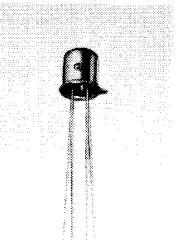
No. 31700

SPRAGUE® THE MARK OF RELIABILITY

Engineering Bulletin

3N90
3N91
3N92

TYPE 3N90, 3N91 and 3N92 DUET® DUAL EMITTER SEPT® TRANSISTORS



ACTUAL SIZE

DUAL-EMITTER PNP silicon planar epitaxial transistors specifically designed for low-level high speed chopper and commutating applications. Sprague Type 3N90, 3N91, and 3N92 DUET transistors feature 30-volt ratings, low offset voltages, low emitter capacitances and excellent thermal characteristics. They are supplied in a four lead TO-18 package.

ABSOLUTE MAXIMUM RATINGS[1]

Storage Temperature ..... — 65 C to + 200 C
Emitter-Emitter Voltage, V_{E1E2}, V_{E2E1} ..... 30 volts
Emitter-Base Voltage, V_{E1BO}, V_{E2BO} ..... 30 volts
Emitter-Collector Voltage, V_{E1CO}, V_{E2CO} ..... 30 volts
Collector-Base Voltage, V_{CBO} ..... 30 volts
Emitter Current, I_{E1}, I_{E2} ..... 10 mA
Base Current, I_B ..... 20 mA
Collector Current, I_C ..... 20 mA
Power Dissipation at 25 C ..... 300 mW
Derating Factor ..... 1.7mW/°C
Lead Temperature (1/16" from case for 10 seconds) . 230C

[1]The maximum ratings are limiting absolute values above which the serviceability may be impaired from the viewpoint of life or satisfactory performance. The breakdown voltages may be far above the maximum voltage ratings. To avoid permanent damage to the transistor, do not attempt to measure these characteristics above the maximum ratings.

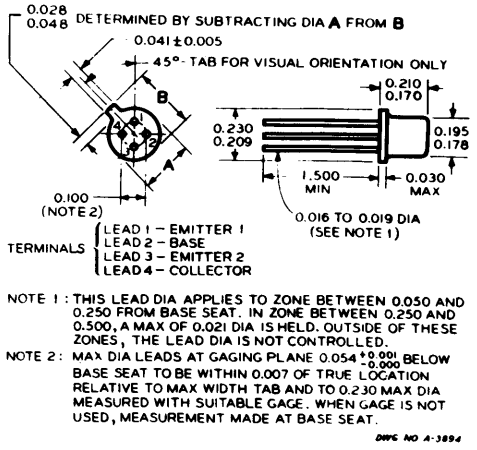
ELECTRICAL CHARACTERISTICS at T = 25 C

	CHARACTERISTICS	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
		D-C CHARACTERISTICS					
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 25V$		—	0.09	1	nA
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 25V$, $T_A = 100C$		—	10	100	nA
I_{EBO}	Emitter Cutoff Current	V_{E1B} or $V_{E2B} = -25V$		—	0.07	1	nA
I_{CBO}	Collector Cutoff Current	$V_{CB} = -25V$		—	0.5	10	nA
BV_{E1E2O}	Emitter-Emitter Breakdown Voltage[2]	I_{E1} or $I_{E2} = -1\mu A$		30	—	—	Volts
BV_{EBO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		30	—	—	Volts
BV_{ECO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		30	—	—	Volts
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -1\mu A$		30	—	—	Volts
$\lvert V_O \rvert$	Offset Voltage[3]	$I_B = -1mA$, $I_{E1} = I_{E2} = 0$,					
		T_A = 25, −25 and 100C	3N90	—	—	50	μV
			3N91	—	—	100	μV
			3N92	—	—	200	μV
$\lvert \Delta V_O \rvert_{I_B}$	Offset Voltage Change[3] with I_B	$I_{B(1)} = -0.5mA$, $I_{B(2)} = -1.5mA$,					
		$I_{E1} = I_{E2} = 0$	3N90	—	—	25	μV
			3N91	—	—	25	μV
			3N92	—	—	50	μV
$\lvert \Delta V_O \rvert_{T_A}$	Offset Voltage Change[3] with Temp.	$T_{A(1)} = -25C$, $T_{A(2)} = 100C$,					
		$I_B = -1mA$, $I_{E1} = I_{E2} = 0$	3N90	—	—	75	μV
			3N91	—	—	125	μV
			3N92	—	—	175	μV
r_{e1e2}	Series Resistance[4]	$I_B = -1mA$, $I_{E1} = I_{E2} = 100\mu A$		10	—	100	ohms
		HIGH FREQUENCY CHARACTERISTICS					
C_{ob}	Collector Capacitance	$V_{CB} = -6V$, $I_E = 0$, f = 4Mc		—	7.0	10	pF
C_{ib}	Emitter Capacitance	V_{E1B} or $V_{E2B} = -6V$, $I_C = 0$, f = 4Mc		—	1.6	3	pF
f_T	Gain Bandwidth Product	$V_{CE} = -6V$, I_{E1} or $I_{E2} = 1mA$		6	12	—	Mc

