Ordering number : EN7161

SANYO Semiconductors
DATA SHEET

L78MS05J
L78MS05JSMP

Monolithic Linear IC

5V Constant-Voltage Power Supply with Strobe Line

Overview

The L78MS05J and L78MS05JSMP are general-purpose constant voltage power supplies that feature an output current of 500mA and a built-in on/off function. The current drain in the output off state is low, making these devices effective for reducing power consumption in application equipment. The surface mounting package can contribute to miniaturization and improved efficiency. These devices are optimal for use in all types of AV and OA equipment and in automotive applications (such as power supplies for meters) as well.

Functions

- Strobe pin that controls the on/off state of the output voltage (active low input).
- 500mA output current.

Features

- TO-220-5H package for easier mounting and thermal design (L78MS05J).
- SMP5 package for easier mounting and thermal design (L78MS05JSMP).
- Low output off state current drain makes these devices optimal for saving power in applications.
- Full complement of built-in protection circuits (current limiter and thermal protection circuit).

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum input voltage	V_{IN} max		35	V
Maximum strobe pin voltage	VST max		V_{IN} max	V

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SANYO Semiconductor Co., Ltd.
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

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Parameter	Symbol	Conditions	Ratings	Unit
Allowable power dissipation	P_d max	L78MS05J - independent IC	1.75	W
		L78MS05J SMP *: When mounted on the stipulated circuit board 1	3.9	W
		*: When mounted on the stipulated circuit board 2	2.0	W
Operating temperature	Topr		-40 to +85	°C
Operating temperature	Tstg		-58 to +150	°C

*: Stipulated circuit board 1:
76.1×114.3×1.6mm³ Cooper foil ratio: 60% FR4
Heat sink fin mounting area pattern: 23% [2000mm²]

*: Stipulated circuit board 2:
140×300×1.6mm³ Cooper foil ratio: 60% FR4

Allowable Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		7.5 to 20.0	V
Output current	L_{OUT}		0 to 500	mA
Output on control voltage	VSTL		-0.3 to 0.8	V
Output off control voltage	VSTH		2.0 to V_{IN}	mA

Electrical Characteristics at Ta = 25°C, V_{IN} = 10V, I_{OUT} = 350mA

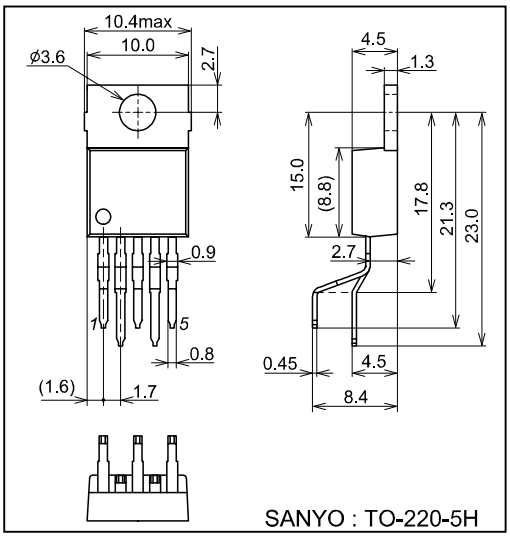
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Output On State, VST = low]						
Output voltage 1	$V_{OUT}1$		4.8	5.0	5.2	V
Line regulation 1	ΔVOLN1	7V ≤ V_{IN} ≤ 25V, I_{OUT} = 200mA		3	50	mV
Line regulation 2	ΔVOLN2	8V ≤ V_{IN} ≤ 20V, I_{OUT} = 200mA		1	25	mV
Load regulation 1	ΔVOLD1	5mA ≤ I_{OUT} ≤ 500mA			100	mV
Load regulation 2	ΔVOLD2	5mA ≤ I_{OUT} ≤ 200mA			50	mV
Output voltage 2	$V_{OUT}2$	7V ≤ V_{IN} ≤ 20V, 5mA ≤ I_{OUT} ≤ 350mA	4.75		5.25	V
Current drain	IQ			1.9	5.0	mA
Output noise voltage	VNO	10Hz ≤ f ≤ 100kHz		90		μVrms
Ripple rejection	Rrej1	f = 120Hz, 8V ≤ V_{IN} ≤ 19V, I_{OUT} = 100mA	60	63		dB
	Rrej2	f = 120H, 8V ≤ V_{IN} ≤ 19V, I_{OUT} = 300mA	60	54		dB
Minimum input to output voltage drop	Vdrop	I_{OUT} = 350mA		2.0		V
Output on control voltage	VSTL				0.8	V
Short circuit current	IOSC	V_{IN} = 35V, for GND		300		mA
Peak output current	IOP			700		mA
[Output Off State, VST = high]						
Low-level output voltage	VO_{OFF}	VST = 5V		20	200	mV
Quiescent current	IQ_{OFF}	VST = 5V, except for ISTB		35	40	μA
Output off control voltage	VSTH		2.0		V_{IN}	V
[Thermal Protection]						
Operating temperature	TTSD	Design target value*	150	180		°C

