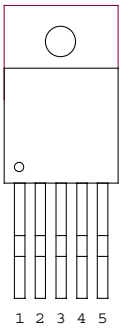
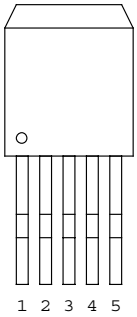
AX3203

150KHz, 5A PWM Buck DC/DC Converter

AX3203 Series	
TO220-5L Package	
TO263-5L Package	

Description

The AX3203 is Monolithic IC that design for a step-down DC/DC Converter, and own the ability of driving a 5A load without additional transistor component. The output version included 3.3V, 5V, 12V and an adjustable type. It operates at a switching frequency of 150KHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators. Other features include a guaranteed ±4% tolerance on output voltage under specified input voltage and output load conditions, and ±15% on the oscillator frequency. Regarding protected function, thermal shutdown is to prevent over temperature operating from damage, and current limit is against over current operating of the output switch.

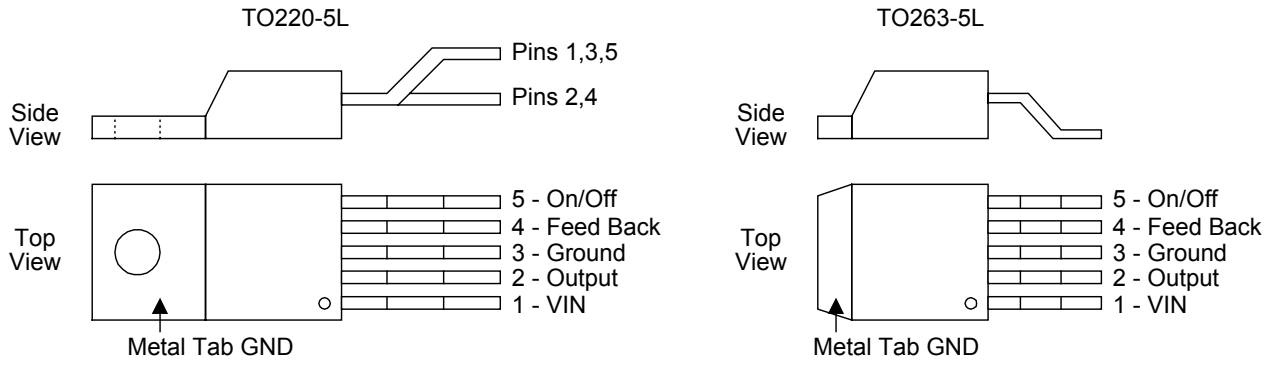
Features

- 3.3V, 5V, 12V and adjustable
- Adjustable version output voltage range: 1.3-37V
- ±4% max over line and load conditions
- 150KHz ±15% fixed switching frequency
- TTL shutdown capability
- Operating voltage can be up to 40V
- Output load current: 5A
- TO220-5L and TO263-5L packages
- Low power standby mode
- Thermal-shuntdown and current-limit protection
- High efficiency
- Built-in switching a transistor on chip, requires only 4 external components

