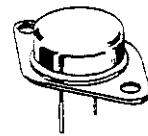


**2N5301
2N5302
2N5303**

20 AND 30 AMPERE
POWER TRANSISTORS
NPN SILICON
40-60-80 VOLTS
200 WATTS



CASE 1-07
TO-204AA
(TO-3)

High-Power NPN Silicon Transistors

- ... for use in power amplifier and switching circuits applications.
- High Collector-Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 80 \text{ Vdc (Min) @ } I_C = 200 \text{ mAdc (2N5303)}$
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 0.75 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc (2N5301, 2N5302)}$
 $1.0 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc (2N5303)}$
- Excellent Safe Operating Area —
200-Watt dc Power Rating to 30 Vdc (2N5303)
- Complements to PNP 2N4398, 2N4399 and 2N5745

*MAXIMUM RATINGS

Rating	Symbol	2N5301	2N5302	2N5303	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	80	Vdc
Collector-Base Voltage	V_{CB}	40	60	80	Vdc
Collector Current — Continuous	I_C	30	30	20	A dc
Base Current	I_B	7.5			A dc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14			Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	$^\circ\text{C/W}$
Thermal Resistance, Case to Ambient	θ_{CA}	34	$^\circ\text{C/W}$

* Indicates JEDEC Registered Data.

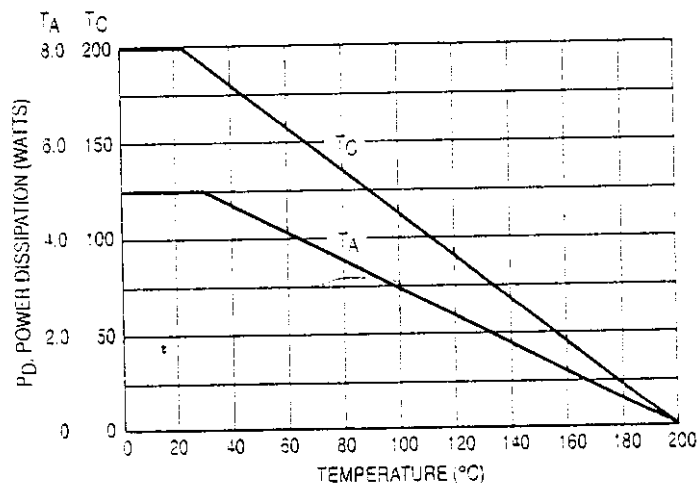


Figure 1. Power Temperature Derating Curve



2N5301 2N5302 2N5303

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
*OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 200\text{ mA}$, $I_B = 0$)	2N5301 2N5302 2N5303	$V_{CEO(sus)}$	40 60 80	— — —	Vdc
Collector Cutoff Current ($V_{CE} = 40\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 80\text{ Vdc}$, $I_B = 0$)	2N5301 2N5302 2N5303	I_{CEO}	— — —	5.0 5.0 5.0	mAac
Collector Cutoff Current ($V_{CE} = 40\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 80\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$)	2N5301 2N5302 2N5303	I_{CEX}	— — —	1.0 1.0 1.0	mAac
Collector Cutoff Current ($V_{CE} = 40\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 80\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	2N5301 2N5302 2N5303	I_{CEX}	— — —	10 10 10	mAac
Collector Cutoff Current ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$)	2N5301 2N5302 2N5303	I_{CBO}	— — —	1.0 1.0 1.0	mAac
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)		I_{EBO}	—	5.0	mAac