[2]Collector and base are shorted together, but are open with respect to both emitters.
[3]To be measured in circuit of Figure 1.
[4]To be measured in circuit of Figure 2.

SPRAGUE ENGINEERING BULLETIN 31700

MECHANICAL SPECIFICATIONS



NOTE 1 : THIS LEAD DIA APPLIES TO ZONE BETWEEN 0.050 AND 0.250 FROM BASE SEAT. IN ZONE BETWEEN 0.250 AND 0.500, A MAX OF 0.021 DIA IS HELD. OUTSIDE OF THESE ZONES, THE LEAD DIA IS NOT CONTROLLED.

NOTE 2 : MAX DIA LEADS AT GAGING PLANE $0.054^{+0.001}_{-0.000}$ BELOW BASE SEAT TO BE WITHIN 0.007 OF TRUE LOCATION RELATIVE TO MAX WIDTH TAB AND TO 0.230 MAX DIA MEASURED WITH SUITABLE GAGE. WHEN GAGE IS NOT USED, MEASUREMENT MADE AT BASE SEAT.

DWG NO A-3894

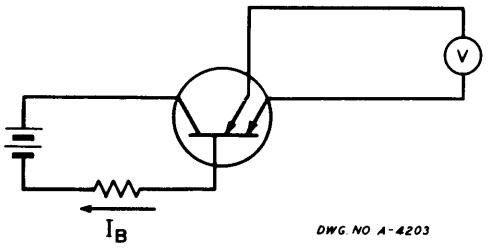


FIGURE 1

OFFSET VOLTAGE TEST CIRCUIT, V_O

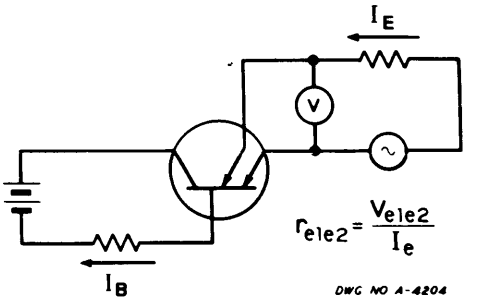


FIGURE 2

ON SERIES RESISTANCE TEST CIRCUIT, r_{e1e2}

In the construction of the components described, the full intent of the specification will be met. The Sprague Electric Company, however, reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

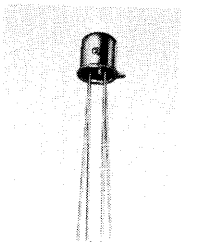
The information included herein is believed to be accurate and reliable. However, the Sprague Electric Company assumes no responsibility for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

SPRAGUE the mark of reliability

Engineering Bulletin

3N93
3N94
3N95

TYPE 3N93, 3N94 and 3N95 DUET® DUAL EMITTER SEPT® TRANSISTORS



ACTUAL SIZE

DUAL-EMITTER PNP silicon planar epitaxial transistors specifically designed for low-level high speed chopper and commutating applications. Sprague Type 3N93, 3N94 and 3N95 DUET transistors feature 50-volt ratings, low offset voltages, low emitter capacitances and excellent thermal characteristics. They are supplied in a four lead TO-18 package.

