


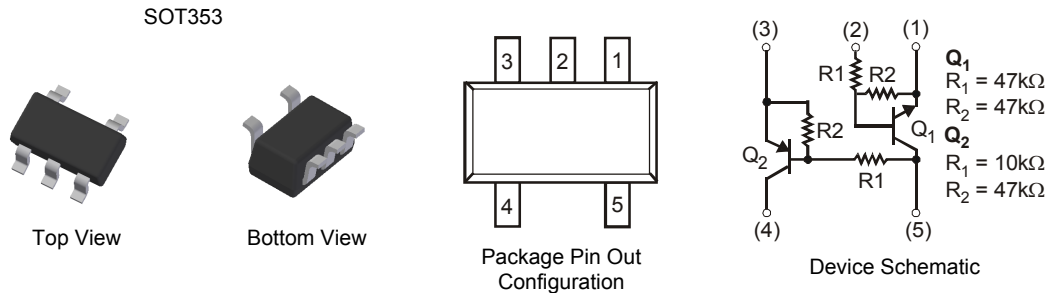
**DUAL COMPLEMENTARY PRE-BIASED TRANSISTORS**

**Features**

- Ultra-Small Surface Mount Package
- Epitaxial Planar Die Construction
- Surface Mount Package Suited for Automated Assembly
- Simplifies Circuit Design and Reduces Board Space
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**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
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 
- Weight: 0.006 grams (approximate)

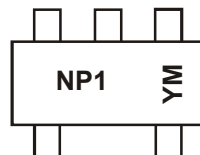


**Ordering Information** (Notes 4 & 5)

Part Number	Compliance	Marking	Reel size (inch)	Tape width (mm)	Quantity per reel
UMC4N-7	AEC-Q101	NP1	7	8	3,000
UMC4NQ-7	Automotive	NP1	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
  5. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



NP1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017
Code	X	Y	Z	A	B	C	D	E

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</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>	-40 to +6	V
Output Current	I <sub>O</sub>	-100	mA
Collector Current	I <sub>C</sub>	-100	mA

**Thermal Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	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: 6. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.

**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 7) V <sub>I(OFF)</sub>	0.5	—	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	(Note 8) 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 9)	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: 7. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to 0.5V  
8. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from 3V  
9. 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	(Note 10) V <sub>I(OFF)</sub>	-0.3	—	—	V	V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA
	(Note 11) V <sub>I(ON)</sub>	—	—	-1.4	V	V <sub>O</sub> = -0.3V, I <sub>O</sub> = -1mA
Output Voltage	V <sub>O(ON)</sub>	—	-0.1	-0.3	V	I <sub>O</sub> / I <sub>I</sub> = -5mA/-0.25 mA
Input Current	I <sub>I</sub>	—	—	-0.88	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 12)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = -10V, I <sub>E</sub> = 5mA, f = 100MHz
Input Resistance	R <sub>1</sub>	7	10	13	kΩ	—
Resistance Ratio	R <sub>2</sub> /R <sub>1</sub>	3.7	4.7	5.7	—	—

Notes: 10. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to -0.3V  
11. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from -1.4V  
12. Characteristic of Transistor – for reference only.

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

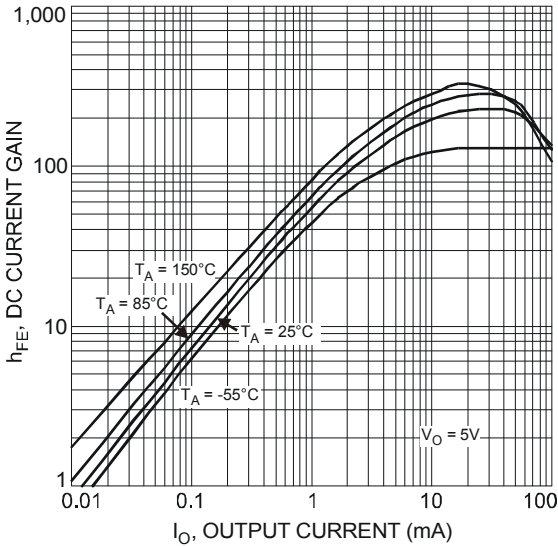


Fig. 1 Typical DC Current Gain vs. Output Current (Q1, NPN)

