

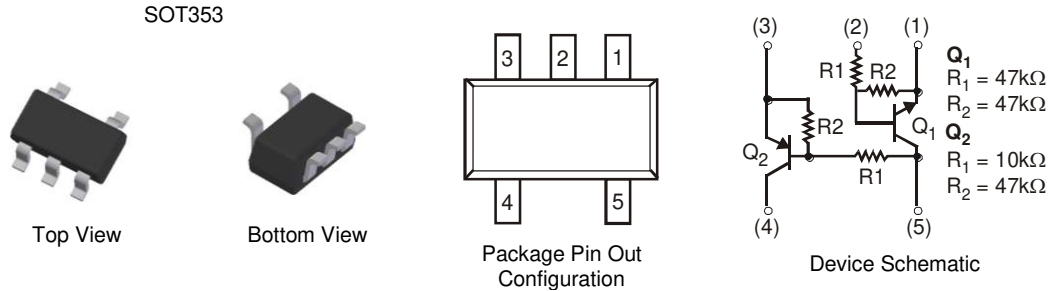
**DUAL COMPLEMENTARY PRE-BIASED TRANSISTORS**

**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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([UMC4NQ](#))**

**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 **e3**
- Weight: 0.006 grams (Approximate)

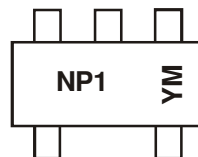


**Ordering Information** (Note 4)

Part Number	Compliance	Marking	Reel Size (inch)	Tape Width (mm)	Quantity per Reel
UMC4N-7	AEC-Q101	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/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



NP1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: E = 2017)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024
Code	E	F	G	H	I	J	K	L

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

### Absolute 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

### Absolute 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 5)	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	R <sub>θJA</sub>	833	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Note: 5. For the device mounted on minimum recommended pad layout FR-4 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 6) V <sub>I(OFF)</sub>	0.5	—	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	(Note 7) 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 8)	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: 6. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to 0.5V.  
 7. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from 3V.  
 8. 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 9) V <sub>I(OFF)</sub>	-0.3	—	—	V	V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA
	(Note 10) 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 11)	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: 9. The device is guaranteed to be in "OFF" state with V<sub>I(OFF)</sub> up to -0.3V.  
 10. The device is guaranteed to be in "ON" state with V<sub>I(ON)</sub> starting from -1.4V.  
 11. Characteristic of Transistor – for reference only.

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

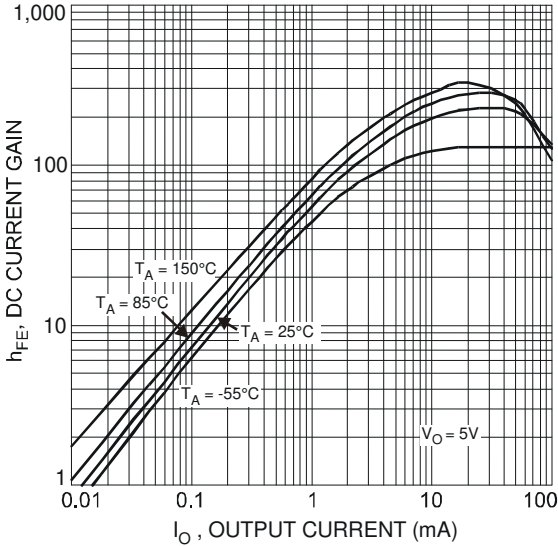


Fig. 1 Typical DC Current Gain vs. Output Current (Q1, NPN)

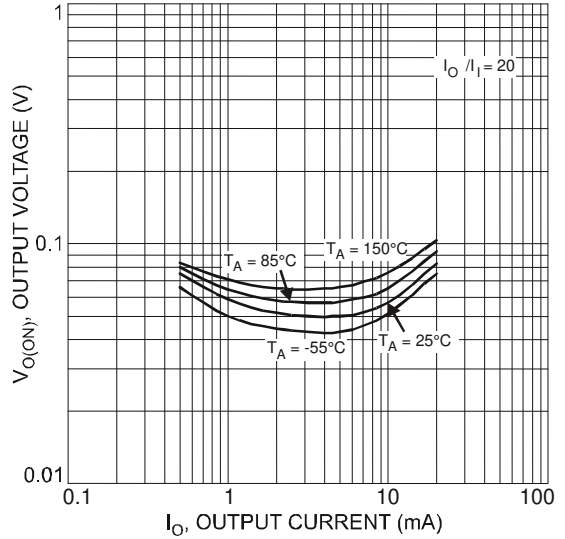


Fig. 2 Typical Output Voltage vs. Output Current (Q1, NPN)

