

Product Specification

XBLW CD4049

Hex Inverting Buffer

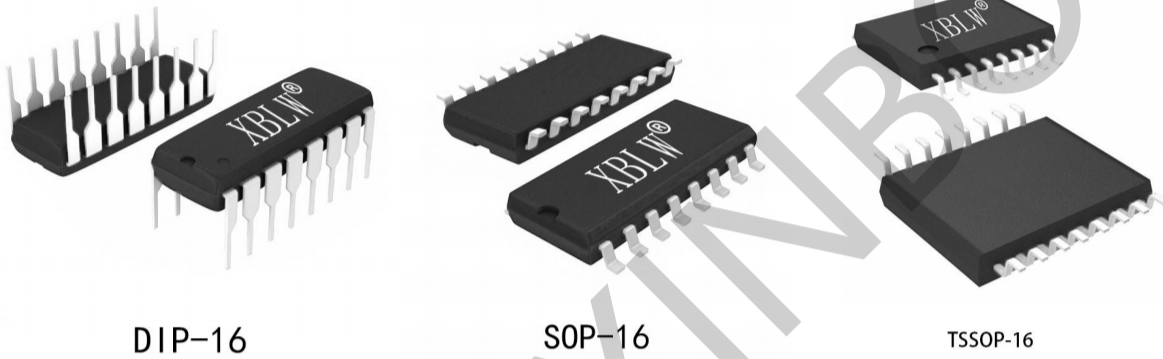
WEB | www.xinboleic.com



Description

The CD4049 provides six 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 15V 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.



Feature

- Specified from -40°C to +125°C
- 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 +105°C
- Packaging information: DIP16/SOP16/TSSOP16

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW CD4049BE	DIP-16	CD4049BE	Tube	1000Pcs/Box
XBLW CD4049BDTR	SOP-16	CD4049B	Tape	2500Pcs/Reel
XBLW CD4049BTDR	TSSOP-16	CD4049B	Tape	3000Pcs/Reel

Block Diagram

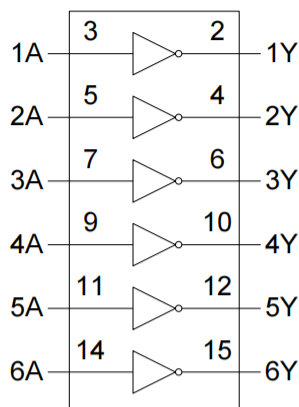


Figure 1. Functional symbol

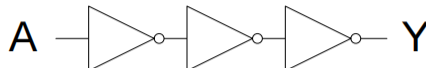


Figure 2. Logic diagram for one gate



Figure 3. Input protection circuit

Pin Configurations

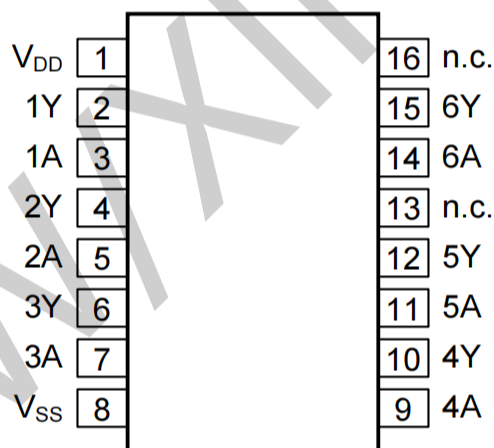


Figure 4. pin configuration

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

Electrical Parameter

Absolute Maximum Ratings

(Tamb=25℃,All voltage referenced to Vss, unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V _{DD}	-	-0.5	+18	V
DC input 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	mh
storage temperature	T _{stg}	-	-65	+150	℃
soldering temperature	T _L	10s	DIP	245	℃
			SOP/TSSOP	260	℃

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}	in free air	-40	-	+105	℃

Electrical Characteristics

DC Characteristics 1 (Tamb=25℃, voltages are referenced to Vss (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions(V)			Tamb=25℃			Unit
		VO	VIN	VDD	Min.	Typ.	Max.	
supply current	IDD	-	0, 5	5	-	-	4	μA
		-	0, 10	10	-	-	8	μA
		-	0, 15	15	-	-	16	μA
LOW-level output current	IOL	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	IOH	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	mA
LOW-level output voltage	VOL	-	0, 5	5	-	-	0.05	V
		-	0, 10	10	-	-	0.05	V
		-	0, 15	15	-	-	0.05	V
HIGH-level output voltage	VOH	-	0, 5	5	4.95	-	-	V
		-	0, 10	10	9.95	-	-	V
		-	0, 15	15	14.95	-	-	V
LOW-level input voltage	VIL	-	0, 5	5	-	-	1.5	V
		-	0, 10	10	-	-	3	V
		-	0, 15	15	-	-	4	V
HIGH-level input voltage	VIH	-	0, 5	5	3.5	-	-	V
		-	0, 10	10	7	-	-	V
		-	0, 15	15	11	-	-	V
input leakage current	II	-	0, 15	15	-	-	±1	μA

DC Characteristics 2

(Tamb=-40℃ to +105℃, voltages are referenced to Vss (ground=0V), unless otherwise specified.)

