DUAL COMPLEMENTARY PRE-BIASED TRANSISTORS

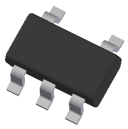
Features

- 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)**

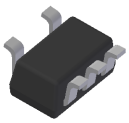
Mechanical Data

- 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 e3
- Weight: 0.006 grams (approximate)

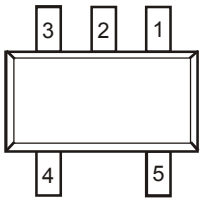
SOT353



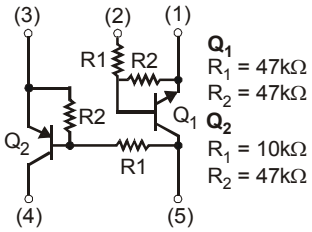
Top View



Bottom View



Package Pin Out Configuration



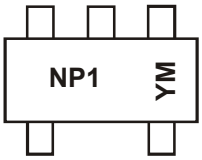
Device Schematic

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_1 (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	50	V
Input Voltage	V_{IN}	-10 to +40	V
Output Current	I_O	30	mA
Collector Current	I_C	100	mA

Maximum Ratings, Pre-Biased PNP Transistor, Q_2 (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	-50	V
Input Voltage	V_{IN}	-40 to +6	V
Output Current	I_O	-100	mA
Collector Current	I_C	-100	mA

Thermal Characteristics (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P_D	150	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-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_1 (@T_A = +25°C unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	(Note 7)	$V_{I(OFF)}$	0.5	—	—	V	V_{CC} = 5V, I_O = 100μA
	(Note 8)	$V_{I(ON)}$	—	—	3	V	V_O = 0.3V, I_O = 2mA
Output Voltage		$V_{O(ON)}$	—	0.1	0.3	V	I_O / I_I = 10mA/0.5 mA
Input Current		I_I	—	—	0.18	mA	V_I = 5V
Output Current		$I_{O(OFF)}$	—	—	0.5	μA	V_{CC} = 50V, V_I = 0V
DC Current Gain		G_I	68	—	—	—	V_O = 5V, I_O = 5mA
Gain-Bandwidth Product (Note 9)		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = -5mA, f = 100MHz
Input Resistance		R_1	32.9	47	61.1	kΩ	—
Resistance Ratio		R_2/R_1	0.8	1	1.2	—	—

Note: 7. The device is guaranteed to be in "OFF" state with $V_{I(OFF)}$ up to 0.5V
8. The device is guaranteed to be in "ON" state with $V_{I(ON)}$ starting from 3V
9. Characteristic of Transistor – for reference only.

Electrical Characteristics, Pre-Biased PNP Transistor, Q_2 (@T_A = +25°C unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	(Note 10)	$V_{I(OFF)}$	-0.3	—	—	V	V_{CC} = -5V, I_O = -100μA
	(Note 11)	$V_{I(ON)}$	—	—	-1.4	V	V_O = -0.3V, I_O = -1mA
Output Voltage		$V_{O(ON)}$	—	-0.1	-0.3	V	I_O/ I_I = -5mA/-0.25 mA
Input Current		I_I	—	—	-0.88	mA	V_I = -5V
Output Current		$I_{O(OFF)}$	—	—	-0.5	μA	V_{CC} = -50V, V_I = 0V
DC Current Gain		G_I	68	—	—	—	V_O = -5V, I_O = -5mA
Gain-Bandwidth Product (Note 12)		f_T	—	250	—	MHz	V_{CE} = -10V, I_E = 5mA, f = 100MHz
Input Resistance		R_1	7	10	13	kΩ	—
Resistance Ratio		R_2/R_1	3.7	4.7	5.7	—	—

Note: 10. The device is guaranteed to be in "OFF" state with $V_{I(OFF)}$ up to -0.3V
11. The device is guaranteed to be in "ON" state with $V_{I(ON)}$ starting from -1.4V
12. Characteristic of Transistor – for reference only.

Typical Electrical Characteristics (@T_A = +25°C unless otherwise specified.)

