30V NPN ULTRA-LOW VCE(sat) TRANSISTOR IN PowerDI3333-8

Features

- BV_{CEO} > 30V
- BV_{EBO} > 8V
- Continuous Current I_C to 10A
- Peak Pulse Current I_{CM} to 20A
- Ultra-Low Saturation Voltage $V_{CE(sat)}$ < 30mV @ 1A
- High Current $R_{CE(sat)}$ = 12mΩ Typical
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Wettable Flank for Improved Optical Inspection
- Rated to +175°C – Ideal for High-Temperature Environments
- Complementary PNP Type: DXTP80030DFG
- **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 (DXTN80030DFGQ)**

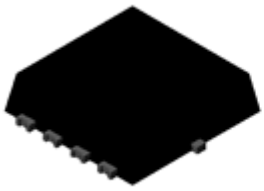
Mechanical Data

- Package: PowerDI®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)

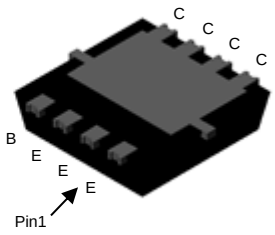
Applications

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

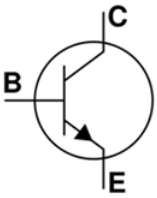
PowerDI3333-8/SWP (Type UX)



Top View



Bottom View



Device Symbol

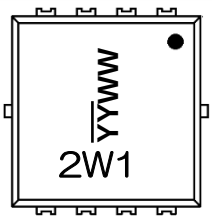
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DXTN80030DFG-7	PowerDI3333-8/SWP (Type UX)	2W1	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)



2W1 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 25 = 2025)
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated in the United States and other countries.

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	30	V
Emitter-Base Voltage	V_{EBO}	8	V
Continuous Collector Current (Note 5)	I_C	5	A
Continuous Collector Current (Note 7)	I_C	10	A
Peak Pulse Current	I_{CM}	20	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	900	mW
	(Note 6)		1.6	W
	(Note 7)		2.4	W
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	140	°C/W
	(Note 6)		92	°C/W
	(Note 7)		62.5	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	6.5	°C/W
Thermal Resistance, Junction to Lead (Note 8)		$R_{\theta JL}$	4.2	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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

