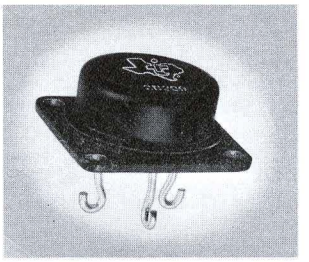
TYPES 2N389 and 2N424
N-P-N DIFFUSED JUNCTION SILICON POWER TRANSISTORS

TYPES 2N389, 2N424
BULLETIN No. DL-S 962, AUGUST, 1958
REPLACES BULLETINS No. DL-S 769, AUGUST, 1957 and DL-S 790, JULY, 1957

85 watts at 25°C with infinite heat sink

Minimum beta of 8 at −55°C
−65°C to +200°C operating and storage range
Temperature stabilized at 215°C



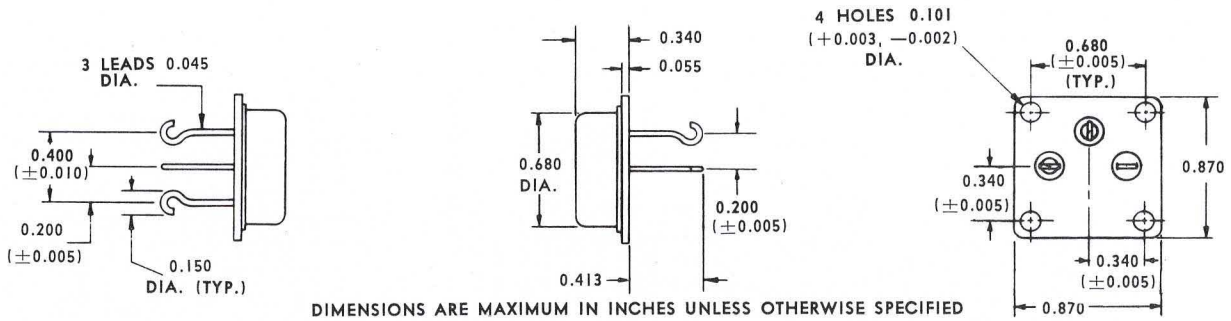
qualification testing

Each unit is heat cycled from −65°C to +175°C for ten cycles, and then the hermetic seal is tested by subjecting immersed units to hydraulic pressure. Each unit is thoroughly tested to determine the electrical design characteristics. Production samples are life tested periodically to determine the effects of storage and dissipation and ensure maximum attainable reliability.

mechanical data

To assure maximum reliability, stability and long life, the case is hermetically sealed by a proven projection welding technique and is designed to meet the stringent requirements of MIL-T-19500. Four mounting holes in the base provide means for mounting the unit, with good thermal contact, to an external heat sink. Each unit has a metal case with glass-to-metal seal between case and leads. Approximate weight is 12 grams.

THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE CASE



DIMENSIONS ARE MAXIMUM IN INCHES UNLESS OTHERWISE SPECIFIED

maximum ratings

Collector voltage referred to emitter at 25°C . . . . . (Breakdown voltages are indicated below)
Total dissipation at 25°C (case temperature)* . . . . . 85 W
Total dissipation at 100°C (case temperature)* . . . . . 45 W
Junction temperature (maximum range) . . . . . −65°C to +200°C

* Derate 0.485 W/°C increase in case temperature within range of 25°C to 200°C

maximum and minimum design characteristics at T_c = 25°C (except as indicated)

PARAMETER	TEST CONDITIONS	2N389		2N424		unit
		min.	max.	min.	max.	
BV_{CER} Breakdown Voltage	I_C = 10mA, R_{BE} = 33	60	—	80	—	Volt
BV_{EBO} Breakdown Voltage	I_E = 10mA, I_C = 0	10	—	10	—	Volt
I_{CER} Collector Cutoff Current	T_C = 100°C, V_{CE} = 60V, R_{BE} = 33	—	10	—	10	mA
I_C Collector Current †	V_{BE} = 8V, V_{CE} = 15V	1.5	—	0.75	—	Amp
R_{CS} Saturation Resistance†	I_C = 1A, I_B = 0.2A	—	5	—	10	Ohm
h_{FE} Current Transfer Ratio†	I_C = 1A, V_{CE} = 15V	12	60	12	60	—
h_{FE} @−55°C †	I_C = 1A, V_{CE} = 15V	8	—	8	—	—

† Semiautomatic testing is facilitated by using pulse techniques to measure these parameters. A 300-microsecond pulse (approximately 2% duty cycle) is utilized. Thus, the unit can be tested under maximum current conditions without a significant increase in junction temperature, even though no heat sink is used. The parameter values obtained in this manner are particularly pertinent for switching circuit design and, in general, indicate the true capabilities of the device.

