64 Mbit Flash

U4 1uA
MX25R6435FM2IL0

D23	1	nCS VCC	8	3.3v
MISO	2	DO nHOLD	7	
3.3v	3	nWP CLK	6	SCK
	4	GND DI	5	MOSI

C11 1uf

SDI-12 INTERFACE

Move to DCK package

U8 4uA
SN74LVC1T45

+5V C26 .1uF   C27 .1uF 3.3v

VccB VccA
B A
GND DIR

R17 10k RX1
TX_EN

TB2 SDI12-1
TB3 SDI12-2
TB4 SDI12-3

7.5v

R19 510
D8 5v zener
C25 47pf

STM32L412KBT in LQFP32 package can replace Atmel
chip at $1.72. It has USB, calibrated RTC, UARTS, 26
IOs, and can thus eliminate two chips in this
design and reduce overall cost by $10 or more.

MCU

U6 ATMEGA1284P

Optimize
Y1 16 MHz
C18 18pf   C14 18pf

C7 1uF C6 .1uf
DTR
R2 47k
3.3v

C23 1uf 3.3v

MOSI 1 PB5
MISO 2 PB6
SCK   3 PB7
RST   4 /RST
      5 Vcc
      6 Gnd
      7 XTAL2
      8 XTAL1
RX0   9 PD0
TX0 10 PD1
RX1 11 PD2

PA4 33
PA5 32
PA6 31
PA7 30
ARef 29
Gnd 28
AVcc 27
PC7 26
PC6 25
PC5 24
PC4 23

PB4 PB3 PB2 PB1 PB0 Gnd Vcc PA0 PA1 PA2 PA3 (44 43 42 41 40 39 38 37 36 35 34)
SS 4X_EN D2 12vSDi SDIPwr BattV RTCInt

PD3 PD4 PD5 PD6 PD7 Vcc Gnd PC0 PC1 PC2 PC3 (13 14 15 16 17 18 19 20 21 22)
USBInt Mbatt SCL SDA

C16 .1uf
C15 1uf 3.3v
D23 D22 D21

J2 CON7
JTDI 1
JTDO 2
JTMS 3
JTCK 4
RST 5
(6 7)

D1 LED
R1 330

C17 1uf
R7 3.9k 3.3v
R8 3.9k
SCL SDA 3.3v

RFM95W Lora Transciever

PVCurrent
R23 10k
R27 10k
PVShort
R16 47k

U1 RFM95W

MISO 1 GND   DIO2 16
MOSI 2 MISO DIO1 15 D22
SCK 3 MOSI DIO0 14 D2
NSS 4 SCK   Vcc 13
RST 5 NSS   DIO4 12
     6 RST   DIO3 11
DIO5 7 DIO5 GND 10
     8 GND   ANT   9

3.3v
C8 10uf 25v
C10 .01uf NPO
R9 10k D21

C9 10uF 25v

J1 CON-SMA-EDGE-S

USB Port

C1 10uf 25v
C2 .01uf NPO

U2 FT231XS-R

RX0 20 TXD   VCC 15 USBInt
TX0 4 RXD   VCCIO 16
R13 3.9k 9 RTS# 3V3OUT 13 R3 27
R6 3.9k   7 CTS#   C13 .1uf
DTR   3 DTR# USBDM 12 R4 27
          6 DSR# USBDP 11
          2 DCD#
          5 RI#   RESET# 14

18 CBUS0
17 CBUS1
10 CBUS2
19 CBUS3
      GND 6
      GND 16

P1 USB/MicroB
S1
1 VCC
2 D-
3 D+
4 ID
5 GND

C4 47pf   C5 47pf

FID4 FID3 FID2 FID1
H1 H2 H3 H4

R10 330 D3 LED RX
R12 330 D2 LED TX
R11 3.9k

Power Regulators

3.3v
U5 MCP1700T3302ETT
2 OUT IN
  GND
C12 10uf 25v

VBATT
U12 TPS22810
1 Vin Vout 6
2 Gnd QOD 5
3 EN   CT 4
SDIPwr
C33 10uf 25v

C32 .1uF
U11 TPS61085DGK
8 SS   Comp
7 Freq FB
6 In   EN
5 SW   Gnd
L2 3.0uH 3A
D10 PMEG2010AEH

R30 47k C31 1000pF
7.5v

R31 91k
R29 18k 1.238v
Q6 SSM3K376R
R28 25k

U9 RT9069-50GB
1 Vcc Vout 5
  Gnd
3 NC   En 4
+5V
C37 10uf 25v C36 10uf 25v
C28 10uF 25v

PV Panel, Charger and Li-Ion Battery

Consumes 1uA max when not charging
5uA

D5 PMEG4005EG
L1 10uH 3A 6.0 volts
C20 .01uf NPO

U7 BD9G101G
6 LX   BST 2
5 VCC GND 3
4 EN   FB 1

TB1 Ext Power
D6 MBR0580S1-7
C22 1uf 35v
R15 510
C19 10uf 25v

D7 MBR0580S1-7
TP2 6v PV Panel (+)
PVCurrent
D9 MBR0580S1-7 6v maximum
R14 3.6k C21 1uf
R22 1 ohm
Q1 SSM3K376R
TP1 6v PV Panel (-)
PVShort
Iset resistor set for 250mA charge

