



Micro Commercial Components



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BDX33 THRU BDX33D

NPN Silicon Power Darlington

Features

- Halogen free available upon request by adding suffix "-HF"
- Lead Free Finish/RoHS Compliant(Note 1) ("P" Suffix designates RoHS Compliant. See ordering information)
- Designed For Complementary Use with BDX34, BDX34A, BDX34B, BDX34C and BDX34D
- 70W at 25°C Case Temperature
- 10A Continuous Collector Current
- Minimum h_{FE} of 750 at 3.0V, 3.0A
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Mounting Torque: 5 in-lbs Maximum

Absolute Maximum Ratings @ 25°C Unless Otherwise Noted

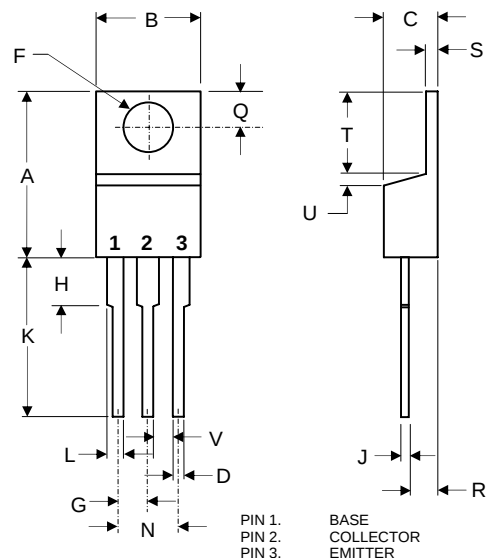
Symbol	Rating	Value	Unit
V_{CBO}	Collector-Base Voltage ($I_E=0$)	45	V
	BDX33	60	
	BDX33A	80	
	BDX33B	100	
	BDX33C	100	
V_{CEO}	Collector-Emitter Voltage ($I_B=0$)	45	V
	BDX33	60	
	BDX33A	80	
	BDX33B	100	
	BDX33C	100	
V_{EBO}	Emitter-Base Voltage	5.0	V
I_C	Continuous Collector Current	10	A
I_B	Continuous Base Current	0.3	A
P_{TOT}	Continuous Device Dissipation at (or below) 25°C Case Temperature (see Note2)	70	W
P_{TOT}	Continuous Device Dissipation at (or below) 25°C Free Air Temperature (see Note 3)	2.0	W
T_J	Operating Free Air Temperature Range	-55~+150	°C
T_{STG}	Storage Temperature Range	-55~+150	°C
T_A	Operating Free-Air Temperature Range	-55~+150	°C

- Notes: 1. High Temperature Solder Exemption Applied, see EU Directive Annex 7.
2. Derate Linearly to 150°C Case Temperature at the Rate of 0.56 W/°C
3. Derate Linearly to 150°C Free Air Temperature at the Rate of 16m W/°C

Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage ($I_C=100mA$, $I_B=0$, see note 3)				V
	BDX33	45			
	BDX33A	60			
	BDX33B	80			
	BDX33C	100			
	BDX33D	100			

TO-220



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.560	.625	14.22	15.88	
B	.380	.420	9.65	10.67	
C	.140	.190	3.56	4.82	
D	.020	.045	0.51	1.14	
F	.139	.161	3.53	4.09	Ø
G	.190	.110	2.29	2.79	
H	---	.250	---	6.35	
J	.012	.025	0.30	0.64	
K	.500	.580	12.70	14.73	
L	.045	.060	1.14	1.52	
N	.190	.210	4.83	5.33	
Q	.100	.135	2.54	3.43	
R	.080	.115	2.04	2.92	
S	.045	.055	1.14	1.39	
T	.230	.270	5.84	6.86	
U	----	.050	----	1.27	
V	.045	----	1.15	----	

