## REVISIONS

| Letter | ECO No. | Description | Checked | Approved | Date |
|---|---|---|---|---|---|
| A | 36-276 | INITIAL RELEASE | PJG | RFG | 5/24/95 |
| B | 36-284 | ADD 100% ELECTRICAL TESTS AT THREE TEMPERATURES. | [illegible] | [illegible] | 5/26/95 |
| | | | | | |
| | | | | | |

| NAME | | DATE |
|---|---|---|
| Drawn: | BRIAN KLATT | 5/22/95 |
| Checked: | P. J. Gray | 5/24/95 |
| Approved: | R. F. Goeke | 5/24/95 |
| Released: | K. Tibbetts | 5/24/95 |

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CENTER FOR SPACE RESEARCH

# DIODE, SILICON DUAL, SCREENING (MMBD7000)

| Size | Code Identification No. | Drawing No. | Rev. |
|---|---|---|---|
| T | 80230 | 36-02310 | B |

Scale: NONE

## 1.0 SCOPE

1.1 Introduction This drawing describes device requirements for a Dual Silicon Diode, used in flight hardware for a space experiment on the AXAF CCD Imaging Spectrometer (ACIS) Instrument. The part described herein is produced by Motorola, part number MMBD7000, in a three (3) lead plastic, small outline (SOT-23) package.

1.2 Part Number The complete MIT part number shall be 36-02310

1.3 Absolute maximum ratings Absolute maximum ratings are in accordance with page 5-81 of Motorola Small-Signal Transistors, FETs and Diodes Data Book.

## 2.0 APPLICABLE DRAWINGS

2.1 Government Specifications and Standards Unless otherwise specified, the following specifications and standards, of the latest released issue, form a part of this drawing, to the extent specified herein.

SPECIFICATIONS

MILITARY

| MIL-S-19500 | Semiconductor Devices, General Specification for |
|---|---|

INDUSTRY

| Motorola | Small-Signal Transistors, FETs and Diodes, Book DL 126/D, Rev 5, Q4/94 |
|---|---|

NOTE: Page 5-81 of Motorola Small-Signal Transistors, FETs and Diodes Data Book is included herein for convenience.

2.2 Order of precedence In the event of conflict between the text of this drawing and the references cited herein, the text of this drawing shall govern.

## 3.0 REQUIREMENTS

3.1 General Requirements

3.1.1 Item Requirements The Diodes described herein shall, in all respects, meet all the requirements of this specification and the intent of JANTX screening (not including hermeticity), per MIL-S-19500. These diodes shall be tested using production and test facilities and a Reliability and Quality Assurance program adequate to assure successful compliance with this specification.

3.1.2 Procuring Activity For the purposes of this specification and documents referenced herein, the procuring activity is the Massachusetts Institute of Technology (MIT), Center for Space Research (CSR).

3.1.3 Product Changes The supplier shall notify MIT of proposed changes to diodes, including changes in design, materials, fabrication methods, or processes, and changes which may affect the quality or intended end use.

3.2 Electrical performance characteristics Unless otherwise specified, the electrical performance characteristics are as specified on page 5-81 of Motorola Small-Signal Transistors, FETs and Diodes Data Book, and apply over the full operating temperature range, as applicable.

## 4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection Unless otherwise specified herein, the supplier is responsible for the performance of all examinations and tests as specified herein. Devices specified herein are to be screened up to a JANTX level.

4.2 Screening All diodes (100%) shall be subjected to and pass the screen tests and examinations defined in table II of MIL-S-19500, for a JANTX device. Final electrical tests after burn-in, shall include group A, subgroup 2 and subgroup 3 (-55°C, +25°C, and +125°C).

4.2.1 Xray All Microcircuits (100%) shall be subjected to and pass radiographic examination per MIL-STD-750, method 2076.

4.2.2 Post Screening Bake After screening and Xray have been completed, all devices shall be baked at +125°C, in an inert atmosphere, for 160 hours minimum. The parts shall be packaged and sealed in a bag, purged with dry nitrogen, within four (4) hours after removal from the post screening bake chamber.

4.3 Quality Conformance Inspection (QCI) Quality conformance inspection shall consist of groups B and C of MIL-S-19500. These devices are tested 100%, therefore group A testing is not required. The sample size for group C, subgroup 6 shall be twelve (12) devices.

4.4 Destructive Physical Analysis (DPA) An internal destructive examination shall be performed in accordance with method 2075 of MIL-STD-750. Sample size shall be two (2) for lot sizes greater than 200, and one (1) sample for lot sizes of 200 or less.