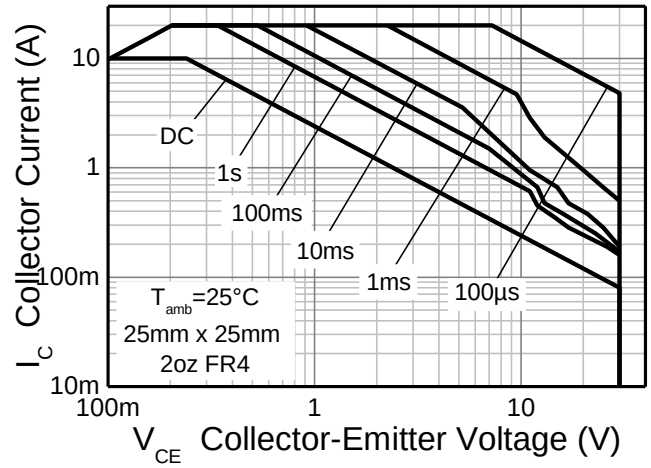


Fig 1. Safe Operating Area

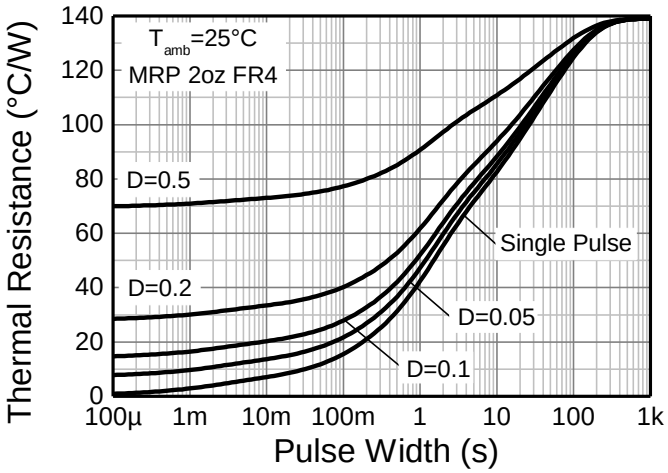


Fig 2. Transient Thermal Impedance

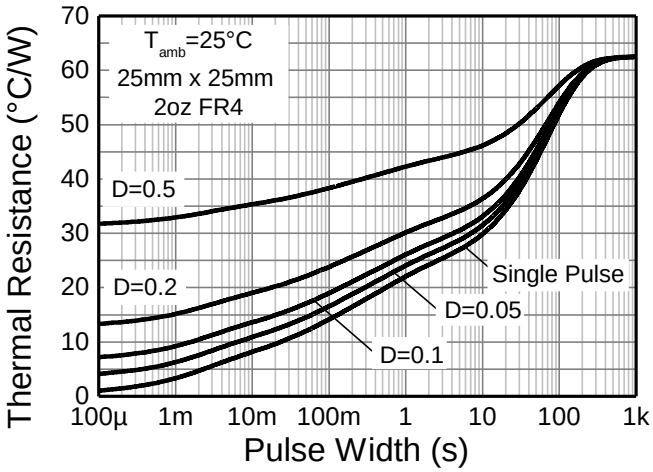


Fig 3. Transient Thermal Impedance

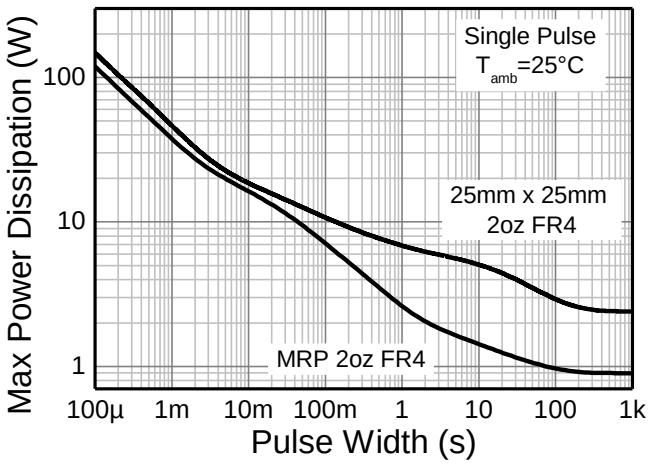


Fig 4. Pulse Power Dissipation

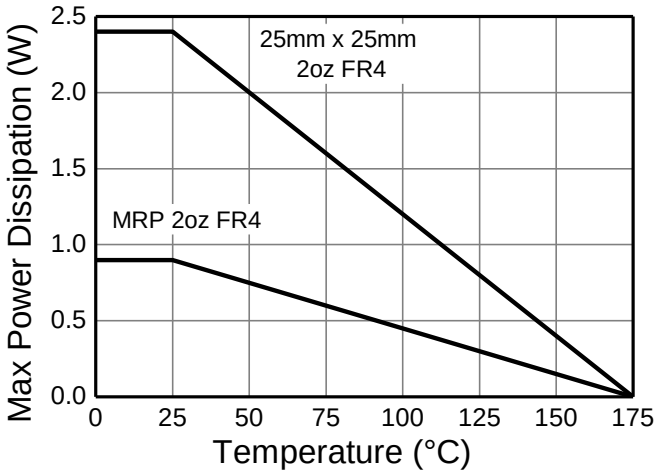


Fig 5. Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	80	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	30	—	—	V	I_C = 10mA
Emitter-Collector Breakdown Voltage	BV_{ECO}	5	—	—	V	I_E = 100µA
Emitter-Base Breakdown Voltage	BV_{EBO}	8	—	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 80V
		—	—	10	µA	V_{CB} = 80V, T_A = +125°C
Collector Cutoff Current	I_{CES}	—	—	300	nA	V_{CE} = 24V
Emitter Cutoff Current	I_{EBO}	—	—	50	nA	V_{EB} = 7V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	28	—	mV	I_C = 100mA, I_B = 1mA
		—	17	30	mV	I_C = 1A, I_B = 100mA