ABSOLUTE MAXIMUM RATINGS[1]

Storage Temperature . . . . . — 65 C to +200 C
Emitter-Emitter Voltage, V_{E1E2}, V_{E2E1} . . . . . 50 volts
Emitter-Base Voltage, V_{E1BO}, V_{E2BO} . . . . . 50 volts
Emitter-Collector Voltage, V_{E1CO}, V_{E2CO} . . . . . 50 volts
Collector-Base Voltage, V_{CBO} . . . . . 50 volts
Emitter Current, I_{E1}, I_{E2} . . . . . 10 mA

Base Current, I_B . . . . . 20 mA
Collector Current, I_C . . . . . 20 mA
Power Dissipation at 25 C . . . . . 300 mW
Derating Factor . . . . . 1.7mW/°C
Lead Temperature (1/16" from case for 10 seconds) 230C

[1]**The maximum ratings are limiting absolute values above which the serviceability may be impaired from the viewpoint of life or satisfactory performance. The breakdown voltages may be far above the maximum voltage ratings. To avoid permanent damage to the transistor, do not attempt to measure these characteristics above the maximum ratings.**

ELECTRICAL CHARACTERISTICS at T = 25 C

	CHARACTERISTICS	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
		D-C CHARACTERISTICS					
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 25V$		—	0.09	1	nA
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 25V$, $T_A = 100C$		—	10	100	nA
I_{EBO}	Emitter Cutoff Current	V_{E1B} or $V_{E2B} = -25V$		—	0.07	1	nA
I_{CBO}	Collector Cutoff Current	$V_{CB} = -30V$		—	0.5	10	nA
BV_{E1E2O}	Emitter-Emitter Breakdown Voltage[2]	I_{E1} or $I_{E2} = -1\mu A$		50	—	—	Volts
BV_{EBO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		50	—	—	Volts
BV_{ECO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		50	—	—	Volts
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -1\mu A$		50	—	—	Volts
$\lvert V_O \rvert$	Offset Voltage[3]	$I_B = -1mA$, $I_{E1} = I_{E2} = 0$,					
		T_A = 25, −25 and 100C	3N93	—	—	50	μV
			3N94	—	—	100	μV
			3N95	—	—	200	μV
$\lvert \Delta V_O \rvert_{I_B}$	Offset Voltage Change[3] with I_B	$I_{B(1)} = -0.5mA$, $I_{B(2)} = -1.5mA$,					
		$I_{E1} = I_{E2} = 0$	3N93	—	—	25	μV
			3N94	—	—	50	μV
			3N95	—	—	75	μV
$\lvert \Delta V_O \rvert_{T_A}$	Offset Voltage Change[3] with Temp.	$T_{A(1)} = -25C$, $T_{A(2)} = 100C$,					
		$I_B = -1mA$, $I_{E1} = I_{E2} = 0$	3N93	—	—	75	μV
			3N94	—	—	125	μV
			3N95	—	—	175	μV
r_{e1e2}	Series Resistance[4]	$I_B = -1mA$, $I_{E1} = I_{E2} = 100\mu A$					
			3N93	10	—	75	ohms
			3N94	10	—	75	ohms
			3N95	10	—	100	ohms
		HIGH FREQUENCY CHARACTERISTICS					
C_{ob}	Collector Capacitance	$V_{CB} = -6V$, $I_E = 0$, f = 4Mc		—	7.0	10	pF
C_{ib}	Emitter Capacitance	V_{E1B} or $V_{E2B} = -6V$, $I_C = 0$, f = 4Mc		—	1.6	3	pF
f_T	Gain Bandwidth Product	$V_{CE} = -6V$, I_{E1} or $I_{E2} = 1mA$		6	12	—	Mc

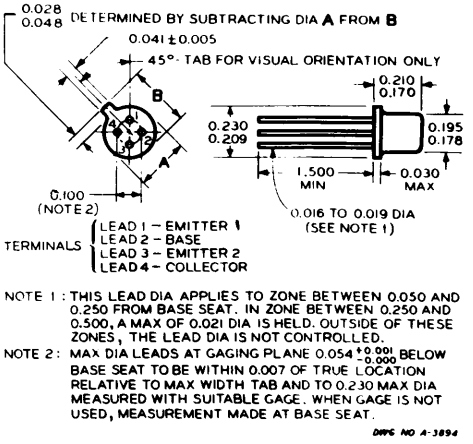
[2]Collector and base are shorted together, but are open with respect to both emitters.

