

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)**

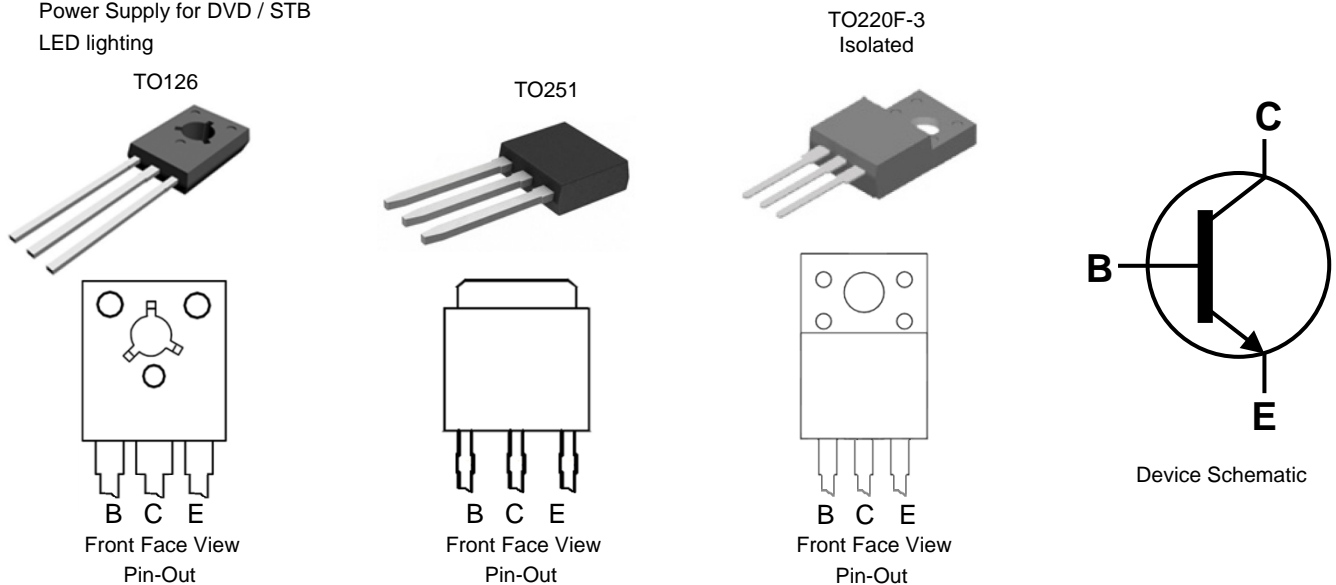
Applications

Low power AC-DC SMPS for:

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

Mechanical Data

- Case: TO126, TO251 or TO220F-3
- 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)
TO220F-3: 1500mg (Approximate)

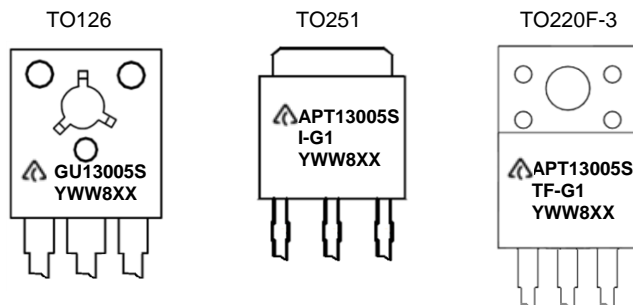


Ordering Information (Note 4)

Product	Package	Marking	Quantity
APT13005SU-G1	TO126	GU13005S	4,000 Bulk, Loose per Box
APT13005SI-G1	TO251	APT13005SI-G1	3,600 per Box in Tubes
APT13005STF-G1	TO220F-3	APT13005STF-G1	1,000 per Box in Tubes

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See 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



= Manufacturers' code marking
 For TO126: GU13005S = Product Type Marking ID
 For TO251: APT13005SI-G1 = Product Type Marking ID
 For TO220F-3: APT13005STF-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°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°C, unless otherwise specified.)

