



Product Specification

XBLW CD4050

Hex Non-inverting Buffers

WEB | www.xinboleic.com



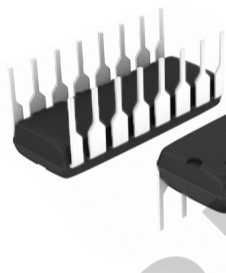
Description

The CD4050 provides six non-inverting buffers with high current output capability suitable for driving TTL or high capacitive loads. Since input voltages in excess of the buffers' supply voltage are permitted, the buffers may also be used to convert logic levels of up to 15 V to standard TTL levels.

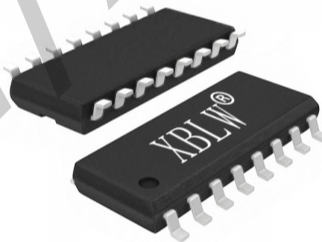
It operates over a recommended V_{DD} power supply range of 3V to 15V referenced to V_{SS} (usually ground). Unused inputs must be connected to V_{DD} , V_{SS} , or another input.

Features

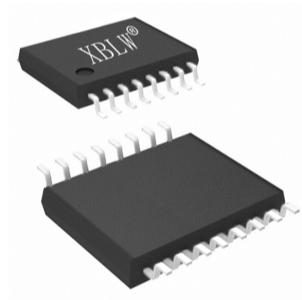
- Wide supply voltage range from 3V to 15V
- Accepts input voltages in excess of the supply voltage
- 5V, 10V, and 15V parametric ratings
- Specified from -40°C to +125°C
- Packaging information: DIP16/SOP16/TSSOP16



DIP-16



SOP-16



TSSOP-16

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW CD4050BE	DIP-16	CD4050BE	Tube	1000Pcs/Box
XBLW CD4050BDTR	SOP-16	CD4050B	Tape	2500Pcs/Reel
XBLW CD4050BDTR	TSSOP-16	CD4050B	Tape	3000Pcs/Reel

Block Diagram

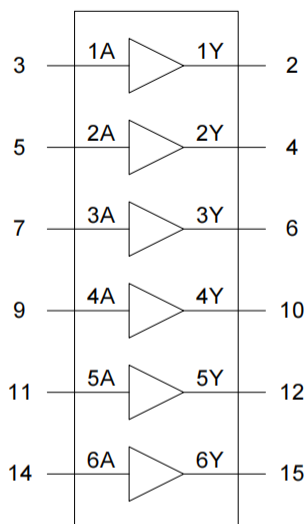


Figure 1. Logic symbol

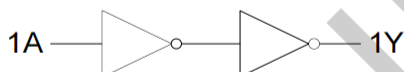


Figure 2. Logic diagram for one gate

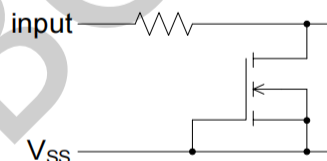
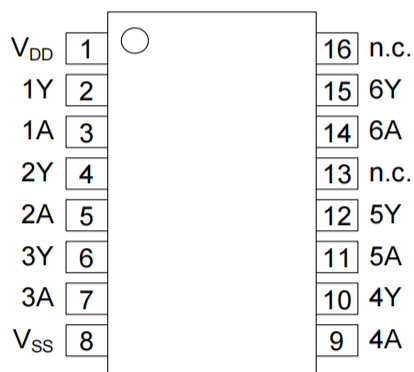


Figure 3. Input protection circuit

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	V _{DD}	supply voltage
2	1Y	output
3	1A	input
4	2Y	output
5	2A	input
6	3Y	output
7	3A	input
8	V _{SS}	ground supply voltage
9	4A	input
10	4Y	output
11	5A	input
12	5Y	output
13	n.c.	not connected
14	6A	input
15	6Y	output
16	n.c.	not connected

Electrical Parameter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V _{DD}	-	-0.5	+18	V
input clamping current	I _{IK}	V _I < -0.5V	-10	-	mA
input voltage	V _I	-	-0.5	+18	V
output clamping current	I _{OK}	V _O < -0.5V or V _O > V _{DD} + 0.5V	-	±10	mA
input/output current	I _{I/O}	-	-	10	mA
supply current	I _{DD}	-	-	50	mA
storage temperature	T _{stg}	-	-65	+150	°C
soldering temperature	T _L	10s	DIP	245	°C
			SOP/TSSOP	260	°C

