AU10 GPS Antenna board-set BOM

TPJ January 20, 2013

Mods from MT075-P2 R1.6

1 Added C8=C9=2p2

Mods from Beta 1A

1 Added L3 & L4

Mods from Beta 1B

1 D9 wrong Farnell part code

Mods from Beta 1C

1 R5 reduced to 100R (correct value for LNA running from 2.7V)

Mods from Release 1A

1 R5 put back to 1K, least risky change to the overall design — No change to PCB

Prototype BOM: MT200-P2 GPS Antenna Top PCB (Release R1B)

Designator	¥AL	Description	Footprint	Quantity	FNL Par	Other	Notes
CON3		Solders directly to CON2 on bottom PCB, no part		0	n.a.		Not fitted
D3-6	Red	Everlight 99-216 series R6SC-AQ2S2B/FC	99-216	4	n.a.	MSC, Everlight	
D7-8	Green	Everlight 99-216 series G6C-AN1P2B/2C	99-216	2	n.a.	MSC, Everlight	
L1	2u2H	Chip inductor, Panasonic ELJFC2R2JF	1008CS	1	119-8422	Farnell 171-1896, 119-8422	
PCB		Shared with bottom PCB, see below		0	n.a.		
R2-4	56/390I	SM chip resistor	0603M	3	933-2197		56R=high bright, 390R=Low Bright

Prototype BOM: MT200-P2 GPS Antenna Bottom PCB (Release 1B)

Designator	¥AL	Description	Footprint	Quantity	FNL Par	Other	Notes
A1		SL1208 Sarantel GeoHelix-P2	GEO-P2	1	n.a.	On order direct from manufac	Must be jigged prior to soldering
A2		John Binns (part no t.b.a) - drawing AU9-AIS-Helicalspec1.pd	leaded	1	n.a.	John Binns & Son (Springs) L	**DO NOT FIT**
C1	4p7	Chip ceramic capacitor	0603M	1	881-9793		
C2	8p2	Chip ceramic capacitor	0603M	1	182-8906		
C3-4	1u	Chip ceramic capacitor	0603M	2	174-0640		
C5	10nF	Chip ceramic capacitor	0603M	1	301-9561		
C6-9	2p2	Chip ceramic capacitor	0603M	4	181-3415		
CON1		RG178 solder pads, no component to fit	RG178_THRU	1	n.a.		Not fitted
CON2		2 pin header pins. 0.64mm square		2	?	?	Not fitted
D1-2	Red	Everlight 99-216 series R6SC-AQ2S2B/FC	99-216	2	n.a.	MSC, Everlight	
D9		BAT54 schottky diode	SOT23M	1	108-1190		Alternatives: select on BAT54 single diodes
L2	150n	Chip inductor, EPCOS B82496C3151J	0603M	1	188-8725		
L3	5n0	Printed inductor - in PCB		0	n.a.		
L4	8n0	Printed inductor - in PCB		0	n.a.		
PCB		AU9-AIS antenna boards MT200-P2-R1A(gerbers).zip		0	n.a.		
R1	56/390I	SM chip resistor	0603M	1	933-2197		56R=high bright, 390R=Low Bright
R5	1K	SM chip resistor	0603M	1	933-0380		
U1		TPS76327DBVT - IC, 2.7V 150MA LDO REG	SOT23M-5	1	175-5502		
U2		RFMD RF2878 LNA	SOT23M-5	1	n.a.	Direct from RFMD	
				22			

AU10 Motherboard BOM

TPJ January 20, 2013

Mods from MT075-P4 R1.6

1 Added L2=56n

Mods from Beta 1A

1 U2 should be SOT353 (smaller) footprint

Mods from Beta 1B

1 B1 - remains on BOM but do not fit at present

Build Quantity = 4

BOM: MT200-P4 Mother Board (Release R1A)

