65V NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

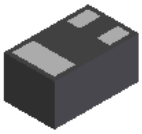
Features

- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- Ultra-Small Leadless Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

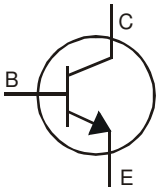
Mechanical Data

- Case: X2-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - NiPdAu, Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.0009 grams (Approximate)

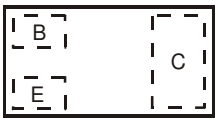
X2-DFN1006-3



Bottom View



Device Symbol



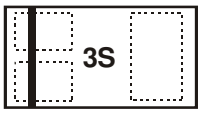
Top View
Device Schematic

Ordering Information (Note 4)

Part Number	Marking	Reel Size (in)	Tape Width (mm)	Quantity per Reel
BC846BLP4-7B	3S	7	8	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



3S = Product Type Marking Code

Top View
Bar Denotes Base and Emitter Side

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	65	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current - Continuous	I_C	100	mA
Peak Collector Current	I_{CM}	200	mA
Peak Emitter Current	I_{EM}	200	mA

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.46	W
	(Note 6)		1	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	272	°C/W
	(Note 6)		120	
Thermal Resistance, Junction to Leads	(Note 7)	$R_{\theta JL}$	110	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	200	V	B

Notes:
5. For a device surface mounted on minimum recommended pad layout FR-4 PCB with single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The entire exposed collector pad is attached to the heatsink.
6. Same as Note 5, except device is surface mounted on 25mm X 25mm collector pad heatsink with 1oz copper.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics

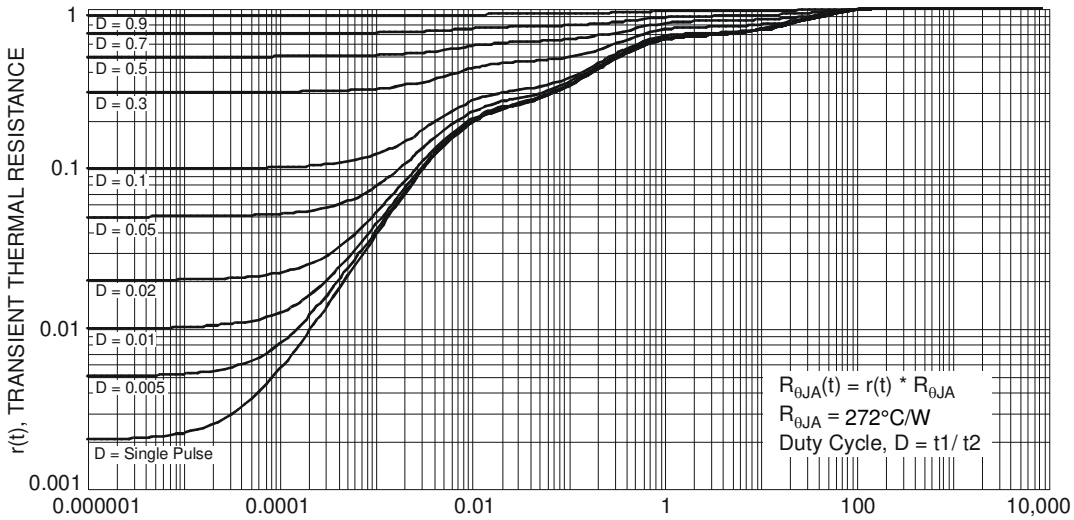


Fig. 1 Transient Thermal Resistance

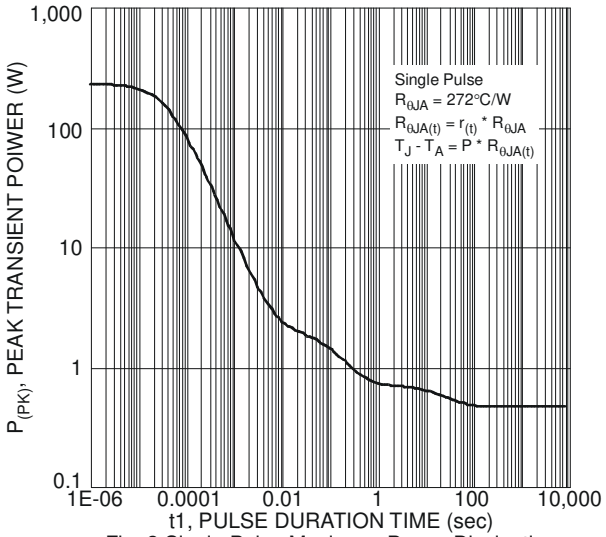


Fig. 2 Single Pulse Maximum Power Dissipation

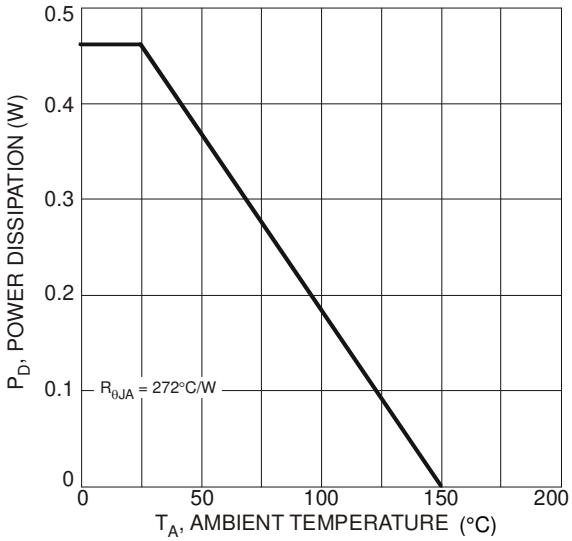


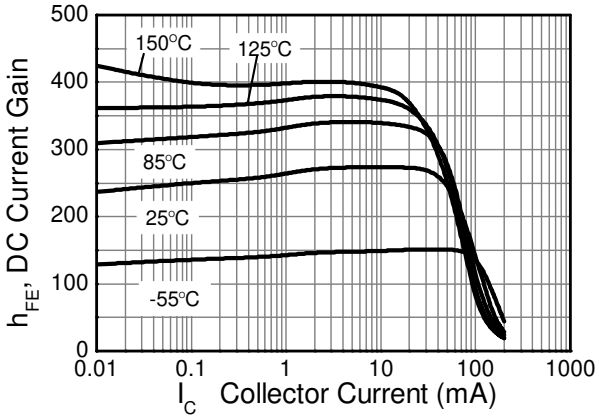
Fig. 3 Power Dissipation vs. Ambient Temperature

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

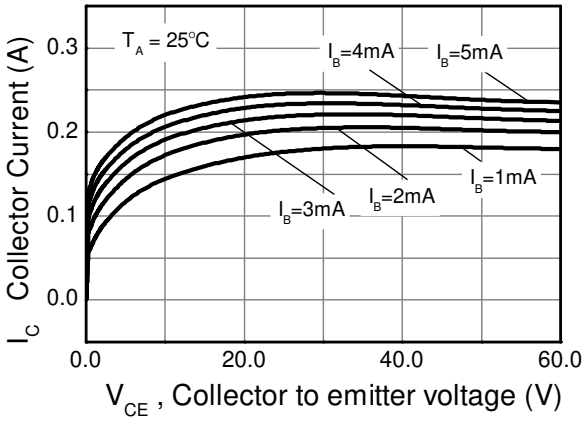
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	80	—	—	V	I_C = 100µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	65	—	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	6	—	—	V	I_E = 100µA, I_C = 0
Collector Cutoff Current	I_{CES}	—	—	15	nA	V_{CE} = 65V
Collector Cutoff Current	I_{CBO}	—	—	15 5.0	nA µA	V_{CB} = 40V V_{CB} = 30V, T_A = +150°C
ON CHARACTERISTICS (Note 9)						
DC Current Gain	h_{FE}	200	270	450	—	V_{CE} = 5V, I_C = 2.0mA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	90 220	250 600	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5.0mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	720 870	900 —	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5.0mA
Base-Emitter Voltage	$V_{BE(ON)}$	580 —	650 —	700 770	mV	V_{CE} = 5V, I_C = 2.0mA V_{CE} = 5V, I_C = 10mA
SMALL SIGNAL CHARACTERISTICS (Note 9)						
Input Capacitance	C_{ibo}	—	6.7	—	pF	V_{CB} = 5V, f = 1.0MHz
Output Capacitance	C_{obo}	—	1.76	—	pF	V_{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f_T	100	300	—	MHz	V_{CE} = 5V, I_C = 10mA, f = 100MHz
Noise Figure	NF	—	2	10	dB	V_{CE} = 5V, I_C = 200µA, R_S = 2.0kΩ, f = 1.0kHz, Δf = 200Hz
Delay Time	t_D	—	11.2	—	ns	V_{CC} = 30V, I_C = 150mA, I_{B1} = -I_{B2} = 15mA
Rise Time	t_R	—	59.7	—	ns	
Storage Time	t_S	—	190.8	—	ns	
Fall Time	t_F	—	108.6	—	ns	

