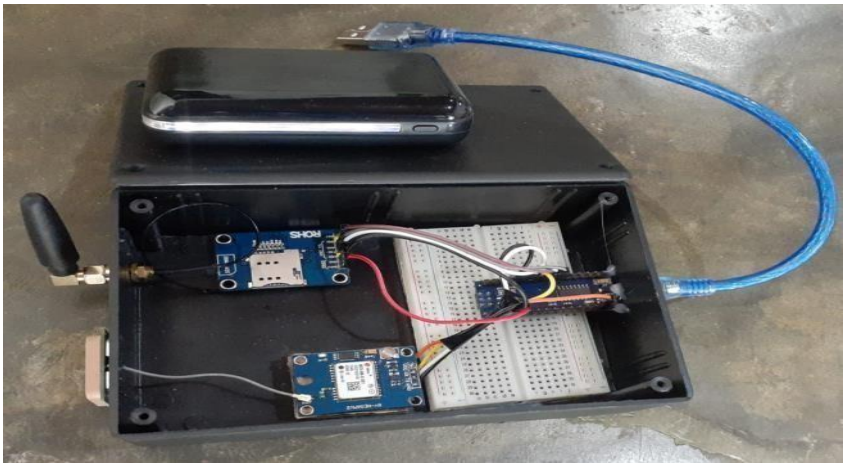
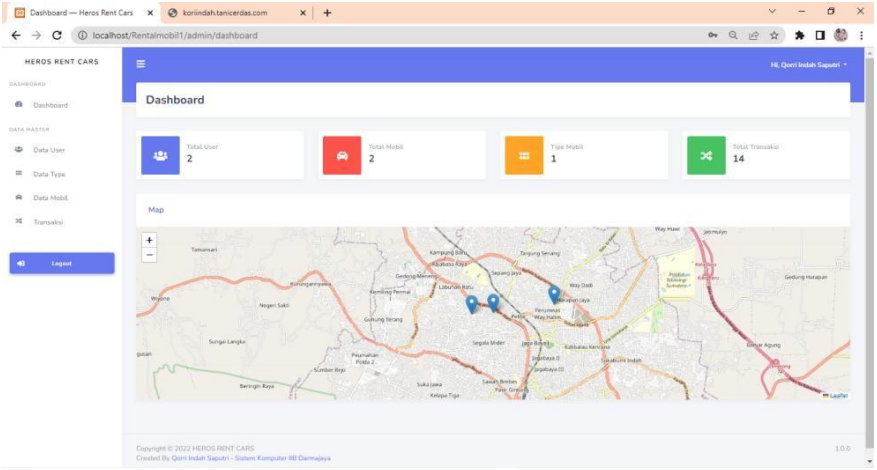
LAMPIRAN

1. Bentuk alat dan tampilan website





2. Kode Program Arduino

```
#include <TinyGPS++.h>
#include <SoftwareSerial.h>
#include <SIM800L.h>
#define SIM800_RX_PIN   7
#define SIM800_TX_PIN   8
#define SIM800_RST_PIN  6
#define GND 5 //Pin Ground SIM800L
#define LEDSIM 4
#define LED 13
```

```
SIM800L* sim800l;
TinyGPSPlus gps;

const char APN[] = "3gprs";
const char URL[] = "http://qorriindah.my.id/check.php";
const char CONTENT_TYPE[] = "application/json";
boolean gpsdata = false;
String Longitude, Latitude;

void setup() {
pinMode(GND, OUTPUT);
pinMode(LEDSIM, OUTPUT);
pinMode(LED, OUTPUT);
Serial.begin(9600);
SoftwareSerial*serial=newSoftwareSerial(SIM800_RX_PIN, SIM800_TX_PIN);
serial->begin(115200);
sim800l = new SIM800L((Stream *)serial, SIM800_RST_PIN, 200, 512);
digitalWrite(GND, LOW);
digitalWrite(LEDSIM, gpsdata);
digitalWrite(LED, gpsdata);
setupModule();
}
void loop() {
 while (Serial.available() > 0) {
  gps.encode(Serial.read());
  if (gps.location.isUpdated()) {
 Latitude = String(gps.location.lat(), 6);
 Longitude = String(gps.location.lng(), 6);
 Serial.println(Latitude + " | " + Longitude);
 gpsdata = true;
 digitalWrite(LED, gpsdata);
    }
  }
```

```
 if (gpsdata) {
 bool connected = false;
 for (uint8_t i = 0; i < 5 && !connected; i++) {
 delay(1000);
 connected = sim800l->connectGPRS();
 digitalWrite(LEDSIM, !digitalRead(LEDSIM));
    }
 if (connected) {
Serial.print(F("GPRS connected with IP "));
 Serial.println(sim800l->getIP());
    } else {
  Serial.println(F("GPRS not connected !"));
  Serial.println(F("Reset the module."));
  sim800l->reset();
  digitalWrite(LEDSIM, LOW);
  setupModule();
  return;
    }
 String PAYLOAD = "{\"longitude\": \"" + Longitude + "\", \"latitude\": \"" + Latitude +
  "\"}";
 Serial.print(F("Payload : "));
 Serial.println(PAYLOAD);
 Serial.println(F("Start HTTP POST..."));
 uint16_t rc = sim800l->doPost(URL, CONTENT_TYPE, PAYLOAD.c_str(), 10000,
10000);
 if (rc == 200) {
// Success, output the data received on the serial
Serial.print(F("HTTP POST successful ("));
Serial.print(sim800l->getDataSizeReceived());
Serial.println(F(" bytes)"));
Serial.print(F("Received : "));
Serial.println(sim800l->getDataReceived());
digitalWrite(LEDSIM, HIGH);
 } else {
```

```
  // Failed…
 Serial.print(F("HTTP POST error "));
 Serial.println(rc);
  }
 bool disconnected = sim800l->disconnectGPRS();
 for (uint8_t i = 0; i < 5 && !connected; i++) {
 delay(1000);
 disconnected = sim800l->disconnectGPRS();
 digitalWrite(LEDSIM, !digitalRead(LEDSIM));
 }
if (disconnected) {
Serial.println(F("GPRS disconnected !"));
} else {
Serial.println(F("GPRS still connected !"));
 }
delay(10000);
digitalWrite(LEDSIM, !digitalRead(LEDSIM));
gpsdata = false;
digitalWrite(LED, gpsdata);
}
}
void setupModule() {
digitalWrite(LEDSIM, LOW);
gpsdata = false;
digitalWrite(LED, gpsdata);
while (!sim800l->isReady()) {
 Serial.println(F("Problem to initialize AT command, retry in 1 sec"));
 delay(1000);
   }
  Serial.println(F("Setup Complete!"));
  uint8_t signal = sim800l->getSignal();
  while (signal <= 0) {
  delay(1000);
   signal = sim800l->getSignal();
   }
```

```
Serial.print(F("Signal OK (strenght: "));
Serial.print(signal);
Serial.println(F(")"));
delay(1000);

 NetworkRegistration network = sim800l->getRegistrationStatus();
 While (network != REGISTERED_HOME && network != REGISTERED_ROAMING) {
  delay(1000);
  network = sim800l->getRegistrationStatus();
  }
  Serial.println(F("Network registration OK"));
  delay(1000);
  bool success = sim800l->setupGPRS(APN);
  while (!success) {
  success = sim800l->setupGPRS(APN);
  delay(5000);
  }
  Serial.println(F("GPRS config OK"));
  digitalWrite(LEDSIM, HIGH);
}
```

