

450V NPN HIGH VOLTAGE POWER TRANSISTOR

Features

- $BV_{CEO} > 450V$
- $BV_{CES} > 700V$
- $BV_{EBO} > 9V$
- $I_C = 1.3A$ 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 or your local Diodes representative.**
<https://www.diodes.com/quality/product-definitions/>

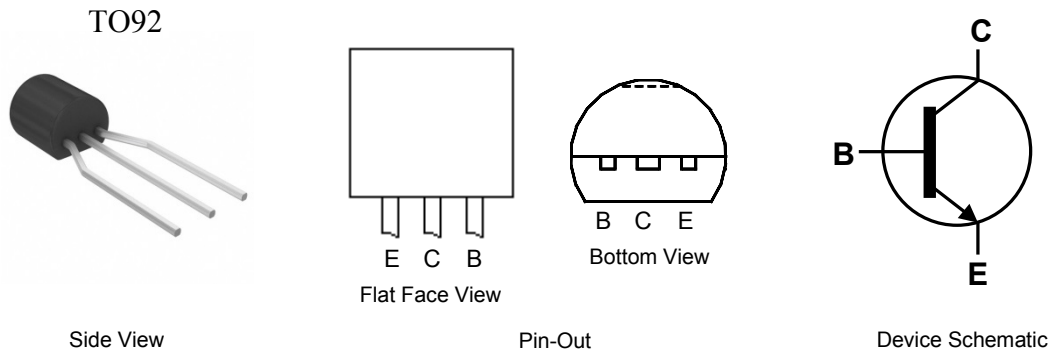
Mechanical Data

- Case: TO92 (Type C)
- 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: TO92: 200mg (Approximate)

Applications

Low Power AC-DC SMPS for:

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



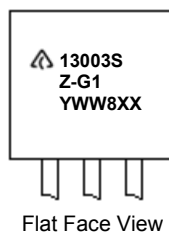
Ordering Information (Note 4)


Product	Package	Marking	Quantity
APT13003SZTR-G1	TO92 (Joggled Legs)	13003SZ-G1	2000 Taped, per Ammo Box

- 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

TO92



 = Manufacturers' Code Marking
 13003SZ-G1 = Product Type Marking ID
 YWW = Date Code Marking
 e.g. 012 = Year 2020, 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	1.3	A
Peak Pulse Collector Current (Note 5)	I _{CM}	2.6	A
Continuous Base Current	I _B	0.65	A
Peak Pulse Base Current (Note 5)	I _{BM}	1.3	A

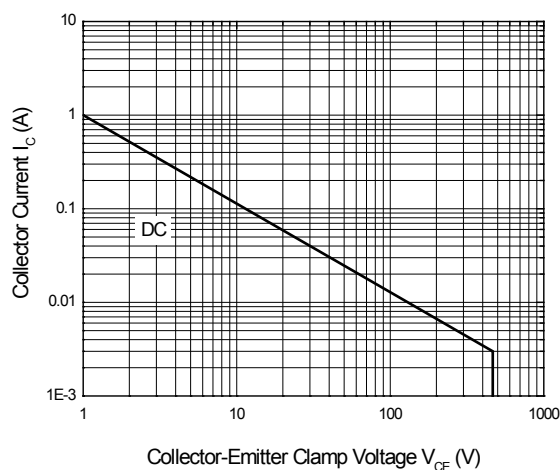
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	1.1	W
Thermal Resistance, Junction to Ambient Air	R _{θJA}	113.6	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	83.3	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-65 to +150	°C

ESD Ratings (Note 6)

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. Pulse test for Pulse Width < 5ms, Duty Cycle ≤ 10%.
 6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