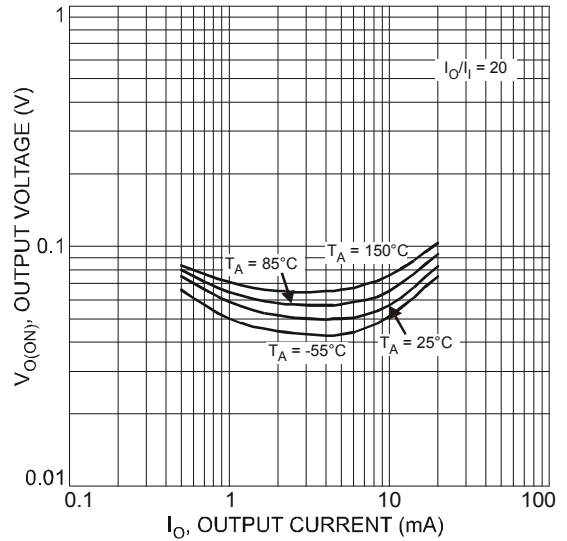


Fig. 2 Typical Output Voltage vs. Output Current (Q1, NPN)

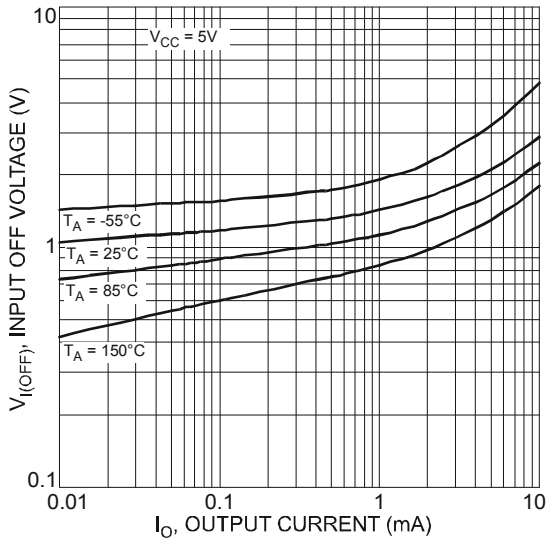


Fig. 3 Typical Input OFF Voltage vs. Output Current (Q1, NPN)

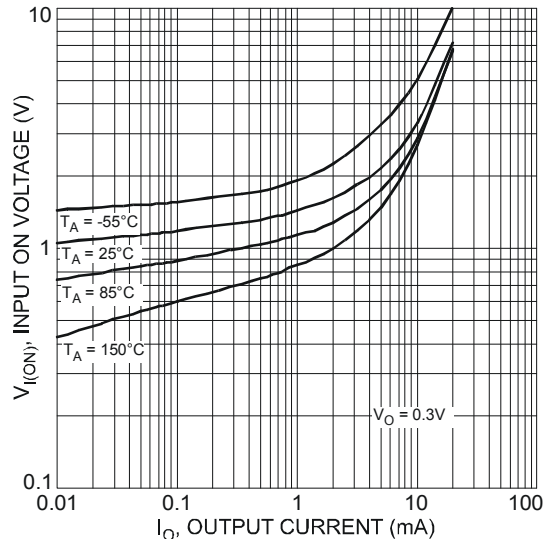
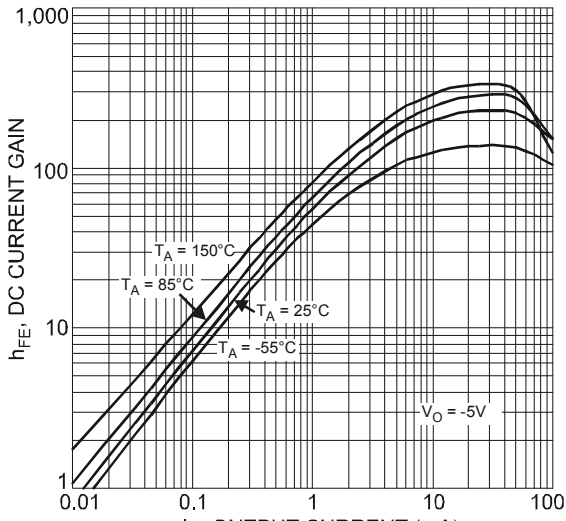
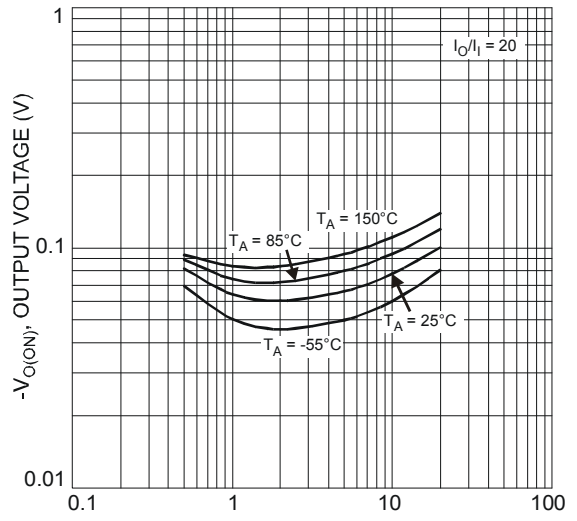


