



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 $T_a = 25^\circ\text{C}$

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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L78MS05J/L78S05JSMP

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Parameter	Symbol	Conditions	Ratings	Unit
Allowable power dissipation	$P_d \text{ max}$	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	T_{opr}		-40 to +85	°C
Operating temperature	T_{stg}		-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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		7.5 to 20.0	V
Output current	I_{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 $T_a = 25^\circ\text{C}$, $V_{IN} = 10\text{V}$, $I_{OUT} = 350\text{mA}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Output On State, VST = low]						
Output voltage 1	V_{OUT1}		4.8	5.0	5.2	V
Line regulation 1	ΔVOLN1	$7\text{V} \leq V_{IN} \leq 25\text{V}$, $I_{OUT} = 200\text{mA}$		3	50	mV
Line regulation 2	ΔVOLN2	$8\text{V} \leq V_{IN} \leq 20\text{V}$, $I_{OUT} = 200\text{mA}$		1	25	mV
Load regulation 1	ΔVOLD1	$5\text{mA} \leq I_{OUT} \leq 500\text{mA}$			100	mV
Load regulation 2	ΔVOLD2	$5\text{mA} \leq I_{OUT} \leq 200\text{mA}$			50	mV
Output voltage 2	V_{OUT2}	$7\text{V} \leq V_{IN} \leq 20\text{V}$, $5\text{mA} \leq I_{OUT} \leq 350\text{mA}$	4.75		5.25	V
Current drain	I_Q			1.9	5.0	mA
Output noise voltage	VNO	$10\text{Hz} \leq f \leq 100\text{kHz}$		90		μV_{rms}
Ripple rejection	Rrej1	$f = 120\text{Hz}$, $8\text{V} \leq V_{IN} \leq 19\text{V}$, $I_{OUT} = 100\text{mA}$	60	63		dB
	Rrej2	$f = 120\text{H}$, $8\text{V} \leq V_{IN} \leq 19\text{V}$, $I_{OUT} = 300\text{mA}$	60	54		dB
Minimum input to output voltage drop	Vdrop	$I_{OUT} = 350\text{mA}$		2.0		V
Output on control voltage	VSTL				0.8	V
Short circuit current	IOSC	$V_{IN} = 35\text{V}$, for GND		300		mA
Peak output current	IOP			700		mA
[Output Off State, VST = high]						
Low-level output voltage	V_{OFF}	VST = 5V		20	200	mV
Quiescent current	I_{QOFF}	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.

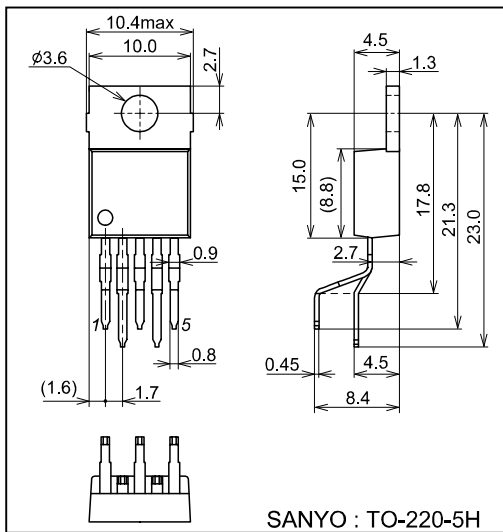
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Package Dimensions

