60V NPN ULTRA-LOW VCE(sat) TRANSISTOR IN PowerDI3333-8

Features

- BV_{CEO} > 60V
- BV_{EBO} > 8V
- Continuous Current I_C to 6.5A
- Peak Pulse Current I_{CM} to 15A
- Ultra-Low Saturation Voltage $V_{CE(sat)}$ < 40mV @ 1A
- High Current $R_{CE(sat)}$ = 16mΩ 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: DXTP80060DFGQ
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DXTN80060DFGQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

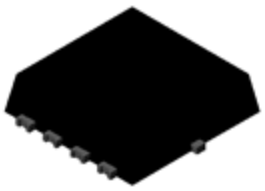
Mechanical Data

- 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)

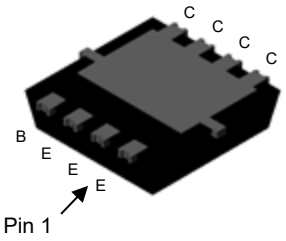
Applications

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

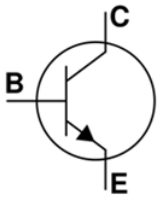
PowerDI3333-8/SWP (Type UX)



Top View



Bottom View



Device Symbol

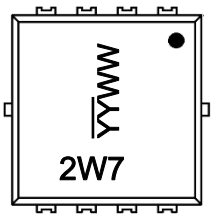
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DXTN80060DFGQ-7	PowerDI3333-8/SWP (Type UX)	2W7	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)



2W7 = 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}	100	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	8	V
Continuous Collector Current (Note 5)	I_C	4	A
Continuous Collector Current (Note 7)	I_C	6.5	A
Peak Pulse Current	I_{CM}	15	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

