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APPROVAL APPLICATION

承 認 書

FOR **HDK**

VARIABLE RESISTOR

TYPE : VZ067TL1 / VZ067TH1

Pb(F)

力圖科技有限公司

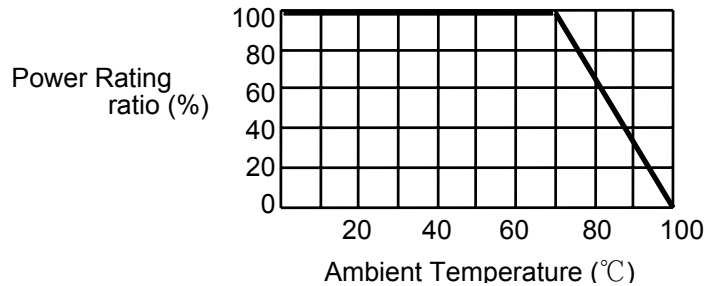
台北市大同區承德路3段163號2樓
TEL : (02)2586-6101~2 FAX : (02)2586-6103

1. Scope

This specification applies to 6 mm type trimmer potentiometer with Carbon - Composition - Resistor, used in electronic equipment.

2. Construction (Dimensions and Materials) and Rating

- 2.1. Dimension See attached Drawing.
- 2.2. Materials See attached Material List
- 2.3. Operating Temperature Range -25 °C ~ +100 °C
- 2.4. Storage Temperature Range -40 °C ~ +100 °C
- 2.5. Nominal Total Resistance Range 100 Ω ~ 1 MΩ
(1 · 2 · 3 · 5 series , see attached Application List)
- 2.6. Total Resistance Tolerance ±25 %
- 2.7. Power Rating 0.1 W (~+70 °C)
Power rating vs. ambient temperature shall be denoted on the following chart.



- 2.8. Rated Voltage Rated Voltage $E = \sqrt{P \cdot R}$
Where P : Power Rating (W)
R : Nominal Total Resistance (Ω)
When the rated voltage exceeds the maximum operating voltage, the maximum operating voltage shall be the rated voltage.
- 2.9. Maximum Operating Voltage 100 V

Nation of product CHINA

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3. Characteristics

Standard atmospheric conditions

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows :

Ambient temperature : 5 °C to 35 °C
 Relative humidity : 45 % to 85 %
 Air pressure : 860 hPa to 1 060 hPa

If there is any doubt about the results, measurements shall be made within the following limits :

Ambient temperature : 20°C±2°C
 Relative humidity : 60 % to 70 %
 Air pressure : 860 hPa to 1 060 hPa

3.1. Mechanical characteristics

	Item	Conditions	Specifications
1	Total Mechanical Rotation		240°±10°
2	Rotational Torque		2.94 mN·m ~ 29.4 mN·m
3	End Stop Strength	The following torsion moment of 49 mN · m shall be applied to the spindle for 5 seconds in any direction.	Without distinct looseness or poor contact.
4	Terminal Strength	The following static load of 2.94 N shall be applied to the terminals for 10 seconds in any direction.	Without distinct looseness or poor contact.
5	Push - Pull Strength	The following static load of 6.86 N shall be applied to the knob for 10 seconds in axial direction.	Without distinct looseness or poor contact.
6	Wobble of Knob	Wobble at the top of the knob in radial direction.	Within 2 mm (p-p)
		Wobble at the top of knob in axial direction.	0.5 mm or less

3.2. Electrical characteristics

	Item	Conditions	Specifications	
1	Resistance Law (Taper)	Output voltage ratio at the middle of total rotational angle.	40 %~60 % (Linear taper)	
2	Ineffective Rotation	Ineffective rotation is the sum of all rotational distances in which resistance does not change and is calculated as a percentage of the total mechanical rotation.	10 % or less of total mechanical rotation, at each end.	
3	Residual Resistance	The resistances at each end of the mechanical rotation between terminals 1 and 2, or 2 and 3 shall be measured.	Total nominal resistance 1 kΩ or less	10Ω or less
			Total nominal resistance more than 1 kΩ but less than 100 kΩ	2 % or less of total nominal resistance.
			Total nominal resistance 100 kΩ and over	5 % or less of total nominal resistance.

