

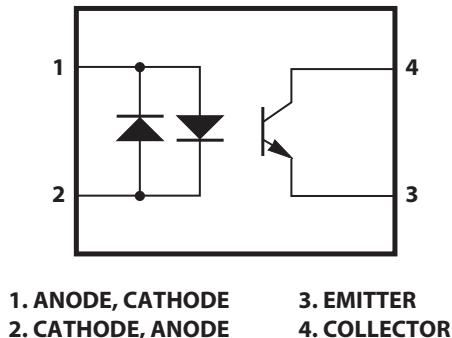
HCPL-354

AC Input Phototransistor Optocoupler SMD Mini-Flat Type

Description

The Broadcom[®] HCPL-354 contains a phototransistor, optically coupled to two LEDs connected inverse parallel. It can operate directly by AC input current. 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 savings. The package volume is 30% smaller than that of conventional DIP type. Input-output isolation voltage is 3750 V_{rms}. Response time, t_r, is typically 4 µs and minimum CTR is 20% at input current of ±1 mA.

Functional Diagram



Features

- AC input response
- Current transfer ratio
(CTR: min. 20% at I_F = ± 1 mA, V_{CE} = 5V)
- Isolation voltage between input and output
(V_{iso} = 3,750 V_{rms})
- Subminiature type
(The volume is smaller than that of conventional DIP type by as far as 30%)
- Mini-flat package
- 2.0 mm profile
- UL approved
- CSA approved
- IEC/EN 60747-5-5 approved
- Options available:
 - IEC/EN 60747-5-5 approvals (060)

Applications

- Detecting or monitoring AC signals
- Programmable controllers
- AC/DC-input modules
- AC line/digital logic isolation

CAUTION! Take normal static precautions in handling and assembly of this component to prevent damage and/or degradation that might be induced by electrostatic discharge (ESD). The components featured in this data sheet are not to be used in military or aerospace applications or environments. The components are not AEC-Q100 qualified and not recommended for automotive applications.

Ordering Information

HCPL-354 is UL Recognized with 3750 V_{rms} 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	Gull Wing	Tape and Reel	IEC/EN 60747-5-5	Quantity
	Rank '0' 20%<CTR<400%	'Rank 'A' 50%<CTR<150%						
HCPL-354	-000E	-00AE	SO-4	X		X		3000 pieces per reel
	-060E	-06AE	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-354-00AE to order product of Miniflat-4 AC Surface Mount package in Tape and Reel packaging with 50%<CTR<150% and RoHS compliant.

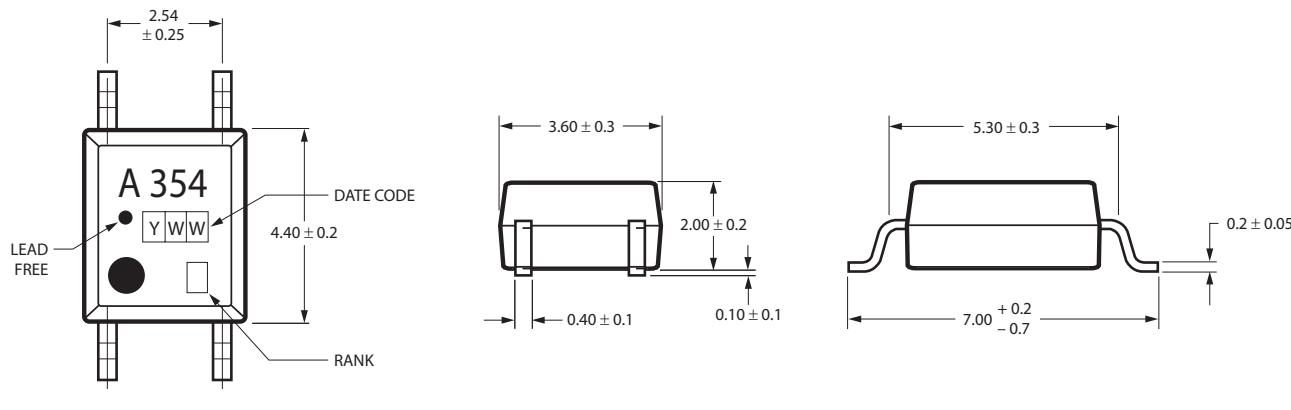
Example 2:

HCPL-354-060E to order product of Miniflat-4 AC Surface Mount package in Tape and Reel pack- aging with 20%<CTR<400%, IEC/EN 60747-5-5 Safety Approval and RoHS compliant.

