



**PREMIUM PERFORMANCE
LOW_{ree} (sat)
SILICON EPITAXIAL JUNCTION
INTEGRATED CHOPPER TRANSISTORS**

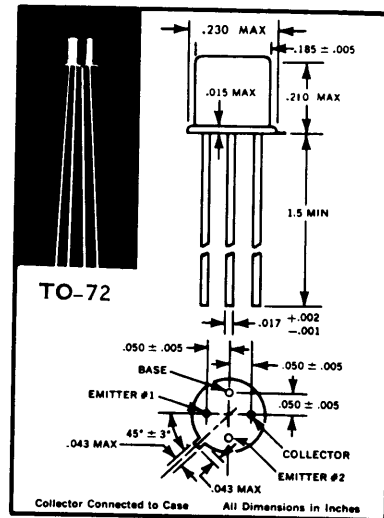
**3N129
3N130
3N131
3N132
3N133**

GEOMETRY 450

- ULTRA LOW r_{ee} (sat), 8 Ohms TYP.
- LOW C_{eb} & C_{ee} , 2.5 pfd TYP.
- LOW LEAKAGE, 0.5 nA MAX.
- HIGH V_{EE} & V_{EB} , UP TO 50 V

ELECTRICAL DATA ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	3N129	3N130	3N131	3N132	3N133	UNITS
Collector to Base Voltage	BV_{CBO}	-20	-30	-40	-50	-60	Volts
Emitter (1) to Base Voltage	BV_{E1BO}	-10	-20	-30	-40	-50	Volts
Emitter (2) to Base Voltage	BV_{E2BO}	-10	-20	-30	-40	-50	Volts
Emitter to Emitter Voltage	BV_{E1E2O}	10	20	30	40	50	Volts
Emitter (1) to Collector Voltage	BV_{E1CO}	10	20	30	40	50	Volts
Emitter (2) to Collector Voltage	BV_{E2CO}	10	20	30	40	50	Volts
Power Diss. @ 25°C Ambient	P_D	300 (Derating 1.7 mW/°C)					mW
Junction Temp. (Oper. & Store)	T_J	-65°C to +200°C					
Lead Temp. (@ 1/16" from Case)	T_L	240°C for 10 sec.					



ELECTRICAL CHARACTERISTICS: $T_A = 25^\circ\text{C}$ (UNLESS OTHERWISE STATED)

Parameter	Symbol	Condition	3N129 — 3N133		Units
			Typ.	Max.	
Offset Voltage	V_{E1E2O}	$I_B = 1.0 \text{ mA}$	15	30	μV
Offset Voltage Change	ΔV_{E1E2O}	$I_B = 1.0 \text{ mA}$ $\text{TEMP} = -25^\circ\text{C} \text{ to } +100^\circ\text{C}$	25	50	μV
Offset Voltage Change	ΔV_{E1E2O}	$\Delta I_B = 0.5 \text{ to } 1.5 \text{ mA}$	5	10	μV
Saturation Resistance	$r_{e1e2}(\text{sat})$	$I_B = 1.0 \text{ mA}, I_{EE} = 0, i_o = 0.1 \text{ mA}$ $f = 1 \text{ kHz}$	8	15	Ohms
Collector Cutoff Current	I_{CBO}	$V_{CB} = V_{CB} \text{ MAX.}$	0.5	1.0	nA
Emitter Cutoff Current	I_{E1BO} I_{E2BO}	$V_{EB} = V_{EB} \text{ MAX.}$	0.5	1.0	nA
Emitter Cutoff Current	I_{E1E2O}	$V_{EE} = V_{EE} \text{ MAX.}, V_{CB} = 0 \text{ (shorted)}$	0.08	0.3	nA
Emitter Cutoff Current	I_{E1E2O}	$V_{EE} = V_{EE} \text{ MAX.}$ $\text{TEMP} = 100^\circ\text{C}$	10.0	25.0	nA
Emitter to Base Capacitance	$C_{e,b}$ $C_{e2,b}$	$V_{EB} = 5 \text{ V}, I_C = 0$ $f = 159 \text{ kHz}$	2.5	4.0	pfd
Emitter to Emitter Capacitance	$C_{e1,e2}$	$V_{EE} = 5 \text{ V}, I_C = 0$ $f = 159 \text{ kHz}$	2.5	4.0	pfd
Collector Base Capacitance	C_{ob}	$V_{CB} = 5 \text{ V}, I_C = 0, f = 159 \text{ kHz}$	6.0	10.0	pfd



