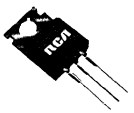
RCA
Solid State
Division

Power Transistors

2N6477
2N6478



JEDEC TO-220AB H-1535R1

Hometaxial-Base, Medium-Power Silicon N-P-N Transistors

Rugged Devices for Intermediate Power Applications in Industrial and Commercial Equipment

Features:

- Maximum safe-area-of-operation curves for dc and pulse operation
- High voltage ratings
- Low saturation voltages
- Thermal-cycling rating curves

Applications:

- Series and shunt regulators
- High-fidelity amplifiers
- Power switching circuits
- Solenoid drivers
- Vertical output stages in color and B/W TV

RCA 2N6477 and 2N6478▲ are hometaxial-base silicon n-p-n transistors intended for a wide variety of medium-to-high power, high-voltage applications. These devices, which are voltage extensions of the 2N5298 family, are especially useful in vertical output stages in color and black-and-white TV. The units differ in voltage ratings and in the currents at which parameters are controlled.

The 2N6477 and 2N6478 are supplied in the JEDEC TO-220AB straight-lead version of the package. They are also available on special order in a variety of lead-form configurations. Two popular variations have leads formed to fit TO-66 sockets (specify formed lead No. 6201) or printed-circuit boards (specify formed lead No. 6207). Detailed information on these and other VERSAWATT outlines is contained in "RCA's Line-up of Power Transistors" (PSP-704).

▲ Formerly RCA Dev. Nos. TA8405 and TA8343.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		2N6477	2N6478	
*COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	140	160	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:				
With base open	$V_{CEO(sus)}$	120	140	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$	130	150	V
* With base reverse-biased (V_{BE} = −1.5 V)	$V_{CEV(sus)}$	140	160	V
*EMITTER-TO-BASE VOLTAGE	V_{EBO}	5	5	V
*CONTINUOUS COLLECTOR CURRENT	I_C	2.5	2.5	A
PEAK COLLECTOR CURRENT		4	4	A
*CONTINUOUS BASE CURRENT	I_B	1	1	A
TRANSISTOR DISSIPATION:	P_T			
* At case temperature up to 25°C		50	50	W
* At case temperatures above 25°C		See Fig. 2		
At ambient temperatures up to 25°C		1.8	1.8	W
At ambient temperatures above 25°C		Derate linearly at 0.0144		W/°C
*TEMPERATURE RANGE:				
Storage and Operating (Junction)		−65 to 150		°C
*PIN TEMPERATURE (During Soldering):				
At distances ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max.		235		°C

*In accordance with JEDEC registration data format JS-6 RDF-2.

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C unless otherwise specified*

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS				UNITS
			VOLTAGE V dc		CURRENT A dc		2N6477		2N6478		
			V_{CE}	V_{BE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	
*	Collector-Cutoff Current:										
	With base open	I_{CEO}	80			0	–	2	–	–	mA
			100			0	–	–	–	2	
	With base-emitter junction reverse-biased	I_{CEV}	130	−1.5			–	2	–	–	
			150	−1.5			–	–	–	2	
	At T_C = 150°C	I_{CEV}	120	−1.5			–	10	–	–	
			140	−1.5			–	–	–	10	
*	Emitter-Cutoff Current	I_{EBO}		−5	0		–	2	–	2	mA
	Collector-to-Emitter Sustaining Voltage:										
*	With base open	$V_{CEO}(sus)$			0.1[a]	0	120	–	140	–	V
	With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER}(sus)$			0.1[a]		130	–	150	–	
	With base-emitter junction reverse-biased	$V_{CEV}(sus)$		−1.5	0.1[a]		140	–	160	–	
*	DC Forward-Current Transfer Ratio	h_{FE}	4		1[a]		25	150	25	150	
			4		2.5[a]		5	–	5	–	
*	Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$			1[a]	0.1	–	1	–	1	V
					2.5[a]	0.5	–	2	–	2	
*	Base-to-Emitter Voltage	V_{BE}	4		1[a]		–	1.8	–	1.8	V
			4		2.5[a]		–	3	–	3	
*	Magnitude of Common-Emitter, Small-Signal, Short-Circuit Forward-Current Transfer Ratio: f = 40 kHz	$\lvert h_{fe} \rvert$	4		0.5		5	–	5	–	
	Gain-Bandwidth Product	f_T	4		0.5		200	–	200	–	kHz
*	Common-Emitter, Small-Signal, Short-Circuit Forward-Current Transfer Ratio: f = 1 kHz	h_{fe}	4		0.1		25	–	25	–	
	Thermal Resistance:										
	Junction-to-Case	$R\theta_{JC}$					–	2.5	–	2.5	°C/W
	Junction-to-Ambient	$R\theta_{JC}$					–	70	–	70	