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{DD}	-	3	-	15	V
input voltage	V_I	-	0	-	15	V
ambient temperature	T_{amb}	-	-40	-	+125	°C
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{DD}=5V$	-	-	3.75	us/V
		$V_{DD}=10V$	-	-	0.5	us/V
		$V_{DD}=15V$	-	-	0.08	us/V

Electrical Characteristics

DC Characteristics 1

($T_{amb}=25^{\circ}C$, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions (V)			$T_{amb}=25^{\circ}C$			Unit
		V_O	V_{IN}	V_{DD}	Min.	Typ.	Max.	
supply current	I_{DD}	-	0, 5	5	-	-	4	uA
		-	0, 10	10	-	-	8	uA
		-	0, 15	15	-	-	16	uA
LOW-level output current	I_{OL}	0.4	0, 5	5	2.9	-	-	mA
		0.5	0, 10	10	10	-	-	mA
		1.5	0, 15	15	20	-	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-	-	-0.44	mA
		2.5	0, 5	5	-	-	-1.4	mA
		9.5	0, 10	10	-	-	-1.1	mA
		13.5	0, 15	15	-	-	-3.0	mA
LOW-level output voltage	V_{OL}	-	0, 5	5	-	-	0.05	V
		-	0, 10	10	-	-	0.05	V
		-	0, 15	15	-	-	0.05	V
HIGH-level output voltage	V_{OH}	-	0, 5	5	4.95	-	-	V
		-	0, 10	10	9.95	-	-	V
		-	0, 15	15	14.95	-	-	V
LOW-level input voltage	V_{IL}	0.5, 4.5	-	5	-	-	1.5	V
		1, 9	-	10	-	-	3	V
		1.5, 13.5	-	15	-	-	4	V
HIGH-level input voltage	V_{IH}	0.5, 4.5	-	5	3.5	-	-	V
		1, 9	-	10	7	-	-	V
		1.5, 13.5	-	15	11	-	-	V
input leakage current	I_I	-	0, 15	15	-	-	±1.0	uA

DC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, voltages are referenced to $V_{ss}(\text{ground}=0\text{V})$, unless otherwise specified)

Parameter	Symbol	Conditions (V)			$T_{amb} = -40^{\circ}\text{C}$		$T_{amb} = +125^{\circ}\text{C}$		Unit
		V_O	V_{IN}	V_{DD}	Min.	Max.	Min.	Max.	
supply current	I_{DD}	-	0, 5	5	-	4	-	30	μA
		-	0, 10	10	-	8	-	60	μA
		-	0, 15	15	-	16	-	120	μA
LOW-level output current	I_{OL}	0.4	0, 5	5	3.5	-	2.3	-	mA
		0.5	0, 10	10	12	-	8	-	mA
		1.5	0, 15	15	24	-	16	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-	-0.52	-	-0.36	mA
		2.5	0, 5	5	-	-1.7	-	-1.1	mA
		9.5	0, 10	10	-	-1.3	-	-0.9	mA
		13.5	0, 15	15	-	-3.6	-	-2.4	mA
LOW-level output voltage	V_{OL}	-	0, 5	5	-	0.05	-	0.05	V
		-	0, 10	10	-	0.05	-	0.05	V
		-	0, 15	15	-	0.05	-	0.05	V
HIGH-level output voltage	V_{OH}	-	0, 5	5	4.95	-	4.95	-	V
		-	0, 10	10	9.95	-	9.95	-	V
		-	0, 15	15	14.95	-	14.95	-	V
LOW-level input voltage	V_{IL}	0.5, 4.5	-	5	-	1.5	-	1.5	V
		1, 9	-	10	-	3	-	3	V
		1.5, 13.5	-	15	-	4	-	4	V
HIGH-level input voltage	V_{IH}	0.5, 4.5	-	5	3.5	-	3.5	-	V
		1, 9	-	10	7	-	7	-	V
		1.5, 13.5	-	15	11	-	11	-	V
input leakage current	I_I	-	0, 15	15	-	± 1.0	-	± 1.0	μA

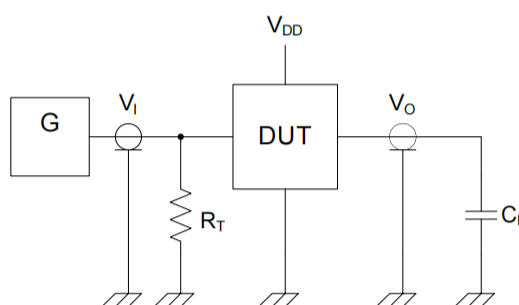
AC Characteristics

($T_{amb}=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, unless otherwise specified)

