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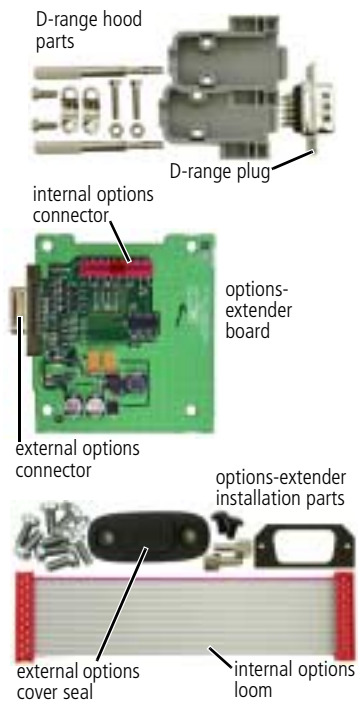
**TM8100** mobiles  
**TM8200** mobiles

## Accessories Manual



MMA-00012-01  
Issue 1  
December 2004

# 3 TMAA01-05 Options-Extender Board



The TMAA01-05 options-extender board provides external access to most of the signal lines provided by the radio's internal options connector.

The options-extender board fits inside the radio in the options cavity and is connected to the main PCB by the internal options connector and loom.

The internal options connector signals are then made available on the high-density 15-way D-range connector mounted on the options-extender board. This connector fits through the external options connector hole provided in the radio chassis.



**Important**

The radio does not meet the IP54 protection standard once an options-extender board has been installed unless the external options cover seal is installed.



**Important**

To comply with EN 301 489-5, all cables connected to the external options connector must be less than three metres (10 feet) in length.

## 3.1 Changing the Options-Extender Links

The options-extender board configuration must be completed before the board is installed in the radio, as the top side of the options-extender board is not accessible once the board is screwed to the radio lid.



**Important**

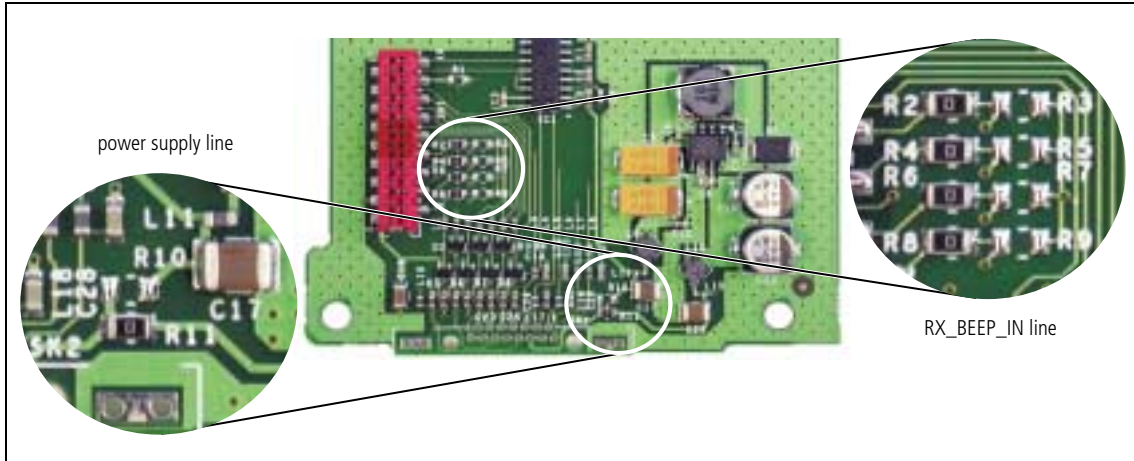
This equipment contains devices which are susceptible to damage from static discharges. Refer to [“ESD Precautions” on page 9](#) for more information.

The options-extender board has various link options which allow the user to re-configure the outputs available on the external options connector. The outputs that can be made available by changing linking resistors are:

- the 5V supply line, and
- the RX\_BEEP\_IN line.

In both cases, these lines replace other lines that are available when the linking resistors are in the factory-set configuration. Note that there is no external connection available for the RX\_AUD line.

