

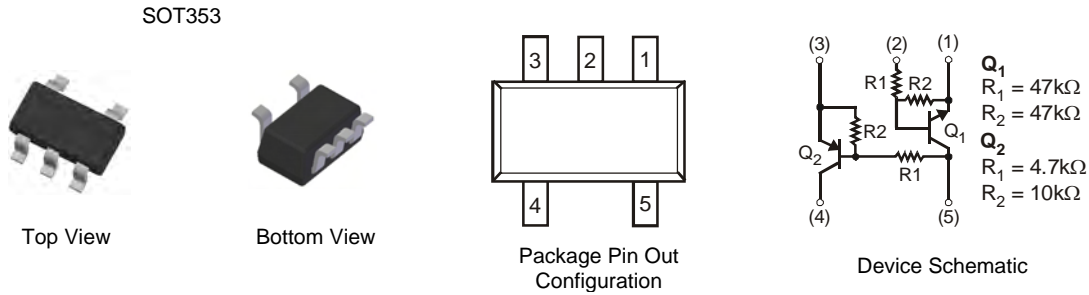
## DUAL COMPLEMENTARY PRE-BIASED TRANSISTORS

### Features

- Epitaxial Planar Die Construction
- Surface Mount Package Suited for Automated Assembly
- Simplifies Circuit Design and Reduces Board Space
- **Lead Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

### Mechanical Data

- Case: SOT353
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed Over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (approximate)

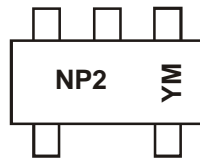


### Ordering Information (Note 3)

Part Number	Case	Packaging
UMC5N-7	SOT353	3000/Tape & Reel

- Notes:
1. No purposefully added lead.
  2. Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
  3. For packaging details, go to our website at <http://www.diodes.com>.

### Marking Information



NP2 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: U = 2007)  
 M = Month (ex: 9 = September)

#### Date Code Key

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Code	U	V	W	X	Y	Z	A	B	C

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings, Pre-Biased NPN Transistor, Q<sub>1</sub> @T<sub>A</sub> = 25°C unless otherwise specified**

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	50	V
Input Voltage	V <sub>IN</sub>	-10 to +40	V
Output Current	I <sub>O</sub>	30	mA
Collector Current	I <sub>C(MAX)</sub>	100	mA

**Maximum Ratings, Pre-Biased PNP Transistor, Q<sub>2</sub> @T<sub>A</sub> = 25°C unless otherwise specified**

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	-50	V
Input Voltage	V <sub>IN</sub>	-20 to +7	V
Output Current	I <sub>O</sub>	-100	mA
Collector Current	I <sub>C(MAX)</sub>	-100	mA

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient Air (Note 4)	R <sub>θJA</sub>	833	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 4. Device mounted on FR-4 PCB; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com>.

**Electrical Characteristics, Pre-Biased NPN Transistor, Q<sub>1</sub> @T<sub>A</sub> = 25°C unless otherwise specified**

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	(Note 5) V <sub>I(OFF)</sub>	0.5	—	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	(Note 6) V <sub>I(ON)</sub>	—	—	3	V	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA
Output Voltage	V <sub>O(ON)</sub>	—	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5 mA
Input Current	I <sub>I</sub>	—	—	0.18	mA	V <sub>I</sub> = 5V
Output Current	I <sub>O(OFF)</sub>	—	—	0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	G <sub>I</sub>	68	—	—	—	V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
Gain-Bandwidth Product (Note 7)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz
Input Resistance	R <sub>1</sub>	32.9	47	61.1	kΩ	—
Resistance Ratio	R <sub>2</sub> /R <sub>1</sub>	0.8	1	1.2	—	—

Notes: 5. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to 0.5V  
6. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from 3V  
7. Characteristic of Transistor – for reference only.

**Electrical Characteristics, Pre-Biased PNP Transistor, Q<sub>2</sub> @T<sub>A</sub> = 25°C unless otherwise specified**

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	V <sub>I(OFF)</sub>	-0.3	—	—	V	V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA
	V <sub>I(ON)</sub>	—	—	-2.5	V	V <sub>O</sub> = -0.3V, I <sub>O</sub> = -20mA
Output Voltage	V <sub>O(ON)</sub>	—	-0.1	-0.3	V	I <sub>O</sub> /I <sub>I</sub> = -10mA/-0.5 mA
Input Current	I <sub>I</sub>	—	—	-1.8	mA	V <sub>I</sub> = -5V
Output Current	I <sub>O(OFF)</sub>	—	—	-0.5	μA	V <sub>CC</sub> = -50V, V <sub>I</sub> = 0V
DC Current Gain	G <sub>I</sub>	30	—	—	—	V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
Gain-Bandwidth Product (Note 7)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = -10V, I <sub>E</sub> = 5mA, f = 100MHz
Input Resistance	R <sub>1</sub>	3.29	4.7	6.11	kΩ	—
Resistance Ratio	R <sub>2</sub> /R <sub>1</sub>	1.7	2.1	2.6	—	—

Notes: 8. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to -0.3V  
9. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from -2.5V  
10. Characteristic of Transistor – for reference only.

