



**SGS-THOMSON**  
MICROELECTRONICS

**BD705/706/707/708**  
**BD709/710/711/712**

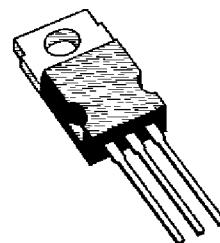
SGS-THOMSON

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POWER LINEAR AND SWITCHING APPLICATIONS

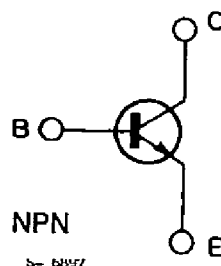
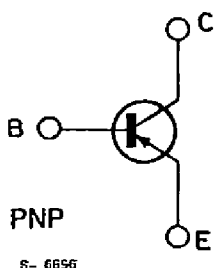
## DESCRIPTION

The BD705, BD707, BD709 and BD711 are silicon epitaxial-base NPN power transistors in Jedec TO-220 plastic package intended for use in power linear and switching applications. The complementary PNP types are the BD706, BD708, BD710 and BD712 respectively.



TO-220

## INTERNAL SCHEMATIC DIAGRAMS



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	NPN PNP*	Value				Unit
			BD705 BD706	BD707 BD708	BD709 BD710	BD711 BD712	
$V_{CE0}$	Collector-emitter Voltage ( $I_E = 0$ )		45	60	80	100	V
$V_{CES}$	Collector-emitter Voltage ( $V_{BE} = 0$ )		45	60	80	100	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )		45	60	80	100	V
$V_{EB0}$	Emitter-base Voltage ( $I_C = 0$ )		5				V
$I_C$	Collector Current		12				A
$I_B$	Base Current		5				A
$P_{tot}$	Total Power Dissipation at $T_{case} \leq 25^\circ C$		75				W
$T_{stg}$	Storage Temperature		- 65 to 150				$^\circ C$
$T_j$	Junction Temperature		150				$^\circ C$

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

## THERMAL DATA

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$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	1.67	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	70	$^{\circ}C/W$

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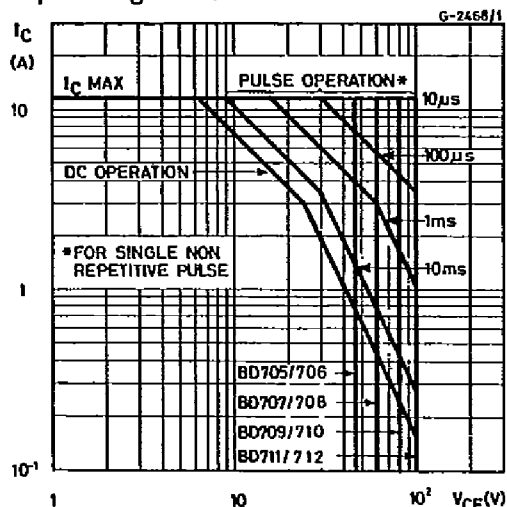
ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cutoff Current ( $I_E = 0$ )	for <b>BD705/706</b> $V_{CB} = 45\ V$			100	$\mu A$
		for <b>BD707/708</b> $V_{CB} = 60\ V$			100	$\mu A$
		for <b>BD709/710</b> $V_{CB} = 80\ V$			100	$\mu A$
		for <b>BD711/712</b> $V_{CB} = 100\ V$			100	$\mu A$
		$T_{case} = 150^{\circ}C$				
		for <b>BD705/706</b> $V_{CB} = 45\ V$			1	mA
		for <b>BD707/708</b> $V_{CB} = 60\ V$			1	mA
		for <b>BD709/710</b> $V_{CB} = 80\ V$			1	mA
		for <b>BD711/712</b> $V_{CB} = 100\ V$			1	mA
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	for <b>BD705/706</b> $V_{CE} = 22\ V$			1	mA
		for <b>BD707/708</b> $V_{CE} = 30\ V$			1	mA
		for <b>BD709/710</b> $V_{CE} = 40\ V$			1	mA
		for <b>BD711/712</b> $V_{CE} = 50\ V$			1	mA
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5\ V$			1	mA
$V_{CEO(sus)}^*$	Collector-emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 100\ mA$ for <b>BD705/706</b>	45			V
		for <b>BD707/708</b>	60			V
		for <b>BD709/710</b>	80			V
		for <b>BD711/712</b>	100			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 4\ A$ $I_B = 0.4\ A$			1	V
$V_{CEK}^*$	Knee Voltage	$I_C = 3\ A$ $I_B = **$			0.4	V
$V_{BE}^*$	Base-emitter Voltage	$I_C = 4\ A$ $V_{CE} = 4\ V$			1.5	V
$h_{FE}^*$	DC Current Gain	$I_C = 0.5\ A$ $V_{CE} = 2\ V$	40	120	400	
		$I_C = 2\ A$ $V_{CE} = 2\ V$				
		for <b>BD705/706</b>	30			
		for <b>BD707/708</b>	30			
		for <b>BD709/710</b>	30			
		$I_C = 4\ A$ $V_{CE} = 4\ V$		30	150	
		for <b>BD705/706</b>	20		150	
		for <b>BD707/708</b>	15		150	
		for <b>BD709/710</b>	15		150	
		for <b>BD711/712</b>	15		150	
		$I_C = 10\ A$ $V_{CE} = 4\ V$		10		
		for <b>BD705/706</b>	5		10	
		for <b>BD707/708</b>	5		8	
		for <b>BD709/710</b>			8	
		for <b>BD711/712</b>			8	
$f_T$	Transition Frequency	$I_C = 300\ mA$ $V_{CE} = 3\ V$	3			MHz