3. Kode Program Website

```
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Auth extends CI_Controller {
        public function __construct()
        {
                parent::__construct();
                cek_login();
        }
        public function gantipass()
        {
                $data['judul'] = 'Ganti Password';
                $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
                >userdata('username')])->row_array();
                $this->form_validation->set_rules('passlama', 'Password Lama',
                'required|trim|min_length[3]',
```

```
['required' => 'Password Lama Harus Di Isi!']
);

$this->form_validation->set_rules('password', 'Password Baru',
'required|trim|matches[password2]|min_length[3]',
['required' => 'Password Baru Harus Di Isi!',
'min_length' => 'Password Minimal 3 Huruf!',
'matches' => 'Konfirmasi Password Tidak Sama!'
]
);
$this->form_validation->set_rules('password2', 'Konfirmasi Password',
'required|trim|matches[password]',
['required' => 'Konfirmasi Password Harus Di Isi!',
'matches' => 'Konfirmasi Password Tidak Sama!'
]
);
if($this->form_validation->run() == FALSE) {
        $this->load->view('themeplates_admin/header', $data);
        $this->load->view('admin/auth/gantipass', $data);
        $this->load->view('themeplates_admin/footer');
} else {
        $passwordLama = $this->input->post('passlama', true);
        $passwordBaru1 = $this->input->post('password', true);
        $passwordBaru2 = $this->input->post('password2', true);

        if(!password_verify($passwordLama, $data['customer']['password'])) {
                // Jika password lama salah.
                $this->session->set_flashdata('pesan', '<div class="alert alert-
danger"><i class="fa fa-exclamation-circle" aria-hidden="true"></i> Password
Lama Anda Salah, Coba Lagi!.</div>');
                redirect('admin/auth/gantipass');
} else {
        if($passwordLama == $passwordBaru1) {
        $this->session->set_flashdata('pesan', '<div class="alert alert-
danger"><i class="fa fa-exclamation-circle" aria-hidden="true"></i> Password
Baru, Tidak Boleh Sama Dengan Password Lama!.</div>');
        redirect('admin/auth/gantipass');

} else {
        $passwordHash = password_hash($passwordBaru1, PASSWORD_DEFAULT);
        $this->db->set('password', $passwordHash);
        $this->db->where('username', $this->session->userdata('username'));
        $this->db->update('customer');
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"
role="alert"><i class="fa fa-bell" aria-hidden="true"></i> Password Berhasil
Di Ganti, <a href="'. base_url('admin/dashboard') .'" class="alert-link">Kembali
Ke Dashboard</a>.</div>');
        redirect('admin/auth/gantipass');
}
} // else
} // else
}
}
```

```
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Bank extends CI_Controller {
public function _construct()
{
parent::_construct();
cek_login();
$this->load->model('Bank_model');
}
public function index()
{
	$data['judul'] = 'Pengelola Bank';
	$data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
		>userdata('username')])->row_array();

	// Pencarian
	if($this->input->post('submit')) {
		$data['keyword'] = $this->input->post('keyword');
		$this->session->set_userdata('keyword');
	} else if(!$this->input->post('submit')) {
		$data['keyword'] = $this->session->unset_userdata('keyword');
} else {
		$data['keyword'] = $this->session->userdata('keyword');
}
$this->db->like('no_rek', $data['keyword']);
$this->db->or_like('nama_rek', $data['keyword']);
$this->db->from('bank');
$config['total_rows'] = $this->db->count_all_results();
$data['total_rows'] = $config['total_rows'];
// Konfigurasi Pagination
$config['base_url'] = 'http://localhost/rental-mobil-ci/admin/bank/index';
// $config['total_rows'] = $this->Bank_model->countAllBank();
// var_dump($config['total_rows']); die;
$config['per_page'] = 2;
$this->pagination->initialize($config);
$data['start'] = $this->uri->segment(4);
$data['bank'] = $this->Bank_model->getAllBank($config['per_page'], $data['start'],
$data['keyword']);
$this->form_validation->set_rules('nama', 'Nama Bank', 'required|trim', ['required' =>
'Nama Bank Wajib Di Isi!']);
$this->form_validation->set_rules('no', 'No.Rekening', 'required|trim', ['required' =>
'No.Rekening Wajib Di Isi!']);
if($this->form_validation->run() == FALSE) {
$this->load->view('themeplates_admin/header', $data);
$this->load->view('themeplates_admin/sidebar', $data);
$this->load->view('admin/bank/index', $data);
$this->load->view('themeplates_admin/footer');

} else {
	$this->Bank_model->tambahBank();
	$this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
```

```
 class="far fa-lightbulb"></i> Data Bank Berhasil Di Tambahkan.</div>');
        redirect('admin/bank');
 }
 }

 public function hapus($id)
 {
        $this->db->delete('bank', ['id_bank' => $id]);
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
        lightbulb"></i> Data Bank Berhasil Di Hapus.</div>');
        redirect('admin/bank');
 }
 public function getubahbank()
 {
        // echo $_POST['id'];
        echo json_encode($this->Bank_model->getBankById($_POST['id']));
 }
 public function ubahbank()
 {
        $this->Bank_model->aksiUbahBank($_POST);
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
        lightbulb"></i> Data Bank Berhasil Di Ubah.</div>');
        redirect('admin/bank');
 }
}
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Customer extends CI_Controller {
 public function __construct()
 {
 parent::__construct();
 $this->load->model('Customer_model');
 cek_login();
 }
 public function index()
 {
 $data['judul'] = 'Customer';
 $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
 >userdata('username')])->row_array();

 // Jika tombol cari ditekan
 if($this->input->post('submit')) {
 $data['keyword'] = $this->input->post('keyword');
 $this->session->set_userdata('keyword');
 } else if(!$this->input->post('submit')) {
        $data['keyword'] = $this->session->unset_userdata('keyword');
 } else {
 $data['keyword'] = $this->session->userdata('keyword');
 }
 $this->db->like('nama', $data['keyword']);
 $this->db->from('customer');
 $config['total_rows'] = $this->db->count_all_results();
```

```
$data['total_rows'] = $config['total_rows'];

// Konfigurasi Pagination
$config['base_url'] = 'http://localhost/rental-mobil-ci/admin/customer/index';
// $config['total_rows'] = $this->Customer_model->countCustomer();

// var_dump($config['total_rows']); die;
$config['per_page'] = 2;
$config['num_links'] = 2;

// Konfigurasi Pagination CUSTOMER
// var_dump($config['total_rows']); die;

// Style
$config['full_tag_open'] = '<nav class="d-inline-block"><ul class="pagination mb-0">';
$config['full_tag_close'] = '</ul></nav>';

$config['first_link'] = 'First';
$config['first_tag_open'] = '<li class="page-item">';
$config['first_tag_close'] = '</li>';

$config['last_link'] = 'Last';
$config['last_tag_open'] = '<li class="page-item">';
$config['last_tag_close'] = '</li>';

$config['next_link'] = '<i class="fas fa-chevron-right"></i>';
$config['next_tag_open'] = '<li class="page-item">';
$config['next_tag_close'] = '</li>';

$config['prev_link'] = '<i class="fas fa-chevron-left"></i>';
$config['prev_tag_open'] = '<li class="page-item">';
$config['prev_tag_close'] = '</li>';

$config['cur_tag_open'] = '<li class="page-item active"><a class="page-link"
href="#">';
$config['cur_tag_close'] = '</li>';

$config['num_tag_open'] = '<li class="page-item">';
$config['num_tag_close'] = '</li>';

$config['attributes'] = array('class' => 'page-link');

$this->pagination->initialize($config);

$data['start'] = $this->uri->segment(4);
$data['customers'] = $this->Customer_model->getCustomer($config['per_page'],
$data['start'], $data['keyword']);
$this->load->view('themeplates_admin/header', $data);
$this->load->view('themeplates_admin/sidebar', $data);
$this->load->view('admin/customer/index', $data);
$this->load->view('themeplates_admin/footer');
```

```
  }
  public function tambahCustomer()
  {
  $data['judul'] = 'Tambah Customer';
  $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
  >userdata('username')])->row_array();
  $this->form_validation->set_rules('nama', 'Nama', 'required|trim',
  ['required' => 'Nama Harus Di Isi!']
  );

  $this->form_validation->set_rules('username', 'Username',
 'required|trim|min_length[6]|max_length[8]',
  ['required' => 'Username Harus Di Isi!'],
  ['min_length' => 'Minimal Panjang 6 Huruf'],
  ['max_length' => 'Maxsimal Panjang 8 Huruf']
  );
  $this->form_validation->set_rules('password', 'Password', 'required|trim',
  ['required' => 'Password Harus Di Isi!']
  );
  $this->form_validation->set_rules('alamat', 'Alamat', 'required|trim',
  ['required' => 'Alamat Harus Di Isi!']
  );
  $this->form_validation->set_rules('jk', 'Jenis Kelamin', 'required|trim',
  ['required' => 'Jenis Harus Di Pilih!']
  );
  $this->form_validation->set_rules('telepon', 'Telepon', 'required|trim',
  ['required' => 'Telepon Harus Di Isi!']
  );
  $this->form_validation->set_rules('ktp', 'No.KTP', 'required|trim',
  ['required' => 'No.KTP Harus Di Isi!']
  );
  if($this->form_validation->run() == FALSE) {
            $this->load->view('themeplates_admin/header', $data);
            $this->load->view('themeplates_admin/sidebar', $data);
            $this->load->view('admin/customer/tambah');
            $this->load->view('themeplates_admin/footer');
  } else {
            $this->Customer_model->aksiTambahCustomer();
            $this->session->set_flashdata('pesan', '<div class="'alert alert-success"><i
  class="'far fa-lightbulb"></i> Data Customer Berhasil Di Tambahkan.</div>');
            redirect('admin/customer');
  }
}
public function editCustomer($id)
{
  $data['judul'] = 'Edit Customer';
  $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
  >userdata('username')])->row_array();
  $data['customer'] = $this->Customer_model->getCustomerById($id);
  $this->form_validation->set_rules('nama', 'Nama', 'required|trim',
  ['required' => 'Nama Harus Di Isi!']
  );
  $this->form_validation->set_rules('username', 'Username',
  'required|trim|min_length[6]|max_length[8]',
```

```
  ['required' => 'Username Harus Di Isi!'],
  ['min_length' => 'Minimal Panjang 6 Huruf'],
  ['max_length' => 'Maxsimal Panjang 8 Huruf']
  );
  $this->form_validation->set_rules('password', 'Password', 'required|trim',
  ['required' => 'Password Harus Di Isi!']
  );
  $this->form_validation->set_rules('alamat', 'Alamat', 'required|trim',
  ['required' => 'Alamat Harus Di Isi!']
  );


  $this->form_validation->set_rules('jk', 'Jenis Kelamin', 'required|trim',
  ['required' => 'Jenis Harus Di Pilih!']
  );
  $this->form_validation->set_rules('telepon', 'Telepon', 'required|trim',
  ['required' => 'Telepon Harus Di Isi!']
  );
  $this->form_validation->set_rules('ktp', 'No.KTP', 'required|trim',
  ['required' => 'No.KTP Harus Di Isi!']
  );
  if($this->form_validation->run() == FALSE) {
            $this->load->view('themeplates_admin/header', $data);
            $this->load->view('themeplates_admin/sidebar', $data);
            $this->load->view('admin/customer/edit');
            $this->load->view('themeplates_admin/footer');
  } else {
            $this->Customer_model->aksiEditCustomer();
                  $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
            class="far fa-lightbulb"></i> Data Customer Berhasil Di Edit.</div>');
                  redirect('admin/customer');
            }
  }
  public function hapusCustomer($id)
  {
            $this->db->delete('customer', ['id_customer' => $id]);
            $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
            lightbulb"></i> Data Customer Berhasil Di Hapus.</div>');
                  redirect('admin/customer');
  }
}
<?php
defined('BASEPATH') or exit('No direct script access allowed');

class Dashboard extends CI_Controller
{
  public function __construct()
  {
            parent::__construct();
            cek_login();
            $this->load->model('Dashboard_model');
```

```
}
        public function index()
        {
          $data['judul'] = 'Dashboard';
          $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
          >userdata('username')])->row_array();
          $data['mobil'] = $this->db->get('mobil')->num_rows();
          $data['customers'] = $this->db->get('customer')->num_rows();
          $data['transaksi'] = $this->db->get('transaksi')->num_rows();
          $data['type'] = $this->db->get('type')->num_rows();
          $dataGrafik = $this->Dashboard_model->getTransaksi();
          $data['grafik'] = json_encode($dataGrafik);
          $this->load->view('themeplates_admin/header', $data);
          $this->load->view('themeplates_admin/sidebar', $data);
          $this->load->view('admin/dashboard', $data);

          $this->load->view('themeplates_admin/footer');
          }
        }
        <?php
        defined('BASEPATH') or exit('No direct script access allowed');

        class Kategori extends CI_Controller
        {
                public function __construct()
                {
          parent::__construct();
          $this->load->model('Kategori_Artikel_model');
          cek_login();
          }
          public function index()
          {
          $data['judul'] = 'Kategori Artikel';
          $data['type'] = $this->db->get('type')->result_array();
          $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
          >userdata('username')])->row_array();

          // Pencarian
          if ($this->input->post('submit')) {
                  $data['keyword'] = $this->input->post('keyword');
                  $this->session->set_userdata('keyword', $data['keyword']);
          } else if (!$this->input->post('submit')) {
                  $data['keyword'] = $this->session->unset_userdata('keyword');
          } else {
                  $data['keyword'] = $this->session->userdata('keyword');
          }
          $this->db->like('nama_kategori', $data['keyword']);
          $this->db->from('kategori');
          $config['total_rows'] = $this->db->count_all_results();
          $data['total_rows'] = $config['total_rows'];
```

```
// Konfigurasi Pagination
$config['base_url'] = 'http://localhost/rental-mobil-ci/admin/kategori/index';
// $config['total_rows'] = $this->Kategori_Artikel_model->countAllKategori();
// var_dump($config['total_rows']); die;


$config['per_page'] = 2;
$config['num_links'] = 2;

// STYLE
$config['full_tag_open'] = '<nav><ul class="pagination ok">';
$config['full_tag_close'] = '</ul></nav>';

$config['first_link'] = 'First';
$config['first_tag_open'] = '<li class="page-item">';
$config['first_tag_close'] = '</li>';

$config['last_link'] = 'Last';
$config['last_tag_open'] = '<li class="page-item">';
$config['last_tag_close'] = '</li>';

$config['next_link'] = '&raquo';
$config['next_tag_open'] = '<li class="page-item">';
$config['next_tag_close'] = '</li>';

$config['prev_link'] = '&laquo';
$config['prev_tag_open'] = '<li class="page-item">';
$config['prev_tag_close'] = '</li>';

$config['cur_tag_open'] = '<li class="page-item active"><a class="page-link"
href="#">';
$config['cur_tag_close'] = '</a></li>';

$config['num_tag_open'] = '<li class="page-item">';
$config['num_tag_close'] = '</li>';

$config['attributes'] = array('class' => 'page-link');

$this->pagination->initialize($config);

$data['start'] = $this->uri->segment(4);
$data['kategori'] = $this->Kategori_Artikel_model-
>getAllKategori($config['per_page'], $data['start'], $data['keyword']);
// $data['kategori'] = $this->db->get('kategori')->result_array();

$this->form_validation->set_rules('kategori', 'Kategori', 'required|trim', ['required' =>
'Kategori Harus Di Isi!']);
if ($this->form_validation->run() == FALSE) {
        $this->load->view('themeplates_admin/header', $data);
        $this->load->view('themeplates_admin/sidebar', $data);
        $this->load->view('admin/kategori/index', $data);
        $this->load->view('themeplates_admin/footer');
```

```
  } else {
        $this->Kategori_Artikel_model->aksiTambahKategori();
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
  class="far fa-lightbulb"></i> Data Kategori Berhasil Ditambahkan.</div>');
        redirect('admin/kategori');
  }
  }
  public function getkategoriartikel()
  {
        echo json_encode($this->Kategori_Artikel_model->getUbahKategori($_POST['id']));
        // echo $_POST['id'];
  }
  public function ubahkategori()
  {
        $this->Kategori_Artikel_model->aksiUbahKategori($_POST);
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
        lightbulb"></i> Data Kategori Berhasil Diubah.</div>');
        redirect('admin/kategori');
  }
  public function hapus($id)
  {
        $this->db->delete('kategori', ['id_kategori' => $id]);
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
        lightbulb"></i> Data Kategori Berhasil Dihapus.</div>');

        redirect('admin/kategori');
  }
}
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Laporan extends CI_Controller {
  public function _construct()
  {
        parent::_construct();
        cek_login();
        $this->load->model('Laporan_model');
  }

  public function index()
  {
        $data['judul'] = 'Laporan Transaksi';
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
        >userdata('username')])->row_array();

  $this->form_validation->set_rules('dari', 'Dari Tanggal', 'required|trim',
  ['required' => 'Dari Tanggal Harus Di Isi!']
  );
  $this->form_validation->set_rules('sampai', 'Sampai Tanggal', 'required|trim',
  ['required' => 'Sampai Tanggal Harus Di Isi!']
  );
  if($this->form_validation->run() == FALSE)
  {
```

```
            $this->load->view('themeplates_admin/header', $data);
            $this->load->view('themeplates_admin/sidebar', $data);
            $this->load->view('admin/laporan/tgllaporan', $data);
            $this->load->view('themeplates_admin/footer');
    } else {
            $data['laporan'] = $this->Laporan_model->tampilLaporanPerTgl();
            // var_dump($data['laporan']); die;
            $this->load->view('themeplates_admin/header', $data);
            $this->load->view('themeplates_admin/sidebar', $data);
            $this->load->view('admin/laporan/tampil_laporan', $data);
            $this->load->view('themeplates_admin/footer');
    }
    }

    public function print()
            {
            $data['judul'] = 'Laporan Transaksi';
            $data['laporan'] = $this->Laporan_model->printTransaksi();
            $this->load->view('themeplates_admin/header', $data);
            $this->load->view('admin/laporan/print', $data);
    }
}
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Mobil extends CI_Controller {
    public function __construct()
    {
            parent::__construct();
            $this->load->model('Mobil_model');
            cek_login();
    }

    public function index()
    {
            $data['judul'] = 'Halaman Data Mobil';
            $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
            >userdata('username')])->row_array();