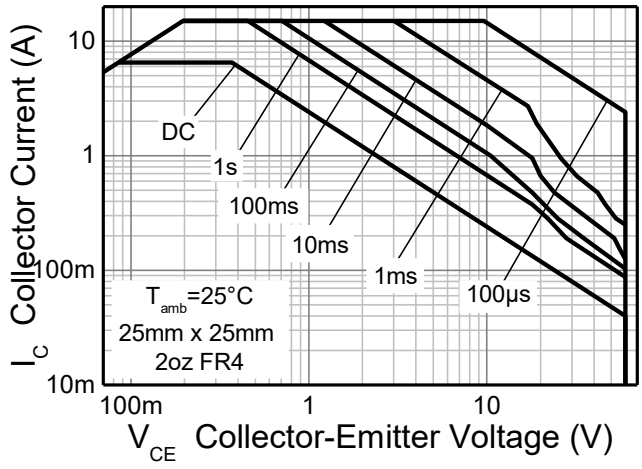


Fig 1. Safe Operating Area

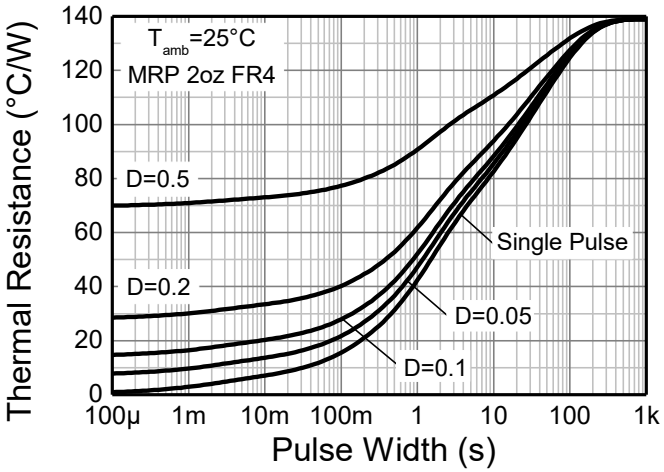


Fig 2. Transient Thermal Impedance

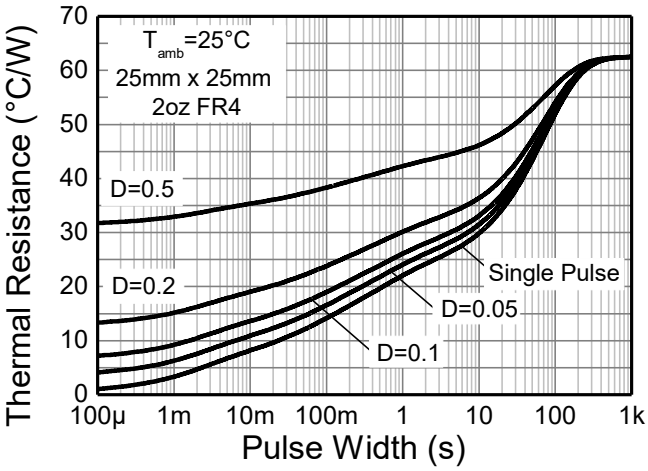


Fig 3. Transient Thermal Impedance

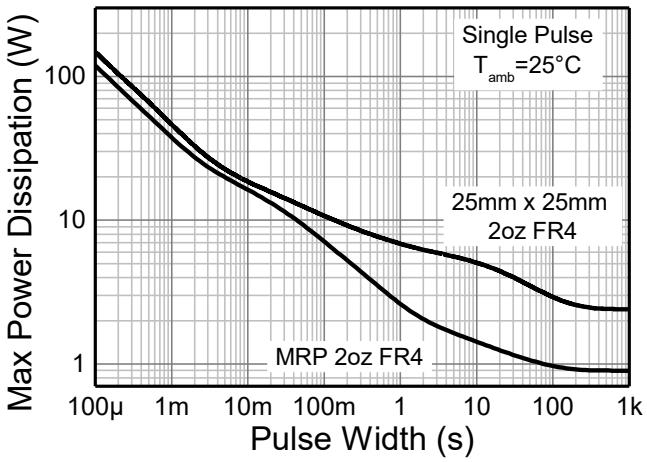


Fig 4. Pulse Power Dissipation

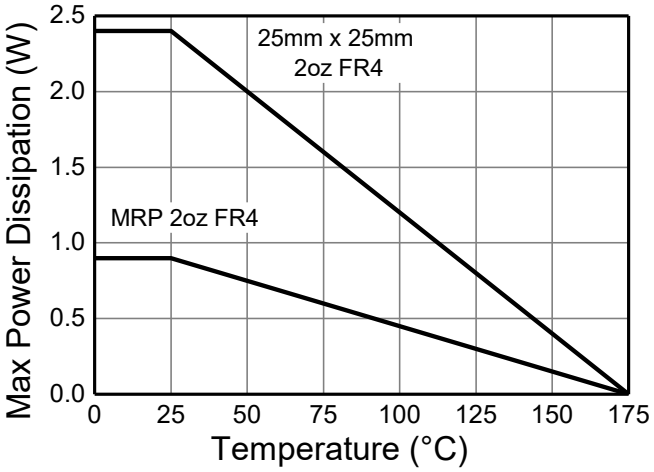


Fig 5. Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	100	—	—	V	I_C = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	60	—	—	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} = 100V
		—	—	10	μA	V_{CB} = 100V, T_A = +125°C
Collector Cutoff Current	I_{CES}	—	—	300	nA	V_{CE} = 48V
Emitter Cutoff Current	I_{EBO}	—	—	50	nA	V_{EB} = 7V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	50	—	mV	I_C = 100mA, I_B = 1mA
		—	45	80	mV	I_C = 1A, I_B = 20mA
		—	22	40	mV	I_C = 1A, I_B = 100mA
		—	70	120	mV	I_C = 2A, I_B = 40mA
		—	75	130	mV	I_C = 4A, I_B = 200mA
		—	100	200	mV	I_C = 6.5A, I_B = 650mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	880	1,000	mV	I_C = 4A, I_B = 200mA
		—	980	1,100	mV	I_C = 6.5A, I_B = 650mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	750	850	mV	I_C = 4A, V_{CE} = 2V
		—	800	950	mV	I_C = 6.5A, V_{CE} = 2V
DC Current Gain (Note 10)	h_{FE}	250	370	—	—	I_C = 10mA, V_{CE} = 2V
		300	370	550	—	I_C = 100mA, V_{CE} = 2V
		260	350	—	—	I_C = 1A, V_{CE} = 2V
		250	335	—	—	I_C = 2A, V_{CE} = 2V
		140	250	—	—	I_C = 4A, V_{CE} = 2V
		35	110	—	—	I_C = 6.5A, V_{CE} = 2V
Input Capacitance	C_{ibo}	—	620	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	30	—	pF	V_{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	100	140	—	MHz	V_{CE} = 10V, I_C = 100mA f = 50MHz
Turn-On Time	t_d	—	14	—	ns	V_{CC} = 10V, I_C = 4A I_{B1} = -I_{B2} = 400mA
	t_r	—	80	—	ns	
Turn-Off Time	t_s	—	375	—	ns	
	t_f	—	28	—	ns	