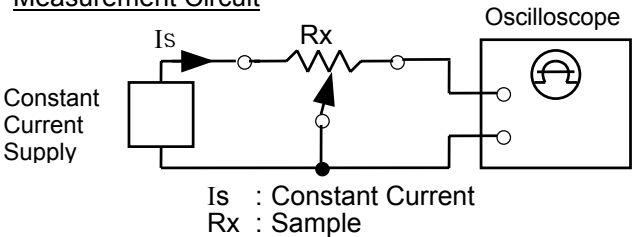
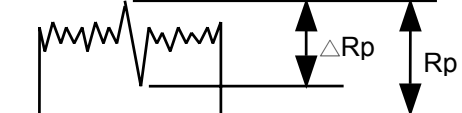
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	Item	Conditions	Specifications
4	Rotational Noise	<p>Rotational rate is about 6 min⁻¹. (A cycle of operation is defined as the travel of the moving contact from one end of the resistance element to the other and back.)</p> <p><u>Measurement Circuit</u></p>  <p>Is : Constant Current Rx : Sample</p> <p>For other procedures is refer to JIS C 5261, Test Method B.</p> <p><u>Measurement data</u></p> 	<p>Rp=3% or less of nominal total resistance. △ Rp=3% or less of nominal total resistance.</p>
5	Contact Resistance	<p>The moving contact shall be rotated to a point where the resistance between terminals 1 and 2 is half of the total resistance. Contact resistance shall be calculated by the following formula :</p> $\frac{(R12+R23) - R13}{2 \times R13} \times 100(\%)$ <p>Where R12 : Resistance between terminals 1 and 2 R23 : Resistance between terminals 2 and 3 R13 : Resistance between terminals 1 and 3</p>	4 % or less of nominal total resistance.
6	High Temperature Resistance Characteristic	<p>The trimmer potentiometer shall be maintained in a thermostatic chamber at a temperature of 70 °C±2 °C without electrical load for 5 h, after which the trimmer potentiometer shall be measured immediately.</p>	<p>Change in total resistance is relative to the value before test . Within ±5 % Nominal total resistance more than 100 kΩ . Within ±7 %</p>

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3.3. Endurance characteristics

When the items in ☆mark, the moving contact shall be rotated to a point where the resistance between 1 and 2 is half of the total resistance.

	Item	Conditions	Specifications
1 ☆	Vibration	The entire frequency range, from 10 Hz to 55 Hz and return to 10 Hz, shall be transversed in 1 min. Amplitude (total excursion) : 1.5mm This motion shall be applied for a period of 2h in each of 3 mutually perpendicular directions. (a total of 6 h)	Change in resistance between 1 and 2 is relative to the value before test . Within ±2 % Without an instant open during the test.
2 ☆	Resistance to Soldering Heat	Mounted on a 1.6 mm thick printed circuit board, the trimmer potentiometer is immersed in a pot of molten solder at 260°C±5°C for 10 s±1 s, or at 380°C±10°C for 3 s± ₀ ¹ s. Then the trimmer potentiometer shall be subjected to standard atmospheric conditions for 1 h ~ 2 h, after which measurements shall be made.	Change in total resistance is relative to the value before test. Within ±2 % Without deformation of knob or distinct looseness of terminals.
3	Solderability	The length 3mm of terminal end shall be immersed in the flux for 5 s to 10 s. After fluxing the terminal shall be immersed in a pot of molten solder at 245 °C±3 °C for 3 s±0.5 s. Flux : Rosin Refer to JIS K 5902 Methanol Refer to JIS K 1501 (The flux shall consist 25 % by weight of rosin.) Solder: Sn-3Ag-0.5Cu	A new uniform coating of solder shall cover a minimum of 95 % of the surface being immersed. However, except bare edge.
4 ☆	High Temperature Storage	The trimmer potentiometer shall be subjected in a thermostatic chamber at a temperature of 70°C±2°C without electrical load for 500h± 12h. Then the trimmer potentiometer shall be taken out from the chamber and maintained at standard atmospheric conditions for 1h ~ 2h, after which measurements shall be made.	Change in total resistance is relative to the value before test . Within ±5 % Nominal total resistance more than 100 kΩ. Within ±7 %
5 ☆	Load Life	The trimmer potentiometer shall be subjected in a thermostatic chamber at a temperature of 70 °C±2 °C with a DC rated voltage for 1.5 h between terminals 1 and 3 followed by a pause of 30 min for 1 000 h±12 h. Then the trimmer potentiometer shall be taken out from the chamber and maintained at standard atmospheric conditions for 1 h ~ 2 h without electrical load, after which measurements shall be made.	Change in total resistance is relative to the value before test. Within ±10 %

