APT13005S

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)**

Mechanical Data

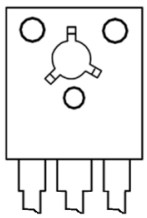
- Case: TO126, TO251 or ITO220AB
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208 e3
- Weight: TO126: 400mg (Approximate)
  TO251: 340mg (Approximate)
  ITO220AB: 1500mg (Approximate)

Applications

Low Power AC-DC SMPS for:

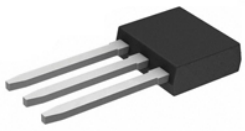
- Battery Chargers for Mobile Phone / Tablets / Smartphones
- Power Supply for DVD / STB
- LED Lighting

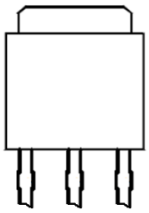
TO126



B C E
Front Face View
Pin-Out

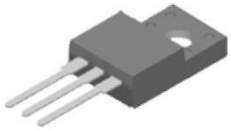
TO251

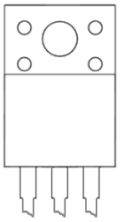




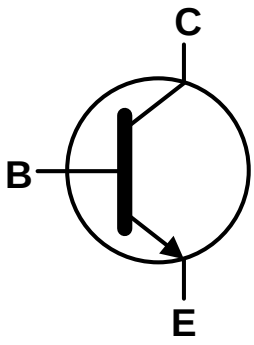
B C E
Front Face View
Pin-Out

ITO220AB Isolated





B C E
Front Face View
Pin-Out



Device Schematic

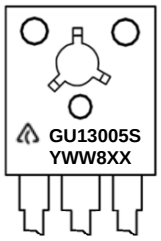
Ordering Information (Note 4)

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	ITO220AB	APT13005STF-G1	1,000 per Box in Tubes

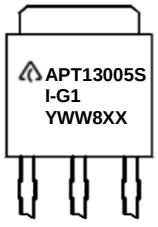
Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "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

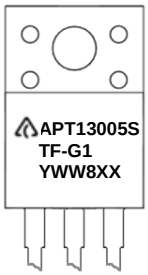
TO126



TO251



ITO220AB



= Manufacturers' Code Marking
For TO126: GU13005S = Product Type Marking ID
For TO251: APT13005SI-G1 = Product Type Marking ID
For ITO220AB: 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.)

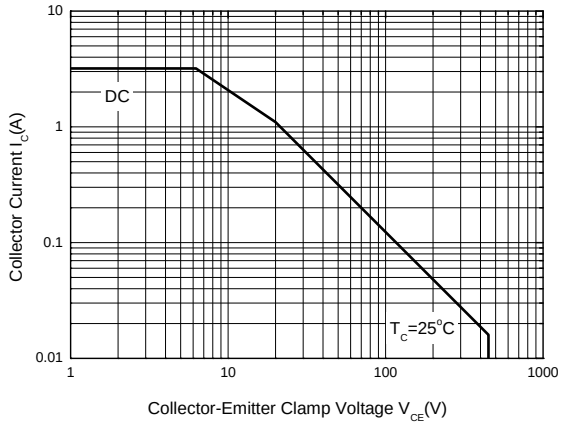
Characteristic		Symbol	Value	Unit
Power Dissipation	For TO126 @T_C = +25°C	P_D	20	W
	For TO251 @T_C = +25°C		25	
	For ITO220AB @T_C = +25°C		28	
Thermal Resistance, Junction to Case	For TO126	$R_{\theta JC}$	6.25	°C/W
	For TO251		5.0	
	For ITO220AB		4.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-65 to +150	°C

ESD Ratings (Note 5)

