Data Sheet

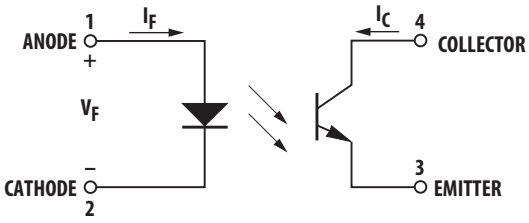
HCPL-181

Phototransistor Optocoupler SMD Mini-Flat Type

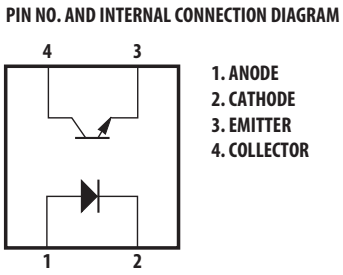
Description

The Broadcom® HCPL-181 contains a light-emitting diode optically coupled to a phototransistor. It is packaged in a 4-pin mini-flat SMD package with a 2.0-mm profile. The small dimension of this product allows significant space saving. The package volume is 30% smaller than that of conventional DIP type. Input-output isolation voltage is 3750 Vrms. Response time, t_r, is typically 4 µs and minimum CTR is 50% at input current of 5 mA.

Schematic



Functional Diagram



Features

- Current transfer ratio
  (CTR: minimum 50% at I_F = 5 mA, V_{CE} = 5V)
- High input-output isolation voltage
  (V_{iso} = 3750 Vrms)
- High collector-emitter voltage (V_{CEO} = 80V)
- Response time
  (t_r: typical, 4 µs at V_{CE} = 2V, I_C = 2 mA, R_L = 100Ω)
- Mini-flat package (2.0-mm profile) in tape and reel package
- UL approved
- CSA approved
- IEC 60747-5-5 approved
- Options available:
  – IEC 60747-5-5 approvals (060)

Applications

- I/O interfaces for computers
- System appliances, measuring instruments
- Signal transmission between circuits of different potentials and impedances
- Feedback circuit in power supply

CAUTION! It is advised that normal static precautions be taken in handling and assembly of this component to prevent damage and/or degradation which may be induced by ESD.
The components featured in this data sheet are not to be used in military or aerospace applications or environments.

Ordering Information

HCPL-181 is UL Recognized with 3750 Vrms for 1 minute per UL1577 and is approved under CSA Component Acceptance Notice #5, File CA 88324.

Part Number	RoHS Compliant Option					Package	Surface Mount	Tape and Reel	IEC 60747-5-5	Quantity
	Rank '0' 50% < CTR < 600%	Rank 'A' 80% < CTR < 160%	Rank 'B' 130% < CTR < 260%	Rank 'C' 200% < CTR < 400%	Rank 'D' 300% < CTR < 600%					
HCPL-181	-000E	-00AE	-00BE	-00CE	-00DE	SO-4	X	X		3000 pieces per reel
	-060E	-06AE	-06BE	-06CE	-06DE	SO-4	X	X	X	3000 pieces per reel

To order, choose a part number from the part number column and combine with the desired option from the option column to form an order entry.

Example 1:

HCPL-181-00AE to order product of Miniflat-4 DC Surface Mount package in Tape and Reel packaging with 80%<CTR<160% and RoHS compliant.