		—	40	65	mV	I_C = 2A, I_B = 40mA
		—	75	125	mV	I_C = 5A, I_B = 100mA
		—	120	160	mV	I_C = 10A, I_B = 500mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	850	1,000	mV	I_C = 5A, I_B = 100mA
		—	970	1,150	mV	I_C = 10A, I_B = 500mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	750	900	mV	I_C = 5A, V_{CE} = 2V
		—	760	900	mV	I_C = 10A, V_{CE} = 2V
DC Current Gain (Note 10)	h_{FE}	—	380	—	—	I_C = 10mA, V_{CE} = 2V
		300	380	550	—	I_C = 100mA, V_{CE} = 2V
		270	365	—	—	I_C = 1A, V_{CE} = 2V
		250	350	—	—	I_C = 2A, V_{CE} = 2V
		200	310	—	—	I_C = 5A, V_{CE} = 2V
		100	250	—	—	I_C = 10A, V_{CE} = 2V
Input Capacitance	C_{ibo}	—	620	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	50	—	pF	V_{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	100	130	—	MHz	V_{CE} = 10V, I_C = 100mA f = 50MHz
Turn-On Time	t_d	—	13.5	—	ns	V_{CC} = 10V, I_C = 5A I_{B1} = -I_{B2} = 500mA
	t_r	—	55	—	ns	
Turn-Off Time	t_s	—	230	—	ns	
	t_f	—	4	—	ns	