**Figure 3.1 Options-extender board linking resistor locations**



### 3.1.1 Power Supply Line

The power supply output available on pin 2 of the external options connector is factory-set to 13.8V. The output on this pin can be changed to 5V if R11 (a 0Ω surface mount resistor) is moved to position R10. [Figure 3.1](#) at the top of the page shows the component locations.



**Important** The maximum current for the 5V supply line is 400mA.

### 3.1.2 RX\_BEEP\_IN Line

If the RX\_BEEP\_IN line is required on the external options connector, it must replace one of the following lines:

- IOP\_RSSI
- AUD\_TAP\_IN
- AUX\_MIC\_AUD
- AUD\_TAP\_OUT.

The following table explains the resistor link changes required and [Figure 3.1](#) at the top of the page shows the component locations.

**Table 3.1 RX\_BEEP\_IN resistor changes**

RX_BEEP_IN Line Replaces	Remove Resistor	Add Resistor
IOP_RSSI	R2	R3
AUD_TAP_IN	R4	R5
AUX_MIC_AUD	R6	R7
AUD_TAP_OUT	R8	R9

## 3.2 Installing the Options-Extender Board

### 3.2.1 Parts Required

The following table describes the parts required to install an options-extender board in a radio. The parts marked with an asterisk (★) are not shown in [Figure 3.2](#) and are used to connect to the radio's external options connector.

**Table 3.2 Options-extender installation parts required**

Quantity	Internal Part Number	Description	Figure 3.2 Reference
1	362-01110-XX <sup>a</sup>	foam seal	③
1	362-01108-XX <sup>a</sup>	cover seal	⑪
2	347-00011-00	4-40x3/16 screws	⑫
2	354-01043-00	screw-lock fasteners	⑦
4	349-02062-00	M3x8 screws	⑨
★1	240-00010-80	D-range plug	—
★1	240-06010-29	D-range hood	—

a. Contact Technical Support for the exact IPN.

### 3.2.2 Installation Procedure

1. Disassemble the radio in order to gain access to the options cavity.  
For detailed disassembly instructions, refer to the disassembly procedure in the TM8000 Service Manual.

Refer to the diagram on the following page and the instructions below.

2. Remove the top cover and lid ① from the radio to access the options cavity.
3. Remove the external options connector bung ②, if it is fitted.
4. On the inside of the radio lid place the foam seal ③ over the external options connector cavity ④.
5. With the top side of the options-extender board ⑤ facing the radio lid, guide the external options connector ⑥ (the D-range connector on the options-extender board) into the external options connector cavity.
6. Screw the external options connector to the radio lid using the two screw-lock fasteners ⑦.

Tighten the fasteners to a torque of 0.9N·m (8lbf·in).