* This rating is a design target value and is not measured.

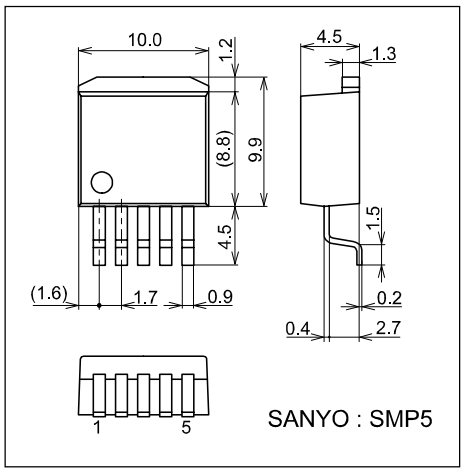
Package Dimensions

unit : mm

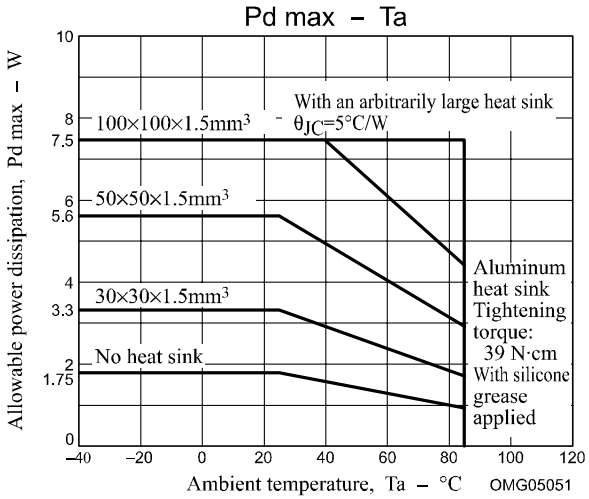
3079A [L78MS05J]



3275 [L78MS05JSMP]



[L78MS05J]



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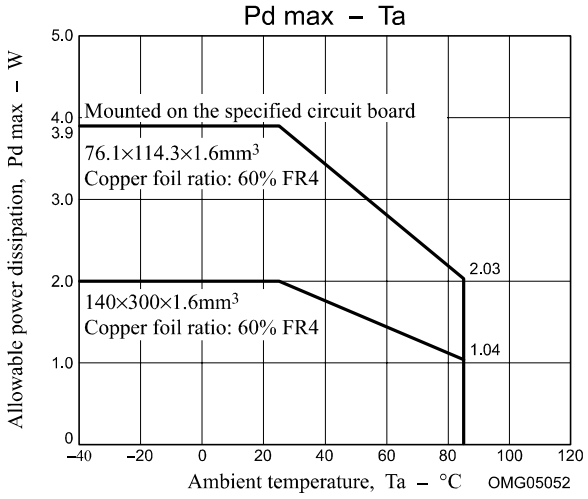
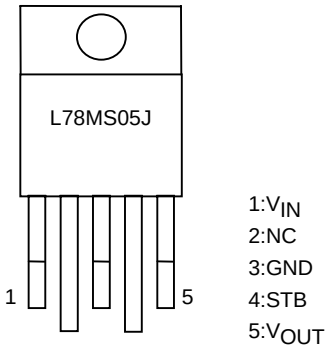


