

7.3X Linear Fan Driver

Features

- VO Follows 7.3 Times of ADIM Voltage
- 120mV Dropout @ 0.4A
- VO Over Current, Short Circuit and Over Temperature Protection
- Enable Pin
- ADIM enable function
- Programmable Soft-Start Time
- FAULT and ALARM indicator
- 100 μ A Quiescent Current in Shutdown
- Power SOP-8 with power pad Package

General Description

The G5363 is a high performance linear fan driver designed for use in applications requiring very low drop-out voltage up to 0.3A load. The G5363 VO output voltage follows the 7.3 times of ADIM voltage until it reaches VIN voltage. An enable pin further reduces power dissipation while shut down. The G5363 provides excellent regulation over variations in line, load and temperature.

The G5363 is available in the power SOP-8 with power pad package.

Applications

- Printer Fan Driver
- Projector Cooling Fan

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G5363F11U	G5363	-40°C ~ +85°C	SOP-8 (FD)

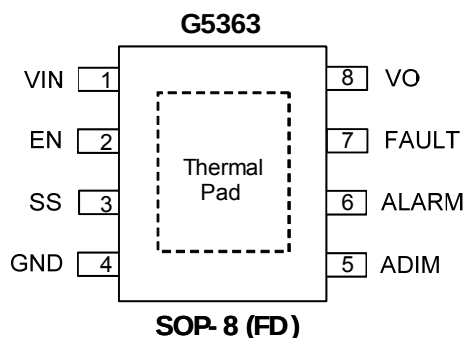
Note: F1:SOP (FD)

1: Bonding Code

U: Tape & Reel

Green : Lead Free / Halogen Free

Pin Configuration



Absolute Maximum Ratings (Note 1)

VIN, VO to GND40V
 EN to GND30V
 FAULT, ALARM, ADIM, SS to GND..... 6V
 Power Dissipation Internally Limited (Note 2)
 Maximum Junction Temperature150°C
 Storage Temperature Range -65°C ≤ T_J ≤ +150°C

Reflow Temperature (soldering, 10sec).....260°C
 Thermal Resistance Junction to Ambient, (θ_{JA}) (Note 3)
 SOP-8 (FD) 110°C/W
 Thermal Resistance Junction to Case, (θ_{JC})
 SOP-8 (FD)12°C/W
 Temperature Range -40°C ≤ T_A ≤ +85°C

Electrical Characteristics

V_{ADIM}=2.5V, V_{EN}=5V, V_{IN}=19V, I_O=0.3A, C_{IN}=2.2μF, C_{OUT}=10μF, C_{SS}=1nF, T_A=25°C.

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
VIN					
Supply Voltage Range		12	---	28	V
Quiescent Current	V _{EN} = 5V	---	3	--	mA
	V _{EN} = 0V	---	100	--	μA
VO					
ADIM Voltage Range	V _{IN} ≥ V _{ADIM} *7.3 + 0.2	0.63	---	3.3	V
Output Voltage/V _{ADIM} Voltage	V _{ADIM} = 2.5V, I _O = 0.1A	17.70	18.25	18.80	V
Line Regulation	V _{IN} =19V to 24V, V _{ADIM} = 2.5V, I _O = 0.1A	---	0.1	0.5	%
Load Regulation	20mA ≤ I _O ≤ 300mA, V _{IN} =19V, V _{ADIM} = 2.5V	---	0.5	2	%
Dropout Voltage	I _O = 0.4A, V _{ADIM} = 2.5V	---	120	---	mV
Soft Start					
Soft Start Charge Current	SS=0V	---	4	---	μA
Protection / FAULT indicator					
VO Over Current Threshold of FAULT indicator	V _{IN} =19V, V _{ADIM} = 2.5V	0.35	---	0.6	A
VO Over Current Limit	V _{IN} =19V, V _{ADIM} = 2.5V	---	0.7	---	A
VO Short Circuit Threshold	(Respective to VO) V _{IN} =19V, V _{ADIM} = 2.5V	---	70	---	%
Hiccup Time of Protection	C _{SS} =1nF, V _{IN} =19V, V _{ADIM} = 2.5V	---	4	---	ms
Over Temperature		---	150	---	°C
Over Temperature Hysteresis		---	40	---	°C
FAULT Blanking Time	(From EN high) V _{IN} =19V, V _{ADIM} = 2.5V	---	180	---	ms
ALARM Indicator					
VO Under Current	V _{IN} =19V, V _{ADIM} = 2.5V	2	4	12	mA
VO Over Voltage	V _{ADIM} = 2.5V	---	20.1	---	V
VO Under Voltage	V _{IN} =19V, V _{ADIM} = 2.5V	---	14.6	---	V
ALARM Blanking Time	(From EN high) V _{IN} =19V, V _{ADIM} = 2.5V	---	180	---	ms
ALARM Deglitch Time	(Alarm state continued occur) V _{IN} =19V, V _{ADIM} = 2.5V	---	2	---	ms
Enable					
V _{EN} Voltage High		1.65	---	---	V
V _{EN} Voltage Low		---	---	0.8	V
V _{EN} Pin Bias Source Current	V _{EN} = 0V	---	2.5	---	μA
V _{EN} Pin Bias Sink Current	V _{EN} = 5V	---	3	---	μA
ADIM Enable Threshold	Rising edge, with 50mV hysteresis	---	0.68	---	V

Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specifications might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.

Note2: The maximum power dissipation is a function of the maximum junction temperature, T_{Jmax}; total thermal resistance, θ_{JA}, and ambient temperature T_A. The maximum allowable power dissipation at any ambient temperature is (T_{Jmax}-T_A)/θ_{JA}. If this dissipation is exceeded, the die temperature will rise above 150°C and IC will go into thermal shutdown.

Note3: The package is placed on a 2-layer PCB (1oz/1oz) with minimum footprint.

Detailed Description

The G5363 is a high performance linear fan driver designed for use in applications requiring very low drop-out voltage up to 0.3A load.

Programmable Output Voltage

The G5363 VO follows 7.3 Times of ADIM Voltage The ADIM pin is also with enable function. When ADIM Voltage is rising above 0.68V, VO will turn on. And falling below 0.63V, VO will turn off.

Protection

(a) Over Current Protection (OCP):

The output current is sensed and compared to the OCP threshold, if output current exceed the threshold, the output current is limited.

(b) Short Circuit Protection (SCP):

When VO is shorted to GND, SCP is activated. The G5363 will turn off the power MOS immediately and enter hiccup protection mode. After a whole hiccup period, the G5363 will enable and soft start again.

(c) Over Temperature Protection (OTP):

An on chip thermal sensor is embedded to limit the device from thermal over load (temperature>150°C). When over temperature protection occurs, the G5363 turn off the power MOS immediately and enter hiccup protection mode. After a whole hiccup period, the G5363 will try to enable and soft start again if the device is cooled down to below 110°C.

FAULT and ALARM indicator

In G5363, the FAULT and ALARM indicator will be

released after 180mS blanking time when startup. The FAULT pin is pulled low when any of the protection (OCP, SCP, OTP) occurs. The ALARM pin is pulled low when the VO over voltage (+10%) /under voltage (-20%), or the under current (UC) is detected(<4mA).

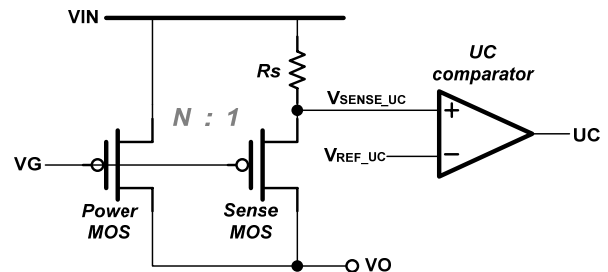


Figure-1 Block diagram of UC sense

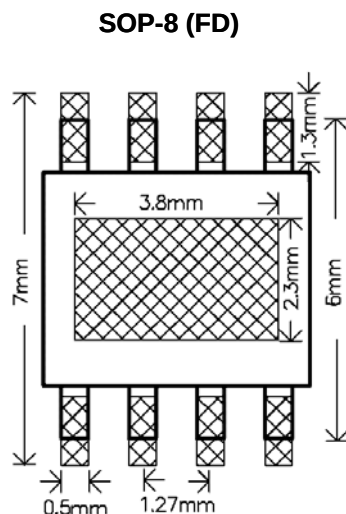
Refer to the Figure-1 - UC sense circuit, Keeping the circuit work well, it should follow the formula: $V_{IN} \geq V_{ADIM} \times 7.3 + 0.2V$, or refer to the recommendation table of ADIM voltage setting as Table-1 and Table-2. If $V_{IN} < V_{ADIM} \times 7.3 + 0.2V$, the UC would not work properly.

