

COMPLIMENTARY LOW SATURATION TRANSISTORS IN W-DFN3020-8
Features and Benefits
NPN Transistor

- $BV_{CEO} > 50V$
- $I_C = 4A$ Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT} = 68m\Omega$ for a Low Equivalent On-Resistance

PNP Transistor

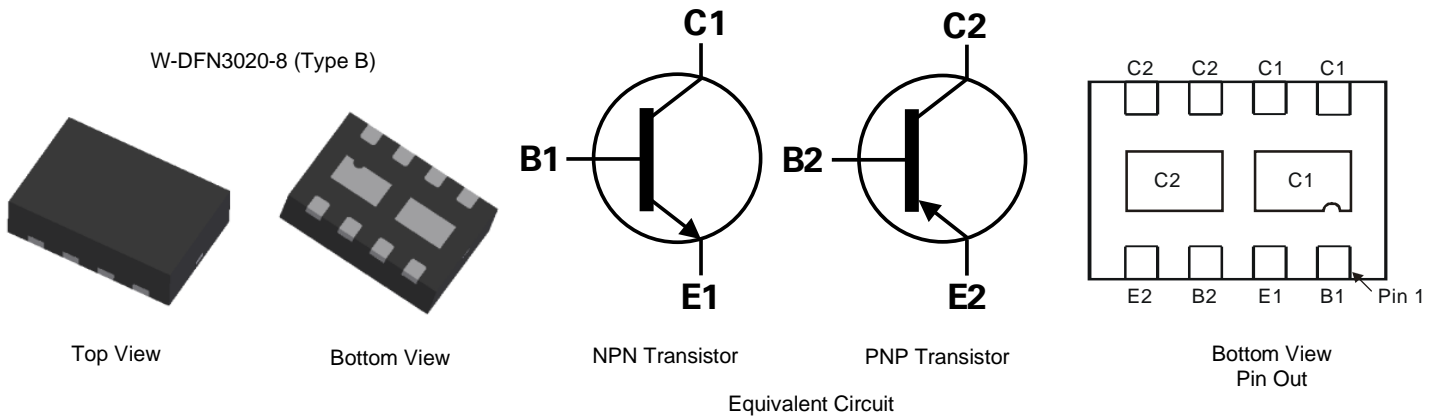
- $BV_{CEO} > -40V$
- $I_C = -3A$ Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT} = 104m\Omega$ for a Low Equivalent On-Resistance
- h_{FE} Characterized Up to 6A for High Current Gain Hold Up
- Low Profile 0.8mm High Package for Thin Applications
- $R_{\theta JA}$ Efficient, 40% Lower than SOT26
- 6mm² Footprint, 50% Smaller than TSOP6 and SOT26
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Package: W-DFN3020-8
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Terminals: Pre-Plated NiPdAu Leadframe. (e4)
- Nominal Package Height: 0.8mm
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.013 grams (Approximate)

Applications

- DC – DC converters
- Charging circuits
- Power switches
- Motor controls
- CCFL backlighting circuits
- Portable applications


Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZXTC6719MCTA	W-DFN3020-8 (Type B)	DC3	7	8	3000	Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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


DC3 = Product Type Marking Code
Dot Denotes Pin 1

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

Parameter		Symbol	NPN	PNP	Unit
Collector-Base Voltage		V_{CBO}	100	-50	V
Collector-Emitter Voltage		V_{CEO}	50	-40	
Emitter-Base Voltage		V_{EBO}	7	-7	
Peak Pulse Current		I_{CM}	6	-4	A
Continuous Collector Current	(Notes 5 & 8)	I_C	4	-3	
	(Notes 6 & 8)		4.5	-3.5	
Base Current		I_B	1		

