XMM Optical Monitor

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DETAIL SPECIFICATION FOR HIGH VOLTAGE DIODES

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CHANGE RECORD

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01	26 July 1996	All New	
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CONTENTS

1. SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Diodes, Switching, rectifier, Low Power, High Voltage, based on types PFM50 and 1FF50.
It shall be read in conjunction with ESA/SCC Generic Specification No 5000, the requirements of which are supplemented herein. These components are for use in the Blue Detector high voltage electronics in the Optical Monitor on the XMM Project.

2. COMPONENT DETAILS

2.1 Maximum Ratings

The maximum ratings, which shall not be exceeded at any time during use or storage, are as shown in Table 1:-

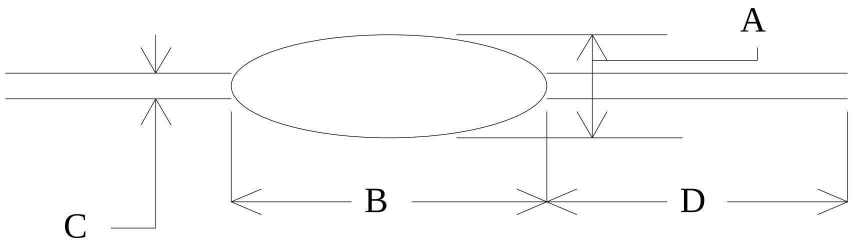
TABLE 1

	Symbol	**PFM50**	**1FF50**	**Unit**
Forward Surge Current	Ifsm	1	4	A
DC Blocking Voltage	Vr	5000	5000	V
Working Peak reverse Voltage	Vrm	5000	5000	V
Average Output Rectified Current	Io	92	100	mA
Peak Forward Surge Current	Ifsm	2	4	A
Operating Temperature Range	Top	-65 to +150	-65 to +175	°C
Storage Temperature Range	Tstg	-65 to +150	-65 to +175	°C
Soldering Temperature	Tsol	+245	+245	°C

2.2 Physical Dimensions

The Physical dimensions of the diodes specified herein are shown in Figure 1:

FIGURE 1



	PFM50		1FF50	
	MIN	MAX	MIN	MAX
A (mm)	-	3.0	-	2.5
B (mm)	-	9.5	4.5	6.2
C (mm)	-	0.65	0.53	0.66
D (mm)	29	-	25.4	33.0

Note: The cathode end shall be marked with a coloured ring

3. APPLICABLE DOCUMENTS

ESA/SCC 5000 Generic Specification for Discrete Semiconductors
Mil-Std-750 Test Methods and Procedures for Semiconductor Devices
Mil-Std-105 Sampling Procedures and Tables for Inspection by Attributes

4. REQUIREMENTS

4.1 General

The complete requirements for the procurement of the diodes specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 5000 for Discrete Semiconductors. Deviations from the Generic Specification, applicable to this detail specification only, are listed in par 4.2

4.2 Deviations from the Generic Specification

4.2.1 Deviations from Special In-process Controls
None

4.2.2 Deviations from Final Production Tests(Chart II)
a. Par 9.2.1, Bond Strength Test: Not applicable
b. Par 9.6, Constant Acceleration: Not applicable
c. Par 9.8.1, Seal Test, Fine: Not applicable
d. Par 9.8.2, Seal Test, Gross: Test Conditions shall be CECC50000, Section 4.4.10, Test Q1.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)
Par 7.1.1(b), Burn-in Duration: Shall be 240 hours.

4.2.4 Deviations from Qualification Tests (Chart IV)
Par 9.2.3, Bond Strength Test: Not applicable

4.2.5 Deviations from Lot Acceptance Tests (Chart V)
None

4.3 Mechanical Requirements

4.3.1 Dimension Check
The dimensions of the diodes specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight
The maximum weight of the diodes specified herein shall be 1.0 grams.

4.3.3 Terminal Strength
The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The test conditions shall be as follows:-

Test Condition: A
Applied force: 13.4 Newtons
Duration: 15 seconds

4.4 Materials and Finishes

4.4.1 Case
The case shall be a corrosion-resistant fused metal oxide, inorganic, homogeneous compound.

4.4.2 Lead Material and Finish
TBA

4.5 Marking

4.5.1 General
Each component shall be marked with the lead identification. Ideally each component will also be marked with this specification number and lot traceability information. However, because of the small size of these components, this latter information may just accompany the components.

4.6 Electrical Measurements

4.6.1 Electrical Measurements at Room Temperature
The parameters to be measured at room temperature are shown in Table 2. The measurements shall be performed at Tamb = +22±3°C.

4.6.2 Electrical Measurements at High and Low Temperatures.
The parameters to be measured at high and low temperatures are shown in Table 3.

4.6.3 Circuits for Electrical Measurements
Circuits for use in performing electrical measurements listed in Tables 2 and 3 are show, where applicable, in Mil-Std-750.

