

LB11685VH

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply voltage	V _{CC}		12.0	V
Operating supply voltage	V _{CC} op		4.5 to 18.0	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I _{CC}	FC1 = FC2 = 0V	5	10	20	mA
Internal regulate voltage	V _{REG}		3.0	3.3	3.6	V
Output voltage (source)	V _{OSOUR}	I _O = 0.8A *3		1.3	1.7	V
Output voltage (sink)	V _{OSINK}	I _O = 0.8A *3		0.5	1.3	V
Current limiter	V _{LIM}		0.268	0.300	0.332	V
MCOM pin common-input voltage range	V _{INCOM}		0		V _{CC} - 2	V
MCOM pin Source current for hysteresis	I _{COM+}	MCOM = 7V	30		80	μA
MCOM pin Sink current for hysteresis	I _{COM-}	MCOM = 7V	30		80	μA
MCOM pin hysteresis current ratio	R _{TCOM}	R _{TCOM} = I _{COM+} / I _{COM-}	0.6		1.4	
VCO input bias current	I _{VCO}	V _{CO} = 2.3V			0.2	μA
VCO oscillation minimum frequency	f _{VCOmin}	V _{CO} = 2.1V, CX = 0.015μF Design target *2		930		Hz
VCO oscillation maximum frequency	f _{VCOmax}	V _{CO} = 2.7V, CX = 0.015μF Design target *2		8.6		kHz
CX charge / discharge current	I _{CX}	V _{CO} = 2.5V, CX = 1.6V	70	100	140	μA
CX hysteresis voltage	ΔV _{CX}		0.35	0.55	0.75	
C1 (C2) charge current	I _{C1(2)+}	V _{CO} = 2.5V, C1(2) = 1.3V	12	20	28	μA
C1 (C2) discharge current	I _{C1(2)-}	V _{CO} = 2.5V, C1(2) = 1.3V	12	20	28	μA
C1 (C2) charge / discharge current ratio	R _{TC1(2)}	R _{TC1(2)} = I _{C1(2)+} / I _{C1(2)-}	0.8	1.0	1.2	
C1/C2 charge current ratio	R _{TCCHG}	R _{TCCHG} = I _{C1+} / I _{C2+}	0.8	1.0	1.2	
C1/C2 discharge current ratio	R _{TCDIS}	R _{TCDIS} = I _{C1-} / I _{C2-}	0.8	1.0	1.2	
C1 (C2) clamp voltage width	V _{CW1(2)}		1.0	1.3	1.6	V
FG output low level voltage	V _{FGL}	I _{FG} = 3mA			0.5	V
RD output low level voltage	V _{RDL}	I _{RD} = 3mA			0.5	v
Thermal shut down operating temperature *1	T _{TSD}	Junction temperature Design target *2	150	180		°C
Thermal shut down hysteresis temperature *1	ΔT _{TSD}	Junction temperature Design target *2		15		°C

*1: The thermal shut down circuit is built-in for protection from damage of IC. But its operation is out of Topr. Design thermal calculation at normal operation.

