

65V NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

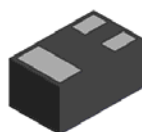
Features

- 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**

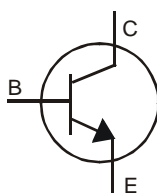
Mechanical Data

- 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 over Copper leadframe. Solderable
per MIL-STD-202, Method 208 **(e4)**
- Weight: 0.0009 grams (Approximate)

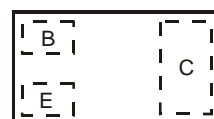
X2-DFN1006-3



Bottom View



Device Symbol



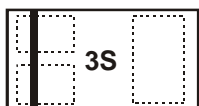
Top View
Device Schematic

Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	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> 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>.

Marking Information



Top View
Bar Denotes Base
and Emitter Side

3S = Product Type Marking Code

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	P _D	0.46	W
		1	
Thermal Resistance, Junction to Ambient	R _{θJA}	272	°C/W
		120	
Thermal Resistance, Junction to Leads	R _{θJL}	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	≥ 8,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

- 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

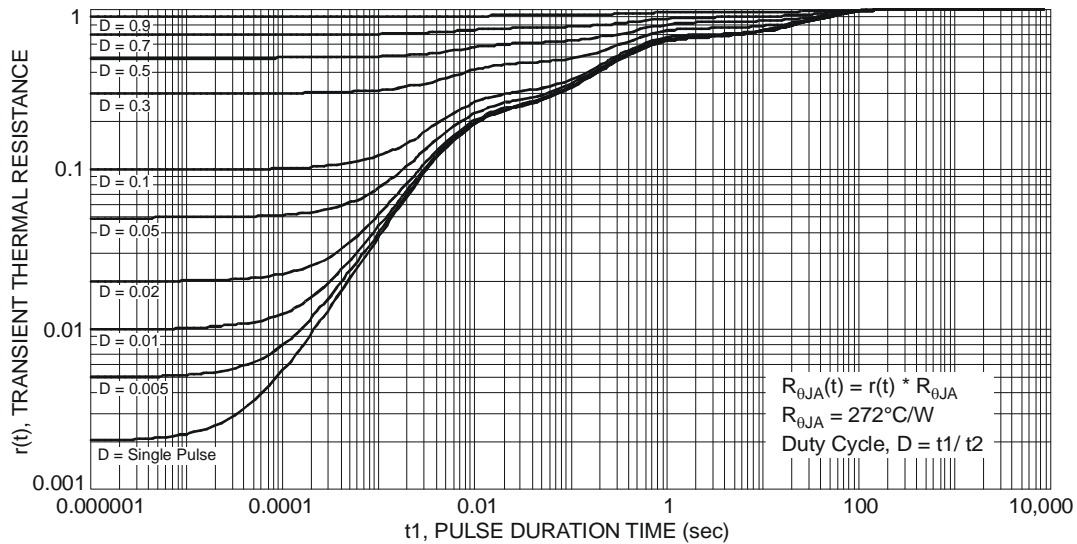


Fig. 1 Transient Thermal Resistance

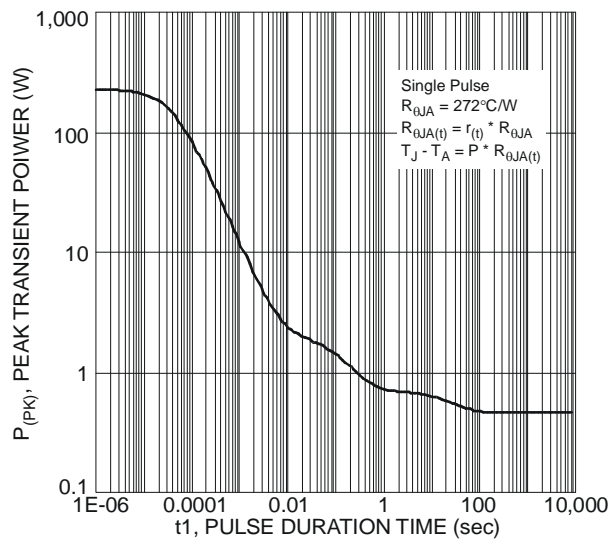


Fig. 2 Single Pulse Maximum Power Dissipation

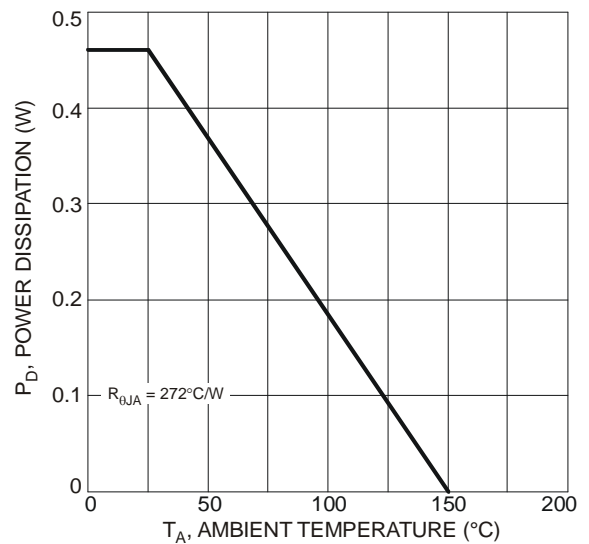


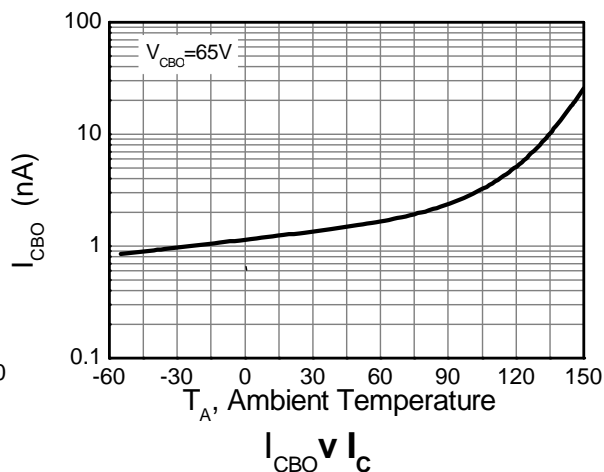
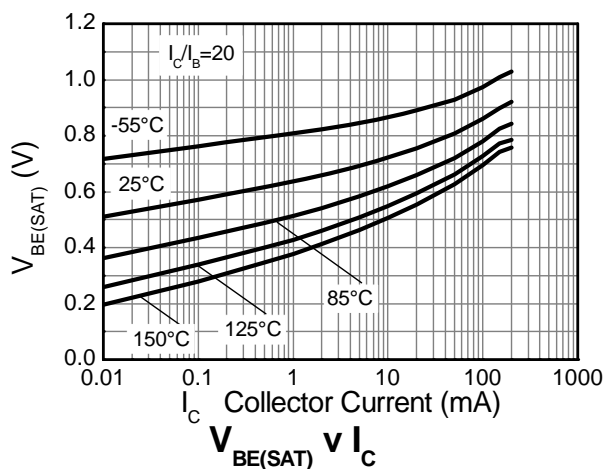
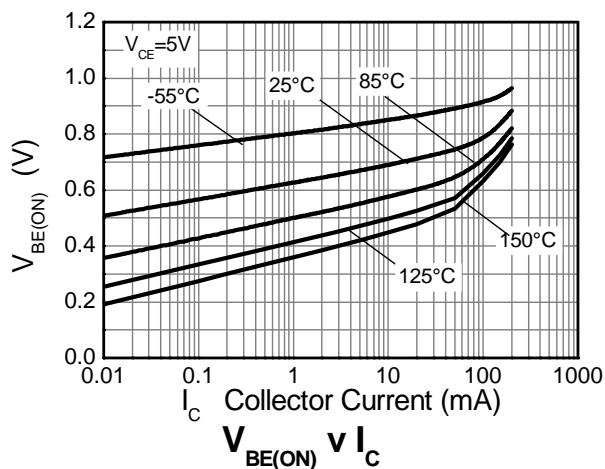
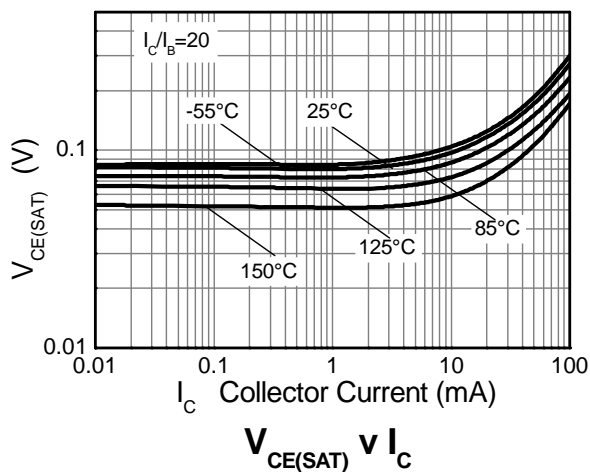
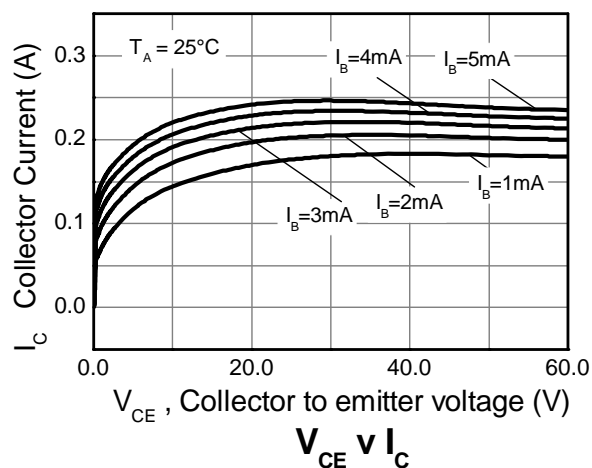
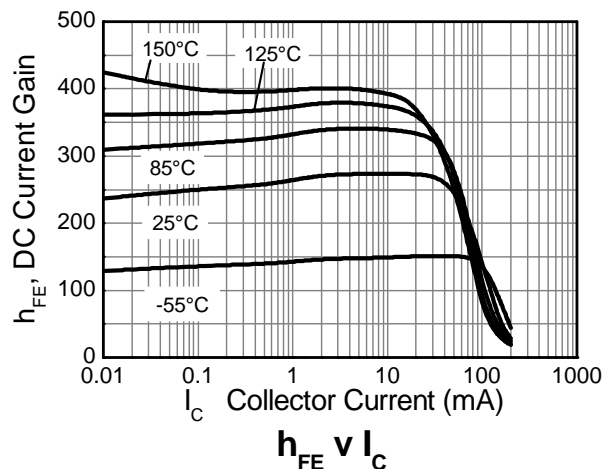
Fig. 3 Power Dissipation vs. Ambient Temperature

