100V NPN/PNP LOW SAT TRANSISTORS IN POWERDI5060-8

Features

- NPN Transistor:
  - BV_{CEO} > 100V
  - I_C = 3A Continuous Collector Current
  - I_{CM} = 8A Peak Pulse Current
  - $R_{CE(sat)}$ = 90mΩ (Typ)
- PNP Transistor
  - BV_{CEO} > -100V
  - I_C = -3A Continuous Collector Current
  - I_{CM} = -8A Peak Pulse Current
  - $R_{CE(sat)}$ = 110mΩ (Typ)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DXTC3C100PDQ 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/

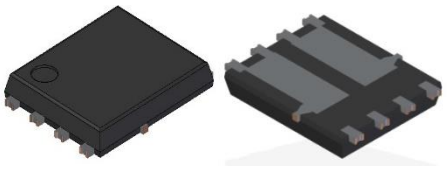
Mechanical Data

- Package: PowerDI5060-8/SWP (Type UXD)
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Lead-Frame; Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

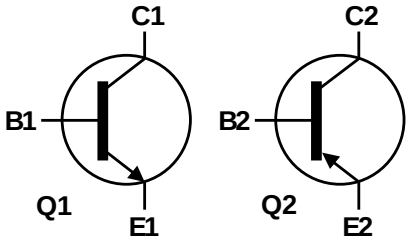
Applications

- Power Management
- Load Switches
- MOSFET and IGBT Gate Drivers

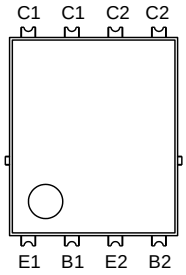
PowerDI5060-8/SWP (Type UXD)



Top View Bottom View



Internal Schematic



Top View
Pin Configuration

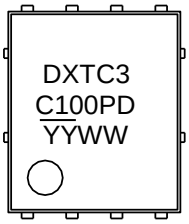
Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DXTC3C100PDQ-13	Automotive	DXTC3C100PD	13	12	2,500

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

PowerDI5060-8/SWP



DXTC3 = Product Type Marking Code
C100PD = Product Type Marking Code
$\overline{YY}$WW = Date Code Marking
$\overline{YY}$ = Last Digit of Year (ex: 21 = 2021)
WW = Week Code (01 to 53)

NPN 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}	100	V
Emitter-Base Voltage	V_{EBO}	7	V
Base Current	I_B	500	mA
Continuous Collector Current	I_C	3	A
Peak Pulse Collector Current	I_{CM}	8	A

PNP 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}	-100	V
Emitter-Base Voltage	V_{EBO}	-7	V
Base Current	I_B	-500	mA
Continuous Collector Current	I_C	-3	A
Peak Pulse Collector Current	I_{CM}	-8	A

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

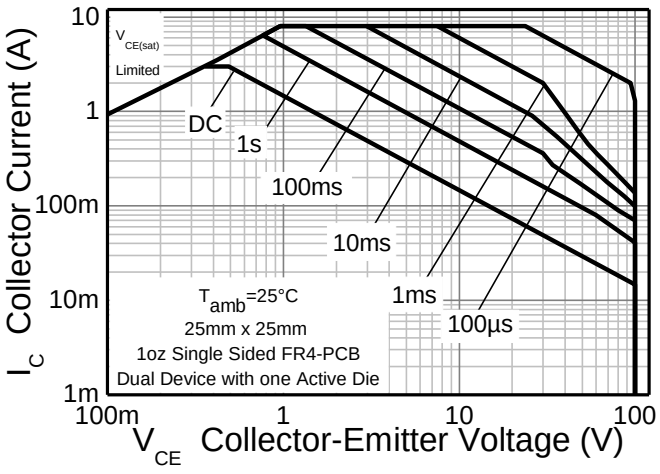
Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 5, 7)	P_D	1.47	W
Linear Derating Factor	(Notes 6, 7)		11.76	mW/°C
Thermal Resistance, Junction to Ambient	(Notes 5, 7)	$R_{\theta JA}$	85	°C/W
	(Notes 6, 7)		37	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	5.7	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

