

LAMPIRAN A
PROGRAM PADA MIKROKONTROLER ATMEGA16


```
//====NAVIGASI ROBOT=====
```

```
void motor_mundur()
```

```
{  
    PORTB = 0x81;  
    delay_ms(200);  
    PORTB = 0x42;  
    delay_ms(200);  
    PORTB = 0x24;  
    delay_ms(200);  
    PORTB = 0x18;  
    delay_ms(200);  
}
```

```
void motor_maju()
```

```
{  
    PORTB = 0x18;  
    delay_ms(200);  
    PORTB = 0x24;  
    delay_ms(200);  
    PORTB = 0x42;  
    delay_ms(200);  
    PORTB = 0x81;  
    delay_ms(200);  
}
```

```
void motor_belok_kiri()
```

```
{  
    PORTB = 0x88;  
    delay_ms(200);  
    PORTB = 0x44;  
    delay_ms(200);  
    PORTB = 0x22;  
    delay_ms(200);  
    PORTB = 0x11;
```

```

        delay_ms(200);
    }
void motor_belok_kanan()
    {
        PORTB = 0x11;
        delay_ms(200);
        PORTB = 0x22;
        delay_ms(200);
        PORTB = 0x44;
        delay_ms(200);
        PORTB = 0x88;
        delay_ms(200);
    }

```

//====FORK=====

```

void motor_DC_Naik()
{PORTA = 0x01;}
void motor_DC_Turun()
{PORTA = 0x02;}

```

//====INISIALISASI=====

```

void main(void)
{
// Declare your local variables here
// Input/Output Ports initialization
// Port A initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In Func0=In
// State7=T State6=T State5=T State4=T State3=T State2=T State1=T State0=T
PORTA=0x00;
DDRA=0xFF;
// Port B initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In Func0=In

```

```

// State7=T State6=T State5=T State4=T State3=T State2=T State1=P State0=P
PORTB=0x00;
DDRB=0xFF;
// Port C initialization
// Func7=Out Func6=Out Func5=Out Func4=Out Func3=Out Func2=Out Func1=Out
Func0=Out
// State7=1 State6=1 State5=1 State4=1 State3=1 State2=1 State1=1 State0=1
PORTC=0x00;
DDRC=0x00;
// Port D initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In Func0=In
// State7=T State6=T State5=T State4=T State3=T State2=T State1=T State0=T
PORTD=0x00;
DDRD=0x48;
// Timer/Counter 0 initialization
// Clock source: System Clock
// Clock value: Timer 0 Stopped
// Mode: Normal top=FFh
// OC0 output: Disconnected
TCCR0=0x00;
TCNT0=0x00;
OCR0=0x00;
// Timer/Counter 1 initialization
// Clock source: System Clock
// Clock value: Timer 1 Stopped
// Mode: Normal top=FFFFh
// OC1A output: Discon.
// OC1B output: Discon.
// Noise Canceler: Off
// Input Capture on Falling Edge
// Timer 1 Overflow Interrupt: Off
// Input Capture Interrupt: Off

```

```

// Compare A Match Interrupt: Off
// Compare B Match Interrupt: Off
TCCR1A=0x00;
TCCR1B=0x00;
TCNT1H=0x00;
TCNT1L=0x00;
ICR1H=0x00;
ICR1L=0x00;
OCR1AH=0x00;
OCR1AL=0x00;
OCR1BH=0x00;
OCR1BL=0x00;
// Timer/Counter 2 initialization
// Clock source: System Clock
// Clock value: Timer 2 Stopped
// Mode: Normal top=FFh
// OC2 output: Disconnected
ASSR=0x00;
TCCR2=0x00;
TCNT2=0x00;
OCR2=0x00;
// External Interrupt(s) initialization
// INT0: Off
// INT1: Off
// INT2: Off
MCUCR=0x00;
MCUCSR=0x00;
// Timer(s)/Counter(s) Interrupt(s) initialization
TIMSK=0x00;
// Analog Comparator initialization
// Analog Comparator: Off
// Analog Comparator Input Capture by Timer/Counter 1: Off

```

```

ACSR=0x80;
SFIO=0x00;
PORTD.4=1; //kecepatan motor DC maksimal

//=====DETEKSI HEADER=====
while (1)
{
while (PIND.2==1) {};
while (PIND.2==0)
{
delay_us(100);
count++;
};
start=count;
count=0;
if (start>=24 && start<=27) //jika header kurang dari 24
//atau lebih dari 27 deteksi ulang

//=====DETEKSI 8 DATA=====
{
while (PIND.2==1) {};
while (PIND.2==0)
{
delay_us(100);
count++;
};
deteksi1=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
delay_us(100);