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

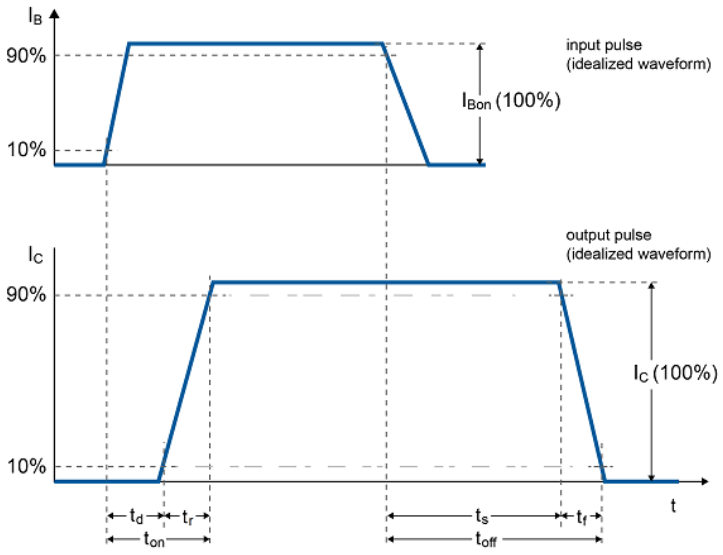


Fig 6. Timing Waveform

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

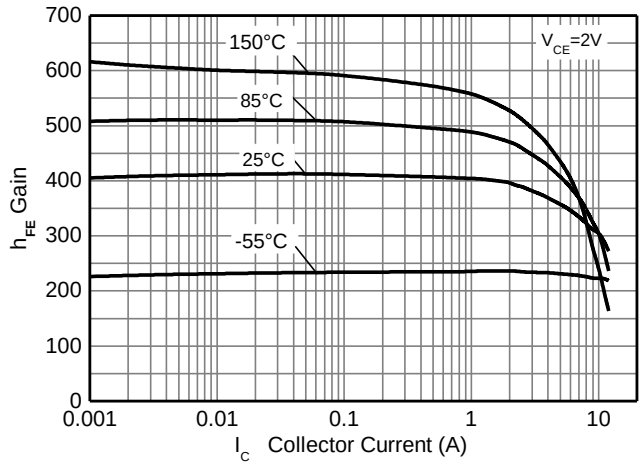


Fig. 7 h_{FE} v I_C

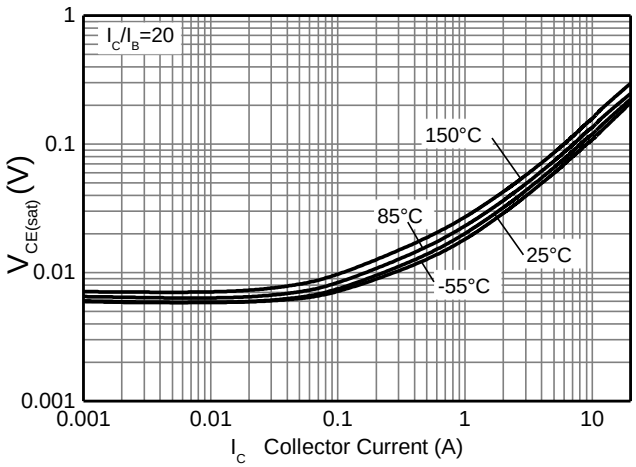


Fig. 8 $V_{CE(sat)}$ v I_C

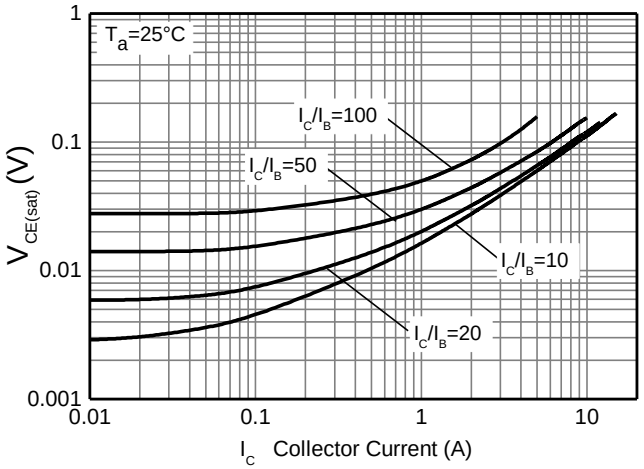


Fig. 9 $V_{CE(sat)}$ v I_C

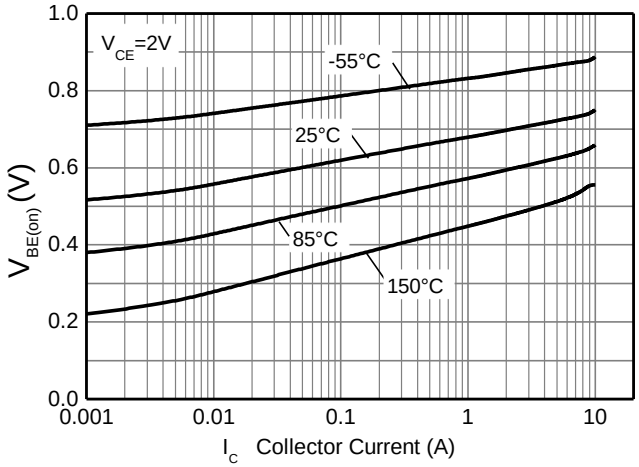


Fig. 10 $V_{BE(on)}$ v I_C

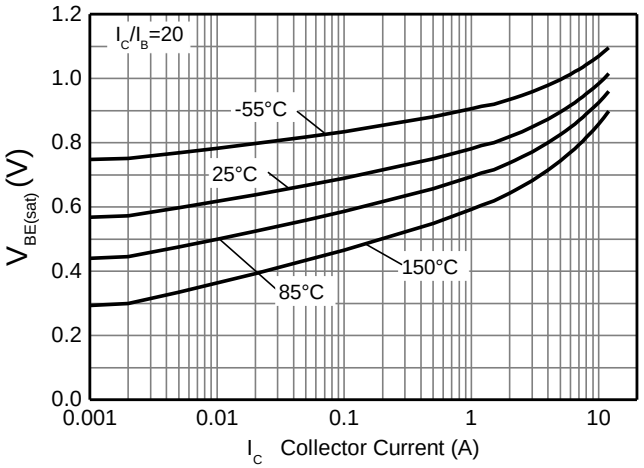


