

1.Description

The UMW TLP521-1,2 and -4 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP521-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP521-4 provides four isolated channels in a sixteen plastic DIP package.

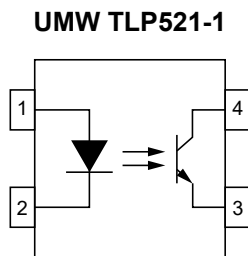
2.Features

- Collector-Emitter Voltage: 55V (min)
- Current Transfer Ratio: 50% (min)
- Rank GB: 100% (min)
- Isolation Voltage: 5000Vrms (high)
- UL-Approved: UL1577, File No.E547318

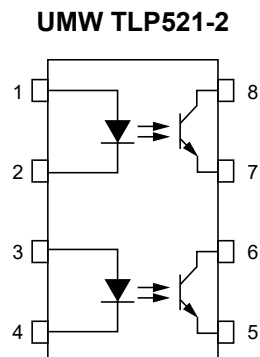
3.Applications

- Programmable Controllers
- AC/DC-Input Module
- Solid State Relay

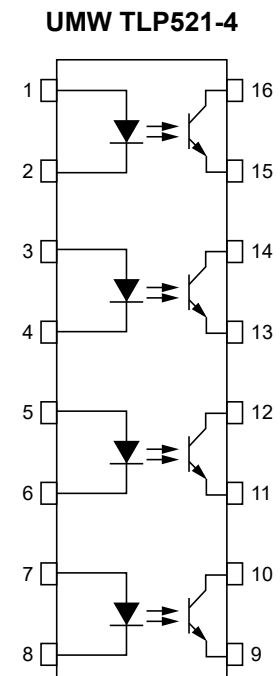
4.Pinning information



1: Anode
2: Cathode
3: Emitter
4: Collector



1,3: Anode
2,4: Cathode
5,7: Emitter
6,8: Collector



1,3,5,7: Anode
2,4,6,8: Cathode
9,11,13,15: Emitter
10,12,14,16: Collector



5. Absolute Maximum Ratings

Parameter		Symbol	Ratings		Unit
			UMW TLP521-1	UMW TLP521-2,-4	
LED	Forward Current	I_F	70	70	mA
	Forward Current Derating	$I_F/^\circ\text{C}$	$-0.93(T_a \geq 50^\circ\text{C})$	$-0.93(T_a \geq 50^\circ\text{C})$	mA/ $^\circ\text{C}$
	Pulse Forward Current	I_{FP}	1(100 μs pulse, 100 pps)		A
	Reverse Voltage	V_R	5		V
	Junction Temperature	T_J	125		$^\circ\text{C}$
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55		V
	Emitter-Collector Voltage	V_{ECO}	7		V
	Collector Current	I_C	50		mA
	Collector Power Dissipation(1 Circuit)	P_C	150	100	mW
	Collector Power Dissipation Derating (1 Circuit, $T_a \geq 25^\circ\text{C}$)	$\Delta P_D/^\circ\text{C}$	-1.5	-1	mW/ $^\circ\text{C}$
	Junction Temperature	T_J	125		$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55 to 125		$^\circ\text{C}$
Operating Temperature Range		T_{OPR}	-55 to 100		$^\circ\text{C}$
Lead Soldering Temperature		T_{SOL}	260(10s)		$^\circ\text{C}$
Total Package Power Dissipation		P_T	200	150	mW
Total Package Power Dissipation Derating($T_a \geq 25^\circ\text{C}$)		$\Delta P_T/^\circ\text{C}$	-2.5	-1.5	mW/ $^\circ\text{C}$
Isolation Voltage		BV_S	2500(AC, 1min. R.H. $\leq 60\%$)(Note 1)		Vrms

(Note 1):

Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins shorted together.



