40V NPN LOW VCESAT TRANSISTOR IN PowerDI3333-8

Features

- BV_{CEO} > 40V
- Small Form Factor Thermally Efficient Package. Enables Higher Density End Products
- I_C = 2A High Continuous Collector Current
- I_{CM} = 3A Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)}$ < 320mV @ 1A
- Complementary PNP Type: DXTP22040DFG
- Wettable Flank for Improved Optical Inspection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

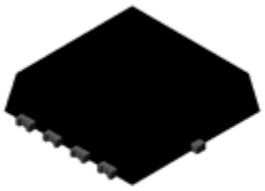
Mechanical Data

- Case: PowerDI®3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.03 grams (Approximate)

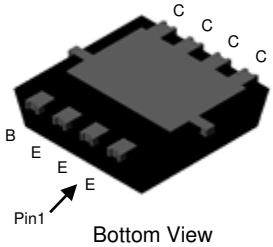
Applications

- DC to DC Conversion
- Supply Line Switching
- Low Drop Out Regulation
- LCD Backlighting

PowerDI3333-8 (SWP) (Type UX)

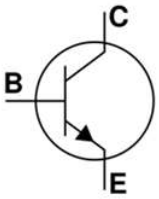


Top View



Bottom View

Equivalent Circuit



Device Symbol

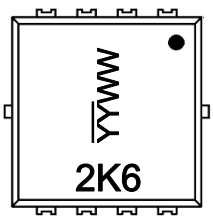
Ordering Information

Part Number	Compliance	Marking	Reel Size (Inches)	Tape Width (mm)	Quantity per Reel
DXTN22040DFG-7	AEC-Q101	2K6	7	12	2,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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)



2K6 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 21 = 2021)
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	2	A
Peak Pulse Collector Current	I_{CM}	3	A
Continuous Base Current	I_B	100	mA
Peak Pulse Base Current	I_{BM}	200	mA

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

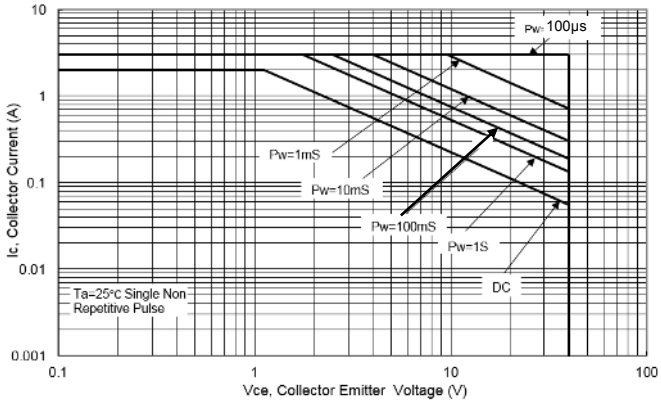
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1.1	W
	(Note 6)		2.3	W
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	113	°C/W
	(Note 6)		55	°C/W
Thermal Resistance, Junction to Leads (Note 7)		$R_{\theta JL}$	7.4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

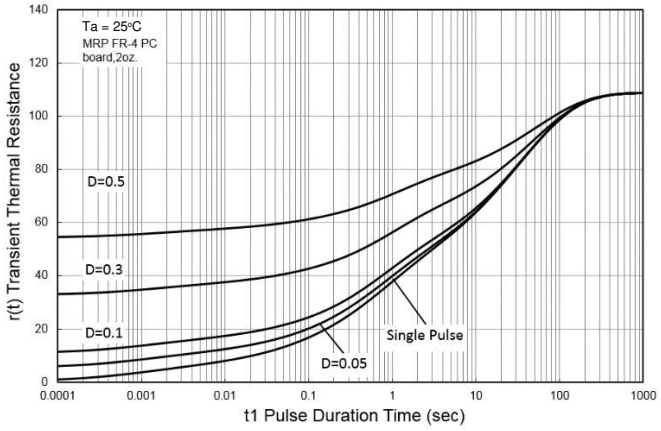
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Charge Device Model	CDM	1000	V	C5

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 25mm x 25mm 2oz copper.
7. Thermal resistance from junction to solder-point (at the collector tab).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