    // Ambil keyword
    // jika tombol cari ditekan
    if($this->input->post('submit')) {
            $data['keyword'] =  $this->input->post('keyword');
            $this->session->set_userdata('keyword', $data['keyword']);
    } else if(!$this->input->post('submit')) {
            $data['keyword'] = $this->session->unset_userdata('keyword');
    } else {
            $data['keyword'] = $this->session->userdata('keyword');
    }

    // Konfigurasi Pagination
    // $config['total_rows'] = $this->Mobil_model->countAllMobil();
    $this->db->like('merk', $data['keyword']);
```

```
$this->db->from('mobil');
$config['total_rows'] = $this->db->count_all_results();
$data['total_rows'] = $config['total_rows'];
// var_dump($config['total_rows']); die;
$config['per_page'] = 2

// initialize
$this->pagination->initialize($config);
$data['start'] = $this->uri->segment(4);
$data['mobil'] = $this->Mobil_model->getMobil($config['per_page'], $data['start'],
$data['keyword']);

$this->load->view('themeplates_admin/header', $data);
$this->load->view('themeplates_admin/sidebar', $data);
$this->load->view('admin/mobil/index', $data);
$this->load->view('themeplates_admin/footer');
}
public function tambahMobil()
{
        $data['judul'] = 'Tambah Data Mobil';
        $data['type'] = $this->db->get('type')->result_array();
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
        >userdata('username')])->row_array();

$this->form_validation->set_rules('type', 'Type', 'required|trim',
['required' => 'Type Harus Dipilih!']
);

$this->form_validation->set_rules('merk', 'Merk', 'required|trim',
['required' => 'Merk Harus Diisi!']);
$this->form_validation->set_rules('no_plat', 'No.Plat', 'required|trim',
['required' => 'No.Plat Harus Diisi!']);
$this->form_validation->set_rules('warna', 'Warna', 'required|trim',
['required' => 'Warna Harus Diisi!']);
$this->form_validation->set_rules('tahun', 'Tahun', 'required|trim',
['required' => 'Tahun Harus Diisi!']);
$this->form_validation->set_rules('status', 'Status', 'required|trim',
['required' => 'Status Harus Dipilih!']
);
$this->form_validation->set_rules('harga', 'Harga Sewa', 'required|trim',
['required' => 'Harga Sewa Harus Di Isi!']
);
$this->form_validation->set_rules('denda', 'Denda', 'required|trim',
['required' => 'Denda Harus Di Isi!']
);
$this->form_validation->set_rules('ac', 'AC', 'required|trim',
['required' => 'AC Harus Dipilih!']
);
$this->form_validation->set_rules('mp3', 'MP3 Player', 'required|trim',
['required' => 'MP3 Player Harus Dipilih!']
);
$this->form_validation->set_rules('supir', 'Supir', 'required|trim',
['required' => 'Supir Harus Dipilih!']
);
```

```
$this->form_validation->set_rules('lock', 'Central Lock', 'required|trim',
['required' => 'Central Lock Harus Dipilih!']
);
$this->form_validation->set_rules('gambar', 'Gambar', 'trim');
if($this->form_validation->run() == FALSE) {
$this->load->view('themeplates_admin/header', $data);

        $this->load->view('themeplates_admin/sidebar', $data);
        $this->load->view('admin/mobil/tambahMobil');
        $this->load->view('themeplates_admin/footer');
} else {
        $this->Mobil_model->aksi_tambah();
                $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
class="far fa-lightbulb"></i> Data Mobil Berhasil Di Tambahkan.</div>');
                redirect('admin/mobil');
        }
        }

public function EditMobil($id)
{
        $data['judul'] = 'Edit Data Mobil';
        // $data['type'] = $this->db->get('type')->result_array();
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
>userdata('username')])->row_array();
        $data['mobil'] = $this->Mobil_model->getMobilById($id);
        $data['type'] = $this->db->get('type')->result_array();

$this->form_validation->set_rules('type', 'Type', 'required|trim',
['required' => 'Type Harus Dipilih!']
);
$this->form_validation->set_rules('merk', 'Merk', 'required|trim',
['required' => 'Merk Harus Diisi!']);
$this->form_validation->set_rules('no_plat', 'No.Plat', 'required|trim',
['required' => 'No.Plat Harus Diisi!']);

$this->form_validation->set_rules('warna', 'Warna', 'required|trim',
['required' => 'Warna Harus Diisi!']);
$this->form_validation->set_rules('tahun', 'Tahun', 'required|trim',
['required' => 'Tahun Harus Diisi!']);
$this->form_validation->set_rules('status', 'Status', 'required|trim',
['required' => 'Status Harus Dipilih!']
);
$this->form_validation->set_rules('harga', 'Harga Sewa', 'required|trim',
['required' => 'Harga Sewa Harus Di Isi!']
);
$this->form_validation->set_rules('denda', 'Denda', 'required|trim',
['required' => 'Denda Harus Di Isi!']
);
$this->form_validation->set_rules('ac', 'AC', 'required|trim',
['required' => 'AC Harus Dipilih!']
);
$this->form_validation->set_rules('mp3', 'MP3 Player', 'required|trim',
```

```
 ['required' => 'MP3 Player Harus Dipilih!']
                    );
                    $this->form_validation->set_rules('supir', 'Supir', 'required|trim',
                    ['required' => 'Supir Harus Dipilih!']
                    );
                    $this->form_validation->set_rules('lock', 'Central Lock', 'required|trim',
                    ['required' => 'Central Lock Harus Dipilih!']
                    );

  // $this->form_validation->set_rules('gambar', 'Gambar', 'required|trim',
                    // ['required' => 'Gambar Wajib Di Upload, PNG/JPG!']
                    // );
                    if($this->form_validation->run() == FALSE) {
                            $this->load->view('themeplates_admin/header', $data);
                            $this->load->view('themeplates_admin/sidebar', $data);
                            $this->load->view('admin/mobil/editMobil');
                            $this->load->view('themeplates_admin/footer');
                    } else {
                            $this->Mobil_model->aksi_edit();
                            $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
                            class="far fa-lightbulb"></i> Data Mobil Berhasil Di Ubah.</div>');
                            redirect('admin/mobil');
                    }
                    }
            public function detailMobil($id)
            {
                    $data['judul'] = 'Detail Mobil';
                    $data['customer'] = $this->db->get_where('customer', ['username' => $this-
>session-                   >userdata('username')])->row_array();


  // $data['mobil'] = $this->Mobil_model->getMobilById($id);
                    $data['mobil'] = $this->Mobil_model->getMobilTypeJoin($id);
                    $this->load->view('themeplates_admin/header', $data);
                    $this->load->view('themeplates_admin/sidebar', $data);
                    $this->load->view('admin/mobil/detailMobil', $data);
                    $this->load->view('themeplates_admin/footer');

  }
            public function hapusMobil($id)
            {
                    $this->db->where('id_mobil', $id);
                    $row = $this->db->get('mobil')->row_array();
                    unlink('./assets/assets_stisla/img/mobil/' . $row['gambar']);
                    $this->db->delete('mobil', ['id_mobil' => $id]);
                    $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
class="far fa-                      lightbulb"></i> Data Mobil Berhasil Di Hapus.</div>');
                            redirect('admin/mobil');
            }
  }
```

```
<?php
defined('BASEPATH') OR exit('No direct script access allowed');
class Transaksi extends CI_Controller {
        public function __construct()
 {
        parent::__construct();
        $this->load->model('Transaksi_model');
        cek_login();
 }

 public function index()
 {
        $data['judul'] = 'Data Transaksi';
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
>userdata('username')])->row_array();

        // Kolom Pencarian
        if($this->input->post('submit')) {
                $data['keyword'] = $this->input->post('keyword');
                $this->session->set_userdata('keyword', $data['keyword']);
        } else if(!$this->input->post('submit')) {
                $data['keyword'] = $this->session->unset_userdata('keyword');
        } else {
                $data['keyword'] = $this->session->userdata('keyword');
        }
        // $this->db->like('merk', $data['keyword']);
        $this->db->from('transaksi');
        $config['total_rows'] = $this->db->count_all_results();
        $data['total_rows'] = $config['total_rows'];

        // KOnfigurasi Pagination
        $config['base_url'] = 'http://localhost/rental-mobil-ci/admin/transaksi/index';
        // $config['total_rows'] = $this->Transaksi_model->countAllTransaksi();
        // var_dump($config['total_rows']); die;
        $config['per_page'] = 2;


        // STYLE
        $config['full_tag_open'] = '<nav class="d-inline-block"><ul class="pagination mb-0">';
        $config['full_tag_close'] = '</ul></nav>';

        $config['first_link'] = 'First';
        $config['first_tag_open'] = '<li class="page-item">';
        $config['first_tag_close'] = '</li>';

        $config['last_link'] = 'Last';

$config['last_tag_open'] = '<li class="page-item">';
        $config['last_tag_close'] = '</li>';

        $config['next_link'] = '<i class="fas fa-chevron-right"></i>';
        $config['next_tag_open'] = '<li class="page-item">';
        $config['next_tag_close'] = '</li>';
```

```
        $config['prev_link'] = '<i class="fas fa-chevron-left"></i>';
        $config['prev_tag_open'] = '<li class="page-item">';
        $config['prev_tag_close'] = '</li>';

        $config['cur_tag_open'] = '<li class="page-item active"><a class="page-link"
        href="#">';
        $config['cur_tag_close'] = '</li>';

        $config['num_tag_open'] = '<li class="page-item">';
        $config['num_tag_close'] = '</li>';

        $config['attributes'] = array('class' => 'page-link');

        // Initialize
        $this->pagination->initialize($config);
        $data['start'] = $this->uri->segment(4);

        $data['transaksi'] = $this->Transaksi_model->getAll3Table($config['per_page'],
        $data['start'], $data['keyword']);
        $this->load->view('themeplates_admin/header', $data);
        $this->load->view('themeplates_admin/sidebar', $data);
        $this->load->view('admin/transaksi/index', $data);
        $this->load->view('themeplates_admin/footer');
}
public function pembayaran($id)
{
        $data['judul'] = 'Konfirmasi Pembayaran';
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
>userdata('username')])->row_array();
        $data['pembayaran'] = $this->Transaksi_model->getTransaksiById($id);
        $this->load->view('themeplates_admin/header', $data);
        $this->load->view('themeplates_admin/sidebar', $data);
        $this->load->view('admin/transaksi/konfirmasi_pembayaran',   $data);
        $this->load->view('themeplates_admin/footer');
}
public function cek_pembayaran()
{
        $id_rental = $this->input->post('id_rental', true);
        $statusPembayaran = $this->input->post('status_pembayaran', true);

        $this->db->set('status_pembayaran', $statusPembayaran);
        $this->db->where('id_rental', $id_rental);
        $this->db->update('transaksi');
        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
lightbulb"></i> Konfirmasi Bukti Pembayaran Berhasil.</div>');
        redirect('admin/transaksi');
}
public function download($id)
{
        $this->load->helper('download');
```

```
$filePembayaran = $this->Transaksi_model->downloadPembayaran($id);
$file = 'assets/bukti/' . $filePembayaran['bukti_pembayaran'];
        force_download($file, NULL);
  }
  public function transaksiSelesai($id)
  {
        $data['judul'] = 'Transaksi Selesai';
        $data['transaksi'] = $this->db->get_where('transaksi', ['id_rental' => $id])-
  >result_array();
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
  >userdata('username')])->row_array();
        $this->form_validation->set_rules('tgl_penggembalian', 'Tanggal Penggembalian',
  'required|trim',
        ['required' => 'Tanggal Penggembalian Harus Di Isi!']
        );
        $this->form_validation->set_rules('status_penggembalian', 'Status Penggembalian',
  'required|trim',
        ['required' => 'Status Penggembalian Harus Di Isi!']
        );

        $this->form_validation->set_rules('status_rental', 'Status Rental', 'required|trim',
        ['required' => 'Status Rental Harus Di Isi!']
        );
        if($this->form_validation->run() == FALSE) {
                $this->load->view('themeplates_admin/header', $data);
                $this->load->view('themeplates_admin/sidebar', $data);
                $this->load->view('admin/transaksi/transaksi_selesai',   $data);
                $this->load->view('themeplates_admin/footer');
        } else {
                $this->Transaksi_model->updateTransaksiSelesai();
                $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
        class="far fa-lightbulb"></i> Transaksi Selesai Berhasil Di Ubah.</div>');
                redirect('admin/transaksi');
        }
  }
  public function batal($id)
  {
        $data = $this->db->get_where('transaksi', ['id_rental' => $id])->row_array();
        // var_dump($data); die;
        $id_mobil = $data['id_mobil'];
        // var_dump($id_mobil); die;
        $this->db->set('status', '1');
        $this->db->where('id_mobil', $id_mobil);
        $this->db->update('mobil');
        $this->db->delete('transaksi', ['id_rental' => $id]);


        $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="fa fa-
  info-circle" aria-hidden="true"></i> Transaksi Berhasil Di Batalkan.</div>');
        redirect('admin/transaksi');
  }
}
```

```
<?php
defined('BASEPATH') OR exit('No direct script access allowed');

class Type extends CI_Controller {
  public function _construct()
  {

parent::__construct();
            $this->load->model('Type_model');
            cek_login();
  }
  public function index()
  {
            $data['judul'] = 'Halaman Data Type';
            $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
  >userdata('username')])->row_array();

  // Jika tombol cari di tekan
  if($this->input->post('submit')) {
            $data['keyword'] = $this->input->post('keyword');
            $this->session->set_userdata('keyword');
  } else if($this->input->post('submit')) {
            $data['keyword'] = $this->session->unset_userdata('keyword');

  } else {
            $data['keyword'] = $this->session->userdata('keyword');
  }

  $this->db->like('nama_type', $data['keyword']);
  $this->db->from('type');
  $config['total_rows'] = $this->db->count_all_results();
  $data['total_rows'] = $config['total_rows'];

  // Konfigurasi Pagination
  $config['base_url'] = 'http://localhost/rental-mobil-ci/admin/type/index';
  // $config['total_rows'] = $this->Type_model->countAllType();
  // var_dump($config['total_rows']); die;
  $config['per_page'] = 2;
  $config['num_links'] = 2;

  // Konfigurasi Pagination TYPE
  // var_dump($config['total_rows']); die;

  // style
  $config['full_tag_open'] = '<nav class="d-inline-block"><ul class="pagination mb-0">';
  $config['full_tag_close'] = '</ul></nav>';

  $config['first_link'] = 'First';
  $config['first_tag_open'] = '<li class="page-item">';
  $config['first_tag_close'] = '</li>';

  $config['last_link'] = 'Last';
  $config['last_tag_open'] = '<li class="page-item">';
  $config['last_tag_close'] = '</li>';
```

```
$config['next_link'] = '<i class="fas fa-chevron-right"></i>';
$config['next_tag_open'] = '<li class="page-item">';
$config['next_tag_close'] = '</li>';

$config['prev_link'] = '<i class="fas fa-chevron-left"></i>';
$config['prev_tag_open'] = '<li class="page-item">';
$config['prev_tag_close'] = '</li>';

$config['cur_tag_open'] = '<li class="page-item active"><a class="page-link"
href="#">';
$config['cur_tag_close'] = '</li>';

$config['num_tag_open'] = '<li class="page-item">';
$config['num_tag_close'] = '</li>';

$config['attributes'] = array('class' => 'page-link');

// initialize
$this->pagination->initialize($config);

$data['start'] = $this->uri->segment(4);
$data['type'] = $this->Type_model->getAllTypeLimit($config['per_page'], $data['start'],

$data['keyword']);
$this->load->view('themeplates_admin/header', $data);
$this->load->view('themeplates_admin/sidebar', $data);
$this->load->view('admin/type/index', $data);
$this->load->view('themeplates_admin/footer');
}
public function tambahType()
{
        $data['judul'] = 'Tambah Data Type';
        $data['customer'] = $this->db->get_where('customer', ['username' => $this->session-
        >userdata('username')])->row_array();
        $this->form_validation->set_rules('kode_type', 'Kode Type',
        'required|trim|max_length[4]',
[
'required' => 'Kode Type Harus Di Isi!',
'max_length' => 'Kode Type Maxsimal 4 Huruf!'
]
);
$this->form_validation->set_rules('nama_type', 'Nama Type', 'required|trim',
['required' => 'Nama Type Harus Di Isi!']
);
if($this->form_validation->run() == FALSE) {
        $this->load->view('themeplates_admin/header', $data);
        $this->load->view('themeplates_admin/sidebar', $data);
        $this->load->view('admin/type/tambahType', $data);
        $this->load->view('themeplates_admin/footer');
```

```
        } else {
                $this->Type_model->aksiTypeTambah();
                $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
                class="far fa-lightbulb"></i> Data Type Berhasil Di Tambahkan.</div>');
                redirect('admin/type');
                }
                }
         public function editType($id)
         {
                $data['judul'] = 'Edit Data Type';
                $data['customer'] = $this->db->get_where('customer', ['username' => $this-
>session-      >userdata('username')])->row_array();
                $data['type'] = $this->Type_model->getTypeById($id);

        $this->form_validation->set_rules('kode_type', 'Kode Type', 'required|trim',
                [
                'required' => 'Kode Type Harus Di Isi!'
                ]
                );
                $this->form_validation->set_rules('nama_type', 'Nama Type', 'required|trim',
                ['required' => 'Nama Type Harus Di Isi!']


 );
 if($this->form_validation->run() == FALSE) {
          $this->load->view('themeplates_admin/header', $data);
          $this->load->view('themeplates_admin/sidebar', $data);
          $this->load->view('admin/type/editType', $data);
          $this->load->view('themeplates_admin/footer');
 } else {
          $this->Type_model->aksiTypeEdit();
          $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i
 class="far fa-lightbulb"></i> Data Type Berhasil Di Edit.</div>');
    redirect('admin/type');
 }
 }
 public function hapusType($id)
 {
          $this->db->delete('type', ['id_type' => $id]);
          $this->session->set_flashdata('pesan', '<div class="alert alert-success"><i class="far fa-
                lightbulb"></i> Data Type Berhasil Di Hapus.</div>');
          redirect('admin/type');
 }
}
```

