2N6671, 2N6672, 2N6673

File Number **1090**

5-A SwitchMax Power Transistors

High-Voltage N-P-N Types for Off-Line Power Supplies and Other High-Voltage Switching Applications

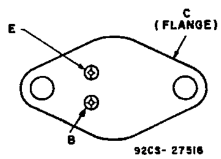
Features:

- *High-temperature parameters guaranteed*
- *Fast switching speed*
- *High voltage ratings:* *V_{CEX} = 350 V to 450 V*
- *Low V_{CE} (sat) at I_C = 5 A*
- *Steel hermetic TO-204AA package*

Applications:

- *Off-line power supplies*
- *High-voltage inverters*
- *Switching regulators*

TERMINAL DESIGNATIONS



JEDEC TO-204AA

The RCA-2N6671, 2N6672, and 2N6673• SwitchMax series of silicon n-p-n power transistors feature high-voltage capability, fast switching speeds, and low saturation voltages, together with high safe-operating-area (SOA) ratings. They are specially designed for use in off-line power supplies and are also well suited for use in a wide range of inverter or converter circuits and pulse-width-modulated regulators. These high-voltage, high-speed transistors are 100-per-cent tested for parameters that are essential to the design of industrial high-power switching circuits. Switching times, including inductive turn-off time, and saturation voltages are guaranteed at 125°C to provide information necessary for worst-case design.

The RCA-2N6671, 2N6672, and 2N6673 series transistors are supplied in steel JEDEC TO-204AA hermetic packages.

•Formerly RCA8767, RCA8767A, and RCA8767B, respectively.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N6671	2N6672	2N6673	
* V_{CEV}				
V_{BE} = −1.5 V	450	550	650	V
* V_{CEX} (Clamped)				
V_{BE} = −1.5 V	350	400	450	V
* V_{CEO}	300	350	400	V
* V_{EBO}		8		V
I_C(sat)		5		A
* I_C		8		A
I_{CM}		10		A
* I_B		4		A
* P_T				
T_C up to 25°C		150		W
T_C above 25°C, derate linearly		0.86		W/°C
* T_{stg}, T_J		−65 to 200		°C
* T_L				
At distance ⩾ 1/16 in. (1.58 mm) from seating plane for 10 s max.		235		°C

* In accordance with JEDEC registration data.

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ELECTRICAL CHARACTERISTICS

CHARAC-TERISTIC	TEST CONDITIONS: VOLTAGE V dc		CURRENT A dc		LIMITS: 2N6671		2N6672		2N6673		UNITS
	V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
$T_C = 25^oC$											
* I_{CEV}	450	−1.5			–	0.1	–	–	–	–	mA
	550	−1.5			–	–	–	0.1	–	–	
	650	−1.5			–	–	–	–	–	0.1	
* I_{EBO}		−8	0		–	2	–	2	–	2	
* $V_{CEO}(sus)^b$			0.2^a	0	300	–	350	–	400	–	V
* h_{FE}	3		5^a		10	40	10	40	10	40	
* $V_{BE}(sat)$			5^a	1	–	1.6	–	1.6	–	1.6	V
* $V_{CE}(sat)$			5^a	1	–	1	–	1	–	1	
			8^a	4	–	2	–	2	–	2	
* V_{CEX}^b (Clamped $E_{S/b}$) L=170 μH, R_{BB}=5 Ω		−5	5	1^e	350	–	400	–	450	–	
		−5	8	3^e	200	–	250	–	300	–	
* $I_{S/b}$	25		6		1	–	1	–	1	–	s
* $\|h_{fe}\|$ f=5 MHz	10		0.2		3	12	3	12	3	12	
f_T	10		0.2		15	60	15	60	15	60	MHz
* C_{obo} f=0.1 MHz	10^c				50	300	50	300	50	300	pF
* t_d^d			5	1	–	0.1	–	0.1	–	0.1	μs
* t_r^d			5	1	–	0.5	–	0.5	–	0.5	
* t_s^d			5	1^e	–	2.5	–	2.5	–	2.5	
* t_f^d			5	1^e	–	0.4	–	0.4	–	0.4	
* t_c V_{CC}=125 V, L=170 μH, R_C=25 Ω Collector clamped to V_{CEX}			5	1^e	–	0.4	–	0.4	–	0.4	
$T_C = 125^oC$											
* I_{CEV}	450	−1.5			–	1	–	–	–	–	mA
	550	−1.5			–	–	–	1	–	–	
	650	−1.5			–	–	–	–	–	1	
* $V_{CE}(sat)$			5^a	1	–	2	–	2	–	2	V
* t_r^d			5	1	–	0.8	–	0.8	–	0.8	μs
* t_s^d			5	1^e	–	4	–	4	–	4	
* t_f^d			5	1^e	–	0.8	–	0.8	–	0.8	
* t_c V_{CC}=125 V, L=170 μH, R_C=25 Ω Collector clamped to V_{CEX}			5	1^e	–	0.8	–	0.8	–	0.8	
* $R_{\theta JC}$					–	1.17	–	1.17	–	1.17	°C/W