BDX33 thru BDX33D

Symbol	Parameter	Min	Typ	Max	Unit
I_{CEO}	Collector-Emitter Cut-Off Current ($V_{CE}=30V, I_B=0$)			0.5	mA
	BDX33				
	($V_{CE}=30V, I_B=0$)			0.5	
	BDX33A				
	($V_{CE}=40V, I_B=0$)			0.5	
	BDX33B				
	($V_{CE}=50V, I_B=0$)			0.5	
	BDX33C				
	($V_{CE}=60V, I_B=0$)			0.5	
I_{CBO}	Collector Cut-Off Current ($V_{CB}=45V, I_E=0$)			1.0	mA
	BDX33				
	($V_{CB}=60V, I_E=0$)			1.0	
	BDX33A				
	($V_{CB}=80V, I_E=0$)			1.0	
	BDX33B				
	($V_{CB}=100V, I_E=0$)			1.0	
	BDX33C				
	($V_{CB}=100V, I_E=0$)			1.0	
I_{EBO}	Emitter Cut-Off Current ($V_{EB}=5.0V, I_C=0$)			10	mA
	BDX33				
	($V_{EB}=5.0V, I_C=0$)			10	
	BDX33A				
	($V_{EB}=5.0V, I_C=0$)			10	
	BDX33B				
	($V_{EB}=5.0V, I_C=0$)			10	
	BDX33C				
	($V_{EB}=5.0V, I_C=0$)			10	
η_{FE}	Forward Current Transfer Ratio ($V_{CE}=3.0V, I_C=4.0A$)	750			
	BDX33				
	($V_{CE}=3.0V, I_C=4.0A$)	750			
	BDX33A				
	($V_{CE}=3.0V, I_C=3.0A$)	750			
	BDX33B				
	($V_{CE}=3.0V, I_C=3.0A$)	750			
	BDX33C				
	($V_{CE}=3.0V, I_C=3.0A$)	750			
$V_{BE(ON)}$	Base-Emitter Voltage ($V_{CE}=3.0V, I_C=4.0A$)			2.5	V
	BDX33				
	($V_{CE}=3.0V, I_C=4.0A$)			2.5	
	BDX33A				
	($V_{CE}=3.0V, I_C=3.0A$)			2.5	
	BDX33B				
	($V_{CE}=3.0V, I_C=3.0A$)			2.5	
	BDX33C				
	($V_{CE}=3.0V, I_C=3.0A$)			2.5	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage ($I_B=8.0mA, I_C=4.0A$)			2.5	V
	BDX33				
	($I_B=8.0mA, I_C=4.0A$)			2.5	
	BDX33A				
	($I_B=6.0mA, I_C=3.0A$)			2.5	
	BDX33B				
	($I_B=6.0mA, I_C=3.0A$)			2.5	
	BDX33C				
	($I_B=6.0mA, I_C=3.0A$)			2.5	
V_{EC}	Parallel Diode Forward Voltage ($I_E=8.0A, I_B=0$)			4.0	V
	BDX33				
	($I_E=8.0A, I_B=0$)			4.0	
	BDX33A				
	($I_E=8.0A, I_B=0$)			4.0	
	BDX33B				
	($I_E=8.0A, I_B=0$)			4.0	
	BDX33C				
	($I_E=8.0A, I_B=0$)			4.0	

NOTES: 4. These parameters must be measured using pulse techniques, $t_p=300\mu s$, duty cycle $\leq 2\%$.

5. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance			1.78	$^{\circ}C/W$
$R_{\theta JA}$	Junction to Free Air Thermal Resistance			62.5	$^{\circ}C/W$

Resistive-Load-Switching Characteristics at 25 $^{\circ}C$ Case Temperature

Symbol	Parameter	Test Conditions [†]	Min	Typ	Max	Unit
t_{on}	Turn-On Time	$I_C=3.0A, I_{B(on)}=12mA, I_{B(off)}=-12mA$		1.0		μs
t_{off}	Turn-Off Time	$V_{BE(off)}=-3.5V, R_L=10\Omega, t_p=20\mu s, dc \leq 2\%$		5.0		μs

