Description

Advanced process capability has been used to maximise the performance of this 60V, NPN transistor. The W-DFN2020-3/SWP (Type A) 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} = 60mΩ for a Low Equivalent On-Resistance
- h_{FE} Specified up to 6A for High Current Gain Hold Up
- Tighter Gain Specification
- Low Profile 0.62mm High Package for Thin Applications
- Sidewall Tin Plating for Wettable Flanks in AOI
- $R_{\theta JA}$ Efficient, 60% Lower than SOT23
- 4mm^2 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 DXTN10060DFJBWQ 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.**

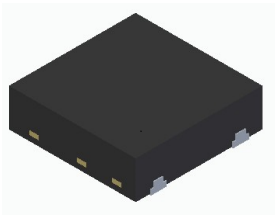
Mechanical Data

- Case: W-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 - Matte Tin, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.01 grams (Approximate)

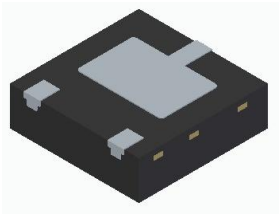
Applications

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

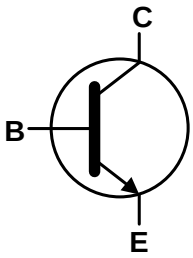
W-DFN2020-3/SWP (Type A)



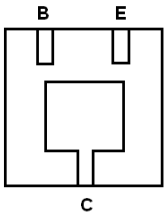
Top View



Bottom View



Device Symbol



Bottom View
Pin-Out

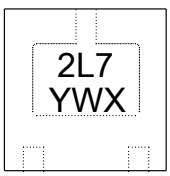
Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DXTN10060DFJBWQ-7	Automotive	2L7	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

W-DFN2020-3/SWP (Type A)



2L7 = 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_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector-Base Voltage		V_{CBO}	100	V
Collector-Emitter Voltage		V_{CEO}	60	
Emitter-Base Voltage		V_{EBO}	8	
Peak Pulse Current		I_{CM}	6	A
Continuous Collector Current	(Note 5)	I_C	4	
	(Note 6)		4.3	
Base Current		I_B	1	

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

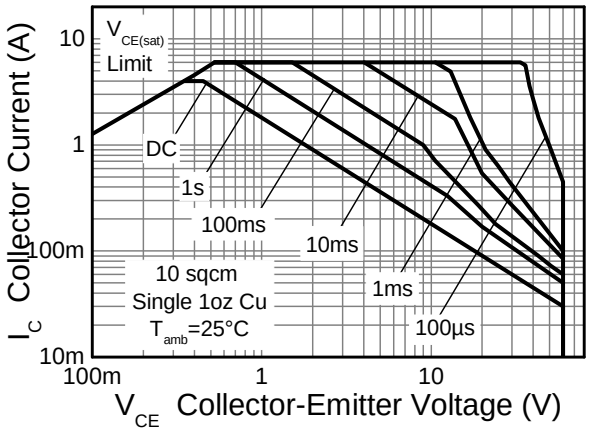
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1.8	W
Linear Derating Factor			12	mW/°C
	(Note 6)		2.94	W
			19.6	mW/°C
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	83	°C/W
	(Note 6)		51	
Thermal Resistance, Junction to Lead	(Note 7)	$R_{\theta JL}$	16.8	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

ESD Ratings (Note 8)

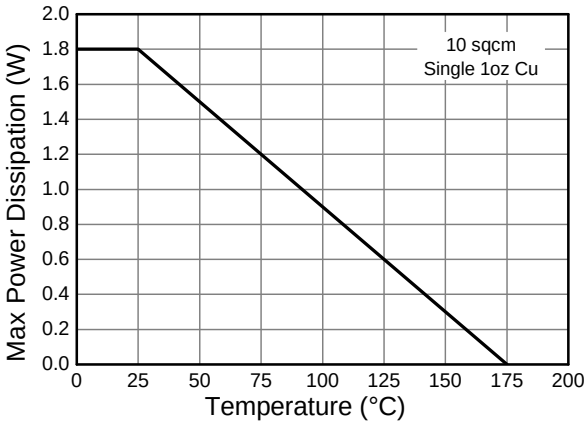
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the exposed collector pad on 31mm x 31mm (10cm^2) 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 ≤ 5 sec.
7. Thermal resistance from junction to solder-point (on the exposed collector pad).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

