74LVC1G10

SINGLE 3 INPUT POSITIVE NAND GATE

NEW PRODUCT

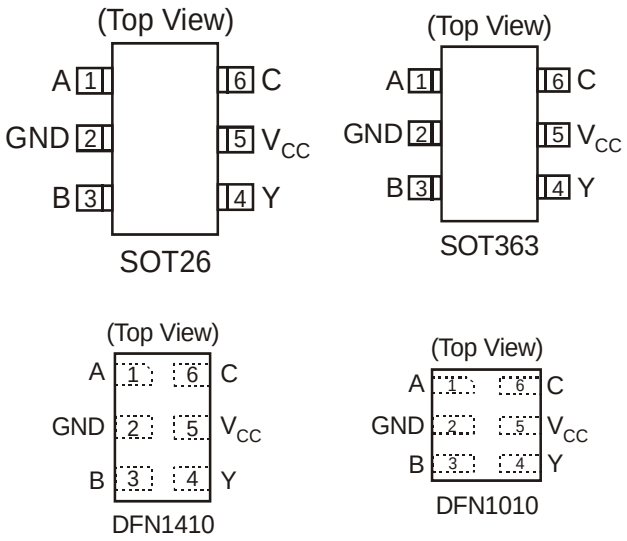
Description

The 74LVC1G10 is a single 3-input positive NAND gate with a standard push-pull 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:

$$Y = \overline{A \bullet B \bullet C} \quad \text{or} \quad Y = \overline{A} + \overline{B} + \overline{C}$$

Pin Assignments



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
- SOT26, SOT363, DFN1410, 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

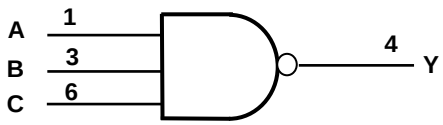
Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

NEW PRODUCT

Pin Descriptions

Pin Name	Description
A	Data Input
GND	Ground
B	Data Input
Y	Data Output
V_{CC}	Supply Voltage
C	Data Input

Logic Diagram



Function Table

Inputs			Output
A	B	C	Y
H	H	H	L
L	X	X	H
X	L	X	H
X	X	L	H

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.

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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_{IH}	High-level Input Voltage	V_{CC} = 1.65V to 1.95V	0.65 X V_{CC}		V
		V_{CC} = 2.3V to 2.7V	1.7		
		V_{CC} = 3V to 3.6V	2		
		V_{CC} = 4.5V to 5.5V	0.7 X V_{CC}		
V_{IL}	Low-level input voltage	V_{CC} = 1.65V to 1.95V		0.35 X V_{CC}	V
		V_{CC} = 2.3V to 2.7V		0.7	
		V_{CC} = 3V to 3.6V		0.8	
		V_{CC} = 4.5V to 5.5V		0.3 X V_{CC}	
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	
$\Delta t/\Delta V$	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 V_{CC} = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ.	Max	Unit
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65V to 5.5V	V_{CC} – 0.1			V
		I_{OH} = -4mA	1.65V	1.2			
		I_{OH} = -8mA	2.3V	1.9			
		I_{OH} = -16mA	3V	2.4			
		I_{OH} = -24mA		2.3			
		I_{OH} = -32mA	4.5V	3.8			
V_{OL}	High-level Input Voltage	I_{OL} = 100µA	1.65V to 5.5V			0.1	V
		I_{OL} = 4mA	1.65V			0.45	
		I_{OL} = 8mA	2.3V			0.3	
		I_{OL} = 16mA	3V			0.4	
		I_{OL} = 24mA				0.55	
		I_{OL} = 32mA	4.5V			0.55	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5V			± 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	1.65V to 5.5V			10	µA
ΔI_{CC}	Additional Supply Current	Input at V_{CC} –0.6V	3V to 5.5V			500	µA

NEW PRODUCT

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

Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ.	Max	Unit
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65V to 5.5V	V_{CC} – 0.1			V
		I_{OH} = -4mA	1.65V	0.95			
		I_{OH} = -8mA	2.3V	1.7			
		I_{OH} = -16mA	3V	1.9			
		I_{OH} = -24mA		2.0			
		I_{OH} = -32mA	4.5V	3.4			
V_{OL}	High-level Input Voltage	I_{OL} = 100µA	1.65V to 5.5V			0.1	V
		I_{OL} = 4mA	1.65V			0.70	
		I_{OL} = 8mA	2.3V			0.45	
		I_{OL} = 16mA	3V			0.60	
		I_{OL} = 24mA				0.80	
		I_{OL} = 32mA	4.5V			0.80	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5V			± 20	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0			± 20	µA
I_{CC}	Supply Current	V_I = 5.5V of GND I_O=0	1.65V to 5.5V			40	µA
ΔI_{CC}	Additional Supply Current	Input at V_{CC} –0.6V	3V to 5.5V			5000	µA
C_i	Input Capacitance	V_i = V_{CC} – or GND	3.3		4		pF
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT26	(Note 4)		204		°C/W
		SOT363			371		
		DFN1410			430		
		DFN1010			510		
θ_{JC}	Thermal Resistance Junction-to-Case	SOT26	(Note 4)		52		°C/W
		SOT363			143		
		DFN1410			190		
		DFN1010			250		