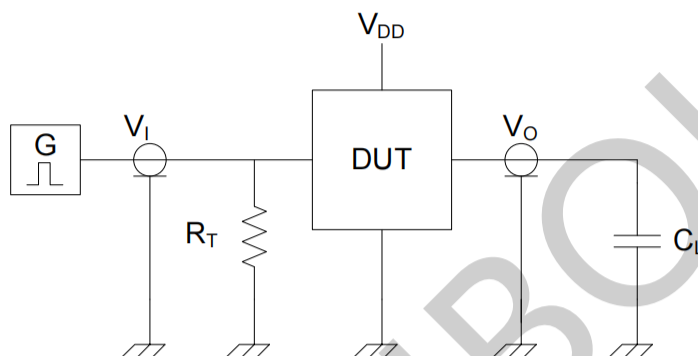
Parameter	Symbol	Conditions(V)			Tamb=-40℃		Tamb=+105℃		Unit
		VO	VIN	VDD	Min.	Max.	Min.	Max.	
supply current	IDD	-	0, 5	5	-	4	-	30	μA
		-	0, 10	10	-	8	-	60	μA
		-	0, 15	15	-	16	-	120	μA
LOW-level output current	IOL	0.4	0, 5	5	3.5	-	2.3	-	mA
		0.5	0, 10	10	12	-	8	-	mA
		1.5	0, 15	15	24	-	16	-	mA
HIGH-level output current	IOH	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	VOL	-	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	VOH	-	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	VIL	-	0, 5	5	-	1.5	-	1.5	V
		-	0, 10	10	-	3	-	3	V
		-	0, 15	15	-	4	-	4	V
HIGH-level input voltage	VIH	-	0, 5	5	3.5	-	3.5	-	V
		-	0, 10	10	7	-	7	-	V
		-	0, 15	15	11	-	11	-	V
input leakage current	II	-	0, 15	15	-	±1	-	±1.0	μA

AC Characteristics (Tamb=25℃, Vss=0V; CL=50pF; tr=tr≤20ns, unless otherwise specified.)

Parameter	Symbol	Conditions	DD	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay	tPHL	nA to nY; see Figure 6	5	-	35	70	ns
			10	-	15	30	ns
			15	-	12	25	ns
LOW to HIGH propagation delay	tPLH	nA to nY; see Figure 6	5	-	50	100	ns
			10	-	25	50	ns
			15	-	20	40	ns
HIGH to LOW output transition time	tTHL	see Figure 6	5	-	20	40	ns
			10	-	10	20	ns
			15	-	7	14	ns
LOW to HIGH output transition time	tTLH	see Figure 6	5	-	60	120	ns
			10	-	30	60	ns
			15	-	20	40	ns

Testing Circuit

AC Testing Circuit



Definitions for 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 5. Test circuit for measuring switching times

AC Testing Waveforms

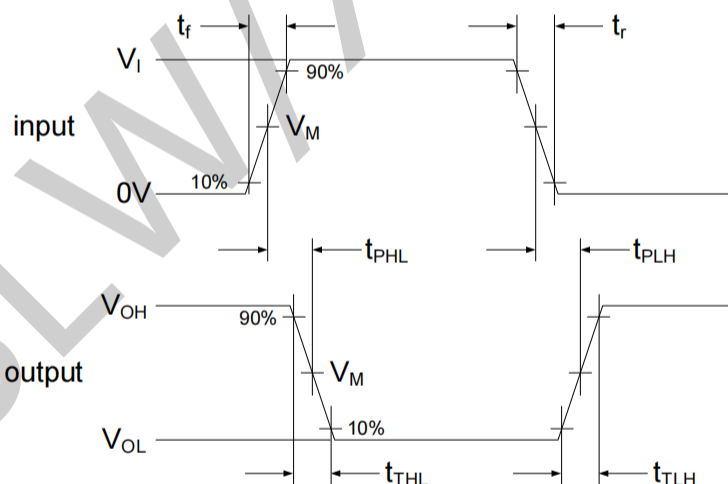


Figure 6. Input (nA) to output (nY) propagation delays and transition times

Measurement Points

Input		Output		
V_M	V_I	V_M	V_X	V_Y
$0.5 \times V_{DD}$	0V to V_{DD}	$0.5 \times V_{DD}$	$0.1 \times V_{DD}$	$0.9 \times V_{DD}$

