

450V NPN HIGH VOLTAGE POWER TRANSISTOR

Features

- $BV_{CEO} > 450V$
- $BV_{CES} > 700V$
- $BV_{EBO} > 9V$
- $I_C = 3.2A$ High Continuous Collector Current
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

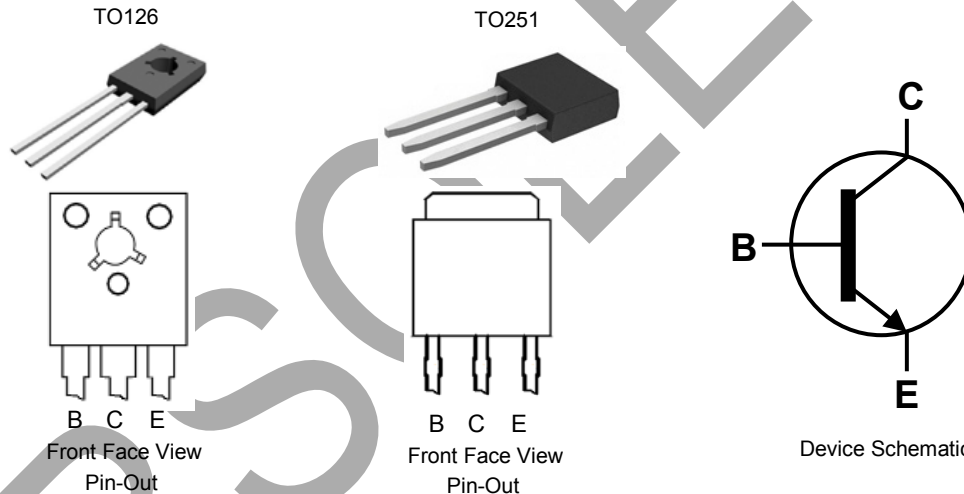
Mechanical Data

- Case: TO126, TO251
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: TO126: 400mg (Approximate)
TO251: 340mg (Approximate)

Applications

Low Power AC-DC SMPS for:

- Battery Chargers for Mobile Phone / Tablets / Smartphones
- Power Supply for DVD / STB
- LED Lighting

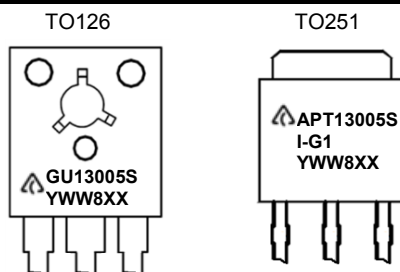


Ordering Information (Note 4)

Product	Package	Marking	Quantity
APT13005SU-G1	TO126	GU13005S	4000 Bulk, Loose per Box
APT13005SI-G1	TO251	APT13005SI-G1	3600 per Box in Tubes

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> 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



- = Manufacturers' Code Marking
- For TO126: GU13005S = Product Type Marking ID
- For TO251: APT13005SI-G1 = Product Type Marking ID
- YWW = Date Code Marking
e.g. 312 = Year 2013, Week 12.
- 8 = Assembly Site Code
- XX = Batch Number

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Emitter Voltage ($V_{BE} = 0V$)	V_{CES}	700	V
Collector-Emitter Voltage	V_{CEO}	450	V
Emitter-Base Voltage	V_{EBO}	9	V
Continuous Collector Current	I_C	3.2	A
Peak Pulse Collector Current	I_{CM}	6.4	A
Continuous Base Current	I_B	1.6	A
Peak Pulse Base Current	I_{BM}	3.2	A

