HARRIS SEMICONDUCTOR

CA3081, CA3082

General Purpose High Current N-P-N Transistor Arrays

March 1993

Features

- **CA3081 - Common Emitter Array**
- **CA3082 - Common Collector Array**
- **Directly Drive Seven Segment Incandescent Displays and Light Emitting Diode (LED) Display**
- **7 Transistors Permit a Wide Range of Applications in Either a Common Emitter (CA3081) or Common Collector (CA3082) Configuration**
- **High I_C 100mA Max**
- **Low V_{CESAT} (at 50mA) 0.4 Typ**

Applications

- **Drivers for**
  - **Incandescent Display Devices**
  - **LED Displays**
  - **Relay Control**
  - **Thyristor Firing**

Description

CA3081 and CA3082 consist of seven high current (to 100mA) silicon n-p-n transistors on a common monolithic substrate. The CA3081 is connected in a common emitter configuration and the CA3082 is connected in a common collector configuration.

The CA3081 and CA3082 are capable of directly driving seven segment displays, and light emitting diode (LED) displays. These types are also well suited for a variety of other drive applications, including relay control and thyristor firing.

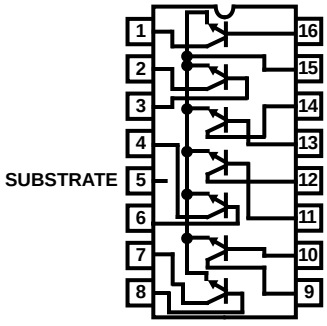
Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
CA3081	-55°C to +125°C	16 Lead Plastic DIP
CA3081F	-55°C to +125°C	16 Lead Ceramic DIP
CA3081M	-55°C to +125°C	16 Lead Narrow Body SOIC
CA3081M96	-55°C to +125°C	16 Lead Narrow Body SOIC*
CA3082	-55°C to +125°C	16 Lead Plastic DIP
CA3082F	-55°C to +125°C	16 Lead Ceramic DIP
CA3082M	-55°C to +125°C	16 Lead Narrow Body SOIC
CA3082M96	-55°C to +125°C	16 Lead Narrow Body SOIC*

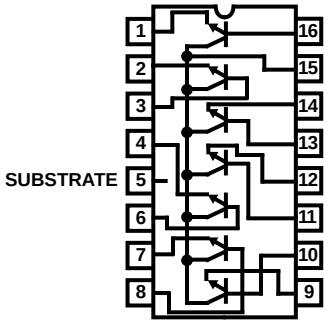
* Denotes Tape and Reel

Pinouts

CA3081
COMMON EMITTER CONFIGURATION
(PDIP, CDIP, 150 mil SOIC)
TOP VIEW



CA3082
COMMON COLLECTOR CONFIGURATION
(PDIP, CDIP, 150 mil SOIC)
TOP VIEW



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper I.C. Handling Procedures.

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File Number **480.2**

Absolute Maximum Ratings ($T_A = +25^oC$)

Collector-to-Emitter Voltage (V_{CEO}) 16V
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
Power Dissipation
Any One Transistor 500mW
Total Package 750mW
Above $T_A = +55^oC$ . . . . . Derate Linearly 6.67mW/^{o}C
Junction Temperature . . . . . $+175^oC$
Junction Temperature (Plastic Package) . . . . . $+150^oC$
Lead Temperature (Soldering 10 Sec.) . . . . . $+300^oC$

Operating Conditions

Operating Temperature Range . . . . . $-55^oC \le T_A \le +125^oC$
Storage Temperature Range . . . . . $-65^oC \le T_A \le +150^oC$

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.

Electrical Specifications For Equipment Design $T_A = +25^oC$

PARAMETERS	SYMBOL	TEST CONDITIONS	LIMIT MIN	LIMIT TYP	LIMIT MAX	UNITS
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 500\mu A$, $I_E = 0$	20	60	-	V
Collector-to-Substrate Breakdown Voltage	$V_{(BR)CIO}$	$I_C = 500\mu A$, $I_B = 0$	20	60	-	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1mA$, $I_B = 0$	16	24	-	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_C = 500\mu A$	5.0	6.9	-	V
DC Forward Current Transfer Ratio	h_{FE}	$V_{CE} = 0.5V$, $I_C = 30mA$	30	68	-	-
		$V_{CE} = 0.8V$, $I_C = 50mA$	40	70	-	-
Base-to-Emitter Saturation Voltage (Figure 2)	V_{BESAT}	$I_C = 30mA$, $I_B = 1mA$	-	0.87	1.2	V
Collector-to-Emitter Saturation Voltage CA3081, CA3082	V_{CESAT}	$I_C = 30mA$, $I_B = 1mA$	-	0.27	0.5	V
CA3081 (Figure 3)		$I_C = 50mA$, $I_B = 5mA$	-	0.4	0.7	V
CA3082 (Figure 3)		$I_C = 50mA$, $I_B = 5mA$	-	0.4	0.8	V
Collector Cutoff Current	I_{CEO}	$V_{CE} = 10V$, $I_B = 0$	-	-	10	µA
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10V$, $I_E = 0$	-	-	1.0	µA

NOTE:

