

## Features

- $BV_{CEO} > -60V$
- $BV_{EBO} > -8V$
- Continuous Current  $I_C$  to -4.5A
- Peak Pulse Current  $I_{CM}$  to -10A
- Ultra-Low Saturation Voltage  $V_{CE(sat)} < -65mV @ -1A$
- High Current  $R_{CE(sat)} = 42m\Omega$  Typical
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Wettable Flank for Improved Optical Inspection
- Rated to  $+175^\circ C$  – Ideal for High-Temperature Environments
- Complementary NPN Type: [DXTN78060DFG](#)
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under a separate datasheet ([DXTP78060DFGQ](#))**

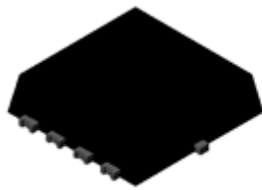
## Mechanical Data

- Package: PowerDI<sup>®</sup>3333-8
- Package 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: 0.03 grams (Approximate)

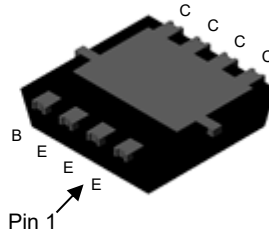
## Applications

- MOSFET & IGBT gate drivers
- Load switches
- Low-voltage regulation
- DC to DC converters
- Motors, solenoids, relays and actuator drivers control

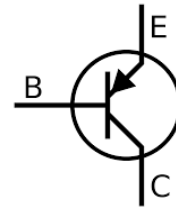
PowerDI3333-8/SWP (Type UX)



Top View



Bottom View



Device Symbol

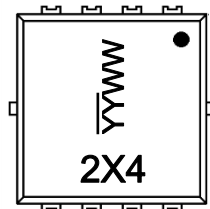
## Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DXTP78060DFG-7	PowerDI3333-8/SWP (Type UX)	2X4	7	12	2,000	Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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

PowerDI3333-8/SWP (Type UX)



2X4 = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Two Digits of Year (ex: 25 = 2025)  
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-70	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-8	V
Continuous Collector Current (Note 5)	I <sub>C</sub>	-2.5	A
Continuous Collector Current (Note 7)	I <sub>C</sub>	-4.5	A
Peak Pulse Current	I <sub>CM</sub>	-10	A