Parameter	Symbol	Conditions	V_{DD}	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay	t_{PHL}	nA to nY; see Figure 5	5	-	35	70	ns
			10	-	20	35	ns
			15	-	15	30	ns
LOW to HIGH propagation delay	t_{PLH}	nA to nY; see Figure 5	5	-	55	110	ns
			10	-	25	55	ns
			15	-	20	40	ns
HIGH to LOW output transition time	t_{THL}	see Figure 5	5	-	25	50	ns
			10	-	10	20	ns
			15	-	7	14	ns
LOW to HIGH output transition time	t_{TLH}	see Figure 5	5	-	60	120	ns
			10	-	30	60	ns
			15	-	20	40	ns

Testing Circuit

AC Testing Circuit



Definitions test circuit:

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to output impedance Z_O of the pulse generator. Figure 4. Test circuit for measuring switching times

AC Testing Waveforms

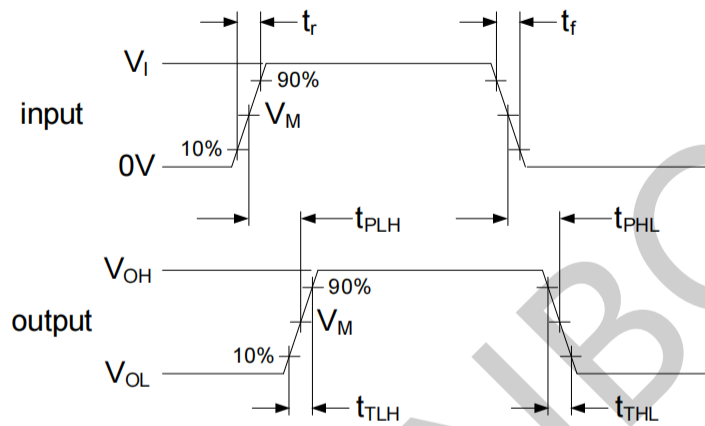


Figure 5. Input to output propagation delays

Measurement Points

Input		Output
V_M	V_I	V_M
$0.5 \times V_{DD}$	0V to V_{DD}	$0.5 \times V_{DD}$

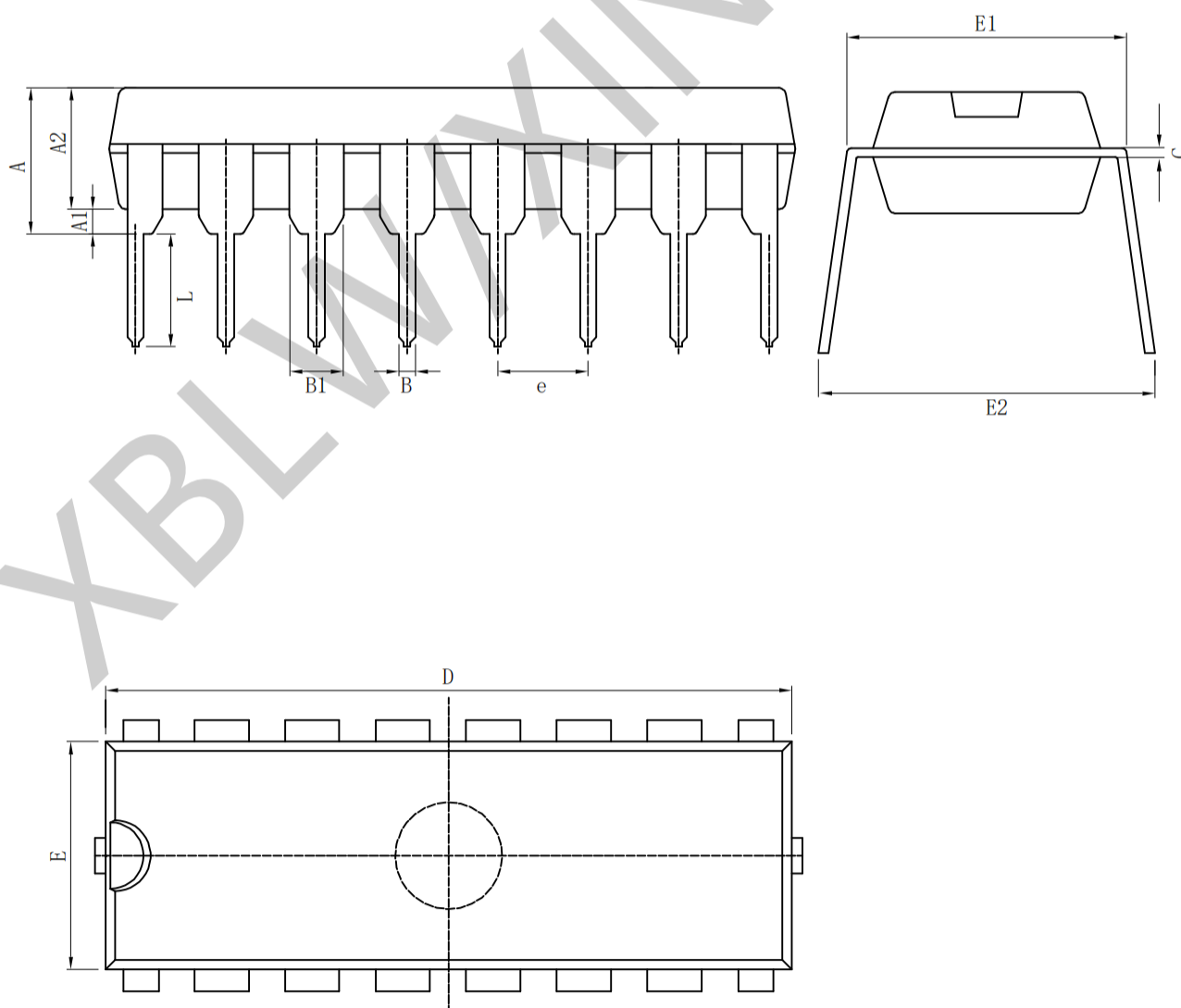
Test Data

Supply voltage	Input			Load
V_{DD}	V_I	V_M	t_r, t_f	C_L
5V to 15V	V_{DD}	$0.5 \times V_I$	$\leq 20\text{ns}$	50pF

Package Information

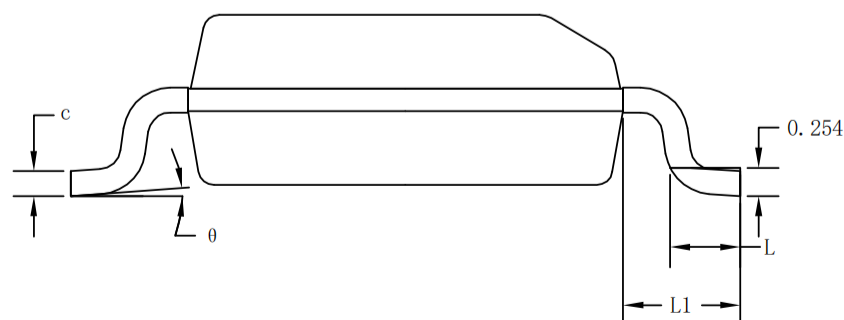
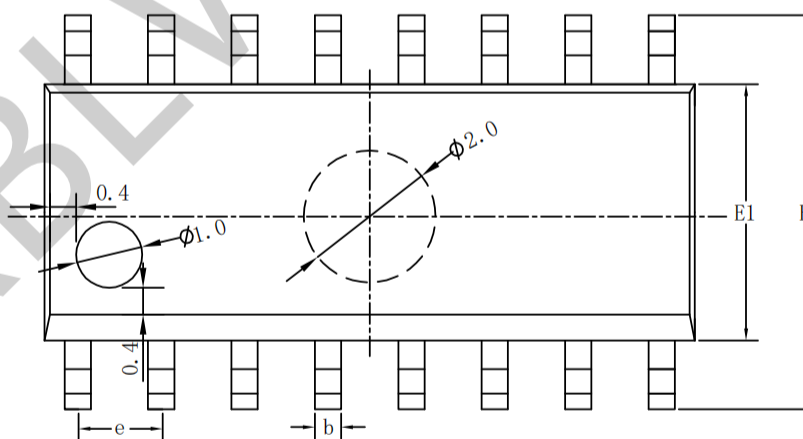
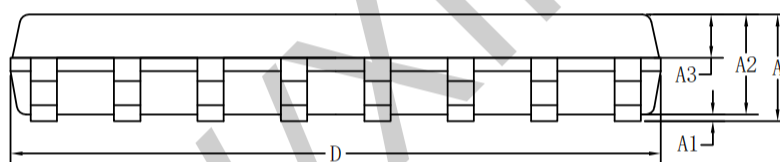
· DIP-16