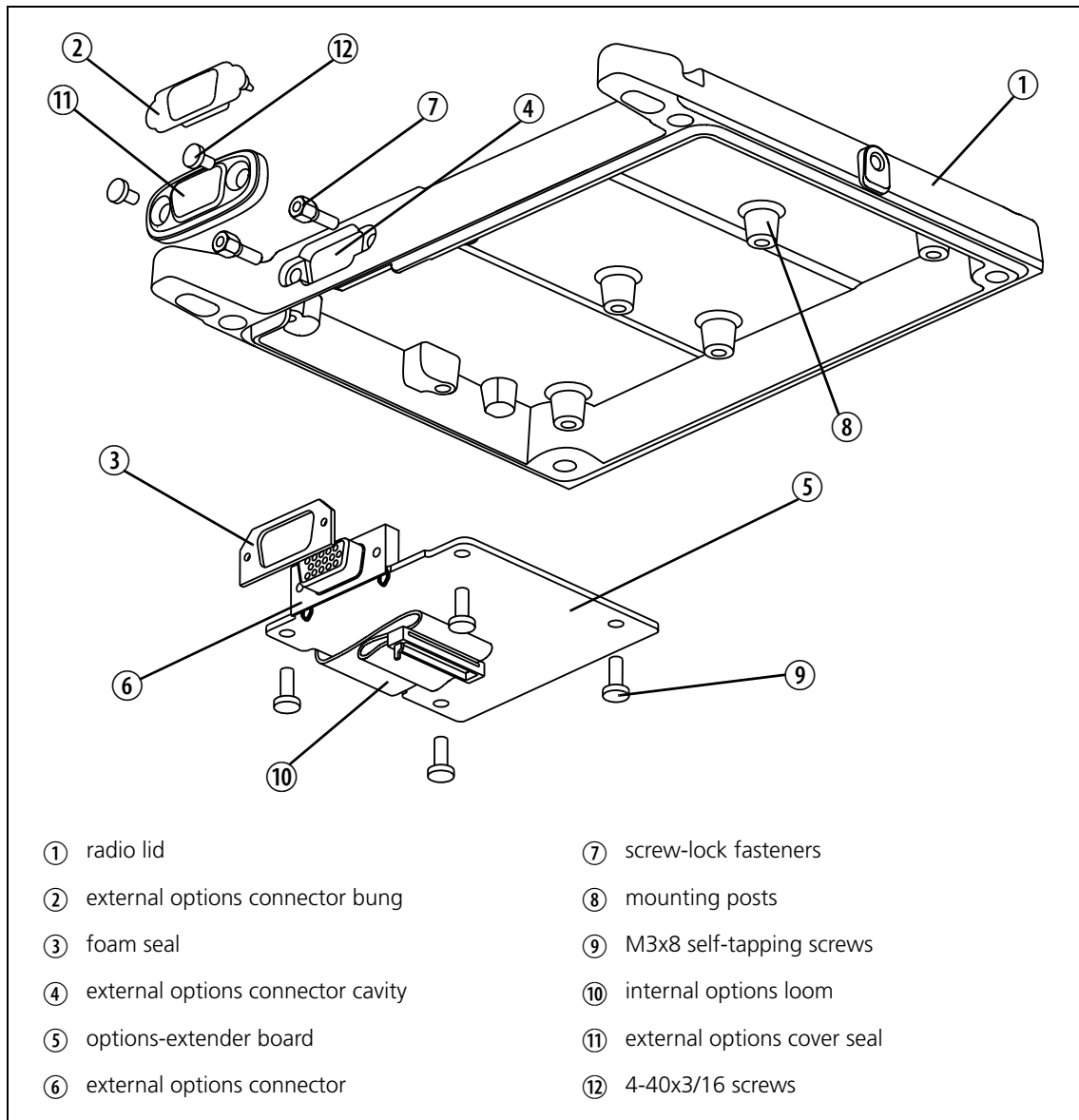


#### **Important**

The external options connector screw-lock fasteners must be tightened correctly before screwing the options-extender board onto the mounting posts ⑧.

7. Screw the options-extender board to the mounting posts on the radio lid using four M3x8 self-tapping screws ⑨.  
Tighten the M3x8 screws to a torque of 1.9N·m (17lbf·in)
8. Plug the unattached end of internal options connector loom ⑩ into the internal options connector on the radio main PCB.
9. Refit the radio lid and top cover to the radio and screw the external options cover seal ⑪ over the external options connector, using the two 4-40x3/16 screws ⑫.

**Figure 3.2 Options-extender board installation**



### 3.3 Interface Specification

The following tables summarize the signals used for the options-extender board on the internal options connector (SK1 on the options-extender board) and the external options connector (SK2 on the options-extender board).

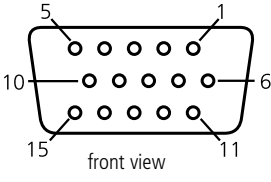


**Note** The TM8000 3DK Hardware Developer's Kit Application Manual (product code MMAA30-01-00-807) contains a detailed electrical specification for the signals available on the radio's internal options connector. This manual is part of the 3DK Resource CD, which can be purchased using product code TMAA30-01.

