250mA, 30V Vin, Output overshoot control LDO

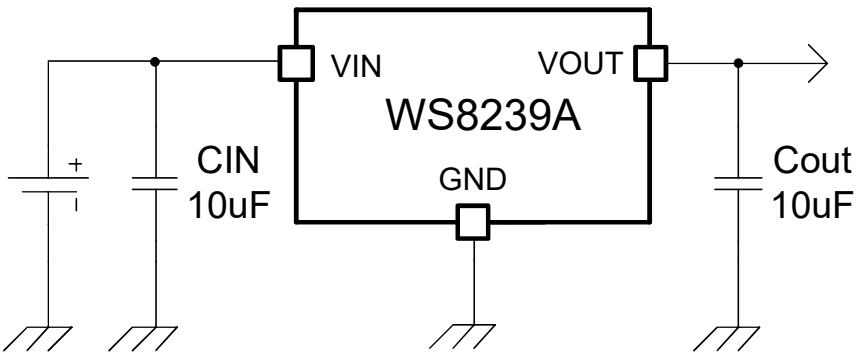
GENERAL DESCRIPTION

WS8239A Series are low-dropout linear voltage regulators with a built-in voltage reference module, error amplifier module and feedback resistance network. WS8239A can deliver 250mA output current and allow an input voltage as high as 30V.This series has the function of internal feedback resistor setting from 1.5V to 12V..

FEATURES

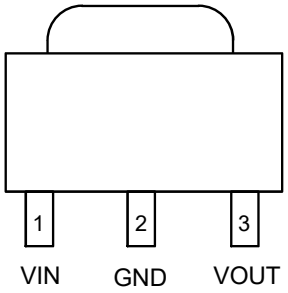
- Input voltage up to 30 V
- Output voltage overshoot control
- Ultra-low quiescent current (Typ.= 1.5 μ A)
- Output voltage 1.5V ~ 12V
- High output accuracy ± 1%
- Output Current IOUT = 250mA (When VIN = 6.5V and VOUT =5.0V)
- Short-circuit Current (Typ.= 42mA)
- Low temperature coefficient
- Ceramic capacitor can be used

TYPICAL APPLICATION CIRCUIT



Suggesting: The circuit uses the electrolytic capacitors or tantalum capacitors in the best ,When VIN is higher than 15V.

PPIN COFIGURATIONIN CONFIGURATION

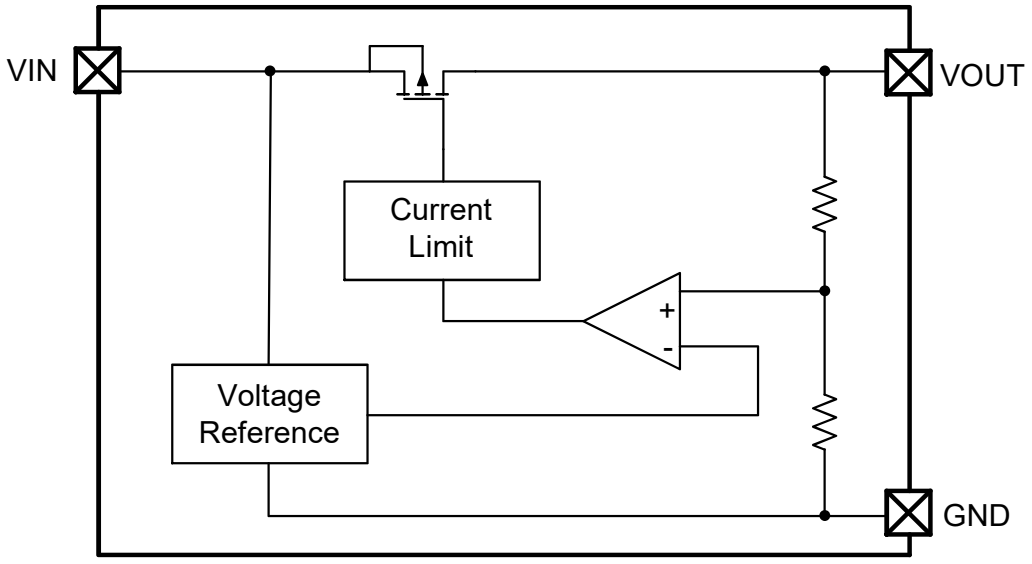


SOT-89

Pin Assignment

Pin Number	Pin Name	Functions
1	VIN	Ground
2	GND	Power Input
3	VOUT	Output

PBLOCK DIAGRAMN CONFIGURATION



Absolute Maximum Ratings

Symbol	Parameter	Ratings	Units
V_{IN}	Input Voltage	30	V
I_{OUT}	Output Current	250	mA
V_{OUT}	Output Voltage	Vss-0.3~V_{IN} +0.3	V
P_D	Internal Power Dissipation	500	mW
θ_{JA}	Thermal resistance (Junction to air)	200	℃/W
T_{OPR}	Operating Ambient Temperature	-40~+85	℃
T_{STG}	Storage Temperature Range	-55~+150	℃
T_J	Maximum Junction Temperature Range	-40~+150	℃
	Lead Temperature	260℃，10sec	

