

MILLIGRID

Wire to Board

CONNECTOR SYSTEM



[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 1 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

Table of Contents

<u>ITEM</u>	<u>PAGE</u>
1.0 SCOPE	3
2.0 PRODUCT DESCRIPTION	3
2.1 DESCRIPTION, SERIES NUMBER, AND LINKS	3
2.2 DIMENSIONS, MATERIALS, PLATINGS	3
2.3 ENVIRONMENTAL CONFORMANCE	3
2.4 SAFETY AGENCY LISTINGS	3
3.0 APPLICABLE DOCUMENTS AND SPECIFICATION	4
3.1 MOLEX DOCUMENTS	4
3.2 INDUSTRY DOCUMENTS	4
4.0 ELECTRICAL PERFORMANCE RATINGS	5
4.1 VOLTAGE	5
4.2 CURRENT RATING (MAXIMUM AMPERES)	5
4.3 TEMPERATURE	6
4.4 DURABILITY	6
5.0 QUALIFICATION	6
6.0 PERFORMANCE	7
6.1 ELECTRICAL PERFORMANCE	7
6.2 MECHANICAL PERFORMANCE	8
6.3 ENVIRONMENTAL PERFORMANCE	9
7.0 TEST SEQUENCE GROUPS	10
8.0 SOLDER INFORMATION	11
8.1 SOLDER PROCESS TEMPERATURE	11
8.2 REFLOW SOLDERING PROFILE	11
9.0 PACKAGING	12
10.0 POLARIZATION AND KEYING OPTIONS	13

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID				SHEET No. 2 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS	CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA	
TEMPLATE FILENAME: 1703070003 REV A						

1.0 SCOPE

This product specification covers the performance requirements for 2 mm Pitch Milligrid BMI Vertical Header.

2.0 PRODUCT DESCRIPTION

2.1 DESCRIPTION, SERIES NUMBER, AND LINKS

DESCRIPTION	SERIES NUMBER
Milligrid 2 mm Pitch Vertical Header	151013

This series mates with Molex Milligrid 2 mm Wire to Board Connector Crimp Receptacle Housing, 51110-**52 and 51110-**60 series and Crimp Terminal, 50394 series.

2.2 DIMENSIONS, MATERIALS, PLATINGS

See sales drawings for details on dimensions, materials and platings.

2.3 ENVIRONMENTAL CONFORMANCE

To find product compliance information:

- [Go to molex.com](http://molex.com)
- Enter the part number in the search field.
- At the bottom of the page go to "Environmental" to see compliance status.

2.4 SAFETY AGENCY LISTINGS

UL Number: E29179
 CSA Number: 1585720 (LR19980)

CSA approval meets following standards/test procedures:

- CSA std. C22.2 No. 182.3-M1987
- UL-1977

* "C" and "US" mark adjacent to CSA signifies that the product has been evaluated to the applicable CSA and ANSI/UL standards, for use in Canada and US respectively.

Series 151013, 151014, rated 2.5 A (No. 24 AWG), 250V

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 3 of 13		
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS	CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A					

3.0 APPLICABLE DOCUMENTS AND SPECIFICATION

3.1 MOLEX DOCUMENTS

- MilliGrid BMI Connectors Test Summary TS
- [MilliGrid BMI Connectors Application Specification 50394-0002-AS](#)
- [Molex Solderability Specification SMES-152](#)
- [Molex Heat Resistance Specification AS-40000-5013](#)
- [Molex Moisture Technical Advisory AS-45499-001](#)
- [Molex Package Handling Specification 454990100-PK](#)

3.2 INDUSTRY DOCUMENTS

- EIA-364-1000
- UL-60950-1
- UL-1977
- CSA STD. C22.2 NO. 182.3-M1987

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 4 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