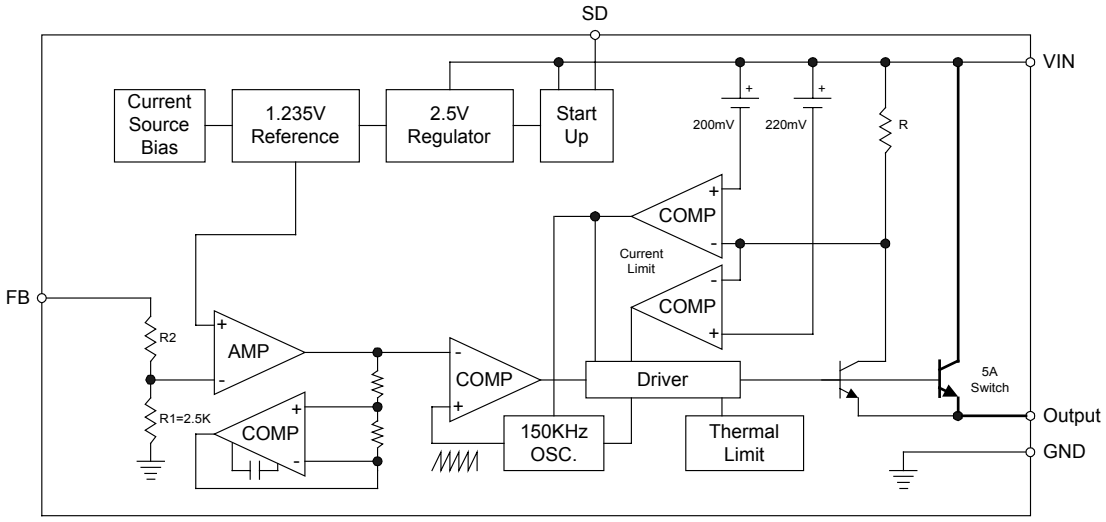
Applications

- Simple High-efficiency step-down regulator
- Positive to negative converter
- On-card switching regulators

Connection Diagrams



Pin Connections



Absolute Maxium Rating (Note1)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	40	V
On/Off Pin Input Voltage	V_{SD}	-0.3~+25	V
Feedback Pin Voltage	V_{FB}	-0.3~+25	V
Output Voltage to Ground	V_{OUT}	-1	V
Power Dissipation	P_D	Internally Limited	W
Operating Temperature	T_{opr}	-40~+125	°C
Storage Temperature	T_{stg}	-65~+150	°C
Operating Voltage	V_{OP}	+4.5~+40	V
Human Body Model	(Note 2)	2000	V

Electrical Characteristics (Continued)

Specifications with **boldface type** apply over for full operating temperature range, the other type are for T_J=25°C

Part No.	Parameter	Symbol	Conditions	Min.	Typ. (Note3)	Max. (Note4)	Unit
AX3203-3.3	Output Voltage	V_{OUT}	4.75V≤V_{IN}≤40V, 0.2A≤I_{LOAD}≤5A	3.168 **3.135**	3.3	3.342 **3.465**	V
	Efficiency	η	V_{IN}=12V, I_{LOAD}=5A	-	71	-	%
AX3203-5.0	Output Voltage	V_{OUT}	7V≤V_{IN}≤40V, 0.2A≤I_{LOAD}≤5A	4.800 **4.750**	5.0	5.200 **5.250**	V
	Efficiency	η	V_{IN}=12V, I_{LOAD}=5A	-	78	-	%
AX3203-12	Output Voltage	V_{OUT}	15V≤V_{IN}≤40V, 0.2A≤I_{LOAD}≤5A	11.52 **11.40**	12.0	12.48 **12.60**	V
	Efficiency	η	V_{IN}=25V, I_{LOAD}=5A	-	88	-	%
AX3203-ADJ	Output Voltage	V_{OUT}	4.5V≤V_{IN}≤40V, 0.2A≤I_{LOAD}≤5A V_{OUT} programmed for 3V	1.193 **1.180**	1.230	1.267 **1.280**	V
	Efficiency	η	V_{IN}=12V, V_{OUT}=3V, I_{LOAD}=5A	-	72	-	%

All Output Voltage Versions Electrical Characteristics

Specifications with **boldface type** apply over for full operating temperature range, the other type are for T_J=25°C

(Unless otherwise specified, V_{IN}=12V for the 3.3V, 5V, and adjustable version and V_{IN}=24V for the 12V version, I_{LOAD}=500mA)