Electrical Characteristics

WS8239A30

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=10mA	X 0.99	V_{OUT} (T) (Note 1)	X 1.01	V
Input Voltage	V_{IN}		3.0	-	30	V
Maximum Output Current	I_{OUT} _max	V_{IN}= V_{OUT}+1.5V	-	250	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1.5V, 1mA≤I_{OUT}≤200mA	-	30	60	mV
Dropout Voltage(Note 3)	V_{DIF}	I_{OUT} =50mA	-	170	-	mV
		I_{OUT} =100mA	-	340	-	mV
Supply Current	I_{SS}	V_{IN}= V_{OUT} +1.0V	-	1.5	2.5	μA
Line Regulations	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT} =1mA V_{OUT} +1.0V ≤V_{IN}≤30V	-	0.06	0.1	%/V
Short-circuit Current	I_{SHORT}	V_{OUT}=0V	-	42	80	mA
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$	I_{OUT} =10mA -40℃≤Ta≤85℃	-	65	-	ppm/℃

WS8239A33

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=10mA	X 0.99	V_{OUT} (T) (Note 1)	X 1.01	V
Input Voltage	V_{IN}		3.3	-	30	V
Maximum Output Current	I_{OUT} _max	V_{IN}= V_{OUT}+1.5V	-	250	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1.5V, 1mA≤I_{OUT}≤200mA	-	30	60	mV
Dropout Voltage(Note 3)	V_{DIF}	I_{OUT} =50mA	-	170	-	mV
		I_{OUT} =100mA	-	340	-	mV
Supply Current	I_{SS}	V_{IN}= V_{OUT} +1.0V	-	1.5	2.5	μA
Line Regulations	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT} =1mA V_{OUT} +1.0V ≤V_{IN}≤30V	-	0.06	0.1	%/V
Short-circuit Current	I_{SHORT}	V_{OUT}=0V	-	42	80	mA
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$	I_{OUT} =10mA -40℃≤Ta≤85℃	-	65	-	ppm/℃

WS8239A36

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=10mA	X 0.99	V_{OUT} (T) (Note 1)	X 1.01	V
Input Voltage	V_{IN}		3.6	-	30	V
Maximum Output Current	I_{OUT} _max	V_{IN}= V_{OUT}+1.5V	-	250	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1.5V, 1mA≤I_{OUT}≤200mA	-	30	60	mV
Dropout Voltage(Note 3)	V_{DIF}	I_{OUT} =50mA	-	170	-	mV
		I_{OUT} =100mA	-	340	-	mV
Supply Current	I_{SS}	V_{IN}= V_{OUT} +1.0V	-	1.5	2.5	μA
Line Regulations	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT} =1mA V_{OUT} +1.0V ≤V_{IN}≤30V	-	0.06	0.1	%/V
Short-circuit Current	I_{SHORT}	V_{OUT}=0V	-	42	80	mA
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$	I_{OUT} =10mA -40℃≤Ta≤85℃	-	65	-	ppm/℃

WS8239A50

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=10mA	X 0.99	V_{OUT} (T) (Note 1)	X 1.01	V
Input Voltage	V_{IN}		5.0	-	30	V
Maximum Output Current	I_{OUT} _max	V_{IN}= V_{OUT}+1.5V	-	250	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1.5V, 1mA≤I_{OUT}≤200mA	-	30	60	mV
Dropout Voltage(Note 3)	V_{DIF}	I_{OUT} =50mA	-	190	-	mV
		I_{OUT} =100mA	-	380	-	mV
Supply Current	I_{SS}	V_{IN}= V_{OUT} +1.0V	-	1.5	2.5	μA
Line Regulations	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT} =1mA V_{OUT} +1.0V ≤V_{IN}≤30V	-	0.06	0.1	%/V
Short-circuit Current	I_{SHORT}	V_{OUT}=0V	-	42	80	mA
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$	I_{OUT} =10mA -40℃≤Ta≤85℃	-	65	-	ppm/℃

Note ：

1. V_{OUT} (T) ： Specified Output Voltage

2.V_{OUT} (E) ： Effective Output Voltage (ie. The output voltage when “V_{OUT} (T)+ 2.0V”is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)

