74LVC1G14

SINGLE SCHMITT-TRIGGER INVERETER

NEW PRODUCT

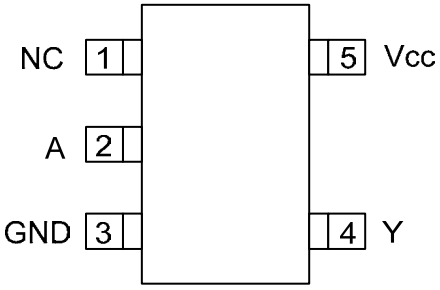
Description

The 74LVC1G14 is a single 1-input Schmitt-trigger inverter with a standard totem pole output. The device is designed for operation with a power supply range of 1.65V to 5.5V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using IOFF. The IOFF circuitry disables the output preventing damaging current backflow when the device is powered down. The gate performs the positive Boolean function:

$$Y = \overline{A}$$

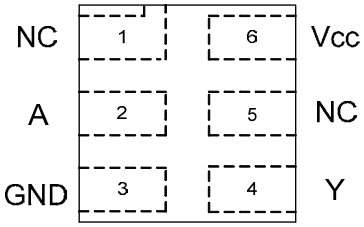
Pin Assignments

(Top View)



SOT25 / SOT353

(Top View)



DFN1010

Features

- Wide Supply Voltage Range from 1.65V to 5.5V
- ± 24mA Output Drive at 3.3V
- CMOS low power consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115-A)
  - 2000-V Human Body Model (A114-A)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- SOT25, SOT353, and DFN1010: Available in “Green” Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, PDAs
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Cell Phones, Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

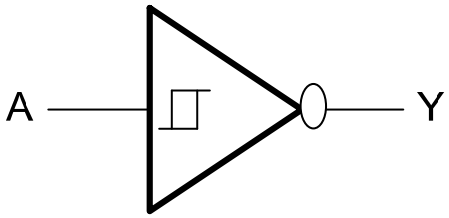
Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

NEW PRODUCT

Pin Descriptions

Pin Name	Description
A	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	**Y**
H	L
L	H

NEW PRODUCT

Absolute Maximum Ratings (Note 2)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage Range	-0.5 to 6.5	V
V_I	Input Voltage Range	-0.5 to 6.5	V
V_o	Voltage applied to output in high impedance or I_{OFF} state	-0.5 to 6.5	V
V_o	Voltage applied to output in high or low state	-0.3 to V_{CC} +0.5	V
I_{IK}	Input Clamp Current V_I<0	-50	mA
I_{OK}	Output Clamp Current	-50	mA
I_O	Continuous output current	±50	mA
	Continuous current through Vdd or GND	±100	mA
T_J	Operating Junction Temperature	-40 to 150	°C
T_{STG}	Storage Temperature	-65 to 150	°C

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 3)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5		V
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 1.65V		-4	mA
		V_{CC} = 2.3V		-8	
		V_{CC} = 3V		-16	
				-24	
		V_{CC} = 4.5V		-32	
I_{OL}	Low-level output current	V_{CC} = 1.65V		4	mA
		V_{CC} = 2.3V		8	
		V_{CC} = 3V		16	
				24	
		V_{CC} = 4.5V		32	
Δt/ΔV	Input transition rise or fall rate	V_{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V		20	ns/V
		V_{CC} = 3.3V ± 0.3V		10	
		V_{CC} = 5V ± 0.5V		5	
T_A	Operating free-air temperature		-40	125	ºC

Notes: 3. Unused inputs should be held at Vcc or Ground.

NEW PRODUCT

Electrical Characteristics T_A=-40 °C to 85 °C (All typical values are at Vcc = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
V_{T+}	Positive-going input threshold voltage		1.65 V	0.70		1.20	
			2.3V	1.11		1.60	
			3 V	1.50		2.00	
			4.5 V	2.16		2.74	
			5.5 V	2.61		3.33	
V_{T-}	Negative-going input threshold voltage		1.65 V	0.30		0.72	
			2.3V	0.58		1.00	
			3 V	0.80		1.30	
			4.5 V	1.21		1.95	
			5.5 V	1.45		2.35	
ΔV_T	Hysteresis (V_{T+} - V_{T-})		1.65 V	0.30		0.62	
			2.3V	0.40		0.80	
			3 V	0.35		1.00	
			4.5 V	0.55		1.10	
			5.5 V	0.60		1.20	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65 V to 5.5V	V_{CC} – 0.1			V
		I_{OH} = -4mA	1.65 V	1.2			
		I_{OH} = -8mA	2.3V	1.9			
		I_{OH} = -16mA	3 V	2.4			
		I_{OH} = -24mA		2.3			
		I_{OH} = -32mA	4.5 V	3.8			
V_{OL}	High-level Input Voltage	I_{OL} = 100µA	1.65 V to 5.5V			0.1	V
		I_{OL} = 4mA	1.65 V			0.45	
		I_{OL} = 8mA	2.3V			0.3	
		I_{OL} = 16mA	3 V			0.4	
		I_{OL} = 24mA				0.55	
		I_{OL} = 32mA	4.5			0.55	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5 V			± 5	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0			± 10	µA
I_{CC}	Supply Current	V_I = 5.5V of GND I_O=0	1.65 V to 5.5V			10	µA
ΔI_{CC}	Additional Supply Current	Input at V_{CC} –0.6 V	3 V to 5.5V			500	µA

