100V NPN ULTRA-LOW VCE(sat) TRANSISTOR IN PowerDI3333-8

Features

- BV_{CEO} > 100V
- BV_{EBO} > 8V
- Continuous Current I_C to 4A
- Peak Pulse Current I_{CM} to 8A
- Ultra-Low Saturation Voltage $V_{CE(sat)}$ < 60mV @ 1A
- High Current $R_{CE(sat)}$ = 32mΩ 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: DXTP78100CFGQ
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DXTN78100CFGQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

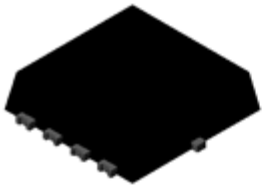
Mechanical Data

- 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)

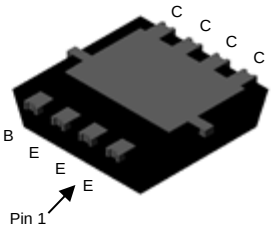
Applications

- MOSFET & IGBT gate drivers
- Load switches
- Low-voltage regulation
- DC to DC converters
- Motor, solenoid, relay and actuator drivers control

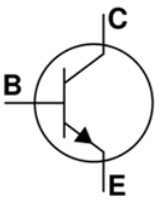
PowerDI3333-8/SWP (Type UX)



Top View



Bottom View



Device Symbol

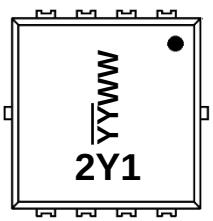
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DXTN78100CFGQ-7	PowerDI3333-8/SWP (Type UX)	2Y1	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)



2Y1 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 25 = 2025)
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	8	V
Continuous Collector Current (Note 5)	I_C	2	A
Continuous Collector Current (Note 7)	I_C	4	A
Peak Pulse Current	I_{CM}	8	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)		$R_{\theta JC}$	8	°C/W
Thermal Resistance, Junction to Lead (Note 8)		$R_{\theta JL}$	6.5	°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 specification JESD22-A114, JESD22-A115 and JESD22-C101.

