

TITLE

WIFI 6E PCB CABLED BALANCED ANTENNA

TABLE OF CONTENTS

- 1.0 SCOPE**
- 2.0 PRODUCT DESCRIPTION**
- 3.0 GENERAL SPECIFICATION**
- 4.0 PRODUCT STRUCTURE INFORMATION**
- 5.0 APPLICABLE DOCUMENTS**
- 6.0 ANTENNA SPECIFICATION**
- 7.0 MECHANICAL SPECIFICATION**
- 8.0 ENVIRONMENTAL SPECIFICATION**
- 9.0 PACKING**
- 10.0 CHANGE HISTORY**

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	1 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				

WIFI 6E PCB CABLED BALANCED ANTENNA

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances specification for WIFI 6E PCB cabled balance antenna.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: WiFi 6E PCB Cabled Balanced Antenna
 Series Number: 146187

2.2 DESCRIPTION

Series 146187 is a balanced, dipole-type, high efficiency antenna for applications, including WiFi 6E, Bluetooth, Zigbee and others. This antenna is made from poly PCB material with small size.

2.3 FEATURES

- 2400~2500MHz,5150~5850MHz, 5925~7125MHz, Linear polarization
- Ground plane independent, balanced dual band antenna
- PCB size 40.95 x 9 x 0.7mm (not contain solder area)
- MHF-I (U.FL compatible) connector
- Cable OD1.13mm, 6 standard length options (50/100/150/200/250/300mm)
- Cable and connector can be customized



MODULE 3D VIEW

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	2 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				

3.0 GENERAL SPECIFICATION

Product name	WiFi 6E PCB Cabled Balanced Antenna		
Part number	146187		
Frequency	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Polarization	Linear		
Operating with matching	-40°C to 85°C		
Storage with matching	-40°C to 85°C		
RF Power	2 Watts		
Impedance with matching	50 Ohms		
Antenna type	PCB		
Connector type	Compatible MHF-1 & U.FL		
Cable diameter	Ø1.13mm		
Cable length	50 mm (P/N for 1461870050)		
	100 mm (P/N for 1461870100)		
	150 mm (P/N for 1461870150)		
	200 mm (P/N for 1461870200)		
	300 mm (P/N for 1461870300)		

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WiFi 6E PCB Cabled Balanced Antenna Antenna Product Specification			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	3 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				

4.0 PRODUCT STRUCTURE INFORMATION

P/N	146187
-----	--------

MAX 2.50 WITH SOLDER PASTE
INCLUDE FLEX

PRINT TEXT

40.95

9.00

Molex
Balanced dual
band Ant
146187

R1.50

PCB

CABLE

CONNECTOR

VERTICAL DIRECTION
SEE NOTE 5

L2 ±2.00

L1 ±2.00

(3.00)

TOP VIEW

4.10 ±0.50

2.10

Ø(2.74)

DETAIL A
SCALE 6:1
CONNECTOR

ITEM	MATERIAL P/N	CABLE LENGTH "L1"	CABLE LENGTH "L2"
1	1461870050	50MM	43MM
2	1461870100	100MM	93MM
3	1461870150	150MM	143MM
4	1461870200	200MM	193MM
5	1461870300	300MM	293MM

NOTES:

1. PCB SIZE:40.95*9MM;THICKNESS:0.7MM.
2. PCB SOLDER MASK COLOR:GREEN.
3. CABLE:Ø1.13MM;COLOR:BLACK.
4. CONNECTOR: MHF-I/U.FL GOLD PATING.
5. CAN NOT LIFT UP CABLE IN VERTICAL DIRECTION.

Mechanical Structure Information for 146187series

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER		DOCUMENT NUMBER	
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET		PS-146187-100	
INITIAL APPR	CYU08	DATE	2015/09/24				

5.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-1461870050	Mechanical Dimension of the product
Application Guide (AS)	AS-1461870100	Antenna Application and surrounding
Packing Drawing (PK)	PK-1461870100	Product packaging specifications

6.0 ANTENNA SPECIFICATION

All measurements are done of the antenna in free space with VNA Agilent E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.1461870100 with a cable length of 100mm

6.1 ELECTRICAL REQUIREMENT

6.1.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGTHH 50mm			
P/N	1461870050		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Peak Gain (Max)	3.0dBi	4.25dBi	4.6dBi
Average Total efficiency	>83%	>84%	>75%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.2 ELECTRICAL REQUIREMENTS FOR CABLE LENGTHH 100mm			
P/N	1461870100		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Peak Gain (Max)	2.8dBi	4.0dBi	4.3dBi
Average Total efficiency	>80%	>80%	>70%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.3 ELECTRICAL REQUIREMENTS FOR CABLE LENGTHH 150mm			
P/N	1461870150		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Peak Gain (Max)	2.6dBi	3.7dBi	4.0dBi
Average Total efficiency	>77%	>76%	>65%
Return Loss	< -10 dB	< -10 dB	< -5 dB

