

**120V NPN HIGH VOLTAGE DARLINGTON TRANSISTOR**
**Features**

- $BV_{CEO} > 120V$
- Low Saturation Voltage  $< 1.5V @ 1A$
- Darlington Transistor  $h_{FE} > 2k @ 1A$
- $I_C = 1A$  High Continuous Collector Current
- Specification is Also Available in Eline and SOT223 Package Outlines
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

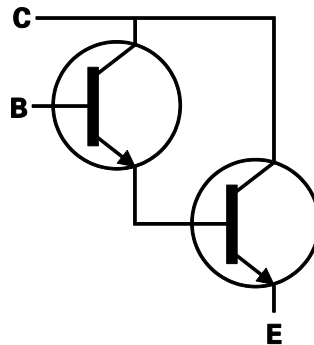
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 (E3)
- Weight: 0.052 grams (Approximate)

**Applications**

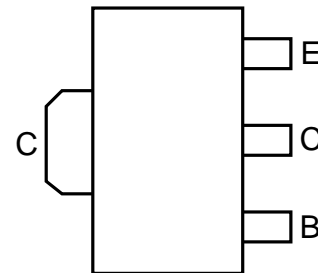
- Various Driving Functions
  - Lamps
  - Motors
  - Relays and Solenoids
- High Output Current Switches



Top View



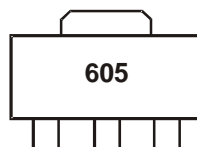
Device Symbol


 Top View  
Pin-Out

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FCX605TA	AEC-Q101	605	7	12	1,000

- 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](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**


605 = Product Type Marking Code

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	140	V
Collector-Emitter Voltage	V <sub>CEO</sub>	120	V
Emitter-Base Voltage	V <sub>EBO</sub>	10	V
Continuous Collector Current	I <sub>C</sub>	1	A
Peak Pulse Current	I <sub>CM</sub>	4	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

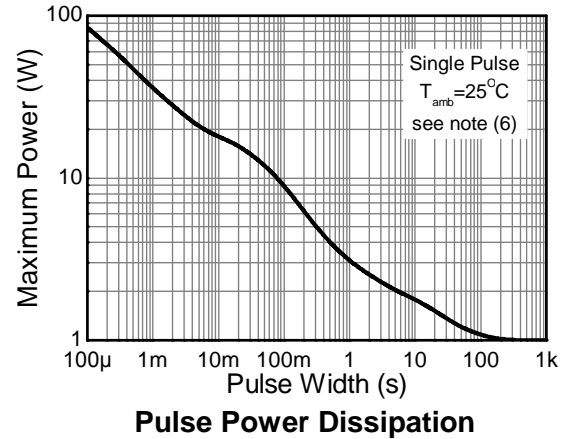
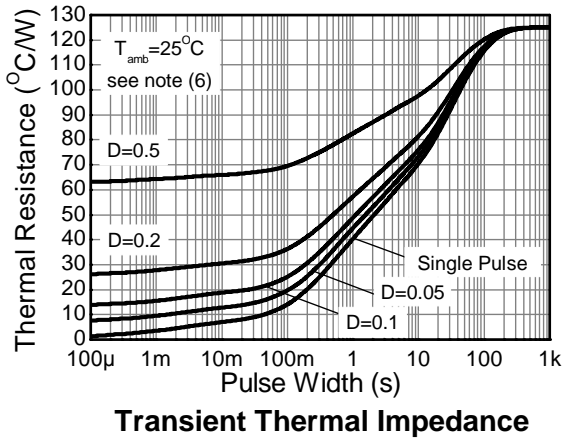
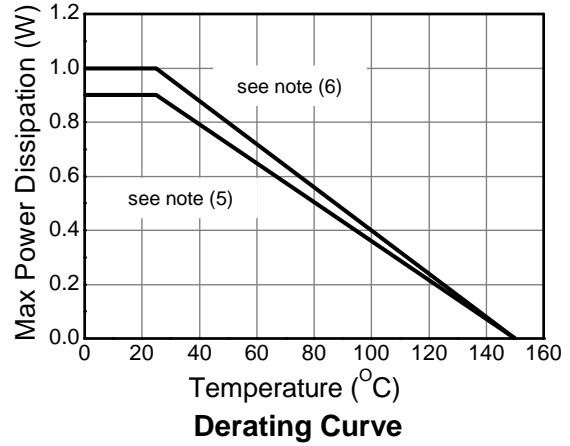
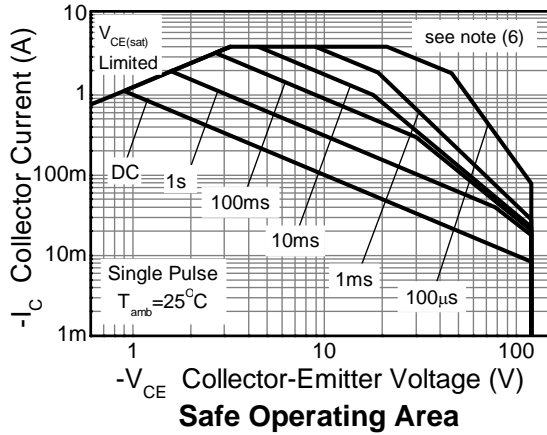
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5) 0.9	W
		(Note 6) 1	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5) 139	°C/W
		(Note 6) 125	
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	5.2	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2
Electrostatic Discharge - Machine Model	ESD MM	200	V	B

- Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
  7. Thermal resistance from junction to solder-point (at the end of the leads).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

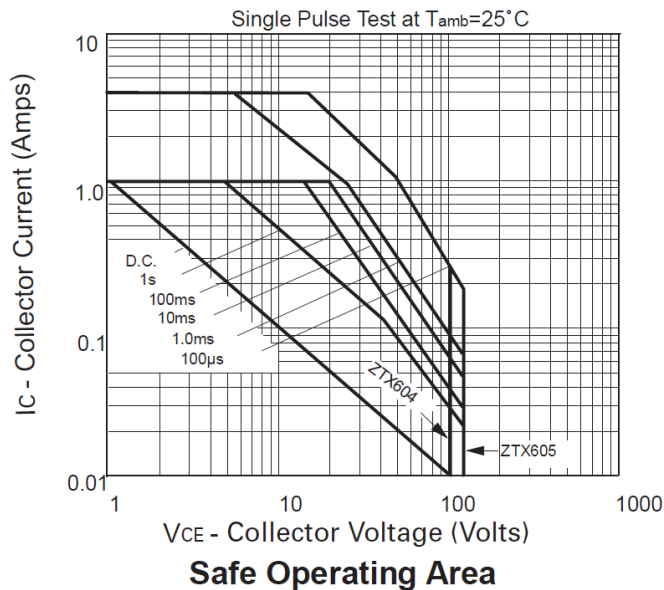
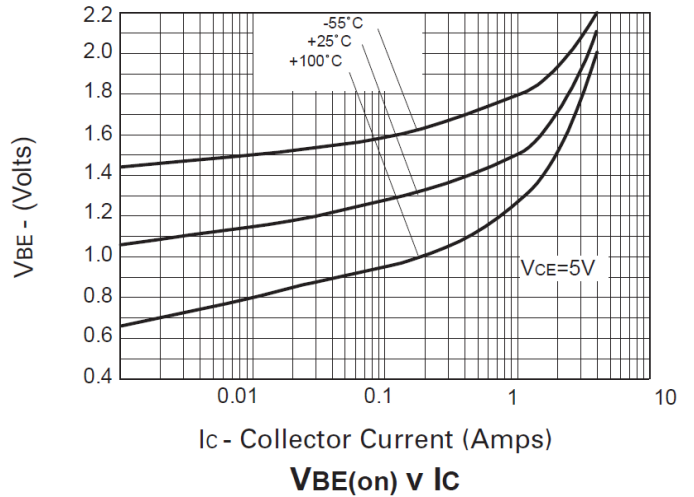
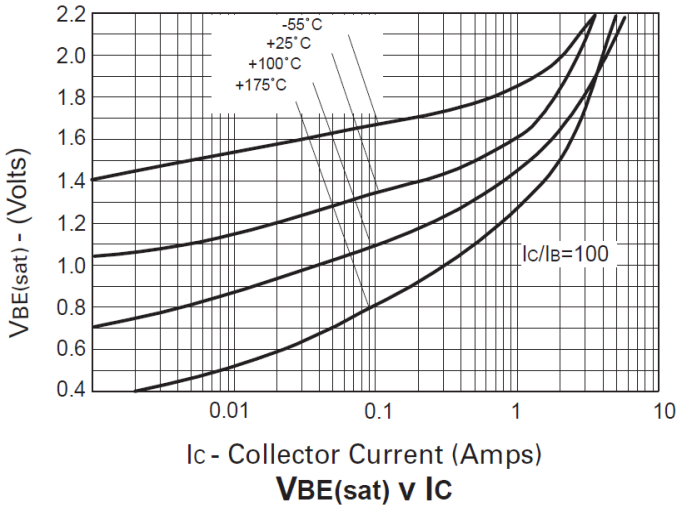
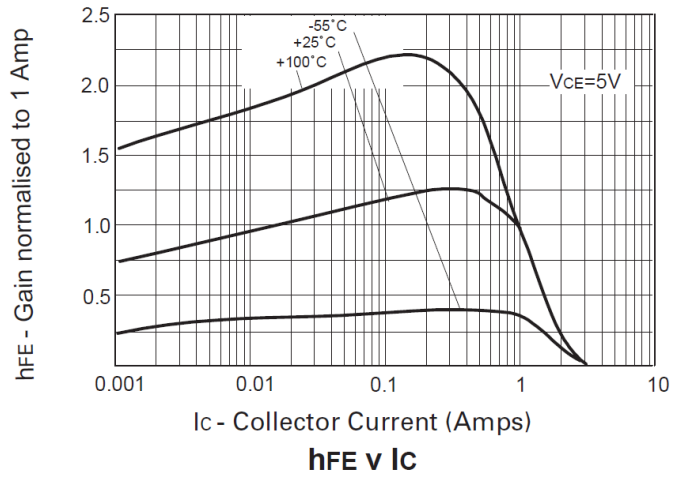
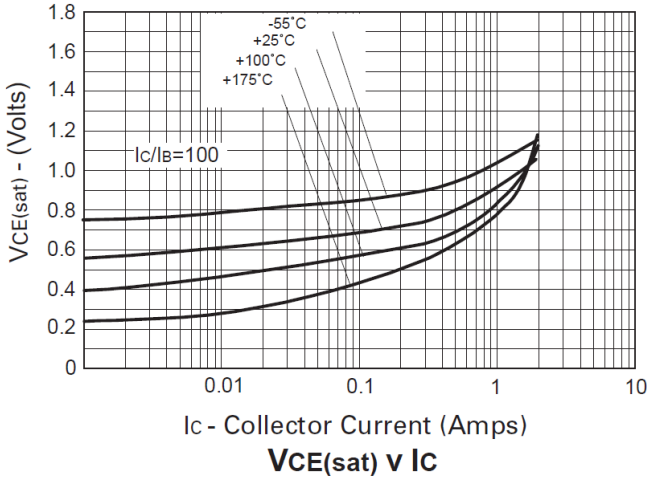