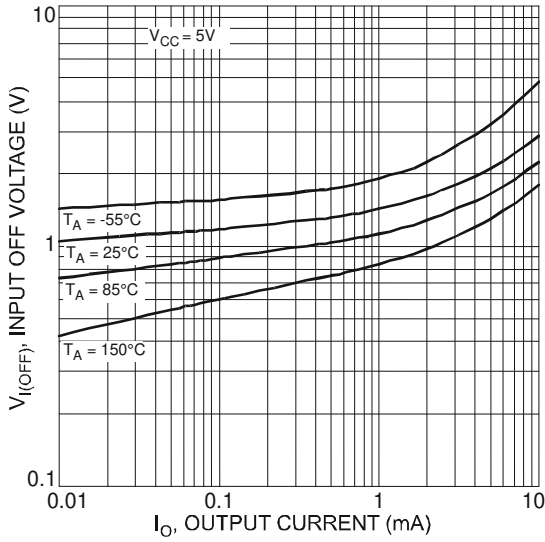


Fig. 3 Typical Input OFF Voltage vs. Output Current (Q1, NPN)

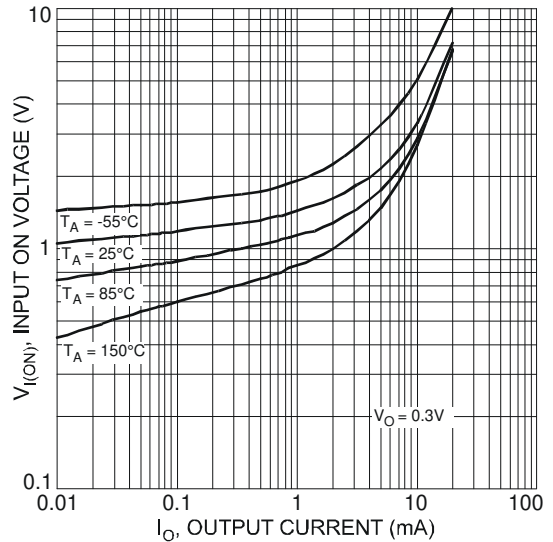


Fig. 4 Typical Input ON Voltage vs. Output Current (Q1, NPN)

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

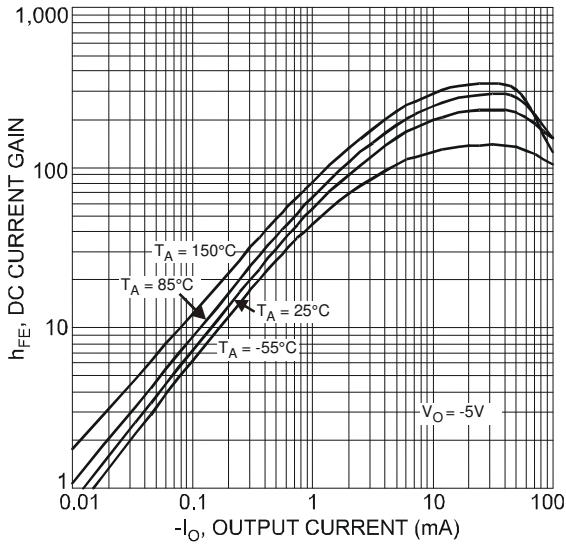


Fig. 5 Typical DC Current Gain vs. Output Current (Q2, PNP)

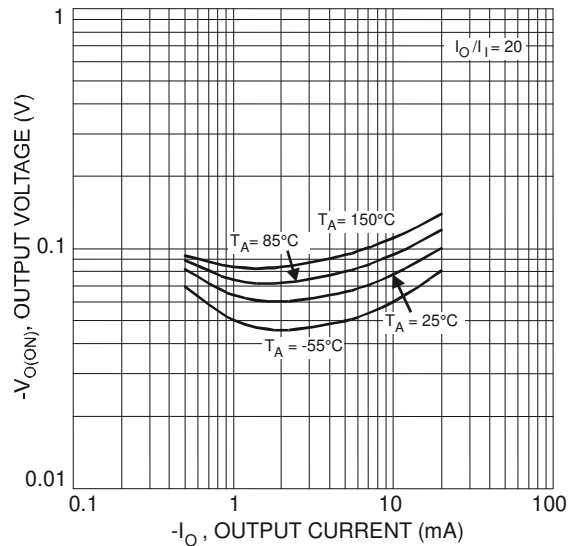


Fig. 6 Typical Output Voltage vs. Output Current (Q2, PNP)