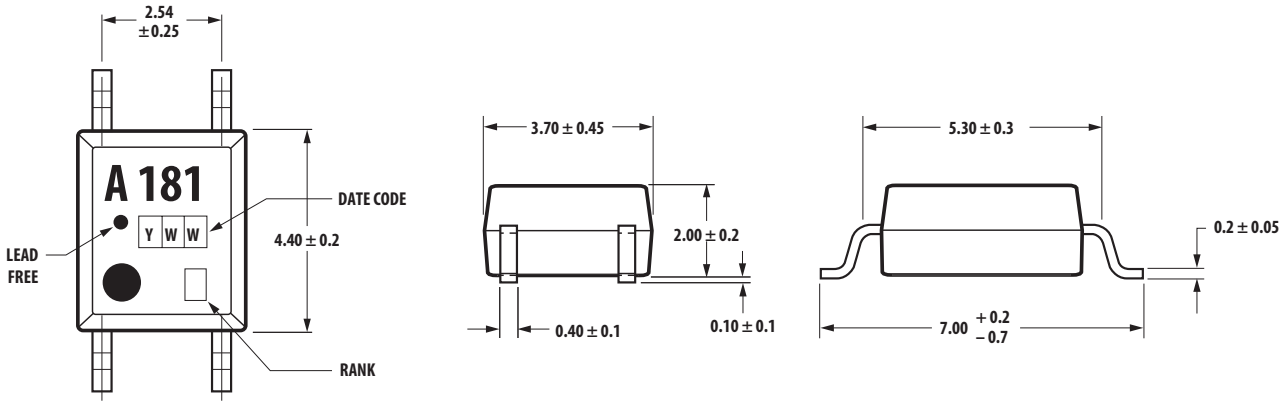
Example 2:

HCPL-181-060E to order product of Miniflat-4 DC Surface Mount package in Tape and Reel packaging with 50%<CTR<600%, IEC 60747-5-5 Safety Approval and RoHS compliant.

Option data sheets are available. Contact your Broadcom sales representative or authorized distributor for information.

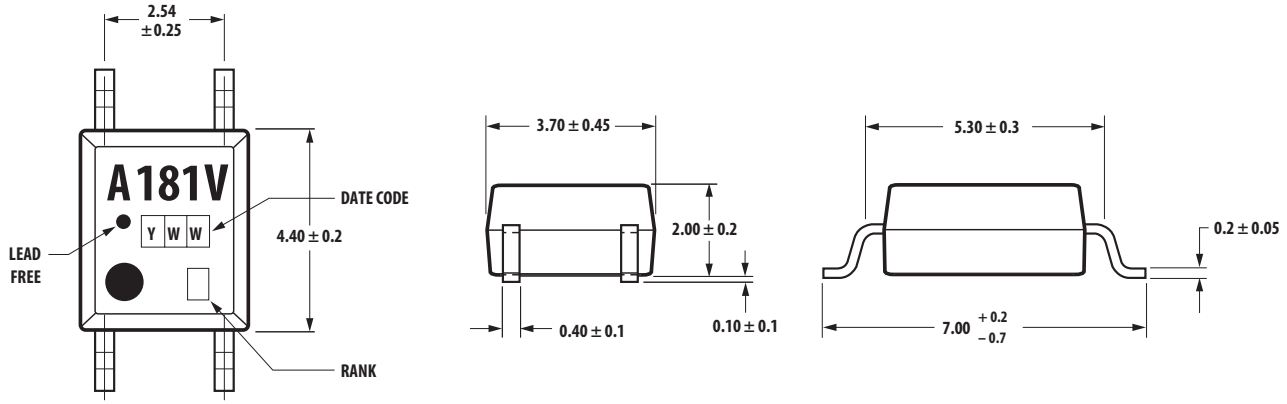
Package Outline Drawings

HCPL-181-000E



DIMENSIONS IN MILLIMETERS.

HCPL-181-060E

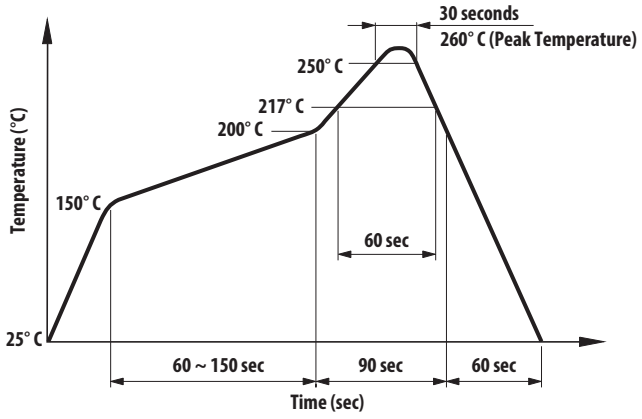


DIMENSIONS IN MILLIMETERS.

