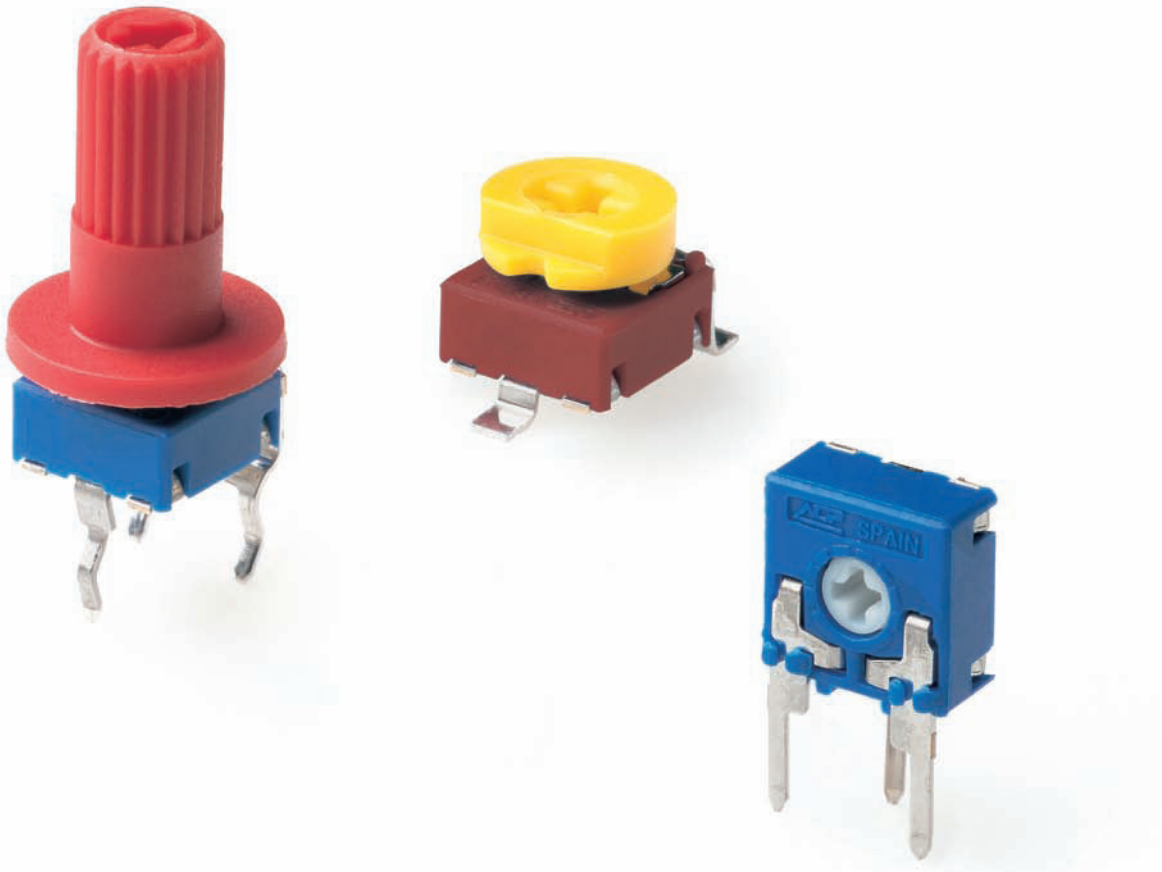


# CARBON – CA6 

6mm carbon potentiometers with plastic housing and Ingress Protection rating type IP 54 (high level of protection against dust and also against water splashing), according to IEC 60529. Plastic materials can be self-extinguishable according to UL 94 V-0 under request.

Through-hole and SMD configurations are available. Terminals and collector are normally manufactured in tinned brass, although versions with steel terminals are also available under request. Terminals for through-hole models can be provided straight or crimped, which helps hold the component to the PCB during soldering.

Tapers can be linear, log and antilog; special tapers can also be studied.

ACP's potentiometers can be adjusted from either the front or the back, both in the horizontal and the vertical adjustment types. Thumbwheels and shafts can be ordered either separately or already inserted in the potentiometer.