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

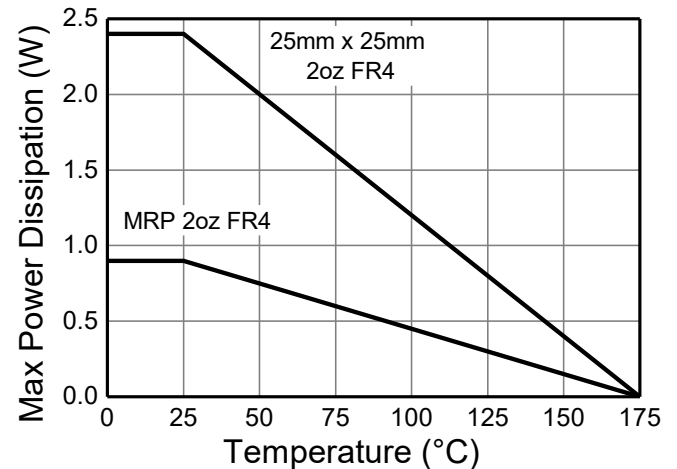
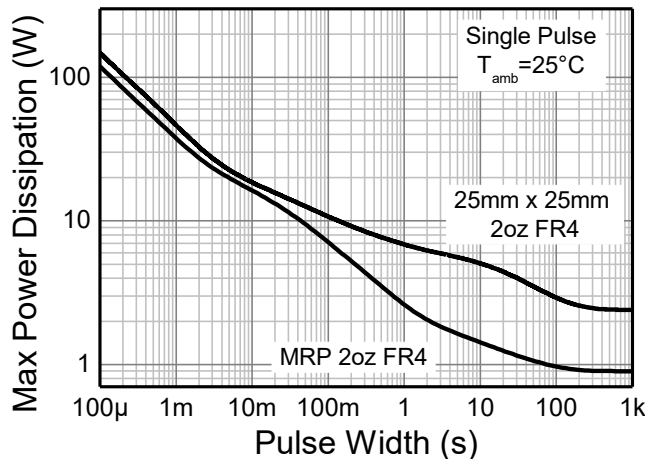
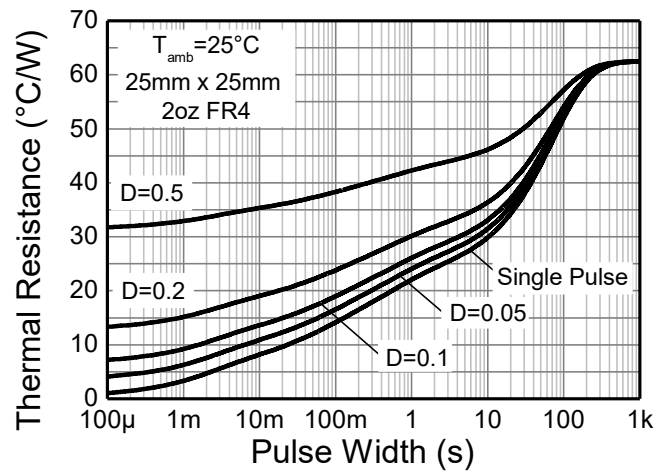
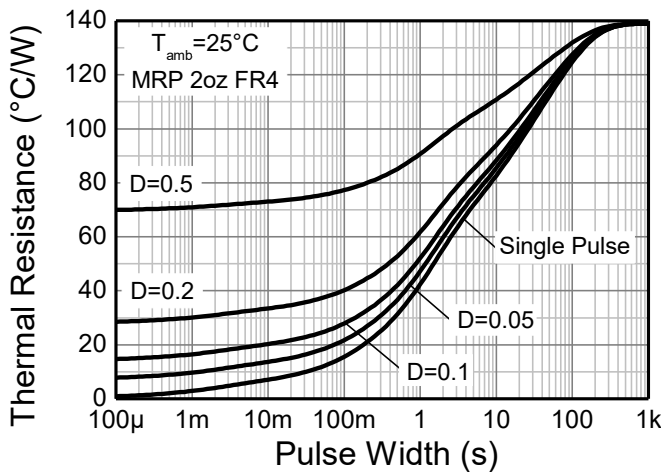
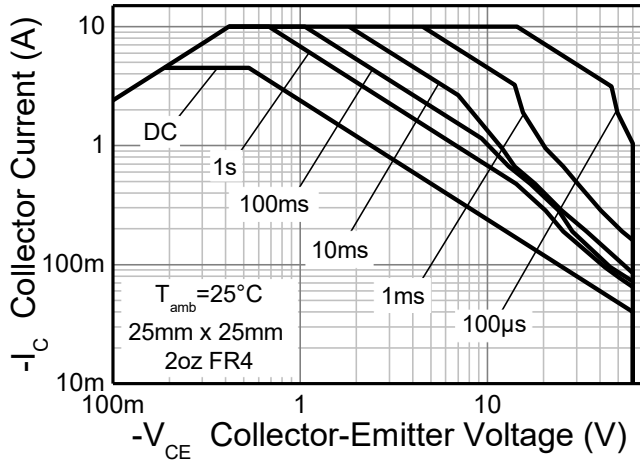
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	900	mW
		1.6	W
		2.4	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	140	°C/W
		92	°C/W
		62.5	°C/W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	8	°C/W
Thermal Resistance, Junction to Lead (Note 8)	R <sub>θJL</sub>	6.5	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

## ESD Ratings (Note 9)

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
Electrostatic Discharge - Charged Device Model	ESD CDM	1,000	V	IV

- Notes:
5. For a device mounted with the collector tab on MRP FR4-PCB; device is measured under still air conditions whilst operating in a steady state.
  6. Same as Note 5, except the device is mounted on 15mm x 15mm 2oz copper.
  7. Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
  8. Thermal resistance from junction to solder-point (at the collector tab).
  9. Refer to JEDEC specifications JESD22-A114, JESD22-A115 and JESD22-C101.

