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

Features

- BV_{CEO} > 30V
- BV_{EBO} > 8V
- Continuous Current I_C to 9A
- Peak Pulse Current I_{CM} to 15A
- Ultra-Low Saturation Voltage $V_{CE(sat)}$ < 35mV @ 1A
- High Current $R_{CE(sat)}$ = 14mΩ 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: DXTP78030DFGQ
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DXTN78030DFGQ 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/

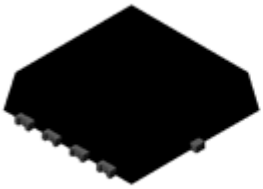
Mechanical Data

- 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)

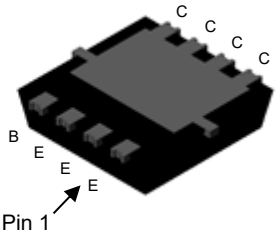
Applications

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

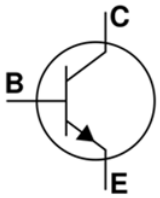
PowerDI3333-8/SWP (Type UX)



Top View



Bottom View



Device Symbol

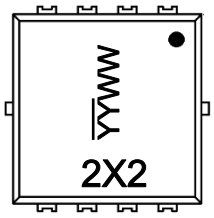
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DXTN78030DFGQ-7	PowerDI3333-8/SWP (Type UX)	2X2	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)



2X2 = 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_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	4	A
Continuous Collector Current (Note 7)	I_C	9	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)		$R_{\theta JC}$	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 specifications JESD22-A114, JESD22-A115 and JESD22-C101.

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Thermal Characteristics and Derating Information