Potentiometers can be manufactured in a wide range of possibilities regarding:

- Resistance value.
- Tolerance.
- Tapers / variation laws.
- Pitch.
- Positioning of the wiper (standard is at 50% rotation).
- Housing and rotor color.
- Mechanical life.
- Self-extinguishable plastic parts according to UL 94 V-0 under request.

**Applications**

6mm potentiometers are mainly used in trimming applications, in different markets:

- Industrial: Timers and relays, dimmers, adjustment of output.
- Electronic appliances: volume regulation, temperature controls and function selection.
- Automotive: Lighting regulation, dimmers.
- Measurement and test equipment.
- Telecommunication equipment (antenna amplifiers and receivers, videocomm, intercomm).
- Alarm systems.

# CA6 HOW TO ORDER

EXAMPLE: **CA6XV2,5-10KA2020 SNP PI WT-6030-BA**

| Standard features | | | | | | | | Extra features | | | | | Assembled accessory | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Series | Rotor | Model | Packg. | Ohm value | Taper | Tol. | Life | Track | Snap in | Housing | Rotor | Wiper | Assembly | Ref # | Color | Flam. |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | 14 | | |
| CA6 | X | V2,5 | | - 10K | A | 2020 | | | SNP | | | PI | WT | -6030 | -BA | |

| Standard configuration: | CA6 Through-hole | CA6 SMD |
|---|---|---|
| Dimensions: | 6mm | |
| Protection: | IP 54 (dust-proof)<br>On request: Self-extinguishable, to meet UL 94 V-0 | |
| Substrate: | Carbon technology | Carbon technology, special for high temperature |
| Color: | Blue housing + white rotor | Brown housing + grey rotor |
| Packaging: | Bulk or Tape & Reel | |
| Wiper position: | at 50% ±15º | |
| Terminals: | Snap in P (except model CA6VS5) | |
| Marking: | Resistive value marked on housing. Others on request. | |

**Customized products:** A drawing is requested when ordering a customized product. Series, rotor, model and total resistive value are indicated before the code that includes all special specifications. Example: CA6XH2,5-10K CODE C00120.

### 1 - Series

- CA6

### 2 - Rotors

| D | M | N | X |
|---|---|---|---|

### 3 - Model and pitch

| H2,5 | HSMD | V2,5 | V5 | VS5 |
|---|---|---|---|---|
| VSMD | VESMD | VSMD WT… | VESMD WT… | |

### 4 - Packaging

| | Trough-hole | SMD models |
|---|---|---|
| Bulk | (blank)...(1) | (blank)...(1) |
| T&R (Tape and 13" reel) | (N.A.)(2) | T&R |
| T&R (Tape and 15" reel) | (N.A.)(2) | T&R15 |

(1) If blank, bulk packaging is implied. (2) N.A., Not Applicable: Tape and Reel packaging is only available for SMD terminals.

### 5 - Resistance value

| 100Ω | 200Ω | 220Ω | 250Ω | 470Ω | 500Ω | 1KΩ | 2KΩ | ... | 500KΩ | 1MΩ | 2MΩ | 2M2Ω | 4M7Ω | 5MΩ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 200 | 220 | 250 | 470 | 500 | 1K | 2K | | 500K | 1M | 2M | 2M2 | 4M7 | 5M |

### 6 - Resistance law / taper

| | |
|---|---|
| Lin - Linear | A |
| Log - Logarithmic | B |
| Antilog - Antilogarithmic | C |
| - Special tapers have codes assigned: | CODE YXXXXX |

### 7 - Tolerance

| ±20% | ±25% | ±30% | +50%,-30% | ±10% | ±5% |
|---|---|---|---|---|---|
| 2020 | 2525 | 3030 | 5030 | 1010 | 0505 |

### 8 - Operating Life (Cycles)

| | |
|---|---|
| Standard (1.000 cycles) | (leave blank) |
| Long life: LV + the number of cycles. ex: LV06 for 6.000 cycles. (others on request) | LVXX: ex: LV06 |

### 9 - Cut Track – Open circuit.

| | |
|---|---|
| Open circuit at beginning of track, fully CCW | PCI |
| Open circuit at end of track, fully CW | PCF |

### 10 - Terminals

| | |
|---|---|
| SNAP IN P | SNP |
| Shorter tip of terminal, TPXX, where XX is tip length (under request) | TPXX, ex: TP20 |
| Steel Terminals | SH |