6.Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Supply Voltage	V_{CC}		5	24	V
Forward Current	I_F		16	25	mA
Collector Current	I_C		1	10	mA
Operating Temperature	T_{OPR}	-25		85	°C

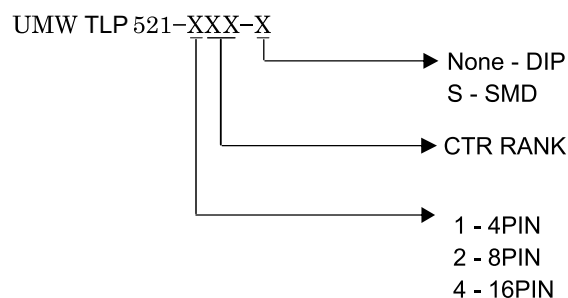
7.Current Transfer Ratio

Type	Classification (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 TLP521	A	50	600	BLANK, Y, Y, G, G, B, B, GB
	Rank Y	50	150	Y, Y
	Rank GR	100	300	G, G
	Rank BL	200	600	B, B
	Rank GB	100	600	G, G, B, B, GB
UMW TLP521-2	A	50	600	BLANK, GR, BL, GB
UMW TLP521-4	Rank GB	100	600	GR, BL, GB

Product Naming System

Type of package used for shipment is denoted by a symbol suffix after a product number. The method of classification is as below.

(Example)





8. Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
LED						
Forward Voltage	V_F	$I_F=10\text{mA}$	1	1.15	1.3	V
Reverse Current	I_R	$V_R=5\text{V}$			10	μA
Capacitance	C_T	$V=0, f=1\text{kHz}$		30		pF
Detector						
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=0.5\text{mA}$	55			V
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E=0.1\text{mA}$	6			V
Collector Dark Current	I_{CEO}	$V_{CE}=24\text{V}$			100	μA
		$V_{CE}=24\text{V}, T_a=85^\circ\text{C}$		2	50	μA
Capacitance (Collector to Emitter)	C_{CE}	$V=0, f=1\text{MHz}$		10		pF

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Current Transfer Ratio	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 CTR	$I_C/I_{F(\text{SAT})}$	$I_F=1\text{mA}, V_{CE}=0.4\text{V}$		60		%
		$I_F=1\text{mA}, V_{CE}=0.4\text{V}, \text{Rank GB}$	30			%
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C=2.4\text{mA}, I_F=8\text{mA}$			0.4	V
		$I_C=0.2\text{mA}, I_F=1\text{mA}$		0.2		V
		$I_C=0.2\text{mA}, I_F=1\text{mA}, \text{Rank GB}$			0.4	V



10. 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 Resistance	R_s	$V_s=500\text{V}$, R.H.≤ 60%		10^{11}		Ω
Isolation Voltage	BV_s	AC, 1 minute	2500			Vrms
		AC, 1 second, in oil		5000		Vrms
		DC, 1 minute, in oil		5000		Vdc

11. Switch Characteristics (Ta=25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Rise Time	t_r	$V_{CC}=10\text{V}$, $I_C=2\text{mA}$ $R_L=100\Omega$		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}	$R_L=1.9\text{k}\Omega$ (Fig.1) $V_{CC}=5\text{V}$, $I_F=16\text{mA}$		2		μs
Storage Time	t_s			15		μs
Turn-off Time	t_{OFF}			25		μs