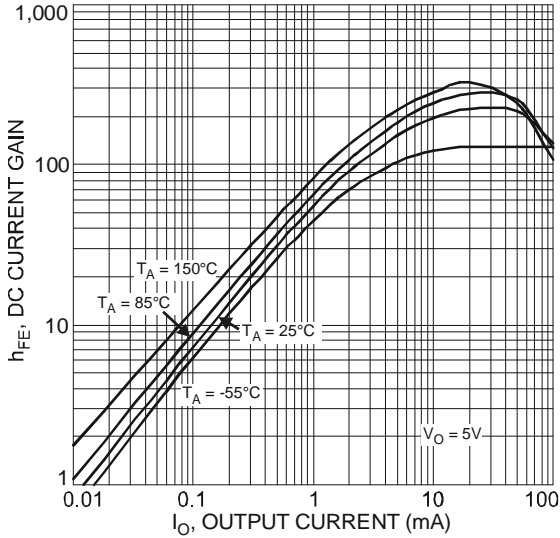


Fig. 1 Typical DC Current Gain vs. Output Current (Q1, NPN)

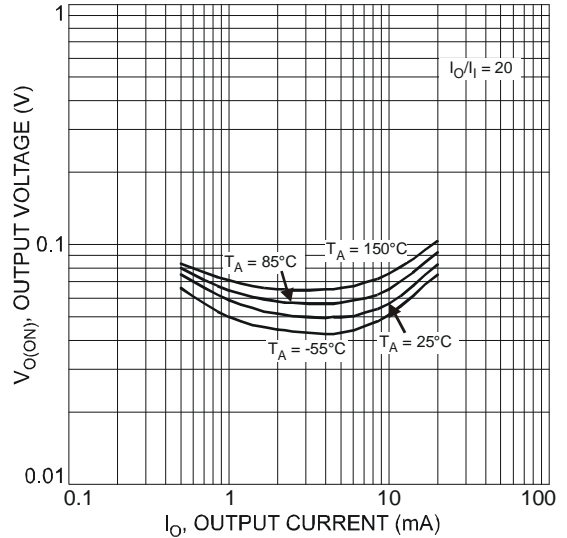


Fig. 2 Typical Output Voltage vs. Output Current (Q1, NPN)

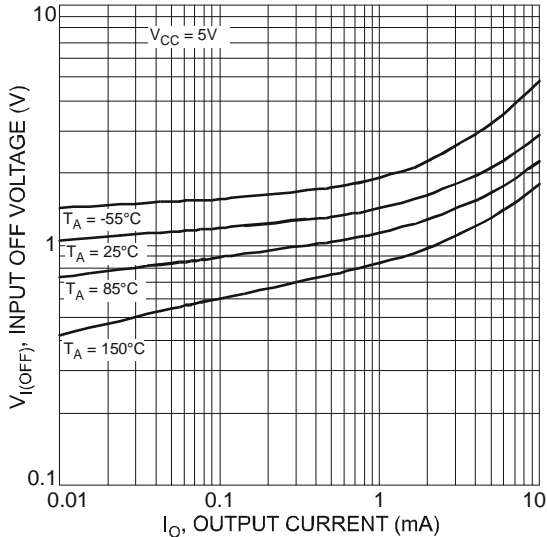


Fig. 3 Typical Input OFF Voltage vs. Output Current (Q1, NPN)

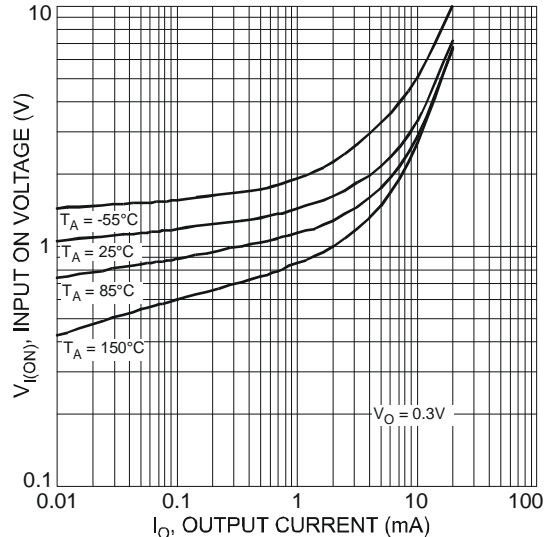


Fig. 4 Typical Input ON Voltage vs. Output Current (Q1, NPN)