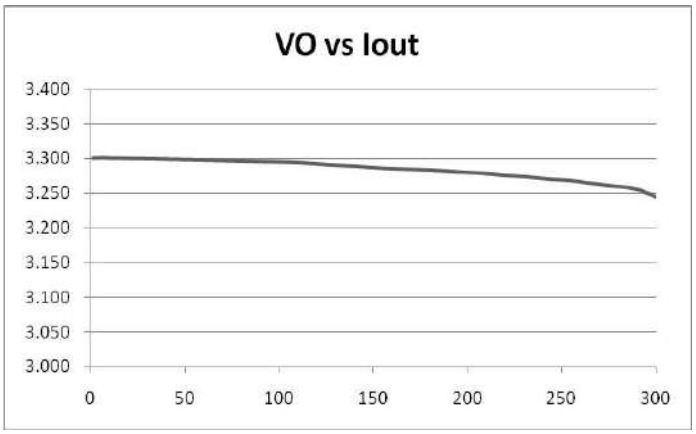
3.V_{DIF}： V_{IN1} –V_{OUT} (E)’

V_{IN1} ： The input voltage when V_{OUT}(E)’ appears as input voltage is gradually decreased.

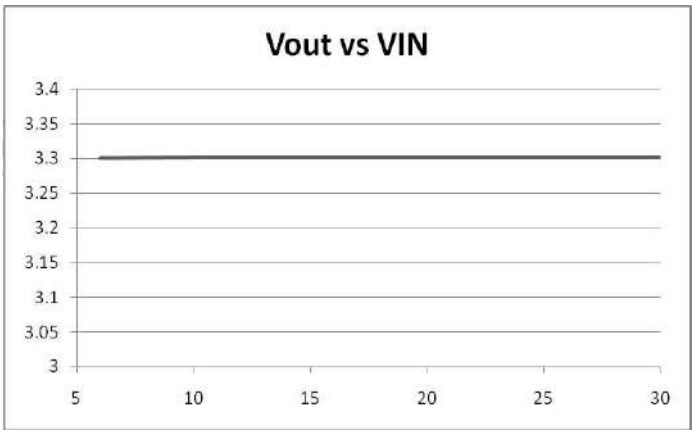
V_{OUT} (E)’=A voltage equal to 98% of the output voltage whenever an amply stabilized I_{OUT} and {V_{OUT} (T)+2.2V} is input.

Type Characteristics

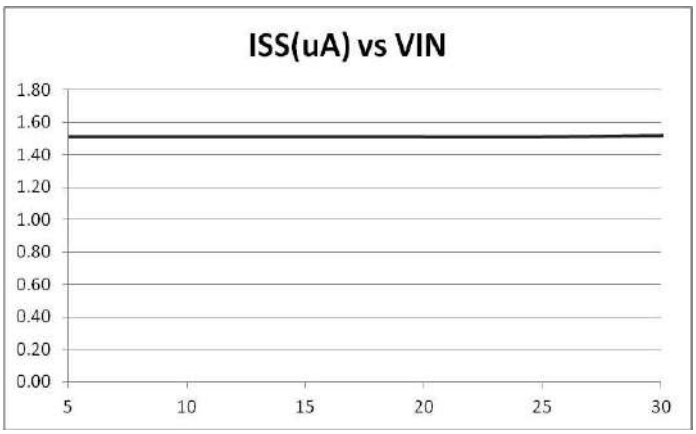
（1）Output Voltage VS. Output Current （**Ta = 25 °C**）
WS8239A33（V_{IN}=V_{OUT}+1.5V）



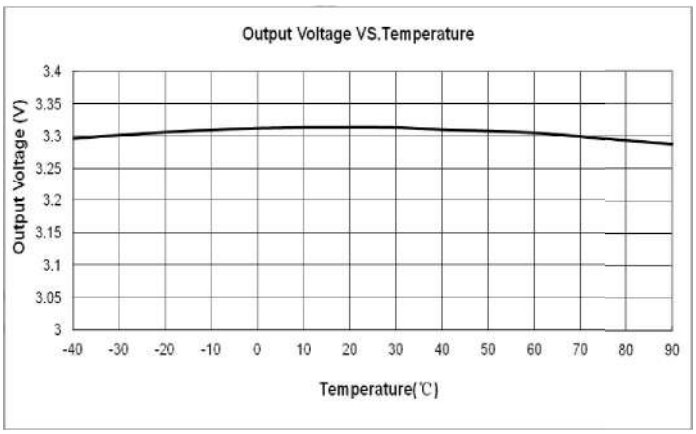
（2）Output Voltage VS. Input Voltage（ **Ta = 25 °C**）
WS8239A33 (Iout=1mA)