unit : mm

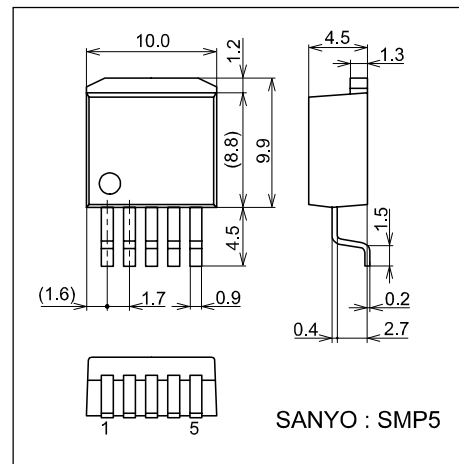
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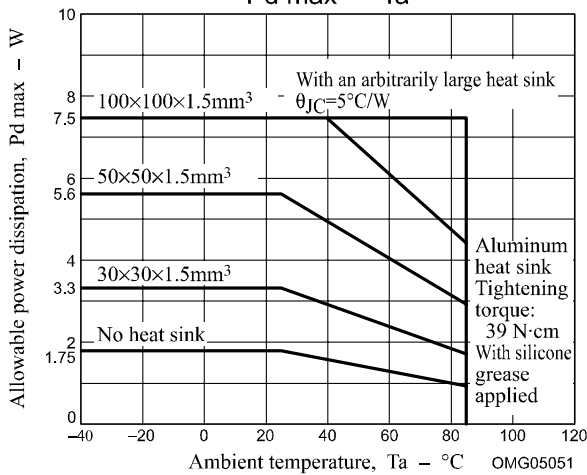
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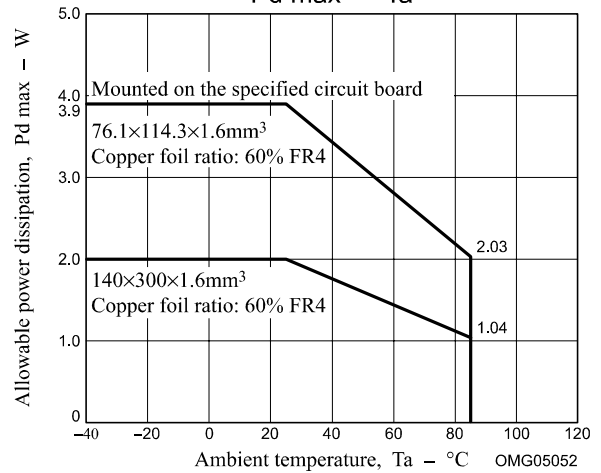
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Pd max - Ta



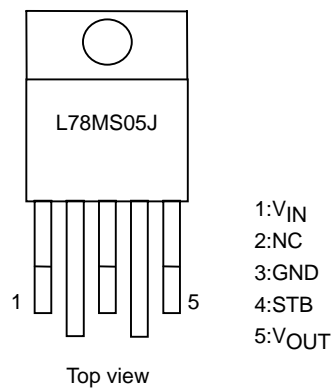
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Pd max - Ta

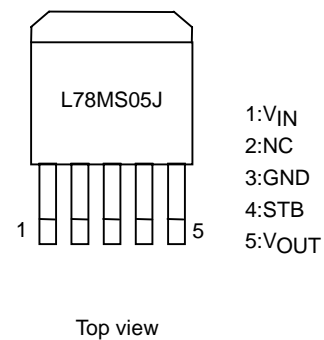


Pin Arrangement

[L78MS05J]



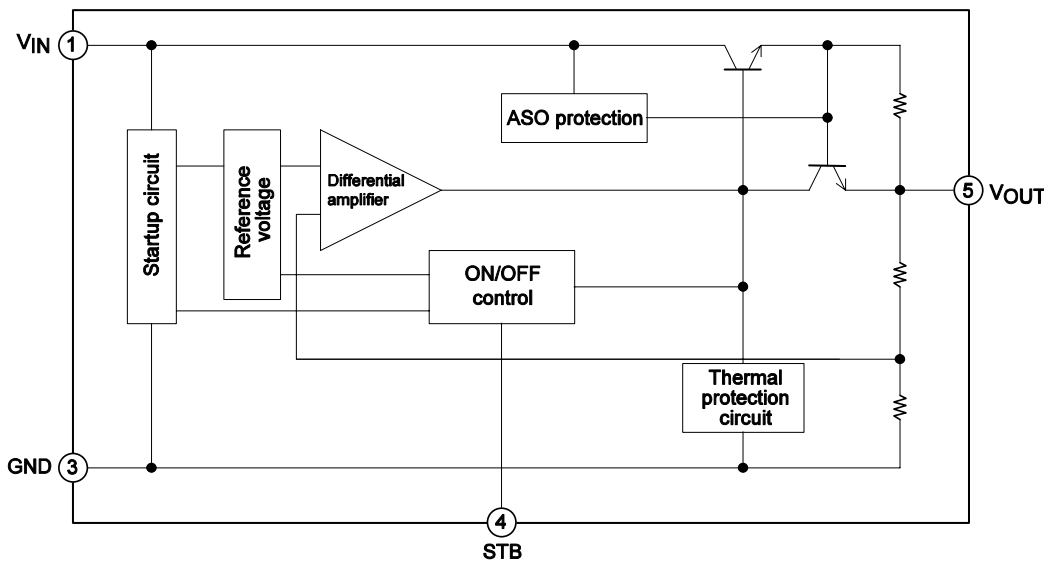
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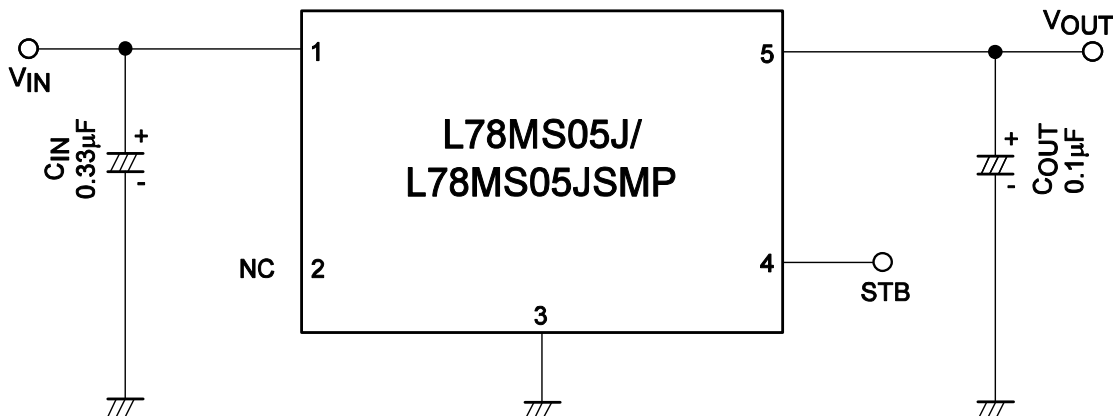
Note: NC pins must not be used (Pin number 2 in the pin arrangement)