NEW PRODUCT

Electrical Characteristics T_A=-40 °C to 125 °C (All typical values are at Vcc = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
V_{T+}	Positive-going input threshold voltage		1.65 V	0.70		1.20	
			2.3V	1.11		1.60	
			3 V	1.50		2.00	
			4.5 V	2.16		2.74	
			5.5 V	2.61		3.33	
V_{T-}	Negative-going input threshold voltage		1.65 V	0.30		0.75	
			2.3V	0.58		1.03	
			3 V	0.80		1.33	
			4.5 V	1.21		1.95	
			5.5 V	1.45		2.35	
ΔV_T	Hysteresis (V_{T+} - V_{T-})		1.65 V	0.30		0.62	
			2.3V	0.37		0.80	
			3 V	0.32		1.00	
			4.5 V	0.50		1.20	
			5.5 V	0.55		1.40	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65 V to 5.5V	V_{CC} – 0.1			V
		I_{OH} = -4mA	1.65 V	0.95			
		I_{OH} = -8mA	2.3V	1.7			
		I_{OH} = -16mA	3 V	1.9			
		I_{OH} = -24mA		2.0			
		I_{OH} = -32mA	4.5 V	3.4			
V_{OL}	High-level Input Voltage	I_{OL} = 100µA	1.65 V to 5.5V			0.1	V
		I_{OL} = 4mA	1.65 V			0.7	
		I_{OL} = 8mA	2.3V			0.45	
		I_{OL} = 16mA	3 V			0.6	
		I_{OL} = 24mA				0.8	
		I_{OL} = 32mA	4.5			0.8	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5 V			± 100	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0			± 200	µA
I_{CC}	Supply Current	V_I = 5.5V of GND I_O=0	1.65 V to 5.5V			200	µA
ΔI_{CC}	Additional Supply Current	Input at V_{CC} –0.6 V	3 V to 5.5V			5000	µA

NEW PRODUCT

Electrical Characteristics (All typical values are at Vcc = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
C_i	Input Capacitance	$V_i = V_{CC}$ – or GND	3.3		3.5		pF
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 4)		151		°C/W
		SOT353	(Note 4)		395		
		DFN1010	(Note 4)		231		
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 4)		45		°C/W
		SOT353	(Note 4)		119		
		DFN1010	(Note 4)		TBD		

Notes: 4. Test condition for SOT25, SOT353 and DFN1010 : Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Switching Characteristics

T_A=-40 °C to 85 °C, CL = 15 pF as noted (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	1.0	9.9	0.7	5.5	0.7	4.6	0.7	4.4	ns

T_A=-40 °C to 85 °C, CL = 30 or 50pF as noted (see Figure 2

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	1.0	11	0.7	6.5	0.7	5.5	0.7	5	ns

T_A=-40 °C to 125 °C, CL = 15 pF as noted (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	1.0	12.5	0.7	7.5	0.7	6.5	0.7	5.5	ns

T_A=-40 °C to 125 °C, CL = 30 or 50pF as noted (see Figure 2)

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	1.0	14.0	0.7	8.5	0.7	7.0	0.7	6.5	ns

