CUSTOMER'S NAME: MechComp Electronic Components

PART NAME: ROTARY ENCODER SWITCH

PART No.:

NOBLE

ELECTRONIC COMPONENTS

SPECIFICATION

REVISIONS		
LTR	DESCRIPTION	DATE

APPROVAL STATUS			
APPROVED		REJECTED	
SIGNATURE		DATE	

NOBLE REFERENCE NO.: 765-0423E
NOBLE TYPE NAME: SDB161EPVB15.5F-1-4-16-16PC/□

PREPARED T. Sakamoto	DATE 20/Oct/2016
APPROVED H. Nishiwaki	24/Oct/2016
QA Y. Watanabe	24/Oct/2016

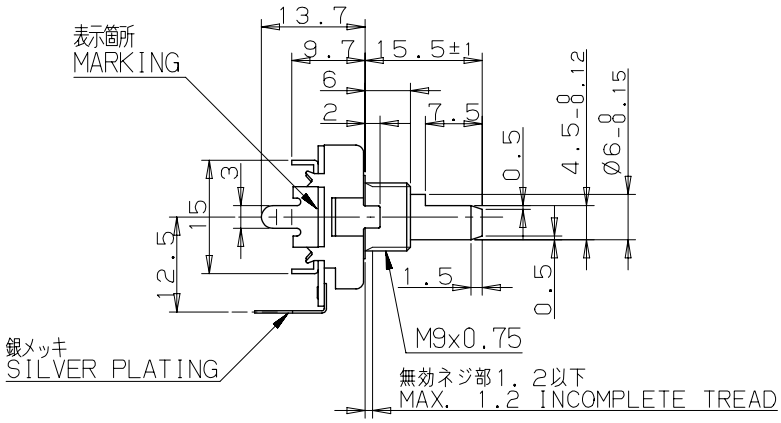
Please return one copy of this drawing with your signature of approval and retain the others for your record. In the event of an order being placed for this part number before the signed copy is returned, it will be assumed that full approval have been given.

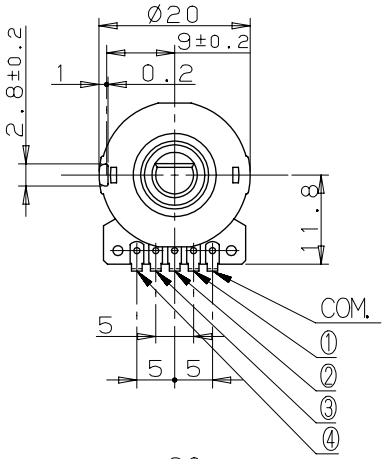
TEIKOKU TSUSHIN KOGYO CO., LTD
45-1, Kariyado, Nakahara-ku, Kawasaki , 211-8530,Japan
Quality Assurance Department
Phone: +81-44-434-2281 Facsimile: +81-44-433-8174

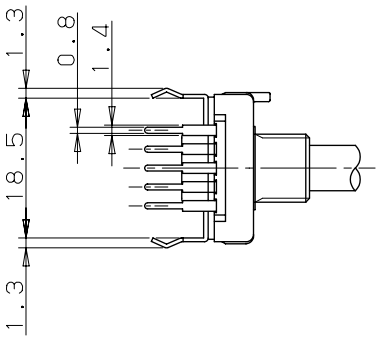
会社（工場）名 CUSTOMER'S NAME	部番（ストックNo.） CUSTOMER'S PART No.	
MechComp Electronic Components		

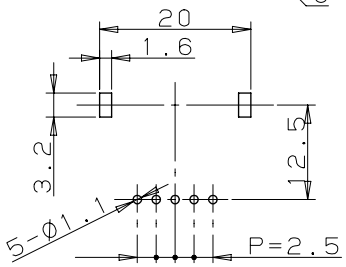
1. 外形寸法図
EXTERNAL DIMENSIONS

下図は軸のスタートの位置を示す。
SHAFT SHOWN IN START POSITION.

