ND1130

Dual H-Bridge Driver with Boost converter

FEATURES

<Boost converter Block>

- Output Switch Voltage 40V (max)
- Switching Current 1.5A (min)
- PWM Control
- Operating Voltage 2.7V to 5.5V
- Oscillation Frequency 380kHz to 1MHz

< H-Bridge Driver Block >

- Internal 2-Channel H-Bridge Driver
- Over Current Protection 200mA (min)
- Operating Voltage 7.0V to 35V
- Input Frequency 300kHz (max)

< General >

- Standby Function
- Under Voltage Lockout
- Built-in Thermal Shutdown
- Fault Indicator Output
- Package WLCSP-30-ZA1

APPLICATIONS

- Small piezo actuators
- Haptics devices

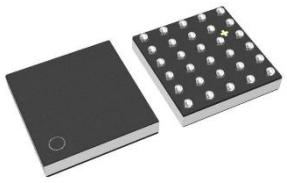
GENERAL DESCRIPTION

The ND1130 is a dual H-bridge driver IC that uses a Bi-CMOS process with Boost converter.

The boost voltage from a Li-ion battery or 5V power supply, and drive small piezoelectric actuators and haptic devices using two H-bridge drivers.

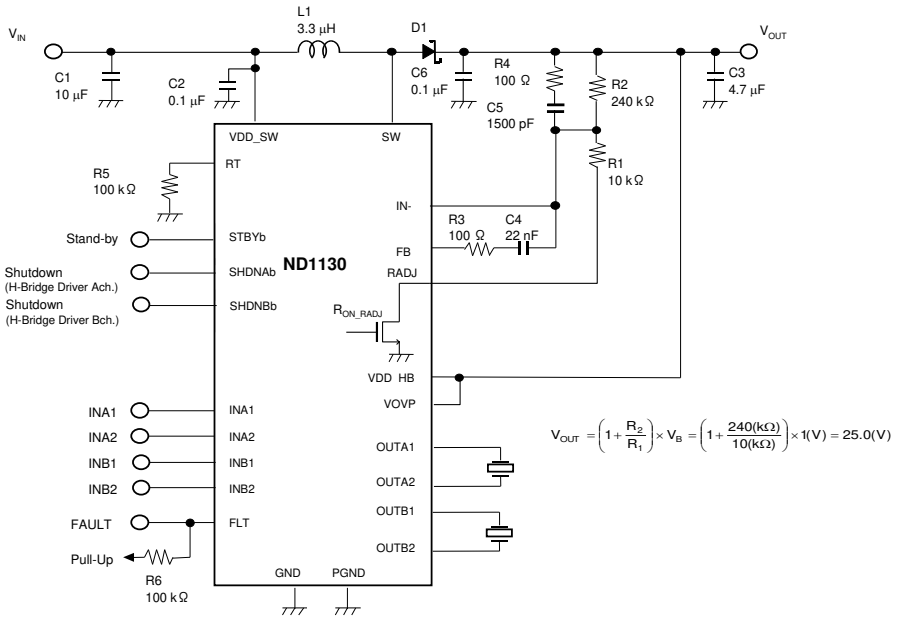
The Boost converter has a built-in soft-start function to limit the inrush current at power-on.

The dual H-bridge driver supports independent signal input between channels, improving controllability from the microcontroller. I/O signal freguencyis up to 300 kHz and can output a FAULT signal in the event of an error.



WLCSP-30-ZA1
2.32 × 2.37 ×0.6(mm)
(Include solder ball size)

TYPICAL APPLICATION



■ PRODUCT NAME INFORMATION

ND1130 aa c dd e

Description of configuration

Composition	Item	Description
aa	Package code	ZA: WLCSP-30-ZA1
c	Version	Indicates the product version. This product is A.
dd	Packing	Insert Direction. Refer to the packing specifications.
e	Grade	Indicates the quality grade. S: Consumer

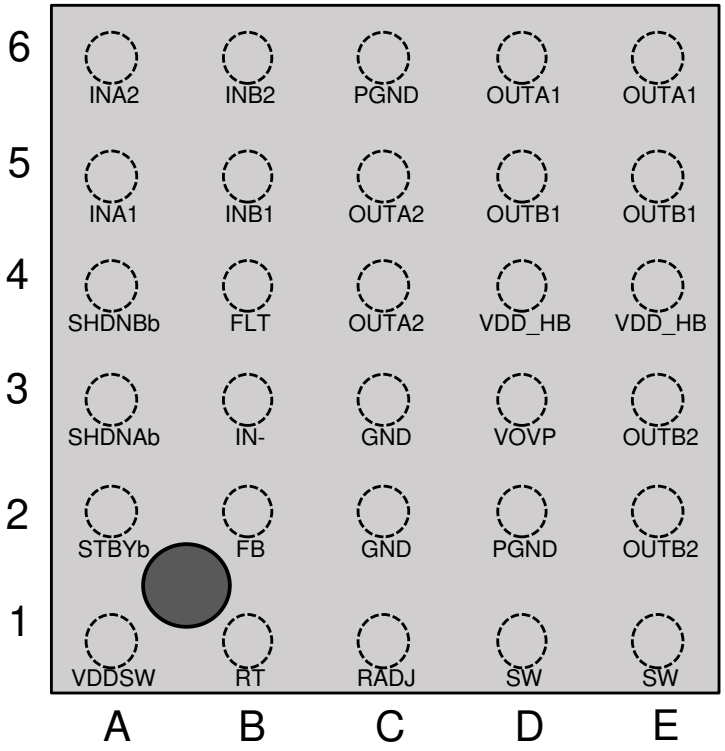
Grade

e	Applications	Operating Temperature Range	Test Temperature
S	General-purpose and Consumer application	−40°C to 105°C	25°C

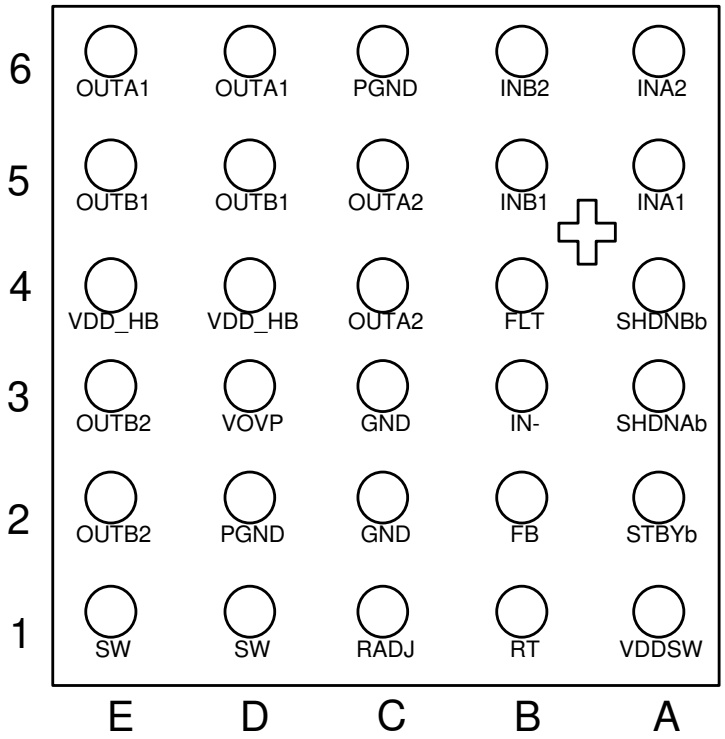
■ ORDER INFORMATION

PRODUCT NAME	PACKAGE	RoHS	HALOGEN-FREE	SOLDER BALL	WEIGHT (mg)	QUANTITY (pcs/reel)
ND1130ZAAE1S	WLCSP-30-ZA1	✓	✓	Sn3.0Ag0.5Cu	6	3000