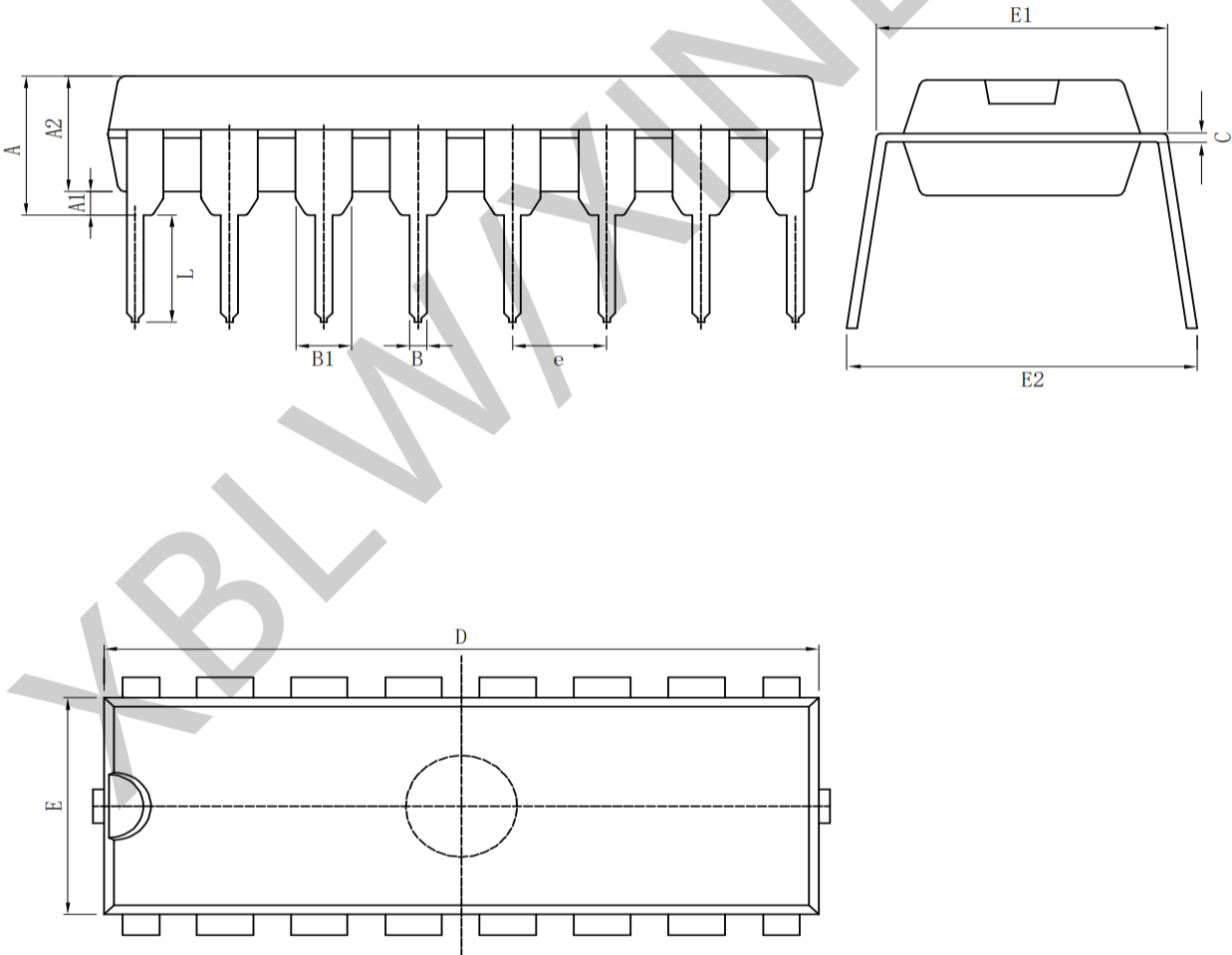
Test Data

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

Package Information

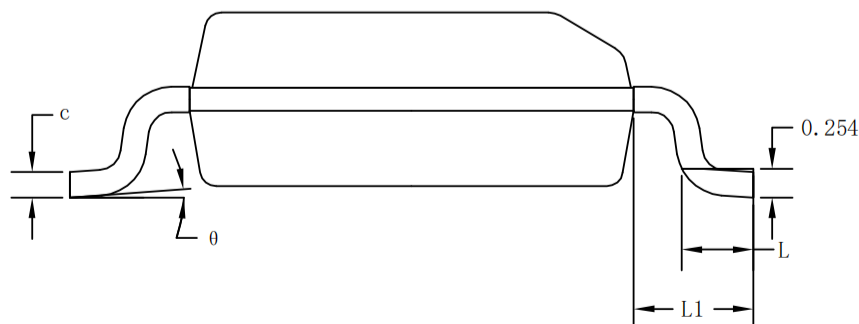
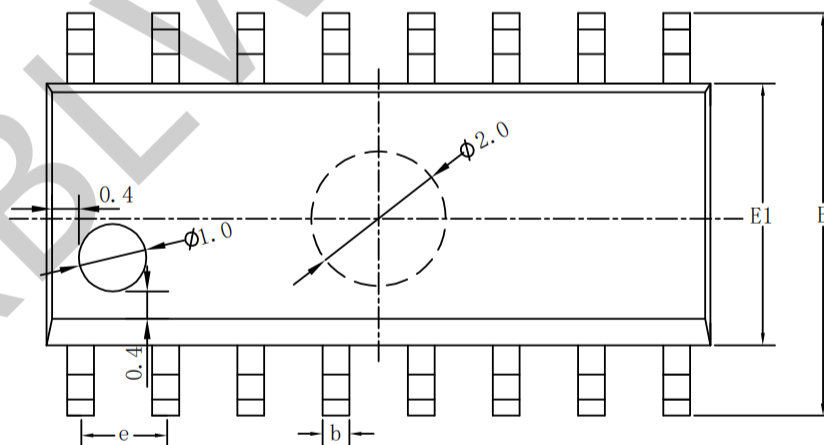
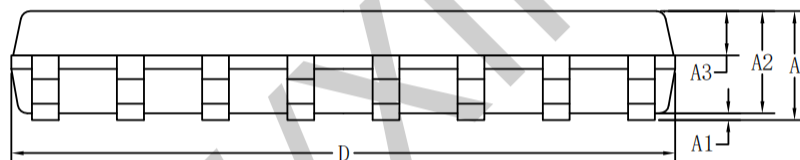
· DIP-16

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