[3]To be measured in circuit of Figure 1.

[4]To be measured in circuit of Figure 2.

SPRAGUE ELECTRIC COMPANY — SEMICONDUCTOR DIVISION
EXECUTIVE OFFICES: NORTH ADAMS, MASS. — CONCORD, N. H.

MECHANICAL SPECIFICATIONS



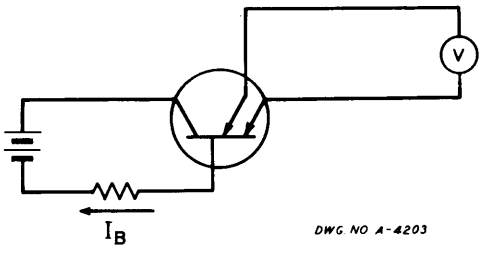


FIGURE 1

OFFSET VOLTAGE TEST CIRCUIT, V_O

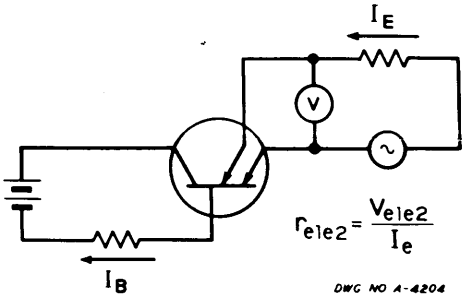


FIGURE 2

ON SERIES RESISTANCE TEST CIRCUIT, r_{ele2}

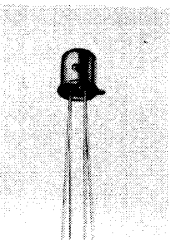
No. 31702

SPRAGUE
THE MARK OF RELIABILITY

Engineering Bulletin

3N114
3N115
3N116

TYPE 3N114, 3N115 and 3N116 DUET® DUAL-EMITTER SEPT® TRANSISTORS



ACTUAL SIZE

DUAL-EMITTER PNP silicon planar epitaxial transistors specifically designed for low-level high speed chopper and commutating applications, Type 3N114, 3N115, and 3N116 DUET transistors feature low offset voltages, low emitter capacitances and excellent thermal characteristics. They are supplied in a four lead TO-72 package.

ABSOLUTE MAXIMUM RATINGS[1]

Storage Temperature ..... −65 C to +200 C
Emitter-Emitter Voltage, V_{E1E2}, V_{E2E1} ..... 12 volts
Emitter-Base Voltage, V_{E1BO}, V_{E2BO} ..... 12 volts
Emitter-Collector Voltage, V_{E1CO}, V_{E2CO} ..... 12 volts
Collector-Base Voltage, V_{CBO} ..... 30 volts
Emitter Current, I_{E1}, I_{E2} ..... 10 mA
Base Current, I_B ..... 20 mA
Collector Current, I_C ..... 20 mA
Power Dissipation at 25 C ..... 300 mW
Derating Factor ..... 1.7mW/°C
Lead Temperature (1/16" from case for 10 seconds) . 230C

[1]The maximum ratings are limiting absolute values above which the serviceability may be impaired from the viewpoint of life or satisfactory performance. The breakdown voltages may be far above the maximum voltage ratings. To avoid permanent damage to the transistor, do not attempt to measure these characteristics above the maximum ratings.

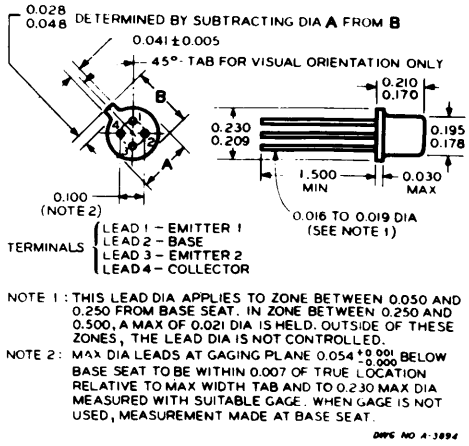
ELECTRICAL CHARACTERISTICS at T_A = 25 C