Solder Reflow Temperature Profile

1. One-time soldering reflow is recommended within the condition of temperature and time profile shown at right.
2. When using another soldering method such as infrared ray lamp, the temperature may rise partially in the mold of the device. Keep the temperature on the package of the device within the condition of Step 1.

NOTE: Non-halide flux should be used.



Absolute Maximum Ratings (T_A = 25°C)

Description	Value
Storage Temperature, T_S	–55°C to +155°C
Operating Temperature, T_A	–55°C to +100°C
Lead Solder Temperature, maximum (1.6 mm below seating plane)	260°C for 10s
Average Forward Current, I_F	50 mA
Reverse Input Voltage, V_R	6V
Input Power Dissipation, P_I	70 mW
Collector Current, I_C	50 mA
Collector-Emitter Voltage, V_{CEO}	80V
Emitter-Collector Voltage, V_{ECO}	6V
Collector Power Dissipation	150 mW
Total Power Dissipation	170 mW
Isolation Voltage, V_{iso} (AC for 1 minute, R.H. = 40% ~ 60%)	3750 Vrms

Rank Mark	CTR (%)	Conditions
A	80 ~ 160	I_F = 5 mA, V_{CE} = 5V, T_A = 25°C
B	130 ~ 260	
C	200 ~ 400	
D	300 ~ 600	

Electrical Specifications (T_A = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F	—	1.2	1.4	V	I_F = 20 mA
Reverse Current	I_R	—	—	10	µA	V_R = 4V
Terminal Capacitance	C_t	—	30	250	pF	V = 0, f = 1 kHz
Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE} = 20V
Collector-Emitter Breakdown Voltage	BV_{CEO}	80	—	—	V	I_C = 0.1 mA, I_F = 0
Emitter-Collector Breakdown Voltage	BV_{ECO}	6	—	—	V	I_E = 10 µA, I_F = 0
Collector Current	I_C	2.5	—	30	mA	I_F = 5 mA, V_{CE} = 5V
Current Transfer Ratio[a]	CTR	50	—	600	%	—
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.2	V	I_F = 20 mA, I_C = 1 mA
Response Time (Rise)	t_r	—	4	18	µs	V_{CC} = 2V, I_C = 2 mA
Response Time (Fall)	t_f	—	3	18	µs	R_L = 100Ω
Isolation Resistance	R_{iso}	5×10^{10}	1×10^{11}	—	Ω	DC 500V, 40% ~ 60% RH
Floating Capacitance	C_f	—	0.6	1.0	pF	V = 0, f = 1 MHz

a. CTR = (I_C / I_F) × 100%.

