| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE (YR-MO-DA) | APPROVED |
| A | Add device type 05. Paragraph 1.4; Correct Input Voltage Range from “+16 V dc to +40 V dc” to “+15 V dc to +50 V dc”. Table IA $V_{OUT}$ Load Regulation test; Correct max value from 100 mV for device type 01 and max value 120 mV for device type 02, 03 to max value of 50 mV for all device types. gjc | 12-01-18 | Charles F. Saffle |
| B | Case outline Y dimensioning table: Correct max inch dimension from “.335” to “.355” for symbol “A”. Add ∅b2 dimension for pin seal to case outlines X and Y. Editorial changes throughout. -gc | 15-06-30 | Charles F. Saffle |
| C | Add device types 06 and 07. Corrections throughout. -gc | 19-02-11 | Charles F. Saffle |

| REV | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHEET | | | | | | | | | | | | | | | | | | | | |
| REV | C | C | C | C | | | | | | | | | | | | | | | | |
| SHEET | 15 | 16 | 17 | 18 | | | | | | | | | | | | | | | | |

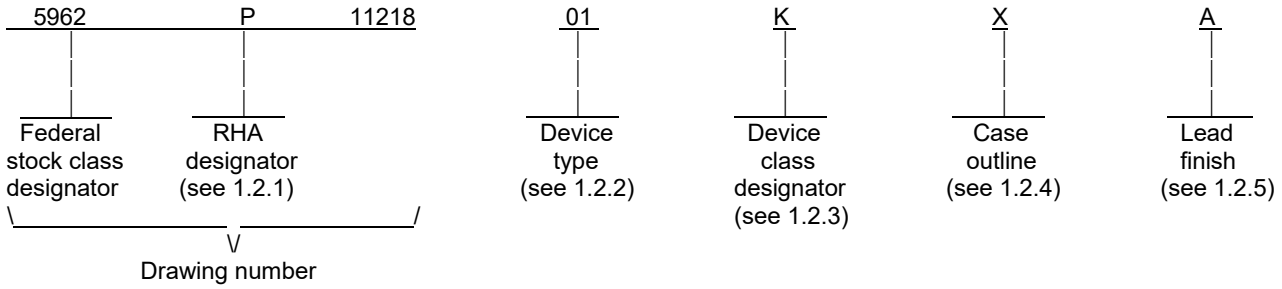
| REV STATUS | REV | C | C | C | C | C | C | C | C | C | C | C | C | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OF SHEETS | SHEET | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

| | | |
|---|---|---|
| PMIC N/A | PREPARED BY<br>Greg Cecil | |
| **STANDARD MICROCIRCUIT DRAWING**<br><br>THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE<br><br>AMSC N/A | CHECKED BY<br>Greg Cecil | **DLA LAND AND MARITIME**<br>**COLUMBUS, OHIO 43218-3990**<br>**https://www.dla.mil/LandandMaritime** |
| | APPROVED BY<br>Charles F. Saffle | **MICROCIRCUIT, HYBRID, LINEAR, SINGLE CHANNEL, DC-DC CONVERTER** |
| | DRAWING APPROVAL DATE<br>11-10-25 | |
| | REVISION LEVEL<br>C | SIZE<br>A<br>CAGE CODE<br>**67268**<br>**5962-11218**<br>SHEET<br>1 OF 18 |

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes as defined in paragraph 1.2.3 and MIL-PRF-38534. A choice of case outlines and lead finishes which are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:




1.2.1 Radiation hardness assurance (RHA) designator. RHA marked devices meet the MIL-PRF-38534 specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

| Device type | Generic number | Circuit function |
|---|---|---|
| 01 | SVHF283R3S | DC-DC Converter, 10 W, +3.3 V Output |
| 02 | SVHF2805S | DC-DC Converter, 15 W, +5 V Output |
| 03 | SVHF2812S | DC-DC Converter, 20 W, +12 V Output |
| 04 | SVHF2815S | DC-DC Converter, 20 W, +15 V Output |
| 05 | SVHF282R5S | DC-DC Converter, 8 W, +2.5 V Output |
| 06 | SVHF285R2S | DC-DC Converter, 15 W, +5.2 V Output |
| 07 | SVHF285R7S | DC-DC Converter, 15 W, +5.7 V Output |

1.2.3 Device class designator. This device class designator is a single letter identifying the product assurance level. All levels are defined by the requirements of MIL-PRF-38534 and require QML Certification as well as qualification (Class H, K, and E) or QML Listing (Class G and D). The product assurance levels are as follows:

| Device class | Device performance documentation |
|---|---|
| K | Highest reliability class available. This level is intended for use in space applications. |
| H | Standard military quality class level. This level is intended for use in applications where non-space high reliability devices are required. |
| G | Reduced testing version of the standard military quality class. This level uses the Class H screening and In-Process Inspections with a possible limited temperature range, manufacturer specified incoming flow, and the manufacturer guarantees (but may not test) periodic and conformance inspections (Group A, B, C, and D). |
| E | Designates devices which are based upon one of the other classes (K, H, or G) with exception(s) taken to the requirements of that class. These exception(s) must be specified in the device acquisition document; therefore the acquisition document should be reviewed to ensure that the exception(s) taken will not adversely affect system performance. |

D — Manufacturer specified quality class. Quality level is defined by the manufacturers internal, QML certified flow. This product may have a limited temperature range.