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

Symbol	Parameter	Test Conditions	V_{CC}	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	SOT26	(Note 4)		204		°C/W
		SOT363			371		
		DFN1410			430		
		DFN1010			510		
θ_{JC}	Thermal Resistance Junction-to-Case	SOT26	(Note 4)		52		°C/W
		SOT363			143		
		DFN1410			190		
		DFN1010			250		

Notes: 4. Test condition for SOT26, SOT363, DFN1410 and DFN1010 : Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

NEW PRODUCT

Switching Characteristics

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

Parameter	From (Input)	TO (OUTPUT)	V_{CC} = 1.8V ± 0.15V		V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		V_{CC} = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	Any	Y	1.0	14.8	0.7	5.5	0.7	3.8	0.7	2.7	ns

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

Parameter	From (Input)	TO (OUTPUT)	V_{CC} = 1.8V ± 0.15V		V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		V_{CC} = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	Any	Y	1.0	18.0	0.7	6.5	0.7	5	0.7	3.6	ns

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

Parameter	From (Input)	TO (OUTPUT)	V_{CC} = 1.8V ± 0.15V		V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		V_{CC} = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	Any	Y	1.0	17.7	0.7	6.6	0.7	4.6	0.7	3.3	ns

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

Parameter	From (Input)	TO (OUTPUT)	V_{CC} = 1.8V ± 0.15V		V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		V_{CC} = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	Any	Y	1.0	21.6	0.7	7.8	0.7	6.0	0.7	4.3	ns

Operating Characteristics

T_A = 25 °C

Parameter		Test Conditions	V_{CC} = 1.8V	V_{CC} = 2.5V	V_{CC} = 3.3V	V_{CC} = 5V	Unit
			Typ.	Typ.	Typ.	Typ.	
C_{pd}	Power dissipation capacitance	f = 10 MHz	17	18	19	22	pF

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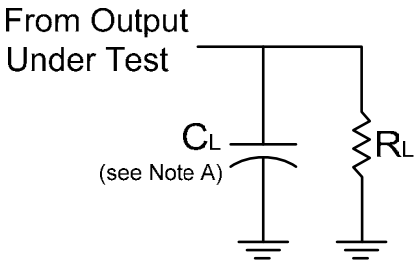
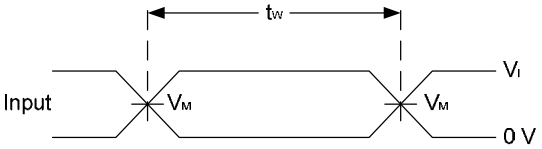
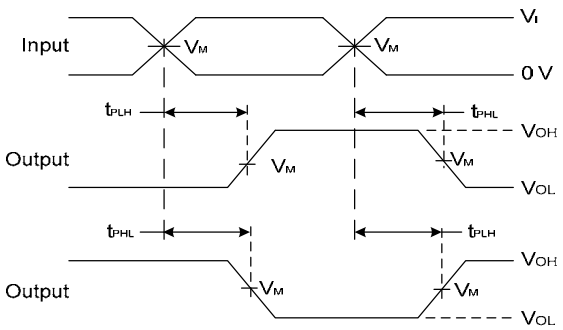
Parameter Measurement Information



V_{CC}	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}

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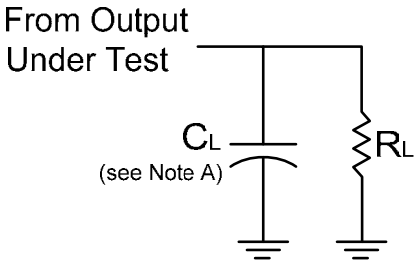
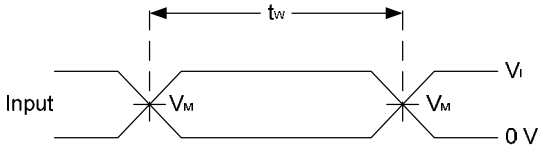
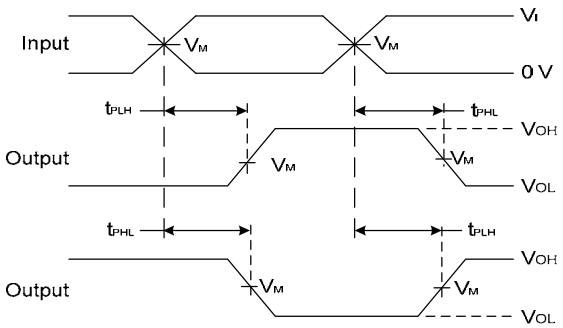
Parameter Measurement Information (cont.)



