

Features

- High efficiency
- Using external P and N channel MOSFET
- Maximum Duty 100%
- Oscillation frequency 600KHz
- Soft Start by an external capacity
- Output voltage accuracy $\pm 2\%$
- Built-in ON/OFF Function
- Stand-by current max. 10 μ A
- Quiescent Current 1mA
- Input voltage: 2.5V ~7.0V

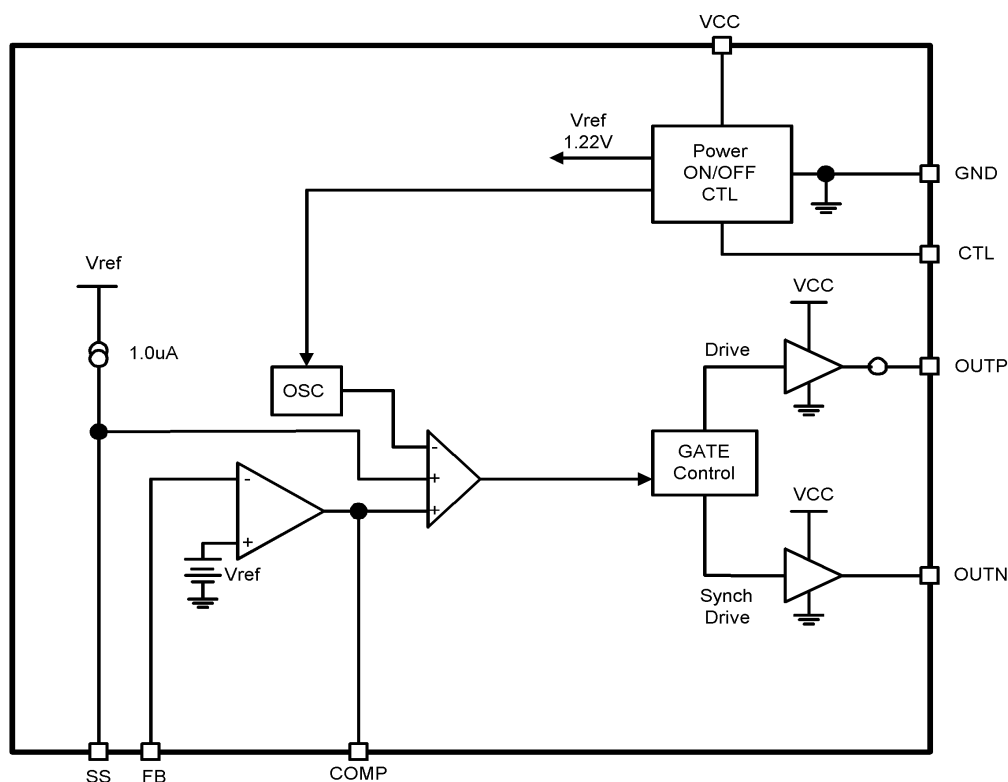
Applications

- Power Supply for portable devices

General Description

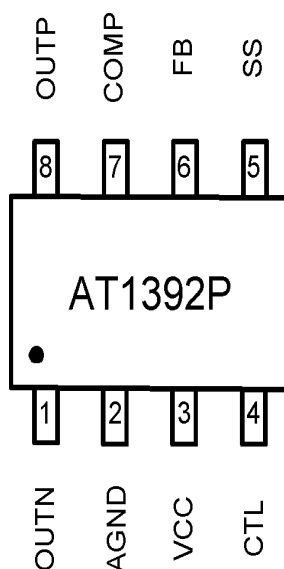
The AT1392 provides complete control and protection for a DC/DC converter optimized for high-performance microprocessor applications. It is designed to drive one P-Channel and one N-Channel in a buck topology. The AT1392 integrates all of the control, output adjustment into a single package. The output voltage of the converter can be precisely regulated with a maximum tolerance of $\pm 2\%$ over temperature and line voltage variations. The AT1392 is a family of low-noise synchronous step-down DC/DC converters that is ideally suited for systems powered from a 1-cell Li-ion battery or from a 3-cell to 4-cell NiCd, NiMH, or alkaline battery. It can also be used to USB-Based power system.

Block Diagram



Aimtron reserves the right without notice to change this circuitry and specifications.