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

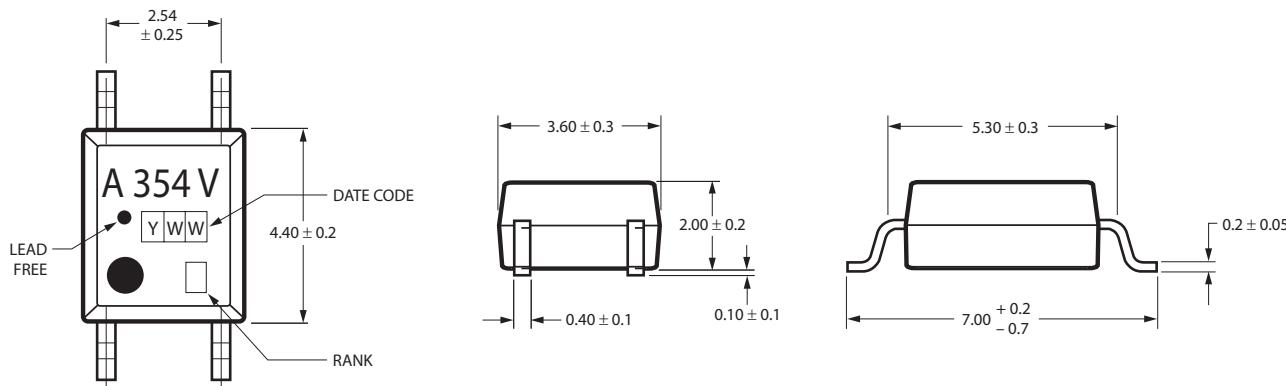
Package Outline Drawing

HCPL-354-000E



DIMENSIONS IN MILLIMETERS.

HCPL-354-060E



DIMENSIONS IN MILLIMETERS.

Solder Reflow Profile

Recommended reflow condition as per JEDEC Standard, J-STD-020 (latest revision). Non-halide flux should be used.

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Units
Storage Temperature	T _S	-55	150	°C
Ambient Operating Temperature	T _A	-55	100	°C
Lead Solder Temperature for 10s (1.6 mm below seating plane)	T _{sol}	—	260	°C
Average Forward Current	I _F	—	±50	mA
Input Power Dissipation	P _I	—	70	mW
Collector Current	I _C	—	50	mA
Collector-Emitter Voltage	V _{CEO}	—	35	V
Emitter-Collector Voltage	V _{ECO}	—	6	V
Collector Power Dissipation	P _C	—	150	mW
Total Power Dissipation	P _{tot}	—	170	mW
Isolation Voltage (AC for 1 minute, RH = 40 ~ 60%) ^a	V _{iso}	—	3750	V _{rms}

- a. Isolation voltage shall be measured using the following method:
 (a) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
 (b) The isolation voltage tester with zero-cross circuit is used.
 (c) The waveform of applied voltage is a sine wave.

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
Terminal Capacitance	C _t	—	30	250	pF	V = 0, f = 1 kHz
Collector Dark Current	I _{CEO}	—	-	100	nA	V _{CE} = 20V, I _F = 0
Collector-Emitter Breakdown Voltage	BV _{CEO}	35	—	—	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	0.2	—	4	mA	I _F = ± 1 mA
Current Transfer Ratio ^a	CTR	20	—	400	%	V _{CE} = 5V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	0.1	0.2	V	I _F = ± 20 mA, I _C = 1 mA
Isolation Resistance	R _{iso}	5 × 10 ¹⁰	1 × 10 ¹¹	—	Ω	DC 500V, 40 ~ 60% RH
Floating Capacitance	C _f	—	0.6	1	pF	V = 0, f = 1 MHz
Response Time (Rise)	t _r	—	4	18	μs	V _{CE} = 2V, I _C = 2 mA
Response Time (Fall)	t _f	—	3	18	μs	R _L = 100Ω

a. CTR = (I_C / I_F) × 100%.

Rank Mark	CTR (%)	Conditions
A	50 ~ 150	I _F = ± 1 mA, V _{CE} = 5V, T _A = 25°C
No Mark	20 ~ 400	

