

Up to 2 A switching step-down regulators

A new family of compact monolithic step-down regulators for automotive applications



A597x family is composed of seven monolithic step-down switching regulators capable of delivering more than 2 A. They are housed in small outline packages such as SO-8, qualified following the AEC-Q100 requirements (Product Part Approval Process available).

Their high switching frequency and a full set of embedded protections reduce the size and number of external components, leading to a lower cost of the application.

Additional flexibility is guaranteed by an adjustable output voltage, wide input voltage range (from 4.4 V up to 36 V) and synchronization capability.

Key features

- Up to 2 A DC output current
- Qualified following the AEC-Q100 requirements (temperature Grade 3 or 1), see PPAP for more details
- 4.4 V to 36 V input voltage range
- Output voltage adjustable from 1.235 V
- 250/500 kHz switching frequency, with synchronization function
- Inhibit for zero current consumption
- 100 % duty cycle
- Voltage feed-forward
- Zero load current operation
- Overcurrent, overvoltage and thermal protection
- Small SO-8 package

Main applications

- Body:
 - Air conditioning, wiper control, power windows, seat control, car alarms
- Power train:
 - Engine cooling and management, throttle driving
- Safety and chassis:
 - Airbag systems, anti-lock brakes, traction control, electric power steering and suspension
- Car infotainment:
 - Car radios, navigation systems, telematics boxes

To satisfy the specific requirements of the automotive market, STMicroelectronics has developed a new monolithic step-down asynchronous DC-DC converters family, the A597x, qualified according to the AEC-Q100 specifications guidelines.

The operating input voltage ranges from 4.4 V to 36 V and the output voltage can be adjusted from 1.23 V up to 35 V. The output voltage has a $\pm 3\%$ precision all included: line, load and temperature.

Extreme conversion ratios are supported thanks to the short minimum conduction time of the embedded power element (around 250 ns) allowing a low output voltage to be regulated even during an overshoot of the bus. The integrated P-channel MOSFET requires no external bootstrap capacitor and allows a 100 % duty cycle.

The low $R_{DS(on)}$ (typical value of 250 m Ω) and the fast conduction times of the power element, combined with the high switching frequency (250/500 kHz), assure a very high efficiency under most application conditions. The A597xD family is thus a very attractive solution

compared to the widely used LDO regulators in the automotive segment, both in terms of size and cost of the overall application.

The low quiescent current minimizes the power consumption and so increases the battery life when the car is parked or the engine is stopped.

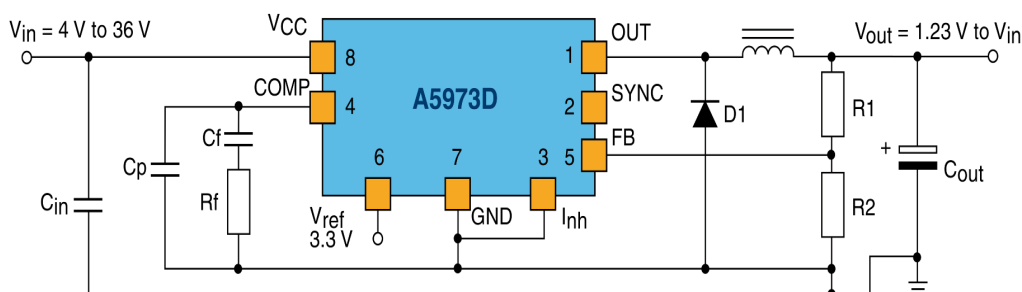
The pulse-by-pulse current limit with internal frequency modulation offers an effective constant current short circuit protection.

The overtemperature circuitry monitors the junction temperature protecting the device. It disables the regulator if the junction temperature reaches 150° C and provides a hysteresis of 20° C. All the parameters are guaranteed within -40° C and 125° C.

The high thermal performance HSOP8 package enables the device to manage high power dissipation.

This feature increases the deliverable output power at the very high ambient temperatures typical in automotive applications.

A5973D application diagram



Part number	Description	T _J max [°C]	V _{in} [V]	V _{out} [V]	I _{out} DC [A]	F _{sw} [kHz]	Package	Qualification std	Extra functions
A5970D	Up to 1 A step down switching regulator	150	4.4 to 36	1.235 to V _{in}	1	250	SO-8	Qualified following the AEC-Q100 requirements, temperature Grade 3	Synch, V _{ref} , I _{nh}
A5970AD	Up to 1 A step down switching regulator	150	4.4 to 36	1.235 to V _{in}	1	500	SO-8	Qualified following the AEC-Q100 requirements, temperature Grade 3	Synch, V _{ref} , I _{nh}
A5972D	Up to 1.5 A step down switching regulator	150	4.4 to 36	1.235 to V _{in}	1.5	250	SO-8	Qualified following the AEC-Q100 requirements, temperature Grade 3	-
A5973AD	Up to 1.5 A step down switching regulator	150	4 to 36	1.235 to V _{in}	1.5	500	HSOP8	Qualified following the AEC-Q100 requirements, temperature Grade 3	Synch, V _{ref} , I _{nh}
A5973D	Up to 2 A step down switching regulator	150	4 to 36	1.235 to V _{in}	2	250	HSOP8	Qualified following the AEC-Q100 requirements, temperature Grade 3	Synch, V _{ref} , I _{nh}
A6902D	Up to 1 A switch step down regulator with adjustable current limit	150	8 to 36	1.235 to V _{in}	Adj to 1	250	SO-8	Qualified following the AEC-Q100 requirements, temperature Grade 3	V _{ref}
B5973D	Up to 2 A step down switching regulator	150	4 to 36	1.235 to V _{in}	2	250	HSOP8	Qualified following the AEC-Q100 requirements, temperature Grade 1	Synch, V _{ref} , I _{nh}



© STMicroelectronics - July 2008 - Printed in Italy - All rights reserved

The STMicroelectronics corporate logo is a registered trademark of the STMicroelectronics group of companies. All other names are the property of their respective owners.

For selected STMicroelectronics sales offices fax:

China +86 21 34054689; France +33 1 55489569; Germany +49 89 4605454; Italy +39 02 8250449; Japan +81 3 57838216; Singapore +65 64815124; Sweden +46 8 58774411; Switzerland +41 22 9292900; United Kingdom and Eire +44 1628 890391; USA +1 781 861 2678

Full product information at www.st.com

Order code: FLA597X0808

www.BDTIC.com/ST