V_{CC}	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



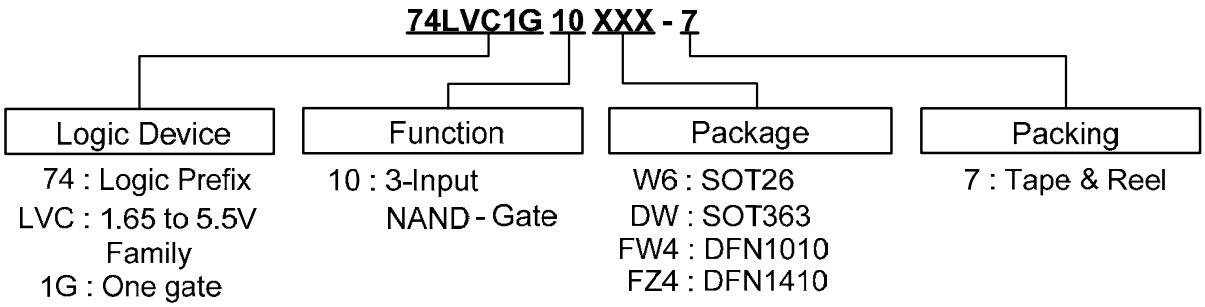
Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs

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
74LVC1G10W6-7	W6	SOT26	3000/Tape & Reel	-7
74LVC1G10DW-7	DW	SOT363	3000/Tape & Reel	-7
74LVC1G10FW4-7	FW4	DFN1010	5000/Tape & Reel	-7
74LVC1G10FZ4-7	FZ4	DFN1410	5000/Tape & Reel	-7

Notes: 5. 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.
6. The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf

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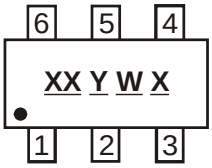
Marking Information

(1) SOT26, SOT363

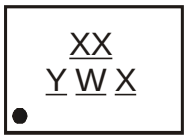


XX : Identification Code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G10W6	SOT26	TU
74LVC1G10DW	SOT363	TU

(2) DFN1010, DFN1410

(Top View)



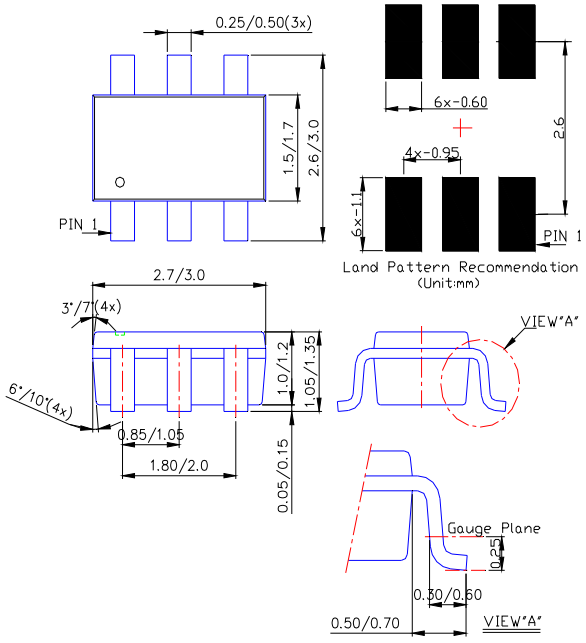
XX : Identification Code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G10FW4	DFN1010	TU
74LVC1G10FZ4	DFN1410	TU