```

```
    count++;
};
deteksi2=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
    count++;
};
deteksi3=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
    count++;
};
deteksi4=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
    count++;
};
deteksi5=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
```

```

    count++;
};
deteksi6=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
    count++;
};
deteksi7=count;
count=0;
while (PIND.2==1) {};
while (PIND.2==0)
{
    delay_us(100);
    count++;
};
deteksi8=count;
count=0;

```

//=====KONVERSI 8 DATA=====

```

data1=((deteksi1/5)-1)*1;//data hasil deteksi pulsa dibagi 5 dikurangi 1
data2=((deteksi2/5)-1)*2;//jadi jika datanya 6 maka outputnya akan = 0
data3=((deteksi3/5)-1)*4;//sedangkan jika datanya 12 maka outputnya akan = 1
data4=((deteksi4/5)-1)*8;//lalu hasil tersebut dikalikan dengan nilai2 bit
data5=((deteksi5/5)-1)*16;
data6=((deteksi6/5)-1)*32;
data7=((deteksi7/5)-1)*64;
data8=((deteksi8/5)-1)*128;

```

```

//=====PENJUMLAHAN 8 DATA=====
    index=data8+data7+data6+data5+data4+data3+data2+data1;

//=====OUTPUT=====
if (index == 0x81)
    {motor_maju();}
else if (index == 0x87)
    {motor_mundur();}
else if (index == 0x85)
    {motor_belok_kanan();}
else if (index == 0x83)
    {motor_belok_kiri();}
else if (index == 0xf4)
    {motor_DC_Naik();}
    else if (index == 0xf5)
        {motor_DC_Turun();}
    else
        {PORTA.0=0;PORTA.1=0;PORTB=0;}
}
};
}

```

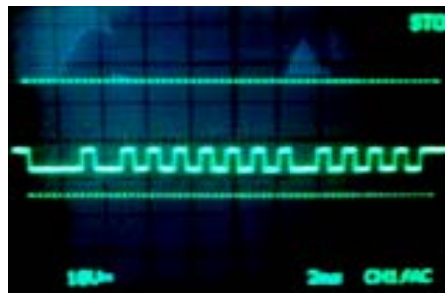
LAMPIRAN B
FOTO SINYAL DI RECEIVER

1. Sinyal di Receiver Ketika Tombol '1' Ditekan :



Dikodekan ke dalam data dalam bilangan Heksa menjadi 80

2. Sinyal di Receiver Ketika Tombol '2' Ditekan :



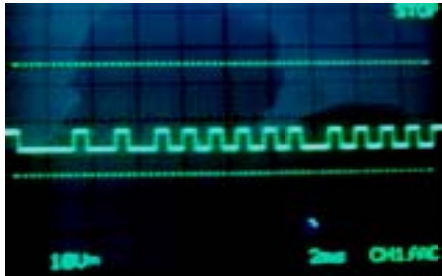
Dikodekan ke dalam data dalam bilangan Heksa menjadi 81

3. Sinyal di Receiver Ketika Tombol '3' Ditekan :



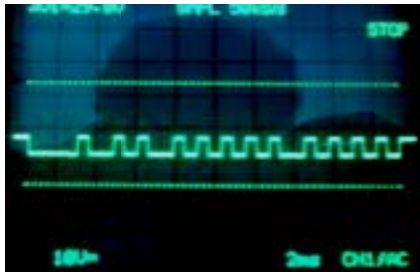
Dikodekan ke dalam data dalam bilangan Heksa menjadi 82

4. Sinyal di Receiver Ketika Tombol '4' Ditekan :



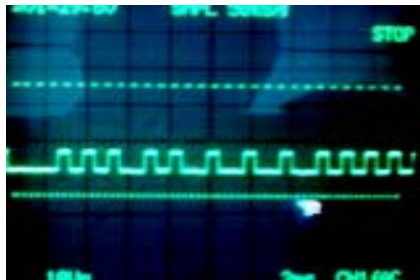
Dikodekan ke dalam data dalam bilangan Heksa menjadi 83