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TYPICAL CHARACTERISTICS

(AS INDICATED)

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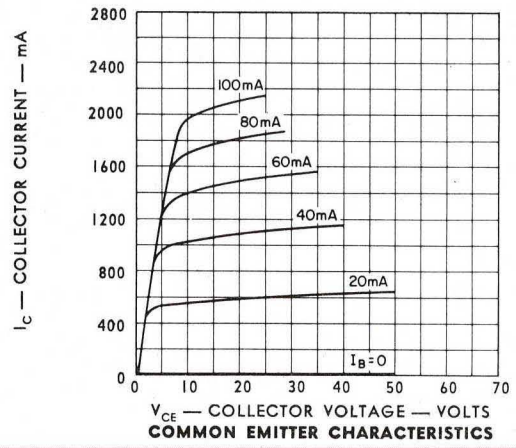
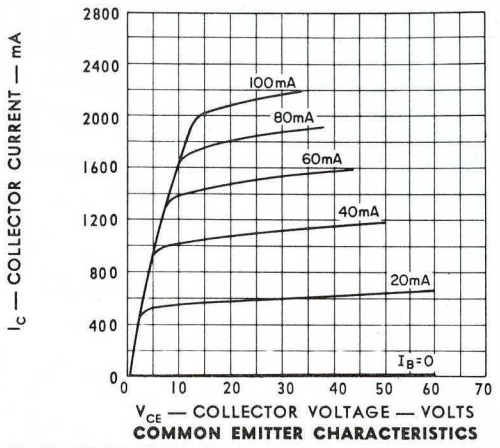


COMMON EMITTER CHARACTERISTICS

TYPE 2N424



COMMON EMITTER CHARACTERISTICS

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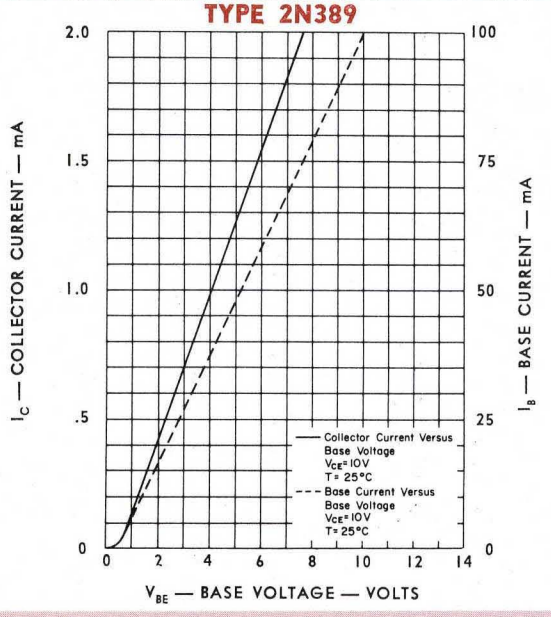
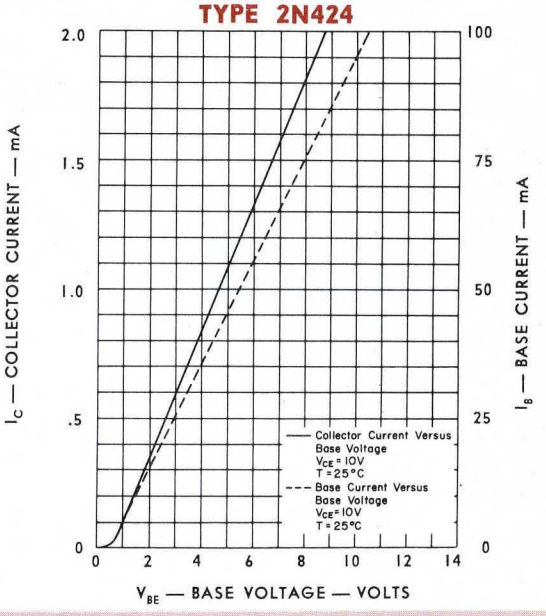


TYPE 2N424



typical design characteristics at $T_c = 25°C$

PARAMETER	TEST CONDITIONS	2N389	2N424	unit
H_{ie} Input Impedance	V_{CE}= 30V I_C = 0.3A I_c = 0.1a	75	75	ohm
H_{fe} Forward Current Gain	V_{CE}= 30V I_C = 0.3A I_c = 0.1a	30	30	—
H_{oe} Output Admittance	V_{CE}= 30V I_C = 0.3A V_{ce}= 10V	1000	1000	μmho
H_{re} Reverse Voltage Gain	V_{CE}= 30V I_C = 0.3A V_{ce}= 10V	0.003	0.003	—
h_{fe} Forward Current Gain @ 1 megacycle	V_{CE}= 30V I_C = 0.3A f = 1mc	8.5	6.0	—

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EXPLANATION OF CURVES:

1. The curves shown are based on extensive data. Individual units or small groups of units may not conform
2. All temperatures are ambient except where noted.