■ PIN DESCRIPTIONS



<Top View>



<Bottom View>

ND1130 WLCSP-30-ZA1 Pin Configuration

Pin No.	Pin Name	I/O	Description
A1	VDD_SW	-	Power Supply pin for Boost converter. Insert a bypass capacitor close to VDD_SW Pin.
B1	RT	I	The pin to which the timing resistor is connected and determines the oscillation frequency of Boost converter. The oscillation frequency should set between 380kHz and 1MHz.
C1	RADJ	I	The pin controls the current path of the output voltage setting resistor. When active, it is connected to GND with low impedance, and in standby, it becomes high impedance and cuts off reactive current flowing through the resistor, which is effective in reducing system current consumption.
D1, E1	SW	O	Switch Output pin for Boost converter Power MOSFET
A2	STBYb	I	It controls all operation/stop of the ND1130. The STBYb pin is pulled down with 300k (typ.) internally.
B2	FB	O	Boost converter feedback setting pin. The feedback resistor and capacitor are connected between the FB pin and the IN- Pin.
C2, C3	GND	-	GND pin Be sure to connect GND and PGND pin next to the IC.
D2, C6	PGND	-	Power GND pin for H-Bridge driver Be sure to connect GND and PGND pin next to the IC.
E2, E3	OUTB2	O	Output pin of H-Bridge driver Bch (one side). The output current is limited to 200mA (min) by the overcurrent protection function.
A3	SHDNAb	I	Shutdown Control pin for H-Bridge driver Ach. The SHDNAb pin is pulled down with 300kΩ (typ.) internally.
B3	IN-	I	Output Voltage Detecting pin.
D3	VOVP	I	Over Voltage Detection pin of Boost converter. When it detected over voltage, the VOVP Pin discharges the output voltage. Be sure to connect VOVP and VDD_HB pin.
A4	SHDNBb	I	Shutdown Control pin for H-Bridge driver Bch. The SHDNAb pin is pulled down with 300kΩ (typ.) internally.
B4	FLT	O	FLT pin outputs a signal at the time of abnormality. It is an open drain type and should be connected to an external power supply through a pull-up resistance.
C4, C5	OUTA2	O	Output pin of H-Bridge driver Ach (one side). The output current is limited to 200mA (min) by the overcurrent protection function.
D4, E4	VDD_HB	-	Power Supply pin for H-Bridge driver block. Insert a bypass capacitor close to VDD_HB pin.
A5	INA1	I	The control signal input pin for the H-bridge driver OUTA1 side.
B5	INB1	I	The control signal input pin for the H-bridge driver OUTB1 side.
D5, E5	OUTB1	O	Output pin of H-Bridge driver Bch (one side). The output current is limited to 200mA (min) by the overcurrent protection function.
A6	INA2	I	The control signal input pin for the H-bridge driver OUTA2 side.
B6	INB2	I	The control signal input pin for the H-bridge driver OUTB2 side.
D6, E6	OUTA1	O	Output pin of H-Bridge driver Ach (one side). The output current is limited to 200mA (min) by the overcurrent protection function.

■ ABSOLUTE MAXIMUM RATINGS

	Symbol	Ratings	Unit
Boost converter Block			
Supply Voltage	V_{DD_SW}	-0.3 to 6	V
SW pin Voltage	V_{SW}	-0.3 to 40	V
RADJ pin Voltage	V_{RADJ}	-0.3 to 6 (*1)	V
IN- pin Voltage	V_{IN-}	-0.3 to 6 (*1)	V
STBYb pin Voltage	V_{STBYb}	-0.3 to 6 (*1)	V
VOVP pin Voltage (*2)	V_{OVP}	-0.3 to 40	V
H-Bridge Driver Block			
Supply Voltage	V_{DD_HB}	-0.3 to 40	V
SHDNAb, SHDNBb pin Voltage	V_{SHDNAb} V_{SHDNBb}	-0.3 to 6 (*1)	V
INA1, INA2, INB1, INB2 pin Voltage	V_{INA1}, V_{INA2} V_{INB1}, V_{INB2}	-0.3 to 6 (*1)	V
General Characteristics			
FLT pin Voltage	V_{FLT}	-0.3 to 6	V
Power Dissipation	P_D	600 (*3) 1300 (*4) 1500 (*5)	mW
Junction Temperature Range (*6)	T_j	-40 to 150	°C
Operating Temperature Range	T_a	-40 to 105	°C
Storage Temperature Range	T_{stg}	-40 to 150	°C

(*1): When Supply Voltage is less than 6V, the Absolute Maximum Voltage is equal to the Supply Voltage

(*2): VOVP pin should be connected to VDD_HB pin.

(*3): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 2Layers FR-4)

(*4): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 4Layers FR-4)

(For 4Layers: Applying 99.5×99.5mm inner Cu area and 2 thermal via hole to a board based on the data measured under the measurement conditions specified by our company with reference to JEDEC standard JESD51-9).

(*5): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 4Layers FR-4)

(For 4Layers: Applying 99.5×99.5mm inner Cu area and 7 thermal via hole to a board based on the data measured under the measurement conditions specified by our company with reference to JEDEC standard JESD51-9).

(*6): Calculate the power loss of the IC based on the usage conditions and calculate the junction temperature using the thermal resistance and thermal parameters.

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage and may degrade the lifetime and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

■ THERMAL CHARACTERISTICS

Parameter	Measurement Result	Unit
Thermal Resistance (θja)	2-Layer / 4-Layer 210(*7) / 95(*8) 84(*9)	°C / W
Thermal Characterization Parameter (ψjt)	2-Layer / 4-Layer 41(*7) / 28(*8) 27(*9)	°C / W

θja : Junction-to-Ambient Thermal Resistance
ψjt : Junction-to-Top Thermal Characterization Parameter

(*7): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 2Layers FR-4)

(*8): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 4Layers FR-4)
(For 4Layers: Applying 99.5×99.5mm inner Cu area and 2 thermal via hole to a board based on the data measured under the measurement conditions specified by our company with reference to JEDEC standard JESD51-9).

(*9): Mounted on glass epoxy board. (101.5×114.5×1.6mm: as reference data EIA/JEDEC standard, 4Layers FR-4)
(For 4Layers: Applying 99.5×99.5mm inner Cu area and 7 thermal via hole to a board based on the data measured under the measurement conditions specified by our company with reference to JEDEC standard JESD51-9).

■ ELECTROSTATIC DISCHARGE RATINGS

	Conditions	Protection Voltage
HBM	C = 100 pF, R = 1.5 kΩ	±2000 V
CDM		±750V (Corner pins) ±500V (Other pins)

ELECTROSTATIC DISCHARGE RATINGS
The electrostatic discharge test is done based on JEDEC JS001 JS002. In the HBM method, ESD is applied using the power supply pin and GND pin as reference pins.

■RECOMMENDED OPERATING CONDITIONS

	Symbol	MIN	TYP	MAX	Unit
Boost converter Block					
Supply Voltage	V_{DD_SW}	2.7	–	5.5	V
STBYb pin Voltage	V_{STBYb}	0	–	V_{DD_SW}	V
Timing Resistor	R_T	68	100	200	kΩ
Oscillating Frequency	f_{OSC}	380	700	1,000	kHz
H-Bridge Driver Block					
Supply Voltage	V_{DD_HB}	7	–	35	V
Output Switch DC Current	I_{OM}	0	20	–	mA
SHDNAb, SHDNBb pin Voltage	V_{SHDNAb} , V_{SHDNBb}	0	–	V_{DD_SW}	V
IN1A, IN1B, IN2A, IN2B pin Voltage	V_{INA1}, V_{INA2}, V_{INB1}, V_{INB2}	0	–	V_{DD_SW}	V
FLT pin Voltage	V_{FLT}	0	–	5.5	V

RECOMMENDED OPERATING CONDITIONS
All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

■ ELECTRICAL CHARACTERISTICS (Boost converter Block)

V_{DD_SW}= V_{STBYb}= 3.7V, R_T= 100kΩ, unless otherwise specified.
For parameter that do not describe the temperature condition, the MIN/MAX value under the condition of Ta = 25 °C is described.

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Under Voltage Lockout Block						
UVLO Release Voltage	V_{RUVLO_SW}		2.1	2.4	2.7	V
UVLO Operate Voltage	V_{DUVLO_SW}		2.0	2.2	2.5	V
UVLO Hysteresis Voltage	ΔV_{UVLO_SW}	V_{RUVLO_SW} - V_{DUVLO_SW}	–	0.2	–	V
Soft Start Block						
Soft Start Time	t_{SS}	V_B=0.95V	34	48	60	ms
Oscillator Block						
Oscillation Frequency	f_{OSC}	R_T= 100kΩ	630	700	770	kHz
Oscillation Frequency Deviation (Supply voltage)	f_{DV}	V_{DD_SW}= 3.0V to 5.5V	–	0.8	–	%
Oscillation Frequency Deviation (Temperature)	f_{DT}	Ta= -40°C to +125°C	–	3	–	%
Error Amplifier Block						
Reference Voltage	V_B	Short IN- and FB, Measuring IN- pin	-1.0%	1	1.0%	V
Input Bias Current	I_B	V_B=1.0V	-0.1	–	0.1	μA
IN- pin Clamp Voltage	V_{CLIN-}	V_{STBYb}=0V, V_{DD_SW}=5.5V, I_{CLIN-}=10μA	4.8	5.2	5.6	V
RADJ pin FET ON Resistance	R_{ON_RADJ}	I_{RADJ}=10mA	–	6	12	Ω
RADJ pin FET Leak Current	I_{LEAK_RADJ}	V_{STBYb}=0V, V_{RADJ}=3.3V	–	–	1	μA
PWM Comparator Block						
Maximum Duty Cycle	$MAXDUTY$	V_{IN-}=0.9V	90	93	98	%
Output Block						
Switching FET ON Resistance	R_{ON_SW}	I_{SW}=100mA	–	0.6	1.2	Ω
Switching Current Limit	I_{LMT_SW}		1.5	2	–	A
Switching FET Leak Current	I_{LEAK_SW}	V_{STBYb}=0V, V_{SW}=40V	–	–	1	μA
Overvoltage Protection Block						
OVP Operate Voltage	V_{DOVP}		36	38	40	V
OVP Release Voltage	V_{ROVP}		31	33	35	V
OVP Hysteresis Voltage	ΔV_{OVP}	V_{DOVP} -V_{ROVP}	–	5	–	V
VOVP pin Input Current 1	I_{OVP1}	V_{OVP}= V_{DD_HB}=35V, OVP Release	–	60	120	μA
VOVP pin Input Current 2	I_{OVP2}	V_{OVP}= V_{DD_HB}=40V, OVP Detect	1,200	2,400	4,000	μA
VOVP pin Leak Current	I_{OVP_LEAK}	V_{STBYb}=0V, V_{OVP}= V_{DD_HB}=40V	–	–	1	μA