**Table 3.3 Internal options connector - pins and signals**

	Pin	Connector Signal	Description
<p>top view</p>	1	13V8_SW	switched 13V8 supply from the radio
	2	AUD_TAP_OUT	Programmable tap point out of the receive or transmit audio chain. DC-coupled
	3	AGND	analogue ground
	4	AUX_MIC_AUD	Auxiliary microphone input, with electret microphone biasing provided. Dynamic microphones are not supported.
	5	RX_BEEP_IN	receive sidetone input, AC-coupled
	6	AUD_TAP_IN	Programmable tap point into the receive or transmit audio chain. DC-coupled
	7	RX_AUD	not connected
	8	RSSI	analogue RSSI output
	9-15	IOP_GPIO1 to IOP_GPIO7	programmable function and direction
	16	DGND	digital ground
	17	IOP_RXD	an RS-232 compliant asynchronous serial port - receive data
	18	IOP_TXD	an RS-232 compliant asynchronous serial port - transmit data

**Table 3.4 External options connector - pins and signals**

	Pin	Signal	Description
	2	13V8_SW <sup>a</sup>	13V8 supply
	6	AUD_TAP_OUT <sup>b</sup>	Programmable tap point out of the Rx or Tx audio chain. DC-coupled
	7	AGND	analogue ground
	11	AUX_MIC_AUD <sup>b</sup>	Auxiliary microphone input, with electret microphone biasing provided. Dynamic microphones are not supported.
	1	AUD_TAP_IN <sup>b</sup>	Programmable tap point into the Rx or Tx audio chain. DC-coupled.
	3	RSSI <sup>b</sup>	analogue RSSI output
	15	IOP_GPIO1 <sup>c</sup>	programmable function and direction
	14	IOP_GPIO2 <sup>c</sup>	programmable function and direction
	13	IOP_GPIO3 <sup>c</sup>	programmable function and direction
	10	IOP_GPIO4 <sup>c</sup>	programmable function and direction
	9	IOP_GPIO5 <sup>c</sup>	programmable function and direction
	5	IOP_GPIO6 <sup>c</sup>	programmable function and direction
	4	IOP_GPIO7 <sup>c</sup>	programmable function and direction
	12	IOP_RXD	an RS-232 compliant asynchronous serial port - receive data
	8	IOP_TXD	an RS-232 compliant asynchronous serial port - transmit data

- a. This can be configured to be 5V. Refer to ["Power Supply Line" on page 32.](#)
- b. This can be re-configured to be RX\_BEEP\_IN. Refer to ["RX\\_BEEP\\_IN Line" on page 32.](#)
- c. 3V3 CMOS output via 1 kΩ series resistance. 5V tolerant input.