**TELEDYNE
CRYSTALONICS**

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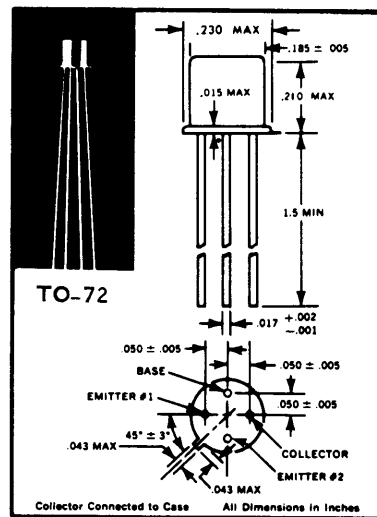
3N134
3N135
3N136

GEOMETRY 450

- ULTRA LOW $r_{ee}(sat)$, 10 Ω TYP.
- LOW LEAKAGE, 2 na TYP.
- LOW C_{eb} , 3 pfd TYP.
- HIGH V_{EE} & V_{EB} , UP TO 50 V

ELECTRICAL DATA ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	3N134	3N135	3N136	UNITS
Collector to Base Voltage	BV_{CBO}	-20	-40	-60	Volts
Emitter (1) to Base Voltage	BV_{E1BO}	-15	-30	-50	Volts
Emitter (2) to Base Voltage	BV_{E2BO}	-15	-30	-50	Volts
Emitter to Emitter Voltage	BV_{E1E2O}	15	30	50	Volts
Emitter (1) to Collector Voltage	BV_{E1CO}	15	30	50	Volts
Emitter (2) to Collector Voltage	BV_{E2CO}	15	30	50	Volts
Power Diss. @ 25°C Ambient	P_D	300(Derating 1.7mW/°C)			mW
Junction Temp. (Oper. & Store)	T_J	-65°C to +200°C			
Lead Temp. (@ 1/16" from Case)	T_L	240°C for 10 sec.			



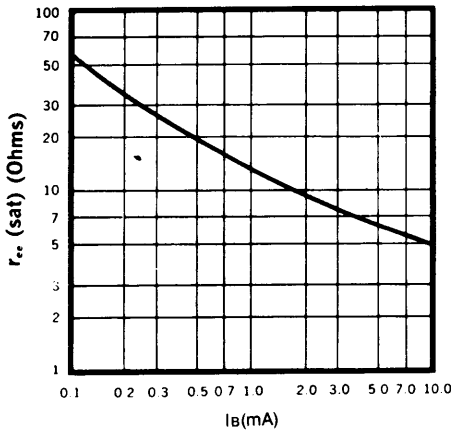
ELECTRICAL CHARACTERISTICS: $T_A = 25^\circ\text{C}$ (UNLESS OTHERWISE STATED)

Parameter	Symbol	Condition	3N134 — 3N136		Units
			Typ.	Max.	
Offset Voltage	V_{E1E2O}	$I_B = 1.0 \text{ MA}$ $T_A = -25^\circ\text{C} / +25^\circ\text{C} / +85^\circ\text{C}$	50	100	μV
Offset Voltage Change	ΔV_{E1E2O}	$\Delta I_B = 0.5 \text{ to } 1.5 \text{ MA}$	10	25	μV
Saturation Resistance	$r_{E1E2}(sat)$	$I_B = 1.0 \text{ MA}$, $I_{EE} = 0$, $i_e = 0.1 \text{ mA}$ $f = 1 \text{ kHz}$	10	15	Ohms
Collector Cutoff Current	I_{CBO}	$V_{CB} = V_{CB} \text{ MAX.}$	6.0	10.0	nA
Emitter Cutoff Current	I_{E1BO} I_{E2BO}	$V_{EB} = V_{EB} \text{ MAX}$	5.0	10.0	nA
Emitter Cutoff Current	I_{E1E2O}	$V_{EE} = V_{EE} \text{ MAX}$, $V_{CB} = 0$ (shorted)	2.0	5.0	nA
Emitter Cutoff Current	I_{E1E2O}	$V_{EE} = V_{EE} \text{ MAX}$ $TEMP = 100^\circ\text{C}$	0.5	1.0	μA
Emitter to Base Capacitance	C_{e1b} C_{e2b}	$V_{EB} = 5\text{V}$, $I_C = 0$ $f = 159 \text{ kHz}$	3.0	6	pfd
Emitter to Emitter Capacitance	C_{e1e2}	$V_{EE} = 5\text{V}$, $I_C = 0$ $f = 159 \text{ kHz}$	2.0	5	pfd
Collector Base Capacitance	C_{ob}	$V_{CB} = 5\text{V}$, $I_C = 0$, $f = 159 \text{ kHz}$	7.0	12.00	pfd