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

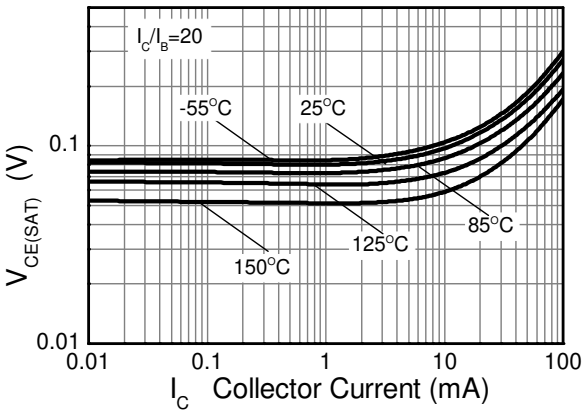
Typical Electrical Characteristics



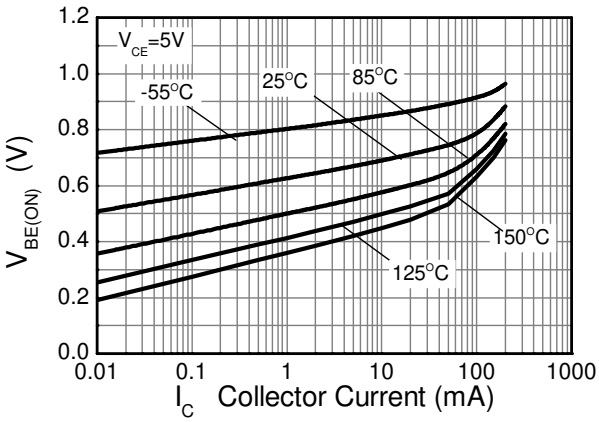
h_{FE} v I_C



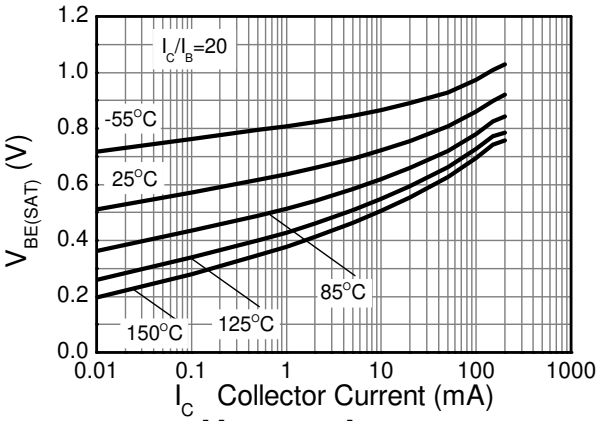
V_{CE} v I_C



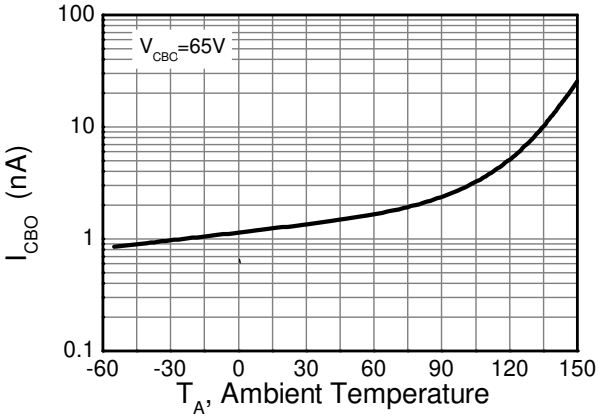
$V_{CE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