（3）Quiescent Current VS. Input Voltage（**Ta = 25 °C**）
WS8239A33



（4）Output Voltage VS. Temperature **WS8239A33**
(I_{OUT}=10mA)



Applications Information

Input Capacitor and Output Capacitor

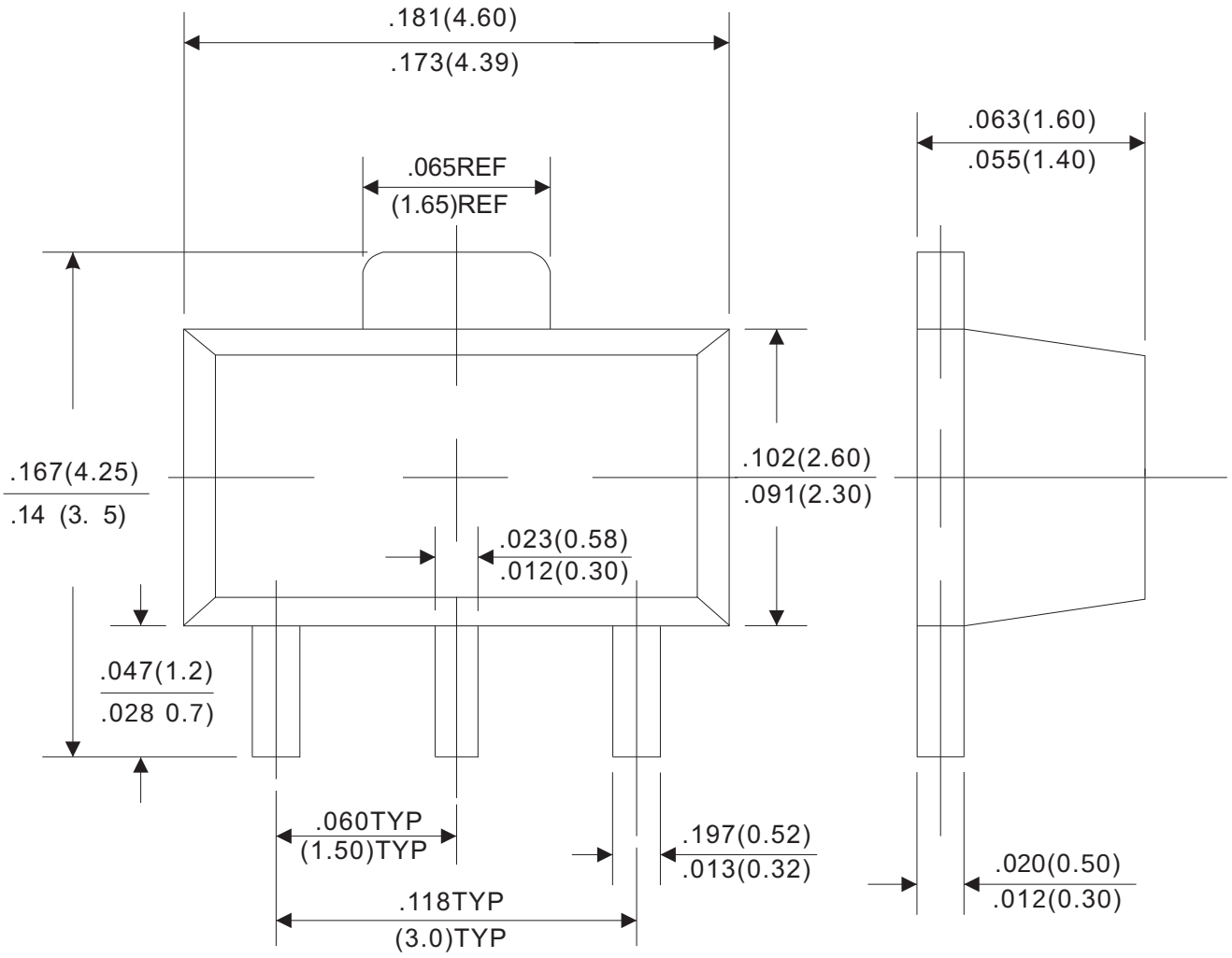
Ceramic capacitors are suitable for smaller volume applications because of its high capacitance and low cost. Its high ripple current, high voltage rating and low ESR make it more suitable for converter applications. The low output voltage ripple and small peripheral circuit size can be obtained by using ceramic capacitor. The X5R or X7R models are selected as output and input capacitors, which have better temperature and voltage characteristics.