ON CHARACTERISTICS

DC Current Gain (Note 1) *($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) *($I_C = 10\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) *($I_C = 15\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 20\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 30\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	ALL TYPES 2N5303 2N5301, 2N5302 2N5303 2N5301, 2N5302	h_{FE}	40 15 15 5.0 5.0	— 60 60 — —	—
*Collector-Emitter Saturation Voltage (Note 1) ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 15\text{ A}$, $I_B = 1.5\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 2.0\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 4.0\text{ A}$) ($I_C = 30\text{ A}$, $I_B = 6.0\text{ A}$)	2N5301, 2N5302 2N5303 2N5303 2N5301, 2N5302 2N5303 2N5301, 2N5302	$V_{CE(sat)}$	— — — — — —	0.75 1.0 1.5 2.0 2.0 3.0	Vdc
*Base-Emitter Saturation Voltage (Note 1) ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 15\text{ A}$, $I_B = 1.5\text{ A}$) ($I_C = 15\text{ A}$, $I_B = 1.5\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 2.0\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 4.0\text{ A}$)	ALL TYPES 2N5301, 2N5302 2N5303 2N5301, 2N5302 2N5303	$V_{BE(sat)}$	— — — — —	1.7 1.8 2.0 2.5 2.5	Vdc
*Base-Emitter On Voltage (Note 1) ($I_C = 10\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 15\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 20\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 30\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	2N5303 2N5301, 2N5302 2N5303 2N5301, 2N5302	$V_{BE(on)}$	— — — —	1.5 1.7 25 3.0	Vdc

* DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ MHz}$)	f_T	2.0	—	—	MHz
Small-Signal Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	40	—	—	—

* SWITCHING CHARACTERISTICS

Rise Time	(VCC = 30 Vdc, $I_C = 10\text{ A}$, $I_{B1} = I_{B2} = 1.0\text{ A}$)	t_r	—	1.0	μs
Storage Time		t_s	—	2.0	μs
Fall Time		t_f	—	1.0	μs

* Indicates JEDEC Registered Data.

Note 1: Pulse Width $\leq 300\text{ } \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

