# ZXTC6719MC

## DUAL 50V NPN & 40V PNP LOW SATURATION TRANSISTOR COMBINATION

## Features and Benefits

NPN Transistor
- $BV_{CEO}$ > 50V
- $I_C$ = 4A Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT}$ = 68mΩ for a low equivalent On-Resistance

PNP Transistor
- $BV_{CEO}$ > -40V
- $I_C$ = -3A Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT}$ = 104mΩ 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
- $6mm^2$ footprint, 50% smaller than TSOP6 and SOT26
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

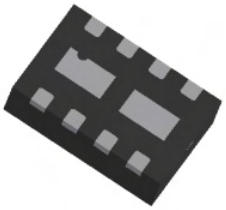
- Case: DFN3020B-8
- Case material: Molded Plastic. "Green" Molding Compound.
- Terminals: Pre-Plated NiPdAu leadframe.
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.013 grams (approximate)

## Applications

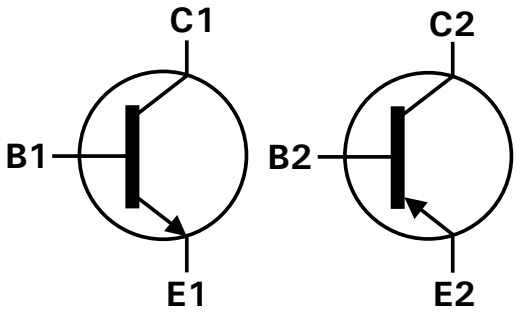
- DC – DC Converters
- Charging circuits
- Power switches
- Motor control
- CCFL Backlighting circuits
- Portable applications

DFN3020B-8

Top View

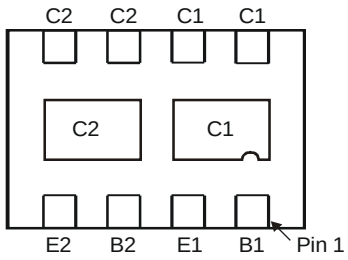


Bottom View




NPN Transistor

PNP Transistor




Bottom View
Pin Out

Equivalent Circuit

## Ordering Information (Note 3)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| ZXTC6719MCTA | DC3 | 7 | 8 | 3000 |

Notes:
1. No purposefully added lead.
2. Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com
3. For Packaging Details, go to our website at http://www.diodes.com.

## Marking Information


DC3 = Product type Marking Code
Dot denotes Pin 1

## Maximum Ratings @ $T_A$ = 25°C unless otherwise specified

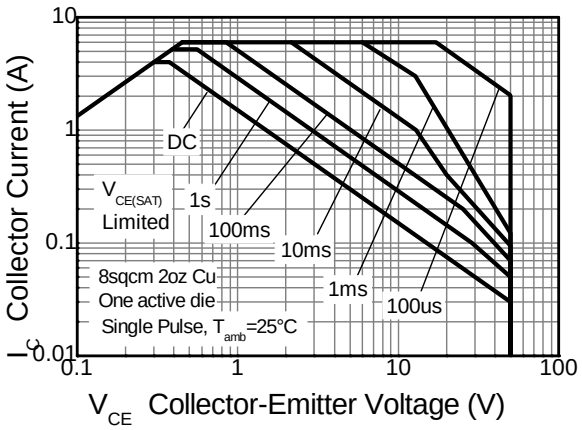
| Parameter | | Symbol | NPN | PNP | Unit |
|---|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | 100 | -50 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | 50 | -40 | |
| Emitter-Base Voltage | | $V_{EBO}$ | 7 | -7 | |
| Peak Pulse Current | | $I_{CM}$ | 6 | -4 | A |
| Continuous Collector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