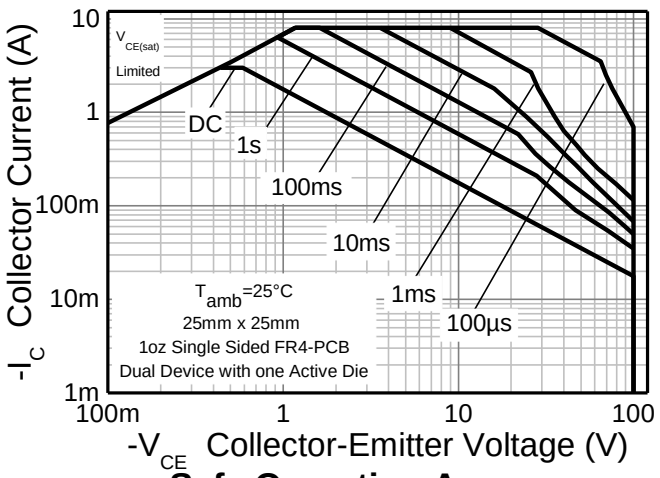
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	C3

Notes:
5. For a device mounted with the collector lead on 25mm x 25mm 1oz copper that is on single-sided 1.6mm FR4 PCB; device with one active die is measured under still air conditions whilst operating in a steady-state.
6. Same as Note 5, except the device is measured at $t \leq 5$ sec.
7. For a dual device with one active die.
8. Thermal resistance from junction to solder-point (at the end of the collector lead).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

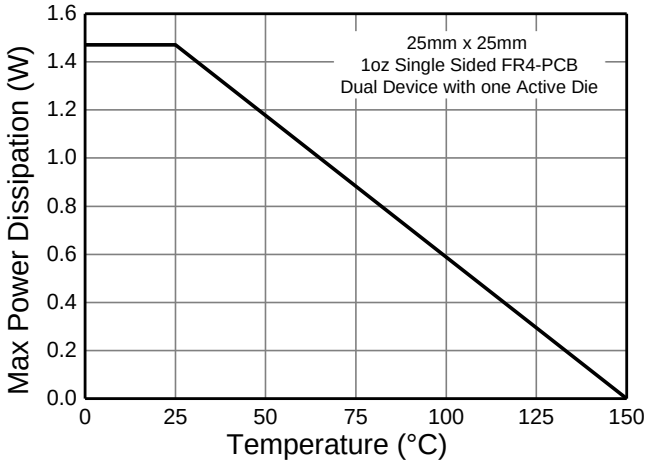
Thermal Characteristics and Derating Information