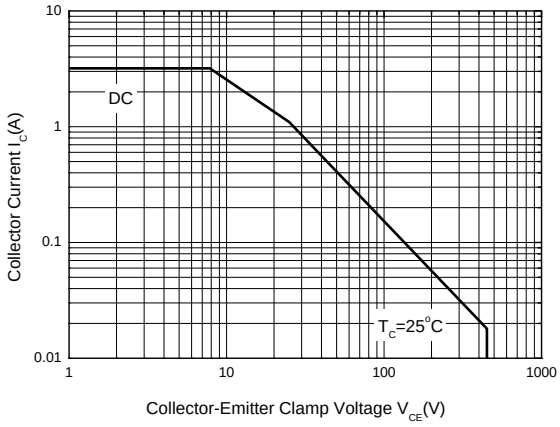
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	8,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

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

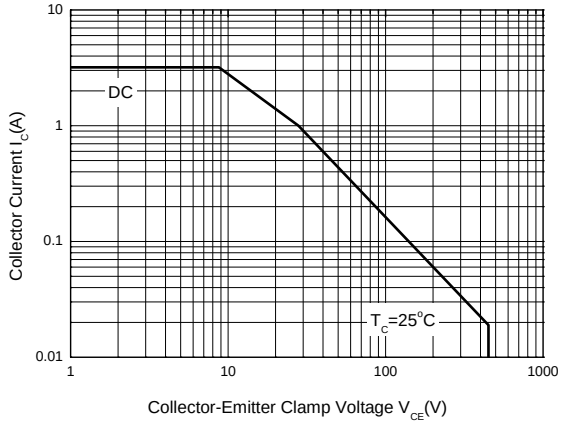
Safe Operating Areas (@T_A = +25°C, unless otherwise specified.)



Safe Operating Areas (TO126 Package)



Safe Operating Areas (TO251 Package)



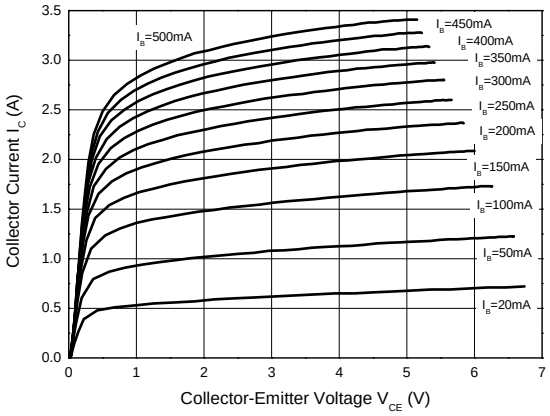
Safe Operating Areas (ITO220AB Package)

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

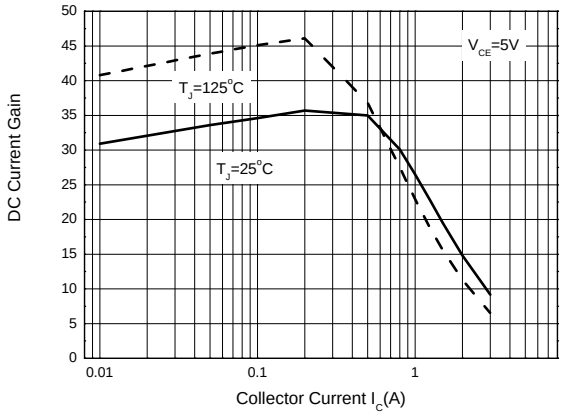
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage	BV_{CES}	700	—	—	V	I_C = 100μA, V_{BE} = 0V
Collector-Emitter Breakdown Voltage	BV_{CEO}	450	—	—	V	I_C = 100μA
Emitter-Base Breakdown Voltage	BV_{EBO}	9	—	—	V	I_E = 100μA
Collector Cutoff Current	I_{CEV}	—	—	10	μA	V_{CE} = 700V, V_{BE} = -1.5V
DC Current Transfer Static Ratio (Note 6)	h_{FE}	20 11	— —	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%.