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

| Outline letter | Descriptive designator | Terminals | Package style |
|---|---|---|---|
| X | See figure 1 | 8 | Dual-in-line |
| Y | See figure 1 | 8 | Dual-in-line, flange mount |

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

| | |
|---|---|
| Input Voltage (Continuous) | +50 V dc |
| Input Voltage (Transient, 1 second) | +80 V dc |
| Junction Temperature Rise to Case | +12 °C |
| Storage Temperature | -65 °C to +150 °C |
| Lead Solder Temperature (10 seconds) | +270 °C |

1.4 Recommended operating conditions.

| | |
|---|---|
| Input Voltage Range | +15 V dc to +50 V dc |
| Case Operating Temperature Range ($T_C$) | -55 °C to +125 °C |

1.5 Radiation features.

| | |
|---|---|
| Maximum total dose available (dose rate = 50 - 300 rad(Si)/s) | 30 krad (Si) 2/ |
| Maximum total dose available (dose rate ≤ 10 mrad(Si)/s) LDR: | |
| Components: | 30 krad (Si) 2/ 3/ |
| Hybrid: | 4/ |
| Single event phenomenon (SEP) effective linear energy threshold (LET): | |
| SEL, SEB, SEGR, SEFI | ≥44 MeV-cm$^2$/mg 5/ 6/ |

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard for Electronic Component Case Outlines.

1/ Stresses above the absolute maximum ratings may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ Bipolar device types may degrade from displacement damage from radiation which could affect RHA levels. These device types have not been characterized for displacement damage.
3/ Components: The discrete semiconductor elements have been High Dose Rate tested using Condition A (50-300 rads(Si)/s) of Method 1019 in MIL-STD-750. The integrated circuit elements have been High Dose Rate tested using Condition A (50-300 rads(Si)/s) and Low Dose Rate tested using Condition D (≤ 10 mrads(Si)/s) of Method 1019 of MIL-STD-883. The difference between HDR and LDR test results have been compared to determine if the integrated circuit elements exhibit ELDRS effect. Enhanced low dose rate sensitivity of the components was not observed.
4/ Hybrid: Hybrid devices have been high dose rate tested using Condition A (50-300 rad(Si)/s) of method 1019 of MIL-STD-883. Low dose rate testing on the device has not been completed.
5/ Single event performance is tested; no dropouts, shutdowns, latch up or burn out.
6/ See table IB.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at https://quicksearch.dla.mil)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F1192 - Standard Guide for the Measurement of Single Event Phenomena (SEP) Induced by Heavy Ion Irradiation of Semiconductor Devices.

(Copies of these documents are available online at https://www.astm.org/)

2.3 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 shall include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. The manufacturer may eliminate, modify or optimize the tests and inspections herein, however the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. In addition, the modification in the QM plan shall not affect the form, fit, or function of the device for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Radiation exposure circuits. The radiation exposure circuits shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DLA Land and Maritime-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DLA Land and Maritime-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DLA Land and Maritime-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

(2) $T_A$ as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

c. PIND testing, method 2020, condition A, of MIL-STD-883.

TABLE IA. Electrical performance characteristics.

| Test | Symbol | Conditions 1/ 2/ 3/ 4/ 5/ 6/ $-55°C \le T_C \le +125°C$, $V_{IN}$ = +28 V dc ± 5%, Full Load unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Output Voltage | $V_{OUT}$ | $I_{OUT}$ = 3 A | 1 | 01 | 3.267 | 3.333 | V dc |
| | | | 2,3 | | 3.25 | 3.35 | |
| | | | 1,2,3 7/ | | 3.244 | 3.35 | |
| | | $I_{OUT}$ = 3 A | 1 | 02 | 4.95 | 5.05 | |
| | | | 2,3 | | 4.925 | 5.075 | |
| | | | 1,2,3 7/ | | 4.89 | 5.10 | |
| | | $I_{OUT}$ = 1.67 A | 1 | 03 | 11.88 | 12.12 | |
| | | | 2,3 | | 11.82 | 12.18 | |
| | | | 1,2,3 7/ | | 11.66 | 12.3 | |
| | | $I_{OUT}$ = 1.34 A | 1 | 04 | 14.85 | 15.15 | |
| | | | 2,3 | | 14.775 | 15.225 | |
| | | | 1,2,3 7/ | | 14.565 | 15.4 | |
| | | $I_{OUT}$ = 3.2 A | 1 | 05 | 2.475 | 2.525 | |
| | | | 2,3 | | 2.463 | 2.538 | |
| | | | 1,2,3 7/ | | 2.463 | 2.538 | |
| | | $I_{OUT}$ = 3 A | 1 | 06 | 5.148 | 5.252 | |
| | | | 2,3 | | 5.122 | 5.278 | |
| | | | 1,2,3 7/ | | 5.09 | 5.3 | |
| | | $I_{OUT}$ = 2.63 A | 1 | 07 | 5.643 | 5.757 | |
| | | | 2,3 | | 5.615 | 5.786 | |
| | | | 1,2,3 7/ | | 5.557 | 5.843 | |
| Output Current 8/ 9/ | $I_{OUT}$ | $V_{IN}$ = 15 V dc to 50 V dc | 1,2,3 | 01,02 | | 3 | A |
| | | | | 03 | | 1.67 | |
| | | | | 04 | | 1.34 | |
| | | | | 05 | | 3.2 | |
| | | | | 06 | | 3 | |
| | | | | 07 | | 2.63 | |
| $V_{OUT}$ Ripple Voltage | $V_{RIP}$ | BW = 20 Hz to 10 MHz | 1,2,3 | All | | 40 | mVp-p |

