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Request for Proposal

of GEO-KOMPSAT-2 EEE Part Procurement

HEATER (FLEXIBLE)

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RFP for EEE Part Procurement

for

GK2 HEATER

1. INTRODUCTION

1.1 GENERAL

This document defines the basic electrical and environmental requirements for the flexible single layer electrical heaters. The intended use of these heaters is to provide a stabilized temperature over the operating temperature range of –65 °C to +200° C. The operating life shall be a minimum of 12 years after a storage time of 7 years over the temperature of –65 °C to + 200 °C.

1.2 PART IDENTIFICATION NUMBER (PIN)

The PIN is formed as follows. The last three digits (indicated by –xxx) will be serial number of the part. Manufacturer specific identification can be added if applicable.

GK2 – HTR – 01 - FM - XXX
→ Serial number

ESCC Component Number
: ESCC Component Numbers are In accordance to ESCC4009/002 or ESCC4009/003.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it. In the event of conflict, this document shall take precedence.

(a) ESCC Generic Specification No. 4009 : Resistors, Heaters, Flexible
(b) ESCC Detail Specification No. 4009/002 : Resistors, Heaters, Flexible, Single and Double Layer
(c) ESCC Detail Specification No. 4009/003 : Resistors, Heaters, Flexible, Single and Double Layer Based on Type FHK
(d) ESCC Generic Specification No. 3901: Wires and Cables, Electrical, 600V, Low Frequency
(e) ESCC Generic Specification No. 3901/019: Polyimide Insulated Wires and Cables, Low Frequency, 600V, -200 to +200°C
(f) ESCC No. 21700 : General Requirements for the Marking of ESCC Components.
(g) ESCC No. 20600 : Preservation, Packaging and Dispatch of ESCC Electronic Components.
(h) MIL-P-46112 : Military Specification for Polyimide Plastic Sheet and Strip
(i) ASTM-D5213: Standard Specification for Polyimide Resin Film for Electrical Insulation and Dielectric Applications.
(j) ESCC Basic Specification No. 2054009 : External Visual Inspection of Flexible Heaters

3. STATEMENT OF WORK

3.1 GENERAL

The bidder shall be the vendor or manufacturer registered in ESCC Qualified Part List (QPL).

3.2 ITEM REQUIREMENTS

The individual item requirements shall be in accordance with 1) ESCC 4009 and 4009/002 or 2) 4009/003 (variant 02) including production controls, screening tests, test methods and procedures, deliveries, packing and dispatch and specified herein. This heater shall be capable of meeting all design, materials, electrical, environmental, and mechanical requirements of 1) ESCC 4009 and 4009/002 or 2) 4009/003 (variant 02), unless otherwise stated.

3.3 ELECTRICAL CHARACTERISTICS AND PHYSICAL DESIGN

3.3.1 ELECTRICAL CHARACTERISTICS

3.3.1.1 Operating Temperature
Operating temperature shall be -65°C to +200°C.

3.3.1.2 Operating Voltage
Operating voltage range of heater shall be 48.8V to 50.5V each.

3.3.1.3 Resistance
Resistance of each heater circuit shall be within ±5%.

3.3.2 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage. Maximum ratings shall only be exceed during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Operating Temperature Range	T_{OP}	-65 to +200	°C	
Storage Temperature Range	T_{STG}	-65 to +200	°C	
Power Density when suspended in Still Air at 25°C	P	0.54	W/cm^2	Note 1

NOTES: 1. Based on heated area (i.e. edges and termination area excluded).

3.3.3 MATERIAL AND FINISHES

3.3.3.1 Heater Resistive Element
The heater resistive element shall be made of flexible nickel/chromium/iron alloy.

3.3.3.2 Protective Coating
Heater resistive elements and terminal lead connections shall be completely coated with Polyimide Polymer/FEP in accordance with MIL-P-46112 (as superseded by ASTM-D5213).

3.3.3.3 Terminal Leads
Terminal leads shall be made of multi-strand silver-plated copper in accordance with ESCC Generic Specification No. 3901. Wires used for terminal leads shall be ESCC qualified 3901 series. Appendix table shall be followed for detail wire type, gauge and specification. Terminal leads shall be electrically welded to the heater resistive element.

3.3.4 WEIGHT

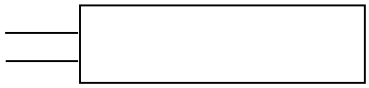
The maximum weight for these heaters shall be TBD.

3.3.5 PHYSICAL DIMENSIONS AND HEATER OUTLINE

The physical dimensions and electrical characteristics are attached in the attachment 1.

3.3.5.1 Lead Wire Length and Gauge
The lead wire length shall be 915 mm and wire gauge shall be 24AWG or 26AWG depending on electrical load. (see Appendix)

3.3.5.2 Dimension Tolerance (In accordance to ESCC4009/002 or ESCC4009/003)
Space between leads, Heating Area : ±0.5mm.
Lead length : ±10%.