Programmable Soft Start

The G5363 will soft start when it turn on or recover from the protection state, including: SCP and OTP. If ADIM voltage is ready before EN asserted, the soft-start time of VO is set as:

$$T_{ss} = 250k \times C_{ss} \times V_{ADIM} \text{ (Sec)}$$

Minimum Footprint PCB Layout Section



Recommendation Table for ADIM,max voltage setting:

Vin(TYP)	Vin(min) = 95% of Vin(TYP)	ADIM	Efficiency	Power Dissipation @ 100mA
	= 7.3*ADIM(max) + 0.2		= 7.3 * ADIM(max) / Vin(TYP)	= (Vin-Vout)*100mA
[V]	[V]	[V]	[%]	[mW]
28	26.6	3.3	86.0	391
27	25.7	3.3	89.2	291
26	24.7	3.3	92.7	191
25	23.8	3.2	93.4	164
24	22.8	3.0	91.3	210
23	21.9	2.9	92.0	183
22	20.9	2.8	92.9	156
21	20.0	2.7	93.9	129
20	19.0	2.5	91.3	175
19	18.1	2.4	92.2	148
18	17.1	2.3	93.3	121
17	16.2	2.1	90.2	167
16	15.2	2.0	91.3	140
15	14.3	1.9	92.5	113
14	13.3	1.7	88.6	159
13	12.4	1.6	89.8	132
12	11.4	1.5	91.3	105

Table-1 5% VIN Variation

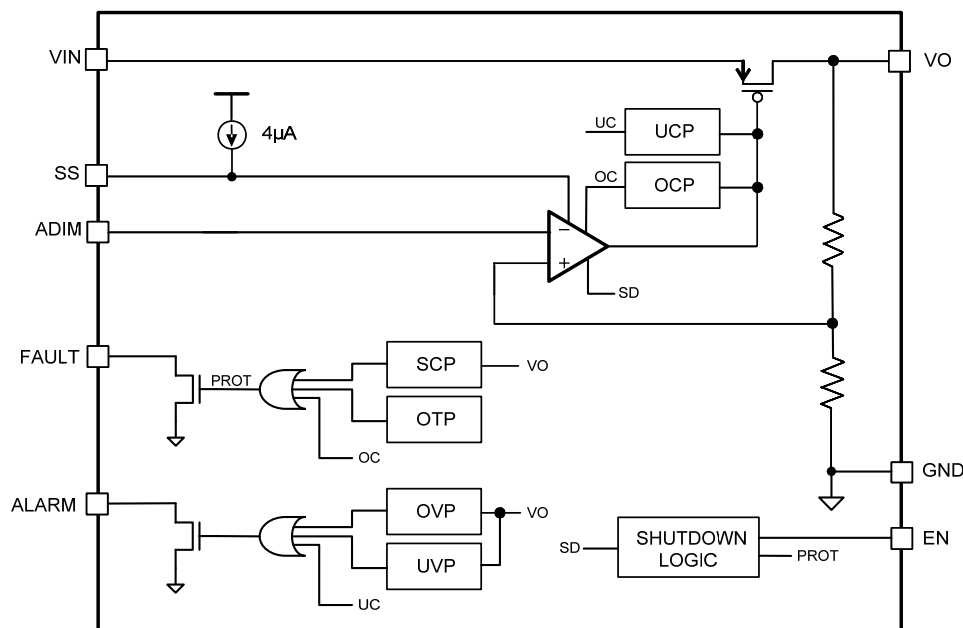
Vin(TYP)	Vin(min) = 90% of Vin(TYP)	ADIM	Efficiency	Power Dissipation @ 100mA
	= 7.3*ADIM(max) + 0.2		= 7.3 * ADIM(max) / Vin(TYP)	= (Vin-Vout)*100mA
[V]	[V]	[V]	[%]	[mW]
28	25.2	3.3	86.0	391
27	24.3	3.3	89.2	291
26	23.4	3.1	87.0	337
25	22.5	3.0	87.6	310
24	21.6	2.9	88.2	283
23	20.7	2.8	88.9	256
22	19.8	2.6	86.3	302
21	18.9	2.5	86.9	275
20	18.0	2.4	87.6	248
19	17.1	2.3	88.4	221
18	16.2	2.1	85.2	267
17	15.3	2.0	85.9	240
16	14.4	1.9	86.7	213
15	13.5	1.8	87.6	186
14	12.6	1.7	88.6	159
13	11.7	1.5	84.2	205
12	10.8	1.4	85.2	178