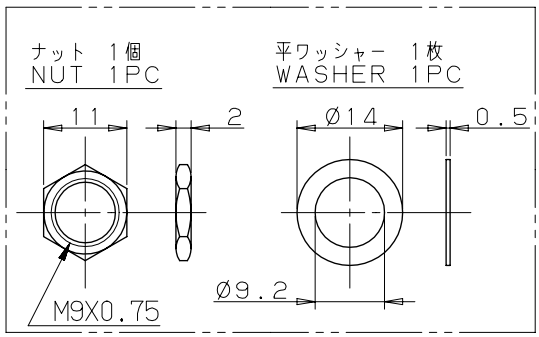








端子穴寸法（参考）
MOUNTING HOLE DIMENSIONS ON P.C.B.
(REFERENCE)



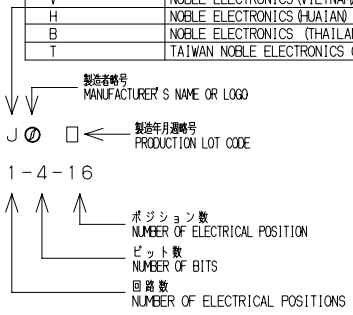
CODE

START POSITION　C.W. ROT.　1:ON 0:OFF

POSITION / TERMINAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ⓒ — ①	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
Ⓒ — ②	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
Ⓒ — ③	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
Ⓒ — ④	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

製造工場表示
MANUFACTURE FACTORY SIGN

工場記号 (FACTORY SIGN)	製造工場 (MANUFACTURE FUCTORY)
J (又は省略) (OR OMISSION)	日本国内工場 (THE Factory IN JAPAN)
I	P.T. NOBLE BATAM (インドネシア バタム)
V	NOBLE ELECTRONICS (VIETNAM) CO., LTD. (ベトナム ハノイ)
H	NOBLE ELECTRONICS (HUAIAN) CO., LTD. (中国 淮安)
B	NOBLE ELECTRONICS (THAILAND) CO., LTD. (タイ アユタヤ)
T	TAIWAN NOBLE ELECTRONICS CO.,LTD (台湾)



帝通名/□には、上記の工場記号が入ります。
NOBLE PART NAME / □,
the symbol above will contain factory sign.

②				⑤			
①				④			
	DATE	REVISION	APPROVED	③			

設計 DESIGNED	検図 CHECKED	尺度 SCALE	一般公差 TOL. UNLESS OTHERWISE STATED		帝通名 NOBLE PART NAME
坂 16-10-20 本	藤 16-10-20 間	1/1	less than 15	±0.3	SDB161EPVB15.5F-1-4-16-16PC/□
			15 - less than 30	±0.5	
			30 - less than 100	±1.0	
			100 - less than 300	±1.5	
単位 UNIT mm	第三角法 THIRD ANGLE PROJECTION METHOD		300 - less than 1000	±2.0	帝通図番 DRAWING No. 765-0423E
			ANGLE	±5°	

2. Scope: This specification is applied to the Model SDB161 type (endless, with detents) mainly used for consumer products.

3. Model: ＳＤＢ１６１

4. Appearance

4.1 Appearance: There shall be no remarkable damage in the visual inspection.

4.2 Dimension: Please see the drawing attached.

4.3 Marking: The following information shall be clearly marked on the mounting plate with a durable method.
(1) Country of origin (2) Manufacturer's trademark (3) Production year and month (4) Number of circuits, bits and electrical positions.

5. Test Conditions

In this specification standard temperature and atmospheric pressure are 20 ℃ and 101.3 kPa respectively. Unless otherwise specified, all tests shall be done in a 15 to 35 ℃ at an atmospheric pressure of 86 to 106 kPa and a relative humidity 25 to 75 %.
In case there are any doubtful points in judgement or reproductivity is needed, the test conditions shall be in accordance with JIS C 60068-1 Referee Test Condition, temperature of 20±2 ℃, relative humidity of 60 to 70 % and atmospheric pressure of 86 to 106 kPa.