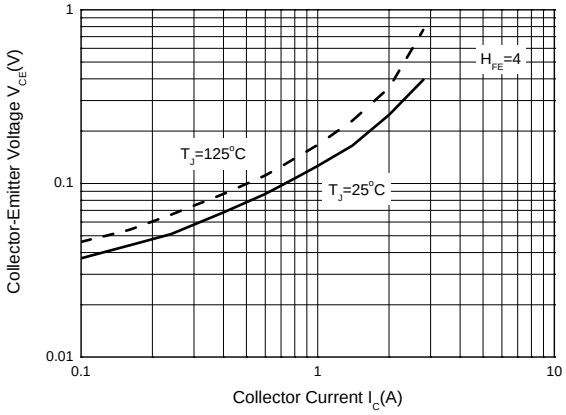
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



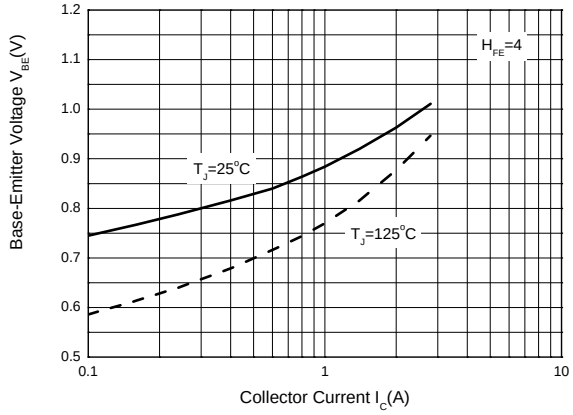
Static Characteristics



DC Current Gain



Collector-Emitter Saturation Region

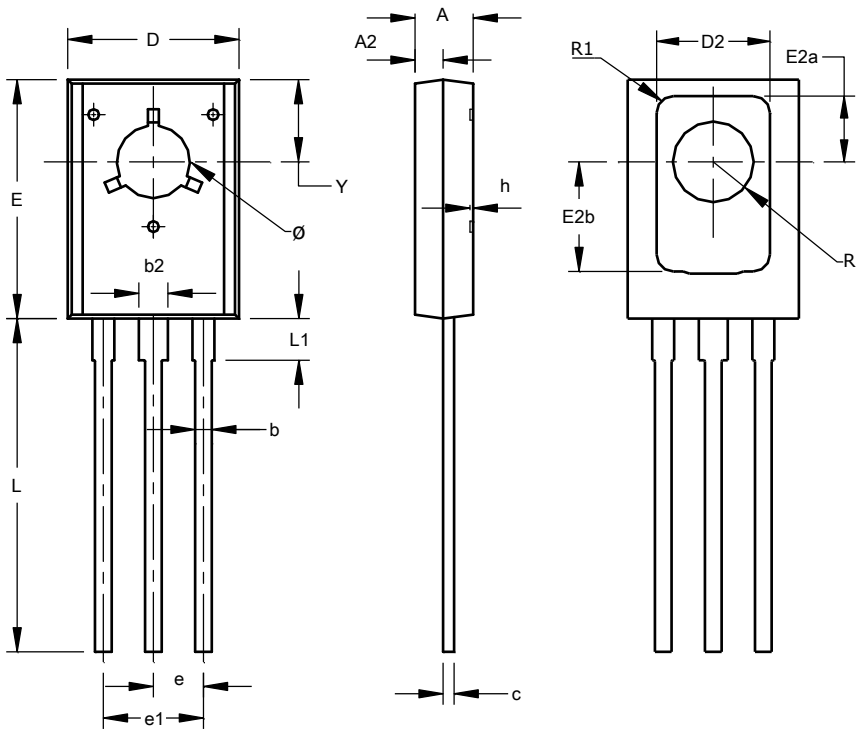


Base-Emitter Saturation Voltage

Package Outline Dimensions

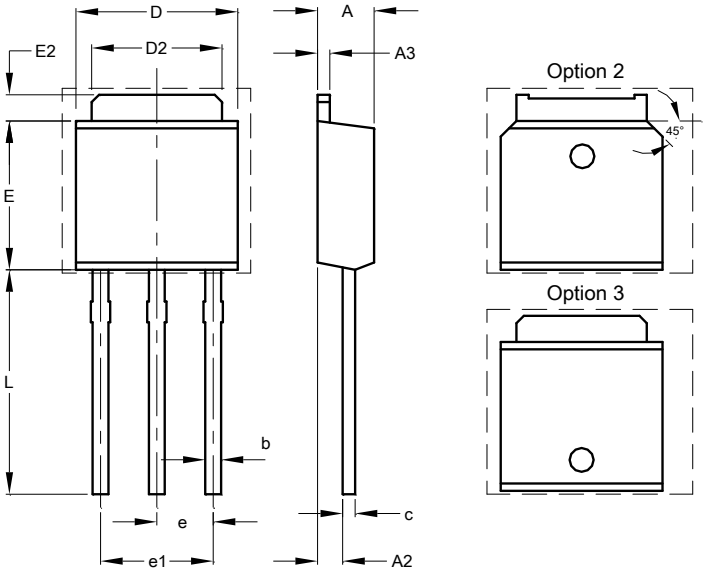
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

(1) Package Type: TO126



TO126			
Dim	**Min**	**Max**	**Typ**
A	2.400	2.900	-
A2	1.060	1.500	-
b	0.660	0.860	-
b2	1.170	1.470	-
c	0.400	0.600	-
D	7.400	8.200	-
D2	5.010	5.310	-
E	10.60	11.20	-
E2a	2.850	3.150	-
E2b	4.850	5.150	-
e	-	-	2.280
e1	-	-	4.560
h	0.00	0.30	-
L	14.50	15.90	-
L1	1.700	2.100	-
R	-	-	1.840
