



SANYO Semiconductors

DATA SHEET

Bi-CMOS IC

LV58132MX — Step-down Switching Regulator

Overview

LV58132MX is a 1ch step-down switching regulator. With built-in 0.25Ω power MOSFET switch, it achieves high output current and high efficiency. With low-heat resistance, miniature package MFP8 (200mil) with heat-sink is adopted. Since it is Current mode control type, it has good load current response, and phase compensation is easy. With ON/OFF pin, operating can be less than 90μA at stand-by mode. It has over current protection for load devices. With external capacitor, it achieves soft start.

Functions

- 2.0A 1ch step-down regulator
- Small package: MFP8 (200mil) with heat sink
- High efficiency (88% $I_{OUT} = 1A$, $V_{IN} = 12V$, $V_O = 5V$)
- Standby mode
- Over-current protection
- Thermal shutdown protection
- Reference voltage: 0.8V
- Inside frequency: 370kHz
- Soft start
- Wide input dynamic range (4.75 to 18V)

Specifications

Maximum Ratings at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum input V_{IN} voltage	$V_{IN\ max}$		20	V
BOOT pin maximum voltage	$V_{BT\ max}$		25	V
SW pin maximum voltage	$V_{SW\ max}$		$V_{IN\ max}$	V
BOOT pin-SW pin maximum voltage	$V_{BS-SW\ max}$		7	V
EN Maximum Voltage	$V_{EN\ max}$		20	V
FB, COMP, SS pin maximum voltage	$V_{fs\ max}$		7	V
Allowable power dissipation	$P_d\ max$	Mount on a specified board *1	2.05	W
Junction temperature	$T_j\ max$		150	°C
Operating temperature	T_{opr}		-20 to 80	°C
Storage temperature	T_{stg}		-40 to 150	°C

*1: 46.4mm x 31.8mm x 1.7mm Four layers glass epoxy substrate.

Note: Plan the maximum voltage while including coil and surge voltages, so that the maximum voltage is not exceeded even for an instant.

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Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
V _{IN} pin voltage	V _{IN}		4.75 to 18	V
BOOT pin voltage	V _{BT}		-0.3 to 23	V
SW pin voltage	V _{SW}		-0.4 to V _{IN}	V
BOOT pin-SW pin voltage	V _{BS-SW}		6.5	V
EN voltage	V _{EN}		18	V
FB, COMP, SS pin voltage	V _{FSO}		6	V

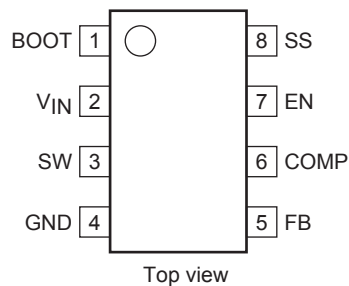
Electrical Characteristics at Ta = 25°C, V_{IN} = 12V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
IC current drain at standby	I _{CC1}	EN=0V		90		μA
IC current drain in operation	I _{CC2}	EN=5V, FB=1V		2		mA
Efficiency	Effcy	V _{IN} =12V, I _{OUT} =1A, V _o =5V, Design target *2		88		%
Reference voltage	V _{ref}	V _{IN} =4.75V to 28V	-2%	0.8	+2%	V
FB pin bias current	I _{ref}	FB=0.8V		20	200	nA
High-side ON resistance	R _{onH}	BOOT=5V		0.25		Ω
Low-side ON resistance	R _{onL}			5		Ω
Oscillation frequency	f _{OSC}		296	370	444	kHz
Oscillatory frequency when short-circuit is protected	f _{OSCS}		85	115	145	kHz
EN high-threshold voltage	V _{ENH}		0.9	1.8	2.7	V
EN low-threshold voltage	V _{ENL}		0.7	1.35	2.0	V
Maximum ON DUTY	D max			85		%
SW Peak Current limit 1	I _{cl1}	V _{IN} =12V, V _{OUT} =1.2V, L=10μH, *3	2.9		5.5	A
SW Peak Current limit 2	I _{cl2}	V _{IN} =12V, V _{OUT} =3.3V, L=10μH, *3	2.6		5.2	A
SW Peak Current limit 3	I _{cl3}	V _{IN} =12V, V _{OUT} =5V, L=10μH, *3	2.3		4.9	A
Thermal shutdown temperature	T _{tsd}	*Design guarantee *3		160		°C
Thermal shutdown temperature hysteresis	D _{tsd}	*Design guarantee *3		40		°C
Soft start current	I _{SS}	SS=0V	3	5	7	μA

