

## Description

Advanced process capability has been used to maximise the performance of this 60V, NPN transistor. The U-DFN2020-3 (Type B) package offers lower profile and the derating up to +175°C allows higher dissipation for applications where power density is of utmost importance.

## Features

- $BV_{CEO} > 60V$
- $I_C = 4A$  Continuous Collector Current
- Low Saturation Voltage (100mV Max @1A)
- $R_{SAT} = 60m\Omega$  for a Low Equivalent On-Resistance
- $h_{FE}$  Specified up to 6A for High Current Gain Hold Up
- Tighter Gain Specification
- Low Profile 0.6mm High Package for Thin Applications
- $R_{\theta JA}$  Efficient, 60% Lower than SOT23
- 4mm<sup>2</sup> Footprint, 50% Smaller than SOT23
- Rated +175°C – Ideal for High Temperature Environment
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DXTN10060DFJBQ is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.**

## Mechanical Data

- Case: U-DFN2020-3
- Nominal Package Height: 0.6mm
- 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 (64)
- Weight: 0.01 grams (Approximate)

## Applications

- Automotive Systems
  - MOSFET Gate Driving
  - DC-DC Converters
  - Motor Control
  - Power Switches

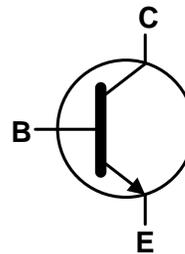
U-DFN2020-3 (Type B)



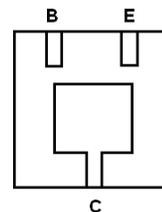
Top View



Bottom View



Device Symbol



Bottom View  
Pin-Out

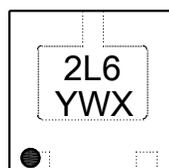
## Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DXTN10060DFJBQ-7	Automotive	2L6	7	8	3,000

- 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

U-DFN2020-3 (Type B)



2L6 = Product Type Marking Code  
 Y = Year: 0~9  
 W = Week: A~Z: 1~26 Week;  
           a~z: 27~52 Week; z Represents  
           52 and 53 Week  
 X = A~Z: Internal Code

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

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	V <sub>CBO</sub>	100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	
Emitter-Base Voltage	V <sub>EBO</sub>	8	
Peak Pulse Current	I <sub>CM</sub>	6	A
Continuous Collector Current	(Note 5)	4	
	(Note 6)	4.3	
Base Current	I <sub>B</sub>	1	

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

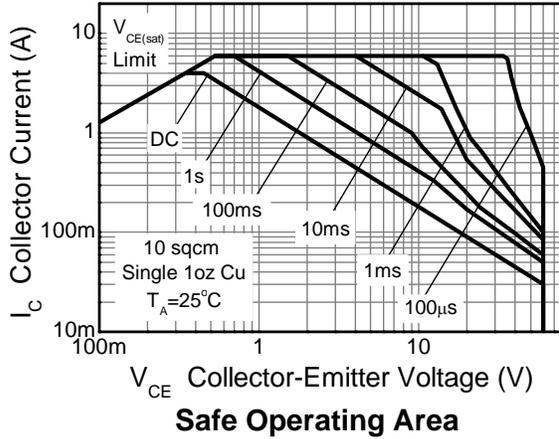
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.8	W mW/°C
		12	
		2.94 19.6	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	83	°C/W
		51	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	16.8	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	

**ESD Ratings** (Note 8)

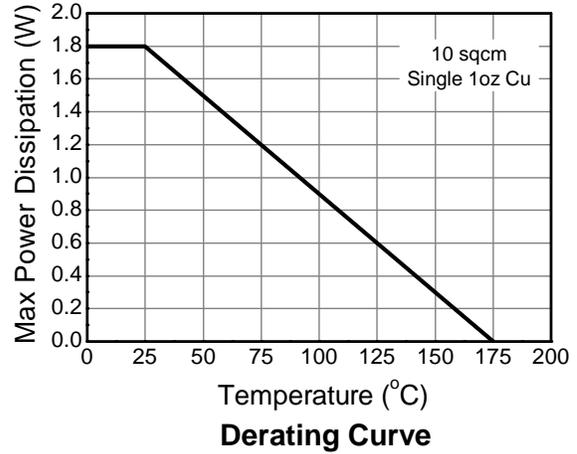
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the exposed collector pad on 31mm × 31mm (10cm<sup>2</sup>) 1oz copper that is on a single sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state. The entire exposed collector pad is attached to the heatsink.
  6. Same as Note 5, except the device is measured at t ≤ 5s.
  7. Thermal resistance from junction to solder-point (on the exposed collector pad).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

