FEELING Technology

FP115

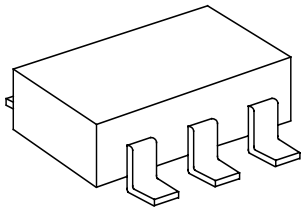
Dual OPA Circuit with Precision Shunt Regulator

GENERAL DESCRIPTION

The FP115 incorporates dual operating amplifier and a precision shunt regulator (typ. 1.25V). The main function of FP115 is CV control and OC sense for low power RCC circuits of power.
The small package sot-25 is suitable to the application field of mini-size ac-dc power supply or adapter.

FEATURES

- Fixed Reference Voltage: 1.25V
- Reference Voltage Precision: 2%
- Output Sink Current: 10mA
- Current Consumption: 2.4mA
- Input Offset Voltage: OPA1: 3mV
  OPA2: 0.5mV
- Wide Operating Voltage Range: 3V ~ 20V
- Package:SOT-25



SOT-25

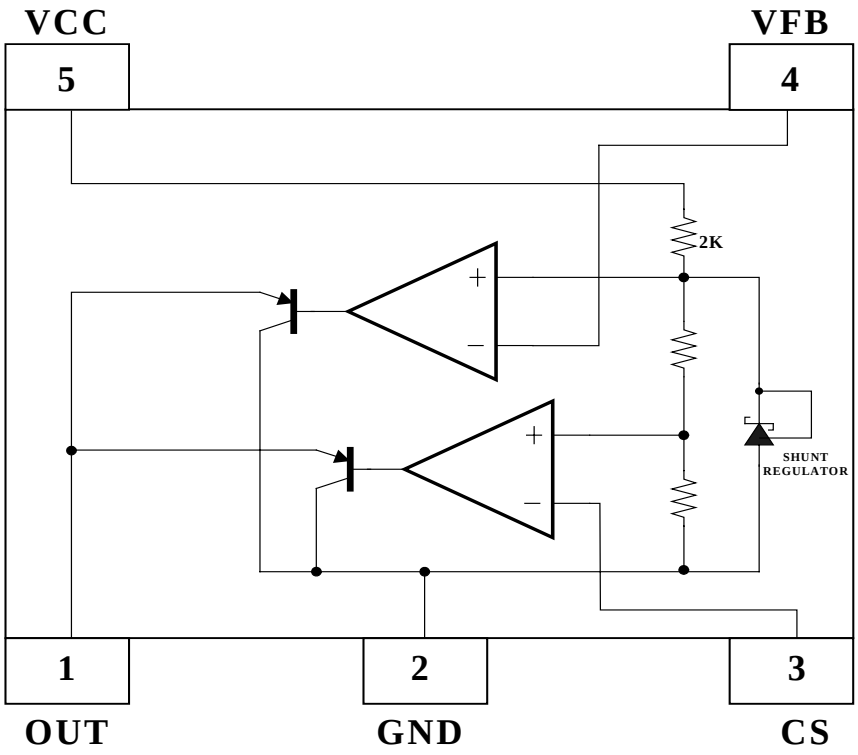
TYPICAL APPLICATION

- Charger
- Switching power supply
- AC adapter

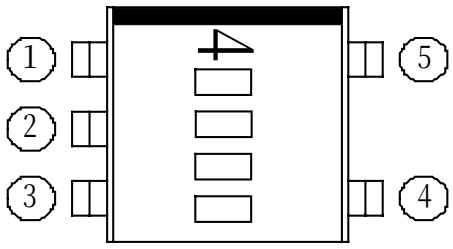
ORDER INFORMATION

Part Number	Operating Temperature	Package	Description
FP115K-LF	-10°C ~ +85°C	SOT-25	Tube
FP115KR-LF	-10°C ~ +85°C	SOT-25	Tape & Reel

