

ELECTRONIC VALVE SPECIFICATION
CV7169-CV7177

ISSUE 1 DATED, SEPTEMBER, 1961
AMENDMENT No. 1

Page 1

J.S. Catalogue Numbers:- Amend to read as follows

| | |
|--------|------------------|
| CV7169 | 5960-99-037-2460 |
| CV7170 | 5960-99-037-2461 |
| CV7171 | 5960-99-037-2462 |
| CV7172 | 5960-99-037-2463 |
| CV7173 | 5960-99-037-2464 |
| CV7174 | 5960-99-037-2465 |
| CV7175 | 5960-99-037-2466 |
| CV7176 | 5960-99-037-2467 |
| CV7177 | 5960-99-037-2468 |

February, 1962
(10660)

GENERAL POST OFFICE: E-IN-C(S)

General Post Office E in C(S)

| | | |
|--|--------------------------------------|-------------------------------|
| Specification: G.P.O./CV 7169 - CV 7177 Issue No 1 Dated September 1961 To be used in conjunction with K 1007. | SECURITY. | |
| | <u>Specification</u> Unclassified | <u>Valve</u> Unclassified. |

← Indicates a change

| | | |
|--|---|--|
| TYPE OF DEVICE - Silicon Voltage Reference Diode. (Note A) PROTOTYPE - VR-B series | MARKING CV Number, Polarity marking, Factory and date code. See K 1007/4 | |
| <u>RATINGS AND CHARACTERISTICS</u> (Not for Inspection purposes) <u>All limiting Values are absolute.</u> Note. | <u>DIMENSIONS</u> K1007/A1/D10 | |
| | <u>MOUNTING POSITION</u> Any. | |
| | <u>PACKAGING</u> K1007/14 | |
| | J.S. Catalogue Numbers are:- | |
| Max. dissipation at 25°C ambient air (W) 2 Max. Continuous forward current at 25°C ambient air. (A) 2.75 Operating ambient temperature range - 55°C to + 150°C. Nominal reference voltage at 25°C ambient air, I _R = 20 mA CV 7169 (V) 3.50 CV 7170 4.25 CV 7171 4.75 CV 7172 5.25 CV 7173 5.75 CV 7174 6.25 CV 7175 7.00 CV 7176 8.00 CV 7177 9.00 Max. continuous reference current at 25°C ambient air. CV 7169 (mA) 525 B CV 7170 470 B CV 7171 430 B CV 7172 400 B CV 7173 370 B CV 7174 345 B CV 7175 285 B CV 7176 235 B CV 7177 210 B | CV 7169 5960 - 99 - 2460 CV 7170 5960 - 99 - 2461 CV 7171 5960 - 99 - 2462 CV 7172 5960 - 99 - 2463 CV 7173 5960 - 99 - 2464 CV 7174 5960 - 99 - 2465 CV 7175 5960 - 99 - 2466 CV 7176 5960 - 99 - 2467 CV 7177 5960 - 99 - 2468. | |

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| <u>RATINGS & CHARACTERISTICS Cont'd</u> | | | NOTE |
|--|-------------------------|--------|------|
| Typical Slope resistance at $I_R = 20\text{mA}$ at 25°C ambient air. | | | |
| CV7169 | (Ω) | 17.2 | C |
| CV7170 | | 16.0 | C |
| CV7171 | | 14.4 | C |
| CV7172 | | 11.0 | C |
| CV7173 | | 4.5 | C |
| CV7174 | | 1.8 | C |
| CV7175 | | 1.5 | C |
| CV7176 | | 1.5 | C |
| CV7177 | | 1.6 | C |
| Typical Mean Temperature coefficients of reference voltage at $I_R = 20\text{mA}$ Temperature range, 25°C to 60°C ambient air | | | |
| CV7169 | ($\%/^\circ\text{C}$) | -0.053 | D |
| CV7170 | | -0.039 | D |
| CV7171 | | -0.026 | D |
| CV7172 | | -0.011 | D |
| CV7173 | | +0.015 | D |
| CV7174 | | +0.033 | D |
| CV7175 | | +0.045 | D |
| CV7176 | | +0.057 | D |
| CV7177 | | +0.065 | D |
| Max. reverse leakage current at -2V $T_{\text{amb}} = 100^\circ\text{C}$. | | | |
| CV7169 | (μA) | 200 | |
| CV7170 | | 200 | |
| CV7171 | | 150 | |
| CV7172 | | 150 | |
| CV7173 | | 100 | |
| CV7174 | | 100 | |
| CV7175 | | 50 | |
| CV7176 | | 20 | |
| CV7177 | | 20 | |