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	Item	Conditions	Specifications															
6 ☆	Temperature Cycle	<p>The trimmer potentiometer shall be subjected in a thermostatic chamber at 5 successive change of temperature cycles, each as shown in table below. Then the trimmer potentiometer shall be taken out from the chamber and maintained at standard atmospheric conditions for 1 h ~ 2 h, after which measurements shall be made.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25 °C±3 °C</td> <td>30 min</td> </tr> <tr> <td>2</td> <td>Standard atmospheric conditions</td> <td>10 min to 15 min</td> </tr> <tr> <td>3</td> <td>100 °C±2 °C</td> <td>30 min</td> </tr> <tr> <td>4</td> <td>Standard atmospheric conditions</td> <td>10 min to 15 min</td> </tr> </tbody> </table>	Step	Temperature	Duration	1	-25 °C±3 °C	30 min	2	Standard atmospheric conditions	10 min to 15 min	3	100 °C±2 °C	30 min	4	Standard atmospheric conditions	10 min to 15 min	<p>Change in total resistance is relative to the value before test. Within ±3 % Without distinct looseness or poor contact.</p>
Step	Temperature	Duration																
1	-25 °C±3 °C	30 min																
2	Standard atmospheric conditions	10 min to 15 min																
3	100 °C±2 °C	30 min																
4	Standard atmospheric conditions	10 min to 15 min																
7 ☆	Humidity	<p>The trimmer potentiometer shall be subjected in a thermostatic chamber at a temperature of 40 °C±2 °C with relative humidity of 90% to 95% without electrical load for 500h±12 h. Then the trimmer potentiometer shall be taken out from the chamber and its surface moisture shall be removed. And then the trimmer potentiometer shall be maintained at standard atmospheric conditions for 1 h ~ 2 h, after which measurement shall be made.</p>	<p>Change in total resistance is relative to the value before test. Within ±5 %</p>															
8 ☆	Humidity Load Life	<p>The trimmer potentiometer shall be subjected in a thermostatic chamber at a temperature of 40 °C±2 °C and a relative humidity of 90 % to 95 % with a DC rated voltage for 1.5 hours between terminals 1 and 3 followed by a pause of 30 minutes for 1 000 h±12 h. Then the trimmer potentiometer shall be taken out from the chamber and its surface moisture shall be removed. And then the trimmer potentiometer shall be maintained at standard atmospheric conditions for 1 h ~ 2 h without electrical load, after which measurement shall be made.</p>	<p>Change in total resistance is relative to the value before test. Within ±10 %</p>															
9	Rotational Life	<p>The moving contact shall be rotated without electrical load for 50 cycles±2 cycles at a rate of 10 min⁻¹. (A cycle of operation is defined as the travel of the moving contact from one end of the resistance element to the other and back through 90 % of the total mechanical rotation .)</p>	<p>Change in total resistance is relative to the value before test. Within ±10 %</p>															

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Item	Conditions	Specifications
10 ☆	Resistance to Sulphurate Atmosphere The trimmer potentiometer shall be subjected in a sulphurate atmospheric chamber at a sulphur concentration of 5ppm±1ppm (H ₂ S, 5ppm±1ppm) without electrical load for 500 h±12 h. Then the trimmer potentiometer shall be taken out of the chamber and maintained at standard atmospheric conditions for 1 h ~ 2 h, after which measurements shall be made.	
	Total Resistance	Change is relative to the value before test
	Residual Resistance	Nominal total resistance 1 kΩ or less
		Nominal total resistance more than 1 kΩ and less than 100 kΩ
		Nominal total resistance 100 kΩ and over
	Contact Resistance	Nominal total resistance 1 kΩ or less
		Nominal total resistance more than 1 kΩ
		Within ±10 %
		30 Ω or less
		1.5 % or less of nominal total resistance.
		6 % or less of nominal total resistance.
		12 % or less of nominal total resistance.
		8 % or less of nominal total resistance.

4. Marking

The following items shall be marked indelibly and legibly on the trimmer potentiometer.

4.1. Manufacturer's Name HDK

4.2. Nominal Total Resistance

Express nominal total resistance using triple figures. First number and second number show significant figures and the other shows quantity of zero.