6. Rating

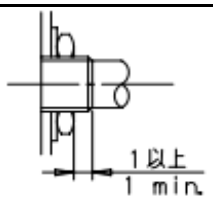
No.	Items	Testing Method and Condition	Specification
6.1	Operating Temp. Range	Operating temperature(humidity) range is assumed by the evaluation criteria based on this specification. It does not guarantee a permanent use around upper or lower limit of operating temperature range.	0～85℃
6.2	Storage Temp. Range		-30～85℃
6.3	Rated Voltage and Current	Resistance load : (Resistor is employed as the load.)	DC 10V, 10mA

7. Electrical Performance

No.	Items	Testing Method and Condition	Specification
7.1	Insulation Resistance	Insulation resistance shall be measured between the terminals and housing with DC 100±10 V Megaohm-meter, and then between the common terminal and other terminals under the non-shorting state with DC 40±4 V Megaohm-meter.	Not less than 10 MΩ.
7.2	Dielectric Strength	AC 100 +5/-0 V shall be applied between the terminals and housing for 1 min. +10/-0 s, and then AC 50 +2.5/-0 V shall be applied between the common terminal and the other terminals under the non-shorting state for 1 min. +10/-0 s.	Neither damage, arc nor insulation breakdown shall cause.
7.3	Circuit Configura-tion		Refer to the external dimensions(gray-coad).
7.4	Switching Timing		Non-shorting
7.5	Contact Resistance	The Contact Resistance shall be measured according to JIS C 5445 (issued in 2012) Para. 4.4.2. The test ferquency shall be 1,000±200 Hz.	Less than 500 mΩ.

8. Mechanical Performance

No.	Items	Testing Method and Condition	Specification
8.1	Total Rotational Angle		360° (endless)
8.2	Detent Position and Angle		16 detents, 22.5±3° /detent
8.3	Rotational Torque of Detent	Rotational torque of detent shall be measured at a rate of 60° per second, according to JIS C 5260-1:1999. Para. 4.18	5～35 mN・m
8.4	Push-Pull Strength of the Shaft	The axial push-pull static load of 100 N shall be applied to the tip of the shaft for 10±1 s.	No remarkable wobble nor damage shall be found. The product shall conform to the para.7.5
8.5	Shaft Wobble	The bending moment of 50 mN・m shall be applied at the point 5 mm away from the tip of shaft in the opposite direction to each other.	Less than 0.6 x (L/30) mm P-P. L:stands for the distance between the mounting surface and measuring point.
8.6	Terminal Strength	A static tensile load of 5 N shall be applied to the terminal in the axial direction for 10±1 s, and then a static tensile load of 5 N in a perpendicular direction for 10±1 s.	There shall be neither a remarkable wobble nor intermittence. The terminal bent, however, is allowed.
8.7	Resistance to Soldering Heat	The following soldering shall be applied. The measurement is conducted after 1-2 hours left in standard condition. 1) In case of flow soldering Specimen shall be put in the laminated board (1.6 mm thick), and it shall be immersed into solder bath on to bottom surface of board as follows. Pre-heating temp.: 110±20 ℃ at bottom of board. Total-heating time : 30-60 seconds Soldering bath temp. : 255±5 ℃ Soldering time : 5 +1/-0 seconds 2) In case of hand soldering The specimen shall be put in laminated board (single copper foil board) with 1.6 mm thick. Each terminals shall be soldered with iron tip of 350±10 ℃ for 3 +1/-0 seconds.	There shall be no any loosened terminal which may cause intermittence.