Designator	VAL	Description	Footprint	Hand	P&P	FNL Part	Other	Notes	Required
B1		*AA positive battery terminal (custom part)*	*leaded*	*0*	*0*	*n.a.*	*CYSpring UK006-M002-C*	**Do not fit the CYSpring, only fit the BeCu finger**	0
C1,9	0u1	Chip ceramic capacitor	0603M	0	2	175-9017			8
C2-5	1n	Chip ceramic capacitor	0603M	0	4	722-170			16
C6	3p3	Chip ceramic capacitor	0603M	0	1	181-3416		Only fitted in GPS version	4
CON1		BeCu finger Tecknit 5X-65000 (cut to individual sections)	clip-on	1	0	n.a.	Tecknit 5X-65000	**NOTE: one strip makes MANY PCBs**	4
CON2		5 x 2 Molex Milli-grid plug 2mm pitch	leaded	1	0	747-2340			4
CON3		3 x 2 Molex Milli-grid plug 2mm pitch	leaded	1	0	747-2323		Only fitted in GPS version	4
CON4		MMCX PCB straight -- PLUG	leaded	1	0	116-9672	FNL 855-8477	Only fitted in GPS version	4
CON5		RG178 cable termination (in PCB)	n/a	0	0	n.a.		Nothing to fit during PCB assembly	0
L1	2u2H	Wound chip inductor (ceramic core)	1008CS	0	1	188-8888		Alt: Farnell 188-8867	4
L2	56n	Wirewound Chip inductor	0805M	0	1	119-8401			4
Q3-4		BSS123 N-Type switching FET	SOT23M	0	2	955-8640	ON-semi, Fairchild		8
Q5		BSH105 N-Type switching FET	SOT23M	0	1	175-8066	NXP		4
Q6		BC847 general purpose NPN	SOT23M	0	1	165-3607			4
Q7		NXP NX2301P -OR- Diodes inc ZXM61P02FTA	SOT23M	0	1	189-4738	20	Alternative Farnell part 952-5297	
PCB		AU9-AIS motherboard MT200-P4-Beta1(gerbers).zip		0	0	n.a.	GBCircuits		0
R1-2,9-10,14	100K	SM chip resistor	0603M	0	5	933-0402			20
R11	82R	SM chip resistor	0603M	0	1	933-1590			4
R12	1K3	SM chip resistor	0603M	0	1	933-0550			4
R13	1K8	SM chip resistor	0603M	0	1	933-0712			4
R15	100R	SM chip resistor	0603M	0	1	933-0364			4
U1		TS5A23159DGST - MULTIPLEXER SWITCH	DGS1O	0	1	156-4921			4
U2		74HC SINGLE GATE, SMD, 74HC1G00	SOT353	0	1	108-5249			4
				4	25				116
									0

AU10 VHF plug-in board BOM

TPJ November 21, 2012

Mods from MT200-P19 Alpha

1 Changed synth from LV2105V to ADF4360-9
2 GFSK Generator and Frequency Trim, removed SLOW-PWM
3 Added a negative rail generator to above (U10, pin23)

Mods from Beta 1A

1 Updated part numbers for X1 & X50

Mods from Beta 1B

1 C86 removed from list of 0u1 capacitors
2 R16 & R17 - corrected quantities

Mods from Beta 1C

1 C56,71,82 should be 0402 parts
2 C77,79 should be 0603 parts
3 R60,67 should be 470R
4 U5 should be LMV321
5 L61 should be 0805
6 R8 should be 10K
7 R16 should be 12K, R17 should be 18K
8 U6 should be LMV841 - this is smaller SOT353 footprint

Mods from Beta 1D

1 L61 should be 47n 0805 (same as L60)

BOM: MT200-P5 VHF TX Board (Beta 1E)

