

450V NPN HIGH VOLTAGE POWER TRANSISTOR

Features

- BV_{CEO} > 450V
- BV_{CES} > 700V
- BV_{EBO} > 9V
- I_C = 4A High Collector Current
- Integrated Anti-Parallel Diode to act as free-wheeling diode
- Anti-Saturation feature
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Mechanical Data

- Case: TO220F-3, TO251, TO220AB Type C
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Classification Rating 94V-0

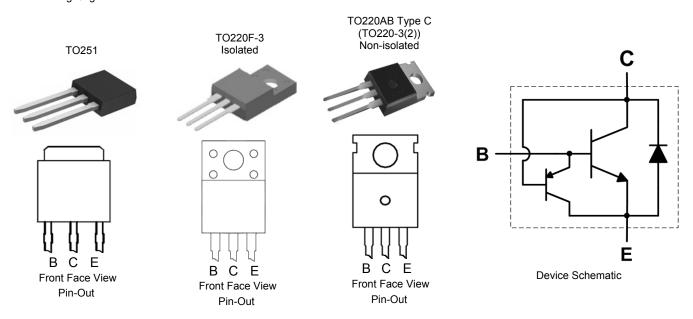
• Weight: TO251: 340mg (Approximate)

TO220F-3: 1500mg (Approximate) TO220AB Type C : 2000mg (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)

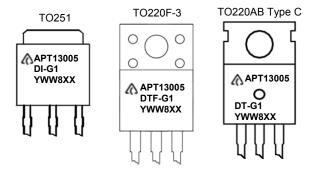
Product	Package	Marking	Quantity
APT13005DI-G1	TO251	APT13005DI-G1	3,600 per Box in Tubes
APT13005DTF-G1	TO220F-3	APT13005DTF-G1	1,000 per Box in Tubes
APT13005DT-G1	TO220AB Type C (TO220-3(2))	APT13005DT-G1	1,000 per Box in Tubes

Notes:

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



A = Manufacturers' code marking For TO251, APT13005DI-G1 = Product Type Marking ID For TO220F-3, APT13005DTF-G1 = Product Type Marking ID For TO220AB Type C, APT13005DT-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 _{CES}	700	V
Collector-Emitter Voltage	V _{CEO}	450	V
Emitter-Base Voltage	V _{EBO}	9	V
Collector Current	Ic	4	Α
Peak Collector Current	I _{CM}	8	Α
Base Current	I _B	2	Α
Peak Base Current	I _{BM}	4	Α

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

Characteristic	Symbol	Value	Unit		
	For TO251		25	W	
Power Dissipation @T _C = +25°C	For TO220F-3	P_{D}	28		
	For TO220AB Type C		75		
	For TO251		5.0	°C/W	
Thermal Resistance, Junction to Case	For TO220F-3	$R_{ heta JC}$	4.5		
	For TO220AB Type C		1.67		
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	С

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





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

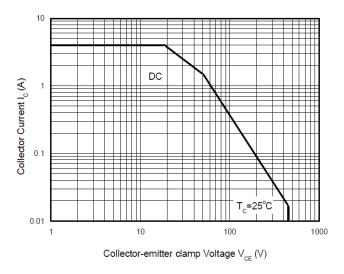


Figure 4. Safe Operating Areas (TO-220-3 (2) Package)

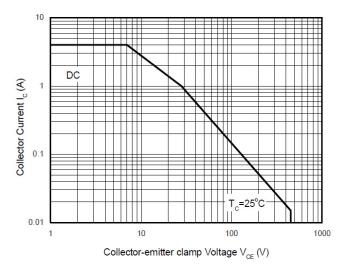


Figure 5. Safe Operating Areas (TO-220F-3 Package)

March 2014

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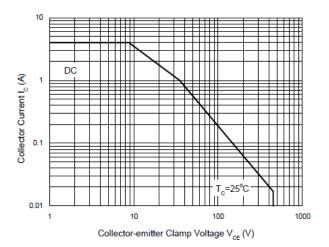
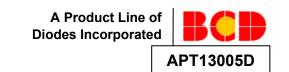


Figure 6. Safe Operating Areas (TO-251 Package)