### 11 - Housing

| | |
|---|---|
| **Color:** For colors other than standard: -See color chart below- | CJ-color, ex., red: CJ-RO |

### 12 - Rotor

| | |
|---|---|
| **Color:** For colors other than standard: -See color chart below- | RT-color; ex., blue: RT-AZ |

*** Self-extinguishable property, V0, for housing and rotor:**

| | |
|---|---|
| By default, carbon is non self-extinguishable, cermet is Self-extinguishable: | (blank) |
| For carbon: self-extinguishable property can be added. V0 means housing and rotor are V0. If only the housing needs to be V0, then CJ-V0. | V0<br>CJ-V0, RT-V0 |
| If only rotor: RT-V0 | |

### 13 - Wiper

| | |
|---|---|
| **Wiper position** (Standard: 50% ± 15º) | (leave blank) |
| Initial or CCW | PI |
| Final or CW | PF |
| Others: following clock positions; at 3 hours: P3H | PXH, ex: P3H |
| **Wiper torque** (Standard: <2Ncm) | (leave blank) |
| Low torque, < 1.5Ncm | PGB |

### 14 - Potentiometers with assembled accessories

| | |
|---|---|
| Assembled from terminal side | WT |
| Assembled from collector side | WTI |
| Accessory Reference<br>See list of shafts and thumbwheels available | -XXXXX<br>Example: 6030 |
| Color of shaft or thumbwheel | -YY Example, white: BA |
| Non self-extinguishable.<br>Self-extinguishable according to standard UL 94<br>(-V0 in box 17 modifies only the accessory, please, note.) | (leave blank)<br>-V0 |

**For ordering spare accessories:**

| | |
|---|---|
| Accessory reference - color- flammability.<br>Ex. 6030-AZ-V0 is a blue self-extinguishable 6030 thumbwheel | XXXX-YY-V0 |

**Color chart for rotor, housing and accessories**

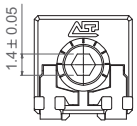
| Black(1) | White | Neutral | Transp. | Red | Green | Yellow | Blue | Grey | Brown |
|---|---|---|---|---|---|---|---|---|---|
| NE | BA | IN | TA | RO | VE | AM | AZ | GS | MR |

(1) black is not an option for housings.

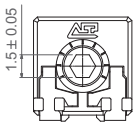
## Rotors

Rotors are drawn in their standard positioning, 50% of rotation. Alternative delivery positioning can be requested. Accessories in this catalogue are designed for the X rotor, unless otherwise stated.

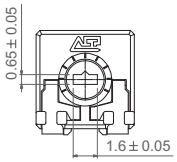
### D



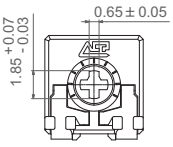

### M




### N



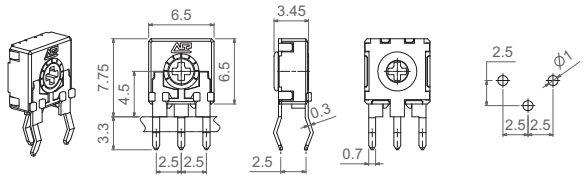

### X



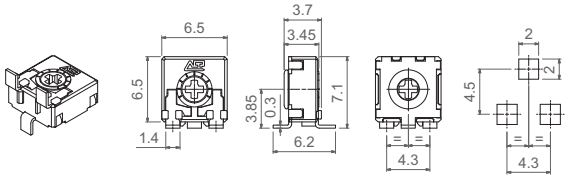

## Models

All models shown here have the most common rotor for 6mm potentiometers: the X rotor. Different rotors are available from the menu above.

