TYPES 2N2160
P-N BAR-TYPE SILICON UNIJUNCTION TRANSISTORS

BULLETIN NO. DL-S 683189, OCTOBER 1962–REVISED MAY 1968

Designed for Medium-Power Switching, Oscillator and Pulse Timing Circuits

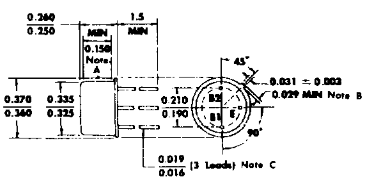
- **Highly Stable Negative Resistance and Firing Voltage**
- **Low Firing Current**
- **High Pulse Current Capabilities**
- **Simplified Circuit Design**

4

mechanical data

Package outline similar to JEDEC TO-5 except for lead position. Approximate weight 1 gram.

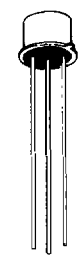
*ALL LEADS INSULATED FROM CASE.



NOTES A. This zone is controlled for automatic handling. The variation in actual diameter within this zone shall not exceed 0.010.

B. Measured from max. diameter of the actual device.

C. The specified lead diameter applies in the zone between 0.050 and 0.250 from the base seat. Between 0.250 and 1.5 maximum of 0.021 diameter is held. Outside of these zones the lead diameter is not controlled.



DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

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

	2N1671 2N1671A 2N1671B	2N2160
Emitter-Base Reverse Voltage	−30 v	
Emitter-Base Reverse Voltage below 140°C Junction Temperature		−30 v
Interbase Voltage	35 v	35 v
RMS Emitter Current	50 ma	
DC Emitter Current		70 ma
Peak Emitter Current (See Note 1)	2 a	
Peak Emitter Current below 140°C Junction Temperature		2 a
Total Device Dissipation at (or below) 25°C Free-Air Temperature (See Notes 2 & 3)	450 mw	450 mw
Operating Temperature Range (See Note 3)	−65°C to 140°C	
Storage Temperature Range (See Note 4)	−65°C to 150°C	
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C	260°C

NOTES: 1. Capacitor discharge — 10 μf or less, 30 volts or less — total interbase power dissipation must be limited by external circuitry.
2. Derate linearly to 140°C free-air temperature at the rate of 3.9 mw/°C. (2N1671 series only, thermal resistance to case = 0.16°C/mw.)
3. Texas Instruments guarantees a maximum operating temperature of 175°C free-air. Derate linearly at the rate of 3 mw/°C.
4. Texas Instruments guarantees a maximum storage temperature of 175°C.

*Indicates JEDEC registered data

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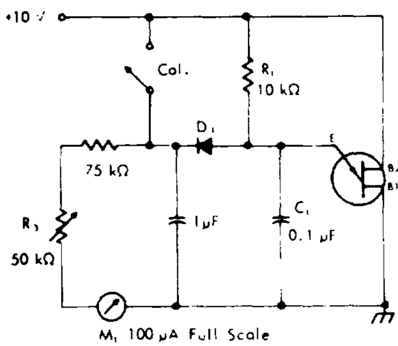
*electrical characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	2N1671		2N1671A		2N1671B		2N2160		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
r_{BB}	Static Interbase Resistance	$V_{B2B1} = 3$ v, $I_E = 0$	4.7	9.1	4.7	9.1	4.7	9.1	4.0	12	kΩ
η	Intrinsic Standoff Ratio	$V_{B2B1} = 10$ v, See Figure 1	0.47	0.62	0.47	0.62	0.47	0.62	0.47	0.80	
$I_{B2(mod)}$	Modulated Interbase Current	$V_{B2B1} = 10$ v, $I_E = 50$ ma	6.8	22	6.8	22	6.8	22	6.8	30	ma
I_{EB2O}	Emitter Reverse Current	$V_{B2E} = 30$ v, $I_{B1} = 0$		−12		−12		−0.2		−12	μa
I_P	Peak-Point Emitter Current	$V_{B2B1} = 25$ v		25		25		6		25	μa
$V_{EB1(sat)}$	Emitter Saturation Voltage	$V_{B2B1} = 10$ v, $I_E = 50$ ma		5		5		5			v
I_V	Valley-Point Emitter Current	$V_{B2B1} = 20$ v, $R_{B2} = 100\ \Omega$	8		8		8		8		ma
V_{OB1}	Base-One Peak Pulse Voltage	$V_1 = 20$ v, $R_{B1} = 20\ \Omega$, See Figure 2			3		3		3		v

*Indicates JEDEC registered data

PARAMETER MEASUREMENT INFORMATION



η — Intrinsic Standoff Ratio — This parameter is defined in terms of the peak-point voltage, V_p, by means of the equation: $V_p = \eta V_{B2B1} + V_F$, where V_F is about 0.56 volt at 25°C and decreases with temperature at about 2 millivolts/deg.

The circuit used to measure η is shown in the figure. In this circuit, R_1, C_1 and the unijunction transistor form a relaxation oscillator, and the remainder of the circuit serves as a peak voltage detector with the diode D_1 automatically subtracting the voltage V_F. To use the circuit, the "cal" button is pushed and R_3 is adjusted to make the current meter M_1 read full scale. The "cal" button then is released and the value of η is read directly from the meter, with $\eta = 1$ corresponding to full scale deflection of 100 μA.

D_1 1N457, or equivalent, with the following characteristics:
$V_F = 0.565$ V at $I_F = 50$ μA,
$I_R \leq 2$ μA at $V_R = 20$ V

FIGURE 1 — TEST CIRCUIT FOR INTRINSIC STANDOFF RATIO (η)

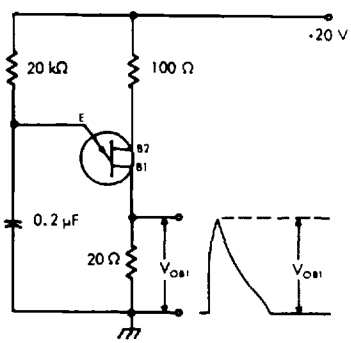


FIGURE 2 — V_{OB1} TEST CIRCUIT

EMITTER—BASE-ONE VOLTAGE vs EMITTER CURRENT

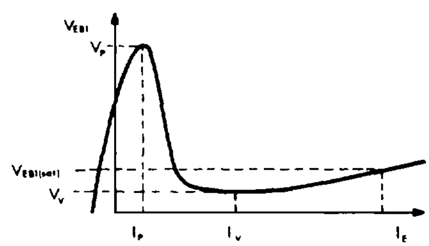


FIGURE 3 — GENERAL STATIC EMITTER CHARACTERISTIC CURVE

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