Pin Configuration



Ordering Information

Part number	Package	Marking
AT1392	TSSOP8	AT1392P

Pin Description

Symbol	Pin No.	Descript	Symbol	Pin No.(A/B)	Descript
OUTN	1	Output for Nch-MOSFET	SS	5	Soft-Start
AGND	2	Power Ground	FB	6	Error amplifier inverting input
VCC	3	Power Supply	COMP	7	Error amplifier output
CTL	4	ON-OFF Control	OUTP	8	Output for Pch-MOSFET

Absolute Maximum Ratings

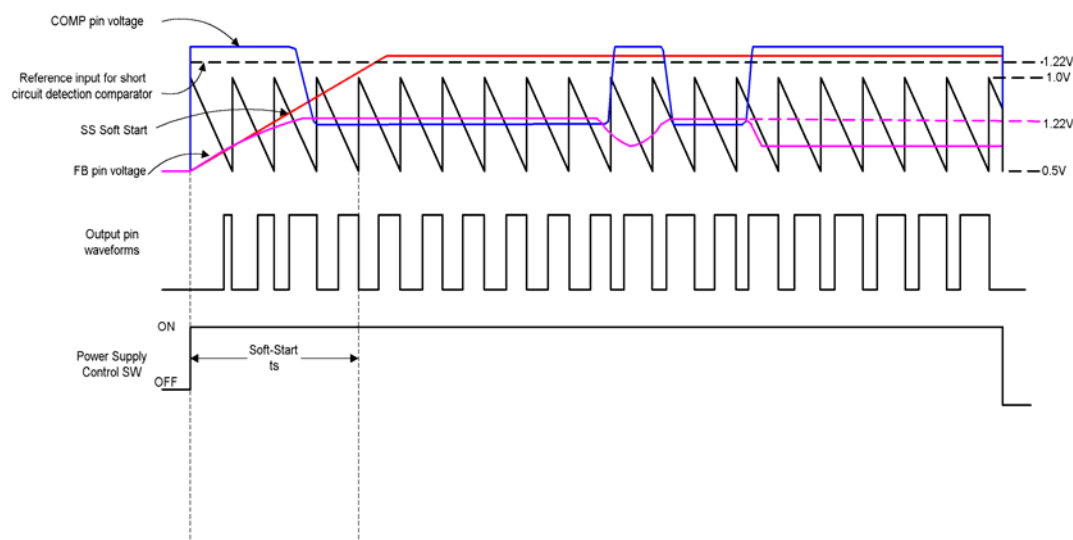
Parameter	Condition	Rated Value		Unit
		Min.	Max.	
Power Supply Voltage	—	-	+7	V
Source Average Current of OUT	—	-	-50	mA
Sink Average Current of OUT	—	-	50	mA
Source Peak Current of OUT	—	-	-200	mA
Sink Peak Current of OUT	—	-	200	mA
Input Voltage to Error Amplifier	—	-	6.5	V
Continuous power dissipation	TSSOP8 (T _a =+25°C)	-	500	mW
Operating temperature	—	-30	+85	°C
Storage temperature	—	-55	+125	°C

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions

(T_a=+25°C)

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power supply voltage	V _{CC}	2.5	--	6	V
Control input voltage	V _{CTL}	0	--	6	V
Operating temperature	T _{OP}	-20	+25	+85	°C



