

Complementary Silicon High-Power Transistors

 \dots designed for general–purpose power amplifier and switching applications.

• Low Collector-Emitter Saturation Voltage —

 $V_{CE(sat)} = 1.0 \text{ Vdc}$, (max) at $I_C = 15 \text{ Adc}$

• Low Leakage Current

 $I_{CEX} = 1.0 \text{ mAdc (max)}$ at Rated Voltage

• Excellent DC Current Gain —

 $h_{FE} = 20$ (min) at $I_C = 10$ Adc

• High Current Gain Bandwidth Product —

 $f_{\tau} = 4.0 \text{ MHz (min)}$ at $I_{C} = 1.0 \text{ Adc}$

MAXIMUM RATINGS (1)

Rating	Symbol	2N5883 2N5885	2N5884 2N5886	Unit
Collector–Emitter Voltage	V _{CEO}	60	80	Vdc
Collector-Base Voltage	V _{CB}	60	80	Vdc
Emitter-Base Voltage	V _{EB}	5.0		Vdc
Collector Current — Continuous Peak	I _C	25 50		Adc
Base Current	I _B	7.5		Adc
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	200 1.15		Watts W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	°C/W

(1) Indicates JEDEC registered data. Units and conditions differ on some parameters and re-registration reflecting these changes has been requested. All above values most or exceed present JEDEC registered data.

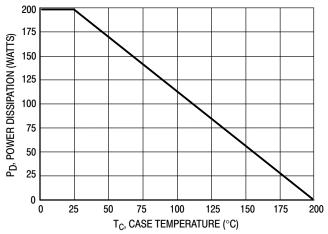


Figure 1. Power Derating

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

2N5883 2N5884* 2N5885 2N5885 2N5886*

*ON Semiconductor Preferred Device

25 AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
60-80 VOLTS
200 WATTS



TO-204AA (TO-3)

*ELECTRICAL CHARACTERISTICS ($T_C = 25$ °C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
Collector–Emitter Sustaining Voltage (2) (I _C = 200 mAdc, I _B = 0)	2N5883, 2N5885 2N5884, 2N5886	V _{CEO(sus)}	60 80	_	Vdc
Collector Cutoff Current (V _{CE} = 30 Vdc, I _B = 0)	2N5883, 2N5885	I _{CEO}	_	2.0	mAdc
$(V_{CE} = 40 \text{ Vdc}, I_{B} = 0)$	2N5984, 2N5886		_	2.0	
Collector Cutoff Current		I _{CEX}			mAdc
$(V_{CE} = 60 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc})$	2N5883, 2N5885		_	1.0	
$(V_{CE} = 80 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc})$	2N5884, 2N5886		_	1.0	
$(V_{CE} = 60 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc}, T_{C} = 150^{\circ}\text{C})$	2N5883, 2N5885			10	
$(V_{CE} = 80 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc}, T_{C} = 150^{\circ}\text{C})$	2N5884, 2N5886			10	
Collector Cutoff Current		I _{CBO}			mAdc
$(V_{CB} = 60 \text{ Vdc}, I_{E} = 0)$	2N5883, 2N5885		_	1.0	
$(V_{CB} = 80 \text{ Vdc}, I_{E} = 0)$	2N5884, 2N5886		_	1.0	
Emitter Cutoff Current (V _{EB} = 5.0 Vdc, I _C = 0)		I _{EBO}	_	1.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (2) ($I_C = 3.0 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc}$)		h _{FE}	35	_	_
$(I_C = 10 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc})$			20	100	
$(I_C = 25 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc})$			4.0		
Collector–Emitter Saturation Voltage (2) (I _C = 15 Adc, I _E	₃ = 1.5 Adc)	V _{CE(sat)}	_	1.0	Vdc
$(I_C = 25 \text{ Adc}, I_E)$	₃ = 6.25 Adc)	(233)	_	4.0	
Base–Emitter Saturation Voltage (2) $(I_C = 25 \text{ Adc}, I_B = 6)$	6.25 Adc)	V _{BE(sat)}	_	2.5	Vdc
Base–Emitter On Voltage (2) (I _C = 10 Adc, V _{CE} = 4.0 Vdc)		V _{BE(on)}	_	1.5	Vdc
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product (3) (I _C = 1.0 Adc, \	/ _{CE} = 10 Vdc, f _{test} = 1.0 MHz)	f _T	4.0	_	MHz
Output Capacitance	2N5883, 2N5884	C _{ob}	_	1000	pF
$(V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz})$	2N5885, 2N5886			500	
Small–Signal Current Gain (I _C = 3.0 Adc, V _{CE} = 4.0 Vdc, f _{test} = 1.0 kHz)		h _{fe}	20	_	_
SWITCHING CHARACTERISTICS					
Rise Time	/	t _r	_	0.7	μs
Storage lime	/dc, I _C = 10 Adc, ₃₂ = 1.0 Adc)	ts		1.0	μs
Fall Time	32 - 1.0 / 100)	t _e		0.8	IIS

^{*}Indicates JEDEC Registered Data.

⁽²⁾ Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2.0%. (3) $f_T = |h_{fe}| \bullet f_{test}$.