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

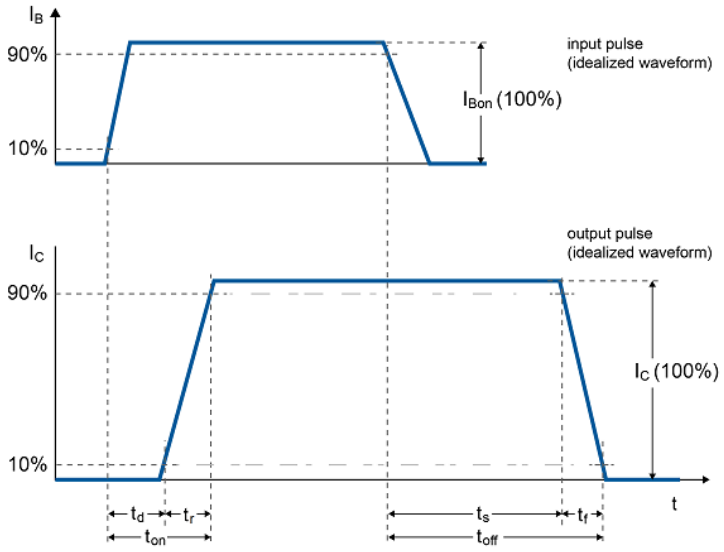


Fig 6. Timing Waveform

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

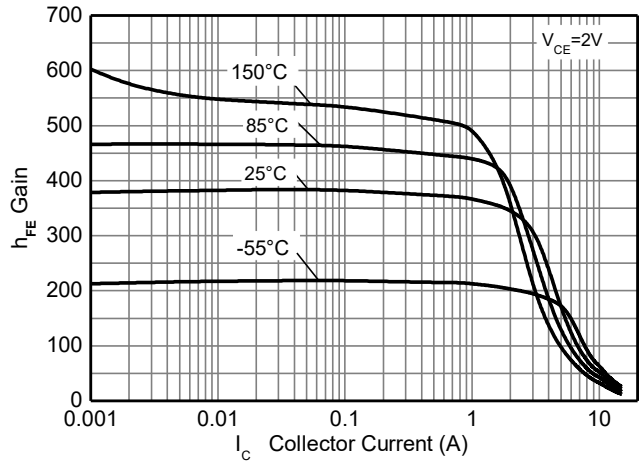


Fig. 7 h_{FE} v I_C

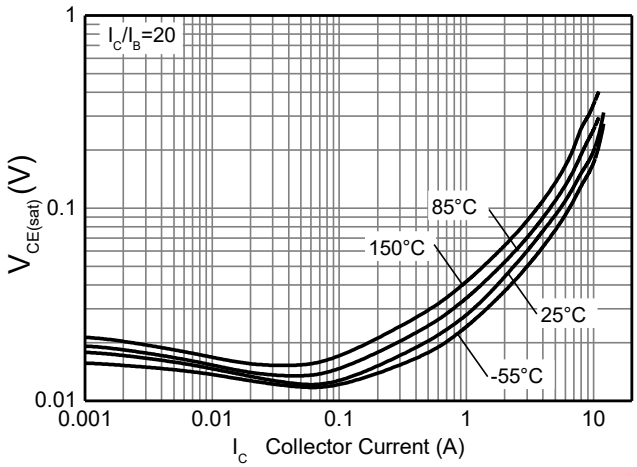


Fig. 8 $V_{CE(sat)}$ v I_C

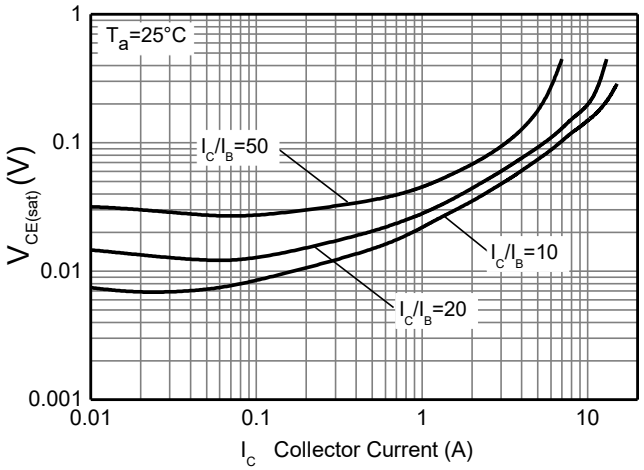


Fig. 9 $V_{CE(sat)}$ v I_C

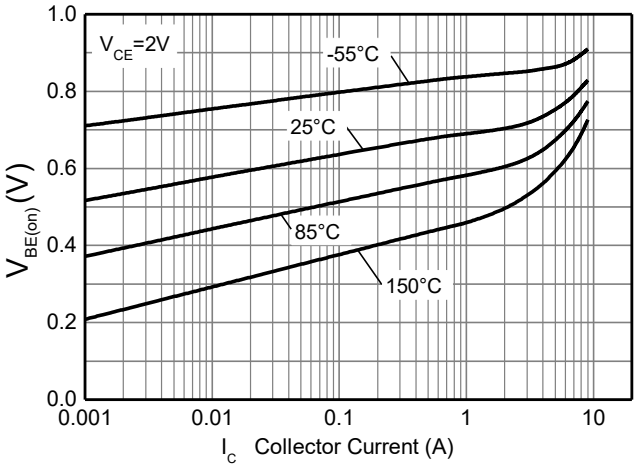