FUNCTIONAL BLOCK DIAGRAM



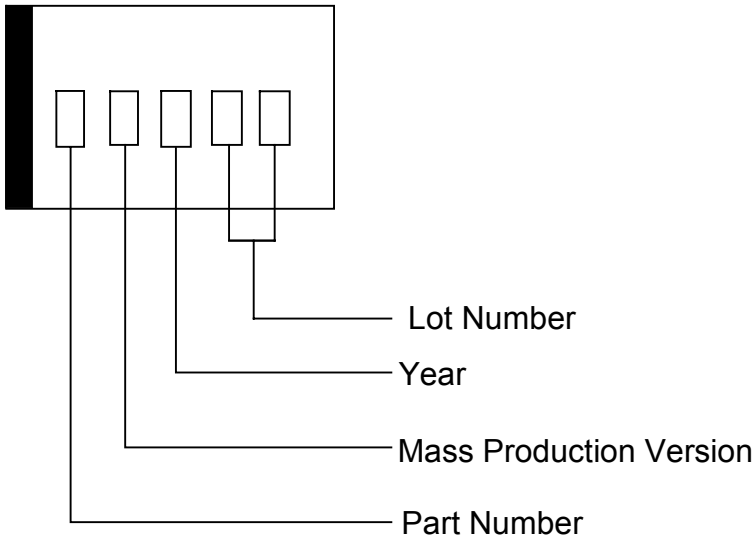
MARK VIEW



PIN DESCRIPTION

Name	No.	Status	Description
OUT	1	O	Open emitter
GND	2	P	IC ground
CS	3	I	Current sense input
V_{FB}	4	I	Voltage feedback sense input
V_{CC}	5	P	IC power supply

IC DATE CODE DISTINGUISH



FOR EXAMPLE:

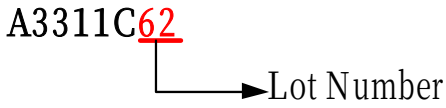
1 – year 2001,

2 – year 2002,

3 – year 2003 ----------And so on

Lot Number is the last two numbers

For Example:



ABSOLUTE MAXIMUM RATINGS

Supply Voltage ---------- +2.5V ~ +20V

Input Voltage (V_i) ---------- +30V

Operating Temperature ---------- -25℃ ~ 85℃

Storage Temperature ---------- -40℃ ~ 125℃

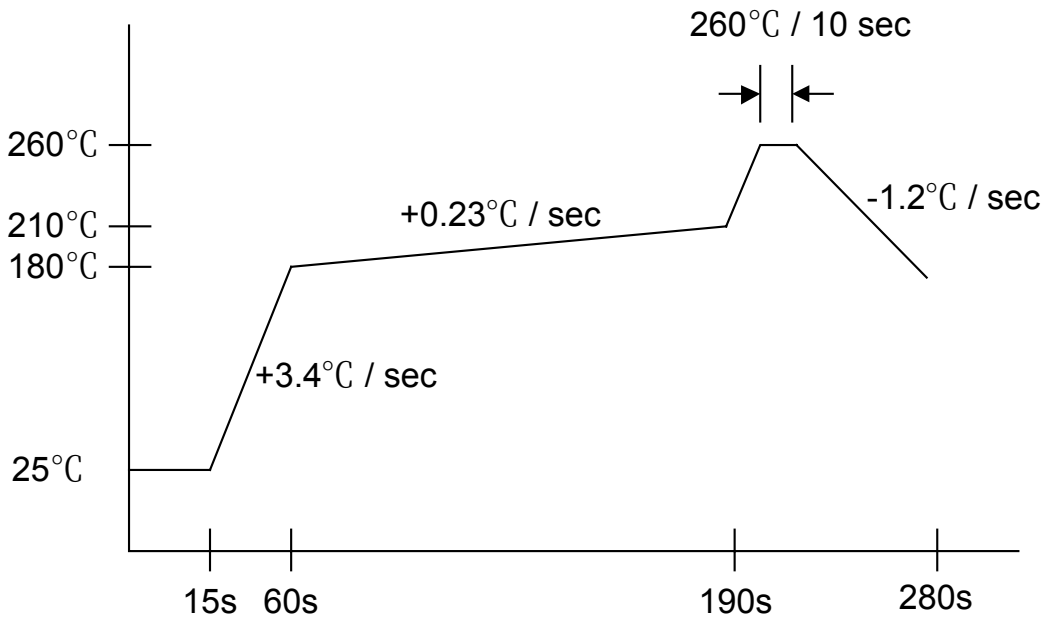
Junction Temperature ---------- +150℃

Power Dissipation (SOT25, Ta=25℃) ---------- 250mW

Operating Temperature Range ---------- -20°C 105°C

Maximum Junction Temperature (T_j) ---------- ---- 150°C

SOT25 Lead Temperature (soldering, 10 sec) ---------- - +260°C



DC ELECTRICAL CHARACTERISTICS

OPA1 section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output inverting voltage	V_{FB}	V_{CS}=0,R_L=4.3K,V_{CC}=3~5V	1.225	1.25	1.275	V
Input bias current	I_{B1}	V_{CS} =0,R_L=4.3K		30	150	nA
PSRR	PSRR	V_{CS} =0,R_L=4.3K	50			dB
Output sink current	I_{O1}	V_{FB} =1.35V, V_{CS} =0V,V_{OUT}=1.5V	5			mA
Output inverting voltage deviation	$\triangle V_{FB}$	V_{CS} =0,R_L=4.3K,V_{CC}=2.5~5V		3		mV
Output inverting voltage temperature coefficient				±100		ppm/℃