Figure 1: Forward Current vs. Temperature

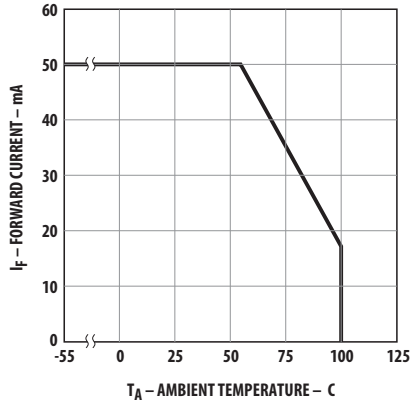


Figure 2: Collector Power Dissipation vs. Temperature

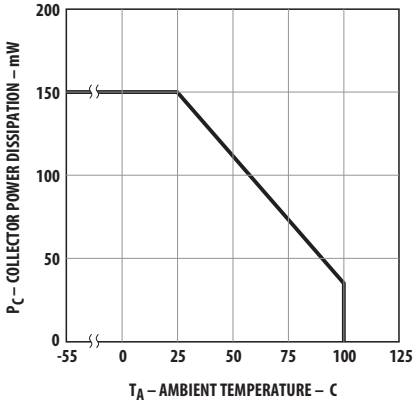


Figure 3: Collector-Emitter Saturation Voltage vs. Forward Current

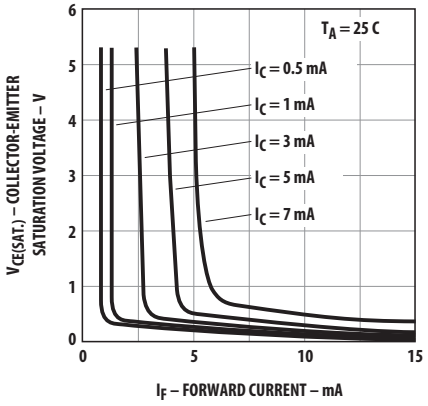


Figure 4: Forward Current vs. Forward Voltage

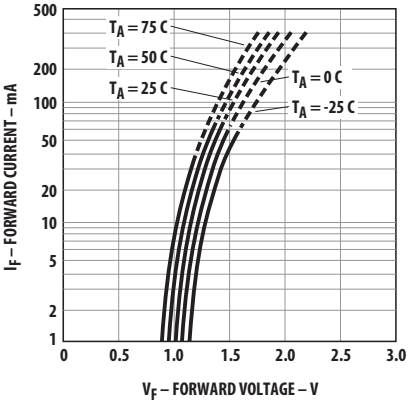


Figure 5: Current Transfer Ratio vs. Forward Current

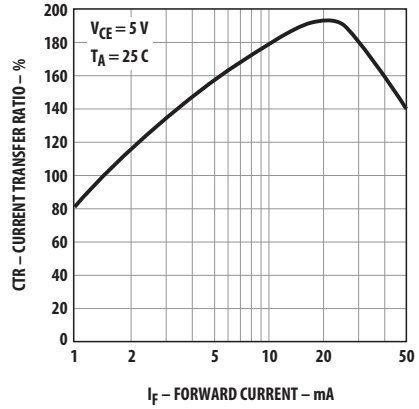


Figure 6: Collector Current vs. Collector-Emitter Voltage

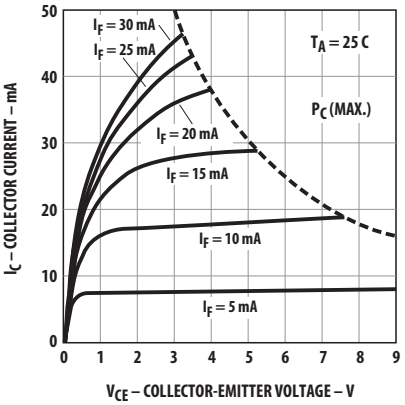


