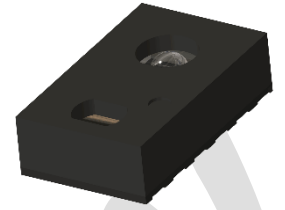


BC3622AT94S00101 Datasheet

Time of Flight Sensor

3622 Series



Applications

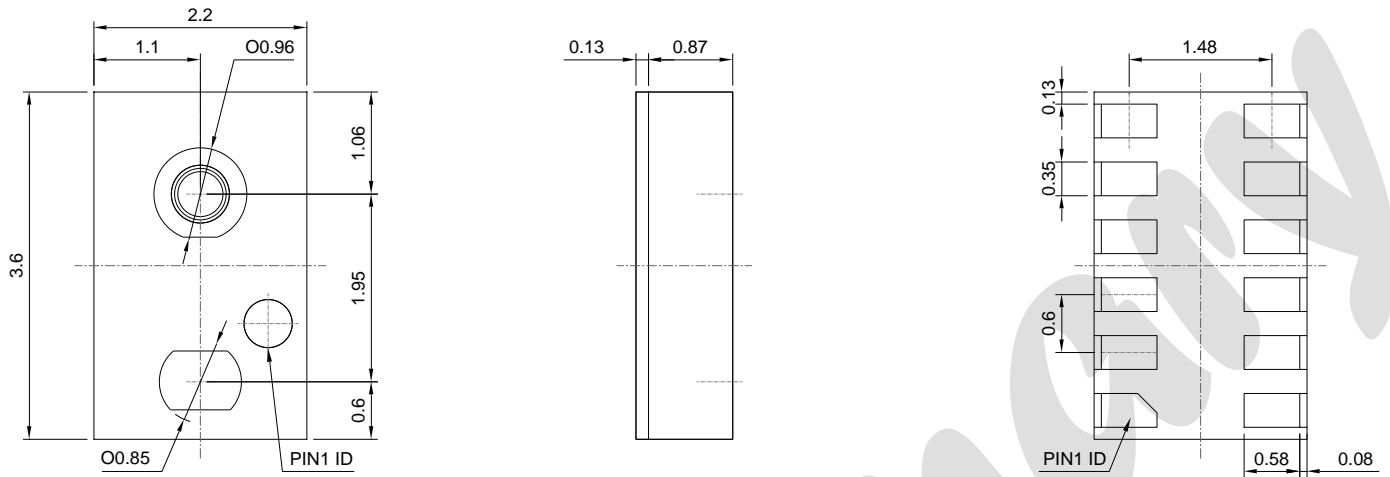
- Laser Auto-Focus
- Unmanned Aerial Vehicles
- Video Tracking
- Presence Detection
- Edge Detection

Features

- Package size : 3.6 x 2.2 x 1.0 mm
- Emitter : 940 nm invisible laser (VCSEL)
- Histogram algorithm embed
- I2C interface : up to 1 MHz
- Field of view : $\pm 18.5^\circ$ (typ.)
- Field of illumination : $\pm 10^\circ$ (typ.)
- Ranging Distance : 2 – 250 cm
- Accuracy : ≤ 30 cm (± 1.5 cm)
- Accuracy : > 30 cm ($\pm 5\%$)
- Single power supply : 2.7 – 3.5 V
- FPS : 30 (max.)
- Low-power CPU with firmware running
- Class 1 Eye Safety
- RoHS 2.0 and REACH compliant
- MSL 3 qualified according to J-STD 020
- Easy integration