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

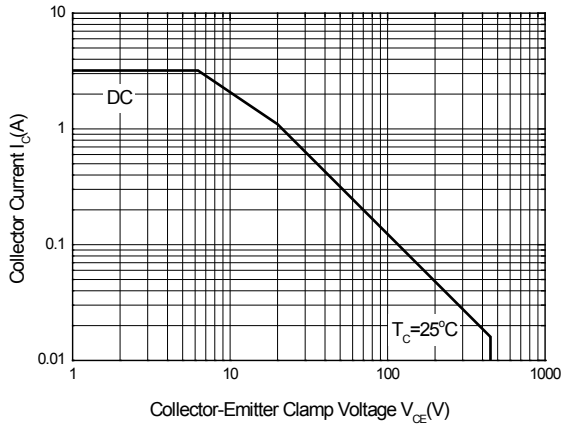
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	For TO126 @ $T_C = +25^\circ\text{C}$	20
		For TO251 @ $T_C = +25^\circ\text{C}$	25
Thermal Resistance, Junction to Case	$R_{\theta JC}$	For TO126	6.25
		For TO251	5.0
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	$^\circ\text{C}$

ESD Ratings (Note 5)

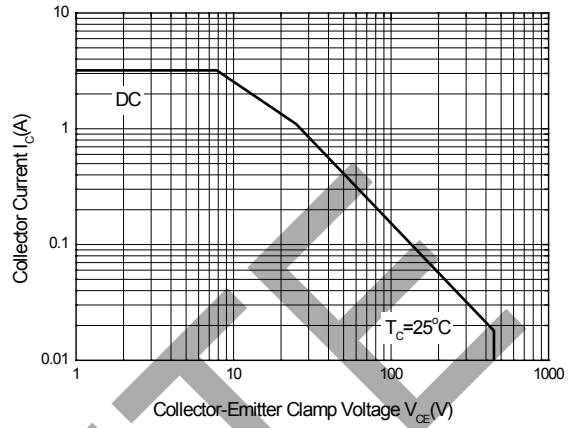
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	8000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Note: 5. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Safe Operating Areas (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



**Safe Operating Areas
(TO126 Package)**



**Safe Operating Areas
(TO251 Package)**

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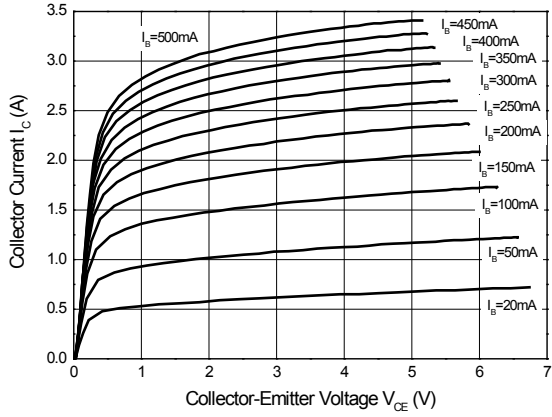
Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage	BV_{CES}	700	—	—	V	$I_C = 100\mu\text{A}$, $V_{BE} = 0\text{V}$
Collector-Emitter Breakdown Voltage	BV_{CEO}	450	—	—	V	$I_C = 100\mu\text{A}$
Emitter-Base Breakdown Voltage	BV_{EBO}	9	—	—	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	I_{CEV}	—	—	10	μA	$V_{CE} = 700\text{V}$, $V_{BE} = -1.5\text{V}$
DC Current Transfer Static Ratio (Note 6)	h_{FE}	20	—	35	—	$I_C = 1\text{A}$, $V_{CE} = 5\text{V}$
		11	—	35		
Collector-Emitter Saturation Voltage (Note 6)	$V_{CE(sat)}$	—	—	0.3	V	$I_C = 1\text{A}$, $I_B = 0.2\text{A}$
		—	—	0.6		
		—	—	1.0		
Base-Emitter Saturation Voltage (Note 6)	$V_{BE(sat)}$	—	—	1.2	V	$I_C = 1\text{A}$, $I_B = 0.2\text{A}$
		—	—	1.4		
Output Capacitance	C_{OB}	—	35	—	pF	$V_{CB} = 10\text{V}$, $f = 0.1\text{MHz}$
Transition Frequency	f_T	4	—	—	MHz	$I_C = 0.5\text{A}$, $V_{CE} = 10\text{V}$
Turn-on Time with Resistive Load	t_{on}	—	—	0.7	μs	$I_C = 2\text{A}$, $V_{CC} = 125\text{V}$, $I_{B1} = -I_{B2} = 0.4\text{A}$
Storage Time with Resistive Load	t_s	—	—	4.5		
Fall Time with Resistive Load	t_f	—	—	0.8		

