



# EPITAXIAL-BASE NPN/PNP

## HIGH GAIN GENERAL PURPOSE

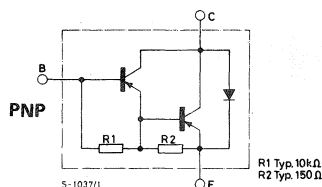
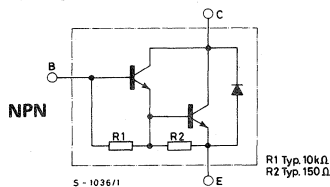
The BDX33, BDX33A, BDX33B and BDX33C are silicon epitaxial-base NPN transistors in monolithic Darlington configuration and are mounted in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications. This complementary PNP types are the BDX34, BDX34A, BDX34B and BDX34C respectively.

## ABSOLUTE MAXIMUM RATINGS

		NPN *PNP	BDX33 BDX34	BDX33A BDX34A	BDX33B BDX34B	BDX33C BDX34C
$V_{CBO}$	Collector-base voltage ( $I_E=0$ )		45	60	80	100
$V_{CEO}$	Collector-emitter voltage ( $I_B=0$ )		45	60	80	100
$I_C$	Collector current			10A		
$I_{CM}$	Collector peak current			15A		
$I_B$	Base current			0.25A		
$P_{tot}$	Total power dissipation at $T_{case} \leq 25^\circ C$			70W		
$T_{stg}$	Storage Temperature			-65 to 150°C		
$T_j$	Junction temperature			150°C		

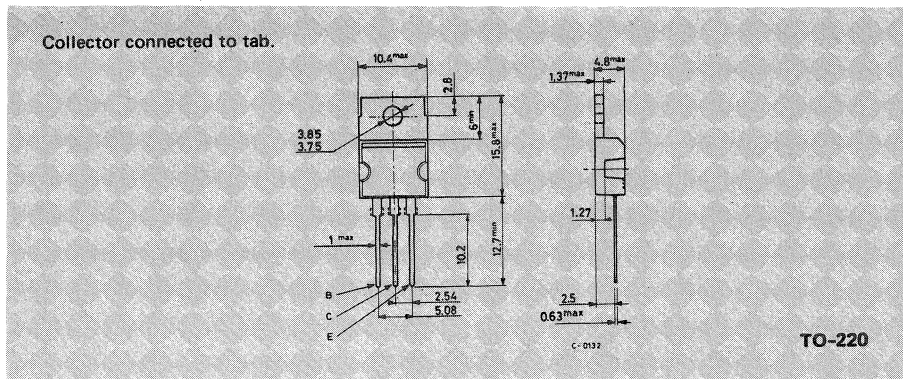
\* For PNP types voltage and current values are negative.

## INTERNAL SCHEMATIC DIAGRAMS



## MECHANICAL DATA

Dimensions in mm





BDX33 BDX34  
 BDX33A BDX34A  
 BDX33B BDX34B  
 BDX33C BDX34C

## THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	1.78	$^{\circ}C/W$
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## ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$ unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$ Collector cutoff current ( $I_E=0$ )	for BDX33/34 $V_{CB} = 45V$			0.2	mA
	for BDX33A/34A $V_{CB} = 60V$			0.2	mA
	for BDX33B/34B $V_{CB} = 80V$			0.2	mA
	for BDX33C/34C $V_{CB} = 100V$			0.2	mA
	$T_{case} = 100^{\circ}C$				
	for BDX33/34 $V_{CB} = 45V$			5	mA
	for BDX33A/34A $V_{CB} = 60V$			5	mA
	for BDX33B/34B $V_{CB} = 80V$			5	mA
	for BDX33C/34C $V_{CB} = 100V$			5	mA
$I_{CEO}$ Collector cutoff current ( $I_B = 0$ )	for BDX33/34 $V_{CE} = 22V$			0.5	mA
	for BDX33A/34A $V_{CE} = 30V$			0.5	mA
	for BDX33B/34B $V_{CE} = 40V$			0.5	mA
	for BDX33C/34C $V_{CE} = 50V$			0.5	mA
	$T_{case} = 100^{\circ}C$				
	for BDX33/34 $V_{CE} = 22V$			10	mA
	for BDX33A/34A $V_{CE} = 30V$			10	mA
	for BDX33B/34B $V_{CE} = 40V$			10	mA
	for BDX33C/34C $V_{CE} = 50V$			10	mA
$I_{EBO}$ Emitter cutoff current ( $I_C = 0$ )	$V_{EB} = 5V$			5	mA
$V_{CEO(sus)}$ * Collector-emitter sustaining voltage ( $I_B = 0$ )	$I_C = 100mA$				
	for BDX33/34	45			V
	for BDX33A/34A	60			V
	for BDX33B/34B	80			V
	for BDX33C/34C	100			V
$V_{CER(sus)}$ * Collector-emitter sustaining voltage ( $I_B=0$ $R_{BE}=100\Omega$ )	$I_C = 100mA$				
	for BDX33/34	45			V
	for BDX33A/34A	60			V
	for BDX33B/34B	80			V
	for BDX33C/34C	100			V
$V_{CEV(sus)}$ * Collector-emitter sustaining voltage ( $I_B=0$ $V_{BE}=-1.5V$ )	$I_C = 100mA$				
	for BDX33/34	45			V
	for BDX33A/34A	60			V
	for BDX33B/34B	80			V
	for BDX33C/34C	100			V

