.45	0.55
A1	0.02	0	0.05
A3	0.127		
b	0.20	0.15	0.25
D	1.20	1.15	1.25
E	1	0.95	1.05
e	0.40		
L	0.35	0.30	0.40
L1	0.45	0.40	0.50

Figure 7. DFN6L (1.2 x 1 mm) package footprint



Obsolete Product(s) - Obsolete Product(s)

Figure 8. SOT-665 (1.6 x 1.6 mm) package outline



Obsolete Product(s) - Obsolete Product(s)

Table 12. SOT665 (1.6 x 1.6 mm) mechanical data

Symbol	Millimeters		
	Typ	Min	Max
A		0.50	0.60
bp		0.17	0.27
c		0.08	0.18
D		1.5	1.7
E		1.1	1.3
e	1		
e1	0.5		
He		1.5	1.7
Lp		0.1	0.3

Figure 9. SOT-665 (1.6 x 1.6 mm) package footprint

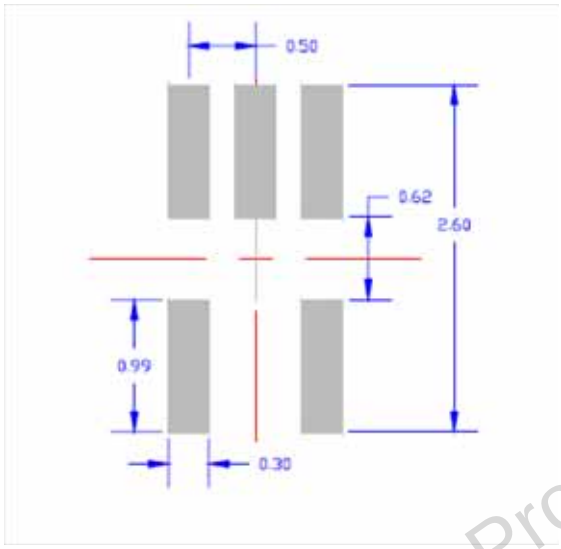
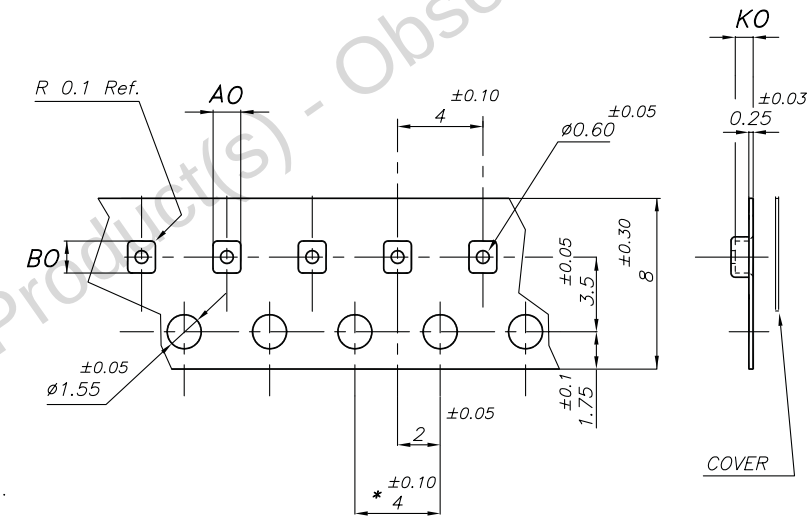