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

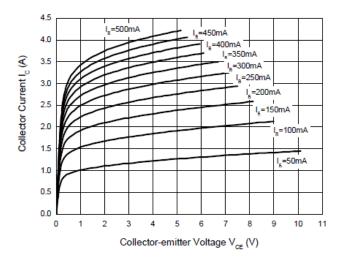
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage	BV _{CES}	700	_	_	V	$I_C = 100 \mu A$, $V_{BE} = 0 V$
Collector-Emitter Breakdown Voltage	BV _{CEO}	450	_	_	V	I _C = 100μA
Emitter-Base Breakdown Voltage	BV _{EBO}	9	_	_	V	I _E = 100μA
Collector Cutoff Current	I _{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 0.9	V	$I_C = 1A$, $I_B = 0.2A$ $I_C = 2A$, $I_B = 0.5A$ $I_C = 4A$, $I_B = 1A$
Base-Emitter Saturation Voltage (Note 6)	V _{BE(sat)}	_	_	1.1 1.3	V	I _C = 1A, I _B = 0.2A I _C = 2A, I _B = 0.5A
Output Capacitance	C _{ob}	_	45	_	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		
Storage Time with Resistive Load	ts	_	_	4.0	μs	$I_C = 2A$, $V_{CC} = 125V$ $I_{B1} = -I_{B2} = 0.4A$
Fall Time with Resistive Load	t _f	_	_	0.8		IB1IB2 - U.+A

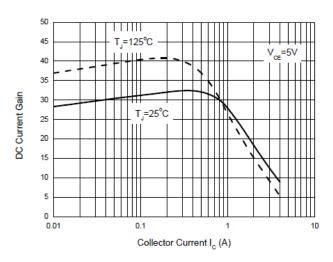
Note: 6. Measured under pulsed conditions. Pulse width \leq 300 μ s. Duty cycle \leq 2%.

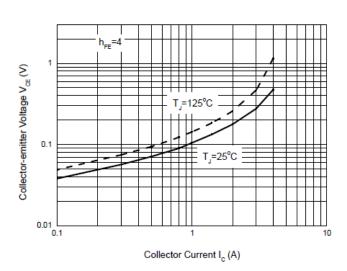


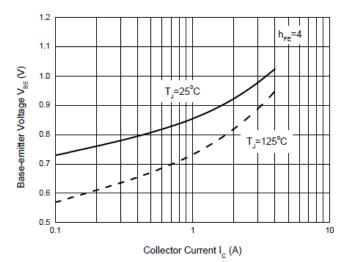


Typical Electrical Characteristics (@TA = +25°C, unless otherwise specified.)

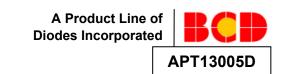








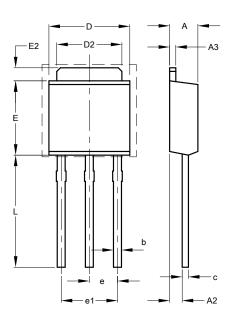


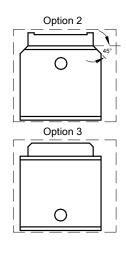


Package Outline Dimensions

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

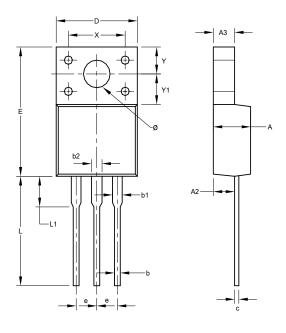
TO251





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

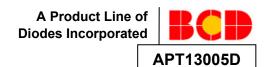
TO220F-3



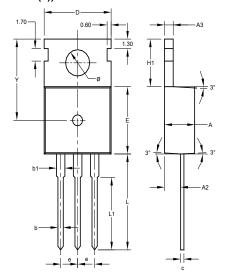
TO220F-3					
Dim	Min	Max	Тур		
Α	4.300	4.900	-		
A2	2.520	2.920	-		
A3	2.350	2.900	-		
b	0.550	0.900	-		
b1	1.000	1.400	-		
b2	1.100	1.500	-		
С	0.450	0.600	-		
D	9.70	10.30	ı		
Е	14.70	16.00	ı		
е	-	-	2.540		
L	12.50	13.50	1		
L1	2.790	4.500	-		
Х	6.90	7.10	-		
Υ	3.000	3.400	-		
Y1	3.370	3.900	-		
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 creepage and clearance distances between device Terminals and PCB tracking.





TO220AB Type C (TO220-3(2))



	TO220AB Type C				
Dim	Min	Max	Тур		
Α	-	-	4.500		
A2	-	-	2.400		
A3	-	-	1.300		
b	0.700	0.900	-		
b1	-	-	1.270		
С	0.400	0.600	-		
D	9.800	10.200	-		
Е	9.000	9.400	-		
е	-	-	2.54		
H1	6.300	6.700	-		
L	12.600	13.600	-		
L1	9.600	10.600	-		
Υ	-	-	11.100		
Ø	3.560	3.640	-		
Al	All Dimensions in mm				

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Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru 4 moschip.ru 9