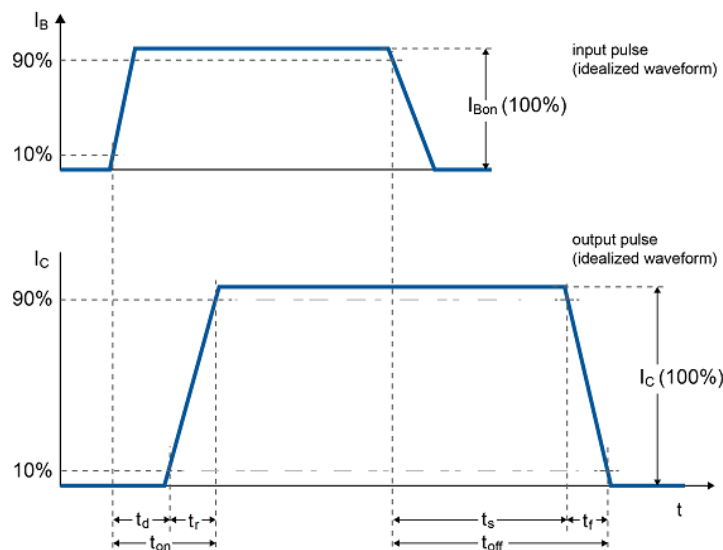
## Thermal Characteristics and Derating Information



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

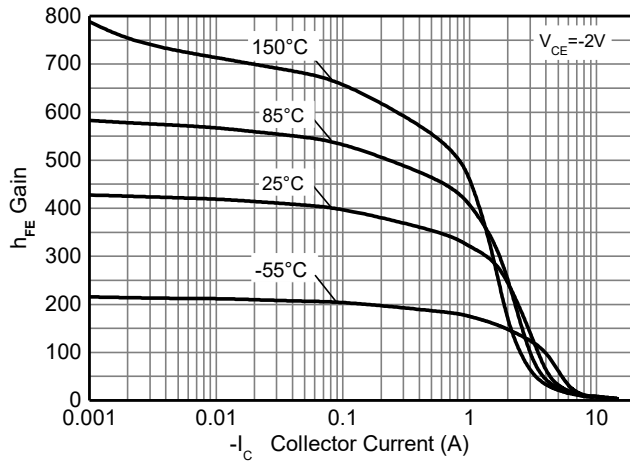
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-70	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	-60	—	—	V	I <sub>C</sub> = -10mA
Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	-5	—	—	V	I <sub>E</sub> = -100μA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-8	—	—	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	—	-100	nA	V <sub>CB</sub> = -70V
		—	—	-10	μA	V <sub>CB</sub> = -70V, T <sub>A</sub> = +125°C
Collector Cutoff Current	I <sub>CES</sub>	—	—	-300	nA	V <sub>CE</sub> = -48V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	-50	nA	V <sub>EB</sub> = -7V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(sat)</sub>	—	-70	—	mV	I <sub>C</sub> = -100mA, I <sub>B</sub> = -1mA
		—	-75	-110	mV	I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA
		—	-52	-65	mV	I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA
		—	-180	-250	mV	I <sub>C</sub> = -2.5A, I <sub>B</sub> = -125mA
		—	-220	-350	mV	I <sub>C</sub> = -4.5A, I <sub>B</sub> = -450mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	—	-860	-950	mV	I <sub>C</sub> = -2.5A, I <sub>B</sub> = -125mA
		—	-960	-1,050	mV	I <sub>C</sub> = -4.5A, I <sub>B</sub> = -450mA
Base-Emitter Turn-On Voltage (Note 10)	V <sub>BE(on)</sub>	—	-750	-850	mV	I <sub>C</sub> = -2.5A, V <sub>CE</sub> = -2V
		—	-810	-900	mV	I <sub>C</sub> = -4.5A, V <sub>CE</sub> = -2V
DC Current Gain (Note 10)	h <sub>FE</sub>	250	355	—	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V
		300	350	550	—	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V
		240	315	—	—	I <sub>C</sub> = -1A, V <sub>CE</sub> = -2V
		130	310	—	—	I <sub>C</sub> = -2.5A, V <sub>CE</sub> = -2V
		20	40	—	—	I <sub>C</sub> = -4.5A, V <sub>CE</sub> = -2V
Input Capacitance	C <sub>ibo</sub>	—	300	—	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
Output Capacitance	C <sub>obo</sub>	—	25	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	200	320	—	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -100mA f = 50MHz
Turn-On Time	t <sub>d</sub>	—	12	—	ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -2.5A I <sub>B1</sub> = -I <sub>B2</sub> = -250mA
	t <sub>r</sub>	—	60	—	ns	
Turn-Off Time	t <sub>s</sub>	—	175	—	ns	
	t <sub>f</sub>	—	21	—	ns	