No.	Items	Testing Method and Condition	Specification
8.8	Terminal Solderability	Specimen shall be immersed into solution of rosin ethanol(25wt%), and specimen shall be put in the laminated board (1.6 mm thick), and then specimen shall be immersed into solder bath on to the bottom surface of board as follows. 1) In case of Pb free solder(Sn-3Ag-0.5Cu) Solder Temp.: 245±3 ℃ 2) In case of Pb solder(Sn-37Pb) Solder Temp.: 235±3 ℃	Not less than 90 % of the surface immersed into solder shall be coverd with new solder, except for cut surface.
8.9	Mounting Nut Tightening Strength	The tortional moment of 1.5 N・m shall be applied to the mounting nut for 10±1 s. The installation of specimen, however, shall be satisfied with the figure right. 	Para.8.3 Rotational Torque shall be satisfied. Nut shall be applied the tortional moment of less than 1.5 N・m.

9. Environmental and Endurance Characteristics

No.	Items	Testing Method and Condition	Specification
9.1	Resistance to Cold	The specimen shall be subjected in a test chamber at 0±3 ℃ at no load for 240±10 h, and then left in the standard conditions for 1 to 2 h.	Para.7.5 and 8.3 shall be satisfied.
9.2	Resistance to Cold (Storage)	The specimens shall be subjected in a test chamber at -30±3 ℃ at no load for 72±2 h, and then left in the standard conditions for 1 to 2 h.	Para.7.1,7.2,7.5,8.3 and 8.8 shall be satisfied.
9.3	Resistance to Heat	The specimen shall be subjected in a test chamber at 85±2 ℃ at no load for 240±8 h, and then left in the standard conditions for 1 to 2 h.	Para.7.5 and 8.3 shall be satisfied.
9.4	Resistance to Heat (Storage)	The specimens shall be subjected in a test chamber at 85±2 ℃ at no load for 72±2 h, and then in the standard conditions for 1 to 2 h.	Para.7.1,7.2,7.5,8.3 and 8.8 shall be satisfied.
9.5	Resistance to Damp (Steady State)	The specimen shall be subjected in a test chamber at 40±2 ℃, 90～95 % r.h. at no load for 240±8 h. and then left in the standard conditions for 1 to 2 h.	Para.7.1 Insulation Resistance shall be not less than 5 MΩ. Para.7.5 and 8.3 shall be satisfied.
9.7	Endurance (Sliding)	A shaft shall be rotated for 50,000±2,500 cycles (One cycle is one clockwise turn, and then one counterclockwise turn.), at a rate of 600 cycles per hour, according to JIS C 5260-1:1999 para. 4.40.	Para.7.1 Contact Resisrance shall be less than 5 Ω. Para.8.3 shall be satisfied.

10. Notice on usage

10.1 Due to the material used such as poly-carbonate and/or ABS of non-crystalline polymer, the unit may be damaged when it will touch some kinds of organic solvnents, grease or inorganic chemicals.

10.2 Storage under being packed

・After being received, the products packed shall be stored under 85 % max. r.h. at 5 to 35 ℃, shall not be stored in the place where dew and/or harmful gas are apt to occur.

・Please use the products within 3 months after the receipt.

10.3 Handling after opening bag

・Care must taken to the handling the products due to the deteriation of solderability on the terminals, since the terminals are treated with the silver-plating.

・After opening the polyethlene bag, please use the products soon.

・And the left products are packed with the same polyethlene bag, and shall be stored under the condition of Para. 10.2.

10.4 If products are operated continuously in upper and lower limit to the operating temperature(humidity) range other than standard condition, please contact us separately.

10.5 When using products, please use products in the range of the requirements and conditions described in the specification and not use products in excess of the maximum rating.

10.6 Products specified in the specification have been manufactured for applications listed below.

・Electric home appliances ・Audio visual equipment ・Office machines

・Home video game machines ・Communications equipment [terminal]

Please do not use products in such as following equipment for applications requiring a high degree of safety or reliability.

Examples: ・Aircraft equipment ・Aerospace equipment ・Power plant equipment

・Communications equipment[trunk]・Gas detect systems ・Traffic signal equipment

・Driving control systems and safety device components of Transportation equipment (vehicles, trains, etc.) ・Medical equipment

10.7 Although we are exerting our efforts to maintain the quality of products, we cannot guarantee that products will never cause short circuiting and open circuitry. Therefore, When designing an equipment or device with which the priority is given to the safety, please carefully study the influences to the whole equipment by a single function failure and achieve the safety of equipment by the fail-safe design.

包装仕様書

Packing Specification
包装荷姿 （製品名： SDB161,VB161,VB162,V0161 ）
Package （Product name SDB161,VB161,VB162,V0161）

1 個 装 ： パーツトレー(H-100-F) 1枚に100個詰めます。
Package for each piece : 100 pcs perpart-tray (H-100-F).

トレー1枚1枚にエアークッションを入れる。
The air cushion is put in one tray one piece.
外寸 374mm (L) X 305mm (W) X 50mm (D)
Outer Dimension : 374mm (L) X 305mm (W) X 50mm (D)
最大数 1箱＝ 100個 （ 1個 X 100 ）
Max Quantity : 100 pcs per part-tray （ 1pcs X 100 ）

2 内 装 ： 個装と兼用です。
Inner carton : Inner carton is Part-tray

パーツトレーを5段積み重ね、最上段にダンボール紙を1枚置き、クラフトテープで3箇所を縛ります。
Inner cartons : 5 parts-trays shall be piled up and a corrugated cardboard shall be put on the top, then it shall be bound by 3 tapes.

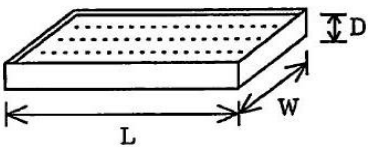
3 外 装 ： ダブルカートン （ F1SW-1 ）
Outer carton : Double carton (F1SW-1)
内 寸 ： 400mm (L) X 330mm (W) X 515mm (D)
Inner Dimension : 400mm (L) X 330mm (W) X 515mm (D)
最大数 1箱＝ 1000個 （内装箱 ×2 ）
Max Quantity : 1000 pcs per carton (inner carton × 2)

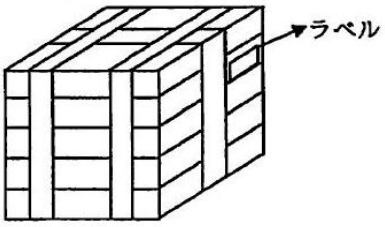
4 表 示 ： 内箱の側面に次の内容を示す包装ラベルを貼ります。
Marking : A packaging label indicating following information shall be attached to the side of the inner carton.

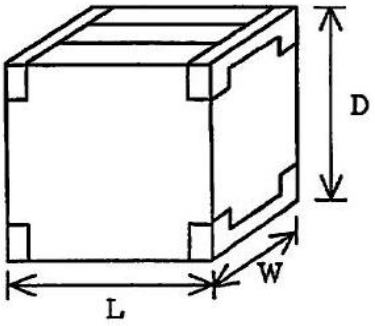
①納入先名 Customer	③注文No. Order No.	⑤品名 Product Name	⑦LOT No. LOT No.	⑨製造元名 Manufacturer Name
②部品 Part No.	④型No. Model No.	⑥受注No. Arranged No.	⑧数量 Quantity	⑩仕様書番号 Spec No.

5 荷姿略図 Rough sketches of each package

（ 個 装 ） (Bulk pack) （ 内 装 ）(Inner carton) （ 外 装 ）(Outer carton)







【Unit of each carton dimensions shall be mm】

△3				△5			
△2				△4			
△1				帝通図番		765-0423E	
	DATE	REVISION	APPROVED	DRAWING No.			

様式02A