4.0 ELECTRICAL PERFORMANCE RATINGS

4.1 VOLTAGE

125 V max.

4.2 CURRENT RATING (MAXIMUM AMPERES)

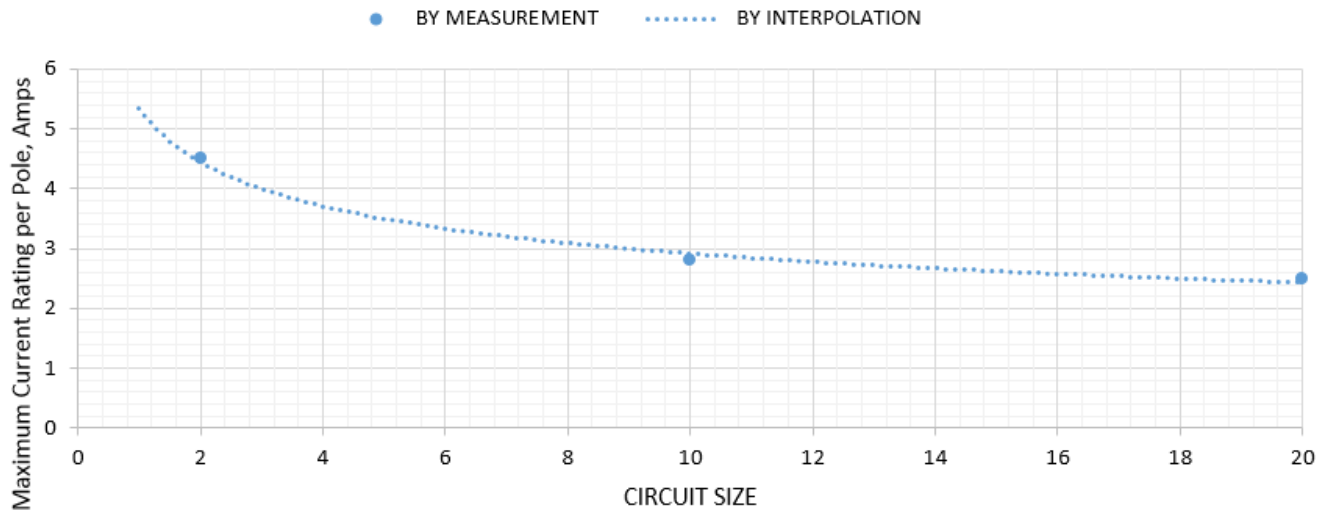
2.50 Amps (Max. with 20 contacts powered up)

Current rating is application dependent and each application should be evaluated by the end user for compliance to specific safety agency requirements. The ratings listed in the chart below are per Molex test method based on a 30 °C maximum temperature rise over ambient temperature and are provided as a guideline. Appropriate de-rating is required based on circuit size, ambient temperature, copper trace size on the PCB, gross heating from adjacent modules/components and other factors that influence connector performance. Wire size, insulation thickness, stranding, tin coated or bare copper, wire length & crimp quality are other factors that influence current rating.

Current Rating per Pole (Amps, Max)	CIRCUIT SIZE (NUMBER OF CONTACTS POWERED UP)									
	2	4*	6*	8*	10	12*	14*	16*	18*	20
	4.50	3.70	3.30	3.00	2.80	2.80	2.70	2.60	2.55	2.50

Tested with AWG 24 wire and PCB with 1oz Copper Traces.

** Extrapolated from test data.*



[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 5 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

4.3 TEMPERATURE

Operating Temperature Range : - 40 °C to + 105 °C
 Non-Operating Temperature Range: : - 40 °C to + 105 °C

Field Temperature and Field Life: 65 °C for 3 years (based EIA-364-1000, table 8)

Note: Temperature life test duration (section 6.3. item 2) is based on the assumption that the contact spends its entire life at the rated field maximum temperature (based on EIA-364-1000, table 8).

4.4 DURABILITY

Plating Type	Number of Cycles
Gold Plated	25

*As tested in accordance with EIA-364-1000 test method (see Sec. 6.2 item 2 of this specification).
 Durability per EIA-364-09.*

5.0 QUALIFICATION

Laboratory condition, sample selection and test sequences are in accordance with EIA-364-1000.

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID				SHEET No. 6 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS	CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA	
TEMPLATE FILENAME: 1703070003 REV A						

6.0 PERFORMANCE

6.1 ELECTRICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.1.1	Contact Resistance (Low Level)	Mate connectors apply a maximum voltage of 20 mV and a current of 100 mA. Per EIA-364-23	40 milliohms MAXIMUM
6.1.2	Insulation Resistance	Unmate connectors: Apply 500 VDC for 1 minute, measure the insulation resistance between adjacent Terminals. Per EIA-364-21.	1000 Megohms MINIMUM
6.1.3	Dielectric Withstanding Voltage	Unmate connectors: Apply 1250 VAC for 1 minute between adjacent terminals. Per EIA-364-20	No breakdown;
6.1.4	Temperature Rise (via Current Cycling)	Mate connectors: measure the temperature rise at the rated current after: 1.) 96 hours (steady state) 2.) 240 hours (45 minutes ON and 15 minutes OFF per hour). 3.) 96 hours (steady state)	Temperature rise: +30 °C MAXIMUM

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 7 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

