


**SANYO Semiconductors**

# DATA SHEET

## LA5648 — Monolithic Linear IC RCC Power Supply Controller

### Overview

The LA5648 is a controller IC for RCC power supply systems.

### Features

- RCC power supply controller
- Overcurrent detection function
- Soft start function
- Built-in UVLO circuit
- Output overcurrent protection timer function
- Base winding voltage detection function

### Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

Parameter		Symbol	Conditions	Ratings	Unit
Maximum supply voltage		$V_{CC\text{ max}}$		30	V
Output peak current		IOUT		$\pm 0.9$	A
Allowable pin voltages	OUT	VOUT	-900mA to +900mA	0 to $V_{CC}$	V
	SYC	VSYS	-2mA to +4mA	-0.3 to +2.5	V
	VPC	VPC	-600 $\mu$ A to +1mA	-0.2 to +3.5	V
	CF	VCF	-50 $\mu$ A to +5mA	-0.2 to +3.5	V
	CT	CT	-15 $\mu$ A to +500 $\mu$ A	-0.2 to +3.5	V
	OCL	OCL	-60 $\mu$ A to 0 $\mu$ A	-0.2 to +3.5	V
Allowable power dissipation		$P_d\text{ max}$	$T_a = 25^\circ\text{C}$	0.6	W
Operating temperature		$T_{opr}$		-30 to +85	$^\circ\text{C}$
Storage temperature		$T_{stg}$		-55 to +150	$^\circ\text{C}$

\* Voltages are referenced to the COM pin. The polarity of a current that flows out of the IC is regarded as negative (minus).

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# LA5648

## Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>	After UVLO release*	5.0 to 26.4	V

\* : When V<sub>CC</sub> is increasing, UVLO is released at 11V. When V<sub>CC</sub> is decreasing, UVLO operates at 3V.

## Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation 1	I <sub>CC1</sub>	When stopped	3	3.8	5	mA
Current dissipation 2	I <sub>CC2</sub>	When in 18kHz continuous oscillation mode. With a 50Ω resistor and a 1μF capacitor	3	6.4	10	mA
Output saturation characteristics (H1)	VsatH1	IOUT = -150mA		2.4	2.8	V
Output saturation characteristics (H2)	VsatH2	IOUT = -10mA		2.1	2.5	V
Output saturation characteristics (L1)	VsatL1	IOUT = 150mA		1.50	1.80	V
Output saturation characteristics (L2)	VsatL2	IOUT = 10mA		0.2	0.4	V
Output peak current (source)	IOUT_PH	Tj = 0 to 100°C, Vce = 30V, design guarantee value value*			-350	mA
Output peak current (sink)	IOUT_PL	Tj = 0 to 100°C, Vce = 30V, design guarantee value value*	700			mA
Output rise time	tr		0	1000	3000	ns
Output fall time	tf		0	1000	3000	ns
OCL1 sensitivity	VthOCL1		0.180	0.200	0.220	V
OCL1 sensitivity temperature characteristics	KOCL1	design guarantee value value*		600		PPM/°C
OCL1 response time	tOCL1		0	1000	3000	ns
OCL1 source current	IOCL1		-45	-31	-20	μA
Maximum time ratio	σMAX	When the external capacitor of 1500pF is used.	75	81	85	%
σmax pin voltage	VPCσMAX	When the external capacitor of 1500pF is used.	1.65	1.82	2.10	V
σmax source current	IPCσMAX	When the external capacitor of 1500pF is used.	-300	-200	-120	μA
σmax pin voltage	VPCσ0	When the external capacitor of 1500pF is used.	0.500	0.540	0.660	V
σmax source current	IPCσ0	When the external capacitor of 1500pF is used.	-490	-350	-240	μA
Control sensitivity	KPCσ	When the external capacitor of 1500pF is used.	51	73	80	%/V
Timer charging start current	IPClm	When the external capacitor of 1500pF is used.	113	90	67	μA
Protection time ratio	σlim	When the external capacitor of 1500pF is used.	23	31	37	%
SYC source current (Hi)	ISYC (Hi)		-18	-15	-12	μA
SYC source current (Lo)	ISYC (Lo)		-12	-10	-8	μA
SYC sensitivity (Hi)	VthSYC (Hi)	Including external 20kΩ	-0.22	-0.19	-0.16	V
SYC sensitivity (Lo)	VthSYC (Lo)	Including external 20kΩ	-0.34	-0.28	-0.21	V
SYC sensitivity temperature characteristics	KthSYC	* design guarantee value		500		PPM/°C
SYC clamp voltage (H)	VSCLMH		0.65	0.75	0.85	V
SYC clamp voltage (L)	VSCLML		-0.60	-0.38	-0.25	V
CF current when SYC operating	IOSCoff		-2	0	2	μA
Oscillation frequency	fOSC	When the external capacitor of 1500pF is used	15.8	17.5	19.3	kHz
Oscillation frequency voltage characteristics	KOSCV			15		Hz/V
Oscillation frequency temperature characteristics	KOSC	* design guarantee value		250		PPM/°C
Oscillation waveform upper limit voltage	VOSCH	When the external capacitor of 1500pF is used.	1.92	2.03	2.17	V
Oscillation waveform lower limit voltage	VOSCL	When the external capacitor of 1500pF is used.	0.75	0.89	1.00	V