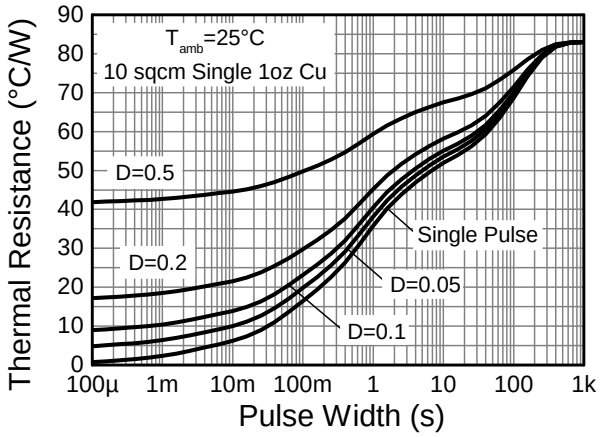
Thermal Characteristics and Derating Information



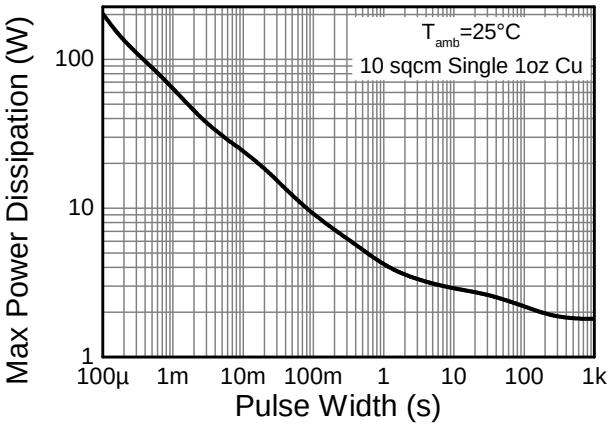
Safe Operating Area



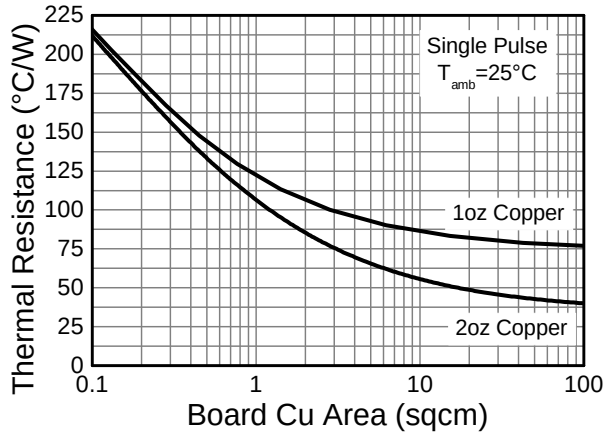
Derating Curve



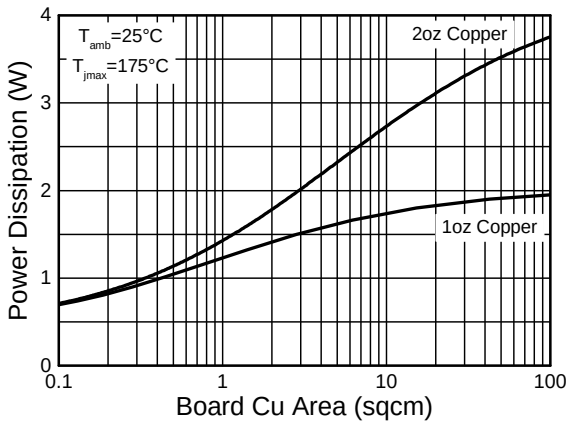
Transient Thermal Impedance



Pulse Power Dissipation



Thermal Resistance vs. Board Area



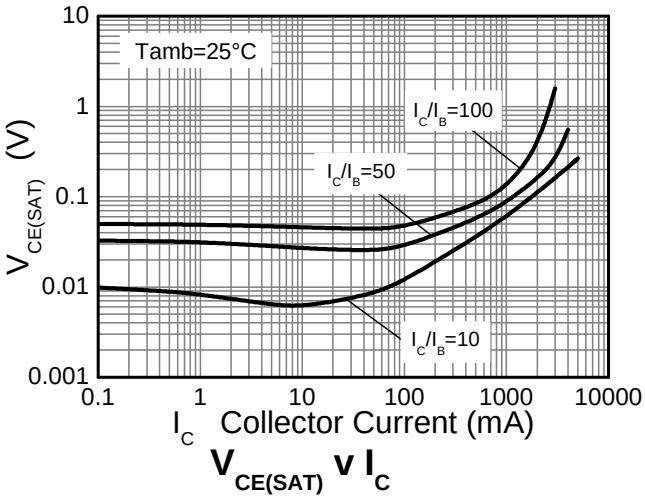
Power Dissipation vs. Board Area

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

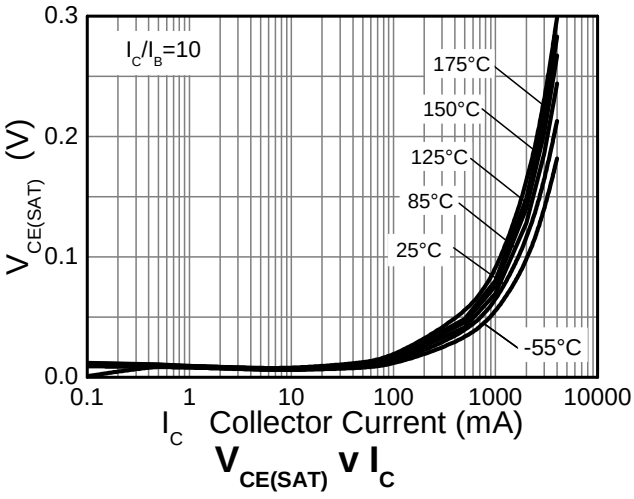
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	150	187	-	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	60	66	-	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	8	9	-	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	-	2	100	nA	V_{CB} = 120V
Emitter Cutoff Current	I_{EBO}	-	2	100	nA	V_{EB} = 7V
Collector Emitter Cutoff Current	I_{CES}	-	2	100	nA	V_{CES} = 48V