■ ELECTRICAL CHARACTERISTICS (H-Bridge Driver Block)

V_{DD_SW}= V_{STBYb}= V_{SHDNAb}= V_{SHDNBb}= 3.7V, V_{DD_HB}= 25V, R_T= 100kΩ unless otherwise specified.
For parameter that do not describe the temperature condition, the MIN/MAX value under the condition of T_a = 25 °C is described.

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Under Voltage Lockout Block						
UVLO Release Voltage	V_{RUVLO_HB}		5.6	6.2	6.8	V
UVLO Operate Voltage	V_{DUVLO_HB}		5.0	5.6	6.2	V
UVLO Hysteresis Voltage	ΔV_{UVLO_HB}	V_{RUVLO_HB} - V_{DUVLO_HB}	–	0.6	–	V
Input Block						
IN pin High Voltage	V_{IHIN}		1.0	–	V_{DD_SW}	V
IN pin Low Voltage	V_{ILIN}		0	–	0.4	V
IN pin Input Current	I_{IIN}	V_{IN} = 3.3 V	–	–	1	μA
SHDNb pin High Voltage (Operating Mode)	$V_{IHSHDNb}$		1.0	–	V_{DD_SW}	V
SHDNb pin Low Voltage (Shutdown Mode)	$V_{ILSHDNb}$		0	–	0.4	V
SHDNb pin Pull-down Resistance	$R_{PDSHDNb}$	V_{SHDNb}=3.3V	210	300	390	kΩ
Output Block						
High Side SW ON Resistance	R_{DSH}	$I_{OSOURCE}$=20mA	4.0	6.0	8.0	Ω
Low Side SW ON Resistance	R_{DSL}	I_{OSINK}=20mA	4.0	6.0	8.0	Ω
High Side Over Current Detection	I_{DCTH}		200	300	400	mA
Low Side Over Current Detection	I_{DCTL}		200	300	400	mA
Output Rise Time	tr	V_{IN}=0 to 3.3V	–	400	–	ns
Output Fall Time	tf	V_{IN}=0 to 3.3V	–	340	–	ns
Rise Dead Time	D_{tr}	V_{IN}=0 to 3.3V	–	200	–	ns
Fall Dead Time	D_{tf}	V_{IN}=0 to 3.3V	–	180	–	ns
Rise Delay Time	t_{d_ON}	V_{IN}=0 to 3.3V	–	310	–	ns
Fall Delay Time	t_{d_OFF}	V_{IN}=0 to 3.3V	–	270	–	ns
Input Frequency	f_{IN}		–	–	300	kHz
High Side SW OFF Leak Current	$I_{OLEAKOUTH}$	V_{STBYb}=V_{SHDNb}=0V,V_{OUT}=0V	–	–	1	μA
Low Side SW OFF Leak Current	$I_{OLEAKOUTL}$	V_{STBYb}=V_{SHDNb}=0V, V_{OUT}=25V	–	–	1	μA
OUT pin – VDD pin Potential Difference	V_{PDOV}	V_{STBYb}=V_{SHDNb}=0V, I_{ORH}=20mA	–	0.7	1.0	V
GND pin – OUT pin Potential Difference	V_{PDGO}	V_{STBYb}=V_{SHDNb}=0V, I_{ORL}=20mA	–	0.7	1.0	V

■ELECTRICAL CHARACTERISTICS (General Characteristics)

V_{DD_SW}= V_{STBYb}= V_{SHDNAb}= V_{SHDNBb}= 3.7V, V_{DD_HB}= 25V, R_T= 100kΩ, unless otherwise specified.
For parameter that do not describe the temperature condition, the MIN/MAX value under the condition of T_a = 25 °C is described.

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
STBYb pin High Voltage (Operating Mode)	$V_{IHSTBYb}$		1.0	–	V_{DD_SW}	V
STBYb pin Low Voltage (Standby Mode)	$V_{ILSTBYb}$		0	–	0.4	V
STBYb pin Pull Down Resistance	$R_{PDSTBYb}$	V_{STBYb}=3.3V	210	300	390	kΩ
FLT pin Low Level Output Voltage	V_{LFLT}	I_{FLT}=500μA	–	0.2	0.4	V
FLT pin OFF Leak Current	$I_{OLEAKFLT}$	V_{FLT}=5.5V	–	–	1	μA
Quiescent Current (Boost converter Block)	I_{QSW}	No Load	–	1.9	2.8	mA
Quiescent Current (H-Bridge Driver Block)	I_{QHB}	f_{INA}= f_{INB}=10kHz antiphase 50% Duty Cycle	–	1.0	2.0	mA
Quiescent Current (Standby mode)	I_{QSTBY}	V_{STBYb}=V_{SHDNb}=0V V_{DD_HB}=0V	–	1.6	3.6	μA

■H-Bridge Driver Block Pin Operation Table

Ach

INPUT			OUTPUT	
SHDNAb	INA1	INA2	OUTA1	OUTA2
Low	*	*	Hi-Z	Hi-Z
High	Low	*	Low	*
High	High	*	High	*
High	*	Low	*	Low
High	*	High	*	High

* Don't Care

Bch

INPUT			OUTPUT	
SHDNBb	INB1	INB2	OUTB1	OUTB2
Low	*	*	Hi-Z	Hi-Z
High	Low	*	Low	*
High	High	*	High	*
High	*	Low	*	Low
High	*	High	*	High

* Don't Care

■ H BRIDGE DRIVER SECTION OVERCURRENT PROTECTION CIRCUIT

The overcurrent protection function operates when the high side SW current flows more than I_{DCTH} or the low side SW current flows more than I_{DCTL}. The overcurrent protection operates in three steps.

(1) **Sensing step**
- Turn off power MOSFET of the Boost converter
- Turn off the power MOSFET of the H-bridge driver
- Reset soft start
- Reset the FB pin Voltage
- Connect a dummy load between the VOVP pin and the GND pin.

(2) **Timer latch step**
Timer latch operation, the protective operation (1) continues for a fixed time (500 ms typ.) after an overcurrent is detected.

(3) **Start step**
After the timer latch operation is completed, the soft start operation automatically starts.
Then the IC operation shifts to normal operation.
When the cause of overcurrent has been removed, IC operates normally after the soft-start.
If it has not been removed, operation from (1) to (3) are repeated.