6.2 MECHANICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.2.1	Pin Retention Force	Apply an axial load on the terminal in the housing to dislodge the terminals from the connector at a rate of 12.5 mm per minute	8.5 N Min. per pin (initial)
6.2.2	Durability	Mate connectors 25 cycles with maximum rate of 10 cycles per minute Per EIA-364-09	20 milliohms Max. (change from initial) No evidence of physical Damage
6.2.3	Vibration	Mate connectors : Test Condition per EIA-364-28, test condition VII, test condition letter D (15 min. in each of 3 mutual perpendicular directions. Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another.)	10 milliohms Max. (change from initial) & Discontinuity < 1 microsecond
6.2.4	Mechanical Shock	Mate connectors and shock at 50 g's with 1/2 sine wave (11 milliseconds) shocks in the ± X, ± Y, ± Z axes (18 shocks total).	10 milliohms Max. (change from initial) & Discontinuity < 1 microsecond

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 8 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

6.3 ENVIRONMENTAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT										
6.3.1	Thermal Shock	Mate connectors; expose to 5 cycles of: <table border="0"> <tr> <td><u>Temp °C</u></td> <td><u>Duration (Minutes)</u></td> </tr> <tr> <td>-55 + 0/-3</td> <td>30</td> </tr> <tr> <td>+25 ± 10</td> <td>5 MAXIMUM</td> </tr> <tr> <td>+85 + 3/-0</td> <td>30</td> </tr> <tr> <td>+25 ± 10</td> <td>5 MAXIMUM</td> </tr> </table> Per EIA 364-32 condition I	<u>Temp °C</u>	<u>Duration (Minutes)</u>	-55 + 0/-3	30	+25 ± 10	5 MAXIMUM	+85 + 3/-0	30	+25 ± 10	5 MAXIMUM	20 milliohms Max. (change from initial) & Visual: No Damage
<u>Temp °C</u>	<u>Duration (Minutes)</u>												
-55 + 0/-3	30												
+25 ± 10	5 MAXIMUM												
+85 + 3/-0	30												
+25 ± 10	5 MAXIMUM												
6.3.2	Temperature Life	Mate connectors; expose to: 96 hours at 105 ± 2 °C Per EIA 364-17	20 milliohms Max. (change from initial) & Visual: No Damage										
6.3.3	Humidity (Cyclic)	24 cycles at temperature 25 ± 3 °C at 80 ± 3% relative humidity and 65 ± 3 °C at 50 ± 3% relative humidity; dwell time of 1.0 hour; ramp time of 0.5 hours. Dwell times start when the temperature and humidity have stabilized within the specified levels. Per EIA-364-31	Dielectric Withstanding Voltage: No Breakdown at 500 VAC & Insulation Resistance: 1250 Megohms Min. & Visual: No Damage										
6.3.4	Solderability	Solder Time: 5 +/- 0.5 secs. Solder Temperature: 260 +/- 5 °C Steam aging for 8 hours	Dipped portion should have 95% continuous new solder coating coverage										
6.3.5	Resistance to Soldering Heat	Refer to Section 8.0 for soldering profile	No damage in appearance of the connector										

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 9 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

7.0 TEST SEQUENCE GROUPS

Test Group →	A	B	C	D	E	F	G
Test or Examination ↓							
Examination of the connector(s)	1	1,5	1	1,8	1	1	1
Contact Resistance (Low Level) (LLCR)				3,5,7	3,5,7	3,5,7,9	
Insulation Resistance	3,6						
Dielectric Withstanding Voltage	4,7						
Temperature Rise (via Current Cycling)		4					
Pin Retention Force in housing			2				
Durability		3		4	4	4	
Vibration						6	
Mechanical Shock						8	
Humidity (cyclic)	5						
Temperature Life				6			
Thermal Shock					6		
Resistance to Soldering Heat	2	2		2	2	2	
Solderability							2

[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 10 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

8.0 SOLDER INFORMATION

Per SMES-152 and AS-40000-5013

*These specifications establish standard solderability test methods used to evaluate a products ability to accept molten solder. Solder Process Temperatures and Reflow Solder Profiles will vary based on application, equipment, solder paste, PCB thickness, etc.

