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CC6407E 5V/12V/24V 300mA Single Coil Fan Driver with Reverse Battery Protection

FEATURES

- Built-in Reverse Power Protection
- Low Power Consumption, Quiescent Current is 2mA
- Integrated Low RDSON Full-bridge Driver
- Current Drive Capability: 300mA
- Built-in Over-temperature Protection Circuit
- Excellent Temperature Stability
- Resistant to Mechanical Stress
- ESD (HBM) 4kV
- The products provided are all A-class products.

APPLICATIONS

- Single Coil Brushless DC Fan
- Single Coil Brushless DC Motor

GENERAL DESCRIPTION

CC6407E is a one-chip solution for driving single-coil DC brushless fans and motors. The IC is designed and manufactured using an innovative, advanced high-voltage BiCMOS process optimized for Hall sensors and motor drives. The chip includes a reverse power supply protection module, a high-sensitivity Hall sensor, a chopper offset cancellation module, a Hall temperature compensation unit, a voltage regulator, over-temperature protection, and a low R_{DSON} full-bridge driver and so on. The CC6407E has low power consumption and quiescent current of only 2mA,which help improve fan efficiency and reliability. CC6407E only provides Class A products, reducing the cost of customer stocking.

CC6407E is available in TO-94 ,SOT335 and CPC8-4 packages. Comply with RoHS requirements. It's operating ambient temperature range is -40~125°C.



FUNCTION BLOCK DIAGRAM

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ORDERING INFORMATION

Part No.	Packing Code	Package Form				
CC6407ETO	TO-94	bulk, 1000 pcs/bulk				
CC6407ESS	SOT335	tape reel,10000 pcs/reel				
CC6407ESS4	CPC8-4	tape reel, 5000 pcs/reel				

PINOUT DIAGRAM







TO-94

SOT335

CPC8-4

Pin Name	Number(TO-94)	Number(SOT335)	Number(CPC8-4)	Function
VDD	1	5	4	Supply Voltage
OUT1	2	3	1	H bridge output 1
OUT2	3	2	2	H bridge output 2
GND	4	4	3	GND
NC	-	1	-	NC

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol		Value	Unit
Fan Supply Voltage	V	DD	-40~42	V
Output Voltage	Vo	TUC	-0.3~V _{DD} +0.3	V
Peak Output Current	lo	UTP	600	mA
Continuous Output Current		TO-94	300	m۸
	IOUTC	SOT335	200	ШA
Junction Temperature	F	ΓJ	150	°C
Thormal Posistance Junction Ambient	R _{thJA}	TO-94	227	°C/M
		SOT335	195	C/VV
Storage Temperature	Г	ſs	-55~150	°C
Magnetic Flux Density	В		Unlimited	mT
Electrostatic Discharge Voltage	н	BM	4	kV

Note: Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.



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RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol		Min.	Max.	Unit
Fan Supply Voltage	V _{DD}		3	32	V
	I _{FAN}	TO-94	-	300	mA
		SOT335	-	200	
Ambient temperature	TA		-40	125	°C

ELECTRICAL PARAMETERS (VDD=24V @ TA=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit
Fan Supply Voltage	V _{DD}	-	3	-	36	V
Supply Current	I _{DD}	-	-	2	4	mA
Output VSAT(SINK)	VSAT(SINK)	Iout=200mA	-	0.4	-	V
	V _{SAT(SOURCE)}	I _{ОUT} =200mА	-	V _{DD} -0.4	-	V
Output Rise Time	tr	$R_L=820\Omega$, $C_L=20pF$	-	1	-	us
Output Fall Time	t _f	$R_L=820\Omega$, $C_L=20pF$	-	3	-	us
Output Dead Time	t _{DEAD}	$R_L=820\Omega$, $C_L=20pF$	-	12	-	us
Over Temperature Protection ①	T _{SD}			160		°C
OTP Hysteresis	∆Tsd			30		°C

Note: 1 Guaranteed by design.

MAGNETIC SPECIFICATIONS (the magnetic field is positive by the south pole applied to the chip silk screen)

Parameter	Symbol	Min.	Тур.	Max.	Unit
Operate Point	BOP	10	30	50	Gs
Release Point	B _{RP}	-50	-30	-10	Gs
Hysteresis	Внуз	40	60	80	Gs

DRIVER OUTPUT vs. MAGNETIC POLE

Parameter	Test Condition	OUT1	OUT2
North Pole	B < B _{RP}	High	Low
South Pole	B > B _{OP}	Low	High

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TYPICAL APPLICATION CIRCUIT



Note:

a) The bypass RC circuit (recommended) can reduce the electromagnetic noise of the fan, absorb the surge current of the fan coil, and improve the reliability of the fan. The specific parameters are related to the actual model, rotating current, starting current, etc.

b) TVS is optional, which can improve the ability to absorb external abnormal conditions.