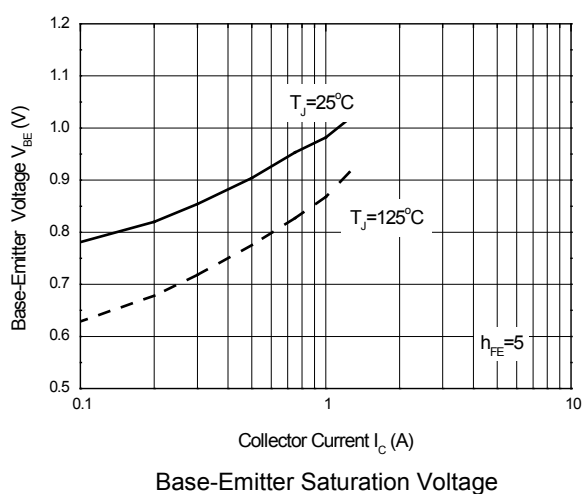
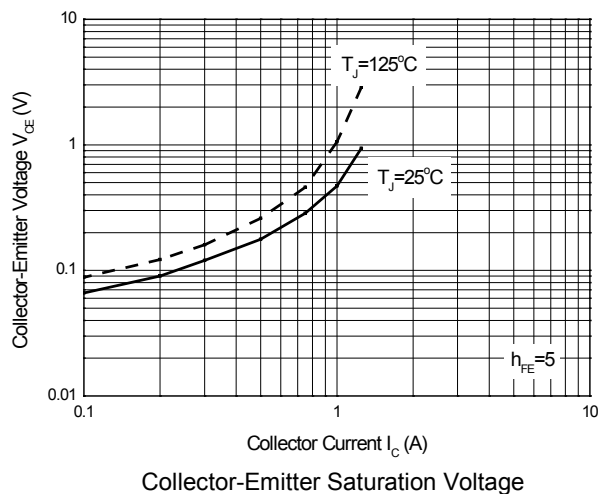
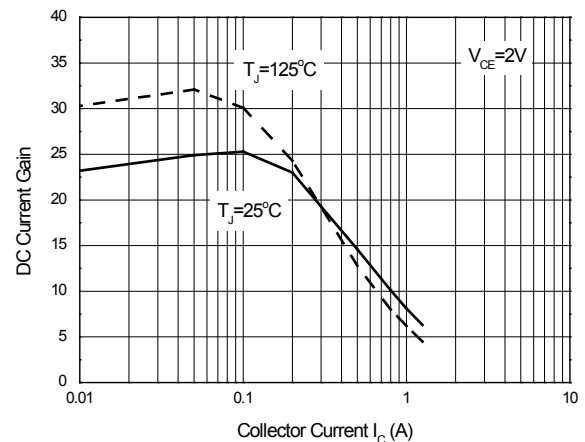
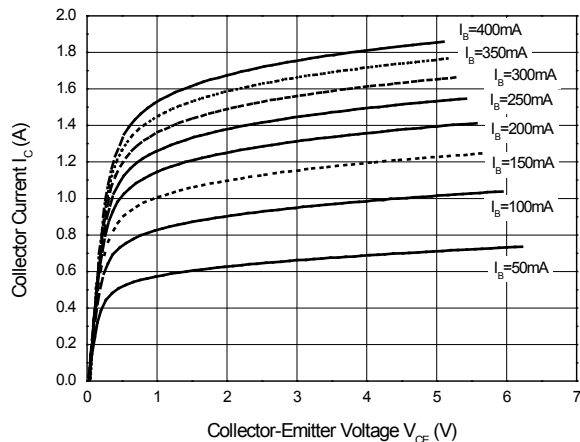
Safe Operating Area and Derating Information (@T_A = +25°C, unless otherwise specified.)