NOTES

- (A) These devices are primarily intended as close tolerance reference diodes and for this purpose they should be operated with reference currents of 20mA or greater.
- (B) For derating above 25°C ambient air see Figure 1.
- (C) For the typical variation of slope resistance with reference current see Figure 2.
- (D) For typical changes in reference voltage with ambient temperature above 25°C see Figures 3 - 11 incl. For limit diodes, whose reference voltage lies between two nominal values, interpolation between two curves will give an indication of voltage change. Similarly, interpolation between current curves is useful for intermediate values of current.

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| K1007 | TEST | TEST CONDITIONS | AQL % | INSE LEVEL | SYM- BOL | LIMITS | | UNITS |
|-------|--|--|----------|---------------|----------------|---|---|--|
| | | | | | | MIN | MAX. | |
| 5.F.2 | <u>GROUP A.</u> Reference Voltage | Tamb. = 25±5°C I _R = 20mA. CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177 | | 100% | V _Z | 2.9 3.9 4.4 4.9 5.4 5.9 6.4 7.4 8.4 | 4.1 4.6 5.1 5.6 6.1 6.6 7.6 8.6 9.6 | V V V V V V V V V |
| 5.F.3 | Slope Resistance | Tamb. = 25±5°C I _R = 20mA. CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177 | | 100% | r _Z | 15 14 12 6 0 0 0 0 0 | 20 19 18 17 10 4 4 4 4 | Ω Ω Ω Ω Ω Ω Ω Ω Ω |
| | <u>GROUP B.</u> | OMITTED | | | | | | |
| 5.F.5 | <u>GROUP C.</u> Reverse Leakage Current | V _R = -2V Tamb. = 100±5°C CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177 | 2.5 | 1 | I _R | - - - - - - - - - | 200 200 150 150 100 100 50 20 20 | μA μA μA μA μA μA μA μA μA |
| 5.F.4 | <u>GROUP D</u> Mean Temperature Coefficient of Reference Voltage. | I _R = 20mA Tamb. = +25°C and +60°C. CV7169 CV7170 CV7171 | 6.5 | 1A | S _Z | -0.07 -0.056 -0.042 | -0.040 -0.025 -0.010 | %/°C |

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| K1007 | TEST | TEST CONDITIONS | AQL % | INSP. LEVEL | SYM- BOL | LIMITS | | UNITS | |
|-------|--|--|----------|----------------|-------------|--------|---|--|--|
| | | | | | | MIN | MAX. | | |
| | <u>GROUP D Cont'd</u> | CV7172 CV7173 CV7174 CV7175 CV7176 CV7177 | | | | | -0.030 -0.015 0 +0.025 +0.040 +0.050 | +0.025 +0.040 +0.048 +0.058 +0.075 +0.080 | |
| | <u>GROUP E</u> | | | | | | | | |
| 10.2 | Temperature Cycling | No Voltage, Three Cycles -55°C to +100°C. | | 1C | | | | | |
| 10.3 | Climatic Cycling | No Voltages, Note 1 | | | | | | | |
| | <u>Post Temperature and Climatic Cycling Tests</u> | Combined AQL. | 10 | | | | | | |
| 8 | Inoperatives Reference Voltage | As in Group A | 6.5 | | Vz | Note 2 | | V | |
| | Slope Resistance | As in Group A | 6.5 | | rZ | Note 2 | | Ω | |
| 11.3 | Fatigue | No Voltages. | | 1C | | | | | |
| | <u>Post Fatigue Tests</u> | | | | | | | | |
| 8 | Inoperatives Reference Voltage | As in Group A | 6.5 | | Vz | Note 2 | | V | |
| | Slope Resistance | As in Group A | 6.5 | | rZ | Note 2 | | Ω | |
| 11.4 | Shock | No Voltages, Hammer Angle = 60° | | T.A. | | | | | |
| 10.1 | Lead Fragility | No Voltages, Note 3 | 6.5 | 1C | | | | | |
| 11.5 | Soldering | | 6.5 | 1C | | | | | |
| | <u>GROUP F</u> | | | | | | | | |
| 13 | Life | Tamb. range +25°C to +150°C, d.c. reference current not less than the value corresponding to the chosen Tamb. according to the derating curve on Figure 1. | | 1A | | | | | |
| 13.3 | <u>Life Test End point 1000 Hours</u> | | | | | | | | |
| | Reference Voltage. | As in Group A. | 6.5 | | Vz | Note 2 | | V | |