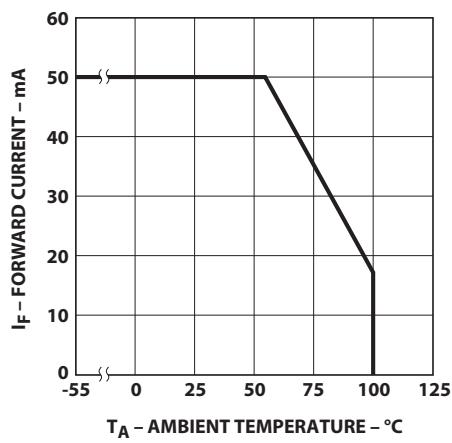
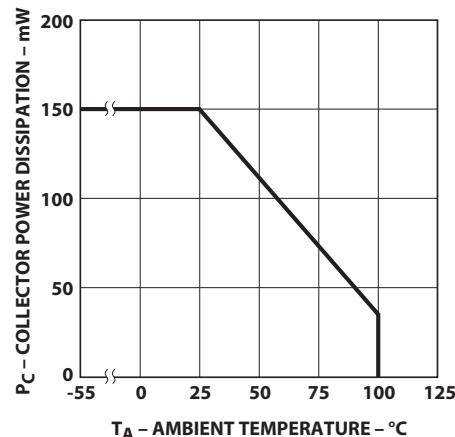
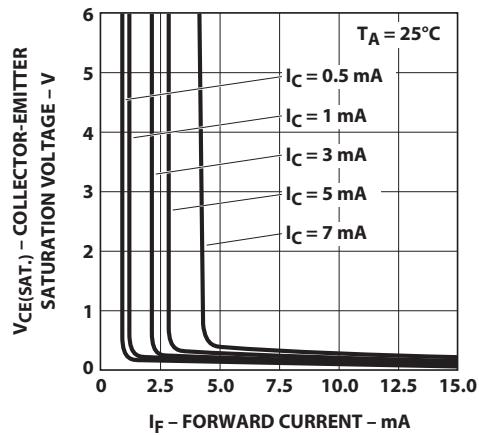
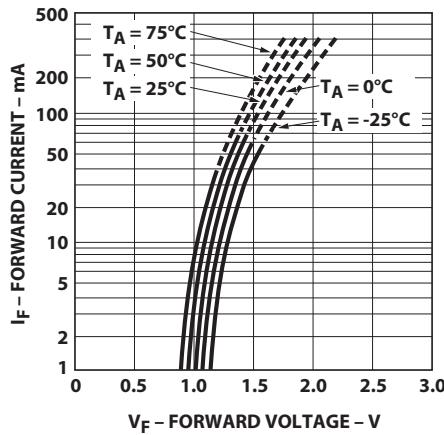
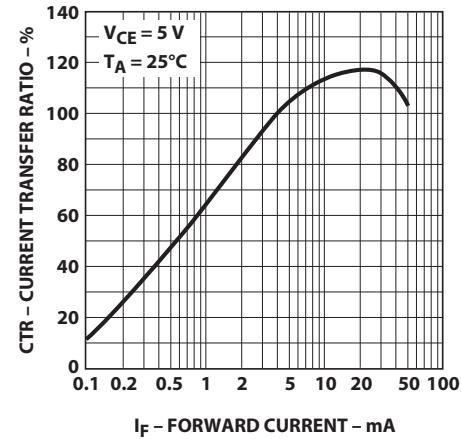
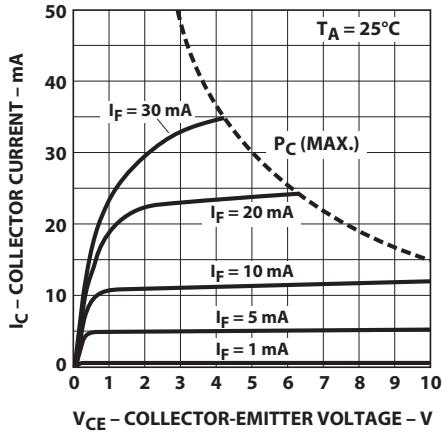
Figure 1: Forward Current vs. Ambient Temperature**Figure 2: Collector Power Dissipation vs. Ambient Temperature****Figure 3: Collector-Emitter Saturation Voltage vs. Forward Current****Figure 4: Forward Current vs. Forward Voltage****Figure 5: Current Transfer Ratio vs. Forward Current****Figure 6: Collector Current vs. Collector-Emitter Voltage**

