

## 1.Description

UMW TLP127GB-S is a small patch optocoupler product suitable for surface mount assembly.

UMW TLP127GB-S is a high-voltage optocoupler composed of gallium arsenide infrared light-emitting diodes and Darlington phototransistors with integrated base emitter resistors, with a VCEO of over 300V.

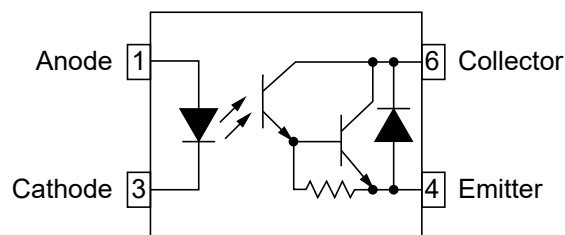
## 3.Features

- Collector-Emitter Voltage: 300V (Min.)
- Current Transfer Ratio: 1000% (Min.)
- Isolation Voltage: Viso=3750Vrms(min.)
- UL Recognized: UL1577,File NO.E547318
- RoHScompliance

## 2.Applications

- Switching power supply, intelligent instrument
- Industrial control, measuring instruments photocopiers and other office equipment
- Household appliances: such as air conditioners fans, water heaters, etc.

## 4.Pinning information



**SOP-4**



## 5.Limit parameter (Ta=25°C)

| Parameter                                                |                                                       | Symbol                      | Value                       | Unit  |
|----------------------------------------------------------|-------------------------------------------------------|-----------------------------|-----------------------------|-------|
| LED                                                      | Forward Current                                       | $I_F$                       | 50                          | mA    |
|                                                          | Forward Current Derating                              | $\Delta I_F/^\circ\text{C}$ | -7(Ta $\geq$ 53°C)          | mA/°C |
|                                                          | Pulse Forward Current                                 | $I_{FP}$                    | 1(100 $\mu$ s pulse,100pps) | A     |
|                                                          | Reverse Voltage                                       | $V_R$                       | 6                           | V     |
|                                                          | Junction Temperature                                  | $T_J$                       | 125                         | °C    |
| DETECTOR                                                 | Collector-Emitter Voltage                             | $V_{CEO}$                   | 300                         | V     |
|                                                          | Emitter-Collector Voltage                             | $V_{ECO}$                   | 0.3                         | V     |
|                                                          | Collector Current                                     | $I_C$                       | 150                         | mA    |
|                                                          | Collector Power Dissipation                           | $P_C$                       | 150                         | mW    |
|                                                          | Collector Power Dissipation Derating (Ta $\geq$ 25°C) | $\Delta P_C/^\circ\text{C}$ | -1.5                        | mW/°C |
|                                                          | Junction Temperature                                  | $T_J$                       | 125                         | °C    |
| Storage Temperature Range                                |                                                       | $T_{STG}$                   | -55 to 125                  | °C    |
| Operating Temperature Range                              |                                                       | $T_{OPR}$                   | -55 to 110                  | °C    |
| Lead Soldering Temperature                               |                                                       | $T_{SOL}$                   | 260(10s)                    | °C    |
| Total Package Power Dissipation                          |                                                       | $P_T$                       | 200                         | mW    |
| Total Package Power Dissipation Derating(Ta $\geq$ 25°C) |                                                       | $\Delta P_T/^\circ\text{C}$ | -2                          | mW/°C |

Notes1: Device considered a two terminal device : Pins 1, 3 shorted together and pins 4,6 shorted together.



## 6. Electrical Characteristics

| Parameter                           | Symbol        | Conditions                                 | Min | Typ  | Max | Units         |
|-------------------------------------|---------------|--------------------------------------------|-----|------|-----|---------------|
| <b>Input</b>                        |               |                                            |     |      |     |               |
| Forward Voltage                     | $V_F$         | $I_F=10\text{mA}$                          | 1   | 1.15 | 1.3 | V             |
| Reverse Voltage                     | $I_R$         | $V_R=5\text{V}$                            |     |      | 10  | $\mu\text{A}$ |
| Terminal Capacitor                  | $C_T$         | $V=0, f=1\text{kHz}$                       |     | 30   |     | pF            |
| <b>Output</b>                       |               |                                            |     |      |     |               |
| Collector Dark Current              | $I_{CEO}$     | $V_{CE}=200\text{V}$                       |     | 10   | 200 | nA            |
|                                     |               | $V_{CE}=200\text{V}, T_a=85^\circ\text{C}$ |     |      | 20  | $\mu\text{A}$ |
| Collector Emitter Breakdown Voltage |               | $I_C=0.1\text{mA}, I_F=0$                  | 300 |      |     | V             |
| Emitter Collector Breakdown Voltage | $V_{(BR)ECO}$ | $I_E=0.1\text{mA}, I_F=0$                  | 0.3 |      |     | V             |
| Capacitor (Collector To Emitter)    | $C_{CE}$      | $V=0, f=1\text{MHz}$                       |     | 12   |     | pF            |