[†] Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

BDX33 thru BDX33D



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TYPICAL DC CURRENT GAIN VS COLLECTOR CURRENT

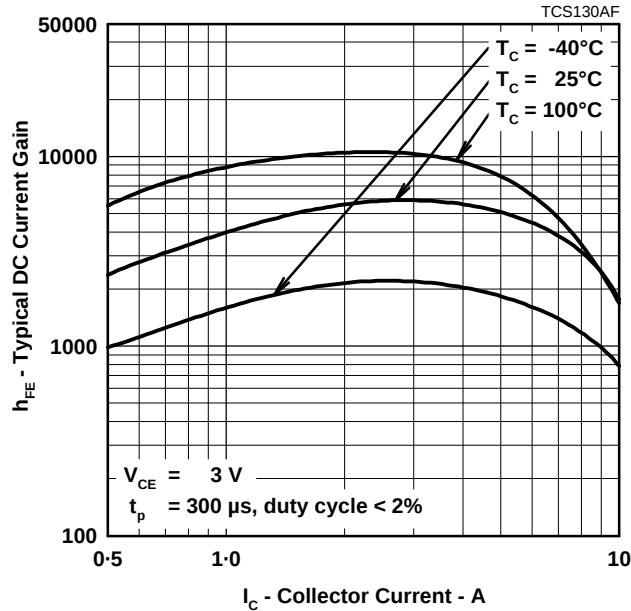


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE VS COLLECTOR CURRENT

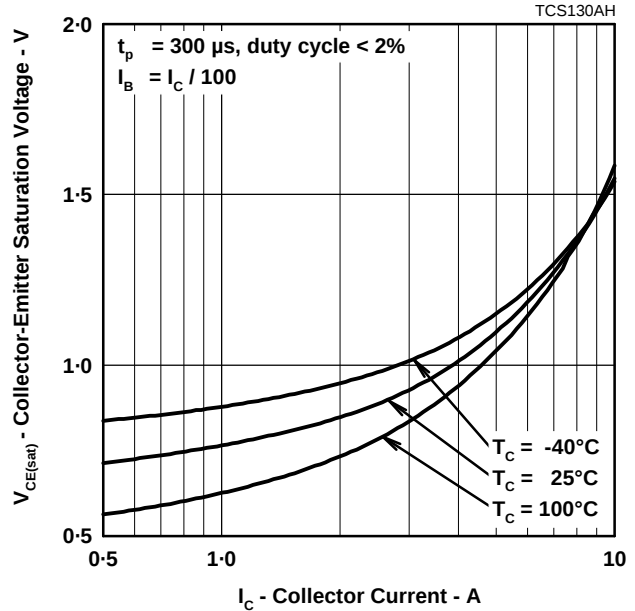


Figure 2.

BASE-EMITTER SATURATION VOLTAGE VS COLLECTOR CURRENT

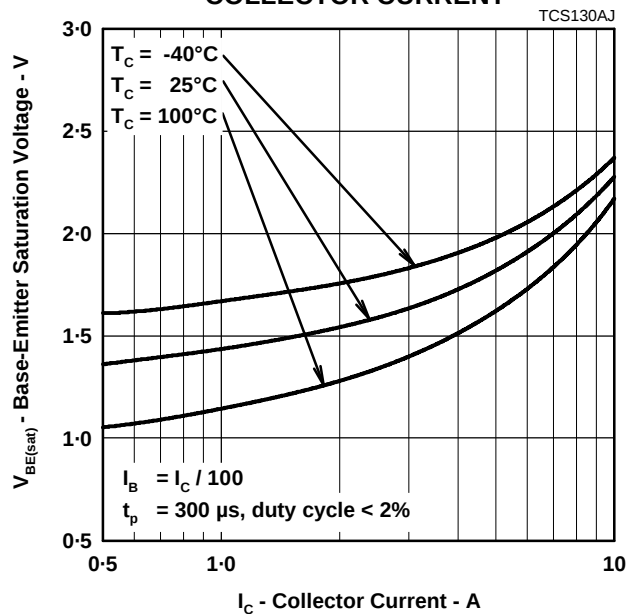


Figure 3.

THERMAL INFORMATION

MAXIMUM POWER DISSIPATION VS CASE TEMPERATURE

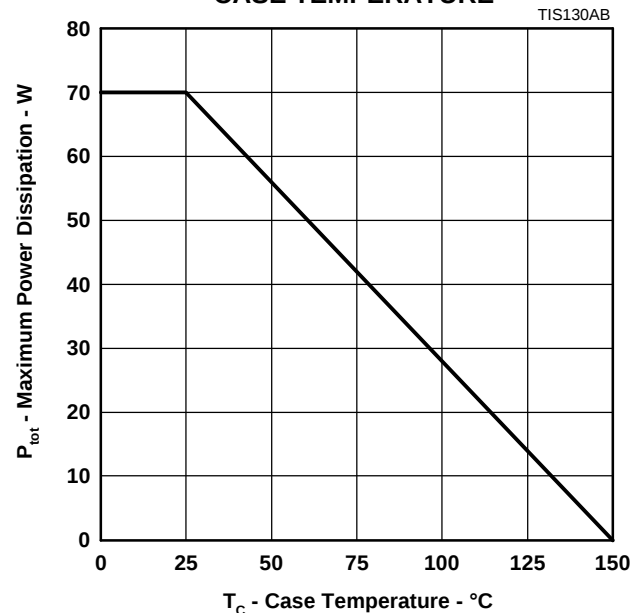


Figure 4.

Ordering Information :

Device	Packing
Part Number-BP	Bulk; 1Kpcs/Box

Note : Adding "-HF" suffix for halogen free, eg. Part Number-BP-HF

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