Thermal Characteristics and Derating Information

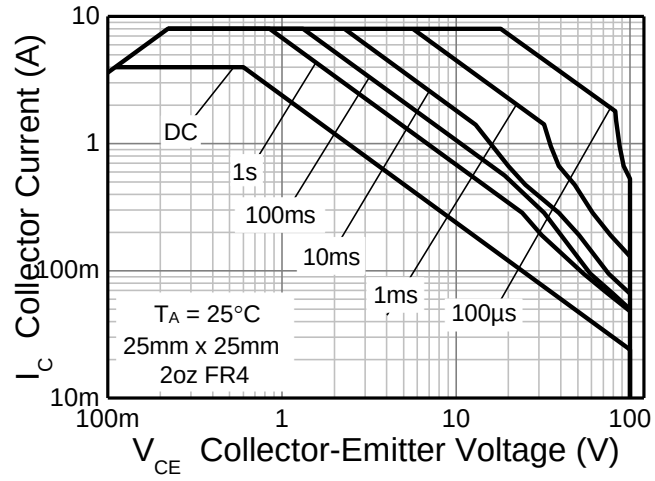


Fig 1. Safe Operating Area

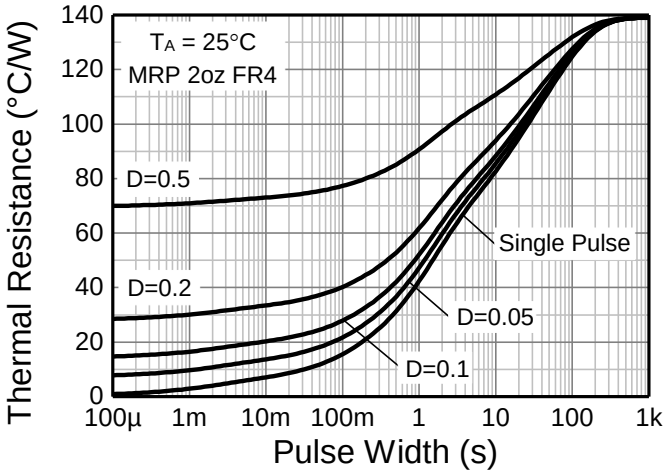


Fig 2. Transient Thermal Impedance

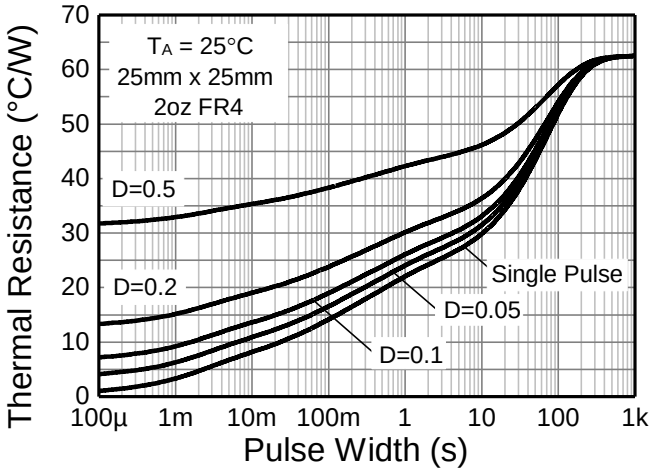


Fig 3. Transient Thermal Impedance

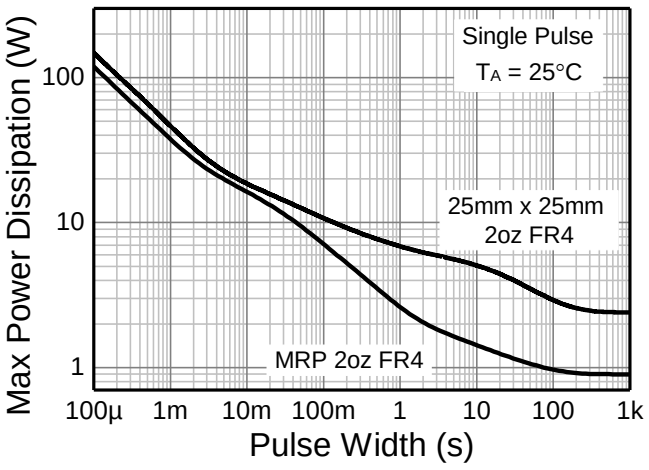


Fig 4. Pulse Power Dissipation

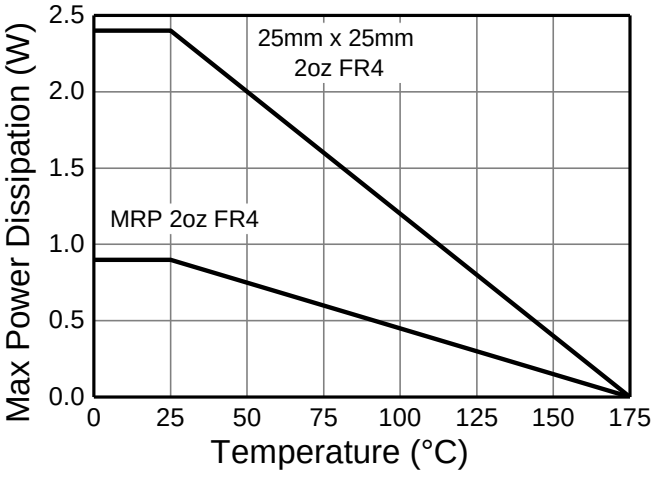


Fig 5. Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	150	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	100	—	—	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 Cut-off Current	I_{CBO}	—	—	100	nA	V_{CB} = 150V
		—	—	10	µA	V_{CB} = 150V, T_A = +125°C
Collector Cut-off Current	I_{CES}	—	—	300	nA	V_{CE} = 80V
Emitter Cut-off Current	I_{EBO}	—	—	50	nA	V_{EB} = 7V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	80	—	mV	I_C = 100mA, I_B = 1mA
		—	100	150	mV	I_C = 1A, I_B = 20mA
		—	40	60	mV	I_C = 1A, I_B = 100mA
