

1.Description

The UMW TLP185GB-S consist of a photo transistor optically coupled to gallium arse-nide infrared emitting diode. The UMW TLP185GB-S photocoupler is housed in the very small and thin SO6 package. Since UMW TLP185GB-S is smaller than DIP package, it's suitable for high-density surface mounting application such as programmable controllers

3.Features

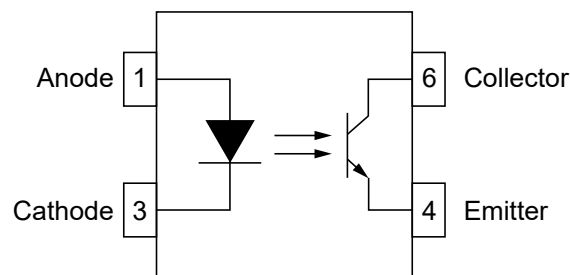
- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 50% (min)
- Rank GB: 100% (min)
- Isolation voltage: 3750 Vrms (min)

2.Applications

- applications
- Office Equipment
- Programmable Logic Controllers (PLCs)
- AC Adapters
- I/O Interface Boards

- Operating temperature: -55 to 110°C
- Safety standards
- UL-approved: UL1577, File No.E547318

4.Pinning information



SOP-4



5.Mechanical Parameters

Characteristics	Min	Unit
Creepage distances	5	mm
Clearance	5	mm
Internal isolation thickness	0.4	mm



6. Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
LED	Input Forward Current	I_F	50	mA
	Input Forward Current Derating ($T_a \geq 90^\circ\text{C}$)	$\Delta I_F / \Delta T_a$	-1.5	mA/ $^\circ\text{C}$
	Input Forward Current (Pulsed) (Note1)	I_{FP}	1	A
	Input Reverse Voltage	V_R	5	V
	Input Power Dissipation	P_D	100	mW
	Input Power Dissipation Derating ($T_a \geq 90^\circ\text{C}$)	$\Delta P_D / \Delta T_a$	-2.86	mW/ $^\circ\text{C}$
	Junction Temperature	T_J	125	$^\circ\text{C}$
Detector	Collector-emitter Voltage	V_{CEO}	80	V
	Emitter-collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Collector Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)	$\Delta P_C / \Delta T_a$	-1.5	mW/ $^\circ\text{C}$
	Junction Temperature	T_J	125	$^\circ\text{C}$
Common	Operating Temperature	T_{OPR}	-55 to 110	$^\circ\text{C}$
	Storage Temperature	T_{STG}	-55 to 125	$^\circ\text{C}$
	Lead Soldering Temperature (10 s)	T_{SOL}	260	$^\circ\text{C}$
	Total Power Dissipation	P_T	200	mW
	Isolation Voltage, AC, 60 s, R.H. $\leq 60\%$ (Note2)	BV_S	3750	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Note 1: Pulse width (PW) $\leq 100 \mu\text{s}$, $f = 100 \text{ Hz}$

Note 2: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.



7. Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
LED						
Input Forward Voltage	V_F	$I_F=10\text{mA}$	1.1	1.25	1.4	V
Input Reverse Current	I_R	$V_R=5\text{V}$			5	μA
Input Capacitance	C_T	$V=0, f=1\text{kHz}$		30		pF
Detector						
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=0.5\text{mA}$	80			V
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E=0.1\text{mA}$	7			V
Dark Current	I_{DARK}	$V_{CE}=48\text{V}$		0.01	0.08	μA
		$V_{CE}=48\text{V}, T_a=85^\circ\text{C}$		2	50	μA
Collector-emitter capacitance	C_{CE}	$V=0, f=1\text{MHz}$		10		pF

8. Coupling Electrical Characteristics ($T_a=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Current Transfer Ratio (Note 1)	I_C/I_F	$I_F=5\text{mA}, V_{CE}=5\text{V}$	50		600	%
		$I_F=5\text{mA}, V_{CE}=5\text{V}, \text{Rank GB}$	100		600	%
Saturated current transfer ratio	$I_C/I_{F(\text{SAT})}$	$I_F=1\text{mA}, V_{CE}=0.4\text{V}$		60		%
		$I_F=1\text{mA}, V_{CE}=0.4\text{V}, \text{Rank GB}$	30			%
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C=2.4\text{mA}, I_F=8\text{mA}$			0.3	V
		$I_C=0.2\text{mA}, I_F=1\text{mA}$		0.2		V
		$I_C=0.2\text{mA}, I_F=1\text{mA}, \text{Rank GB}$			0.3	V
Off-State Collector Current	$I_{C(\text{off})}$	$V_F=0.7\text{V}, V_{CE}=48\text{V}$		1	10	μA

Note 1: See Table 8.1 for current transfer ratio.