	CHARACTERISTICS	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
D-C CHARACTERISTICS							
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 10V$		—	0.09	1	nA
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 10V$, T_A = 100C		—	10	100	nA
I_{EBO}	Emitter Cutoff Current	V_{E1B} or $V_{E2B} = -10V$		—	0.07	1	nA
I_{CBO}	Collector Cutoff Current	$V_{CB} = -25V$		—	0.5	10	nA
BV_{E1E2O}	Emitter-Emitter Breakdown Voltage[2]	I_{E1} or $I_{E2} = -1\mu A$		12	—	—	Volts
BV_{EBO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		12	—	—	Volts
BV_{ECO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		12	—	—	Volts
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -1\mu A$		30	—	—	Volts
$\lvert V_O \rvert$	Offset Voltage[3]	$I_B = -1$mA, $I_{E1} = I_{E2} = 0$, T_A = 25, −25 and 100C	3N114	—	—	50	μV
			3N115	—	—	100	μV
			3N116	—	—	200	μV
$\lvert \Delta V_O / \Delta I_B \rvert$	Offset Voltage Change[3] with I_B	$I_{B(1)} = -0.5$mA, $I_{B(2)} = -1.5$mA, $I_{E1} = I_{E2} = 0$	3N114	—	—	25	μV
			3N115	—	—	25	μV
			3N116	—	—	50	μV
$\lvert \Delta V_O / \Delta T_A \rvert$	Offset Voltage Change[3] with Temp.	$T_{A(1)} = -25$C, $T_{A(2)}$ = 100C, $I_B = -1$mA, $I_{E1} = I_{E2} = 0$	3N114	—	—	75	μV
			3N115	—	—	125	μV
			3N116	—	—	175	μV
r_{e1e2}	Series Resistance[4]	$I_B = -1$mA, $I_{e1} = I_{e2} = 100\mu A$		—	—	50	ohms
HIGH FREQUENCY CHARACTERISTICS							
C_{ob}	Collector Capacitance	$V_{CB} = -6V$, $I_E = 0$, f = 4Mc		—	8.0	10	pF
C_{ib}	Emitter Capacitance	V_{E1B} or $V_{E2B} = -6V$, $I_C = 0$, f = 4Mc		—	1.6	3	pF
f_T	Gain Bandwidth Product	$V_{CE} = -6V$, I_{E1} or I_{E2} = 1mA		12	—	—	Mc

[2]Collector and base are shorted together, but are open with respect to both emitters.
[3]To be measured in circuit of Figure 1.
[4]To be measured in circuit of Figure 2.

SPRAGUE ELECTRIC COMPANY
EXECUTIVE OFFICES: NORTH ADAMS, MASS.
SEMICONDUCTOR DIVISION
CONCORD, N.H. • WORCESTER, MASS.

MECHANICAL SPECIFICATIONS



NOTE 1: THIS LEAD DIA APPLIES TO ZONE BETWEEN 0.050 AND 0.250 FROM BASE SEAT. IN ZONE BETWEEN 0.250 AND 0.500, A MAX OF 0.021 DIA IS HELD. OUTSIDE OF THESE ZONES, THE LEAD DIA IS NOT CONTROLLED.

NOTE 2: MAX DIA LEADS AT GAGING PLANE $0.054^{+0.001}_{-0.000}$ BELOW BASE SEAT TO BE WITHIN 0.007 OF TRUE LOCATION RELATIVE TO MAX WIDTH TAB AND TO 0.230 MAX DIA MEASURED WITH SUITABLE GAGE. WHEN GAGE IS NOT USED, MEASUREMENT MADE AT BASE SEAT.

