

General Purpose High Current NPN Transistor Array

September 1996

Features

- High I_C 100mA (Max)
- Low $V_{CE\ sat}$ (at 50mA) 0.7V (Max)
- Matched Pair (Q_1 and Q_2)
 - V_{IO} (V_{BE} Match) $\pm 5mV$ (Max)
 - I_{IO} (at 1mA) 2.5 μA (Max)
- 5 Independent Transistors Plus Separate Substrate Connection

Applications

- Signal Processing and Switching Systems Operating from DC to VHF
- Lamp and Relay Driver
- Differential Amplifier
- Temperature Compensated Amplifier
- Thyristor Firing
- See Application Note AN5296 "Applications of the CA3018 Circuit Transistor Array" for Suggested Applications

Description

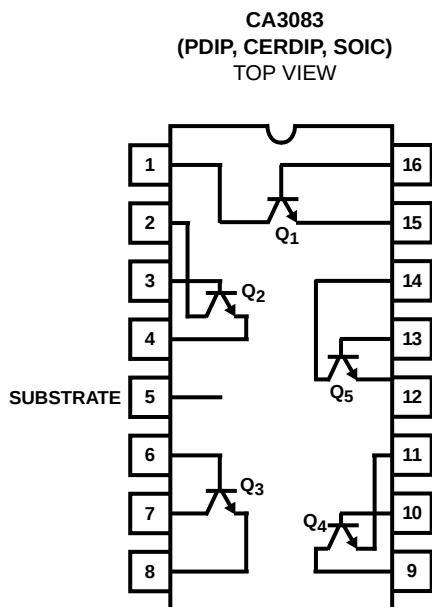
The CA3083 is a versatile array of five high current (to 100mA) NPN transistors on a common monolithic substrate. In addition, two of these transistors (Q_1 and Q_2) are matched at low current (i.e., 1mA) for applications in which offset parameters are of special importance.

Independent connections for each transistor plus a separate terminal for the substrate permit maximum flexibility in circuit design.

Ordering Information

PART NUMBER (BRAND)	TEMP. RANGE ($^{\circ}C$)	PACKAGE	PKG. NO.
CA3083	-55 to 125	16 Ld PDIP	E16.3
CA3083F	-55 to 125	16 Ld Cerdip	F16.3
CA3083M (3083)	-55 to 125	16 Ld SOIC	M16.15
CA3083M96 (3083)	-55 to 125	16 Ld SOIC Tape and Reel	M16.15

Pinout



Absolute Maximum Ratings

The following ratings apply for each transistor in the device:

Collector-to-Emitter Voltage, V_{CEO}	15V
Collector-to-Base Voltage, V_{CBO}	20V
Collector-to-Substrate Voltage, V_{CIO} (Note 1)	20V
Emitter-to-Base Voltage, V_{EBO}	5V
Collector Current (I_C)	100mA
Base Current (I_B)	20mA

Operating Conditions

Temperature Range

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTES:

1. The collector of each transistor of the CA3083 is isolated from the substrate by an integral diode. The substrate must be connected to a voltage which is more negative than any collector voltage in order to maintain isolation between transistors and provide normal transistor action. To avoid undesired coupling between transistors, the substrate Terminal (5) should be maintained at either DC or signal (AC) ground. A suitable bypass capacitor can be used to establish a signal ground.
2. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Thermal Information

Thermal Resistance (Typical, Note 2)	θ_{JA} ($^{\circ}\text{C}/\text{W}$)	θ_{JC} ($^{\circ}\text{C}/\text{W}$)
CERDIP Package	135	65
PDIP Package	135	N/A
SOIC Package	200	N/A
Maximum Power Dissipation (Any One Transistor)	500mW	
Maximum Junction Temperature (Hermetic Package)	175 $^{\circ}\text{C}$	
Maximum Junction Temperature (Plastic Package)	150 $^{\circ}\text{C}$	
Maximum Storage Temperature Range	-65 $^{\circ}\text{C}$ to 150 $^{\circ}\text{C}$	
Maximum Lead Temperature (Soldering 10s)	300 $^{\circ}\text{C}$ (SOIC - Lead Tips Only)	

