

CONTACT IMAGE SENSOR

H8R108-6258

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1. Description

This specification is applied to H8R108-6258 Contact Image Sensor module (CIS).

2. Scope

This H8R108-6258 is a CIS consists of a Rod Lens Array, a LED light source and an array of linear MOS image sensor.

3. Outline

| Item | Specification | Note |
|-------------------------------------|--|----------------------------------|
| Scanning width | 108 mm | |
| Sensor element density | 8dot/mm | |
| Effective number of sensor elements | 864 elements | |
| Scanning speed | 0.5 msec/line | |
| Clock speed | 1.75 MHz | |
| Rod lens array | Single row | |
| Light source | Red: $\lambda_p = 630\text{nm} \pm 30\text{nm}$ Green: $\lambda_p = 520\text{nm} \pm 15\text{nm}$ | LED At least two LED vendors. |
| Power supply | +5V x 40 mA | |
| Data output | 1 analog output | Synchronous |
| Block diagram | Figure 4 | |
| Dimensions | Figure 1 | |

4. Image Data Output Characteristics (Ta = 25°C)

The shipment test of SHEC is done on the condition of this table.

| Item | Symbol | Specification | | | Note |
|-------------------------|--------|--------------------|--------------|--------------|-----------------|
| | | Red x 2 | Red | Green | |
| DC supply voltage | VDD | +5.0V | | | Detector, Logic |
| LED supply voltage | VLED | <3.0V | <3.0V | <5.0V | LED |
| LED supply current | ILED | 60mA x 2 | 60mA | 60mA | |
| White image target | | 0.05 ~ 0.09 OD | | | |
| Timing diagram | | Figure 5, Figure 7 | | | |
| Dark output minimum | Vdmin | 150±100mV | | | 4.1 |
| White output maximum | Vpmax | 600 ±100mV | 370 ±50mV | 230 ±50mV | 4.2 |
| Dark output | Ud | Less than Vpmax/4 | | | 4.3 |
| White output uniformity | UEp | Less than 50% | | | 4.4 |
| MTF | | 15% MIN | | 30% MIN | 4.5 71.37 lppi |
| Linearity Uniformity | LU | Less than 6% | | | 4.6 |

The output level of image signal like white and dark and MTF is defined at the point of “ts1” which described in section 6.

A test target is set on the reading position described Figure 1..

4.1 Vdmin

As shown in Figure 2, Vdmin is the minimum in the dark output signal (turning off the LED).

Every other parameters are defined by Vdmin as a reference.

4.2 Vpmax

As shown in Figure 2, Vpmax is the maximum white output signal and is defined by:

$$Vpmax = MAX[Vp(n)]$$

Vp(n) is the output signal of the n-th pixel using a white image target.

4.3 Ud

As shown in Figure 2, Ud is the output signal in the dark (turning off the LED) and is defined by;

$$Ud = Vdmax - Vdmin$$

Vdmax is the maximum output signal of the n-th pixel in the dark

Vdmin is the minimum output signal of the n-th pixel in the dark

4.4 UEp

UEp is the white output non-uniformity with dark signal subtracted and is defined by:

$$UEp = ((VEpmax - VEpmi) / (VEpmax)) \times 100\%$$

$VEpmax = \text{MAX}[VEp(n)]$; is the maximum effective output signal

$VEpmin = \text{MIN}[VEp(n)]$; is the minimum effective output signal

$VEp(n)$ is the effective output signal of every pixel and is defined by:

$$VEp(n) = Vp(n) - Vd(n)$$

4.5 MTF

MTF is defined by:

$$MTF = \text{MIN}\{ [(Vmax - Vmin) / VEp] \} \times 100\%$$

$Vmax$ is the maximum output signal using the MTF image target

$Vmin$ is the minimum output signal using the MTF image target

VEp is the effective output signal .

4.6 Linearity Uniformity

LUG is measured following procedure and defined;

Step1. Test Target

The white image target is used as a test target. This target must not be moved while this test is being operated.

Step2. LED adjustment

$Tred$, $Tgrn$ should be adjusted according to Figure 6 procedure.

