Customer: ALPS EUROPE DISTRIBUTION

No. ECR2009-6582

Date: Feb. 16, 2009

Attention:

Your ref. No.:

Your Part No.: STEC11B03

SPECIFICATIONS

ALPS' ;

MODEL: EC11B152442D

Spec. No.:

Sample No.: F 7 3 7 4 6 9 7 M

RECEIPT STATUS

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By Date

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Title

ALPS

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Q1003#03A (EA)

No. ECR2009-6582

SPECIFICATIONS

1. THIS SPECIFICATIONS APPLY TO EC11B152442D ROTARY ENCODERS.

2. CONTENTS OF THIS SPECIFICATIONS.

F7374697M
LA211446S
4K-1

3. MARKING

• MARKING ON ALL UNITS
EIA DATE CODE

4. REMARKS

• FURNUSH PACKAGE
NUT:1 WASHER:1

• CAUTION

1.For the export of products which are controlled items subject to foreign and domestic export laws and regulations, you must obtain approval and/or follow the formalities of such laws and regulations.

2.Products must not be used for military and/or antisocial purposes such as terrorism, and shall not be supplied to any party intending to use the products for such purposes.

3.Unless provided otherwise, the products have been designed and manufactured for application to equipment and devices which are sold to end-users in the market, such as AV (audio visual) equipment, home electric equipment, office and commercial electronic equipment, information and communication equipment or amusement equipment. The products are not intended for use in, and must not be used for, any application of nuclear equipment, driving control equipment for aerospace or any other unauthorized use.
With the exception of the above mentioned banned applications, for applications involving high levels of safety and liability such as medical equipment, burglar alarm equipment, disaster prevention equipment and undersea equipment, please contact an Alps sales representative and/or evaluate the total system on the applicability. Also, implement a fail-safe design, protection circuit, redundant circuit, malfunction protection and/or fire protection into the complete system for safety and reliability of the total system.

4.Before using products which were not specifically designed for use in automotive applications, please contact an Alps sales representative.

5.The products shall be stored in the original packaging and kept at room temperature and humidity, out of direct sunlight, and away from any and all corrosive gas. The products shall be completely used as soon as possible, but no later than 6 months from the date of delivery.

Once product packaging is opened, the complete quantity of such products shall be promptly used.

CLASS NO.	TITLE 11形回転形エンコーダ規格書 11mm Size Rotary Encoder Specification	

1. 一般事項 General (SW01), (SW02)

1-1 適用範囲 Scope

この仕様書は主として電子機器に用いる微小電流回路用11形薄形ロータリーエンコーダに適用する。
This specification applies to 11mm size low-profile rotary encoder (incremental type) for microscopic current circuits, used in electronic equipment.

1-2 標準状態 Standard atmospheric conditions

測定は特に指定のない限り、次の状態で行なう。
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

温 度	Ambient temperature	: 15°C to 35°C
相対湿度	Relative humidity	: 25% to 85%
気 圧	Air pressure	: 86kPa to 106kPa

但し、疑義を生じた場合は、次の基準状態で行なう。
If there is any doubt about the results, measurements shall be made within the following limits:

温 度	Ambient temperature	: 20 ± 1°C
相対湿度	Relative humidity	: 63% to 67%
気 圧	Air pressure	: 86kPa to 106kPa

1-3 使用温度範囲
Operating temperature range : -40°C to +85°C

1-4 保存温度範囲
Storage temperature range : -40°C to +85°C

2. 構造 Construction

2-1 寸法 Dimensions

添付組立図による。
Refer to attached drawing.

3. 定格 Rating

3-1 定格容量(SW01)
Rating : D.C. 5V 10mA (1mA MIN)

4. 電気的性能 Electrical characteristics(SW01)

	項目 Item	条件 Conditions	規格 Specifications
4-1	出力信号 Output signal format	<Fig 1>	A, B2信号の位相差出力とし、詳細は<fig. 1>の通りとする。(破線はクリック付きの場合のクリックの位置を示す。) 2 Phase-different signals (SignalA, signalB) Details shown in <fig. 1>. (The broken line shows detent position of with-detent type.)