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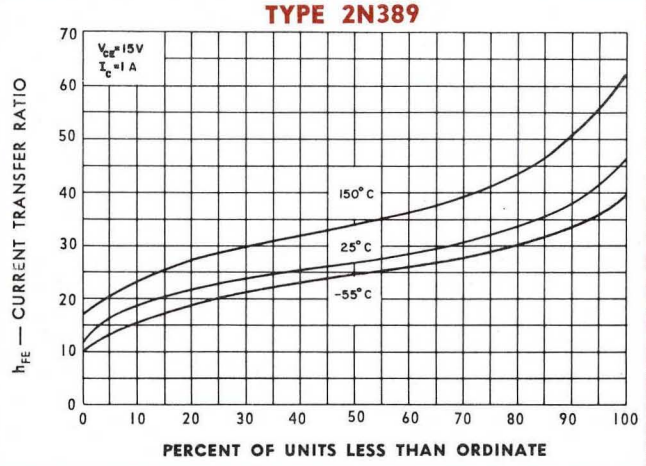

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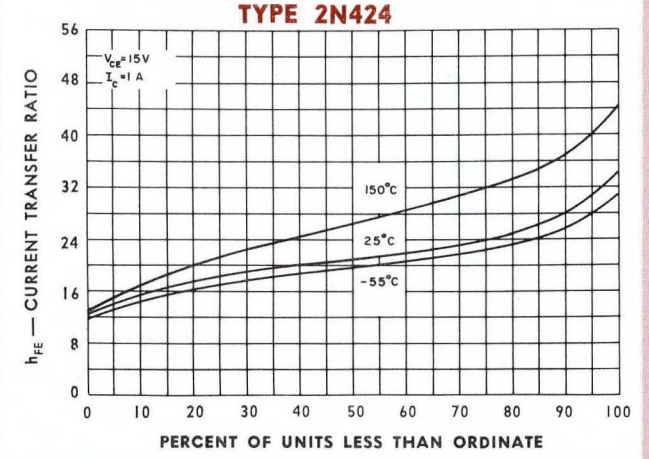

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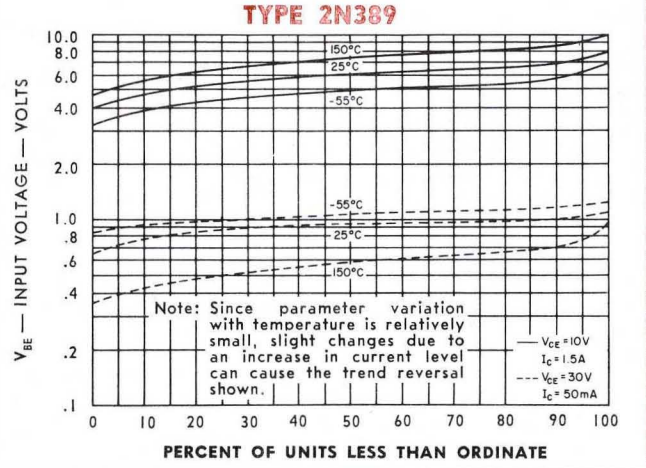

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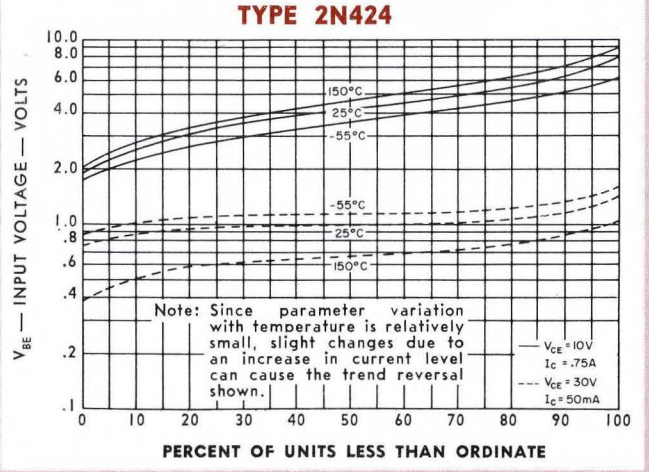