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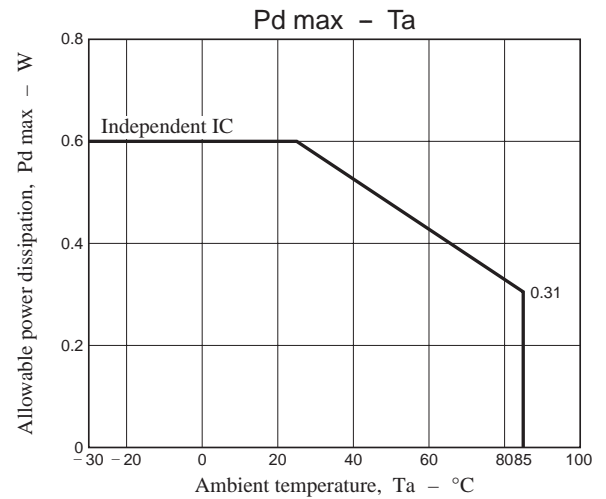
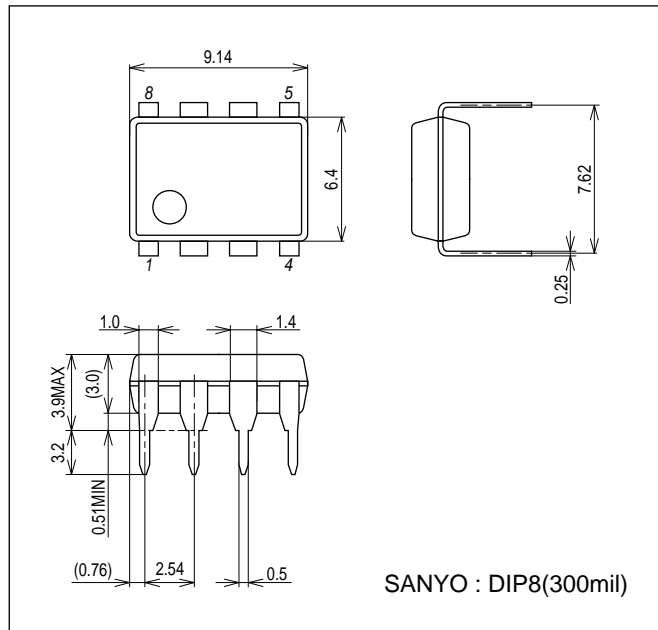
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Timer charge current	ICTCHG		-9.0	-6.0	-4.0	$\mu\text{A}$
Timer discharge current	ICTDCHG	VCT = 1V	30	55	75	$\mu\text{A}$
Timer sensitivity voltage	VCT_H		1.25	1.31	1.37	V
UVLO release voltage	VUVLO_H		9.5	10.3	11.0	V
UVLO operating voltage	VUVLO_L		2.5	3.3	4.0	V

\* : The temperature characteristics within a range of -30°C to +150°C are design guarantee values.

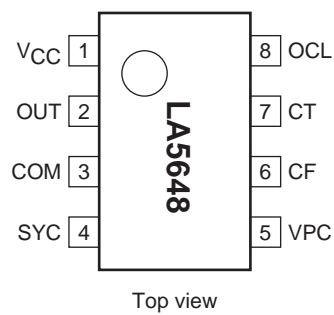
## Package Dimensions

unit : mm (typ)

