Lead-free Green

ZXTC4591AMC

COMPLEMENTARY 40V HIGH PERFORMANCE TRANSISTOR

Features

NPN Transistor
- BV_{CEO} > 40V
- I_C = 3A Continuous Collector Current
- Low Saturation Voltage (500mV max @ 1A)
- R_{SAT} = 195mΩ for a low equivalent On-Resistance

PNP Transistor
- BV_{CEO} > -40V
- I_C = -3A Continuous Collector Current
- Low Saturation Voltage (-500mV max @ -1A)
- R_{SAT} = 350mΩ for a low equivalent On-Resistance

- h_{FE} characterized up to 2A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$ efficient, 40% lower than SOT26
- $6mm^2$ footprint, 50% smaller than TSOP6 and SOT26
- **Totally Lead-Free & Fully 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)**

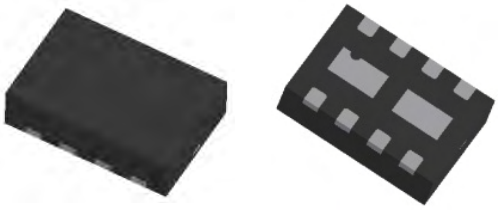
Mechanical Data

- 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

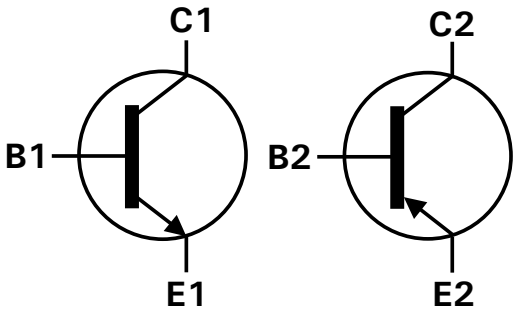
- DC – DC Converters
- Charging circuits
- Power switches
- LED Backlighting circuits
- Motor control
- Portable applications

W-DFN3020-8
Type B



Top View

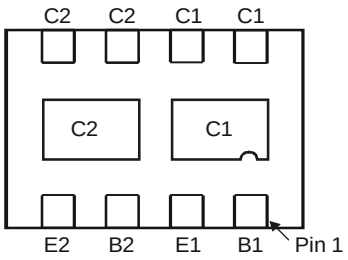
Bottom View



NPN Transistor

PNP Transistor

Equivalent Circuit



Bottom View
Pin Out

Ordering Information (Note 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC4591AMCTA	AEC-Q101	91A	7	8	3,000
ZXTC4591AMCQTA	Automotive	91A	7	8	3,000

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. 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

91A = Product type marking code
Top view, dot denotes pin 1

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

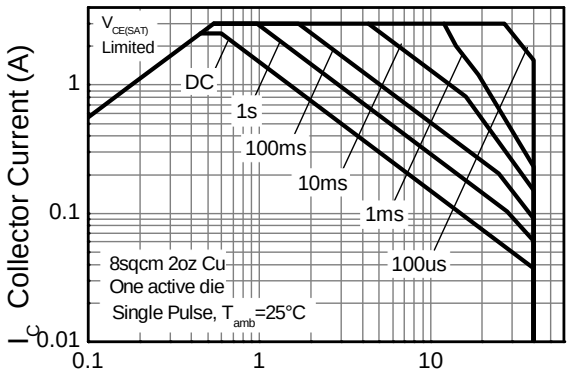
Parameter		Symbol	NPN	PNP	Unit
Collector-Base Voltage		V_{CBO}	40	-40	V
Collector-Emitter Voltage		V_{CEO}	40	-40	
Emitter-Base Voltage		V_{EBO}	7	-7	
Peak Pulse Current		I_{CM}	3	-3	A
Continuous Collector Current	(Notes 6 & 9)	I_C	2	-1.5	
	(Notes 7 & 9)		2.5	-2	
Base Current		I_B	300		mA