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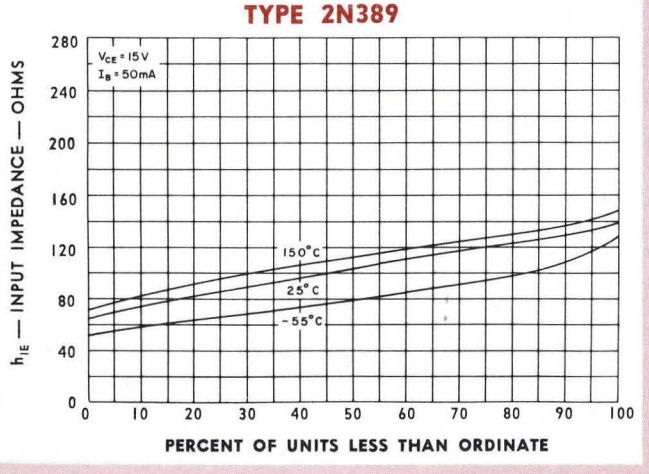

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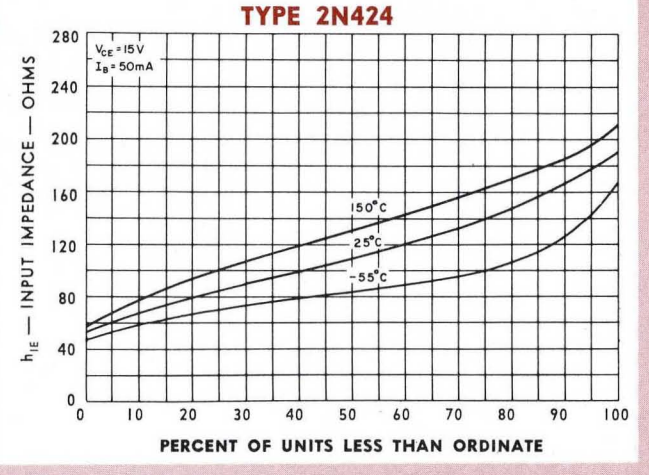

n exactly to the curves. Hence, these curves should be considered to be typical.

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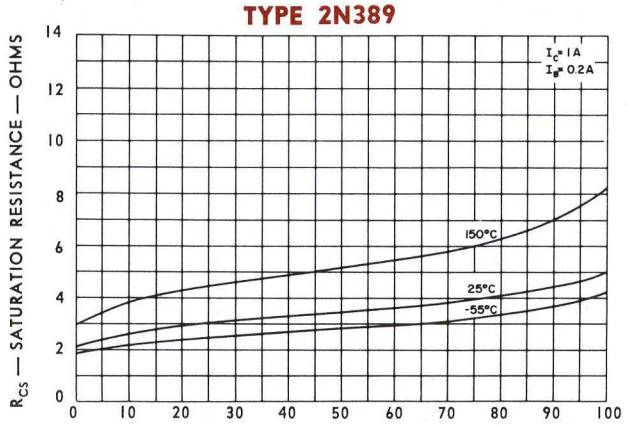

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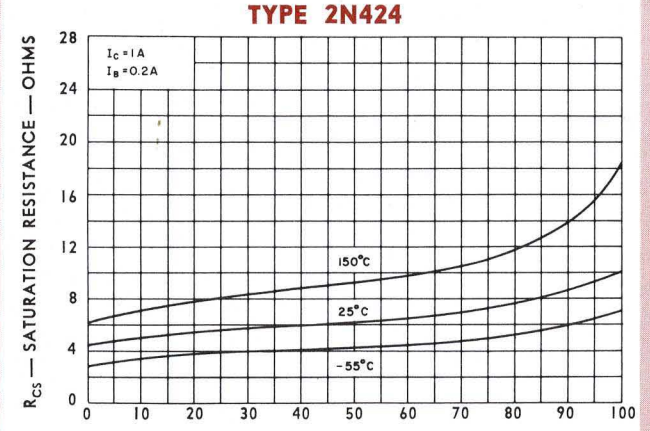
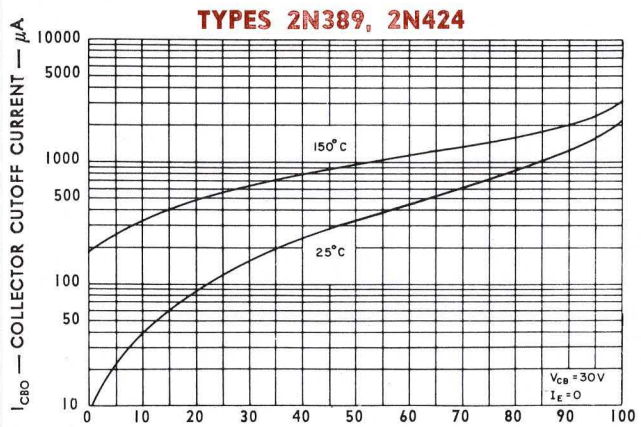