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Block Diagram



Stipulated Test Circuits

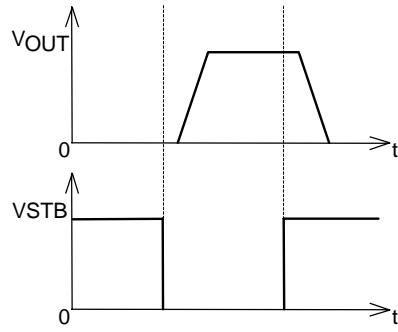


Application Notes

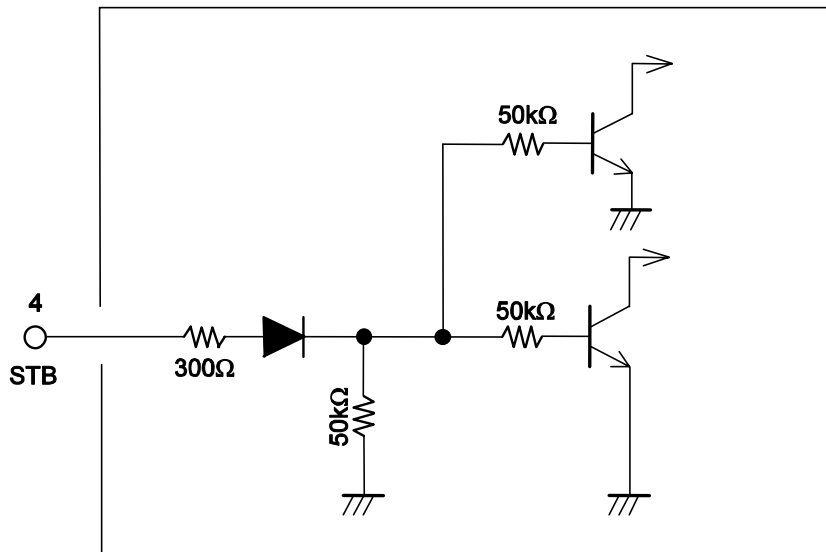
- Notes:
1. C_{IN} and C_{OUT} must be located as close as possible to the IC to stabilize IC operation.
 2. C_{OUT} must be $0.1\mu\text{F}$ or larger, and a capacitor (such as a tantalum capacitor) with a low temperature coefficient must be used to prevent oscillation at low temperatures.
 3. If the 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

