

Product Catalogue

**Switching Regulators (DC-DC Converters),
Boost Charge Pumps, Composite ICs**

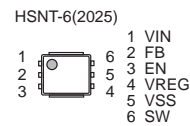
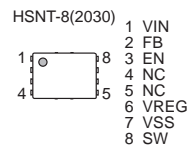
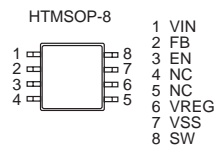
2020-2021



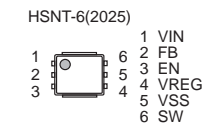
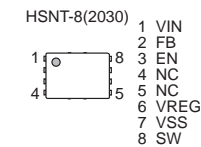
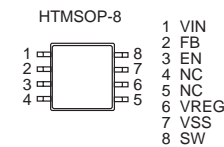
Features	Series Name	Page
Switching Regulators (DC-DC Converters)		
36 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR	S-8580AA/8580AB/8581AA/8581AB Series	3-3
36 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR	S-8580AC/8580AD/8581AC/8581AD Series	3-3
18 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR	S-8590AA/8590AB/8591AA/8591AB Series	3-4
18 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR	S-8590AC/8590AD/8591AC/8591AD Series	3-4
STEP-DOWN, SYNCHRONOUS PWM CONTROL SWITCHING REGULATOR CONTROLLER	S-8533 Series	3-5
STEP-DOWN, PWM CONTROL or PWM / PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER	S-8520/8521 Series	3-5
5.6 V INPUT, 200 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85M1A Series (WLP product)	3-5
5.6 V INPUT, 50 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85M0A Series (WLP product)	3-6
STEP-DOWN, BUILT-IN FET, SYNCHRONOUS RECTIFICATION, PWM CONTROL SWITCHING REGULATORS	S-8550 Series	3-6
5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 10 μ A QUIESCENT CURRENT	S-85V1A Series	3-6
5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85S1A Series	3-7
SUPPLY VOLTAGE DIVIDED OUTPUT, 5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85S1P Series	3-7
5.5 V INPUT, 50 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85S0A Series	3-8
SUPPLY VOLTAGE DIVIDED OUTPUT, 5.5 V INPUT, 50 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT	S-85S0P Series	3-8
STEP-UP, SUPER-SMALL PACKAGE, 600 kHz, PWM CONTROL or PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER	S-8355/56/57/58 Series	3-9
STEP-UP, BUILT-IN / EXTERNAL FET PFM CONTROL SWITCHING REGULATOR / SWITCHING REGULATOR CONTROLLER	S-8351/8352 Series	3-9
STEP-UP, PWM CONTROL or PWM / PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR	S-8353/8354 Series	3-10
STEP-UP, FOR LCD BIAS SUPPLY, 1-CHANNEL, PWM CONTROL SWITCHING REGULATOR CONTROLLER	S-8333 Series	3-10
STEP-UP, 1.2 MHz HIGH-FREQUENCY, PWM CONTROL SWITCHING REGULATOR CONTROLLER	S-8337/8338 Series	3-11
STEP-UP, SUPER-SMALL PACKAGE, 1.2 MHz, PWM CONTROL or PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER	S-8365/8366 Series	3-11
STEP-UP, SUPER-SMALL PACKAGE, 1.2 MHz, PWM/PFM SWITCHABLE SWITCHING REGULATOR	S-8363 Series	3-11
Boost Charge Pumps		
VOLTAGE REGULATION BOOST CHARGE PUMP DC-DC CONVERTER	S-8821 Series	3-12
Composite ICs		
BATTERY BACKUP SWITCHING IC	S-8424A Series	3-12

S-8580AA/8580AB/8581AA/8581AB Series**36 V INPUT, 600 mA SYNCHRONOUS
STEP-DOWN SWITCHING REGULATOR****Features**

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

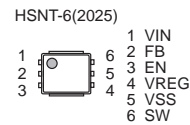
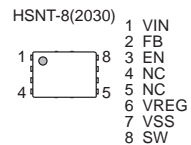
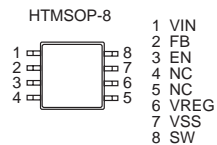
**S-8580AC/8580AD/8581AC/8581AD Series****36 V INPUT, 600 mA SYNCHRONOUS
STEP-DOWN SWITCHING REGULATOR****Features**