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

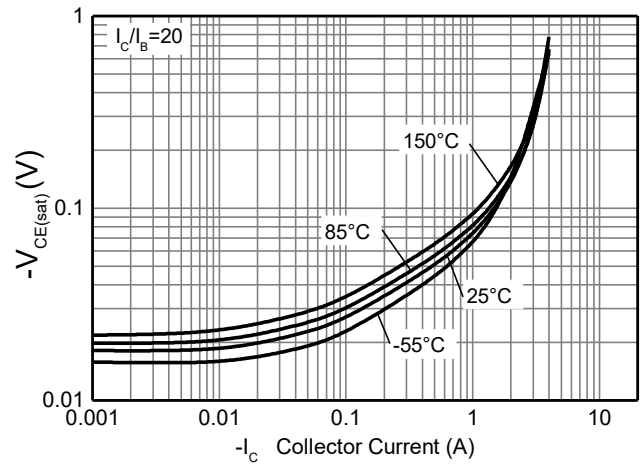


**Fig 6. Timing Waveform**

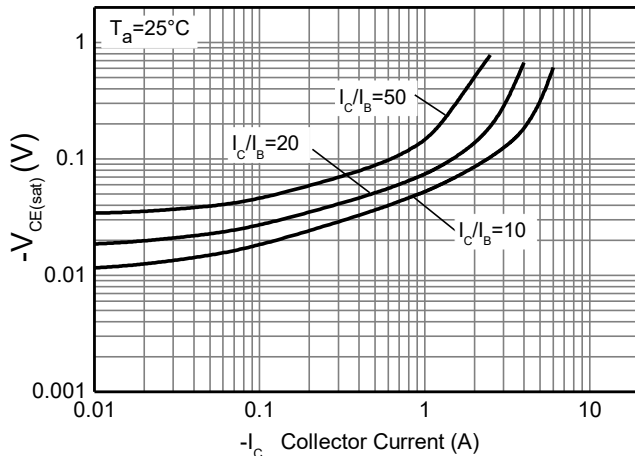
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