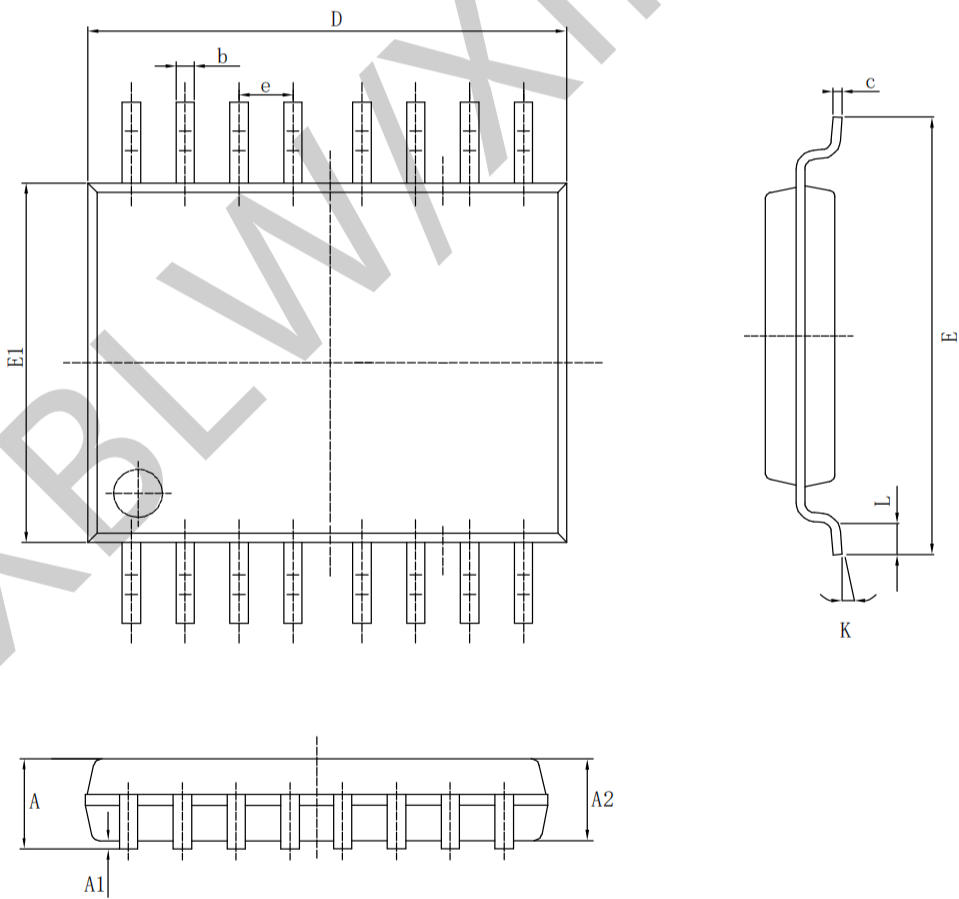
· SOP-16

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 products have not been licensed for life support, military, and aerospace applications, and therefore XBLW is not responsible for any consequences arising from the use of this product 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.