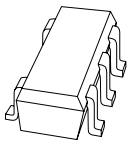
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PSSI2021SAY

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

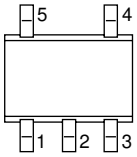
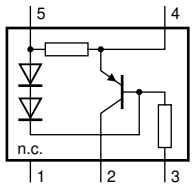
Table 1. Quick reference data

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

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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

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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

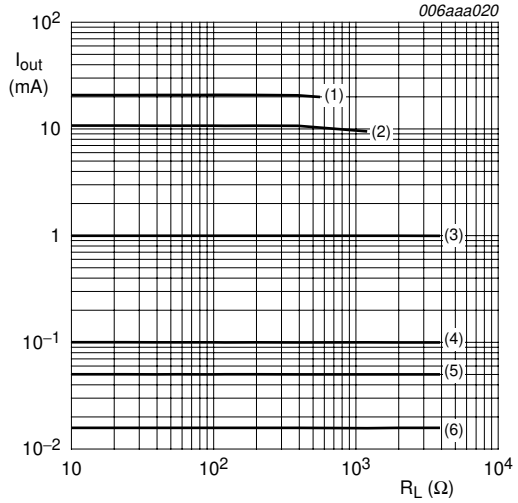
7. Characteristics

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

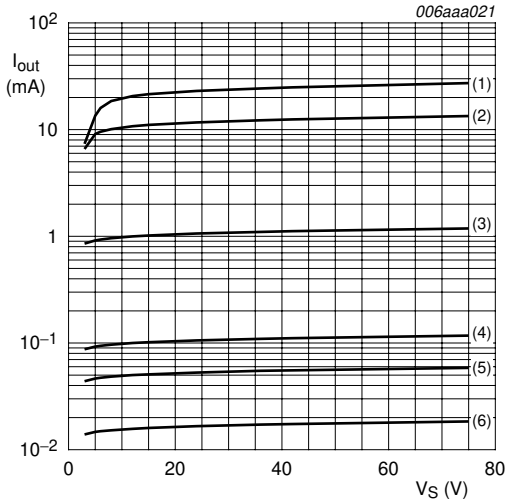
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V_S = 12 V

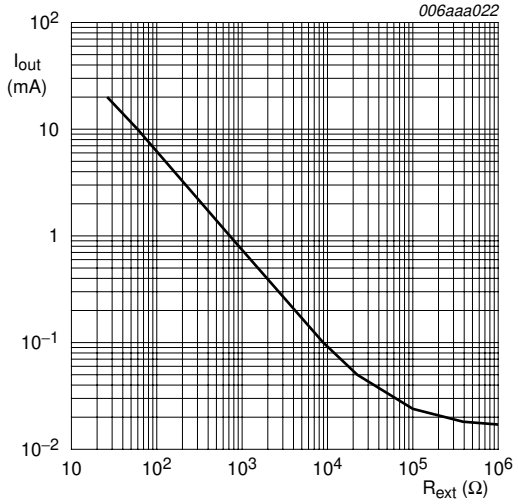
(1) I_{out} = 20 mA
(2) I_{out} = 10 mA
(3) I_{out} = 1mA
(4) I_{out} = 100 µA
(5) I_{out} = 50 µA
(6) I_{out} = 15 µA

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



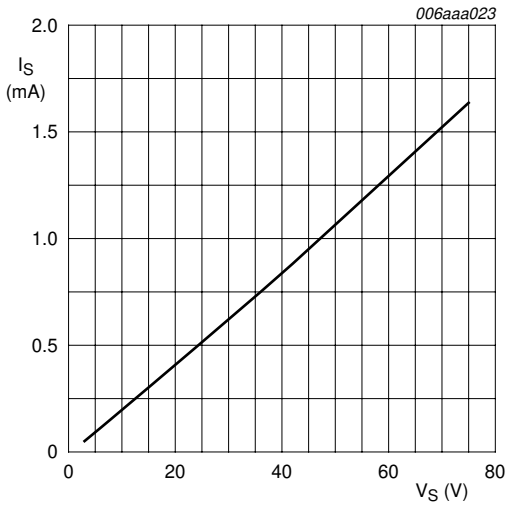
(1) I_{out} = 20 mA
(2) I_{out} = 10 mA
(3) I_{out} = 1mA
(4) I_{out} = 100 µA
(5) I_{out} = 50 µA
(6) I_{out} = 15 µA

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

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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

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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.