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

Characteristic		Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	(Notes 5 & 8)	P_D	1.5		W mW/ $^\circ\text{C}$
			12		
	(Notes 6 & 8)		2.45		
			19.6		
	(Notes 7 & 8)		1.13		
	(Notes 7 & 9)	8			
		1.7			
		13.6			
Thermal Resistance, Junction to Ambient	(Notes 5 & 8)	$R_{\theta JA}$	83.3		$^\circ\text{C/W}$
	(Notes 6 & 8)		51.0		
	(Notes 7 & 8)		111		
	(Notes 7 & 9)		73.5		
Thermal Resistance, Junction to Lead	(Notes 8 & 10)	$R_{\theta JL}$	17.1		
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		$^\circ\text{C}$

- Notes:
5. For a dual device surface mounted on 28mm x 28mm (8cm²) FR4 PCB with high coverage of single sided 2oz 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.
 6. Same as note (5), except the device is measured at $t < 5\text{sec}$.
 7. Same as note (5), except the device is surface mounted on 31mm x 31mm (10cm²) FR4 PCB with high coverage of single sided 1oz copper.
 8. For a dual device with one active die.
 9. For dual device with 2 active die running at equal power.
 10. Thermal resistance from junction to solder-point (at the end of the collector lead).

Thermal Characteristics

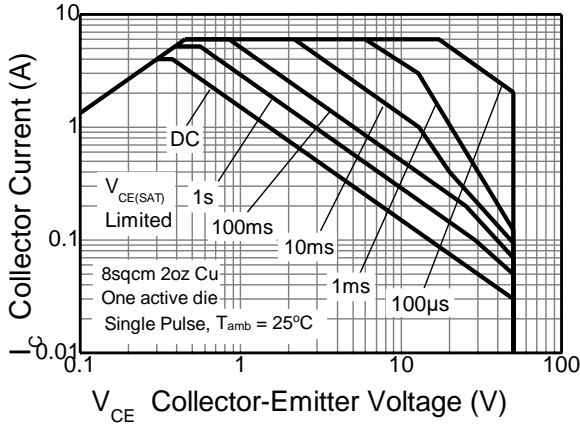