* In accordance with JEDEC registration data format (JS-6 RDF-2).

[a] Pulsed: Pulse duration = 300 μs, duty factor = 1.8%.

CAUTION: The sustaining voltage $V_{CEO}(sus)$, $V_{CER}(sus)$, and $V_{CEV}(sus)$ MUST NOT be measured on a curve tracer. These sustaining voltages should be measured by means of the test circuit shown in Fig. 10.

TERMINAL CONNECTIONS

JEDEC TO-220AB

Terminal No.1 — Base
Terminal No. 2 — Collector
Terminal No. 3 — Emitter
Terminal No. 4 — Collector

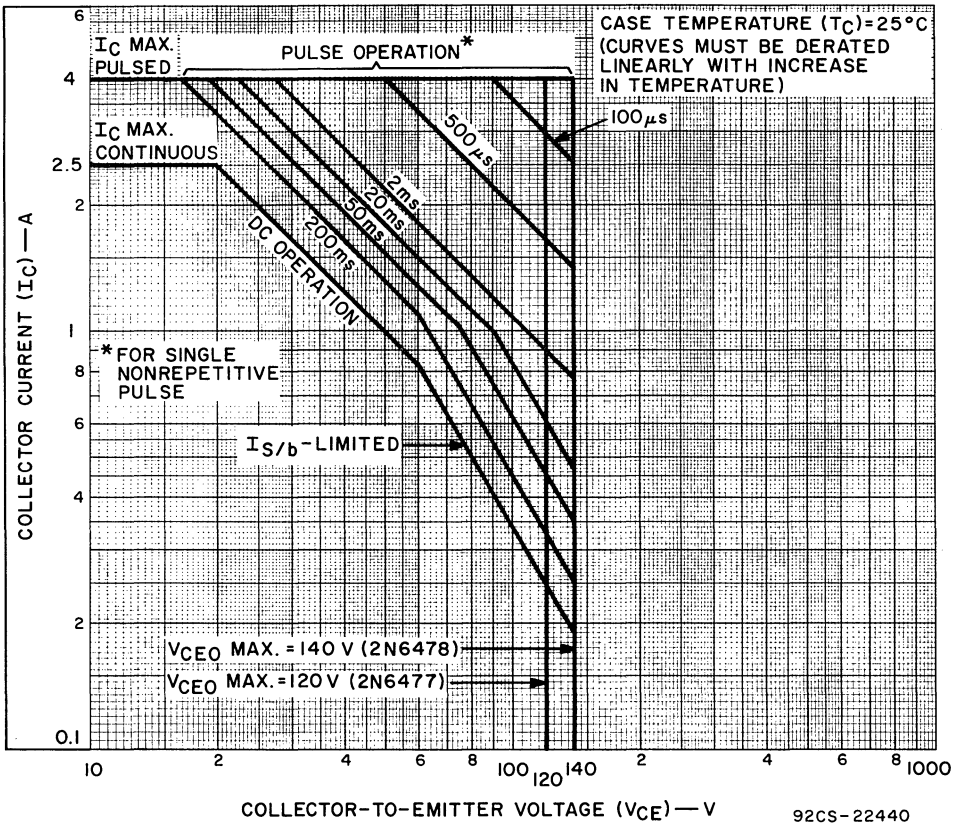


Fig.1 – Maximum operating areas for both types.