Table-2 10% VIN Variation

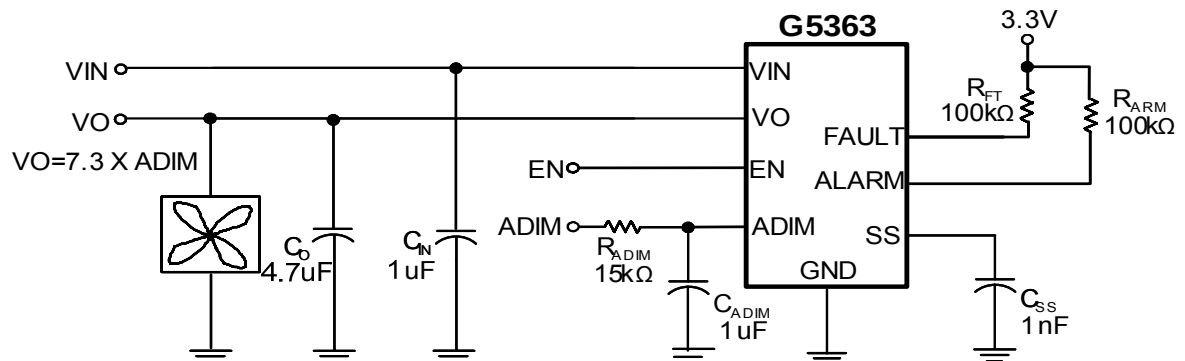
Pin Description

PIN	NAME	FUNCTION
1	VIN	Input voltage.
2	EN	Enable Input. The device will be enabled if this pin is floating.
3	SS	Setting pin for soft-start time.
4	GND	GND
5	ADIM	Analog Dimming signal input pin.
6	ALARM	Output Power Good indicator(open drain) for Output Under Current / Vo+10% / Vo-20%
7	FAULT	Output Power Good indicator(open drain) for OCP / SCP / OTP
8	VO	The power output of the device.
Thermal Pad		Recommend connecting the Thermal Pad to the GND for excellent power dissipation.

Block Diagram



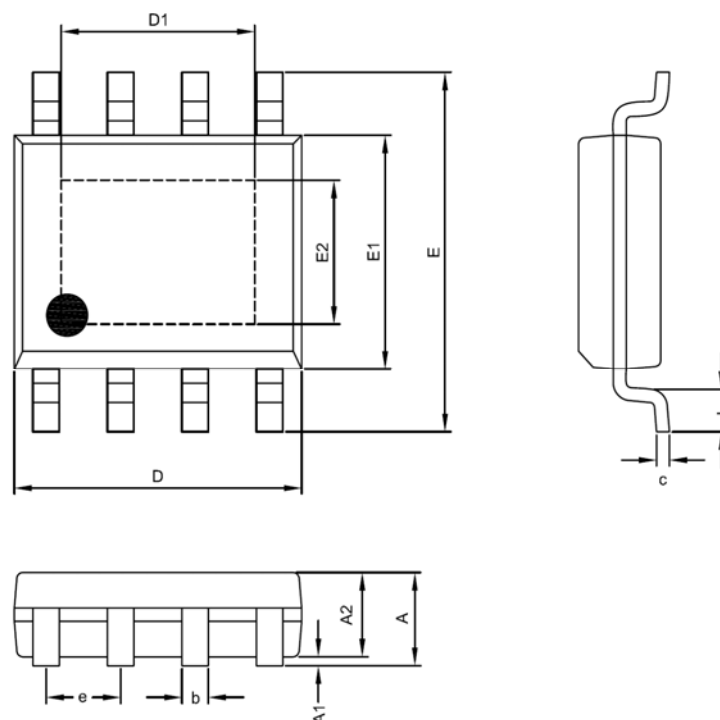
Application Circuit



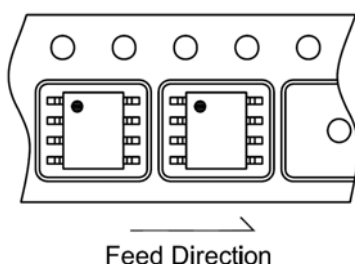
*The recommended value of Co is 4.7μF, and it should be larger than 2.2μF.

*The recommended value of C_{SS} is smaller than 20nF.

*The recommended value of R_{ADIM}*C_{ADIM} is larger than 1.5k · Co (sec).

Package Information

SOP- 8 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.60	0.053	0.061	0.063
A1	0.00	---	0.10	0.000	---	0.004
A2	1.15	1.35	1.50	0.045	0.053	0.059
D	4.80	4.90	5.00	0.189	0.192	0.197
D1	2.29	---	3.71	0.090	---	0.146
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.29	---	2.64	0.090	---	0.104
c	0.19	0.23	0.27	0.007	0.009	0.011
b	0.33	0.43	0.53	0.013	0.017	0.021
e	1.27 BSC			0.050 BSC		
L	0.40	0.70	1.00	0.016	0.028	0.039

Taping Specification


PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea

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