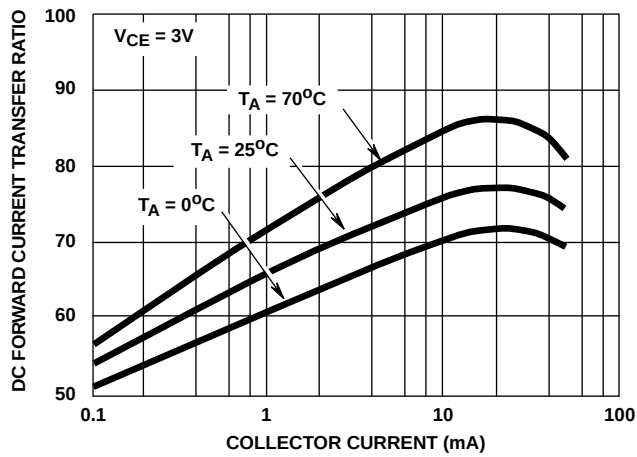
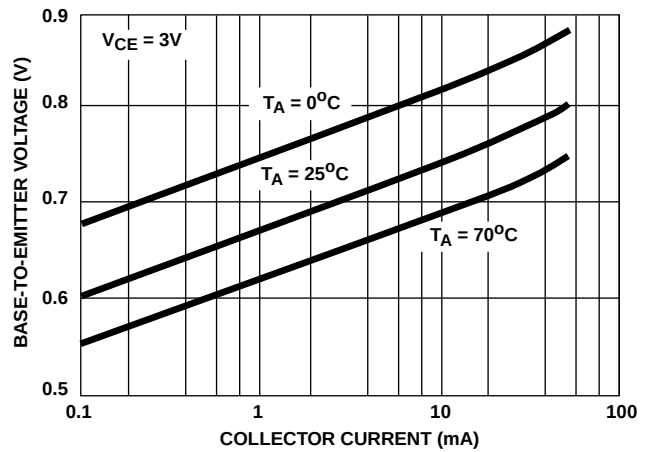
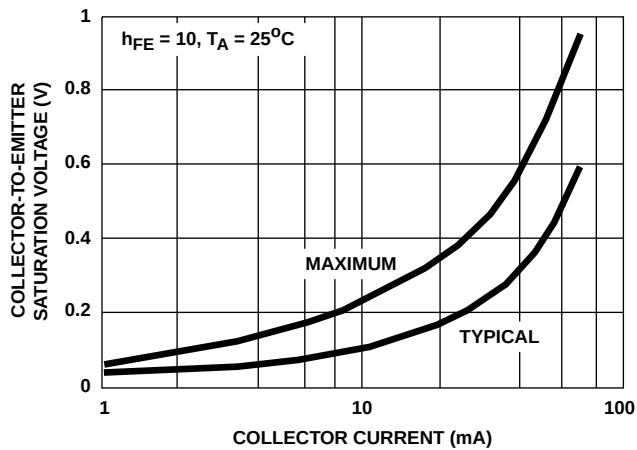
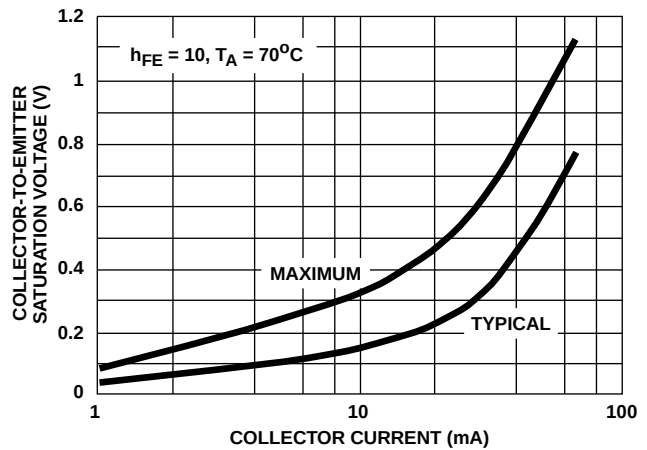
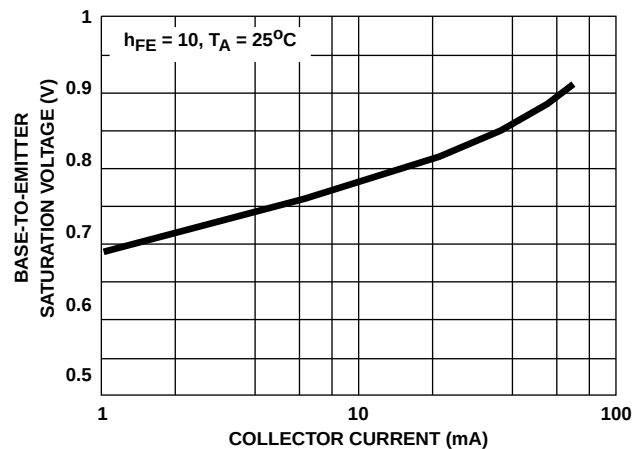
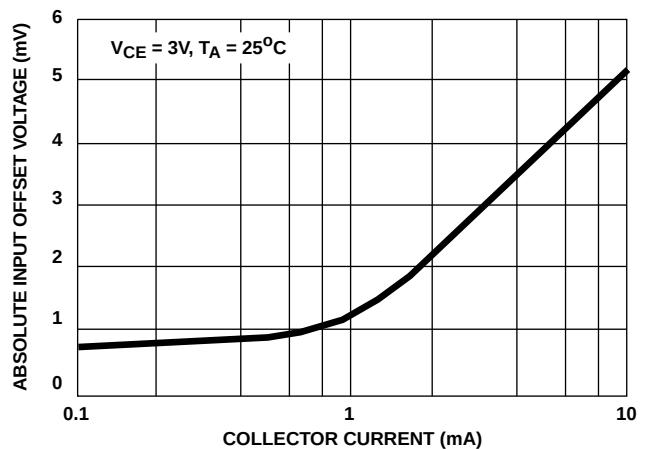
Electrical Specifications For Equipment Design, $T_A = 25^{\circ}\text{C}$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
FOR EACH TRANSISTOR						
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}$, $I_E = 0$	20	60	-	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$, $I_B = 0$	15	24	-	V
Collector-to-Substrate Breakdown Voltage	$V_{(BR)CIO}$	$I_{CI} = 100\mu\text{A}$, $I_B = 0$, $I_E = 0$	20	60	-	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 500\mu\text{A}$, $I_C = 0$	5	6.9	-	V
Collector-Cutoff-Current	I_{CEO}	$V_{CE} = 10\text{V}$, $I_B = 0$	-	-	10	μA
Collector-Cutoff-Current	I_{CBO}	$V_{CB} = 10\text{V}$, $I_E = 0$	-	-	1	μA
DC Forward-Current Transfer Ratio (Note 3) (Figure 1)	h_{FE}	$V_{CE} = 3\text{V}$ $I_C = 10\text{mA}$	40	76	-	
		$I_C = 50\text{mA}$	40	75	-	
Base-to-Emitter Voltage (Figure 2)	V_{BE}	$V_{CE} = 3\text{V}$, $I_C = 10\text{mA}$	0.65	0.74	0.85	V
Collector-to-Emitter Saturation Voltage (Figures 3, 4)	$V_{CE\text{ SAT}}$	$I_C = 50\text{mA}$, $I_B = 5\text{mA}$	-	0.40	0.70	V
Gain Bandwidth Product	f_T	$V_{CE} = 3\text{V}$, $I_C = 10\text{mA}$	-	450	-	MHz
FOR TRANSISTORS Q₁ AND Q₂ (As a Differential Amplifier)						
Absolute Input Offset Voltage (Figure 6)	$ V_{IO} $	$V_{CE} = 3\text{V}$, $I_C = 1\text{mA}$	-	1.2	5	mV
Absolute Input Offset Current (Figure 7)	$ I_{IO} $	$V_{CE} = 3\text{V}$, $I_C = 1\text{mA}$	-	0.7	2.5	μA