When the VIN voltage is greater than 15V, if the input capacitor is ceramic capacitor, the high voltage spike generated at the VIN pin will exceed 40V, which may cause permanent damage to the chip. Therefore, we suggest that customers using electrolytic or tantalum capacitors with better power consumption in the application of VIN>15V, can effectively protect chips and improve system reliability.

When the VIN voltage is very fast, the internal circuit of the chip is too late to respond and the output voltage is prone to exceed the rated output voltage, that is, the output voltage overshoot., the overshoot of the output voltage is especially serious in the following: 1. VIN rising fast. 2. The output capacitance is small. 3. The output load is small. When the system has the output voltage overshoot, the customers can increase the output capacitance to alleviate this situation.

Outline Drawing

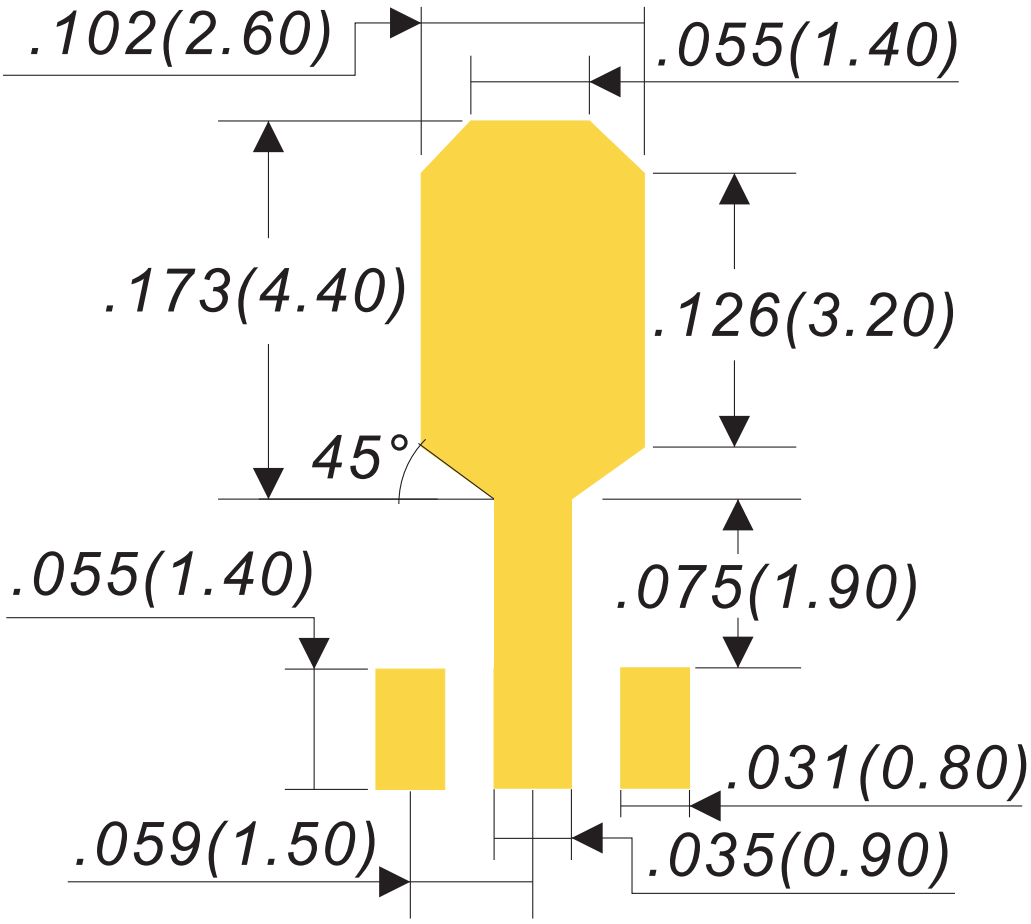
SOT-89



Dimensions in inches and (millimeters)

Rev.F

Suggested Soldering Pad Layout	SOT-89



Dimensions in inches and (millimeters)

RevA

Ordering Information:

Device PN	Packing
WS8239A(1)5(2)0(3)PL(4)-T(5)G(6)-WS(7)	Tape&Reel: 1 Kpcs/Reel

Note: (1) Output Accuracy A : ±1%

(2),(3):Output Voltage e.g : 5.0V=(1) : 5, (2) : 0

Output Voltage Range : 3.0V ~ 5.0V

(4) PL : Package : SOT-89(1 : VIN, 2 : GND, 3 : VOUT)

(5) Packing code, Tape & Reel Packing

(6) Halogen free product for packing code suffix “H”

(7) WS : Willas brand abbreviation, Label Type does not display