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 95%
- Oscillation frequency: 400 kHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

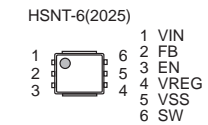
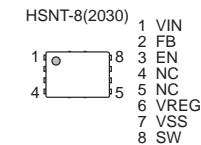
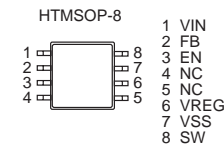


S-8590AA/8590AB/8591AA/8591AB Series**18 V INPUT, 600 mA SYNCHRONOUS
STEP-DOWN SWITCHING REGULATOR****Features**

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 1.0 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

**S-8590AC/8590AD/8591AC/8591AD Series****18 V INPUT, 600 mA SYNCHRONOUS
STEP-DOWN SWITCHING REGULATOR****Features**

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 95%
- Oscillation frequency: 400 kHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free



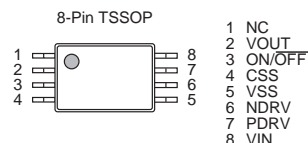
S-8533 Series

STEP-DOWN, SYNCHRONOUS PWM CONTROL SWITCHING REGULATOR CONTROLLER

Features

- Synchronous rectification system realizing high efficiency (typ. 94%)
- Use at maximum duty ratio = 100% and use of a battery up to maximum life is possible by using P-channel and N-channel power MOS FETs externally.
- Oscillation frequency : 300 kHz typ.
- Input voltage : 2.7 to 16.0 V
- Output voltage : 1.25 V
1.3 to 6.0 V, selectable in 0.1 V steps
- Output voltage accuracy : $\pm 2.0\%$
- Soft-start function set by an external capacitor (C_{SS})
- Shutdown function
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



S-8520/8521 Series

STEP-DOWN, PWM CONTROL or PWM / PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

Features

- Low current consumption

During operation:	60 μ A max. (A, B types)
	21 μ A max. (C, D types)
	100 μ A max. (E, F types)
During shutdown:	0.5 μ A max.
- Input voltage:

2.5 V to 16 V (B, D, F types)
2.5 V to 10 V (A, C, E types)
- Output voltage: Selectable between 1.5 V and 6.0 V in 0.1 V step
- Duty ratio:

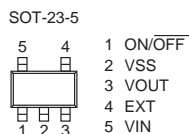
0% to 100% PWM control (S-8520 Series)
25% to 100% PWM / PFM switching control (S-8521 Series)
- External parts are Pch power MOS FET or PNP transistor, coil, diode, and capacitor only (When using PNP transistor, add base resistor and capacitor).
- Oscillation frequency:

180 kHz typ. (A, B types)
60 kHz typ. (C, D types)
300 kHz typ. (E, F types)
- Soft-start function:

8 ms. typ. (A, B types)
12 ms. typ. (C, D types)
4.5 ms. typ. (E, F types)
- With a shutdown function
- With a built-in overload protection circuit

Overload detection time:	4 ms. typ. (A type)
	14 ms. typ. (C type)
	2.6 ms. typ. (E type)
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.

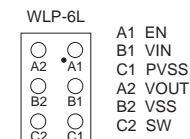


S-85M1A Series (WLP product)

5.6 V INPUT, 200 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT

Features

- Ultra low current consumption: 260 nA quiescent current
- Efficiency (when under 100 μ A load): 90.5%
- Fast transient response: COT control
- Input voltage: 2.2 V to 5.6 V
- Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
 $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
- Output voltage accuracy: $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
1.0 MHz (at PWM operation)
- Switching frequency: 360 m Ω
- High side power MOS FET on-resistance: 250 m Ω
- Low side power MOS FET on-resistance: 1 ms typ.
- Soft-start function: 1.8 V typ. (detection voltage)
- Under voltage lockout function (UVLO): 135°C typ. (detection temperature)
- Thermal shutdown function: 450 mA (at L = 2.2 μ H)
- Overcurrent protection function: Hiccup control
- Automatic recovery type short-circuit protection function: Unavailable
- Discharge shunt function: Available
(S-85M1A Series C type)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free, halogen-free