## 7. Coupling electrical characteristics ( $T_a=25^\circ\text{C}$ )

| Parameter                              | Symbol           | Conditions                          | Min  | Typ  | Max | Units |
|----------------------------------------|------------------|-------------------------------------|------|------|-----|-------|
| Current transmission ratio(CTR)        | $I_C/I_F$        | $I_F=10\text{mA}, V_{CE}=1\text{V}$ | 1000 | 4000 |     | %     |
| Saturation current transfer ratio(CTR) | $I_C/I_{F(SAT)}$ | $I_F=10\text{mA}, V_{CE}=1\text{V}$ | 500  |      |     | %     |
| Saturation pressure drop               | $V_{CE(sat)}$    | $I_C=10\text{mA}, I_F=1\text{mA}$   |      |      | 1   | V     |
|                                        |                  | $I_C=100\text{mA}, I_F=10\text{mA}$ | 0.3  |      | 1.2 | V     |



## 8.Isolation characteristics (Ta=25°C)

| Parameter                   | Symbol | Conditions                          | Min               | Typ       | Max | Units    |
|-----------------------------|--------|-------------------------------------|-------------------|-----------|-----|----------|
| Capacitor (input to output) | $C_s$  | $V_s=0$ , $f=1\text{MHz}$           |                   | 0.8       |     | pF       |
| Isolation resistor          | $R_s$  | $V_s=500\text{V}$ , $R.H.\leq 60\%$ | $5\times 10^{10}$ | $10^{14}$ |     | $\Omega$ |
| Isolation voltage           | $BV_s$ | AC, 1 minute                        | 3750              |           |     | Vrms     |
|                             |        | AC, 1 second, in oil                |                   | 5000      |     | Vrms     |
|                             |        | DC, 1 minute, in oil                |                   | 5000      |     | Vdc      |

## 9.Switch characteristics (Ta=25°C)

| Parameter    | Symbol    | Conditions                                                         | Min | Typ | Max | Units         |
|--------------|-----------|--------------------------------------------------------------------|-----|-----|-----|---------------|
| Rise time    | $t_r$     | $V_{CC}=10\text{V}$ , $I_C=10\text{mA}$<br>$R_L=100\Omega$         |     | 40  |     | $\mu\text{s}$ |
| Descent time | $t_f$     |                                                                    |     | 15  |     | $\mu\text{s}$ |
| Open time    | $t_{on}$  |                                                                    |     | 50  |     | $\mu\text{s}$ |
| Off time     | $t_{off}$ |                                                                    |     | 15  |     | $\mu\text{s}$ |
| Open time    | $t_{ON}$  | $R_L=180\Omega$ (Fig.1)<br>$V_{CC}=10\text{V}$ , $I_F=16\text{mA}$ |     | 5   |     | $\mu\text{s}$ |
| Storage time | $t_s$     |                                                                    |     | 40  |     | $\mu\text{s}$ |
| Off time     | $t_{OFF}$ |                                                                    |     | 80  |     | $\mu\text{s}$ |

## 10.Recommended operating conditions

| Parameter           | Symbol    | Min | Typ | Max | Units              |
|---------------------|-----------|-----|-----|-----|--------------------|
| Working voltage     | $V_{CC}$  |     |     | 200 | V                  |
| Forward current     | $I_F$     |     | 16  | 25  | mA                 |
| Output current      | $I_C$     |     |     | 120 | mA                 |
| Working temperature | $T_{OPR}$ | -25 |     | 85  | $^{\circ}\text{C}$ |