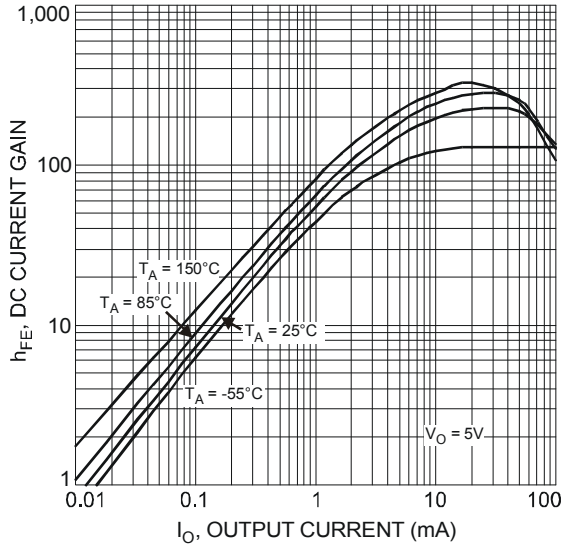


Fig. 1 Typical DC Current Gain vs. Output Current (Q1, NPN)

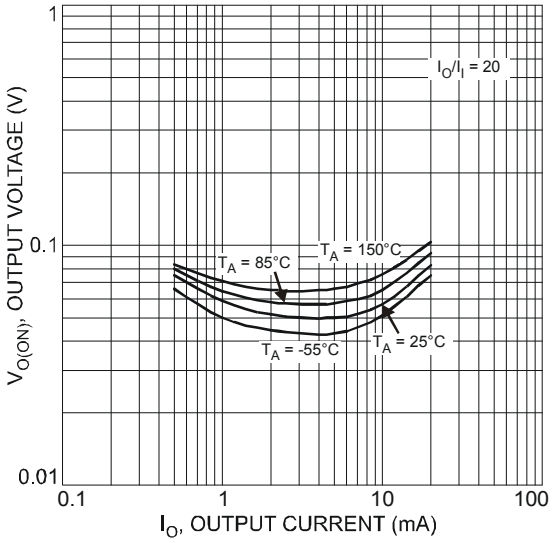


Fig. 2 Typical Output Voltage vs. Output Current (Q1, NPN)

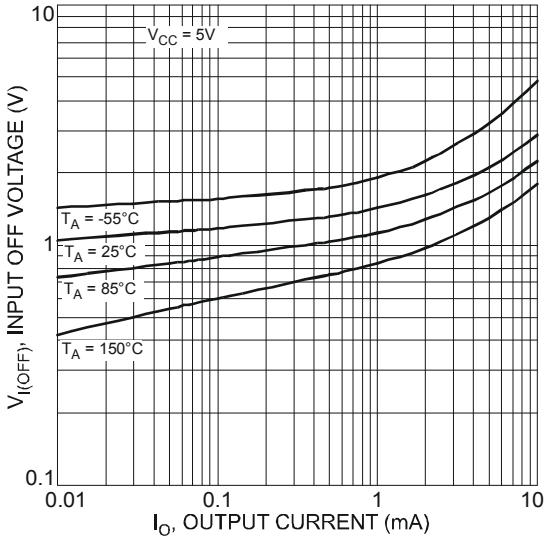


Fig. 3 Typical Input OFF Voltage vs. Output Current (Q1, NPN)

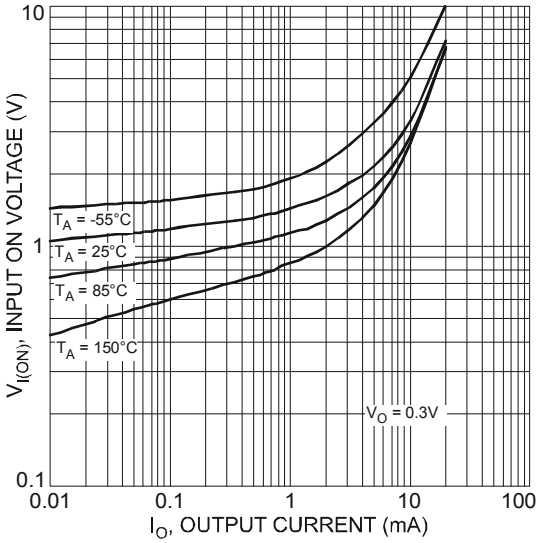


Fig. 4 Typical Input ON Voltage vs. Output Current (Q1, NPN)

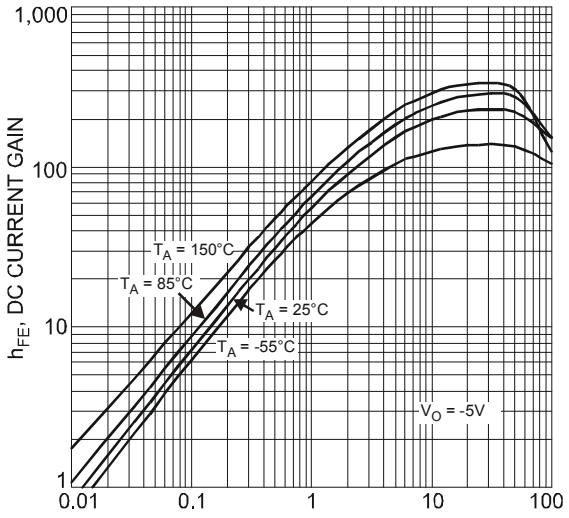


Fig. 5 Typical DC Current Gain vs. Output Current (Q2, PNP)