12. Test circuit

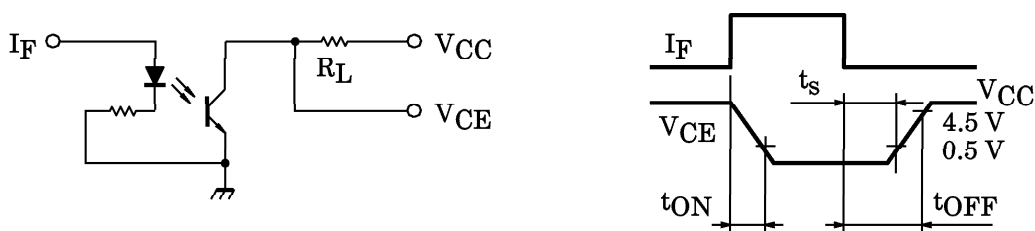
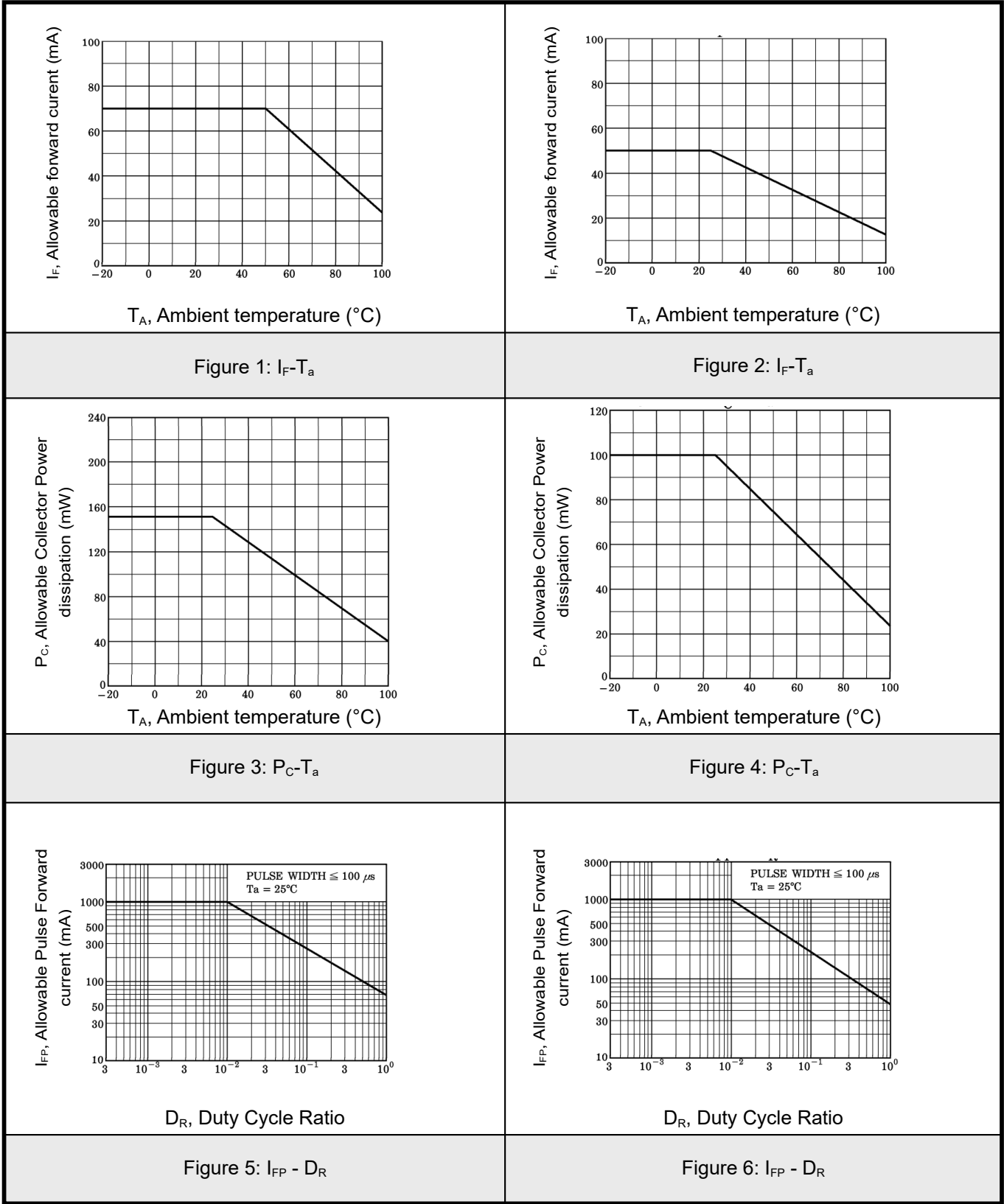