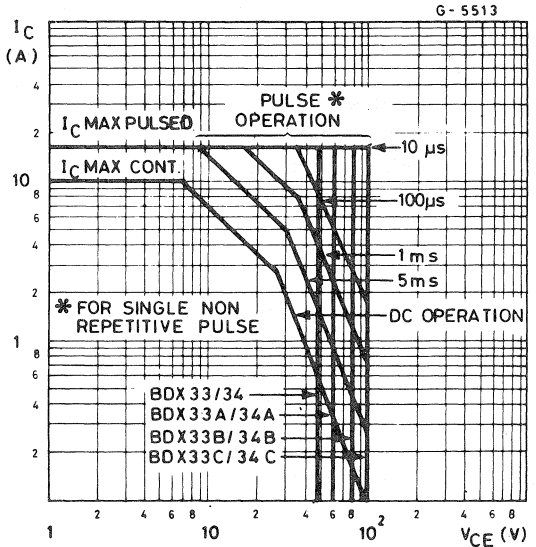


**ELECTRICAL CHARACTERISTICS** (continued)

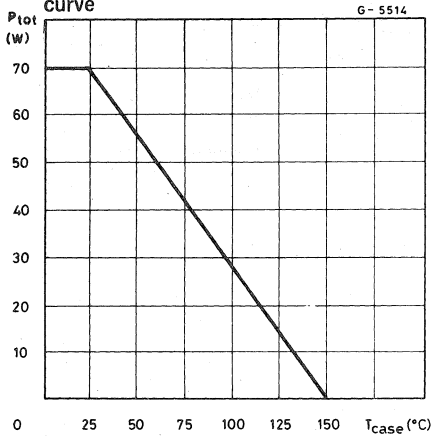
Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$ * Collector-emitter saturation voltage	for BDX33/33A/34/34A $I_C = 4A$ $I_B = 8mA$ for BDX33B/33C/34B/34C $I_C = 3A$ $I_B = 6mA$			2.5	V
$V_{BE}$ * Base-emitter voltage	for BDX33/33A/34/34A $I_C = 4A$ $V_{CE} = 3V$ for BDX33B/33C/34B/34C $I_C = 3A$ $V_{CE} = 3V$			2.5	V
$h_{FE}$ * DC current gain	for BDX33/33A/34/34A $I_C = 4A$ $V_{CE} = 3V$ for BDX33B/33C/34B/34C $I_C = 3A$ $V_{CE} = 3V$	750			—
$V_F$ * Parallel-diode forward voltage	$I_F = 8A$			4	V
$h_{fe}$ Small signal current gain	$I_C = 1A$ $V_{CE} = 5V$ $f = 1KHz$	1000			—

\* Pulsed: pulse duration = 300 $\mu$ s, duty cycle = 1.5%  
For PNP types voltage and current values are negative

