T-43-25

HARRIS

CA3081
CA3082

General-Purpose High-Current N-P-N Transistor Arrays

August 1991

Features

- CA3081 - Common-Emitter Array
- CA3082 - Common-Collector Array
- Directly Drive 7-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_{CE} Sat (at 50mA) ..... 0.4V Typ

Applications

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

Description

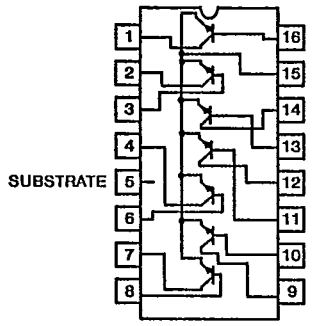
CA3081 and CA3082 consist of seven high-current (to 100mA) silicon n-p-n transistors on a common monolithic substrate. The CA3081 is connected in a common-emitter configuration and the CA3082 is connected in a common-collector configuration.

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.

The CA3081 and CA3082 are supplied in a 16-lead Small Outline package (M suffix), in a 16-lead dual-in-line plastic package (no suffix), and in a 16-lead dual-in-line frit-seal ceramic package (F suffix), which include a separate substrate connection for maximum flexibility in circuit design. Both types are also available in chip form.

Functional Diagrams

CA3081
COMMON-EMITTER CONFIGURATION



CA3082
COMMON-COLLECTOR CONFIGURATION

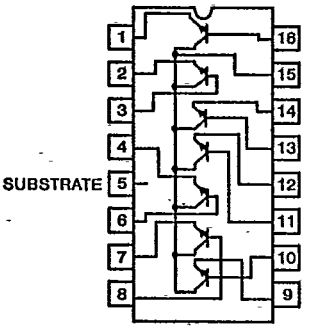


FIGURE 1. FUNCTIONAL DIAGRAMS OF TYPES CA3081 AND CA3082

7 ARRAYS

CAUTION: These devices are sensitive to electrostatic discharge. Proper I.C. handling procedures should be followed.

File Number 480.1

MAXIMUM RATINGS, Absolute-Maximum Values at T_A = 25°C

Power Dissipation:

Any one transistor	500	mW
Total package	750	mW
Above 55°C	Derate linearly 6.67	mW/°C

Ambient Temperature Range:

Operating	−55 to +125	°C
Storage	−65 to + 150	°C

Lead Temperature (During Soldering):

At distance 1/16" ±1/32" (1.59 mm ±0.79 mm)

from case for 10 seconds max.	265	°C

The following ratings apply for each transistor in the device:

Collector-to-Emitter Voltage (V_{CEO})	16	V
Collector-to-Base Voltage (V_{CBO})	20	V
Collector-to-Substrate Voltage (V_{CIO}) *	20	V
Emitter-to-Base Voltage (V_{EBO})	5	V
Collector Current (I_C)	100	mA
Base Current (I_B)	20	mA

* 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.

ELECTRICAL CHARACTERISTICS at T_A = 25°C

For Equipment Design

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	Typ. Char. Curve Fig. No.	LIMITS Min.	Typ.	Max.	UNITS
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 500 μA, I_E = 0	–	20	60	–	V
Collector-to-Substrate Breakdown Voltage	$V_{(BR)CIO}$	I_{CI} = 500 μA, I_B = 0	–	20	60	–	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 1 mA, I_B = 0	–	16	24	–	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_C = 500 μA	–	5	6.9	–	V
DC Forward-Current Transfer Ratio	h_{FE}	V_{CE} = 0.5 V, I_C = 30 mA	–	30	68	–	
		V_{CE} = 0.8 V, I_C = 50 mA	–	40	70	–	
Base-to-Emitter Saturation Voltage	$V_{BE\ sat}$	I_C = 30 mA, I_B = 1 mA	3	–	0.87	1.2	V
Collector-to-Emitter Saturation Voltage: CA3081, CA3082	$V_{CE\ sat}$	I_C = 30 mA, I_B = 1 mA	–	–	0.27	0.5	V
CA3081		I_C = 50 mA, I_B = 5 mA	4	–	0.4	0.7	
CA3082		I_C = 50 mA, I_B = 5 mA	4	–	0.4	0.8	
Collector-Cutoff-Current	I_{CEO}	V_{CE} = 10 V, I_B = 0	–	–	–	10	μA
Collector-Cutoff Current	I_{CBO}	V_{CB} = 10 V, I_E = 0	–	–	–	1	μA