Designator	VAL	Description	Footprint	Hand	P&P	FNL Part	Other	Notes
C1-2,87	10u	Chip ceramic capacitor	0805M	0	3	183-3812		
C5-6,9,12,25-27, 63-65	1u	Chip ceramic capacitor	0603M	0	10	183-3809		
C3-4,C8,C10-11, 13-15,51-52,54-55, 57-62,68	0u1	Chip ceramic capacitor	0402M	0	19	183-3862		
C16	6n8	Chip ceramic capacitor	0402M	0	1	301-9263		
C17-18	n.f.	Chip ceramic capacitor (not fitted)	0402M	0	0	n.a.		
C19-20	0u47	Chip ceramic capacitor	0402M	0	2	182-8863		
C21	3n3	Chip ceramic capacitor	0402M	0	1	301-9305		
C22-23	330p	Chip ceramic capacitor	0402M	0	2	186-5450		
C24,83	10n	Chip ceramic capacitor	0402M	0	2	169-2285		
C56,71,82	1n	Chip ceramic capacitor	0402M	0	3	141-4573		
C76	1n	Chip ceramic capacitor	0603M	0	1	183-3874		Also 722-170
C67,69-70	100p	Chip ceramic capacitor	0402M	0	3	174-0576		
C72	270p	Chip ceramic capacitor	0402M	0	1	186-5449		
C73	10p	Chip ceramic capacitor	0402M	0	1	174-0571		
C77,79	10p	Chip ceramic capacitor	0603M	0	2	190-7284		
C74	22n	Chip ceramic capacitor	0402M	0	1	301-9299		
C75	3p3	Chip ceramic capacitor	0402M	0	1	1800797		