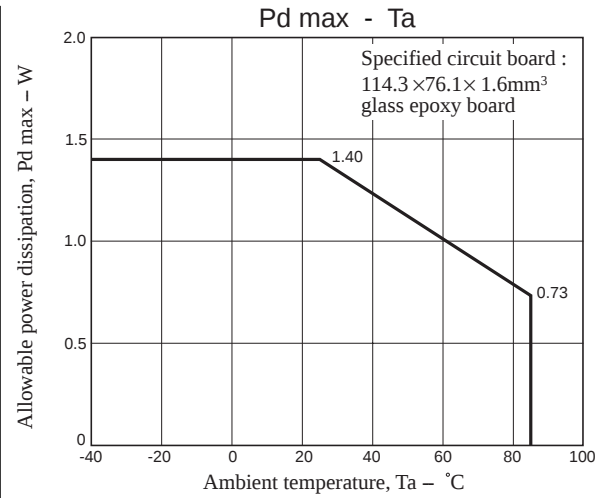
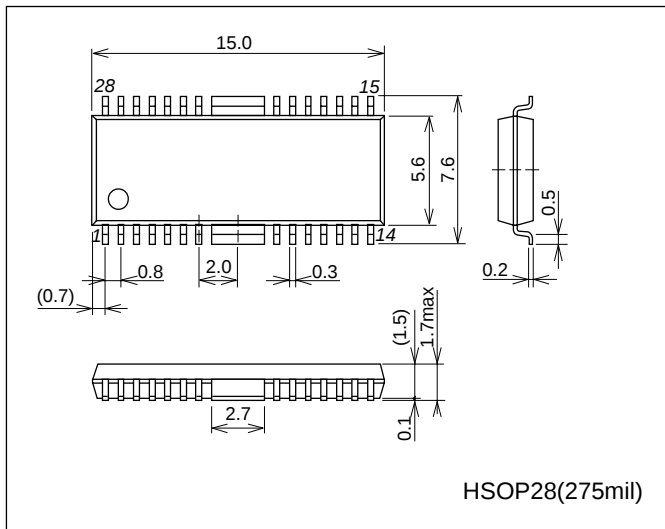
*2: Design target value and no measurement is made.

*3: The I_O is a peak value of motor-current.

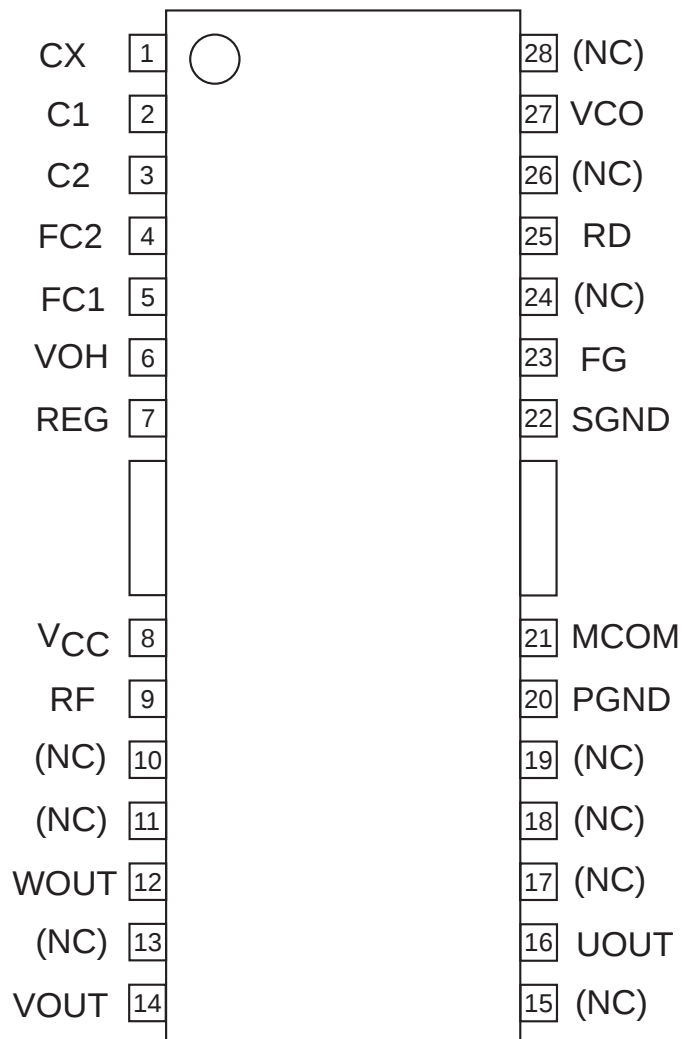
Package Dimensions

unit : mm (typ)

