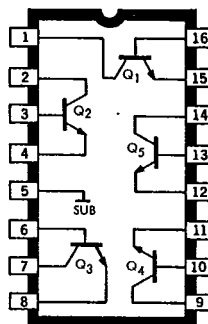


ULN-2083A AND ULS-2083H TRANSISTOR ARRAYS (Five Independent NPN Transistors)

DESIGNED for use in general purpose, medium current (to 100 mA) switching and differential amplifier applications, the ULN-2083A and ULS-2083H transistor arrays each consist of five NPN transistors on a single monolithic chip. Two transistors are matched at low currents (1 mA) making them ideal for use in balanced mixer circuits, push-pull amplifiers, and other circuit functions requiring close thermal and offset matching.

A separate substrate connection permits maximum circuit design flexibility. In order to maintain isolation between transistors and provide normal transistor action, the substrate must be connected to a voltage which is more negative than any collector voltage. The substrate terminal (pin 5) should therefore be maintained at either d-c ground or suitably bypassed to a-c ground to avoid undesired coupling between transistors.

Two package configurations are available. The Type ULN-2083A is supplied in a 16-lead dual in-line plastic package for operation over the temperature range of -20°C to $+85^{\circ}\text{C}$. This package is sim-



ilar to JEDEC style MO-001AC. The Type ULS-2083H is electrically identical to the ULN-2083A but is supplied in a hermetic dual in-line package for operation over the temperature range of -55°C to $+125^{\circ}\text{C}$. This package conforms to the dimensional requirements of Military Specification MIL-M-38510 and can meet all of the applicable environmental requirements of Military Standard MIL-STD-883.

ABSOLUTE MAXIMUM RATINGS at $+25^{\circ}\text{C}$ Free-Air Temperature

Power Dissipation, P_D (any one transistor)	.....	500 mW
(total package)	.....	750 mW*
Operating Temperature Range, T_A (ULN-2083A)	.....	-20°C to $+85^{\circ}\text{C}$
(ULS-2083H)	.....	-55°C to $+125^{\circ}\text{C}$
Storage Temperature Range, T_S	.....	-55°C to $+150^{\circ}\text{C}$

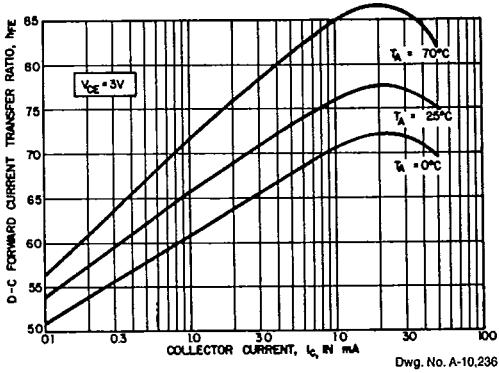
*Derate at the rate of 6.67 mW/ $^{\circ}\text{C}$ above 25°C .

