



Power Transistors

**40346 40346V1 40346V2
40412 40412V1 40412V2**

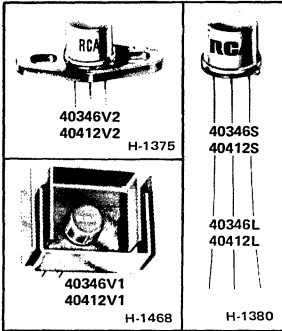
Medium-Power Silicon N-P-N Planar Transistors

For High-Voltage Switching and
Linear-Amplifier Applications

Features:

- For operation at junction temperature up to 200°C
- Planar construction for low noise and low leakage

These devices are available with either 1/8-inch leads (TO-5 package) or 1/4-inch leads (TO-39 package). The longer-lead versions are specified by suffix "L" after the type number; the shorter-lead versions are specified by suffix "S" after the type number.



RCA-40346, -40346V1, -40346V2, -40412, -40412V1, and -40412V2 are silicon n-p-n transistors having high breakdown voltages, high frequency-response capability, and fast switching speeds.

These transistors are intended for a wide variety of low- and medium-power, high-voltage applications. Types 40346, 40346V1, and 40346V2 are especially useful in such devices as neon indicator and NIXIE* driver circuits and in differential and operational amplifiers. Types 40412, 40412V1, and 40412V2 are especially suited for class-A ac/dc audio-amplifier service.

Types 40346 and 40412 are supplied in a JEDEC TO-39 (S) or TO-5 (L) package; types 40346V1 and 40412V1, with a factory-attached heat radiator for greater free-air dissipation, capability; and types 40346V2 and 40412V2 are supplied with an attached flange for increased power dissipation and mounting convenience.

* Nixie is a Registered Trademark of Burroughs Corporation, Electronic Components Division, Plainfield, N. J.

MAXIMUM RATINGS, Absolute-Maximum Values:

	40346	40346V1	40346V2	40412	40412V1	40412V2
COLLECTOR-TO-EMITTER VOLTAGE: $V_{CE}(sus)$						
With $R_{BE} = 1,000 \Omega$	175	175	175	—	—	— V
With $R_{BE} = 10,000 \Omega$	—	—	—	250	250	250 V
COLLECTOR CURRENT: I_C	1	1	1	1	1	1 A
BASE CURRENT: I_B	0.5	0.5	0.5	0.5	0.5	0.5 A
TRANSISTOR DISSIPATION: P_T						
At case temperatures up to 25°C	10	—	10	10	—	10 W
At free-air temperatures up to 50°C	1	—	—	1	—	— W
At free-air temperatures up to 25°C	—	4	—	—	4	— W
At other temperatures	← See Fig. 1 →					
TEMPERATURE RANGE:						
Storage and Operating	← -65 to +200 → °C					

ELECTRICAL CHARACTERISTICS, Case Temperature (T_C) = 25°C, Unless Otherwise Specified

CHARACTERISTICS	SYMBOL	VOLTAGE		CURRENT	LIMITS								UNITS	
		V dc			mA dc	40346		40346V1		40412		40412V1		
		V_{CE}	V_{EB}	I_C	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
Collector-Cutoff Current: With base open With $R = 10,000$ ohms With base reverse-biased: $T_C = 25^\circ\text{C}$ $T_C = 150^\circ\text{C}$ $T_C = 150^\circ\text{C}$	I_{CEO}	100	—	—	—	5	—	5	—	—	—	—	μA	
	I_{CER}	100	—	—	—	—	—	—	—	1	—	1	mA	
	I_{CEV}	200	1.5	—	—	10	—	10	—	—	—	—	μA	
	I_{CEV}	200	1.5	—	—	1	—	1	—	—	—	—	mA	
	I_{CEV}	150	1.5	—	—	—	—	—	—	—	2	—	2	mA
Emitter-Cutoff Current	I_{EBO}	—	4	—	—	5	—	5	—	—	—	—	μA	
	I_{EBO}	—	3	—	—	—	—	—	—	100	—	100	μA	
Collector-To-Emitter Sustaining Voltage: With external base-to-emitter resistance $R_{BE} = 1,000$ ohms $R_{BE} = 10,000$ ohms	$V_{CER(sus)}$	—	—	50	175	—	175	—	—	—	—	—	V	
	$V_{CER(sus)}$	—	—	50	—	—	—	—	250	—	250	—	V	
Collector-To-Emitter Saturation Voltage: $I_B = 1$ mA	$V_{CE(sat)}$	—	—	10	—	0.5	—	0.5	—	—	—	—	V	
Base-To-Emitter Voltage	V_{BE}	10	—	10	—	1	—	1	—	—	—	—	V	
Second-Breakdown Current	$I_{S/b}$	200	—	—	—	—	—	—	—	50	—	50	mA	
DC Forward-Current Transfer Ratio	h_{FE}	10	—	10	25	—	25	—	—	—	—	—		
	h_{FE}	20	—	30	—	—	—	—	40	—	40	—		
Small-Signal Forward- Current Transfer Ratio: $f = 5$ MHz	h_{fe}	10	—	10	2	—	2	—	2	—	2	—		
Output Capacitance: $V_{CB} = 10$ V, $f = 1$ MHz	C_{ob}	—	—	—	—	—	—	—	—	—	10	—	10	pF
Thermal Resistance: Junction-to-case Junction-to-free air	$R_{\theta JC}$	—	—	—	—	—	15	—	—	—	15	—	—	$^\circ\text{C/W}$
	$R_{\theta JFA}$	—	—	—	—	—	—	—	45	—	—	—	45	$^\circ\text{C/W}$