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| K1007 | TEST | TEST CONDITIONS | AQL % | INSP. LEVEL | SYM- BOL | LIMITS | | UNITS |
|--------------|---|---|----------|----------------|----------------|--------|------|-------|
| | | | | | | MIN | MAX. | |
| 13.4 13.5 | <u>GROUP F (Contd)</u> | | | | | | | |
| | Slope Resistance | As in Group A. | 6.5 | | r _Z | Note 2 | | Ω |
| | Storage Life (1) | t = 150 hours, T _{amb} = -55°C | | 1 | | | | |
| | Storage Life (2) | t = 150 hours, T _{amb} = +100°C | | 1 | | | | |
| | <u>Post Storage Life Tests</u> | | | | | | | |
| | | COMBINED AQL FOR STORAGE (1) POST TESTS | | 6.5 | | | | |
| | COMBINED AQL FOR STORAGE (2) POST TESTS | | 6.5 | | | | | |
| | Reference Voltage | As in Group A | 4.0 | | V _Z | Note 2 | | V |
| | Slope Resistance | As in Group A | 4.0 | | r _Z | Note 2 | | Ω |
| 8 | <u>GROUP G</u> | | | | | | | |
| | Retest after 28 days holding period | | | 100% | | | | |
| | Inoperatives | | 0.5 | | | | | |
| | Reference Voltage | As in Group A | 1.0 | | V _Z | Note 2 | | V |
| | Slope Resistance | As in Group A. | 1.0 | | r _Z | Note 2 | | Ω |

NOTES

- (1) The samples of diodes shall be subjected to conditioning in accordance with K1007 Section 10.1 and shall then be subjected to temperature cycling and climatic cycling in sequence and shall then pass the post temperature and climatic cycling tests.
- (2) To Group A test limits of reference voltage or slope resistance.
- (3) Diodes used for this test must have undergone at least 28 cycles of the climatic test in accordance with K1007 Section 10.3.1 or 10.3.2 or 6 cycles in accordance with Section 10.3.3.

DATA SHEET

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VOLTAGE REFERENCE DIODE DERATING CURVE