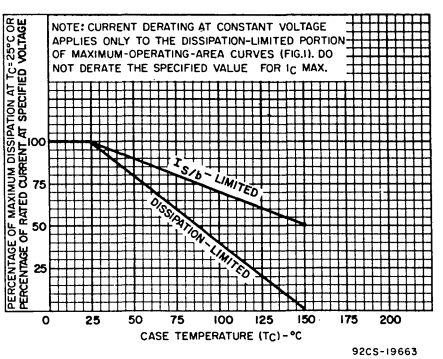


Fig.2 – Current derating curve for both types.

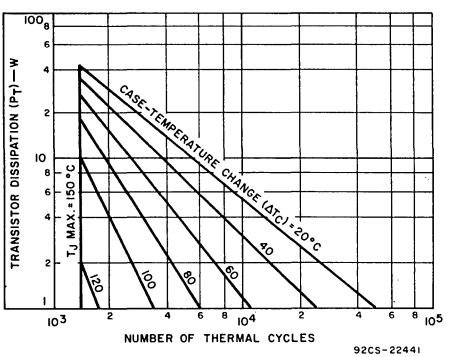


Fig.3 – Thermal-cycling rating chart for both types.

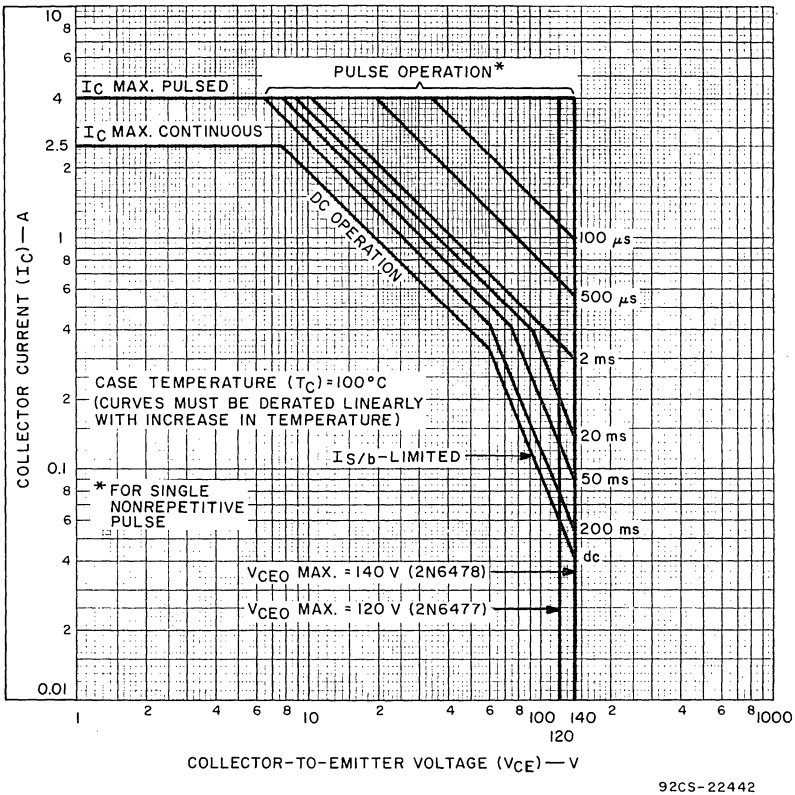


Fig.4 — Maximum operating areas for both types.