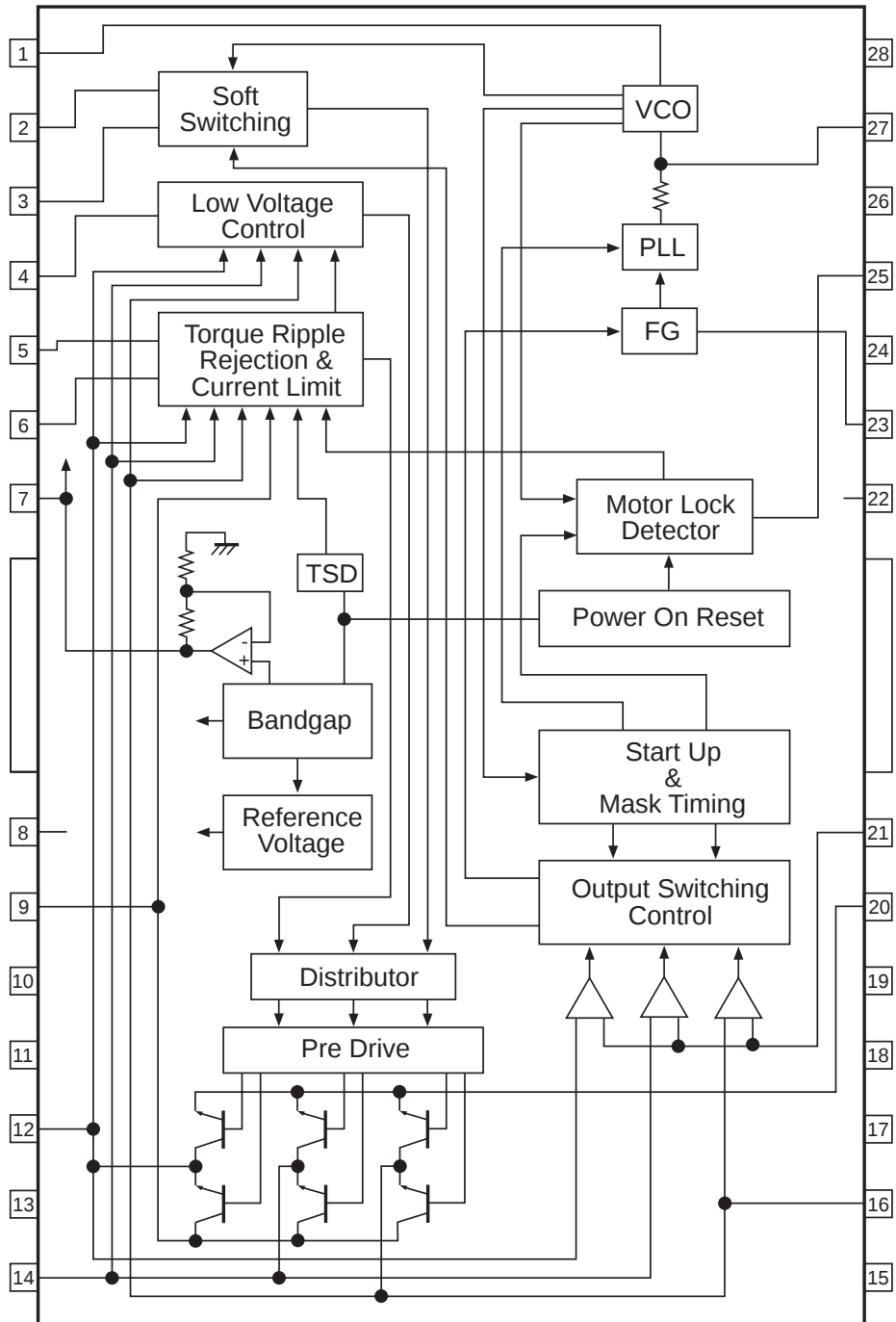
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Pin Assignment



