

**COMPLEMENTARY 20V LOW SATURATION TRANSISTORS**

**Features**

NPN Transistor

- $BV_{CEO} > 20V$
- $I_C = 4.5A$  Continuous Collector Current
- Low Saturation Voltage (150mV max @ 1A)
- $R_{SAT} = 47m\Omega$  for a low equivalent On-Resistance

PNP Transistor

- $BV_{CEO} > -20V$
- $I_C = -3.5A$  Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT} = 64m\Omega$  for a low equivalent On-Resistance

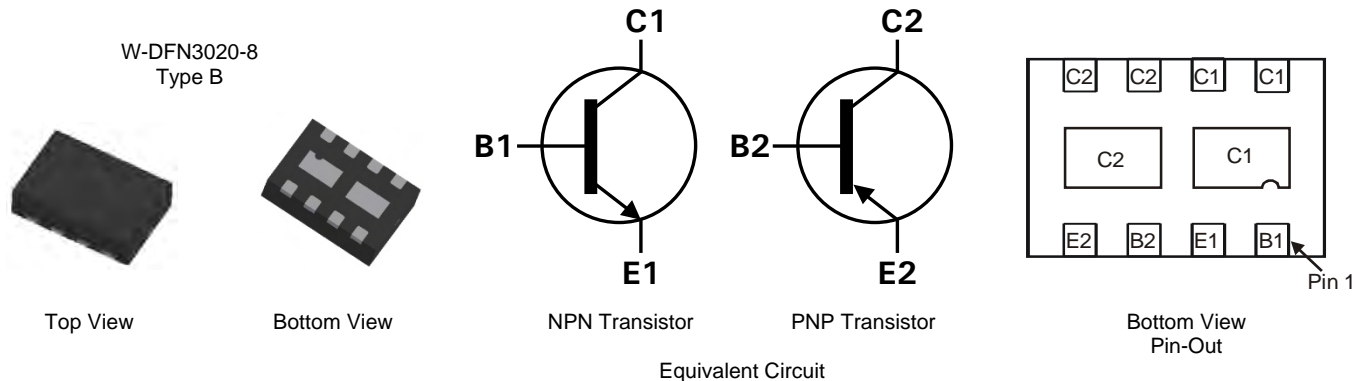
- $h_{FE}$  characterized up to 6A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$  efficient, 40% lower than SOT26
- 6mm<sup>2</sup> footprint, 50% smaller than TSOP6 and SOT26
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**Mechanical Data**

- Case: W-DFN3020-8 Type B
- Nominal package height: 0.8mm
- Case material: molded plastic. "Green" molding compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - NiPdAu, Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.013 grams (approximate)

**Applications**

- DC – DC Converters
- Charging circuits
- Power switches
- Motor control
- LED Backlighting circuits
- Portable applications



**Ordering Information** (Note 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC6718MCTA	AEC-Q101	DB2	7	8	3,000
ZXTC6718MCQTA	Automotive	DB2	7	8	3,000

- 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> 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
  5. For packaging details, go to our website at <http://www.diodes.com>