TYPES 2N389, 2N424



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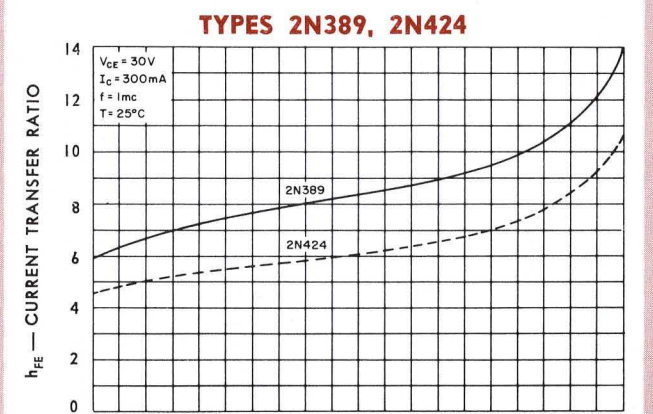

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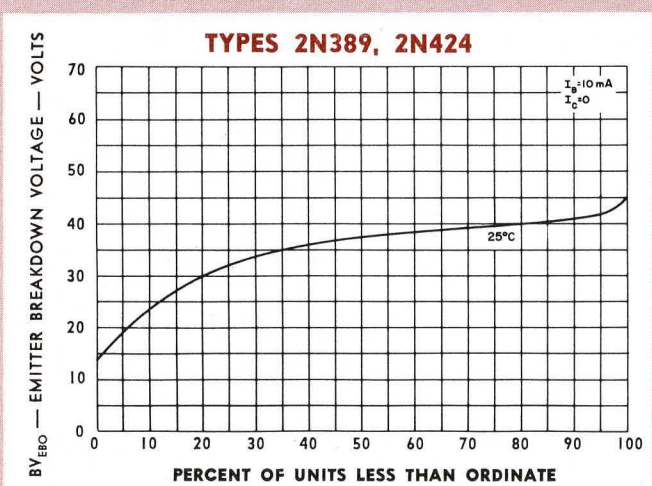

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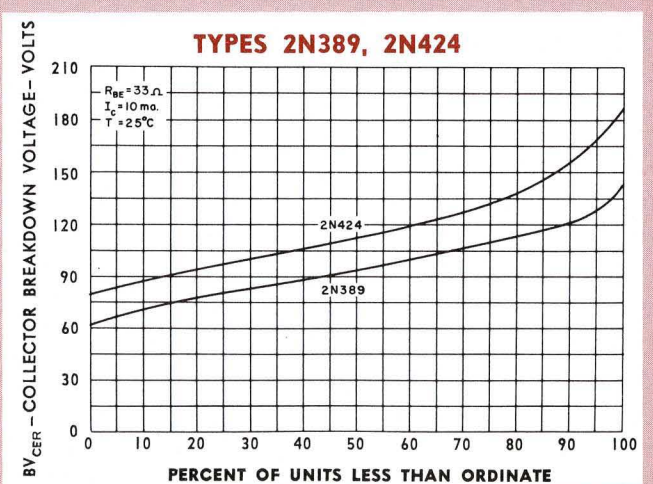

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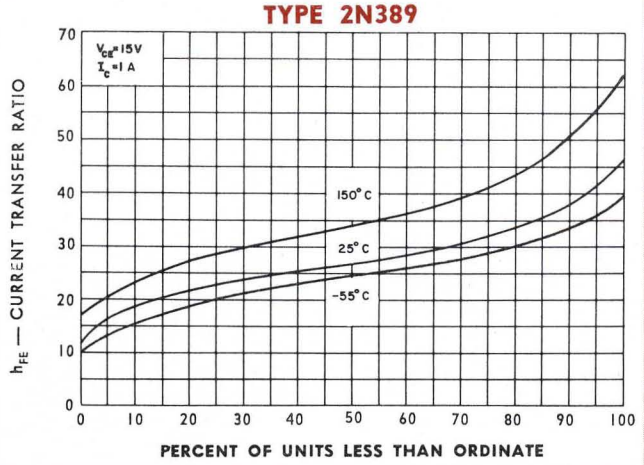

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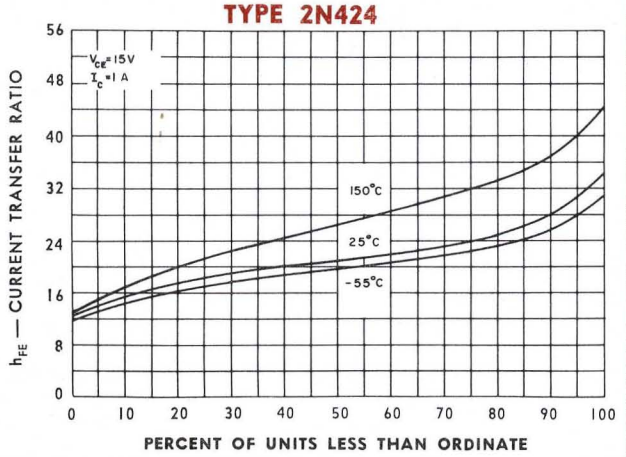