<Fig 1>

軸回転方向 Shaft rotational direction	信号 Signal	出力波形 Output
時計方向 C.W.	A(A-C端子間) A(Terminal A-C)	OFF / ON
	B(B-C端子間) B(Terminal B-C)	OFF / ON
反時計方向 C.C.W.	A(A-C端子間) A(Terminal A-C)	OFF / ON
	B(B-C端子間) B(Terminal B-C)	OFF / ON

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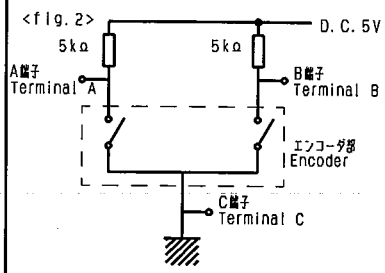
ALPS ELECTRIC CO., LTD.

APPD.	CHKD.	DSGD.	TITLE 11形回転形エンコーダ 11mm Size Rotary encoder
Mar.22.'96	Mar.22.'96	Mar.22.'96	
Y.YOSHIOKA	M.SATOH	Y.ISAWA	DOCUMENT NO. F7374697M (1/6)

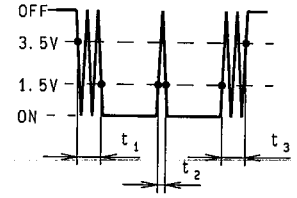
CLASS NO. | TITLE 11形回転形エンコーダ規格書 11mm Size Rotary Encoder Specification

	項目 Item	条件 Conditions	規格 Specifications
4-2	分解能 Resolution	1回転にて出力されるパルス数 Number of pulses in 360° rotation.	各相 15パルス/360° 15 pulses/360° for each phase (2クリック 1パルス) (2Click 1Pulse)
4-3	スイッチング特性 Switching characteristics	下記測定回路<fig. 2>を用い、回転軸を360°・S^{-1}の速さで回転し測定する。 Measurement shall be made under the condition as follows. 1)Shaft rotational speed : 360°·S^{-1} 2)Test circuit : <fig. 2>	

<fig. 2>



<fig. 3>



(注記) コードOFF状態 :出力電圧が3.5V以上の状態を言う。
コードON状態 :出力電圧が1.5V以下の状態を言う。
(note) Code-OFF area : The area which the voltage is 3.5V or more.
code-ON area : The area which the voltage is 1.5V or less.

1)	チャタリング Chattering	コードのOFF→ON及びON→OFFの際の、出力1.5V~3.5Vの通過時間にて規定する。 Specified by the signal's passage time from 3.5V to 1.5V or from 1.5V to 3.5V of each switching position (code OFF→ON or ON→OFF).	t_1, t_3 ≦ 2ms
2)	摺動ノイズ (バウンス) Sliding noise (Bounce)	コードONの部分の1.5V以上の電圧変動時間とし、チャタリングt_1, t_3両者との間に1mS以上の1.5V以下のON部分を有するものとする。また、摺動ノイズ間に1.5V以下の範囲が1mSある場合は、別の摺動ノイズと判断する。 Specified by the time of voltage change exceed 1.5V in code-ON area. When the bounce has code-ON time less than 1mS between chatterings (t_1 or t_3), the voltage change shall be regarded as a part of chattering. When the code-ON time between 2 bounces is less than 1mS, they are regarded as 1 linked bounce.	t_2 ≦ 2mS
3)	摺動ノイズ Sliding noise	コードOFFの部分の電圧変動 The voltage change in code-OFF area.	3.5V以上 3.5V MIN

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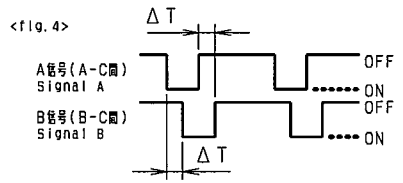
ALPS ELECTRIC CO., LTD.