C81	2p2	Chip ceramic capacitor	0603M	0	1	185-5742		
C84	470p	Chip ceramic capacitor	0402M	0	1	141-4593		
C85	5n6	Chip ceramic capacitor	0402M	0	1	186-5459		
C86	220p	Chip ceramic capacitor	0402M	0	1	180-0805		
CON1		5 x 2 MOLEX - 87264-1052 Milli-grid socket 2mm pitch	leaded	1	0	856-0129		
CON2		Flash programming = HARWIN M30-6000646 6 pins	MOLEX6	0	1	102-2270		
D1,50		BAT54 single diode	SOD323	0	2	980-1502		
D2		BAT54S in-series double diode	SOT23	0	1	162-1835		
D52		HSMS-2820 RF detector diode	SOT23M	0	1	105-6826		Alternative is HSMS-2822 105-6836
D53		NXP BB149A single tuning diode	SOD323	0	1	121-2469		
L50-52	1K	1K @ 100 MHz ferrite bead	0805M	0	3	119-3424	Tyco BMB-2A-1000L-N2	
L54,57	1u	Wound chip inductor (ceramic core)	0805CS	0	2	119-8418		
L56	1u	Wound chip inductor (ceramic core)	1008CS	0	1	126-5592	Coilcraft 1008CS-102XKBC	Needs to be bigger to handle 250mA+ current
L55,65	1u5	Wound chip inductor (ceramic core)	0805CS	0	2	171-1848	Coilcraft 1008CS-152XKBC	
L58,64	22n	Wound chip inductor (ceramic core)	0603CS	0	2	188-8887		
L59	68n	Wound chip inductor (ceramic core)	0603CS	0	1	126-5478		
L60,61	47n	Wound chip inductor (ceramic core)	0805CS	0	2	171-1828	Coilcraft 0805CS-470XKBC	
L62	82n	Wound chip inductor (ceramic core)	0805CS	0	1	171-1833	Coilcraft 0805CS-820XKBC	alternative 126-5521
L63	39n	Wound chip inductor (ceramic core)	0603CS	0	1	188-8919	Coilcraft 0603CS-390XKBC	alternative 126-5472
L66	13n5	Printed inductor, no part to fit	n.a.	0	0	n.a.		
L67	4n	Printed inductor, no part to fit	n.a.	0	0	n.a.		
PCB		AU9-AIS VHF card MT200-P5-Beta1(gerbers).zip		0	0	n.a.	GBCircuits	
Q1-2		NXP NX2301P -OR- Diodes inc ZXM61P02FTA	SOT23M	0	2	189-4738		Alternative Farnell part 952-5297
Q50,52		Toshiba 2SC5065 -OR- BFR92A RF transistor	SC70 (SC70)	0	2	121-2470	Toshiba 2SC5065 (Y or O suff	Affects the value of R58 & R64
Q53		2SK3078 or 2SK3078A RF fet	SOT89M	0	1	n.a.	Toshiba 2SK3078(A)	
R1	0R	SM chip resistor	0603M	0	1	205-9527		Used as an option link, will remove after prototyping
R2-3,23	220R	SM chip resistor	0402M	0	3	205-9215		
R4-5,8,52,66	10K	SM chip resistor	0402M	0	5	146-9669		
R6	56K	SM chip resistor	0402M	0	1	205-9248		
R7,64	47K	SM chip resistor	0402M	0	2	205-9246		
R10-11,63,68	4K7	SM chip resistor	0402M	0	4	205-9234		
R12-13,15,50,56	33K	SM chip resistor	0402M	0	5	117-4164		
R16	12K	SM chip resistor	0402M	0	1	214-0866		
R17	18K	SM chip resistor	0402M	0	1	214-0874		
R18	3K9	SM chip resistor	0402M	0	1	214-0826		alternative 923-2834
R19	50K	22AR50KLFTR - TRIMMER CERMET, 3MM 50K	POT3203	0	1	152-0625		
R21,51	100K	SM chip resistor	0402M	0	2	205-9250		
R22	3M3	SM chip resistor	0603M	0	1	205-9692		
R53-54	1K	SM chip resistor	0402M	0	2	205-9225		
R55	2K2	SM chip resistor	0402M	0	1	173-9097		
R57	22K	SM chip resistor	0402M	0	1	205-9243		
R58	330R	SM chip resistor	0402M	0	1	205-9219		
R60,67	470R	SM chip resistor	0402M	0	2	207-8859		
R61-62	51R	SM chip resistor	0402M	0	2	214-0644		
R65	100R	SM chip resistor	0402M	0	1	205-9210		
R69,71	15K	SM chip resistor	0402M	0	2	173-8866		
R70	47R	SM chip resistor	0402M	0	1	184-0537		
R72	27K	SM chip resistor	0402M	0	1	214-0887		
RP50	10K	4-way 1206 res-pack	1206M4	0	1	924-1310		
Shield		MT200_P20_draftA.zip 0.3mm tinned etched	n.a.	1	0	n.a.	P.E.C.	Must be seam soldered to PCB after EOL testing
SW1		Custom flat spring contact, made by Precision Micro	n.a.	1	0	n.a.	Precision Micro QM027884	This part must be rivetted and not soldered (Cleveland have stock)
SW1-rivet		1mm stud rivet (copper)	n.a.	1	0	n.a.	Illingworth Supplies	This part must be rivetted and not soldered (Cleveland have stock)
SW2		6mm QS SPNO push button	FSMJSMA	1	0	380-1305	Tyco 4-1437565-1 or Alcoswit	IMPORTANT: fit this part upside down, through the hole in the PCB, therefore hand-fit!
U1		Microchip MCP1702T-3302E/MB 3V3 low quiescent reg	SOT89M	0	1	160-5558		
U2,50		3V3 LDO MIC5205-3.3YM5 -OR- XC6204B332MRN -OR- ZXC	SOT23M-5	0	2	166-3083		Alternatives are FARNELL 1106658 & FARNELL 1132756
U3		Microchip MCP4651-103E/ST Dual 10K digital pot	TSSOP14	0	1	169-0415		
U4		SPDT analog switch: NC7SBU3157P6X -OR- FSA4157P6X	SOT363	0	1	160-7853		Alternative is FARNELL 1564491
U5		LMV321 SOT23-5 op-amp	SOT23M-5	0	1	156-4743		
U6		LMV841 SOT23-5 op-amp	SOT353	0	1	132-0980		
U7		SN74HCT04PW hex inverter	TSSOP14	0	1	128-7538		Plenty of alternatives available
U8,9		NEC (Renesas) MRMS211M Magneto-resistive sensor	SOT23M	0	2	n.a.	Gleichmann	Replaced MRSS23E
U10		TI - MSP430F5172IRSBT Microcontroller	QFN40(RSB)	0	1	205-7048		
U51		ANALOG DEVICES - ADF4360-9BCPZ - SYNTHESIZER	LFCSP24	0	1	207-0540	Impact Components	
X1		Golledge MP04372, 19.6608 MHz Crystal 30ppm	GSX533	0	1	n.a.	Golledge	Alternative is Sunstu SCJ18D27-19.6608MHz TR
X2		MURATA BUZZER SMD, 4KHZ - PKLCS1212E4001-R1	piezo1	0	1	119-2551	Murata	
X50		Golledge MP03549, 8.0000 MHz Crystal 10ppm	GSX533	0	1	n.a.	Golledge	Alternative is Sunstu SCJ18D27-8.000MHz TR