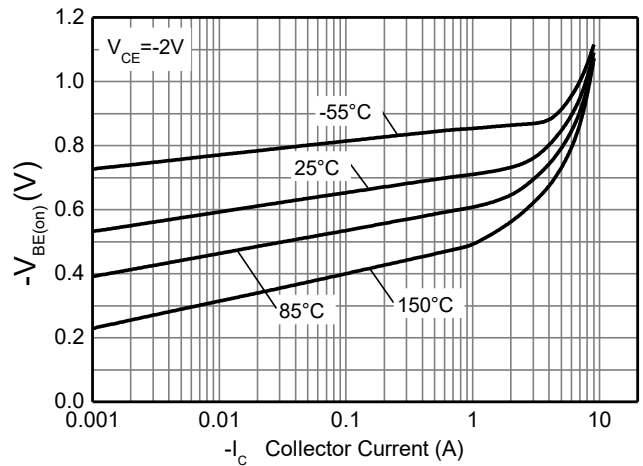
**Fig. 7**  $h_{FE} \text{ v } I_C$



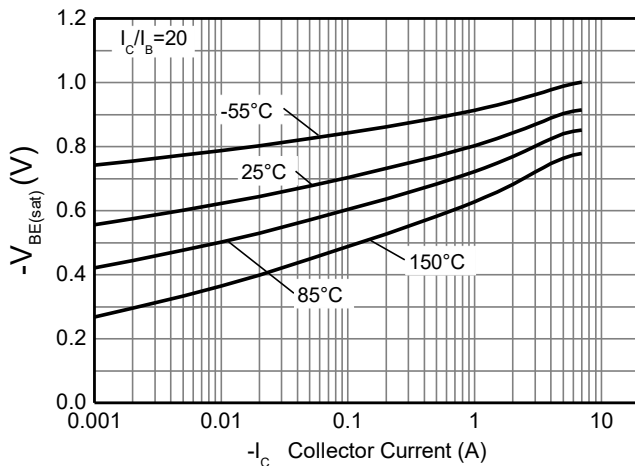
**Fig. 8**  $V_{CE(sat)} \text{ v } I_C$



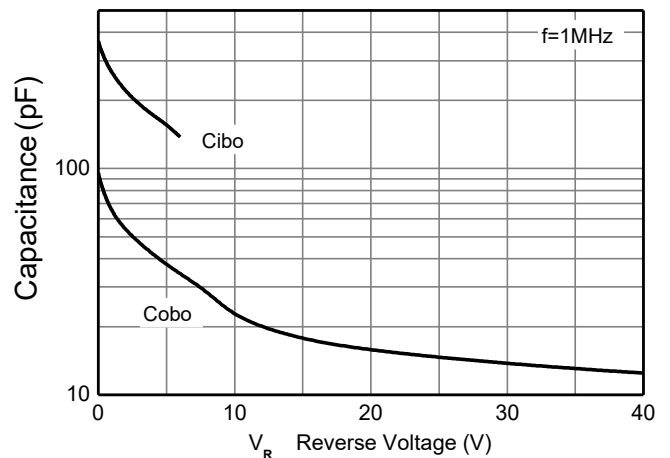
**Fig. 9**  $V_{CE(sat)} \text{ v } I_C$



**Fig. 10**  $V_{BE(on)} \text{ v } I_C$

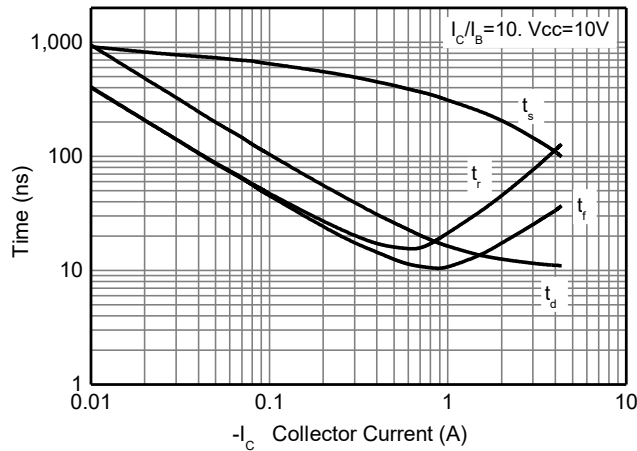
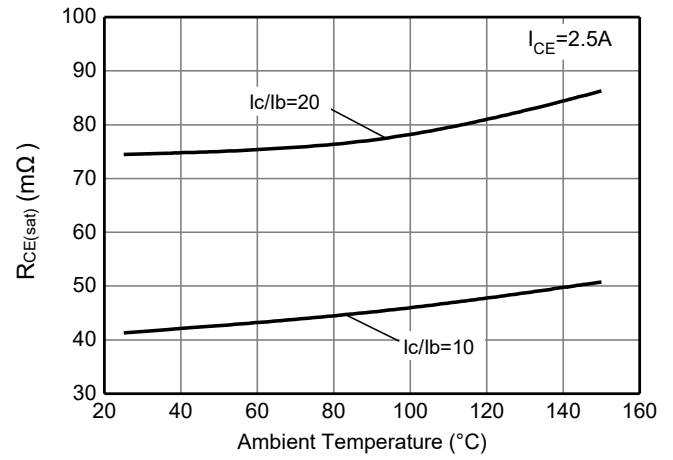
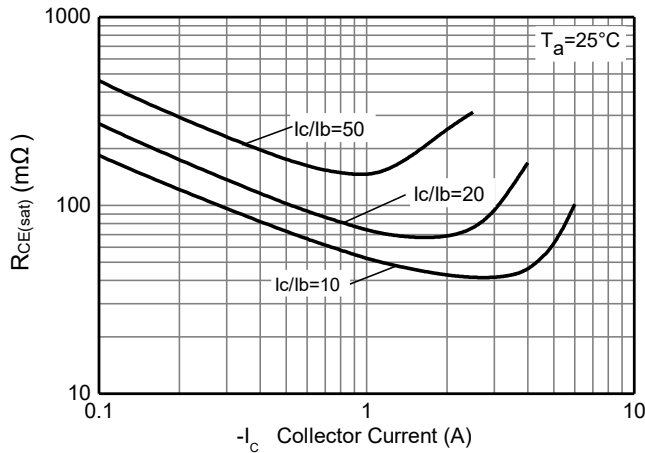