See footnotes at end of table.

TABLE IA. Electrical performance characteristics.

| Test | Symbol | Conditions 1/ 2/ 3/ 4/ 5/ 6/ $-55°C \le T_C \le +125°C$, $V_{IN}$ = +28 V dc ± 5%, Full Load unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| $V_{OUT}$ Line Regulation | $VR_{LINE}$ | $V_{IN}$ = 15 V dc to 50 V dc | 1,2,3 | All | | 20 | mV |
| $V_{OUT}$ Load Regulation | $VR_{LOAD}$ | $+V_{OUT}$ No Load to Full Load | 1,2,3 | All | | 50 | mV |
| Input Current | $I_{IN}$ | $I_{OUT}$ = 0, Inhibit = 0 | 1,2,3 | All | | 6 | mA |
| | | $I_{OUT}$ = 0, Inhibit = open | | | | 65 | |
| $I_{IN}$ Ripple Current | $I_{RIP}$ | BW = 20 Hz to 10 MHz | 1,2,3 | All | | 80 | mAp-p |
| | | | 1 7/ | | | 80 | |
| | | | 2,3 7/ | | | 110 | |
| Efficiency | Eff | $I_{OUT}$ = 3 A | 1,2,3 | 01 | 65 | | % |
| | | $I_{OUT}$ = 3 A | | 02,06 | 72 | | |
| | | $I_{OUT}$ = 1.67 A | | 03 | 77 | | |
| | | $I_{OUT}$ = 1.34 A | | 04 | 78 | | |
| | | $I_{OUT}$ = 3.2 A | | 05 | 57 | | |
| | | $I_{OUT}$ = 2.63 A | | 07 | 72 | | |
| Isolation | ISO | 500 V dc, $T_C$ = +25°C | 1 | All | 100 | | MΩ |
| Capacitive Load 10/ | $C_L$ | No effect on DC performance, $T_C$ = +25°C | 1 | 01,02, 05,06, 07 | | 1000 | µF |
| | | | | 03,04 | | 500 | |
| Short Circuit Power Dissipation | $P_D$ | Short Circuit | 1,2,3 | All | | 8 | W |
| Switching Frequency | $F_S$ | | 1,2,3 | All | 350 | 500 | kHz |
| $V_{OUT}$ Step Load Transient | $V_{TLOAD}$ | 50% Load to 100% Load | 4,5,6 | 01 | | 400 | mV pk |
| | | | | 02,06 | | 600 | |
| | | | | 03,04 | | 500 | |
| | | | | 05 | | 250 | |
| | | | | 07 | | 400 | |

See footnotes at end of table.

TABLE IA. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ 2/ 3/ 4/ 5/ 6/ $-55°C \le T_C \le +125°C$ $V_{IN}$ = +28 V dc ± 5% Full Load unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| $V_{OUT}$ Step Load Transient Recovery 11/ | $TT_{LOAD}$ | 50% Load to 100% Load | 4,5,6 | 01,03, 04 | | 500 | µs |
| | | | | 02, 05,06 | | 600 | |
| | | | | 07 | | 400 | |
| $V_{OUT}$ Step Line Transient 10/ | $V_{TLINE}$ | $V_{IN}$ = 16 V dc to 40 V dc | 4,5,6 | 01, 05 | | 700 | mV pk |
| | | | | 02,06 | | 800 | |
| | | | | 03,04 | | 900 | |
| | | | | 07 | | 450 | |
| $V_{OUT}$ Step Line Transient Recovery 10/ 11/ | $TT_{LINE}$ | $V_{IN}$ = 16 V dc to 40 V dc | 4,5,6 | 01,03, 04, 05 | | 500 | µs |
| | | | | 02,06, 07 | | 700 | |
| Start Up Overshoot | $Vton_{OS}$ | $V_{IN}$ = 0 V dc to 28 V dc | 4,5,6 | 01, 05 | | 15 | mV pk |
| | | | | 02,06, 07 | | 25 | |
| | | | | 03,04 | | 50 | |
| Start Up Delay 11/ | $Ton_D$ | $V_{IN}$ = 0 V dc to 28 V dc | 4,5,6 | All | | 20 | ms |