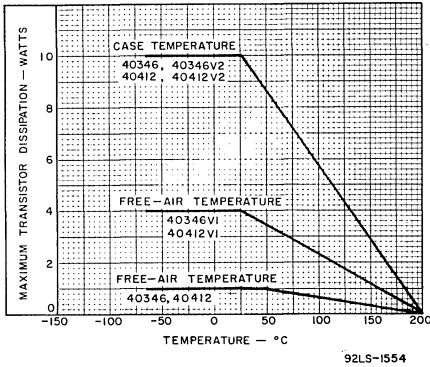


Fig. 1 - Dissipation derating curves.

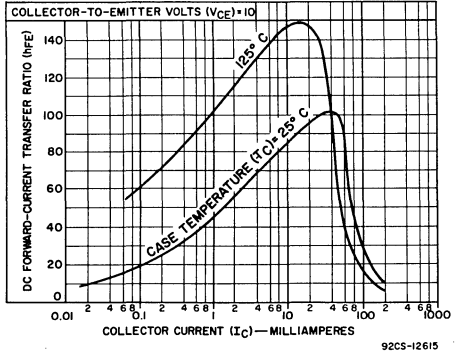


Fig. 2 - Typical dc-beta characteristics for all types.

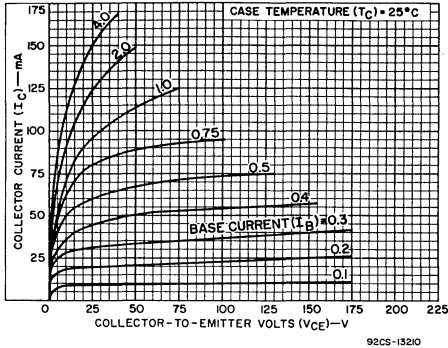


Fig. 3 - Typical output characteristics for all types.

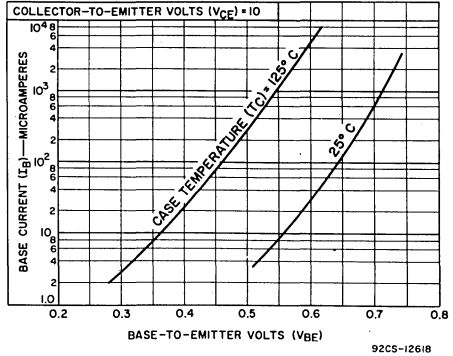


Fig. 4 - Typical input characteristics for all types.

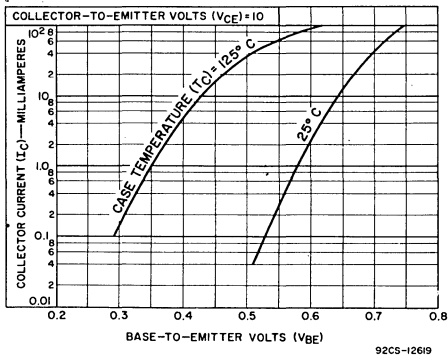


Fig. 5 - Typical transfer characteristics for all types.

**TERMINAL CONNECTIONS
FOR 40346 AND 40412**

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

**TERMINAL CONNECTIONS
FOR 40346V1 AND 40412V1**

- Lead 1 - Emitter
- Lead 2 - Base
- Heat Radiator, Lead 3 - Collector

**TERMINAL CONNECTIONS
FOR 40346V2 AND 40412V2**

- Lead 1 - Emitter
- Lead 2 - Base
- Flange, Lead 3 - Collector