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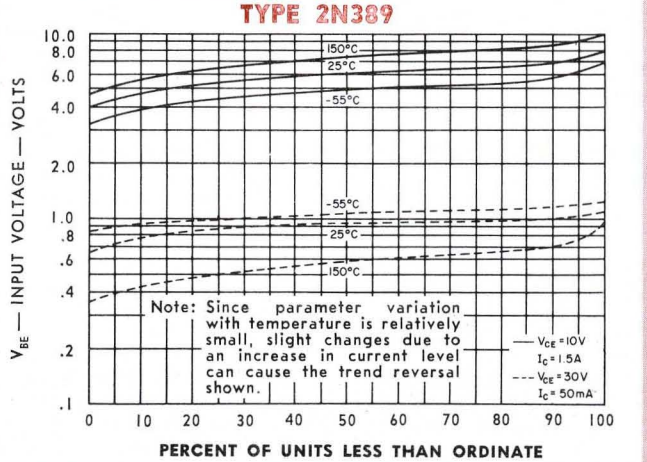

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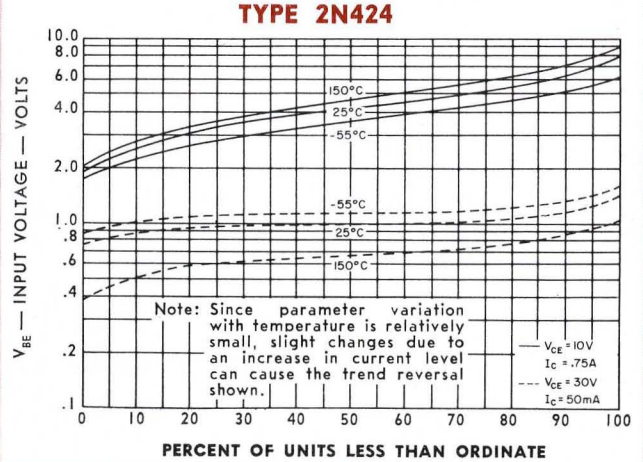

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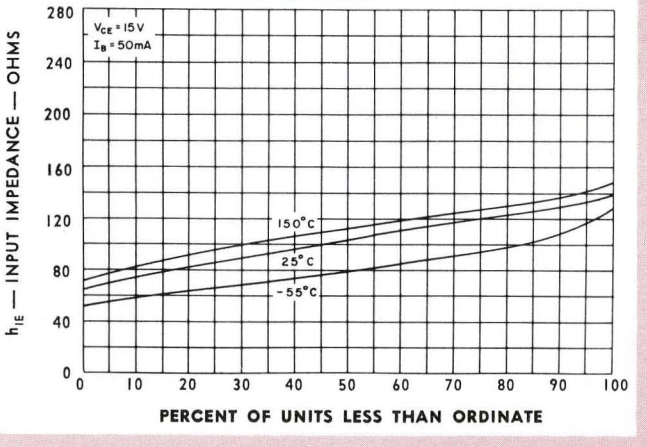

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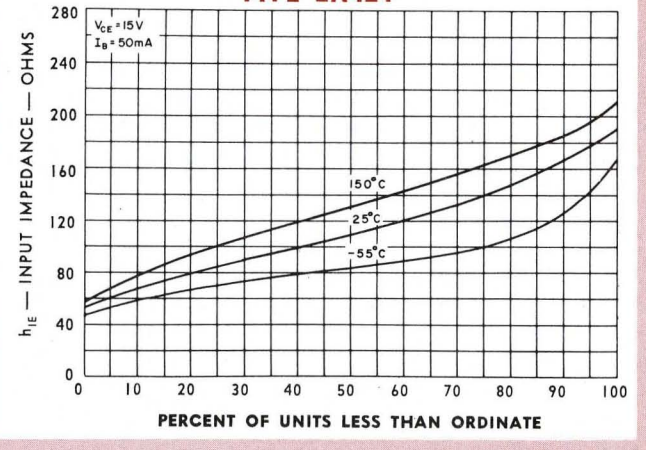

conform exactly to the curves. Hence, these curves should be considered to be typical.