BC3622AT94S00101

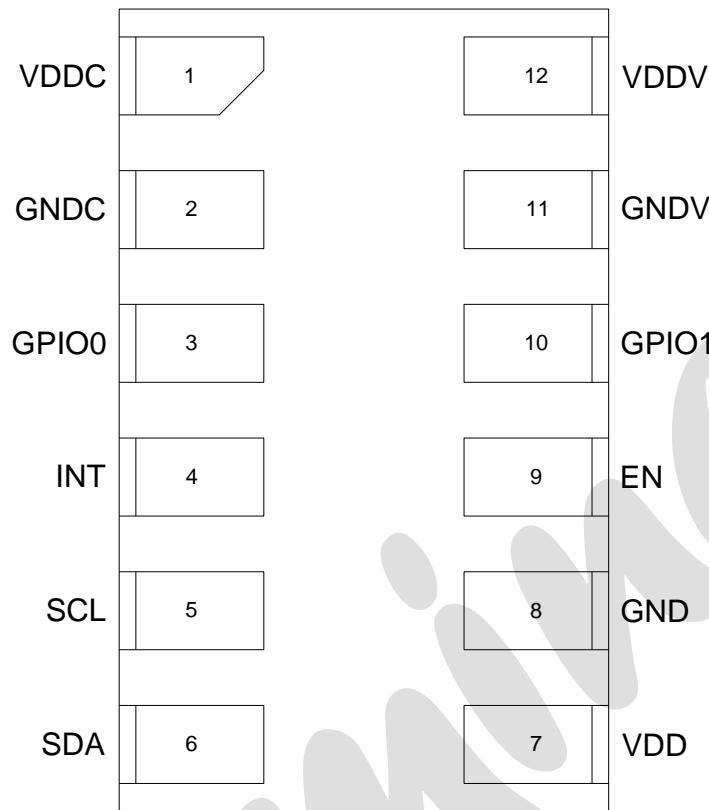
Dimensional Drawing



1. Dimensions are in millimeters.
2. General tolerance is $\pm 0.05\text{mm}$.
3. Keep free of mechanical items which interfere with module operation in irradiate and receive area.

BC3622AT94S00101

Device Pinout



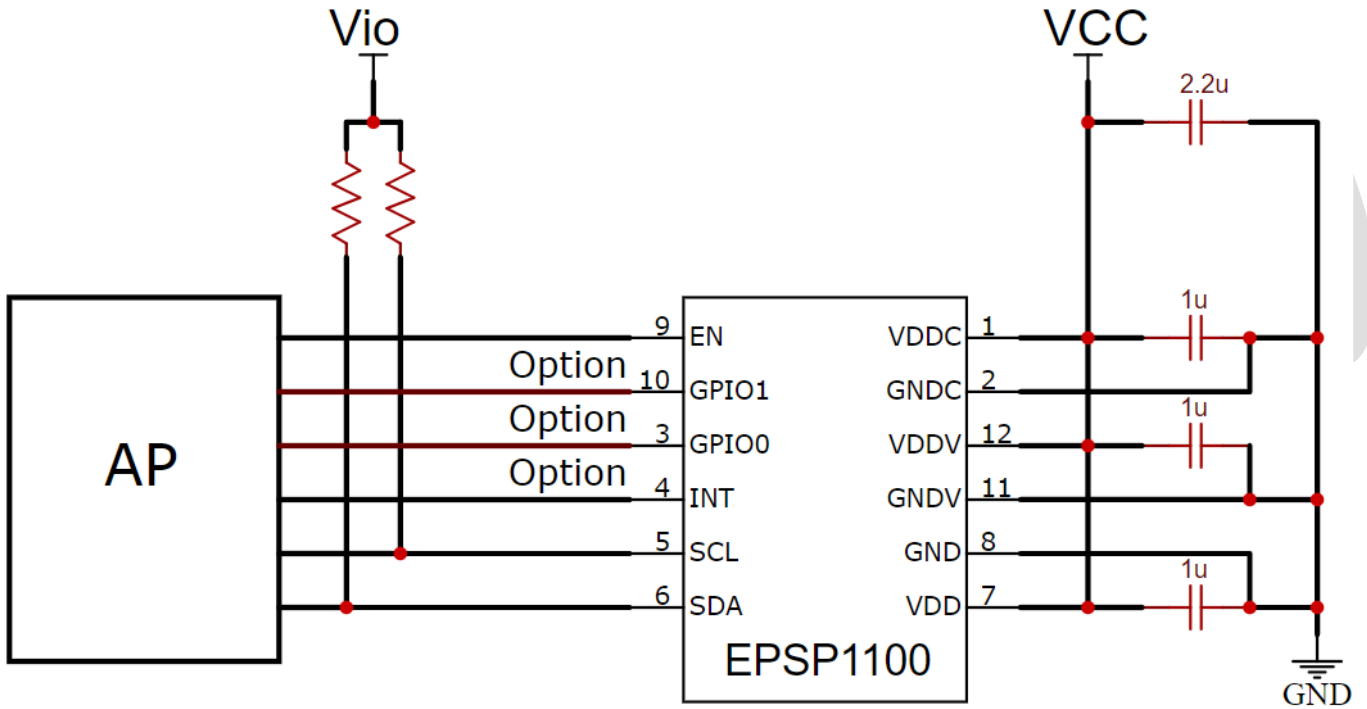
Pin num.	Pin name	Pin type	Description
1	VDDC	Power	Charge-pump supply, add a capacitor with 0.1uF to GNDC.
2	GNDC	Ground	Charge-pump ground, connected to GND together.
3	GPIO0	Input/Output	General purpose I/O, leave floating if not used.
4	INT	Output	Interrupt, open-drain output, connect to GND if not used.
5	SCL	Input	I ² C clock
6	SDA	Input/Output	I ² C data
7	VDD	Power	Chip supply, add a capacitor with 0.1uF to GND.
8	GND	Ground	Chip ground.
9	EN	Input	Enable active high, reset active low.
10	GPIO1	Input/Output	General purpose I/O, leave floating if not used.
11	GNDV	Ground	VCSEL ground, connected to GND together.
12	VDDV	Power	VCSEL supply, add a capacitor with 0.1uF to GNDV.