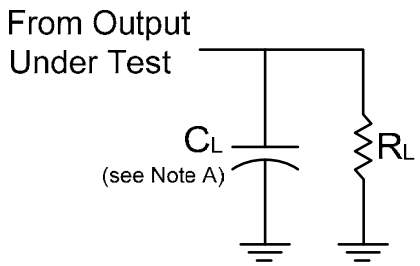
NEW PRODUCT

Operating Characteristics

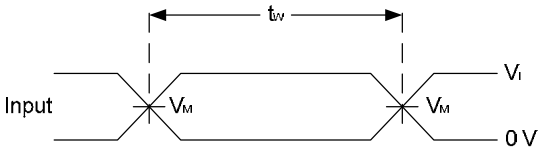
T_A = 25 ºC

Parameter		Test Conditions	Vcc = 1.8 V	Vcc = 2.5 V	Vcc = 3.3 V	Vcc = 5 V	Unit
			TYP	TYP	TYP	TYP	
C_{pd}	Power dissipation capacitance	f = 10 MHz	20	21	22	25	pF

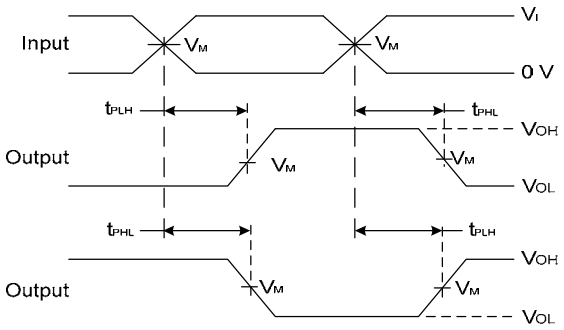
Parameter Measurement Information



Vcc	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	15pF	1MΩ



Voltage Waveform Pulse Duration



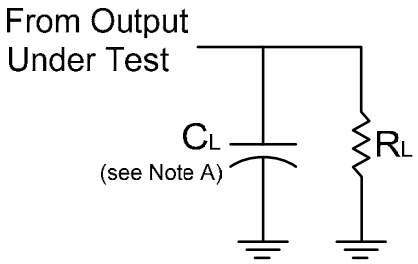
Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs

Figure 1. Load Circuit and Voltage Waveforms

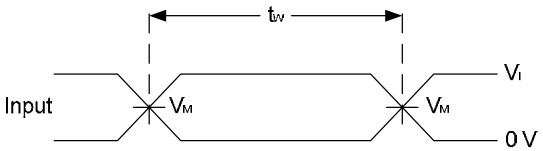
Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

NEW PRODUCT

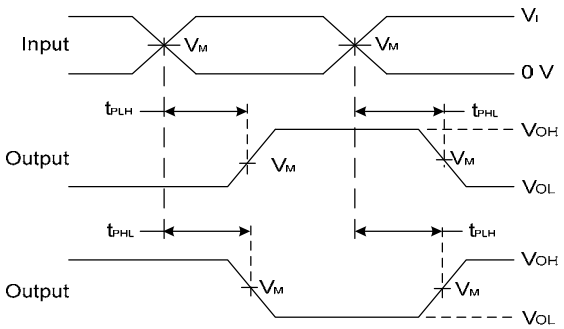
Parameter Measurement Information (Continued)



Vcc	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1KΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50pF	500Ω



Voltage Waveform Pulse Duration



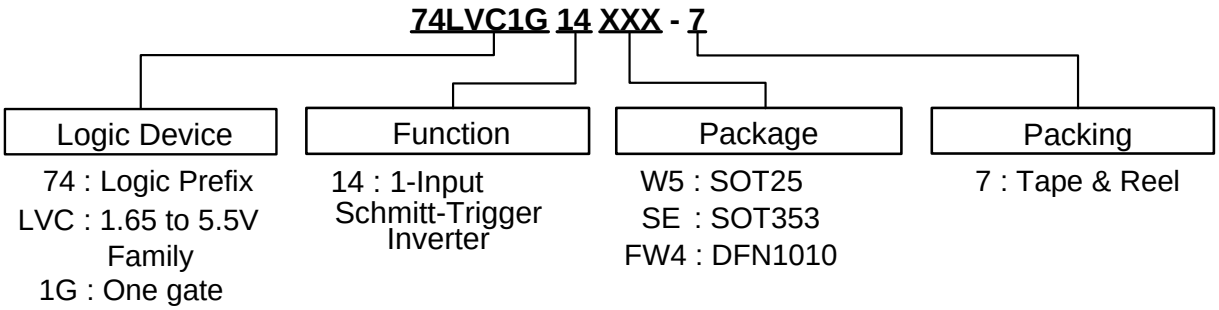
Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

Figure 2. Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

NEW PRODUCT

Ordering Information



Device	Package Code	Packaging (Note 7)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVC1G14W5-7	W5	SOT25	3000/Tape & Reel	-7
74LVC1G14SE-7	SE	SOT353	3000/Tape & Reel	-7
74LVC1G14FW4-7	FW4	DFN1010	5000/Tape & Reel	-7