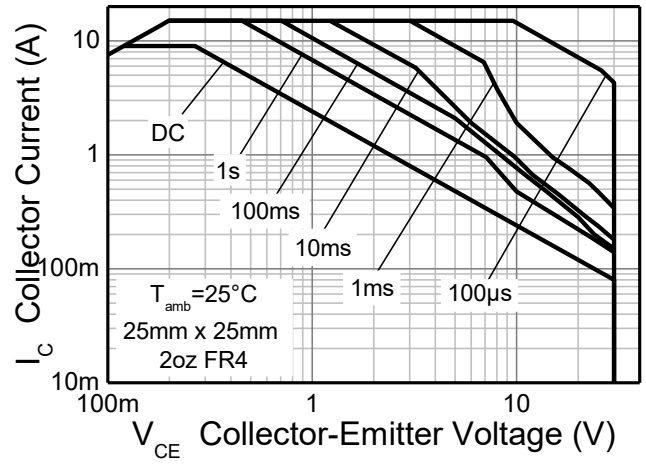


Fig 1. Safe Operating Area

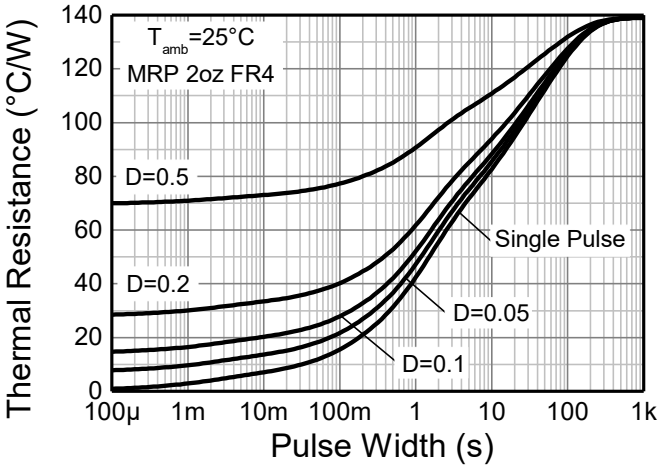


Fig 2. Transient Thermal Impedance

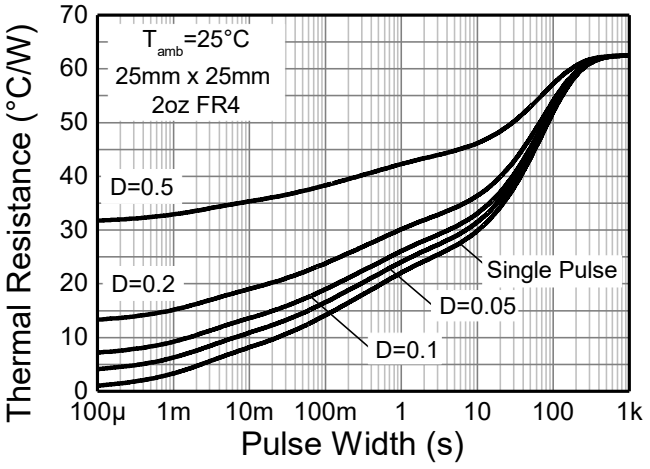


Fig 3. Transient Thermal Impedance

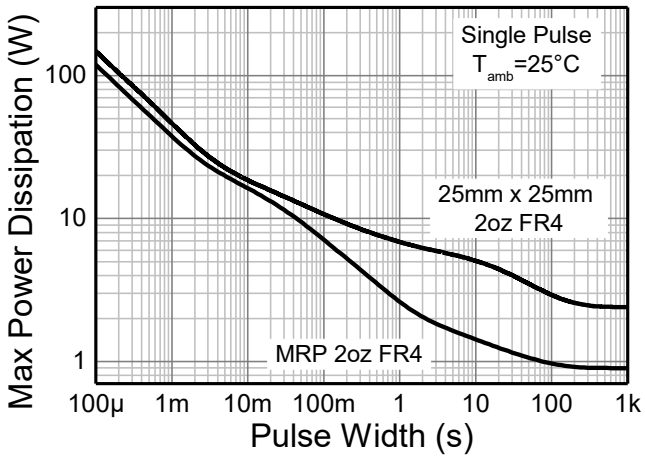


Fig 4. Pulse Power Dissipation

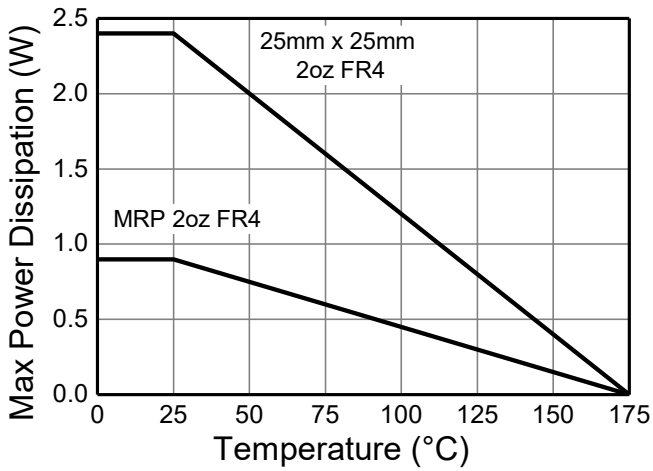


Fig 5. Derating Curve

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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
		—	—	1	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)	$V_{CE(sat)}$	—	30	—	mV	I_C = 100mA, I_B = 1mA
		—	20	35	mV	I_C = 1A, I_B = 100mA
		—	55	75	mV	I_C = 2A, I_B = 40mA
		—	90	125	mV	I_C = 4A, I_B = 80mA
		—	140	175	mV	I_C = 9A, I_B = 450mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	850	1,050	mV	I_C = 4A, I_B = 80mA
		—	1	1.15	V	I_C = 9A, I_B = 450mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	750	900	mV	I_C = 4A, V_{CE} = 2V
		—	780	900	mV	I_C = 9A, V_{CE} = 2V
DC Current Gain (Note 10)	h_{FE}	200	—	—	—	I_C = 10mA, V_{CE} = 2V
		300	390	550	—	I_C = 100mA, V_{CE} = 2V
		270	370	—	—	I_C = 1A, V_{CE} = 2V
		250	350	—	—	I_C = 2A, V_{CE} = 2V
		200	300	—	—	I_C = 4A, V_{CE} = 2V
		100	180	—	—	I_C = 9A, V_{CE} = 2V
Input Capacitance	C_{ibo}	—	340	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	30	—	pF	V_{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	150	260	—	MHz	V_{CE} = 5V, I_C = 100mA f = 100MHz
Turn-On Time	t_d	—	11.6	—	ns	V_{CC} = 10V, I_C = 4A I_{B1} = -I_{B2} = 400mA
	t_r	—	42	—	ns	
Turn-Off Time	t_s	—	179	—	ns	
	t_f	—	4.2	—	ns	