Fig. 10 $V_{BE(on)}$ v I_C

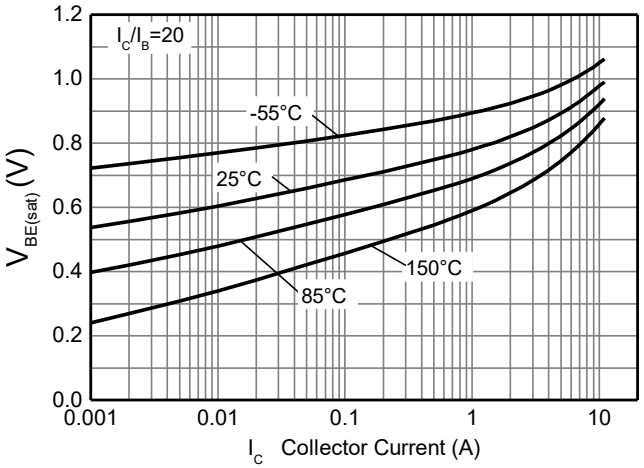


Fig. 11 $V_{BE(sat)}$ v I_C

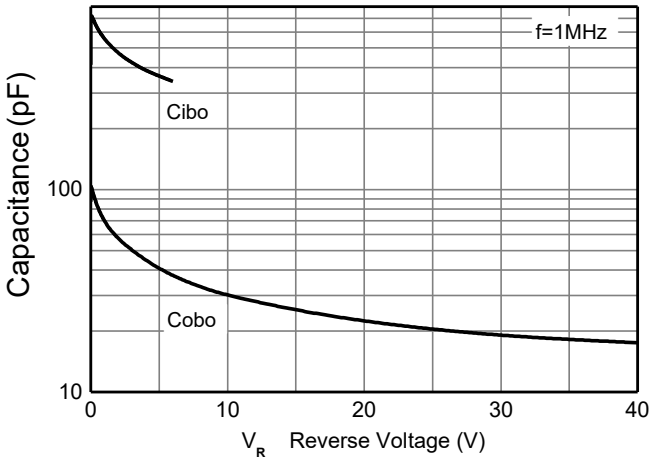


Fig. 12 Typical Junction Capacitance

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

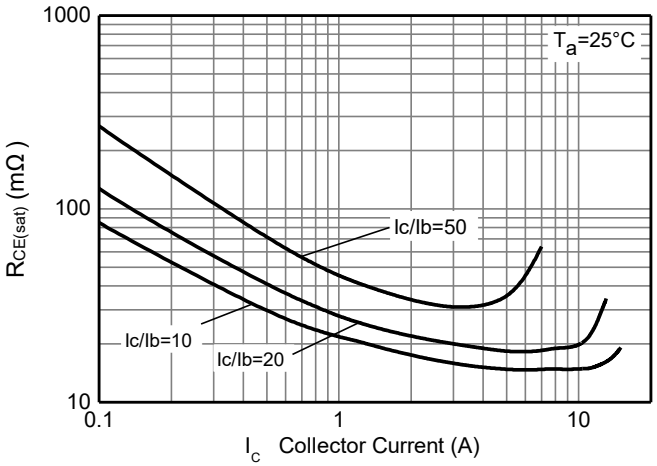


Fig. 13 $R_{CE(sat)}$ v I_C

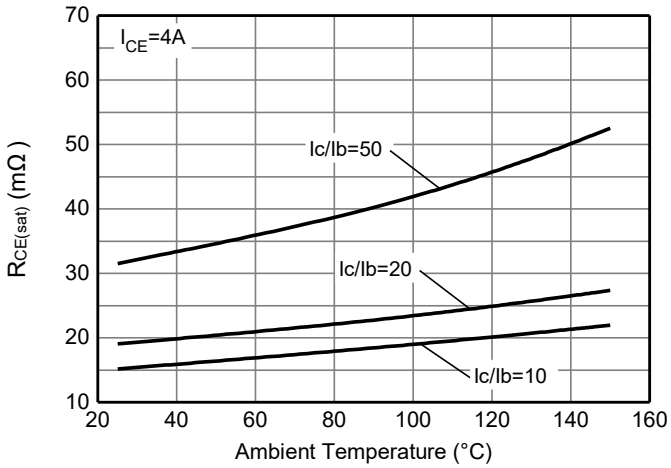


Fig. 14 $R_{CE(sat)}$ v T_{amb}

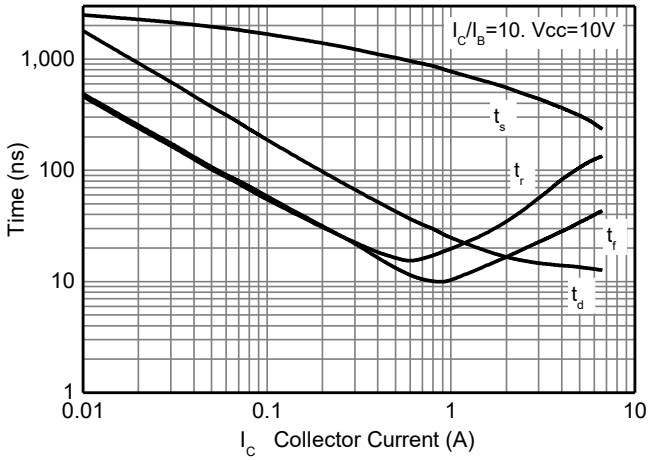