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	5 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				

6.1.4 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 200mm

P/N	1461870200		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Peak Gain (Max)	2.4dBi	3.5dBi	3.7dBi
Average Total efficiency	>74%	>72%	>60%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.6 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 300mm

P/N	1461870300		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Peak Gain (Max)	2.0dBi	2.8dBi	3.1dBi
Average Total efficiency	>68%	>65%	>50%
Return Loss	< -10 dB	< -10 dB	< -5 dB

Note that the above antenna performance is measured with just the antenna mounted on a PC/ABS block to similar a free-space condition. When implement into the system, the frequency resonant might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dBi in the actual implementation as the radiation pattern will change due to the surround components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION				
CHANGE NO.	737858							
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES	
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187	
INITIAL RELEASE			CUSTOMER		DOCUMENT NUMBER		REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	6 OF 10	
INITIAL APPR	CYU08	DATE	2015/09/24					

6.2 CABLE LOSS

DESCRIPTION	TEST CONDITION	REQUIREMENTS		
Frequency Range	2.4GHz/5GHz	2GHz~3GHz	5GHz~6GHz	6-7.125GHz
Attenuation	1m cable measured by VNA5071C	≤3.5dB/m	≤5.5dB/m	≤6.5dB/m

Balance antenna resonance is insensitive to cable's length, but the cable's loss will affect the total efficiency.

7.0 MECHANICAL SPECIFICATION

All measurements in this document are done with the part no. 1461870100 for different cable length.

DESCRIPTION	TEST CONDITION	TEST RESULT
Pull Test	1. Test machine: Max intelligent load tester 2. Stick the PCB antenna on a plastic board, pull cable in axial direction.	Pull force >8N
Un-mating force (connector)	Solder the receptacle connector to the test board ,then place the board and plug on push-on/pull-off machine, and repeat mating and un-mating 30 cycles at a speed 25±3mm/min. along the mating axis.	Un-mating force : 0.5 kgf min

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	7 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				

8.0 ENVIRONMENTAL SPECIFICATION

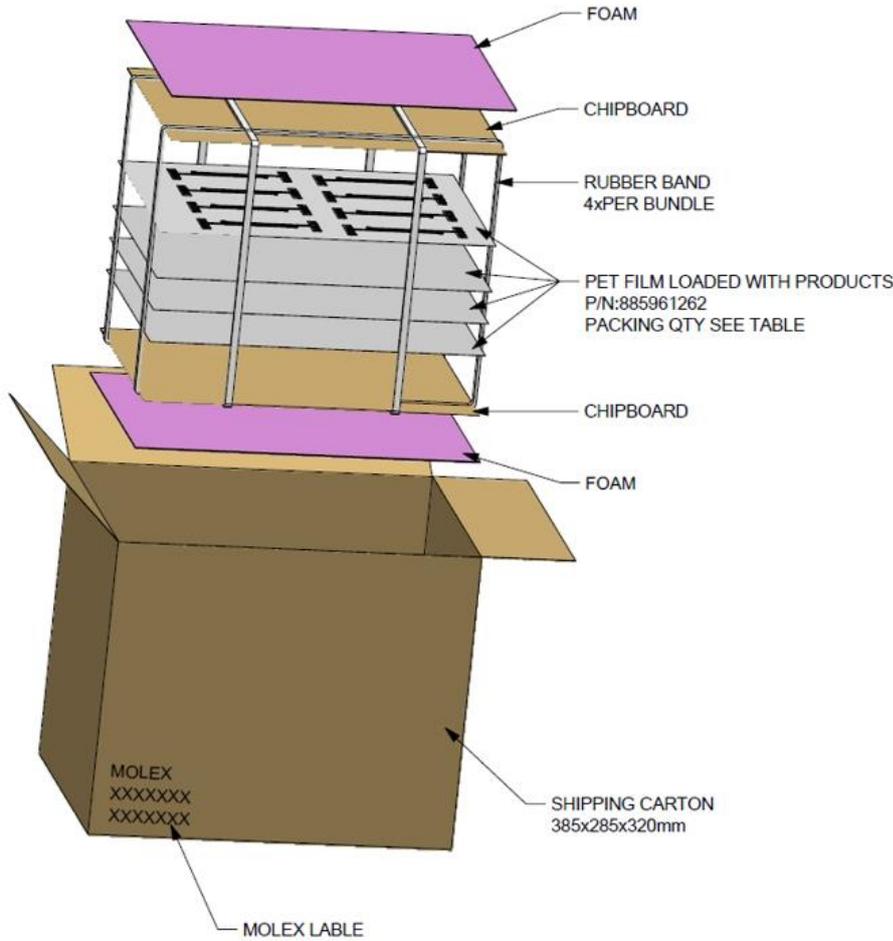
DESCRIPTION	SPECIFICATION
Temperature /Humidity cycling	<ol style="list-style-type: none"> 1.The device under test is kept for 30 mins in an environment with a temperature of -40 °C 2. Kept for 4 Hours in an environment with a temperature of 85 °C 3. Kept for 2 Hours in an environment with a temperature of 125 °C 4. The cycle is repeated until a total of 40 cycles have been completed. Hereafter the conditions are stabilized at room temperature. Transfer temperature 8°C per min. 5. Parts should meet RF spec before and after test. 6. No cosmetic problem (No soldering problem; No adhesion problem of glue.)
Temperature Shock	<ol style="list-style-type: none"> 1.The device under test at -40 °C-125 °C by 100 cycles, Dwell of 30 mins, transition time between Dwell 30 secs (~ 61 mins / cycle) and each item should be measured after exposing them in normal temperature and humidity for 24 h. 2. Parts should meet RF spec before and after test. 3. No cosmetic problem (No soldering problem ; No adhesion problem of glue) .
High Temperature	<ol style="list-style-type: none"> 1.Temperature:125°C, time:1008 hours 2.There is no substantial obstruction to air flow across and around the samples, and the samples are not touching each other 3. Parts should meet RF spec before and after test. 4. No cosmetic problem (No soldering problem ; No adhesion problem of glue) .
Salt mist test	<ol style="list-style-type: none"> 1. The device under test is exposed to a spray of a 5% (by volume) resolution of NACL in water for 2 hours. Thereafter the device under test is left for 1 week in room temperature at a relative humidity of 95%. The cycle is repeated until a total of 2 cycles have been completed. Here after the conditions are stabilized at room temperature. 2. Parts should meet RF spec before and after test. 3. No visible corrosion. Discoloration accept.