DWG NO A-3894

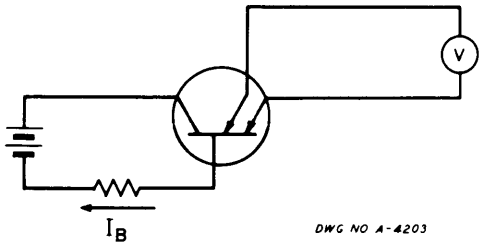


FIGURE 1

OFFSET VOLTAGE TEST CIRCUIT, V_O

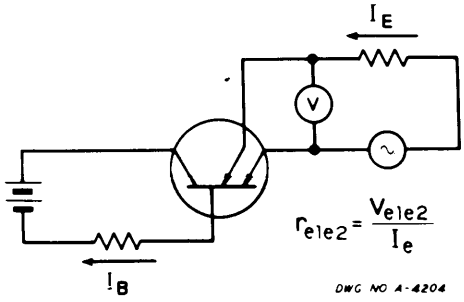


FIGURE 2

ON SERIES RESISTANCE TEST CIRCUIT, r_{ele2}

In the construction of the components described, the full intent of the specification will be met. The Sprague Electric Company, however, reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

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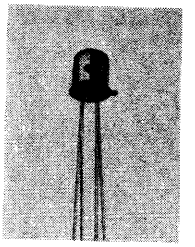
No. 31703

SPRAGUE
THE MARK OF RELIABILITY

Engineering Bulletin

3N117
3N118
3N119

TYPE 3N117, 3N118, and 3N119 DUET® DUAL-EMITTER SEPT® TRANSISTORS



ACTUAL SIZE

SPRAGUE TYPE 3N117, 3N118, and 3N119 DUET Dual-emitter PNP silicon planar epitaxial transistors are specifically designed for low-level high speed chopper and commutating applications. They feature low offset voltages, low emitter capacitances and excellent thermal characteristics. They are supplied in a four lead TO-18 package.

ABSOLUTE MAXIMUM RATINGS[1]

Storage Temperature . . . . . — 65 C to + 200 C
Emitter-Emitter Voltage, V_{E1E2}, V_{E2E1} . . . . . 20 volts
Emitter-Base Voltage, V_{E1BO}, V_{E2BO} . . . . . 20 volts
Emitter-Collector Voltage, V_{E1CO}, V_{E2CO} . . . . . 20 volts
Collector-Base Voltage, V_{CBO} . . . . . 50 volts
Emitter Current, I_{E1}, I_{E2} . . . . . 10 mA
Base Current, I_B . . . . . 20 mA
Collector Current, I_C . . . . . 20 mA
Power Dissipation at 25 C . . . . . 300 mW
Derating Factor . . . . . 1.7mW/°C
Lead Temperature (1/16" from case for 10 seconds) . 230C

[1]The maximum ratings are limiting absolute values above which the serviceability may be impaired from the viewpoint of life or satisfactory performance. The breakdown voltages may be far above the maximum voltage ratings. To avoid permanent damage to the transistor, do not attempt to measure these characteristics above the maximum ratings.