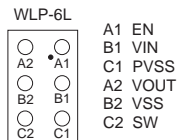


S-85M0A Series (WLP product)

5.6 V INPUT, 50 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT

Features

- Ultra low current consumption: 260 nA quiescent current
- Efficiency (when under 100 μ A load): 90.5%
- Fast transient response: COT control
- Input voltage: 2.2 V to 5.6 V
- Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
- Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
- High side power MOS FET on-resistance: 360 m Ω
- Low side power MOS FET on-resistance: 250 m Ω
- Soft-start function: 1 ms typ.
- Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
- Thermal shutdown function: 135°C typ. (detection temperature)
- Overcurrent protection function: 300 mA (at L = 2.2 μ H)
- Automatic recovery type short-circuit protection function: Hiccup control
- Discharge shunt function: Unavailable (S-85M0A Series B type)
Available (S-85M0A Series C type)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free, halogen-free

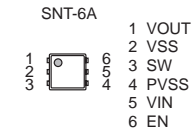


S-85V1A Series

5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 10 μ A QUIESCENT CURRENT

Features

- Current consumption: 10 μ A quiescent current
- Efficiency: 93%
- Fast transient response: COT control
- Input voltage: 2.2 V to 5.5 V
- Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
- Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
- Switching frequency: 1.0 MHz (at PWM operation)
- High side power MOS FET on-resistance: 450 m Ω
- Low side power MOS FET on-resistance: 350 m Ω
- Soft-start function: 1 ms typ.
- Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
- Thermal shutdown function: 135°C typ. (detection temperature)
- Overcurrent protection function: 450 mA (at L = 2.2 μ H)
- Automatic recovery type short-circuit protection function: Hiccup control
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free



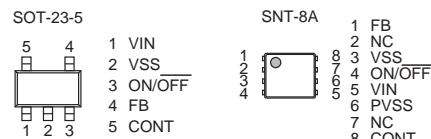
S-8550 Series

STEP-DOWN, BUILT-IN FET, SYNCHRONOUS RECTIFICATION, PWM CONTROL SWITCHING REGULATORS

Features

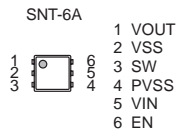
- Oscillation frequency: 1.2 MHz
- Input voltage range: 2.0 V to 5.5 V
- Output voltage range: Arbitrarily settable by external output voltage setting resistor
- Output current: 600 mA
- Reference voltage: 0.6 V $\pm 2.0\%$
- Efficiency: 92%
- Soft-start function: 1 ms typ.
- Shutdown function: Shutdown current consumption : 1.0 μ A max.
- Built-in current limit circuit
- Pch power MOS FET on-resistance: 0.4 Ω typ.
- Nch power MOS FET on-resistance: 0.3 Ω typ.
- Constant continuous mode operation (no light load mode)
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



S-85S1A Series**5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT****Features**

- Ultra low current consumption: 260 nA quiescent current
- Efficiency (when under 100 μ A load): 90.5%
- Fast transient response: COT control
- Input voltage: 2.2 V to 5.5 V
- Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
- Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
- Switching frequency: 1.0 MHz (at PWM operation)
- High side power MOS FET on-resistance: 420 m Ω
- Low side power MOS FET on-resistance: 320 m Ω
- Soft-start function: 1 ms typ.
- Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
- Thermal shutdown function: 135°C typ. (detection temperature)
- Overcurrent protection function: 450 mA (at L = 2.2 μ H)
- Automatic recovery type short-circuit protection function: Hiccup control
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free

**S-85S1P Series****SUPPLY VOLTAGE DIVIDED OUTPUT, 5.5 V INPUT, 200 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT****Features**

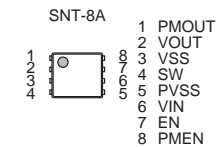
- DC-DC converter block**
- Ultra low current consumption: 260 nA quiescent current
 - Efficiency (when under 100 μ A load): 90.5%
 - Fast transient response: COT control
 - Input voltage: 2.2 V to 5.5 V
 - Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
 - Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
 - Switching frequency: 1.0 MHz (at PWM operation)
 - High side power MOS FET on-resistance: 420 m Ω
 - Low side power MOS FET on-resistance: 320 m Ω
 - Soft-start function: 1 ms typ.
 - Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
 - Thermal shutdown function: 135°C typ. (detection temperature)
 - Overcurrent protection function: 450 mA (at L = 2.2 μ H)
 - Automatic recovery type short-circuit protection function: Hiccup control
 - Input and output capacitors: Ceramic capacitor compatible