3.3.6 MARKING

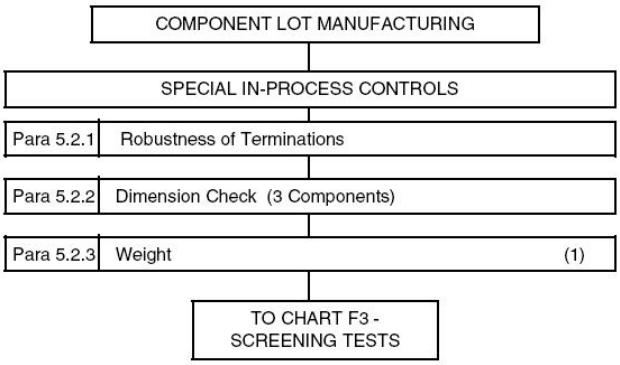
The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be (but not be limited to) :

a. KARI Part Number
b. ESCC Component Number and ESCC qualified component symbol
c. Serial Number
d. Manufacturer's Name
e. Date code

3.4 PRODUCTION CONTROL

Production control shall be in accordance with ESCC 4009, para. 5.



NOTES:
1. Guaranteed but not tested.

Chart F2 – Production Control in ESCC 4009.

3.4.1 ROBUSTNESS OF TERMINATIONS

The test conditions for robustness of terminations, tested as specified in the ESCC Generic Specification, shall be as follows and apply to a single terminal lead at a time.

Wire Gauge (AWG)	20	22	24	26	28	30
Pull Strength (N)	45	36	22	13	9	4.5
Duration (s) Minimum	5	5	5	5	5	5

3.5 SCREENING TESTS

Heaters procured to this document shall be subjected to the following screening test in accordance with ESCC Generic Specification No. 4009 with failure criteria in it. All electrical measurement method, condition, and criteria shall also be followed by relative paragraph in detail specification, ESCC No. 4009/002 or ESCC No. 4009/003.

ESCC 4009 ISSUE3	COMPONENTS FROM PRODUCTION CONTROL
Para. 8.1.3	Room Temperature Electrical Measurements
Para. 8.2	Rapid Change of Temperature
Para. 8.3	Overload (4 Components)
Para. 8.4	Burn-in
Para. 8.1.2	High and Low Temperatures Electrical Measurements (4 Components)
Para. 8.1.3	Room Temperature Electrical Measurements
Para. 6.4	Check for Lot Failure
Para. 8.5	External Visual Inspection

Deviations from the above Screening test in Generic Specification shall be applied in accordance with detail specification, ESCC No. 4009/002 or ESCC No. 4009/003.

4. QUALITY ASSURANCE

4.1 DELIVERABLE DATA

The following data shall be delivered with the Heaters shipment. The data shall include, but not be limited to, the followings:

KARI purchase order number
KARI Part number and serial number
ESCC Part number
Lot identification
Quantity shipped
Weight
Certificate of Conformance
Test Reports (in-production and screening test)

4.2 RECEVING INSPECTION

Upon receipt at KARI, receiving inspection shall perform sample Visual and mechanical inspection to verify materials, physical dimensions, making and workmanship.

5. PREPARATION FOR DELIVERY

5.1 PACKING

The packaging and dispatch of components to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 20600.

5.2 MARKING FOR SHIPMENT

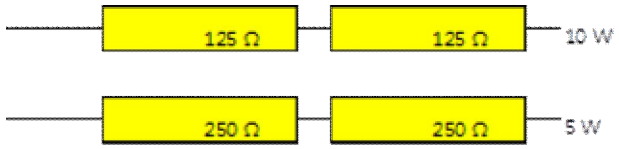
Shipping container shall be labeled to show at least the following:
a) Item Name
b) Name of Manufacturer
c) KARI Part Number and Serial Number
d) Contract or Purchase Order Number
e) Supplier’s Code Number and Revision Information
f) Notice of Handling Caution

APPENDIX. HEATER CHARACTERISTICS

Item	Overall Dimension of the Polyimide polymer/FEP		Resistance (Ω)	No. of Layers	Power (W) to each heater at 50 V	Current (A)	AWG Gauge (AWG)	Al Foil Backing	Wire length (mm)	Wire Type (ESCC3901/ 019-03) (Note2)	Heater Configuration	Quantity (EA)	Comment
	Length (mm)	Width (mm)											
1	150	26	83.3	1	30	0.6	26	Yes	915	Straight	Parallel	10	
2	125	26	100	1	25	0.5	26	Yes	915	Straight	Parallel	35	
3	100	26	125	1	20	0.4	26	Yes	915	Straight	Parallel	50	
4	95	20	167	1	15	0.3	26	Yes	915	Straight	Parallel	40	
5	135	12	250	1	10	0.2	26	Yes	915	Straight	Parallel	120	
6	65	20	125	1	20	0.4	26	Yes	915	Straight	Serial	75	Note3
7	38	12	250	1	10	0.2	26	**No**	915	Straight	Serial	130	Note3, 4
8	65	20	250	1	10	0.2	26	Yes	915	Straight	Parallel	65	

Notes:

1. In terms of heating area, the watt density shall be less than 1.0W/cm^2 for all items above.
2. Wire type: ESCC3901/019-03, Straight
3. The heaters shall be used in series:



4. The heaters might be mounted on a curved surface.