EX. 12 means 100 Ω
 13 means 1 000 Ω (1 kΩ)
 14 means 10 000 Ω (10 kΩ)
 15 means 100 000 Ω (100 kΩ)

4.3. Date Code Following EIAJ RC-1001

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5. The others

5.1. Preset Position

The moving contact set half position of total rotation angle (50 %± 15 % of total rotation angle) on delivery.

5.2. Application Notes

- Recommend speedy soldering (max.260 °C)
- Be careful with flying flux in soldering.
- Handle the trimmer potentiometer with care.

5.3. Industrial Proprietorship

If the trouble on industrial proprietorship (related on delivered product' s design and production) happens, we solves it on own responsibility.

5.4. Nation of product

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MATERIAL LIST

HDK TYPE : VZ067TH○ Pb(F)series
VZ067TL○ Pb(F)series

MATERIAL LIST No. : **C-1023** REV. :

※ METAL MATERIALS AND OTHERES

No.	PART NAME	BASE MATERIAL		PLATING			
		GENERIC TYPE	TYPE NUMBER	UNDERCOAT		SURFACE COATING	
				TYPE OF COATING	THICKNESS	TYPE OF COATING	THICKNESS
1	SUBSTRATE	ALUMINA	—	—	—	—	—
2	RESISTANCE ELEMENT	CARBON COMPOSITION	—	—	—	—	—
3	TERMINALS	STEEL	SPCC	NICKEL ELECTRO-PLATE	0.5 μm ~ 1 μm	Sn ELECTRO-PLATE	2 μm ~ 6 μm
4	TERMINAL CONNECTOR	SOLDER	Sn-3Ag-0.5Cu	—	—	—	—
5	MOVING CONTACT	NICKEL SILVER	NSR	—	—	—	—

※ PLASTIC MATERIALS

No.	PART NAME	GENERIC TYPE	MANUFACTURER	MANUFACTURER'S TYPE & TYPE NUMBER	U.L. FILE NUMBER	U.L. FLAM CLASS
1	KNOB	POLYAMIDE TYPE 6-NYLON	MITSUBISHI ENGINEERING PLASTICS CO., LTD.	NOVAMID : ES 110C	E53664	94V-2
			TAKAYASU CO., LTD.	TANAGIN : TN - 300	E56345	94V-2