Safe Operating Areas (TO92 Package)

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 7)	h_{FE}	13 5	—	30 25	—	$I_C = 0.5\text{A}$, $V_{CE} = 2\text{V}$ $I_C = 1.0\text{A}$, $V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 7)	$V_{CE(sat)}$	—	—	0.3 0.6	V	$I_C = 0.5\text{A}$, $I_B = 0.1\text{A}$ $I_C = 1\text{A}$, $I_B = 0.25\text{A}$
Base-Emitter Saturation Voltage (Note 7)	$V_{BE(sat)}$	—	—	1.0 1.2	V	$I_C = 0.5\text{A}$, $I_B = 0.1\text{A}$ $I_C = 1\text{A}$, $I_B = 0.25\text{A}$
Transition Frequency	f_T	4	—	—	MHz	$I_C = 0.1\text{A}$, $V_{CE} = 10\text{V}$
Turn-on Time with Resistive Load	t_{on}	—	—	1	μs	$I_C = 1\text{A}$, $V_{CC} = 125\text{V}$, $I_{B1} = 0.2\text{A}$, $I_{B2} = -0.2\text{A}$, $t_p = 25\mu\text{s}$
Storage Time with Resistive Load	t_s	—	—	3		
Fall Time with Resistive Load	t_f	—	—	0.5		

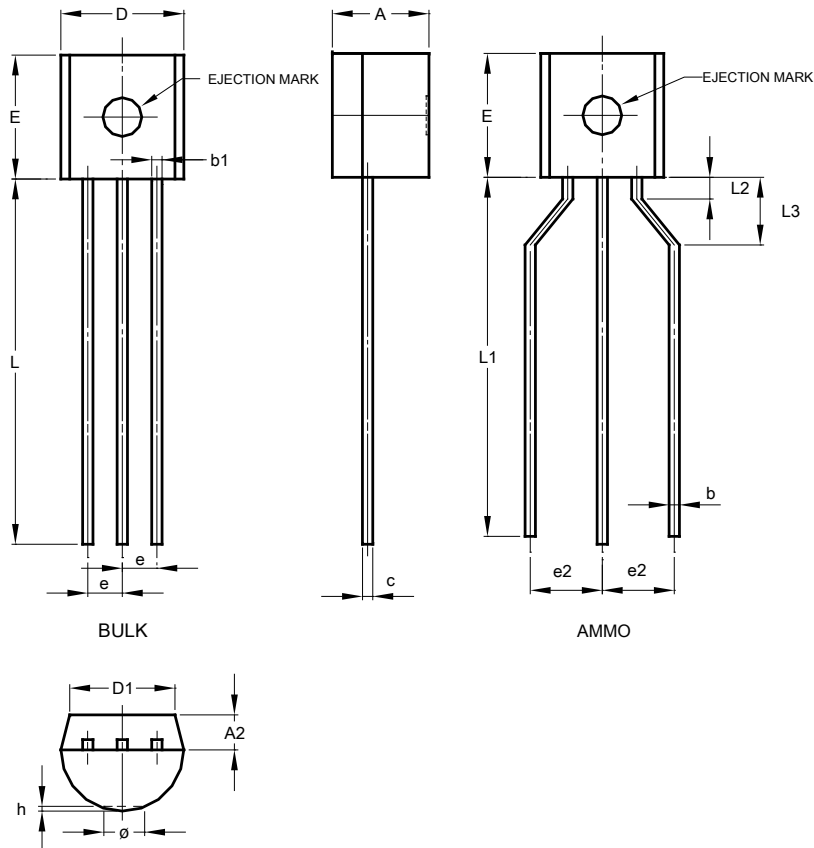
Note: 7. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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


Package Outline Dimensions

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

TO92 (Type C)



TO92 (Type C)			
Dim	Min	Max	Typ
A	3.30	3.70	-
A2	1.10	1.40	-
b	0.38	0.55	-
c	0.36	0.51	-
D	4.40	4.70	-
D1	3.430	-	-
E	4.30	4.70	-
e	-	-	1.27
e2	2.440	2.640	-
h	0.00	0.38	-
L	14.10	14.50	-
L1	12.50	14.50	-
L3	2.50	3.50	-
Ø	-	1.60	-
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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