**Marking Information**



DB2 = Product type marking code  
Top view, dot denotes pin 1

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

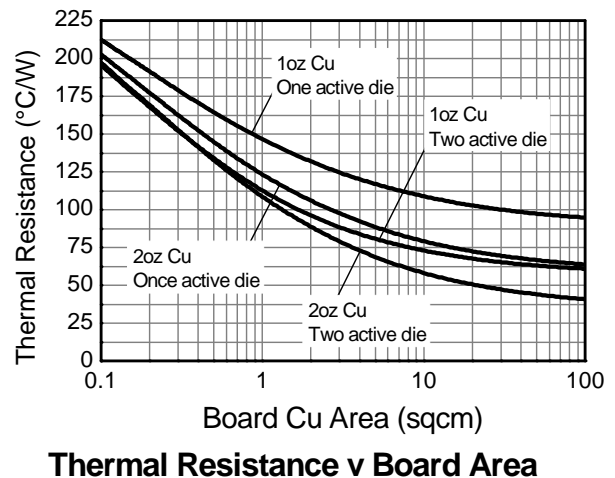
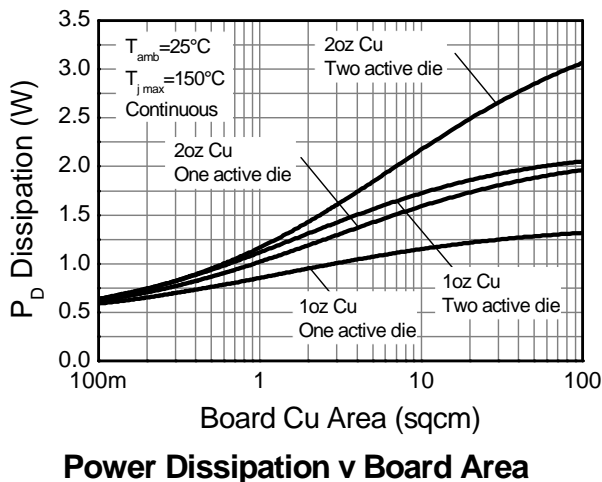
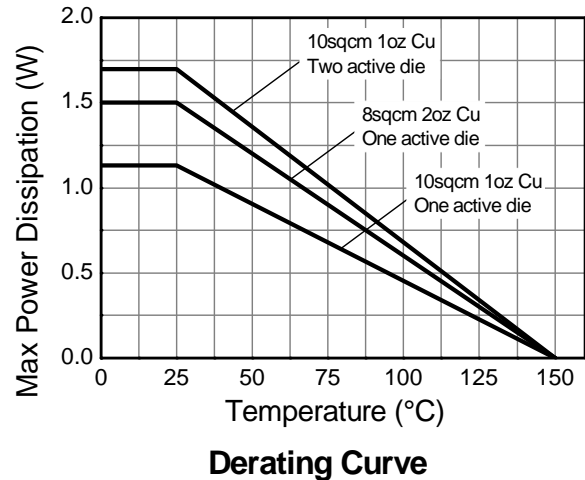
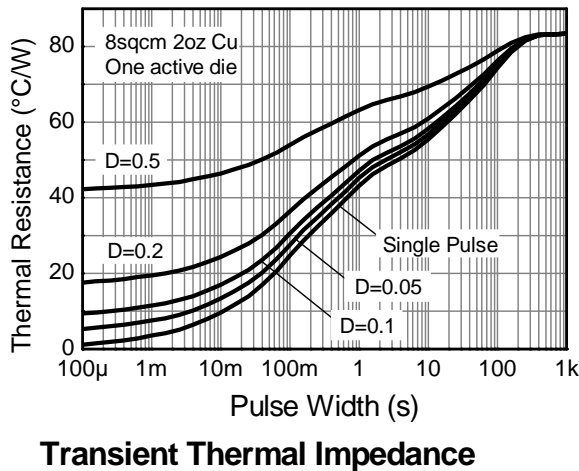
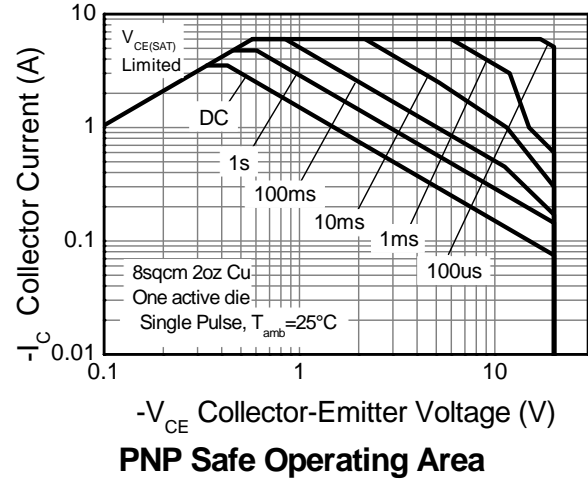
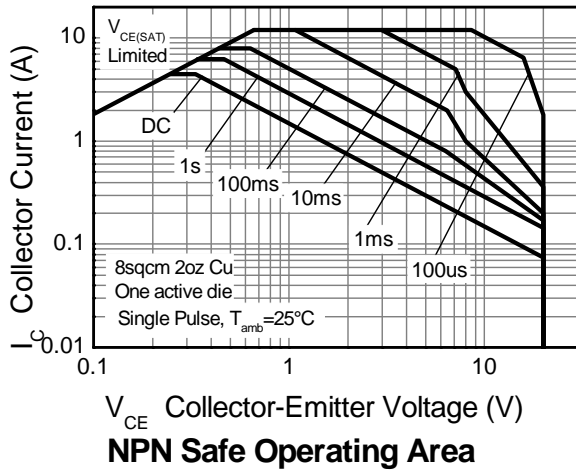
Characteristic	Symbol	NPN	PNP	Unit
Collector-Base Voltage	V <sub>CB0</sub>	40	-25	V
Collector-Emitter Voltage	V <sub>CEO</sub>	20	-20	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	-7	V
Peak Pulse Current	I <sub>CM</sub>	12	-6	A
Continuous Collector Current	I <sub>C</sub>	4.5	-3.5	A
Continuous Collector Current		(Notes 7 & 9)	5	
Base Current	I <sub>B</sub>	1		A