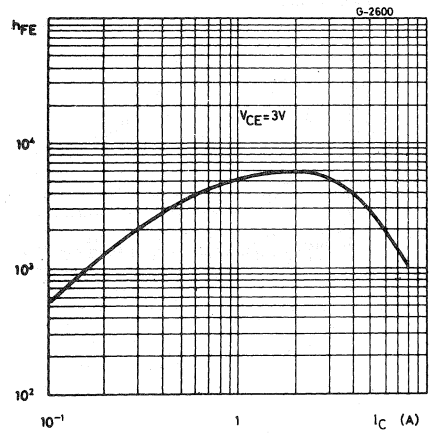
**Safe operating areas**



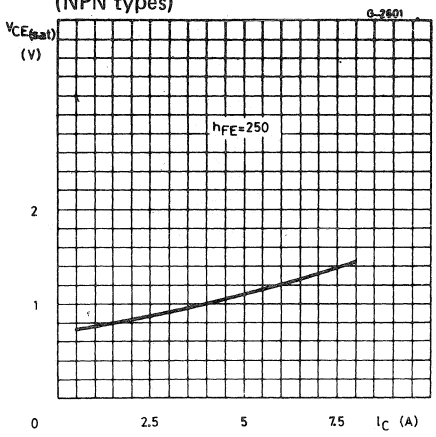
Case temperature dissipation derating curve



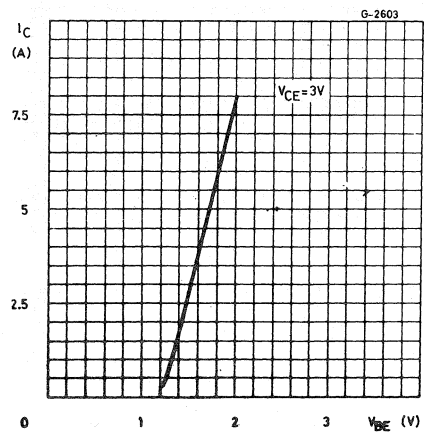
DC current gain (NPN types)



Collector-emitter saturation voltage (NPN types)



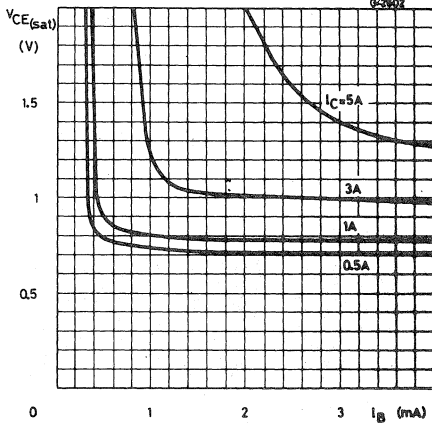
DC transconductance (NPN types)



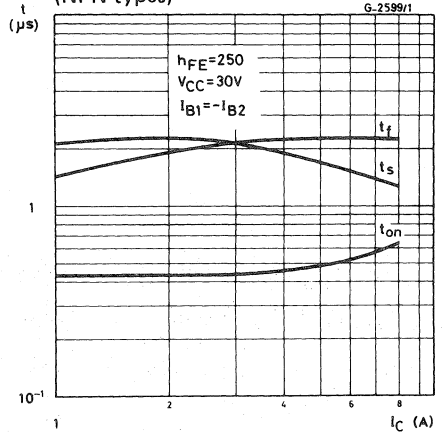


BDX33 BDX34  
BDX33A BDX34A  
BDX33B BDX34B  
BDX33C BDX34C

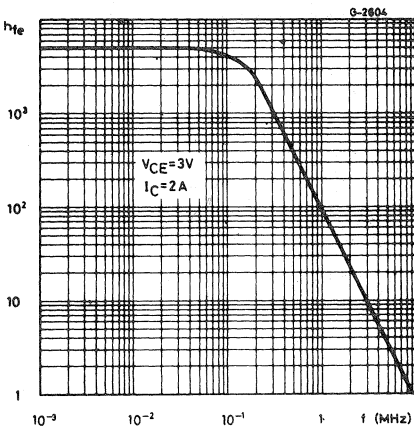
Collector-emitter saturation voltage (NPN types)



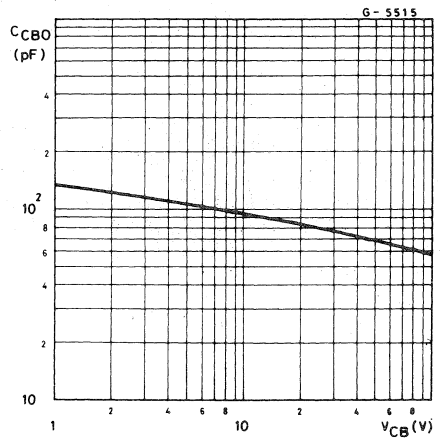
Saturated switching characteristics (NPN types)



Small signal current gain (NPN types)