Fig. 11 $V_{BE(sat)}$ v I_C

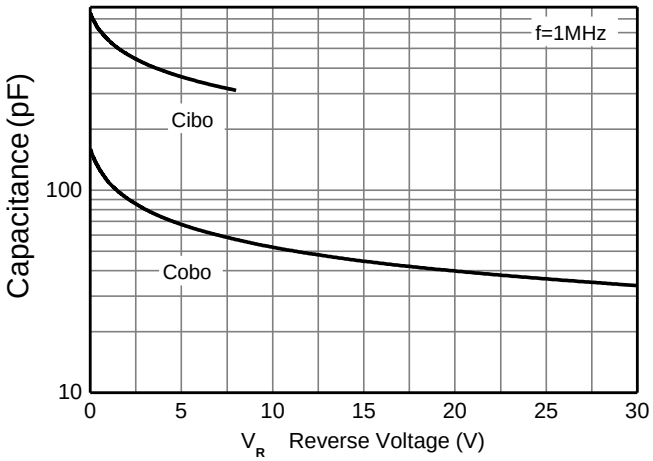


Fig. 12 Typical Junction Capacitance

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

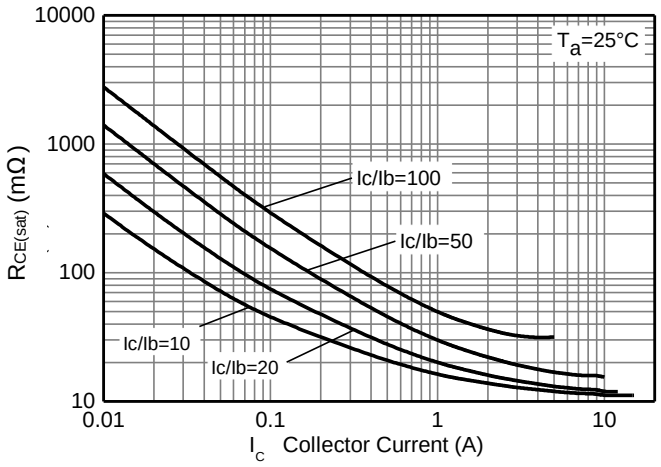


Fig. 13 $R_{CE(sat)}$ v I_C

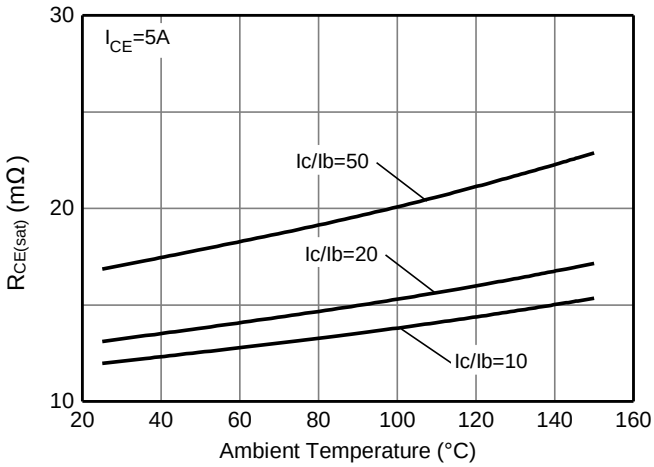


Fig. 14 $R_{CE(sat)}$ v T_{amb}

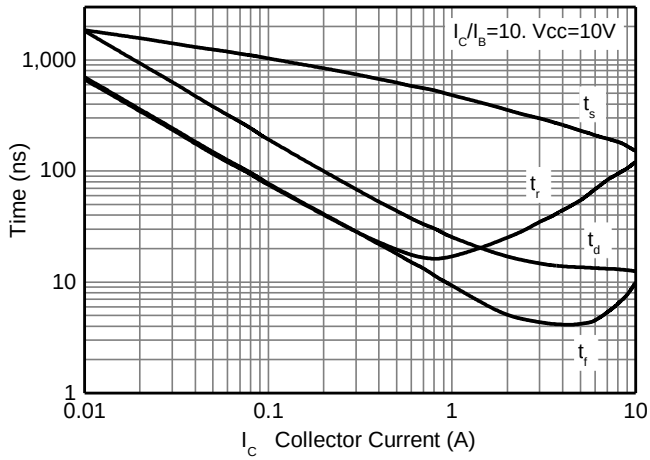
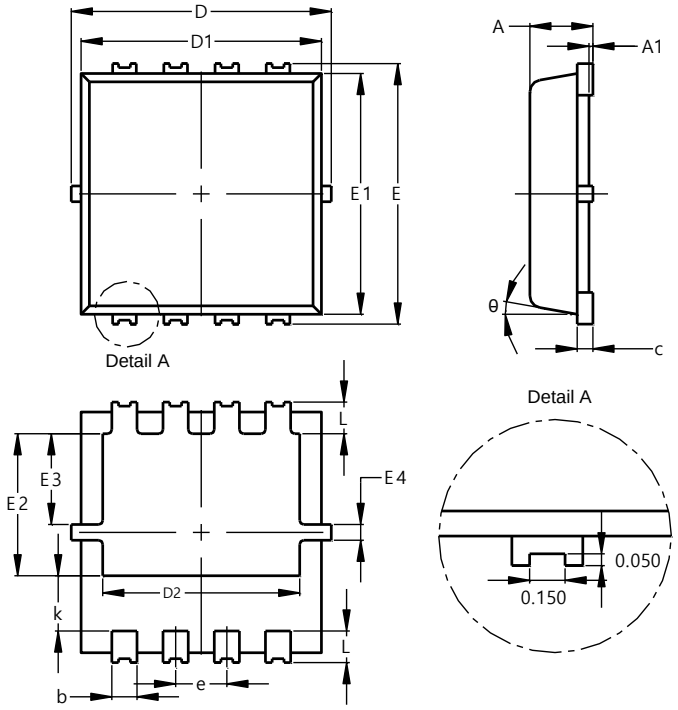


Fig. 15 Switching Performance

Package Outline Dimensions

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

PowerDI3333-8/SWP (Type UX)

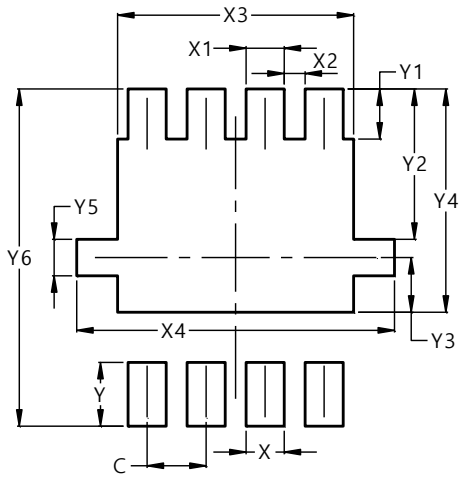


PowerDI3333-8/SWP (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
k	0.50	0.90	0.70
L	0.30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

Suggested Pad Layout

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

PowerDI3333-8/SWP (Type UX)



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.

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

www.diodes.com