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

Characteristic	Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.5		W
		12		
		2.45		
		19.6		
		1.13		
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	8		°C/W
		1.7		
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	13.6		°C/W
		83.3		
		51.0		
		111		
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	73.5		°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150		°C

- Notes:
6. For a dual device surface mounted on 28mm x 28mm (8cm<sup>2</sup>) FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed collector pads connected to each half.
  7. Same as note (6), except the device is measured at t <5 sec.
  8. Same as note (6), except the device is surface mounted on 31mm x 31mm (10cm<sup>2</sup>) FR4 PCB with high coverage of single sided 1oz copper.
  9. For a dual device with one active die.
  10. For dual device with 2 active die running at equal power.
  11. Thermal resistance from junction to solder-point (on the exposed collector pads).

**Thermal Characteristics and Derating Information**

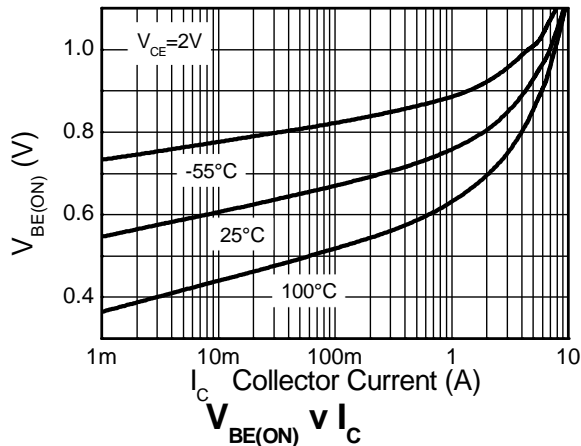
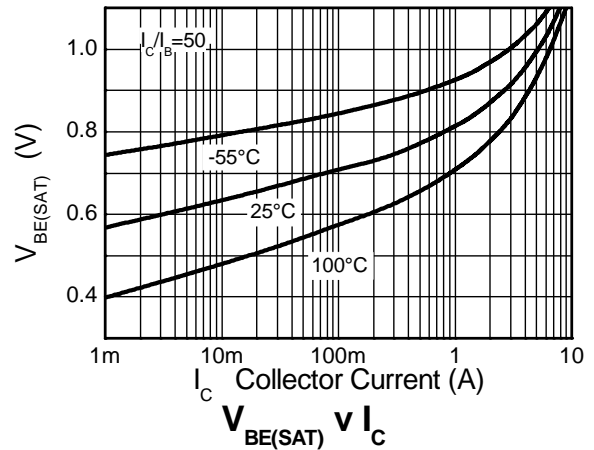
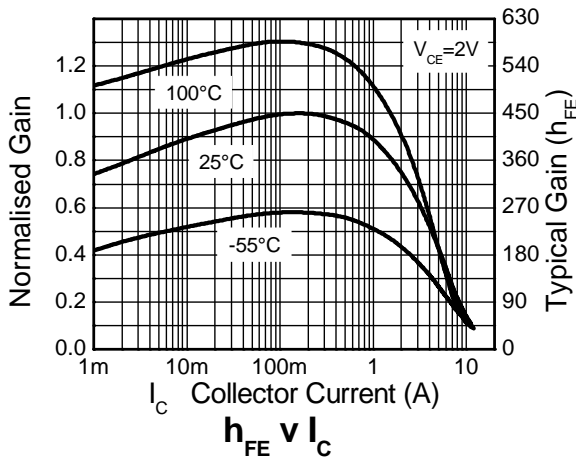
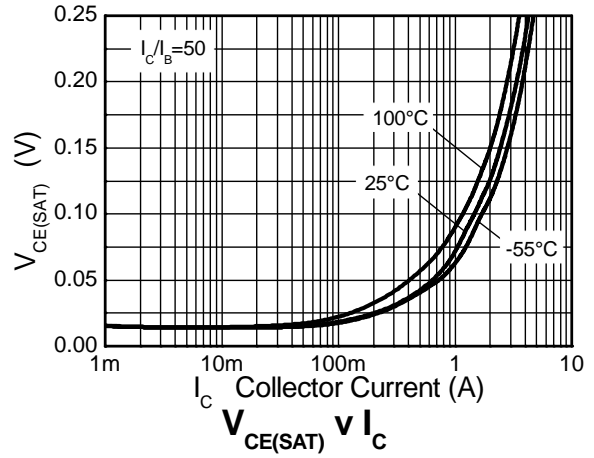
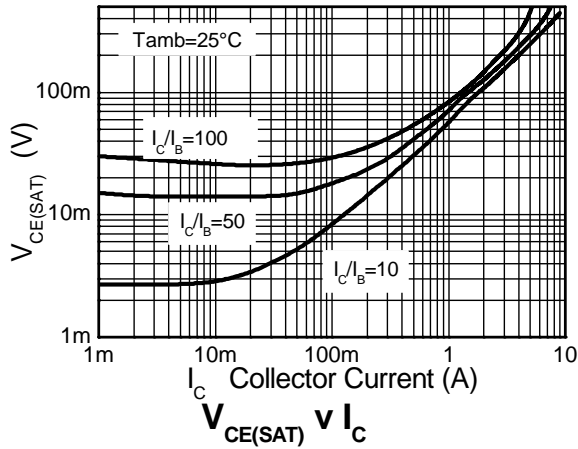


**NPN - Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	40	100	-	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	20	27	-	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.2	-	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	-	-	100	nA	V <sub>CB</sub> = 30V
Emitter Cutoff Current	I <sub>EBO</sub>	-	-	100	nA	V <sub>EB</sub> = 6V