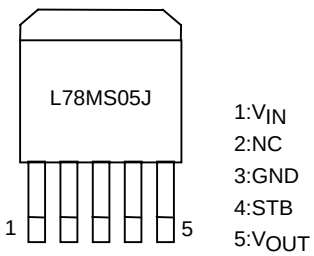
Pin Arrangement

[L78MS05J]



Top view

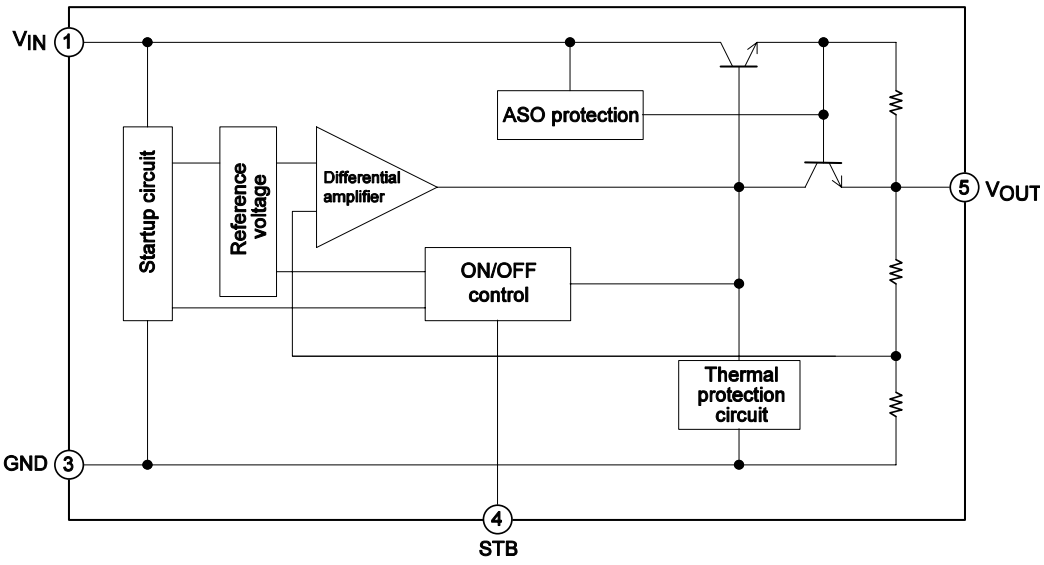
[L78MS05JSMP]



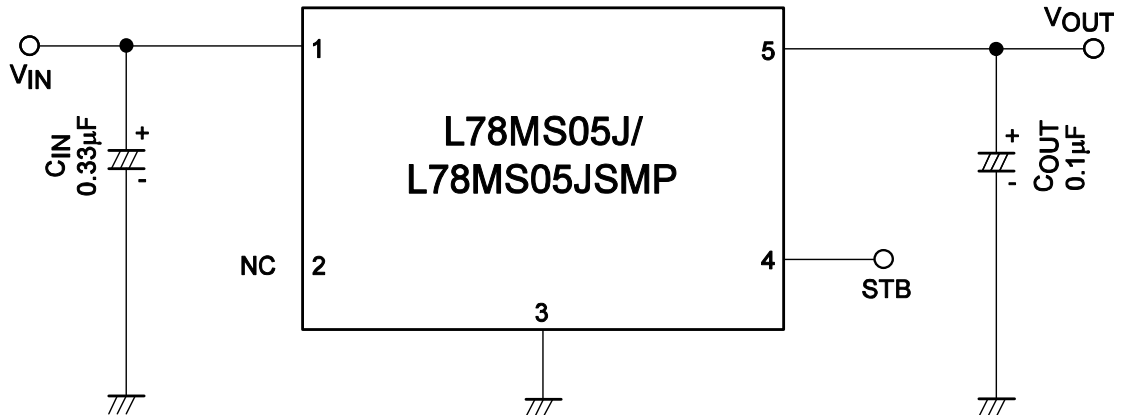
Top view

Note: NC pins must not be used (Pin number 2 in the pin arrangement)