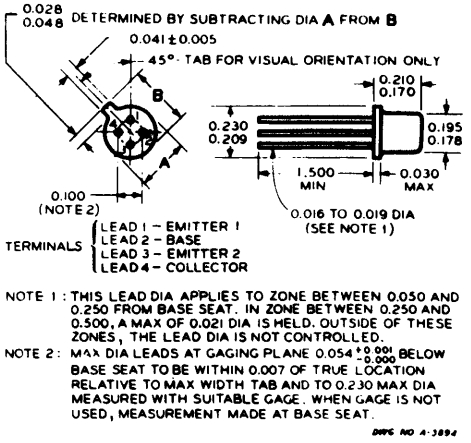
ELECTRICAL CHARACTERISTICS at T = 25 C

	CHARACTERISTICS	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
		D-C CHARACTERISTICS					
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 15V$		—	0.09	1	nA
I_{E1E2O}	Emitter Cutoff Current[2]	$V_{E1E2} = \pm 15V$, $T_A = 100C$		—	10	100	nA
I_{EBO}	Emitter Cutoff Current	V_{E1B} or $V_{E2B} = -15V$		—	0.07	1	nA
I_{CBO}	Collector Cutoff Current	$V_{CB} = -25V$		—	0.5	10	nA
BV_{E1E2O}	Emitter-Emitter Breakdown Voltage[2]	I_{E1} or $I_{E2} = -1\mu A$		20	—	—	Volts
BV_{EBO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		20	—	—	Volts
BV_{ECO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$		20	—	—	Volts
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -1\mu A$		50	—	—	Volts
$\lvert V_O \rvert$	Offset Voltage[3]	$I_B = -1mA$, $I_{E1} = I_{E2} = 0$, T_A = 25, −25 and 100C	3N117	—	—	50	μV
			3N118	—	—	100	μV
			3N119	—	—	200	μV
$\lvert \Delta V_O \rvert_{I_B}$	Offset Voltage Change[3] with I_B	$I_{B(1)} = -0.5mA$, $I_{B(2)} = -1.5mA$, $I_{E1} = I_{E2} = 0$	3N117	—	—	25	μV
			3N118	—	—	25	μV
			3N119	—	—	50	μV
$\lvert \Delta V_O \rvert_{T_A}$	Offset Voltage Change[3] with Temp.	$T_{A(1)} = -25C$, $T_{A(2)} = 100C$, $I_B = -1mA$, $I_{E1} = I_{E2} = 0$	3N117	—	—	75	μV
			3N118	—	—	125	μV
			3N119	—	—	175	μV
r_{e1e2}	Series Resistance[4]	$I_B = -1mA$, $I_{e1} = I_{e2} = 100\mu A$		—	—	50	ohms
		HIGH FREQUENCY CHARACTERISTICS					
C_{ob}	Collector Capacitance	$V_{CB} = -6V$, $I_E = 0$, f = 4Mc		—	8.0	10	pF
C_{ib}	Emitter Capacitance	V_{E1B} or $V_{E2B} = -6V$, $I_C = 0$, f = 4Mc		—	1.6	3	pF
f_T	Gain Bandwidth Product	$V_{CE} = -6V$, I_{E1} or $I_{E2} = 1mA$		12	—	—	Mc

[2]Collector and base are shorted together, but are open with respect to both emitters.
[3]To be measured in circuit of Figure 1.
[4]To be measured in circuit of Figure 2.

SPRAGUE ENGINEERING BULLETIN 31703

MECHANICAL SPECIFICATIONS



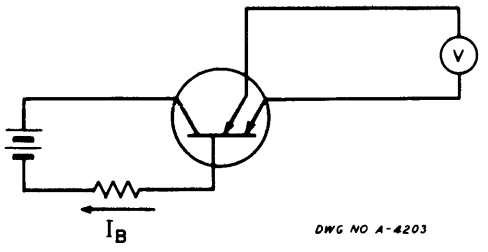


FIGURE 1

OFFSET VOLTAGE TEST CIRCUIT, V_O

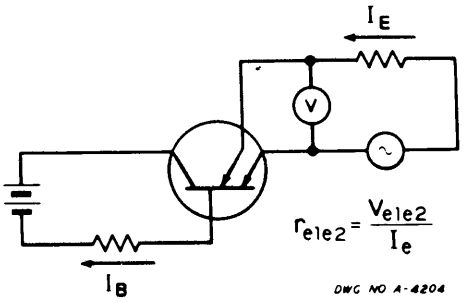


FIGURE 2

ON SERIES RESISTANCE TEST CIRCUIT, r_{ele2}

No. 31707

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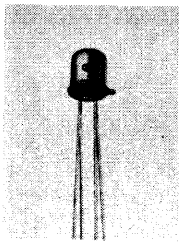
Engineering Bulletin

3N123

TYPE 3N123 DUET*

DUAL-EMITTER SEPT® TRANSISTORS

— P-N-P Silicon Planar Epitaxial Series



TO-72 CASE

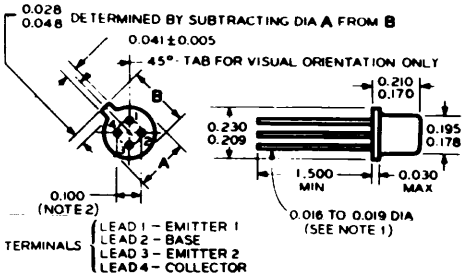
TYPE 3N123 Dual-Emitter PNP Silicon Planar Epitaxial Transistors are specifically designed for use in low-level, high-speed chopper and commutating applications. Primary features of these transistors are low offset voltages, low emitter capacitances, and excellent thermal characteristics.