Static Forward Current Transfer Ratio (Note 9)	h_{FE}	250 340 250 140 20	444 425 363 205 40	550 500 -- -- --	-	I_C = 10mA, V_{CE} = 2V I_C = 200mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V I_C = 2A, V_{CE} = 2V I_C = 6A, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	-- -- -- -- -- --	12 70 125 150 200 240	20 100 160 200 300 320	mV	I_C = 0.1A, I_B = 10mA I_C = 1A, I_B = 50mA I_C = 1A, I_B = 10mA I_C = 2A, I_B = 50mA I_C = 3A, I_B = 100mA I_C = 4A, I_B = 200mA
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(ON)}$	--	0.94	1.00	V	I_C = 4A, V_{CE} = 2V
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	--	1.00	1.07	V	I_C = 4A, I_B = 200mA
Output Capacitance	C_{obo}	--	14	--	pF	V_{CB} = 10V. f = 1MHz
Transition Frequency	f_T	125	--	--	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz
Turn-On Time	t_{ON}	--	200	--	ns	V_{CC} = 10V, I_C = 1A
Turn-Off Time	t_{OFF}	--	700	--	ns	I_{B1} = -I_{B2} = 10mA

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

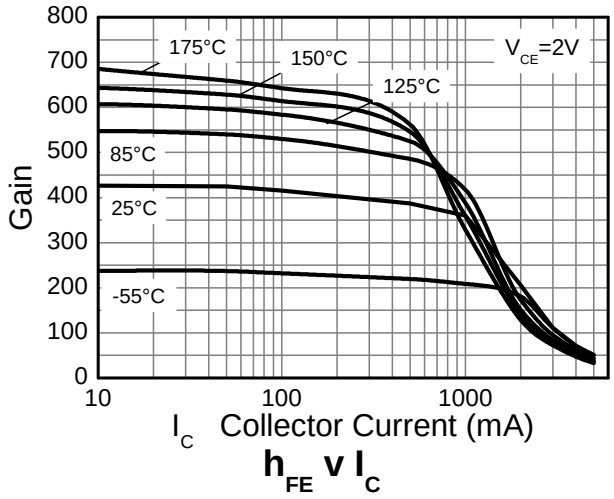
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