OPA2 section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output inverting voltage	V_{CS}	V_{FB} =0,R_L=4.3K,V_{CC}=3~5V	151	154	157	mV
Input bias current	I_{B2}	V_{FB} =0, R_L =4.3K		30	150	nA
PSRR	PSRR	V_{FB} =0, R_L =4.3K	50			dB
Output sink current	I_{O2}	V_{FB} =0.17V, V_{CS} =0V,V_{OUT}=1.5V	5			mA
Output inverting voltage deviation	$\triangle V_{CS}$	V_{FB} =0, R_L =4.3K,Vcc=2.5~5V		3		mV
Output inverting voltage temperature coefficient				±100		ppm/℃

Total device

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Current consumption	I_{CC}	V_{FB} =0V, V_{CS} =0V,R_L=∞		2.4	3.4	mA

†All typical values are at T_A＝25°C.

TYPICAL CHARACTERISTICS

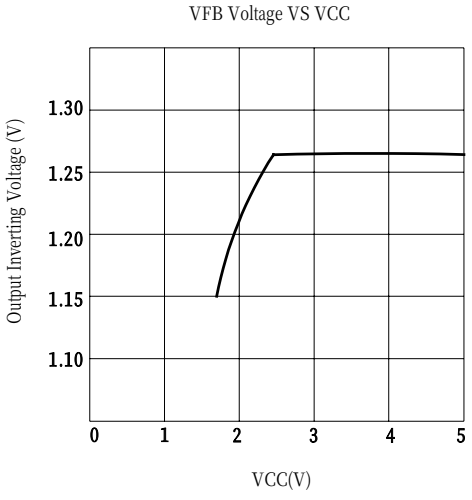


Figure 1

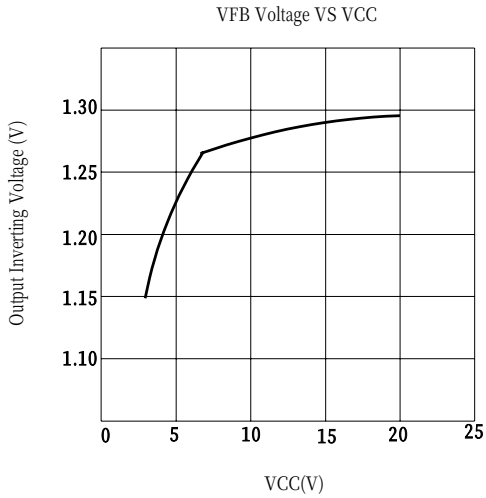


Figure 2

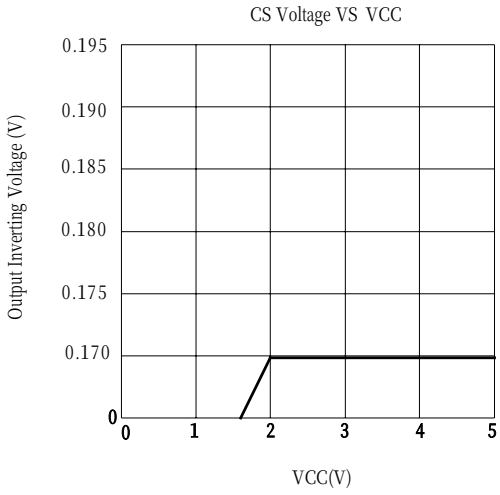


Figure 3

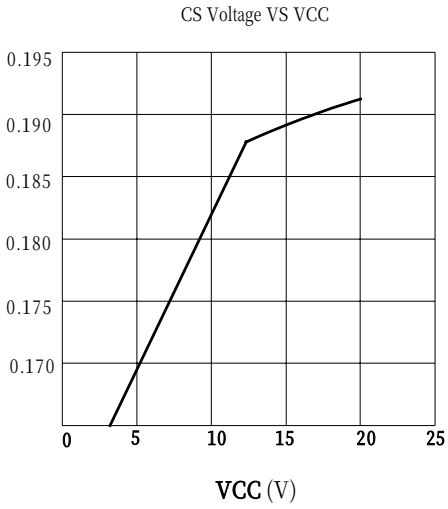


Figure 4

DETAILED DESCRIPTION

Internal Reference Regulator

FP115 has a 1.25V high precision shut regulator, and this voltage supplies to OPA1 non-inverting input pin and OPA2 non-inverting input pin by way of a resistor divider to 154mV.