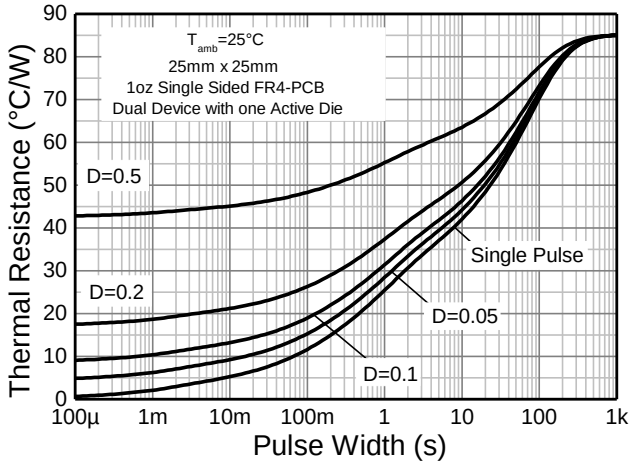
Safe Operating Area



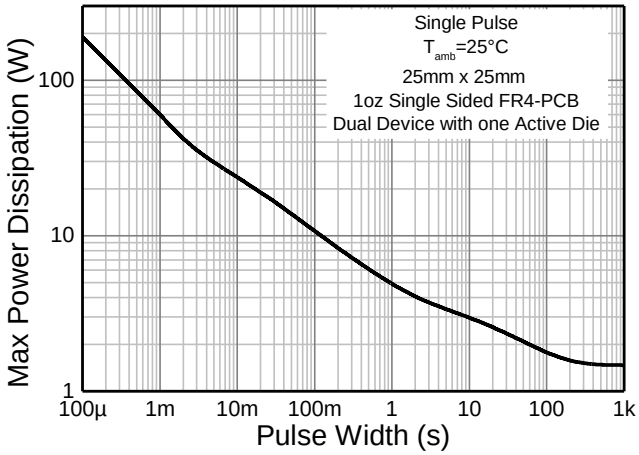
Safe Operating Area



Derating Curve



Transient Thermal Impedance



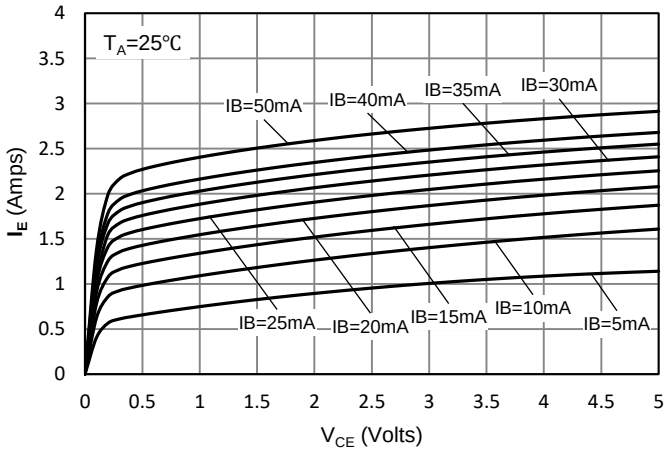
Pulse Power Dissipation

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

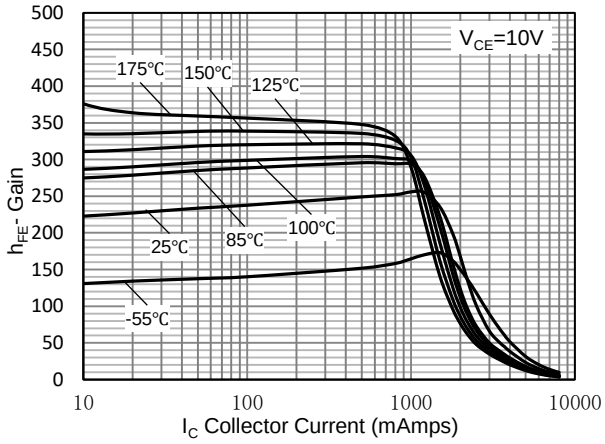
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	100	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	100	—	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	—	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 80V
		—	—	50	µA	V_{CB} = 80V @Tj = 150°C
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 7V
Collector-Emitter Cutoff Current	I_{CES}	—	—	100	nA	V_{CES} = 80V
ON CHARACTERISTICS (Note 10)						
DC Current Gain	h_{FE}	150	250	—	—	I_C = 500mA, V_{CE} = 10V
		80	250	—		I_C = 1A, V_{CE} = 10V
		20	100	—		I_C = 2A, V_{CE} = 10V
		10	40	—		I_C = 3A, V_{CE} = 10V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	90	150	mV	I_C = 1A, I_B = 50mA
		—	225	330	mV	I_C = 3A, I_B = 300mA
Collector-Emitter Saturation Resistance	$R_{CE(sat)}$	—	90	150	mΩ	I_C = 1A, I_B = 50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	0.86	1.0	V	I_C = 1A, I_B = 50mA
		—	1.0	1.2		I_C = 2A, I_B = 200mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	0.67	0.85	V	I_C = 0.1A, V_{CE} = 2V
SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product	f_T	—	130	—	MHz	V_{CE} = 10V, I_C = 100mA, f = 100MHz
Output Capacitance	C_{obo}	—	11	—	pF	V_{CB} = 10V, f = 1MHz
Delay Time	t_d	—	40	—	ns	V_{CC} = 12.5V, I_C = 1A I_{B1} = -I_{B2} = 0.05A
Rise Time	t_r	—	20	—	ns	
Turn-On Time	t_{on}	—	60	—	ns	
Storage Time	t_s	—	620	—	ns	
Fall Time	t_f	—	40	—	ns	
Turn-Off Time	t_{off}	—	660	—	ns	