Fig 1. NPN Safe Operating Area

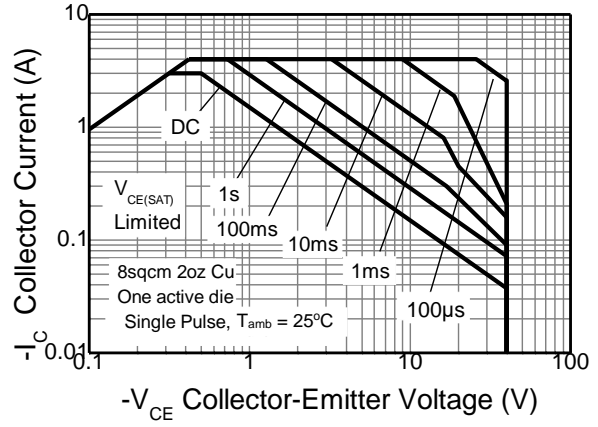


Fig 2. PNP Safe Operating Area

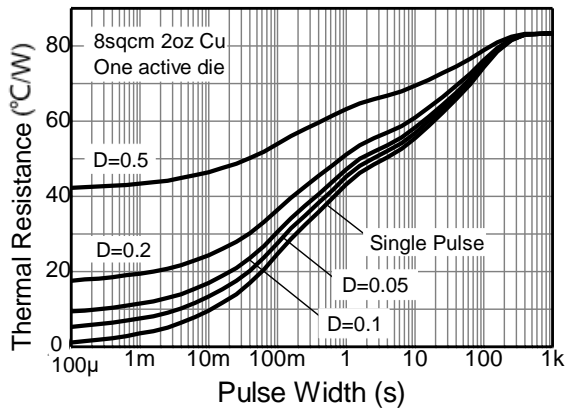


Fig 3. Transient Thermal Impedance

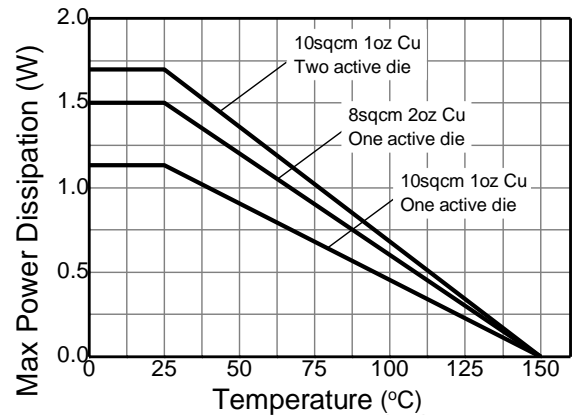


Fig 4. Derating Curve

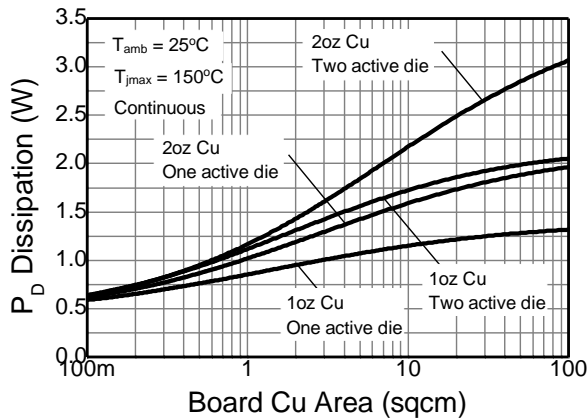


Fig 5. Power Dissipation v Board Area

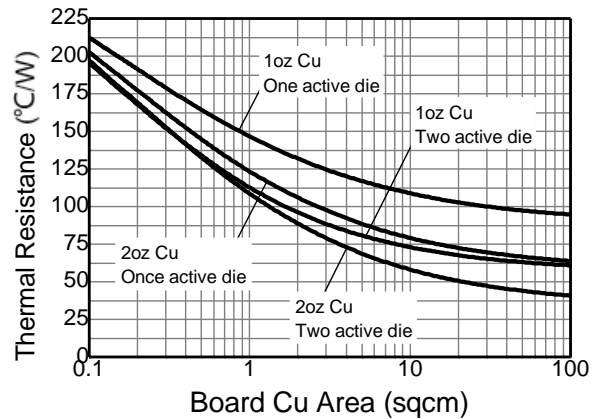


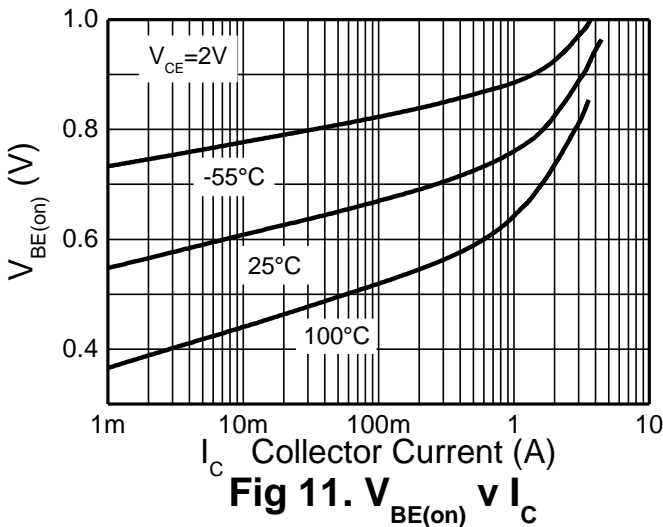
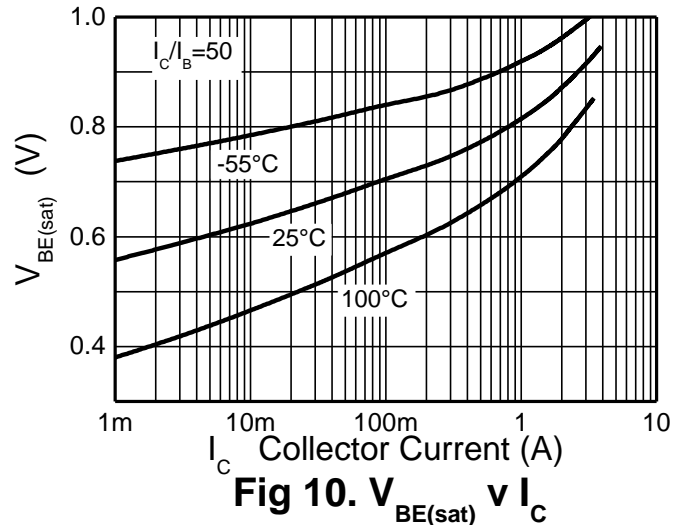
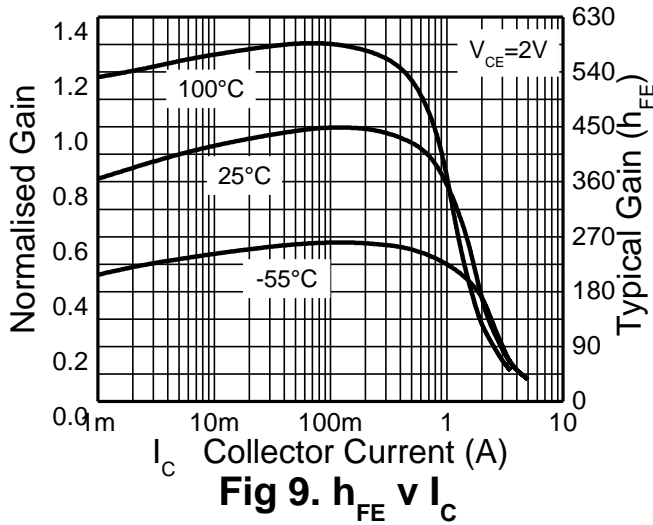
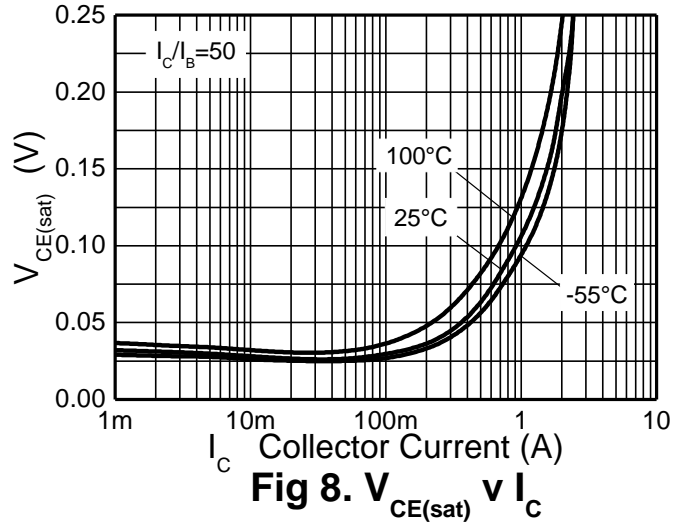
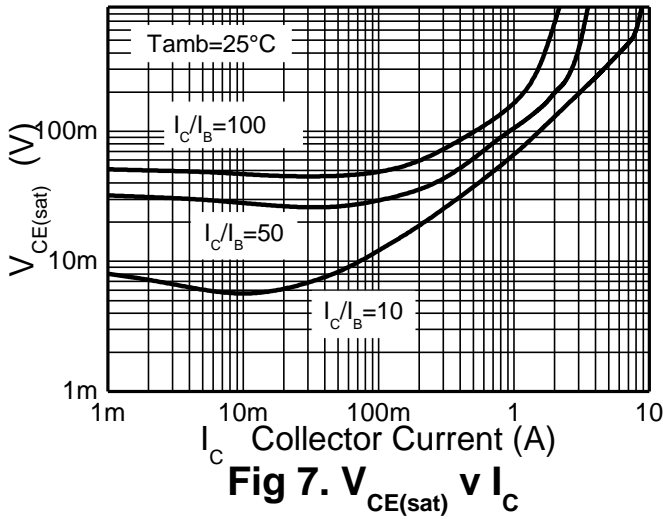
Fig 6. Thermal Resistance v Board Area