FP115 is also used to reduce external part of application circuit and built-in a low operating voltage start-up resistor is near 2KΩ, so the supply voltage of application isn't suitable for a VCC voltage high than 20V operating environment because of increase more bias current and power loss.

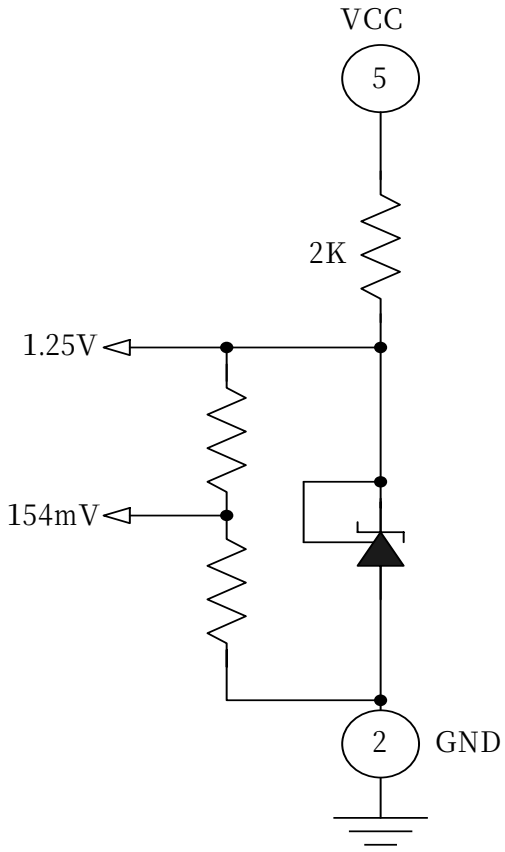


Figure 5 1.25V Reference regulator with resistor divider

For example:

If VCC is 6V and VREF is 1.25V, the power loss of the 2KΩ resistor is 11.3mW

When VCC is 12V, but VREF is still 1.25V, the power loss of the 2KΩ resistor is 57.8mW

Operating Amplifier 1&2

FP115 includes two operating amplifiers, and their output are tied together such as a AND gate, the inverting input of OPA is low than non-inverting reference voltage, the output transistor is turn-off; otherwise the output transistor is turn-on.

FP115 output (pin1) connects to a photo-coupler; its total sink current ability is near 10mA to drive photo diode turn-on or off to adjust feedback status.

In general, OPA1 is used for voltage feedback and OPA2 is used for over current feedback, the detail application circuits please see FP115 application note for design reference.