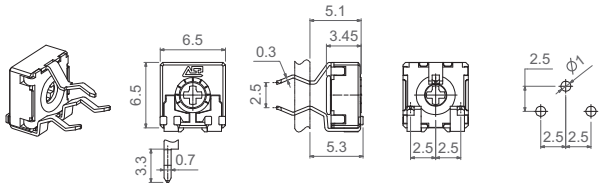
### H2,5



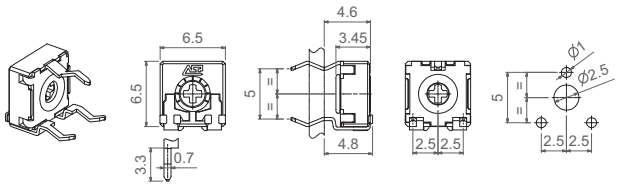

### HSMD



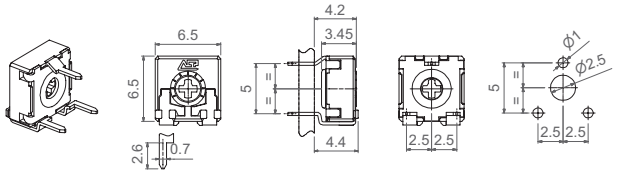

### V2,5




### V5

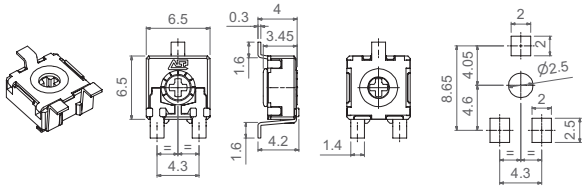



### VS5

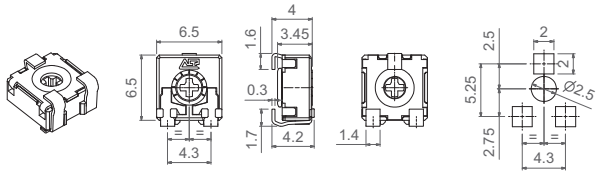



SNP not possible with VS5 model

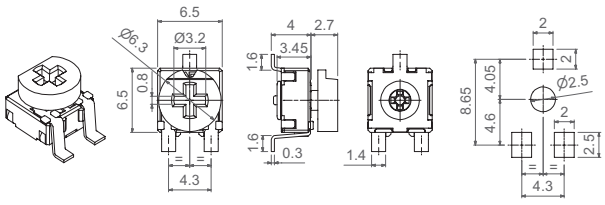
### VSMD



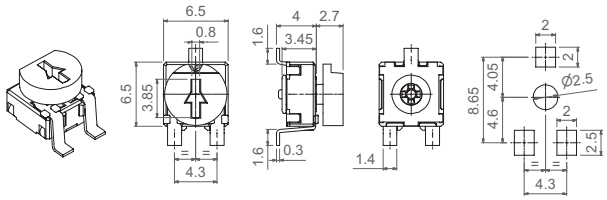

### VESMD




### VSMD WT-6030

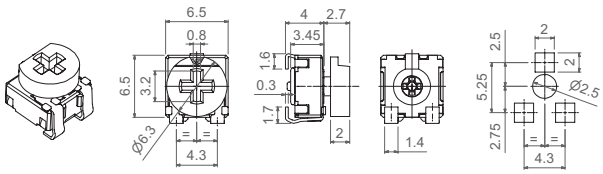



### VSMD WT-6037

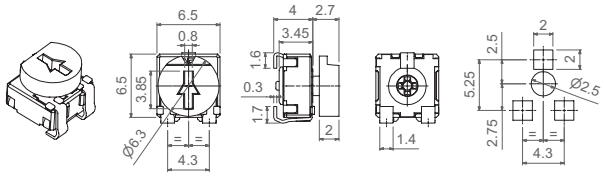


## Models

### VESMD WT-6030



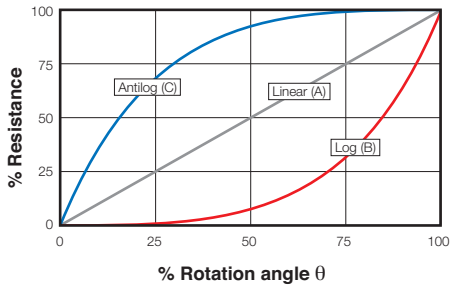

### VESMD WT-6037




## Tapers

The standard taper is linear (A). Log (B) and Antilog (C) tapers are also available, as well as special tapers according to customer's specifications.