1. Pin locations drawing is top view, no scale.
2. GPIO0/1 are push-pull output.
3. EN can be connected to pin VDD, if not controlled.

BC3622AT94S00101

Application Schematic

Typical application schematic of EPSP1100.



Note :

1. Capacitors recommend placed as close as possible to the VDD/VDDV/VDDC.
2. GPIO0/1 to be left unconnected if not used.
3. The SCL/SDA/INT need an external pull-up resistor to the Vio supply (Vio < 3.5V).
4. EN pin can be connected to VDD directly.

BC3622AT94S00101

Maximum Ratings

T_A : 25 °C

Parameter	Symbol	Rating	
VDD, VDDV, VDDC	V _{DD}	min.	-0.3 V
		max.	3.6 V
GND, GNDV, GNDC	GND	min.	0 V
		max.	0 V
GPIO0, GPIO1	V _{I/O}	min.	-0.3 V
		max.	3.6 V
SCL, SDA, INT, EN	V _{I/O}	min.	-0.3 V
		max.	3.6 V
ESD withstand voltage (HBM : JEDEC JS-001-2017)	V _{ESD-HBM}	max.	1500 V
ESD withstand voltage (CDM : JEDEC EIA/JESD22-C101F)	V _{ESD-CDM}	max.	500 V

1. The reflow peak soldering temperature is specified according to IPC/JEDEC J-STD-020.

Recommended Operating Conditions

Parameter	Symbol	Rating	
VDD, VDDV, VDDC	V _{DD}	min.	2.7 V
		typ.	3.0 V
		max.	3.5 V
Operating temperature	T _{op}	min.	-40 °C
		typ.	25 °C
		max.	85 °C

BC3622AT94S00101

Control Interface I²C

Parameter	Symbol	Rating
Clock speed	-	typ. 100 kHz
		max. 1000 kHz

1. Clock signal (SCL) generation is performed by the master device. The master device initiates data transfer. The I²C bus on the EPSP1100 has a maximum speed of 1 MBits/s and slave address "0x41".