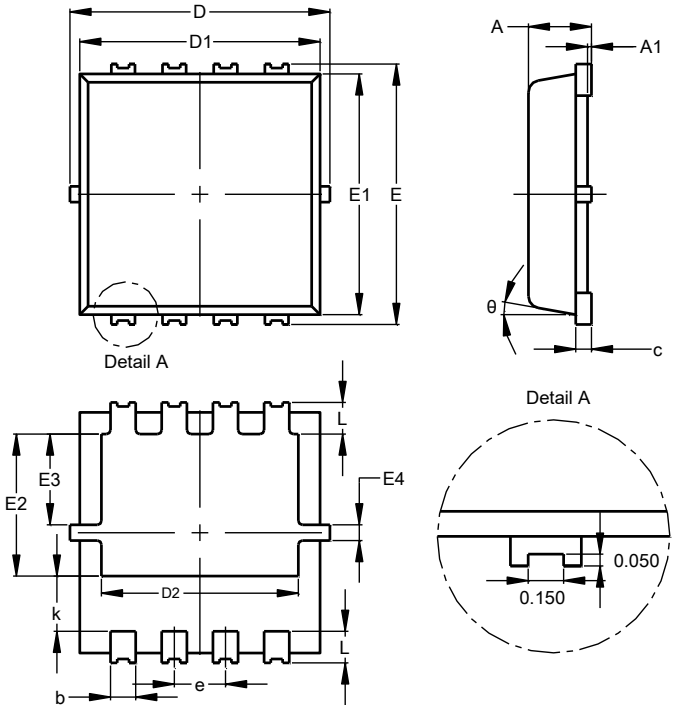


Fig. 15 Switching Performance

Package Outline Dimensions

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

PowerDI3333-8/SWP (Type UX)

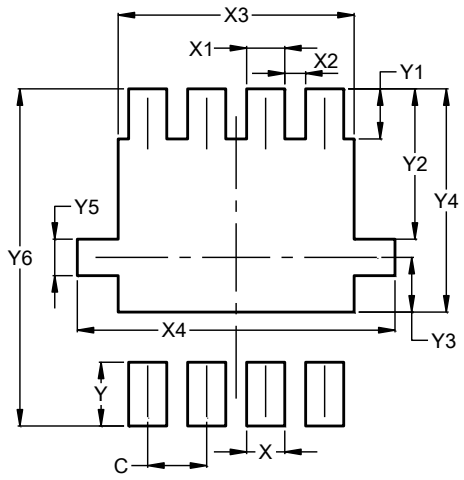


PowerDI3333-8/SWP (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
k	0.50	0.90	0.70
L	0.30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

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