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Device Parameters							
Feedback Bias Current	I_b	Adjustable Version Only, V_{FB}=1.3V		-	10	50 **100**	nA
Oscillator Frequency	f_O	(Note 6)		127 **110**	150	173 **173**	KHz
Saturation Voltage	V_{SAT}	I_{OUT}=5A (Note 7,8)		-	1.5	1.6 **1.7**	V
Max. Duty Cycle (ON) Min. Duty Cycle (OFF)	DC	(Note 8) (Note 9)		-	100 0	-	%
Current Limit	I_{CL}	Peak Current (Note 7,8)		5.5	6	6.5 **7.5**	A
Output Leakage Current	I_L	Output=0V (Note 7,9)		-	-	50	uA
		Output=-1V (Note 10)		-	2	30	mA
Quiescent Current	I_Q	(Note 9)		-	5	10	mA
Standby Quiescent Current	I_{STBY}	ON/OFF pin=5V (Note 10)		-	150	250 **300**	uA
Thermal Resistance	θ_{JC}	TO220-5L	Junction to Case	-	2.5	-	°C/W
		TO263-5L		-	3.5	-	
	θ_{JA} (Note 11)	TO220-5L	Junction to ambient	-	28	-	°C/W
		TO263-5L		-	23	-	
ON/OFF Control							
ON/OFF Pin Logic Input Threshold Voltage	V_{IH}	Low (Regulator ON)		-	1.3	0.6	V
	V_{IL}	High (Regulator OFF)		2.0		-	
ON/OFF Pin Input Current	I_{IH}	V_{LOGIC}=2.5V (Regulator OFF)		-	15	25	uA
	I_{IL}	V_{LOGIC}=0.5V (Regulator ON)		-	0.02	5	

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Note 2: The human body model is a 100pF capacitor discharged through a 1.5k resistor into each pin.

Note 3: Typical numbers are at 25°C and represent the most likely norm.

Note 4: All limits guaranteed at room temperature (standard type face) and at temperature extremes (bold type face). All room temperature limits are 100% production tested. All limits at temperature extremes are guaranteed via correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).

Note 5: External components such as the catch diode, inductor, input and output capacitors, and voltage programming resistors can affect switching regulator system performance.

Note 6: The switching frequency is reduced when the second stage current limit is activated.

Note 7: No diode, inductor or capacitor connected to output pin.

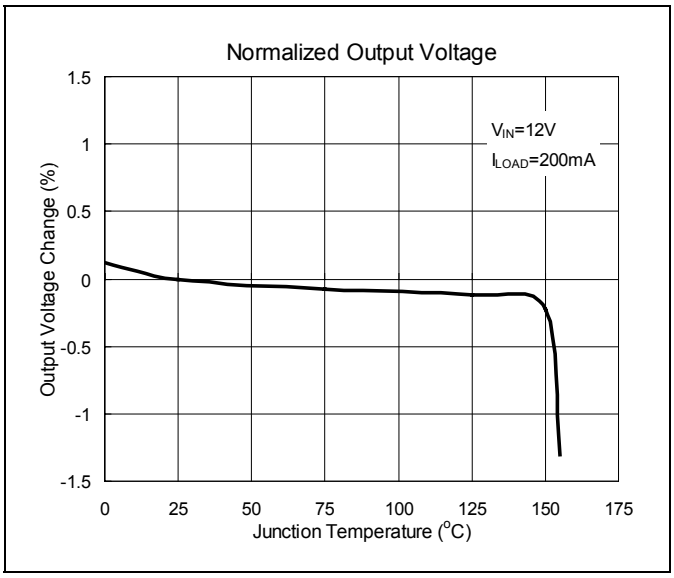
Note 8: Feedback pin removed from output and connected to 0V to force the output transistor switch ON.