NEO-6

u-blox 6 GPS Modules

Data Sheet

Abstract

Technical data sheet describing the cost effective, high-performanceu-blox 6 based NEO-6 series of GPS modules, that brings the high performance of the u-blox 6 positioning engine to the miniature NEO form factor.
These receivers combine a high level of integration capability withflexible connectivity options in a small package. This makes them perfectly suited for mass-market end products with strict size and cost requirements.

16.0 x 12.2 x 2.4 mm

Document Information	
Title	NEO-6
Subtitle	u-blox 6 GPS Modules
Document type	Data Sheet
Document number	GPS.G6-HW-09005-E
Document status	

Document status information	
Objective Specification	This document contains target values. Revised and supplementary data will be publishedlater.
Advance Information	This document contains data based on early testing. Revised and supplementary data willbe published later.
Preliminary	This document contains data from product verification. Revised and supplementary datamay be published later.
Released	This document contains the final product specification.

This document applies to the following products:

Name	Type number	ROM/FLASH version	PCN reference
NEO-6G	NEO-6G-0-001	ROM7.03	UBX-TN-11047-1
NEO-6Q	NEO-6Q-0-001	ROM7.03	UBX-TN-11047-1
NEO-6M	NEO-6M-0-001	ROM7.03	UBX-TN-11047-1
NEO-6P	NEO-6P-0-000	ROM6.02	N/A
NEO-6V	NEO-6V-0-000	ROM7.03	N/A
NEO-6T	NEO-6T-0-000	ROM7.03	N/A

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Contents

Contents 3

1 Functional description 5
1.1 Overview 5
1.2 Product features 5
1.3 GPS performance 6
1.4 Block diagram 7
1.5 Assisted GPS (A-GPS) 7
1.6 AssistNow Autonomous 7
1.7 Precision Timing 8
1.7.1 Time mode 8
1.7.2 Timepulse and frequency reference 8
1.7.3 Time mark 8
1.8 Raw data 8
1.9 Automotive Dead Reckoning 8
1.10 Precise Point Positioning 9
1.11 Oscillators 9
1.12 Protocols and interfaces 9
1.12.1 UART 9
1.12.2 USB 9
1.12.3 Serial Peripheral Interface (SPI) 9
1.12.4 Display Data Channel (DDC) 10
1.13 Antenna 10
1.14 Power Management 10
1.14.1 Maximum Performance Mode 10
1.14.2 Eco Mode 10
1.14.3 Power Save Mode 11
1.15 Configuration 11
1.15.1 Boot-time configuration 11
1.16 Design-in 11

2 Pin Definition 12
2.1 Pin assignment 12

3 Electrical specifications 14
3.1 Absolute maximum ratings 14
3.2 Operating conditions 15

3.3 Indicative power requirements 15
3.4 SPI timing diagrams 16
3.4.1 Timing recommendations 16

4 Mechanical specifications 17

5 Qualification and certification 18
5.1 Reliability tests 18
5.2 Approvals 18

6 Product handling & soldering 19
6.1 Packaging 19
6.1.1 Reels 19
6.1.1 Tapes 20
6.2 Moisture Sensitivity Levels 21
6.3 Reflow soldering 21
6.4 ESD handling precautions 21

7 Default settings 22

8 Labeling and ordering information 23
8.1 Product labeling 23
8.2 Explanation of codes 23
8.3 Ordering information 24

Related documents 24

Revision history 24
Contact 25

9. Functional description

• Overview

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. These flexible and cost effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints.

The 50-channel u-blox 6 positioning engine boasts a Time-To-First-Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments.

• Product features

Model	Type					Supply		Interfaces				Features						
	GPS	PPP	Timing	Raw Data	Dead Reckoning	1.75 V - 2.0 V	2.7 V - 3.6 V	UART	USB	SPI	DDC (I²C compliant)	Programmable (Flash) FW update	TCXO	RTC crystal	Antenna supply and supervisor	Configuration pins	Timepulse	External interrupt/ Wakeup
NEO-6G	•					•		•	•	•	•		•	•	o	3	1	•
NEO-6Q	•						•	•	•	•	•		•	•	o	3	1	•
NEO-6M	•						•	•	•	•	•			•	o	3	1	•
NEO-6P	•	•		•			•	•	•	•	•			•	o	3	1	•
NEO-6V	•				•		•	•	•	•	•			•	o	3	1	•
NEO-6T	•		•	•			•	•	•	•	•		•	•	o	3	1	•

o = Requires external components and integration on application processor

Table 1: Features of the NEO-6 Series

All NEO-6 modules are based on GPS chips qualified according to AEC-Q100. See Chapter 5.1 for furtherinformation.

• GPS performance

Parameter	Specification			
Receiver type	50 Channels GPS L1 frequency, C/A Code SBAS: WAAS, EGNOS, MSAS			
Time-To-First-Fix[1]		NEO-6G/Q/T	NEO-6M/V	NEO-6P
	Cold Start[2]	26 s	27 s	32 s
	Warm Start[2]	26 s	27 s	32 s
	Hot Start[2]	1 s	1 s	1 s
	Aided Starts[3]	1 s	<3 s	<3 s
Sensitivity[4]		NEO-6G/Q/T	NEO-6M/V	NEO-6P
	Tracking & Navigation	-162 dBm	-161 dBm	-160 dBm
	Reacquisition[5]	-160 dBm	-160 dBm	-160 dBm
	Cold Start (without aiding)	-148 dBm	-147 dBm	-146 dBm
	Hot Start	-157 dBm	-156 dBm	-155 dBm
Maximum Navigation update rate		NEO-6G/Q/M/T	NEO-6P/V	
		5Hz	1 Hz	
Horizontal position accuracy[6]	GPS	2.5 m		
	SBAS	2.0 m		
	SBAS + PPP[7]	< 1 m (2D, R50)[8)]		
	SBAS + PPP[7]	< 2 m (3D, R50)[8]		
Configurable Timepulse frequency range		NEO-6G/Q/M/P/V	NEO-6T	
		0.25 Hz to 1 kHz	0.25 Hz to 10 MHz	
Accuracy for Timepulse signal	RMS	30 ns		
	99%	<60 ns		
	Granularity	21 ns		
	Compensated[9]	15 ns		
Velocity accuracy[6]		0.1m/s		
Heading accuracy[6]		0.5 degrees		
Operational Limits	Dynamics	≤ 4 g		
	Altitude[10]	50,000 m		
	Velocity[10]	500 m/s		

Table 2: NEO-6 GPS performance

[1] All satellites at -130 dBm
[2] Without aiding
[3] Dependent on aiding data connection speed and latency
[4] Demonstrated with a good active antenna
[5] For an outage duration 10≤
[6] CEP, 50%, 24 hours static, -130dBm, SEP: <3.5m
[7] NEO-6P only
[8] Demonstrated under following conditions: 24 hours, stationary, first 600 seconds of data discarded. HDOP < 1.5 during measurement period, strong signals. Continuous availability of valid SBAS correction data during full test period.
[9] Quantization error information can be used with NEO-6T to compensate the granularity related error of the timepulse signal
[10] Assuming Airborne <4g platform

- **Block diagram**

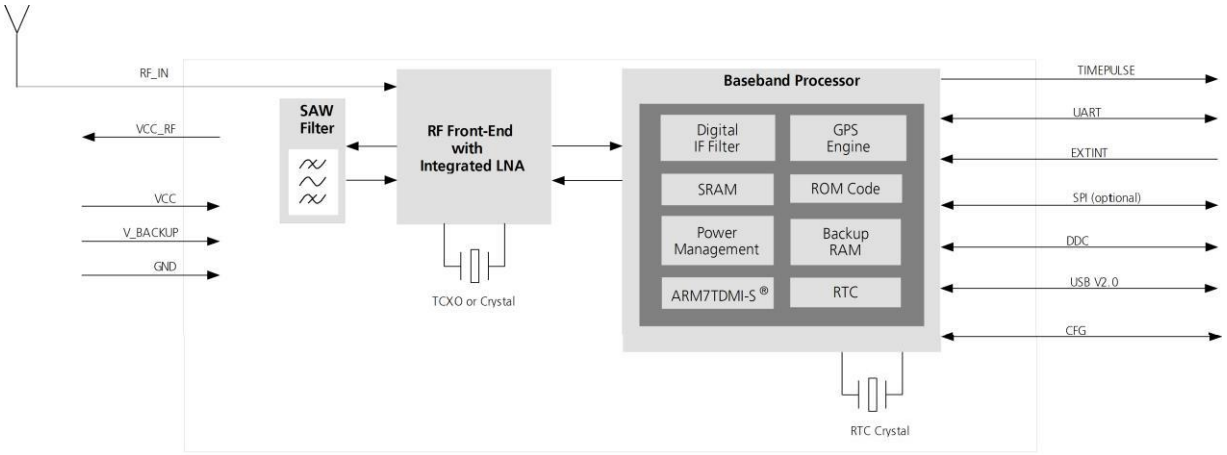


Figure 1: Block diagram (For available options refer to the product features table in section 1.2).