Block Diagram



Stipulated Test Circuits



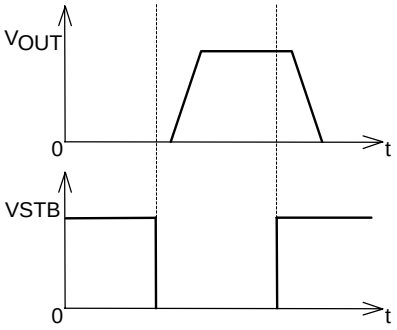
Application Notes

Notes: 1. C_{IN} and C_{OUT} must be located as close as possible to the IC to stabilize IC operation.

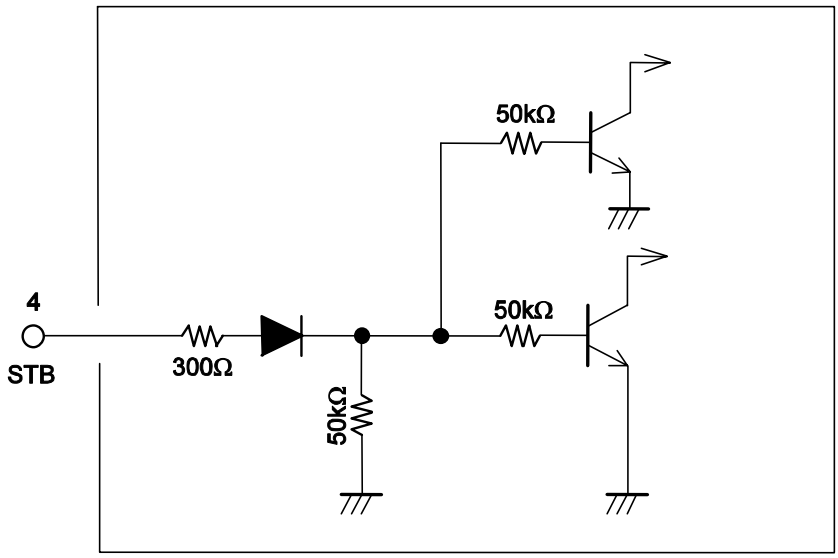
2. C_{OUT} must be 0.1µF or larger, and a capacitor (such as a tantalum capacitor) with a low temperature coefficient must be used to prevent oscillation at low temperatures.
3. If the STB pin is open, the internal bias will result in the output going to the on state. If the STB function is not used, the STB pin must be connected to ground to complete the STB operation.
4. Note that a large current will flow if the IC is connected in reverse, that is, if V_{IN} is connected to - and GND is connected to +.