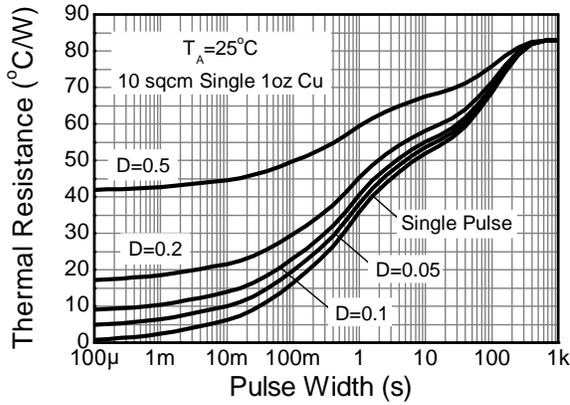
**Thermal Characteristics and Derating Information**



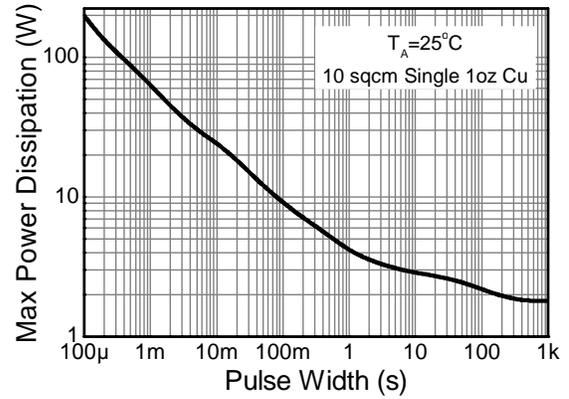
**Safe Operating Area**



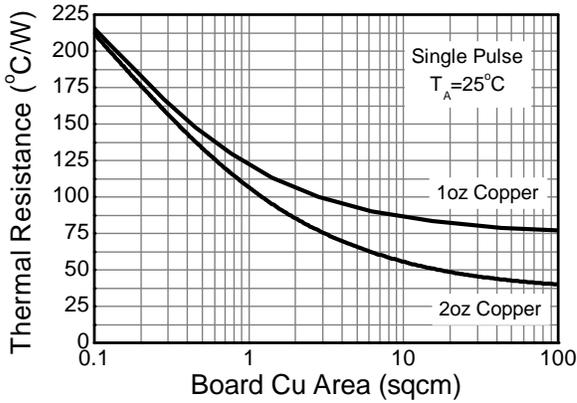
**Derating Curve**



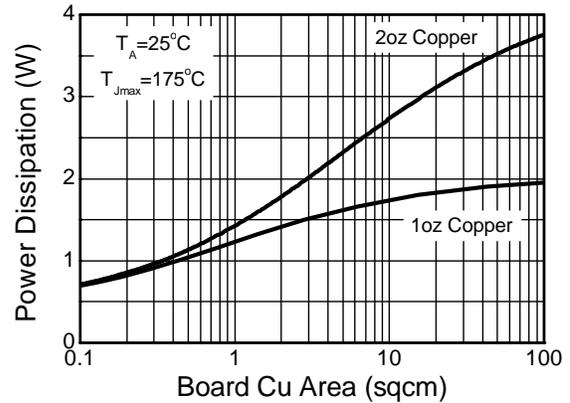
**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Thermal Resistance vs. Board Area**



