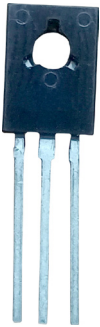


Single Bipolar Transistor multicomp^{PRO}

RoHS
Compliant



Applications

- Intended for use in Medium Power Linear Switching Applications

Features

- This product is available in AEC-Q101 Compliant and PPAP Capable also.
Note: For AEC-Q101 compliant products, please use suffix -AQ in the part number while ordering.

Absolute Maximum Ratings (Ta = 25°C Unless otherwise specified)

Parameter	Symbol	BD233 BD234	BD235 BD236	Unit
Collector Base Voltage	V _{CB0}	45	60	V
Collector Emitter Voltage	V _{CE0}			
Collector Emitter Voltage (R _{BE} =1KΩ)	V _{CER}			
Emitter Base Voltage	V _{EBO}	5		
Collector Current	I _C	2		A
Collector Peak Current	I _{CM}	6		
Total Dissipation @ T _C =25°C	P _D	50		W
Total Dissipation @ T _a =25°C		1.25		
Derate above 25°C		10		mW/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +150		°C

Thermal Resistance

Description	Symbol	Value	Unit
Junction to Case	R _{th(j-c)}	5	°C/W
Junction to Ambient in free air	R _{th(j-a)}	100	

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Electrical Characteristics at (Ta = 25°C Unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector Cut off Current	BD233/234	$V_{CB}=45V, I_E=0$	--	--	100	μA
	BD235/236					
Collector Cut off Current TC = 150°C	BD233/234	$V_{CB}=45V, I_E=0$	--	--	2	mA
	BD235/236					
Emitter Cut off Current	I_{EBO}	$V_{EB}=5V, I_C=0$			1	
Collector Emitter Sustaining Voltage	BD233/234	$I_C=0.1A, I_B=0$	--	--	--	V
	BD235/236					
Collector Emitter Saturation Voltage	$V_{CE(sat)}^1$	$I_C=1.0A, I_B=0.1A$	--		0.6	
Base Emitter Voltage	$V_{BE(on)}^1$	$I_C=1.0A, V_{CE}=2V$	--		1.3	
DC Current Gain	h_{FE}^1	$I_C=150mA, V_{CE}=2V$	40			
		$I_C=1.0A, V_{CE}=2V$	25	--		
Current Gain Bandwidth Product	f_T	$I_C=250mA, V_{CE}=10V$	3			MHz
h_{FE1}^1 / h_{FE2}	Matched Pairs	$I_C=150mA, V_{CE}=2V$	--		1.6	

Note:

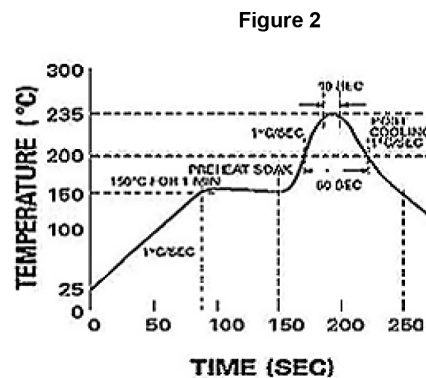
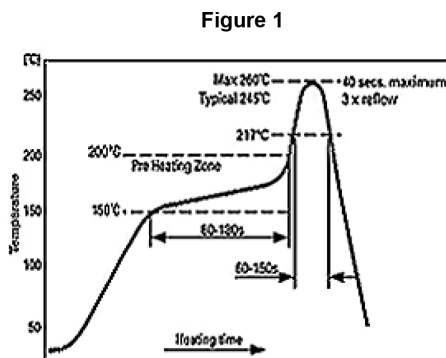
1. Pulsed Pulse Duration=300 μ s, Duty Cycle=1.5%

Recommended Reflow Solder Profiles

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.



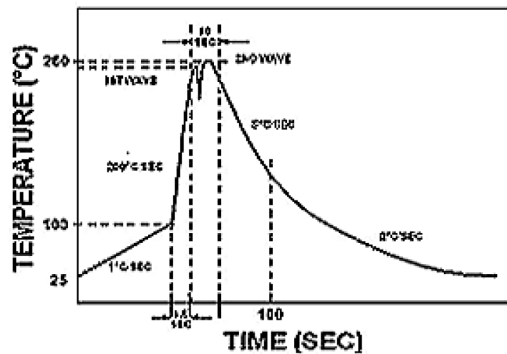
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Reflow profiles in tabular form

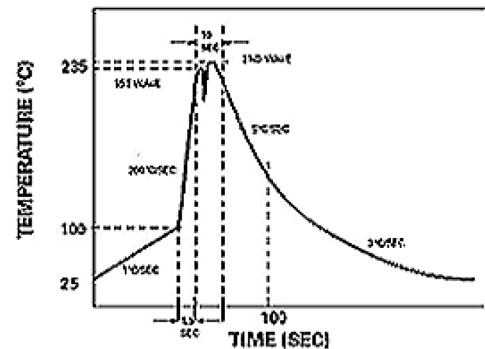
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	150-170°C 60-180 seconds	150-200°C 60-180 seconds
Time maintained above: – Temperature – Time	200°C 30-50 seconds	217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

Recommended Wave Solder Profiles

The Recommended solder Profile For Devices with Pb-free terminal plating where ae Pb-free solder is used



The Recommended solder Profile For Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder



Wave Profiles in Tabular Form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~200°C/second	~200°C/second
Heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	10 seconds
Ramp-Down Rate	5°C/second max.	5°C/second max.