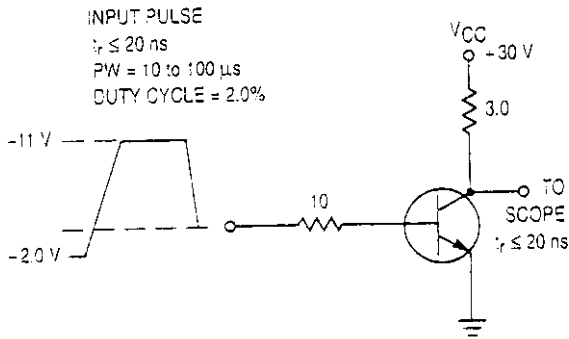


Figure 2. Turn-On time

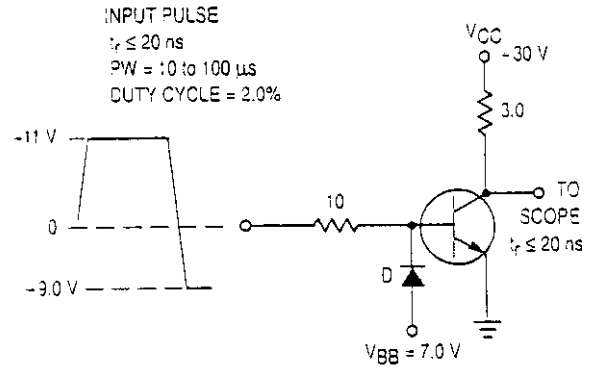


Figure 3. Turn-Off time

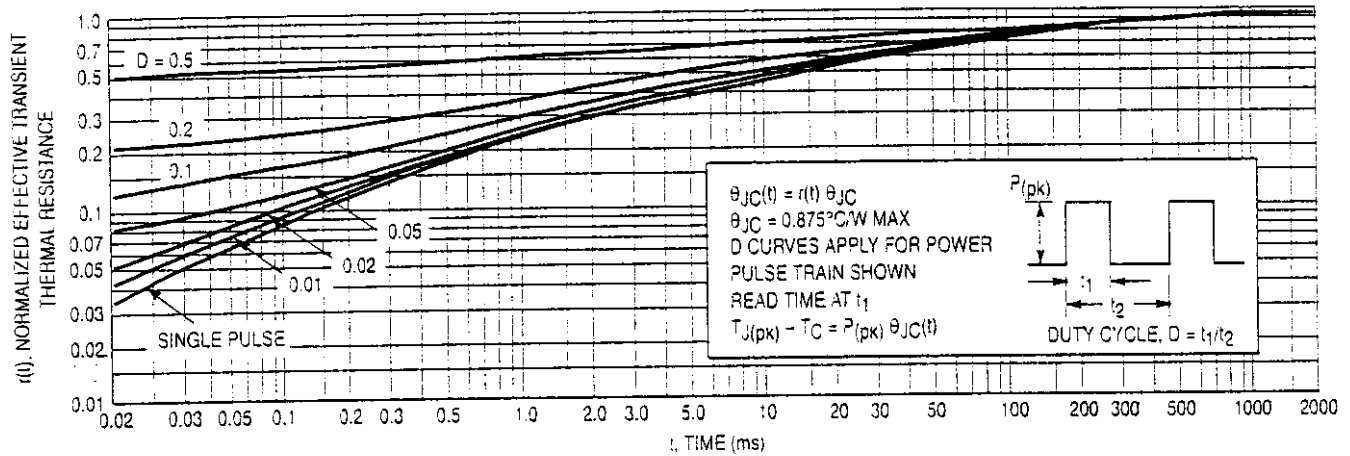


Figure 4. Thermal Response

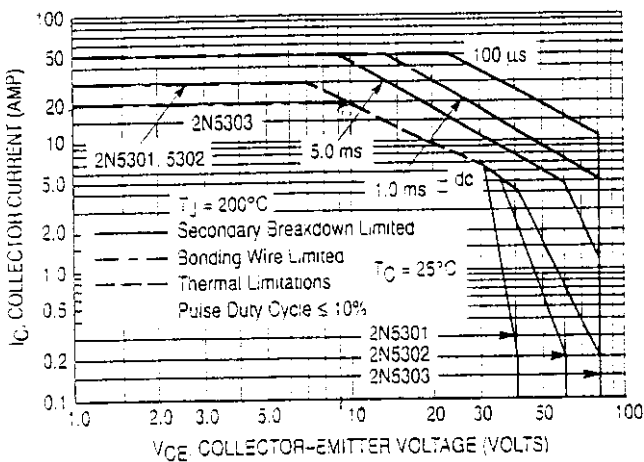


Figure 5. Active-Region Safe Operating Area

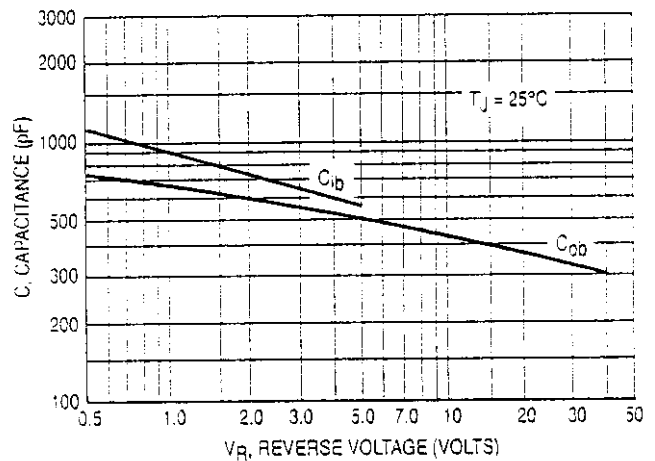