- **Assisted GPS (A-GPS)**

Supply of aiding information like ephemeris, almanac, rough last position and time and satellite status and an optional time synchronization signal will reduce time to first fix significantly and improve the acquisition sensitivity. All NEO-6 modules support the u-blox AssistNow Online and AssistNow Offline A-GPS services[11] and are OMA SUPL compliant.

- **AssistNow Autonomous**

AssistNow Autonomous provides functionality similar to Assisted-GPS without the need for a host or external network connection. Based on previously broadcast satellite ephemeris data downloaded to and stored by the GPS receiver, AssistNow Autonomous automatically generates accurate satellite orbital data ("AssistNow Autonomous data") that is usable for future GPS position fixes. AssistNow Autonomous data is reliable for up to3 days after initial capture.

u-blox' AssistNow Autonomous benefits

- are:Faster position fix
- No connectivity required
- Complementary with AssistNow Online and Offline
- services No integration effort, calculations are done in the background

☞ For more details see the u-blox 6 Receiver Description including Protocol Specification [2].

- **Precision Timing**

  - **Time mode**

NEO-6T provides a special Time Mode to provide higher timing accuracy. The NEO-6T is designed for use with stationary antenna setups. The Time Mode features three different settings described in Table 3: Disabled, Survey-In and Fixed Mode. For optimal performance entering the position of the antenna (when known) is recommended as potential source of errors will be reduced.

Time Mode Settings	Description
Disabled	Standard PVT operation
Survey-In	The GPS receiver computes the average position over an extended time period until a predefined maximum standard deviation has been reached. Afterwards the receiver will be automatically set to Fixed Mode and the timing features will be activated.
Fixed Mode	In this mode, a fixed 3D position and known standard deviation is assumed and the timing features are activated. Fixed Mode can either be activated directly by feeding pre-defined position coordinates (ECEF - Earth Center Earth Fixed format) or by performing a Survey-In. In Fixed mode, the timing errors in the TIMEPULSE signal which otherwise result from positioning errorsare eliminated. Single-satellite operation is supported. For details, please refer to the *u-blox 6 Receiver Description including Protocol Specification* [2].

Table 3: Time mode settings

  - **Timepulse and frequency reference**

NEO-6T comes with a timepulse output which can be configured from 0.25 Hz up to 10 MHz. The timepulse can either be used for time synchronization (i.e. 1 pulse per second) or as a reference frequency in the MHz range. A timepulse in the MHz range provides excellent long-term frequency accuracy and stability.

  - **Time mark**

NEO-6T can be used for precise time measurements with sub-microsecond resolution using the external interrupt (EXTINT0). Rising and falling edges of these signals are time-stamped to the GPS or UTC time and counted. The Time Mark functionality can be enabled with the UBX-CFG-TM2 message

For details, please refer to the *u-blox 6 Receiver Description including Protocol Specification* [2].

- **Raw data**

Raw data output is supported at an update rate of 5 Hz on the NEO-6T and NEO-6P. The UBX-RXM-RAW message includes carrier phase with half-cycle ambiguity resolved, code phase and Doppler measurements, which can be used in external applications that offer precision positioning, real-time kinematics (RTK) and attitude sensing.

- **Automotive Dead Reckoning**

Automotive Dead Reckoning (ADR) is u-blox' industry proven off-the-shelf Dead Reckoning solution for tier-oneautomotive customers. u-blox' ADR solution combines GPS and sensor digital data using a tightly coupled Kalman filter. This improves position accuracy during periods of no or degraded GPS signal.

The NEO-6V provides ADR functionality over its software sensor interface. A variety of sensors (such as wheel ticks and gyroscope) are supported, with the sensor data received via UBX messages from the application processor. This allows for easy integration and a simple hardware interface, lowering costs. By using digital sensor data available on the vehicle bus, hardware costs are minimized since no extra

sensors are required for Dead Reckoning functionality. ADR is designed for simple integration and easy configuration of different sensoroptions (e.g. with or without gyroscope) and vehicle variants, and is completely self-calibrating.

For more details contact the u-blox support representative nearest you to receive dedicated *u-blox 6 ReceiverDescription Including Protocol Specification* [3].

- **Precise Point Positioning**

u-blox' industry proven PPP algorithm provides extremely high levels of position accuracy in static and slow moving applications, and makes the NEO-6P an ideal solution for a variety of high precision applications such as surveying, mapping, marine, agriculture or leisure activities.

Ionospheric corrections such as those received from local SBAS[12] geostationary satellites (WAAS, EGNOS, MSAS) or from GPS enable the highest positioning accuracy with the PPP algorithm. The maximum improvement of positioning accuracy is reached with PPP+SBAS and can only be expected in an environment with unobstructed sky view during a period in the order of minutes.

- **Oscillators**

NEO-6 GPS modules are available in Crystal and TCXO versions. The TCXO allows accelerated weak signal acquisition, enabling faster start and reacquisition times.

- **Protocols and interfaces**

Protocol	Type
NMEA	Input/output, ASCII, 0183, 2.3 (compatible to 3.0)
UBX	Input/output, binary, u-blox proprietary
RTCM	Input, 2.3

Table 4: Available protocols

All listed protocols are available on UART, USB, and DDC. For specification of the various protocols see the *u- blox 6 Receiver Description including Protocol Specification* [2].

- **UART**

NEO-6 modules include one configurable UART interface for serial communication (for information about configuration see section 1.15).

- **USB**

NEO-6 modules provide a USB version 2.0 FS (Full Speed, 12Mbit/s) interface as an alternative to the UART. The pull-up resistor on USB_DP is integrated to signal a full-speed device to the host. The VDDUSB pin supplies the USB interface. u-blox provides a Microsoft® certified USB driver for Windows XP, Windows Vista and Windows 7 operating systems.

- **Serial Peripheral Interface (SPI)**

The SPI interface allows for the connection of external devices with a serial interface, e.g. serial flash to save configuration and AssistNow Offline A-GPS data or to interface to a host CPU. The interface can be operated inmaster or slave mode. In master mode, one chip select signal is available to select external slaves. In slave mode asingle chip select signal enables communication with the host.

☞ The maximum bandwidth is 100kbit/s.

- **Display Data Channel (DDC)**

The I²C compatible DDC interface can be used either to access external devices with a serial interface EEPROM orto interface with a host CPU. It is capable of master and slave operation. The DDC interface is I²C Standard Mode compliant. For timing parameters consult the I²C standard.

The DDC Interface supports serial communication with u-blox wireless modules. See the specification of the applicable wireless module to confirm compatibility.

The maximum bandwidth is 100kbit/s.

- **External serial EEPROM**

NEO-6 modules allow an optional external serial EEPROM to be connected to the DDC interface. This can beused to store Configurations permanently.

For more information see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

Use caution when implementing since forward compatibility is not guaranteed.

- **Antenna**

NEO-6 modules are designed for use with passive and active[13] antennas.

Parameter	Specification	
Antenna Type		Passive and active antenna
Active Antenna Recommendations	Minimum gain Maximum gain Maximum noise figure	15 dB (to compensate signal loss in RF cable)50 dB 1.5 dB

Table 5: Antenna Specifications for all NEO-6 modules

- **Power Management**

u-blox receivers support different power modes. These modes represent strategies of how to control the acquisition and tracking engines in order to achieve either the best possible performance or good performancewith reduced power consumption.

For more information about power management strategies, see the *u-blox 6 Receiver Description including Protocol Specification* [2].

- **Maximum Performance Mode**

During a Cold start, a receiver in Maximum Performance Mode continuously deploys the acquisition engine tosearch for all satellites. Once the receiver has a position fix (or if pre-positioning information is available), the acquisition engine continues to be used to search for all visible satellites that are not being tracked.

- **Eco Mode**

During a Cold start, a receiver in Eco Mode works exactly as in Maximum Performance Mode. Once a position can be calculated and a sufficient number of satellites are being tracked, the acquisition engine is powered offresulting in significant power savings. The tracking engine continuously tracks acquired satellites and acquires other available or emerging satellites.

Note that even if the acquisition engine is powered off, satellites continue to be acquired.

- ### Power Save Mode

Power Save Mode (PSM) allows a reduction in system power consumption by selectively switching parts of thereceiver on and off.

Power Save mode is not available with NEO-6P, NEO-6T and NEO-6V.

- ## Configuration

- ### Boot-time configuration

NEO-6 modules provide configuration pins for boot-time configuration. These become effective immediately after start-up. Once the module has started, the configuration settings can be modified with UBX configurationmessages. The modified settings remain effective until power-down or reset. If these settings have been stored in battery-backup RAM, then the modified configuration will be retained, as long as the backup battery supply isnot interrupted.

NEO-6 modules include both **CFG_COM0** and **CFG_COM1** pins and can be configured as seen in Table 6. Default settings in bold.

CFG_COM1	CFG_COM0	Protocol	Messages	UARTBaud rate	USB power
1	**1**	**NMEA**	**GSV, RMC, GSA, GGA, GLL, VTG, TXT**	**9600**	**BUS Powered**
1	0	NMEA	GSV, RMC, GSA, GGA, GLL, VTG, TXT	38400	Self Powered
0	1	NMEA	GSV[14], RMC, GSA, GGA, VTG, TXT	4800	BUS Powered
0	0	UBX	NAV-SOL, NAV-STATUS, NAV-SVINFO, NAV-CLOCK,INF, MON-EXCEPT, AID-ALPSERV	57600	BUS Powered

Table 6: Supported COM settings

NEO-6 modules include a **CFG_GPS0** pin, which enables the boot-time configuration of the power mode. These settings are described in Table 7. Default settings in bold.

CFG_GPS0	Power Mode
0	Eco Mode
1	**Maximum Performance Mode**

Table 7: Supported CFG_GPS0 settings

Static activation of the **CFG_COM** and **CFG_GPS** pins is not compatible with use of the SPI interface.

- ## Design-in

In order to obtain the necessary information to conduct a proper design-in, u-blox strongly recommends consulting the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

10. Pin Definition

• Pin assignment

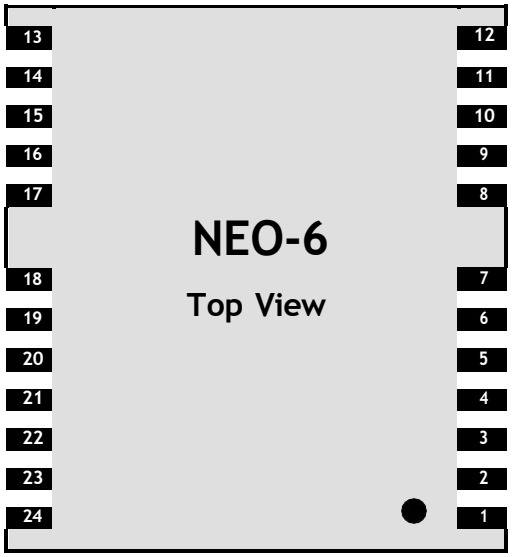


Figure 2 Pin Assignment

No	Module	Name	I/O	Description
1	All	Reserved	I	Reserved
2	All	SS_N	I	SPI Slave Select
3	All	TIMEPULSE	O	Timepulse (1PPS)
4	All	EXTINT0	I	External Interrupt Pin
5	All	USB_DM	I/O	USB Data
6	All	USB_DP	I/O	USB Data
7	All	VDDUSB	I	USB Supply
8	All	Reserved		See Hardware Integration Manual Pin 8 and 9 must be connected together.
9	All	VCC_RF	O	Output Voltage RF section Pin 8 and 9 must be connected together.
10	All	GND	I	Ground
11	All	RF_IN	I	GPS signal input
12	All	GND	I	Ground
13	All	GND	I	Ground
14	All	MOSI/CFG_COM0	O/I	SPI MOSI / Configuration Pin. Leave open if not used.
15	All	MISO/CFG_COM1	I	SPI MISO / Configuration Pin. Leave open if not used.
16	All	CFG_GPS0/SCK	I	Power Mode Configuration Pin / SPI Clock.Leave open if not used.
17	All	Reserved	I	Reserved
18	All	SDA2	I/O	DDC Data
19	All	SCL2	I/O	DDC Clock
20	All	TxD1	O	Serial Port 1
21	All	RxD1	I	Serial Port 1

No	Module	Name	I/O	Description
22	All	V_BCKP	I	Backup voltage supply
23	All	VCC	I	Supply voltage
24	All	GND	I	Ground

Table 8: Pinout

Pins designated Reserved should not be used. For more information about Pinouts see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

11. Electrical specifications

• Absolute maximum ratings

Parameter	Symbol	Module	Min	Max	Units	Condition
Power supply voltage	VCC	NEO-6G	-0.5	2.0	V	
		NEO-6Q, 6M, 6P, 6V, 6T	-0.5	3.6	V	
Backup battery voltage	V_BCKP	All	-0.5	3.6	V	
USB supply voltage	VDDUSB	All	-0.5	3.6	V	
Input pin voltage	Vin	All	-0.5	3.6	V	
	Vin_usb	All	-0.5	VDDUSB	V	
DC current trough any digital I/O pin (except supplies)	Ipin			10	mA	
VCC_RF output current	ICC_RF	All		100	mA	
Input power at RF_IN	Prfin	NEO-6Q, 6M, 6G, 6V, 6T		15	dBm	source impedance = 50 Ω continuous wave
		NEO-6P		-5	dBm	
Storage temperature	Tstg	All	-40	85	°C	

Table 9: Absolute maximum ratings

GPS receivers are Electrostatic Sensitive Devices (ESD) and require special precautions when handling. For more information see chapter 6.4.