Collector Emitter Cutoff Current	I <sub>CES</sub>	-	-	100	nA	V <sub>CE</sub> = 16V
Static Forward Current Transfer Ratio (Note 12)	h <sub>FE</sub>	200	400	-	-	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V
		300	450	-	-	I <sub>C</sub> = 200mA, V <sub>CE</sub> = 2V
		200	360	-	-	I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
		100	180	-	-	I <sub>C</sub> = 6A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 12)	V <sub>CE(sat)</sub>	-	8	15	mV	I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA
		-	90	150		I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
		-	115	135		I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA
		-	190	250		I <sub>C</sub> = 3A, I <sub>B</sub> = 100mA
		-	210	300		I <sub>C</sub> = 4.5A, I <sub>B</sub> = 125mA
Base-Emitter Turn-On Voltage (Note 12)	V <sub>BE(on)</sub>	-	0.88	0.97	V	I <sub>C</sub> = 4.5A, V <sub>CE</sub> = 2V
Base-Emitter Saturation Voltage (Note 12)	V <sub>BE(sat)</sub>	-	0.98	1.07	V	I <sub>C</sub> = 4.5A, I <sub>B</sub> = 125mA
Output Capacitance	C <sub>obo</sub>	-	23	30	pF	V <sub>CB</sub> = 10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	100	140	-	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 100MHz
Turn-on Time	t <sub>on</sub>	-	170	-	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 3A
Turn-off Time	t <sub>off</sub>	-	400	-	ns	I <sub>B1</sub> = I <sub>B2</sub> = 10mA

Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

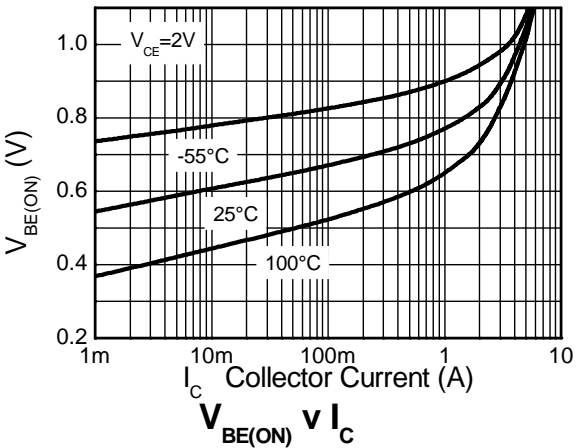
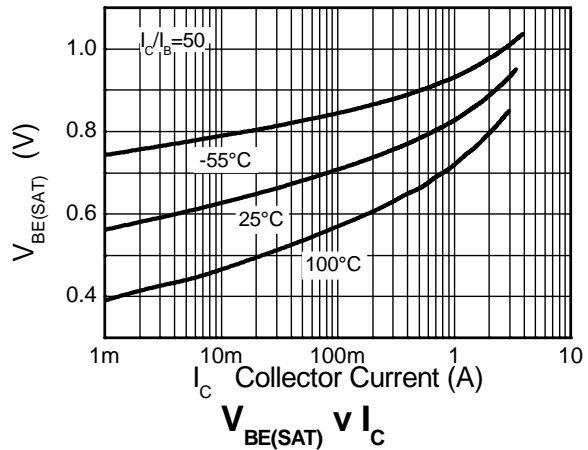
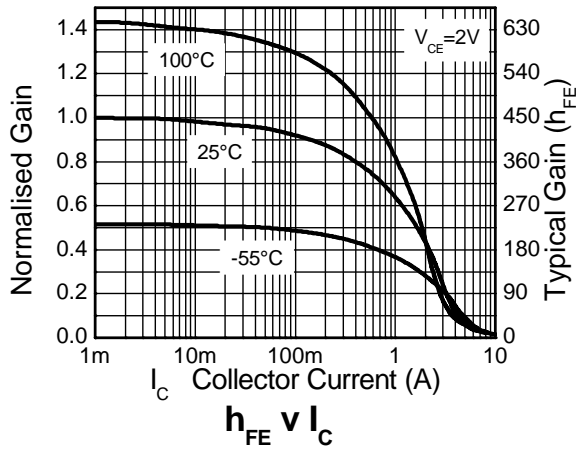
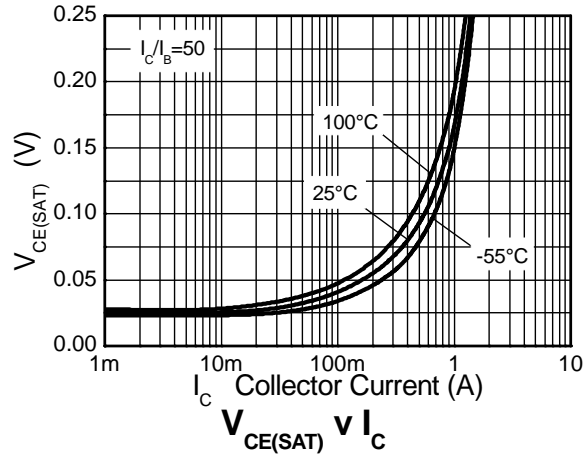
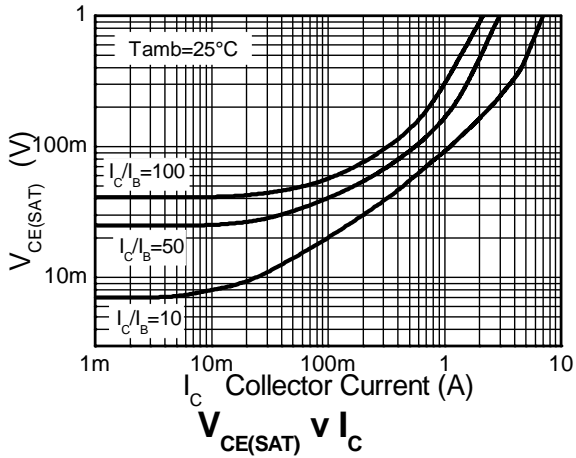