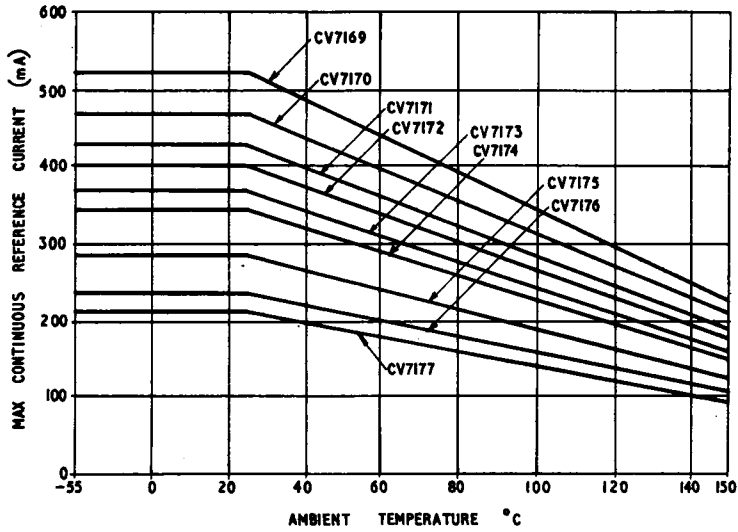


FIG. 1 CV7169 - CV7177

DATA SHEET
 TYPICAL VARIATIONS OF SLOPE RESISTANCE
 WITH REFERENCE CURRENT

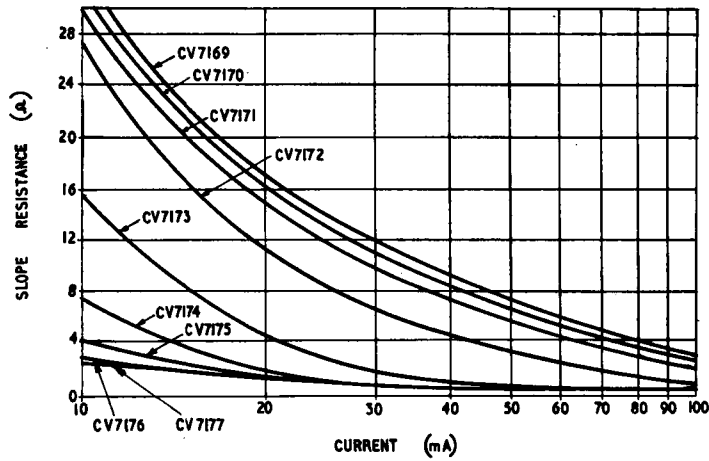


FIG.2 CV7169 - CV7177

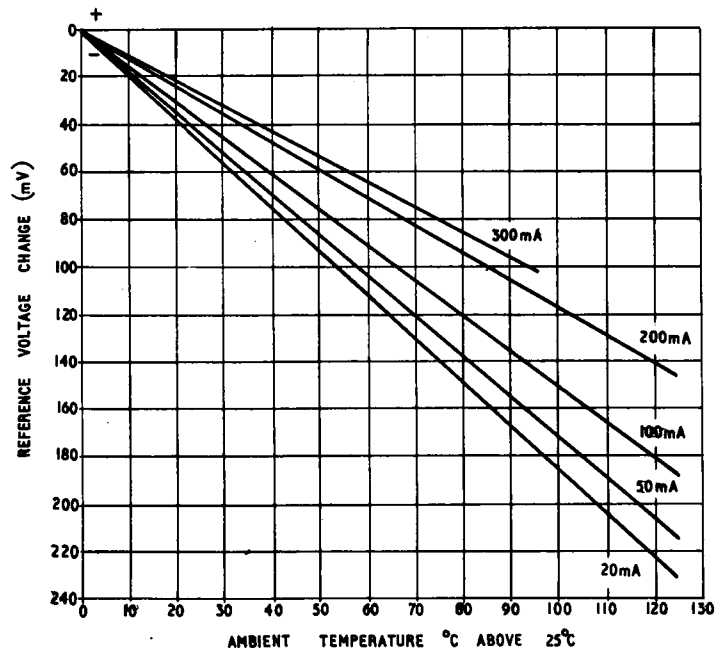


FIG.3 CV7169
 TYPICAL VARIATION OF REFERENCE VOLTAGE
 WITH AMBIENT TEMPERATURE

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DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

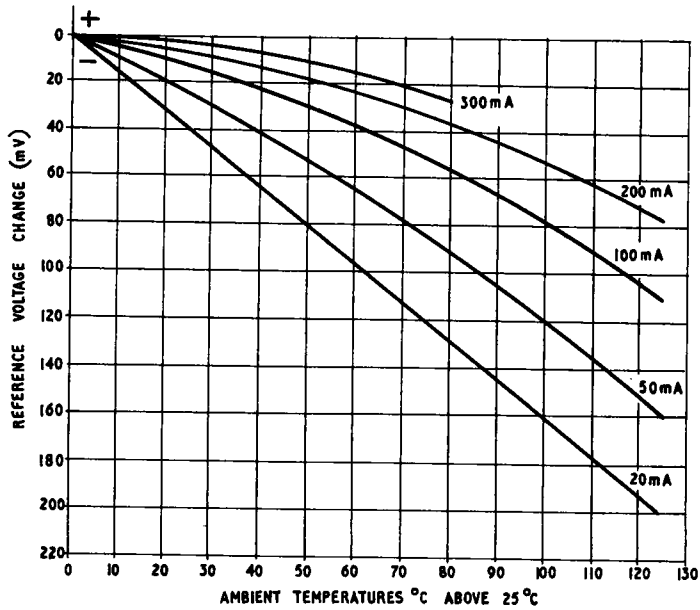


FIG. 4 CV 7170

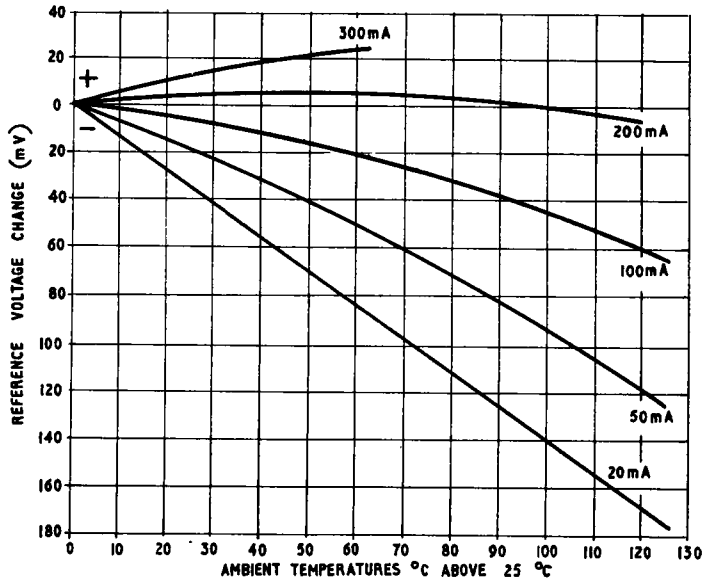


FIG. 5 CV 7171

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DATA SHEET
TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