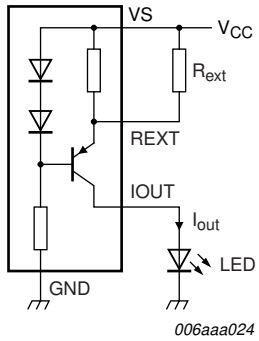


Fig 5. LED driver application diagram

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.

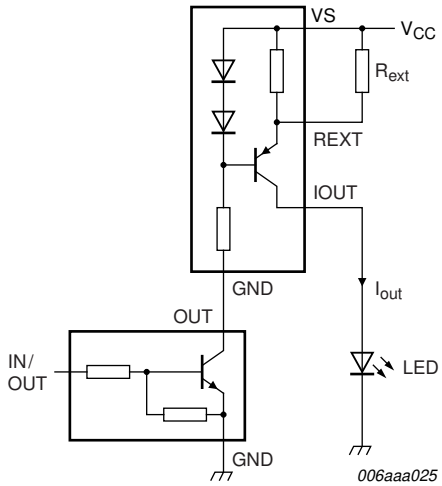


Fig 6. Switching the current ON/OFF; application diagram

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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).

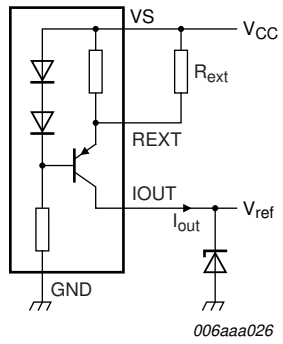
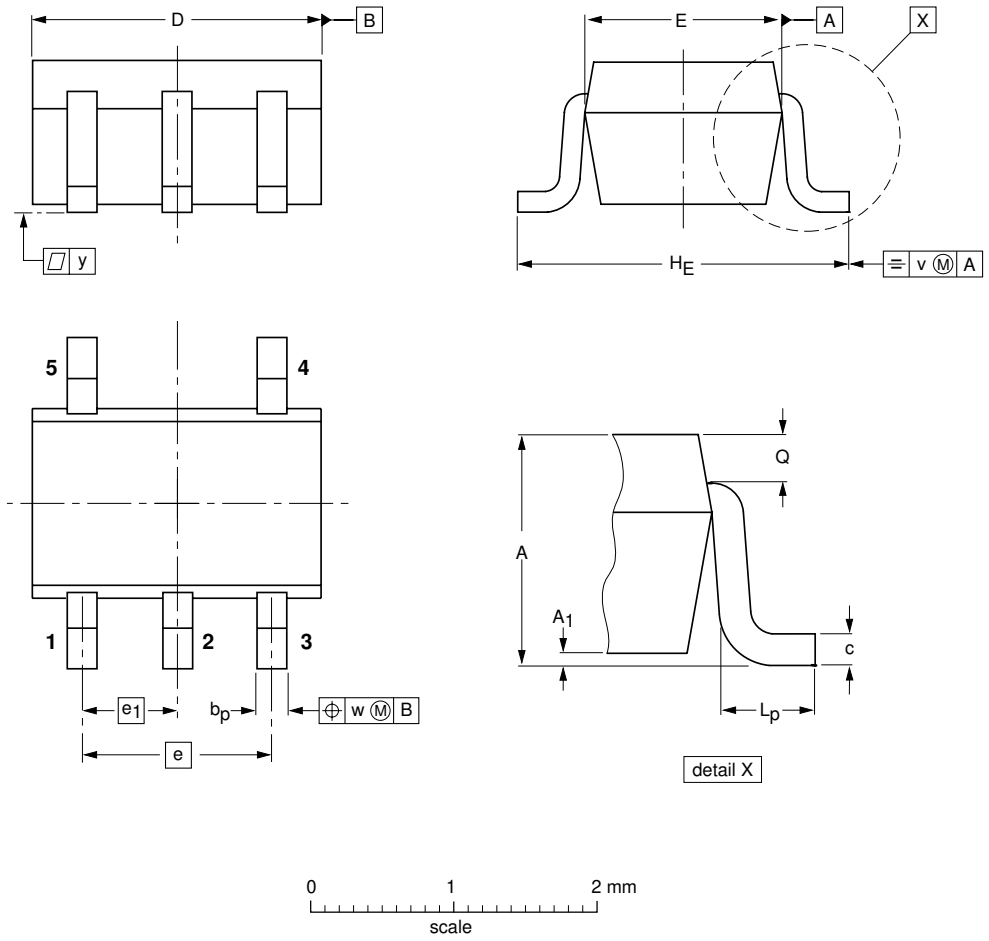


Fig 7. Voltage reference application diagram

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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)

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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.

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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	-	-

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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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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Date of release: 27 August 2009
Document identifier: PSSI2021SAY_3

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