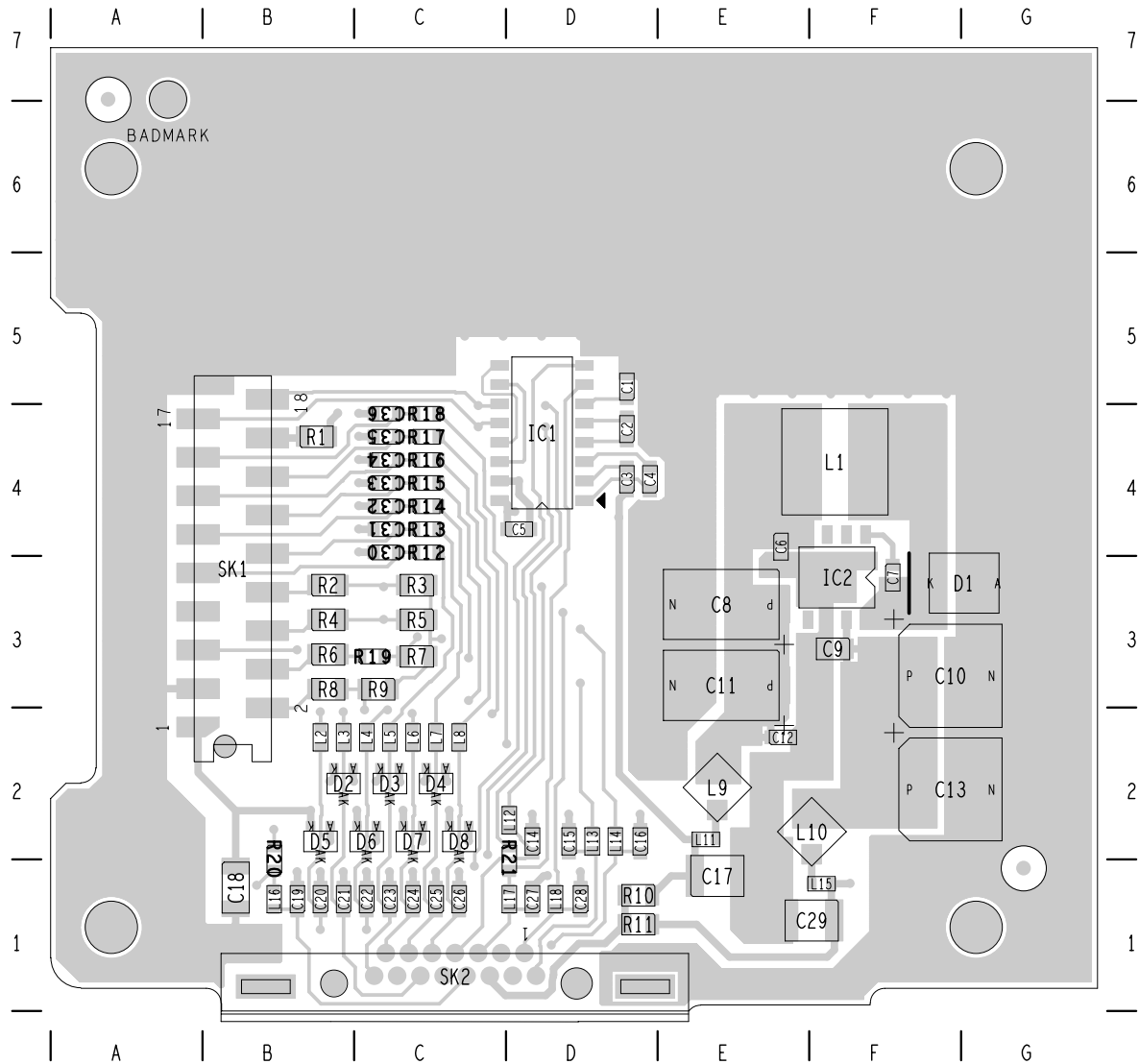
## 3.4 PCB Information

### 3.4.1 TMAA01-05 Parts List (PCB IPN 226-00129-03)

Ref.	IPN	Description	Ref.	IPN	Description
C1	018-16100-00	Cap 0603 100n 16vx7r+-10%	L18	057-10010-20	Ind 0603 Blm11-B102s 0.1a
C2	018-16100-00	Cap 0603 100n 16vx7r+-10%	R2	036-10000-00	Res M/F SMD 0805 0e 0.125w
C3	018-16100-00	Cap 0603 100n 16vx7r+-10%	R4	036-10000-00	Res M/F SMD 0805 0e 0.125w
C4	018-16100-00	Cap 0603 100n 16vx7r+-10%	R6	036-10000-00	Res M/F SMD 0805 0e 0.125w
C5	018-16100-00	Cap 0603 100n 16vx7r+-10%	R8	036-10000-00	Res M/F SMD 0805 0e 0.125w
C6	018-16100-00	Cap 0603 100n 16vx7r+-10%	R11	036-10000-00	Res M/F SMD 0805 0e 0.125w
C7	018-15100-00	Cap 0603 10n 50v X7r +-10%			
C8	014-08100-30	Cap Tant SMD 100u 10v Loesr D	SK1	240-10000-11	Conn SMD 18w Skt M/Match
C9	015-26100-08	Cap Cer 0805 100n 10% X7r 50v	SK2	240-00011-67	Skt 15w Drng Ra Slim Dsub 7912
C10	016-08470-01	Cap Elec SMD 47uf 6*4 16v			
C11	014-08100-30	Cap Tant SMD 100u 10v Loesr D		226-00129-03	PCB TMAA01-05 Opts Brd
C12	018-16100-00	Cap 0603 100n 16vx7r+-10%		365-00011-38	Lbl Static Warning Yel
C13	016-08470-01	Cap Elec SMD 47uf 6*4 16v		365-00011-54	Lbl White R1556/2 90*24mm
C14	018-15100-00	Cap 0603 10n 50v X7r +-10%		399-00010-88	Bag Static Shldng 152*254mm
C15	018-15100-00	Cap 0603 10n 50v X7r +-10%		410-01189-00	Pkg TMA Box 200x133x67mm
C16	018-15100-00	Cap 0603 10n 50v X7r +-10%			
C17	015-07220-35	Cap Cer 1210 2u2 X5R 35v	600-00009-00 parts:		
C18	015-06470-01	Cap Cer 1206 470n X7r 20% 50v		240-00010-80	Plg 15w Drng Hi-D
C19	018-13470-00	Cap 0603 470p 50v X7r+-10%		240-06010-29	Conn 9w Hood/Cvr Lets
C20	018-13470-00	Cap 0603 470p 50v X7r+-10%	600-00010-00 parts:		
C21	018-13470-00	Cap 0603 470p 50v X7r+-10%		219-00329-00	Loom TMA Int Opt
C22	018-13470-00	Cap 0603 470p 50v X7r+-10%		354-01043-00	Fsnr Scrw Lok 1pr 4-40