4.7 Burn-in Tests

4.7.1 Parameter Drift Values
The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at Tamb = +22±3°C. The parameter drift values applicable to the shown parameters shall not be exceeded. In addition, to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for H.T.R.B, and Power Burn-in
The requirements for H.T.R.B. and power burn-in are specified in Section 7 of ESA/SCC Generic Specification No.5000. The conditions for H.T.R.B. and power burn-in shall be as specified in Tables 5a and 5b of this specification.

4.7.3 Electrical Circuits for H.T.R.B. and Power Burn-in
Not applicable

TABLE 2 - Electrical Measurements At Room Temperature

D.C. Parameters

	Symbol	Mil-Std-750 Test Method	Test Conditions	Limits Min	Limits Max	Unit
DC Forward Voltage	Vf	4011	PFM50, If = 25mA	-	12.5	VDC
			1FF50, If = 100mA	-	9	
DC Reverse Current	Ir	4016	PFM50, Vr = 5000VDC	-	0.03	uADC
			1FF50, Vr = 5000VDC	-	0.2	
Breakdown voltage	Vbr	4021	PFM50, Ir = 3uADCmax	5000	-	VDC
			1FF50, Ir = 10uADCmax	5000	-	

A.C. Parameters

	Symbol	Mil-Std-750 Test Method	Test Conditions	Limits Min	Limits Max	Unit
Capacitance	C	4001	PFM50, Vr = 100V, f = 1.0MHz	-	0.5	pF
	(Note 1)		1FF50, Vr = 100V, f = 1.0MHz	-	1.0	
Reverse Current	trr	4031	PFM50, Ir = 100mA	-	250	ns
Recovery Time	(Note 2)		1FF50, Ir = 100mA	-	60	

Note 1. If more than 20 units have to be measured, the measurements shall be performed on a sample basis in accordance with Inspection Level II, Table IIA, AQL=1.0 of Mil-Std-105.
Note 2. trr is measured when rectifiers recover to 25mA.

TABLE 3

	Symbol	Mil-Std-750 Test Method	Test Conditions Tamb = +100 (+0-5)°C	Limits Min	Limits Max	Unit
D C Reverse	Ir	4016	PFM50, Vr = 5000VDC	-	3	uADC
Current			1FF50, Vr = 5000VDC	-	10	

N.B. Measurements at low temperature are not applicable.

TABLE 4

	Symbol	Spec and/or Test Method	Test Conditions	Change Limits
D C Reverse Current	Ir	As per Table 2	PFM50, As per Table 2	±0.05uADC or ±100%*
			1FF50, As per Table 2	±0.1uADC or ±100%*

* whichever is the greater

Table 5a

	Symbol	Condition	Unit
Ambient Temperature	Tamb	PFM50, = +100(+0-5)	°C
		1FF50, = +100(+0-5)	
DC Blocking Voltage	Vr	PFM50, = 5000	V
		1FF50, = 5000	
Mil-Std-750 Test Method 1038	-	PFM50, = A	-
		1FF50, = A	
Duration	t	PFM50, = 96	Hrs
		1FF50, = 96	

Table 5b

	Symbol	Condition	Unit
Ambient Temperature	Tamb	PFM50, = +25(±3.0)	°C
		1FF50, = +25(±3.0)	
DC Blocking Voltage	Vr	PFM50, = 5000	V
		1FF50, = 5000	
Mil-Std-750 Test Method 1038	-	PFM50, = B	-
		1FF50, = B	
Rectified Current	Io	PFM50, = 32	mA
		1FF50, = 44	
Duration	t	PFM50, = 240	Hrs
		1FF50, = 240	

4.8 Environmental and Endurance Tests (Charts IV and V of ESA/SCC Generic Specification No.5000)

4.8.1 Electrical Measurements on Completion of Environmental Tests
The parameters to be measured on completion of environmental tests are shown in Table 6. Unless otherwise stated , the measurements shall be performed at Tamb = +22±3°C.

4.8.2 Electrical Measurements at Intermediate Points and on Completion of Endurance Tests.
The parameters to be measures at intermediate points during and on completion of endurance tests are as shown in Table 6. Unless otherwise stated , the measurements shall be performed at Tamb = +22±3°C.

4.8.3 Conditions for Operating Life Tests (Part of Endurance Testing)
The requirements for operating life tests are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The conditions for operating life testing shall be the same as specified in Table 5b for the burn-in test.

4.8.4 Conditions for High Temperature Storage Test (Part of Endurance Testing)
The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 5000. The temperature to be applied shall be the maximum storage temperature specified in Table 1 of this specification.

Table 6

	Symbol	**Spec and/or Test Method**	**Test Conditions**	**Limits**		**Unit**
				Min	**Max**	
DC Forward Voltage	Vf	As per Table 2	PFM50, As per Table 2	-	12.5	VDC
			1FF50, As per Table 2	-	9	
DC Reverse Current	Ir	As per Table 2	PFM50, As per Table 2	-	0.03	uADC
			1FF50, As per Table 2	-	0.2	
Reverse Recovery Time	trr	As per Table 2	PFM50, As per Table 2	-	250	ns
			1FF50 As per Table 2	-	60	