R1	-	-	0.760
Y	3.600	3.900	-
Ø	3.100	3.550	-
All Dimensions in mm			

(2) Package Type: TO251

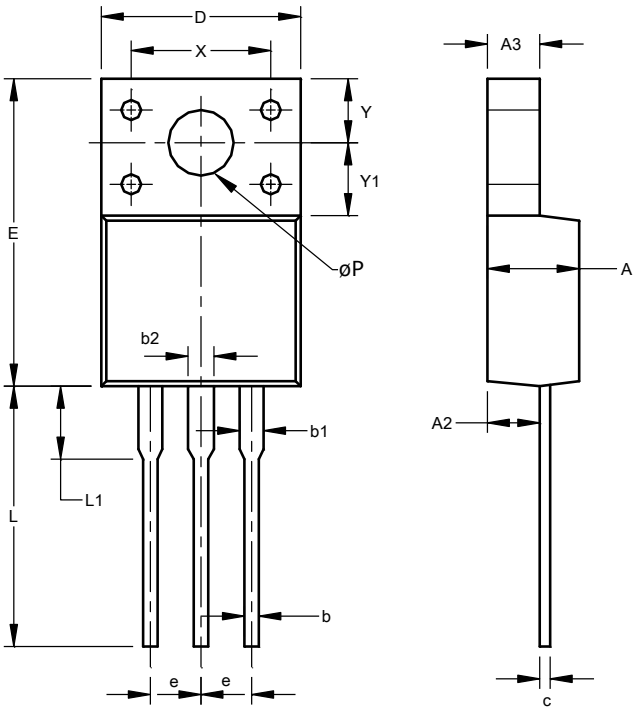


TO251		
Dim	**Min**	**Max**
A	2.200	2.400
A2	0.890	1.150
A3	0.450	0.550
b	0.550	0.740
c	0.450	0.570
D	6.400	6.750
D2	5.200	5.400
E	5.950	6.250
E2	0.900	1.250
e	2.240	2.340
e1	4.430	4.730
L	8.900	9.500
All Dimensions in mm		

Package Outline Dimensions (continued)

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

(3) Package Type: ITO220AB (TYPE BR)



ITO220AB (TYPE BR)			
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	-	-	2.54
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	-
øP	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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