Block Diagram



Pin Function

Pin No.	Pin name	Function	Equivalent circuit
16 12 14	UOUT WOUT VOUT	Each output pin of three phases.	
20	PGND	GND pin in the output part. This pin is connected to GND. The SGND pin is also connected to GND.	
9	RF	Pin to detect output current. By connecting a resistor between this pin and V_{CC} , the output current is detected as a voltage. The current limiter is operated by this voltage.	
21	MCOM	Motor coil midpoint input pin. The coil voltage waveform is detected based on this voltage.	
22	SGND	Ground pin (except the output part) This pin is connected to GND. The PGND pin is also connected to GND.	
23	FG	FG out made by back EMF pin. It synchronizes FG out with inverted V-phase. When don't use this function, open this pin.	
25	RD	Motor lock protection detection output pin. Output with L during rotation of motor. Open during lock protection of motor (High-impedance). When don't use this function, open this pin.	
27	VCO	PLL output pin and VCO input pin. To stabilize PLL output, connect a capacitor between this pin and GND.	
1	CX	VCO oscillation output pin. Operation frequency range and minimum frequency are determined by the capacity of the capacitor connected to this pin.	

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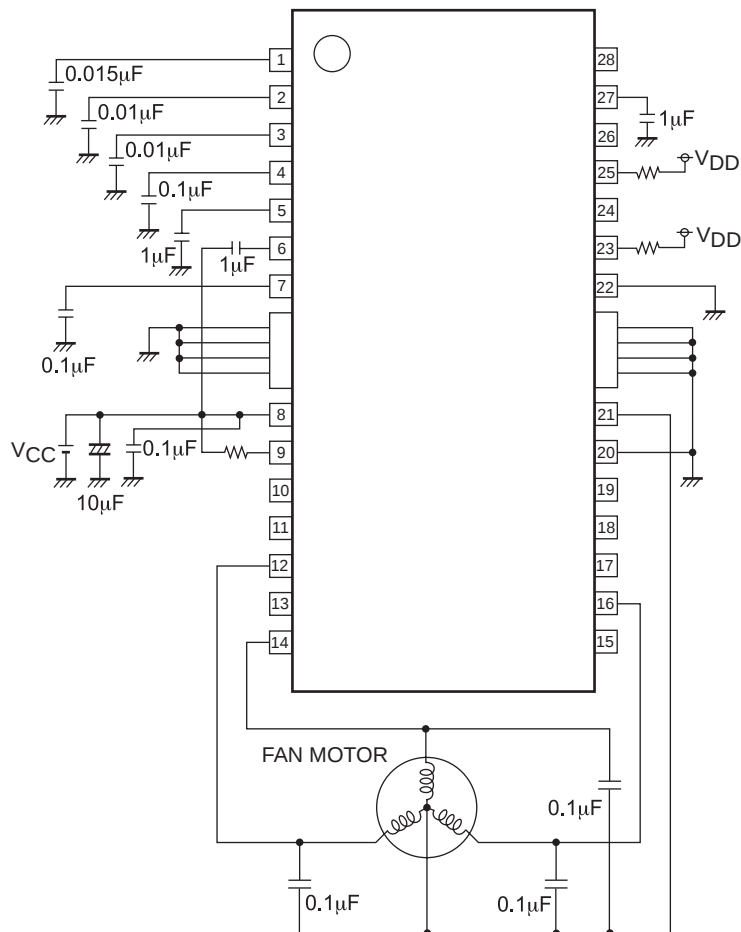
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Pin No.	Pin name	Function	Equivalent circuit
2 3	C1 C2	Soft switching adjustment pin. The triangular wave from is form formed by connecting a capacitor with this pin. And, the switching of three-phase output is adjusted by the slope.	
4	FC2	Frequency characteristic correction pin 2. To suppress the oscillation of control system closed loop of sink-side, connect a capacitor between this pin and GND.	
5	FC1	Frequency characteristic correction pin 1. To suppress the oscillation of control system closed loop of source-side, connect a capacitor between this pin and GND.	
6	VOH	Three-phase output high level output pin. To stabilize the output voltage of this pin, connect a capacitor between this pin and the VCC pin.	
7	VREG	DC voltage (3.3V) output pin. Connect a capacitor between this pin and GND for stabilization.	
19	VCC	Pin to supply power-supply voltage. To curb the influence of ripple and noise. The voltage should be stabilized.	

Application Circuit Example

* Each fixed number in the following FIG, is the referential value.



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