C23	018-13470-00	Cap 0603 470p 50v X7r+-10%		362-01108-01	Seal Drng Cvr 9way TMA
C24	018-13470-00	Cap 0603 470p 50v X7r+-10%		362-01111-00	Seal Drng 9way TMA
C25	018-13470-00	Cap 0603 470p 50v X7r+-10%		347-00011-00	Scrws 4-40*3/16 Unc P/P Blk
C26	018-13470-00	Cap 0603 470p 50v X7r+-10%		349-02062-00	Scrws M3*8 T/T P/T ContiR
C27	018-13470-00	Cap 0603 470p 50v X7r+-10%			
C28	018-15100-00	Cap 0603 10n 50v X7r +-10%			
C29	015-07220-35	Cap Cer 1210 2u2 X5R 35v			
D1	001-10014-03	Diode SMD MBRS140T3 Sch			
D2	001-10099-01	Diode BAV99w Dual Ss			
D3	001-10099-01	Diode BAV99w Dual Ss			
D4	001-10099-01	Diode BAV99w Dual Ss			
D5	001-10099-01	Diode BAV99w Dual Ss			
D6	001-10099-01	Diode BAV99w Dual Ss			
D7	001-10099-01	Diode BAV99w Dual Ss			
D8	001-10099-01	Diode BAV99w Dual Ss			
IC1	002-10020-20	IC SMD ADM202 Rs-232 Con S0-16			
IC2	002-10267-40	IC LM2674 S08 Swtch Volt Regul			
L1	057-10100-65	Ind SMD Pwr Cdrh6D38 100UH .65			
L2	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L3	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L4	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L5	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L6	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L7	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L8	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L9	057-10010-45	Ind SMD Pwr CDRH2D18 10UH .43A			
L10	057-10010-45	Ind SMD Pwr CDRH2D18 10UH .43A			
L11	057-10600-05	Ind 0603 Blm11p600s .5a F/Bead			
L12	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L13	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L14	038-13220-00	Res 0603 220e 1/16w +-5%			
L15	057-10600-05	Ind 0603 Blm11p600s .5a F/Bead			
L16	057-10010-20	Ind 0603 Blm11-B102s 0.1a			
L17	057-10010-20	Ind 0603 Blm11-B102s 0.1a			