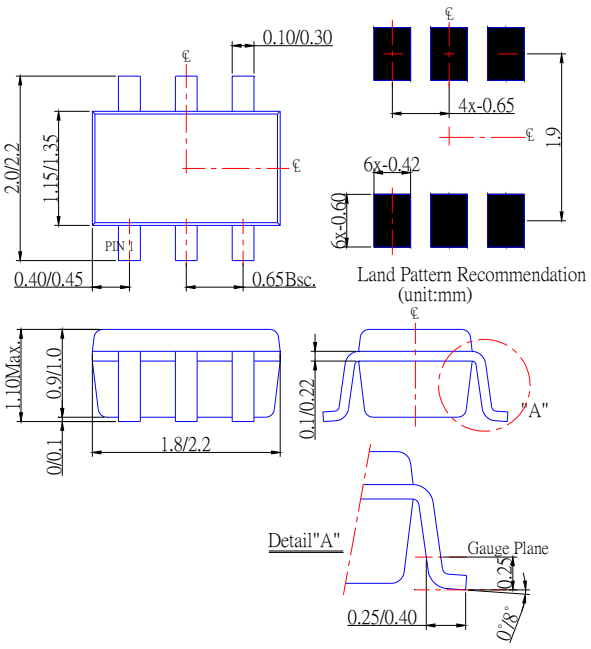
NEW PRODUCT

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT26



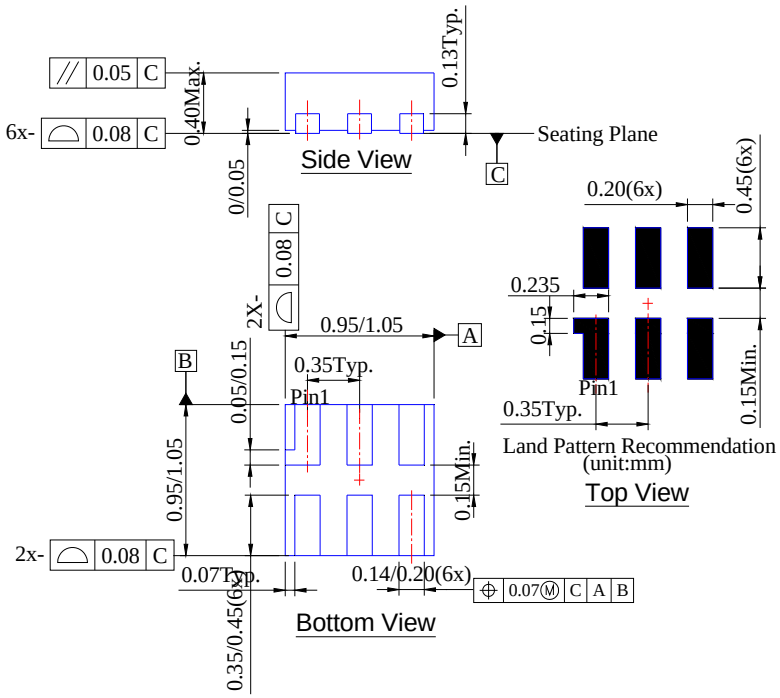
(2) Package Type: SOT363



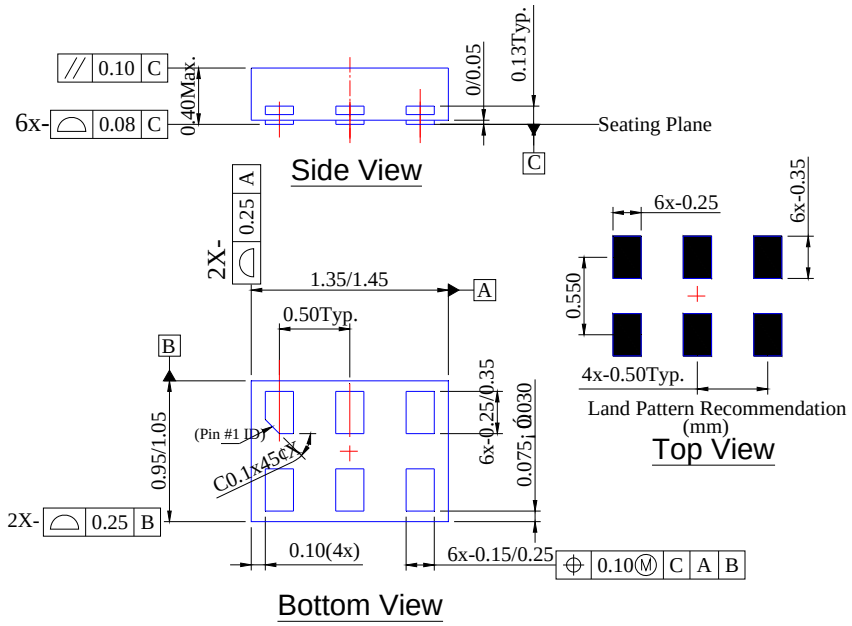
NEW PRODUCT

Package Outline Dimensions (All Dimensions in mm)

(3) Package Type: DFN1010



(4) Package Type DFN1410



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