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

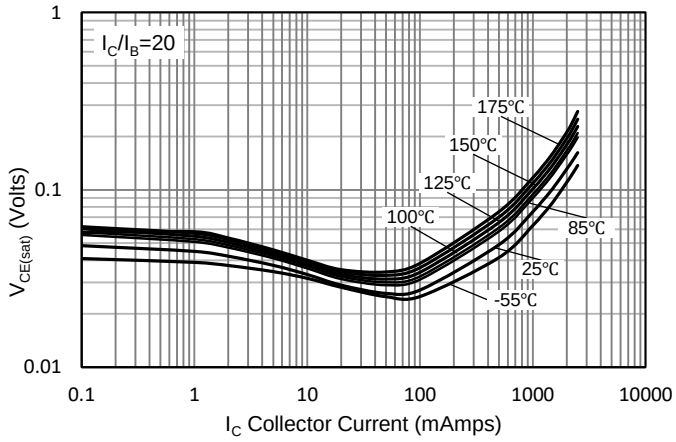
NPN Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



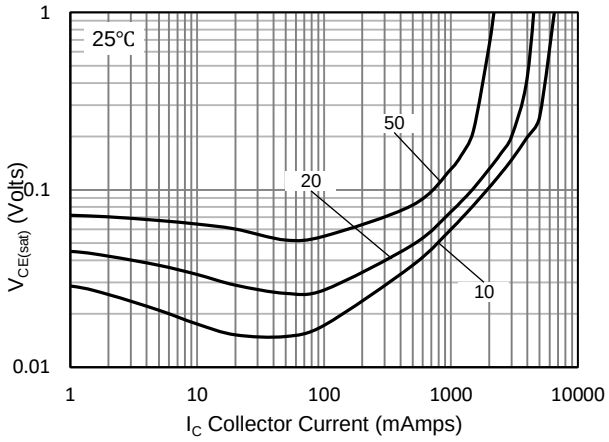
V_{CE} vs I_E



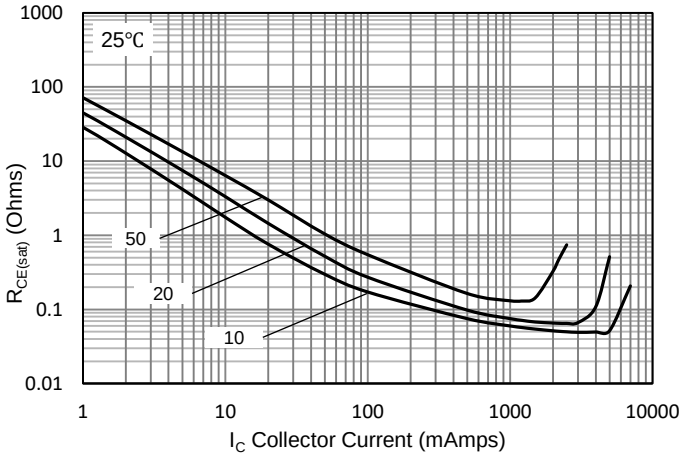
h_{FE} vs I_C



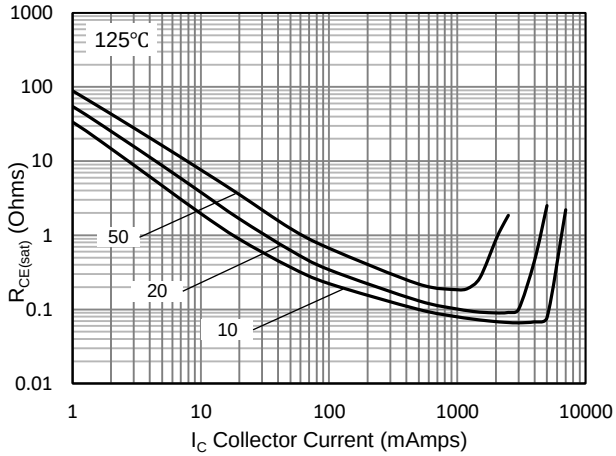
$V_{CE(sat)}$ vs I_C



$V_{CE(sat)}$ vs I_C

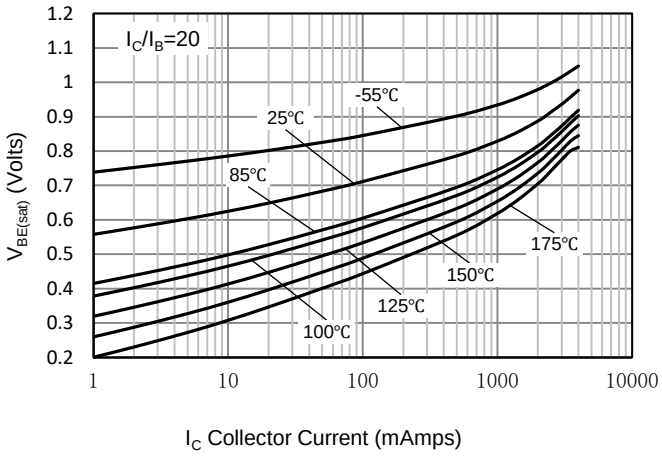


$R_{CE(sat)}$ vs I_C

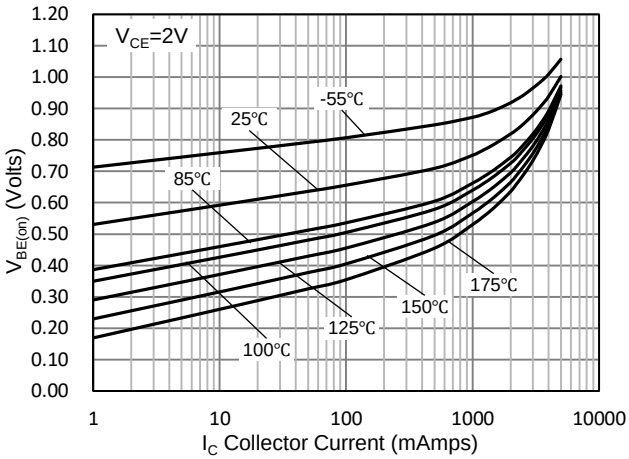


$R_{CE(sat)}$ vs I_C

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



$V_{BE(sat)}$ vs I_C



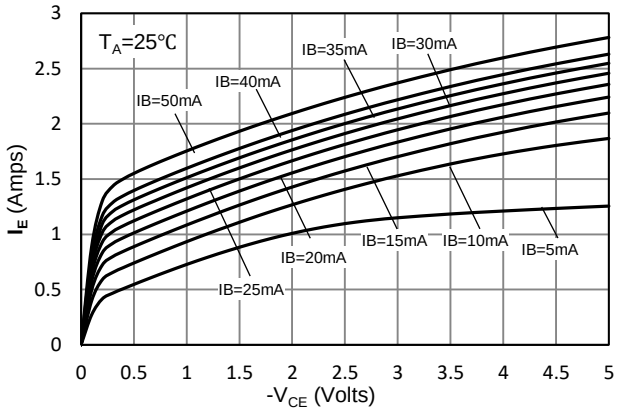
$V_{BE(on)}$ vs I_C

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

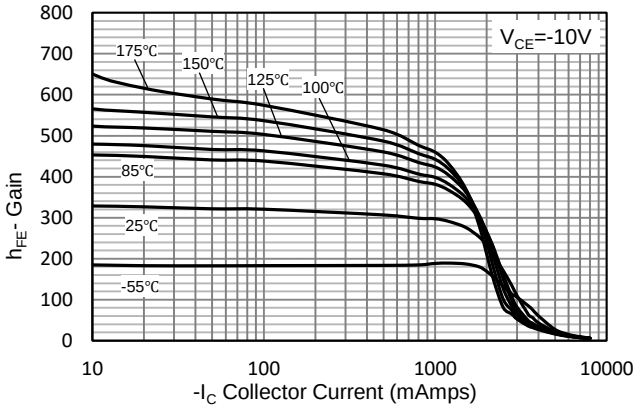