4.5 Inspection and Test Records The supplier shall maintain inspection and test records for 36 months after hardware delivery to MIT. Test data for all electrical tests, screening, DPA, and QCI inspections shall be submitted to MIT with the delivery of flight parts.

4.6 Government Source Inspection (GSI) The government has the right to inspect any or all of the work included in this order at the supplier's plant.

## 5.0 PACKAGING

5.1 Packaging requirements Packaging shall be in accordance with paragraph 5.1 of MIL-S-19500. See paragraph 4.2.2 above.

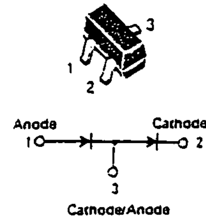
## 6.0 NOTES

6.1 Approved Source of Supply

**TBD**

# MMBD7000LT1*

CASE 318-07, STYLE 11
SOT-23 (TO-236AB)




DUAL SWITCHING DIODE

*This is a Motorola designated preferred device.

**MAXIMUM RATINGS (EACH DIODE)**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Reverse Voltage | $V_R$ | 100 | Vdc |
| Forward Current | $I_F$ | 200 | mAdc |
| Peak Forward Surge Current | $I_{FM(surge)}$ | 500 | mAdc |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation FR-5 Board,* $T_A$ = 25°C | $P_D$ | 225 | mW |
| Derate above 25°C | | 1.8 | mW/°C |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 556 | °C/W |
| Total Device Dissipation Alumina Substrate,** $T_A$ = 25°C | $P_D$ | 300 | mW |
| Derate above 25°C | | 2.4 | mW/°C |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 417 | °C/W |
| Junction and Storage Temperature | $T_J$, $T_{stg}$ | −55 to −150 | °C |

*FR-5 = 1.0 x 0.75 x 0.062 in.
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

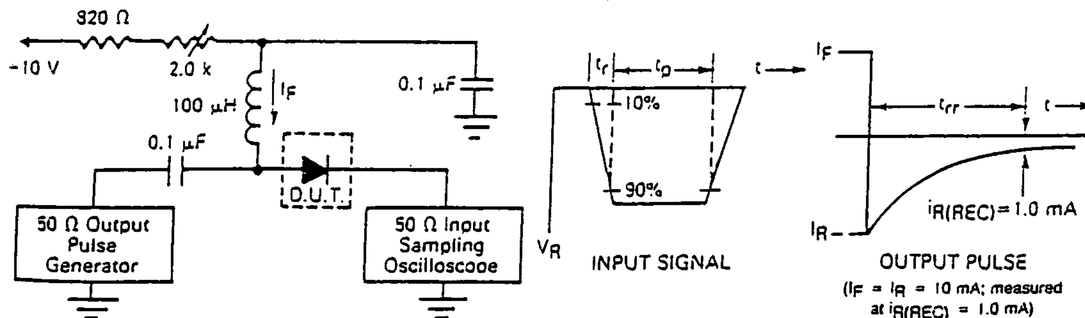
**DEVICE MARKING**

MMBD7000LT1 = M5C

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted.) (EACH DIODE)

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Reverse Breakdown Voltage ($I_{(BR)}$ = 100 µAdc) | $V_{(BR)}$ | 100 | — | Vdc |
| Reverse Voltage Leakage Current | | | | µAdc |
| ($V_R$ = 50 Vdc) | $I_R$ | — | 1.0 | |
| ($V_R$ = 100 Vdc) | $I_{R2}$ | — | 3.0 | |
| ($V_R$ = 50 Vdc, 125°C) | $I_{R3}$ | — | 100 | |
| Forward Voltage | $V_F$ | | | Vdc |
| ($I_F$ = 1.0 mAdc) | | 0.55 | 0.7 | |
| ($I_F$ = 10 mAdc) | | 0.67 | 0.82 | |
| ($I_F$ = 100 mAdc) | | 0.75 | 1.1 | |
| Reverse Recovery Time ($I_F$ = $I_R$ = 10 mAdc) (Figure 1) | $t_{rr}$ | — | 4.0 | ns |
| Capacitance ($V_R$ = 0) | C | — | 1.5 | pF |

FIGURE 1 — Recovery Time Equivalent Test Circuit




Notes: 1. A 2.0 kΩ variable resistor adjusted for a Forward Current ($I_F$) of 10 mA.
2. Input pulse is adjusted so $I_{R(peak)}$ is equal to 10 mA.
3. $t_p$ » $t_{rr}$