8.1 SOLDER PROCESS TEMPERATURE

Wave Solder: 260 °C Max
 Reflow Solder: 260 °C Max

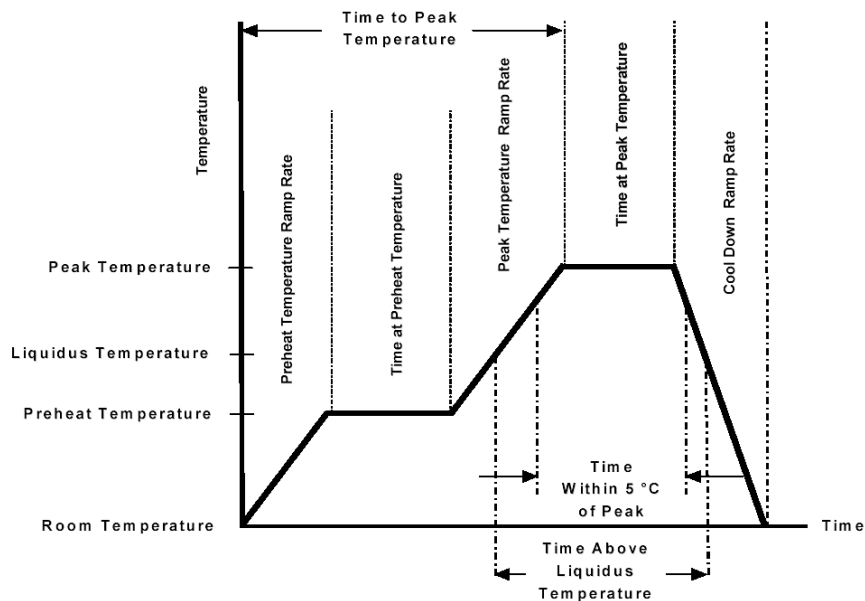
8.2 REFLOW SOLDERING PROFILE

(This profile is per AS-40000-5013 and is provided as a guideline only. Please see notes for additional information)

[Molex Connector Heat Resistance Specification](#)

[AS-40000-5013](#)

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[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 11 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			

Description	Requirement
Average Ramp Rate	3°C/sec Max
Preheat Temperature	150°C Min to 200°C Max
Preheat Time	60 to 180 sec
Ramp to Peak	3°C/sec Max
Time over Liquidus (217°C)	60 to 150 sec
Peak Temperature	260 +0/-5°C
Time within 5°C of Peak	20 to 40 sec
Ramp - Cool Down	6°C/sec Max
Time 25°C to Peak	8 min Max

9.0 PACKAGING

Parts shall be packaging to protect the parts from damage during standard shipping, storage, and handling. Refer Molex.com specific part number webpage to get the exact packaging document for that item

[Milli-Grid BMI Connector System Web Page](#)

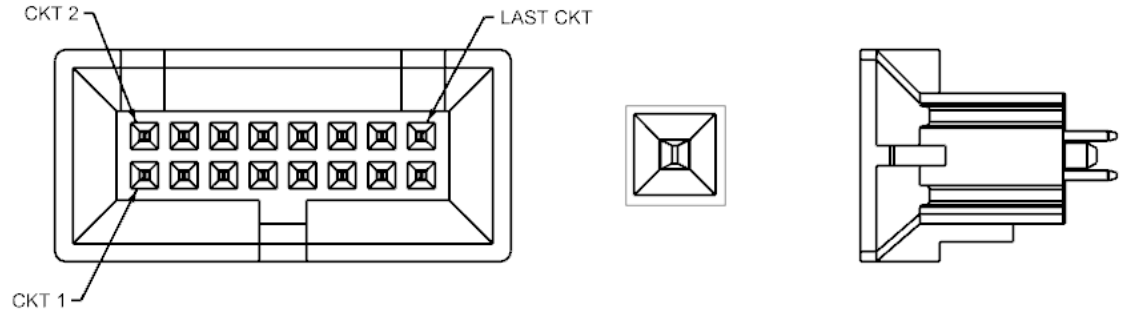
[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID				SHEET No. 12 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS	CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA	
TEMPLATE FILENAME: 1703070003 REV A						

10.0 POLARIZATION AND KEYING OPTIONS

10.1 VERTICAL HEADER (Series: [151013](#))



[Milli-Grid BMI Connector System Web Page](#)

[TABLE OF CONTENTS](#)



REVISION: B1	ECM INFORMATION: EC No: 634089 DATE: 2020/03/16	TITLE: PRODUCT SPECIFICATION 2MM BMI VERTICAL HEADER MILLIGRID	SHEET No. 13 of 13
DOCUMENT NUMBER: PS-151013-0001	DOC TYPE: PS	DOC PART: 001	CREATED / REVISED BY: ABABUPS
		CHECKED BY: MRAMAKRISHNA	APPROVED BY: MRAMAKRISHNA
TEMPLATE FILENAME: 1703070003 REV A			