NOTE:

3. Actual forcing current is via the emitter for this test.

Typical Performance Curves

FIGURE 1. h_{FE} vs I_C FIGURE 2. V_{BE} vs I_C FIGURE 3. $V_{CE\text{ SAT}}$ vs I_C FIGURE 4. $V_{CE\text{ SAT}}$ vs I_C FIGURE 5. $V_{BE\text{ SAT}}$ vs I_C FIGURE 6. V_{IO} vs I_C (TRANSISTORS Q_1 AND Q_2 AS A DIFFERENTIAL AMPLIFIER)

Typical Performance Curves (Continued)

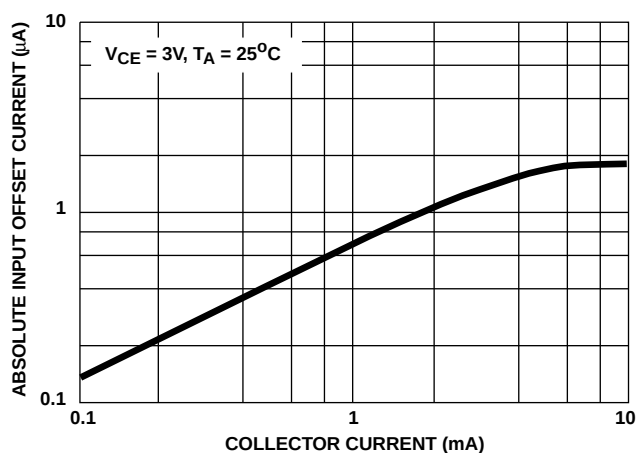


FIGURE 7. I_{IO} vs I_C (TRANSISTORS Q_1 AND Q_2 AS A DIFFERENTIAL AMPLIFIER)

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