Reference registers

Register Name	Index	Default Value
BL revision	0x00	0x12
Sensor reset	0xE0	0x81
Device ID	0xE3	0x08

Power Consumption

Parameter	State	Typ (mA)
Power on, pin EN low	Power down	0.8
Power on, pin EN high	Wake-up	2.0
CPU low-speed, ranging not active	Standby 1	26.6
CPU high-speed, ranging not active	Standby 2	42.5
CPU run, ranging active	Processing	50.0

1. Temperature and voltages are at nominal conditions (ambient and 3.0 V).

Function Timing

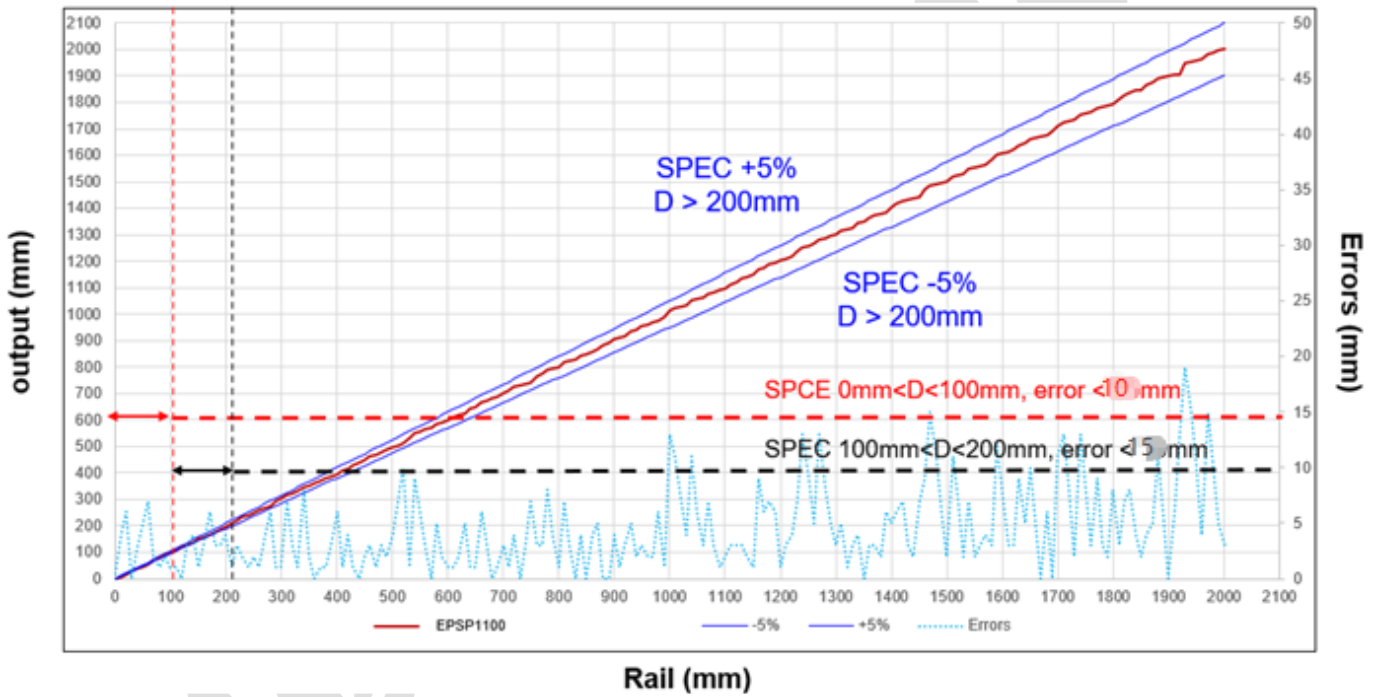
Parameter	Symbol	Rating
Power on	-	max. 5 ms
		min. 25 ms
Ranging processing	-	typ. 33 ms
		max. 100 ms
Ranging period	-	typ. 100 ms