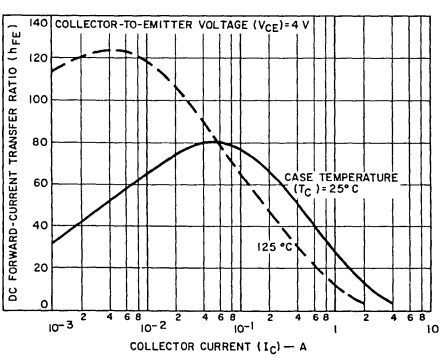


Fig.5 — Typical dc beta characteristics for 2N6477.

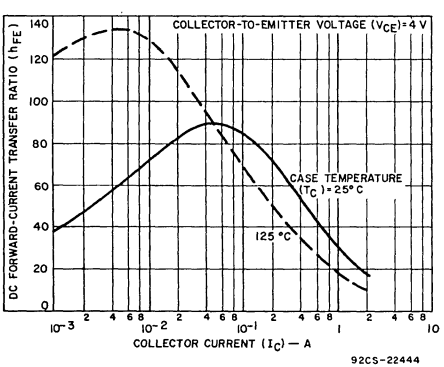


Fig.6 — Typical dc beta characteritics for 2N6478.

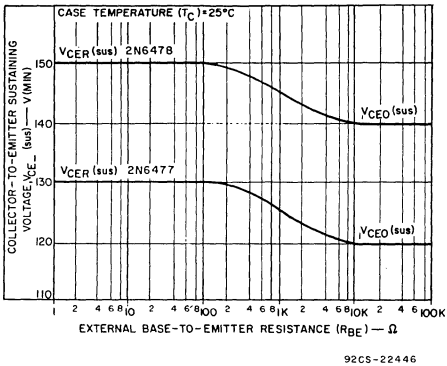


Fig.7 – Sustaining voltage vs. base-to-emitter resistance for both types.

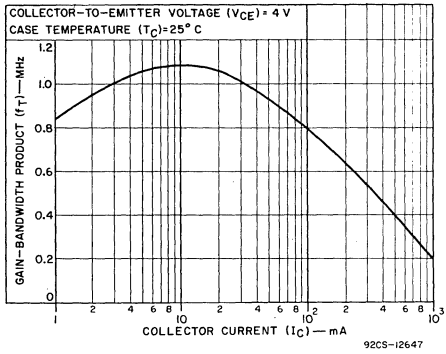


Fig.8 – Typical gain-bandwidth product for both types.

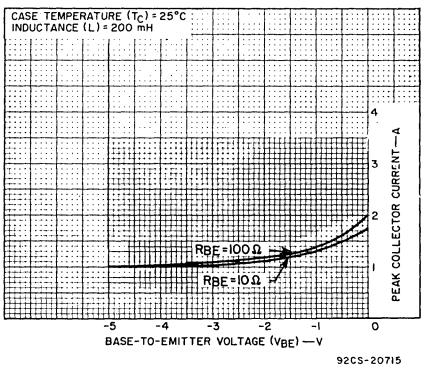


Fig.9 – Minimum reverse-bias second-breakdown characteristics for both types.

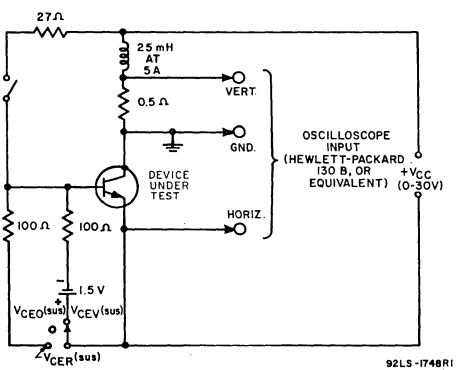
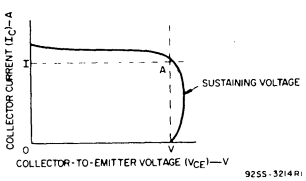


Fig.10 – Circuit used to measure sustaining voltages, V_{CEO}(sus), V_{CER}(sus), and V_{CEV}(sus) for both types.