Stressing the device beyond the "Absolute Maximum Ratings" may cause permanent damage. These are stress ratings only. The product is not protected against overvoltage or reversed voltages. If necessary, voltage spikes exceeding the power supply voltage specification, given in table above, must be limited to values within the specified boundaries by using appropriate protection diodes. For more information see the *LEA-6/ NEO-6/ MAX-6 Hardware Integration Manual* [1].

- **Operating conditions**

All specifications are at an ambient temperature of 25°C.

Parameter	Symbol	Module	Min	Typ	Max	Units	Condition
Power supply voltage	VCC	NEO-6G	1.75	1.8	1.95	V	
		NEO-6Q/M NEO-6P/V/T	2.7	3.0	3.6	V	
Supply voltage USB	VDDUSB	All	3.0	3.3	3.6	V	
Backup battery voltage	V_BCKP	All	1.4		3.6	V	
Backup battery current	I_BCKP	All		22		µA	V_BCKP = 1.8 V, VCC = 0V
Input pin voltage range	Vin	All	0		VCC	V	
Digital IO Pin Low level input voltage	Vil	All	0		0.2*VCC	V	
Digital IO Pin High level input voltage	Vih	All	0.7*VCC		VCC	V	
Digital IO Pin Low level output voltage	Vol	All			0.4	V	Iol=4mA
Digital IO Pin High level output voltage	Voh	All	VCC -0.4			V	Ioh=4mA
USB_DM, USB_DP	VinU	All	Compatible with USB with 22 Ohms series resistance				
VCC_RF voltage	VCC_RF	All		VCC-0.1		V	
VCC_RF output current	ICC_RF	All			50	mA	
Antenna gain	Gant	All			50	dB	
Receiver Chain Noise Figure	NFtot	All		3.0		dB	
Operating temperature	Topr	All	-40		85	°C	

Table 10: Operating conditions

Operation beyond the specified operating conditions can affect device reliability.

- **Indicative power requirements**

Table 11 lists examples of the total system supply current for a possible application.

Parameter	Symbol	Module	Min	Typ	Max	Units	Condition
Max. supply current [15]	Iccp	All			67	mA	VCC = 3.6 V[16] / 1.95 V[17]
Average supply current[18]	Icc Acquisition	All		47[19]		mA	VCC = 3.0 V[16] / 1.8 V[17]
	Icc Tracking (Max Performance mode)	NEO-6G/Q/T		40[20]		mA	
		NEO-6M/P/V		39[20]		mA	
	Icc Tracking (Eco mode)	NEO-6G/Q/T		38[20]		mA	
		NEO-6M/P/V		37		mA	
	Icc Tracking (Power Save mode / 1 Hz)	NEO-6G/Q		12[20]		mA	
		NEO-6M		11[20]		mA	

Table 11: Indicative power requirements

Values in Table 11 are provided for customer information only as an example of typical power requirements. Values are characterized on samples, actual power requirements can vary depending on FW version used, external circuitry, number of SVs tracked, signal strength, type of start as well as time, duration and conditions of test.

[15] Use this figure to dimension maximum current capability of power supply. Measurement of this parameter with 1 Hz bandwidth.
[16] NEO-6Q, NEO-6M, NEO-6P, NEO-6V, NEO-6T
[17] NEO-6G
[18] Use this figure to determine required battery capacity.
[19] >8 SVs in view, CNo >40 dBHz, current average of 30 sec after cold start.
[20] With strong signals, all orbits available. For Cold Starts typical 12 min after first fix. For Hot Starts typical 15 s after first fix.

- **SPI timing diagrams**

In order to avoid a faulty usage of the SPI, the user needs to comply with certain timing conditions. Thefollowing signals need to be considered for timing constraints:

Symbol	Description
SS_N	Slave Select signal
SCK	Slave Clock signal

Table 12: Symbol description

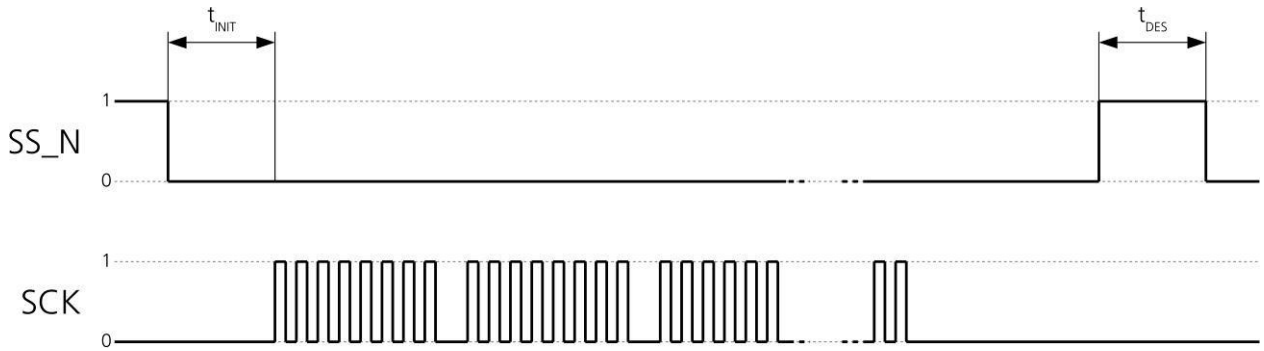


Figure 3: SPI timing diagram

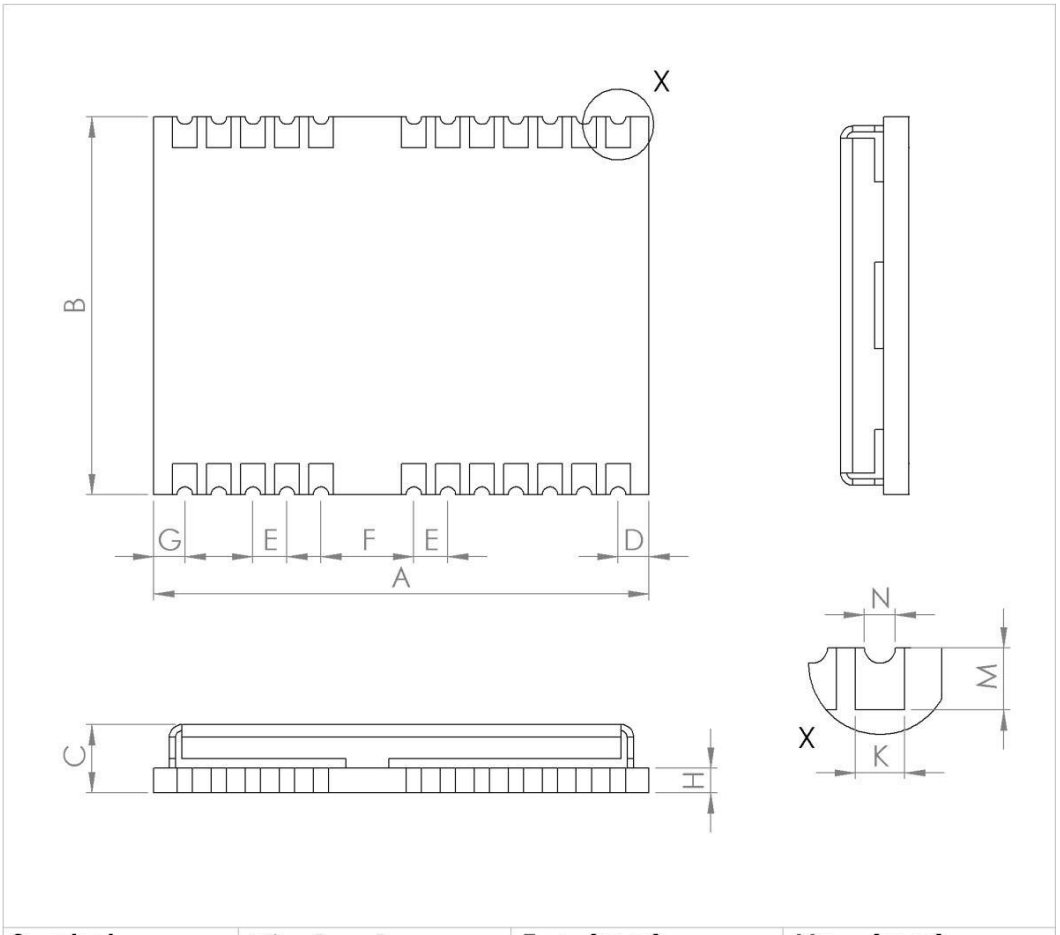
- **Timing recommendations**

Parameter	Description	Recommendation
t_{INIT}	Initialization Time	500 µs
t_{DES}	Deselect Time	1 ms
Bitrate		100 kbit/s

Table 13: SPI timing recommendations

☞ The values in the above table result from the requirement of an error-free transmission. By allowing justa few errors, the byte rate could be increased considerably. These timings - and therefore the byte rate
- could also be improved by disabling other interfaces, e.g. the UART. ☞ The maximum bandwidth is 100 kbit/s[21].

12. Mechanical specifications



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	15.9	16.0	16.6
B	12.1	12.2	12.3
C	2.2	2.4	2.6
D	0.9	1.0	1.3
E	1.0	1.1	1.2
F	2.9	3.0	3.1
G	0.9	1.0	1.3
H		0.82	
K	0.7	0.8	0.9
M	0.8	0.9	1.0
N	0.4	0.5	0.6
Weight		1.6g	

Figure 4: Dimensions

For information regarding the Paste Mask and Footprint see the *LEA-6/NEO-6/MAX-6 HardwareIntegration Manual* [1].

13. Qualification and certification

- **Reliability tests**

☞ All NEO-6 modules are based on AEC-Q100 qualified GPS chips.

Tests for product family qualifications according to ISO 16750 "Road vehicles - Environmental conditions and testing for electrical and electronic equipment", and appropriate standards.

- **Approvals**

Products marked with this lead-free symbol on the product label comply with the "Directive 2002/95/EC of the European Parliament and the Council on the Restriction of Use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).

All u-blox 6 GPS modules are RoHS compliant.

14. Product handling & soldering

• Packaging

NEO-6 modules are delivered as hermetically sealed, reeled tapes in order to enable efficient production, production lot set-up and tear-down. For more information about packaging, see the *u-blox Package Information Guide* [4].

Figure 5: Reeled u-blox 6 modules

• Reels

NEO-6 GPS modules are deliverable in quantities of 250pcs on a reel. NEO-6 modules are delivered using reel Type B as described in the *u-blox Package Information Guide* [4].

Parameter	Specification
Reel Type	B
Delivery Quantity	250

Table 14: Reel information for NEO-6 modules

6.1.1 Tapes

Figure 6 shows the position and orientation of NEO-6 modules as they are delivered on tape. The dimensions ofthe tapes are specified in Figure 7.