1. The collector of each transistor of the CA3081 and CA3082 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.

Typical Performance Curves

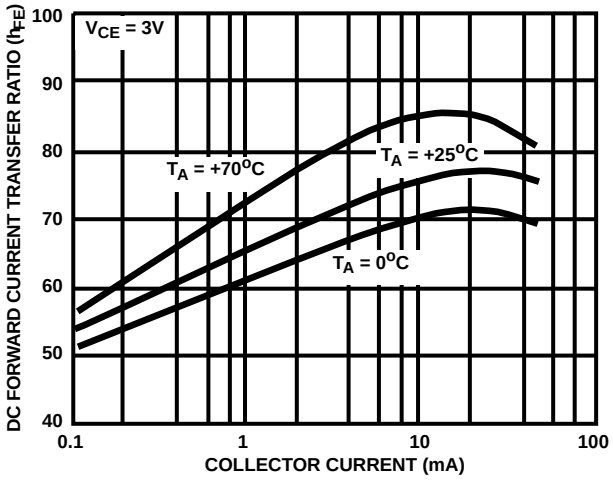


FIGURE 1. DC FORWARD CURRENT TRANSFER RATIO vs COLLECTOR CURRENT

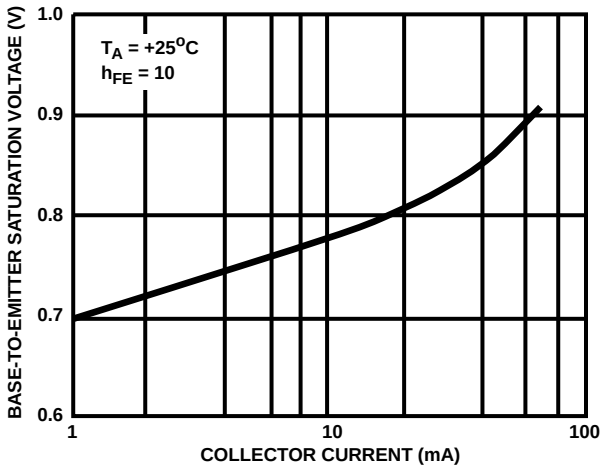


FIGURE 2. BASE-TO-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

Typical Performance Curves (Continued)

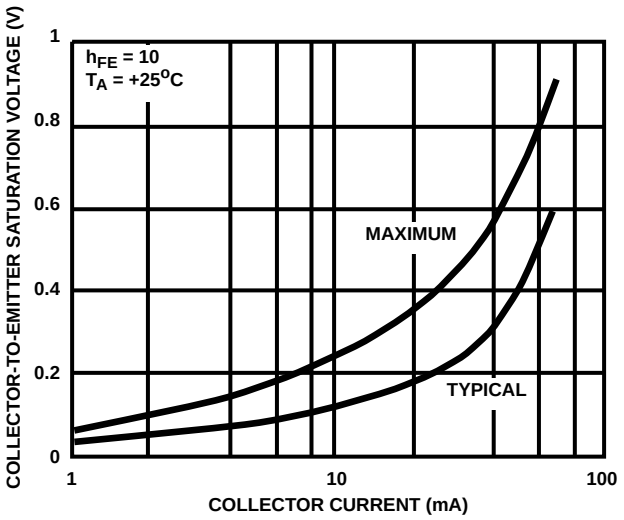


FIGURE 3. COLLECTOR-TO-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT AT T_A = +25°C

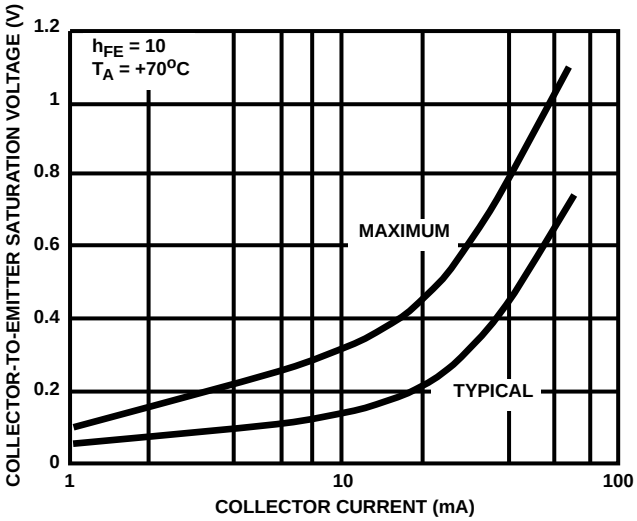


FIGURE 4. COLLECTOR-TO-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT AT T_A = +70°C

Typical Read - Out Driver Applications

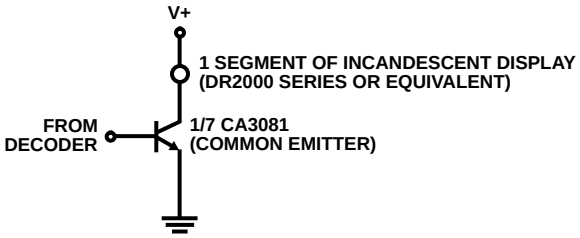
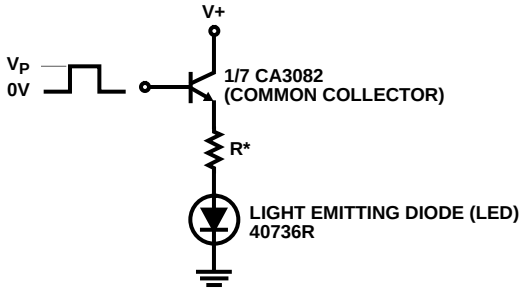


FIGURE 5. SCHEMATIC DIAGRAM SHOWING ONE TRANSISTOR OF THE CA3081 DRIVING ONE SEGMENT OF AN INCANDESCENT DISPLAY



* The Resistance for R is determined by the relationship:

$$R = \frac{V_P - V_{BE} - V_F(LED)}{I(LED)}$$

$$R = 0 \text{ for } V_P = V_{BE} + V_F(LED)$$

Where: V_P = Input Pulse Voltage
V_F = Forward Voltage Drop Across the Diode

FIGURE 6. SCHEMATIC DIAGRAM SHOWING ONE TRANSISTOR OF THE CA3082 DRIVING A LIGHT EMITTING DIODE (LED)