■ TIMING CHART

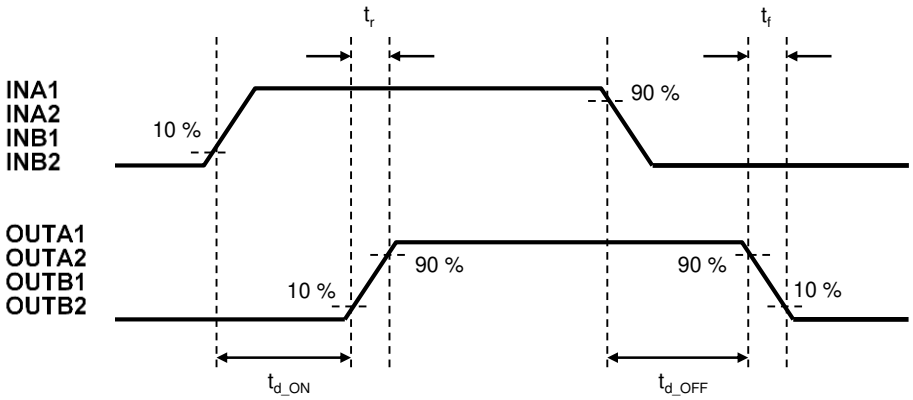


Fig. 1. Output Rise/Fall Time, Rise/Fall Delay Time

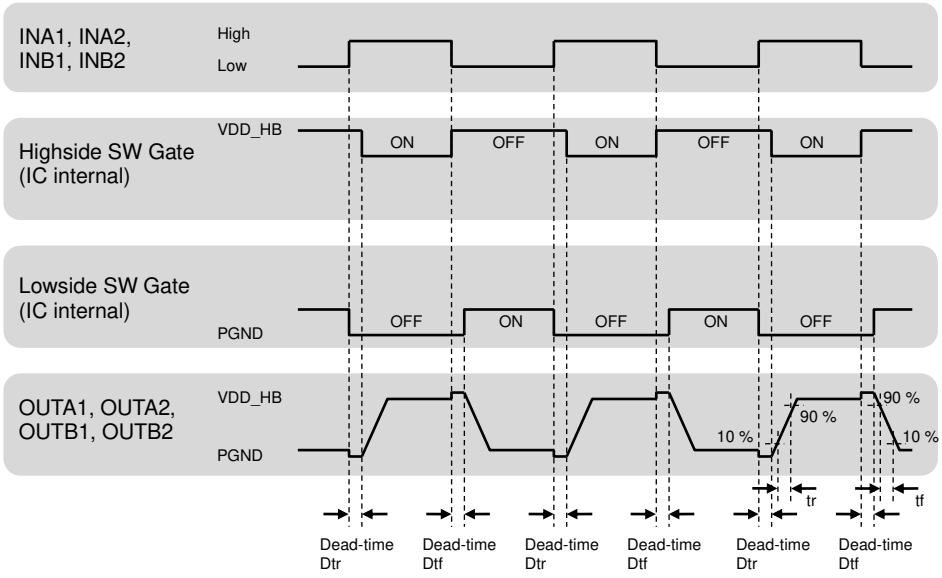
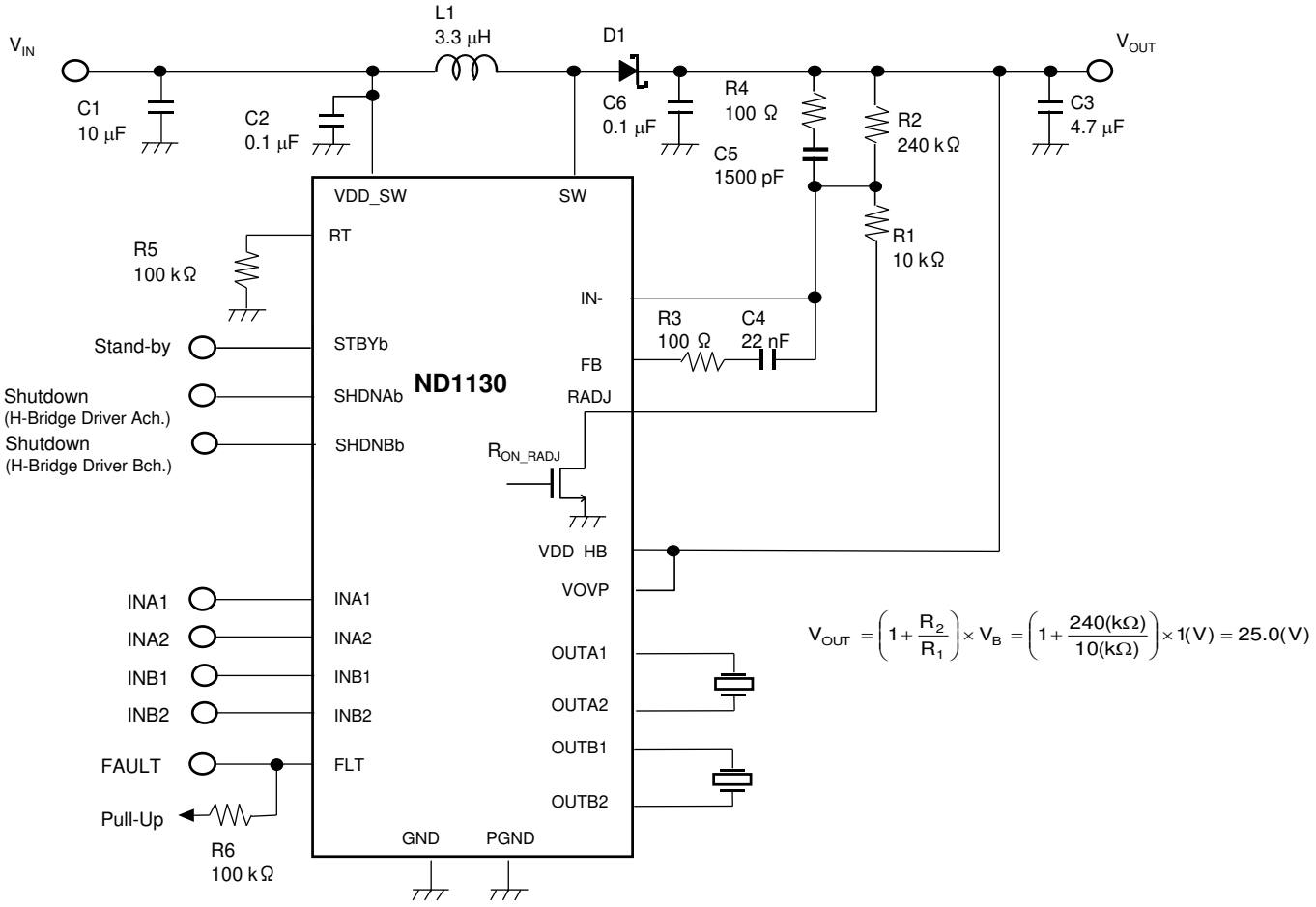