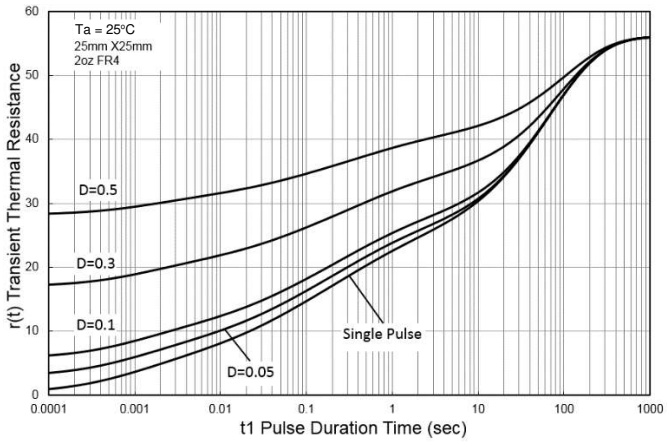
Thermal Characteristics and Derating Information



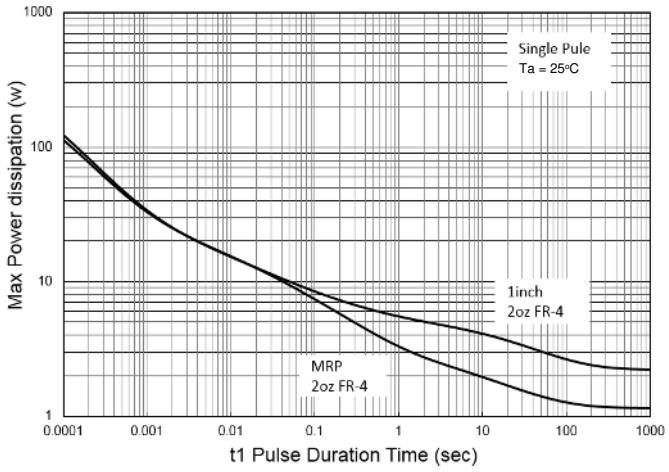
SOA Safe Operation Area



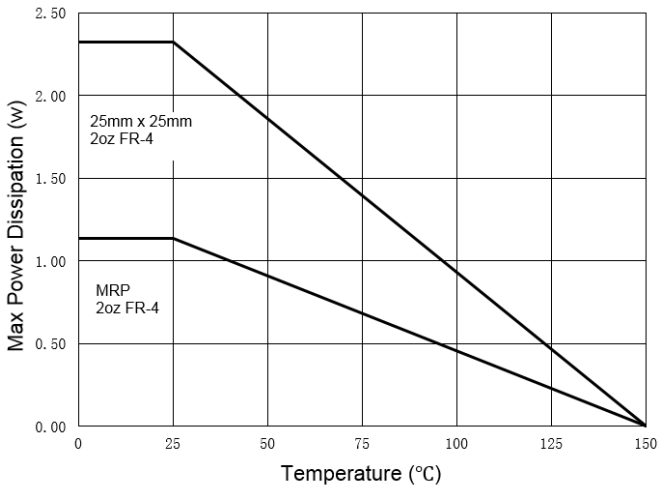
Transient Thermal Resistance



Transient Thermal Resistance



Pulse Power dissipation

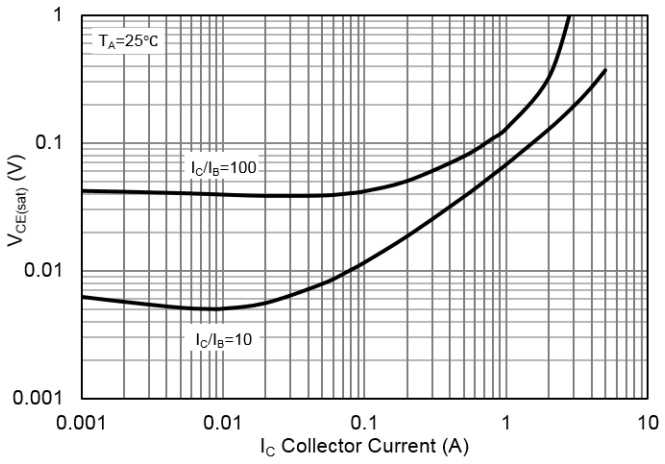


Derating Curve

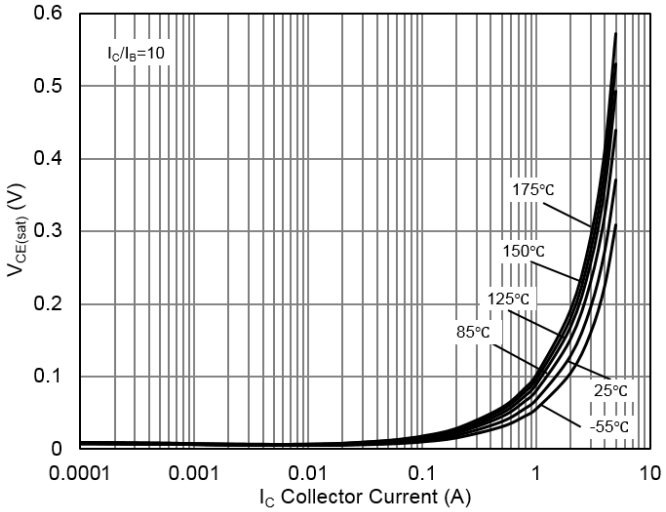
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	50	171	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	40	54	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Collector-Base Cut-Off Current	I_{CBO}	—	1 0.01	50 10	nA µA	V_{CB} = 40V V_{CB} = 40V, T_A = +150°C
Emitter-Base Cut-Off Current	I_{EBO}	—	1	20	nA	V_{EB} = 6V
Collector-Emitter Cut-Off Current	I_{CES}	—	1	50	nA	V_{CE} = 40V, V_{BE} = 0V