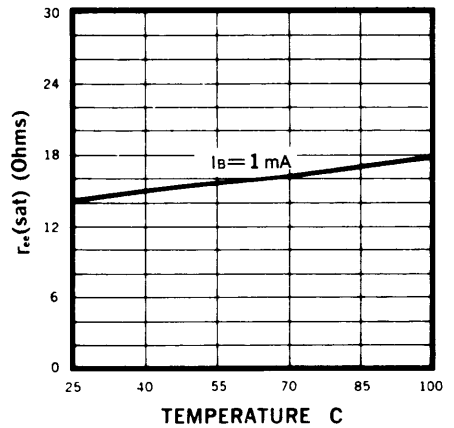
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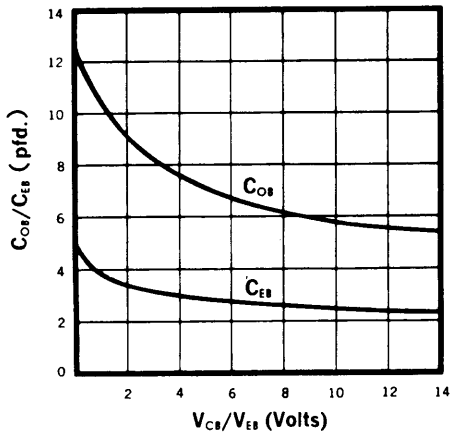
$r_{ee}(\text{sat})$ vs I_B



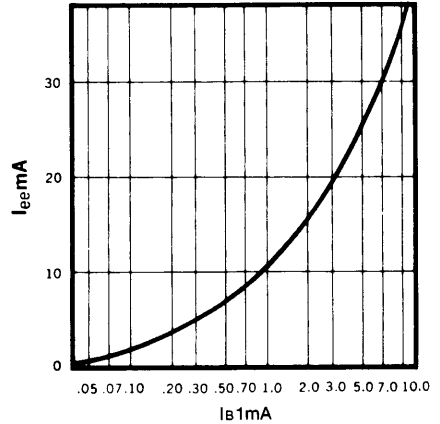
$r_{ee}(\text{sat})$ vs Temp.



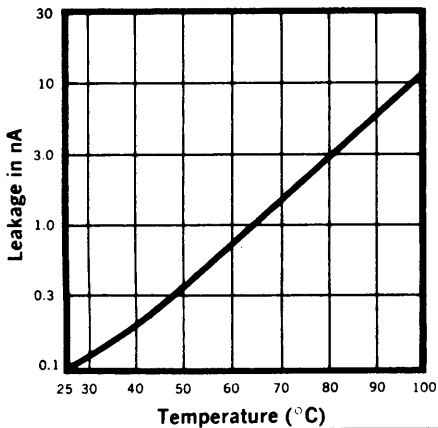
C_{OB}/C_{EB} vs Voltage



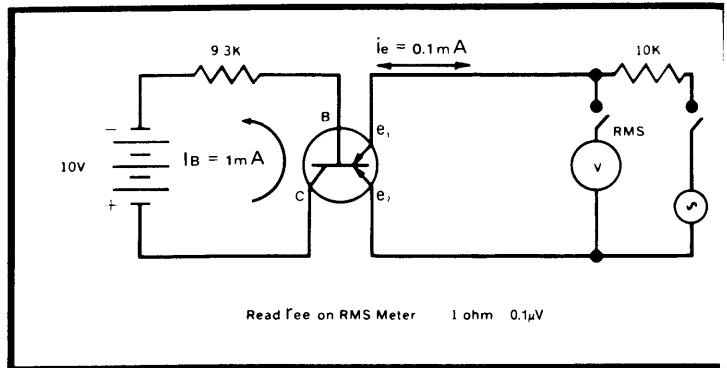
$I_{ee}(\text{sat})$ vs I_B



I_{ee0} vs Temp.



$r_{ee}(\text{sat})$ Test Circuit



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