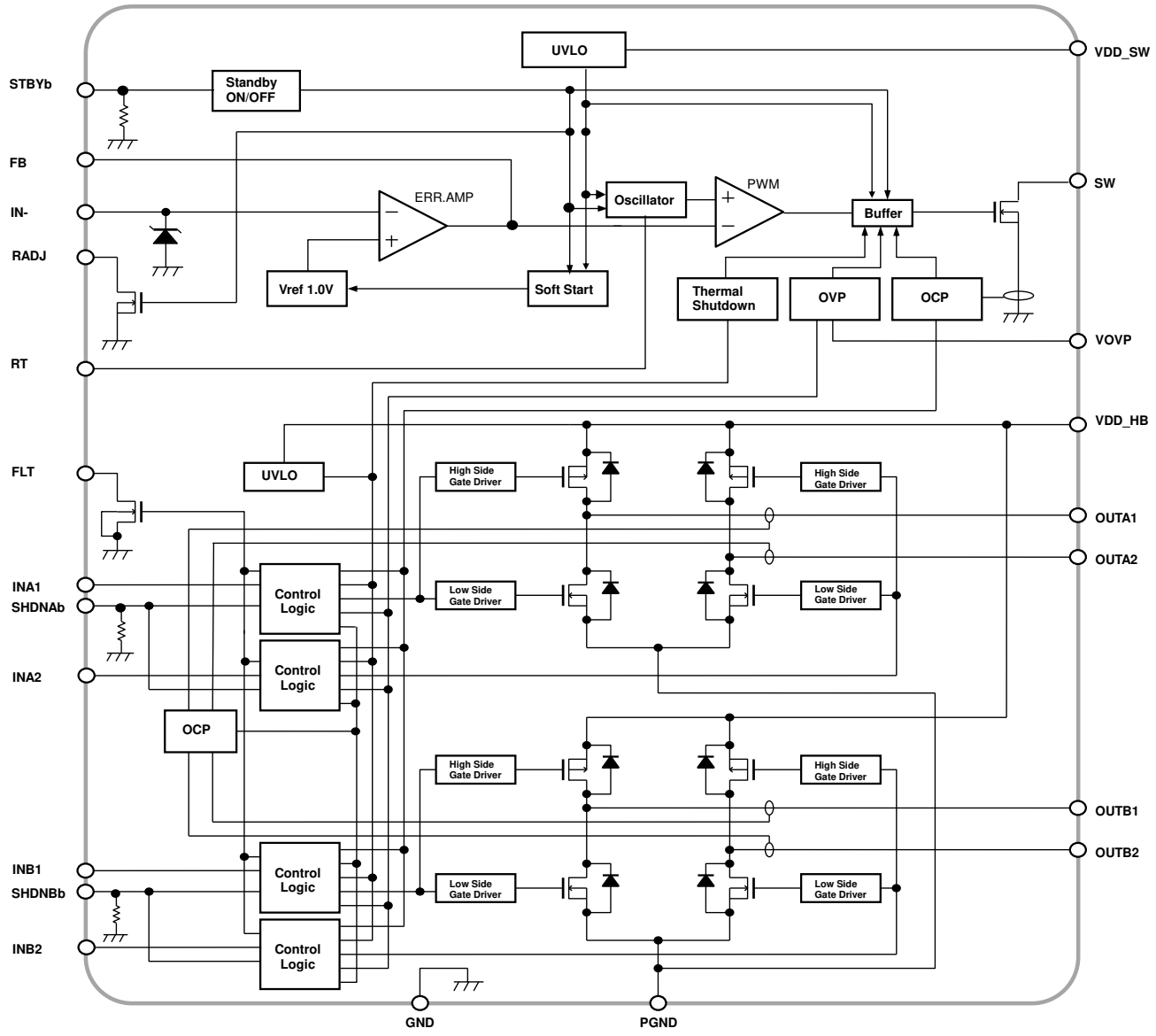
Fig. 2. H-Bridge Driver Block

■ TYPICAL APPLICATION CIRCUIT



ND1130 Typical Application Circuit

■ BLOCK DIAGRAM

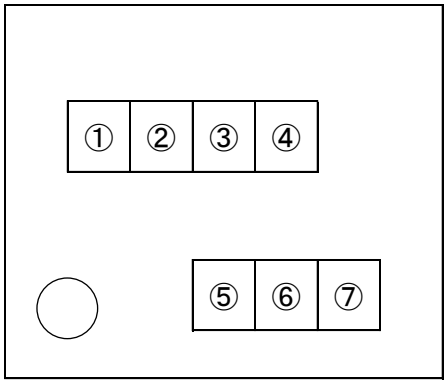


ND1130 Block Diagram

■MARKING SPECIFICATION

①②③④: Product Code … Refer to *Part Marking List*

⑤⑥⑦: Lot Number … Alphanumeric Serial Number



WLCSP-30-ZA1 Marking Specification

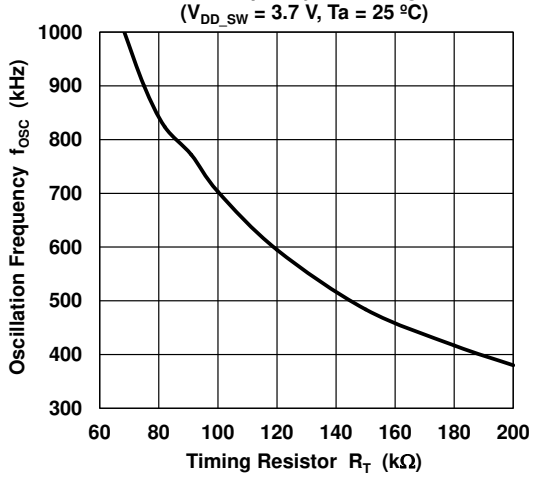
NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or distributor before attempting to use AOI.

ND1130 Part Marking List

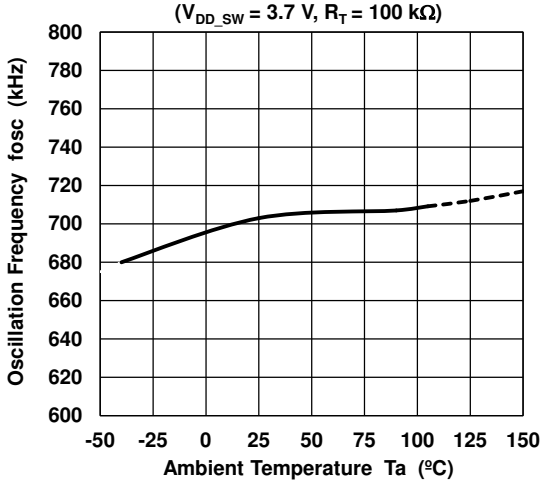
Product Name	① ② ③ ④
ND1130ZAAE1S	1 1 3 0

■TYPICAL CHARACTERISTICS (Boost converter Block)

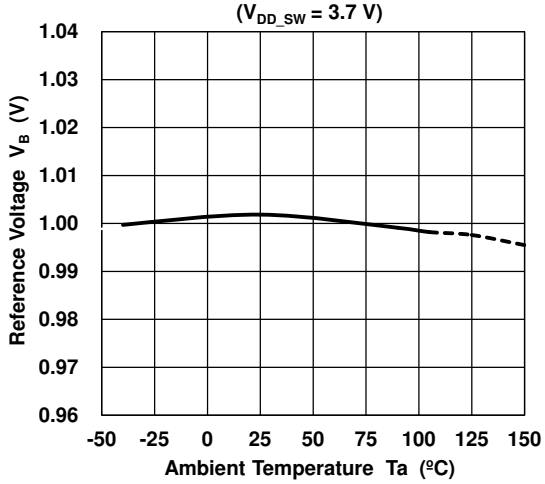
Oscillation Frequency vs. Timing Resistor
(V_{DD_SW} = 3.7 V, Ta = 25 ºC)



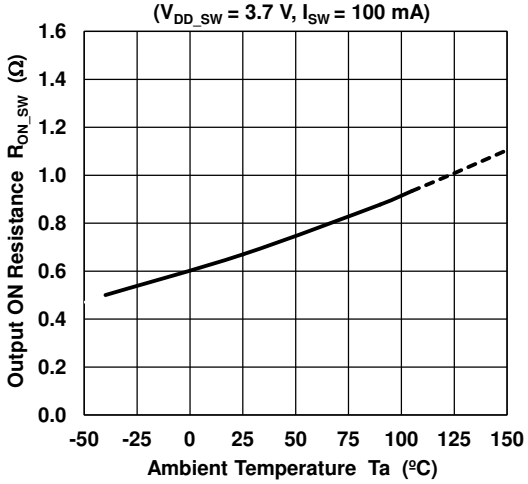
Oscillation Frequency vs. Temperature
(V_{DD_SW} = 3.7 V, R_T = 100 kΩ)



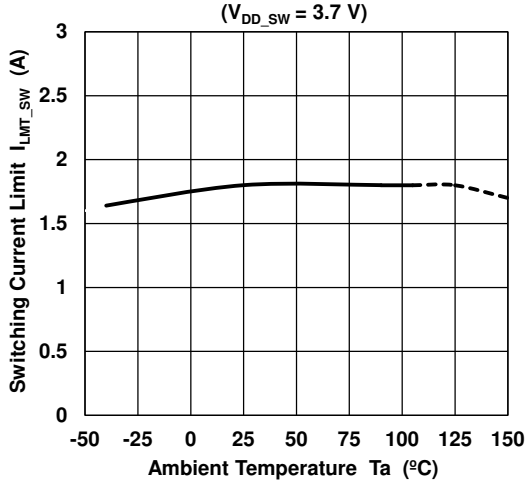
Reference Voltage vs. Temperature
(V_{DD_SW} = 3.7 V)



Output ON Resistance vs. Temperature
(V_{DD_SW} = 3.7 V, I_{SW} = 100 mA)

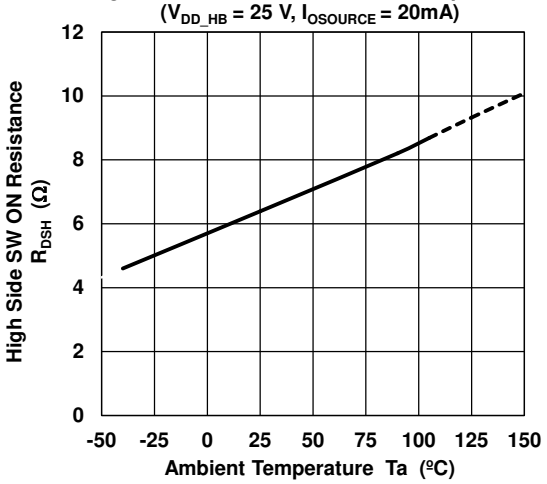


Switching Current Limit vs. Temperature
(V_{DD_SW} = 3.7 V)

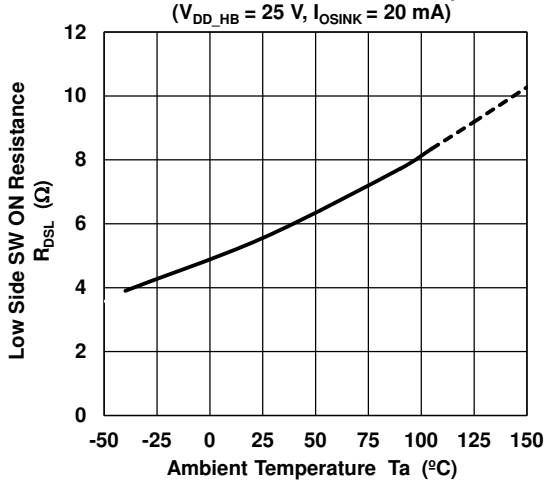


■TYPICAL CHARACTERISTICS (H-Bridge Driver Block)