## 11. Test circuit

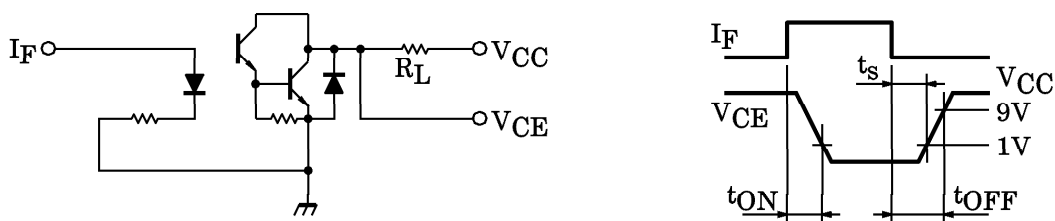
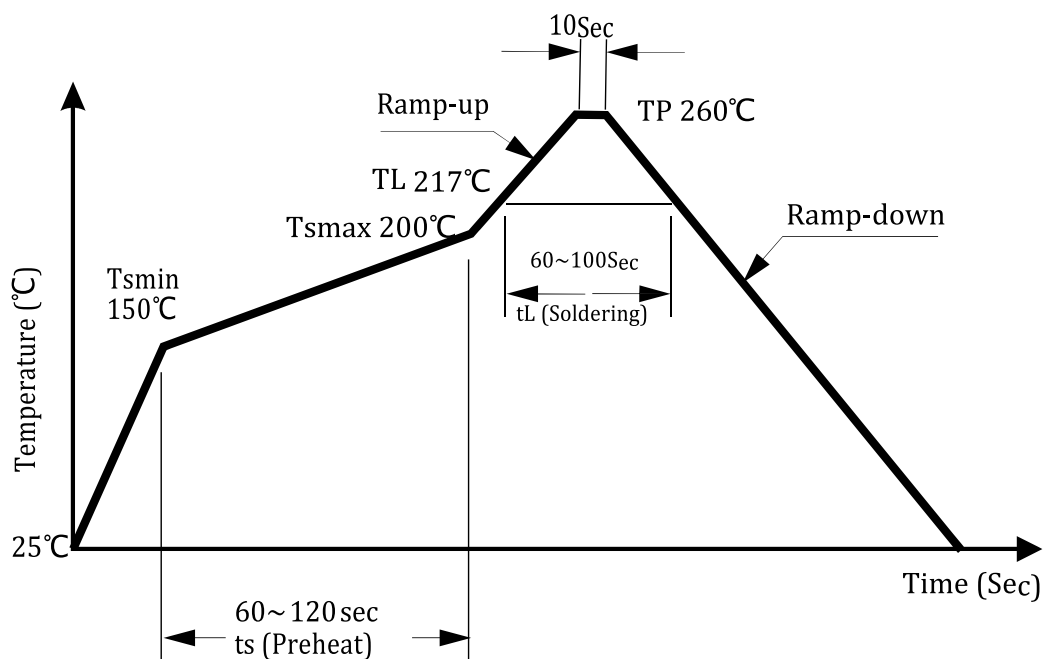


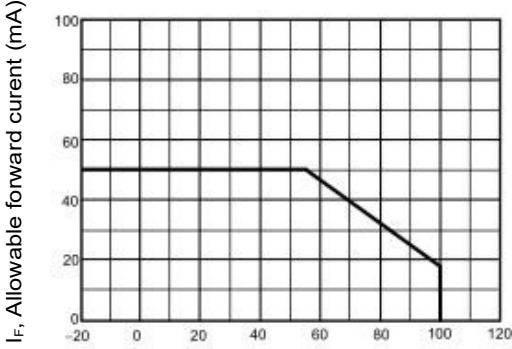
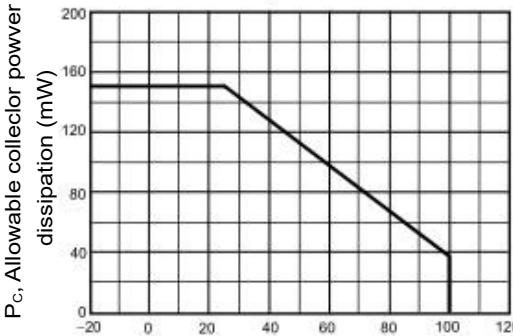
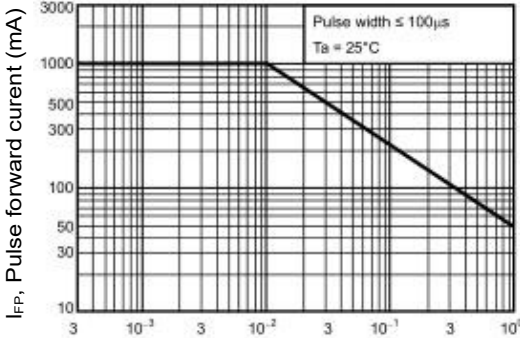
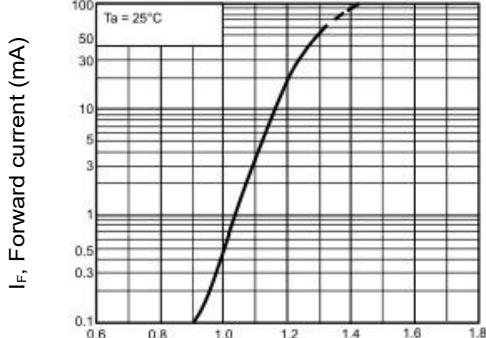
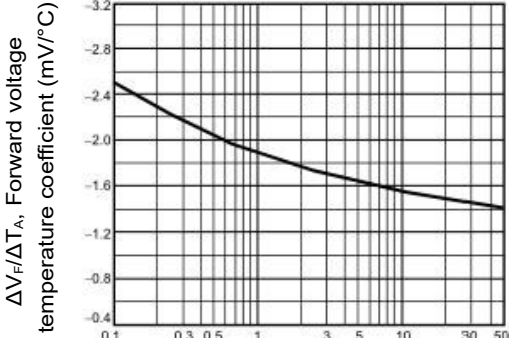
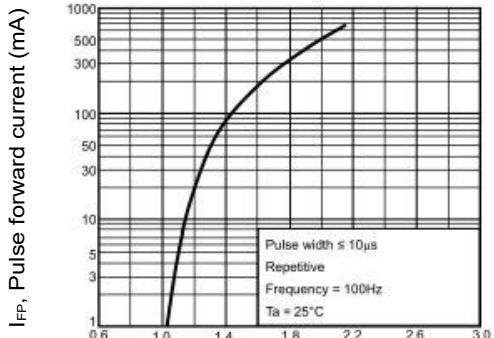
Fig.1 Switching Time Test Circuit

## 12. Reflow temperature curve



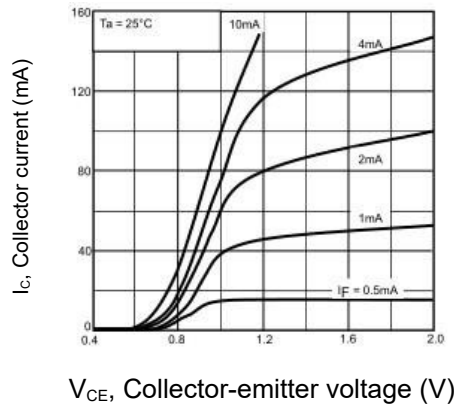
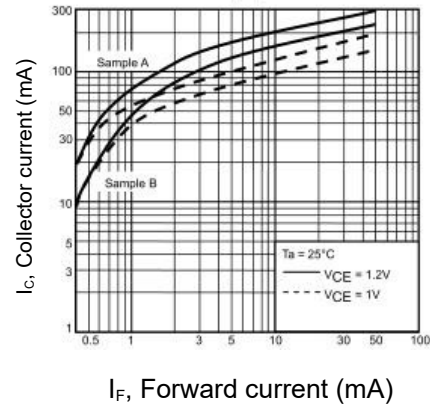
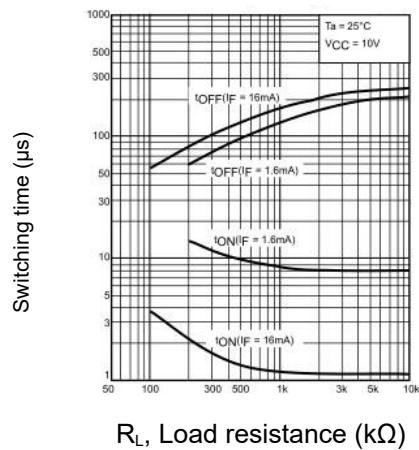
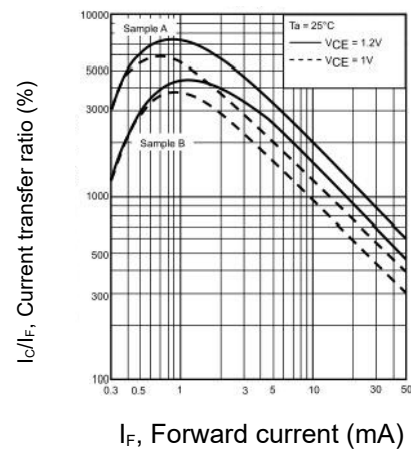
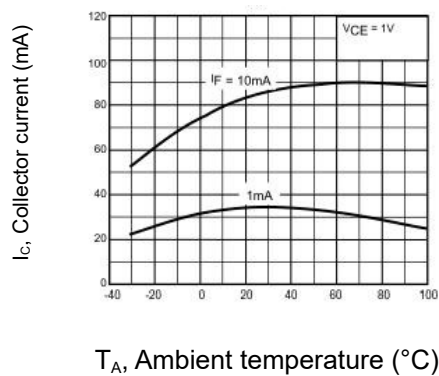
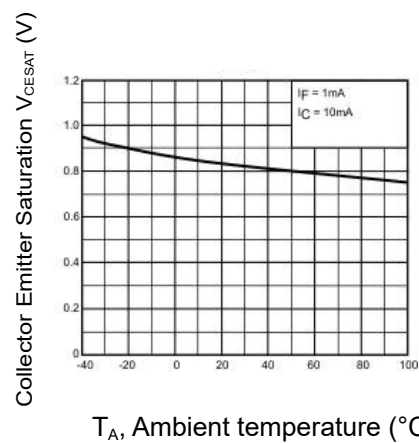


13.1 Typical Characteristic

|                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><math>I_F</math>, Allowable forward current (mA)</p> <p><math>T_A</math>, Ambient temperature (<math>^{\circ}\text{C}</math>)</p>                                         |  <p><math>P_C</math>, Allowable collector power dissipation (mW)</p> <p><math>T_A</math>, Ambient temperature (<math>^{\circ}\text{C}</math>)</p> |
| Figure 1: $I_F$ - $T_a$                                                                                                                                                                                                                                        | Figure 2: $P_C$ - $T_a$                                                                                                                                                                                                             |
|  <p><math>I_{FP}</math>, Pulse forward current (mA)</p> <p><math>D_R</math>, Duty cycle ratio</p>                                                                            |  <p><math>I_F</math>, Forward current (mA)</p> <p><math>V_F</math>, Forward voltage (V)</p>                                                      |
| Figure 3: $I_{FP}$ - $D_R$                                                                                                                                                                                                                                     | Figure 4: $I_F$ - $V_F$                                                                                                                                                                                                             |
|  <p><math>\Delta V_F/\Delta T_A</math>, Forward voltage temperature coefficient (<math>\text{mV}/^{\circ}\text{C}</math>)</p> <p><math>I_F</math>, Forward current (mA)</p> |  <p><math>I_{FP}</math>, Pulse forward current (mA)</p> <p><math>V_{FP}</math>, Pulse forward voltage (V)</p>                                   |
| Figure 5: $\Delta V_F/\Delta T_A$ - $I_F$                                                                                                                                                                                                                      | Figure 6: $I_{FP}$ - $V_{FP}$                                                                                                                                                                                                       |



## 13.2 Typical Characteristic

Figure 7:  $I_C - V_{CE}$ Figure 8:  $I_C - I_F$ Figure 9: Switching Time -  $R_L$ Figure 10:  $I_C/I_F - I_F$ Figure 11:  $I_C - T_A$ Figure 12:  $V_{CE(SAT)} - T_A$



### 13.3 Typical Characteristic

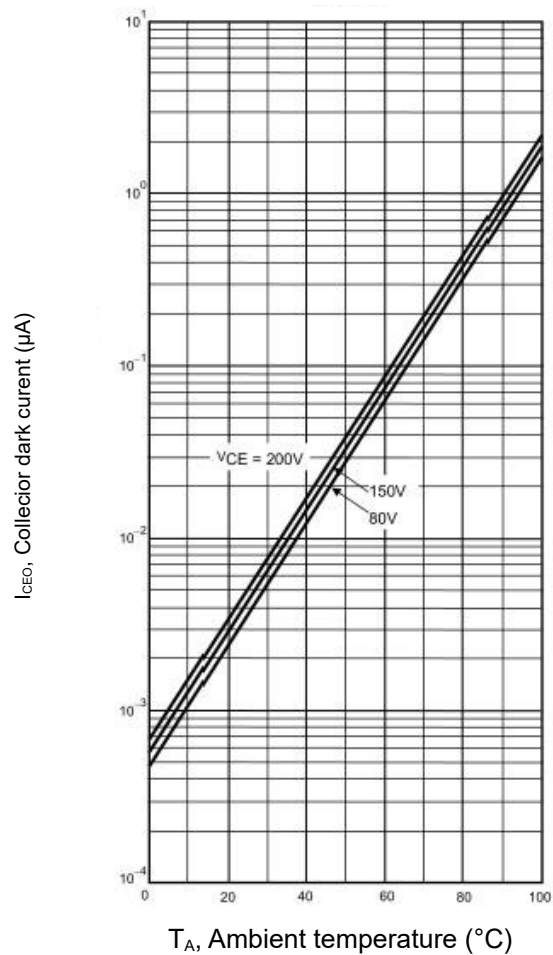
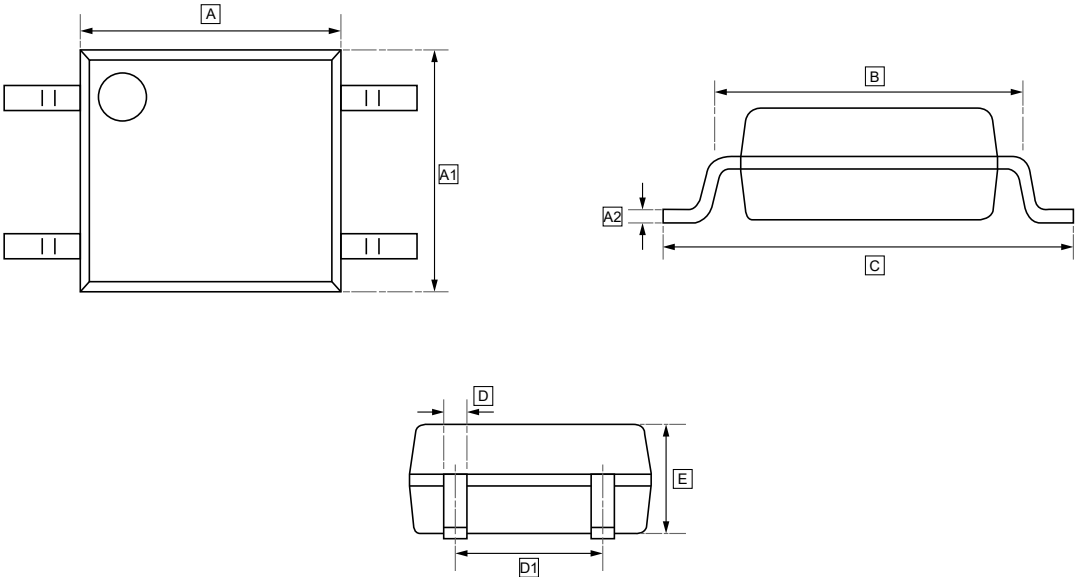


Figure 10:  $I_{CEO} - T_a$





14.SOP-4 Package Outline Dimensions

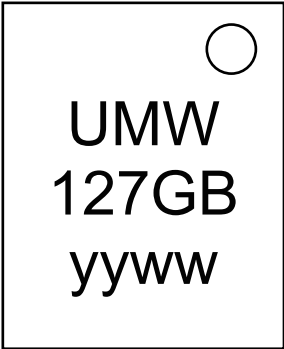


DIMENSIONS (mm are the original dimensions)

| Symbol | A    | A1   | A2   | B    | C    | D    | D1   | E    |
|--------|------|------|------|------|------|------|------|------|
| Min    | 4.40 | 3.60 | 0.15 | 5.00 | 6.70 | 0.30 | 2.54 | 1.82 |
| Max    | 4.80 | 4.10 |      | 5.40 | 7.30 | 0.50 | TYP  | 2.02 |



15.Ordering information



yy: Year Code  
ww: Week Code

| Order Code     | Package | Base QTY | Delivery Mode |
|----------------|---------|----------|---------------|
| UMW TLP127GB-S | SOP-4   | 3000     | Tape and reel |



## **16.Disclaimer**

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