Figure 6. Capacitance versus Voltage

2N5301 2N5302 2N5303

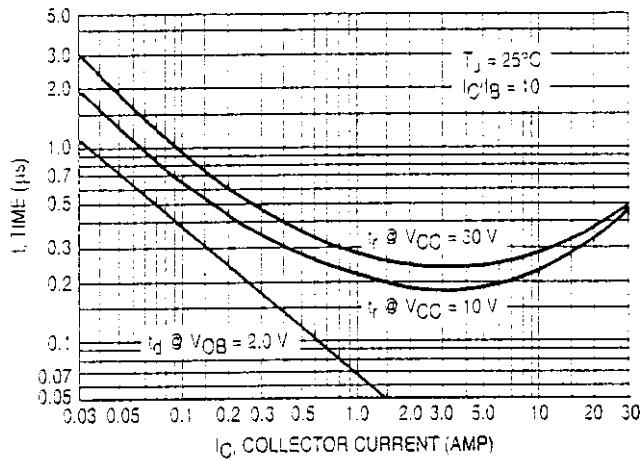


Figure 7. Turn-On Time

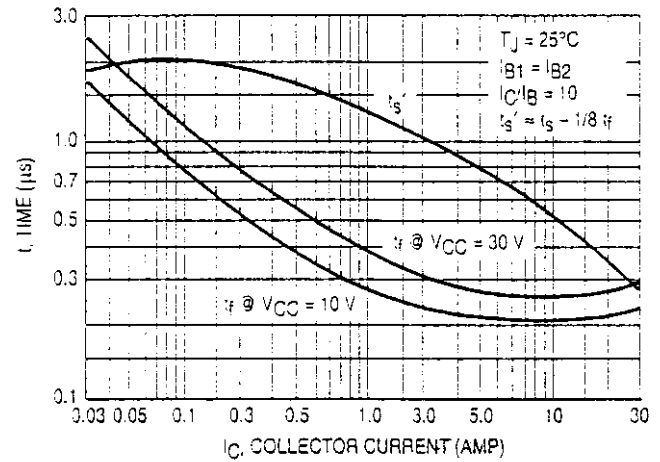


Figure 8. Turn-Off Time

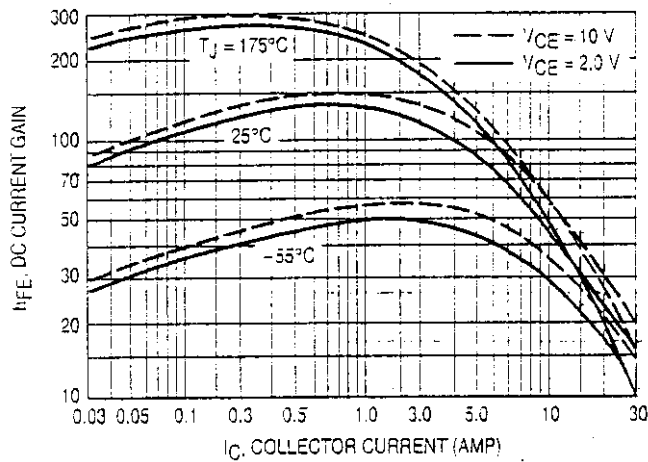


Figure 9. DC Current Gain

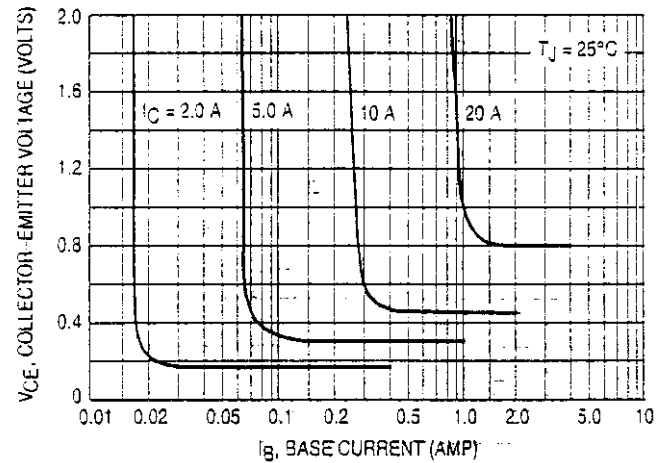


Figure 10. Collector Saturation Region