Step3. Dark and White correction

Dark and White correction must be done for every each pixel.

Step4. LED on time set

$Tred$, $Tgrn$ should be changed as following;

$$Tred/2, Tgrn/2$$

Step5. Compute LUG

LUG should be computed for each color as;

$$LUG = \sqrt{Dgave - Dgextm}^{1/2}$$

$Dgave$ is the average of $Vg(n)$. $Vg(n)$ should be got more than 8 times sampling.

Step6. LED on time set

$Tred$, $Tgrn$ should be changed as followed and compute LUG regarding to Step5;

$$Tred/4, Tgrn/4$$

Step7. LED on time set

$Tred$, $Tgrn$ should be changed as followed and compute LUG regarding to Step5;

$$Tred/8, Tgrn/8$$

4.7 Correction of Dark and White uniformity

For the best performance two points correction (dark and white) is strongly recommended.

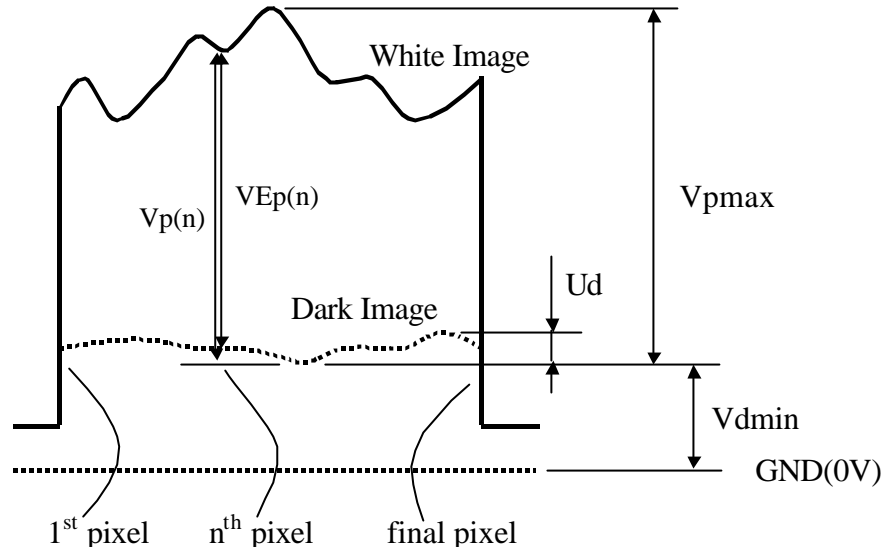


Figure 2. Output Signals Waveform

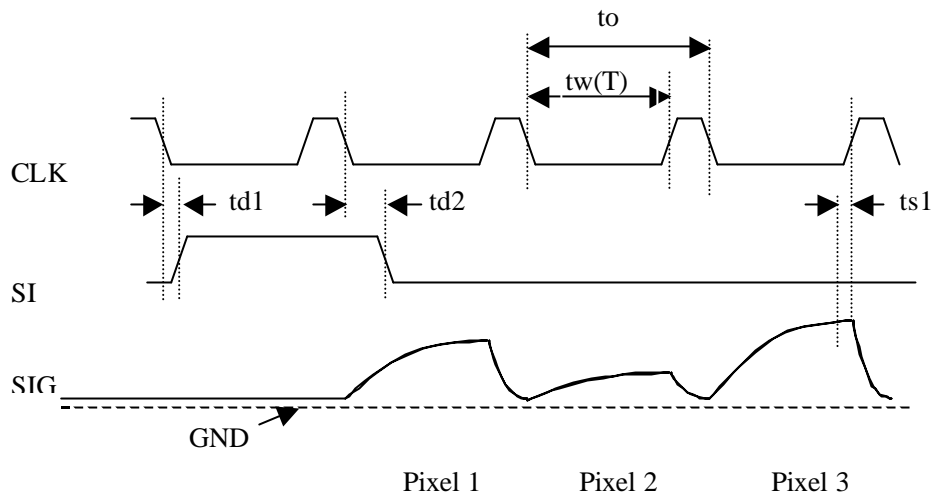
5. Maximum Rating

| Item | Symbol | Specification | Note |
|-------------------------------|--------|--------------------|-------------------------------|
| DC supply voltage | VDD | +5V ± 0.25V | |
| Input voltage | VIN | -0.2 ~ VDD+0.3V | SI, CLK |
| Ambient temperature | Ta | 0 ~ +50 °C | Operating |
| | | -20 ~ +60 °C | Non-operating |
| Ambient humidity | | 10 ~ 90%RH | Avoid a build up condensation |
| Maximum operating Temperature | | 65 °C 30minuts MAX | |

6. Electrical Characteristics (Ta = 25 °C)

| Item | Symbol | Condition | Specification | | | Unit |
|----------------------------|--------|---------------------|---------------|------|-------|------|
| | | | Min. | Typ. | Max. | |
| DC supply Voltage | VDD | GND reference | 4.75 | 5.0 | 5.25 | V |
| DC Supply Current | IDD | VDD = 5V | | 30 | 40 | mA |
| LED forward Voltage | VFred | IF=60mA | 1.7 | 1.8 | 1.9 | V |
| | VFgen | IF=60mA | 3.6 | 4.0 | 4.4 | V |
| Input voltage (Note 1) | VIH | SI,CLK | 3.7 | | | V |
| | VIL | | | | 1.4 | V |
| Input Current (Note 1) | IIH | SI,C LK | | | ± 0.1 | μA |
| | IIL | | | | ± 4 | μA |
| Clock frequency | f | CLK | 1.65 | 1.75 | 1.85 | MHz |
| Clock pulse duty | | tw(T)/to; to=1/f | 73 | 75 | 77 | % |
| SI delay time | td1 | SI-CLK | 30 | 40 | to/2 | ns |
| | td2 | SI-CLK | 30 | 40 | to/2 | ns |