## Thermal Characteristics @ $T_A$ = 25°C unless otherwise specified

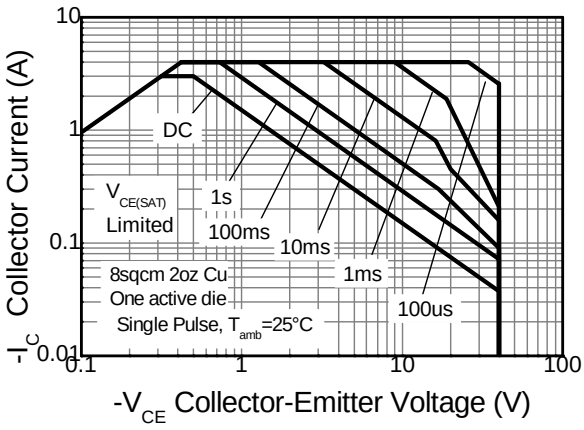
| Characteristic | | Symbol | NPN | PNP | Unit |
|---|---|---|---|---|---|
| Power Dissipation<br>Linear Derating Factor | (Notes 4 & 7) | $P_D$ | 1.5<br>12 | | W<br>mW/°C |
| | (Notes 5 & 7) | | 2.45<br>19.6 | | |
| | (Notes 6 & 7) | | 1.13<br>8 | | |
| | (Notes 6 & 8) | | 1.7<br>13.6 | | |
| Thermal Resistance, Junction to Ambient | (Notes 4 & 7) | $R_{\theta JA}$ | 83.3 | | °C/W |
| | (Notes 5 & 7) | | 51.0 | | |
| | (Notes 6 & 7) | | 111 | | |
| | (Notes 6 & 8) | | 73.5 | | |
| Thermal Resistance, Junction to Lead | (Notes 7 & 9) | $R_{\theta JL}$ | 17.1 | | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | | °C |

Notes:
4. 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.
5. Same as note (3), except the device is measured at t <5 sec.
6. Same as note (3), except the device is surface mounted on 31mm x 31mm (10cm$^2$) FR4 PCB with high coverage of single sided 1oz copper.
7. For a dual device with one active die.
8. For dual device with 2 active die running at equal power.
9. Thermal resistance from junction to solder-point (at the end of the collector lead).