3001D



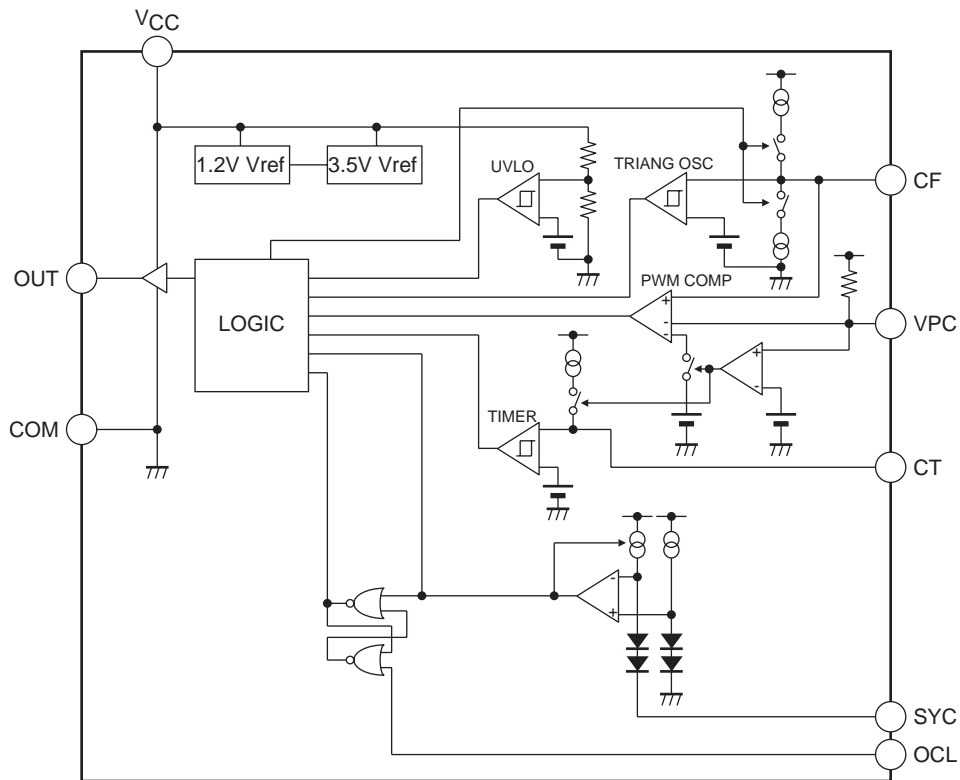
## Pin Assignment



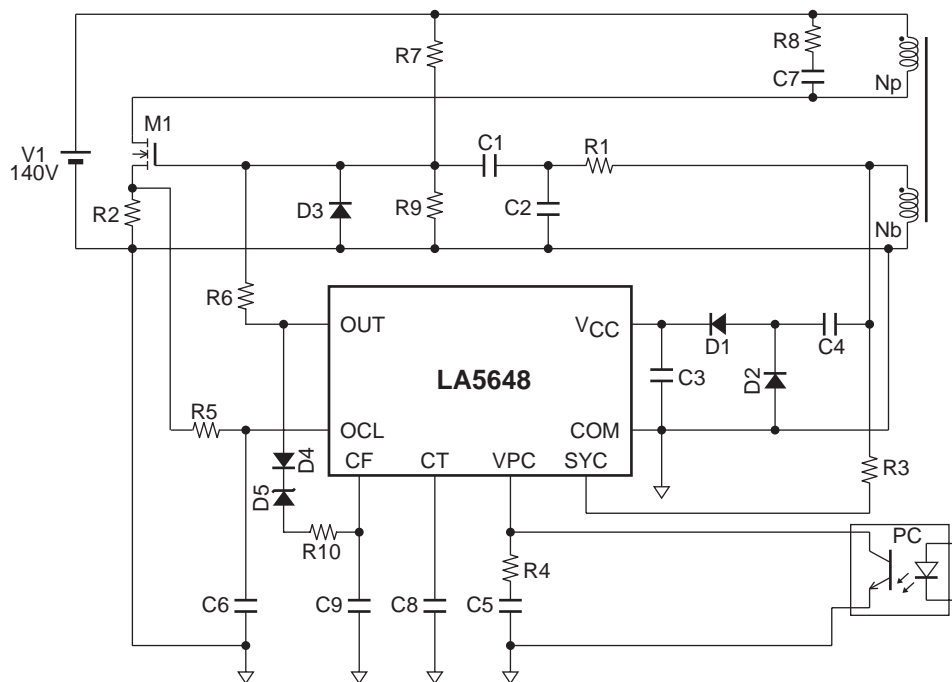
## Pin Description

Pin No.	Pin Name	Description
1	V <sub>CC</sub>	Power pin
2	OUT	Output pin. Connected to an external MOS-FET gate.
3	COM	Common potential or ground
4	SYC	Sync signal input pin. Base winding voltage is input. If this voltage is negative, the internal triangular wave oscillator stops and output is set low. The oscillator and output turn on at the timing when the voltage switches from negative to positive. Fixing this pin at a positive voltage causes the oscillator to run continually, enabling operation using the external excitation.
5	VPC	Control signal input pin. The secondary side output voltage data is sent to this pin via a photo coupler. Internal PWM comparator input. The output on time gets shorter as the input voltage lowers. The output on time is fixed when a voltage higher than a certain level is applied. The timer also starts operation.
6	CF	Oscillation capacitor connection pin.
7	CT	Timer capacitor connection pin. Charging operation starts when the VPC voltage gets higher than a certain level. Output is stopped when the CT pin voltage becomes higher than a certain level.
8	OCL	Overcurrent detection pin. Connected to the source voltage of the external MOS-FET. The output is stopped by triggering the internal FF. The internal FF is reset by the SYC pin voltage on a pulse by pulse basis.

## Block Diagram



## Sample Application Circuit



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