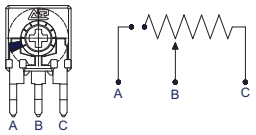
### REGULAR TAPERS



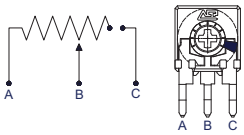

## Potentiometers with cut track

The cut track is an area with very high resistive value, resulting in an open circuit. It is widely used in lighting applications.
PCI = Cut at initial position, when the potentiometer is turned fully counter clockwise.
PCF = Cut at final position, when the potentiometer is turned fully clockwise.
Other positions are available on request.

### PCI




### PCF

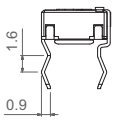



## Terminals

By default, terminals are always crimped (with snap in, "SNP") to better hold the component to the PCB during the soldering operation, except for VS5, with short terminals that do not allow for SNP.
ACP can provide straight terminals if needed.

### SNP

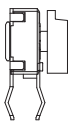
Also, there is an option of having shorter terminal tips.



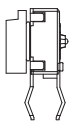

## Possibilities for insertion of accessories

Accessories can be mounted on potentiometers through either the front side (WT) or the collector side (WTI). For the specific angular position of shafts with planes, a drawing with the exact position is requested.

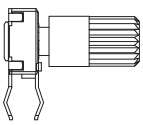
### WT Front side



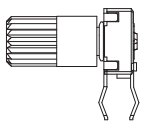
### WTI Collector side



### WT Front side



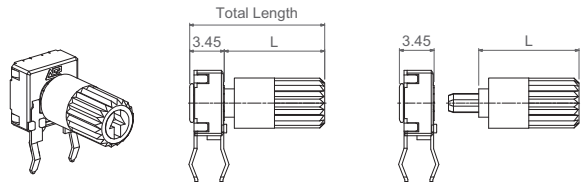
### WTI Collector side



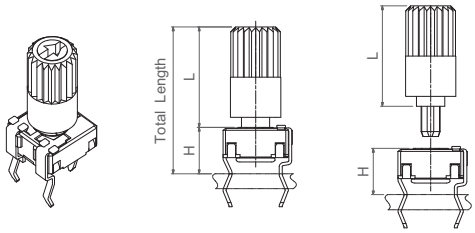
## Shafts

Shafts are available in different colors (color chart in “how to order” section) and with self-extinguishable property, according to UL 94 V-0, under request. ACP can study special shaft designs.
Shafts can be sold separately or delivered already mounted on the potentiometer at ACP.
When a shaft is mounted on a potentiometer, the distance from the top of the potentiometer to the top of the shaft is marked with “L” in the table below, as shown in the drawings:

### H potentiometer + shaft

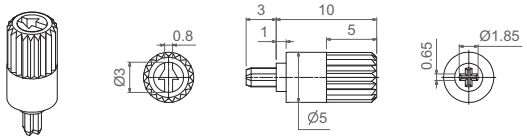



### V potentiometer + shaft

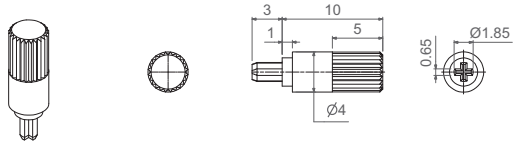



| Shaft | 6022 | 6023 | 6031 | 6024 | 6025 | 6028 | 6040 |
|---|---|---|---|---|---|---|---|
| L Dimension | 10 | 10 | 11 | 12.2 | 14.5 | 14.5 | 21.3 |