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-100	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	-100	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	—	—	V	I_E = -100µA
Collector-Base Cutoff Current	I_{CBO}	—	—	-100	nA	V_{CB} = -80V
		—	—	-50	µA	V_{CB} = -80V @Tj = 150°C
Emitter Cutoff Current	I_{EBO}	—	—	-100	nA	V_{EB} = -7V
Collector-Emitter Cutoff Current	I_{CES}	—	—	-100	nA	V_{CES} = -80V
ON CHARACTERISTICS (Note 10)						
DC Current Gain	h_{FE}	170	305	—	—	I_C = -500mA, V_{CE} = -10V
		160	275	—		I_C = -1A, V_{CE} = -10V
		45	90	—		I_C = -2A, V_{CE} = -10V
		10	20	—		I_C = -3A, V_{CE} = -10V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-70	-110	mV	I_C = -0.5A, I_B = -50mA
		—	-220	-325		I_C = -2A, I_B = -200mA
Collector-Emitter Saturation Resistance	$R_{CE(sat)}$	—	110	180	mΩ	I_C = -2A, I_B = -200mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-0.91	-1	V	I_C = -1A, I_B = -50mA
		—	-1.02	-1.2		I_C = -2A, I_B = -200mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-0.68	-0.9	V	I_C = -0.1A, V_{CE} = -2V
SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product	f_T	—	100	—	MHz	V_{CE} = -10V, I_C = -100mA, f = 100MHz
Output Capacitance	C_{obo}	—	30	—	pF	V_{CB} = -10V, f = -1MHz
Delay Time	t_d	—	30	—	ns	V_{CC} = -12.5V, I_C = -1A I_{B1} = -I_{B2} = -50mA
Rise Time	t_r	—	30	—	ns	
Turn-On Time	t_{on}	—	60	—	ns	
Storage Time	t_s	—	660	—	ns	
Fall Time	t_f	—	50	—	ns	
Turn-Off Time	t_{off}	—	710	—	ns	

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

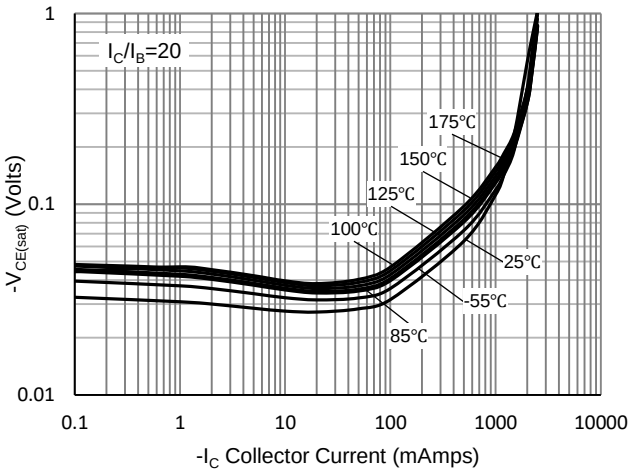
PNP Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