Fig.1 Switching Time Test Circuit

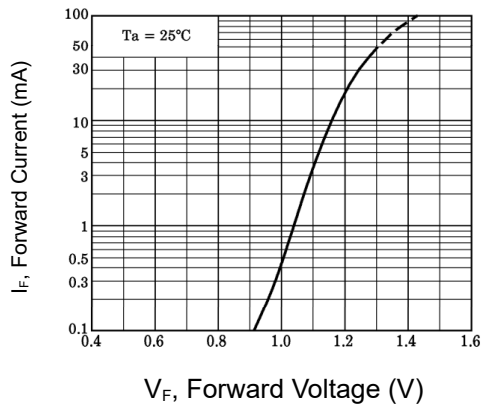
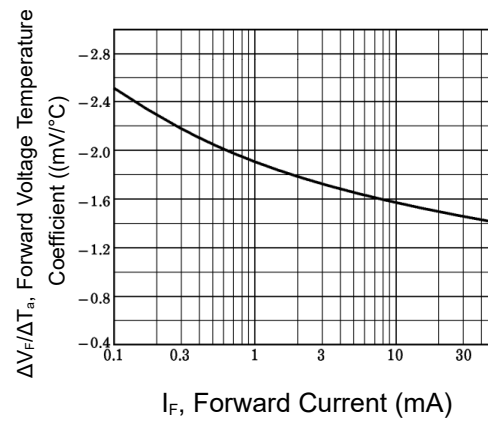
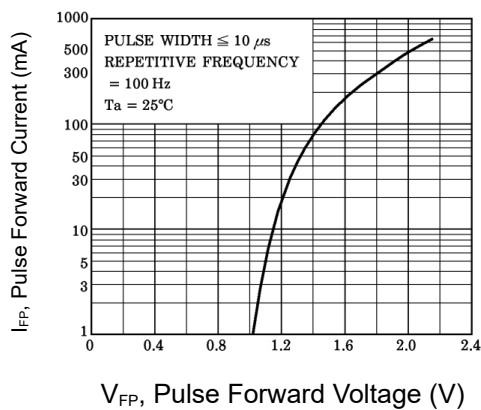
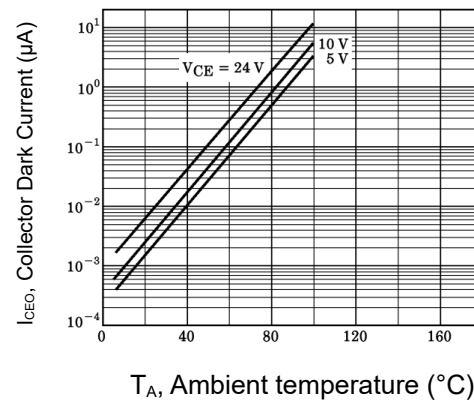
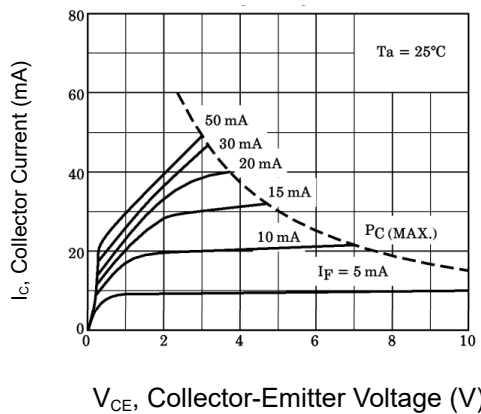
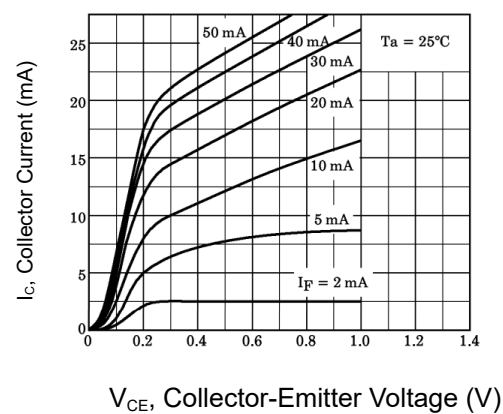


13.1Typical Characteristic





13.2 Typical Characteristic

Figure 7: $I_F - V_F$ Figure 8: $\Delta V_F / \Delta T_a - I_F$ Figure 9: $I_{FP} - V_{FP}$ Figure 10: $I_{CEO} - T_A$ Figure 11: $I_C - V_{CE}$ Figure 12: $I_C - V_{CE}$