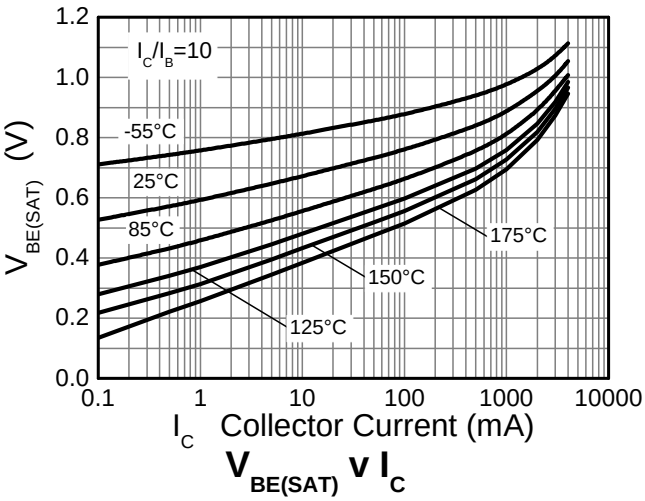
$V_{CE(SAT)}$ v I_C



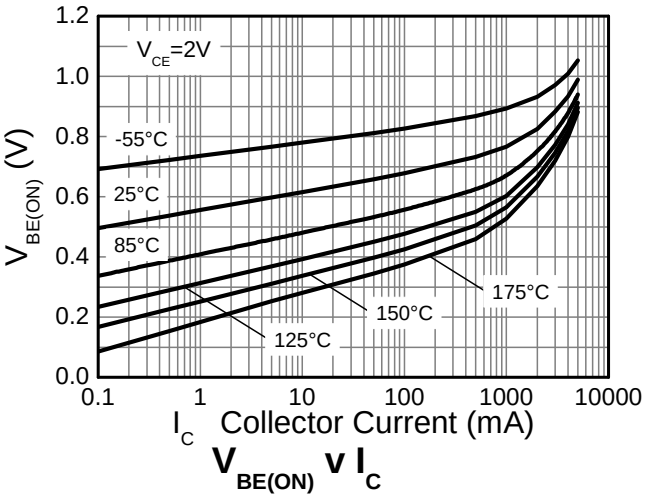
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

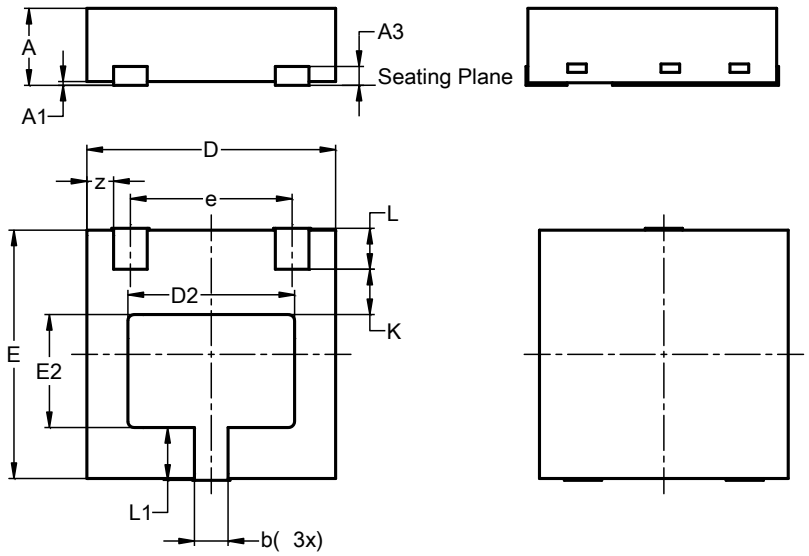


$V_{BE(ON)}$ v I_C

Package Outline Dimensions

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

W-DFN2020-3/SWP (Type A)

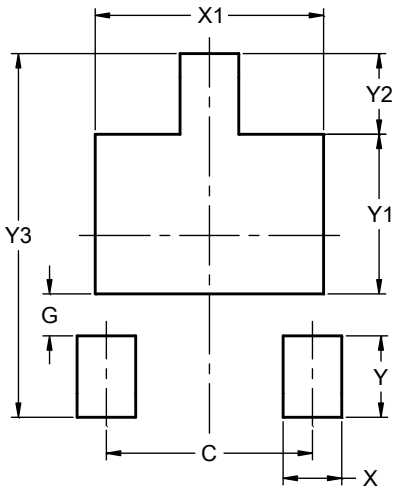


W-DFN2020-3 /SWP (Type A)			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.67	0.62
A1	0.00	0.05	0.03
A3	—	—	0.152
b	0.22	0.32	0.27
D	1.95	2.05	2.00
D2	1.24	1.44	1.34
D4	0.56	0.76	0.66
E	1.95	2.05	2.00
E2	0.81	1.01	0.91
e	—	—	1.30
k	—	—	0.365
L	0.28	0.38	0.33
L1	0.375	0.475	0.425
z	—	—	0.215
All Dimensions in mm			

Suggested Pad Layout

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

W-DFN2020-3/SWP (Type A)



Dimensions	Value (in mm)
C	1.300
G	0.265
X	0.370
X1	1.440
Y	0.515
Y1	1.010
Y2	0.510
Y3	2.300

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