5. Sinyal di Receiver Ketika Tombol '6' Ditekan :



Dikodekan ke dalam data dalam bilangan Heksa menjadi 85

6. Sinyal di Receiver Ketika Tombol '+' Ditekan :



Dikodekan ke dalam data dalam bilangan Heksa menjadi F4

7. Sinyal di Receiver Ketika Tombol ‘-‘ Ditekan :



Dikodekan ke dalam data dalam bilangan Heksa menjadi F5

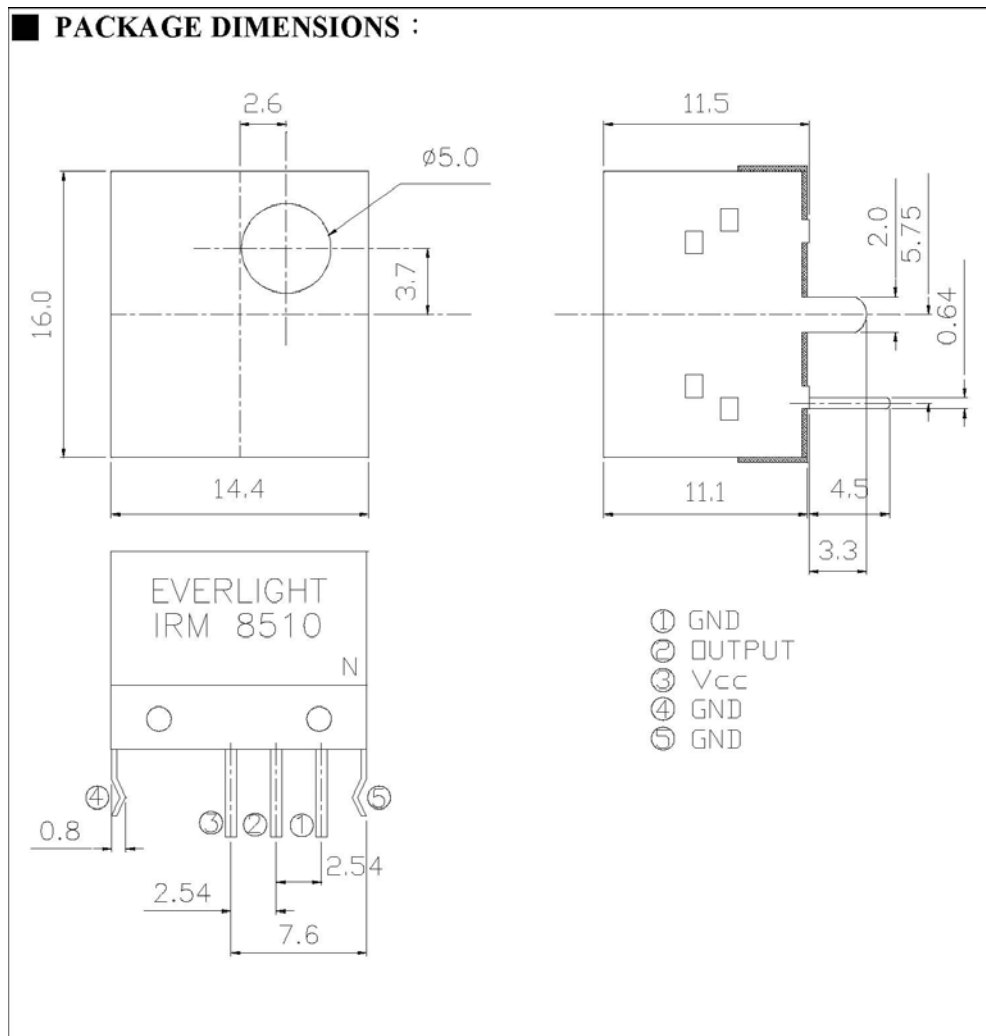
LAMPIRAN C
DATA SHEET IR – 8510



EVERLIGHT ELECTRONICS CO., LTD.

Device Number: DMO-851-005 REV: 1.1 MODEL NO: IRM-8510/N ECN:

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OFFICE: NO 25, Lane 76, Chung Yang Rd, Sec.3 Tucheng, Taipei 236, Taiwan,
R.O.C. TEL : 886-2-2267-2000, 2266-9936 (22 Lines) FAX : 886-2-2267-
6189 <http://www.everlight.com>

■ **NOTES :**

This drawing measure is a standard value. All dimensions are in millimeter.

In case of designation is tolerance $\pm 0.3\text{mm}$.

Lead spacing is measured where the lead emerge from the package.

Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.

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■ **Description :**

The module is a small type infrared remote control system receiver which has beendeveloped and designed by utilizing the latest hybrid technology.

This single unit type module incorporates a photo diode and a receiving preamplifier IC.

The demodulated output signal can directly be decoded by a microprocessor.

■ **Feature :**

High protection ability to EMI and metal case can be customized.