Figure 7: Relative Current Transfer Ratio vs. Ambient Temperature

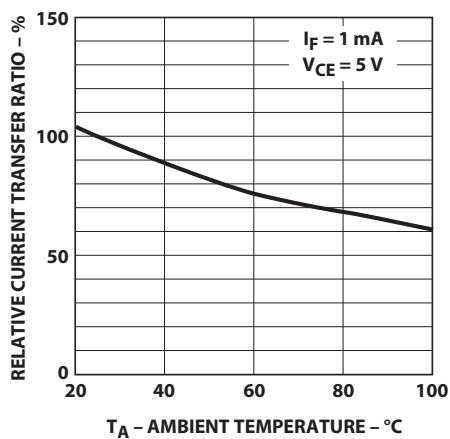


Figure 8: Collector-Emitter Saturation Voltage vs. Ambient Temperature

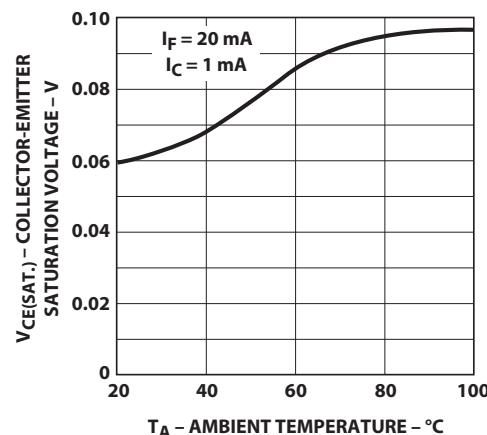


Figure 9: Collector Dark Current vs. Ambient Temperature

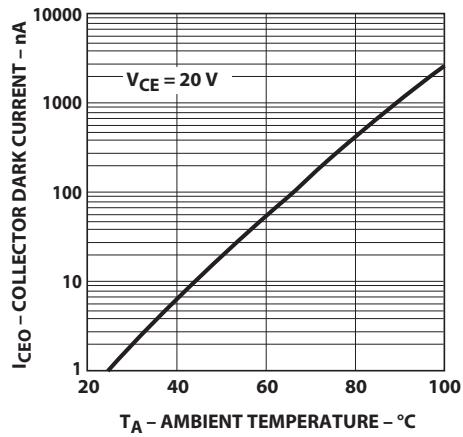


Figure 10: Response Time vs. Load Resistance

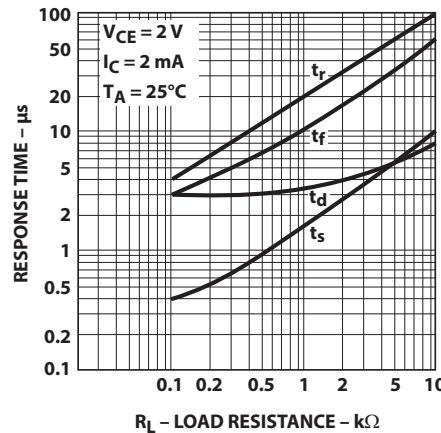


Figure 11: Frequency Response

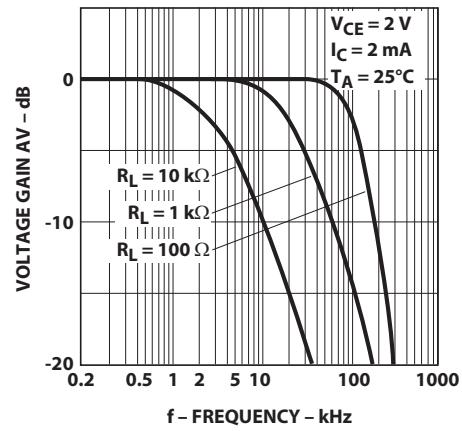
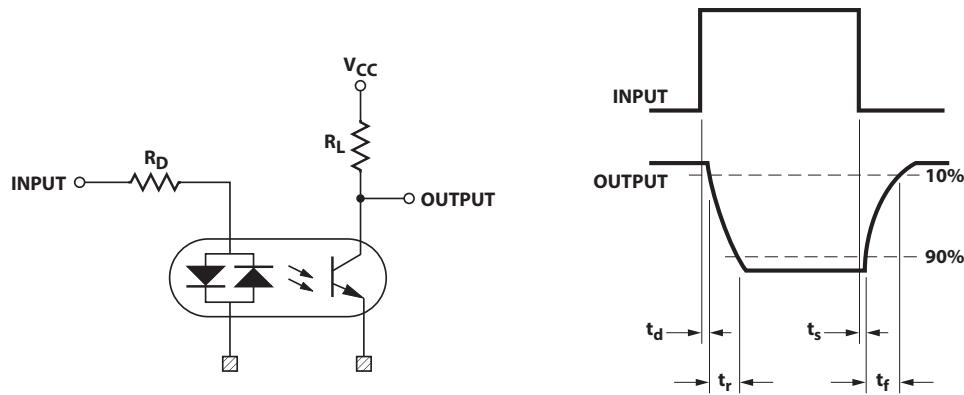
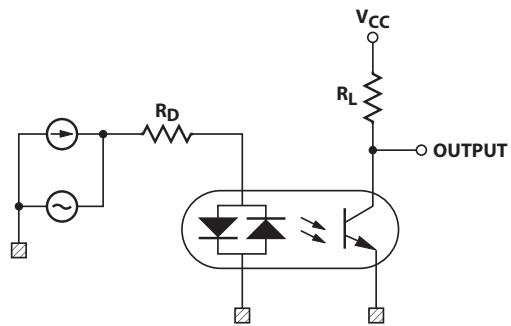


Figure 12: Test Circuit for Response Time**Figure 13: Test Circuit for Frequency Response**

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