

OFFICE MACHINE

PROGRAMMABLE CONTROLLERS

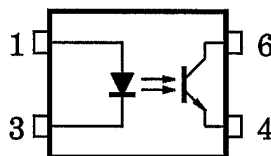
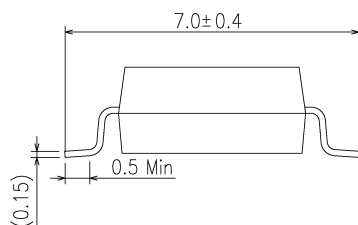
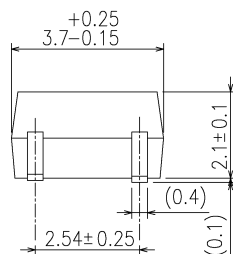
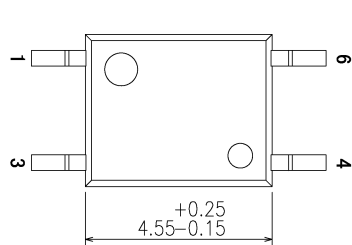
AC/DC-INPUT MODULE

TELECOMMUNICATION

The UMW MINI FLAT COUPLER TLP181 is a small outline coupler, suitable for surface mount assembly.

TLP181 consist of a photo transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP package.

- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)  
Rank GB : 100% (Min.)
- Isolation Voltage : 3750V<sub>rms</sub> (Min.)
- UL Recognized : UL1577, File No. E492440



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

CURRENT TRANSFER RATIO

TYPE	CLASSI- FICATION *1	CURRENT TRANSFER RATIO (%) ( $I_C / I_F$ )		MARKING OF CLASSIFICATION
		$I_F = 5\text{mA}, V_{CE} = 5\text{V}, T_a = 25^\circ\text{C}$		
		MIN.	MAX.	
TLP181	(None)	50	600	BLANK, Y, Y <sup>■</sup> , G, G <sup>■</sup> , B, B <sup>■</sup> , GB
	Rank Y	50	150	Y, Y <sup>■</sup>
	Rank GR	100	300	G, G <sup>■</sup>
	Rank BL	200	600	B, B <sup>■</sup>
	Rank GB	100	600	G, G <sup>■</sup> , B, B <sup>■</sup> , GB

\*1 : EX, Rank GB : UMW TLP181GB

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	RATING	UNIT
ED	Forward Current	$I_F$	50	mA
	Forward Current Detating	$\Delta I_F / ^\circ C$	-0.7 (Ta $\geq$ 53°C)	mA / °C
	Pulse Forward Current	$I_{FP}$	1 (100 $\mu$ s pulse, 100pps)	A
	Reverse Voltage	$V_R$	5	V
	Junction Temperature	$T_j$	125	°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 (1 Circuit)	$P_C$	150	mW
	Collector Power Dissipation Derating (1 Circuit Ta $\geq$ 25°C)	$\Delta P_C / ^\circ C$	-1.5	mW / °C
	Junction Temperature	$T_j$	125	°C
Storage Temperature Range	$T_{stg}$	-55~125	°C	
Operating Temperature Range	$T_{opr}$	-55~100	°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)	$\Delta P_T / ^\circ C$	-2.0	mW / °C	
Isolation Voltage	(Note 1) $BV_S$	3750 (AC, 1min., RH $\leq$ 60%)	$V_{rms}$	

Note 1 Device considered a two-terminal device : Pin 1, 3 shorted together and pins 4, 6 shorted together

**INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse Current	$I_R$	$V_R = 5\text{V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	30	—	pF
ELECTOR	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
	Collector Dark Current	$I_{CEO}$	$V_{CE} = 48\text{V}$ , (Ambient Light Below 1000 lx )	—	0.01 (2)	0.1 (10)	$\mu\text{A}$
			$V_{CE} = 48\text{V}$ , $T_a = 85^\circ\text{C}$ , (Ambient Light Below 1000 lx )	—	2 (4)	50 (50)	$\mu\text{A}$
Capacitance (Collector to Emitter)	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	10	—	pF	

**COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	$I_C / I_F$	$I_F = 5\text{mA}$ , $V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1\text{mA}$ , $V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4\text{mA}$ , $I_F = 8\text{mA}$ $I_C = 0.2\text{mA}$ , $I_F = 1\text{mA}$ Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-State Collector Current	$I_C (\text{off})$	$V_F = 0.7\text{V}$ , $V_{CE} = 48\text{V}$	—	1	10	$\mu\text{A}$

**ISOLATION CHARACTERISTICS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	$C_S$	$V_S = 0\text{V}$ , $f = 1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	$R_S$	$V_S = 500\text{V}$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	3750	—	—	$V_{\text{rms}}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	$V_{\text{dc}}$

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	$t_r$	$V_{CC} = 10V, I_C = 2mA$ $R_L = 100\Omega$	—	2	—	$\mu s$
Fall Time	$t_f$		—	3	—	
Turn-on Time	$t_{on}$		—	3	—	
Turn-off Time	$t_{off}$		—	3	—	
Turn-on Time	$t_{ON}$	$R_L = 1.9k\Omega$ (Fig.1) $V_{CC} = 5V, I_F = 16mA$	—	2	—	$\mu s$
Storage Time	$t_s$		—	25	—	
Turn-off Time	$t_{OFF}$		—	40	—	

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V_{CC}$	—	5	48	V
Forward Current	$I_F$	—	16	20	mA
Collector Current	$I_C$	—	1	10	mA
Operating Temperature	$T_{opr}$	-25	—	85	°C

Fig.1 SWITCHING TIME TEST CIRCUIT

