

Up to 3 A switching step-down regulators



STMicroelectronics

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

Housed in small outline packages, such as SO8 and HSOP8, qualified using the AEC Q100 requirements (PPAP product part approval process available) this complete family of compact monolithic step down switching regulators provides a wide range of output current, meeting the requirements of different applications.

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 V up to 36 V) and synchronization capability.

Key features

- Up to 3 A DC output current
- 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 and HSOP8 packages

Main applications

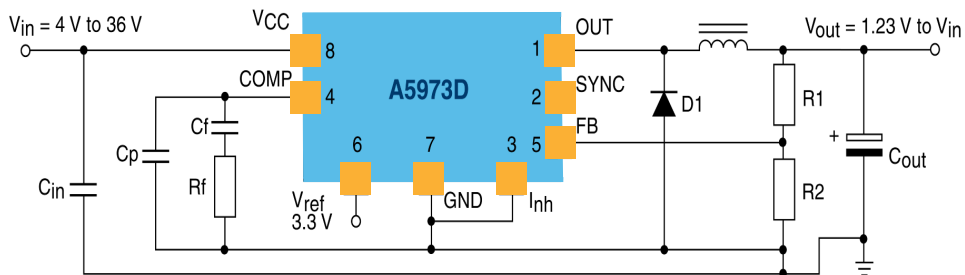
- Body: Air conditioning, wiper control, power windows, seat control, car alarms
- Power train: Engine cooling and management, throttle driving
- Safety and chassis: Airbag systems, anti-lock brakes, traction control, electric power steering and suspension
- Car infotainment: Car radios, navigation systems,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

To satisfy the specific requirements of the automotive market, STMicroelectronics has developed a new monolithic step-down asynchronous DC-DC converters family, qualified according to the AEC-Q100 specifications guidelines. The operating input voltage ranges from 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. This 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



Product table

Part number	Description	TJ max [°C]	VIN [V]	VOUT [V]	IOUT DC [A]	FSW [kHz]	Package	Qualification std	Extra functions
A5970D	Up to 1A step down switching regulator	150	4 to 36	1.235 to VIN	1	250	SO-8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5970AD	Up to 1A step down switching regulator	150	4 to 36	1.235 to VIN	1	500	SO-8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5972D	Up to 1.5A step down switching regulator	150	4 to 36	1.235 to VIN	1.5	250	SO-8	Qualified following the AEC-Q100 requirements	-
A5973AD	Up to 1.5A step down switching regulator	150	4 to 36	1.235 to VIN	1.5	500	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5973D	Up to 2A step down switching regulator	150	4 to 36	1.235 to VIN	2	250	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A6902D	Up to 1A step down switching regulator with adjustable current limit	150	8 to 36	1.235 to VIN	1	250	SO-8	Qualified following the AEC-Q100 requirements	VREF
A5974AD	Up to 2A step down switching regulator	150	4 to 36	1.235 to VIN	2	500	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5974D	Up to 2.5A step down switching regulator	150	4 to 36	1.235 to VIN	2.5	250	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5975AD	Up to 2.5A step down switching regulator	150	4 to 36	1.235 to VIN	2.5	500	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
A5975D	Up to 3A step down switching regulator	150	4 to 36	1.235 to VIN	3	250	HSOP8	Qualified following the AEC-Q100 requirements	Synch, VREF,INH
B5973D	Up to 2A step down switching regulator	150	4 to 36	1.235 to VIN	2	250	HSOP8	Qualified following the AEC-Q100 requirements with Burn-in	Synch, VREF,INH