Mold type and metal case type to meet the design of front panel.

Elliptic lens to improve the characteristic against

Line-up for various center carrier frequencies.

Low voltage and low power consumption.

High immunity against ambient light.

Photodiode with integrated circuit.

TTL and CMOS compatibility.

Long reception distance.

High sensitivity.

■ **Application :**

Optical switch

2. Light detecting portion of remote control

- AV instruments such as Audio, TV, VCR, CD, MD, etc.
- Home appliances such as Air-conditioner, Fan , etc.
- The other equipments with wireless remote control.
- CATV set top boxes
- Multi-media Equipment

- ■ **Absolute maximum ratings** : (Ta=25□)
- ■ **Electro Optical Characteristics** : (Ta=25□)

Parameter	Symbol	Ratings	Unit	Notice
Supply Voltage	Vcc	4.3~5.7	V	
Operating Temperature	Topr	-10 ~+60	°C	
Storage Temperature	Tstg	-20 ~+70	°C	
Soldering Temperature	Tsol	260	°C	4mm from mold body less than 5 seconds

Parameter	Symbol	MIN	TYP	MAX	Unit	Condition
Supply Voltage	Vcc	4.7	5	5.3	V	DC voltage
Supply Current	Icc	-	-	3	mA	No signal input
B.P.F Center Frequency	fo	-	37.9	-	KHz	
Peak Wavelength	λ_p	-	940	-	nm	
Transmission Distance	L0	5	-	-	m	At the ray axis *1
	L45	2.5	-			
Half Angle	θ	-	45	-	deg	
High Level Pulse Width	TH	400	-	800	μ s	At the ray axis *2
Low Level Pulse Width	TL	400	-	800	μ s	
High Level Output Voltage	VH	4.5	-	-	V	
Low Level Output Voltage	VL			0.5	V	

*1: The ray receiving surface at a vertex and relation to the ray axis in the range of $\varphi=0^\circ$ and $\varphi=45^\circ$.

*2: A range from 30cm to the arrival distance. Average value of 50 pulses.

■ TEST METHOD : The specified electro-optical characteristics is satisfied under the following Conditions at the controllable distance.

- Measurement place A place that is nothing of extreme light reflected in the room.
- External light Project the light of ordinary white fluorescent lamps which are not high frequency lamps and must be less than 10 Lux at the module surface. ($E_e \leq 10 \text{ Lux}$)
- Standard transmitter A transmitter whose output is so adjusted as to $V_o = 400 \text{ mV}_p$ and the output Wave form shown in Fig.-1. According to the measurement method shown in Fig.-2 the standard transmitter is specified. However, the infrared photodiode to be used for the transmitter should be $\lambda_p = 940 \text{ nm}$, $\Delta\lambda = 50 \text{ nm}$. Also, photo diode is used of PD438B ($V_R = 5 \text{ V}$). (Standard light / Light source temperature 2856°K).
- Measuring system According to the measuring system shown in Fig.-3

■ Module schematic & circuit :