| Data output stability time | ts1 | CLK-SIG | 0 | | 30 | ns |

(Note1) 74HC244 or equivalent is recommended for input signal.



The each pixel's reset time or the blank time should not be used as the reference level.

Figure 3. Timing Diagram

7. Reliability

The following table satisfies the reliability when the CIS is operated continuously under standard operating conditions as specified in section 4.

| Item | Variable Amount (%) | Note |
|-------------------|-------------------------|--------|
| White output (Vp) | Initial level +10% -30% | 1000Hr |
| | Initial level +10% -50% | 5000Hr |

8. Precautions before use:**8.1 Lens surface**

The glass surface should be kept clean. Don't wipe the glass surface with hand. Don't use the CIS module in a dust-polluted environment. If the glass surface gets dirty, wipe the glass surface gently with a clean cloth. The glass surface should be wiped very carefully.

8.2 Extracting / Inserting the connector

The maximum number of times that the connector should be extracted and connected is 10. If the connector is inserted / extracted more than 10 times, the connector 'burrs' will be eroded, thereby making the connector ineffective.

8.3 Stable operation

(1) The connector pins should not be touched by bare hand or electrostatic charge materials.

(2) Noise

- a. Insert a low frequency noise suppressing capacitor(100uF) between VDD(+5V) and GND. A high frequency noise suppressing capacitor is already integrated into the circuit.
- b. Ensure that the sensor connecting cables are 30cm or less in length. The CLK and GND, SIG and GND and VLED and GLED respectively from form twisted cable pairs.

(3) Latch up

When the supply voltage is higher than the absolute maximum, latch up will cause the sensor to break, even if the voltage is caused by a surge. If the current varies rapidly in the external circuit, or when the power is turned on an off very frequently, ensure that the voltage of each terminal does not exceed the values indicated in below.

(4) LED circuit

As shown in Figure.4 LED circuit has not any resistance. Be careful not to connect the LED circuit to power supply directly without current limit resistors.