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524 (BSC)		B1	0.060 (BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.80	19.20	D	0.740	0.756
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540 (BSC)		e	0.100 (BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354



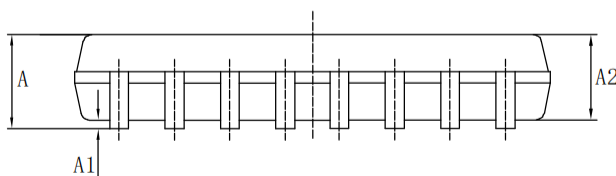
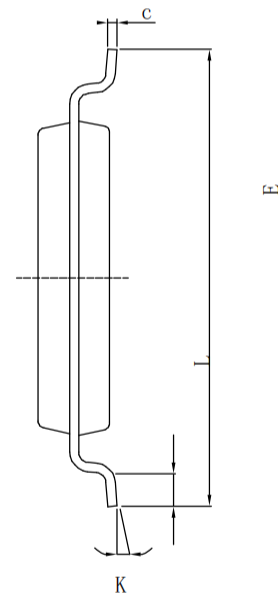
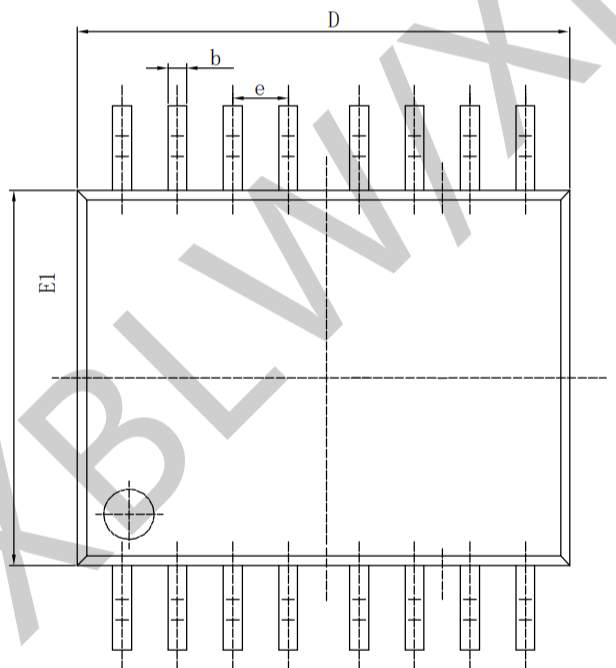
· SOP-16

Size Symbol	Dimensions In Millimeters			Size Symbol	Dimensions In Inches		
	Min (mm)	Nom (mm)	Max (mm)		Min (in)	Nom (in)	Max (in)
A	1.500	1.600	1.700	A	0.059	0.063	0.067
A1	0.100	0.150	0.250	A1	0.004	0.006	0.010
A2	1.400	1.450	1.500	A2	0.055	0.057	0.059
A3	0.600	0.650	0.700	A3	0.024	0.026	0.028
b	0.300	0.400	0.500	b	0.012	0.016	0.020
c	0.150	0.200	0.250	c	0.006	0.008	0.010
D	9.800	9.900	10.00	D	0.386	0.390	0.394
E	5.800	6.000	6.200	E	0.228	0.236	0.244
E1	3.850	3.900	3.950	E1	0.152	0.154	0.156
e	1.27 (BSC)			e	0.050 (BSC)		
L	0.500	0.600	0.700	L	0.020	0.024	0.028
L1	1.05 (BSC)			L1	0.041 (BSC)		
θ	0°	4°	8°	θ	0°	4°	8°



· TSSOP-16

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A		1.200	A		0.047
A1	0.050	0.150	A1	0.002	0.006
A2	0.800	1.050	A2	0.031	0.041
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.0089
D	4.900	5.100	D	0.193	0.201
E	6.200	6.600	E	0.244	0.260
E1	4.300	4.480	E1	0.169	0.176
e	0.65 (BSC)		e	0.0256 (BSC)	
K	0°	8°	K	0°	8°
L	0.450	0.750	L	0.018	0.030



Statement

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!
- XBLW product has not been licensed for life support, military and aerospace applications, and therefore XBLW is not responsible for any consequences arising from its use in these areas.
- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.
- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.