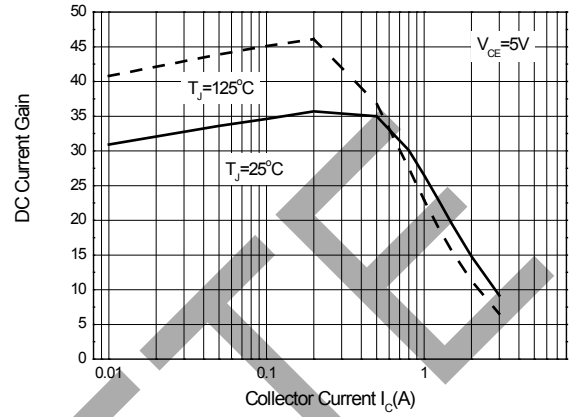
 Note: 6. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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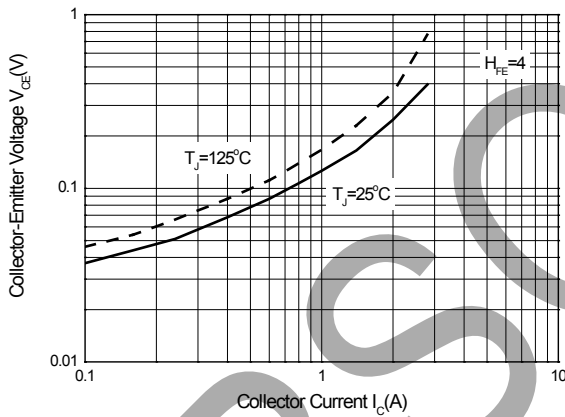
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