(5) Absolute maximum ratings

| Item | Symbol | Condition | Specification | | Unit |
|----------------|--------|---------------|---------------|---------|------|
| | | | Min | Max | |
| Supply Voltage | VDD | GND reference | -0.3 | +6.5 | V |
| Input voltage | Vin | SI,CLK | GND-0.3 | VDD+0.3 | V |

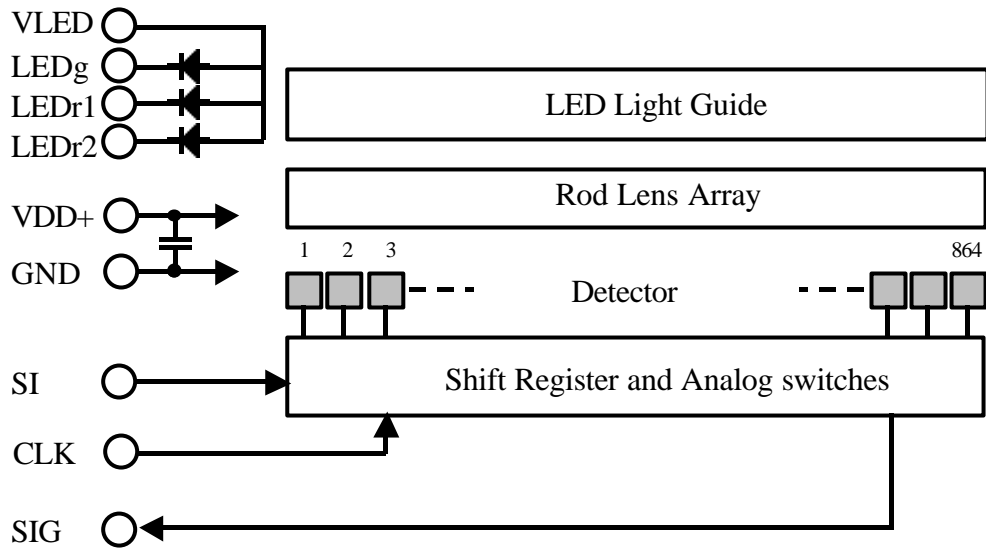
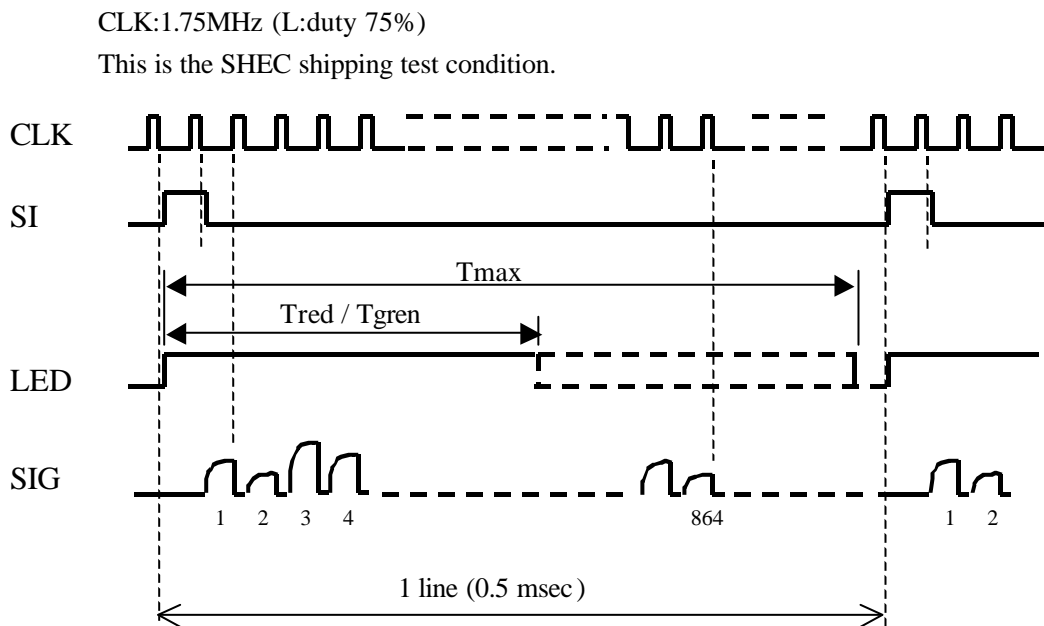


Figure 4. Block Diagram



Refer the adjustment flow chart at Figure 6.