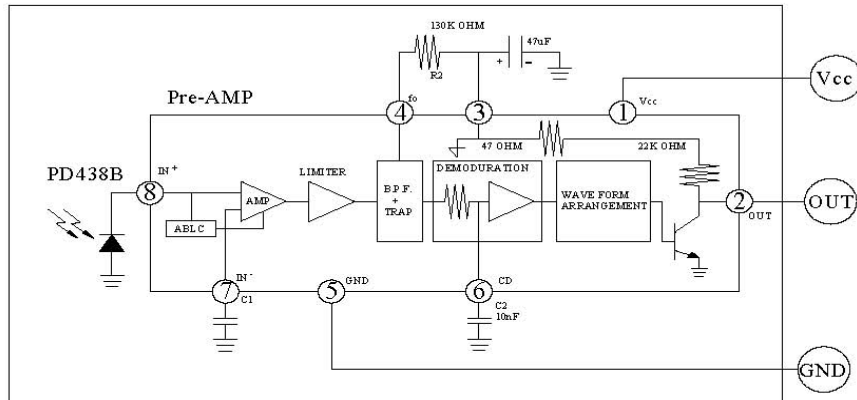


Fig.-1 Transmitter Wave Form

D.U.T Output Pulse

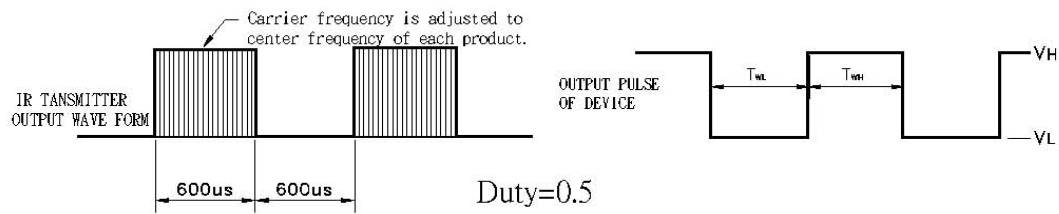
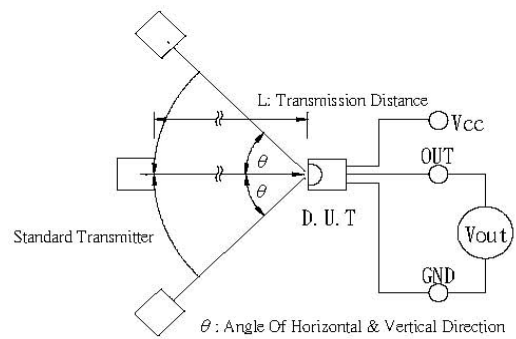
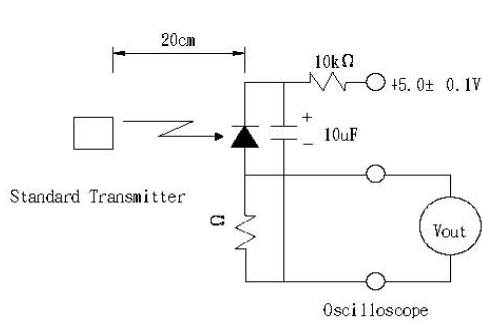


Fig.-2 Measuring Method

Fig.-3 Measuring System



■ TYPICAL ELECTRICAL/OPTICAL/CHARACTERISTICS CURVES

Fig.-4 Relative Spectral Sensitivity vs. Wavelength

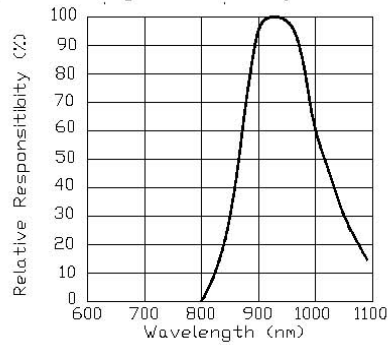


Fig.-5 Relative Transmission Distance vs. Direction

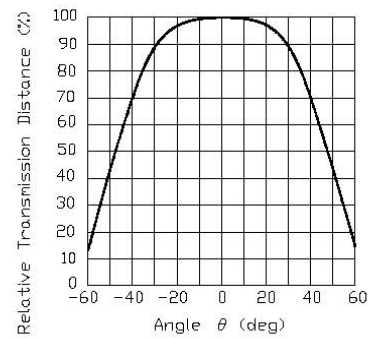


Fig.-6 Output Pulse Length vs. Arrival Distance

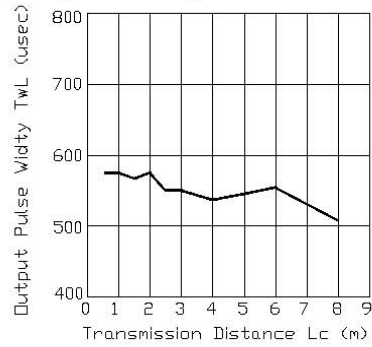


Fig.-7 Arrival Distance vs. Supply Voltage

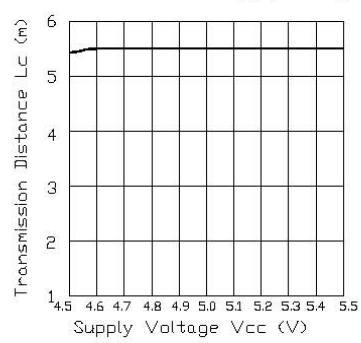


Fig.-8 Relative Transmission Distance vs. Center Carrier Frequency

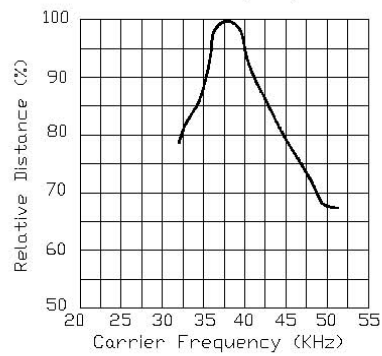


Fig.-9 Arrival Distance vs. Ambient Temperature