Figure 7: Relative Current Transfer Ratio vs. Temperature

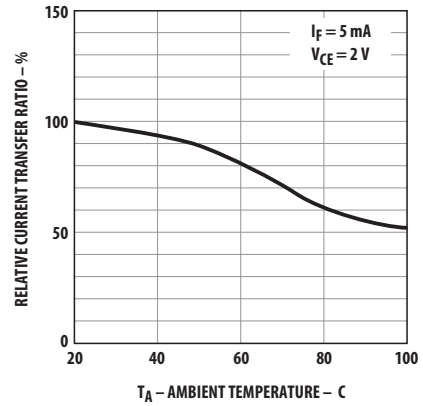


Figure 8: Collector-Emitter Saturation Voltage vs. Temperature

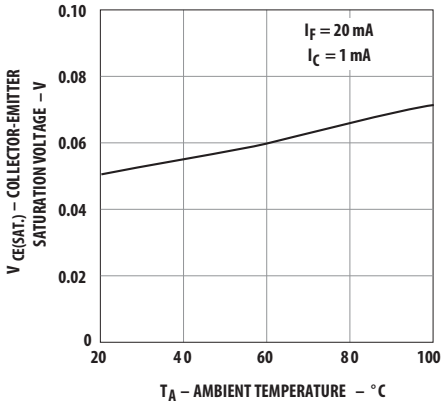


Figure 9: Collector Dark Current vs. Temperature

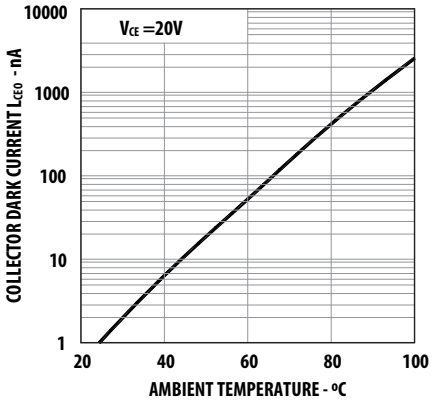


Figure 10: Response Time vs. Load Resistance

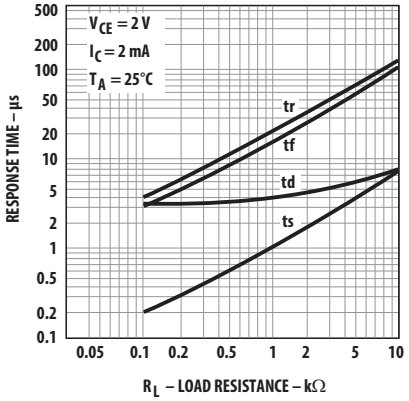
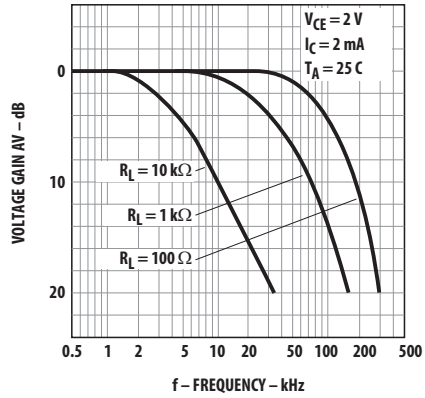
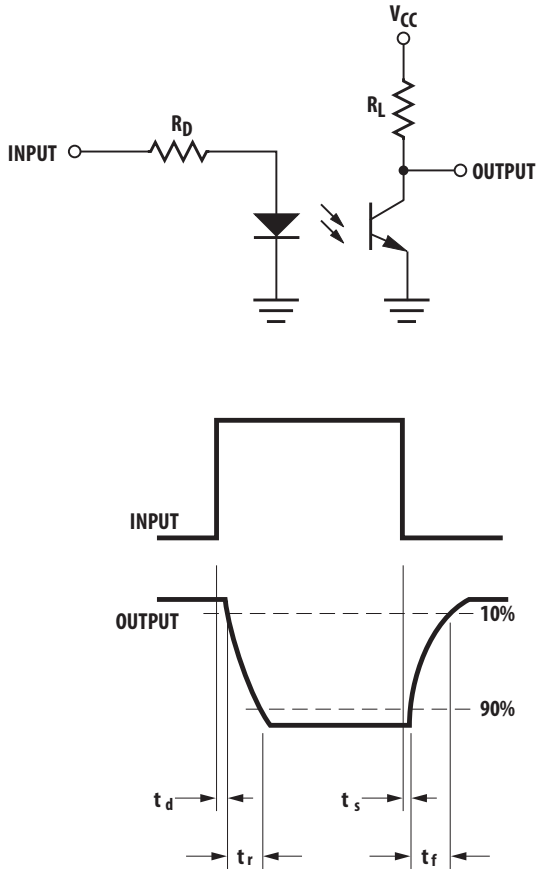


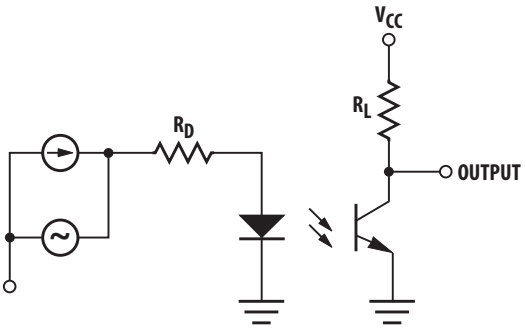
Figure 11: Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



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