Figure 5. Timing Diagram with single LED
(This is the SHEC shipping test condition.)

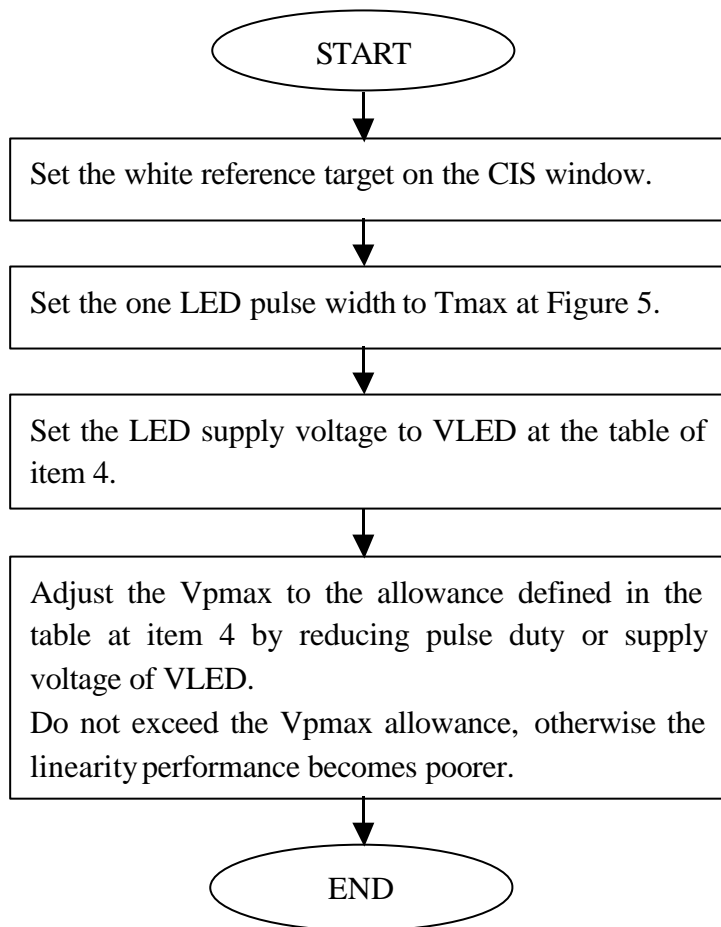


Figure 6. Flow chart for single-LED Adjustment

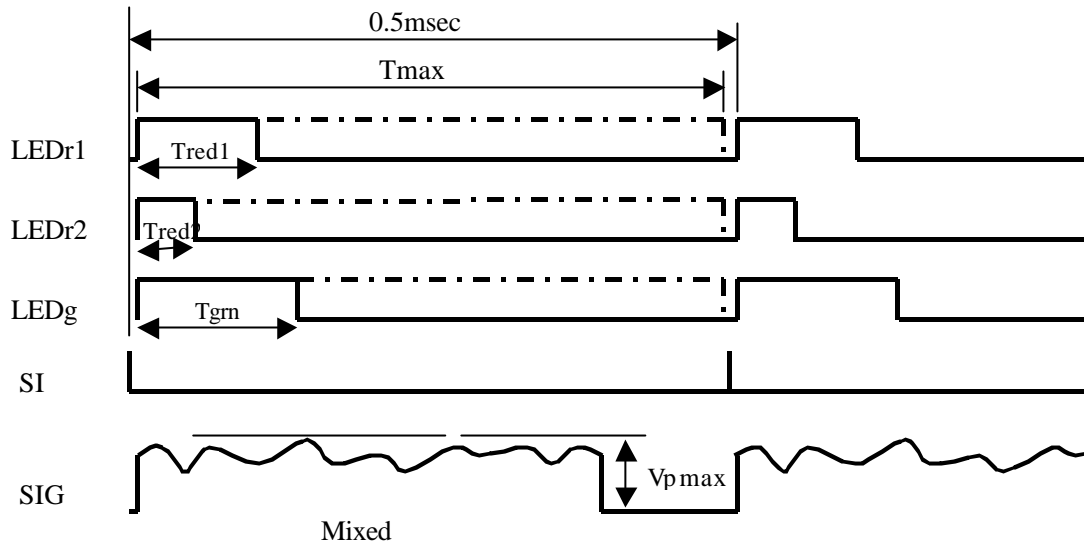


Figure 7. Timing Diagram with multi-LED
(This is the SHEC shipping test condition.)