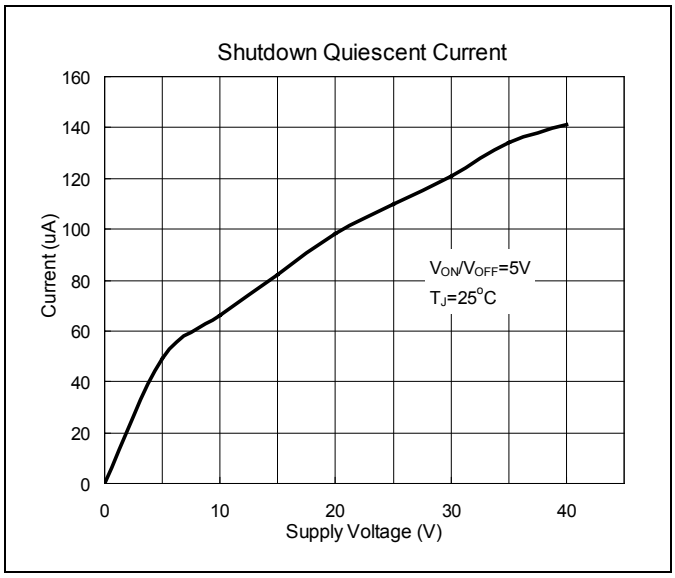
Note 9: Feedback pin removed from output and connected to 12V for the 3.3V, 5V, ADJ. version, and 15V for the 12V version, to force the output transistor switch OFF.

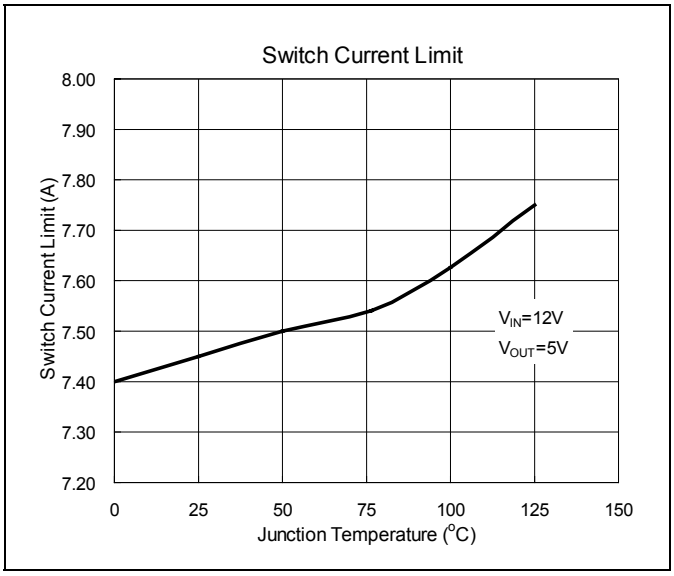
Note 10: V_{IN}=40V.

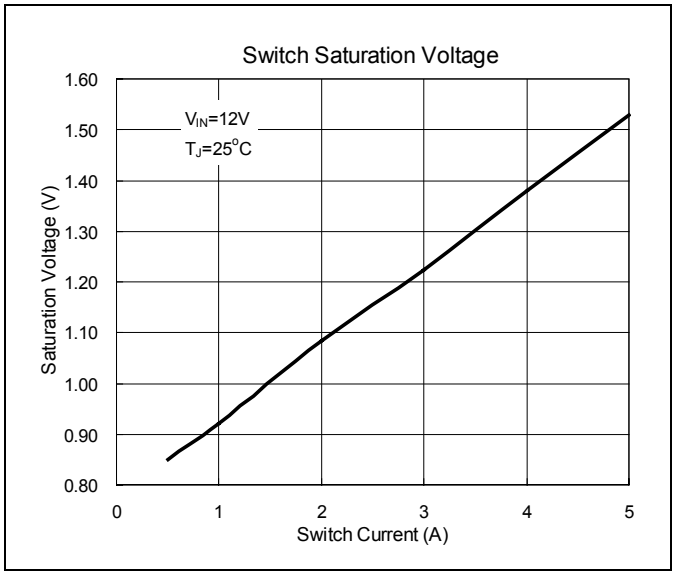
Note 11: Junction to ambient thermal resistance. (With copper area of approximately 3in^2)