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

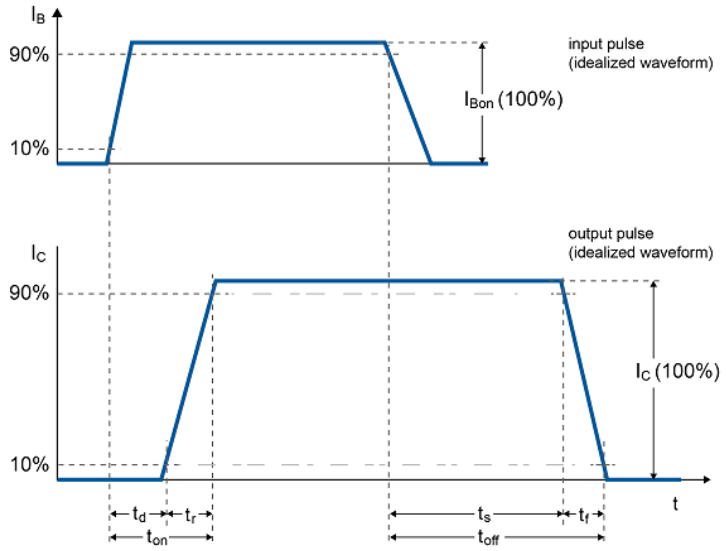


Fig 6. Timing Waveform

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

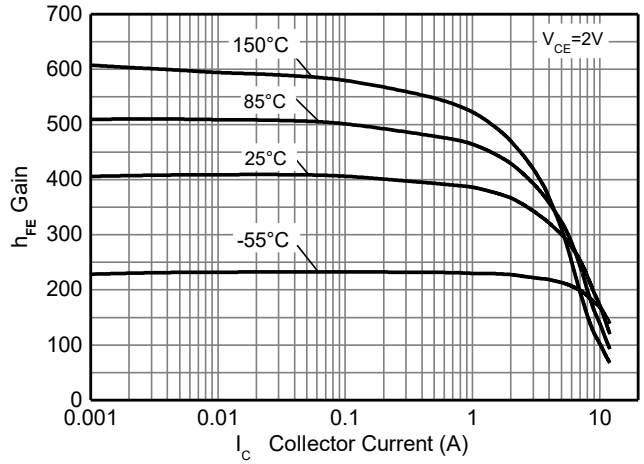


Fig. 7 h_{FE} v I_C

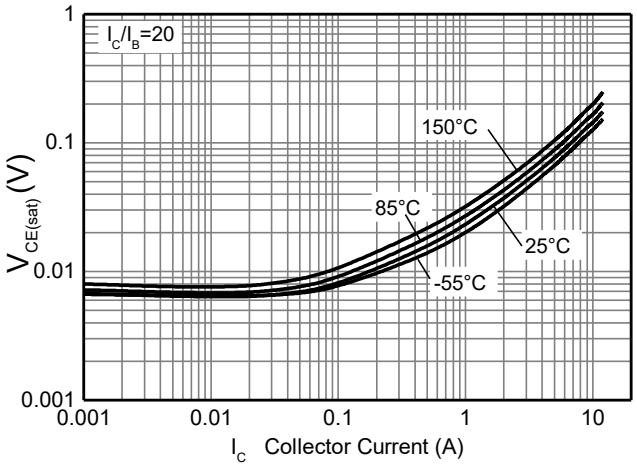


Fig. 8 $V_{CE(sat)}$ v I_C

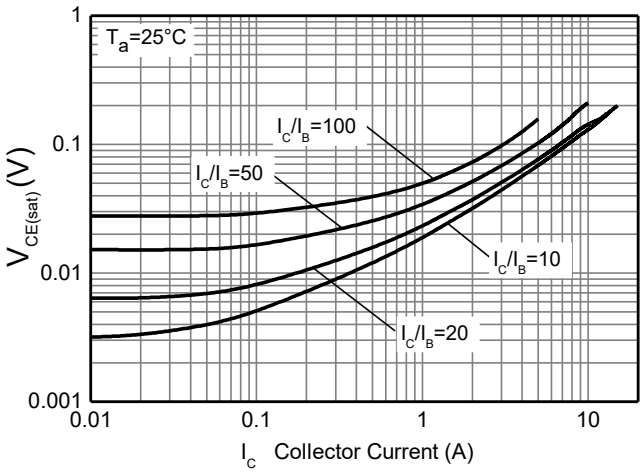


Fig. 9 $V_{CE(sat)}$ v I_C

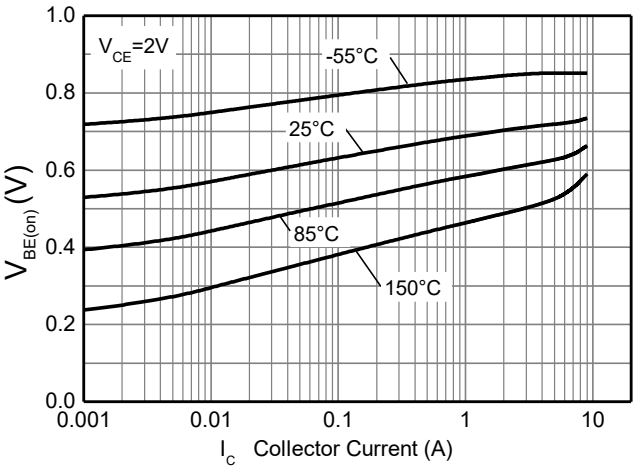