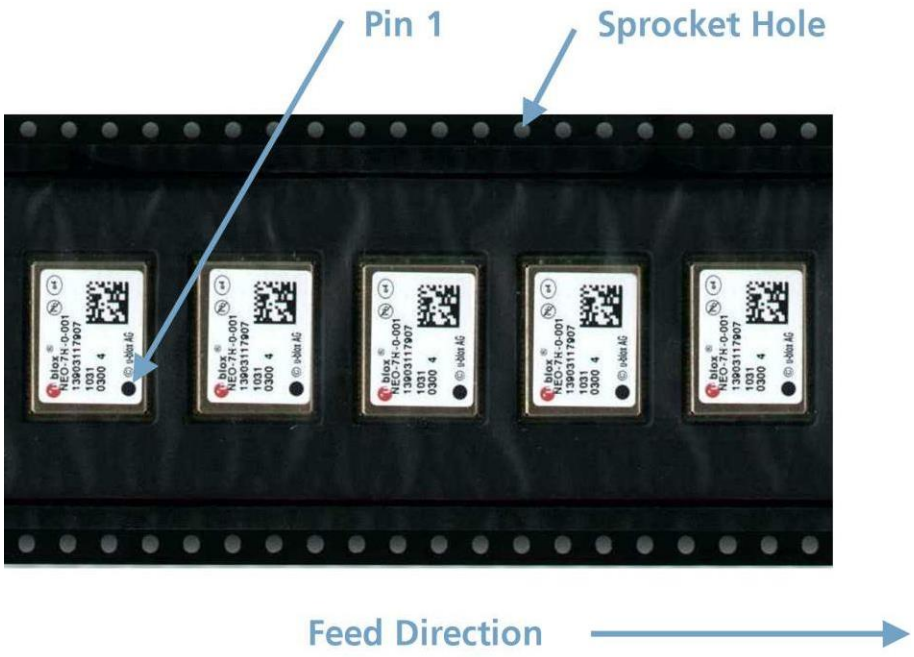


Figure 6: Orientation for NEO-6 modules on tape

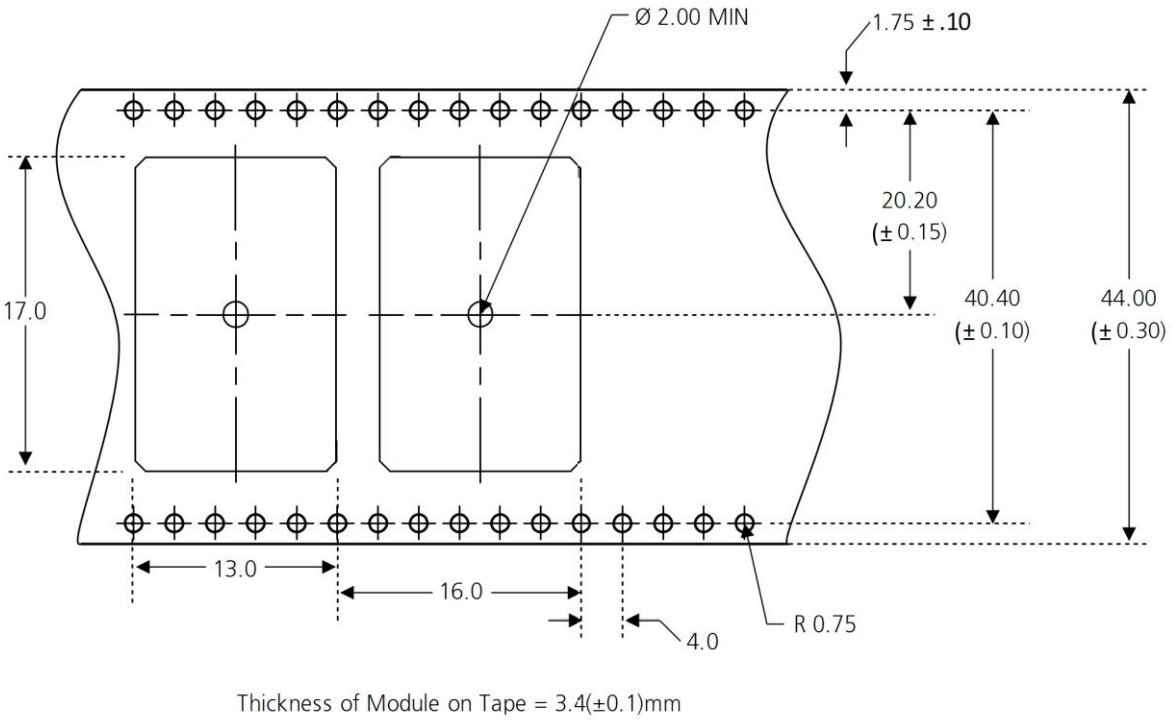


Figure 7: NEO tape dimensions (mm)

- **Moisture Sensitivity Levels**

NEO-6 modules are Moisture Sensitive Devices (MSD) in accordance to the IPC/JEDEC specification.

NEO-6 modules are rated at MSL level 4. For more information regarding moisture sensitivity levels, labeling,storage and drying see the *u-blox Package Information Guide* [4].

For MSL standard see IPC/JEDEC J-STD-020, which can be downloaded from www.jedec.org.

- **Reflow soldering**

Reflow profiles are to be selected according to u-blox recommendations (see *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1]).

- **ESD handling precautions**

NEO-6 modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Observe precautions for handling! Failure to observe these precautions can result in severe damage to the GPS receiver!

GPS receivers are Electrostatic Sensitive Devices (ESD) and require special precautions when handling. Particular care must be exercised when handling patch antennas, due to the risk of electrostatic charges. In addition to standard ESD safety practices, the following measures should be taken into account whenever handling the receiver:

- Unless there is a galvanic coupling between the local GND (i.e. the work table) and the PCB GND, then the first point of contact whenhandling the PCB must always be between the local GND and PCBGND.
- Before mounting an antenna patch, connect ground of the device

- When handling the RF pin, do not come into contact with any charged capacitors and be careful when contacting materials thatcan develop charges (e.g. patch antenna ~10pF, coax cable ~50- 80pF/m, soldering iron, ...)

- To prevent electrostatic discharge through the RF input, do not touch any exposed antenna area. If there is any risk that such exposed antenna area is touched in non ESD protected work area,implement proper ESD protection measures in the design.

- When soldering RF connectors and patch antennas to the receiver's RF pin, make sure to use an ESD safe soldering iron (tip).

15. Default settings

Interface	Settings
Serial Port 1 Output	9600 Baud, 8 bits, no parity bit, 1 stop bit Configured to transmit both NMEA and UBX protocols, but only following NMEA and noUBX messages have been activated at start-up: **GGA, GLL, GSA, GSV, RMC, VTG, TXT** (In addition to the 6 standard NMEA messages the NEO-6T includes **ZDA**).
USB Output	Configured to transmit both NMEA and UBX protocols, but only following NMEA and noUBX messages have been activated at start-up: **GGA, GLL, GSA, GSV, RMC, VTG, TXT** (In addition to the 6 standard NMEA messages the NEO-6T includes **ZDA**).USB Power Mode: Bus-Powered
Serial Port 1 Input	9600 Baud, 8 bits, no parity bit, 1 stop bit Automatically accepts following protocols without need of explicit configuration: **UBX, NMEA** The GPS receiver supports interleaved UBX and NMEA messages.
USB Input	Automatically accepts following protocols without need of explicit configuration: **UBX, NMEA** The GPS receiver supports interleaved UBX and NMEA messages.USB Power Mode: Bus-Powered
TIMEPULSE (1Hz Nav)	1 pulse per second, synchronized at rising edge, pulse length 100ms
Power Mode	Maximum Performance mode
AssistNow Autonomous	Disabled.

Table 15: Default settings

Refer to the *u-blox 6 Receiver Description including Protocol Specification* [2] for information about further settings.

16. Labeling and ordering information

• Product labeling

The labeling of u-blox 6 GPS modules includes important product information. The location of the product typenumber is shown in Figure 8.

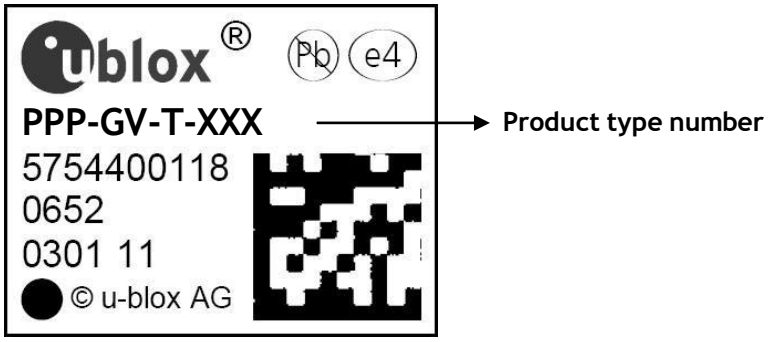


Figure 8: Location of product type number on u-blox 6 module label

• Explanation of codes

3 different product code formats are used. The **Product Name** is used in documentation such as this data sheet and identifies all u-blox 6 products, independent of packaging and quality grade. The **Ordering Code** includesoptions and quality, while the **Type Number** includes the hardware and firmware versions. Table 16 below details these 3 different formats:

Format	Structure
Product Name	PPP-GV
Ordering Code	PPP-GV-T
Type Number	PPP-GV-T-XXX

Table 16: Product Code Formats

The parts of the product code are explained in Table 17.

Code	Meaning	Example
PPP	Product Family	NEO
G	Product Generation	6 = u-blox6
V	Variant	T = Timing, R = DR, etc.
T	Option / Quality Grade	Describes standardized functional element or quality grade such asFlash size, automotive grade etc.
XXX	Product Detail	Describes product details or options such as hard- and softwarerevision, cable length, etc.

Table 17: part identification code

- **Ordering information**

Ordering No.	Product
NEO-6G-0	u-blox 6 GPS Module, 1.8V, TCXO, 12x16mm, 250 pcs/reel
NEO-6M-0	u-blox 6 GPS Module, 12x16mm, 250 pcs/reel
NEO-6Q-0	u-blox 6 GPS Module, TCXO, 12x16mm, 250 pcs/reel
NEO-6P-0	u-blox 6 GPS Module, PPP, 12x16mm, 250 pcs/reel
NEO-6V-0	u-blox 6 GPS Module, Dead Reckoning SW sensor, 12x16mm, 250 pcs/reel
NEO-6T-0	u-blox 6 GPS Module, Precision Timing, TCXO, 12x16mm, 250 pcs/reel

Table 18: Product Ordering Codes

Product changes affecting form, fit or function are documented by u-blox. For a list of Product ChangeNotifications (PCNs) see our website at: http://www.u-blox.com/en/notifications.html

Related documents

2 LEA-6/NEO-6/MAX-6 Hardware Integration Manual, Docu. GPS.G6-HW-09007

3 u-blox 6 Receiver Description Including Protocol Specification (Public version), Docu. No. GPS.G6-SW-10018

4 u-blox 6 Receiver Description Including Protocol Specification (Confidential version), Docu. No. GPS.G6-SW-10019

5 u-blox Package Information Guide, Docu. No GPS-X-11004

For regular updates to u-blox documentation and to receive product change notifications please registeron our homepage.

Revision history

Revision	Date	Name	Status / Comments
	31/08/2009	tgri	Initial Version
1	21/09/2009	tgri	update of section 1.3 GPS performance, section 1.4 block diagram,section 3.2 peak supply current
A	25/02/2010	tgri	Change of status to Advance Information. Addition of NEO-6G. Update of section 1.8.2, removed reference to Vddio - added USBdriver certification. Update of section 3.2 table 11: average supply current, Added section 3.3-3.4: SPI & DDC timing, section 5.1: addition of table 12.
B	24/06/2010	dhur	Change of status to Preliminary. Update of section 1.2, 1.8.4, 1.10.4,3.1, 3.2 and chapter 2 and 4. General clean-up and consistency check.
B1	11/08/2010	dhur	Replaced graphic in figure 2.
C	18/07/2011	dhur	Added chapter 1.6, update to FW7.03.
D	19/10/2011	dhur	Added NEO-6P and NEO-6V. Added chapter 1.7 and 1.8. Revised Chapter 6.
E	05/12/2011	dhur	Added NEO-6T. Added chapter 1.7 and 1.8. Added Accuracy for Timepulse signal in Table 2. Corrected Maximum Input power at RF_IN for NEO-6P in Table 9.

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4. Introduction

This document describes SIM800L hardware interface in great detail.
This document can help user to quickly understand SIM800L interface specifications, electrical and mechanical details. With the help of this document and other SIM800L application notes, user guide, users can use SIM800Lto design various applications quickly.

5. SIM800L Overview

SIM800L is a quad-band GSM/GPRS module, that works on frequencies GSM850MHz, EGSM900MHz, DCS1800MHz and PCS1900MHz. SIM800L features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.
With a tiny configuration of 15.8*17.8*2.4mm, SIM800L can meet almost all the space requirements in userapplications, such as smart phone, PDA and other mobile devices.

SIM800L has 88pin pads of LGA packaging, and provides all hardware interfaces between the module andcustomers' boards.

5.3 Support 5*5*2 keypads
5.4 One full modem serial port, user can configure two serial ports
5.5 One USB, the USB interfaces can debug, download software
5.6 Audio channel which includes two microphone input; a receiver output and a speaker output
5.7 Programmable general purpose input and output.
5.8 A SIM card interface
5.9 Support FM
5.10 Support one PWM

SIM800L is designed with power saving technique so that the current consumption is as low as 0.7mA in sleepmode.

1.7 SIM800L Key Features

Table 1: SIM800L key features

Feature	Implementation
Power supply	3.4V ~4.4V
Power saving	typical power consumption in sleep mode is 0.7mA (AT+CFUN=0)
Frequency bands	3 Quad-band: GSM 850, EGSM 900, DCS 1800, PCS 1900. SIM800L can search the 4 frequency bands automatically. The frequency bands can also be set by AT command "AT+CBAND". For details, please refer to document [1]. 4 Compliant to GSM Phase 2/2+
Transmitting power	6. Class 4 (2W) at GSM 850 and EGSM 900 7. Class 1 (1W) at DCS 1800 and PCS 1900
GPRS connectivity	5. GPRS multi-slot class 12（default） 6. GPRS multi-slot class 1~12 (option)
Temperature range	*4.* Normal operation: -40°C ~ +85°C

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	c. Storage temperature -45°C ~ +90°C
Data GPRS	4 GPRS data downlink transfer: max. 85.6 kbps 5 GPRS data uplink transfer: max. 85.6 kbps 6 Coding scheme: CS-1, CS-2, CS-3 and CS-4 7 PAP protocol for PPP connect 8 Integrate the TCP/IP protocol. 9 Support Packet Broadcast Control Channel (PBCCH) 10 CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps
CSD	**2.** Support CSD transmission
USSD	**2.** Unstructured Supplementary Services Data (USSD) support
SMS	5 MT, MO, CB, Text and PDU mode 6 SMS storage: SIM card
SIM interface	Support SIM card: 1.8V, 3V
External antenna	Antenna pad
Audio features	Speech codec modes: f. Half Rate (ETS 06.20) g. Full Rate (ETS 06.10) h. Enhanced Full Rate (ETS 06.50 / 06.60 / 06.80) i. Adaptive multi rate (AMR) j. Echo Cancellation k. Noise Suppression
Serial port and debug port	**Serial port:** 5 Full modem interface with status and control lines, unbalanced, asynchronous. 6 1200bps to 115200bps. 7 Can be used for AT commands or data stream. 8 Support RTS/CTS hardware handshake and software ON/OFF flow control. 9 Multiplex ability according to GSM 07.10 Multiplexer Protocol. 10 Autobauding supports baud rate from 1200 bps to 57600bps. 11 upgrading firmware **Debug port:** 12 USB_DM and USB_DP 13 Can be used for debugging and upgrading firmware.
Phonebook management	Support phonebook types: SM, FD, LD, RC, ON, MC.
SIM application toolkit	GSM 11.14 Release 99
Real time clock	Support RTC
Timing functions	Use AT command set
Physical characteristics	Size:15.8*17.8*2.4mm Weight:1.35g
Firmware upgrade	Main serial port or USB port.