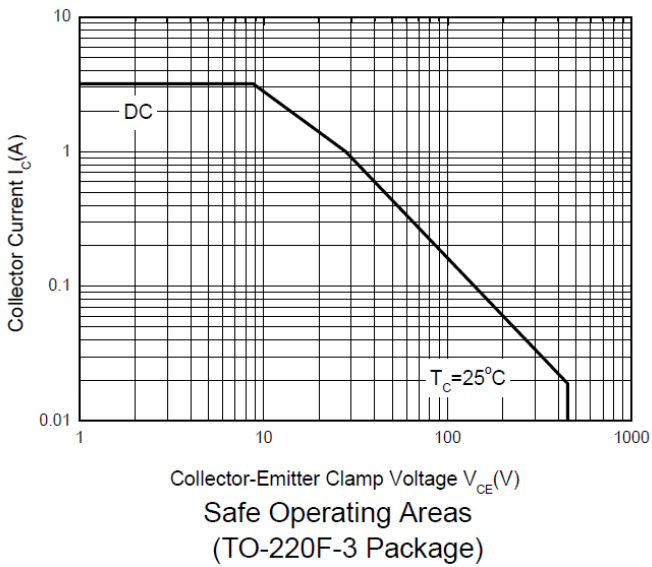
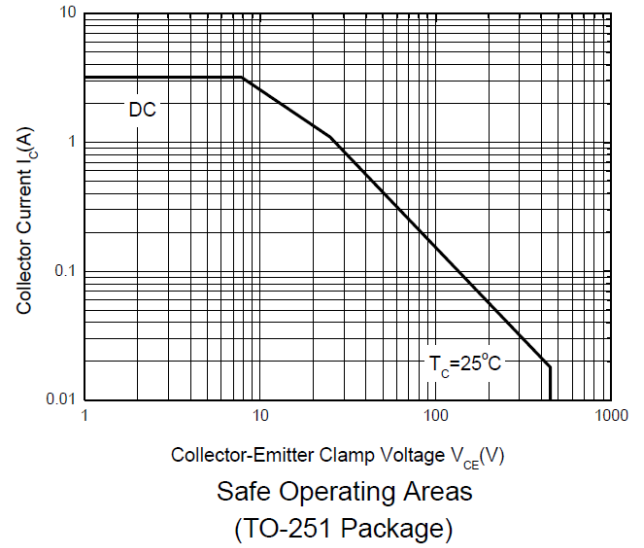
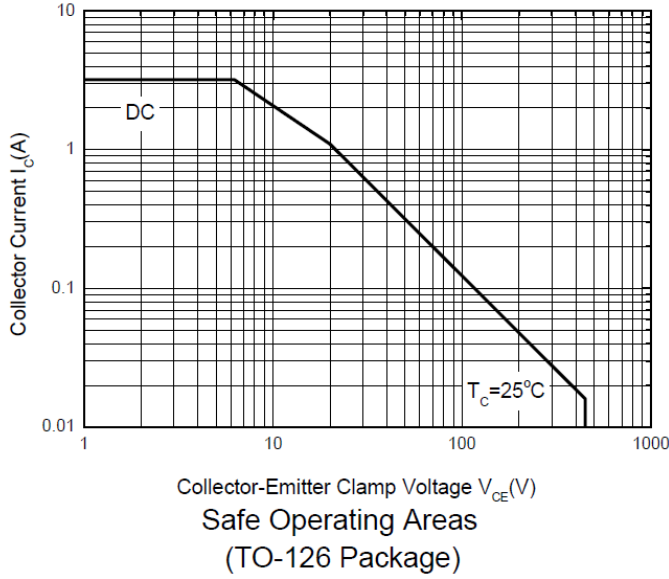
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	For TO126 @T _C = +25°C	20
		For TO251 @T _C = +25°C	25
		For TO220F-3 @T _C = +25°C	28
Thermal Resistance, Junction to Case	R _{θJC}	For TO126	6.25
		For TO251	5.0
		For TO220F-3	4.5
Operating and Storage Temperature Range	T _J , T _{STG}	-65 to +150	°C

ESD Ratings (Note 5)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 8,000	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.)