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CURVE & WAVEFORM (VDD=18V @ TA=25°C, unless otherwise specified)



 $I_{\text{DD}} \text{ vs. } V_{\text{DD}}$

BOP & BRP & BHYS VS. VDD



H-bridge Output Resistance vs. IOUT

H-bridge Output Resistance vs. V_{DD}

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MAXIMUM DRIVE CURRENT

The power dissipation of CC6407E is determined by the following equation (Note: K is the recommended coefficient):

$$P_{D(MAX)} = (T_J - T_A)/R_{thJA} \times K$$

While normal operation, the power dissipated in CC6407E:

$$\mathsf{P} = \mathsf{I}_{OUT}^2 \times \mathsf{R}_{ON} + \mathsf{V}_{DD} \times \mathsf{I}_{DD}$$

The output current is calculated as follows:

$$I_{MAX} = \sqrt{(P_{D(MAX)} - V_{DD} \times I_{DD})/R_{ON}}$$

the PD curve and the output current curve:



Power Dissipation of TO-94

Maximum Output Current of TO-94



Power Dissipation of SOT335



Maximum Output Current of SOT335



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PACKAGE INFORMATION

1) TO-94 Package



Symphol	Size(mm)				
Symbol	Min.	Тур.	Max.		
A	1.400	1.600	1.800		
A1	0.700	0.800	0.900		
A2	0.500	0.600	0.700		
b	0.360	0.430	0.500		
b1	0.380	0.465	0.550		
с	0.360	0.435	0.510		
D	4.980	5.130	5.280		
D1	4.921	4.941	4.961		
E	3.450	3.600	3.750		
е	1.270TYP				
e1	3.710	3.810	3.910		
L	14.900	15.100	15.300		
Q	10°TYP				

Note:

1. All dimensions are in millimeters.

2. In order to maintain the reliability, it is suggested that the pin length should be greater than 2.5mm.

Marking:

1 st Line: CC6407E - Name of the device
2 nd Line: XXYYWWZ
XX - assembler code
YY - assembly year (last 2 digits)

- WW assembly week number
- Z assembler code

Hall Location



Note:

1. All dimensions are in millimeters.



2) SOT335 Package



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Note:

1. All dimensions are in millimeters.

Marking on the back: 1st Line: 6407E – Name of the device

2nd Line:YYWW

YY - assembly year (last 2 digits)

WW - assembly week number

Hall Location





Carrier Tape Information



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Note:

1. All dimensions are in millimeters.

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3) CPC8-4 Package





	Size ((mm)	
Symbol	Min.	Max.	
A	2.50	2.70	
A1	0.35	0.45	
е	1.20 (BSC)	
e1	1.59 (BSC)		
В	2.50	2.70	
B1	3.90	4.10	
b	0.16	0.26	
b1	0.94	1.04	
С	0.85	1.05	
C1	0.00	0.15	
C2	0.15	0.18	
L	0.40	0.60	
θ	0°	8°	

Hall Plate Location



Note: 1. All size units are millimeters.

Marking:

- 1st: 6407E product name
- 2nd: XXYYWW
- XX internal code
- YY the last two digits of the year
- WW number of weeks

Carrier Tape Information





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TAPE AND REEL INFORMATION (SOT335 Package)





Reel Dimensions Information

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User Direction of Feed

Note:Each carrier tape has a front space of 100±5 squares and a back space of 100±5 squares.

Symbol		Size(mm)	
Symbol	Min.	Тур.	Max.
W	11.90	12.00	12.05
Ao	2.90	2.95	3.00
Bo	4.30	4.35	4.40
Ko	1.30	1.35	1.40
E	1.65	1.75	1.85
F	5.40	5.50	5.60
D1	-	1.00	1.10
Do	-	1.50	1.60
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
t	0.20	0.25	0.30

Note: 1. All dimensions are in millimeters.



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REVISION HISTORY

Revision Date	Description of Revision	
2024.06.24	Adjustment of home page format;	rov (2, 0
2024.06.24	Adjust the position of the R and C devices in the typical application circuit of the CC6407ESS.	Tev2.0

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CrossChip

CrossChip Microsystems Inc. was founded in 2013, is a national high-tech enterprise, engaged in integrated circuit design and sales. The company has strong technical strength, has more than 60 kinds of patents, mainly used in Hall sensor signal processing, with the following product lines:

- ✓ High precision linear Hall sensor
- ✓ All kinds of Hall switches
- ✓ Single phase motor drive
- Single chip current sensor
- ✓ AMR Magnetoresistance sensor
- ✓ Isolation drive class chip

Contact us

Chengdu

Address: 4th floor, unit 2, building 3, No. 88, Tianchen Road, Gaoxinxi Zone, Chengdu, Sichuan Province

Tel: + 86 - 028 - 87787685

Email: support@crosschipmicro.com

Website: https://www.crosschipmicro.com

Shenzhen

Address: 605 room, 6F, Beike building, NO.18 Keyuan Rd, Yuehai Street, Nanshan District, Shenzhen

Shanghai

Address: 602 room, Building 1, Shengda Tiandi Yuanchuanggu, No. 88, Shengrong Road, Pudong New District, Shanghai

Suzhou

Address: NO.78 Jinshan Rd East, Suzhou High-tech Zone, Huqiu District, Suzhou , Jiangsu Province