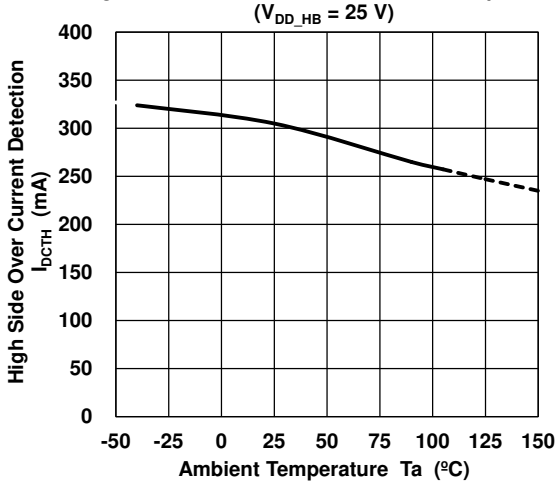
High Side SW ON Resistance vs. Temperature
(V_{DD_HB} = 25 V, $I_{OSOURCE}$ = 20mA)



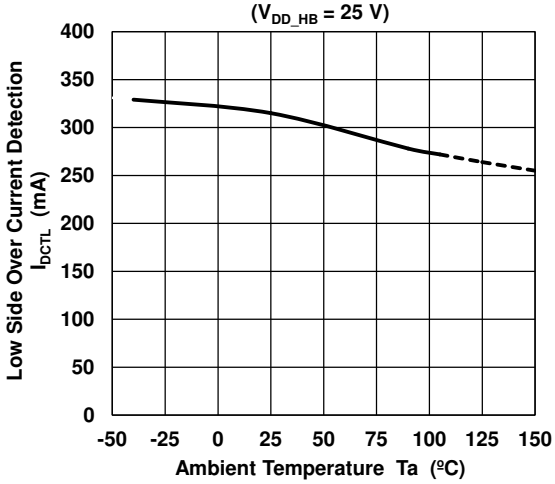
Low Side SW ON Resistance vs. Temperature
(V_{DD_HB} = 25 V, I_{OSINK} = 20 mA)



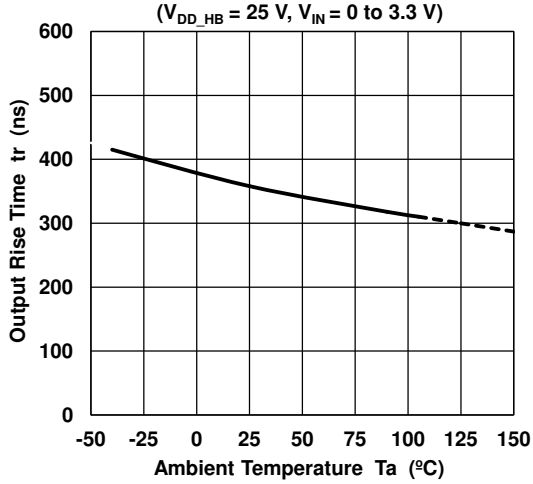
High Side Over Current Detection vs. Temperature
(V_{DD_HB} = 25 V)



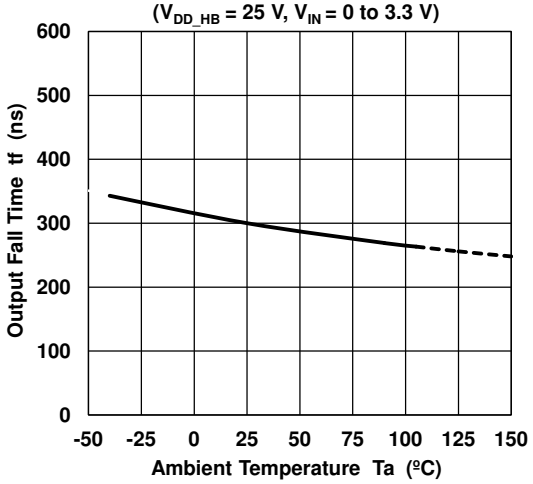
Low Side Over Current Detection vs. Temperature
(V_{DD_HB} = 25 V)



Output Rise Time vs. Temperature
(V_{DD_HB} = 25 V, V_{IN} = 0 to 3.3 V)

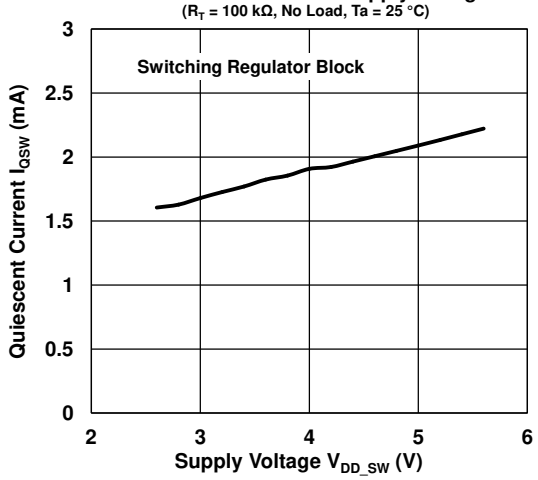


Output Fall Time vs. Temperature
(V_{DD_HB} = 25 V, V_{IN} = 0 to 3.3 V)

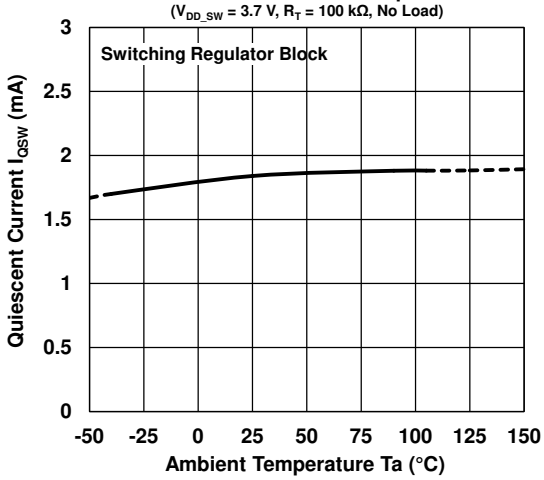


■TYPICAL CHARACTERISTICS (General Characteristics)

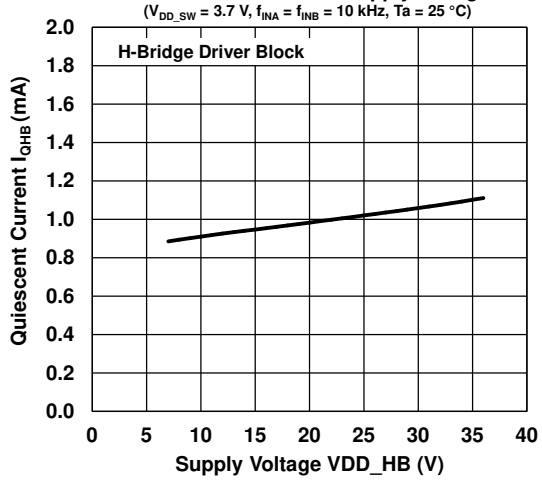
Quiescent Current vs. Supply Voltage
(R_T = 100 kΩ, No Load, Ta = 25 °C)



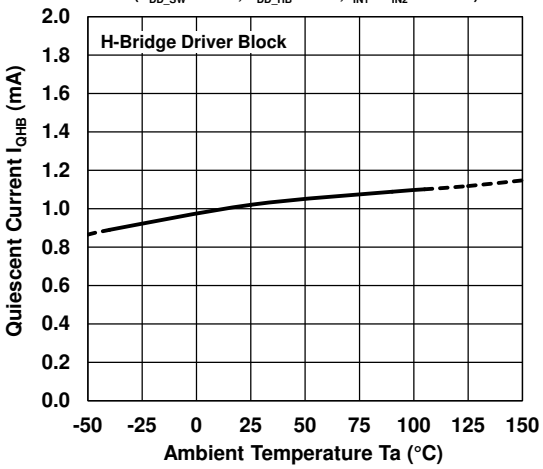
Quiescent Current vs. Temperature
(V_{DD_SW} = 3.7 V, R_T = 100 kΩ, No Load)



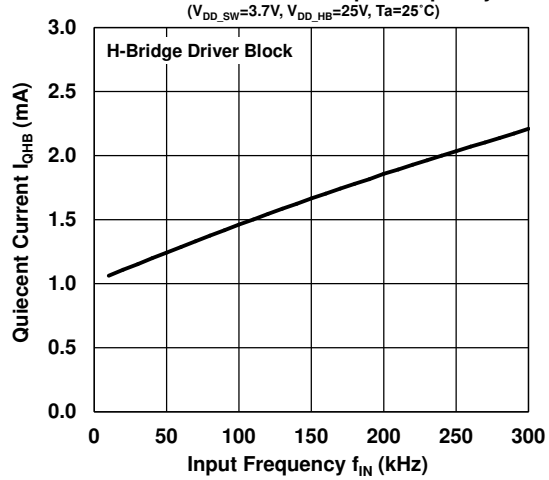
Quiescent Current vs. Supply Voltage
(V_{DD_SW} = 3.7 V, f_{INA} = f_{INB} = 10 kHz, Ta = 25 °C)