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TYPICAL PRODUCTION DISTRIBUTIONS

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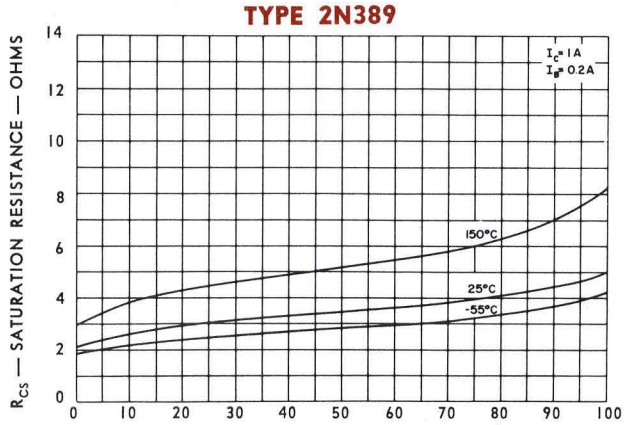

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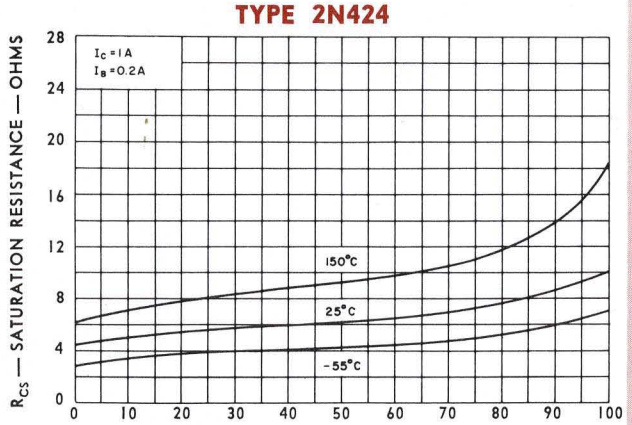

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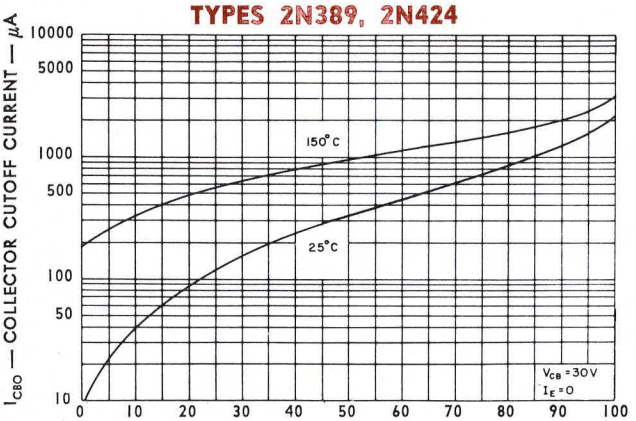

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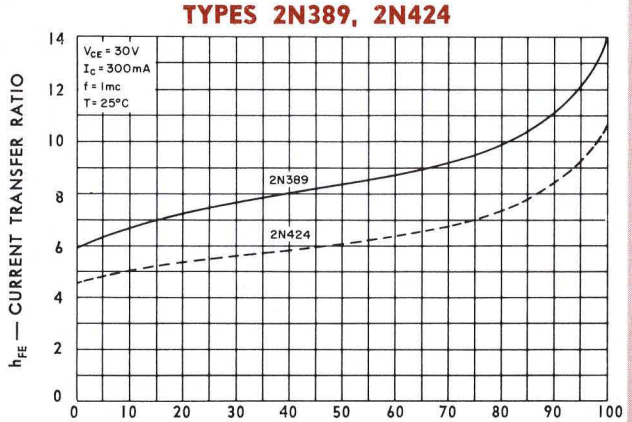

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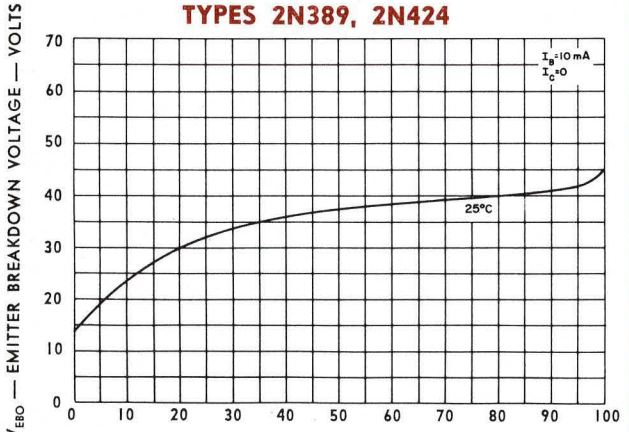

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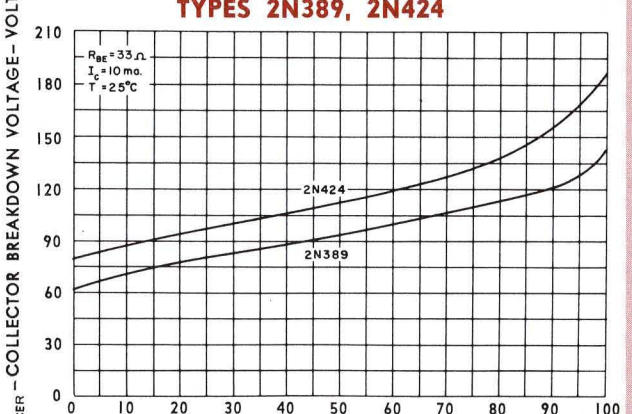