Static Forward Current Transfer Ratio (Note 9)	h_{FE}	300 300 200 140	464 468 445 377	— 900 — —	—	I_C = 1mA, V_{CE} = 2V I_C = 500mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V I_C = 2A, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	—	43 38 68 126 187	80 120 220 350 600	mV	I_C = 100mA, I_B = 1mA I_C = 500mA, I_B = 50mA I_C = 1A, I_B = 100mA I_C = 2A, I_B = 200mA I_C = 3A, I_B = 300mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	—	0.9	1.1	V	I_C = 1A, I_B = 100mA
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	—	0.74	1	V	I_C = 1A, V_{CE} = 5V
Input Capacitance	C_{ibo}	—	161	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	11	—	pF	V_{CB} = 10V, f = 1MHz
Transition Frequency	f_T	—	198	—	MHz	I_C = 50mA, V_{CE} = 10V f = 100MHz
Switching Time	t_{delay}	—	7.9	—	ns	I_C = 1A, V_{CC} = 10V, I_{B1} = -I_{B2} = 100mA
	t_{rise}	—	2.9	—	ns	
	$t_{storage}$	—	673	—	ns	
	t_{fall}	—	26.8	—	ns	

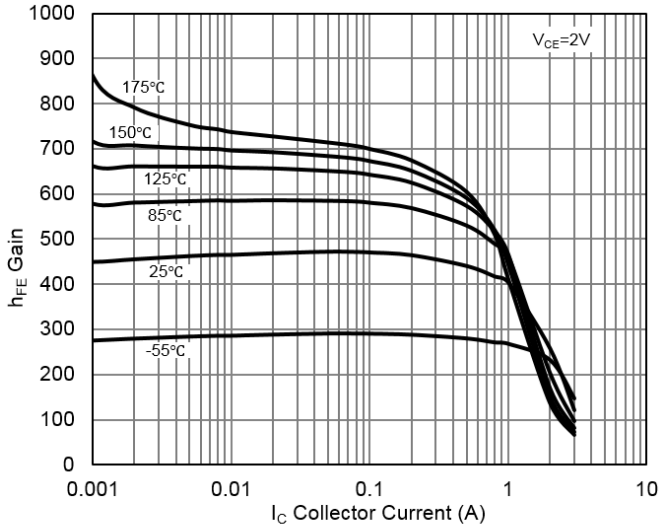
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.