*2: Reference value (not tested IC unit)

*3: Design guarantee (value guaranteed by design and not tested IC unit)

Pin Assignment

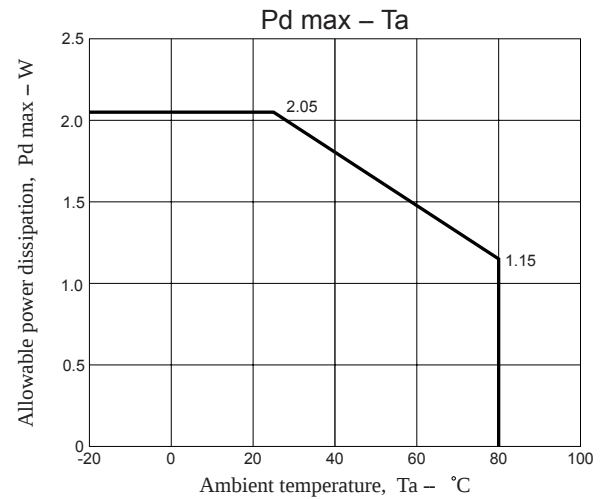
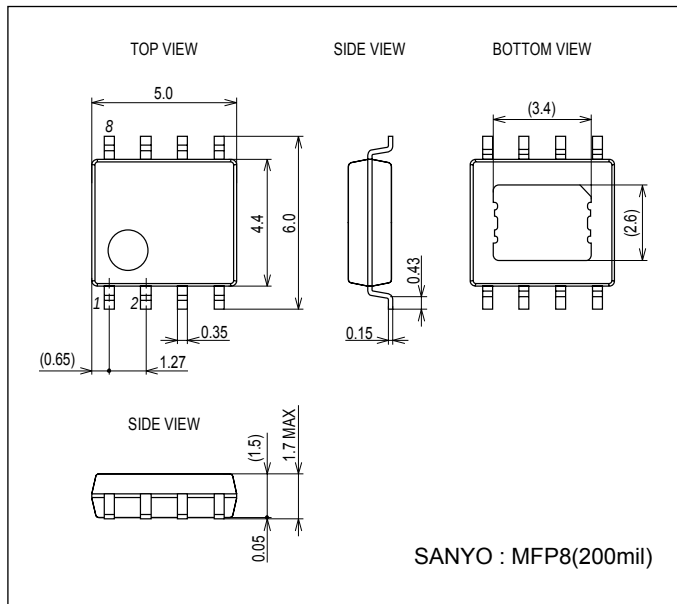


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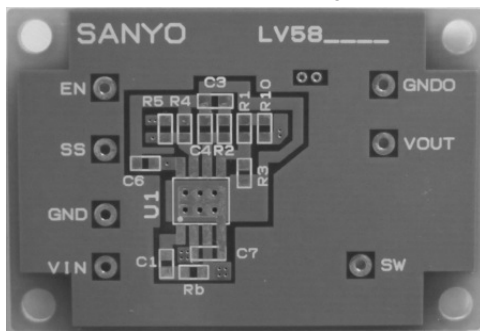
Package Dimensions

unit : mm (typ)

