

# Silicon NPN Transistor

## **2N2016**

High Power Transistor

130V / 10A

# DATASHEET

OEM –RCA

Source: RCA Databook 1975

## Power Transistors

### 2N2015 2N2016

RCA 2N2015 and 2N2016 are diffused-junction power transistors of the silicon n-p-n type having very high power-dissipation capabilities (150 watts). The 2N2015 and 2N2016 are particularly useful in power-switching circuits such as those employed in dc-to-dc converters, inverters, choppers, and relay-control equipment. They are also extremely useful in oscillator, regulator, and pulse-amplifier circuits, and as class A and class B push-pull amplifiers for af and servo applications.

**Maximum Ratings, Absolute-Maximum Values:**

	2N2015	2N2016		
COLLECTOR-TO-BASE VOLTAGE.	100	130	max.	volts
COLLECTOR-TO-EMITTER VOLTAGE:				
With base open				
(Sustaining voltage)	50	65	max.	volts
EMITTER-TO-BASE VOLTAGE.	10	10	max.	volts
COLLECTOR CURRENT.	10	10	max.	amp
EMITTER CURRENT.	-13	-13	max.	amp
BASE CURRENT.	6	6	max.	amp
TRANSISTOR DISSIPATION: <sup>a</sup>				
At case temperatures				
up to 25° C.	150	150	max.	watts
At other case				
temperatures	See Fig. 1			
TEMPERATURE RANGE:				
Operating and Storage.	-65 to +200			°C
LEAD TEMPERATURE,				
1/16" ± 1/32" from case,				
for immersion in molten				
solder for 10 sec. max.	235	235	max.	°C

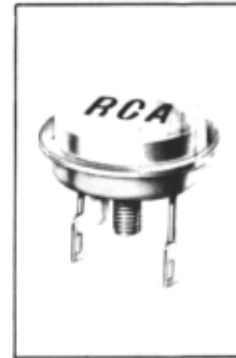
**Typical Characteristics of 2N2015 and 2N2016 at a Case Temperature<sup>c</sup> of 25° C:**

Collector-to-Base Capacitance, C <sub>ob</sub> :	
(V <sub>CB</sub> = 40 volts)	400 μf
Thermal Time Constant, τ <sub>1</sub> .	30 msec
Forward Current-Transfer-Ratio	
Cutoff Frequency, f <sub>αe</sub> .	25 Kc

**TERMINAL CONNECTIONS**

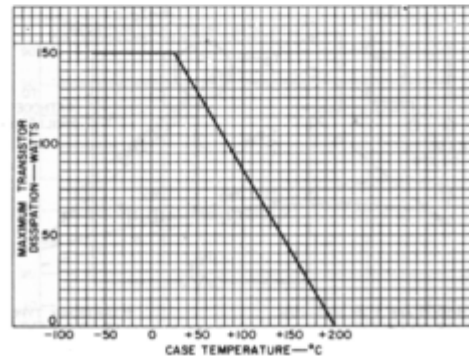
- Lead 1 — Emitter
- Lead 2 — Collector, Case
- Lead 3 — Base

**High-Power Types for Military and Industrial Applications**



JEDEC TO-36

- for operation at high junction temperatures — up to 200° C
- very high dissipation rating — 150 watts
- very low thermal resistance, junction-to-case — 1.17° C/Watt
- very low saturation resistance — 0.25 ohm max. at I<sub>C</sub> = 5 amp, I<sub>B</sub> = 0.5 amp
- JEDEC TO-36 single-ended stud-type package with cold-weld hermetic seals



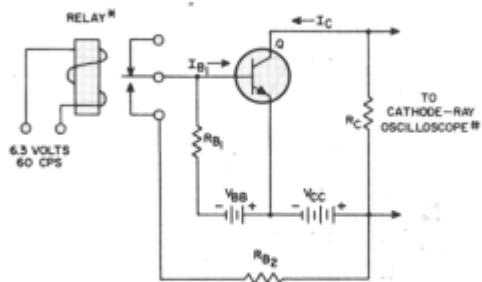
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Fig. 1 — Rating Chart for Types 2N2015 and 2N2016.

**ELECTRICAL CHARACTERISTICS**

Case temperature = 25° C unless otherwise specified.

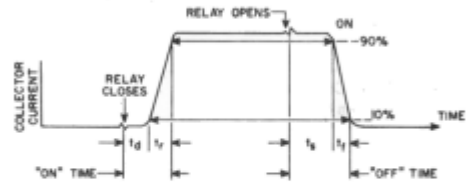
Characteristic	Symbol	TEST CONDITIONS					LIMITS				Units
		DC Collector-to-Base Voltage	DC Collector-to-Emitter Voltage	DC Emitter-to-Base Voltage	DC Collector Current	DC Base Current	Type 2N2015		Type 2N2016		
		$V_{CB}$	$V_{CE}$	$V_{EB}$	$I_C$	$I_B$	Min.	Max.	Min.	Max.	
Collector-Cutoff Current ( $I_E=0$ ) at case temperature of: 25° C 150° C	$I_{CBO}$	30 30					-	50	-	50	$\mu A$ mA
Emitter-Cutoff Current	$I_{EBO}$			10			-	50	-	50	$\mu A$
DC Forward-Current Transfer Ratio	$h_{FE}$		4 4		5 10		15 7.5	50	15 7.5	50	
Collector-to-Emitter Saturation Resistance	$R_s$				5	0.5	-	0.25	-	0.25	ohm
Base-to-Emitter Voltage	$V_{BE}$		4		5		-	2.2	-	2.2	volt
Collector-to-Emitter Voltage: Sustaining voltage with base open	$V_{CE0}$ (sus)				0.2	0	-	50	-	65	volt
With reverse bias between emitter and base	$V_{CEX}$			1.5	2 mA		-	100	-	130	volt
Thermal Resistance Junction-to-case	$R_T$						-	1.17	-	1.17	°C/W