1. Temperature and voltages are at nominal conditions (ambient and 3.0 V).

Algorithm and Package Performance

Parameter	Condition	Values
Reflectivity	object at 940nm	min. 18 %
		max. 88 %
Accuracy	20mm < distance ≤ 100mm	max. ± 10 mm
	100mm < distance ≤ 200mm	typ. ± 10 mm
		max. ± 15 mm
	distance > 200mm	typ. 3 %
		max. 5 %

1. Test conditions: temperature and voltages are at nominal conditions (ambient and 3.0 V), oscillator tuned to 5.0MHz, test object 100cm*100cm white card with 88% reflection.



2. 88% white card, x-axis is truly distance, y-axis is output by EPSP1100. (Mar.2023)

General Register

- Valid at App1 mode

Addr : 0x00		APP Position Register		
Field	Name	Reset	Type	Description
7:0	App position	0	RW	0x80 : bootloader running 0xC0 : App1 running

Addr : 0x01		APP Major Register		
Field	Name	Reset	Type	Description
7:0	App major	0	RW	App major revision

Addr : 0x12		APP Minor Register		
Field	Name	Reset	Type	Description
7:0	App minor	0	RW	App minor revision

Addr : 0x13		APP Patch Register		
Field	Name	Reset	Type	Description
7:0	App patch	0	RW	App patch revision

Addr : 0x0E		Iteration LSByte Register		
Field	Name	Reset	Type	Description
7:0	iteration lsb	0x14	RW	Iterations of VCSEL pulses. (unit : ms)

Addr : 0x0F		Iteration MSByte Register		
Field	Name	Reset	Type	Description
7:0	iteration msb	0	RW	Not available, keeps 0x00.

Addr : 0x1D		Last Status Register		
Field	Name	Reset	Type	Description
7:0	command status	0	R	Get result for last executed command.

Addr : 0x20		Frame ID Register		
Field	Name	Reset	Type	Description
7:0	frame id	0	R	An unique ID for each ranging result, repeat from 0 to 255.

Addr : 0x22		Distance Result 0 Register		
Field	Name	Reset	Type	Description
7:0	Distance [7:0]	0	R	Peak distance in (mm) of the object, LSByte.

Addr : 0x23		Distance Result 1 Register		
Field	Name	Reset	Type	Description
7:0	Distance [15:8]	0	R	Peak distance in (mm) of the object, MSByte.

Addr : 0xE0		Enable Register		
Field	Name	Reset	Type	Description
7	cpu reset	0	RW_W	Write "1" to reset CPU. It's fully resetting and no need to clear it.
6	cpu ready	0	RO	CPU is ready to communication via I ² C.
0	power on	1	RO	"1" standby

Addr : 0xE1		INT Status Register		
Field	Name	Reset	Type	Description
1	int2	0	R	INT2 status, write "1" to clear.
0	int1	0	R	INT1 status, write "1" to clear

Addr : 0xE2		INT Enable Register		
Field	Name	Reset	Type	Description
1	int2 enable	0	RW	Asserted INT2 when a ranging result available. "0" disable, "1" enable.
0	int1 enable	0	RW	Asserted INT1 when a ranging result available. "0" disable, "1" enable.

Addr : 0xE3		Device ID Register		
Field	Name	Reset	Type	Description
3 : 0	device id	0	R	Device ID, reads 08h.

Addr : 0xE4		Chip ID Register		
Field	Name	Reset	Type	Description
1:0	chip id	0	R	Chip revision ID.

BC3622AT94S00101

Bootloader

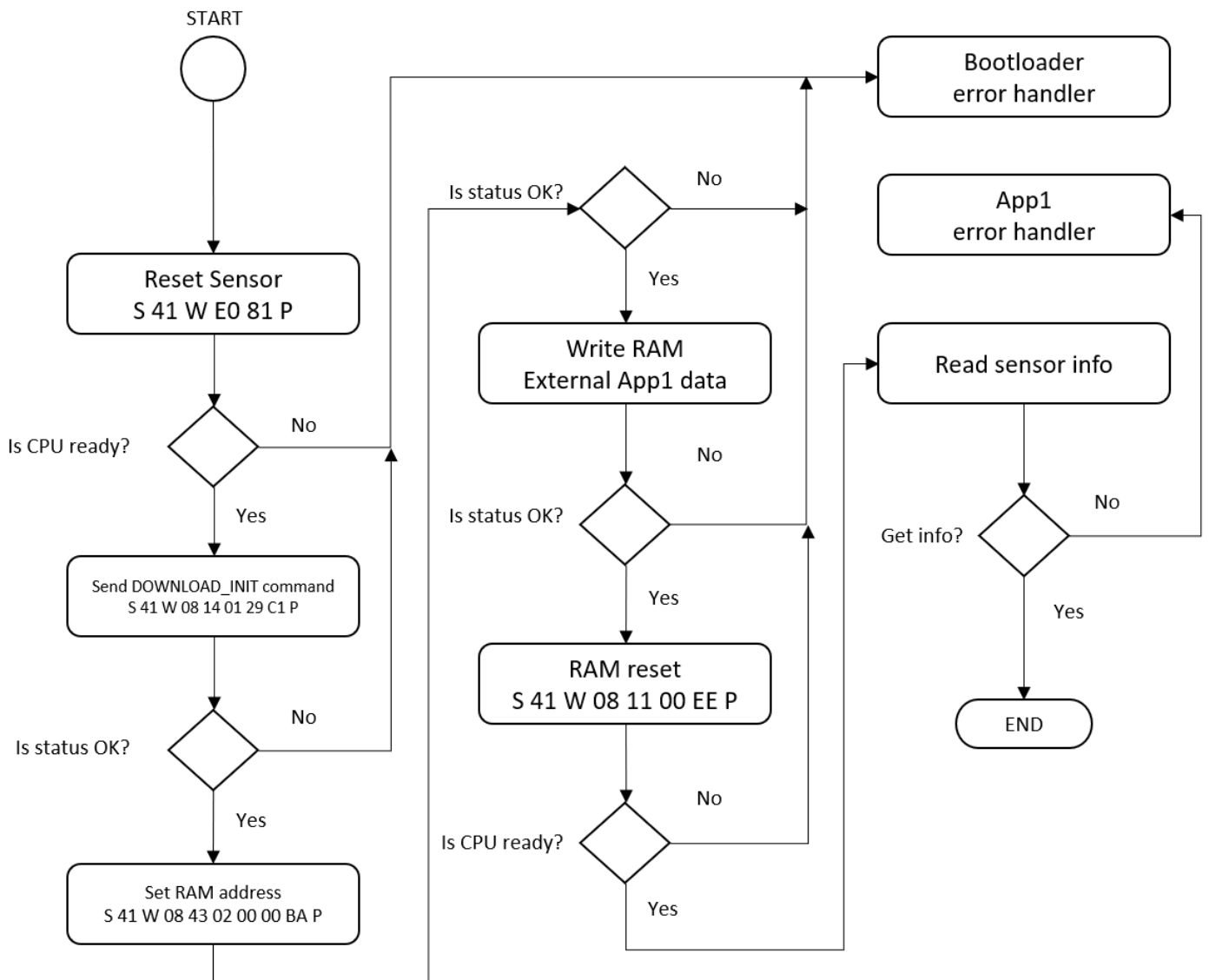
- **Bootloader Commands**

Command	Value	Description
RAM re-map reset	0x11	Re-map RAM to address 0x0 and do reset.
Download init	0x14	Initialize download procedure
Write RAM	0x41	Write RAM position/area
Add RAM address	0x43	Set RAM pointer to a indicated address