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	140	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	120	—	—	V	$I_{CEO} = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	10	—	—	V	$I_{EBO} = 100\mu\text{A}$
Collector Cut-off Current	$I_{CBO}$	—	—	100 10	nA $\mu\text{A}$	$V_{CB} = 10\text{V}$ $V_{CB} = 120\text{V}, T_A = +100^\circ\text{C}$
Emitter-base Cut-off Current	$I_{EBO}$	—	—	0.1	$\mu\text{A}$	$V_{EB} = 8\text{V}$
Collector Emitter Cut-Off Current	$I_{CES}$	—	—	10	$\mu\text{A}$	$V_{CES} = 120\text{V}$
<b>ON CHARACTERISTICS (Note 9)</b>						
Static Forward Current Transfer Ratio	$h_{FE}$	2k 5k 2k 0.5	— — — —	— — 100k —	—	$I_C = 50\text{mA}, V_{CE} = 5\text{V}$ $I_C = 500\text{mA}, V_{CE} = 5\text{V}$ $I_C = 1\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{A}, V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	1 1.5	V	$I_C = 250\text{mA}, I_B = 0.25\text{mA}$ $I_C = 1\text{A}, I_B = 1\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.8	V	$I_C = 1\text{A}, I_B = 1\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$	—	—	1.7	V	$I_C = 1\text{A}, V_{CE} = 5\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS (Note 9)</b>						
Transition Frequency	$f_T$	150	—	—	MHz	$I_C = 100\text{mA}, V_{CE} = 10\text{V}$ $f = 20\text{MHz}$
Input Capacitance	$C_{ibo}$	—	90	—	pF	$V_{CB} = 500\text{mV}, f = 1\text{MHz}$
Output Capacitance	$C_{obo}$	—	15	—	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Turn-On Time	$t_{ON}$	—	0.5	—	$\mu\text{s}$	$I_C = 500\text{mA}, V_{CE} = 10\text{V}$ $I_{B1} = -I_{B2} = 0.5\text{mA}$
Turn-Off Time	$t_{OFF}$	—	1.6	—	$\mu\text{s}$	$I_C = 500\text{mA}, V_{CE} = 10\text{V}$ $I_{B1} = -I_{B2} = 0.5\text{mA}$

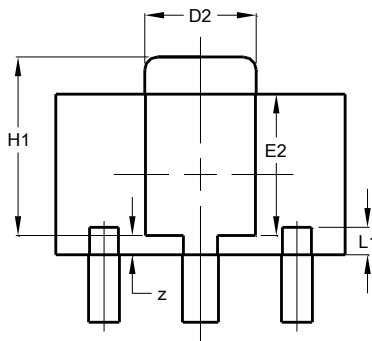
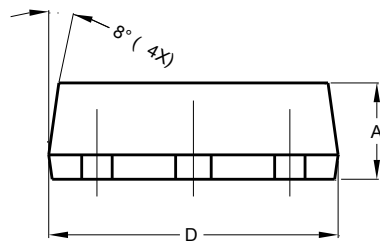
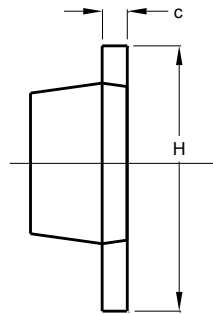
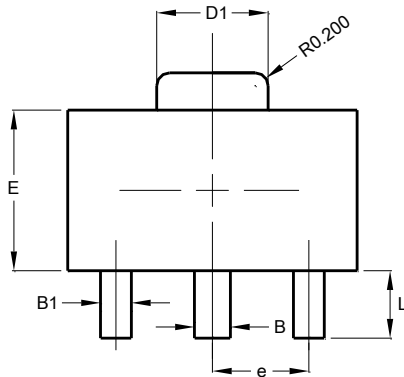
Note: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



## Package Outline Dimensions

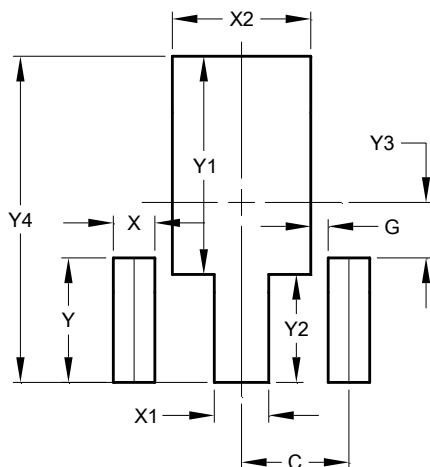
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
<b>All Dimensions in mm</b>			

## Suggested Pad Layout

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



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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.

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