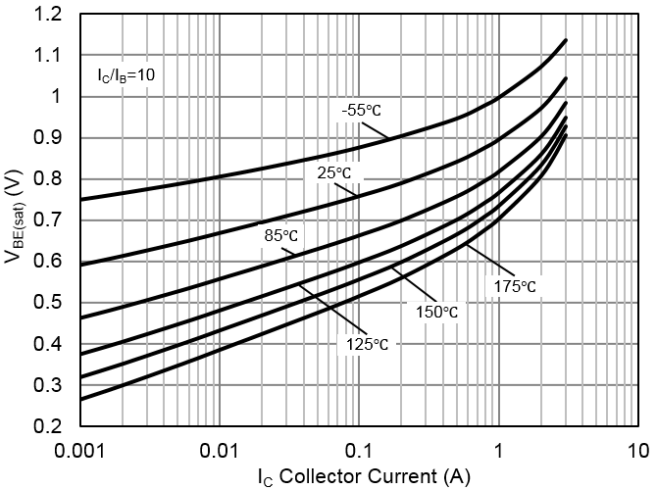
$V_{CE(sat)}$ vs I_C



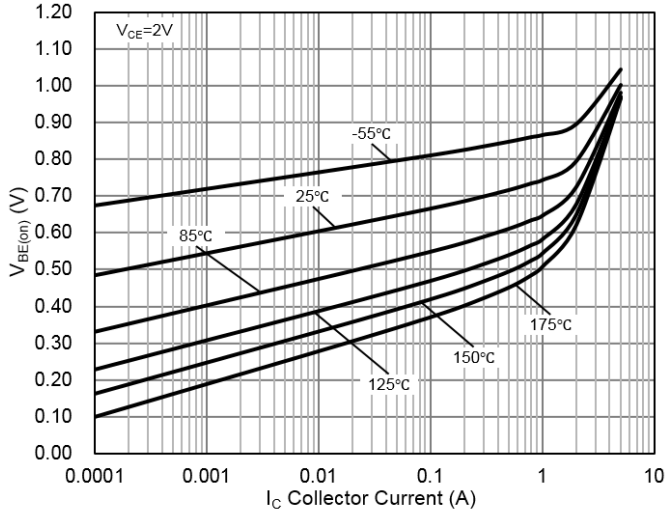
$V_{CE(sat)}$ vs I_C



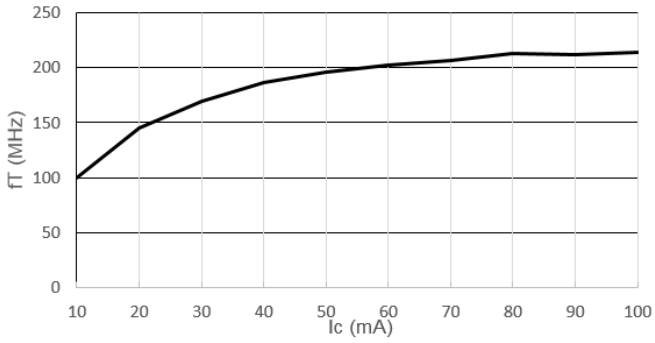
h_{FE} vs I_C



$V_{BE(sat)}$ vs I_C



$V_{BE(on)}$ vs I_C

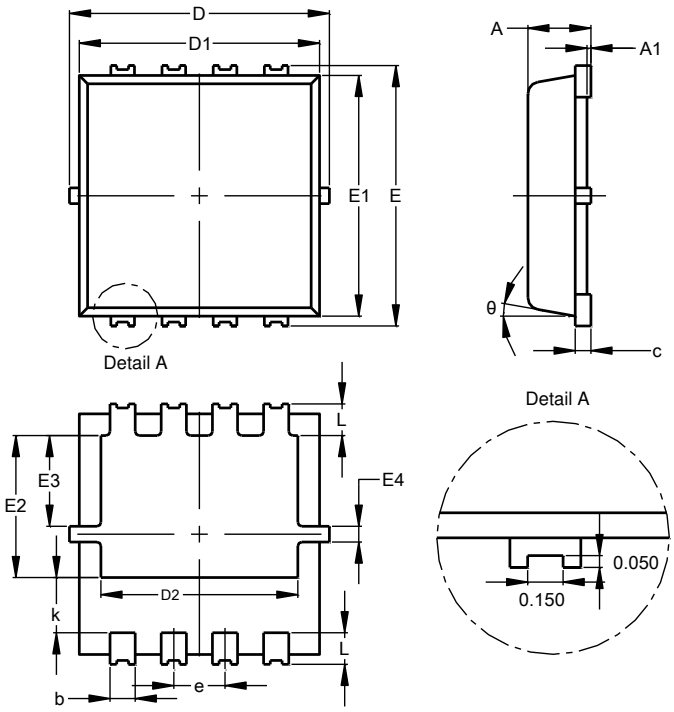


fT vs Ic

Package Outline Dimensions

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

PowerDI3333-8 (SWP) (Type UX)

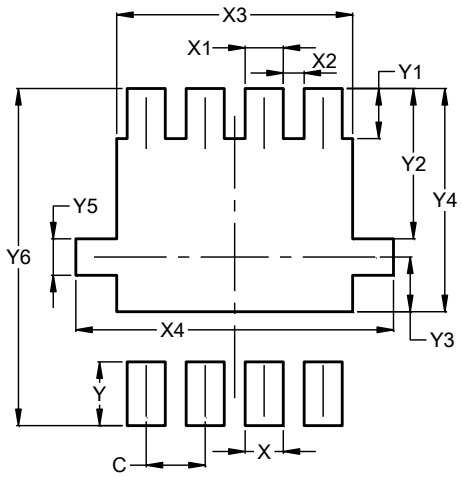


PowerDI3333-8 (SWP) (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
k	0.50	0.90	0.70
L	0.30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

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