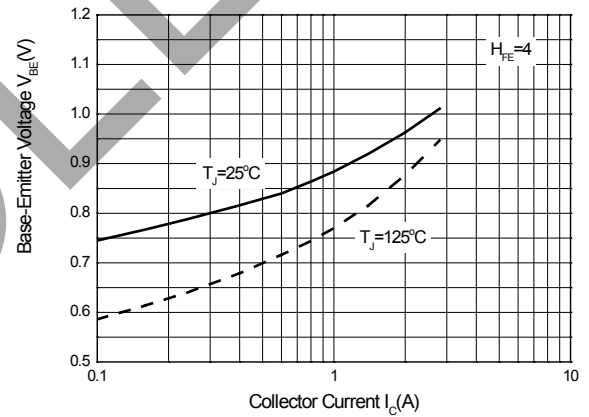
Static Characteristics



DC Current Gain



Collector-Emitter Saturation Region

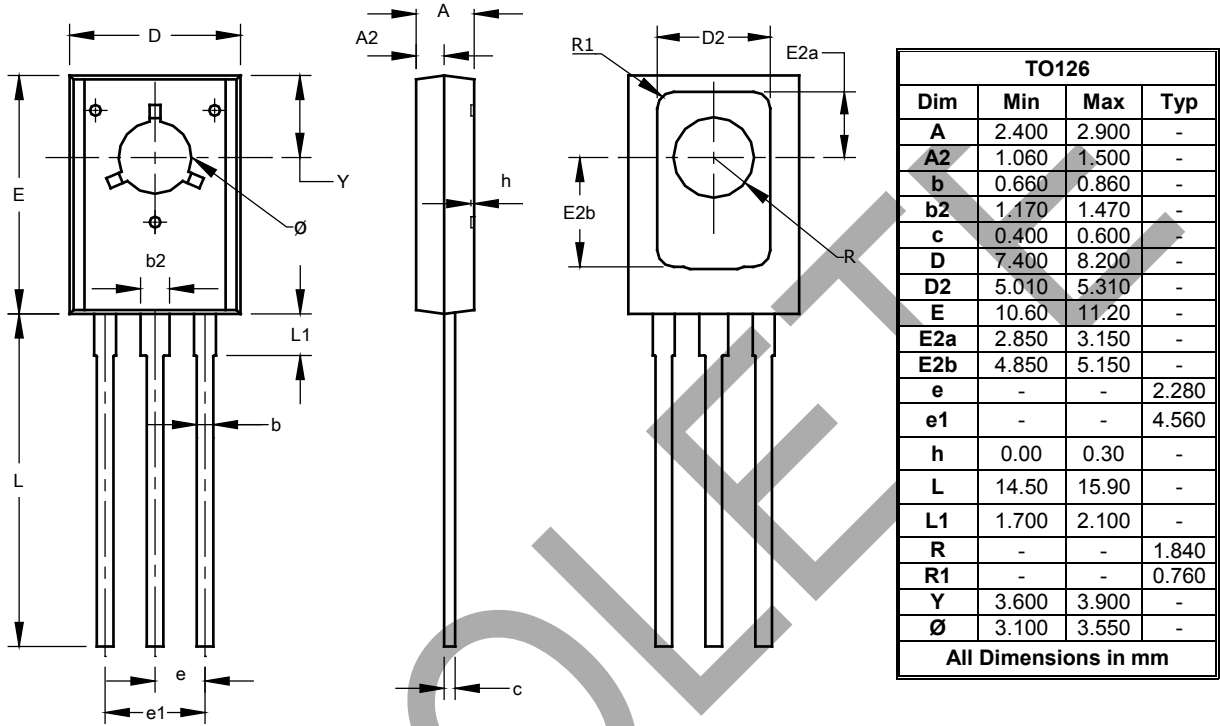


Base-Emitter Saturation Voltage

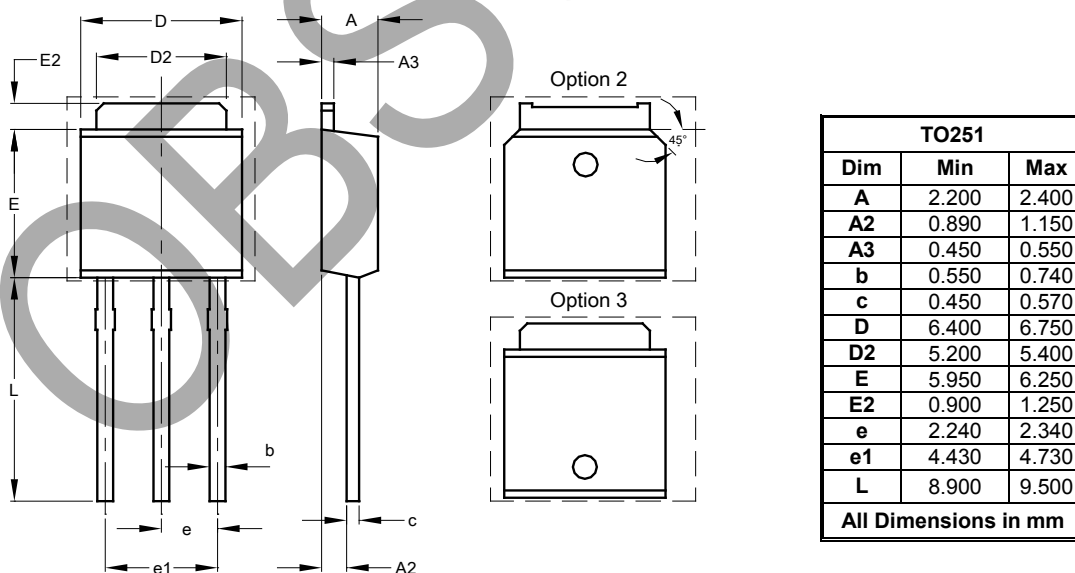
Package Outline Dimensions

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

(1) Package Type: TO126



(2) Package Type: TO251



Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to voltage spacing between terminals.

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