TYPES 2N2432, 2N2432A, 2N4138
N-P-N SILICON TRANSISTORS

BULLETIN NO. DL-S 689079, OCTOBER 1966—REVISED JANUARY 1968

FOR LOW-LEVEL, HIGH-SPEED CHOPPER APPLICATIONS IN INVERTED CONNECTION

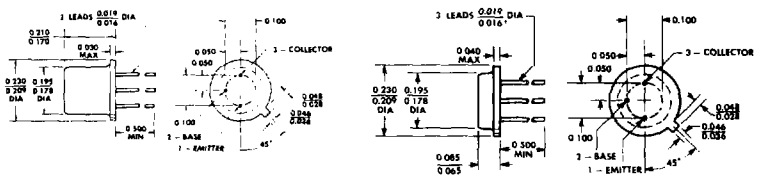
- **Low Offset Voltage . . . 0.4 mV Max (2N2432A)**
- **Low I_{ECS} . . . 2 nA Max**
- **High Rated V_{ECO} for Inverted Connection**

ALSO USEFUL FOR LOW-LEVEL AMPLIFIER APPLICATIONS

- **h_{FE} . . . 30 Min at 10 μA**

***mechanical data**

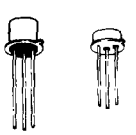
THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE CASE



2N2432 AND 2N2432A
ALL JEDEC TO-18 DIMENSIONS AND NOTES ARE APPLICABLE.

2N4138
ALL JEDEC TO-46 DIMENSIONS AND NOTES ARE APPLICABLE.

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED



†TI guaranteed minimum. The JEDEC registered minimum lead diameter for the TO-46 is 0.012.

***absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)**

	2N2432 2N4138	2N2432A
Collector-Base Voltage	30 V	45 V
Collector-Emitter Voltage (See Note 1)	30 V	45 V
Emitter-Collector Voltage (See Note 2)	15 V	18 V
Emitter-Base Voltage	15 V	18 V
Continuous Collector Current	← 100 mA →	
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	←300 mW →	
Continuous Device Dissipation at (or below) 25°C Case Temperature (See Note 4)	←600 mW →	
Storage Temperature Range	−65°C to 200°C	
Lead Temperature 1/16 Inch from Case for 10 Seconds	← 300°C →	

NOTES: 1. This value applies between 0 and 10 mA collector current when the emitter-base diode is open-circuited.
2. This value applies between 0 and 100 μA emitter current when the collector-base diode is open-circuited.
3. Derate linearly to 175°C free-air temperature at the rate of 2 mW/deg.
4. Derate linearly to 175°C case temperature at the rate of 4 mW/deg.

*Indicates JEDEC registered data.

USES CHIP N18

***electrical characteristics at 25°C free-air temperature (unless otherwise noted)**

PARAMETER		TEST CONDITIONS			2N2432 2N4138 MIN	2N2432 2N4138 MAX	2N2432A MIN	2N2432A MAX	UNIT
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 μA, I_E = 0			30		45		V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = 10 mA, I_B = 0,		See Note 5	30		45		V
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	I_E = 100 μA, I_B = 0			15		18		V
I_{CBO}	Collector Cutoff Current	V_{CB} = 25 V, I_E = 0				10			nA
		V_{CB} = 40 V, I_E = 0						10	nA
I_{CES}	Collector Cutoff Current	V_{CE} = 25 V, V_{BE} = 0				10			nA
		V_{CE} = 25 V, V_{BE} = 0,	T_A = 125°C			250			nA
		V_{CE} = 40 V, V_{BE} = 0						10	nA
		V_{CE} = 40 V, V_{BE} = 0,	T_A = 125°C					250	nA
I_{EBO}	Emitter Cutoff Current	V_{EB} = 15 V, I_C = 0				2		2	nA
I_{ECS}	Emitter Cutoff Current	V_{EC} = 15 V, V_{BC} = 0				2		2	nA
		V_{EC} = 15 V, V_{BC} = 0,	T_A = 125°C			200		200	nA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = 5 V, I_C = 10 μA			30		30		
		V_{CE} = 5 V, I_C = 1 mA			50		50		
$h_{FE(inv)}$	Static Forward Current Transfer Ratio (Inverted Connection)	V_{EC} = 5 V, I_E = 0.2 mA			2		3		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = 0.5 mA, I_C = 10 mA				0.15		0.15	V
$V_{EC(ofs)}$	Offset Voltage (Inverted Connection)	I_B = 200 μA, I_E = 0,		See Figure 1		0.5		0.4	mV
		I_B = 1 mA, I_E = 0,		See Figure 1		1		0.7	mV
$r_{ec(on)}$	Small-Signal Emitter-Collector On-State Resistance	I_B = 1 mA, I_E = 0, f = 1 kHz,		I_e = 100 μA, See Figure 2		20		15	Ω
$\|h_{fe}\|$	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = 5 V, I_C = 1 mA,		f = 20 MHz	1		1		
C_{obo}	Common-Base Open-Circuit Output Capacitance	V_{CB} = 0, I_E = 0,		f = 140 kHz		12		12	pF
C_{cb}	Collector-Base Capacitance	V_{CB} = 0, I_E = 0,		f = 1 MHz, See Note 6		12		12	pF
C_{ibo}	Common-Base Open-Circuit Input Capacitance	V_{EB} = 0, I_C = 0,		f = 140 kHz		12		12	pF
C_{eb}	Emitter-Base Capacitance	V_{EB} = 0, I_C = 0,		f = 1 MHz, See Note 6		12		12	pF

NOTES: 5. This parameter must be measured using pulse techniques. t_p = 300 μs, duty cycle ≤ 2%.
6. C_{cb} and C_{eb} are measured using three-terminal measurement techniques with the third electrode (emitter or collector respectively) guarded.

PARAMETER MEASUREMENT INFORMATION

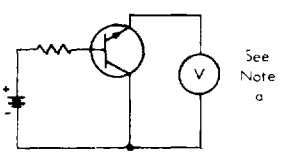


FIGURE 1

MEASUREMENT CIRCUIT FOR OFFSET VOLTAGE

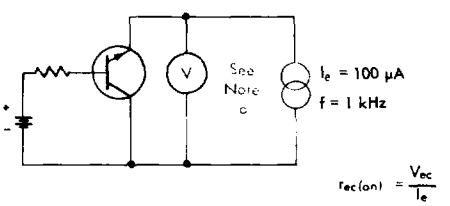


FIGURE 2

MEASUREMENT CIRCUIT FOR EMITTER-COLLECTOR ON-STATE RESISTANCE

NOTE a: The voltmeter must have high enough impedance that halving the value of the voltmeter impedance does not change the measured value.
*Indicates JEDEC registered data.

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