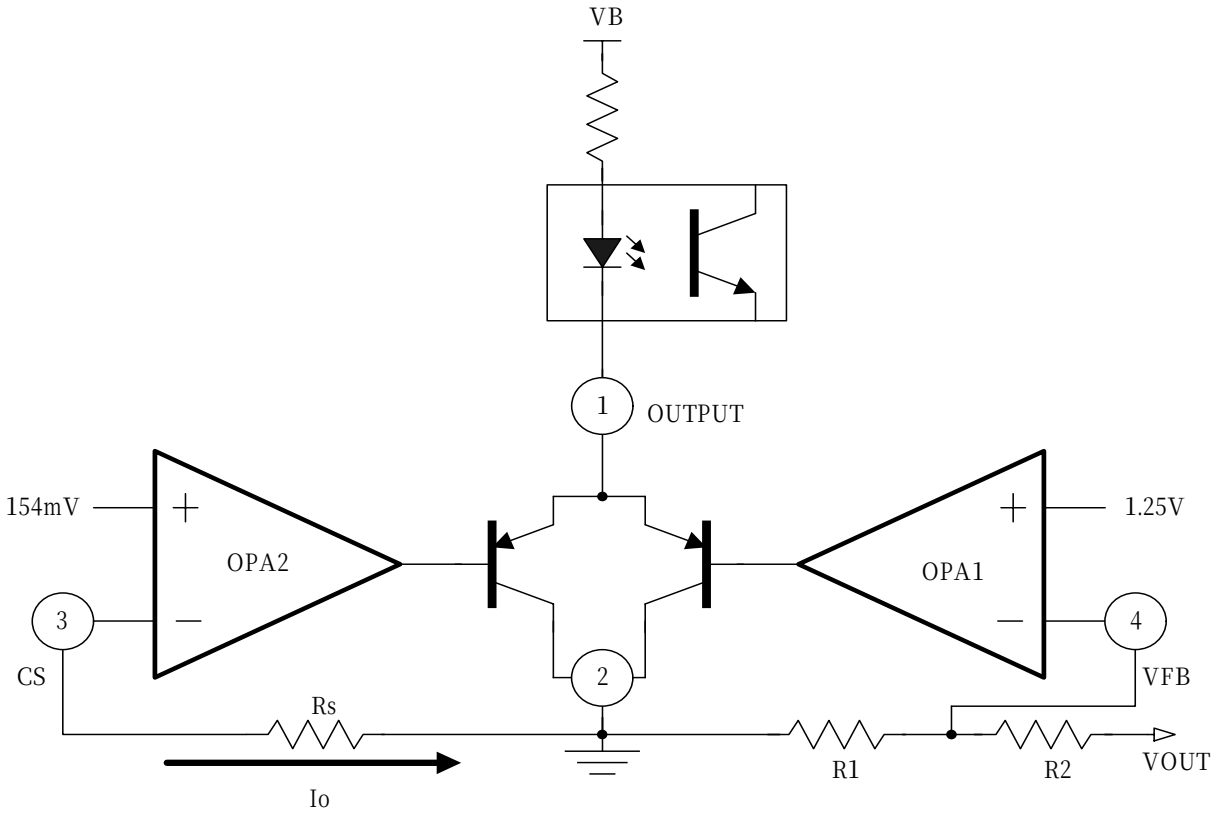


Figure 6 OPA1&2 with Photo-coupler circuit

Voltage Feedback formula:

$$Vout = \left(1 + \frac{R2}{R1}\right) \times 1.25V$$

Current Feedback formula:

$$154mV = Io \times Rs$$

APPLICATION CIRCUIT

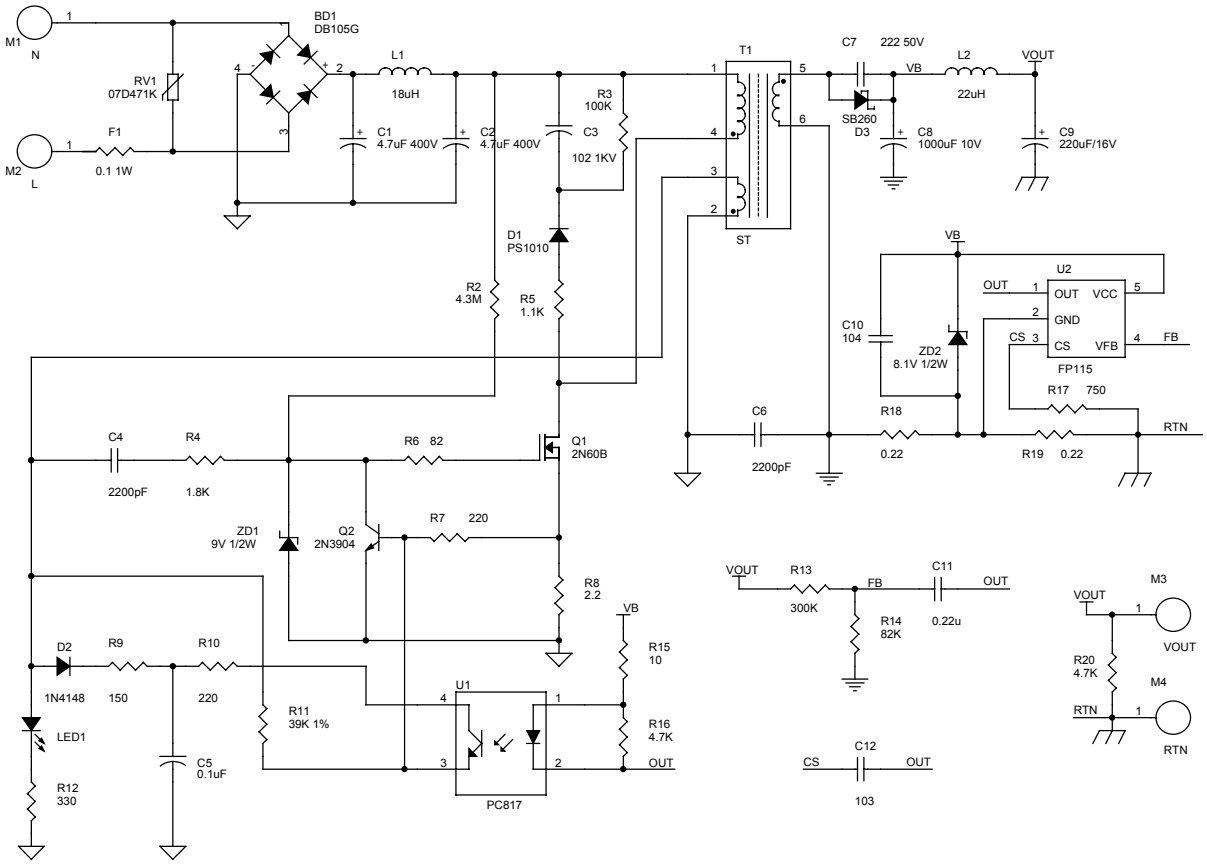
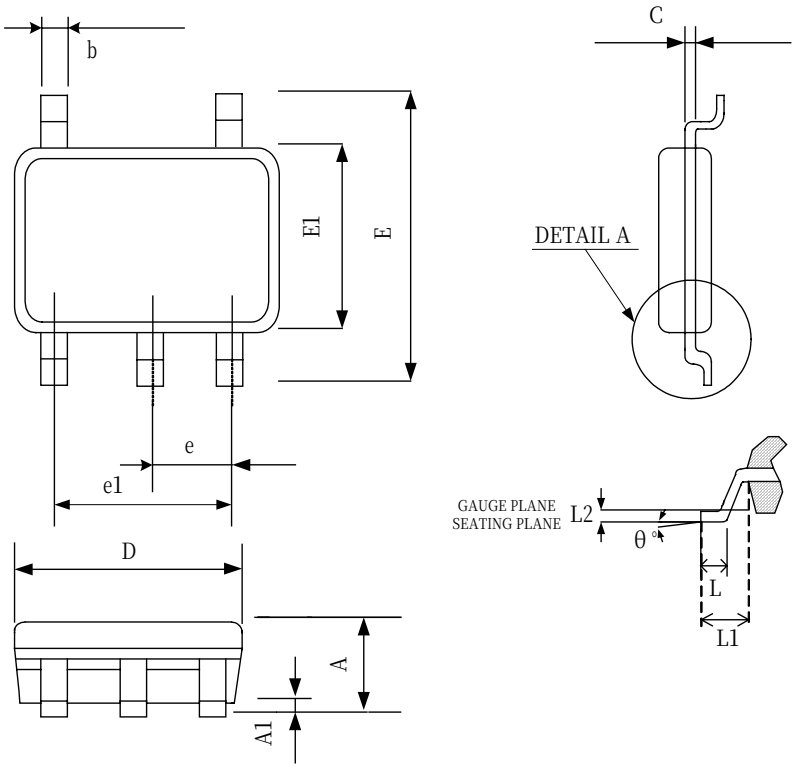