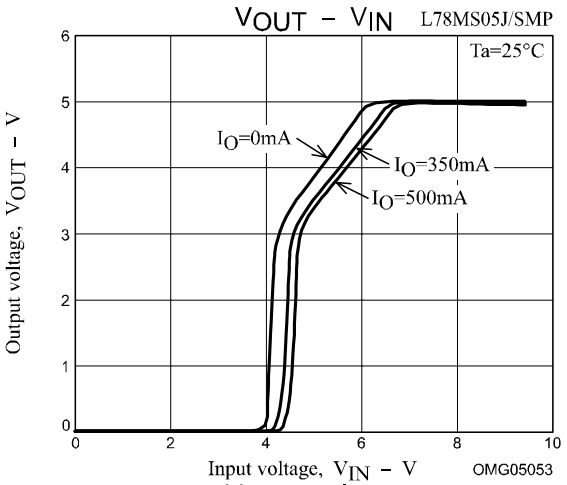
Function Table

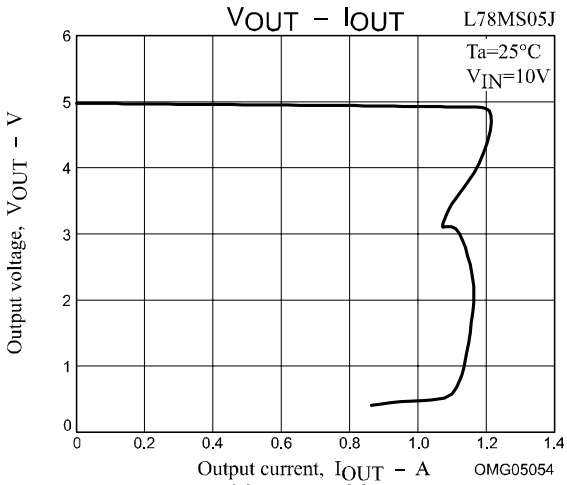
VSTB	V_{OUT}
Low	High
High	Low

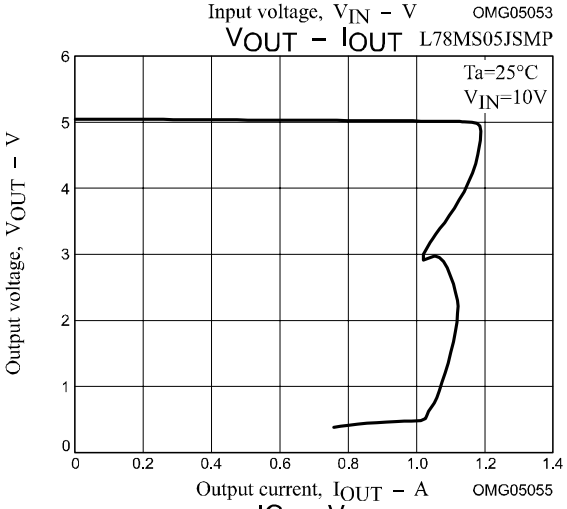


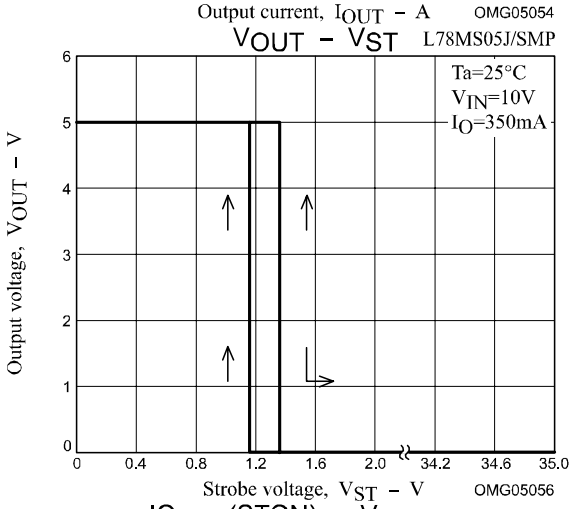
ON/OFF Control Input Block Equivalent Circuit Diagram