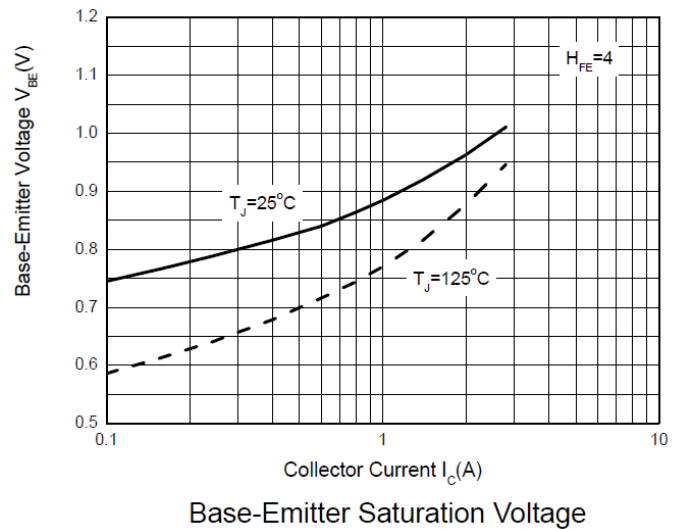
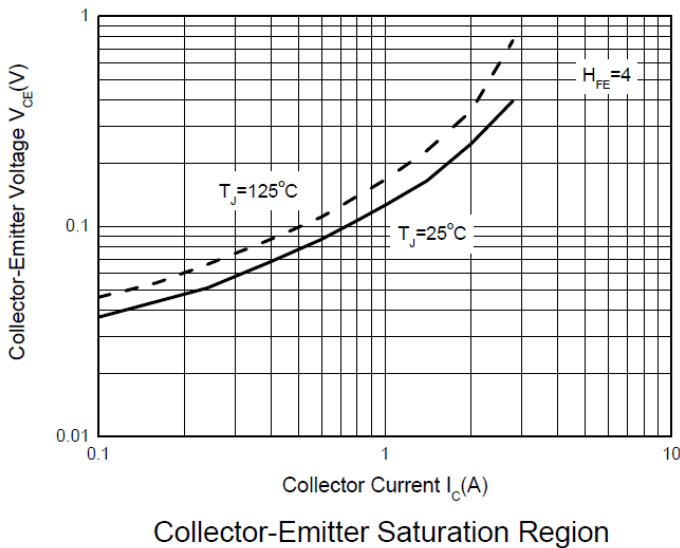
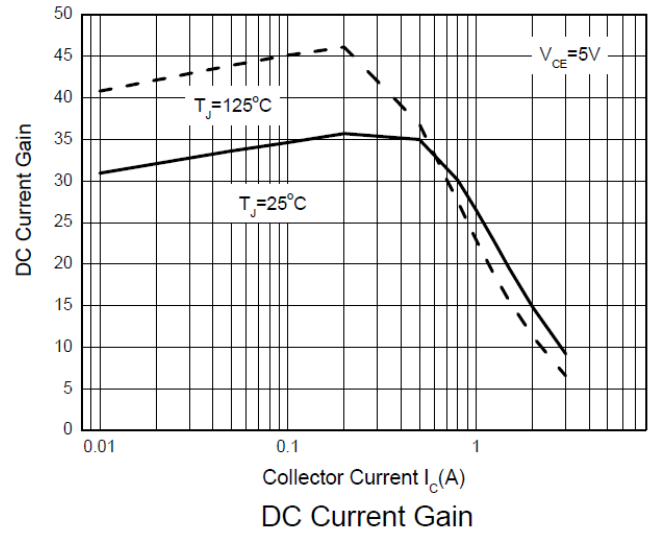
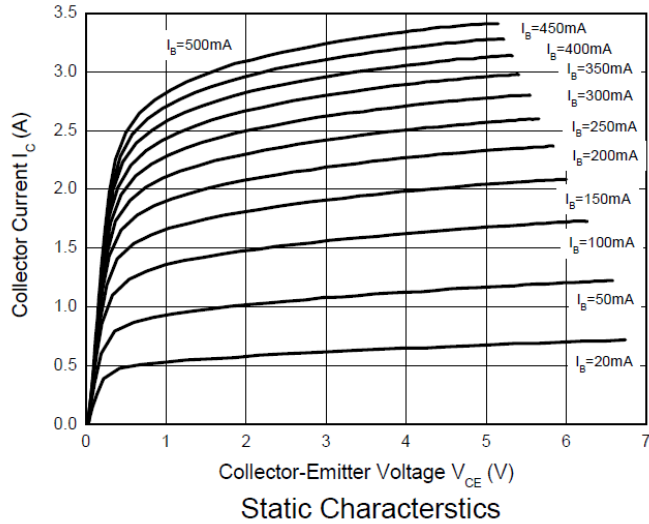