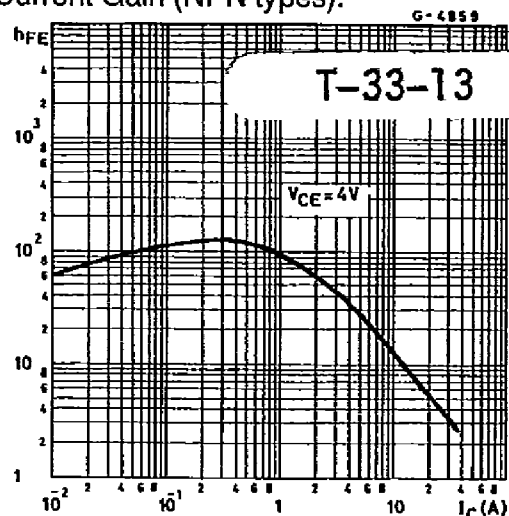
\* Pulsed : pulse duration = 300  $\mu s$ , duty cycle = 1.5 %.\*\* Value for which  $I_C = 3.3A$  at  $V_{CE} = 2V$ .

For PNP types voltage and current values are negative.

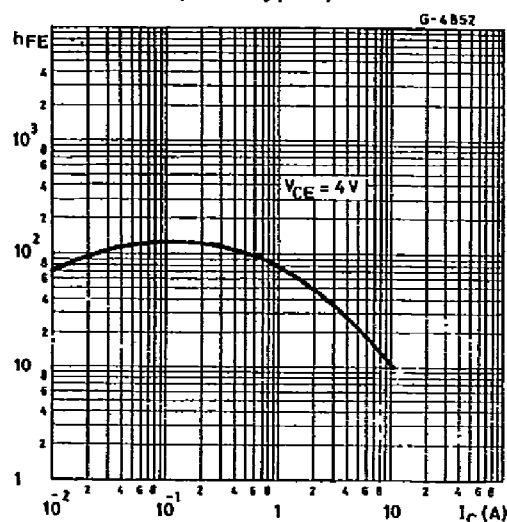
## Safe Operating Areas.



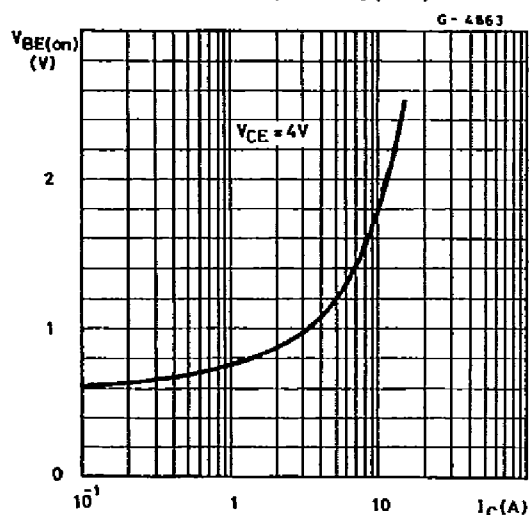
## DC Current Gain (NPN types).