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V _{(BR)CBO}	100	190	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	V _{(BR)CEO}	50	65	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	7	8.2	—	V	I _E = 100μA
Collector Cutoff Current	I _{CBO}	—	—	100	nA	V _{CB} = 80V
Emitter Cutoff Current	I _{EBO}	—	—	100	nA	V _{EB} = 6V
Collector Emitter Cutoff Current	I _{CES}	—	—	100	nA	V _{CES} = 40V
Static Forward Current Transfer Ratio (Note 11)	h _{FE}	200	400	—	—	I _C = 10mA, V _{CE} = 2V
		300	450	—		I _C = 200mA, V _{CE} = 2V
		200	400	—		I _C = 1A, V _{CE} = 2V
		100	225	—		I _C = 2A, V _{CE} = 2V
		—	40	—		I _C = 6A, V _{CE} = 2V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	—	10	20	mV	I _C = 0.1A, I _B = 10mA
		—	145	200		I _C = 1A, I _B = 10mA
		—	70	100		I _C = 1A, I _B = 50mA
		—	115	220		I _C = 2A, I _B = 50mA
		—	225	300		I _C = 3A, I _B = 100mA
		—	270	320		I _C = 4A, I _B = 200mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	—	0.94	1.00	V	I _C = 4A, V _{CE} = 2V
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	1.00	1.07	V	I _C = 4A, I _B = 200mA
Output Capacitance	C _{obo}	—	12	20	pF	V _{CB} = 10V, f = 1MHz
Transition Frequency	f _T	100	165	—	MHz	V _{CE} = 10V, I _C = 50mA, f = 100MHz
Turn-on Time	t _{on}	—	170	—	ns	V _{CC} = 10V, I _C = 1A
Turn-off Time	t _{off}	—	750	—	ns	I _{B1} = I _{B2} = 10mA

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

NPN – Typical Electrical Characteristics



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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V _{(BR)CBO}	-50	-80	—	V	I _C = -100μA
Collector-Emitter Breakdown Voltage (Note 11)	V _{(BR)CEO}	-40	-70	—	V	I _C = -10mA
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	-7	-8.5	—	V	I _E = -100μA
Collector Cutoff Current	I _{CBO}	—	—	-100	nA	V _{CB} = -40V
Emitter Cutoff Current	I _{EBO}	—	—	-100	nA	V _{EB} = -6V
Collector Emitter Cutoff Current	I _{CES}	—	—	-100	nA	V _{CES} = -32V
Static Forward Current Transfer Ratio (Note 11)	h _{FE}	300 300 180 60 12	480 450 290 130 22	— — — — —	—	I _C = -10mA, V _{CE} = -2V I _C = -100mA, V _{CE} = -2V I _C = -1A, V _{CE} = -2V I _C = -1.5A, V _{CE} = -2V I _C = -3A, V _{CE} = -2V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	— — — — —	-25 -150 -195 -210 -260	-40 -220 -300 -300 -370	mV	I _C = -0.1A, I _B = -10mA I _C = -1A, I _B = -50mA I _C = -1.5A, I _B = -100mA I _C = -2A, I _B = -200mA I _C = -2.5A, I _B = -250mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	—	-0.89	-0.95	V	I _C = -2.5A, V _{CE} = -2V
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	-0.97	-1.05	V	I _C = -2.5A, I _B = -250mA
Output Capacitance	C _{obo}	—	19	25	pF	V _{CB} = -10V, f = 1MHz
Transition Frequency	f _T	150	190	—	MHz	V _{CE} = -10V, I _C = -50mA, f = 100MHz
Turn-on Time	t _{on}	—	40	—	ns	V _{CC} = -15V, I _C = -0.75A
Turn-off Time	t _{off}	—	435	—	ns	I _{B1} = I _{B2} = -10mA