1/ Half load at $+V_{OUT}$ and half load at $-V_{OUT}$.
2/ End-of-Life performance meets standard datasheet limits unless specific End-of-life limits are given.
3/ Post irradiation testing shall be in accordance with 4.3.5 herein.
4/ The discrete semiconductor elements have been High Dose Rate tested using Condition A (50-300 rads(Si)/s) of Method 1019 in MIL-STD-750. The integrated circuit elements have been High Dose Rate tested using Condition A (50-300 rads(Si)/s) and Low Dose Rate tested using Condition D (≤ 10 mrads(Si)/s) of Method 1019 of MIL-STD-883. The difference between HDR and LDR test results have been compared to determine if the integrated circuit elements exhibit ELDRS effect. Enhanced low dose rate sensitivity of the components was not observed.
5/ Hybrid devices have been high dose rate tested using Condition A (50-300 rad(Si)/s) of method 1019 of MIL-STD-883. Low dose rate testing on the device has not been completed.
6/ RHA devices supplied to this drawing have been characterized through all levels M, D and P of irradiation. However, this device is tested only at the "P" level. Pre and Post irradiation values are identical unless otherwise specified in Table IA. When performing post irradiation electrical measurements for any RHA level, $T_A$ =+25ºC.
7/ End-of-Life limits are not tested. These values are determined by worst case analysis and include radiation and aging factors.
8/ Derate linearly to 0 at 135°C.
9/ Up to 70 percent of the total power or current can be drawn from any one of the two outputs.
10/ Parameter shall be tested as part of device characterization and after design and process changes. Thereafter, parameters shall be guaranteed to the limits specified in table I.
11/ Time for $V_{OUT}$ to settle within ±1 percent of its final value.

TABLE IB. SEP test limits. 1/

| Device types | SEP | Temperature ($T_C$) | Effective linear energy transfer (LET) |
|---|---|---|---|
| 01,02,03,04,05,06,07 | SEL | +25°C | ≥ 44 MeV-cm$^2$/mg |
| 01,02,03,04,05,06,07 | SEB | +25°C | ≥ 44 MeV-cm$^2$/mg |
| 01,02,03,04,05,06,07 | SEGR | +25°C | ≥ 44 MeV-cm$^2$/mg |
| 01,02,03,04,05,06,07 | SEFI | +25°C | ≥ 44 MeV-cm$^2$/mg |

1/ For SEP test conditions, see 4.3.5.1.1.3 herein.

Case outline X.

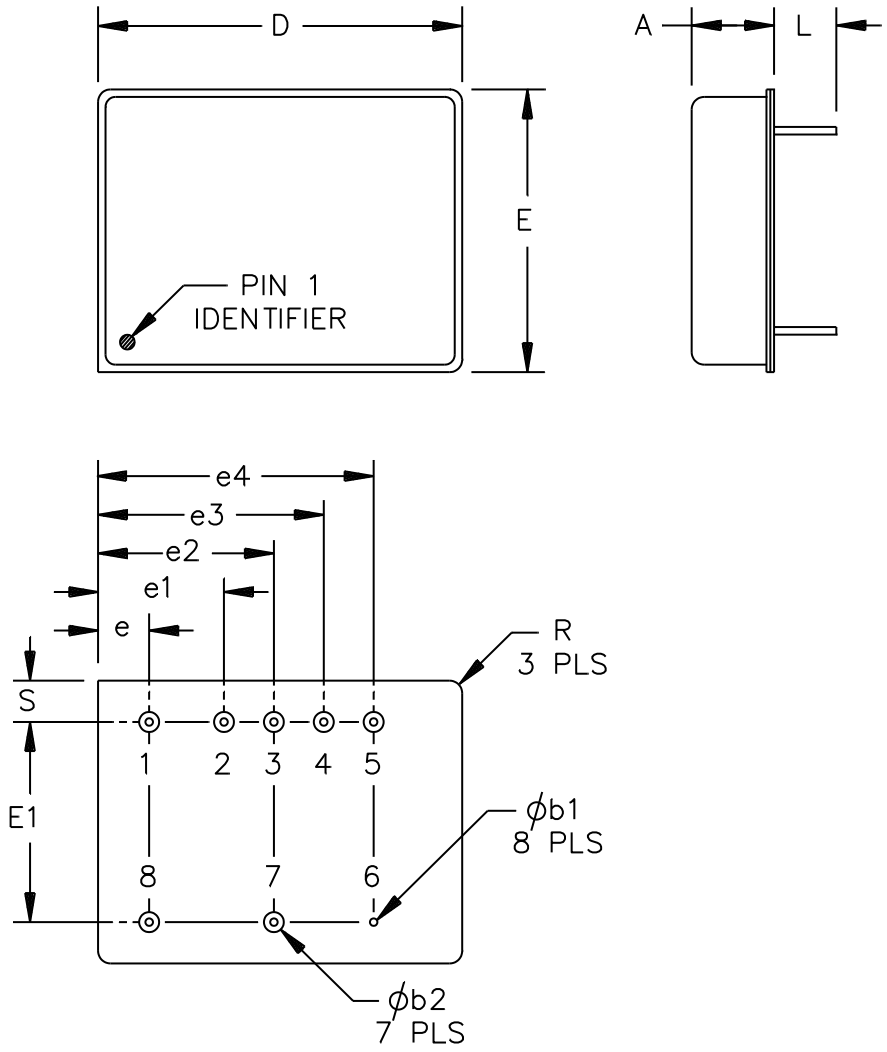



FIGURE 1. Case outline.