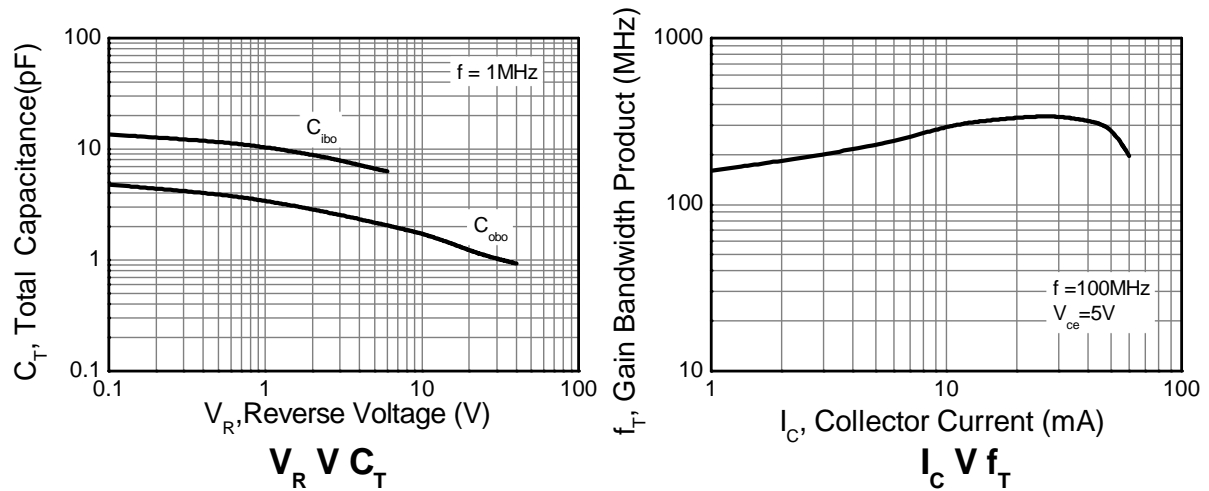
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

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	

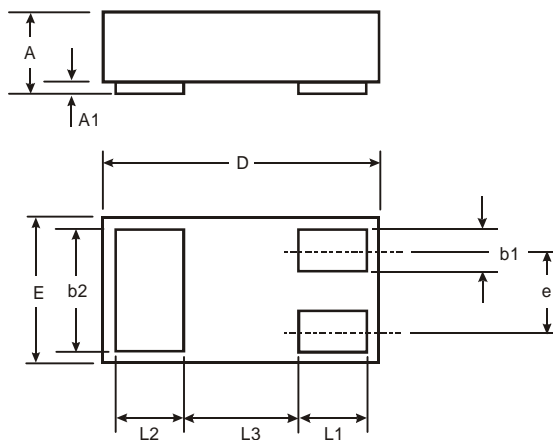
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics



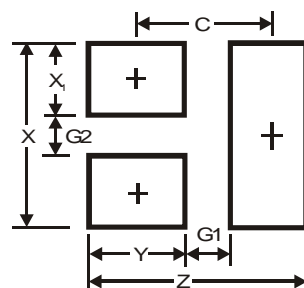


Package Outline Dimensions



X2-DFN1006-3			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0	0.05	0.03
b1	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
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.1
G1	0.3
G2	0.2
X	0.7
X1	0.25
Y	0.4
C	0.7

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