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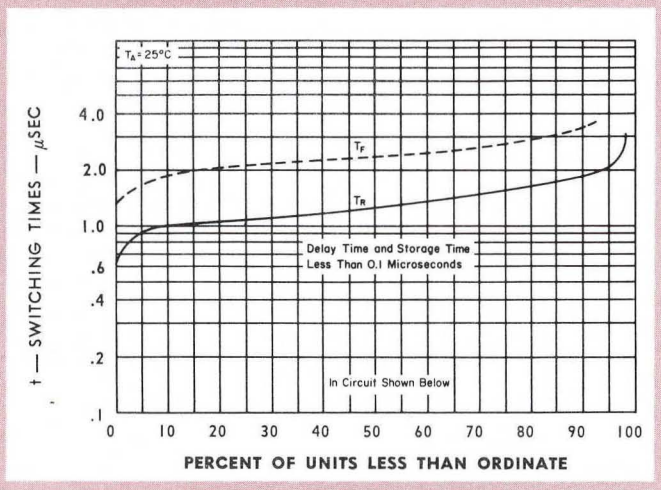
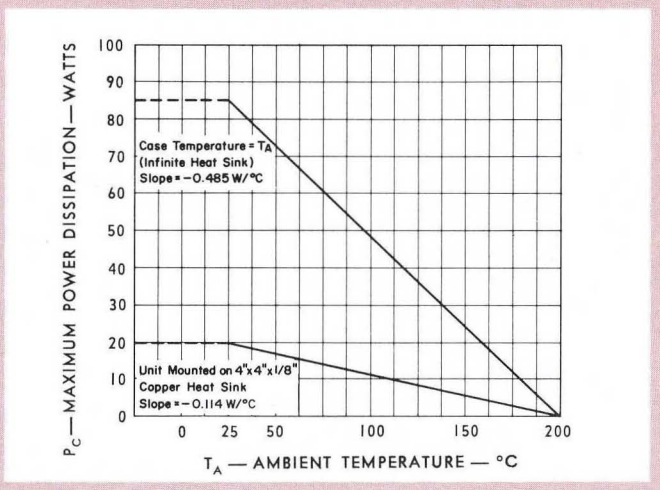
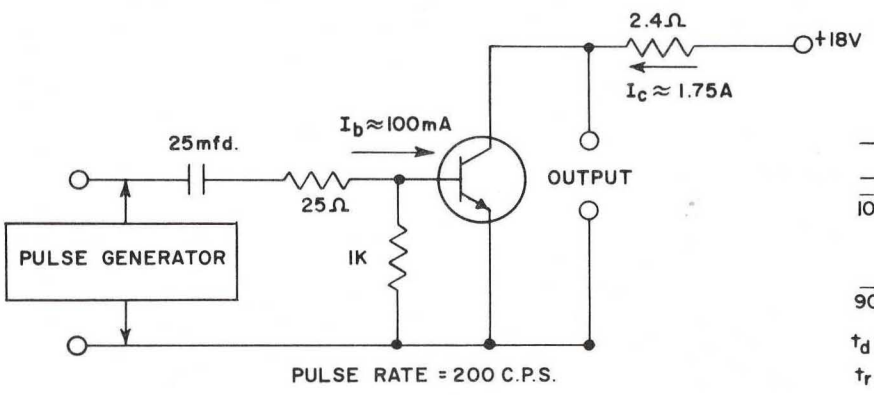
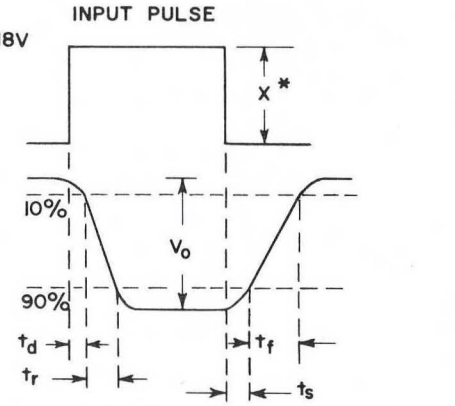




TYPICAL SATURATING TYPE SWITCHING CIRCUIT





*INPUT ADJUSTED UNTIL TRANSISTOR UNDER TEST JUST REACHES SATURATION

N-P-N DIFFUSED JUNCTION SILICON POWER TRANSISTORS

TYPES 2N389, 2N424

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