Figure 5. 3.5W RCC adapter application circuit

PACKAGE OUTLINE

SOT-25



SYMBOLS	MIN	MAX
A	1.05	1.35
A1	0.05	0.15
A2	1.00	1.20
b	0.25	0.50
c	0.08	0.20
D	2.70	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC.	
e1	1.90 BSC.	
L	0.30	0.55
L1	0.60 REF.	
L2	0.25 BSC.	
θ °	0	10

NOTE:

1.JEDEC OUTLINE:MS-001 BA

2.“D””E1”DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH

3.eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED

POINTED OR ROUNDED LEAD TIPS ARE PREFERRED TO EASE INSERTIDN

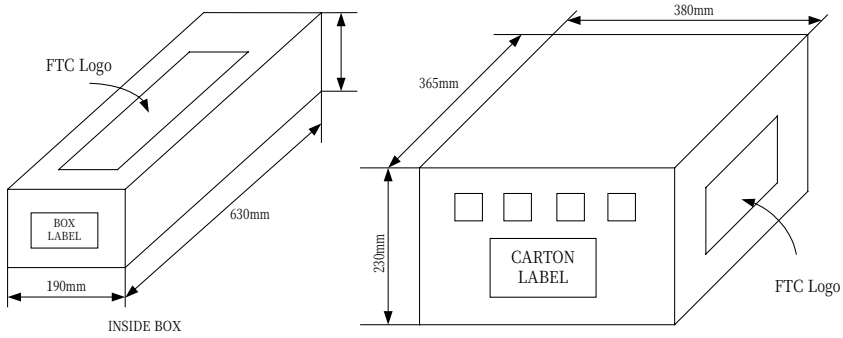
4.DISTANCE BETWEEN LEADSINCLUDING DAM BAR PROTRUSIONS TO BE .005 INCH MININUM

5.DATUM PLANE H CONINCIDENT WITH THE BOTTOM OF LEAD, WHERE LEAD EXITS BODY.