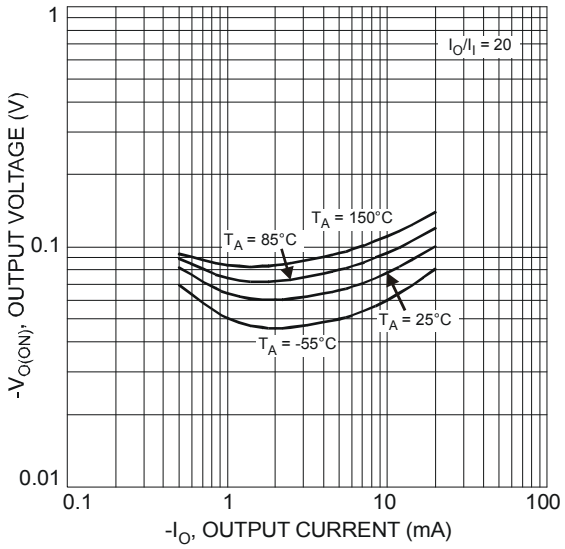


Fig. 6 Typical Output Voltage vs. Output Current (Q2, PNP)

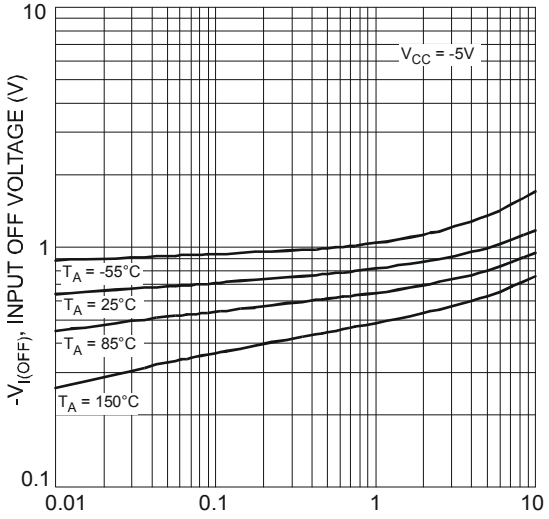


Fig. 7 Typical Input Off Voltage vs. Output Current (Q2, PNP)

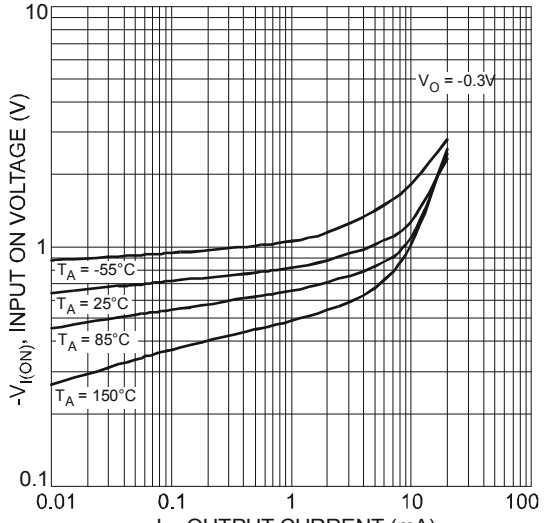
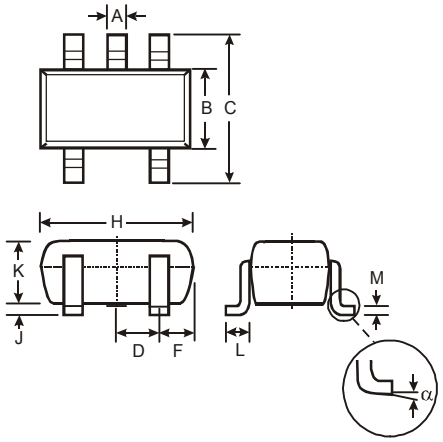


Fig. 8 Typical Input ON Voltage vs. Output Current (Q2, PNP)

Package Outline Dimensions

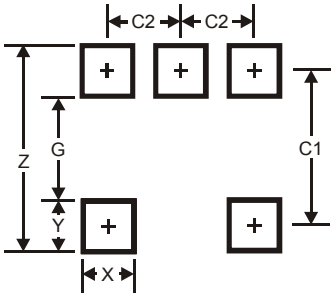
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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