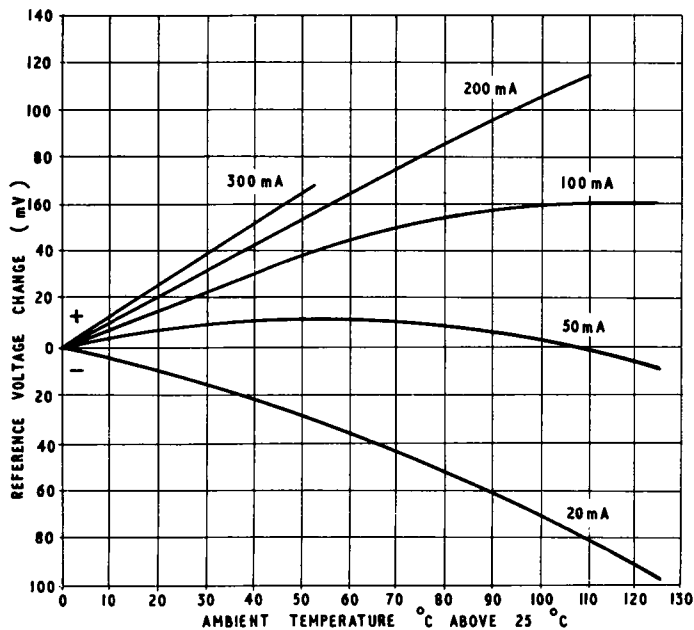


FIG. 6 CV7172

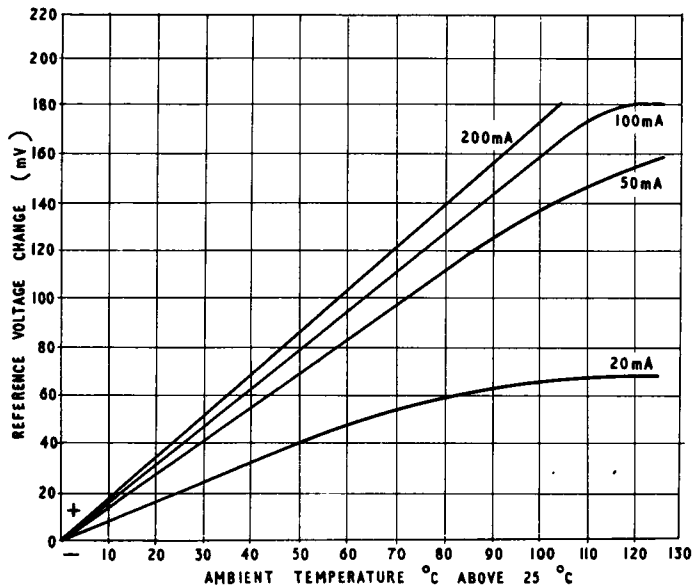


FIG. 7 CV7173

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DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