Case outline X - Continued.

| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | - | 8.38 | - | .330 |
| øb1 | .71 | .81 | 0.028 | 0.032 |
| øb2 | 1.98 | 2.08 | 0.078 | 0.082 |
| D | - | 37.08 | - | 1.460 |
| E | - | 28.70 | - | 1.130 |
| E1 | 20.19 | 20.45 | .795 | .805 |
| e | 5.08 | 5.33 | .200 | .210 |
| e1 | 12.70 | 12.95 | .500 | .510 |
| e2 | 17.78 | 18.03 | .700 | .710 |
| e3 | 22.86 | 23.11 | .900 | .910 |
| e4 | 27.94 | 28.19 | 1.10 | 1.11 |
| L | 5.97 | 6.73 | .235 | .265 |
| R | 1.14 | 1.40 | .045 | .055 |
| S | 3.94 | 4.19 | .155 | .165 |

NOTES:
1. The U. S. Government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Pin numbers are for reference only.
3. Case outline X weight: 24 grams maximum.

FIGURE 1. Case outline – Continued.

Case outline Y.

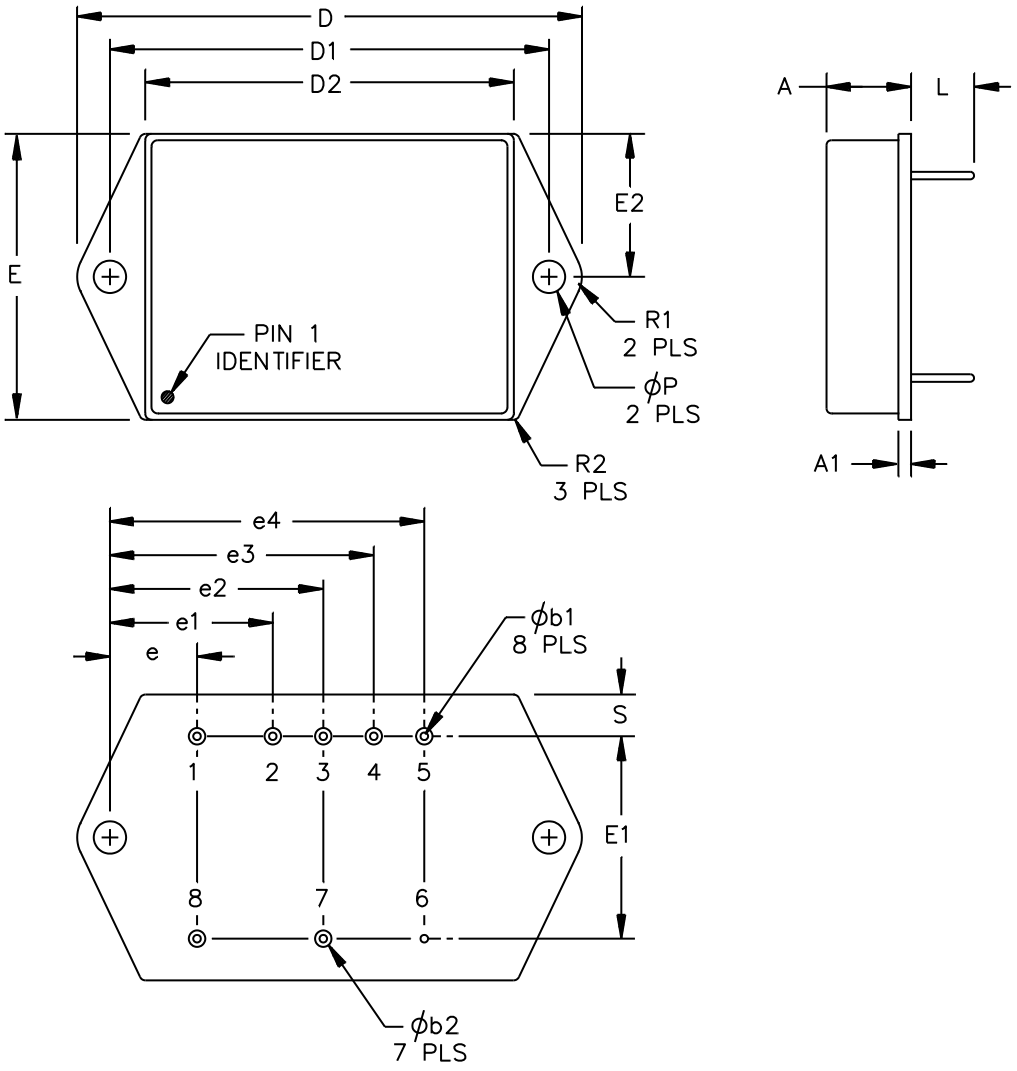



FIGURE 1. Case outline(s). – Continued

Case outline Y - Continued.

| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | - | 9.02 | - | .355 |
| A1 | 1.07 | 1.27 | .042 | .050 |
| øb1 | 0.71 | 0.81 | .028 | .032 |
| øb2 | 1.98 | 2.08 | .078 | .082 |
| D | - | 50.80 | - | 2.00 |
| D1 | 43.82 | 44.07 | 1.725 | 1.735 |
| D2 | - | 37.08 | - | 1.460 |
| e | 8.64 | 8.89 | .340 | .350 |
| e1 | 16.26 | 16.51 | .640 | .650 |
| e2 | 21.34 | 21.59 | .840 | .850 |
| e3 | 26.42 | 26.67 | 1.040 | 1.050 |
| e4 | 31.50 | 31.75 | 1.240 | 1.250 |
| E | - | 28.70 | - | 1.130 |
| E1 | 20.19 | 20.45 | .795 | .805 |
| E2 | 14.10 | 14.35 | .555 | .565 |
| øP | 3.12 | 3.38 | .123 | .133 |
| L | 5.97 | 6.73 | .235 | .265 |
| R1 | 3.18 | 3.43 | .125 | .135 |
| R2 | 1.14 | 1.40 | .045 | .055 |
| S | 3.94 | 4.19 | .155 | .165 |

NOTES:
1. The U. S. Government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Pin numbers are for reference only.
3. Case outline Y weight: 27 grams maximum.

FIGURE 1. Case outline(s). - Continued

| Device types | All |
|---|---|
| Case outlines | X and Y |
| Terminal number | Terminal symbol |
| 1 | Inhibit |
| 2 | No connection |
| 3 | Output return |
| 4 | Output |
| 5 | No connection |
| 6 | Case ground |
| 7 | Input return |
| 8 | Input |

FIGURE 2. Terminal connections.

TABLE II. Electrical test requirements.

| MIL-PRF-38534 test requirements | Subgroups (in accordance with MIL-PRF-38534, group A test table) |
|---|---|
| Interim electrical parameters | 1, 4 |
| Final electrical parameters | 1*, 2, 3, 4, 5, 6 |
| Group A test requirements | 1, 2, 3, 4, 5, 6 |
| Group C end-point electrical parameters | 1, 2, 3, 4, 5, 6 |
| End-point electrical parameters for radiation hardness assurance (RHA) devices | 1, 4 |

* PDA applies to subgroup 1.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DLA Land and Maritime-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

(2) $T_A$ as specified in accordance with table I of method 1005 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5. Radiation hardness assurance (RHA). RHA qualification is required only for those devices with the RHA designator as specified herein. See table IIIA and IIIB.

Table IIIA. Radiation Hardness Assurance Methods Table.

| RHA method Employed | Active elements tested only as part of the hybrid device. | Rated total dose (30 krad(Si)) | | Worst Case Analysis Performed | | | | End points tests after final total dose | |
|---|---|---|---|---|---|---|---|---|---|
| | | Element Level | Hybrid Device Level | Includes temperature effects | Combines temperature and radiation effects | Combines total dose and displacement effects | End-of-life | Element Level | Hybrid device level |
| | No | Tested at 2X | Tested at 2X | Yes | Yes | No | 1/ Yes | $T_C$ = +25ºC | $T_C$ = +25ºC |

1/ Worst case analysis performed with case temperatures from -55ºC to +85ºC.

Table IIIB. Hybrid level and element level test table.

| VPT SVHF | Radiation test | | | | |
|---|---|---|---|---|---|
| SMD 5962-11218 | Total Dose | | | Heavy Ion | Neutron |
| Hybrid Level Testing | Low Dose Rate | High Dose Rate (HDR) | ELDRS Characterization | SEP | Displacement Damage (DD) |
| | Tested (60 krads) | Tested (60 krads) | No | Tested (44 MeV-cm$^2$/mg) | Not tested |
| Element Level Testing | | | | | |
| CMOS Discrete (Power MOSFET) | N/A | Tested (60 krads) | N/A | Tested (hybrid level test) | Not Tested |
| Bipolar Discrete Devices | Not Tested | Tested (60 krads) | Not Tested | Tested (hybrid level test) | Not Tested |
| Bipolar Linear or Mixed Signal > 90 nm | Tested (60 krads) | Tested (60 krads) | Tested | Tested (hybrid level test) | Not Tested |

4.3.5.1 Radiation Hardness Assurance (RHA) inspection. RHA qualification is required for those devices with the RHA designator as specified herein. End-point electrical parameters for radiation hardness assurance (RHA) devices shall be specified in table II. Radiation testing will be in accordance with the qualifying activity DLA Land and Maritime-VQ approved plan and with MIL-PRF-38534, Appendix G.

a. The hybrid device manufacturer shall establish procedures controlling component radiation testing, and shall establish radiation test plans used to implement component lot qualification during procurement. Test plans and test reports shall be filed and controlled in accordance with the manufacturer's configuration management system.

b. The hybrid device manufacturer shall designate a RHA program manager to oversee component lot qualification, and to monitor design changes for continued compliance to RHA requirements.