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage	BV _{CES}	700	—	—	V	I _C = 100μA, V _{BE} = 0V
Collector-Emitter Breakdown Voltage	BV _{CEO}	450	—	—	V	I _C = 100μA
Emitter-Base Breakdown Voltage	BV _{EBO}	9	—	—	V	I _E = 100μA
Collector Cutoff Current	I _{CEV}	—	—	10	μA	V _{CE} = 700V, V _{BE} = -1.5V
DC current transfer Static ratio (Note 6)	h _{FE}	15 8	— —	35 35	—	I _C = 1A, V _{CE} = 5V I _C = 2A, V _{CE} = 5V
Collector-Emitter Saturation Voltage (Note 6)	V _{CE(sat)}	— — —	— — —	0.3 0.6 1.0	V	I _C = 1A, I _B = 0.2A I _C = 2A, I _B = 0.5A I _C = 3A, I _B = 0.75A
Base-Emitter Saturation Voltage (Note 6)	V _{BE(sat)}	— —	— —	1.2 1.4	V	I _C = 1A, I _B = 0.2A I _C = 2A, I _B = 0.5A
Output Capacitance	C _{ob}	—	35	—	pF	V _{CB} = 10V, f = 0.1MHz
Transition Frequency	f _T	4	—	—	MHz	I _C = 0.5A, V _{CE} = 10V
Turn-on Time with Resistive Load	t _{on}	—	—	0.7	μs	I _C = 2A, V _{CC} = 125V, I _{B1} = -I _{B2} = 0.4A
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 ≤ 300μs. Duty cycle ≤ 2%.

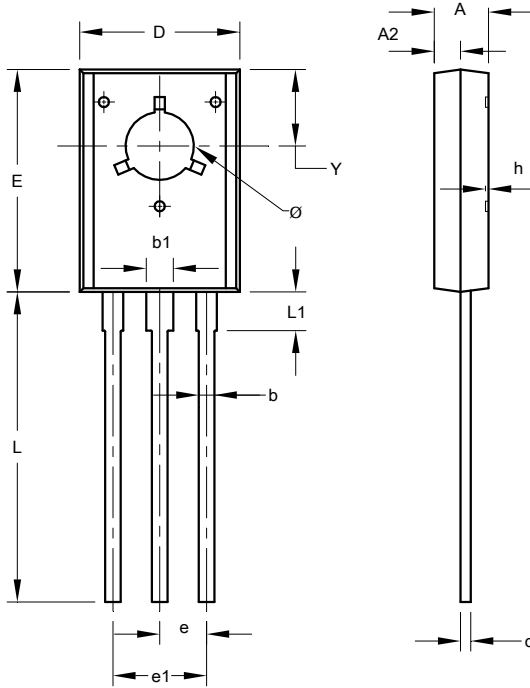
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