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

PNP – Typical Electrical Characteristics

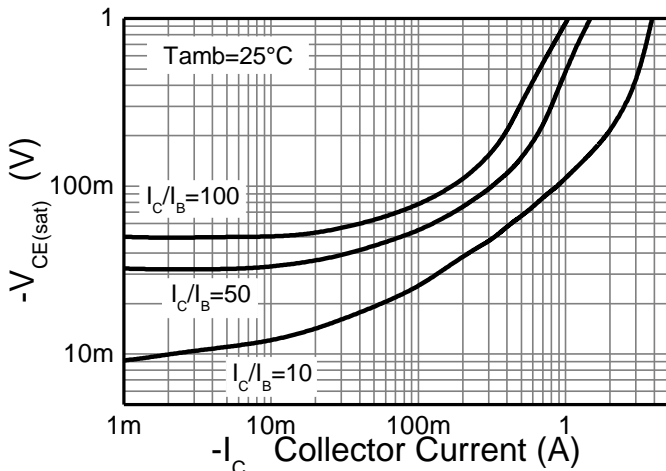


Fig 12. $V_{CE(sat)}$ v I_C

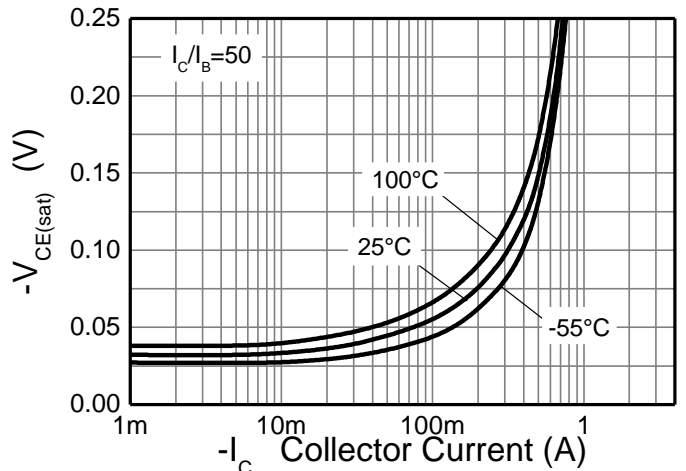


Fig 13. $V_{CE(sat)}$ v I_C

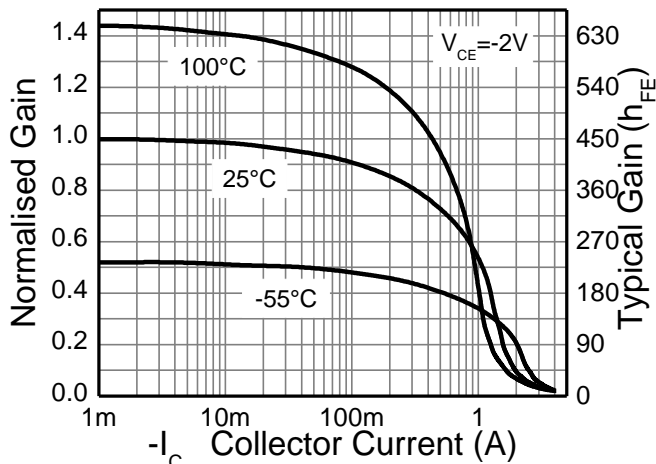


Fig 14. h_{FE} v I_C

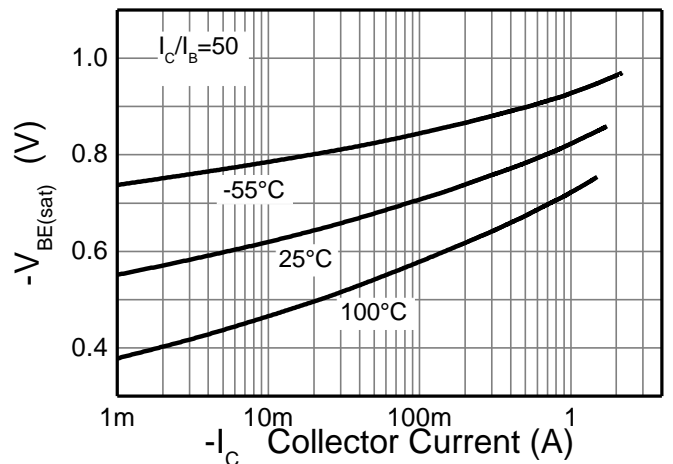


Fig 15. $V_{BE(sat)}$ v I_C

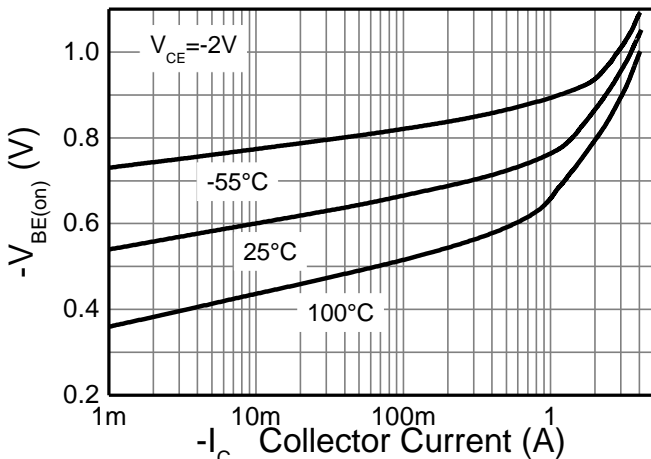
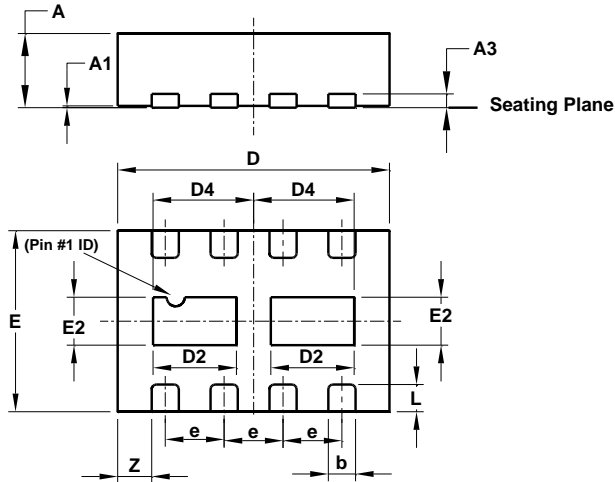


Fig 16. $V_{BE(on)}$ v I_C

Package Outline Dimensions

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

W-DFN3020-8 (Type B)

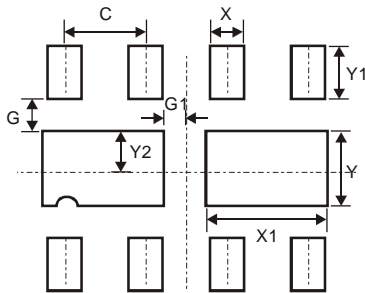


W-DFN3020-8 Type B			
Dim	Min	Max	Typ
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
Z	-	-	0.375
All Dimensions in mm			

Suggested Pad Layout

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

W-DFN3020-8 (Type B)



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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