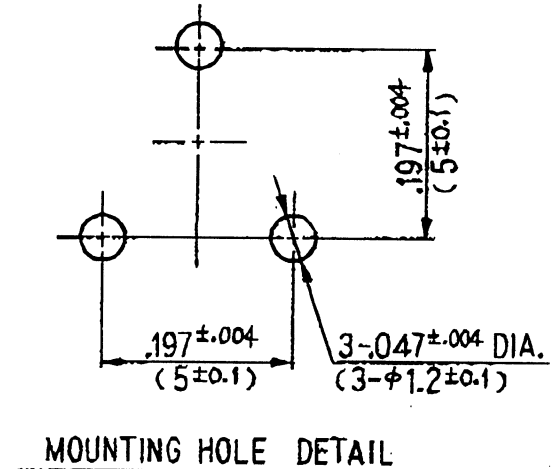
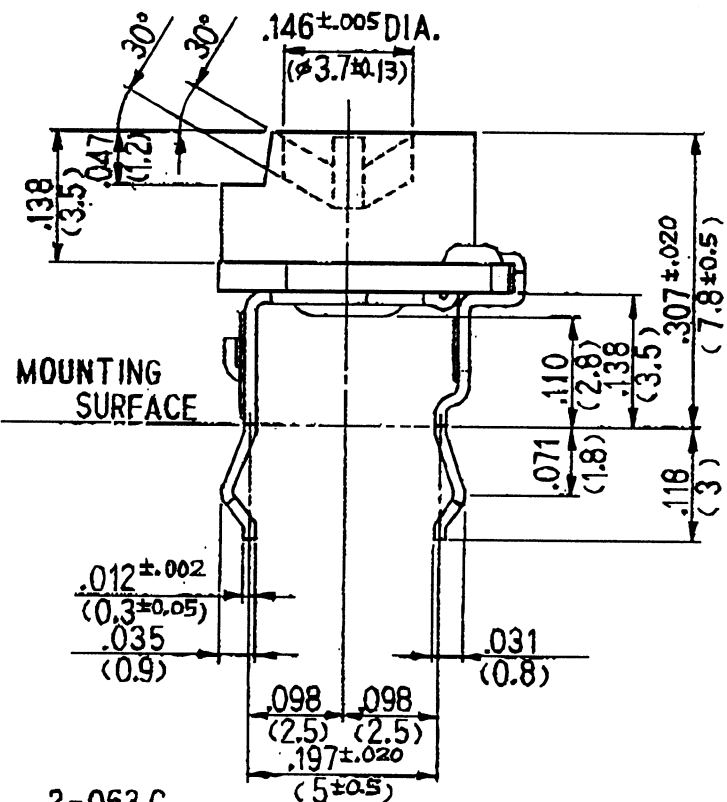
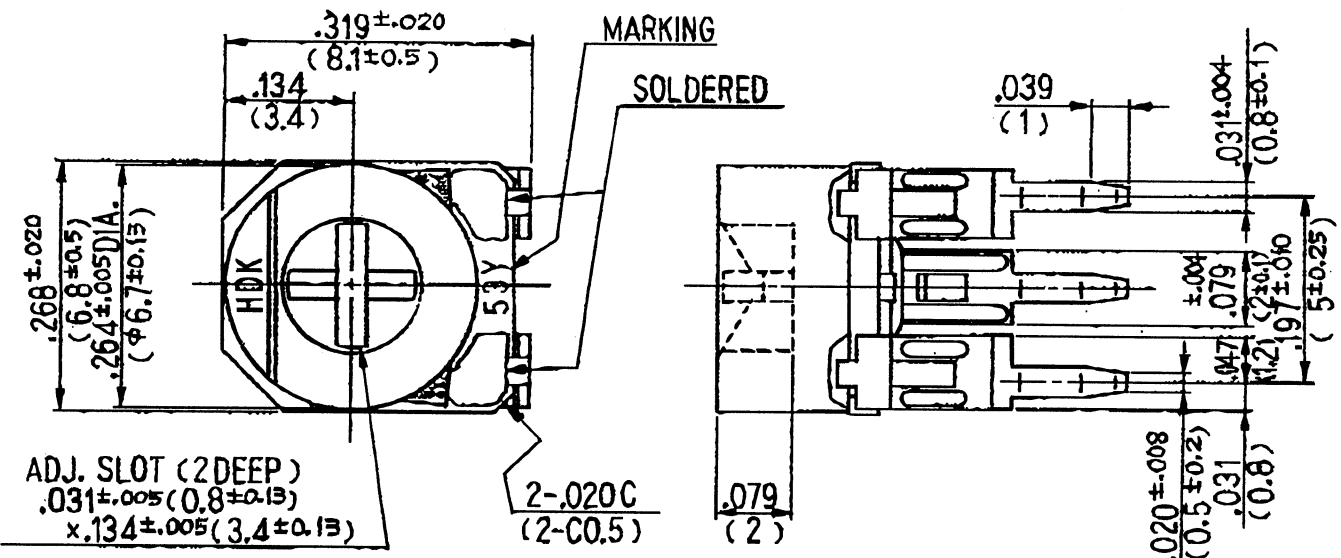
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APPLICATION LIST