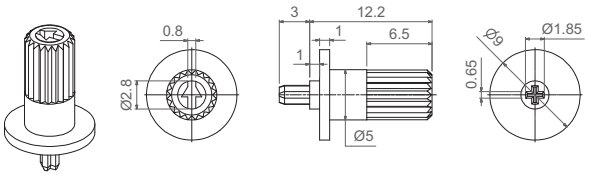
### 6022



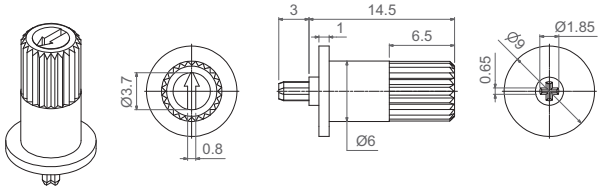

### 6023



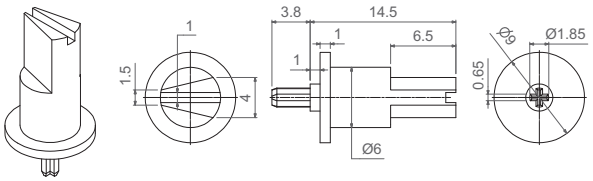

### 6024



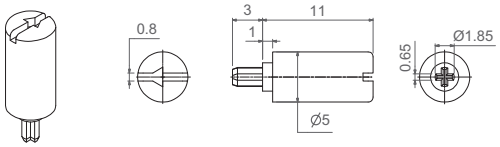

### 6025



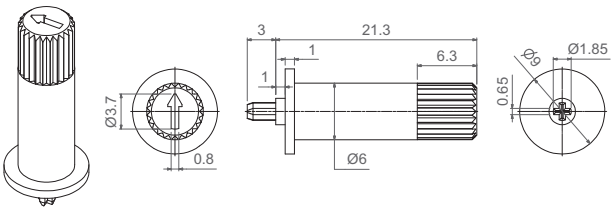

### 6028




### 6031



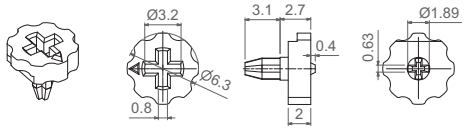

### 6040



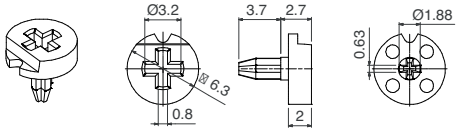
## Thumbwheel

Thumbwheels are available in different colors (color chart in “how to order” section) and with self-extinguishable property according to UL 94 V-0, under request.
Thumbwheels can be mounted on the potentiometers at ACP (see models with WT-6030 or WT-6037) or sold separately. ACP can study special thumbwheel designs.

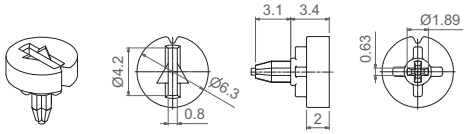
### 6001



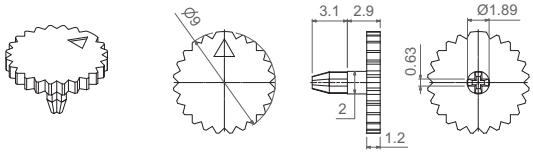

### 6030



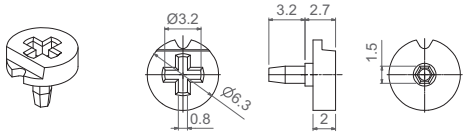

### 6032



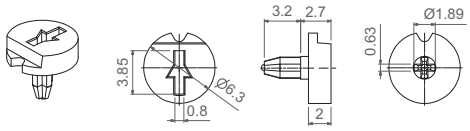

### 6034




### 6035 (Designed for M rotor)




### 6037



## Packaging

### Bulk packaging:

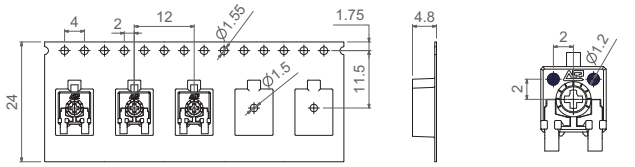
| Potentiometer model | With shaft or thumbwheel inserted? | Pieces per small box (150 x 100 x 70) | Pieces per bigger box (250 x 150 x 70, CG on description) |
|---|---|---|---|
| H2,5 - V2,5 - V5<br>VS5 - HSMD - VSMD - VESMD | None, only potentiometers. | 1.000 | 4.000 |
| | 6001, 6030, 6032, 6035, 6037 | 1.000 | 3.000 |
| | 6024, 6025, 6028 | 300 | To be determined. |
| | 6022, 6023, 6031 | 500 | To be determined. |