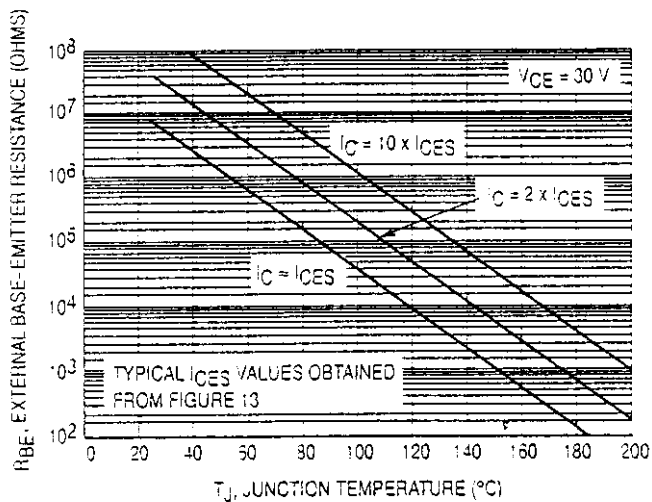


Figure 11. Effects of Base-Emitter Resistance

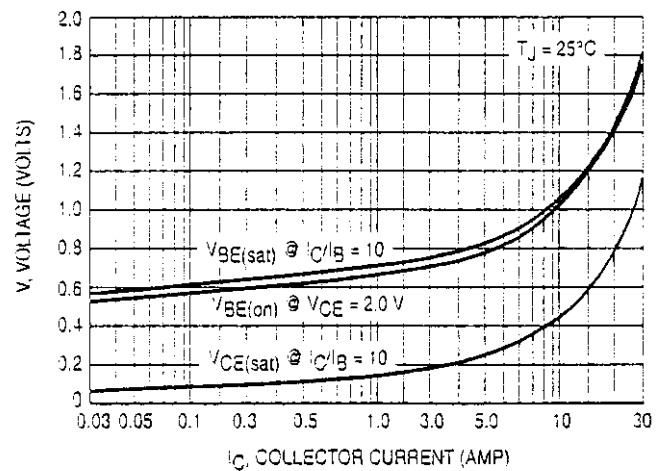


Figure 12. "On" Voltages

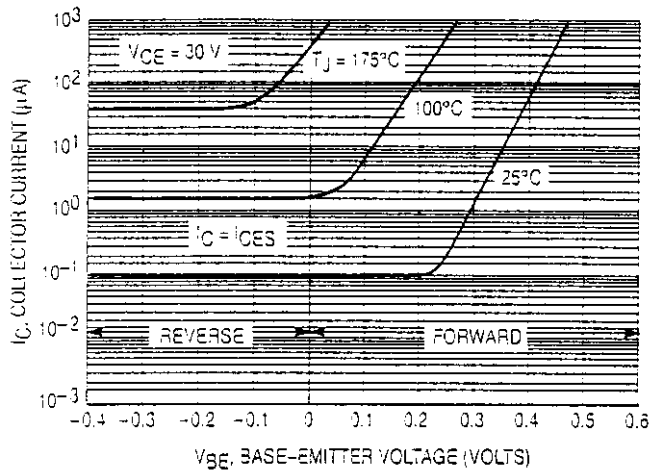


Figure 13. Collector Cut-Off Region

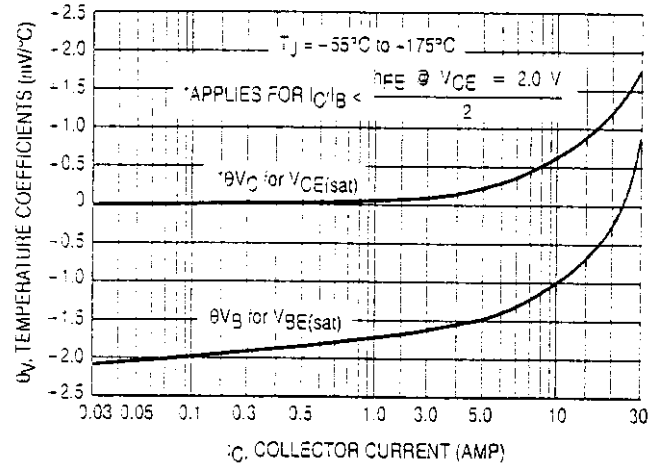
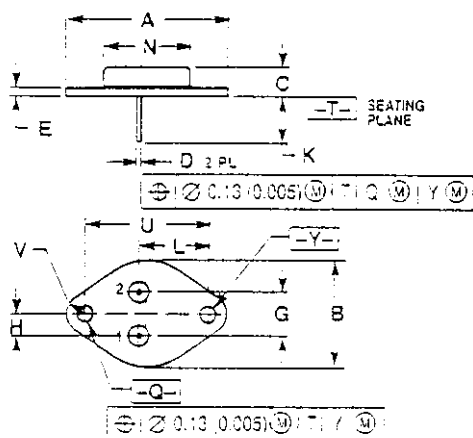