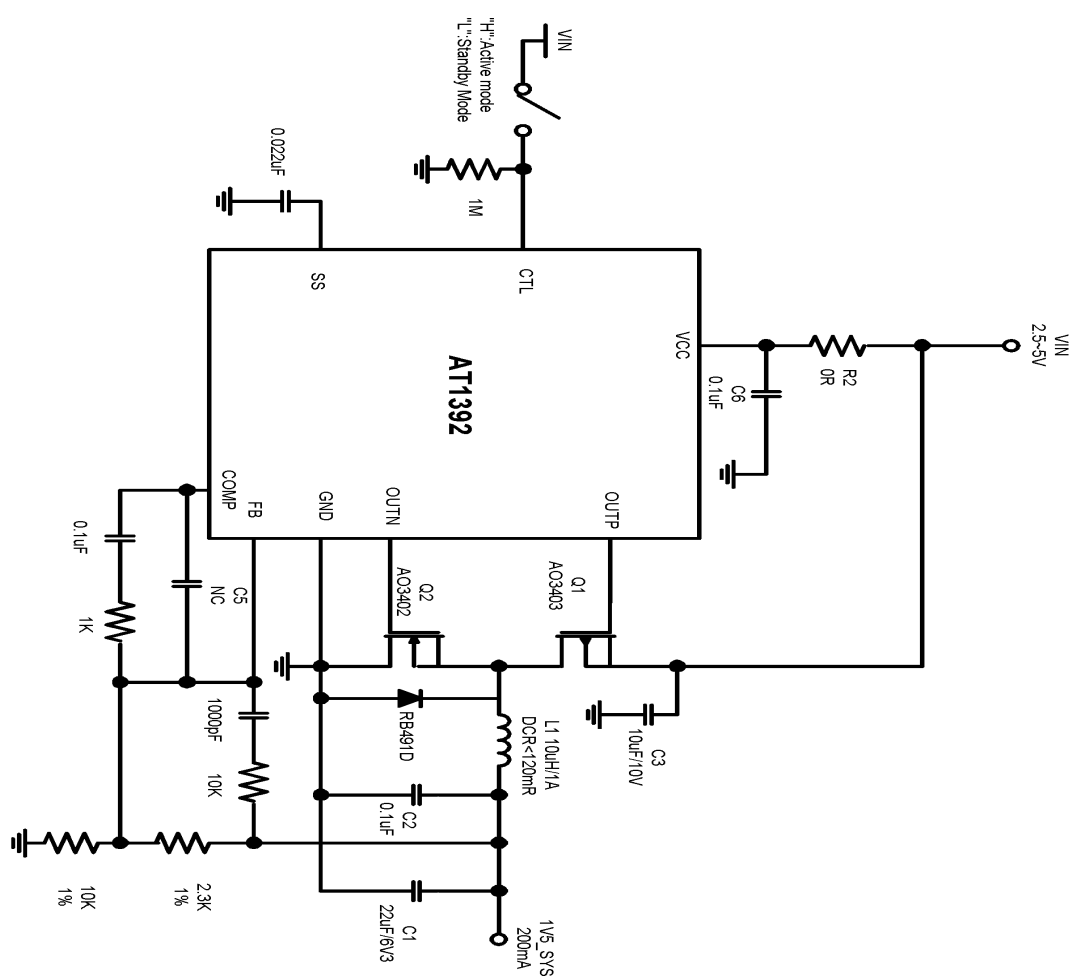
Electrical Characteristics

 (VCC = 5V, T_a = +25°C, unless otherwise noted.)

