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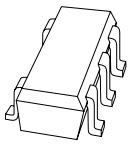


PSSI2021SAY

Constant current source in SOT353 package

Rev. 03 — 27 August 2009 Product data sheet

1. Product profile

1.1 General description

Resistor-equipped PNP transistor with two diodes on one chip in a SOT353 (SC-88A) plastic package. Stabilized output current of between 15 µA and 50 mA by connection of an external resistor between pins 4 and 5.

1.2 Features

- One chip integrated constant current source
- Output current setting by use of an external resistor
- Very small package
- Reduces component count and board space

1.3 Applications

- Automotive applications
- Generic constant current source
- Constant current LED driver
- Active bias control for audio amplifiers

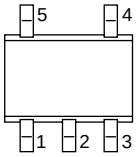
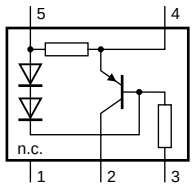
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{out}	output current		0.015	-	50	mA
V_S	supply voltage		-	-	75	V

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Symbol
1	n.c.	not connected		
2	IOUT	output current		
3	GND	ground		
4	REXT	external resistor		
5	VS	supply voltage		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSSI2021SAY	SC-88A	plastic surface mounted package; 5 leads	SOT353

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PSSI2021SAY	S1*

[1] * = -: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
I_{out}	stabilized output current	see Figure 2		0.015	50	mA
V_S	supply voltage			-	75	V
V_{out}	output voltage	V_S = 75 V		-	73	V
V_R	reverse voltage		[1]	-	0.5	V
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	335	mW
T_{stg}	storage temperature			–65	+150	°C
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–65	+150	°C

[1] Between all terminals

[2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	370	K/W

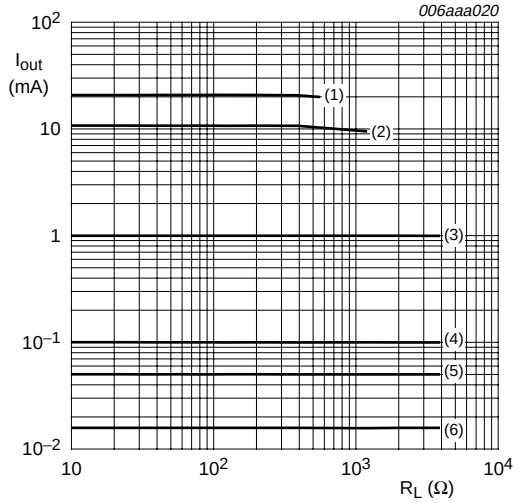
[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint

7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified

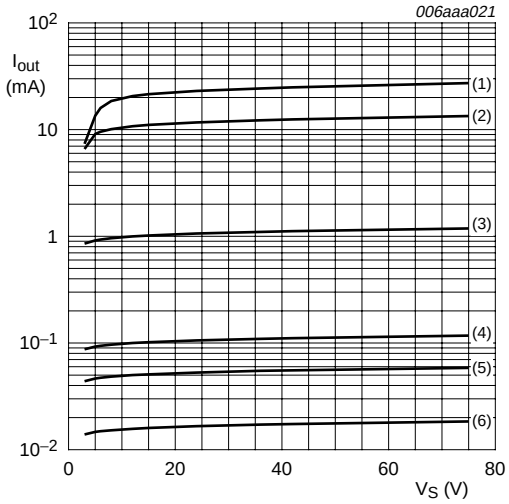
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{out}	stabilized output current	V_S = 12 V; R_{ext} = open; V_{out} = 0 V to 10 V; see Figure 2	10	15	20	µA
I_S	supply current	V_S = 12 V; I_{out} = 15 µA; V_{out} = 0 V to 10 V; see Figure 4	-	240	370	µA
		V_S = 75 V; I_{out} = 15 µA; V_{out} = 0 V; see Figure 4	-	1.5	2.2	mA
$\Delta I_{out} / (I_{out} \times \Delta T_{amb})$	output current change over ambient temperature	V_S = 12 V; V_{out} = 1 V; T_{amb} = –55 °C to 150 °C	-	0.15	-	%/K
$\Delta I_{out} / I_{out}$	load stability of stabilized output current	V_S = 12 V; V_{out} = 1 V to 10 V	-	0.5	-	%
R_{int}	internal resistor value		-	48	-	kΩ