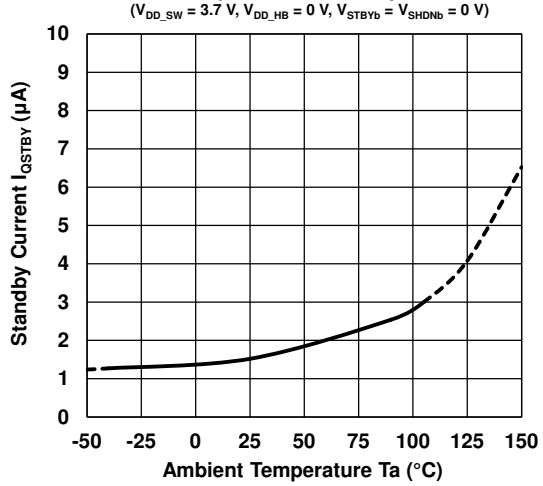
Quiescent Current vs. Temperature
(V_{DD_SW} = 3.7 V, V_{DD_HB} = 25 V, f_{IN1} = f_{IN2} = 10 kHz)



Quiecent Current vs. Input Frequency
(V_{DD_SW}=3.7V, V_{DD_HB}=25V, Ta=25°C)



Standby Current vs. Temperature
(V_{DD_SW} = 3.7 V, V_{DD_HB} = 0 V, V_{STBYb} = V_{SHDNb} = 0 V)



■REVISION HISTORY

Date	Revision	Contents of Changes
October.11.2024	Ver. 1.0	Initial release

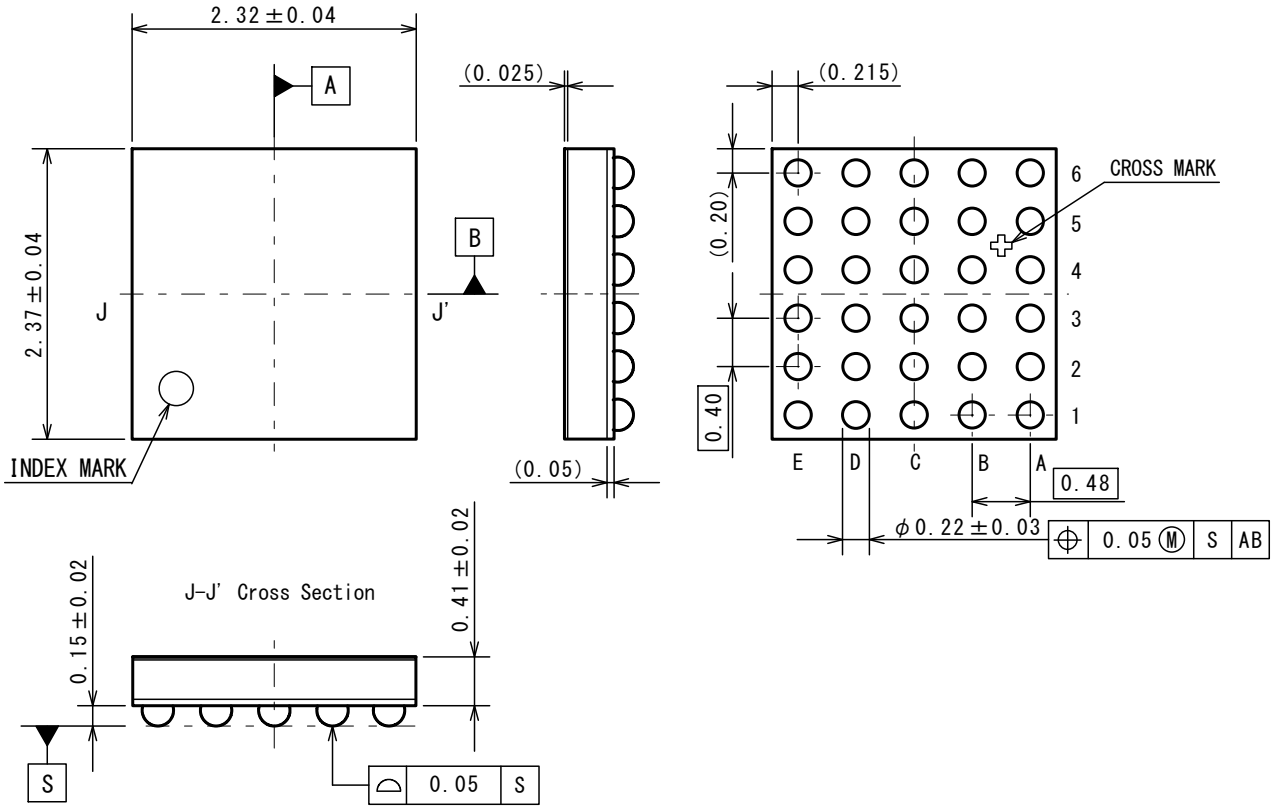
Nisshinbo Micro Devices Inc.

WLCSP-30-ZA1

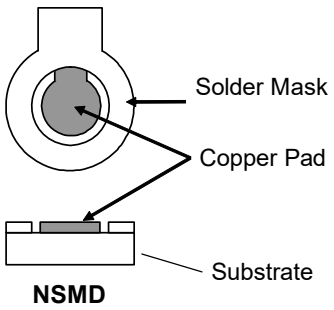
PI-WLCSP-30-ZA1-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



■ Recommended Land Pattern



NSMD Pad Definition		
Pad definition	Copper Pad	Solder Mask Opening
NSMD (Non-Solder Mask defined)	0.20mm	MIN. 0.30mm

*Pad layout and size can modify by customers material, equipment and method.
*Please adjust pad layout according to your conditions.

Recommended Stencil Aperture Size: φ0.30mm

Nisshinbo Micro Devices Inc.