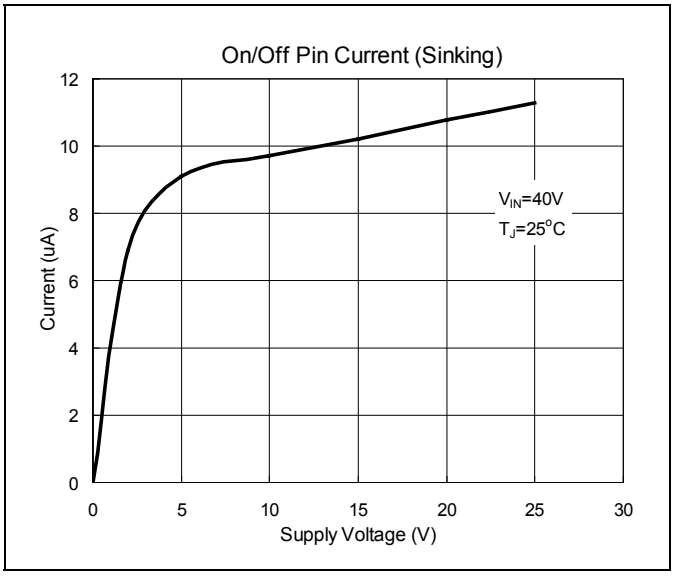
Characteristics Curve











Typical Application Circuit

Fig.1 Fixed Type Circuit

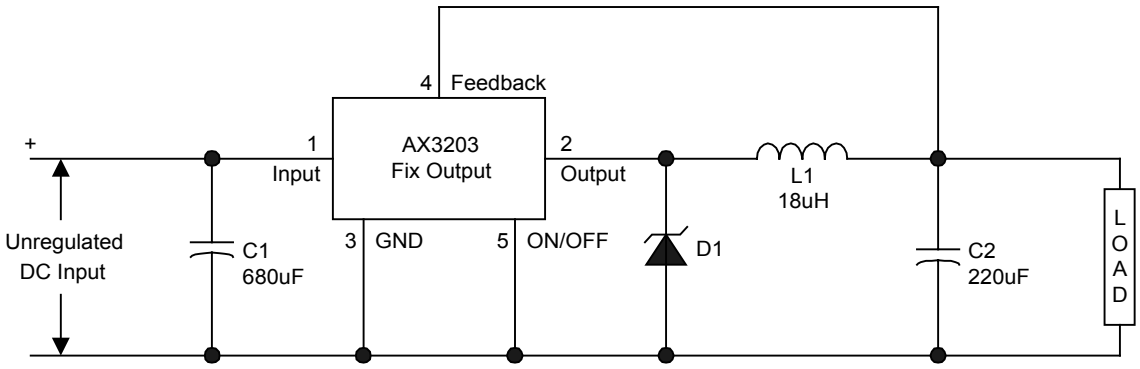
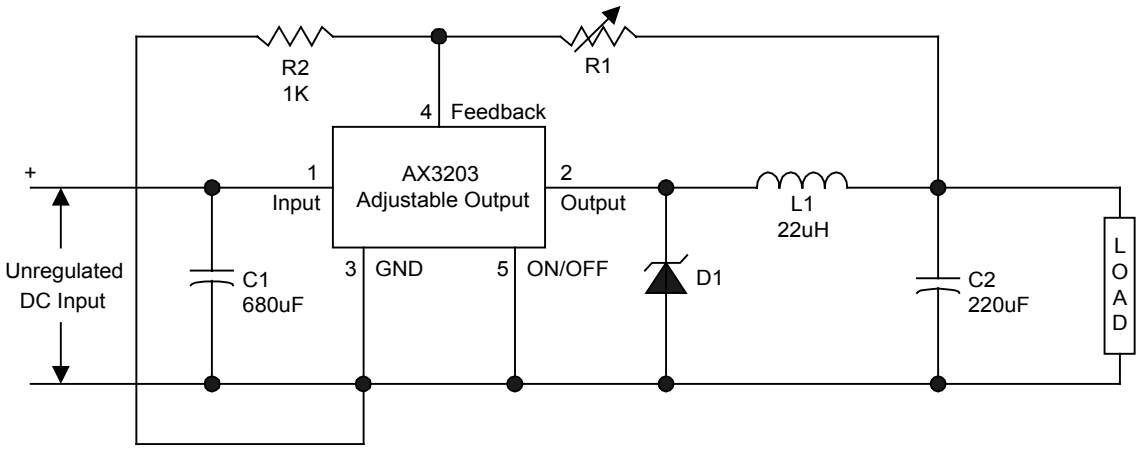
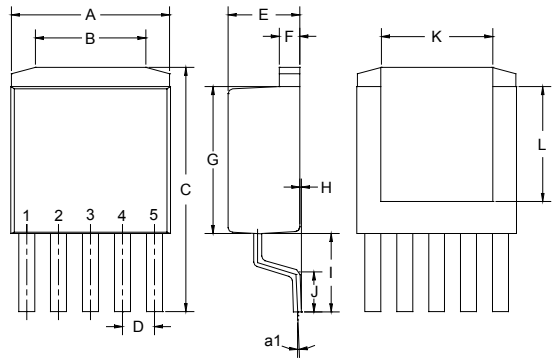