ELECTRICAL CHARACTERISTICS at $T_A = +25^{\circ}\text{C}$ Free-Air Temperature

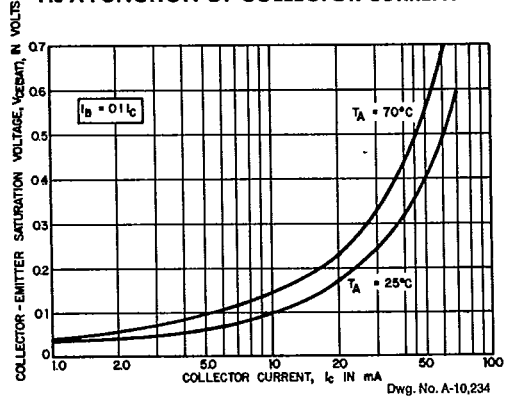
Characteristic	Symbol	Test Conditions	Limits			Units
			Min.	Typ.	Max.	
Collector-Base Breakdown Voltage	BV_{CBO}	$I_C = 100 \mu\text{A}$	20	60	—	V
Collector-Emitter Breakdown Voltage	BV_{CEO}	$I_C = 1 \text{ mA}$	15	24	—	V
Collector-Substrate Breakdown Voltage	BV_{CISO}	$I_C = 100 \mu\text{A}$	20	60	—	V
Emitter-Base Breakdown Voltage	BV_{EBO}	$I_E = 500 \mu\text{A}$	5.0	6.9	—	V
Collector Cutoff Current	I_{CEO}	$V_{CE} = 10 \text{ V}$	—	—	10	μA
	I_{CBO}	$V_{CB} = 10 \text{ V}$	—	—	1.0	μA
Base Emitter Voltage	V_{BE}	$V_{CE} = 3 \text{ V}, I_C = 10 \text{ mA}$	650	740	850	mV
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 50 \text{ mA}, I_B = 5 \text{ mA}$	—	400	700	mV
D-C Forward Current Transfer Ratio	h_{FE}	$V_{CE} = 3 \text{ V}, I_C = 10 \text{ mA}$	40	76	—	
		$V_{CE} = 3 \text{ V}, I_C = 50 \text{ mA}$	40	75	—	
Differential Input Offset Voltage*	V_{IO}	$V_{CE} = 3 \text{ V}, I_C = 1 \text{ mA}$	—	1.2	5.0	mV
Differential Input Offset Current	I_{IO}	$V_{CE} = 3 \text{ V}, I_C = 1 \text{ mA}$	—	0.7	2.5	μA

*Applies only to transistors Q_1 and Q_2 when connected as a differential pair.

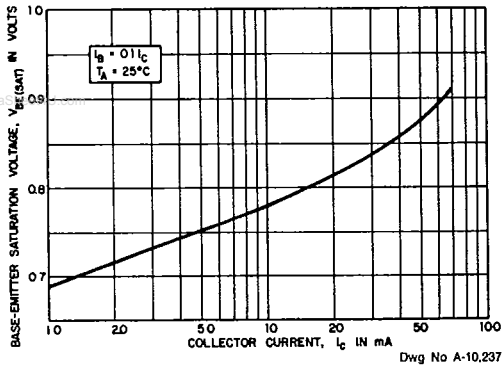
D-C FORWARD CURRENT TRANSFER RATIO AS A FUNCTION OF COLLECTOR CURRENT



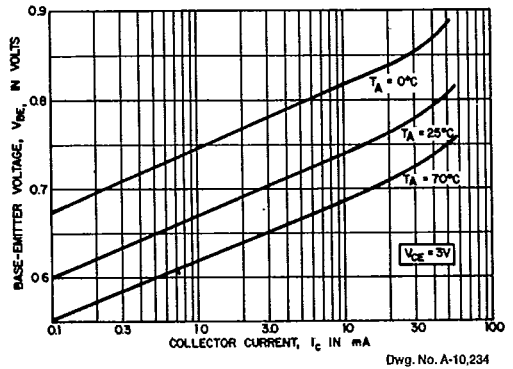
COLLECTOR-EMITTER SATURATION VOLTAGE AS A FUNCTION OF COLLECTOR CURRENT



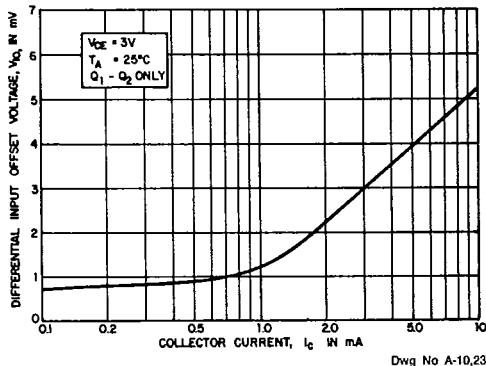
BASE-EMITTER SATURATION VOLTAGE AS A FUNCTION OF COLLECTOR CURRENT



BASE-EMITTER VOLTAGE AS A FUNCTION OF COLLECTOR CURRENT



DIFFERENTIAL INPUT OFFSET VOLTAGE AS A FUNCTION OF COLLECTOR CURRENT



DIFFERENTIAL INPUT OFFSET CURRENT AS A FUNCTION OF COLLECTOR CURRENT