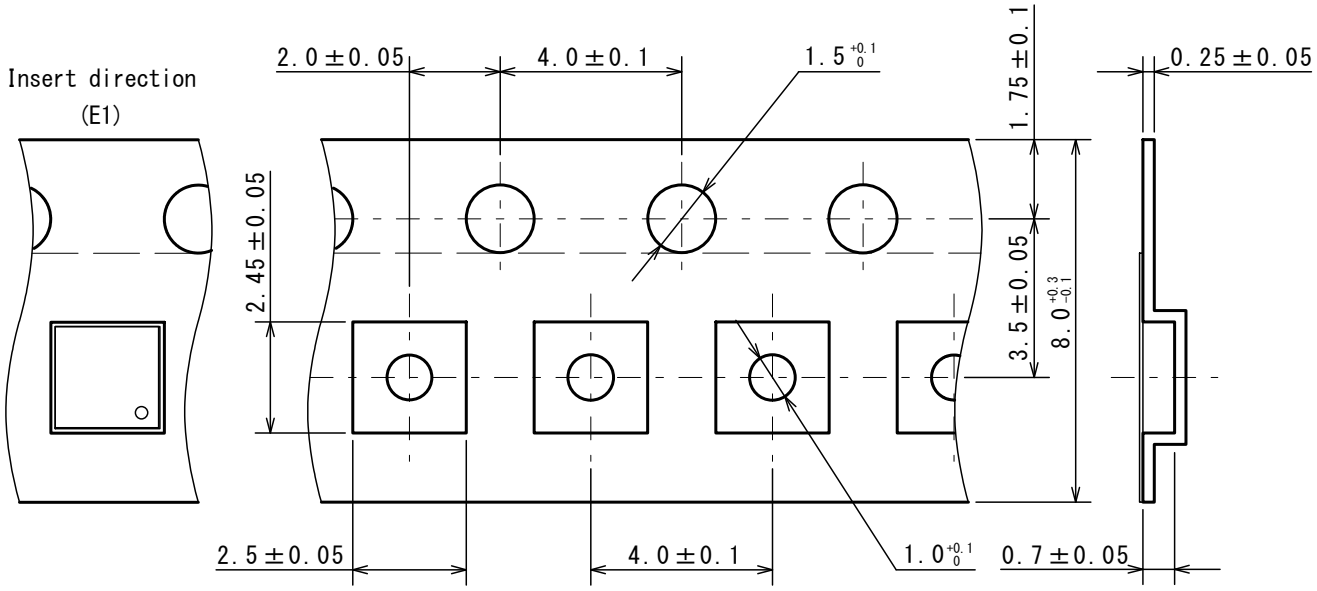
WLCSP-30-ZA1

PI-WLCSP-30-ZA1-E-A

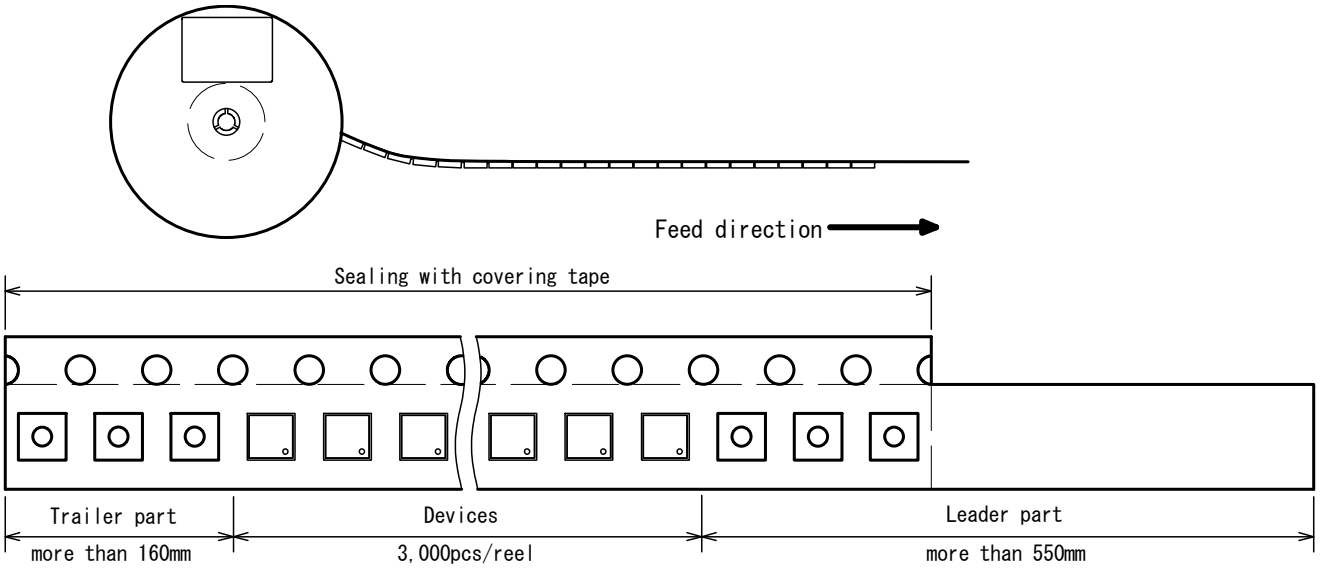
■ PACKING SPEC

UNIT: mm

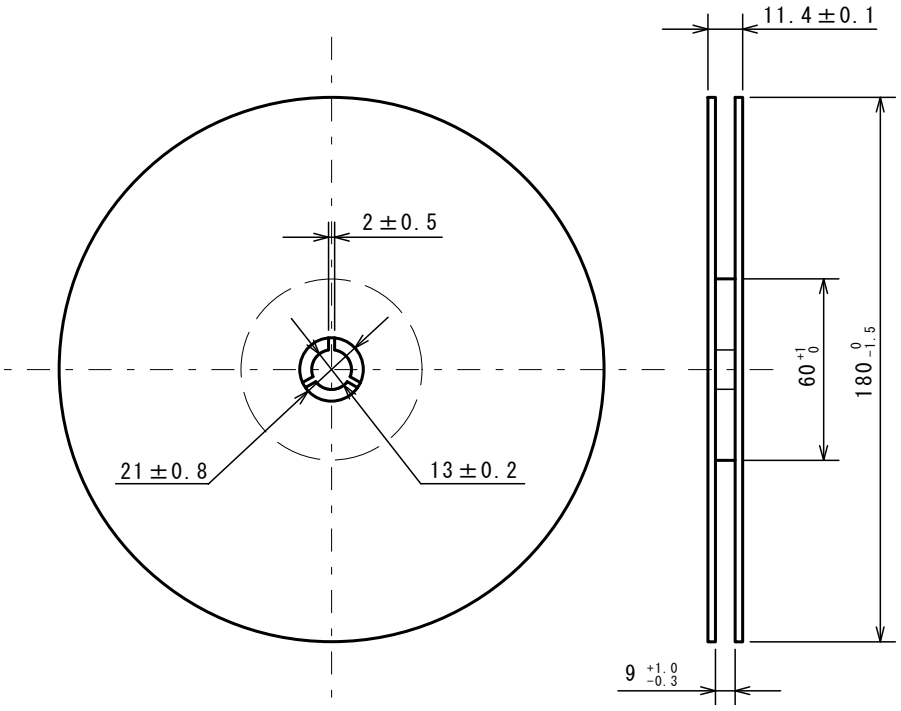
(1) Taping dimensions / Insert direction



(2) Taping state



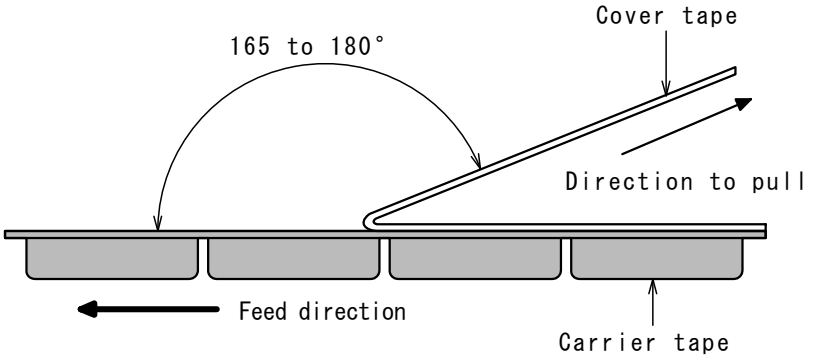
(3) Reel dimensions



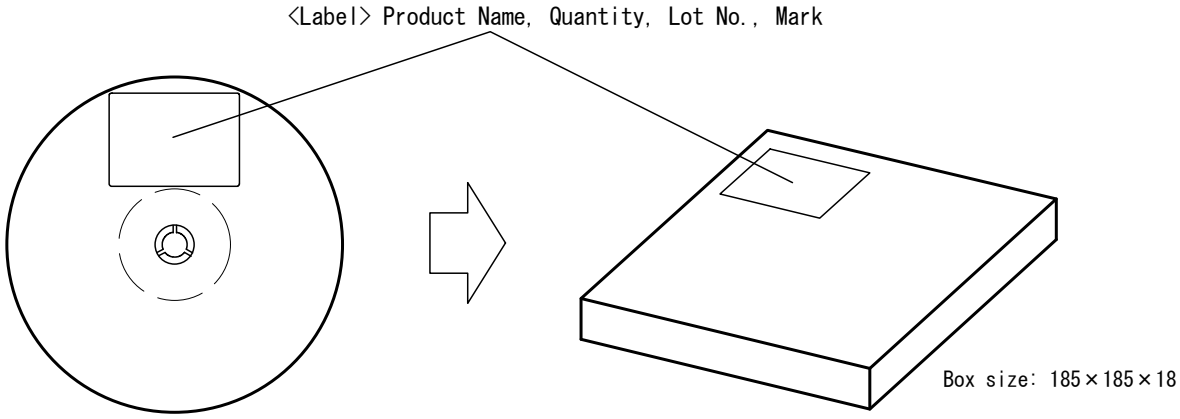
(4) Peeling strength

Peeling strength of cover tape

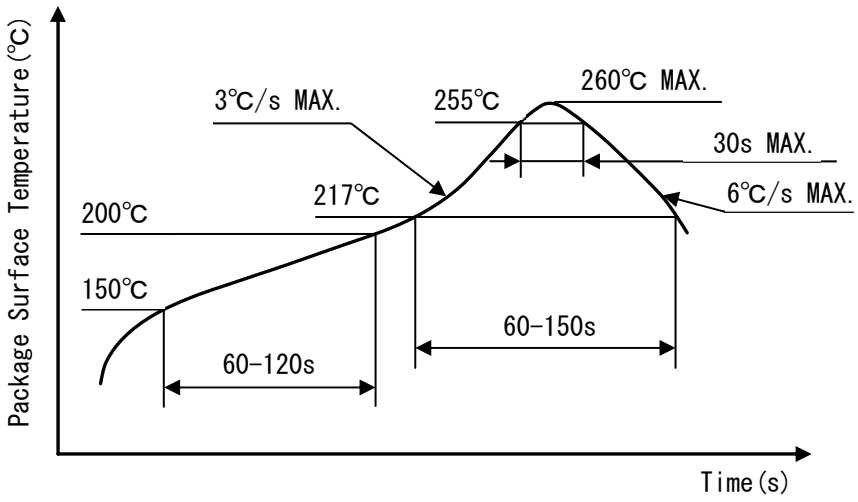
・Peeling angle	165 to 180° degrees to the taped surface.
・Peeling speed	300mm/min
・Peeling strength	0.1 to 1.0N



(5) Packing state



■ **HEAT-RESISTANCE PROFILES**



Reflow profile

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    8-2. Quality Warranty Remedies
    When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.
    Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
    8-3. Remedies after Quality Warranty Period
    With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
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