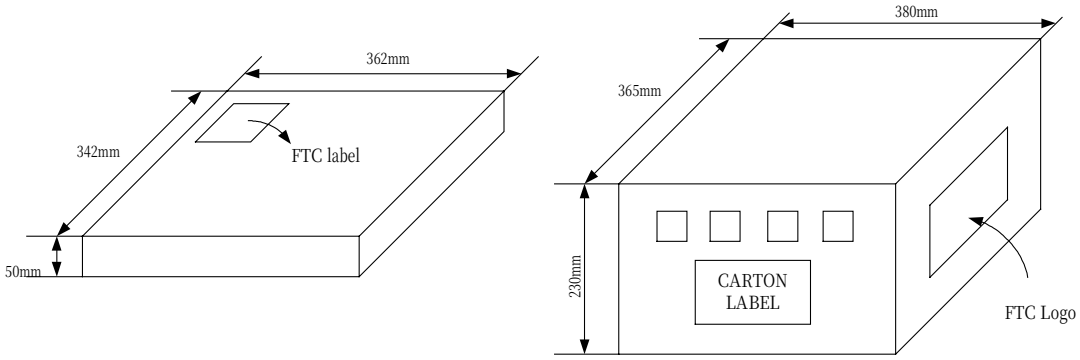
PACKING SPECIFICATIONS

BOX DIMENSION

TUBE INSIDE BOX AND CARTON



TAPE & REEL INSIDE BOX AND CARTON



PACKING QUANTITY SPECIFICATIONS

2500 EA / REEL
4 INSIDE BOXES / CARTON

LABEL SPECIFICATIONS

TAPPING & REEL

Feeling Technology Corp.
Product : FP115KR-LF
Lot No : A3311C62
D/C : 4XXXX
Q'ty : ◎ ◎

無鉛
Lead Free

CARTON

Feeling Technology Corp.

Product Type: FP115KR-LF

Lot No: A3311C62

Date Code: 4XXXX

Package Type: SOT-25

Marking Type: Laser

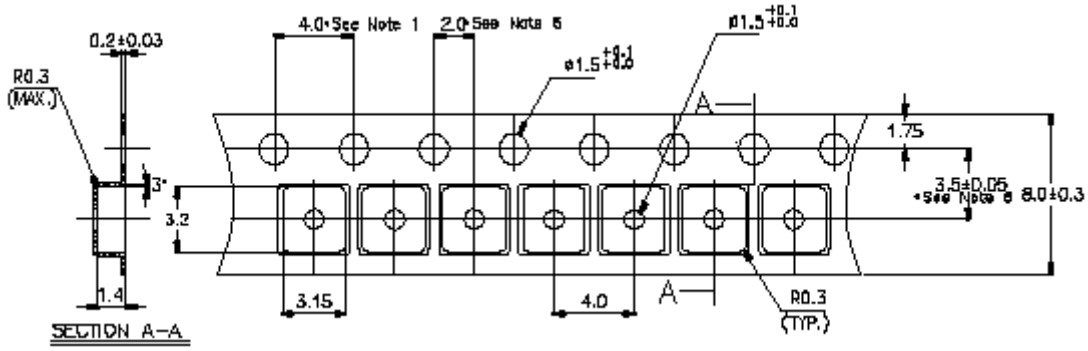
Total Q'ty: 10,000

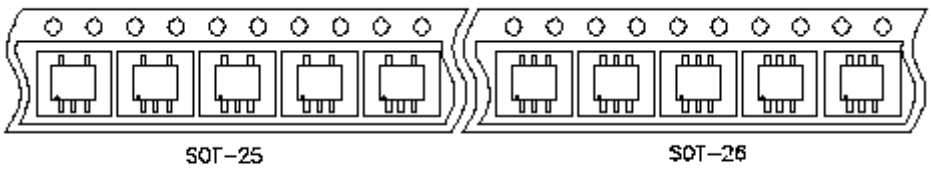
無 鉛
Lead Free

CARRIER TAPE DIMENSIONS

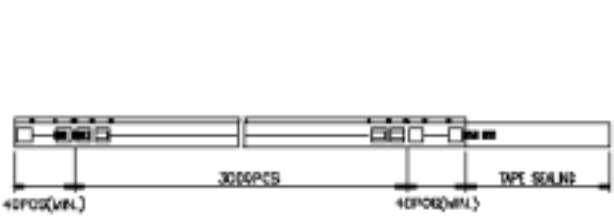
APPLICATION	W	P	E	F	D	D_1
SOT25	8.0±0.3	4.0	1.75±0.1	3.5±0.05	1.50±0.1	$1.50^{+0.1}$