Fig. 10 $V_{BE(on)}$ v I_C

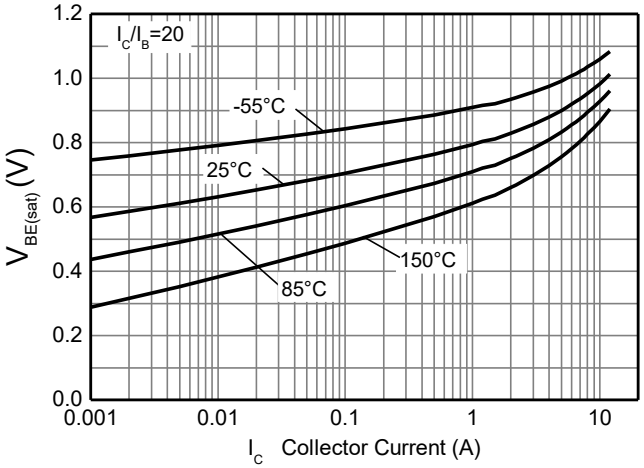


Fig. 11 $V_{BE(sat)}$ v I_C

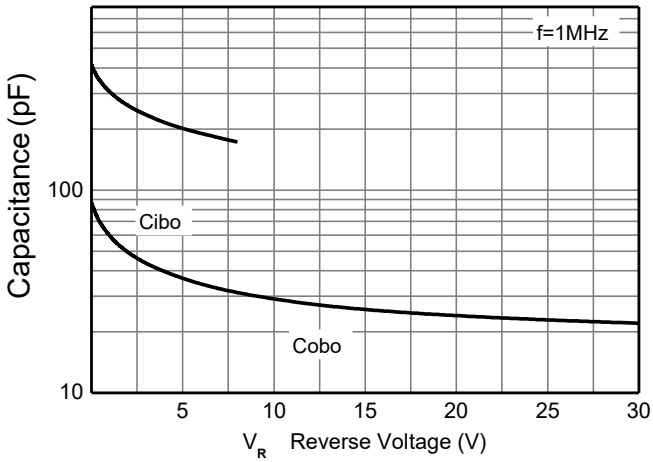


Fig. 12 Typical Junction Capacitance

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

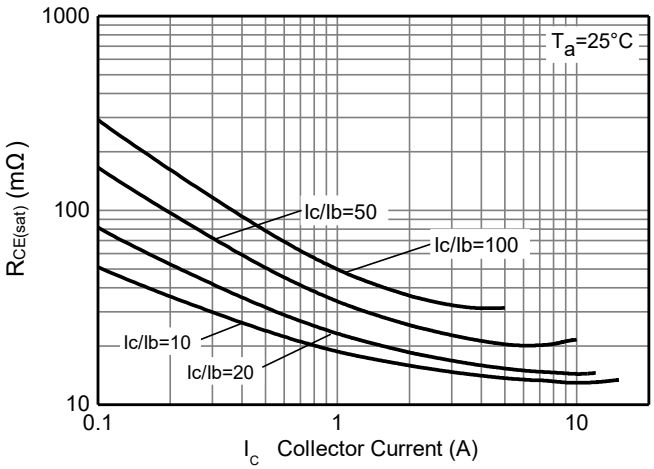


Fig. 13 $R_{CE(sat)}$ v I_C

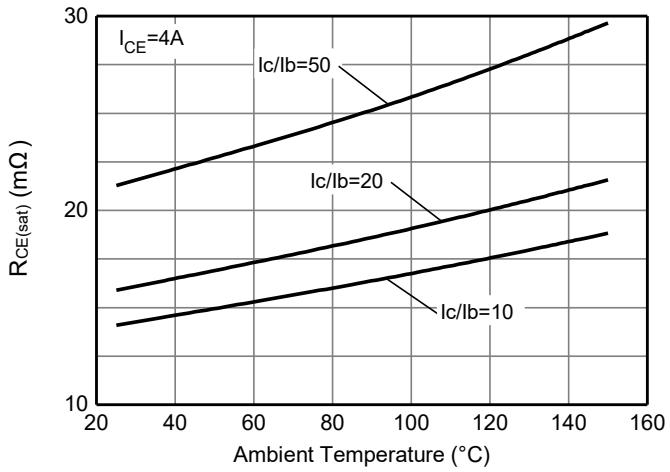


Fig. 14 $R_{CE(sat)}$ v T_{amb}

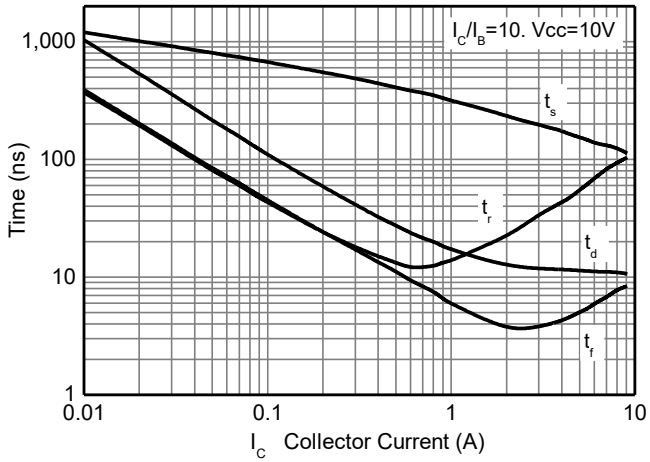


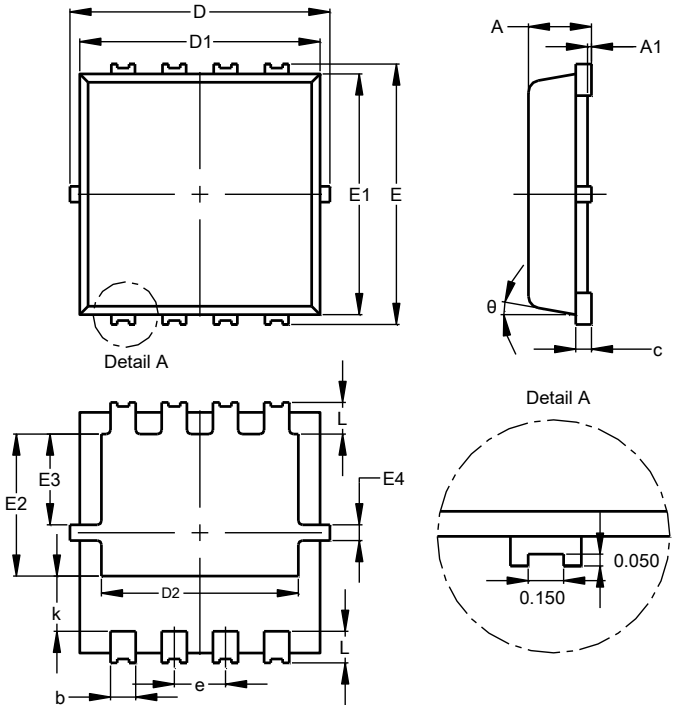
Fig. 15 Switching Performance

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Package Outline Dimensions

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

PowerDI3333-8/SWP (Type UX)

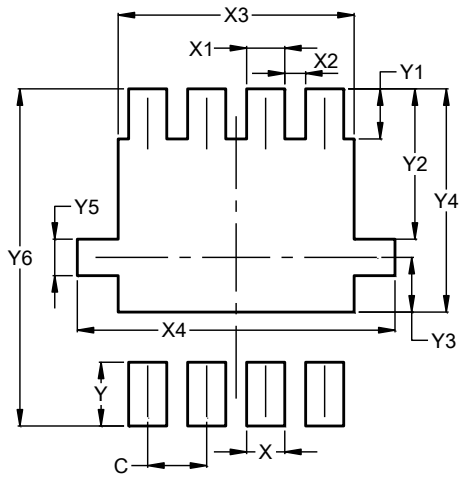


PowerDI3333-8/SWP (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
k	0.50	0.90	0.70
L	0.30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