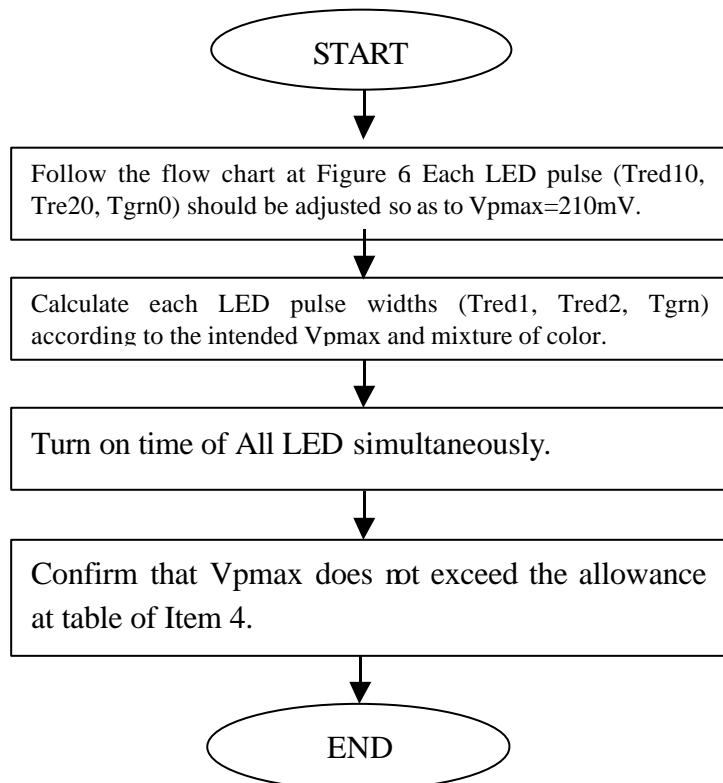


Figure 8. Flow chart for multi-LED Adjustment

Figure 9. Typical Performance Curve
Unless otherwise specified, Ta=25°C

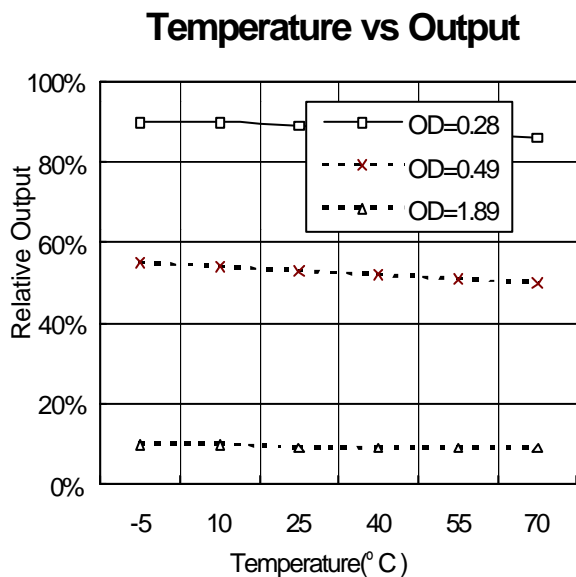