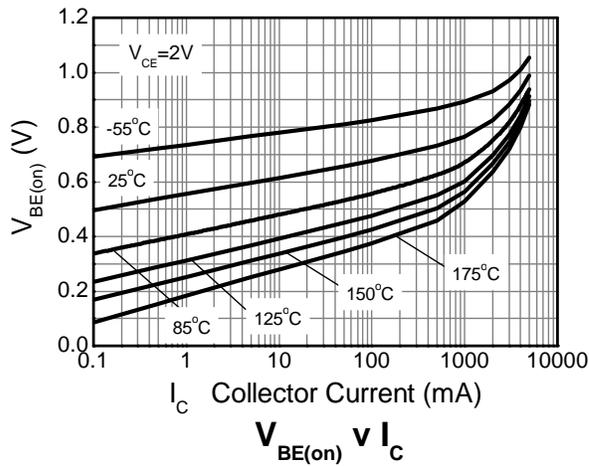
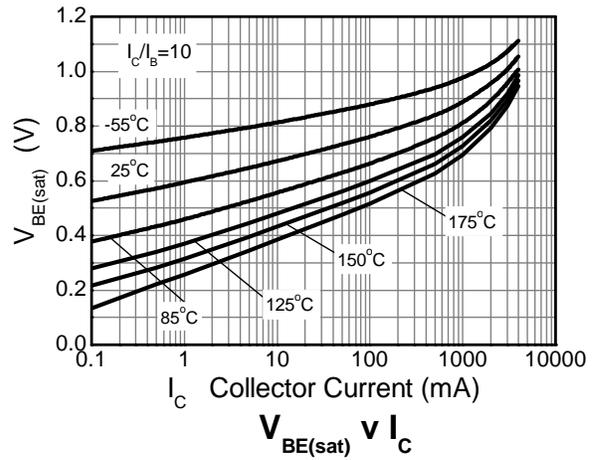
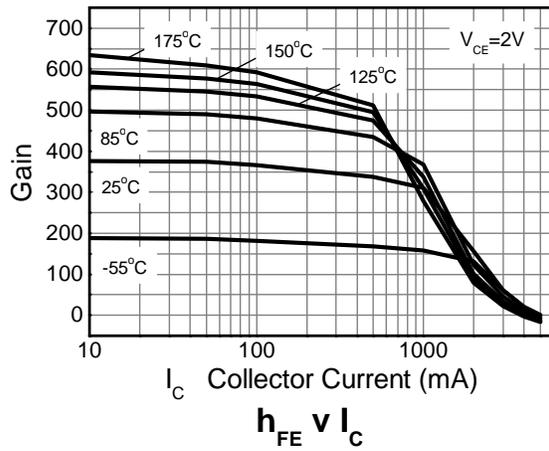
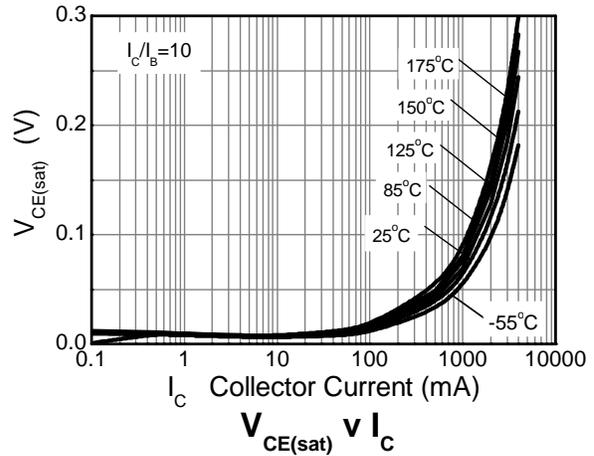
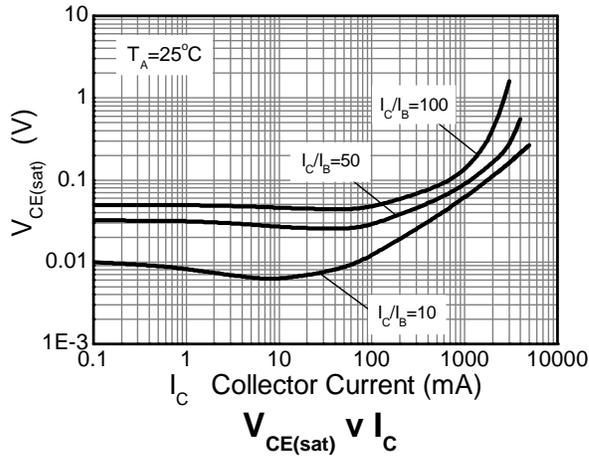
**Power Dissipation vs. Board Area**