Figure 14. Temperature Coefficients

PACKAGE DIMENSIONS



NOTES

1. DIMENSIONING AND TOLERANCING PER ANSI
Y14.5M, 1982.
2. CONTROLLING DIMENSION: NCH
3. ALL RULES AND NOTES ASSOCIATED WITH
REFERENCED TO-204AA OUTLINE SHALL APPLY

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.50	REF	39.27	REF
B	---	1.50	---	38.17
C	1.250	1.335	31.5	33.51
D	1.038	1.043	26.7	26.9
E	1.055	1.070	26.9	27.7
F	1.430 BSC	---	36.32 BSC	---
G	1.215 BSC	---	30.8 BSC	---
H	1.440	1.490	36.6	37.9
I	1.565 BSC	---	39.39 BSC	---
J	---	1.390	---	35.28
K	1.151	1.165	29.34	29.9
L	1.187 BSC	---	30.15 BSC	---
M	1.131	1.188	28.93	30.7

STYLE 1:

- PIN 1. BASE
2. EMITTER
CASE. COLLECTOR

CASE 1-07
TO-204AA (TO-3)
ISSUE Z

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MOTOROLA

2SB754

シリコンPNP三重拡散形トランジスタ(PCT)
SILICON PNP TRIPLE DIFFUSED TRANSISTOR
(PCT PROCESS)

2SB754

- 大電流スイッチング用
- 電力増幅用
- High Current Switching Applications.
- Power Amplifier Applications.

- ・ 許容コレクタ電流が大きい: $I_C = -7A$
- ・ コレクタ飽和電圧が低い: $V_{CE(sat)} = -0.4V$ (Max.)
(at $I_C = -4A$)
- ・ 許容コレクタ損失が大きい: $P_C = 60W$ (at $T_C = 25^\circ C$)
- ・ 2SB754とエミッタリキタリをなす。
- ・ Complementarily to 2SB754.

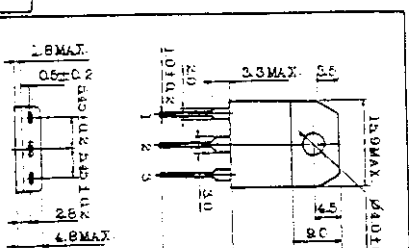
最大定格 MAXIMUM RATINGS ($T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
コレクタ-エミッタ間電圧	V_{CE}	50	V
コレクタ-ベース間電圧	V_{CB}	50	V
コレクタ電流	I_C	7	A
ベース電流	I_B	7	A
コレクタ損失	P_C	60	W
エミッタ損失	P_E	150	W
温度	T_J	55~150	$^\circ C$

