



F2970

Preliminary

LINEAR INTEGRATED CIRCUIT

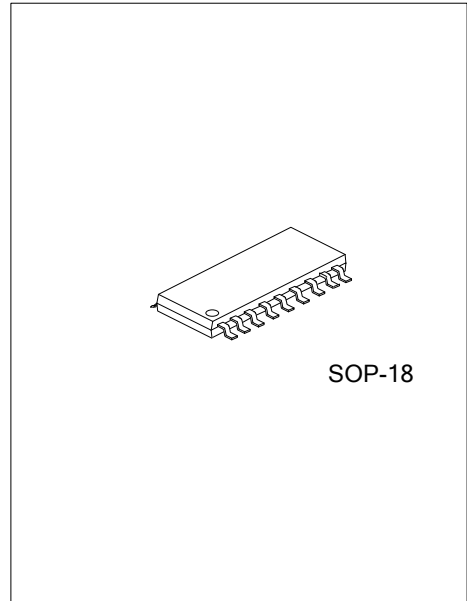
FOR FAN MOTOR SINGLE-PHASE FULL-WAVE DRIVER

DESCRIPTION

The UTC **F2970** is a single-phase full-wave bipolar driver control IC with excellent efficiency for fan motor.

FEATURES

- * Single-phase full-wave drive (16V to 1.2A transistors are built in)
- * Speed adjustment function by thermistor input and external signal incorporated
→Enables silent and low-vibration variable speed control through direct PWM control with separately-excited upper t_R
- * Kick-back absorption circuit are built in
- * Current limiter function (The limiter value determined with R_i , limit at $I_o=480mA$ with $R_L=1\Omega$ connection,)
- * Low-consumption, low-loss, and low-noise drive enabled by the soft switching circuit during phase shift
- * HB incorporated
- * Lock protection and automatic reset functions incorporated
- * FG (rotation detection) output
- * Regeneration Di incorporated with less external parts
- * Thermal shutdown circuit incorporated



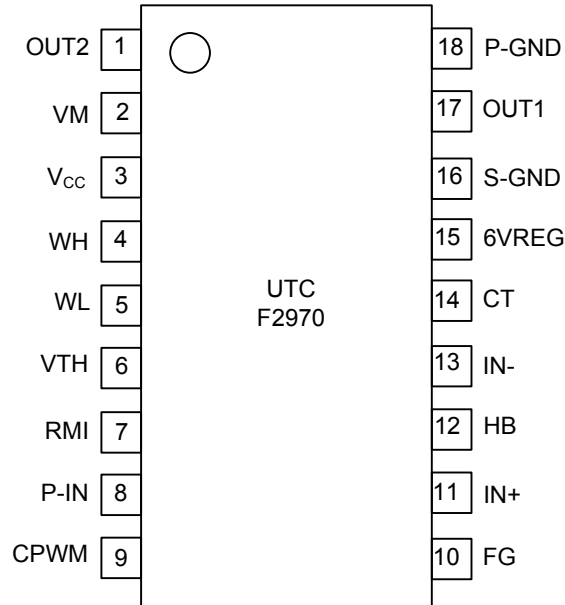
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
F2970L-S18-T	F2970G-S18-T	SOP-18	Tube
F2970L-S18-R	F2970G-S18-R	SOP-18	Tape Reel

Note: xx: Output Voltage, refer to Marking Information.