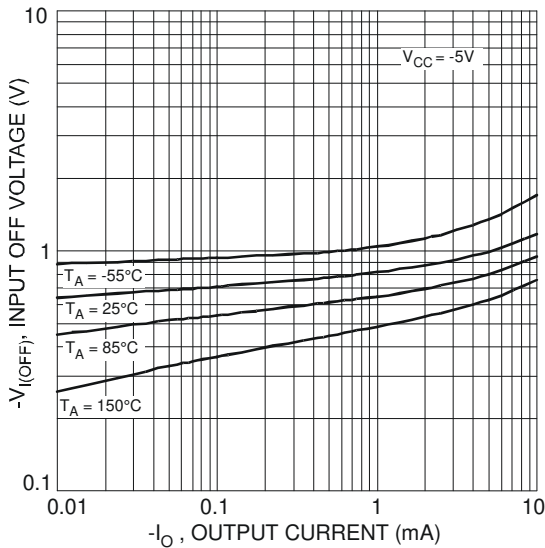


Fig. 7 Typical Input Off Voltage vs. Output Current (Q2, PNP)

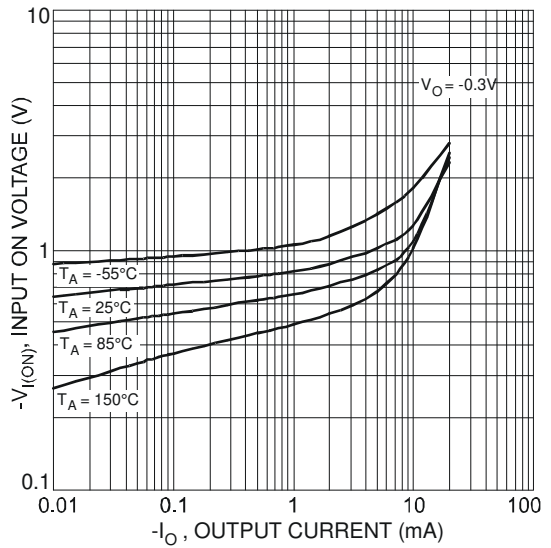
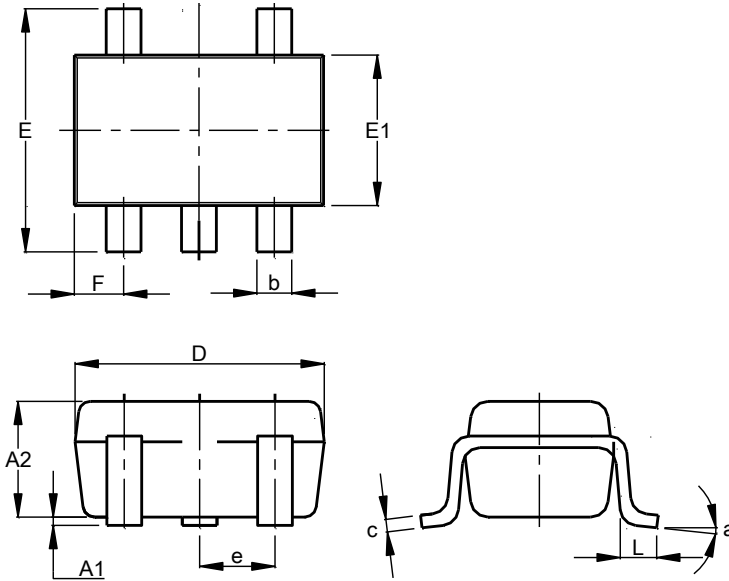


Fig. 8 Typical Input ON Voltage vs. Output Current (Q2, PNP)

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT353**

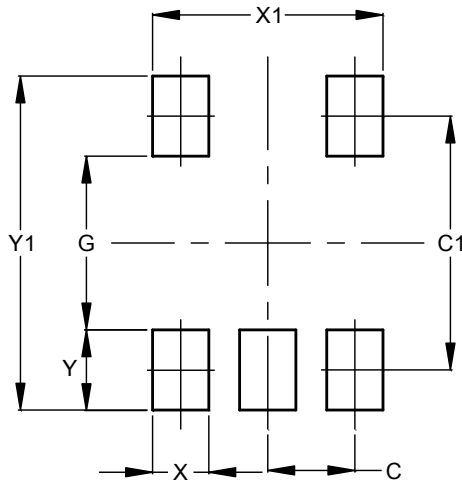


SOT353			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	1.00
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT353**



Dimensions	Value (in mm)
C	0.650
C1	1.900
G	1.300
X	0.420
X1	1.720
Y	0.600
Y1	2.500

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