13.3Typical Characteristic

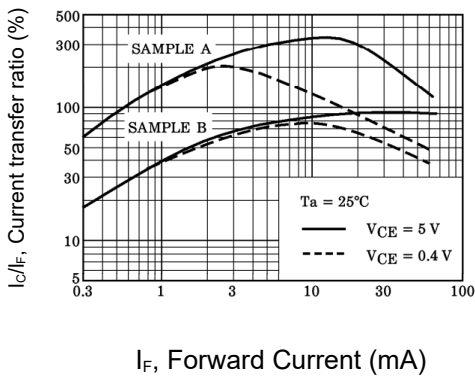


Figure 13: $I_C - I_F$

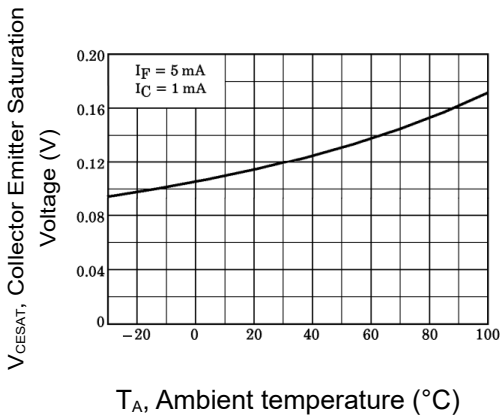


Figure 14: $V_{CE(SAT)} - T_A$

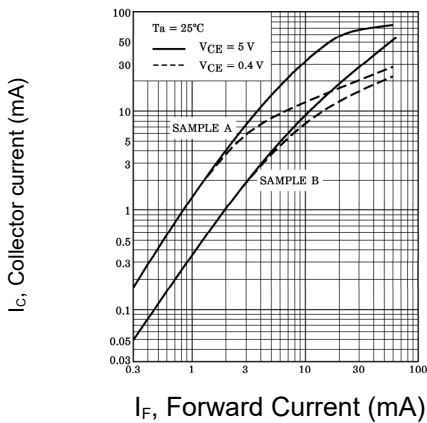


Figure 15: $I_C - I_F$

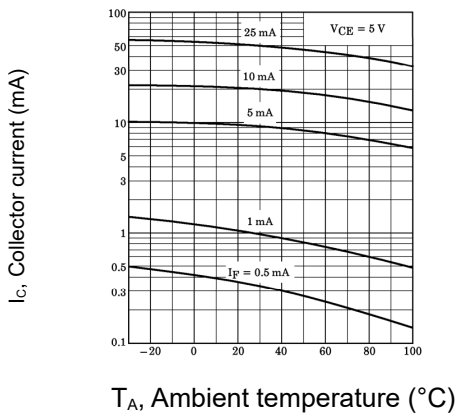


Figure 16: $I_C - T_A$

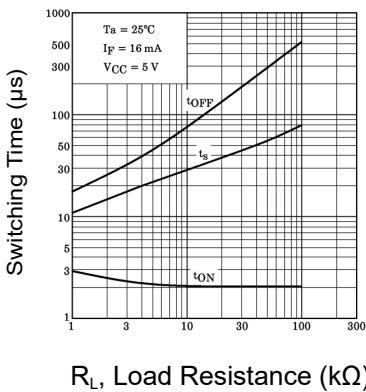
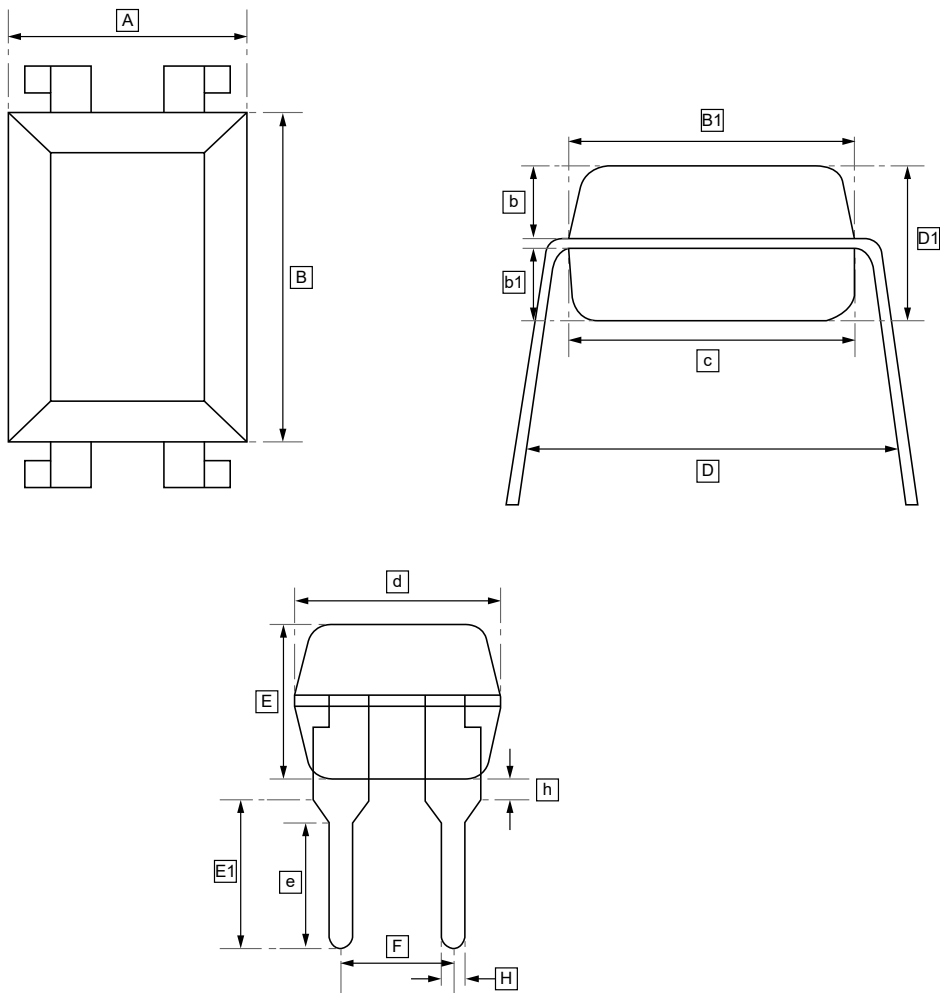