<p>F2970G-xx-S18-R</p>	<p>(1) R: Tape Reel, T: Tube (2) S18: SOP-18 (3) xx: Refer to Marking Information (4) G: Halogen Free, L: Lead Free</p>
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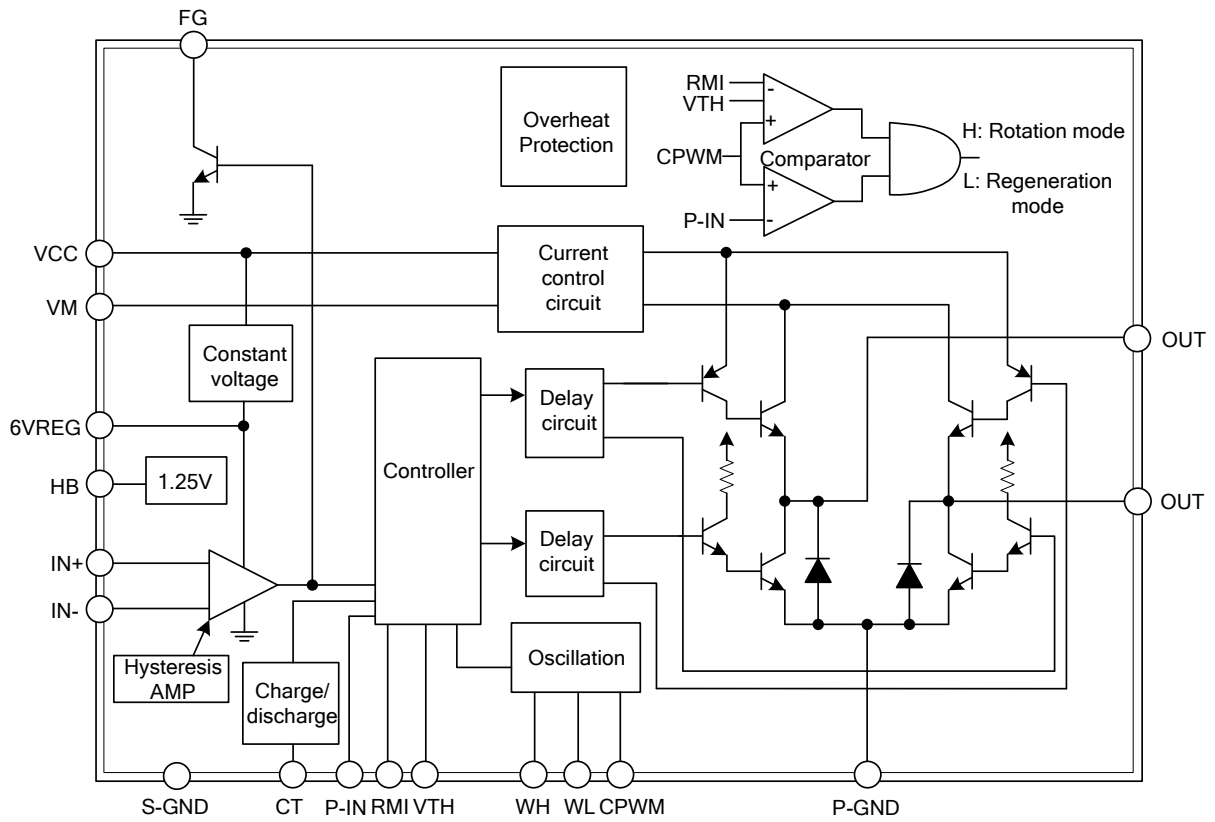
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT2	Output2
2	VM	Sense pin of current limiter
3	VCC	Power supply
4	WH	OSC input
5	WL	OSC output
6	VTH	Variable speed function input
7	RMI	Lowest speed setting voltage
8	P-IN	Dricte PWM speed control pin
9	CPWM	PWM oscillator frequency setting capacitor
10	FG	Speed detection output
11	IN+	The hall sensor input
12	HB	Power the hall sensor 1.25V
13	IN-	The hall sensor input
14	CT	Setting lock protection time
15	6VREG	V _{REF} 6V
16	S-GND	Control system GND
17	OUT1	Output1
18	P-GND	Motor system GND

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum supply Voltage V _{CC}	V _{CC}	17	V
Maximum supply Voltage V _M	V _M	17	V
OUT Pin Maximum Output Current	I _{OUT}	1.2	A
OUT Pin Output Withstand Voltage	V _{OUT}	18	V
Maximum Output Current of HB	I _{HB}	10	mA
VTH, RMI Input Pin Withstand Voltage	VTH, RMI	7	V
P-IN Input Pin Withstand Voltage	V _{P-IN}	V _{CC}	V
FG Output Pin Output Withstand Voltage	V _{FG}	18	V
FG Output Current	I _{FG}	10	mA
Allowable Power Dissipation	Specified substrate (Note 1) P _D	0.8	W
Operating Temperature	T _{OPR}	-30~90	°C
Storage Temperature	T _{STG}	-55~150	°C

Notes: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

- Specified substrate: 30mm×30mm×0.8mm, paper phenol.

■ RECOMMENDED OPERATING RANGES (T_A=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
V _{CC} Supply Voltage	V _{CC}	4.5~16	V
V _M Supply Voltage	V _M	3.5~16	V
VTH, RMI Input Level Voltage Range	VTH, RMI	0~6	V
P-IN Input Level Voltage Range	V _{P-IN}	0~V _{CC}	V
Triangular Wave Input Range	VRM	0.5~4	V
Hall Input Common Phase Input Voltage Range	V _{ICM}	0.2~3	V

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, V_{CC}=12V, R_f=0Ω, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Circuit Current	I _{CC1}	During Drive	12	15	18	mA
	I _{CC2}	During Lock Protection	11	14	17	mA
HB Voltage	V _{HB}	I _{HB} =5mA	1.12	1.22	1.32	V
6VREG Voltage	V _{6VREG}	I _{6VREG} =5mA	5.85	5.95	6.10	V
Pin-CT H Level Voltage	V _{CTH}		3.4	3.6	3.8	V
Pin-CT L Level Voltage	V _{CTL}		1.4	1.6	1.8	V
Pin-CT Charge Current	I _{CT1}			2.2		μA
Pin-CT Discharge Current	I _{CT2}			0.22		μA
CT Charge/Discharge Current Ratio	R _{CT}			6.8		
OUT Output L Saturation Voltage	V _{OL}	I _O =200mA		0.1	0.2	V
OUT Output H Saturation Voltage	V _{OH}	I _O =200mA, R _f =1Ω		0.6	0.8	V
Current Limiter	V _{Rf}			480		mV
Sensitivity of Hall Input	V _{HN}	Zero Peak Value (Including Offset and Hysteresis)		10	20	mV
FG Output Pin L Voltage	V _{FG}	I _{FG} =5mA		0.2	0.3	V
FG Output Pin Leak Current	I _{FGL}	V _{FG} =7V			30	μA
Overheat Protection	THD	Design Guarantee Value (Note 1)		180		°C