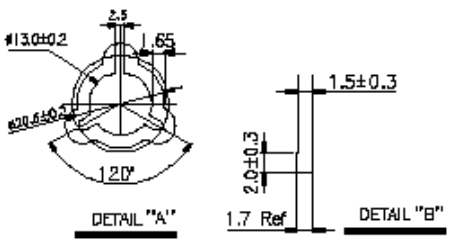
APPLICATION	P_0	P_1	A_0	B_0	K_0	t
SOT25	4.0±0.1	2.0±0.1	3.15	0.3	1.4	0.20±0.03



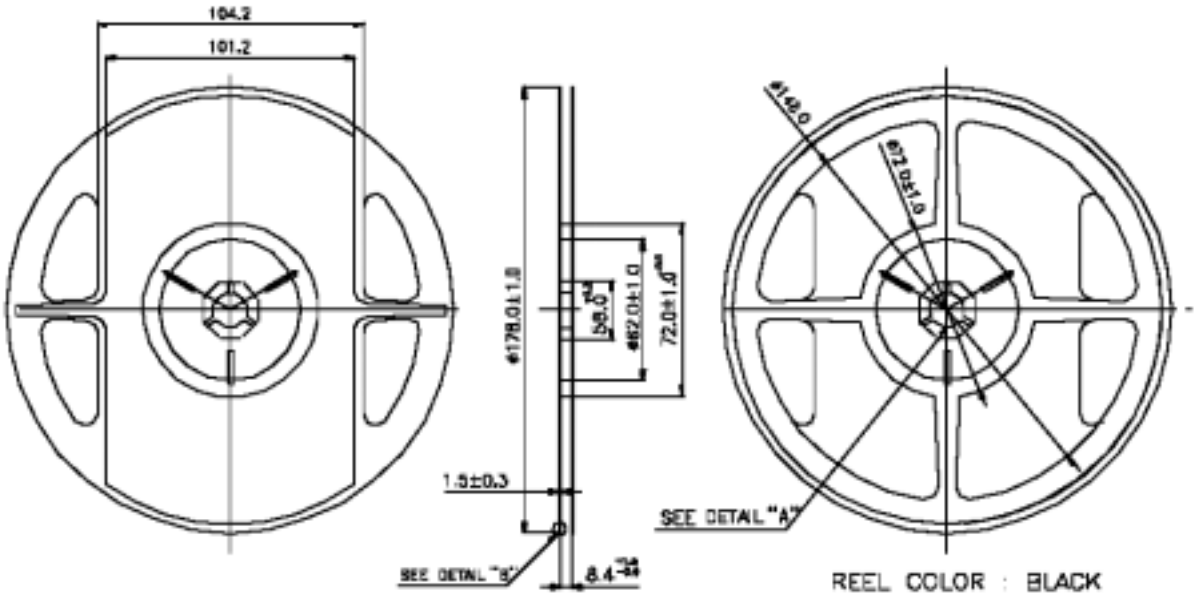


包裝方式: 3000 EA/PER REEL 5 REEL/BOX





REEL DIMENISIONS



APPLICATION	MATERIAL	A	B	C	D	T_1	T_2
SOT25	PLASTIC REEL (BLACK)	178±1.0	72±1.0	13.02+0.15	1.65	8.4+0.2	1.5+0.3

SGS REPORT

SGS Test Report

SIRFINER CORP.
NO.789-1, PO-AI ST., CHU-PEI CITY, HSIN-CHU HSIEN

Report No . : CE/2004/A2650B
Date : 2004/10/28
Page : 1 of 1

Test Result

PART NAME NO . 1 : PLEASE REFER TO THE PHOTO(S) ATTACHED.(MIX ALL PARTS)

Test Item (s):	Unit	Method	MDL	Result No.1				
PBBs (Polybrominated biphenyls)(CAS NO: 67774-32-7)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC and 76/769/EEC)	0.0005	N.D.				
PBBEs (PBDEs)(Polybromi nated biphenyl ethers)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC and 76/769/EEC)	0.0005	N.D.				

Test Item (s):	Unit	Method	MDL	Result No.1				
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.				
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B: 2001 or other acid digestion.	2	N.D.				
Mercury (Hg)	ppm	ICP-AES after as per EN 3502, method or other acid digestion.	2	N.D.				
Lead (Pb)	ppm	ICP-AES after as per EN 3505B, method or other acid digestion.	2	N.D.				

NOTE (1) N.D. =Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit

SGS TAIWAN LIMITED | NO. 136-1 Wu Kung Road, WuKu Industrail Zone County, Taiwan.
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