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

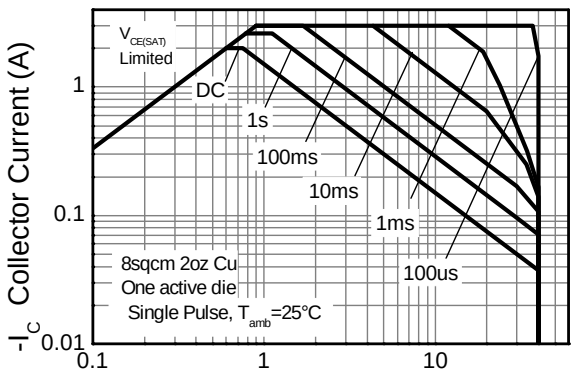
Characteristic		Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	(Notes 6 & 9)	P_D	1.5 12		W mW/°C
	(Notes 7 & 9)		2.45 19.6		
	(Notes 8 & 9)		1.13 8		
	(Notes 8 & 10)		1.7 13.6		
Thermal Resistance, Junction to Ambient	(Notes 6 & 9)	$R_{\theta JA}$	83.3		°C/W
	(Notes 7 & 9)		51.0		
	(Notes 8 & 9)		111		
	(Notes 8 & 10)		73.5		
Thermal Resistance, Junction to Lead	(Notes 9 & 11)	$R_{\theta JL}$	17.1		
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		°C

Notes:
6. For a dual device surface mounted on 28mm x 28mm (8cm^2) 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^2) 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 pad).

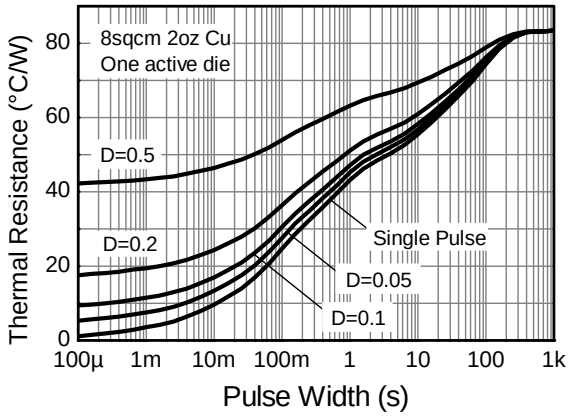
Thermal Characteristics and Derating Information



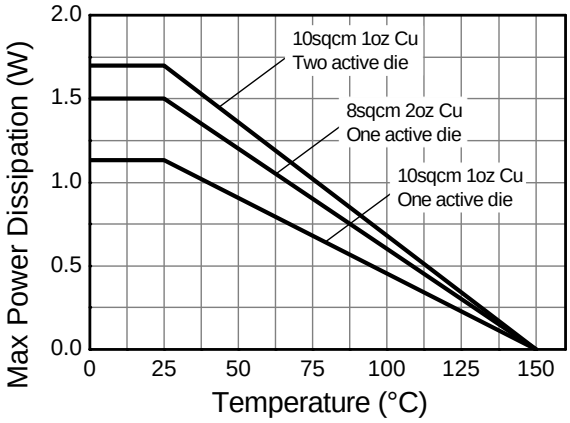
NPN Safe Operating Area



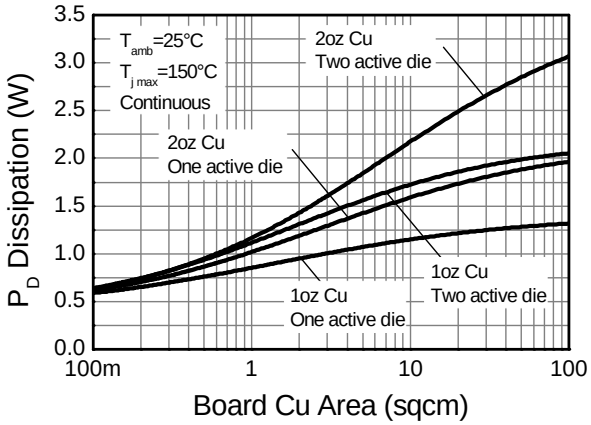
PNP Safe Operating Area



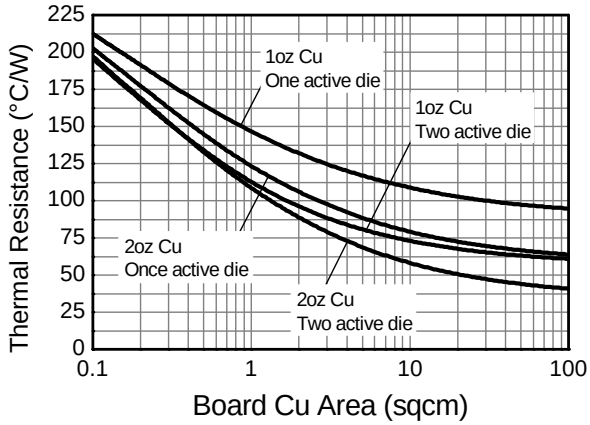
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