**PNP - Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-25	-35	-	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	-20	-25	-	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-8.5	-	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	I <sub>CBO</sub>	-	-	-100	nA	V <sub>CB</sub> = -20V
Emitter Cutoff Current	I <sub>EBO</sub>	-	-	-100	nA	V <sub>EB</sub> = -6V
Collector Emitter Cutoff Current	I <sub>CES</sub>	-	-	-100	nA	V <sub>CES</sub> = -16V
Static Forward Current Transfer Ratio (Note 12)	h <sub>FE</sub>	300 300 150 15	475 450 230 30	- - - -	-	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -2A, V <sub>CE</sub> = -2V I <sub>C</sub> = -6A, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage (Note 12)	V <sub>CE(sat)</sub>	- - - - -	-19 -170 -190 -240 -225	-30 -220 -250 -350 -300	mV	I <sub>C</sub> = -0.1A, I <sub>B</sub> = -10mA I <sub>C</sub> = -1A, I <sub>B</sub> = -20mA I <sub>C</sub> = -1.5A, I <sub>B</sub> = -50mA I <sub>C</sub> = -2.5A, I <sub>B</sub> = -150mA I <sub>C</sub> = -3.5A, I <sub>B</sub> = -350mA
Base-Emitter Turn-On Voltage (Note 12)	V <sub>BE(on)</sub>	-	-0.87	-0.95	V	I <sub>C</sub> = -3.5A, V <sub>CE</sub> = -2V
Base-Emitter Saturation Voltage (Note 12)	V <sub>BE(sat)</sub>	-	-1.01	-1.12	V	I <sub>C</sub> = -3.5A, I <sub>B</sub> = -350mA
Output Capacitance	C <sub>obo</sub>	-	21	30	pF	V <sub>CB</sub> = -10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	150	180	-	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 100MHz
Turn-on Time	t <sub>on</sub>	-	40	-	ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A
Turn-off Time	t <sub>off</sub>	-	670	-	ns	I <sub>B1</sub> = I <sub>B2</sub> = -10mA

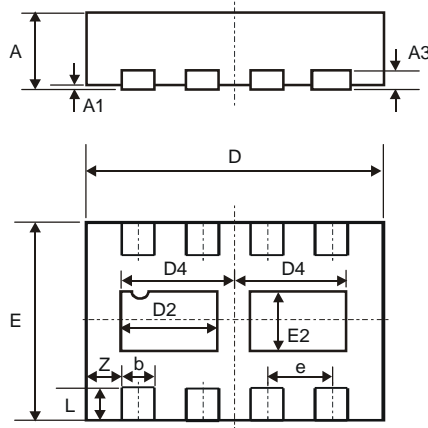
Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



### Package Outline Dimensions

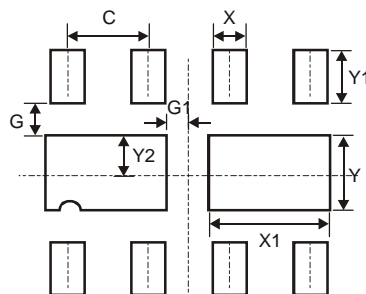
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



W-DFN3020-8 Type B			
Dim	Min	Max	Typ
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
Z	-	-	0.375
All Dimensions in mm			

### Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	0.650
G	0.285
G1	0.090
X	0.400
X1	1.120
Y	0.730
Y1	0.500
Y2	0.365



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