```
#include <TinyGPS.h>
#include <LoRaWan.h>

TinyGPS gps;

char memBuffer[256];
char packetBuffer[51];

char DevEUI[] = "";
char AppEUI[] = "";
char devAddr[] = "";
char nwkSKey[] = "";
char appSKey[] = "";
char AppKey[] = "";

#define LoraDeviceMode LWABP   // LWOTA or LWABP
#define LoraDataRate DR0
//  datarate    SF/BW     bits/s
  // DR0     SF12/125KHz    250
  // DR1     SF11/125KHz    440
  // DR2     SF10/125KHz    980
  // DR3     SF9/125KHz    1760
  // DR4     SF8/125KHz    3125
  // DR5     SF7/125KHz    5470
  // DR6     SF7/250KHz   11000
  // DR7 FSK:50kbps 50000
#define LoraPower 20
#define LoraPort 1
#define LoraADR 1
#define LoraNET 1   //1: Public net

#define DEBUG 1

void setup(void)
{
    if (DEBUG) {
      SerialUSB.begin(115200);
//      while(!SerialUSB);
    }

    Serial.begin(9600);
    lora.init();

    if (DEBUG) {
      memset(memBuffer, 0, 256);
      lora.getVersion(memBuffer, 256, 1);
      SerialUSB.print(memBuffer);
    }

    if (DEBUG) {
      memset(memBuffer, 0, 256);
      lora.getId(memBuffer, 256, 1);
      SerialUSB.print(memBuffer);
    }

    // Disable UART timeout
    memset(memBuffer, 0, 256);
    SerialLoRa.print("AT+UART=TIMEOUT, 0\r\n");
    if (DEBUG) {
      SerialUSB.print(memBuffer);
    }


    // Set public network key
    lora.setPubNetwKey(LoraNET);

    // NwkSKey, AppSKey, AppKey
    lora.setKey(nwkSKey, appSKey, AppKey);

    lora.setId(devAddr,DevEUI,AppEUI);
    if (DEBUG) {
      SerialUSB.println();
    }
    lora.setReceiceWindowFirst(1);

    //lora.setReceiceWindowSecond(869.525, DR3);

    // Set RXwin2

    memset(memBuffer, 0, 256);
    SerialLoRa.print("AT+RXWIN2=869.525,DR3\r\n");
    if (DEBUG) {
      SerialUSB.print(memBuffer);
    }



    lora.setPower(LoraPower);


    lora.setDeciveMode(LoraDeviceMode);

    lora.setChannel(0, 868.1, DR0, DR7);
    //lora.setChannel(1, 868.3);
    //lora.setChannel(2, 868.5);
    lora.setChannel(1, 0);
    lora.setChannel(2, 0);

    lora.setDataRate(LoraDataRate, EU868);


    lora.setPort(LoraPort);



    if (DEBUG) {
      SerialUSB.println("Setup completed");
    }
}

void loop(void)
{

    String packetString = "";

    packetString = get_gpsdata();
    if (DEBUG) {
      SerialUSB.println(packetString);
    }
    int strLength = packetString.length() + 1;

    packetString.toCharArray(packetBuffer, strLength);

    if (DEBUG) {
      SerialUSB.println("Start transmission");
    }

    bool result = false;
    result = lora.transferPacket(packetBuffer, strLength);
    if(result)
    {
        short length;
        short rssi;

        memset(memBuffer, 0, 256);
        length = lora.receivePacket(memBuffer, 256, &rssi);

        if (DEBUG) {
          if(length)
          {
            SerialUSB.print("Length is: ");
            SerialUSB.println(length);
            SerialUSB.print("RSSI is: ");
            SerialUSB.println(rssi);
            SerialUSB.print("Data is: ");
            for(unsigned char i = 0; i < length; i ++)
            {
                SerialUSB.print("0x");
                SerialUSB.print(memBuffer[i], HEX);
                SerialUSB.print(" ");
            }
            SerialUSB.println();
          }
        }
    }

    delay(120*1000);
}

String get_gpsdata() {
  bool newData = false;
  String returnString = "";
  float flat, flon;
  unsigned long age;

  // For one second we parse GPS data and report some key values
  for (unsigned long start = millis(); millis() - start < 1000;)
  {
    while (Serial.available())
    {
      char c = Serial.read();
      // Serial.write(c); // uncomment this line if you want to see the GPS data flowing
      if (gps.encode(c)) // Did a new valid sentence come in?
        newData = true;
    }
  }

  if (newData)
  {
    gps.f_get_position(&flat, &flon, &age);
    returnString = "LAT=";
    returnString += String(flat,6);
    returnString += " LON=";
    returnString += String(flon,6);
    returnString += " SAT=";
    returnString += String(gps.satellites());
    returnString += " PREC=";
    returnString += String(gps.hdop());
    returnString += " AGE=";
    returnString += String(age);
  } else {
    returnString = "NO GPS data available!";
  }

  return returnString;
}
```