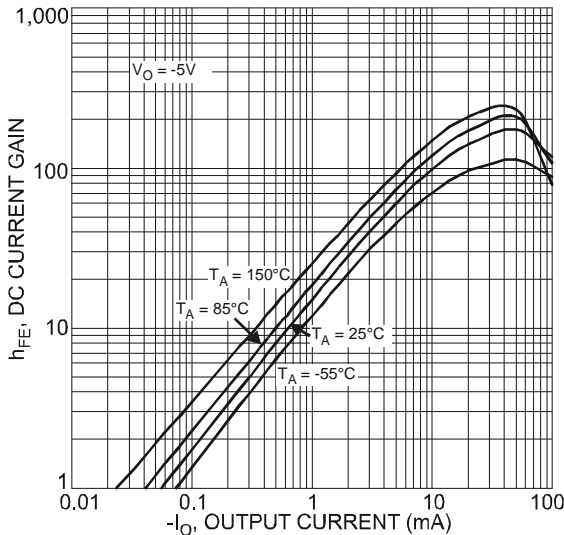


Fig. 5 Typical DC Current Gain vs. Output Current (Q2, PNP)

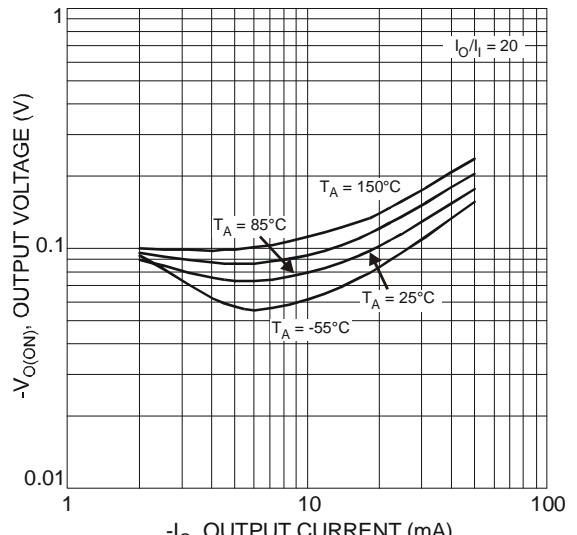


Fig. 6 Typical Output Voltage vs. Output Current (Q2, PNP)

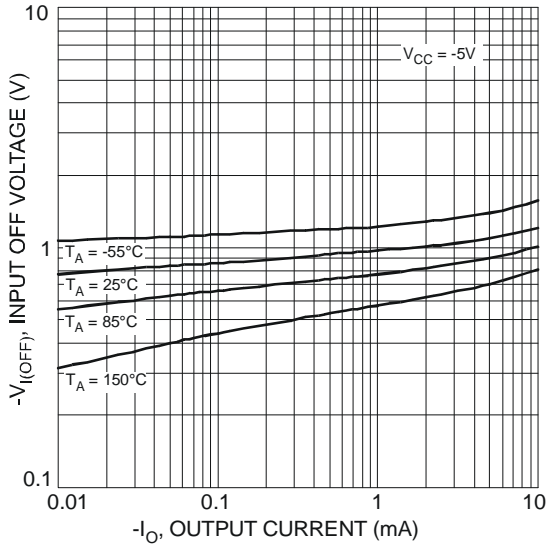


Fig. 7 Typical Input Off Voltage vs. Output Current (Q2, PNP)

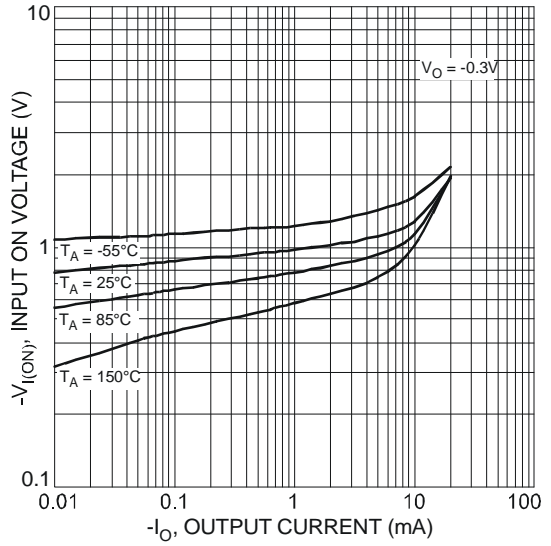
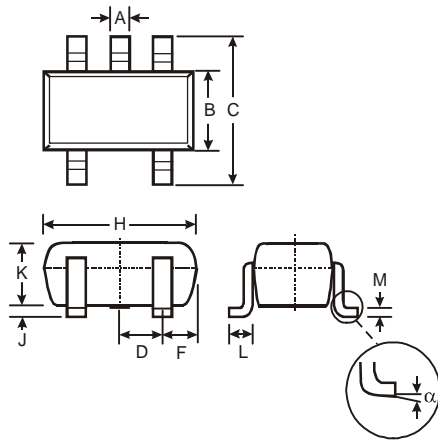


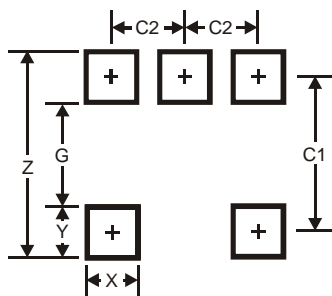
Fig. 8 Typical Input ON Voltage vs. Output Current (Q2, PNP)

**Package Outline Dimensions**



SOT353		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

**Suggested Pad Layout**



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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