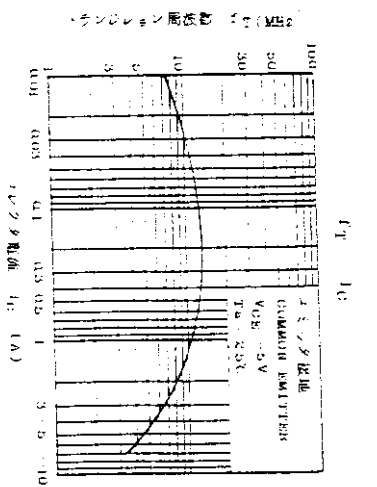
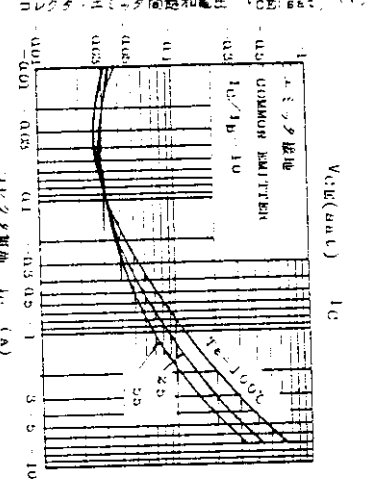
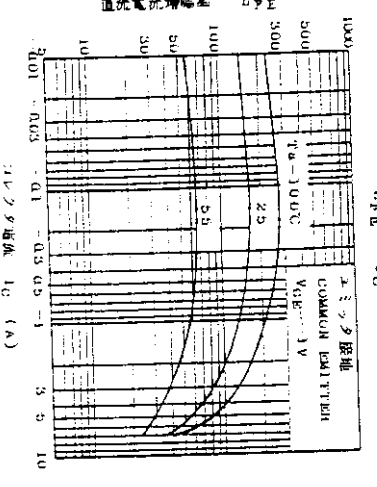
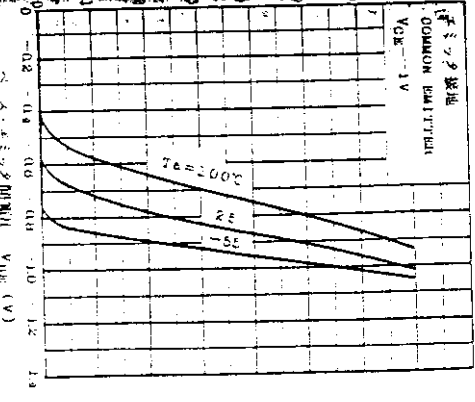
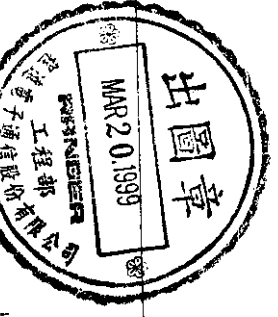
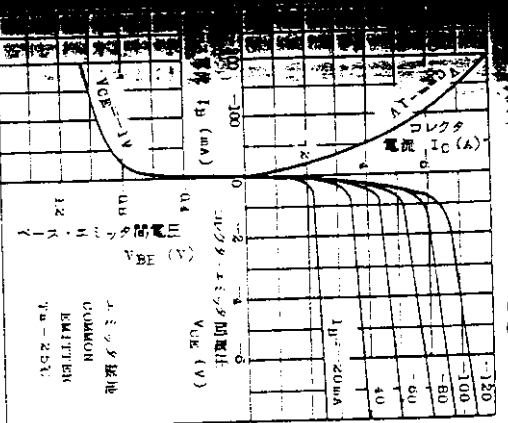
電流的特性 ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
コレクタ-エミッタ間電圧	V_{CE}	$V_{CE} = -50V, I_C = 0$			-10	V
コレクタ-ベース間電圧	V_{CB}	$V_{CB} = -50V, I_C = 0$			10	V
コレクタ電流	I_C	$I_C = -50mA, V_{CE} = 0$			50	mA
ベース電流	I_B	$I_B = -10mA, V_{CE} = 0$			5	mA
直流電流増幅率	h_{FE}	$V_{CE} = -1V, I_C = 1A$ (Note 1)			240	
交流電流増幅率	h_{FE}	$V_{CE} = -1V, I_C = 1A$ (Note 1)			30	
コレクタ-エミッタ間飽和電圧	$V_{CE(sat)}$	$I_C = 4A, I_B = 4A$ (Note 1)		0.2	0.4	V
コレクタ-ベース間飽和電圧	$V_{CB(sat)}$	$V_{CB} = -1V, I_C = 4A$ (Note 1)		0.9	1.2	V
エミッタ出力電圧	V_E	$V_{CE} = -5V, I_C = -1A$		10		V
エミッタ出力電流	I_E	$V_{CE} = -10V, I_C = -0.5A$		300		mA

Note 1: Pulse Test, Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
Note 2: h_{FE} (直流) / h_{FE} (交流) / h_{FE} (交流) 0: 70~140, 1: 150~240



1 BASE
2 COLLECTOR (HEAT SINK)
3 EMITTER
JEDEC
EIAJ
TOSHIBA 2-16A1A



$\angle$ 