V_S = 12 V

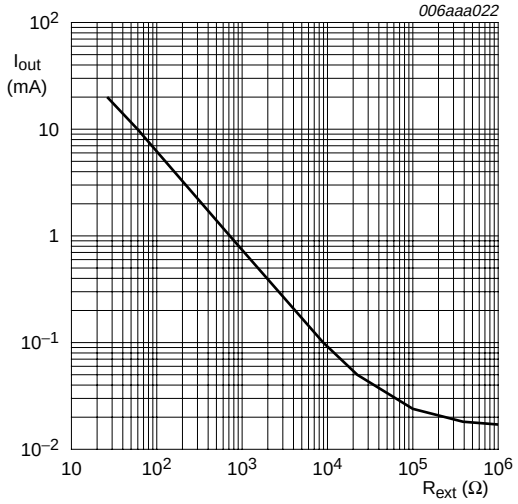
(1) I_{out} = 20 mA
(2) I_{out} = 10 mA
(3) I_{out} = 1mA
(4) I_{out} = 100 µA
(5) I_{out} = 50 µA
(6) I_{out} = 15 µA

Fig 1. Output current as a function of load resistance; typical values



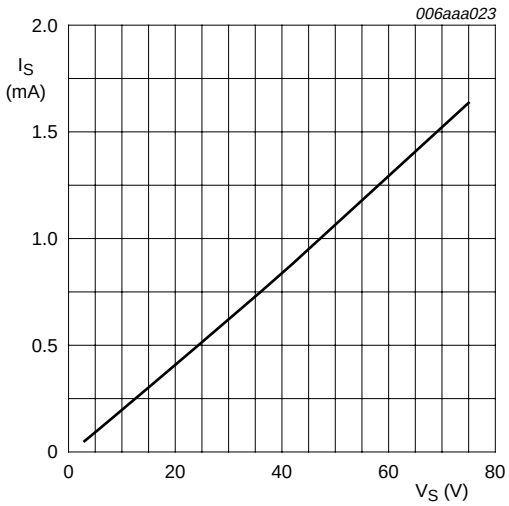
(1) I_{out} = 20 mA
(2) I_{out} = 10 mA
(3) I_{out} = 1mA
(4) I_{out} = 100 µA
(5) I_{out} = 50 µA
(6) I_{out} = 15 µA

Fig 2. Output current as a function of supply voltage; typical values



V_S = 12 V; R_L = 100 Ω

Fig 3. Output current as a function of external resistance; typical values



R_{ext} = ∞; R_L = 100 Ω

Fig 4. Supply current as a function of supply voltage; typical values

8. Application information

External resistor calculation

The output current can be set by connecting an external resistor between VS (pin 5) and REXT (pin 4).

I_{out} then calculates to: $$I_{out} = \frac{0.617}{R_{ext}} + 15\ \mu A$$

Without an external resistor the output current will be typically 15 µA.

Typical output currents versus supply voltage V_S

The applied supply voltage determines the output current. Table 8 gives typical I_{out} values at specified supply voltages, assuming that the working output current is 70% of the maximum possible output current.

Table 8. Typical output currents at specified supply voltages

V_S (V)	I_{out} (mA)
5	6
12	18
24	38
36	60

8.1 Typical application circuits

LED driver

Figure 5 shows a typical application circuit for an LED driver. The constant current ensures a constant LED brightness.

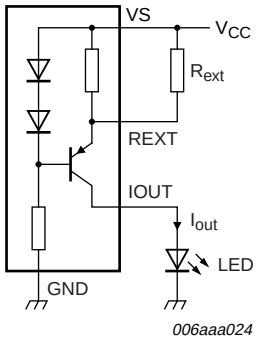


Fig 5. LED driver application diagram

Switching the current ON/OFF

The output can be switched ON and OFF by connecting a resistor-equipped transistor (RET, e.g. PDTC124XU) as shown in Figure 6.

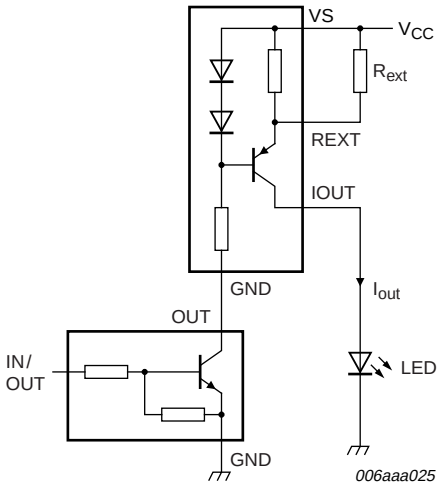


Fig 6. Switching the current ON/OFF; application diagram

Voltage reference

The PSSI2021SAY supplies a constant current to the Zener diode regardless of supply voltage variation, resulting in a constant reference voltage (see Figure 7).