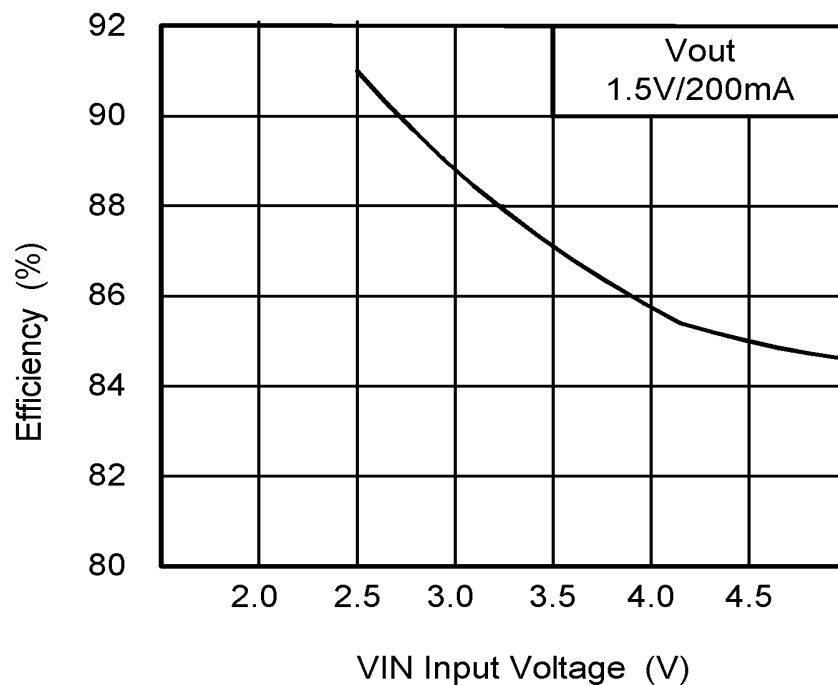
Parameter		Symbol	Condition	Values			Unit
				Min.	Typ.	Max.	
Entire device	Input Supply Range	V _{CC}		2.5	--	6.0	V
	Quiescent Current	I _{CC}	Duty=50%, f _{OSC} =600KHz PDRV/NDRV No Load		1.0	1.5	mA
	Current in standby mode	I _{ST}	CTL=0V			10	μA
	Reference Voltage	V _{REF}	T _a = -20°C to +85°C	1.20	1.22	1.24	V
	Reference Voltage line-regulation	V _{REF-Line}	VCC=2.5V to 6.0V		1	5	mV
	Reference Variation with Temperature		T _a = -20°C to +85°C		0.5	1.5	%
Error amplifier	Input Offset Voltage	V _{IO}				10	mV
	Source Current	I _{OH}	V _{COMP} = V _{REF} - 0.5V	-1.0	-1.5	-2.0	mA
	Sink Current	I _{OL}	V _{COMP} = 0.5V	160	120	80	μA
	Source current Variation with temperature		T _a = -20°C to +85°C			20	%
	Sink current Variation with temperature		T _a = -20°C to +85°C			20	%
	Unity Gain Bandwidth	f _T			10.0		MHz
	Common Mode Input Voltage Range	V _{COM}		0.2		1.5	V
	DC Open Loop Gain	A _V			110		dB
Sawtooth wave oscillator (OSC)	Frequency	f _{osc}		500	600	700	KHz
	High Level Voltage				1.0		V
	Low Level Voltage				0.5		V
	Variation with Power Supply		Vcc=2.5V to 6V			2	%
	Variation with temperature		T _a = -20°C to +85°C			7	%
Soft-Start	Charge Current of SS	I _{CSS}			-1.0		μA
	Invalid threshold voltage of SS				1.0		V
Output Block	Output source current	I _{source}	Duty ≥ 95% OUT = 0V	-	-130	-80	mA
	Output sink current	I _{sink}	Duty ≤ 5% OUT = 5V	65	100		mA
	Output ON resistor	R _{OH}	OUT = -15mA		18	30	Ω
		R _{OL}	OUT = 15mA		16	25	Ω

Control Block	CTL input voltage	V_{IH}	Active mode	2.0		V_{CC}	V
		V_{IL}	Standby mode	0		0.5	V
	CTL input Current	I_{CTL}	CTL=5.0V			20	μA