		—	70	120	mV	I_C = 2A, I_B = 200mA
		—	130	340	mV	I_C = 4A, I_B = 400mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	870	1,000	mV	I_C = 2A, I_B = 200mA
		—	950	1,100	mV	I_C = 4A, I_B = 400mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	770	850	mV	I_C = 2A, V_{CE} = 2V
		—	850	950	mV	I_C = 4A, V_{CE} = 2V
DC Current Gain (Note 10)	h_{FE}	200	320	—	—	I_C = 10mA, V_{CE} = 2V
		250	320	420	—	I_C = 100mA, V_{CE} = 2V
		210	300	—	—	I_C = 500mA, V_{CE} = 2V
		140	200	—	—	I_C = 1A, V_{CE} = 2V
		35	80	—	—	I_C = 2A, V_{CE} = 2V
		10	30	—	—	I_C = 4A, V_{CE} = 2V
Input Capacitance	C_{ibo}	—	360	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	12.5	—	pF	V_{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	150	210	—	MHz	V_{CE} = 10V, I_C = 100mA, f = 50MHz
Turn-On Time	t_d	—	12.5	—	ns	V_{CC} = 10V, I_C = 2A, I_{B1} = -I_{B2} = 200mA
	t_r	—	145	—	ns	
Turn-Off Time	t_s	—	430	—	ns	
	t_f	—	83	—	ns	