### Tape & Reel packaging:

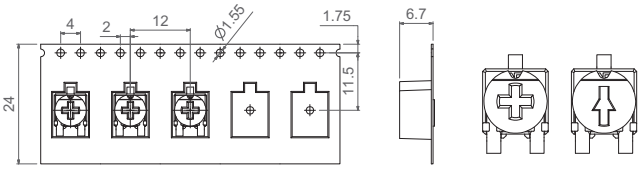
| | With thumbwheel inserted? | 13" Reel (Standard), with 24mm width tape | 15" Reel, with 24mm width tape |
|---|---|---|---|
| VSMD | None, only potentiometers. | 1.200 pcs per reel, 12mm step between cavities. | 1.700 pcs per reel, 12mm step between cavities. |
| | 6030, 6035, 6037 | 750 pcs per reel, 12mm step between cavities. | 1.100 pcs per reel, 12mm step between cavities. |
| VESMD | None, only potentiometers. | 1.000 pcs per reel, 12mm step between cavities. | 1.500 pcs per reel, 12mm step between cavities. |
| | 6030, 6035, 6037 | 700 pcs per reel, 12mm step between cavities. | 1.000 pcs per reel, 12mm step between cavities. |
| HSMD | None, only potentiometers. | 750 pcs per reel, 12mm step between cavities. | 1.000 pcs per reel, 12mm step between cavities. |
| | With specific thumbwheel. | Under request. | Under request. |

The 13" reel is the standard. For the 15" reel, T&R15 is added to the description.

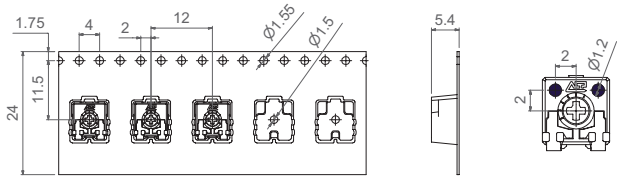
**VSMD-T&R**



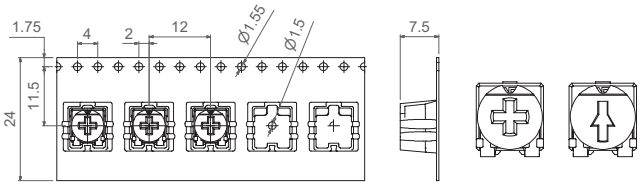

**VSMD-T&R...WT-6030 / 6035 / 6037**



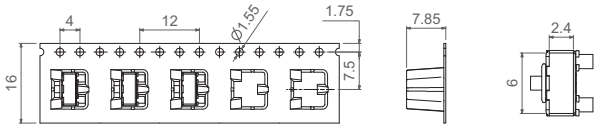

**VESMD-T&R**



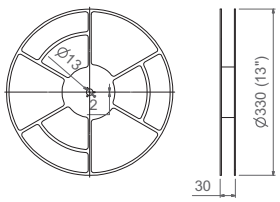

**VESMD-T&R...WT-6030 / 6035 / 6037**



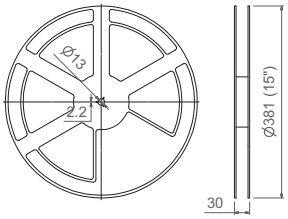

**HSMD-T&R**




**13"Reel**




**15"Reel**



## Electric Specifications

These are standard features; other specifications and out of range values can be studied on request.

| | CA6 Through-hole | CA6 SMD |
|---|---|---|
| Range of resistance values*<br>Lin (A)<br>Log (B) Antilog (C) | <br>100Ω ≤ Rn ≤ 5MΩ<br>1 KΩ ≤ Rn ≤ 2M2Ω | <br>100Ω ≤ Rn ≤ 1MΩ<br>1 KΩ ≤ Rn ≤ 1 MΩ |
| Tolerance*<br>Rn < 100Ω:<br>100Ω ≤ Rn ≤ 100KΩ<br>100K< Rn ≤ 1MΩ:<br>1MΩ < Rn ≤5MΩ:<br>Rn > 5MΩ: | <br>+50%, -30% (out of range)<br>±20%<br>±20%<br>±30%<br>+50%, -30% (out of range) | <br>-<br>±25%<br>±25%<br>±50%<br>- |
| Variation laws | Lin (A), Log (B), Antilog (C). Other tapers available on request | |
| Residual resistance | Lin (A), Log (B), Antilog (C) ≤ 5*10-3*Rn. Minimum value 2Ω | |
| CRV - Contact Resistance Variation (dynamic) | Lin (A) Electrical Angle 215º±20º ≤ 3%Rn.<br>Other tapers, please inquire | |
| CRV - Contact Resistance Variation (static) | Lin (A) Electrical Angle 215º±20º ≤ 5%Rn.<br>Other tapers, please inquire | |
| Maximum power dissipation**<br>Lin (A)<br>Log (B), Antilog (C) | <br>at 50ºC<br>0.10W<br>0.06W | |
| Maximum voltage<br>Lin (A)<br>Log (B), Antilog (C) | <br>100VDC<br>60VDC | |
| Operating temperature | -25ºC … +70ºC (+85ºC on request) | |
| Temperature coefficient<br>100Ω ≤ Rn ≤ 10KΩ<br>10KΩ < Rn ≤ 5MΩ | <br>+200/ -300 ppm<br>+200/ -500 ppm | <br>+200/ -500 ppm<br>+200/ -1000 ppm |