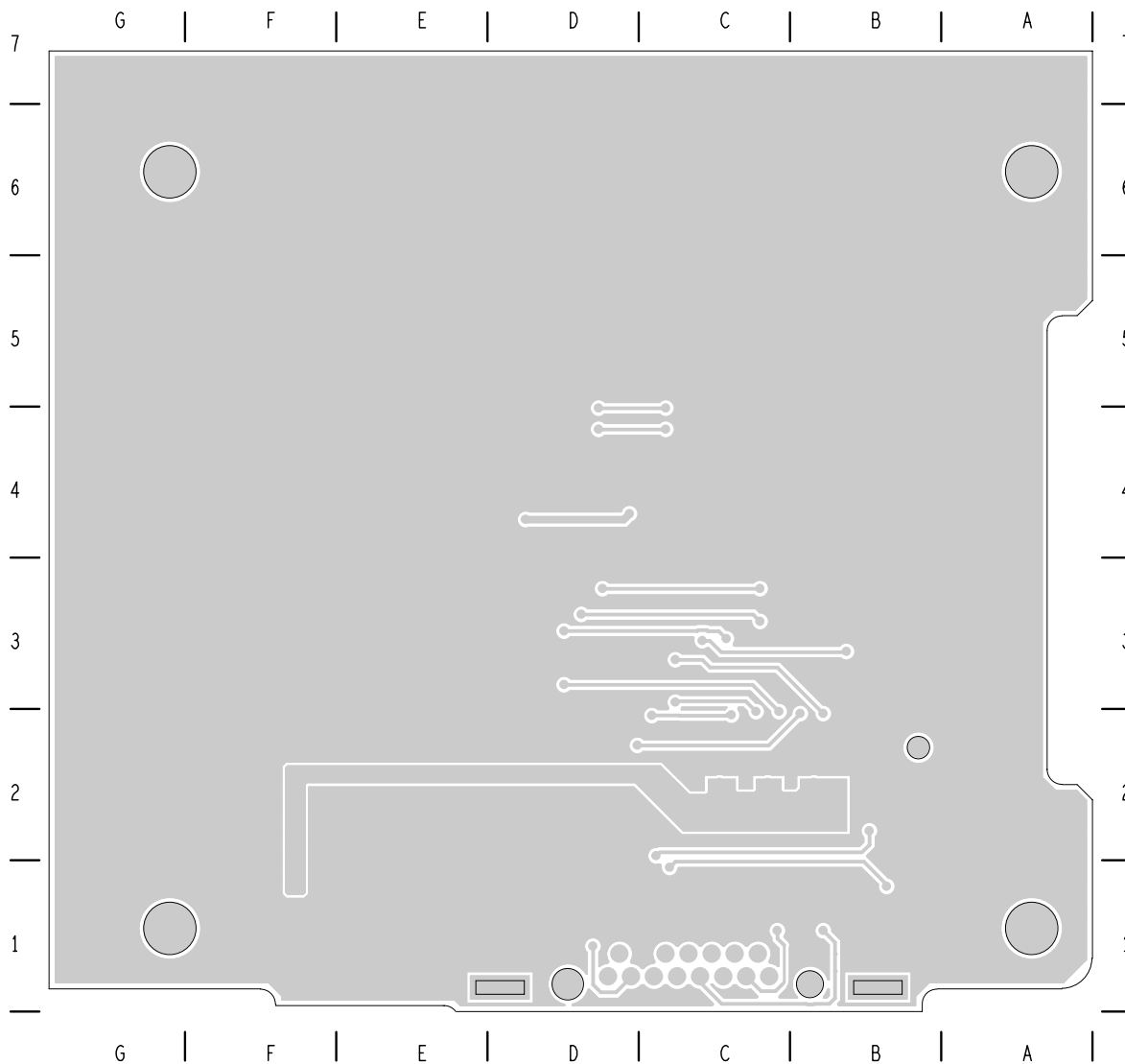


### 3.4.2 Options-Extender Board Layout (top side)



IPN 226-00129-03

### 3.4.3 Options-Extender Board Layout (bottom side)



IPN 226-00129-03