**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>	150	187	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	60	66	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	8	9	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	2	100	nA	V <sub>CB</sub> = 120V
Emitter Cutoff Current	I <sub>EBO</sub>	—	2	100	nA	V <sub>EB</sub> = 7V
Collector Emitter Cutoff Current	I <sub>CES</sub>	—	2	100	nA	V <sub>CES</sub> = 48V
Static Forward Current Transfer Ratio (Note 9)	h <sub>FE</sub>	250	444	550	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V
		340	425	500		I <sub>C</sub> = 200mA, V <sub>CE</sub> = 2V
		250	363	—		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		140	205	—		I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
		20	40	—		I <sub>C</sub> = 6A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	—	12	20	mV	I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA
		—	70	100		I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA
		—	125	160		I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
		—	150	200		I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA
		—	200	300		I <sub>C</sub> = 3A, I <sub>B</sub> = 100mA
		—	240	320		I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	—	0.94	1.00	V	I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	—	1.00	1.07	V	I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Output Capacitance	C <sub>obo</sub>	—	14	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	125	—	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 100MHz
Turn-On Time	t <sub>ON</sub>	—	200	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A
Turn-Off Time	t <sub>OFF</sub>	—	700	—	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 10mA

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

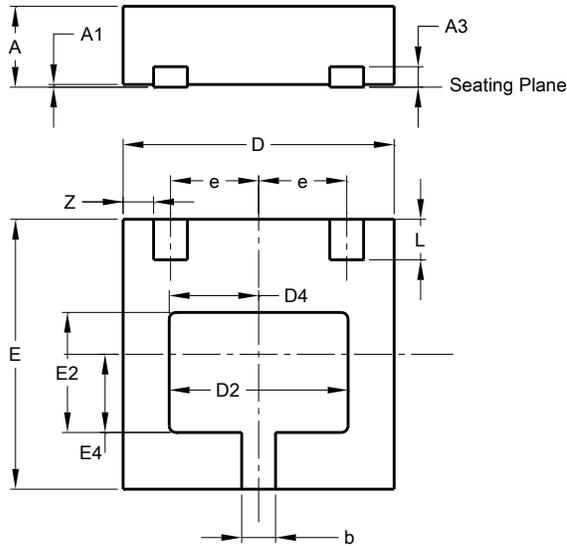
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

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

**U-DFN2020-3 (Type B)**

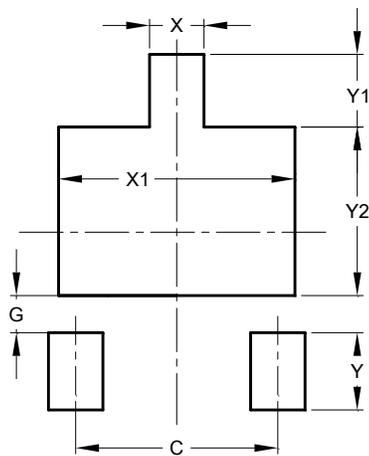


U-DFN2020-3 (Type B)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.02
A3	—	—	0.152
b	0.20	0.30	0.25
D	1.950	2.075	2.00
D2	1.22	1.42	1.32
D4	0.56	0.76	0.66
E	1.950	2.075	2.00
E2	0.79	0.99	0.89
E4	0.48	0.68	0.58
e	—	—	0.65
L	0.25	0.35	0.30
Z	—	—	0.225
All Dimensions in mm			

**Suggested Pad Layout**

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

**U-DFN2020-3 (Type B)**



Dimensions	Value (in mm)
C	1.300
G	0.240
X	0.350
X1	1.520
Y	0.500
Y1	0.470
Y2	1.090

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