**Fig. 11**  $V_{BE(sat)} \text{ v } I_C$



**Fig. 12** Typical Junction Capacitance

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



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

Technical drawing of a square plate with four raised corners. The drawing includes a top view, a side view, and two detail views.

**Top View:** Shows the square plate with overall dimensions  $D$  and  $E$ . The inner dimensions are  $D1$  and  $E1$ . The corner dimensions are  $E2$ ,  $E3$ ,  $E4$ ,  $D2$ ,  $k$ ,  $b$ , and  $e$ .

**Side View:** Shows the height  $A$  and the corner radius  $R$ .

**Detail A:** Shows the corner profile with dimensions  $0.150$  and  $0.050$ .

<b>PowerDI3333-8/SWP (Type UX)</b>			
<b>Dim</b>	<b>Min</b>	<b>Max</b>	<b>Typ</b>
<b>A</b>	0.75	0.85	0.80
<b>A1</b>	0.00	0.05	--
<b>b</b>	0.25	0.40	0.32
<b>c</b>	0.10	0.25	0.15
<b>D</b>	3.20	3.40	3.30
<b>D1</b>	2.95	3.15	3.05
<b>D2</b>	2.30	2.70	2.50
<b>E</b>	3.20	3.40	3.30
<b>E1</b>	2.95	3.15	3.05
<b>E2</b>	1.60	2.00	1.80
<b>E3</b>	0.95	1.35	1.15
<b>E4</b>	0.10	0.30	0.20
<b>e</b>	--	--	0.65
<b>k</b>	0.50	0.90	0.70
<b>L</b>	0.30	0.50	0.40
<b>θ</b>	0°	12°	10°
<b>All Dimensions in mm</b>			

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

The figure consists of two parts. The top part is a cross-sectional view of a periodic structure. It shows a central rectangular region with a width of  $X_4$  and a height of  $Y_6$ . This central region is surrounded by a layer of thickness  $Y_5$ . Above this layer, there are four rectangular protrusions of width  $X_1$  and height  $Y_1$ . The distance between the centers of these protrusions is  $X_3$ . The total width of the structure is  $X_4$ , and the total height is  $Y_6$ . The distance from the center of the central region to the center of one of the protrusions is  $X_2$ . The distance from the center of the central region to the edge of the structure is  $X_3$ . The distance from the center of the central region to the edge of the structure is  $Y_2$ . The distance from the center of the central region to the edge of the structure is  $Y_3$ . The distance from the center of the central region to the edge of the structure is  $Y_4$ . The distance from the center of the central region to the edge of the structure is  $Y_5$ . The distance from the center of the central region to the edge of the structure is  $Y_6$ .

The bottom part is a top-down view of the unit cell. It shows a rectangular unit cell with a width of  $X$  and a height of  $Y$ . The unit cell is divided into four rectangular regions of width  $C$  and height  $Y$ . The distance between the centers of these regions is  $X$ .

Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.600
X4	3.500
Y	0.700
Y1	0.550
Y2	1.650
Y3	0.600
Y4	2.450
Y5	0.400
Y6	3.700

Note: 11. Side wall tin plated package for wettable flanks in AOI.

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