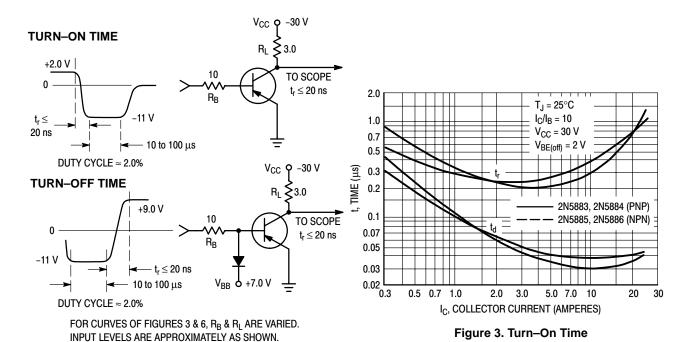


Figure 2. Switching Time Equivalent Test Circuits

FOR NPN, REVERSE ALL POLARITIES.

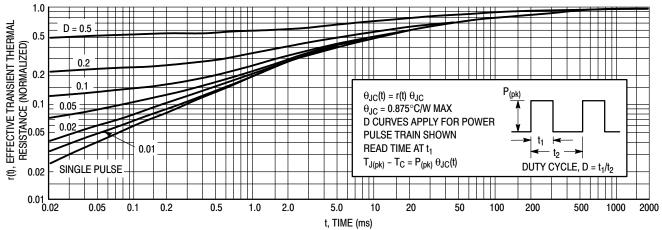


Figure 4. Thermal Response

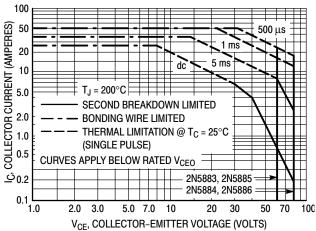


Figure 5. Active-Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 200^{\circ}C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 200^{\circ}C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

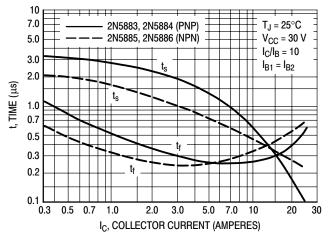


Figure 6. Turn-Off Time

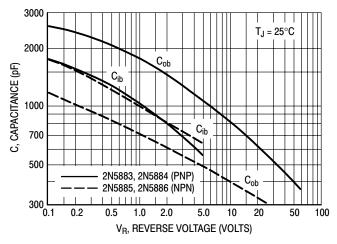


Figure 7. Capacitance

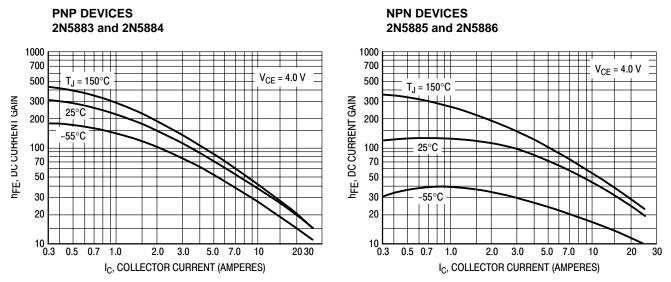


Figure 8. DC Current Gain

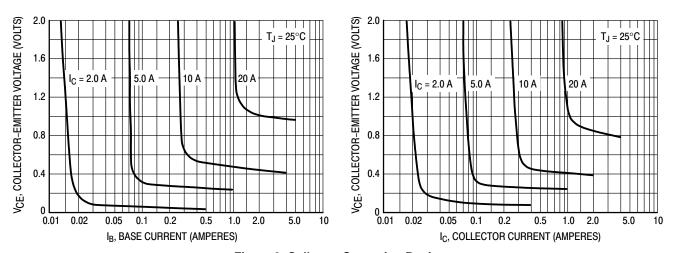


Figure 9. Collector Saturation Region

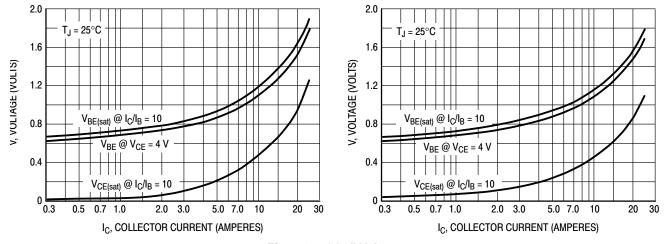
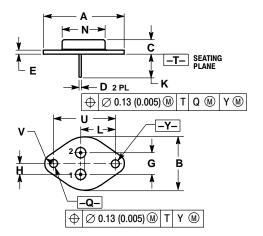


Figure 10. "On" Voltages

PACKAGE DIMENSIONS

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



NOTES:

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

	INCHES		MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
Α	1.550 REF		39.37 REF		
В		1.050		26.67	
С	0.250	0.335	6.35	8.51	
D	0.038	0.043	0.97	1.09	
E	0.055	0.070	1.40	1.77	
G	0.430 BSC		10.92 BSC		
Н	0.215 BSC		5.46 BSC		
K	0.440	0.480	11.18	12.19	
L	0.665 BSC		16.89 BSC		
N		0.830		21.08	
Q	0.151	0.165	3.84	4.19	
U	1.187 BSC		30.15 BSC		
٧	0.131	0.188	3.33	4.77	

STYLE 1:
PIN 1. BASE
2. EMITTER
CASE: COLLECTOR



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