9.Current Transfer Ratio (CTR) Rank (Note) (Ta=25°C)

Rank	Test Condition	Current Transfer Ratio		Marking of Classification	Unit
		I _C /I _F			
		Min	Max		
Blank	I _F =5mA, V _{CE} =5V	50	600	Blank, YE, GR, GB, BL, Y+, G, G+, B	%
Y		50	150	YE, Y+	
GR		100	300	GR, G, G+	
GB		100	600	GB, GR, BL, G, G+, B	
BL		200	600	BL, B	
YH		75	150	Y+	
GRL		100	200	G	
GRH		150	300	G+	
BLL		200	400	B	

Note: Specify both the part number and a rank in this format when ordering. Example: UMW TLP185GB-S.

10.Isolation Characteristics (Ta=25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Total capacitance (Input To Output) (Note 1)	C_s	$V_s=0, f=1MHz$		0.8		pF
Isolation Resistance (Note 1)	R_s	$V_s=500V, R.H. \leq 60\%$	1×10^{12}	10^{14}		Ω
Isolation Voltage (Note 1)	BV_s	AC, 60s	3750			Vrms
		AC, 1s in oil		10000		Vrms
		DC, 60s in oil		10000		Vdc

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.



11.Switch Characteristics (Ta=25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Rise Time	t_r	$V_{CC}=10V, I_C=2mA$ $R_L=100\Omega$		2		μs
Fall Time	t_f			3		μs
Turn-on Time	t_{on}			3		μs
Turn-off Time	t_{off}			3		μs
Turn-on Time	t_{ON}	See Fig. 10.1 $R_L=1.9k\Omega$		0.5		μs
Storage Time	t_s			25		μs
Turn-off Time	t_{off}			40		μs

12.Test circuit

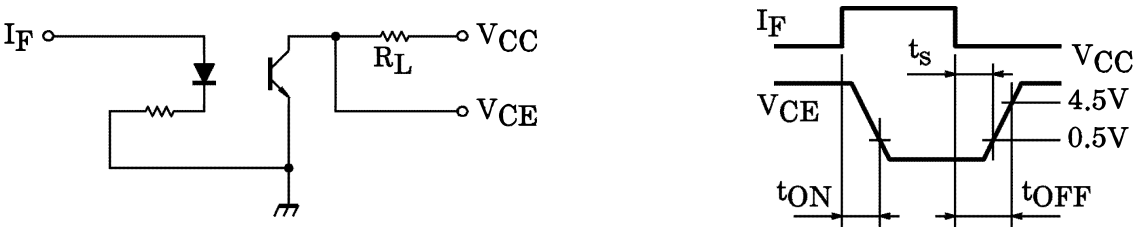


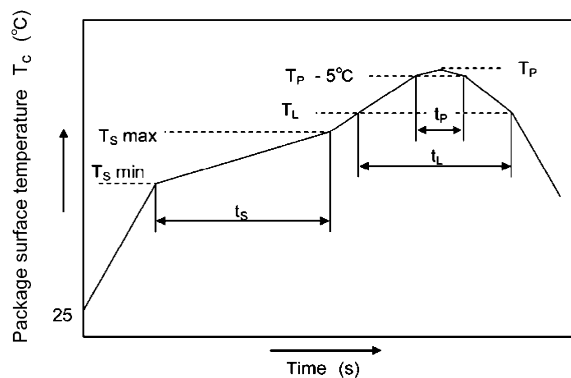
Fig.10.1 Switching Time Test Circuit and Waveform



13. Precautions for Soldering

The soldering temperature should be controlled as closely as possible to the conditions shown below, irrespective of whether a soldering iron or a reflow soldering method is used.

