

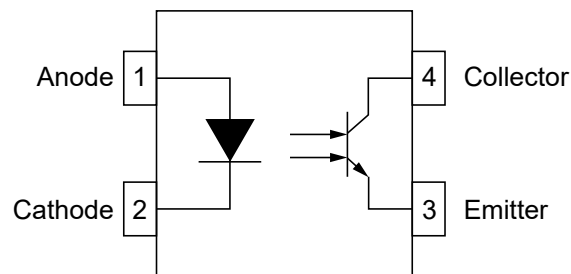
## 1.Description

The UMW PS2501-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

## 2.Features

- High isolation voltage (BV=5000 Vr.m.s.)
- High collector to emitter voltage ( $V_{CE0}=80V$ )
- High-speed switching ( $t_r=3\mu s$  TYP.,  $t_f=5\mu s$  TYP.)
- UL approved: File No.E547318

## 3.Pinning information



**DIP-4/SOP-4**



#### 4. Absolute Maximum Ratings

| Parameter                       |                                    | Symbol                      | Ratings    |             | Unit                 |
|---------------------------------|------------------------------------|-----------------------------|------------|-------------|----------------------|
|                                 |                                    |                             | PS2501-1   | PS2501-2,-4 |                      |
| Diode                           | Reverse Voltage                    | $V_R$                       | 6          |             | V                    |
|                                 | Forward Current (DC)               | $I_F$                       | 80         |             | mA                   |
|                                 | Power Dissipation Derating         | $\Delta P_D/^\circ\text{C}$ | 1.5        | 1.2         | mW/ $^\circ\text{C}$ |
|                                 | Power Dissipation                  | $P_D$                       | 150        | 120         | mW/ch                |
|                                 | Peak Forward Current <sup>*1</sup> | $I_{FP}$                    | 1          |             | A                    |
| Transistor                      | Collector to Emitter Voltage       | $V_{CEO}$                   | 80         |             | V                    |
|                                 | Emitter to Collector Voltage       | $V_{ECO}$                   | 7          |             | V                    |
|                                 | Collector Current                  | $I_C$                       | 50         |             | mA/ch                |
|                                 | Power Dissipation Derating         | $\Delta P_D/^\circ\text{C}$ | 1.5        | 1.2         | mW/ $^\circ\text{C}$ |
|                                 | Power Dissipation                  | $P_C$                       | 150        | 120         | mW/ch                |
| Isolation Voltage <sup>*2</sup> |                                    | BV                          | 5000       |             | Vr.m.s.              |
| Operating Ambient Temperature   |                                    | $T_A$                       | -55 to 100 |             | $^\circ\text{C}$     |
| Storage Temperature             |                                    | $T_{STG}$                   | -55 to 150 |             | $^\circ\text{C}$     |

\*1 PW=100μs, Duty Cycle = 1 %

\*2 AC voltage for 1 minute at  $T_A=25^\circ\text{C}$ , RH = 60 % between input and output