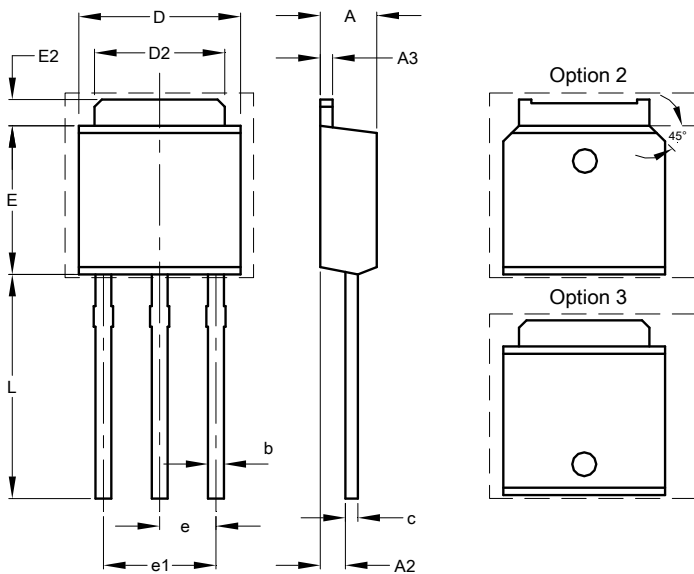
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

TO126



TO126			
Dim	Min	Max	Typ
A	2.400	2.900	-
A2	1.060	1.500	-
b	0.660	0.860	-
b1	1.170	1.470	-
c	0.400	0.600	-
D	7.400	8.200	-
E	10.60	11.20	-
e	-	-	2.280
e1	-	-	4.560
h	0.00	0.30	-
L	14.50	15.90	-
L1	1.700	2.100	-
Y	3.600	3.900	-
φ	3.100	3.550	-
All Dimensions in mm			

TO251

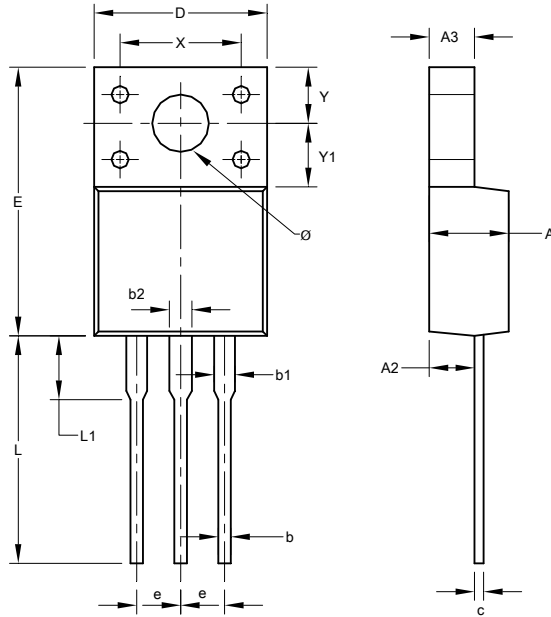


TO251		
Dim	Min	Max
A	2.200	2.400
A2	0.890	1.150
A3	0.450	0.550
b	0.550	0.740
c	0.450	0.570
D	6.400	6.750
D2	5.200	5.400
E	5.950	6.250
E2	0.900	1.250
e	2.240	2.340
e1	4.430	4.730
L	8.900	9.500
All Dimensions in mm		

Package Outline Dimensions (cont.)

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

TO220F-3



TO220F-3			
Dim	Min	Max	Typ
A	4.300	4.900	-
A2	2.520	2.920	-
A3	2.350	2.900	-
b	0.550	0.900	-
b1	1.000	1.400	-
b2	1.100	1.500	-
c	0.450	0.600	-
D	9.70	10.30	-
E	14.70	16.00	-
e	-	-	2.540
L	12.50	13.50	-
L1	2.790	4.500	-
X	6.90	7.10	-
Y	3.000	3.400	-
Y1	3.370	3.900	-
ø	3.000	3.550	-
All Dimensions in mm			

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

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