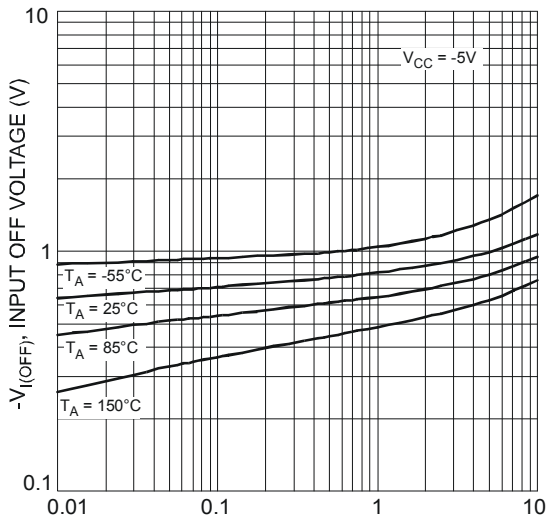
Fig. 4 Typical Input ON Voltage vs. Output Current (Q1, NPN)



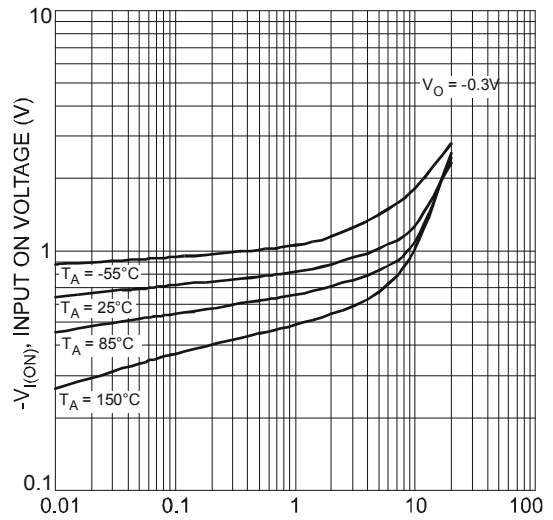
-I<sub>O</sub>, OUTPUT CURRENT (mA)  
Fig. 5 Typical DC Current Gain vs. Output Current (Q2, PNP)



-I<sub>O</sub>, OUTPUT CURRENT (mA)  
Fig. 6 Typical Output Voltage vs. Output Current (Q2, PNP)



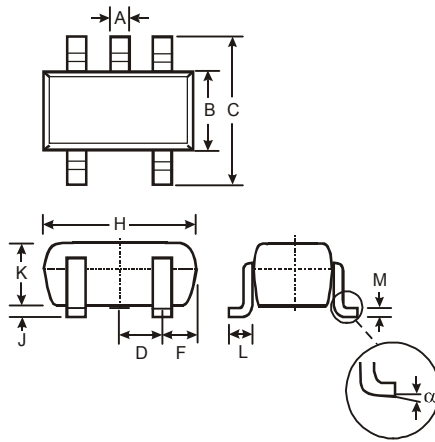
-I<sub>O</sub>, OUTPUT CURRENT (mA)  
Fig. 7 Typical Input Off Voltage vs. Output Current (Q2, PNP)



-I<sub>O</sub>, OUTPUT CURRENT (mA)  
Fig. 8 Typical Input On Voltage vs. Output Current (Q2, PNP)

**Package Outline Dimensions**

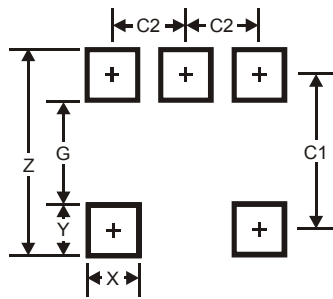
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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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