Note:
The sustaining voltage, V_{CEO}(sus), V_{CER}(sus), or V_{CEV}(sus) is acceptable when the trace falls to the right and above point "A" for all types. (For values of current and voltage, see *Electrical Characteristics*)

Fig.11 – Oscilloscope display for measurement of sustaining voltages (test circuit shown in Fig. 10).

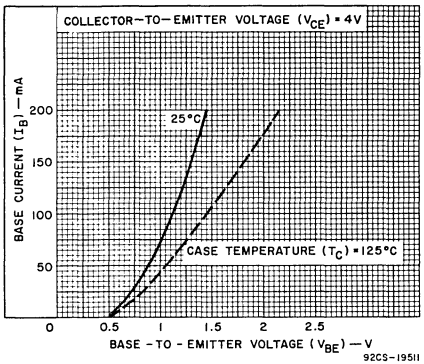


Fig. 12 – Typical input characteristics for 2N6477.

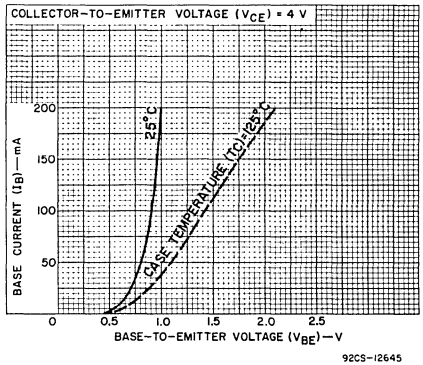


Fig. 13 – Typical input characteristics for 2N6478.

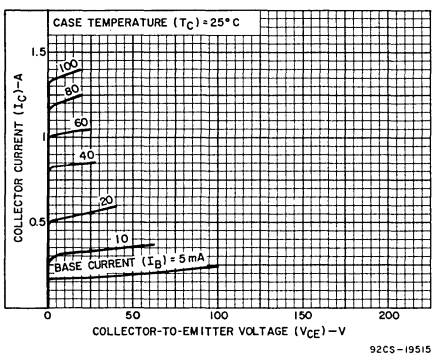


Fig. 14 – Typical output characteristics for 2N6477.

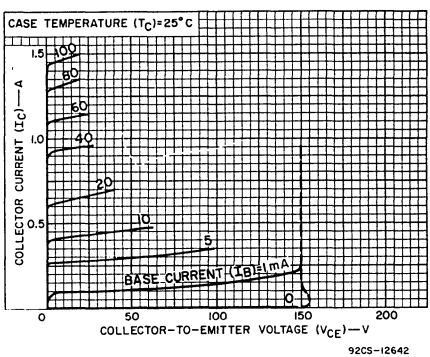


Fig. 15 – Typical output characteristics for 2N6478.

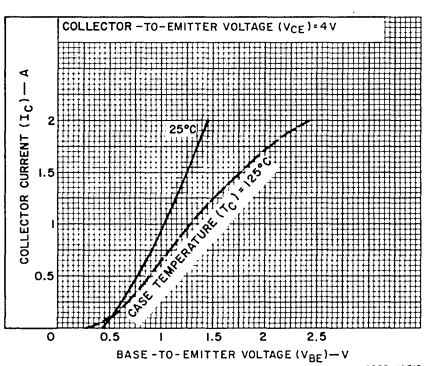


Fig. 16 – Typical transfer characteristics for 2N6477.

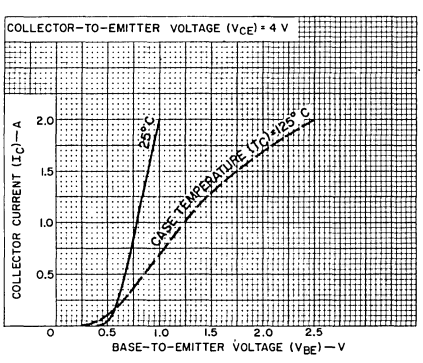


Fig. 17 – Typical transfer characteristics for 2N6478.