Supply voltage divider block

- Low current consumption: 280 nA typ.
- Input voltage: 1.5 V to 5.5 V
- Output voltage: $V_{\text{IN}}/2$ (S-85S1PCxx)
 $V_{\text{IN}}/3$ (S-85S1PDxx)

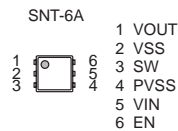
Overall

- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free



S-85S0A Series**5.5 V INPUT, 50 mA SYNCHRONOUS STEP-DOWN
SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT****● Features**

- Ultra low current consumption: 260 nA quiescent current
- Efficiency (when under 100 μ A load): 90.5%
- Fast transient response: COT control
- Input voltage: 2.2 V to 5.5 V
- Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
- Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
- High side power MOS FET on-resistance: 420 m Ω
- Low side power MOS FET on-resistance: 320 m Ω
- Soft-start function: 1 ms typ.
- Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
- Thermal shutdown function: 135°C typ. (detection temperature)
- Overcurrent protection function: 300 mA (at L = 2.2 μ H)
- Automatic recovery type short-circuit protection function: Hiccup control
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free

**S-85S0P Series****SUPPLY VOLTAGE DIVIDED OUTPUT,
5.5 V INPUT, 50 mA SYNCHRONOUS STEP-DOWN
SWITCHING REGULATOR WITH 260 nA QUIESCENT CURRENT****● Features**

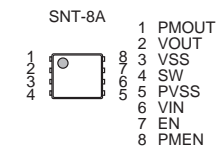
- DC-DC converter block**
- Ultra low current consumption: 260 nA quiescent current
 - Efficiency (when under 100 μ A load): 90.5%
 - Fast transient response: COT control
 - Input voltage: 2.2 V to 5.5 V
 - Output voltage: 0.7 V to 2.5 V, in 0.05 V step
2.6 V to 3.9 V, in 0.1 V step
 - Output voltage accuracy: $\pm 1.5\%$ ($1.0 \text{ V} \leq V_{\text{OUT}} \leq 3.9 \text{ V}$)
 $\pm 15 \text{ mV}$ ($0.7 \text{ V} \leq V_{\text{OUT}} < 1.0 \text{ V}$)
 - High side power MOS FET on-resistance: 420 m Ω
 - Low side power MOS FET on-resistance: 320 m Ω
 - Soft-start function: 1 ms typ.
 - Under voltage lockout function (UVLO): 1.8 V typ. (detection voltage)
 - Thermal shutdown function: 135°C typ. (detection temperature)
 - Overcurrent protection function: 300 mA (at L = 2.2 μ H)
 - Automatic recovery type short-circuit protection function: Hiccup control
 - Input and output capacitors: Ceramic capacitor compatible

Supply voltage divider block

- Low current consumption: 280 nA typ.
- Input voltage: 1.5 V to 5.5 V
- Output voltage: $V_{\text{IN}}/2$ (S-85S0PCxx)
 $V_{\text{IN}}/3$ (S-85S0PDxx)

Overall

- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free



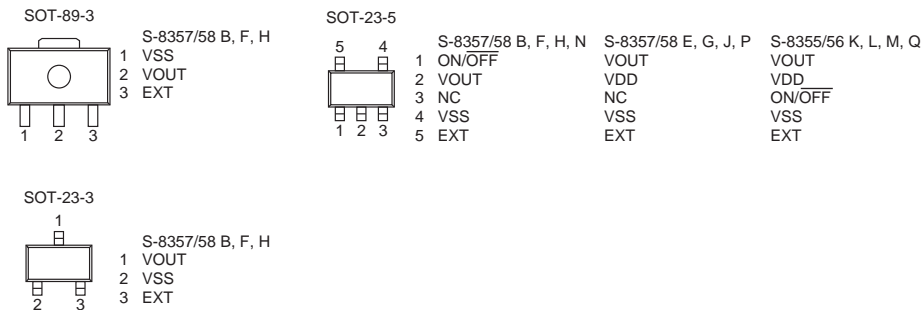
S-8355/56/57/58 Series

STEP-UP, SUPER-SMALL PACKAGE, 600 kHz, PWM CONTROL or PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