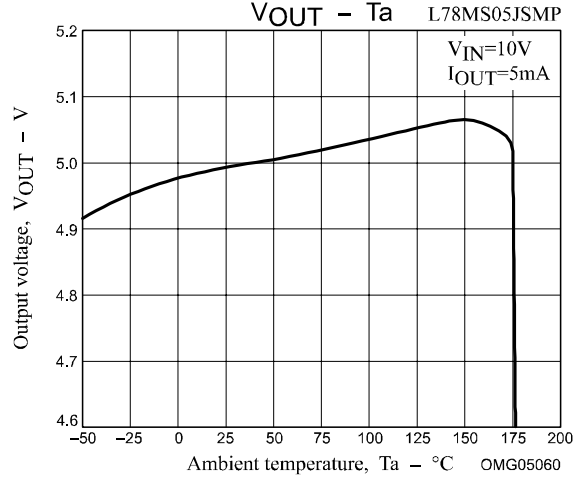
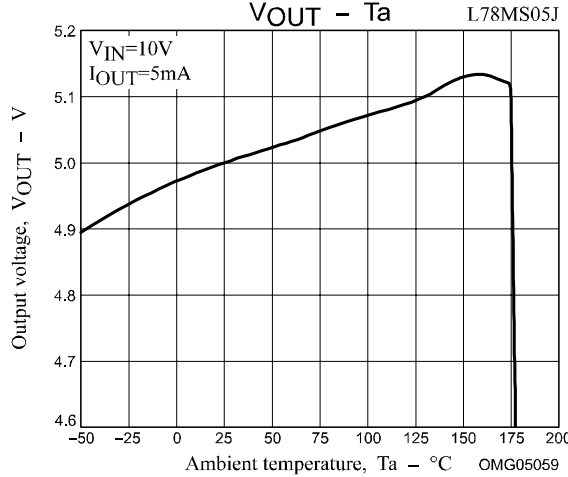
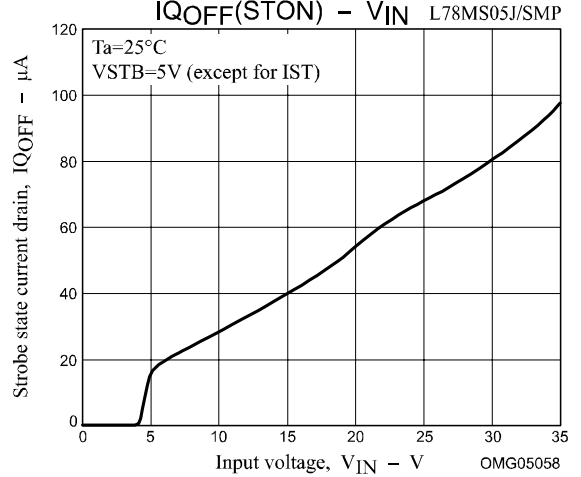
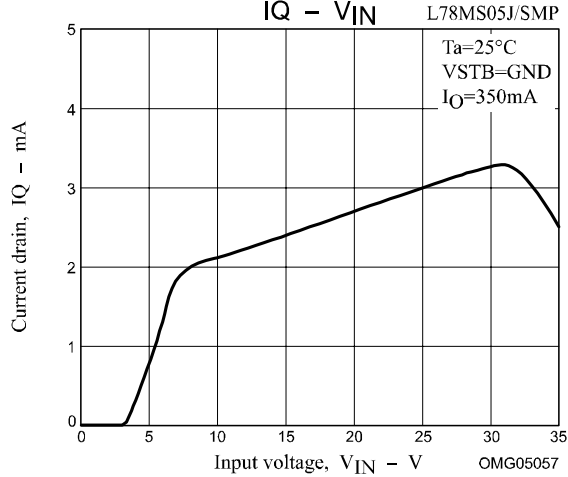
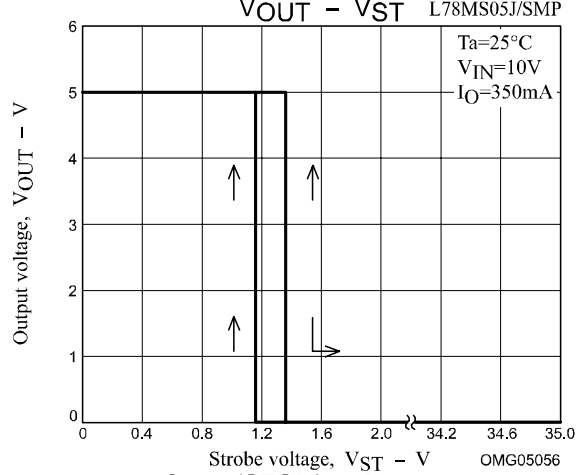
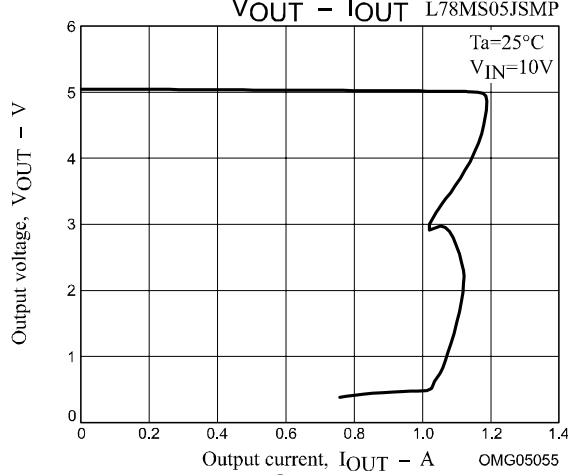
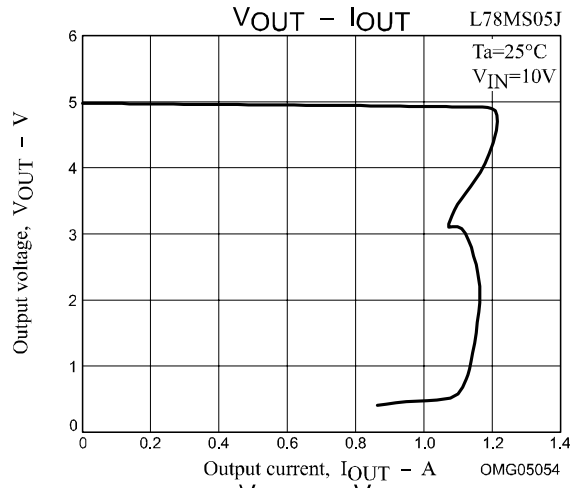
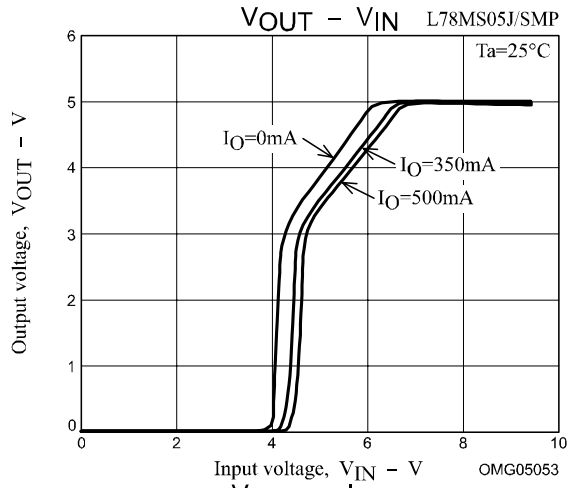
VSTB	VOUT
Low	High
High	Low