## 5. Electrical Characteristics

| Parameter                               | Symbol        | Conditions                                         | Min       | Typ  | Max | Units         |
|-----------------------------------------|---------------|----------------------------------------------------|-----------|------|-----|---------------|
| <b>Diode</b>                            |               |                                                    |           |      |     |               |
| Forward Voltage                         | $V_F$         | $I_F=10\text{mA}$                                  |           | 1.17 | 1.4 | V             |
| Reverse Current                         | $I_R$         | $V_R=5\text{V}$                                    |           |      | 5   | $\mu\text{A}$ |
| Terminal Capacitance                    | $C_t$         | $V=0, f=1\text{MHz}$                               |           | 50   |     | pF            |
| <b>Transistor</b>                       |               |                                                    |           |      |     |               |
| Collector to Emitter Dark Current       | $I_{CEO}$     | $V_{CE}=80\text{V}, I_F=0\text{mA}$                |           |      | 100 | nA            |
| <b>Coupled</b>                          |               |                                                    |           |      |     |               |
| Current Transfer Ratio ( $I_C/I_F$ ) *1 | CTR           | $I_F=5\text{mA}, V_{CE}=5\text{V}$                 | 80        | 300  | 600 | %             |
| Collector Saturation Voltage            | $V_{CE(sat)}$ | $I_F=10\text{mA}, I_C=2\text{mA}$                  |           |      | 0.3 | V             |
| Isolation Resistance                    | $R_{I-O}$     | $V_{I-O}=1\text{kV}_{DC}$                          | $10^{11}$ |      |     | $\Omega$      |
| Isolation Capacitance                   | $C_{I-O}$     | $V=0\text{V}, f=1\text{MHz}$                       |           | 0.5  |     | pF            |
| Rise Time *2                            | $t_r$         | $V_{CC}=10\text{V}, I_C=2\text{mA}, R_L=100\Omega$ |           | 3    |     | $\mu\text{s}$ |
| Fall Time *2                            | $t_f$         |                                                    |           | 5    |     | $\mu\text{s}$ |

Notes:

\*1 C

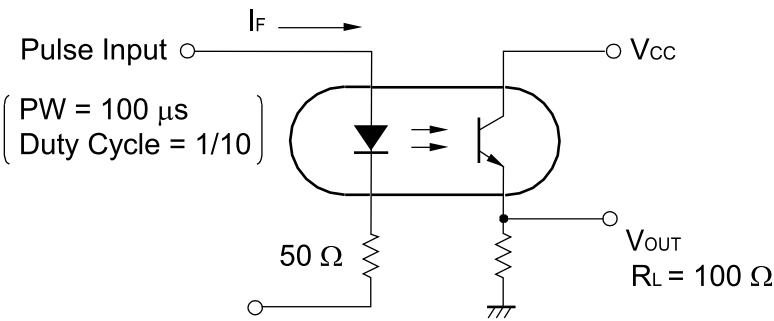
\*2 Test circuit for switching time



6.Current Transfer Ratio

| Type          | Classification<br>(Note 1) | Current Transfer Ratio (%) ( $I_C/I_F$ ) |     | Marking of Classification |
|---------------|----------------------------|------------------------------------------|-----|---------------------------|
|               |                            | $I_F=5mA, V_{CE}=5V, T_a=25^{\circ}C$    |     |                           |
|               |                            | Min                                      | Max |                           |
| UMW<br>PS2501 | None                       | 80                                       | 600 | Blank                     |
|               | Rank Q                     | 100                                      | 200 | Q                         |
|               | Rank W                     | 130                                      | 260 | W                         |
|               | Rank H                     | 80                                       | 160 | H                         |
|               | Rank D                     | 100                                      | 300 | D                         |
|               | Rank M                     | 80                                       | 240 | M                         |
|               | Rank L                     | 200                                      | 400 | L                         |
|               | Rank K                     | 300                                      | 600 | K                         |
|               | Rank                       | -                                        | -   | -                         |