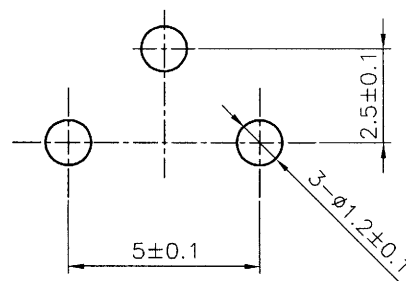
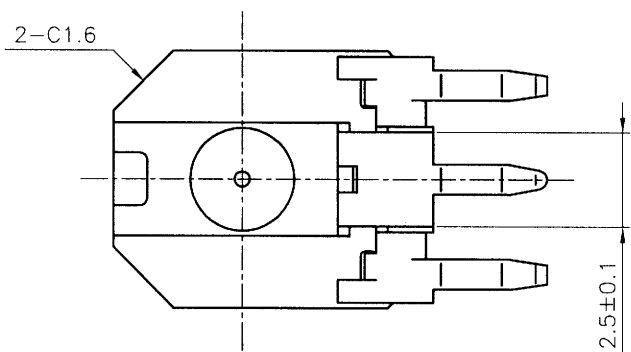
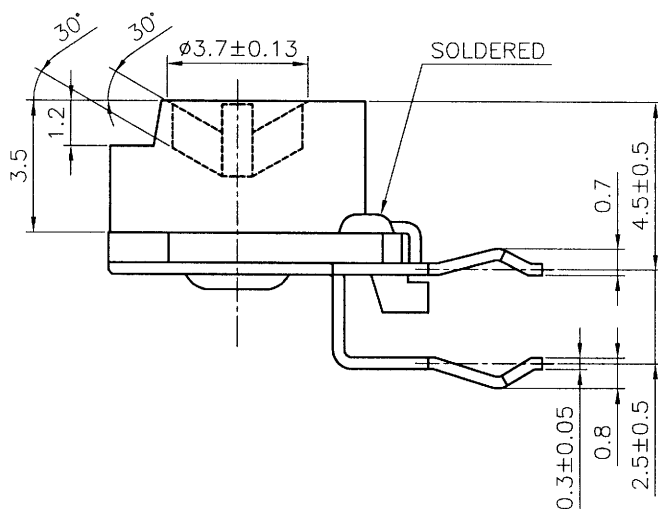
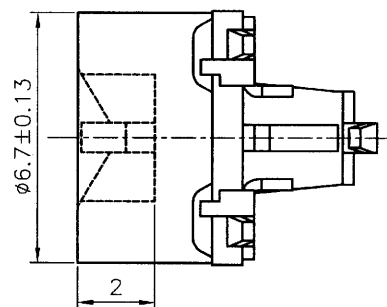
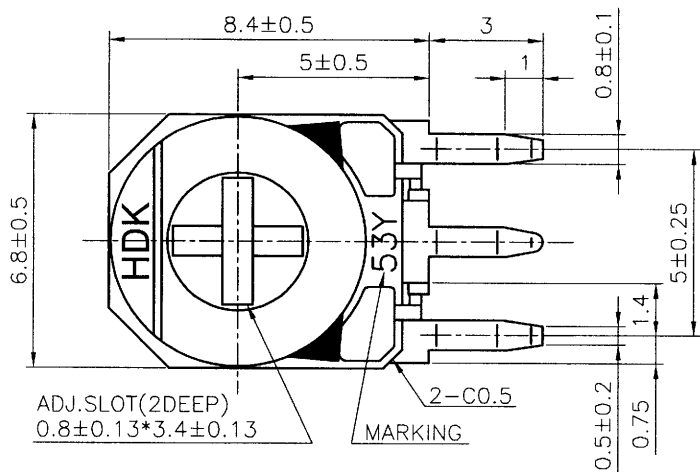
NOMINAL RESISTANCE	TAPER	TOLERANCE	HDK TYPE NO.	PART NO.
100 Ω	B	±25 %	VZ(G)067T B101	
200 Ω			B201	
300 Ω			B301	
500 Ω			B501	
1 k Ω			B102	
2 k Ω			B202	
3 k Ω			B302	
5 k Ω			B502	
10k Ω			B103	
20k Ω			B203	
30k Ω			B303	
50k Ω			B503	
100k Ω			B104	
200k Ω			B204	
300k Ω			B304	
500k Ω			B504	
1 M Ω	▼	▼	▼	B105

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REVISIONS			
DRAWN <i>A. Suzuki</i> Apr. 4 '03 DATE	CHECKED <i>H. Seradok</i> Apr. 4 '03 DATE	APPROVALS <i>[Signature]</i>	UNIT INCH (mm)
TOLERANCES UNLESS OTHERWISE SPECIFIED ± .012 (0.3)		SCALE 5/1	TITLE VARIABLE RESISTOR
TAIWAN HOKURIKU CO., LTD.		HDK TYPE V _G 067 TL1 HDK. DWG. NO. F-220,076T	



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DRAWN <i>Jenny Chua</i>	CHECKED <i>H. Hiraki</i>	APPROVALS <i>Y. Terasaki</i>	SCALE 5/1	TITLE VARIABLE RESISTOR	HDK TYPE VZ(G)067TH1	ISSUE
TOLERANCES UNLESS OTHERWISE SPECIFIED ± 0.3		UNIT mm	TAIWAN HOKURIKU CO.,LTD.		HDK. DWG. NO. C-1703	