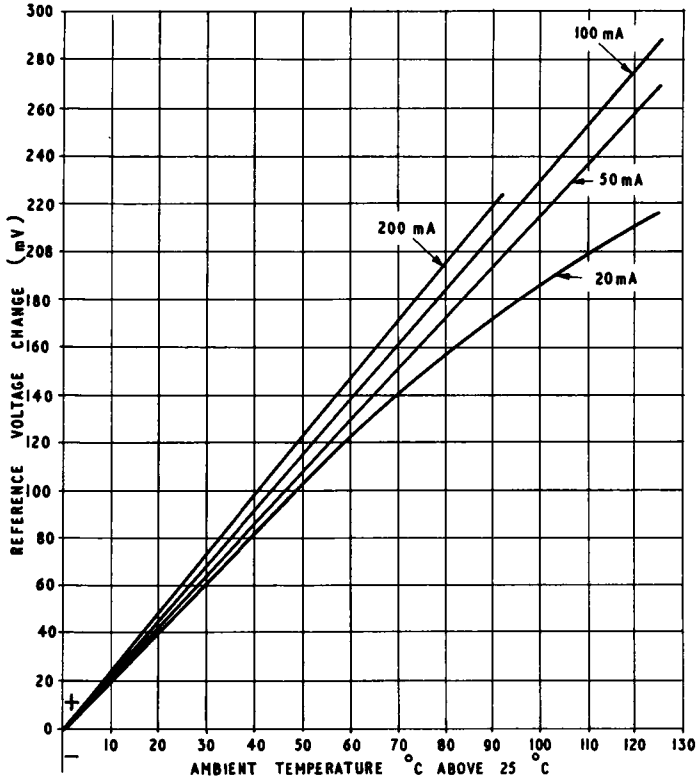


FIG. 8 CV7174

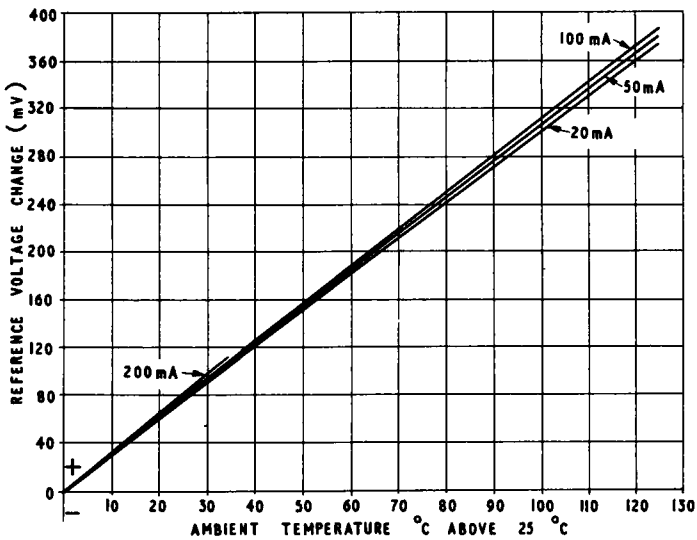


FIG. 9 CV7175

DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE WITH AMBIENT TEMPERATURE

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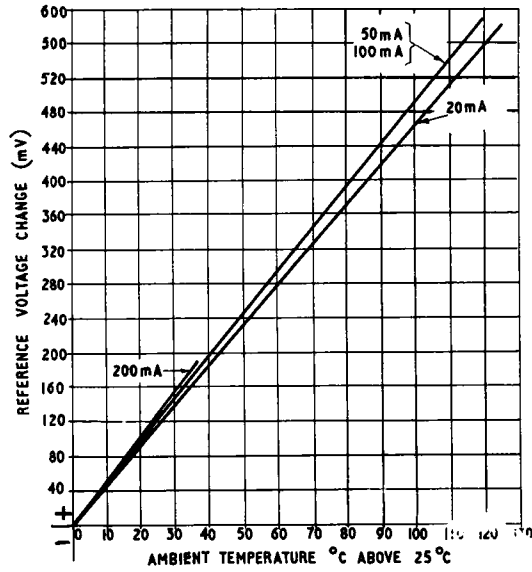


FIG. 10 CV 7176

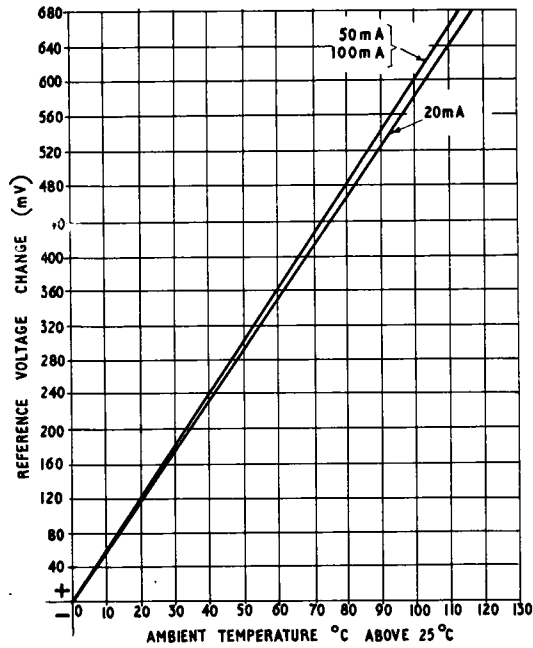


FIG. 11 CV 7177