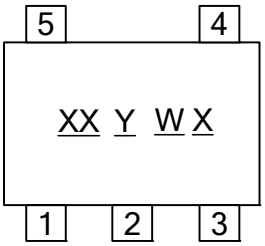
Notes: 7. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

NEW PRODUCT

Marking Information

(1) SOT25, SOT353

(Top View)

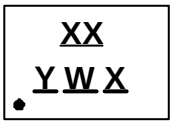


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Internal code

Part Number	Package	Identification Code
74LVC1G14W5-7	SOT25	UP
74LVC1G14SE-7	SOT353	UP

(2) DFN1010

(Top View)



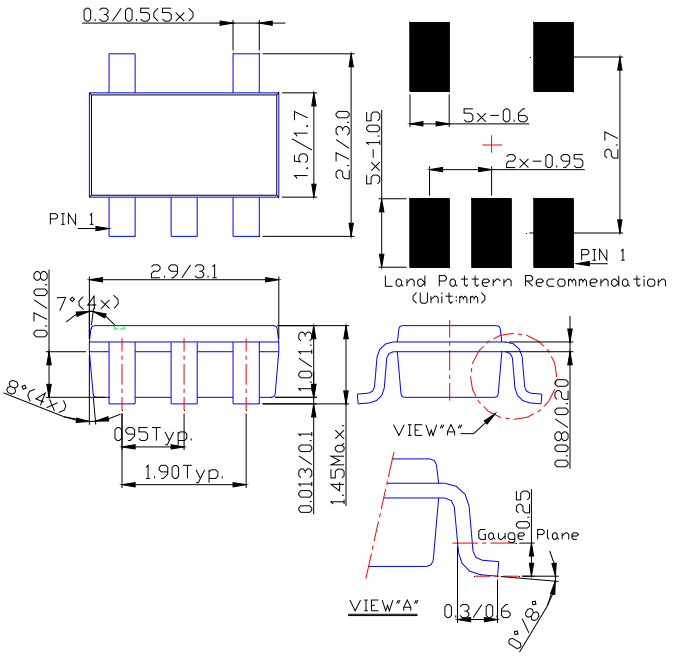
XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Internal code