Features

- Low voltage operation : Startup at 0.9 V min. ($I_{OUT} = 1$ mA) guaranteed
- Low current consumption : During operation 25.9 μ A (3.3 V, 100 kHz, typ.)
During shutdown 0.5 μ A (max.)
- Duty ratio : Built-in PWM/PFM switching control circuit (S-8356/58 Series)
15 to 83% (100 kHz models)
15 to 78% (250 kHz, 300 kHz, and 600 kHz models)
- External parts : Coil, diode, capacitor, and transistor
- Output voltage : Selectable in 0.1 V steps between 1.5 and 6.5 V (for V_{DD} / V_{OUT} separate types)
Selectable in 0.1 V steps between 2.0 and 6.5 V (for other than V_{DD} / V_{OUT} separate types)
- Output voltage accuracy : $\pm 2.4\%$
- Oscillation frequency : 100 kHz, 250 kHz, 300 kHz, 600 kHz selectable
- Soft start function : 6 ms (100 kHz, typ.)
- Shutdown function
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



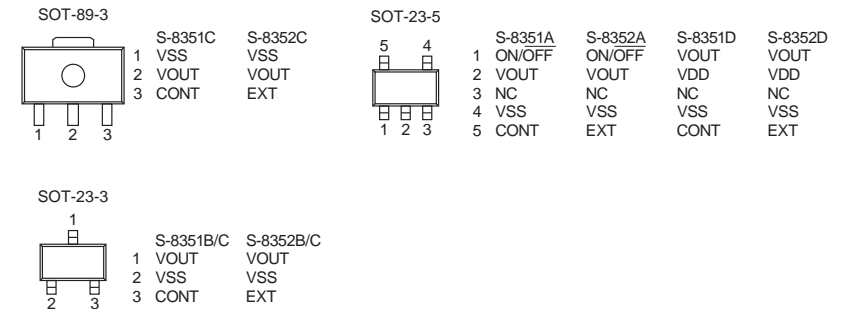
S-8351/8352 Series

STEP-UP, BUILT-IN / EXTERNAL FET PFM CONTROL SWITCHING REGULATOR / SWITCHING REGULATOR CONTROLLER

Features

- Low voltage operation : Startup at 0.9 V min. ($I_{OUT} = 1$ mA) guaranteed
- Low current consumption : During operation 23.2 μ A ($V_{OUT} = 3.3$ V, typ.)
During shutdown 0.5 μ A (max.)
- Duty ratio : 50 % / 75 % built-in auto-switching-type PFM control circuit (A, B, and D type)
75 % built-in fixed-type PFM control circuit (C type)
- External parts : Coil, capacitor, and diode
- Output voltage : Selectable in 0.1 V steps between 2.0 V to 6.5 V (A, B, and C type)
Selectable in 0.1 V steps between 1.5 V to 6.5 V (D type)
- Output voltage accuracy : $\pm 2.4\%$
- Shutdown function (A type)
- V_{DD} / V_{OUT} separate type (D type)
- External transistor type available (S-8352 Series)
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



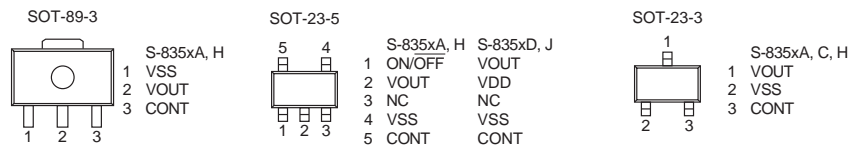
S-8353/8354 Series

STEP-UP, PWM CONTROL or PWM / PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR

● Features

- Low voltage operation: Startup at 0.9 V min. ($I_{OUT} = 1$ mA) guaranteed
- Low current consumption : During operation 18.7 μ A (3.3 V, 50 kHz, typ.)
During shutdown: 0.5 μ A (max.)
- Duty ratio : Built-in PWM / PFM switching control circuit (S-8354 Series)
15 % to 83 % (30 kHz and 50 kHz models)
15 % to 78 % (250 kHz models)
- External parts : Coil, capacitor, and diode
- Output voltage : Selectable in 0.1 V steps between 1.5 V and 6.5 V (for V_{DD} / V_{OUT} separate types)
Selectable in 0.1 V steps between 2.0 V and 6.5 V (for other than V_{DD} / V_{OUT} separate types)
- Output voltage accuracy : $\pm 2.4\%$
- Oscillation frequency : 30 kHz, 50 kHz, and 250 kHz selectable
- Soft start function : 6 ms (50 kHz, typ.)
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



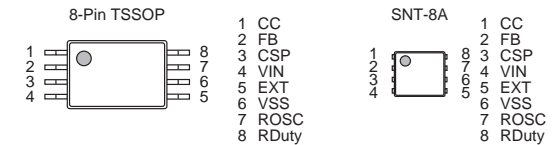
S-8333 Series

STEP-UP, FOR LCD BIAS SUPPLY, 1-CHANNEL, PWM CONTROL SWITCHING REGULATOR CONTROLLER

● Features

- Low voltage operation: 1.8 V to 6.0 V
- Oscillation frequency: 280 kHz to 1.08 MHz (selectable by external resistor)
- Maximum duty: Settable up to 88.5% by external resistor
47 to 88.5% (oscillation frequency; 500 kHz or more)
47 to 80% (oscillation frequency; less than 500 kHz)
- Reference voltage: 1.0 V $\pm 1.5\%$
- Range of operation temperature: -40 to $+85^\circ\text{C}$
- UVLO (under-voltage lockout) function: Detection voltage can be selected from between 1.5 V and 2.3 V in 0.1 V step.
Hysteresis width can be selected from between 0.1 V and 0.3 V in 0.1 V step.
- Timer latch short-circuit protection circuit: Delay time can be set using an external capacitor.
- Soft-start function: Soft-start time can be selected in three steps, 10 ms, 15 ms, and 20 ms.
Both reference voltage control and maximum duty control methods are applied
- Phase compensation external setting: Control is possible via the resistor connected between the CC and GND pins and capacitor
- Lead-free, Sn 100%, halogen-free^{*1}

*1. Refer to "■ Product Name Structure" for details.



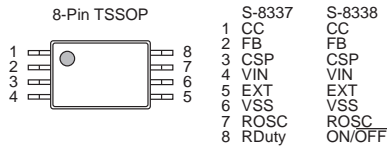
S-8337/8338 Series

STEP-UP, 1.2 MHz HIGH-FREQUENCY, PWM CONTROL SWITCHING REGULATOR CONTROLLER

Features

- Low voltage operation: 1.8 V to 6.0 V
- Oscillation frequency: 286 kHz to 1.133 MHz (selectable by external resistor)
- Maximum duty: 47 to 88.5% (selectable by external resistor) (S-8337 Series)
Fixed to 88% typ. (S-8338 Series)
- Reference voltage: 1.0 V \pm 1.5%
- UVLO (under-voltage lockout) function:
 - Detection voltage can be selected from between 1.5 V and 2.3 V in 0.1 V steps.
 - Hysteresis width can be selected from between 0.1 V and 0.3 V in 0.1 V steps.
- Timer latch short-circuit protection circuit:
 - Delay time can be set using an external capacitor.
- Soft-start function: Soft-start time can be selected in three steps, 10 ms, 15 ms, and 20 ms.
- Phase compensation external setting: Adjustable by connecting resistor and capacitor in series to GND.
- Shutdown function: S-8338 Series, shutdown current consumption: 1.0 μ A max.
- Lead-free, Sn 100%, halogen-free*1

*1. Refer to "■ Product Name Structure" for details.



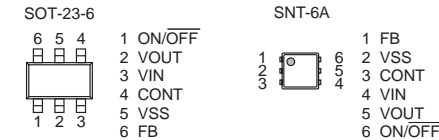
S-8363 Series

STEP-UP, SUPER-SMALL PACKAGE, 1.2 MHz PWM / PFM SWITCHABLE SWITCHING REGULATOR

Features

- Low operation voltage: Start-up from 0.9 V ($I_{OUT} = 1$ mA) guaranteed
- Oscillation frequency: 1.2 MHz
- Input voltage range: 0.9 V to 4.5 V
- Output current: 300 mA ($V_{IN} = 1.8$ V, $V_{OUT} = 3.3$ V)
- Reference voltage: 0.6 V \pm 2.5%
- Efficiency: 85%
- Soft start function: 1.2 ms typ.
- Low current consumption: During switching-off, 95 μ A typ.
- Duty ratio: PWM / PFM switching control
max.88%
- Power-off function: Current consumption during power-off 3.0 μ A max.
- Current limit circuit: limits the peak value of inductor current
- Nch power MOS FET ON resistance: 0.25 Ω typ.
- Start-up function: Operation with fixed duty pulse under the V_{OUT} voltage of 1.4 V or less
- Lead-free, Sn 100%, halogen-free*1

*1. Refer to "■ Product Name Structure" for details.



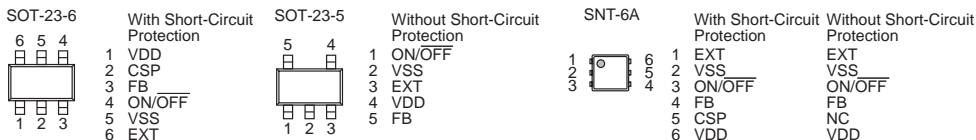
S-8365/8366 Series

STEP-UP, SUPER-SMALL PACKAGE, 1.2 MHz PWM CONTROL or PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

Features

- Low operation voltage: Start at 1.1 V (1 mA) guaranteed (in the product without UVLO function)
- Input voltage range: 1.8 V to 5.5 V
- Oscillation frequency: 1.2 MHz, 600 kHz
- Reference voltage: 0.6 V \pm 2.0%
- Soft start function: 7 ms typ.
- Low current consumption: 70 μ A typ. at switching off
- Duty ratio: Built-in PWM / PFM switching control circuit (S-8366 Series)
28% to 85% (1.2 MHz product)
28% to 90% (600 kHz product)
- Shutdown function: Current consumption 1.0 μ A max. at shutdown
- External parts: Inductor, diode, capacitor, transistor
- Timer latch short-circuit protection circuit: Selectable with / without short-circuit protection circuit for each product
Settable delay time by external capacitor
(in the product with short-circuit protection)
- UVLO (under-voltage lockout) function: Selectable with / without UVLO for each product
- Lead-free, Sn 100%, halogen-free*1

*1. Refer to "■ Product Name Structure" for details.



S-8821 Series

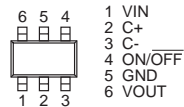
VOLTAGE REGULATION
BOOST CHARGE PUMP DC-DC CONVERTER

● Features

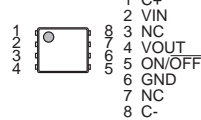
- PFM control CMOS boost charge pump
- Power supply voltage: 1.6 to 5.0 V
- Output voltage: 2.5 to 5.5 V, selectable in 0.1 V steps.
- Output voltage accuracy: $\pm 2\%$ max.
- Built-in soft start circuit: 1.0 ms typ.
- Output current: 25 mA ($V_{IN} = (V_{OUT(S)} \times 0.80)$ V)
- Oscillation frequency: 1.0 MHz typ.
- ON/OFF function: During standby: 1 μ A max.
- Lead-free, Sn 100%, halogen-free**1

*1. Refer to "■ Product Name Structure" for details.

SOT-23-6W



SNT-8A



S-8424A Series

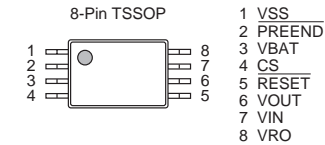
BATTERY BACKUP SWITCHING IC

● Features

- Low power consumption
 - Normal operation: 15 μ A Max. ($V_{IN} = 6$ V)
 - Backup: 2.1 μ A Max.
- Voltage regulator
 - Output voltage tolerance : $\pm 2\%$
 - Output voltage: Independently selectable in 0.1 V steps in the range of 2.3 V to 5.4 V
- Three built-in voltage detectors (CS, PREEND, RESET)
 - Detection voltage precision: $\pm 2\%$
 - Detection voltage: Selectable in 0.1 V steps in the range of 2.4 V to 5.3 V (CS voltage detector)
 - Selectable in 0.1 V steps in the range of 1.7 V to 3.4 V (PREEND, RESET voltage detector)
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply possible
- Special sequence
 - Backup voltage is not output when the primary power supply voltage does not reach the initial voltage at which the switch unit operates.
- Lead-free, Sn 100%, halogen-free**1

*1. Refer to "■ Product Name Structure" for details.

8-Pin TSSOP

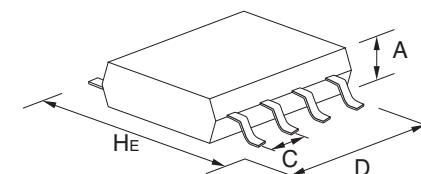


Package List

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)
			H _E	D	A (max.)	C
Lead insertion type	3	TO-92	7.0	5.2	4.2	2.5/1.27
	3	TO-92S	4.95	4.1	1.62	2.5/1.27
Flat-lead type	3	SOT-89-3	4.0	4.5	1.6	1.5
	5	SOT-89-5	4.5	4.5	1.6	1.5
Gull-wing type	4	SC-82AB	2.1	2.0	1.1	1.3
	5	SC-88A	2.1	2.0	1.1	0.65
	3	SOT-23-3	2.8	2.9	1.3	1.9
	3	SOT-23-3S	2.8	2.9	1.2	1.9
	3	TSOT-23-3S	2.85	2.9	0.8	1.9
	5	SOT-23-5	2.8	2.9	1.3	0.95
	6	SOT-23-6	2.8	2.9	1.35	0.95
	6	SOT-23-6W	2.8	2.9	1.3	0.95
	8	8-Pin SOP (JEDEC)	6.0	5.02	1.75	1.27
	8	8-Pin TSSOP	6.4	3.0	1.1	0.65
	8	8-Pin TSSOP	6.4	3.0	1.1	0.65
	16	16-Pin TSSOP	6.4	5.1	1.1	0.65
	20	20-Pin TSSOP	6.4	6.5	1.2	0.65
	24	24-Pin SSOP	7.6	7.9	1.4	0.65
	8	TMSOP-8	4.0	2.9	0.8	0.65
	8	HTMSOP-8	4.0	2.9	0.8	0.65
	16	HTSSOP-16	6.4	5.12	1.1	0.65
	6	HSOP-6	6.0	5.02	1.75	1.91
	8	HSOP-8A	6.0	5.02	1.68	1.27
	8	HSOP-8A	6.0	5.02	1.65	1.27
	8	HSOP-8Q	6.0	5.02	1.68	1.27
	5	TO-252-5S(A)	6.5	6.5	1.4	1.27
	9	TO-252-9S	6.5	6.5	1.4	0.65

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)
			H _E	D	A (max.)	C
Non-lead type	6	6-Pin HSON(A)	3.0	2.9	0.9	0.95
	6	SON-6C	2.55	1.56	0.65	0.5
	4	SNT-4A	1.6	1.2	0.5	0.65
	6	SNT-6A SNT-6A(H)	1.8	1.57	0.5	0.5
	8	SNT-8A	2.46	1.97	0.5	0.5
	4	HSNT-4(0808)	0.8	0.8	0.4	0.4
	4	HSNT-4(0808)B	0.8	0.8	0.41	0.4
	4	HSNT-4(1010)	1.0	1.0	0.4	0.65
	4	HSNT-4(1010)B	1.0	1.0	0.41	0.65
	6	HSNT-6(1212)	1.2	1.2	0.4	0.4
	6	HSNT-6A	2.46	1.96	0.5	0.5
	6	HSNT-6(2025)	2.46	1.96	0.5	0.5
	8	HSNT-8(1616)	1.6	1.6	0.4	0.4
	8	HSNT-8(2030)	3.0	2.0	0.5	0.5
	6	DFN-6(1414)A	1.4	1.4	0.6	0.5
	6	DFN-6(1518)A	1.8	1.5	0.33	0.5
	8	DFN-8(1616)A	1.6	1.6	0.6	0.4
	8	DFN-8(2030)	3.0	2.0	0.5	0.5
	8	DFN-8(2030)A	3.0	2.0	0.6	0.5
	8	DFN-8(2030)B	3.0	2.0	0.8	0.5

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