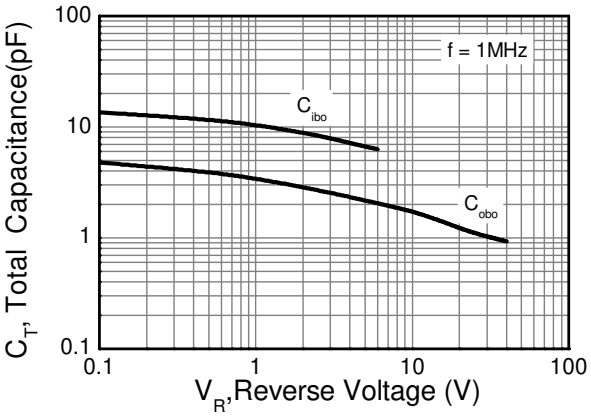


$V_{BE(SAT)}$ v I_C

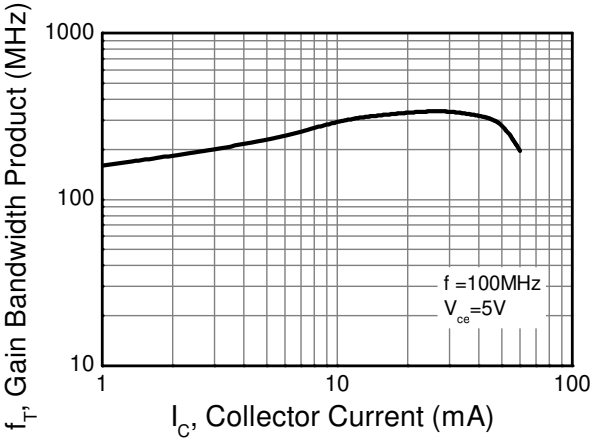


I_{CBO} v I_C

Typical Electrical Characteristics (Cont.)



V_R V C_T

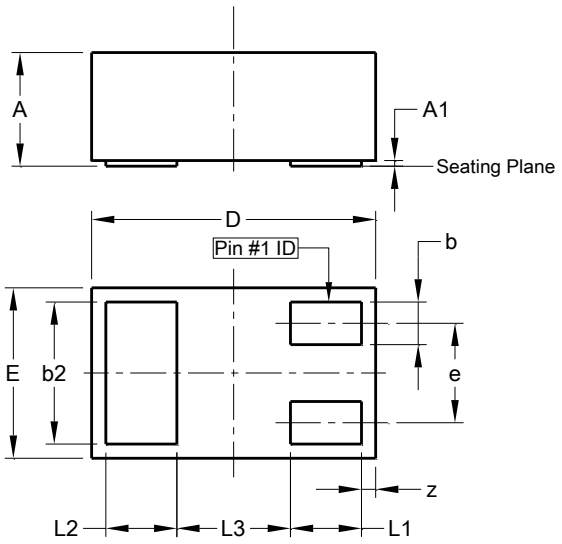


I_C V f_T

Package Outline Dimensions

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

X2-DFN1006-3

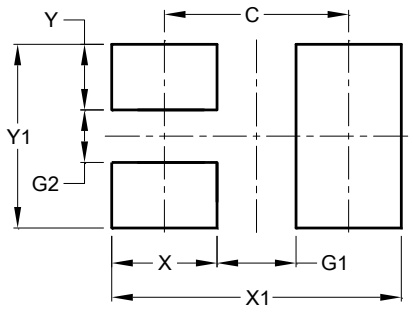


X2-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	—
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.05	1.00
E	0.55	0.65	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X2-DFN1006-3



Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70