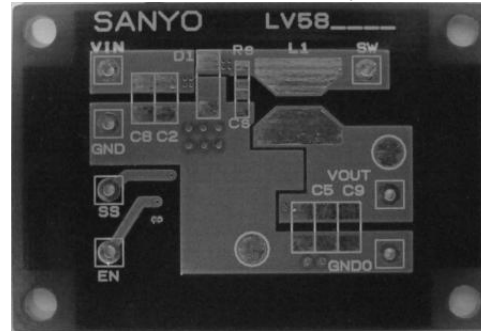
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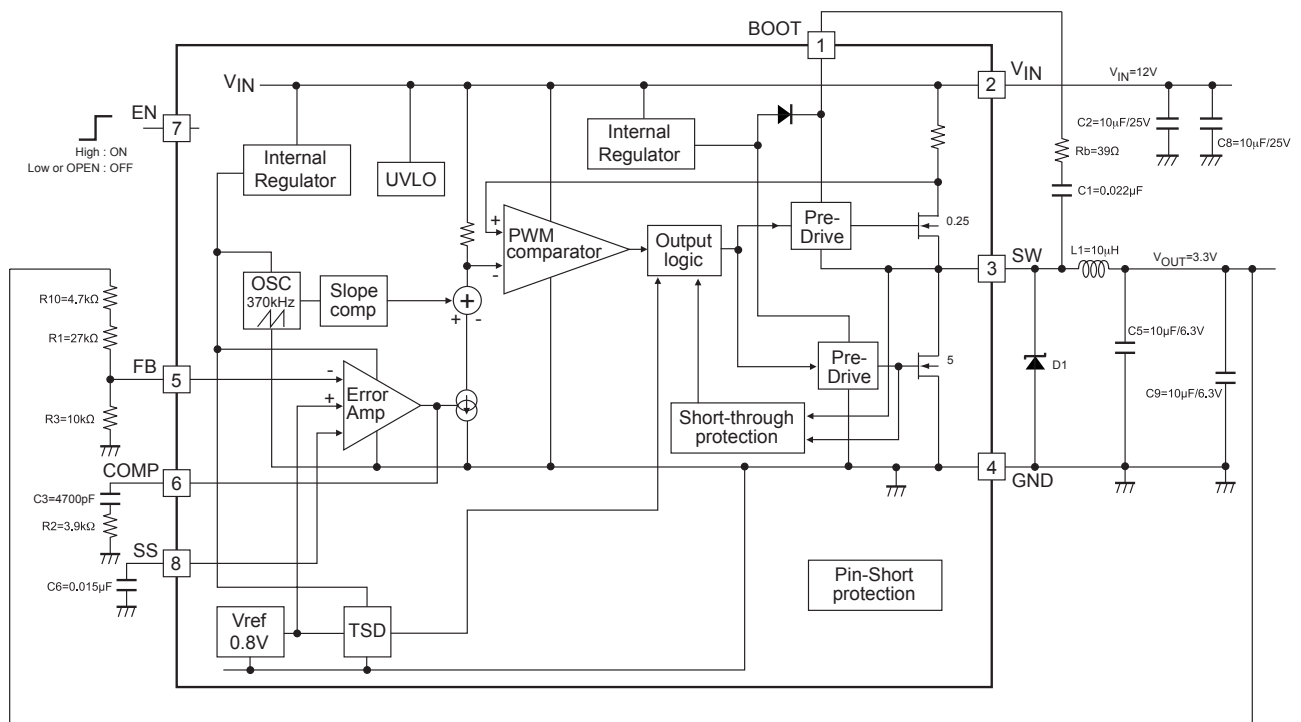
Specified Board [IC, Small signal part side]



Specified Board [coil, Schottky part side]



Block Diagram and Sample Application Circuit



Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1	BOOT	Upper MOS transistor boot strap capacitance connection pin. Connect the boot capacitance of about 0.022uF between SW pins. To protect the SW pin's absolute maximum rating , to ensure stable operation, and to eliminate noise , the boot capacitance serial resistance (about 100Ω) Rb proves effective.	
2	VIN	Input Voltage Pin. Connect substantially large (10uF more) capacitance between this pin and GND.	
3	SW	Power Switch pin. Connect the output LC filter. Connect the above capacitance between this pin and BOOT pin.	
4	GND	Ground pin.	
5	FB	Feedback pin. Set the output voltage by means of split resistor in the section of the output voltage VOUT-FB-GND. VOUT setting is made as calculated below. $V_{OUT} = V_{ref} \times \left\{ 1 + \frac{(R1 + R10)}{R3} \right\}$ $V_{ref} = 0.8V$ Example: 3.3V output voltage (See, Block Diagram and Application example) $V_{OUT} = 0.8 \times \left\{ 1 + \frac{(27k + 4.3k)}{10k} \right\}$ $= 3.304V$	
8	SS	Soft start pin. Sets the soft start time by means of the built-in 5uA source voltage and external soft start capacity. The soft start capacity CSS can be set as follows: $C_{SS} = 5\mu A \times \frac{T_{ss}}{V_{ref}}$ Where, Tss is the soft start time and Vref is the reference voltage. Example: 2.4ms soft start time achieved $C_{SS} = 5\mu A \times \frac{2.4ms}{0.8V} = 0.015\mu F$	
6	COMP	Phase compensation pin. Connects with the phase compensation external capacitance and resistance of DC/DC converter close loop.	
7	EN	Enable pin. Converter enabled when set to the HIGH voltage and disabled when GND or OPEN state.	

Reference data (1)