Fig.2 Adjustable Output Voltage Versions

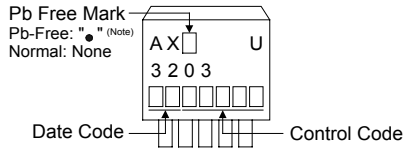


TO-263-5L Dimension



5-Lead TO-263
Plastic Package
AVANTICS Package Code: U

Marking:



Note: Green label is used for pb-free packing

Pin Style: 1.Vin 2.Output 3.Ground 4.Feed Back
5.On/Off

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	9.9	10.30
B	-	#7.10
C	15.20	15.60
D	-	*1.70
E	4.50	4.70
F	-	*1.27
G	8.20	8.60
H	0.05	0.25
I	5.10	5.50
J	2.44	2.64
K	-	#7.00
L	-	#4.48
a1	0^{O}	7^{O}

#: REF, *: Typical, Unit: mm

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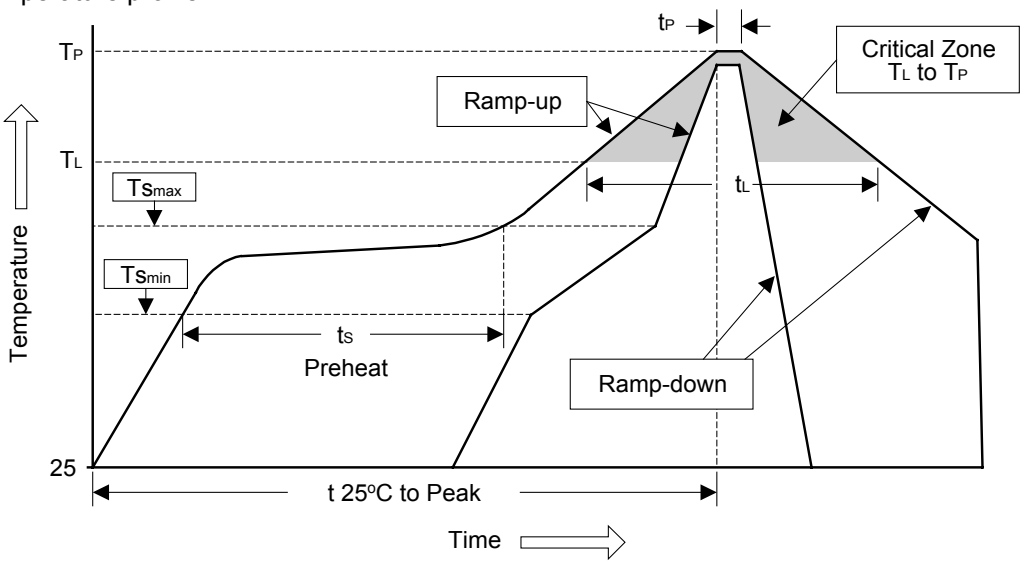
- AVANTICS Microelectronics Corp: No. 255, Cai Lun Rd. Zhangjiang Technology Industrial Park Pudong, Shanghai, China
  Tel: 86-021-58955599 Fax: 86-021-58558038

Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec