1 Scope

The present specifications shall apply to switching power supply IC SFA0001-VF-RP

2 Outline

| | |
|---|---|
| Type | Semiconductor IC (Monolithic IC) |
| Structure | Plastic package (Transfer mold) |
| Features | Build-in current limit protection, thermal shutdown protection.<br>Built-in error-amp helps eliminate components at sensing stage such as shunt regulator. |

3 Absolute maximum ratings

3－1 Absolute maximum ratings（Ta=25℃）

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| OCP terminal voltage | VOCP | −6～+6 | V |
| SS terminal voltage | VSS | −0.3～+9 | V |
| FB terminal voltage | VFB | −0.3～+6 | V |
| Input voltage for control part | VCC | 0～36 | V |
| Phase compensation terminal voltage | VCOMP | −0.3～+6 | V |
| Frequency setting terminal voltage | VFREQ | −0.3～+6 | V |
| Drive terminal peak current | IDRV(peak) | −540mA～+270mA | mA |
| Drive terminal DC current | IDRV(DC) | −180mA～+90mA | mA |
| Power dissipation | PD | 1.2（※1） | W |
| Junction temperature | Tj | −40～150 | ℃ |
| Storage temperature | Tstg | −40～150 | ℃ |

（※1）Mounted on glass epoxy board (The dimension of PCB : 42mm×32mm×1mmt)

3－2 Recommended operating conditions

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Input voltage for control part | VCC | 6～24 | V |
| Switching frequency | FOSC | 20～200 | kHz |

## 4 Electrical characteristic

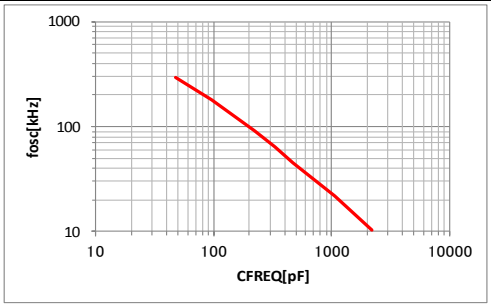
### 4－1 Electrical characteristics (VCC=14V, Ta=-40～125℃) (*1)

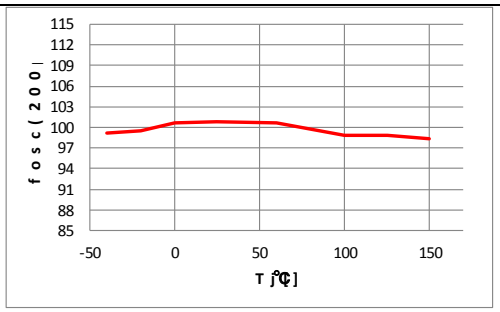
| Parameter | Symbol | Ratings MIN | Ratings TYP | Ratings MAX | Unit | Conditions |
|---|---|---|---|---|---|---|
| **Power supply Start-up Operation** | | | | | | |
| Operation start voltage | VCC(ON) | 4.9 | 5.1 | 5.3 | V | FB=0V、SS=0V、OCP=0V、FREQ=200pF VCC=0V→14V |
| Operation stop voltage | VCC(OFF) | 4.4 | 4.6 | 4.8 | V | FB=0V、SS=0V、OCP=0V、FREQ=200pF VCC=14V→0V |
| Circuit current in operation | ICC(ON) | 1.8 | 2.8 | 4 | mA | FB=0V、SS=0V、OCP=0V、FREQ=200pF、VCC=14V |
| Circuit current in non-operation | ICC(OFF) | 0.3 | 0.6 | 1 | mA | FB=0V、SS=0V、OCP=0V、FREQ=200pF、VCC=4.8V |
| **Normal Operation** | | | | | | |
| SS terminal high threshold voltage | VHSS | 1.9 | 2 | 2.1 | V | FB=0V、OCP=0V、FREQ=0V、VCC=14V、SS=0V→2.5V |
| SS terminal low threshold voltage | VLSS | 0.9 | 1 | 1.1 | V | FB=0V、OCP=0V、FREQ=0V、VCC=14V、SS=2.5V→0V |
| SS terminal voltage hysteresis width | Δ VSS | 0.9 | 1 | 1.1 | V | VHSS-VLSS |
| SS terminal outflow current | Isrc(SS) | 11 | 15 | 19 | uA | FB=0V、OCP=0V、FREQ=0V、VCC=14V、SS=0.9V |
| SS terminal inflow current | Isnk(SS) | 13 | 17 | 21 | uA | FB=0V、OCP=0V、FREQ=0V、VCC=14V、SS=2.1V |
| Switching frequency | fosc(200p) | 85 | 100 | 115 | kHz | FB=0V、SS=0V、OCP=0V、FREQ=200pF、VCC=14V |
| FREQ terminal outflow current | Isrc(FREQ) | 27 | 30 | 33 | uA | FB=0V、OCP=0V、SS=0V、VCC=14V、FREQ=0.9V |
| FREQ terminal inflow current | Isnk(FREQ) | 75 | 86 | 95 | uA | FB=0V、OCP=0V、SS=0V、VCC=14V、FREQ=2.1V |
| Oscillation circuit high threshold voltage | VHF | 1.9 | 2 | 2.1 | V | FB=0V、OCP=0V、SS=0V、VCC=14V、FREQ=0V→2.5V |
| Oscillation circuit low threshold voltage | VLF | 0.9 | 1 | 1.1 | V | FB=0V、OCP=0V、SS=0V、VCC=14V、FREQ=2.5V→0V |
| Maximum on-duty width | Dmax | 70 | 73 | 78 | % | FB=0V、SS=0V、OCP=0V、FREQ=200pF、VCC=14V |
| Slope compensation rate | SLP | 2.1 | 2.5 | 2.9 | mV/% | FB=0V、SS=2.5V、COMP=1.3V、FREQ=470p、VCC=14V、OCP=0V→1V |
| Feedback voltage | VFB | 2.45 | 2.5 | 2.55 | V | SS=0V、OCP=0V、FREQ=0V、VCC=14V FB=0V→2.5V |
| Drive voltage | Vdrive | 7.6 | 8.3 | 9 | V | FB=0V、OCP=0V、SS=0V、VCC=14V FREQ＝3V・1pluse |
| Minimam drive voltage | Vdrive(min) | 4 | | | V | FB=0V、OCP=0V、SS=0V、VCC≧6V FREQ＝3V・1pluse |
| Minimum on-time | Ton(min) | | 400 | | ns | FB=3V、SS=0V、OCP=1V、FREQ=200pF、VCC=14V |
| **Protection Operation** | | | | | | |
| Leading edge blanking time | Tbw | (70) | 100 | (150) | ns | (*2) |
| OCP threshold voltage | VOCP | 0.46 | 0.5 | 0.54 | V | FB=0V、SS=0V、VCC=14V FREQ＝3V・1pluse、OCP=0V→1V |
| OLP delay time | TOLP | 32 | 42 | 52 | ms | FB=0V、OCP=0V、SS=10nF、VCC=14V FREQ＝3V・1pluse |
| Drive stop threshold voltage | VST | 3.5 | 4 | 4.5 | V | FB=0V、OCP=0V、VCC=14V FREQ＝3V・1pluse、SS=0V→5V |
| Thermal shutdown operating temperature | TjH (TSD) | 150 | 165 | | ℃ | (*2) |
| Thermal shutdown release temperature | TjL (TSD) | | 150 | | ℃ | (*2) |

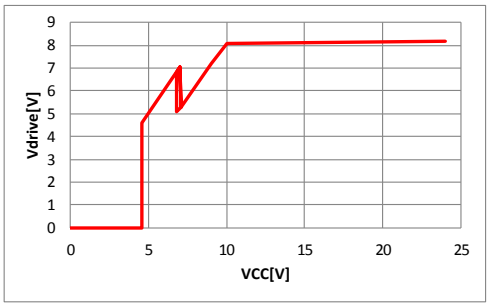
*1 The ratings at Ta=-40℃ to 125℃ shall be treated as a design value.
The ratings of devices shall be checked at -30℃,25℃,125℃ at Outgoing Inspection.

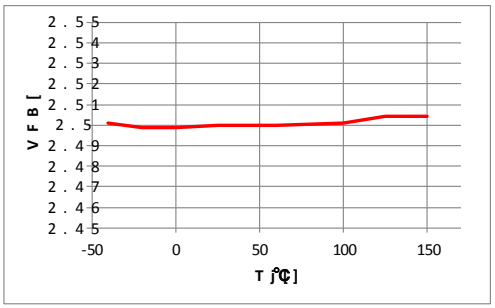
*2 The rating of devices shall be treated as a design value.

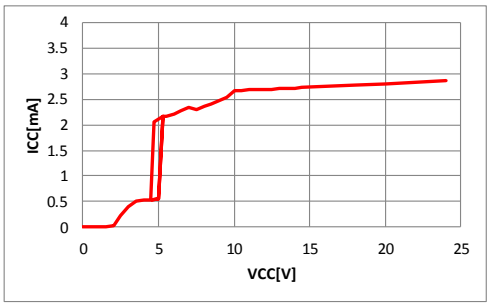
### 4－2 Typical characteristics(Ta=25℃)



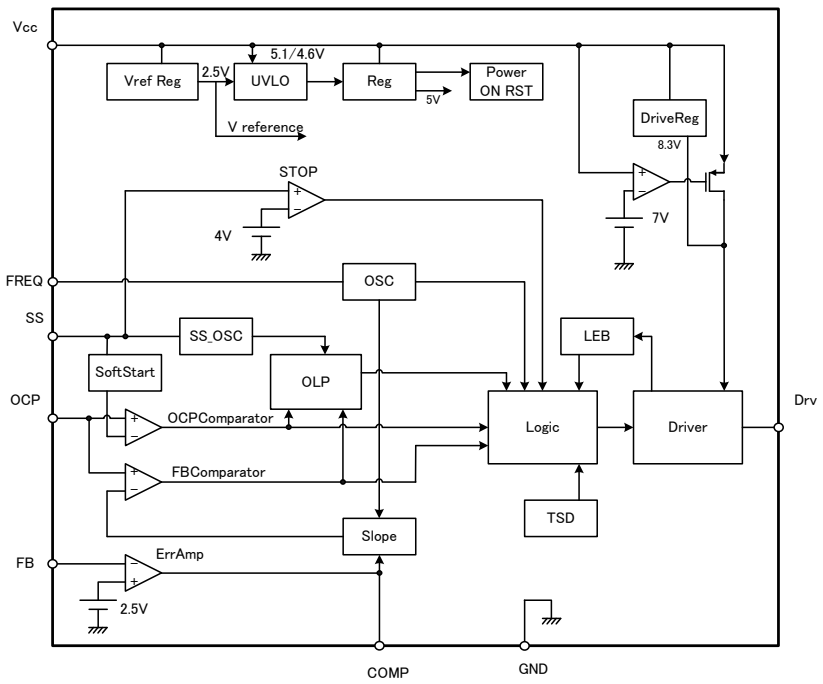



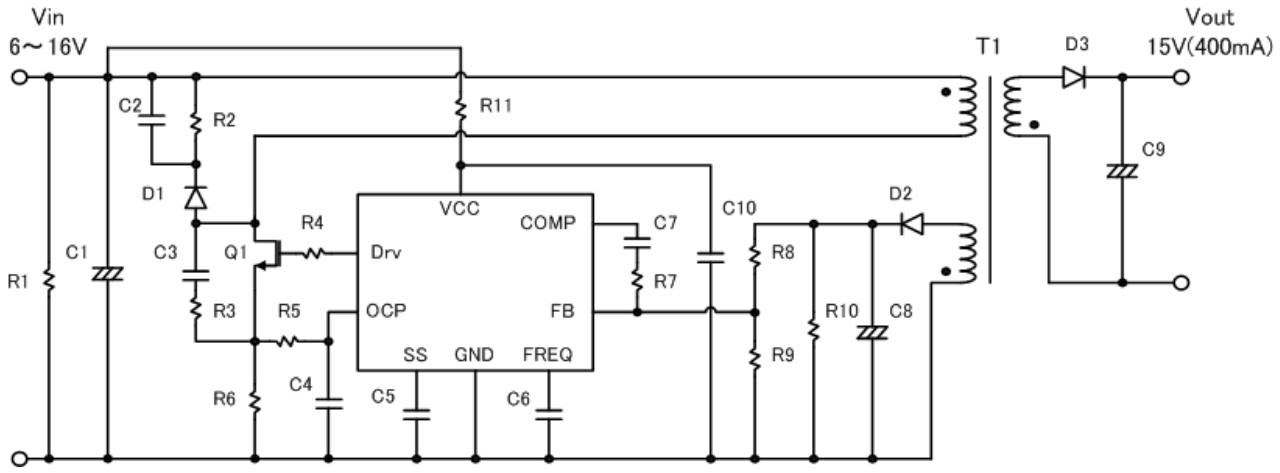




## 5 Block diagram



6 Standard connection



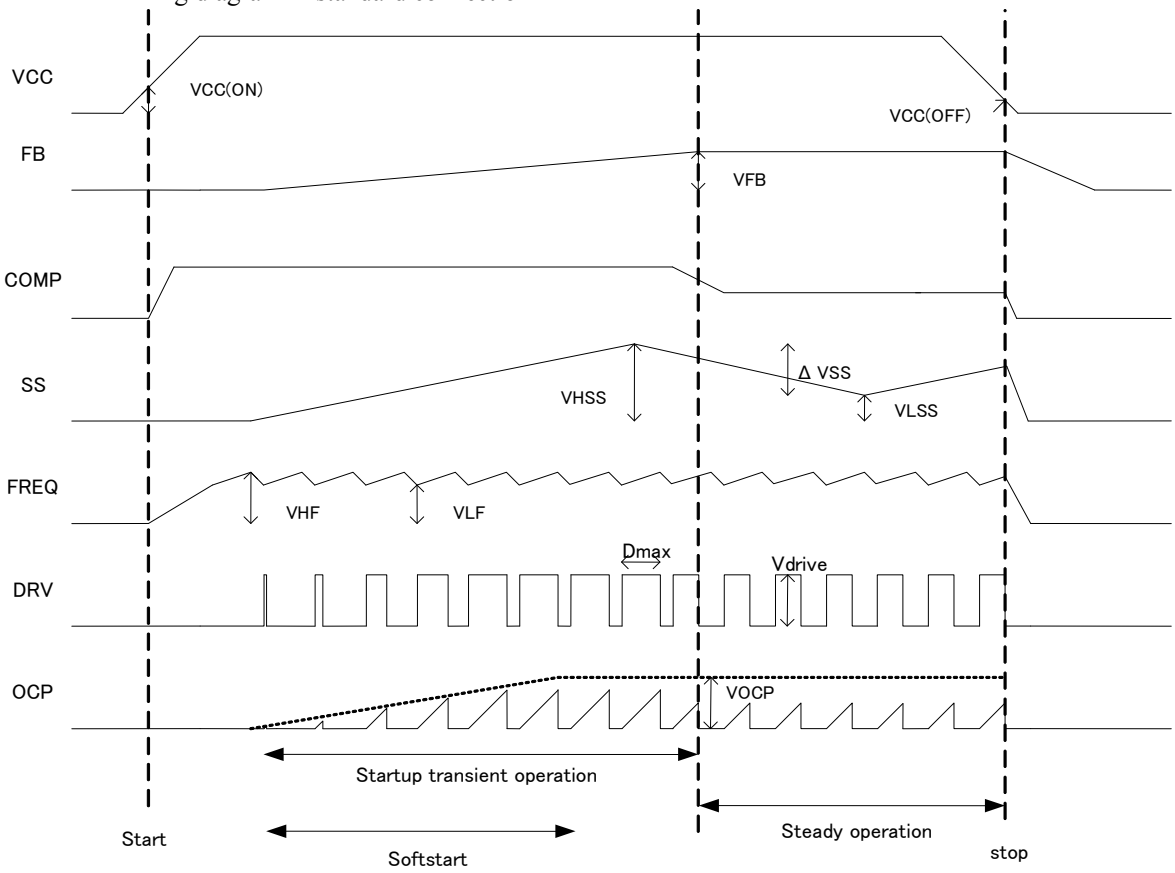

※Since the switching noise caused by Q1 may affect the operation of an IC ,appropriate design for peripheral circuits is required to prevent the malfunction of an IC by adding snubber circuit and /or filter circuit.

7 Pins function description

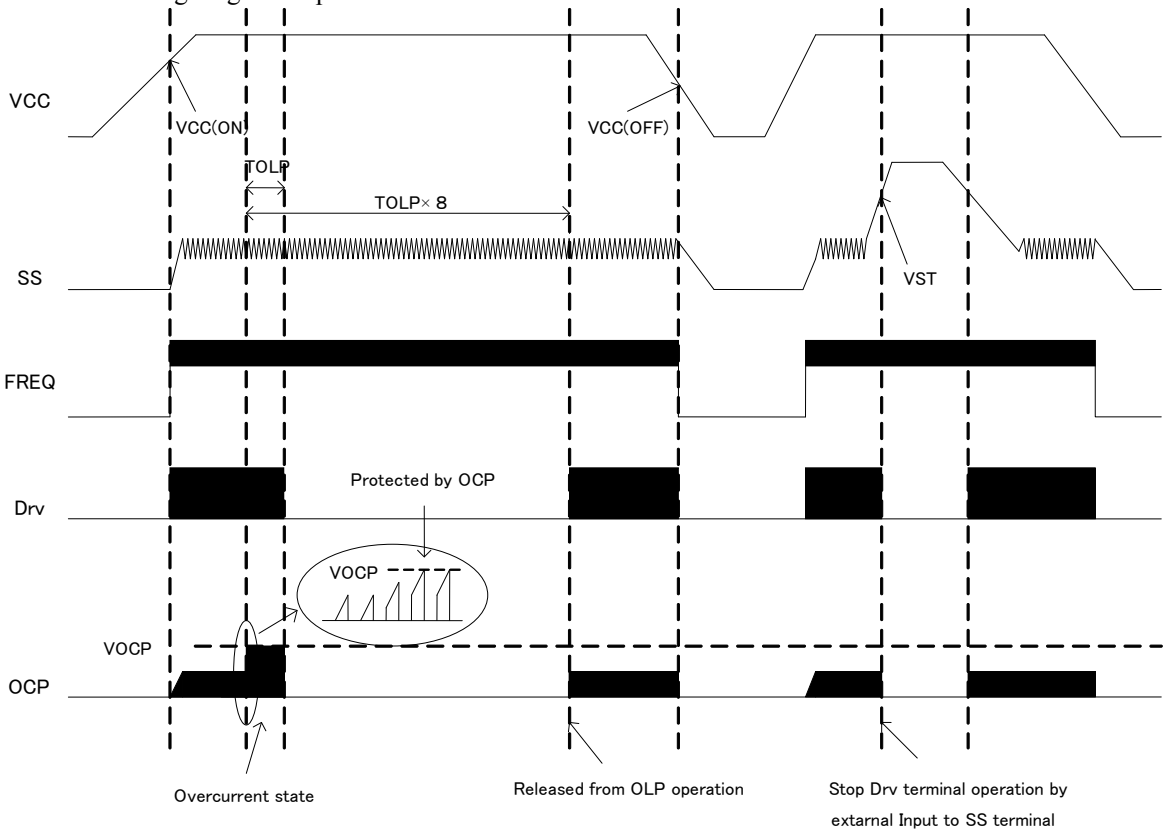
| Terminal No | symbols | Descripton |
|---|---|---|
| 1 | VCC | Power supply terminal |
| 2 | FB | Feedback terminal |
| 3 | GND | Ground terminal |
| 4 | SS | Soft start terminal |
| 5 | FREQ | Frequency setting terminal |
| 6 | COMP | Phase compensation terminal |
| 7 | Drive | Gate drive terminal |
| 8 | OCP | Over current protection terminal |

8 Timing diagram

8 － 1 Timing diagram in standard connection

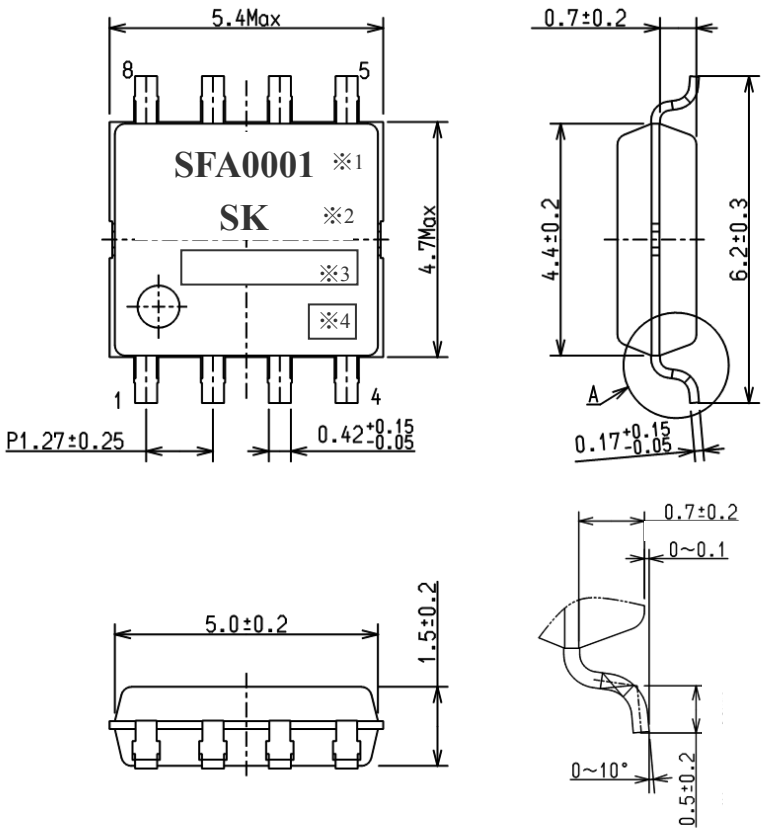



8 － 2 Timing diagram in protection



9 Package information

9 － 1 Package type, physical dimensions and material




※1：Part Number
※2：Logo Mark
※3：Lot Number
1st letter：The Last digit of year
2nd letter：Month
（1 to 9 Jan. to Sept.,O for Oct. N for Nov. D for Dec.）
3rd & 4th letter：day
01～31 Arabic Numeral
※4：Administer number

Dimensions in mm

Lead is solder-plated
(except cutting surface of lead)

Zoom of A part

| Terminal No | symbols | Descripton |
|---|---|---|
| 1 | VCC | Power supply terminal |
| 2 | FB | Feedback terminal |
| 3 | GND | Ground terminal |
| 4 | SS | Soft start terminal |
| 5 | FREQ | Frequency setting terminal |
| 6 | COMP | Phase compensation terminal |
| 7 | Drive | Gate drive terminal |
| 8 | OCP | Over current protection terminal |

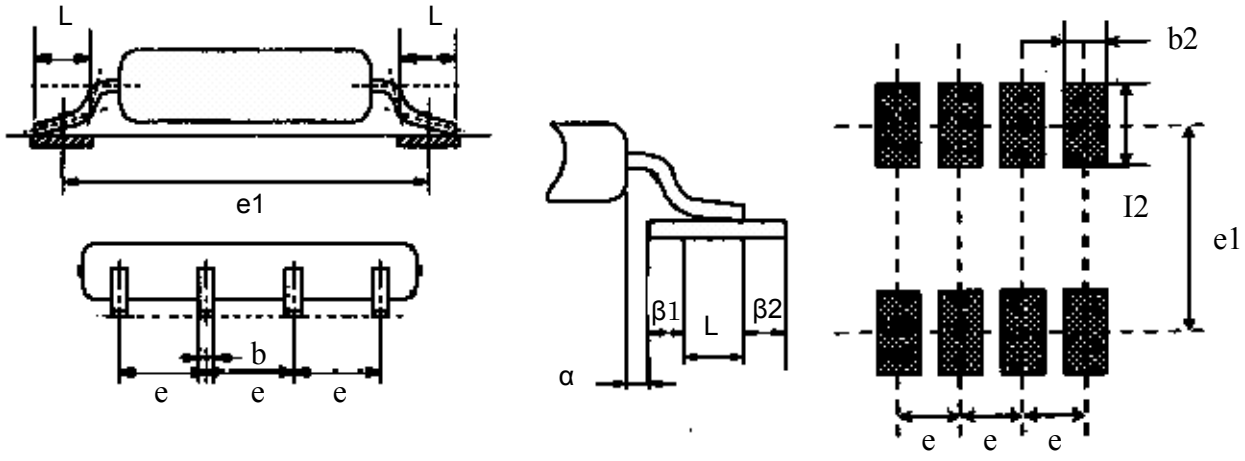
9 － 2 Appearance

The body shall be clean and shall not bear any stain, rust or flaw.

9 － 3 Marking

The type number and lot number shall be legitimately marked in order not to be erased easily.

The example of the solder pattern




| Symbol | Dimensions(mm) |
|---|---|
| e1 | 5.72 |
| e | 1.27 |
| α | 0.2 or more |
| β1 | 0.2～0.5 |
| β2 | 0.2 |
| L | 0.6 |
| b | 0.42 |
| b2 | 0.76 |
| I2 | L+β1+β2 |

There are reference value that are according with the EIAJ standards. (ED-7402-1)

SOP8 Taping specifications for packing

1. Outline

This specification specifies packaging spec. for Sanken electric co., SFA0001-VF-RP as well as its related matters. Shipping is only taping as to SOP8.

2. Part name indication

This followings specifies part name for taping spec.

2.1 Part name indication method

"Part name" - VF

2.2 IC direction in carrier tape pocket

SFA0001-VF-RP is [VF type] .

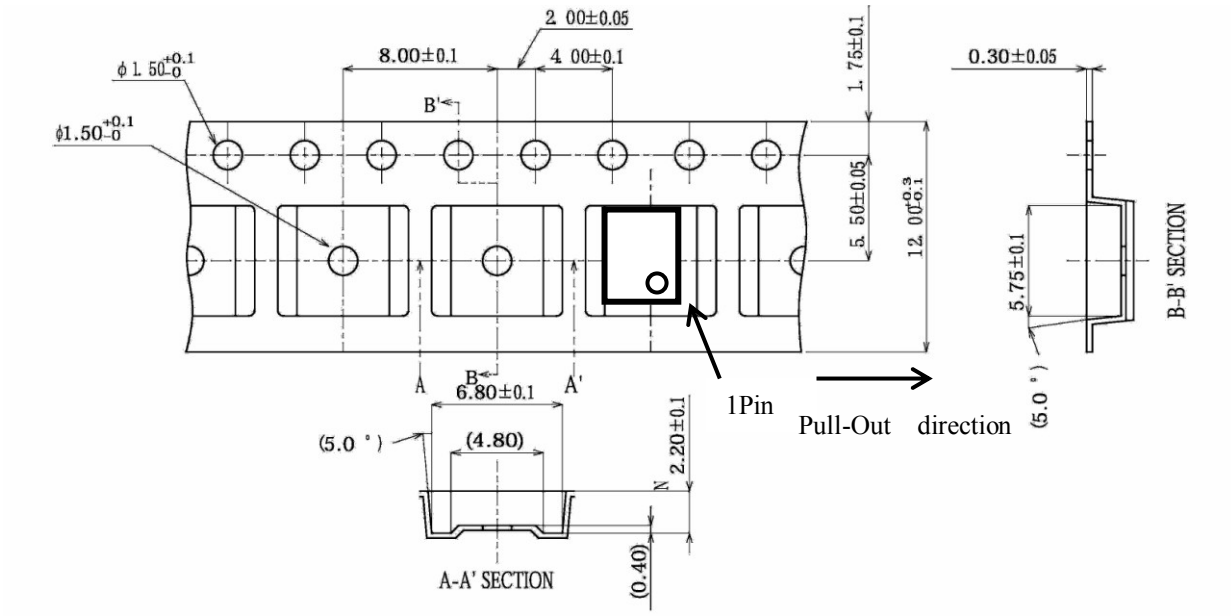
End of "Part name" is [- VB]: 1 pin of IC is facing to tape roll-in direction.

End of "Part name" is [- VF]: 1 pin of IC is facing to tape pull-out direction.

3. Embossed taping specifications

3.1 Taping type and physical dimensions

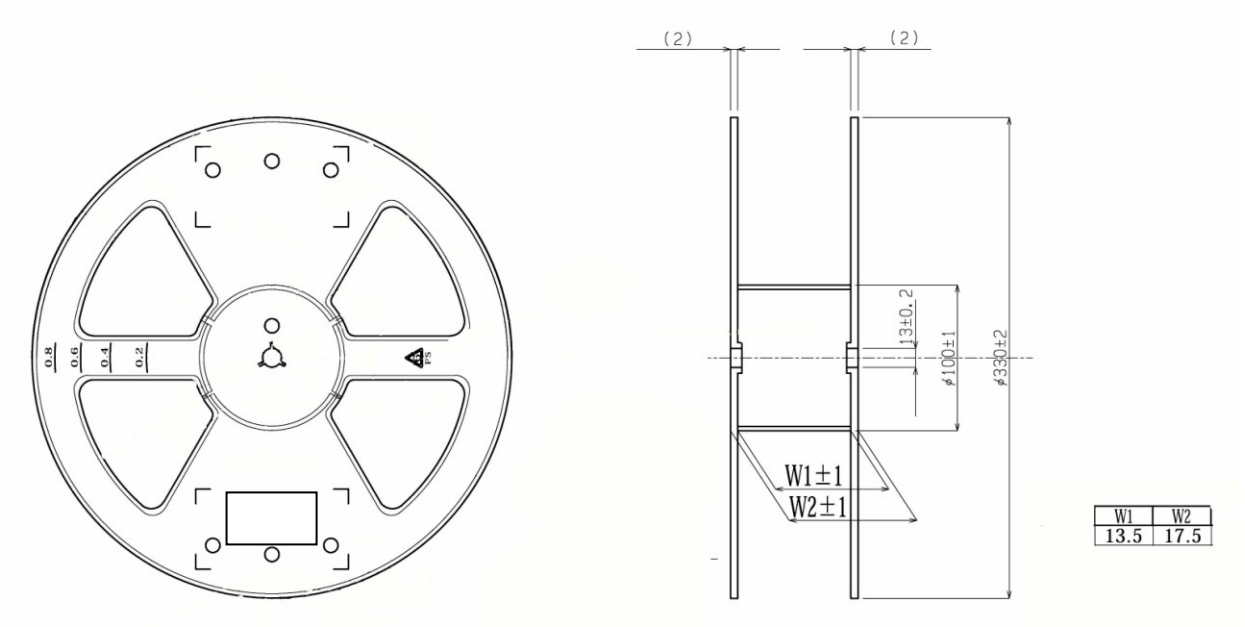
This carrier tape is treated antistatic treatment.




Material: Emboss

Note
1) The radius (R) is 0.3mm max
2) Cumulative tolerance of 10 pitches of the sprocket hole is ± 0.2mm

3.2 Reeling type and physical dimensions
This reel is made of plastic with antistatic treatment.




A label shall be put on a side of flange. A label has part number including a direction for unreeling, quantity, and lot number.

Note
Reel Material : Plastic

Label content

| |
|---|
| NAME |
| LOT<br>No. |
| AMOUNT P・C・S |

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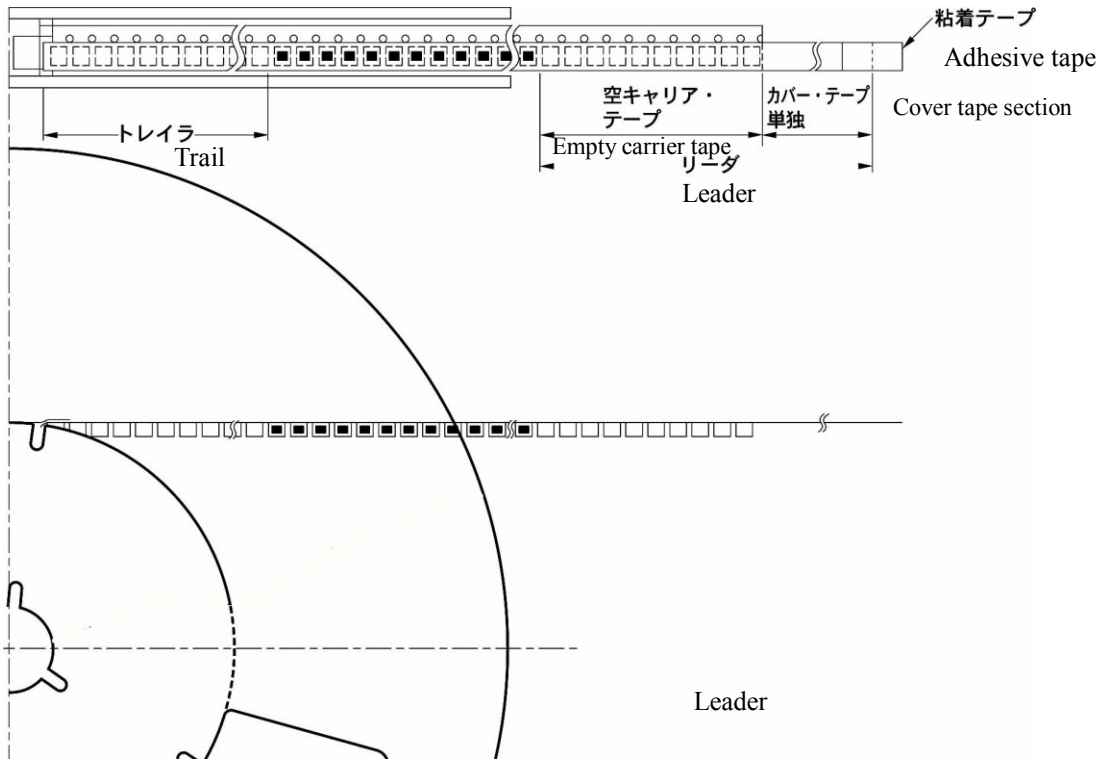
3.3 Reeling specifications (Leader/Trail)