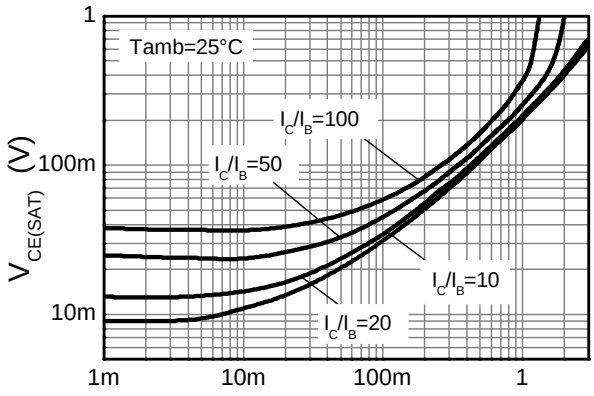
Thermal Resistance v Board Area

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

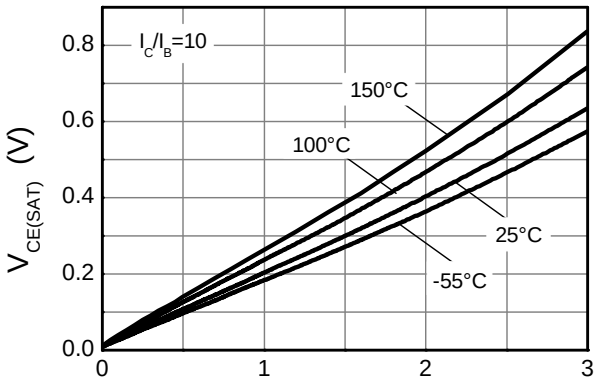
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	40	-	-	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	40	-	-	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	-	-	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	-	-	100	nA	V_{CB} = 30V
Emitter Cutoff Current	I_{EBO}	-	-	100	nA	V_{EB} = 4V
Collector Emitter Cutoff Current	I_{CES}	-	-	100	nA	V_{CE} = 30V
Static Forward Current Transfer Ratio (Note 12)	h_{FE}	300 300 200 35	- - - -	- 900 - -	-	I_C = 1mA, V_{CE} = 5V I_C = 500mA, V_{CE} = 5V I_C = 1A, V_{CE} = 5V I_C = 2A, V_{CE} = 5V
Collector-Emitter Saturation Voltage (Note 12)	$V_{CE(sat)}$	- -	- -	300 500	mV	I_C = 0.5A, I_B = 50mA I_C = 1A, I_B = 100mA
Base-Emitter Turn-On Voltage (Note 12)	$V_{BE(on)}$	-	-	1.0	V	I_C = 1A, V_{CE} = 5V
Base-Emitter Saturation Voltage (Note 12)	$V_{BE(sat)}$	-	-	1.1	V	I_C = 1A, I_B = 100mA
Output Capacitance	C_{obo}	-	-	10	pF	V_{CB} = 10V, f = 1MHz
Transition Frequency	f_T	150	-	-	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz

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

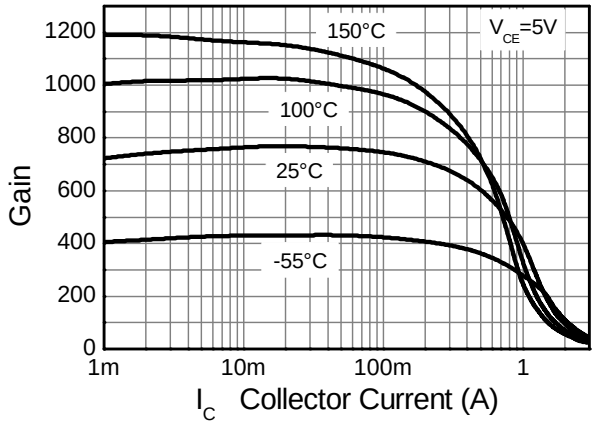
NPN - Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