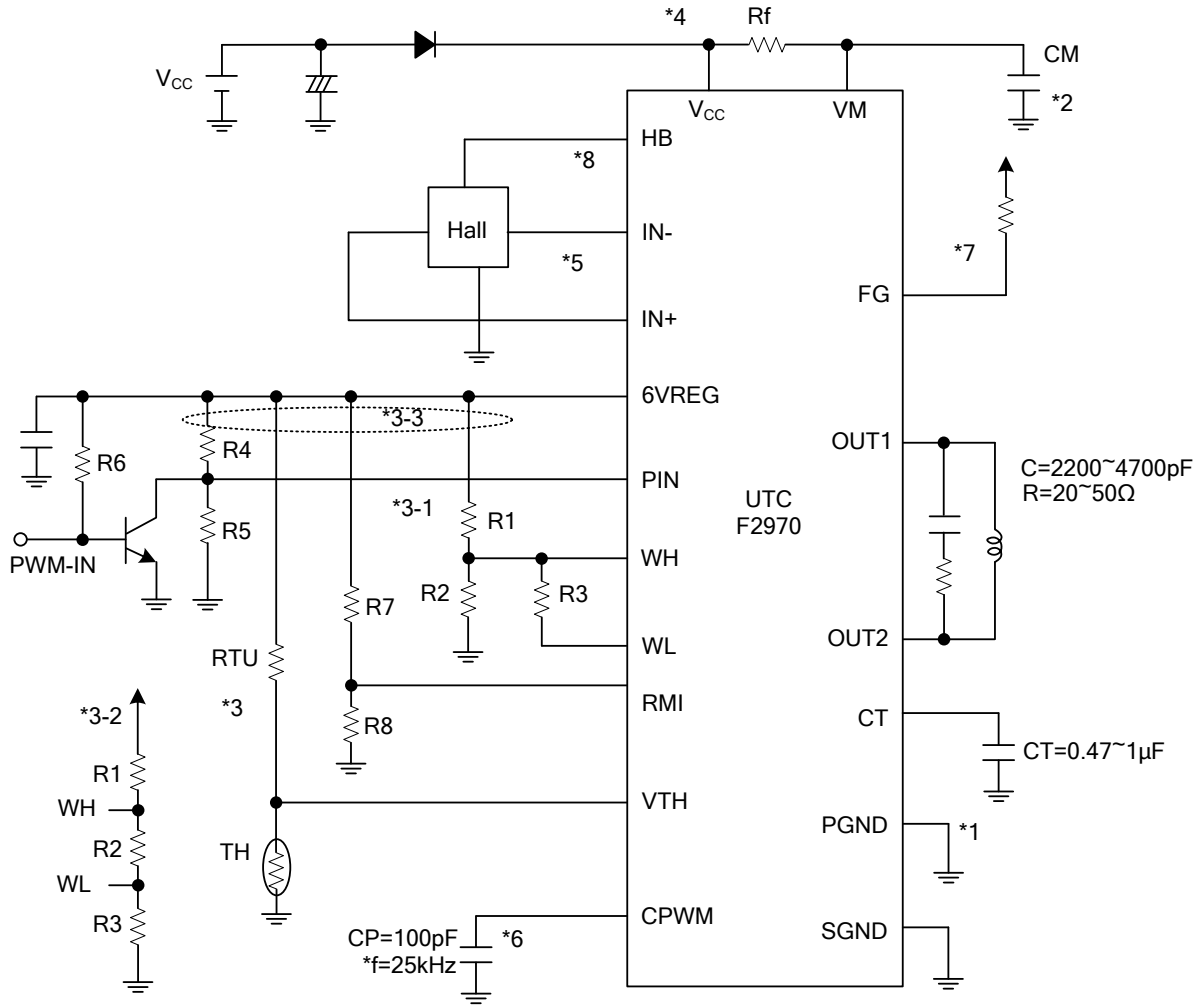
Note: 1. Design target value and no measurement was made.

■ TRUTH TABLE

VTH	PIN	IN-	IN+	CT	OUT1	OUT2	FG	Mode
L (OPEN)	L	H	L	L	H	L	L	Running-Drive
	L	L	H		L	H	OFF	
H	L	H	L		OFF	L	L	Running-Regeneration
	L	L	H		L	OFF	OFF	
-	H	H	L	L	OFF	L	L	Output Regeneration Mode with External Signal
-	H	L	H		L	OFF	OFF	
-	-	H	L	H	OFF	L	L	Lock Protection
-	-	L	H	H	L	OFF	OFF	

Notes: 1.VTH, P-IN=L means VTH, P-IN<CPWM
 2.VTH, P-IN=H means VTH, P-IN>CPWM

■ TYPICAL APPLICATION CIRCUIT



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