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

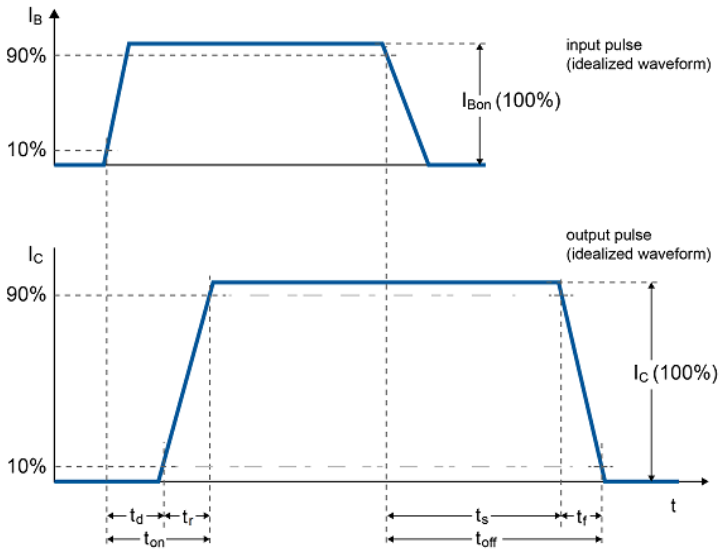


Fig 6. Timing Waveform

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

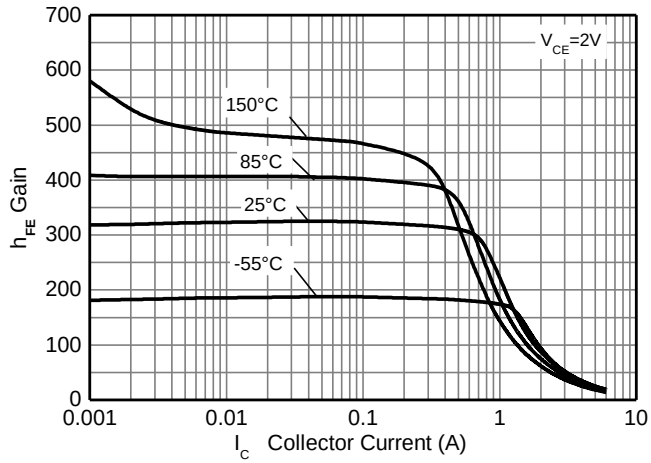


Fig. 7 h_{FE} v I_C

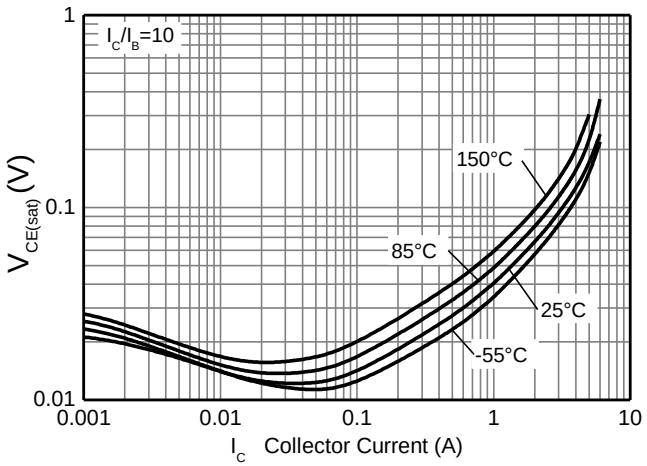


Fig. 8 $V_{CE(sat)}$ v I_C

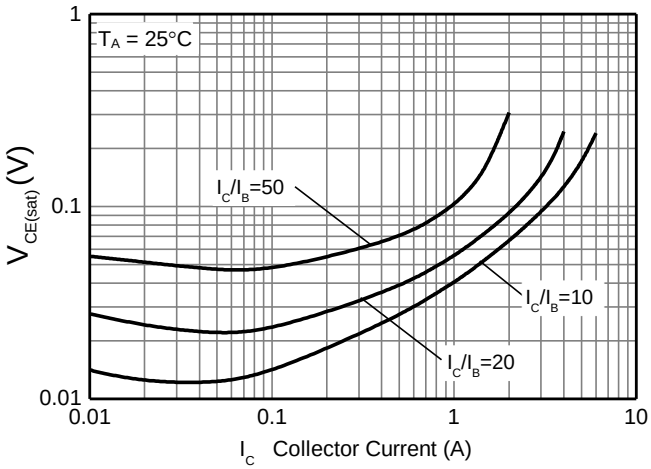


Fig. 9 $V_{CE(sat)}$ v I_C

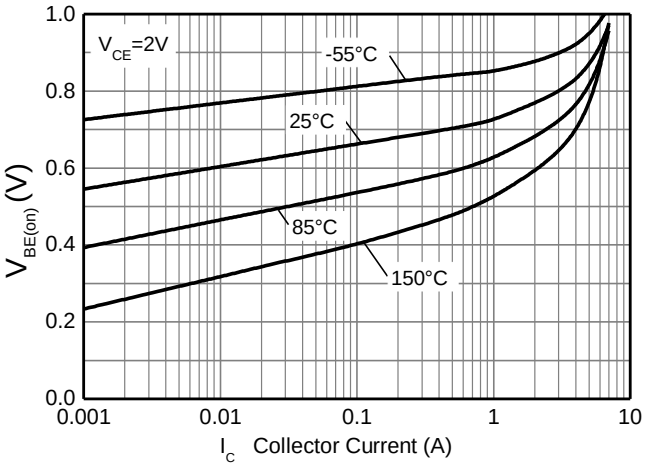


Fig. 10 $V_{BE(on)}$ v I_C