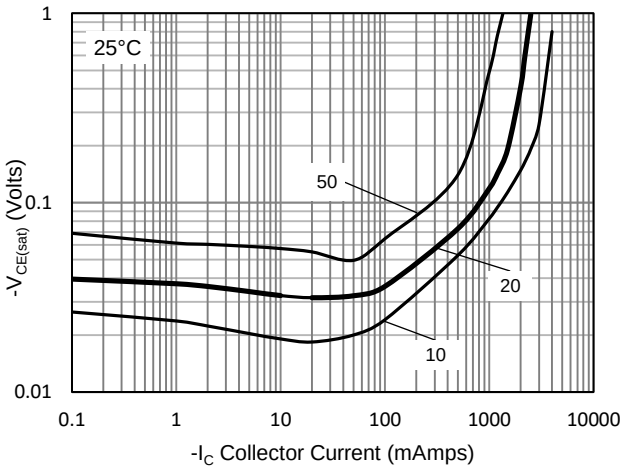
V_{CE} vs I_E



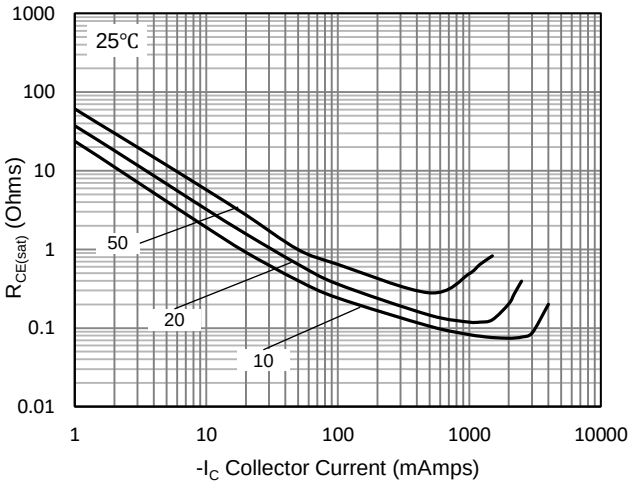
h_{FE} vs I_C



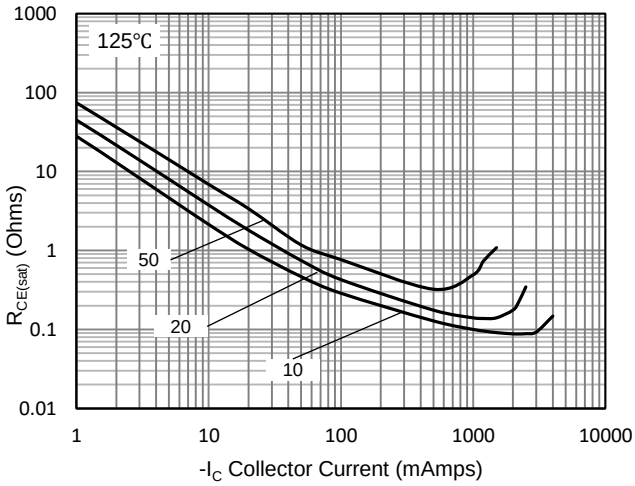
$V_{CE(sat)}$ vs I_C



$V_{CE(sat)}$ vs I_C

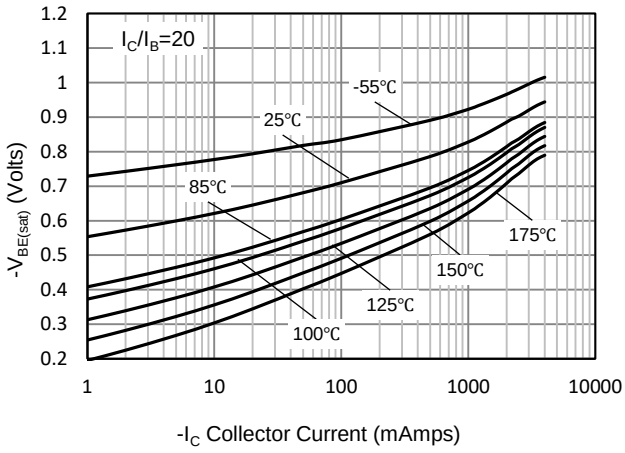


$R_{CE(sat)}$ vs I_C

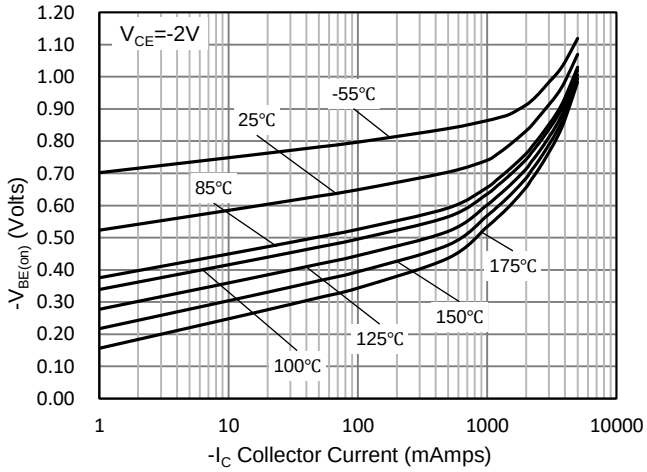


$R_{CE(sat)}$ vs I_C

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



$V_{BE(sat)}$ vs I_C

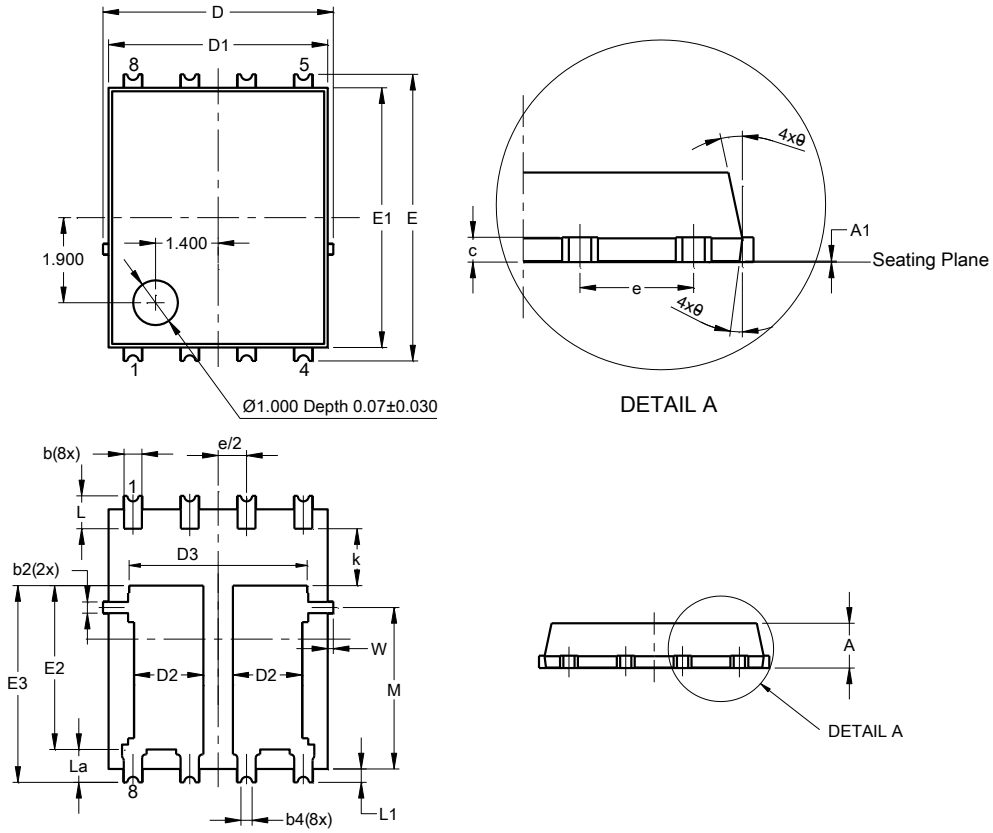


$V_{BE(on)}$ vs I_C

Package Outline Dimensions

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

PowerDI5060-8/SWP (Type UXD)

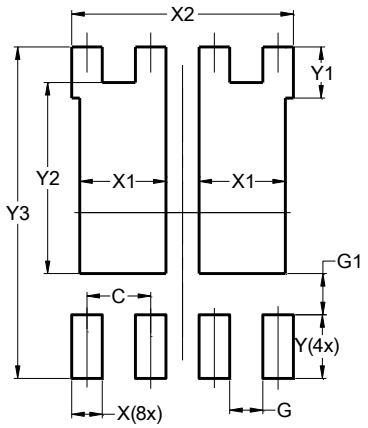


PowerDI5060-8/SWP (Type UXD)			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0.00	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	1.46	1.66	1.55
D3	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
M	3.205	4.005	3.605
W	0.025	0.225	0.125
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

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

PowerDI5060-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	1.720
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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