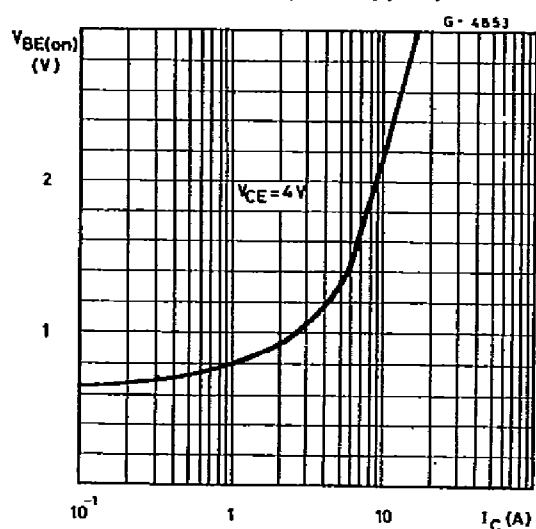
## DC Current Gain (PNP types).



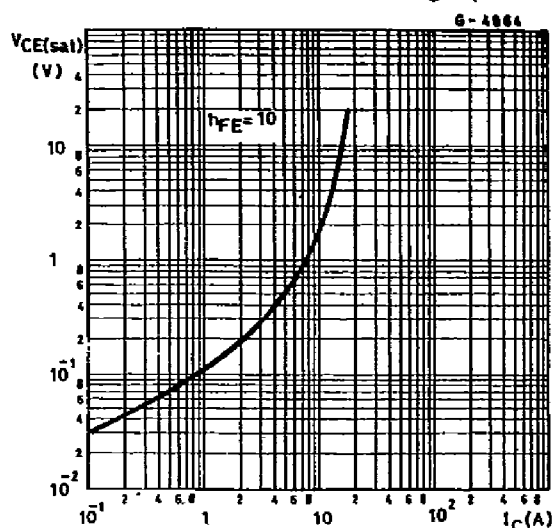
## DC Transconductance (NPN types).



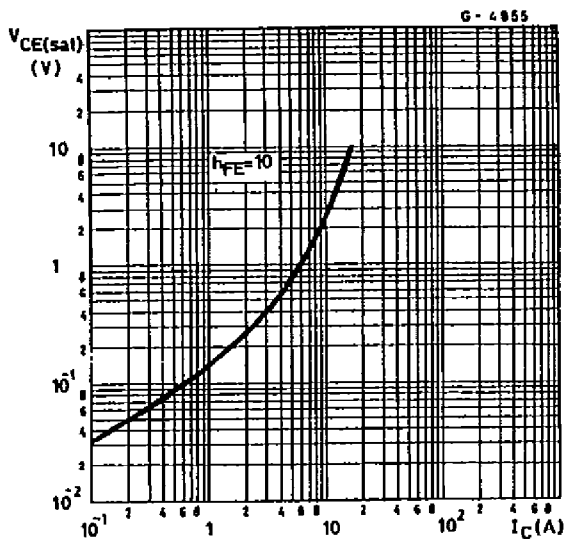
## DC Transconductance (PNP types).



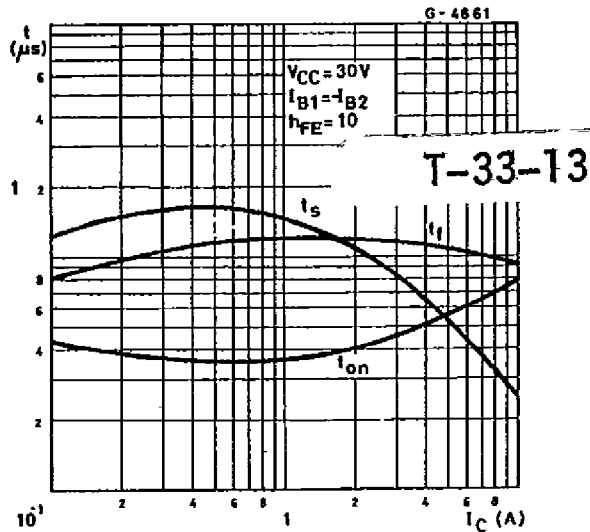
## Collector-emitter Saturation Voltage (NPN types).