U10 BQ24092 - Li Charger
1 IN   OUT 10
2 ISET TS 9
3 Vss   nCHG 8
  ISET2 7
  nPG   Vss_pad 11
C24 1uf
R18 2.2k
10k NTC
D4 LED
R32 330
VBATT

VBATT
R21 10k
R26 10uf 25v
C29 10uf 25v
C30 10uf 25v C35 10uf 25v C34 10uf 25v
3.8v

Q3 DMG2305UX
Q2 BC817
R20 10k

Q5 RQ5E035ATTCL
SW1 ON/OFF
Use keystone #54
B1 Battery-18650_1043P
R24 10k
R25 30k
Q4 SSM3K376R
VMeas
Mbatt
BattV

RTC

3.3v 3.3v
R5 47k
C3 1uf
RTCInt
RST
110uA

U3 DS3231
1 32kHz SCL 16 SCL
2 Vcc   SDA 15 SDA
3 /Int   VBat 14
4 /Rst   GND 13
5 NC   NC 12
6 NC   NC 11
7 NC   NC 10
8 NC   NC 9

Changes needed on next Rev

Title	SDI12 to LoRa Radio Node
Size	B
Document Number	T012-032
Rev	E
Date	Thursday, March 21, 2019
Sheet	1 of 1

Item	Qty	Part	Value	Reference
1	1	1043	Battery-18650_1043P	B1
2	13	C0805X5R106V25	10uf 25v	C1,C8,C9,C12,C19,C28,C29, C30,C33,C34,C35,C36,C37
3	3	C0603NPO103V50	.01uf NPO	C2,C10,C20
4	8	C0603X5R105V16	1uf	C3,C7,C11,C15,C17,C21, C23,C24
5	3	C0603NPO470V50	47pf	C4,C5,C25
6	6	C0603X7R104V50	.1uf	C6,C13,C16,C26,C27,C32
7	2	C0603NPO180V50	18pf	C18,C14
8	1	C0805X5R105V35	1uf 35v	C22
9	1	C0603NP0102V50	1000pF	C31
10	4	LTST-C171GKT	LED	D1,D2,D3,D4
11	1	PMEG4005EG	PMEG4005EG	D5
12	3	MBR0580S1-7	MBR0580S1-7	D6,D7,D9
13	1	BZT52C5V1-SOD123	5v zener	D8
14	1	PMEG2010AEH	PMEG2010AEH	D10
16	4	9911-062	spacer	H1,H2,H3,H4
17	1	CON-SMA-EDGE-S	CON-SMA-EDGE-S	J1
18	1	DNL	CON7	J2
19	1	NR6045T100M	10uH 3A	L1
20	1	NR6045T3R0M	3.0uH 3A	L2
21	1	105133-001	USB/MicroB	P1
22	3	SSM3K376R	SSM3K376R	Q1,Q4,Q6
23	1	BC817-40W	BC817	Q2
24	1	DMG2305UX	DMG2305UX	Q3
25	1	RQ5E035ATTCL	RQ5E035ATTCL	Q5
26	4	R0603-3300	330	R1,R10,R12,R32
27	4	R0603-4702	47k	R2,R5,R16,R30
28	2	R0603-27R0	27	R4,R3
29	5	R0603-3901	3.9k	R6,R7,R8,R11,R13
30	7	R0603-1002	10k	R9,R17,R20,R21,R23,R24,R27
31	1	R0603-3601	3.6k	R14
32	2	R0603-5100	510	R15,R19
33	1	R0603-2201	2.2k	R18
34	1	R0805-1R00	1 ohm	R22
35	1	R0603-3002	30k	R25
36	1	NCP18XH103D03RB	10k NTC	R26
37	1	R0603-2502	25k	R28
38	1	R0603-1802	18k	R29
39	1	R0603-9102	91k	R31
40	1	SS12F56V4	ON/OFF	SW1
41	1	OSTOQ025450	Ext Power	TB1
42	3	OSTOQ33250	SDI12-1, 2, 3	TB2,TN3,TB4
45	2		6v PV Panel (-, +)	TP1, TP2
47	1	RFM95W	RFM95W	U1
48	1	FT231XS-R	FT231XS-R	U2
49	1	DS3231SN	DS3231	U3
50	1	MX25R6435FM2IL0	MX25R6435FM2IL0	U4
51	1	MCP1700T3302EETT	MCP1700T3302ETT	U5
52	1	ATMEGA1284P	ATMEGA1284P	U6
53	1	BDG9G101G	BD9G101G	U7
54	1	SN74LVC1T45DBVR	SN74LVC1T45	U8
55	1	RT9069-50GB	RT9069-50GB	U9
56	1	BQ24092DGQ	BQ24092 - Li Charger	U10
57	1	TPS61085DGK	TPS61085DGK	U11
58	1	TPS22810DBVR	TPS22810	U12
59	1	ABM3-16.000MHZ-B2-T	16 MHz	Y1