4.3.5.1.1 Hybrid level qualification.

4.3.5.1.1.1 Qualification by similarity. A family is defined by the family model designator e.g. SVFL single/dual. All parts with this designator share a common design and use the same active elements. Device type 5962P1121802HXC was tested and all other devices on this SMD are qualified by similarity.

4.3.5.1.1.2 Total ionizing dose irradiation testing. A minimum of one representative hybrid of the hybrid family (family model designator, e.g. SVFL Single/Dual) is initially characterized and tested and after any design or process changes which may affect the RHA response of the device type. Devices are tested at High Dose Rate (HDR) in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883, as well as at Low Dose Rate (LDR) in accordance with condition D of method 1019 of MIL-STD-883. Differences between HDR and LDR tests results are compared to determine if the parts exhibit ELDRS effects. Total ionizing dose is tested to 60 krad (Si) and characterized to ensure 30 krad (Si) by 2 times the rated value. A minimum of 1 biased sample for HDR and LDR and 1 unbiased sample for HDR and LDR will be tested.

4.3.5.1.1.3 Single event phenomena (SEP). A minimum of one representative hybrid of the hybrid family is characterized for SEE response at initial qualification and after any design or process changes which may affect the RHA response of the device type. Testing shall be performed in accordance with ASTM F1192. Test conditions for SEP are as follows:

a. The ion beam angle of incidence shall be normal to the die surface. No shadowing of the ion beam due to fixturing is allowed.

b. The fluence shall be $\geq 1 \times 10^6$ particles/cm$^2$.

c. The flux shall be between $10^2$ and $10^5$ ions/cm$^2$/s.

d. The particle range shall be $\geq$ 35 micron in silicon.

e. The characterization is performed at nominal input voltage, and the test temperature shall be 25°C ± 10°C in air.

f. For SEP test limits, see table IB herein.

4.3.5.1.2 Component level qualification.

4.3.5.1.2.1 Total Ionizing Dose Irradiation. Testing every initial wafer lot of bipolar / BiCMOS linear or mixed signal semiconductor components will be characterized and tested at HDR in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883, as well as at LDR in accordance with condition D of method 1019 of MIL-STD-883. Differences between HDR and LDR tests results are compared to determine if the parts exhibit ELDRS effects. A minimum of 10 samples for HDR (5 biased and 5 unbiased) and 10 samples for LDR (5 biased and 5 unbiased) will be tested. If a specific component type is determined to exhibit ELDRS, all future wafer lots of that specific component will be tested at LDR.

4.3.5.2 Lot Acceptance. Each lot of active elements shall be evaluated for acceptance in accordance with MIL-PRF-38534 and herein.

4.3.5.2.1 Total Ionizing Dose. Every wafer lot of all critical semiconductor components will be RLAT (Radiation Lot Acceptance Testing) tested at HDR in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883. A minimum of 5 biased samples and 5 unbiased samples will be tested. 0.9900/90% statistics are applied to the device parameter degradations which are compared against established limits for lot acceptance. Low dose rate will be used in lieu of HDR for parts that exhibit ELDRS effects or for which ELDRS evaluation per test method 1019 MIL-STD-883 is not available.

4.3.5.2.2 Technologies not being tested. Testing is not performed on device technologies including: P/N, Schottky and zener diodes, and on small signal bipolar junction transistors that the manufacturer considers to be radiation hardened.

4.3.5.2.3 Performance requirements. As an alternative to testing, components may be procured to manufacturer radiation guarantees that meet the minimum performance requirements. Component radiation performance guarantees shall be established in compliance with MIL-PRF-19500, Group D or MIL-PRF-38535, Group E, as applicable.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated as specified in MIL-PRF-38534.

6.4 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and the applicable SMD. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

6.5 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-1081.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QML-38534. The vendors listed in MIL-HDBK-103 and QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

6.7 Additional information. When applicable, a copy of the following additional data shall be maintained and available from the device manufacturer:

a. RHA upset levels.

b. Test conditions (SEP).

c. Occurrence of latchup (SEL).

d Occurrence of Burn-out (SEB).

e. Occurrence of Gate Rupture (SEGR).

f. Occurrence of Single Event Functional Interrupt (SEFI).