Table 2: Coding schemes and maximum net data rates over air interface

Coding scheme	1 timeslot	2 timeslot	4 timeslot
CS-1	9.05kbps	18.1kbps	36.2kbps
CS-2	13.4kbps	26.8kbps	53.6kbps
CS-3	15.6kbps	31.2kbps	62.4kbps
CS-4	21.4kbps	42.8kbps	85.6kbps

1.8 Operating Mode

The table below summarizes the various operating modes of SIM800L.

Table 3: Overview of operating modes

Mode	Function	
Normal operation	GSM/GPRS SLEEP	Module will automatically go into sleep mode if the conditions of sleep mode are enabling and there is no on air and no hardware interrupt (such as GPIO interrupt or data on serial port). In this case, the current consumption of module will reduce to the minimal level. In sleep mode, the module can still receive paging message and SMS.
	GSM IDLE	Software is active. Module is registered to the GSM network, and the module is ready to communicate.
	GSM TALK	Connection between two subscribers is in progress. In this case, the power consumption depends on network settings such as DTX off/on, FR/EFR/HR, hopping sequences, antenna.
	GPRS STANDBY	Module is ready for GPRS data transfer, but no data is currently sent or received. In this case, power consumption depends on network settings and GPRS configuration.
	GPRS DATA	There is GPRS data transfer (PPP or TCP or UDP) in progress. In this case, power consumption is related with network settings (e.g. power control level); uplink/downlink data rates and GPRS configuration (e.g. used multi-slot settings).
Power down	Normal power down by sending AT command “AT+CPOWD=1” or using the PWRKEY. The power management unit shuts down the power supply for the baseband part of the module, and only the power supply for the RTC is remained. Software is not active. The serial port is not accessible. Power supply (connected to VBAT) remains applied.	
Minimum functionality mode	AT command “AT+CFUN” can be used to set the module to a minimum functionality mode without removing the power supply. In this mode, the RF part of the module will not work or the SIM card will not be accessible, or both RF part and SIM card will be closed, and the serial port is still accessible. The power consumption in this mode is lower than normal mode.	

1.9 Functional Diagram

The following figure shows a functional diagram of SIM800L:

1) GSM baseband
2) GSM RF
3) Antenna interface
4) Other interface

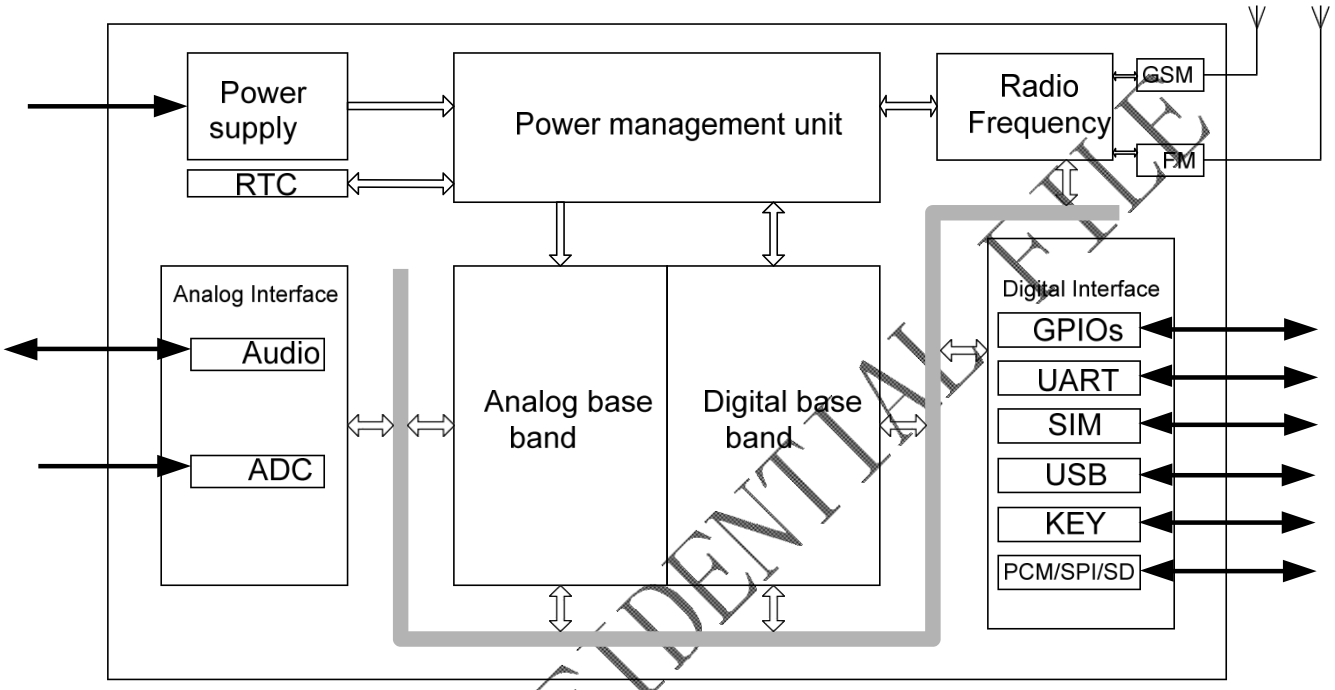

Figure 1: SIM800L functional diagram

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6 Package Information

4.5 Pin out Diagram

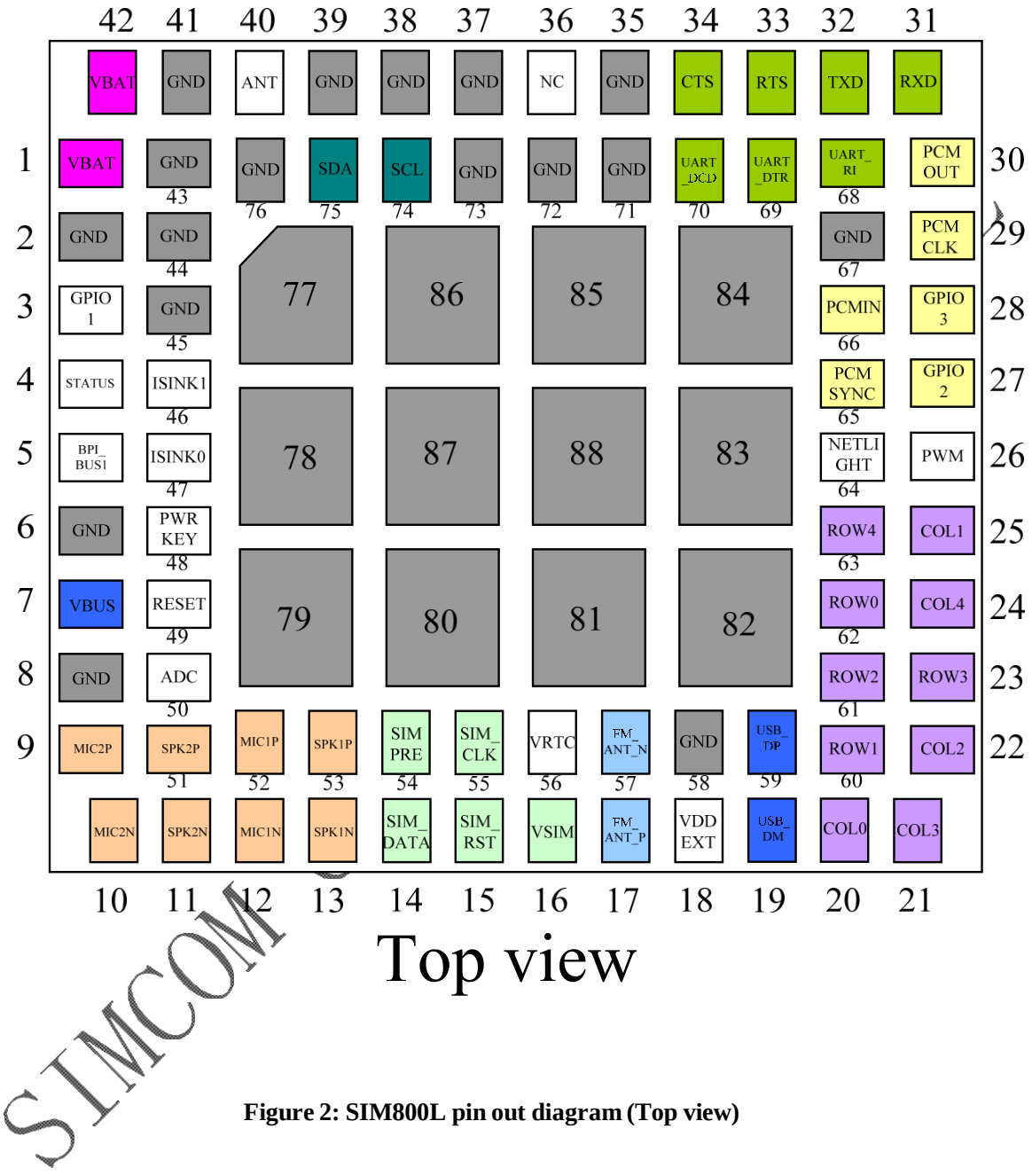

Figure 2: SIM800L pin out diagram (Top view)

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Datasheet Arduino Nano

The **Arduino Nano** is a compact board similar to the UNO.The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

Microcontroller	ATmega328
Architecture	AVR
Operating Voltage	5 V
Flash Memory	32 KB of which 2 KB used by bootloader
SRAM	2 KB
Clock Speed	16 MHz
Analog I/O Pins	8
EEPROM	1 KB
DC Current per I/O Pins	40 mA (I/O Pins)
Input Voltage	7-12 V
Digital I/O Pins	22
PWM Output	6
Power Consumption	19 mA
PCB Size	18 x 45 mm
Weight	7 g
Product Code	A000005

Power

The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

Memory

The ATmega328 has 32 KB, (also with 2 KB used for the bootloader. The ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

Input and Output

Each of the 14 digital pins on the Nano can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

7 Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip.

8 External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

9 PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

10 SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

11 LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Nano has 8 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the analogReference() function. Analog pins 6 and 7 cannot be used as digital pins. Additionally, some pins have specialized functionality:

12 I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library(documentation on the Wiring website).

There are a couple of other pins on the board:

13 AREF. Reference voltage for the analog inputs. Used with analogReference().

14 Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication

The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of the Nano's digital pins. The ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus. To use the SPI communication, please see ATmega328 datasheet.

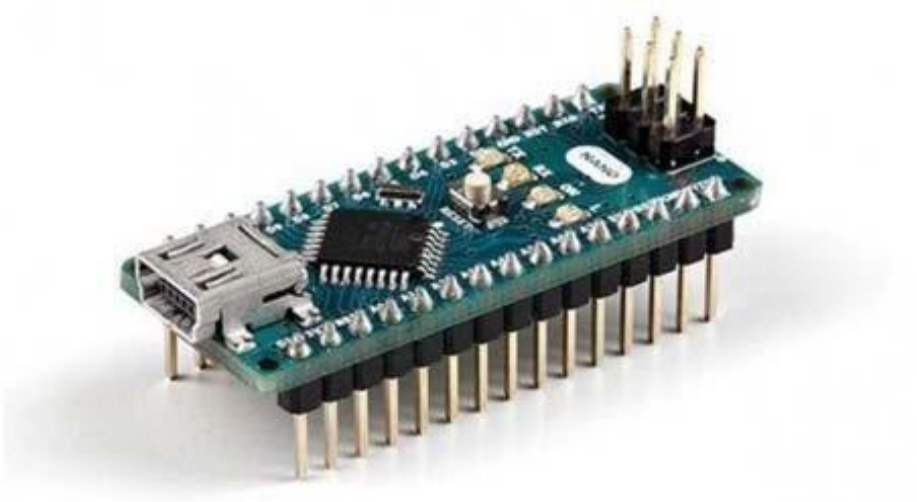
Programming

The Arduino Nano can be programmed with the Arduino software (download). Select "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). The ATmega328 on the Arduino Nano comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar.

Automatic (Software) Reset

Rather then requiring a physical press of the reset button before an upload, the Arduino Nano is designed in a way that allows it to be reset by software running ona connected computer. One of the hardware flow control lines (DTR) of the FT232RL is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Nano is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Nano. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a

connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data



https://store.arduino.cc/usa/arduino-usb-2-serial-micro 12-7-17