7.Test circuit





## 8.1 Typical characteristic

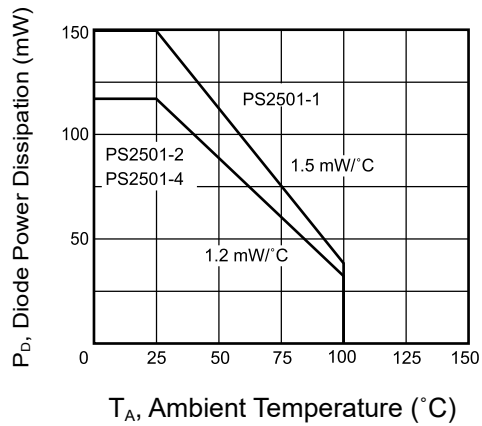


Figure 1: Diode Power Dissipation vs. Ambient Temperature

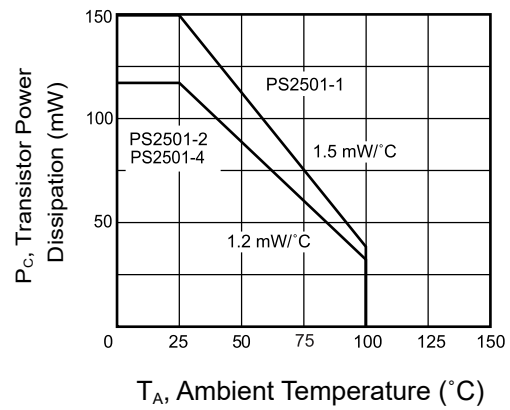


Figure 2: Transistor Power Dissipation vs. Ambient Temperature

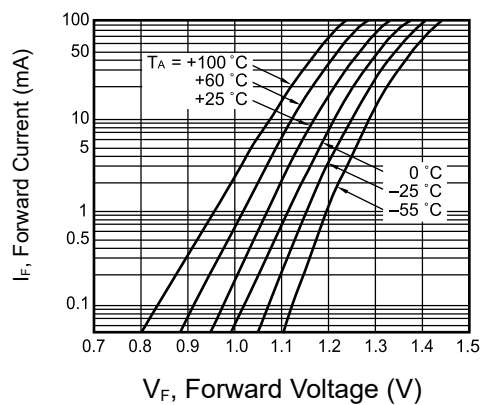


Figure 3: Forward Current vs. Forward Voltage

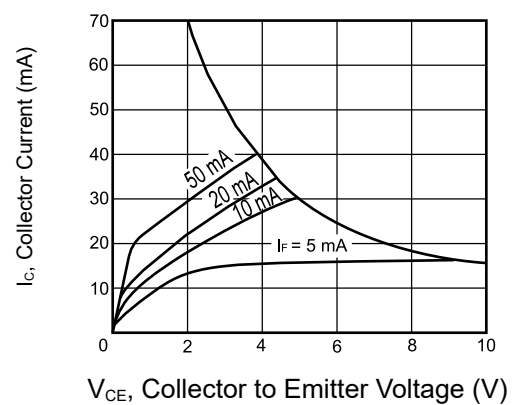


Figure 4: Collector Current vs. Collector To Emitter Voltage

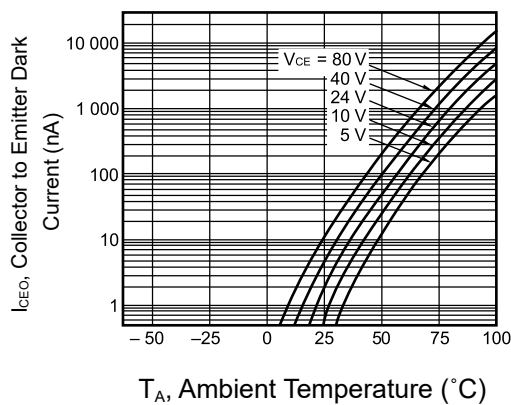


Figure 5: Collector To Emitter Dark Current vs. Ambient Temperature

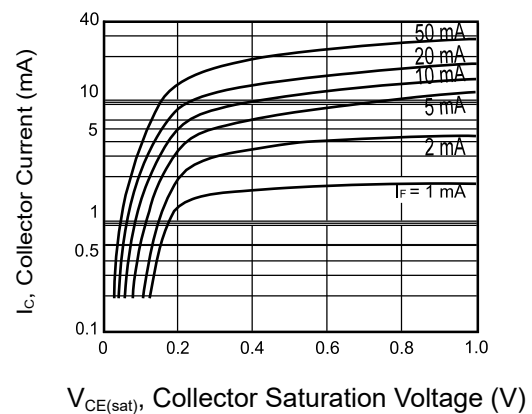


Figure 6: Collector Current vs. Collector Saturation Voltage

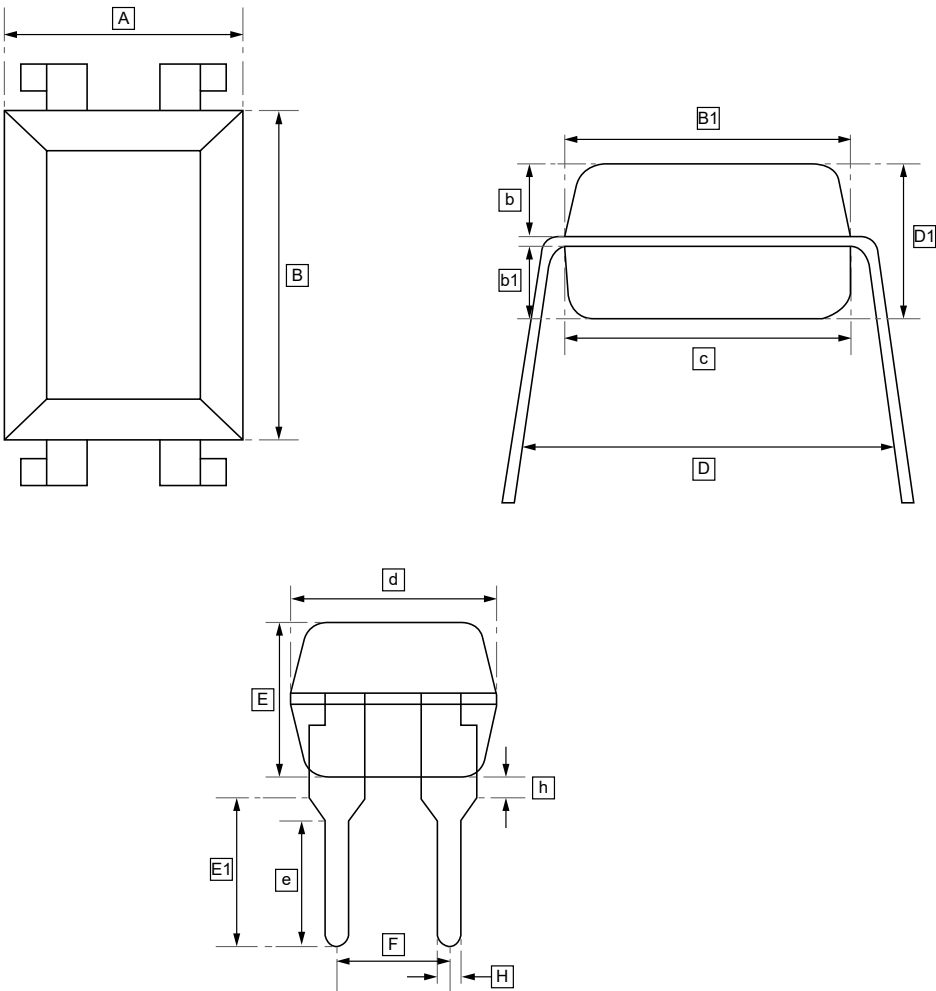


8.2Typical characteristic

|                                                                     |                                                      |
|---------------------------------------------------------------------|------------------------------------------------------|
|                                                                     |                                                      |
| Figure 7: Normalized Current Transfer Ratio vs. Ambient Temperature | Figure 8: Current Transfer Ratio vs. Forward Current |
|                                                                     |                                                      |
| Figure 9: Switching Time vs. Load Resistance                        | Figure 10: Switching Time vs. Load Resistance        |
|                                                                     |                                                      |
| Figure 11: Frequency Response                                       | Figure 12: Long Term CTR Degradation                 |