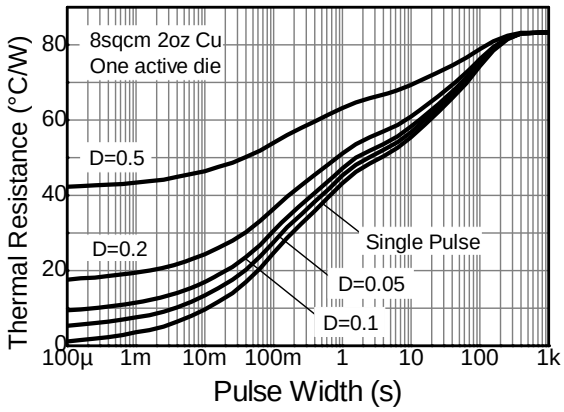
## Thermal Characteristics



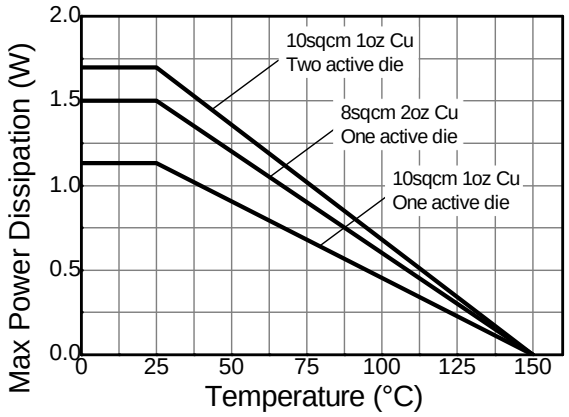

**NPN Safe Operating Area**



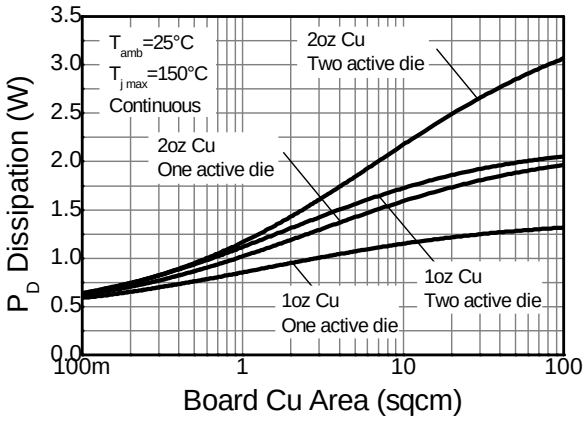

**PNP Safe Operating Area**



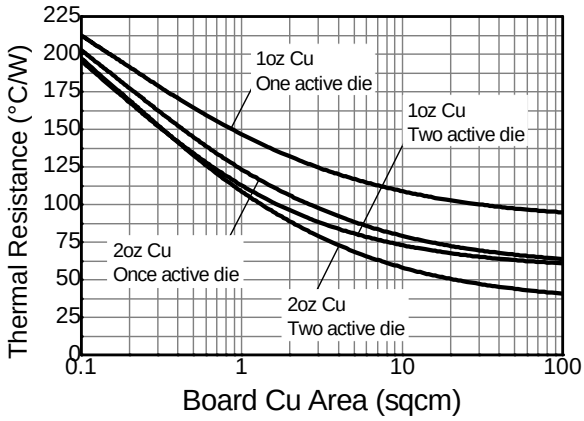

**Transient Thermal Impedance**




**Derating Curve**




**Power Dissipation v Board Area**



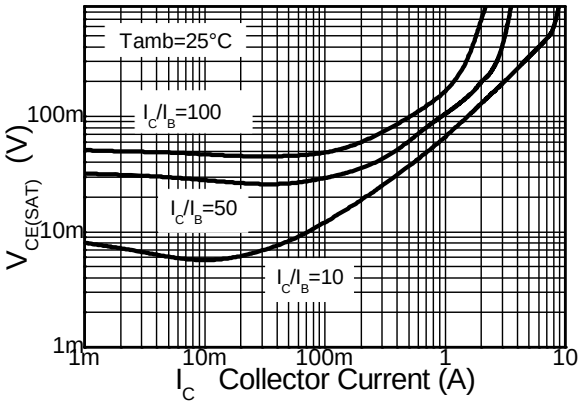

**Thermal Resistance v Board Area**

## NPN - Electrical Characteristics @ $T_A$ = 25°C unless otherwise specified

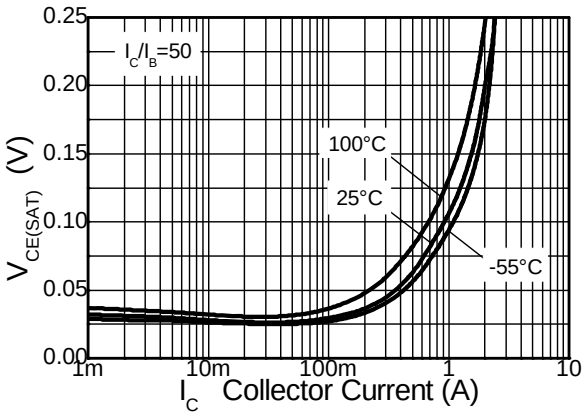
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 100 | 190 | - | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 10) | $V_{(BR)CEO}$ | 50 | 65 | - | V | $I_C$ = 10mA |
| Emitter-Base 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 10) | $h_{FE}$ | 200<br>300<br>200<br>100<br>- | 400<br>450<br>400<br>225<br>40 | -<br>-<br>-<br>-<br>- | - | $I_C$ = 10mA, $V_{CE}$ = 2V<br>$I_C$ = 200mA, $V_{CE}$ = 2V<br>$I_C$ = 1A, $V_{CE}$ = 2V<br>$I_C$ = 2A, $V_{CE}$ = 2V<br>$I_C$ = 6A, $V_{CE}$ = 2V |
| Collector-Emitter Saturation Voltage (Note 10) | $V_{CE(sat)}$ | -<br>-<br>-<br>-<br>-<br>- | 10<br>145<br>70<br>115<br>225<br>270 | 20<br>200<br>100<br>220<br>300<br>320 | mV | $I_C$ = 0.1A, $I_B$ = 10mA<br>$I_C$ = 1A, $I_B$ = 10mA<br>$I_C$ = 1A, $I_B$ = 50mA<br>$I_C$ = 2A, $I_B$ = 50mA<br>$I_C$ = 3A, $I_B$ = 100mA<br>$I_C$ = 4A, $I_B$ = 200mA |
| Base-Emitter Turn-On Voltage (Note 10) | $V_{BE(on)}$ | - | 0.94 | 1.00 | V | $I_C$ = 4A, $V_{CE}$ = 2V |
| Base-Emitter Saturation Voltage (Note 10) | $V_{BE(sat)}$ | - | 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 |

Notes: 10. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%

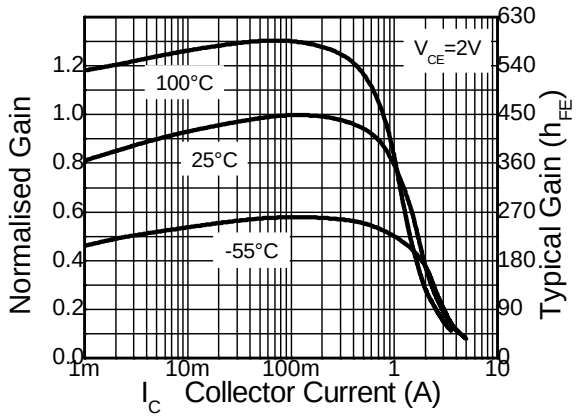
## NPN – Typical Electrical Characteristics