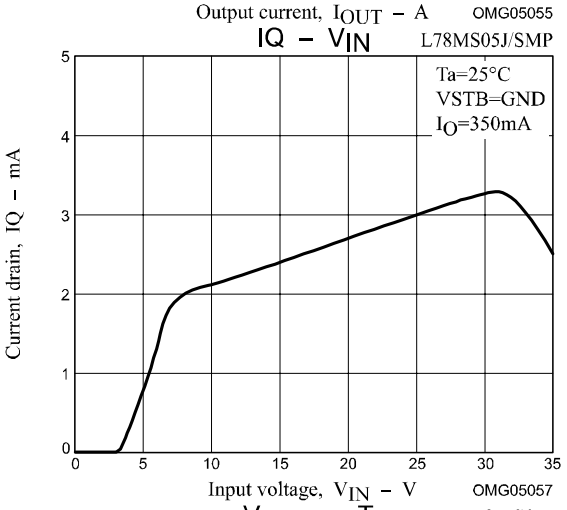


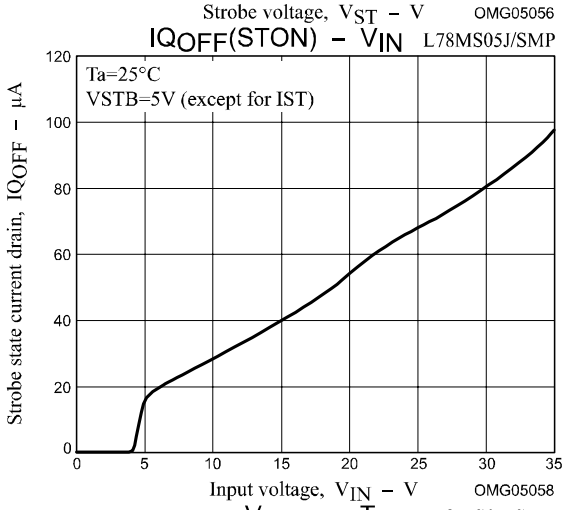

VOUT – VIN L78MS05J/SMP
Ta=25°C
IO=0mA
IO=350mA
IO=500mA
Output voltage, VOUT – V
Input voltage, VIN – V
OMG05053

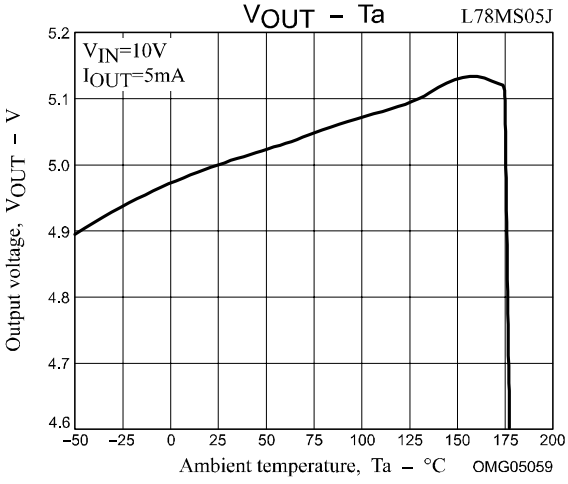

VOUT – IOUT L78MS05J
Ta=25°C
VIN=10V
Output voltage, VOUT – V
Output current, IOUT – A
OMG05054

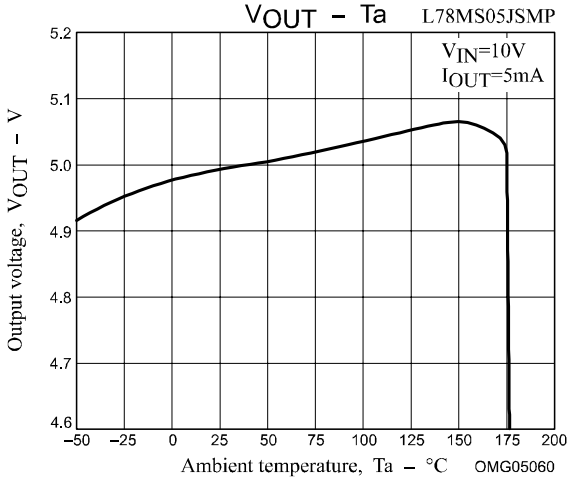

VOUT – IOUT L78MS05JSMP
Ta=25°C
VIN=10V
Output voltage, VOUT – V
Output current, IOUT – A
OMG05055


VOUT – VST L78MS05J/SMP
Ta=25°C
VIN=10V
IO=350mA
Output voltage, VOUT – V
Strobe voltage, VST – V
OMG05056


IQ – VIN L78MS05J/SMP
Ta=25°C
VSTB=GND
IO=350mA
Current drain, IQ – mA
Input voltage, VIN – V
OMG05057


IQOFF(STON) – VIN L78MS05J/SMP
Ta=25°C
VSTB=5V (except for IST)
Strobe state current drain, IQOFF – µA
Input voltage, VIN – V
OMG05058


VOUT – Ta L78MS05J
VIN=10V
IOUT=5mA
Output voltage, VOUT – V
Ambient temperature, Ta – °C
OMG05059


VOUT – Ta L78MS05JSMP
VIN=10V
IOUT=5mA
Output voltage, VOUT – V
Ambient temperature, Ta – °C
OMG05060