AU10 GPS plug-in board BOM

ARG 26/11/12

MODS From 1A

Added Farnell part number for L1 etc

corrected R5,6,9 comment to 1K

MODS From 1B

U3 should be RF2878 as RF2361 now obsolete

MODS From 1C

R8 needs to be increased to 2K

BOM: MT200-P9 GPS Board (Beta 1D)

Designator	VAL	Description	Footprint	Hand	P&P	FNL Part	Other	Notes
C1, C5, C6, C7, C8, C9	10n	Chip ceramic capacitor (X7R/X5R)	0603M	0	6	1414609RL		
C2, C3	4u7/10V	Chip ceramic capacitor (X7R/X5R)	0805m	0	2	1759420RL		
C4	10u/6V3	Chip ceramic capacitor (X7R/X5R)	0805m	0	1	1759476RL		
C10, C13	1U/6V3	Chip ceramic capacitor (X7R/X5R)	0603m	0	2	9527699RL		
C11, C12, C20, C21, C22, C23, C24, C28, C29	100n	Chip ceramic capacitor (X7R/X5R)	0402m	0	9	9402047RL		
C14	22p	Chip ceramic capacitor	0603M	0	1	181-3429		
C15, C16	2p2	Chip ceramic capacitor	0603M	0	2	181-3415		
C17, C18	1p	Chip ceramic capacitor	0603M	0	2	141-4611		
C19	0p82	Chip ceramic capacitor	0603M	0	1	721-839		
C25, C26	12p	Chip ceramic capacitor	0603M	0	2	721979RL		
C27	22p	Chip ceramic capacitor	0603m	0	1	1759057		
CON1		3 x 2 MOLEX - 87264-1052 Milli-grid socket 2mm pitch	MG-6-RA-REV	1	0	856-0102		
CON3		JACK MMCX, RIGHT ANGLE, PCB MOUNT	MMCX-RA	1	0	116-9674		
L1, L2, L4, L7, L8	1K@1G	1K @ 1 GHz ferrite bead, Wurth Elektronik	0603M	0	5	174-8582	Wurth 742-861-210	
L3	100n	Wound chip inductor	0603CS	0	1	126-5481		
L5	22uH	22uH inductor 1212 size, 340mA max	1212murata	0	1	1875344	MURATA LQH3NPN220MG0L	
L6	12n	Wound chip inductor	0603CS	0	1	188-8884		
Q1		BSS123N -channel FET	SOT23M	0	1	151-0764		
R1	300K	SM chip resistor	0603m	0	1	9330992RL		
R2, R3	240K	SM chip resistor	0603m	0	2	9330895RL		
R4	*10K*	*SM chip resistor*	*0402M*	*0*	*1*	*1358069RL*		
R5, R6, R9	1K	SM chip resistor	0402m	0	3	1358043		
R7	100R	SM chip resistor	0603M	0	1	146-9752		
R8	2K	SM 3mm trimmer pot	POT3203	0	1	107-131		
U1		TPS62122 75mA buck regulator in DFN package	TI_PACKAGE_	0	1	186-3098	TI	
U2, U4		TOREX - XC6204B332MRN 3.3V regulator	SOT23M-5	0	2	110-6658		
U3		RFMD RF2878 (formerly RF2361) LNA	SOT23M-5	0	1	n.a.		
U5		Ublox AMY-6M GPS module	UBLOX_AMY_	0	1	n.a.	UBLOX AMY-6M-0001	UK Distributor is Alpha Micro
X1	32768Hz	32.768KHz SM watch crystal	XTAL_ACT711S	0	1	1611822RL		
PCB		MT200_P9		1	0	n.a.		
Shield – LNA	CAN	MT075_P16		1	0	n.a.		Supplied flat
Shield – uBlox	CAN	MT200_P22		1	0	n.a.		Supplied flat
				4	53			