Figure 10. DFN6L (1.2 x 1 mm) carrier tape information



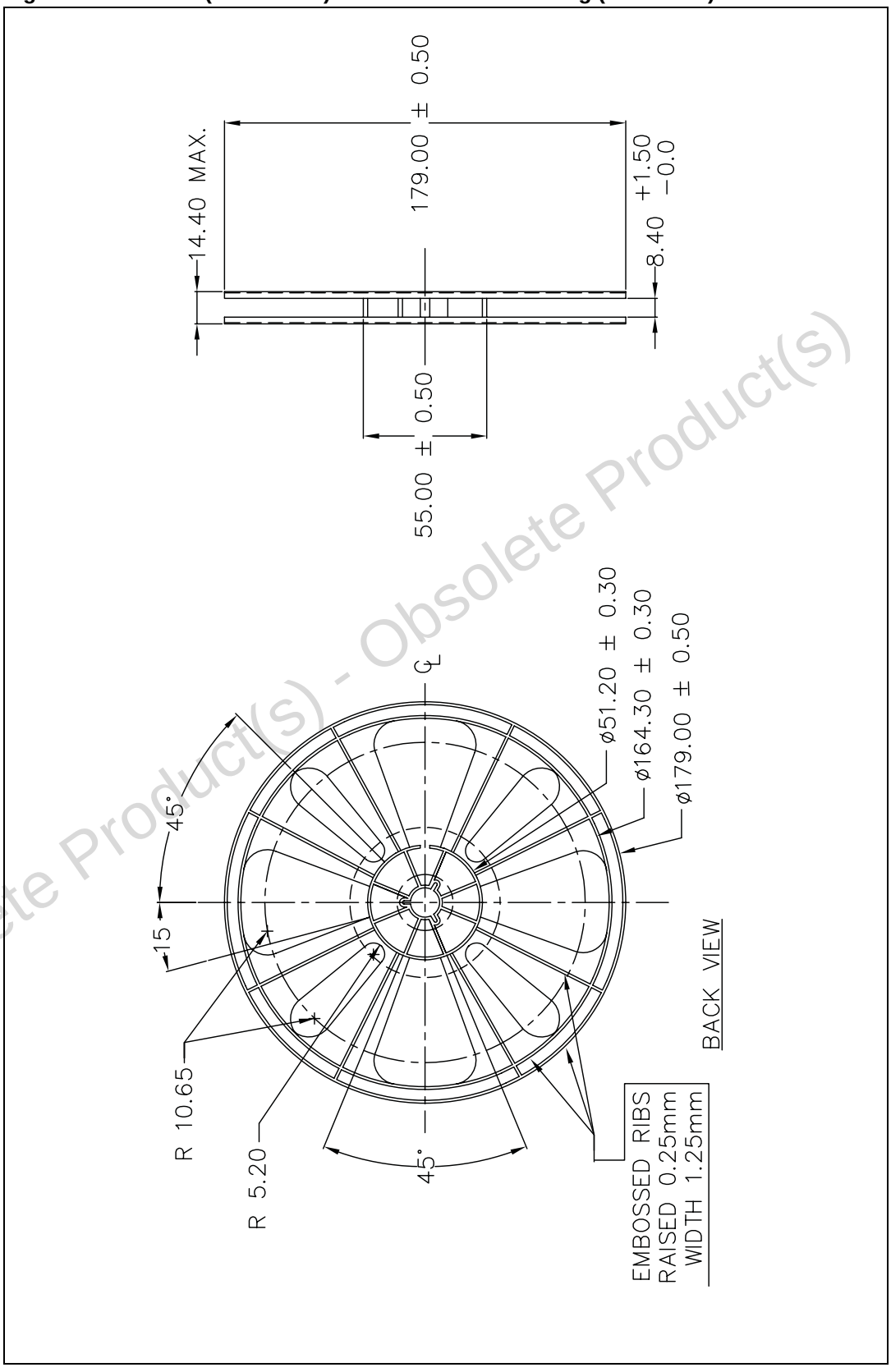
AO	1.30 ±0.10
BO	1.50 ±0.10
KO	0.75 ±0.10