9.1DIP-4 Package Outline Dimensions



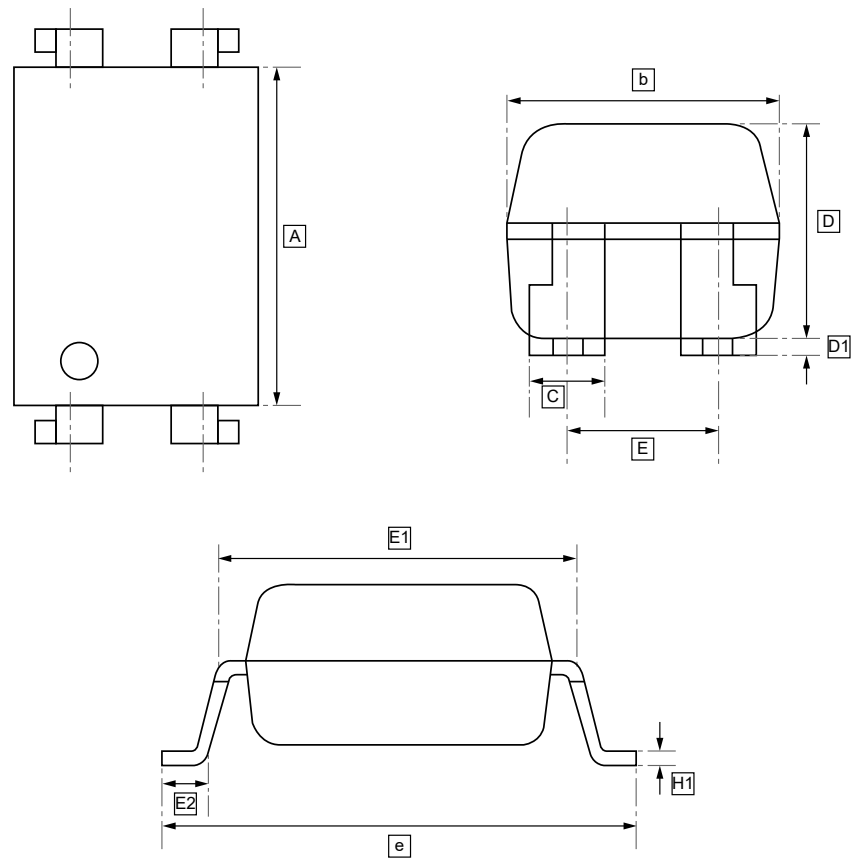
DIMENSIONS (mm are the original dimensions)

| Symbol | A    | B    | B1   | b    | b1   | c    | D    | D1   | d    | E    | E1   | e    |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| Min    | 4.60 | 6.40 | 6.35 | 1.64 | 1.60 | 6.45 | 8.86 | 3.43 | 4.55 | 3.48 | 3.05 | 2.55 |
| Max    |      |      | 6.45 |      |      | 6.55 |      |      |      |      | 3.55 | 3.05 |

| Symbol | F    | H    | h    |
|--------|------|------|------|
| Min    | 2.29 | 0.50 | 0.50 |
| Max    | 2.79 |      |      |



9.2SOP-4 Package Outline Dimensions

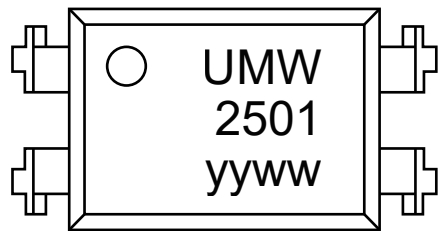


DIMENSIONS (mm are the original dimensions)

| Symbol | A    | b    | C   | D   | D1   | E    | E1   | E2   | e     | H1   |
|--------|------|------|-----|-----|------|------|------|------|-------|------|
| Min    | 6.15 | 4.33 | 1.1 | 3.4 | 0.05 | 2.29 | 7.37 | 0.75 | 9.85  | 0.26 |
| Max    | 6.65 | 4.83 | 1.3 | 3.9 | 0.6  | 2.79 | 7.87 | 1.25 | 10.45 |      |



10.Ordering information



yy: Year Code  
ww: Week Code

| Order Code   | Marking | Package | Base QTY | Delivery Mode |
|--------------|---------|---------|----------|---------------|
| UMW PS2501   | 2501    | DIP-4   | 5000     | Tube and box  |
| UMW PS2501-S | 2501    | SOP-4   | 2000     | Tape and reel |



## 11.Disclaimer

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