TYPICAL STATIC CHARACTERISTICS FOR EACH TRANSISTOR OF TYPES CA3081 AND CA3082

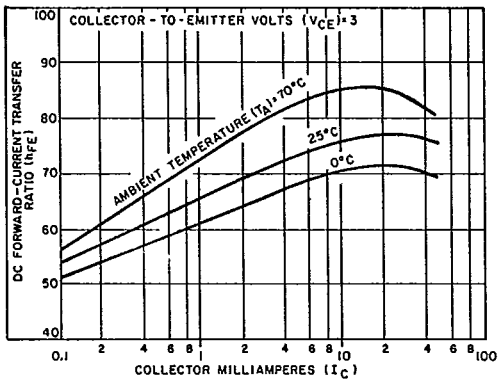


Fig. 2-h_{FE} vs. I_C

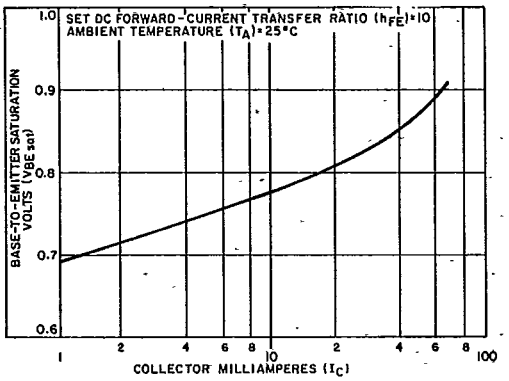


Fig. 3-V_{BEsat} vs. I_C

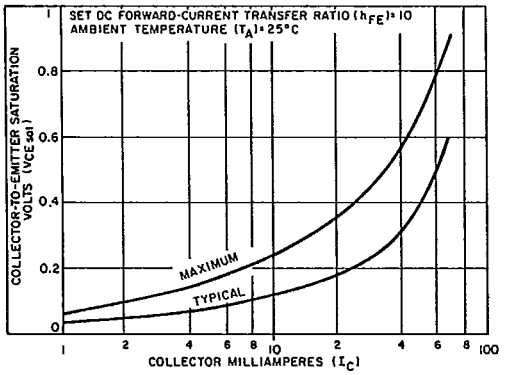


Fig. 4-V_{CEsat} vs. I_C at T_A = 25°C

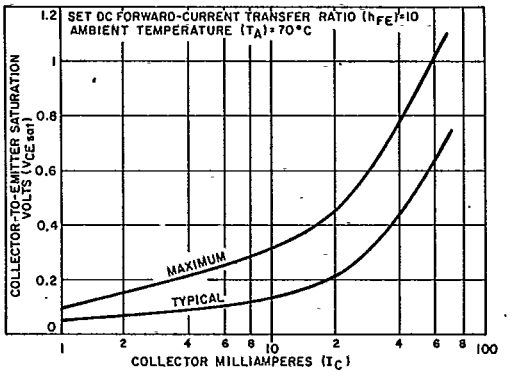


Fig. 5-V_{CEsat} vs. I_C at T_A = 70°C

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TYPICAL READ-OUT DRIVER APPLICATIONS

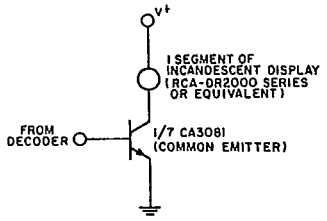
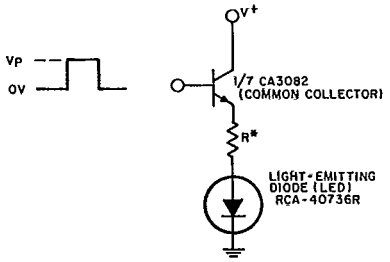


Fig.6—Schematic diagram showing one transistor of the CA3081 driving one segment of an incandescent display.



*THE RESISTANCE FOR R IS DETERMINED BY THE RELATIONSHIP

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

R=0 FOR $V_P = V_{BE} + V_F(LED)$

WHERE: V_P = INPUT PULSE VOLTAGE

V_F = FORWARD VOLTAGE DROP ACROSS THE DIODE

Fig.7—Schematic diagram showing one transistor of the CA3082 driving a light-emitting diode (LED).