Leader

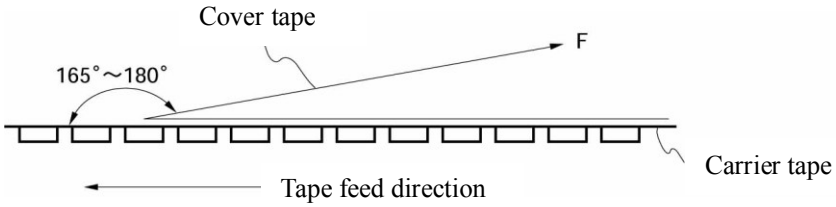
| | | |
|---|---|---|
| Cover tape section | MIN | 100mm |
| Empty carrier tape | MIN | 320mm |
| Leader Section | MIN | 420mm |

Trail

| | | |
|---|---|---|
| Empty carrier tape | MIN | 80mm |

3.4 Strength of taping seal

Detachment Strength of cover tape 0.1～1.0N
Tear away angle: 165～180° Detachment speed: 300±10mm／min



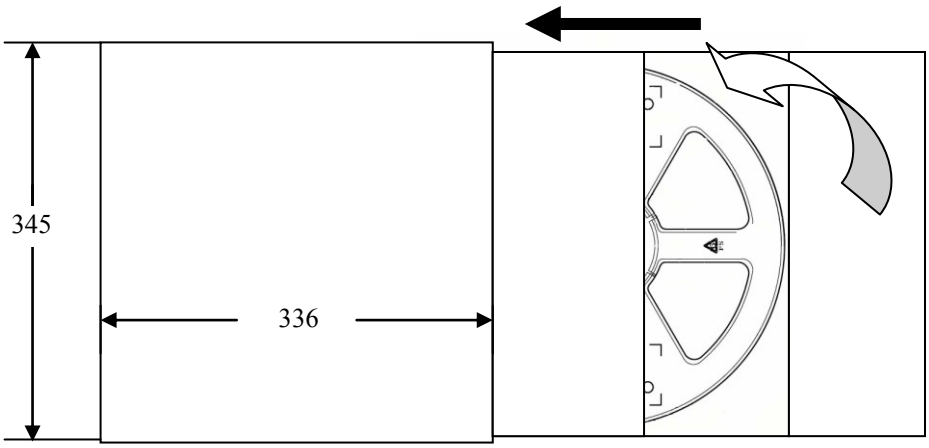

3.5 Missed parts on tape

The number of missed parts cannot exceed 0.2% of total parts on the tape. Also, missing of sequential parts must not happen.

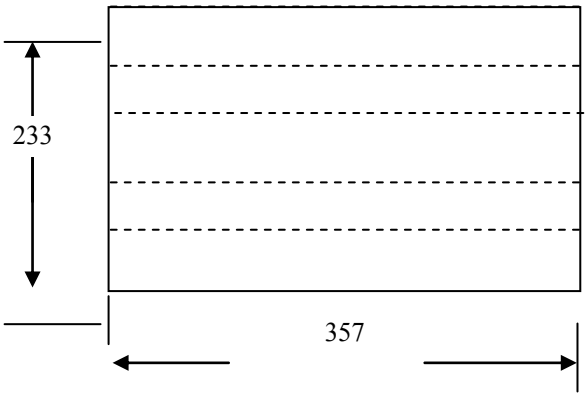
4. Packaging
   4.1 The number of parts per a reel: 3000 parts (MAX)
   4.2 Indication of part name and quantity
   A label shows part number, quantity, and lot number.

   4.3 Outer packaging of reel
   Reel is put into moisture barrier bag and seal with desiccant and put into outer box.

5. Packing Dimensions and Appearance (A box is made of card boards.
The following dimensions are reference value.)




Dimensions of a box: H336mm x V345mm x T 40mm




Size of a box contains 5 small boxes: 357mm x 357x 233mm

6. Storage

In order to avoid failures during picking and mounting of devices by degradation of taping peel strength and to maintain mounting quality, the box shall be stored under temperature +5~+40 degree C and humidity 40%~60%. Parts shall be used within 3 months from the shipping date with unpacked state.

After unpacking the bag, the parts shall be stored under temperature 30℃ and humidity 60% and used within 168hrs.
Moisture sensitivity level (MSL): Level 3

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  In addition, it should be noted that since power devices or IC's including power devices have large self-heating value, the degree of derating of junction temperature (Tj) affects the reliability significantly.
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