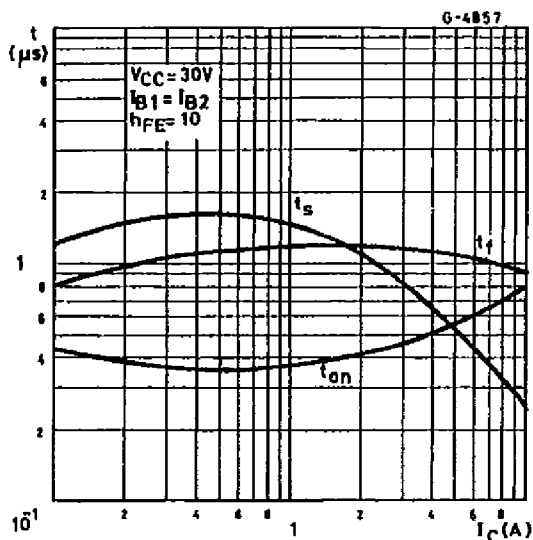
Collector-emitter Saturation Voltage (PNP types).



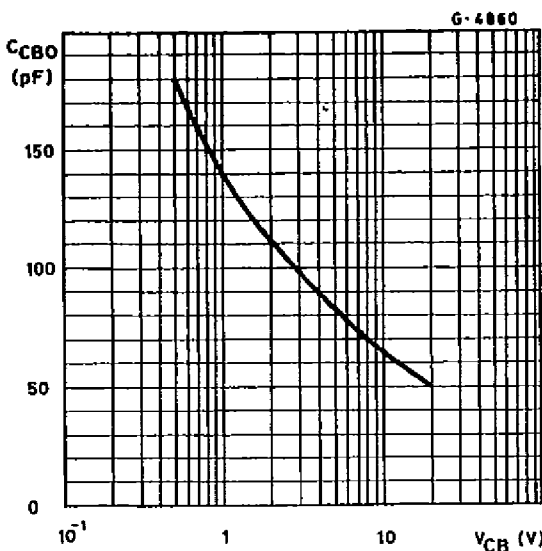
Saturated Switching Characteristics (NPN types)



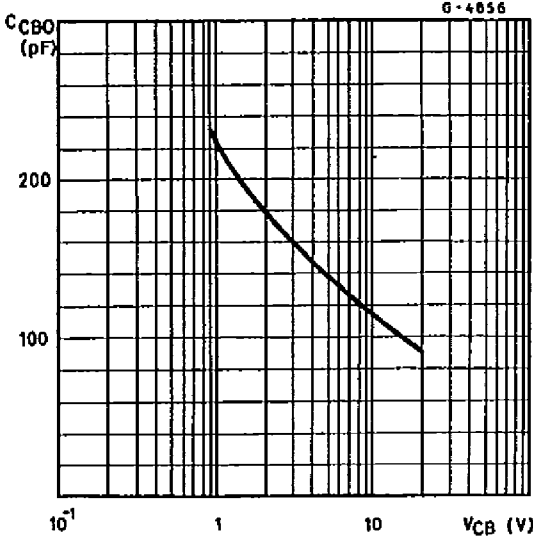
Saturated Switching Characteristics (PNP types).



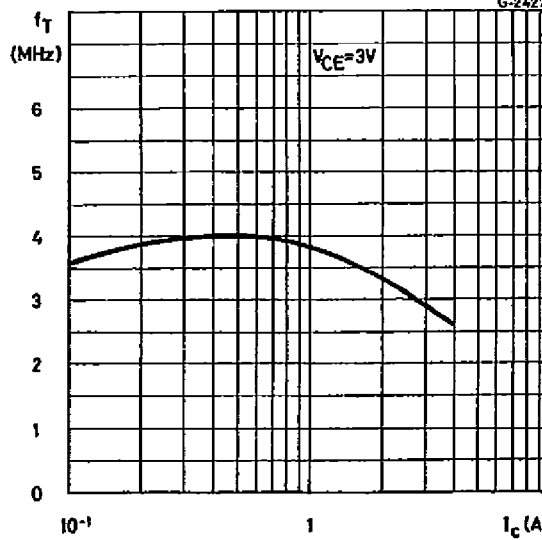
Collector-base Capacitance (NPN types).



Collector-base Capacitance (PNP types).



Transition Frequency (NPN types).



# Transition Frequency (PNP types). Σ G Σ