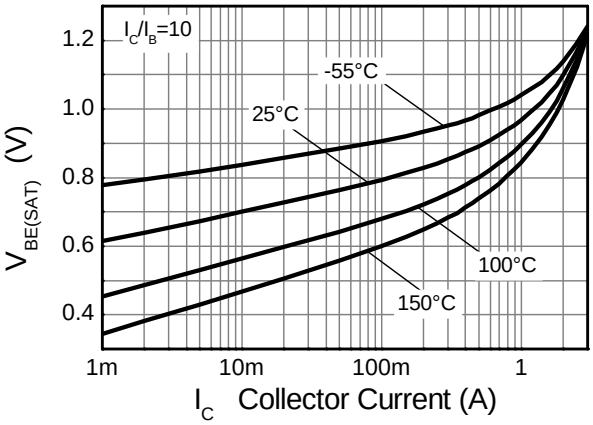
$V_{CE(SAT)}$ v I_C



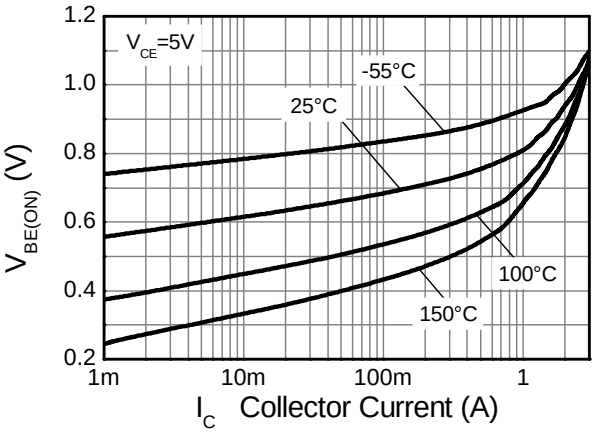
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



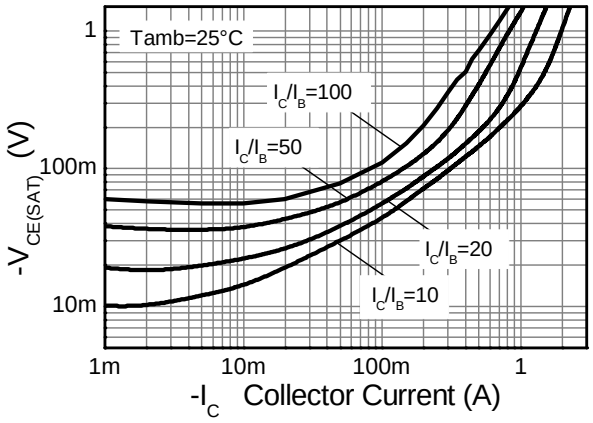
$V_{BE(ON)}$ v I_C

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

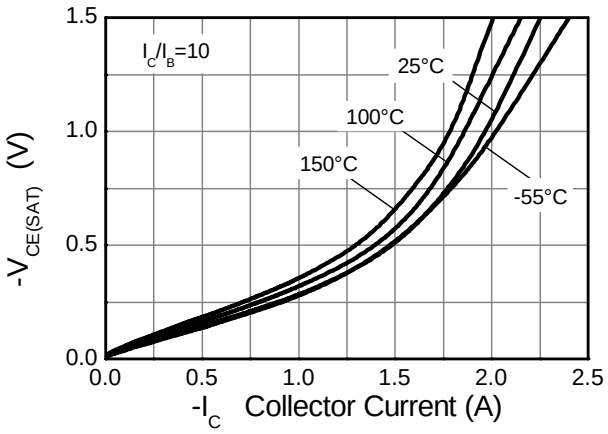
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-40	-	-	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	-40	-	-	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-	-	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	-	-	-100	nA	V_{CB} = -30V
Emitter Cutoff Current	I_{EBO}	-	-	-100	nA	V_{EB} = -4V
Collector Emitter Cutoff Current	I_{CES}	-	-	-100	nA	V_{CE} = -30V
Static Forward Current Transfer Ratio (Note 12)	h_{FE}	300 300 250 160 30	- - - - -	- 800 - - -	-	I_C = -1mA, V_{CE} = -5V I_C = -100mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V I_C = -1A, V_{CE} = -5V I_C = -2A, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 12)	$V_{CE(sat)}$	- - -	- - -	-200 -350 -500	mV	I_C = -0.1A, I_B = -1mA I_C = -0.5A, I_B = -20mA I_C = -1.0A, I_B = -100mA
Base-Emitter Turn-On Voltage (Note 12)	$V_{BE(on)}$	-	-	-1.0	V	I_C = -1A, V_{CE} = -5V
Base-Emitter Saturation Voltage (Note 12)	$V_{BE(sat)}$	-	-	-1.1	V	I_C = -1A, I_B = -50mA
Output Capacitance	C_{obo}	-	-	10	pF	V_{CB} = -10V, f = 1MHz
Transition Frequency	f_T	150	-	-	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz

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

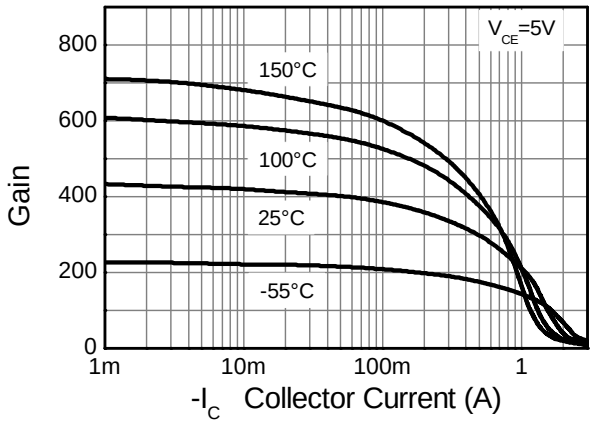
PNP - Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



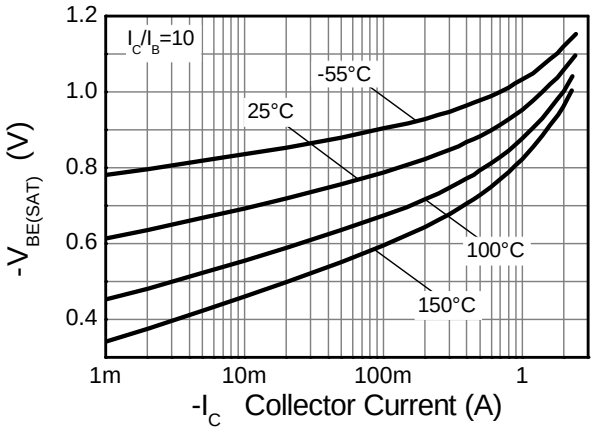
$V_{CE(SAT)}$ v I_C



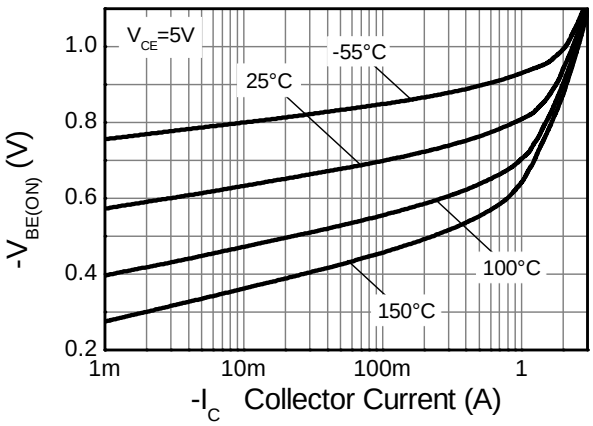
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



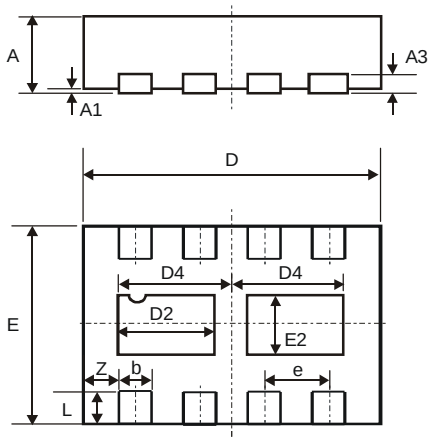
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

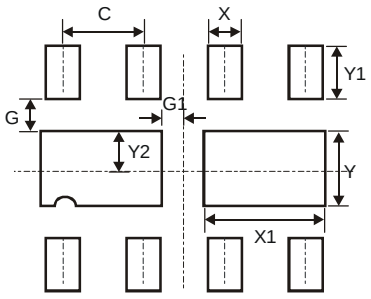
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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