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Typical Characteristics Curves

Fig 1: DC current Gain

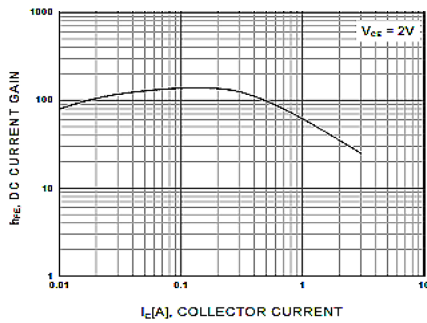


Fig 3: Base-Emitter Saturation Voltage
Collector-Emitter Saturation Voltage

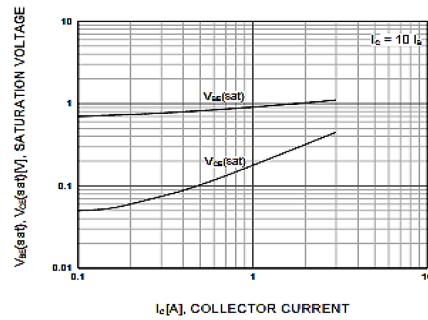


Fig 2: Safe Operating Area

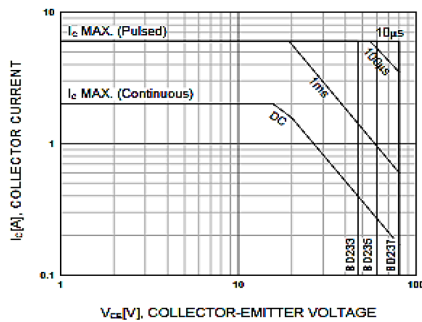
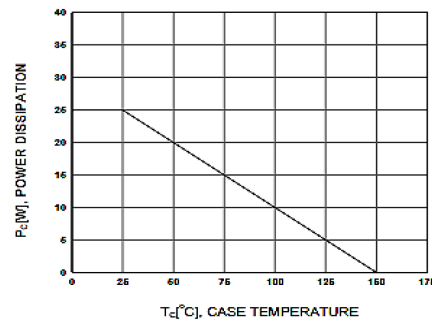
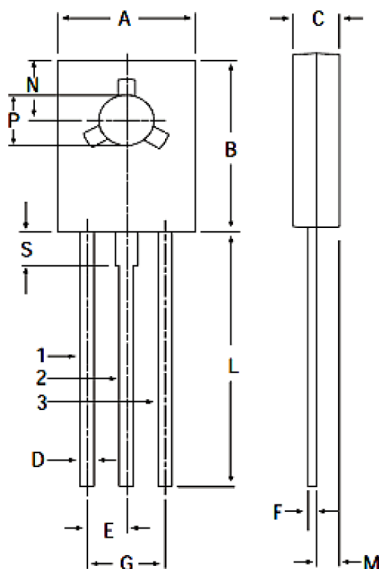


Fig 4: Power Derating



TO-18 Leaded Plastic Package

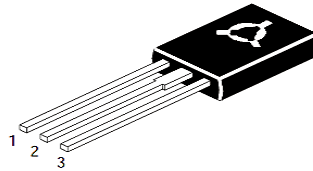


DIM	MIN	MAX
A	7.4	7.8
B	10.5	10.8
C	2.4	2.7
D	0.7	0.9
E	2.25 TYP.	
F	0.49	0.75
G	4.5 TYP.	
L	15.7 TYP.	
M	1.27 TYP.	
N	3.75 TYP.	
P	3	3.2
S	2.5 TYP.	

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PIN CONFIGURATION

1. EMITTER
2. COLLECTOR
3. BASE



Part Number Table

Description	Part Number
Single Bipolar Transistor, NPN, 45V, 2000mA, 50W, TO-126	BD233
Single Bipolar Transistor, PNP, 45V, 2000mA, 50W, TO-126	BD234
Single Bipolar Transistor, NPN, 60V, 2000mA, 50W, TO-126	BD235
Single Bipolar Transistor, PNP, 60V, 2000mA, 50W, TO-126	BD236

Dimensions : Millimetres

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