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION			
CHANGE NO.	737858			DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REVISED BY	SANTHN	DATE	2023/02/13	PS	PRODUCT SPECIFICATION WORD	001	146187
REV APPR BY	GGA	DATE	2023/02/24	INITIAL RELEASE		CUSTOMER	DOCUMENT NUMBER
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET		REVISION	SHEET
INITIAL APPR	CYU08	DATE	2015/09/24			G	8 OF 10

9.0 PACKING

PART NUMBER	PCS/FILM	FILMS/BUNDLE	BUNDLES/CARTON	QTY/CARTON
1461870050	32	40	3	3840PCS
1461870100	16	40	4	2560PCS
1461870150	12	40	4	1920PCS
1461870200	12	40	4	1920PCS
1461870300	8	40	4	1280PCS



NOTES:

1. PRODUCTS MUST BE PACKED IN CARTONS AND SEALED UP WITH TAPE.
2. STICK LABEL WITH PART NUMBER AND DATE CODE
3. STANDARD PACKAGING QUANTITY: SEE TABLE
4. THIS PACKAGING SPECIFICATION TO BE USED FOR "2.4/5GHz BALANCE PCB ANTENNA".

PACKAGING INFORMATION FOR 146187 Series

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION				
CHANGE NO.	737858							
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES	
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187	
INITIAL RELEASE			CUSTOMER		DOCUMENT NUMBER		REVISION SHEET	
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET		PS-146187-100	G	9 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24					

10.0 CHANGE HISTORY

CHANGE HISTORY		
REV	DATA	DESCRIPTION
E	2020/05/27	Add 6-7.125GHz band
F	2022/10/31	Update the efficiency and gain values of Part 6.1 to be consistent with AS.
G	2023/02/13	Removed obsoleted part number 1461870250.

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	OBSOLETD PART NUMBER AS PER PCN#511691			<p align="center">WIFI 6E PCB CABLED BALANCED ANTENNA ANTENNA PRODUCT SPECIFICATION</p>			
CHANGE NO.	737858						
REVISED BY	SANTHN	DATE	2023/02/13	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	GGA	DATE	2023/02/24	PS	PRODUCT SPECIFICATION WORD	001	146187
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	ZLRAO	DATE	2015/07/06	GENERAL MARKET	PS-146187-100	G	10 OF 10
INITIAL APPR	CYU08	DATE	2015/09/24				