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 19-02-11

Approved sources of supply for SMD 5962-11218 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38534 during the next revisions. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DLA Land and Maritime -VA. This information bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QML-38534. DLA Land and Maritime maintains an online database of all current sources of supply https://landandmaritimeapps.dla.mil/programs/Smcr/.

| Standard microcircuit drawing PIN 1/ | Vendor CAGE number | Vendor similar PIN 2/ |
|---|---|---|
| 5962P1121801HXC | 0ZBZ6 | SVHF283R3S/H+ |
| 5962P1121801HXA | 0ZBZ6 | SVHF283R3S/H+-E |
| 5962P1121801HYC | 0ZBZ6 | SVHF283R3SF/H+ |
| 5962P1121801HYA | 0ZBZ6 | SVHF283R3SF/H+-E |
| 5962P1121801KXC | 0ZBZ6 | SVHF283R3S/K |
| 5962P1121801KXA | 0ZBZ6 | SVHF283R3S/K-E |
| 5962P1121801KYC | 0ZBZ6 | SVHF283R3SF/K |
| 5962P1121801KYA | 0ZBZ6 | SVHF283R3SF/K-E |
| 5962P1121802HXC | 0ZBZ6 | SVHF2805S/H+ |
| 5962P1121802HXA | 0ZBZ6 | SVHF2805S/H+-E |
| 5962P1121802HYC | 0ZBZ6 | SVHF2805SF/H+ |
| 5962P1121802HYA | 0ZBZ6 | SVHF2805SF/H+-E |
| 5962P1121802KXC | 0ZBZ6 | SVHF2805S/K |
| 5962P1121802KXA | 0ZBZ6 | SVHF2805S/K-E |
| 5962P1121802KYC | 0ZBZ6 | SVHF2805SF/K |
| 5962P1121802KYA | 0ZBZ6 | SVHF2805SF/K-E |
| 5962P1121803HXC | 0ZBZ6 | SVHF2812S/H+ |
| 5962P1121803HXA | 0ZBZ6 | SVHF2812S/H+-E |
| 5962P1121803HYC | 0ZBZ6 | SVHF2812SF/H+ |
| 5962P1121803HYA | 0ZBZ6 | SVHF2812SF/H+-E |
| 5962P1121803KXC | 0ZBZ6 | SVHF2812S/K |
| 5962P1121803KXA | 0ZBZ6 | SVHF2812S/K-E |
| 5962P1121803KYC | 0ZBZ6 | SVHF2812SF/K |
| 5962P1121803KYA | 0ZBZ6 | SVHF2812SF/K-E |
| 5962P1121804HXC | 0ZBZ6 | SVHF2815S/H+ |
| 5962P1121804HXA | 0ZBZ6 | SVHF2815S/H+-E |
| 5962P1121804HYC | 0ZBZ6 | SVHF2815SF/H+ |
| 5962P1121804HYA | 0ZBZ6 | SVHF2815SF/H+-E |
| 5962P1121804KXC | 0ZBZ6 | SVHF2815S/K |
| 5962P1121804KXA | 0ZBZ6 | SVHF2815S/K-E |
| 5962P1121804KYC | 0ZBZ6 | SVHF2815SF/K |
| 5962P1121804KYA | 0ZBZ6 | SVHF2815SF/K-E |

| Standard microcircuit drawing PIN 1/ | Vendor CAGE number | Vendor similar PIN 2/ |
|---|---|---|
| 5962P1121805HXC | 0ZBZ6 | SVHF282R5S/H+ |
| 5962P1121805HXA | 0ZBZ6 | SVHF282R5S/H+-E |
| 5962P1121805HYC | 0ZBZ6 | SVHF282R5SF/H+ |
| 5962P1121805HYA | 0ZBZ6 | SVHF282R5SF/H+-E |
| 5962P1121805KXC | 0ZBZ6 | SVHF282R5S/K |
| 5962P1121805KXA | 0ZBZ6 | SVHF282R5S/K-E |
| 5962P1121805KYC | 0ZBZ6 | SVHF282R5SF/K |
| 5962P1121805KYA | 0ZBZ6 | SVHF282R5SF/K-E |
| 5962P1121806HXC | 0ZBZ6 | SVHF285R2S/H+ |
| 5962P1121806HXA | 0ZBZ6 | SVHF285R2S/H+-E |
| 5962P1121806HYC | 0ZBZ6 | SVHF285R2SF/H+ |
| 5962P1121806HYA | 0ZBZ6 | SVHF285R2SF/H+-E |
| 5962P1121806KXC | 0ZBZ6 | SVHF285R2S/K |
| 5962P1121806KXA | 0ZBZ6 | SVHF285R2S/K-E |
| 5962P1121806KYC | 0ZBZ6 | SVHF285R2SF/K |
| 5962P1121806KYA | 0ZBZ6 | SVHF285R2SF/K-E |
| 5962P1121807HXC | 0ZBZ6 | SVHF285R7S/H+ |
| 5962P1121807HXA | 0ZBZ6 | SVHF285R7S/H+-E |
| 5962P1121807HYC | 0ZBZ6 | SVHF285R7SF/H+ |
| 5962P1121807HYA | 0ZBZ6 | SVHF285R7SF/H+-E |
| 5962P1121807KXC | 0ZBZ6 | SVHF285R7S/K |
| 5962P1121807KXA | 0ZBZ6 | SVHF285R7S/K-E |
| 5962P1121807KYC | 0ZBZ6 | SVHF285R7SF/K |
| 5962P1121807KYA | 0ZBZ6 | SVHF285R7SF/K-E |

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

| Vendor CAGE number | Vendor name and address |
|---|---|
| 0ZBZ6 | VPT Incorporated<br>1971 Kraft Drive, Suite 1000<br>Blacksburg, VA 24060 |