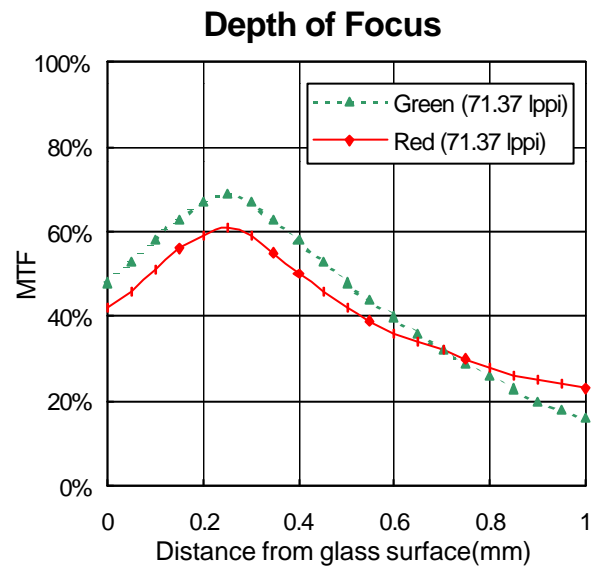
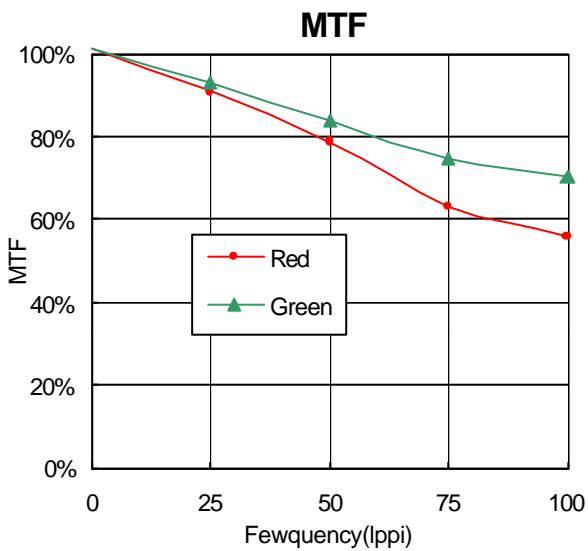
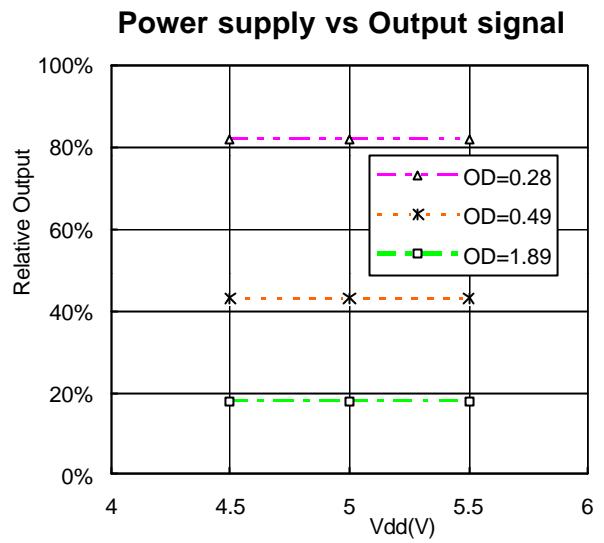
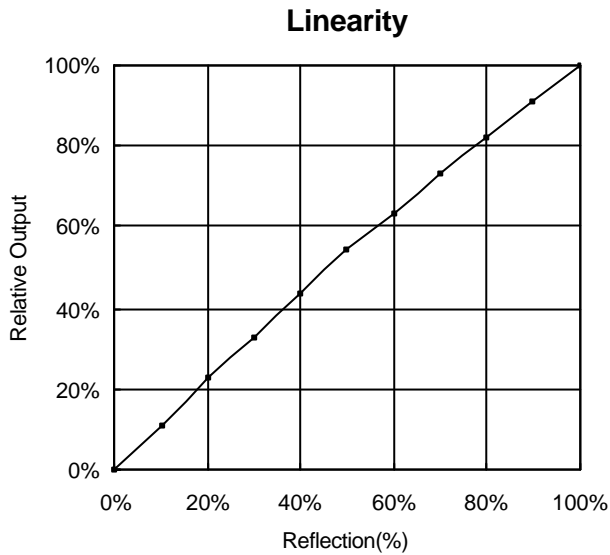


Figure 1 Dimensions