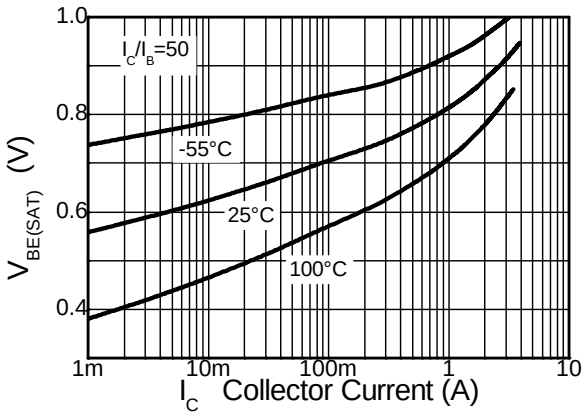

**$V_{CE(SAT)}$ v $I_C$**



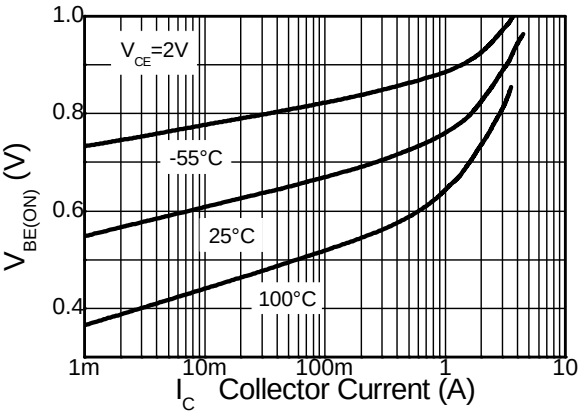

**$V_{CE(SAT)}$ v $I_C$**




**$h_{FE}$ v $I_C$**




**$V_{BE(SAT)}$ v $I_C$**



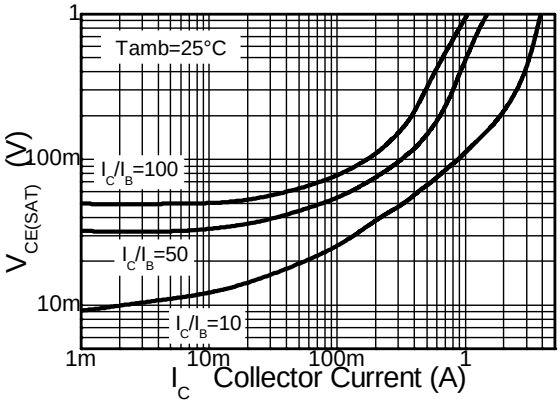

**$V_{BE(ON)}$ v $I_C$**

## PNP - Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

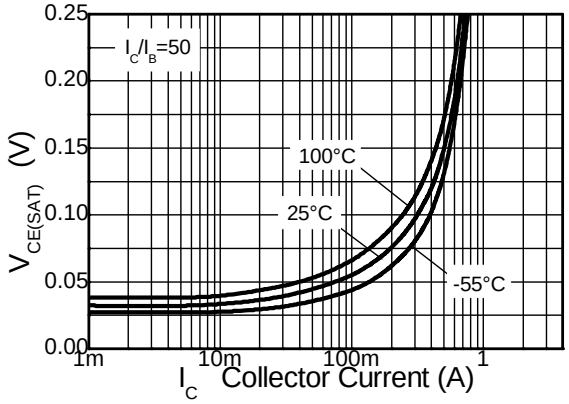
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -50 | -80 | - | V | $I_C$ = -100µA |
| Collector-Emitter Breakdown Voltage (Note 11) | $V_{(BR)CEO}$ | -40 | -70 | - | V | $I_C$ = -10mA |
| Emitter-Base 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<br>300<br>180<br>60<br>12 | 480<br>450<br>290<br>130<br>22 | -<br>-<br>-<br>-<br>- | - | $I_C$ = -10mA, $V_{CE}$ = -2V<br>$I_C$ = -100mA, $V_{CE}$ = -2V<br>$I_C$ = -1A, $V_{CE}$ = -2V<br>$I_C$ = -1.5A, $V_{CE}$ = -2V<br>$I_C$ = -3A, $V_{CE}$ = -2V |
| Collector-Emitter Saturation Voltage (Note 11) | $V_{CE(sat)}$ | -<br>-<br>-<br>-<br>- | -25<br>-150<br>-195<br>-210<br>-260 | -40<br>-220<br>-300<br>-300<br>-370 | mV | $I_C$ = -0.1A, $I_B$ = -10mA<br>$I_C$ = -1A, $I_B$ = -50mA<br>$I_C$ = -1.5A, $I_B$ = -100mA<br>$I_C$ = -2A, $I_B$ = -200mA<br>$I_C$ = -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 |