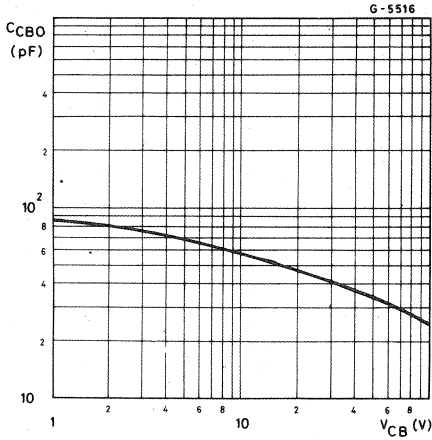
Collector-base capacitance (PNP types)



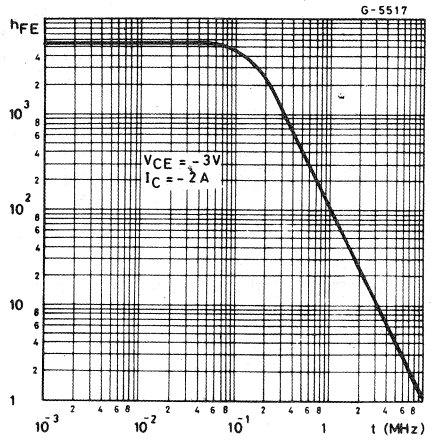


BDX33 BDX34  
BDX33A BDX34A  
BDX33B BDX34B  
BDX33C BDX34C

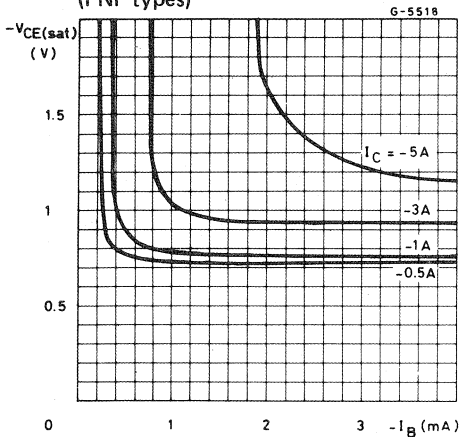
Collector-base capacitance (NPN types)



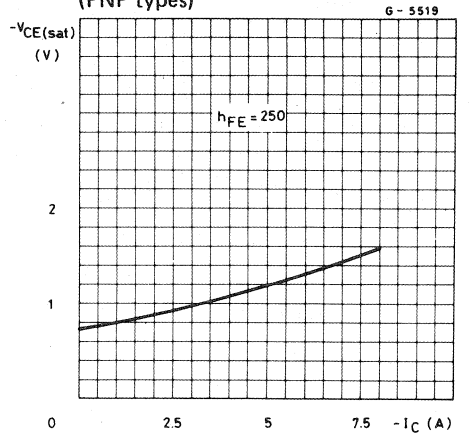
Small signal current gain (PNP types)

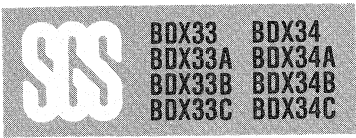


Collector-emitter saturation voltage (PNP types)

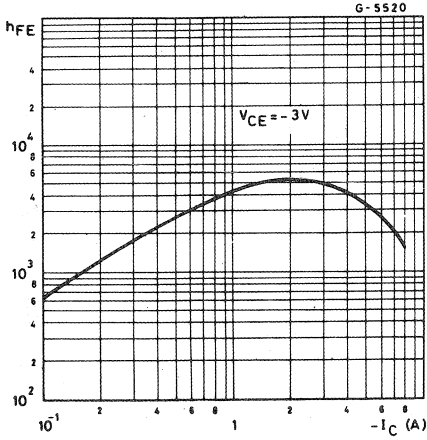


Collector-emitter saturation voltage (PNP types)

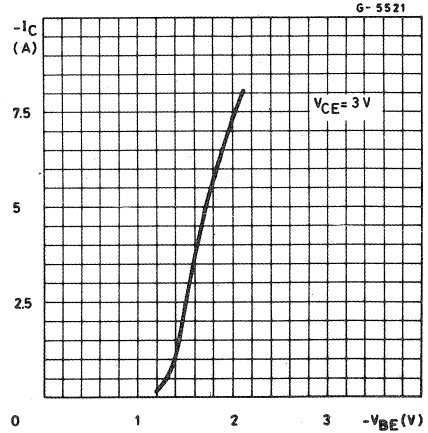




DC current gain (PNP types)



DC transconductance (PNP types)



Saturated switching characteristics (PNP types)