TO12-032 Rev E
SDI-12/LoRa Node
Assembly Drawing - TOP

J1

H1

P1

D1

H2

TB1

I

1

B1

D2 D3

TB2

TP1

TP2

TB3

H3

+

SW1

H4

TB4

D4
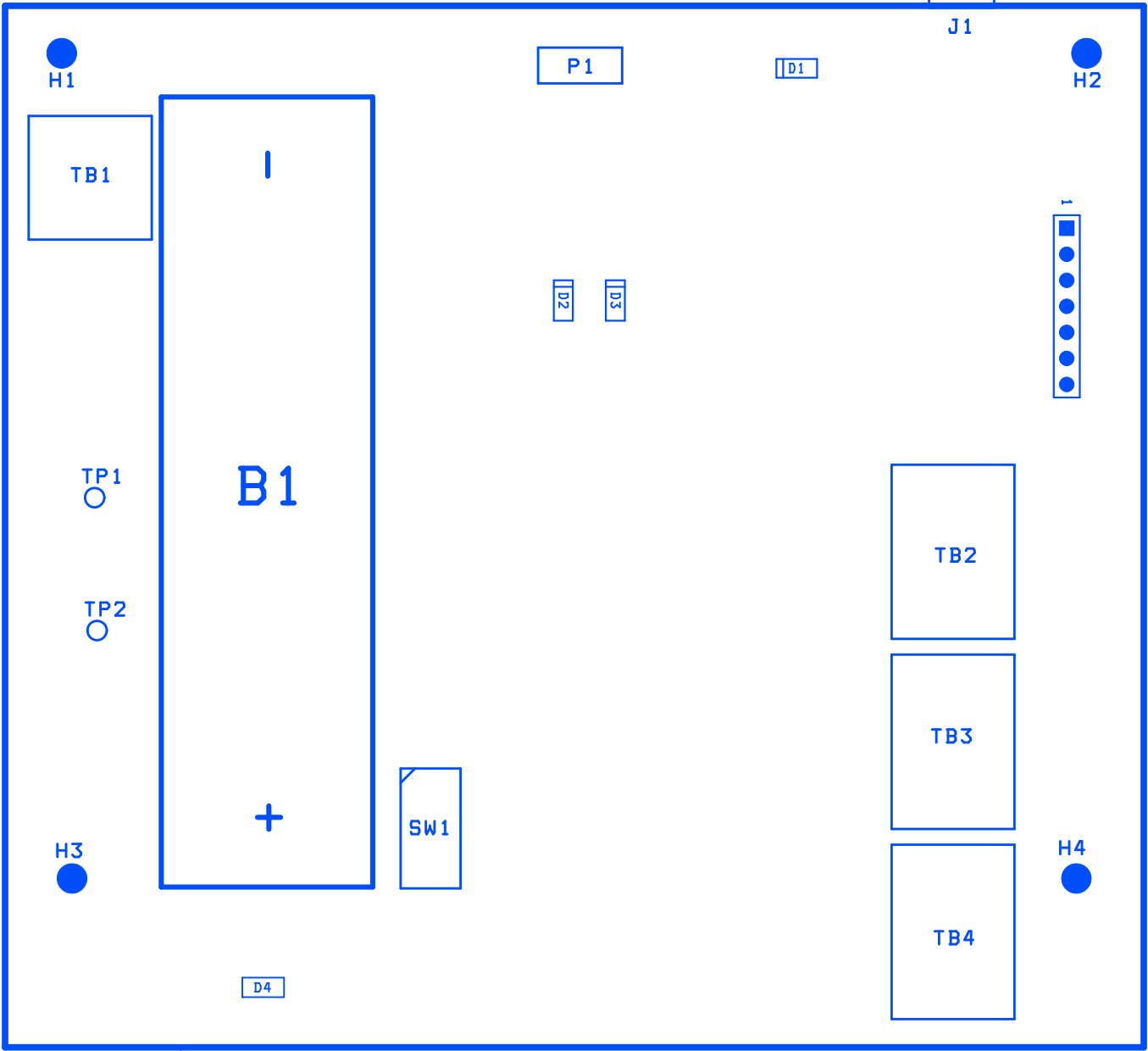
TO12-032 Rev E
SDI-12/LoRa Node
Assembly Drawing - BOTTOM

FID1

FID2

C1
C2

R1

R2 C3

C4
R3

C5
R4

C6

C7

R5
R7

R6

U2

C8 C9 C10

U1

R8

C11

C12

R9

U4

U5

R10

R11

C13

R13
R12

L1

C15
C16

U6

C14

Y1

C18

C19

C20

D5

C17

C21
R15

R14

U7

D6

C22

C23

R16

R17

R18
C24

D7

Q1

R19
C25

D8

C26

C28

R20

R22

C27

R21

D9

R24

R27
R23

U9
R29

U10
Q2

R26

Q3

C29
C30

Q4

Q5

FID3

Q6

R28
R29

C31
R30

U12

C32

C33

U11

L2

C34

C35

D10

C36
C37

R32

FID4