* 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.20

7875978

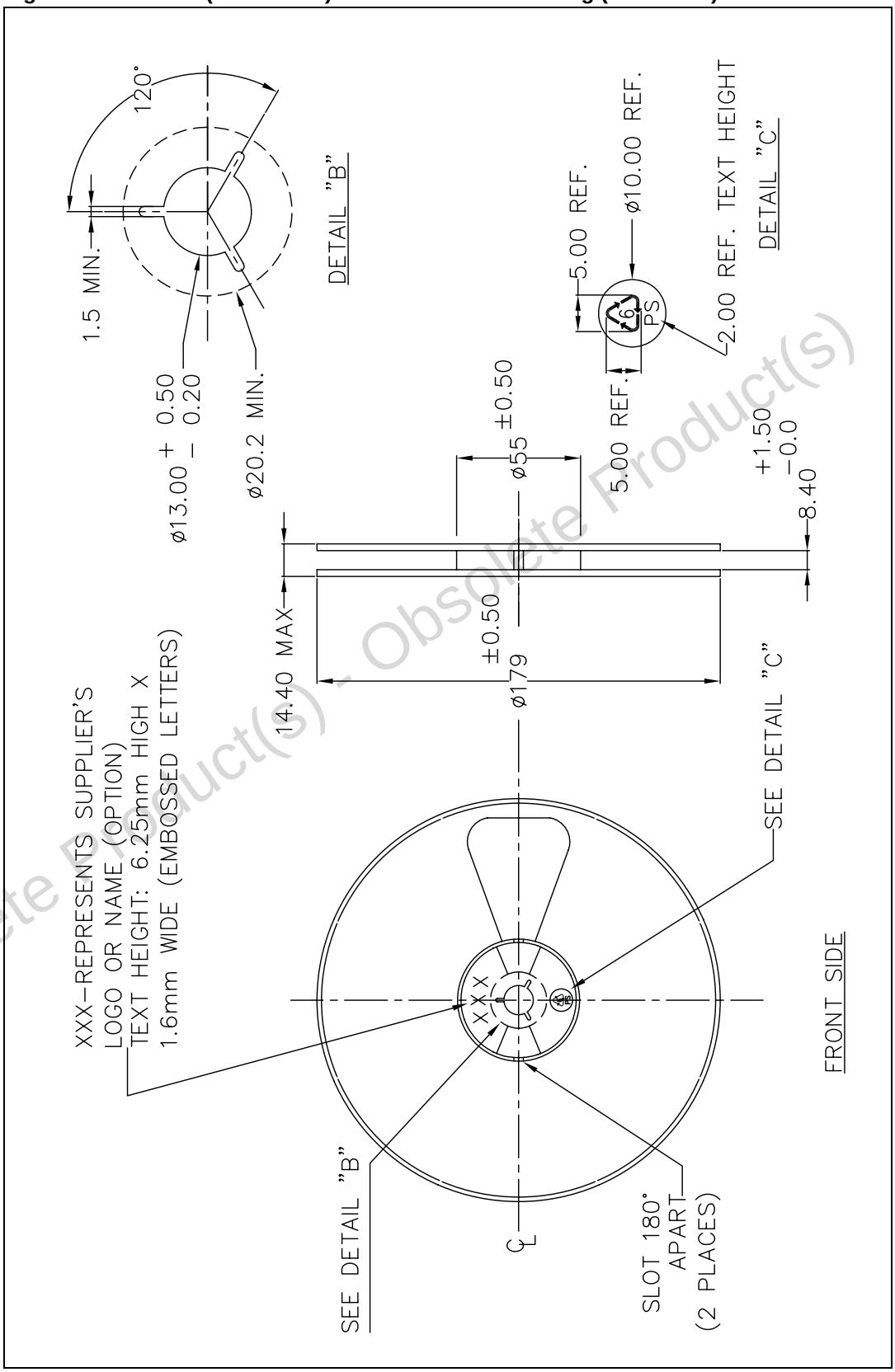
Obsolete Product(s) - Obsolete Product(s)

Figure 11. DFN6L (1.2 x 1 mm) reel information drawing (back view)



Obsolete Product(s) - Obsolete Product(s)

Figure 12. DFN6L (1.2 x 1 mm) reel information drawing (front view)



Obsolete Product(s) - Obsolete Product(s)