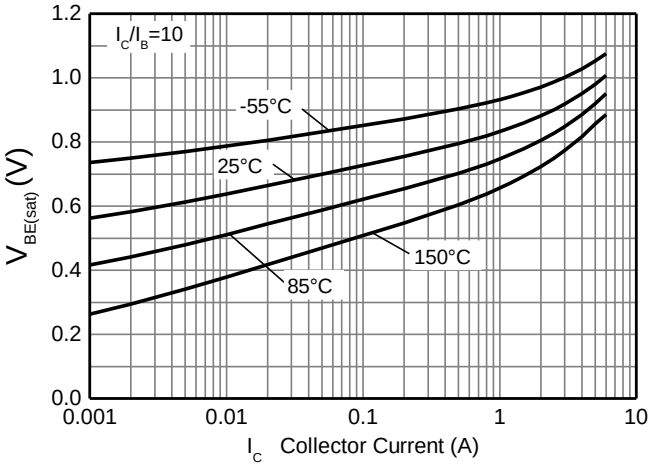


Fig. 11 $V_{BE(sat)}$ v I_C

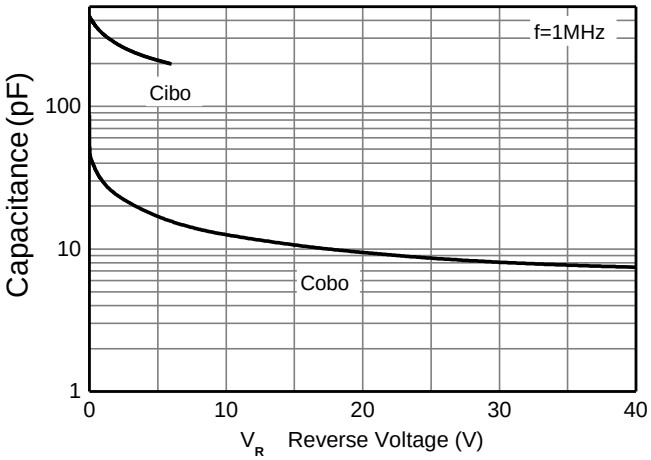


Fig. 12 Typical Junction Capacitance

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

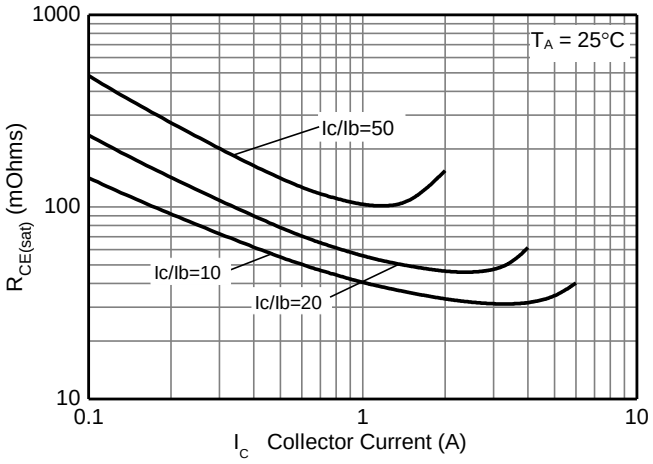


Fig. 13 $R_{CE(sat)}$ v I_C

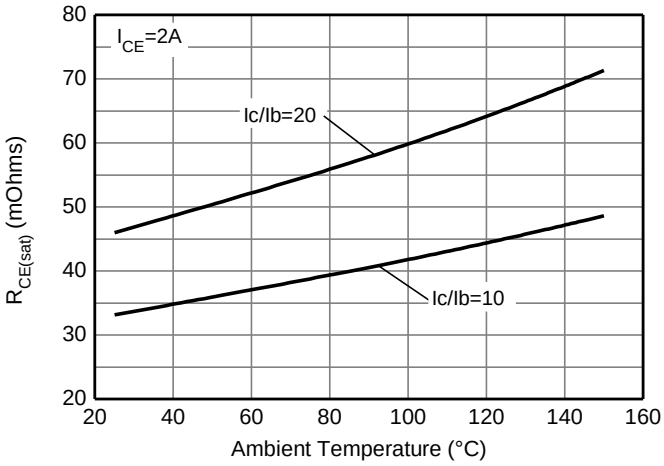


Fig. 14 $R_{CE(sat)}$ v T_A

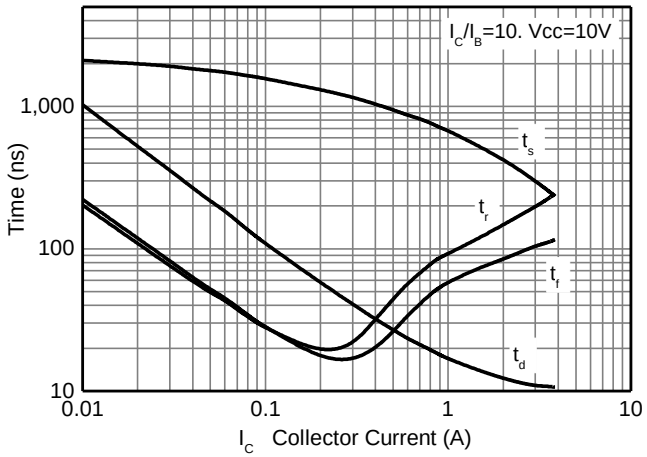
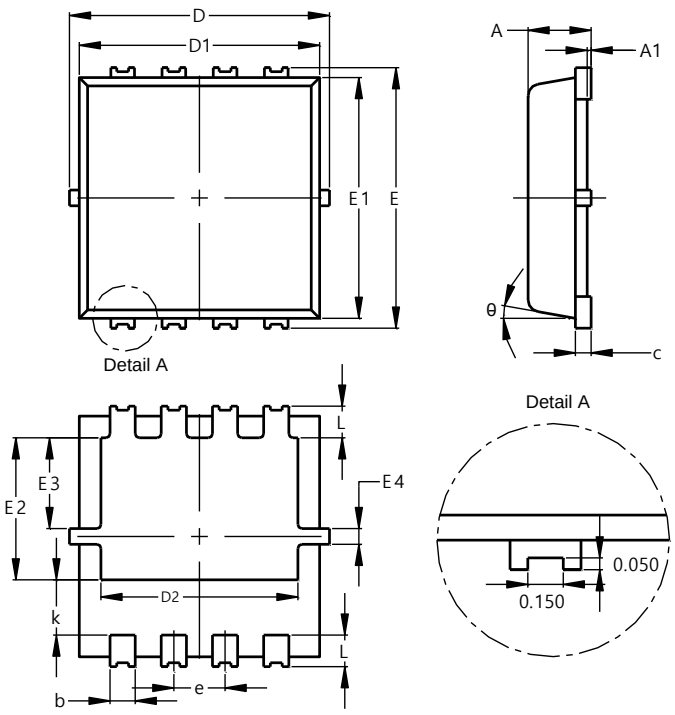


Fig. 15 Switching Performance

Package Outline Dimensions

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

PowerDI3333-8/SWP (Type UX)

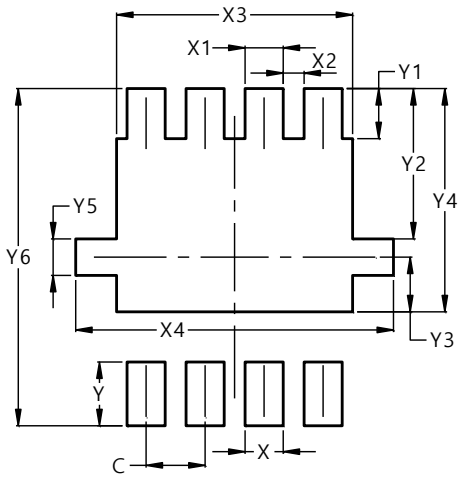


PowerDI3333-8/SWP (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
k	0.50	0.90	0.70
L	0.30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

Notes: 11. For high-voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.
12. Side wall tin plated package for wettable flanks in AOI.

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