- **Checksum Calculation**

1. Take sum of all data bytes and do XOR.
2. e.g. (0x10 + 0x01) ^ 0xFF= 0xEE

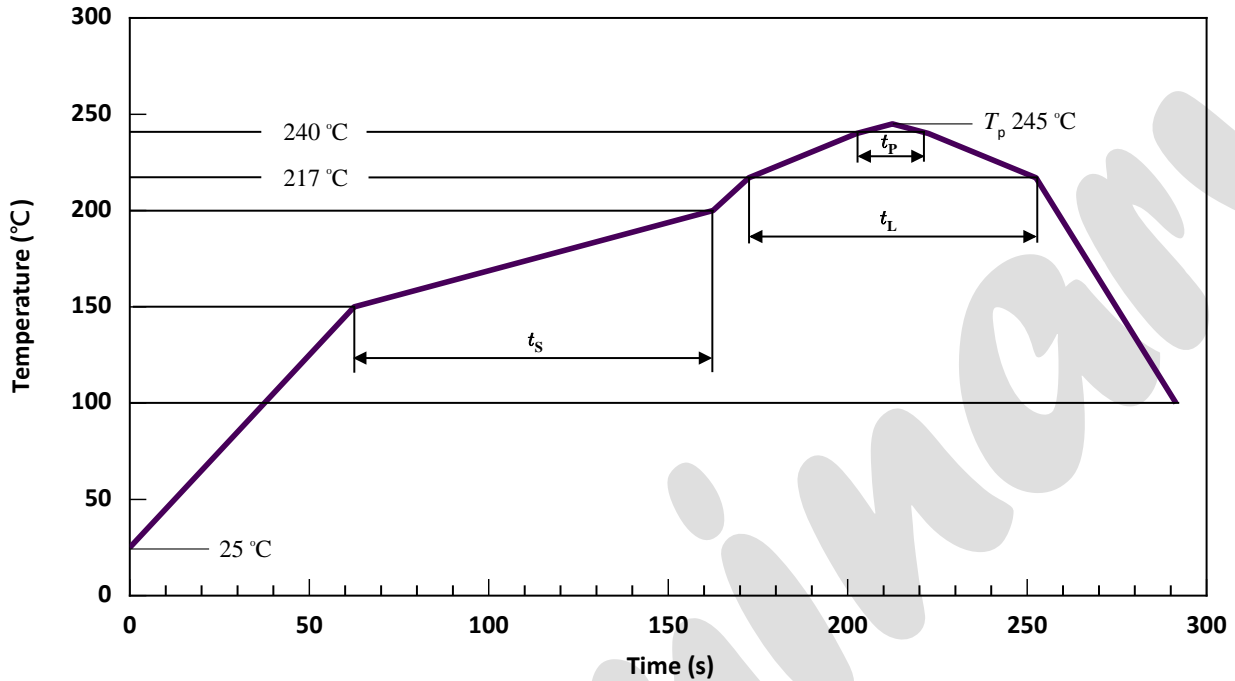
- **Download app1 flow via bootloader**



BC3622AT94S00101

Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat 25°C to 150°C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature	t_L		80	100	s
Peak temperature	T_p		245	260	°C
Time within 5 °C of the specified peak temperature $T_p - 5$ K	T_p	10	20	30	s
Ramp-down Rate T_p to 100 °C			3	4	K/s
Time 25 °C to T_p				480	s

1. Do not stress the silicone resin while it is exposed to high temperature.
2. The reflow process should not exceed 2 times.

Disclaimer

1. Brightek reserves the right(s) on the adjustment of product material mix for the specification.
2. The product meets Brightek published specification for a period of one year from date of shipment.
3. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
4. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. Brightek assumes no responsibility for any damage resulting from the use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
5. These specification sheets include materials protected under copyright of Brightek. Reproduction in any form is prohibited without obtaining Brightek's prior consent.
6. This product is not intended to be used for military, aircraft, life sustaining or life saving applications or any other application which can result in human injury or death. Please contact authorized Brightek sales agent for special application request.