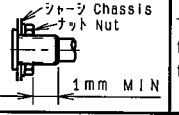
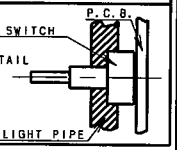
APPD. Mar.22.'96 Y.YOSHIOKA | CHKD. Mar.22.'96 M.SATOH | DSGD. Mar.22.'96 Y.ISAWA | TITLE 11形回転形エンコーダ 11mm Size Rotary encoder | DOCUMENT NO. F7374697M (2/6)

	項目 Item	条件 Conditions	規格 Specifications
4-4	位相差 Phase-difference	360°・S⁻¹の定速度で操作軸を回転する。 Measurement shall be made under the condition which the shaft is rotated in 360°・S⁻¹ (constant speed). <fig. 4>  注意事項 振動接点ですので手動操作時の出力波形はご使用されるツマミ径、軸の回転速度によって変化致します。回路設計時は実装にて確認願います。 Note : Above specification (4-4) is changeable. When operate by manual. Please check performance using actual circuit and knob.	<fig. 4>において ΔT≧6msec In<fig. 4>
4-5	絶縁抵抗 Insulation resistance	端子-軸受間にD. C. 250V 1mA印加する。 Measurement shall be made under the condition which a voltage of 250VD. C. 1mA is applied between individual terminals and bushing.	端子-軸受間にて100MΩ以上 Between individual terminals and bushing: 100MΩ MIN.
4-6	耐電圧 Dielectric strength	端子-軸受間にA. C. 300V 1分間又は、A. C. 360V 2秒間印加する。(リーク電流1mA) A voltage of 300VA. C. shall be applied for 1min or a voltage of 360VA. C. shall be applied for 2sec between individual terminals and bushing. (Leak current: 1mA)	損傷・アーク・絶縁破壊がないこと。 Without damage to parts arcing or breakdown.

5. 機械的性能 Mechanical characteristics

	項目 Item	条件 Conditions	規格 Specifications
5-1	全回転角度 Total rotational angle		360°(エンドレス) 360°(Endless)
5-2	クリックトルク Detent torque		12±7mN・m
5-3	クリック点数及び位置 Number and position of detents.		30点クリック 30 detents (ステップ角度 12°±3°) (Step angle: 12°±3°)
5-4	端子強度 Terminal strength	端子先端の任意の一方向に5Nの静荷重を1分間加える。 A static load of 5N be applied to the tip of terminals for 1minute in any direction.	端子の破損、著しいガタがないこと。但し、端子の曲がりは可とする。 Without damage or excessive looseness of terminals. Terminal bend is permitted.
5-5	軸の押し引き強度 Push-pull strength of shaft	軸の押し及び引張り方向に100Nの静荷重を10秒間加える。(セット実装状態) Push and pull static load of 100N shall be applied to the shaft in the axial direction for 10S. (After installing)	軸の破損、著しいガタのないこと。感触に異常がないこと。 Without damage or excessive play in shaft No excessive abnormality in rotational feeling.

CLASS NO. | TITLE 11形回転形エンコーダ規格書 11mm Size Rotary Encoder Specification

	項目 Item	条件 Conditions	規格 Specifications
5-6	軸受ネジ締付強度 Bushing nut tightening strength	<fig. 5>を満足するよう締付る。 Tighten the nut according to <fig. 5>  <fig. 5>	1N・m以下にて使用のこと。 Tightening torque to be no greater than 1N. m.
5-7	軸ガタ Shaft wobble	軸先端から5mmの位置に50mN・mの曲げモーメントを加える。 A momentary load of 50mN・m shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft.	軸ガタ Wobble 以下 (mmp-p less) 0. 7×L/30 Lは取付長さで比例計算する。 L: Measurement point from mounting surface of bushing.
5-8	軸のスラスト方向ガタ Shaft play in axial direction		0. 4mmp-p以下 0. 4mmp-p MAX.
5-9	軸の回転方向ガタ Rotation play at the click position	角度板にて測定する。 Measure with jig for rotational angle.	5度以内 5° MAX.
5-10	はんだ耐熱 Resistance to soldering heat	7項の"はんだ付け条件"による。 Specified by the clause 7 "Soldering conditions".	絶縁体の変形、破損のないこと。感触に異常のないこと。 There shall be no deformation or cracks. in molded part. No excessive abnormality in rotational feeling.
5-11	取付け上の注意 Notice for mounting	右図の様にスイッチ本体を抑えてご使用下さい。セット側でスイッチ本体の引き及び回転方向のガイトが無い場合は、はんだ付けだけの固定となり、はんだ付け信頼性及びスイッチ本体強度が不安定となる可能性があります。 Hold the bushing use front panel or light pipe. Because this switch not has thread. If don't hold the bushing, the switch maybe become intermittent or rough mounting after soldering by knob stopper force. 	

6. 耐久性能 Endurance characteristics.

	項目 Item	条件 Conditions	規格 Specifications
6-1	しゅう動寿命性能 Rotational life	無負荷で軸を毎時500サイクルの速さで、15, 000サイクル断続動作を行う。但し、試験途中5, 000で中間測定を行う。(1サイクルは、360°1往復) The shaft of encoder shall be rotated to 15, 000 cycles at a speed of 500cycles per hour without electrical load. after which measurements shall be made. However, an interim measurement shall be made immediately after 5, 000 cycles. (1 cycle: rotate 360° CCW rotate 360° CW)	クリックトルク: 初期規格値に対し +10% -30% その他、初期規格を満足すること。 Detent torque: Relative to the previously specified value. +10% -30% Except above items, specifications in clause 4. 1~6 and 5. 1. 5. 3 shall be satisfied.

CLASS NO.	TITLE 11形回転形エンコーダ規格書 11mm Size Rotary Encoder Specification	

7. はんだ付け条件 Soldering conditions (SW01),(SW02)

7-1 手はんだの場合 Manual soldering

温度350°C以下，時間3秒以内
Bit temperature of soldering iron :350°C or less.
Application time of soldering iron : within 3s.

7-2 ディップはんだの場合 Dip soldering

使用基板 :t1.6両面銅張積層板
Printed wiring board: Both-sided copper clad laminate board with thickness of 1.6mm.

フラックス :比重0.82以上のフラックスを用い発泡式フラクサーにて発泡面高さは，基板板厚の3分の2.
Flux:
·Specific gravity: 0.82 or more.
·Flux shall be applied to the board using a bubble foaming type fluxer.
·The board shall be soaked in the flux bubble only to the 2/3 of its thickness.

プリヒート :基板表面温度100°C以下，時間2分以内
Preheating:
·Surface temperature of board: 100°C or less.
·Preheating time: within 2 min.

はんだ :温度260±5°C，時間5±1秒
Soldering:
·Solder temperature: 260±5°C.
·Immersion time: 5±1 sec.

以上の工程を1回または2回通過する.
Apply the above soldering process for 1 or 2 times.

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ALPS ELECTRIC CO., LTD.

APPD.	CHKD.	DSGD.	TITLE 11形回転形エンコーダ 11mm Size Rotary encoder
Mar.22.'96 Y.YOSHIOKA	Mar.22.'96 M.SATOH	Mar.22.'96 Y.ISAWA	DOCUMENT NO. F7374697M (5/6)

CLASS NO.	TITLE フ°ッシュモーメンタリスイッチ規格書 PUSH MOMENTARY SWITCH SPECIFICATION	(SW02)

1. 定格容量(抵抗負荷) D.C.5V 0.1A (500μA MIN)
Switch rating (Resistor load)

2. 電気的性能 Electrical characteristics

	項目 Item	条件 Conditions	規格 Specifications
2-1	接触抵抗 Contact resistance	D.C.5V10mA電圧降下法にて測定する. Measured by the 10mA 5V D.C. voltage drop method.	100mΩ以下 100mΩ MAX.
2-2	チャタリング Chattering	1サイクル (OFF-ON-OFF)1秒で動作させる. Switch is operated at the rate of 1 cycle 1 sec. The 1 cycle shall be OFF-ON-OFF.	10msec以下 Less than 10msec
2-3	絶縁抵抗 Insulation resistance	端子-軸受間にD.C.250V1mA印加する. Measurement shall be made under the condition which a voltage of 250VD.C.1mA is applied between individual terminals and bushing.	端子-軸受間にて100MΩ以上 Between individual terminals and bushing: 100MΩ MIN.
2-4	耐電圧 Dielectric strength	端子-軸受間にA.C.300V1分間又は，A.C.360V2秒間印加する.(リーク電流1mA) A voltage of 300VA.C. shall be applied for 1min or a voltage of 360VA.C. shall be applied for 2sec between individual terminals and bushing.(Leak current:1mA)	損傷・アーク・絶縁破壊がないこと. Without damage to parts arcing or breakdown.

注記:
Note: 軸・スイッチ端子間は絶縁されております.
Shaft is insulated from switch terminal.

3. 機械的性能 Mechanical characteristics

	項目 Item	条件 Conditions	規格 Specifications
3-1	スイッチ回路・接点数 Contact arrangement		単極単投(Push on) S.P.S.T.(Push on)
3-2	スイッチ移動量 Switching stroke		$0.5^{+0.4}_{-0.3}$mm
3-3	スイッチ作動力 Switch operation force		6±3N

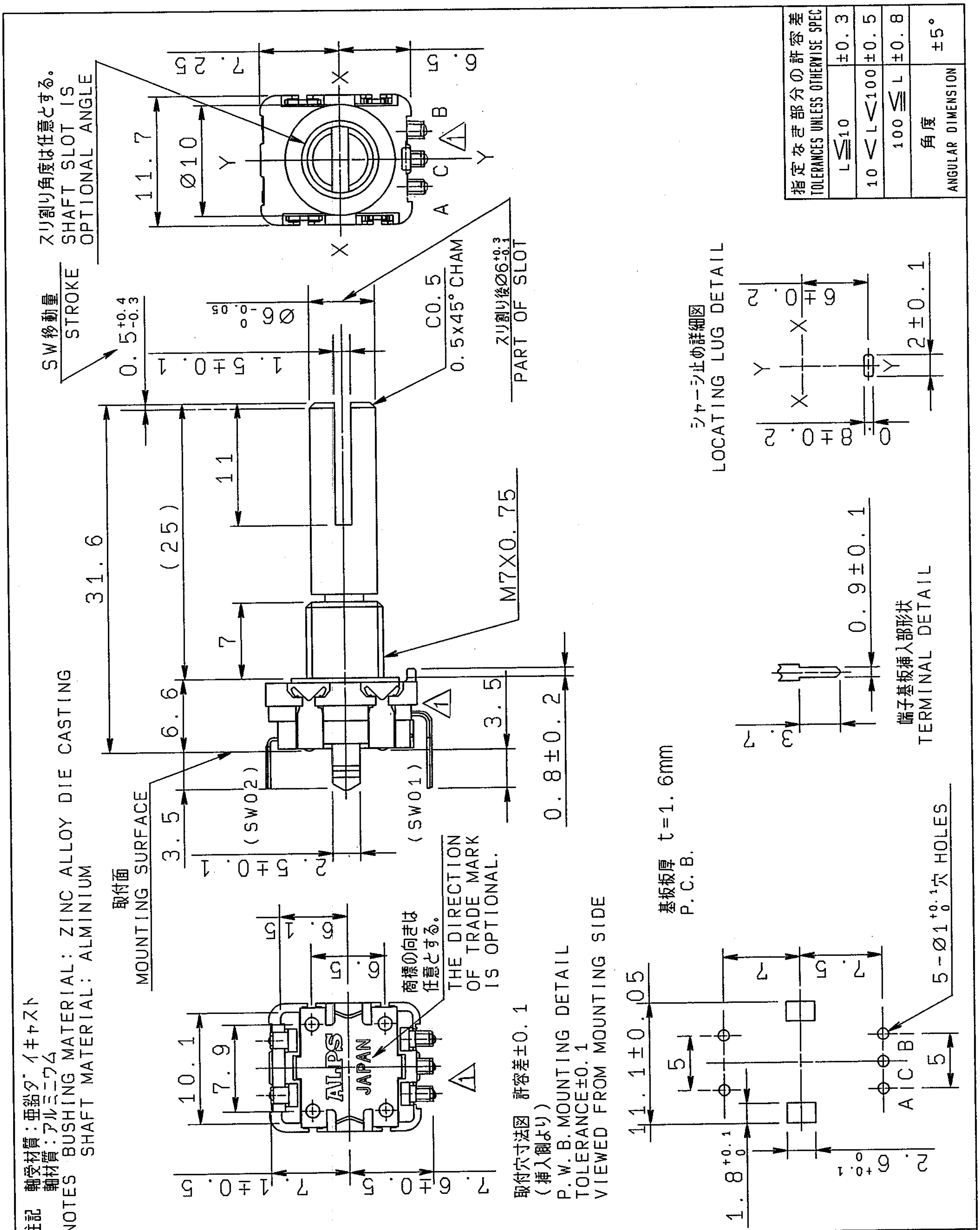
4. 耐久性能 Endurance characteristics.

	項目 Item	条件 Conditions	規格 Specifications
4-1	負荷寿命特性 Operating life	定格負荷にて毎時500回の速さで25,000回断続動作を行う. 但し，試験途中5,000で中間測定を行う. The shaft of switch shall be 25,000 times at a speed of 500times per hour without electrical load. after which measurements shall be made. However, an interim measurement shall be made immediately after 5,000 times.	接触抵抗:200mΩ以下 その他，初期規格を満足すること. Switch contact resistance:200mΩMAX. Except above items, specifications in clause 2.2~4. and 3.1~3 shall be satisfied.

SYMB	DATE	APPD	CHKD	DSGD

ALPS ELECTRIC CO., LTD.

APPD.	CHKD.	DSGD.	TITLE
Mar.22.'96 Y.YOSHIOKA	Mar.22.'96 M.SATOH	Mar.22.'96 Y.ISAWA	DOCUMENT NO. F7374697M (6/6)



PART NO.	NAME	MATERIAL NAME & CODE	FINISH
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ALPS ELECTRIC CO., LTD.

UNIT.	SCALE
mm	:

APPD.	CHKD.	DSGD.
一設2 '94.11.16 溝渕	一設2 '94.11.16 竹沢	一設2 '94.11.15 三浦

SYMB	DATE	APPD	CHKD	DSGD
△1 3	98-09-18	S-1	T.O	K.A

TITLE 11形1軸
PUSH ON SW付薄形エンコーダー

DOCUMENT NO.
LA211446S

1998. 9. 28
1995. 4. 3

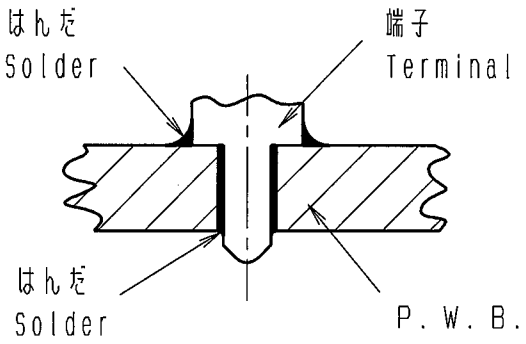
4.6g

OR

CLASS No.	TITLE	

<はんだ付け時のご注意事項>
Caution for soldering

図のようにP. W. Bの上面にはんだ付けをする配線はお避け下さい。
Please avoid soldering on upper surface of P.W.B.as shown



⚠1 基板に挿入される金属足ははんだ付けしてご使用願います。
Solder all metal inserted fixing including terminals & metal lugs into a substrate.

SYMB	DATE	APPD	CHKD	DSGD
⚠1	'09-01-27	Y. K	Y. K	H. M

ALPS ELECTRIC CO., LTD.

APPD.	CHKD.	DSGD.
DSG1	DSG1	DSG1
Y. YOSHIOKA	Y. SATO	Y. OYA
1996/01/11	1996/01/11	1996/01/11

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