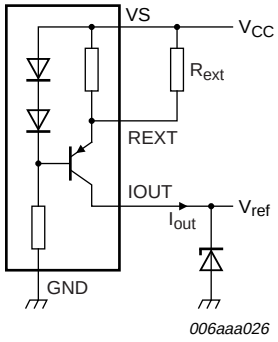
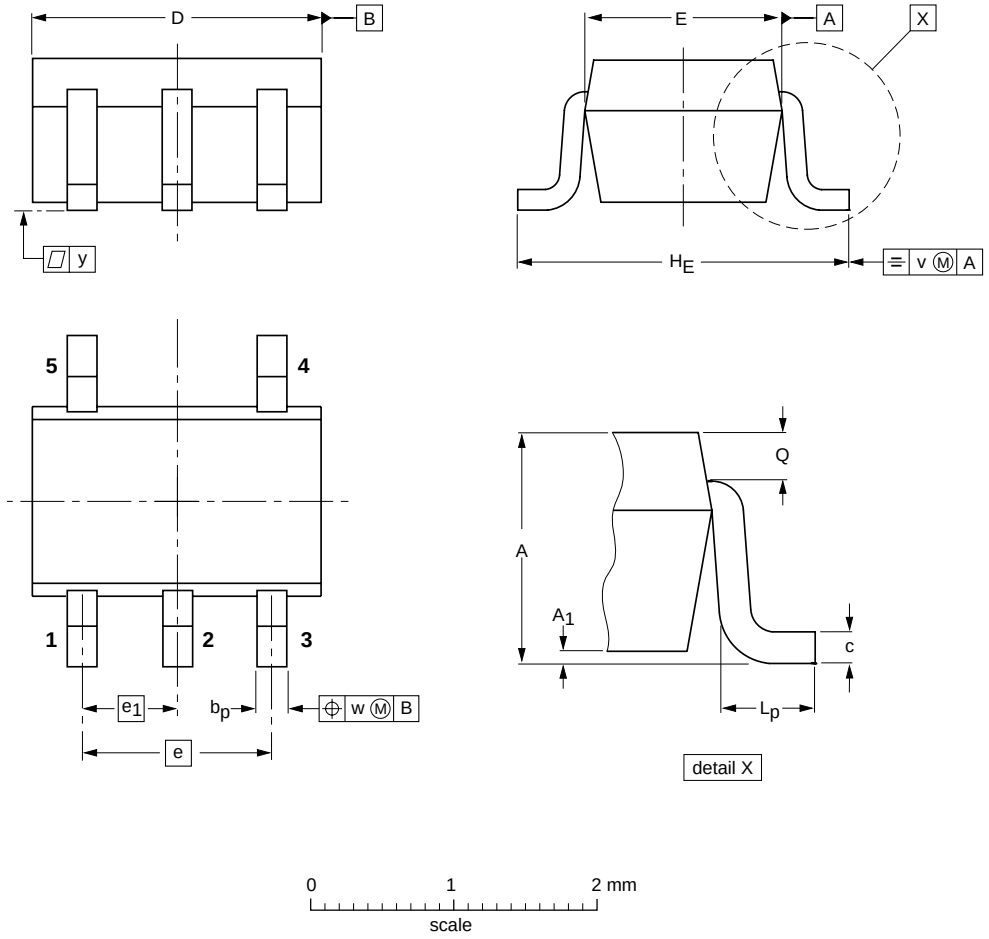


Fig 7. Voltage reference application diagram

9. Package outline

Plastic surface-mounted package; 5 leads **SOT353**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E (2)	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.3 0.2	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT353			SC-88A			~~04-11-16~~ 06-03-16

Fig 8. Package outline SOT353 (SC-88A)

10. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			3000
PSSI2021SAY	SOT353	4 mm pitch, 8 mm tape and reel	-115

[1] For further information and the availability of packing methods, see Section 13.

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSSI2021SAY_3	20090827	Product data sheet	-	PSSI2021SAY_2
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Table 2 “Pinning”: amended • Figure 8 “Package outline SOT353 (SC-88A)”: updated			
PSSI2021SAY_2	20041020	Product data sheet	-	PSSI2021SAY_1
PSSI2021SAY_1	20010507	Product specification	-	-

12. Legal information

12.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 27 August 2009
Document identifier: PSSI2021SAY_3

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