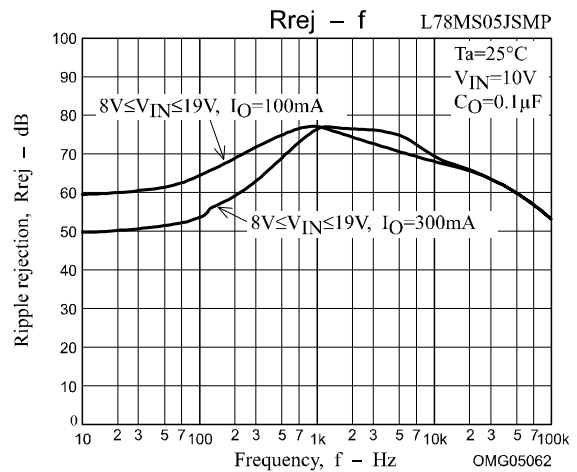
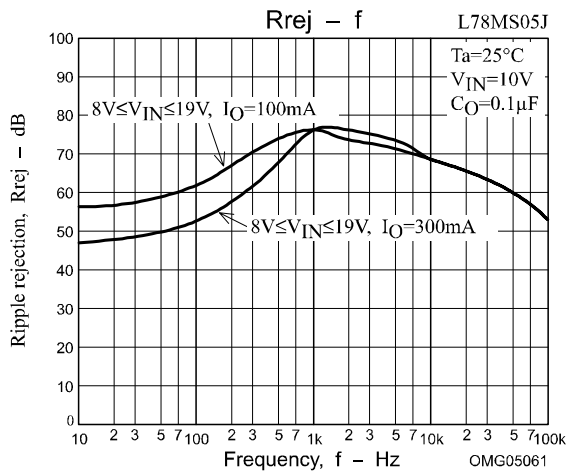
ON/OFF Control Input Block Equivalent Circuit Diagram



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