Figure 13. SOT-665 (1.6 x 1.6 mm) carrier tape information

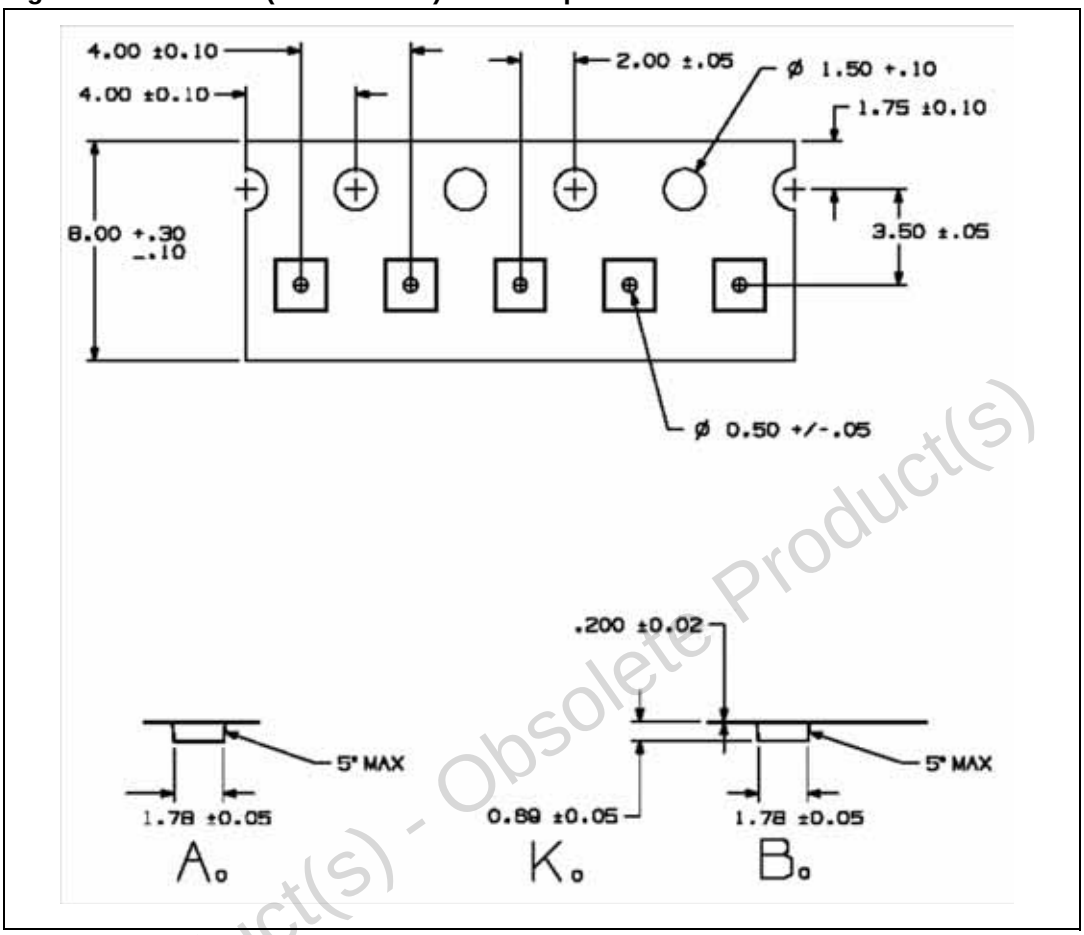
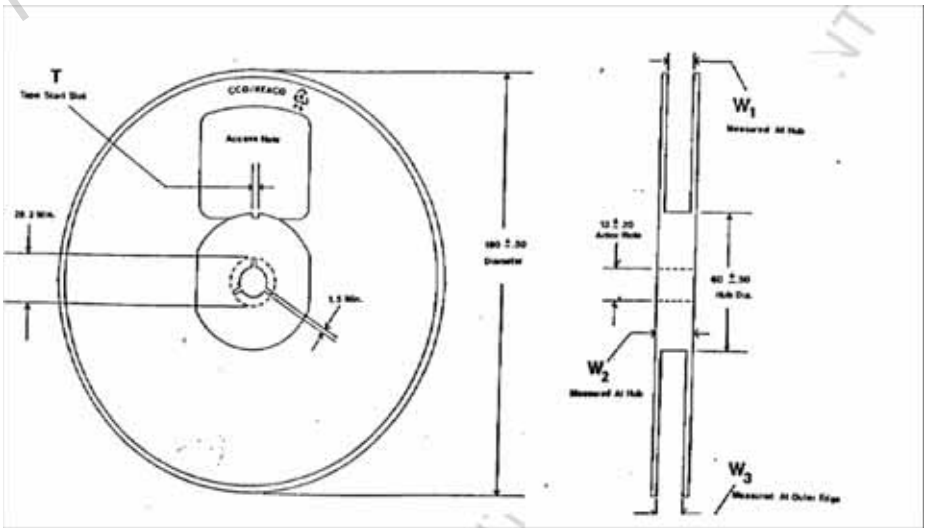


Figure 14. SOT-665 (1.6 x 1.6 mm) reel information



Obsolete Product(s) - Obsolete Product(s)

Table 13. SOT-665 (1.6 x 1.6 mm) reel description

Value[1]	R1	R2	R3	eint (at hub)	e1	W1	W2	W3
Min	12.8	175	59.5	8.4	1.5	8.4		7.9
Typ	13	180	60	8.4		8.4		9.4
Max	13.2	185	60.5	10		10	14.4	10.9

1. Millimeters.

Obsolete Product(s) - Obsolete Product(s)

6 Revision history

Table 14. Document revision history

Date	Revision	Changes
28-Mar-2008	1	Initial release.

Obsolete Product(s) - Obsolete Product(s)

Obsolete Product(s) - Obsolete Product(s)

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