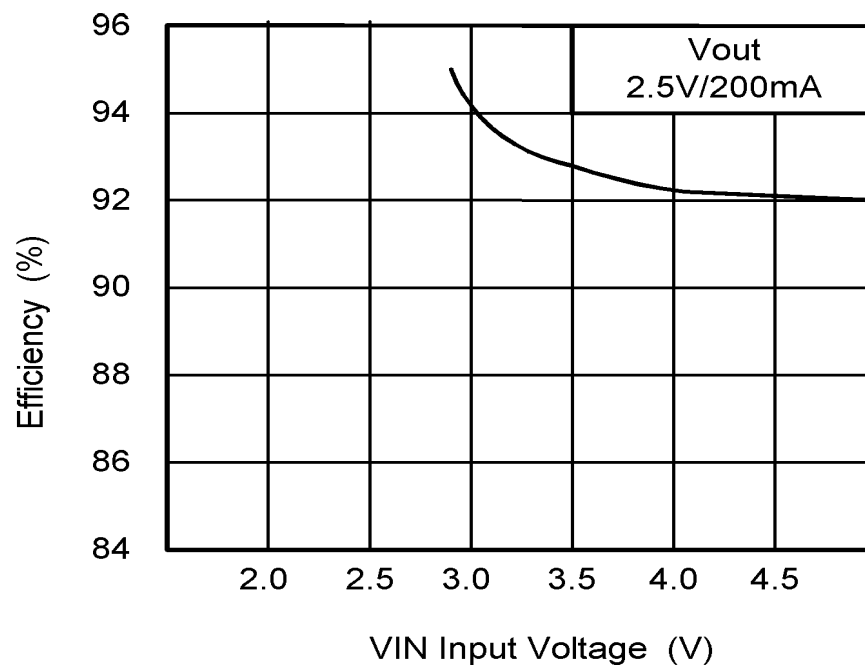
Application Circuit

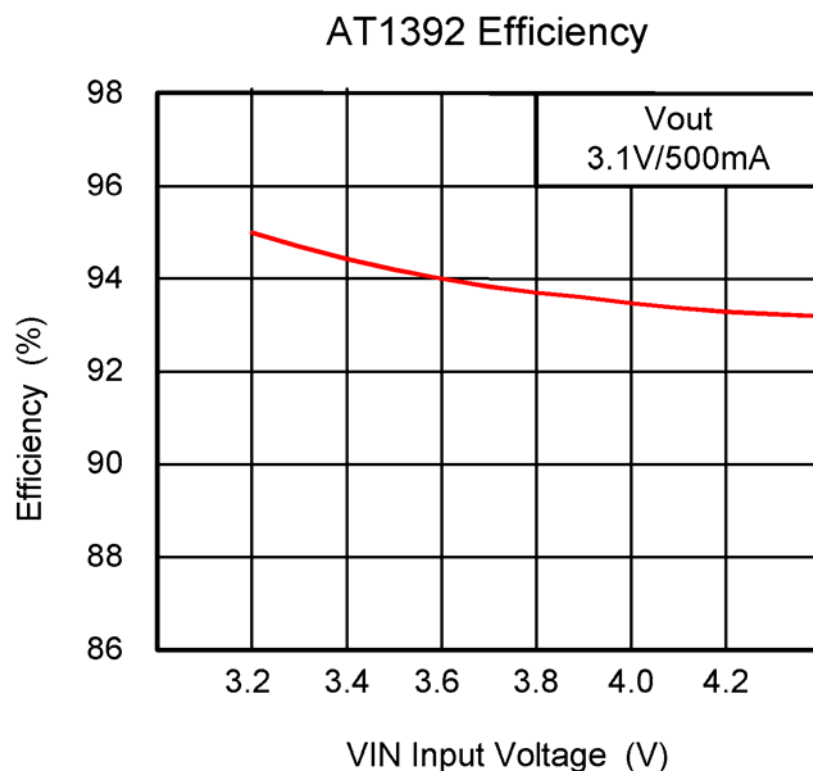


AT1392 Efficiency

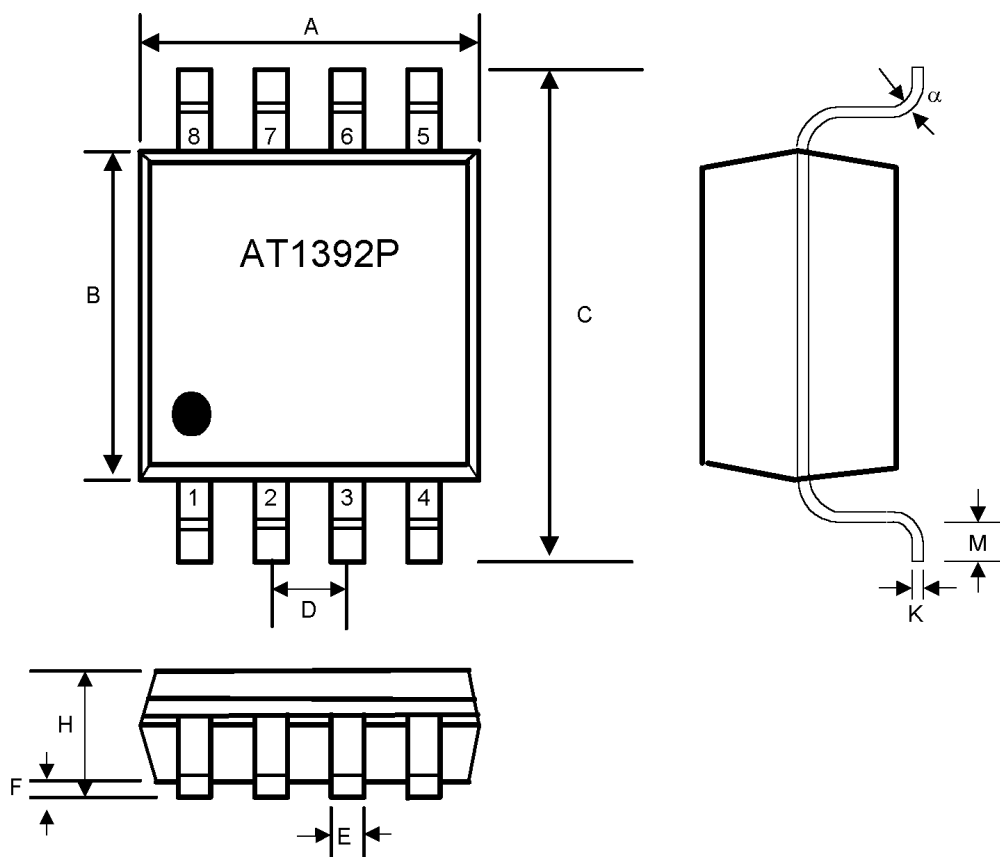


AT1392 Efficiency





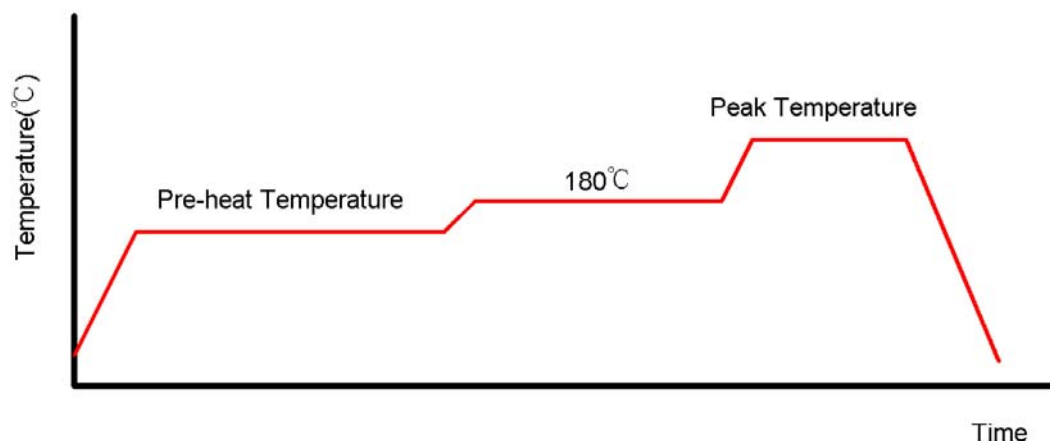
Small Outline 8-pin TSSOP



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.114	0.122	2.90	3.10	-
B	0.169	0.177	4.30	4.50	-
C	0.244	0.260	6.20	6.60	-
D	0.026 BSC		0.65 BSC		-
E	0.010	0.012	0.25	0.30	-
F	0.002	0.006	0.05	0.15	-
H	0.041	0.047	1.05	1.20	-
K	0.005 BSC		0.127 BSC		-
M	0.020	0.028	0.50	0.70	-
α	0°	8°	0°	8°	-

Reflow Condition (IR/Convection or VPR Reflow)

Reference JEDEC Standard J-STD-020A



Classification Reflow Profiles

	Convection or IR/Convection	VPR
Average Heating Rate(180°C to peak)	5°C/second max.	10°C/second max.
Preheat Temperature(125±20°C)	120 seconds max.	
Temperature maintained above 180°C	10~150 seconds	
Time within 5°C of actual Peak Temperature	10~20 seconds	60 seconds
Peak Temperature Range(Note 1)	219~225°C or 235~240°C	219~225°C or 235~240°C
Cooling Rate	6°C /second max.	10°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	

*1 The maximum peak temperatures for IR and VP reflow are depending on package dimensions.

Package Reflow Conditions

Pkg. Thickness ≥2.5mm and all bags	Pkg. Thickness <2.5mm and Pkg. Volume ≥350 mm ³	Pkg. Thickness <2.5mm and Pkg. Volume <350 mm ³
Convection 219~225°C		Convection 235~240°C
VPR 219~225°C		VPR 235~240°C
IR/Convection 219~225°C		IR/Convection 235~240°C