- When using soldering reflow.
- The soldering temperature profile is based on the package surface temperature.
- (See the figure shown below, which is based on the package surface temperature.)
- Reflow soldering must be performed once or twice.
- The mounting should be completed with the interval from the first to the last mountings being 2 weeks.



	Symbol	Min	Max	Unit
Preheat temperature	T_S	150	200	°C
Preheat time	t_s	60	120	s
Ramp-up rate (T_L to T_P)			3	°C/s
Liquidus temperature	T_L	217		°C
Time above T_L	t_L	60	150	s
Peak temperature	T_P		260	°C
Time during which T_c is between ($T_P - 5$) and T_P	t_p		30	s
Ramp-down rate (T_P to T_L)			6	°C/s

An Example of a Temperature Profile When Lead(Pb)-Free Solder Is Used

- When using soldering flow

Preheat the device at a temperature of 150°C (package surface temperature) for 60 to 120 seconds.

Mounting condition of 260°C within 10 seconds is recommended.

Flow soldering must be performed once.

- When using soldering Iron

Complete soldering within 10 seconds for lead temperature not exceeding 260°C or within 3 seconds not exceeding 350°C

Heating by soldering iron must be done only once per lead.

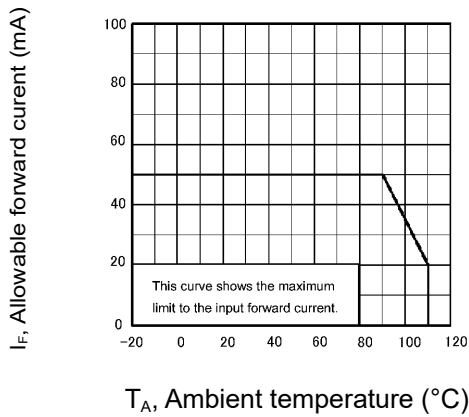
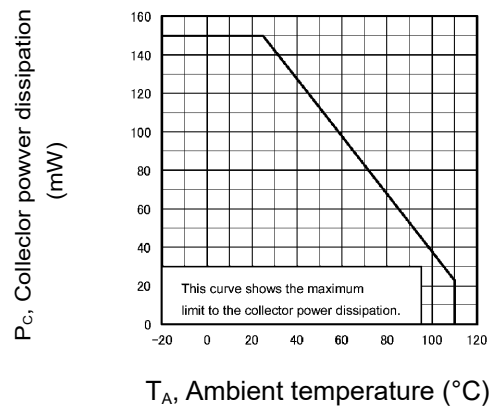
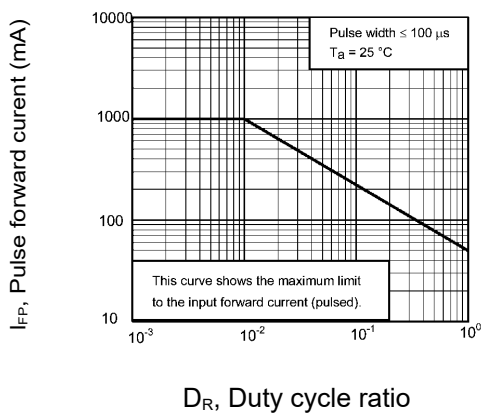
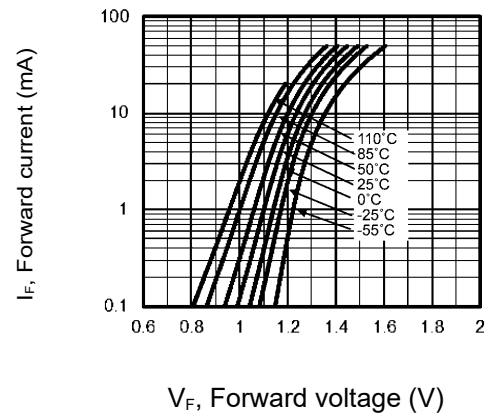
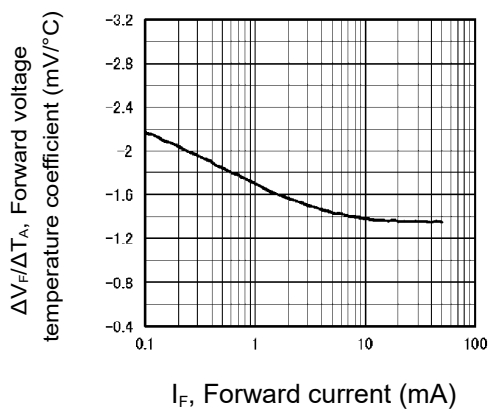
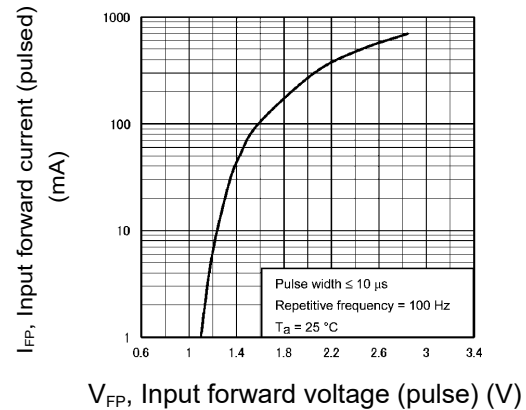


14. Precautions for General Storage

- Avoid storage locations where devices may be exposed to moisture or direct sunlight.
- Follow the precautions printed on the packing label of the device for transportation and storage.
- Keep the storage location temperature and humidity within a range of 5°C to 35°C and 45 % to 75 %, respectively.
- Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
- Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
- When restoring devices after removal from their packing, use anti-static containers.
- Do not allow loads to be applied directly to devices while they are in storage.
- If devices have been stored for more than two years under normal storage conditions, it is recommended that you check the leads for ease of soldering prior to use.

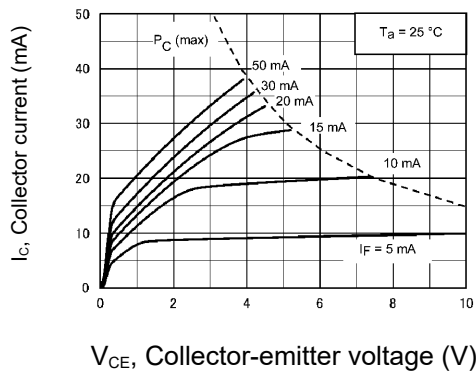
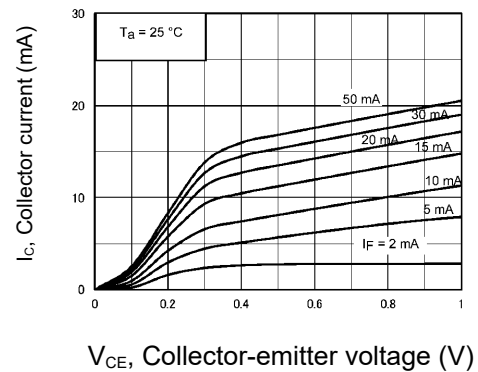
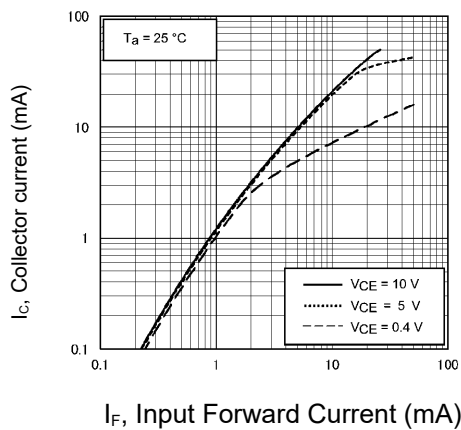
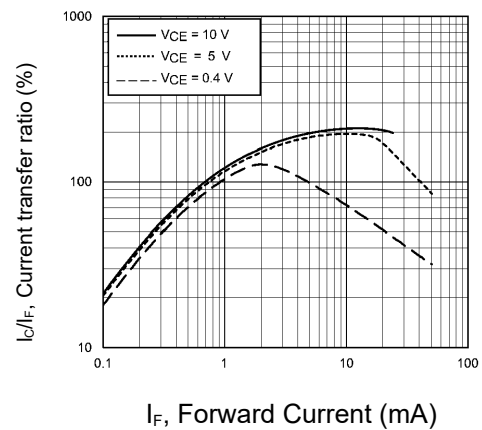
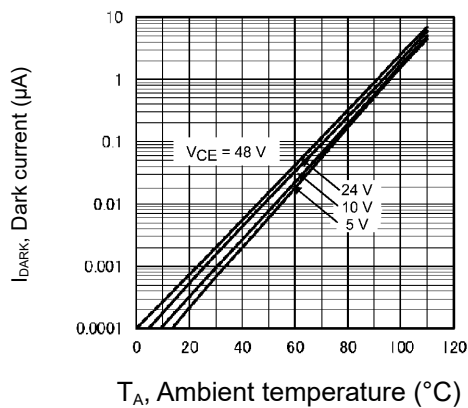
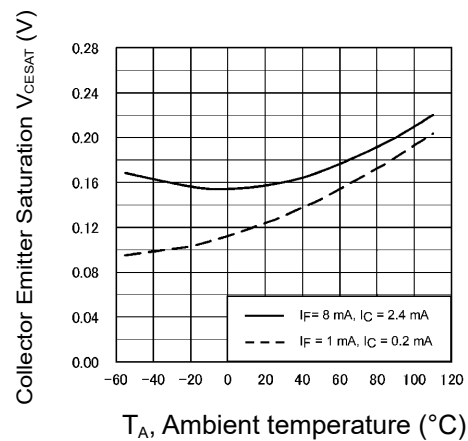


15.1 Typical Characteristic

Figure 1: I_F - T_A Figure 2: P_C - T_A Figure 3: I_{FP} - D_R Figure 4: I_F - V_F Figure 5: $\Delta V_F/\Delta T_A$ - I_F Figure 6: I_{FP} - V_{FP}

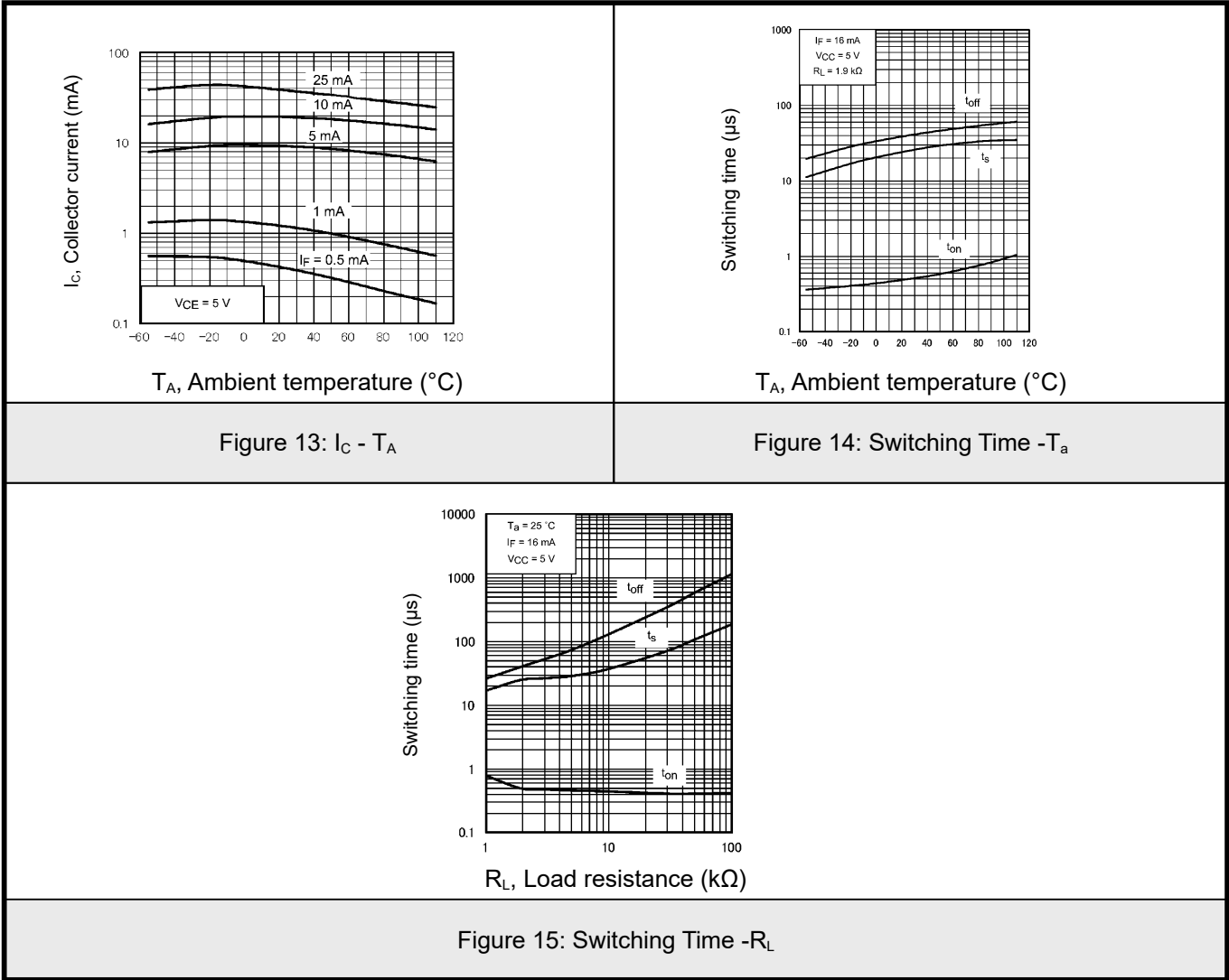


15.2 Typical Characteristic

Figure 7: $I_C - V_{CE}$ Figure 8: $I_C - V_{CE}$ Figure 9: $I_C - I_F$ Figure 10: $I_{CE0} - T_A$ Figure 11: $I_{DARK} - T_a$ Figure 12: $V_{CE(SAT)} - T_A$



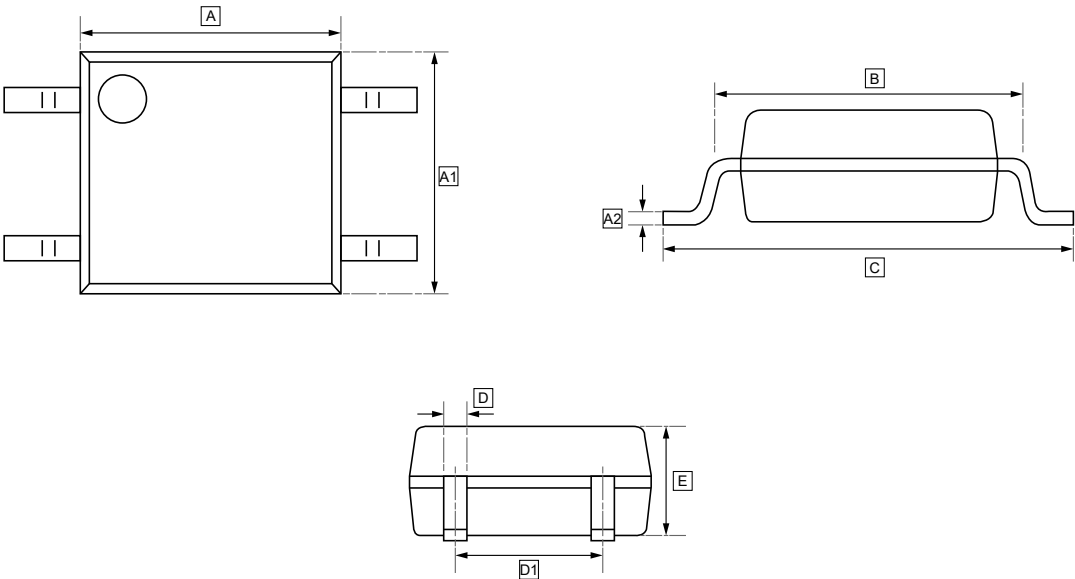
15.3Typical Characteristic



Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



16.SOP-4 Package Outline Dimensions

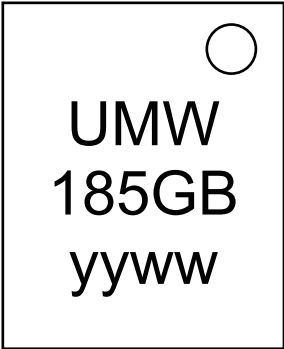


DIMENSIONS (mm are the original dimensions)

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



17.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW TLP185GB-S	SOP-4	3000	Tape and reel



18.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

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