Part Number	Package	Identification Code
74LVC1G14FW4-7	DFN1010	UP

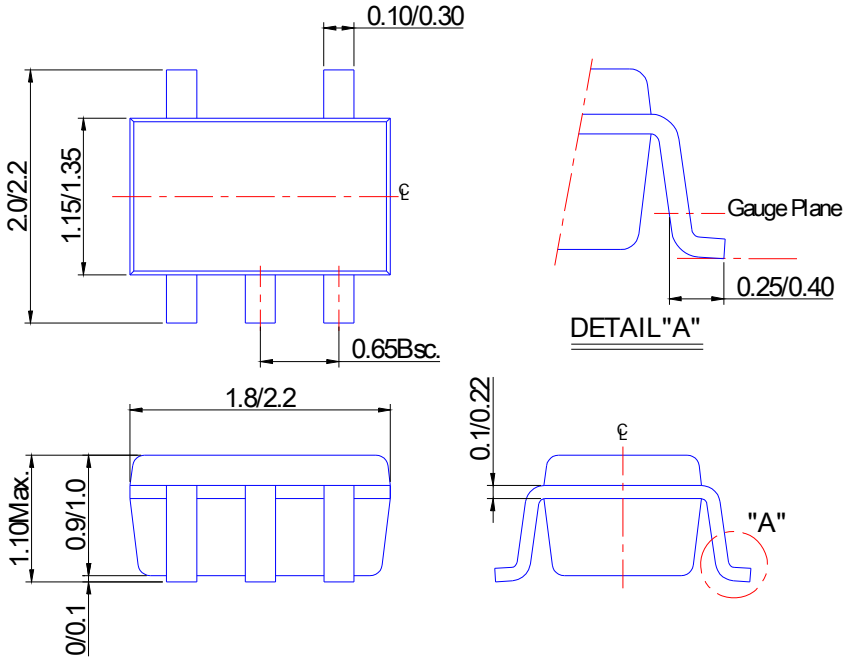
NEW PRODUCT

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



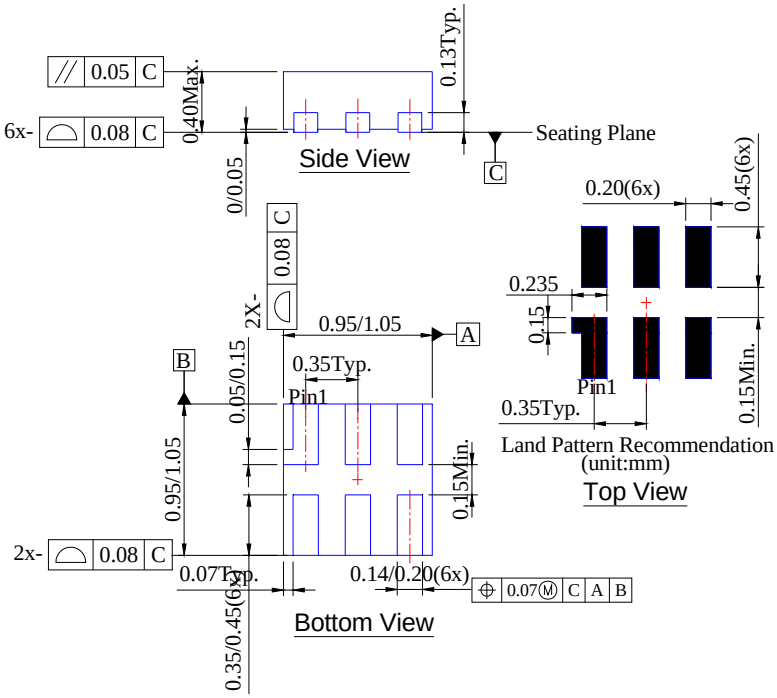
(2) Package Type: SOT353



NEW PRODUCT

Package Outline Dimensions (All Dimensions in mm) (Continued)

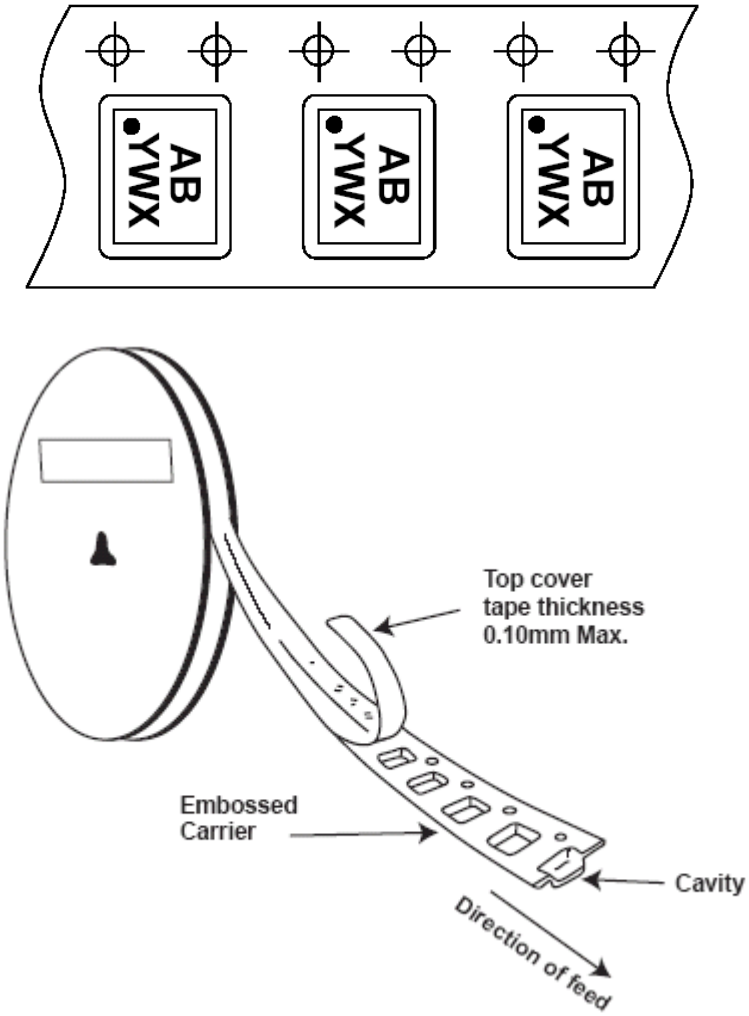
(3) Package Type: DFN1010



NEW PRODUCT

Taping Orientation (Note 8)

For DFN1010



Notes: 8. The taping orientation of the other package type can be found on our website at http://www.diodes.com/datasheets/ap02007.pdf

NEW PRODUCT

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