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

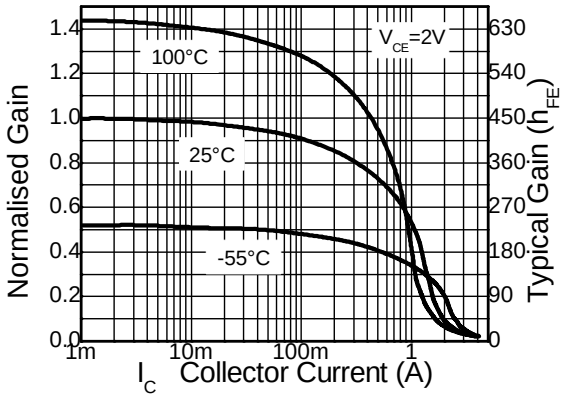
## PNP – Typical Electrical Characteristics



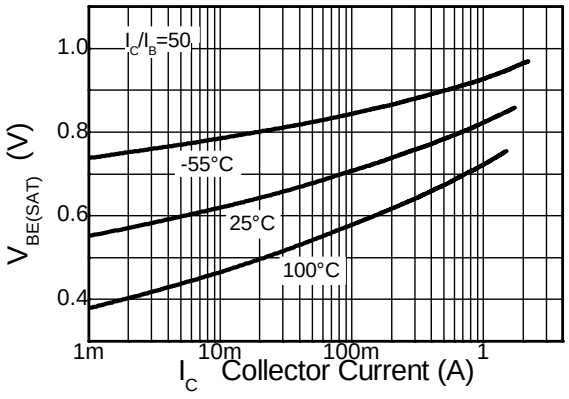

**$V_{CE(SAT)}$ v $I_C$**



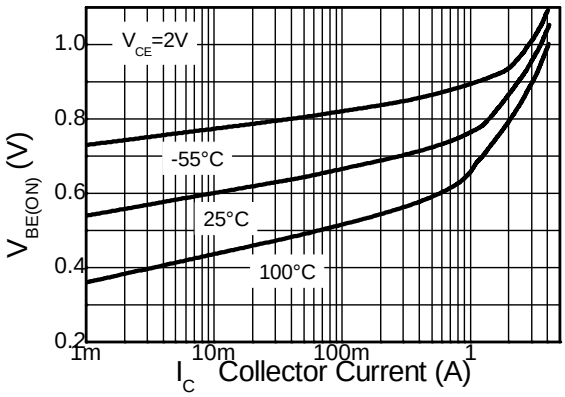

**$V_{CE(SAT)}$ v $I_C$**




**$h_{FE}$ v $I_C$**

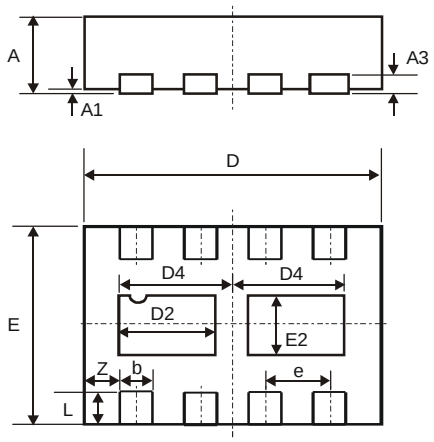



**$V_{BE(SAT)}$ v $I_C$**



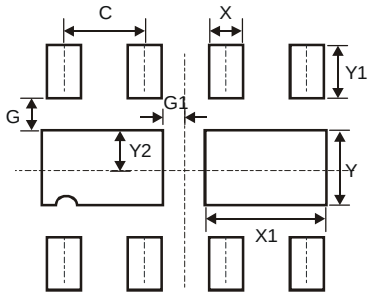

**$V_{BE(ON)}$ v $I_C$**

## Package Outline Dimensions




| DFN3020B-8 | | | |
|---|---|---|---|
| **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




| 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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