\*C.P. CLARE TYPE H9P-1028 OR EQUIVALENT

\*\* TEKTRONIX TYPE 545 OR EQUIVALENT

- Collector Supply Voltage ( $V_{CC}$ ) . . . . . 24 volts
- DC Base Bias Voltage ( $V_{BB}$ ) . . . . . 6 volts
- \*On\* DC Collector Current . . . . . 10 amperes
- \*Turn-On\* Base Current ( $I_{B1}$ ) . . . . . 2 amperes



\*ON\* TIME, DELAY TIME ( $t_d$ ) + RISE TIME ( $t_r$ ) . . . . . 4  $\mu$ sec  
 \*OFF\* TIME, STORAGE TIME ( $t_s$ ) + FALL TIME ( $t_f$ ) . . . . . 7  $\mu$ sec

- Base Resistance ( $R_{B1}$ ) . . . . . 10 ohms
- Base Resistance ( $R_{B2}$ ) . . . . . 10 ohms
- Collector Resistance ( $R_C$ ) . . . . . 2 ohms
- Switching Time:
  - \*On\* Time [Delay time ( $t_d$ ) + Rise time ( $t_r$ )] . . . . . 4  $\mu$ sec
  - \*Off\* Time [Storage time ( $t_s$ ) + Fall time ( $t_f$ )] . . . . . 7  $\mu$ sec

Fig. 2 - Pulse-Response Test Circuit for Types 2N2015 and 2N2016.

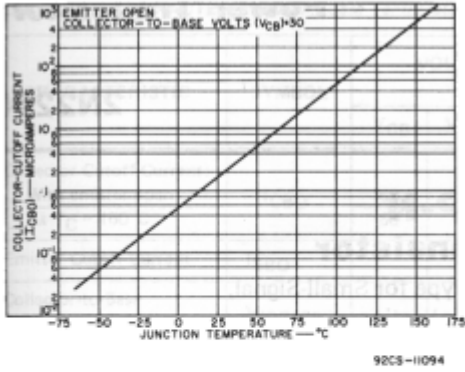


Fig. 3 - Typical Operation Characteristic for Types 2N2015 and 2N2016.

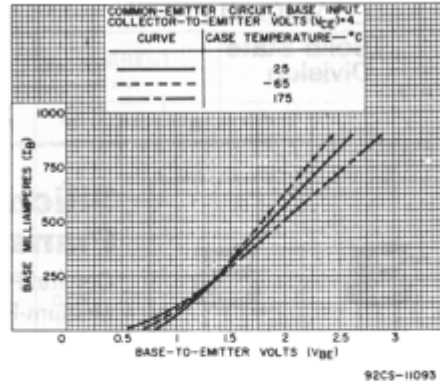


Fig. 5 - Typical Input Characteristics for Types 2N2015 and 2N2016.

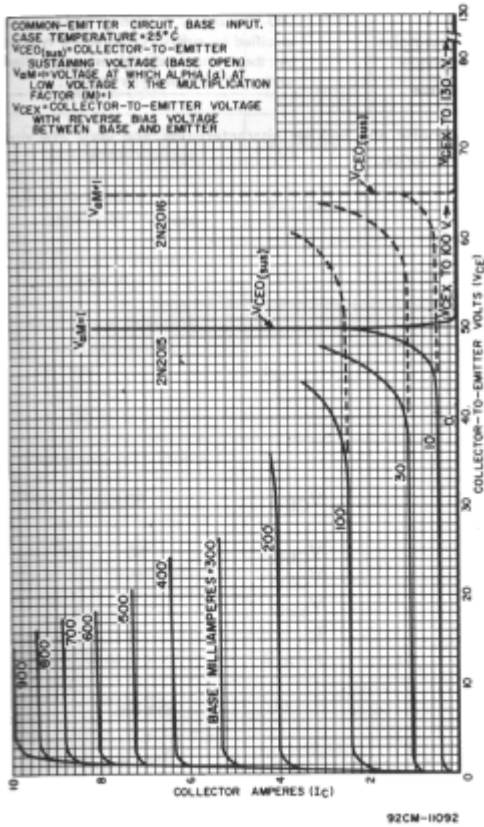


Fig. 4 - Typical Collector Characteristics for Types 2N2015 and 2N2016.

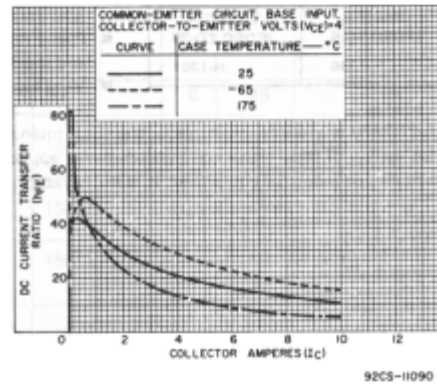


Fig. 6 - Typical Operation Characteristics for Types 2N2015 and 2N2016.

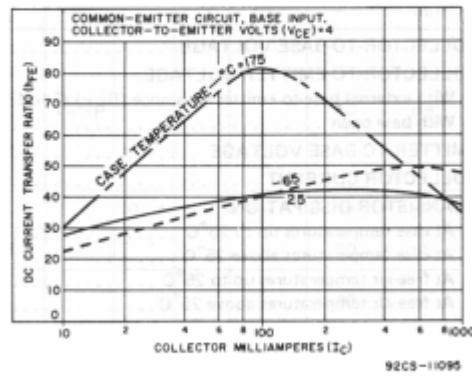


Fig. 7 - Typical Operation Characteristics for Types 2N2015 and 2N2016.