* Out of range ohm values and tolerances are available on request, please, inquire.
** Dissipation of special tapers will vary, please, inquire.

## Mechanical Specifications

| | CA6 Through-hole | CA6 SMD |
|---|---|---|
| Resistive element | Carbon technology | Carbon technology |
| Angle of rotation (mechanical) | 235º ± 10º | |
| Angle of rotation (electrical) | 215º ± 20º | |
| Wiper standard delivery position | 50% ± 15º | |
| Max. stop torque | 4 Ncm | |
| Max. push/pull on rotor | 9.8 N | |
| Wiper torque* | <2 Ncm | |
| Mechanical life | 1.000 cycles (others available on request) | |

* Stronger or softer torque feeling is available on request.

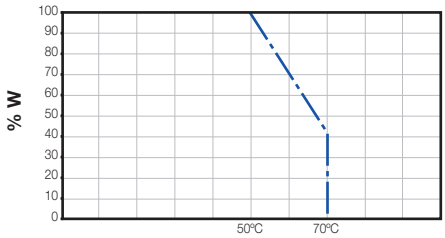
## Test results

The following typical test results are given at 23ºC ±2ºC and 50% ±25% RH.

| | CA6 Through-hole and SMD | |
|---|---|---|
| | **Test conditions** | **Typical variation of nominal resistance** |
| Damp heat | 500 h. at 40°C and 95% RH | +5%, -2% |
| Thermal cycles | 16 h at 85ºC, plus 2 h at –25ºC | ±2.5% |
| Load life | 1.000 h. at 50°C | +0%; -6% |
| Mechanical life | 1.000 cycles at 10 c.p.m. and at 23°C ± 2°C | ±4% |
| Storage (3 years) | 3 years at 23°C ± 2°C | ±3% |

**CA6 Through-hole and SMD**

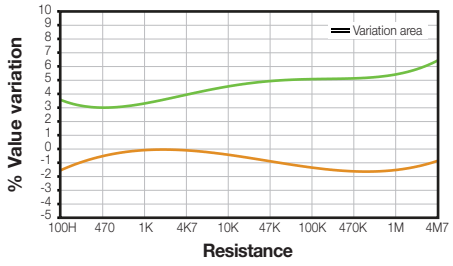
Power derating curve:



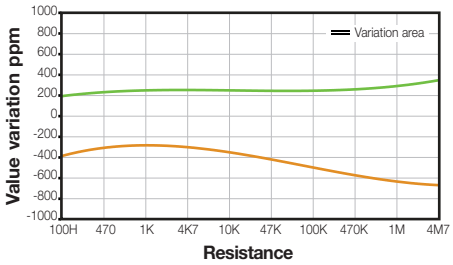

Representation of the typical variation of nominal resistance (with 95% confidence) throughout the ohm value range:

**CA6 Through-hole and SMD**

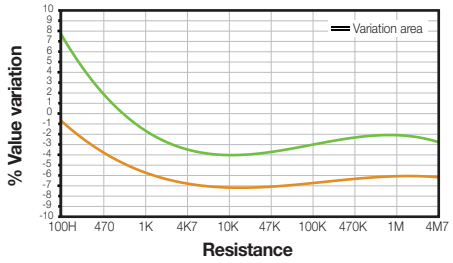
Damp heat




Temperature Coefficient




Load life




Mechanical life