Figure 12: R_L -switching Time



14.1 DIP-4 Package Outline Dimensions



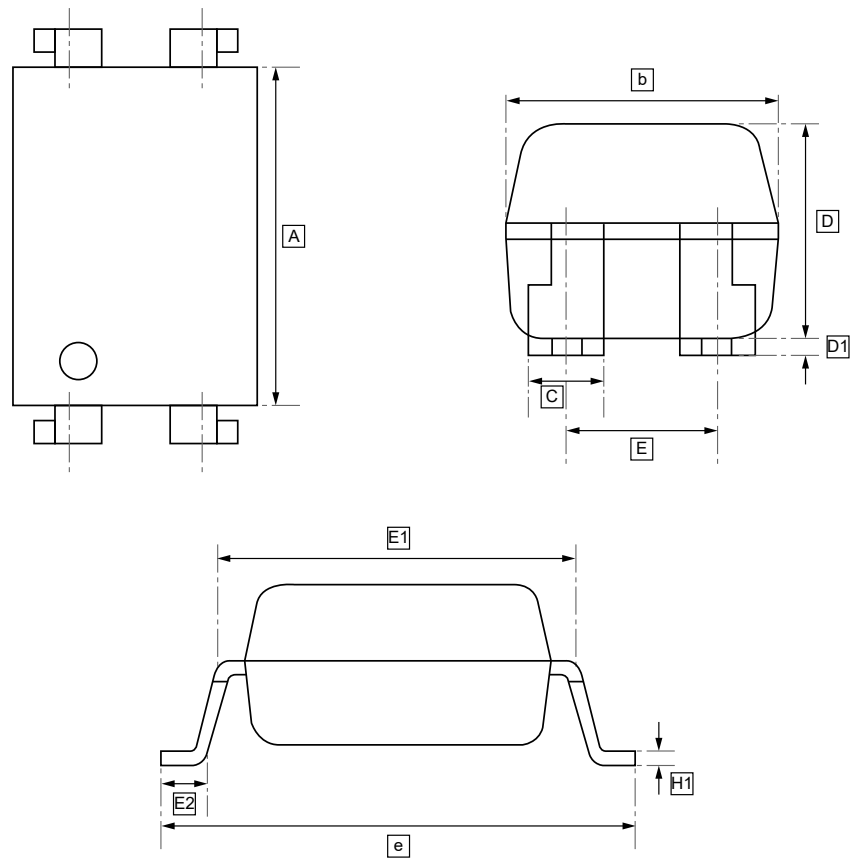
DIMENSIONS (mm are the original dimensions)

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		3.53			3.55	3.05

Symbol	F	H	h
Min	2.29	0.50	0.50
Max	2.79		



14.2 SOP-4 Package Outline Dimensions

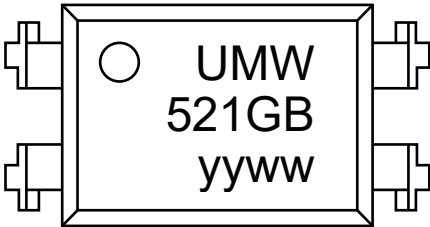


DIMENSIONS (mm are the original dimensions)

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	



15.Ordering information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW TLP521GB	521GB	DIP-4	5000	Tube and box
UMW TLP521GB-S	521GB	SOP-4	2000	Tape and reel



16.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.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.