ABSOLUTE MAXIMUM RATINGS[1]

Storage Temperature	−65 C to +200 C
Emitter-Emitter Voltage, V_{E1E2}, V_{E2E1}	25 Volts
Emitter-Base Voltage, V_{E1BO}, V_{E2BO}	25 Volts
Emitter-Collector Voltage, V_{E1CO}, V_{E2CO}	25 Volts
Collector-Base Voltage, V_{CBO}	30 Volts
Emitter Current, I_{E1}, I_{E2}	10 mA
Base Current, I_B	20 mA
Collector Current, I_C	20 mA
Power Dissipation at 25C Free Air	100 mW
Derating Factor	0.58mW/°C
Lead Temperature (1/16" from case for 10 sec.)	230C

[1]The maximum ratings are limiting absolute values above which the serviceability may be impaired from the viewpoint of life or satisfactory performance. The breakdown voltages may be far above the maximum collector voltage ratings. To avoid permanent damage to the transistor, do not attempt to measure these characteristics above the maximum ratings.

MECHANICAL SPECIFICATIONS



NOTE 1: THIS LEAD DIA APPLIES TO ZONE BETWEEN 0.050 AND 0.250 FROM BASE SEAT. IN ZONE BETWEEN 0.250 AND 0.500, A MAX OF 0.021 DIA IS HELD. OUTSIDE OF THESE ZONES, THE LEAD DIA IS NOT CONTROLLED.

NOTE 2: MAX DIA LEADS AT GAGING PLANE 0.054 +0.001 −0.000 BELOW BASE SEAT TO BE WITHIN 0.007 OF TRUE LOCATION RELATIVE TO MAX WIDTH TAB AND TO 0.230 MAX DIA MEASURED WITH SUITABLE GAGE. WHEN GAGE IS NOT USED, MEASUREMENT MADE AT BASE SEAT.

DIMS NO A-3894

ELECTRICAL CHARACTERISTICS[2] at T = 25 C

D-C CHARACTERISTICS						
I_{E1E2O}	Emitter Cutoff Current	$V_{E1E2} = \pm 15V$, $V_{CB} = 0$	—	0.09	1	nA
I_{E1E2O}	Emitter Cutoff Current	$V_{E1E2} = \pm 15V$, $T_A = 100C$, $V_{CB} = 0$	—	10	100	nA
I_{EBO}	Emitter Cutoff Current	V_{E1B} or $V_{E2B} = -15V$	—	0.07	1	nA
I_{CBO}	Collector Cutoff Current	$V_{CB} = -25V$	—	0.5	10	nA
BV_{E1E2O}	Emitter-Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$, $V_{CB} = 0$	±25	—	—	Volts
BV_{EBO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$	25	—	—	Volts
BV_{ECO}	Emitter Breakdown Voltage	I_{E1} or $I_{E2} = -1\mu A$	25	—	—	Volts
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -1uA$	25	—	—	Volts
$\lvert V_O \rvert$	Offset Voltage	$I_B = -1mA$, $I_{E1} = I_{E2} = 0$	—	—	250	μV
$\lvert \Delta V_O \rvert_{I_B}$	Offset Voltage Change with I_B	$T_A = 0$ to $+65C$ $I_{B(1)} = -0.5mA$, $I_{B(2)} = -1.5mA$, $I_{E1} = I_{E2} = 0$ $T_{A(1)} = 0C$, $T_{A(2)} = 65C$	—	—	100	μV
$\lvert \Delta V_O \rvert_{T_A}$	Offset Voltage Change with Temp.	$I_B = -1mA$, $I_{E1} = I_{E2} = 0$	—	—	150	μV
$r_{e_1e_2}$	Series Resistance	$I_B = -1mA$, $I_{e1} = I_{e2} = 100\mu A$	10	20	100	Ohms
HIGH FREQUENCY CHARACTERISTICS						
C_{ob}	Collector Capacitance	$V_{CB} = -6V$, $I_E = 0$, $f = 4$ Mc	—	8.0	10	pF
C_{ib}	Emitter Capacitance	V_{E1B} or $V_{E2B} = -6V$, $I_C = 0$, $f = 4$Mc	—	1.6	3	pF
f_T	Gain Bandwidth Product	V_{CE1} or $V_{CE2} = -6V$, $I_C = -1mA$, $f = 4$Mc	6	15	—	Mc

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