* In accordance with JEDEC registration data.
[a] Pulsed: pulse duration = 300 μs, duty factor ≤ 2%.
[b] CAUTION: The sustaining voltage $V_{CEO}(sus)$ and V_{CEX} MUST NOT be measured on a curve tracer
[c] V_{CB} value.
[d] V_{CC} = 125 V, t_p = 20 μs.
[e] $I_{B_1} = -I_{B_2}$.

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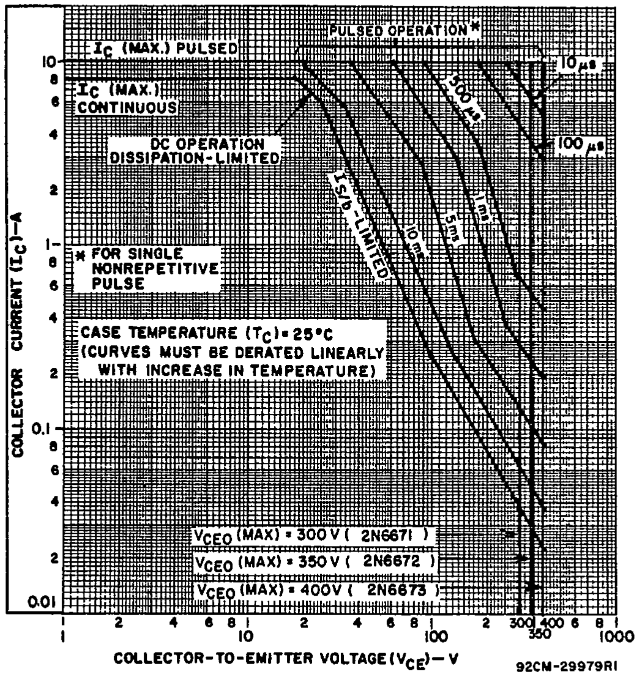

Fig. 1 — Maximum operating areas for all types (T_C = 25° C).

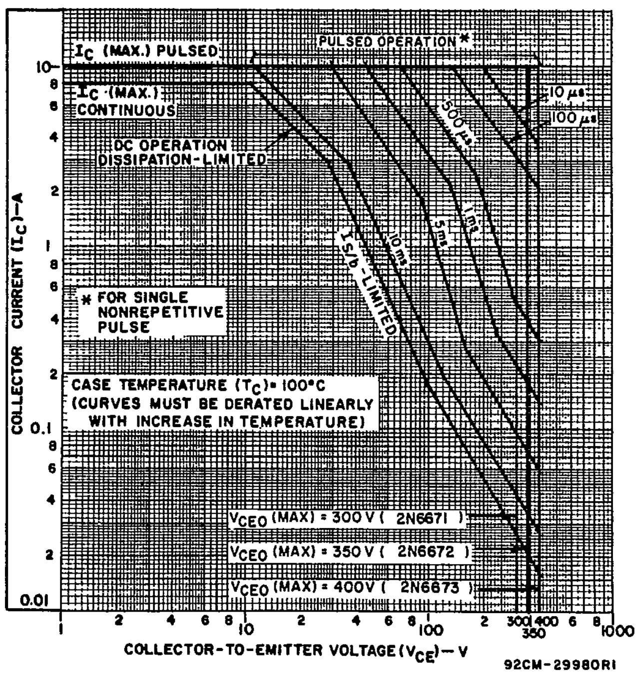

Fig. 2 — Maximum operating areas for all types (T_C =100° C).

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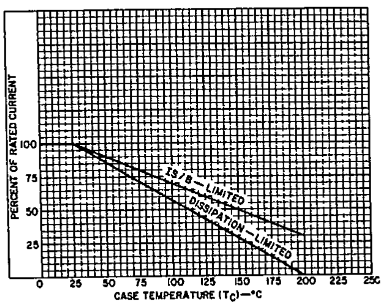

Fig. 3 — Dissipation and Is/b derating curves for all types.

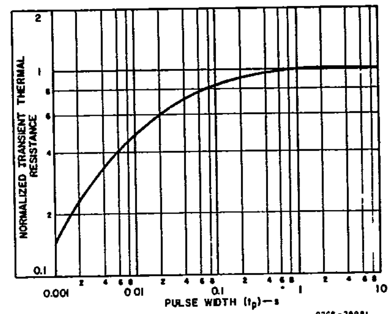

Fig. 4 — Typical thermal-response characteristic for all types.

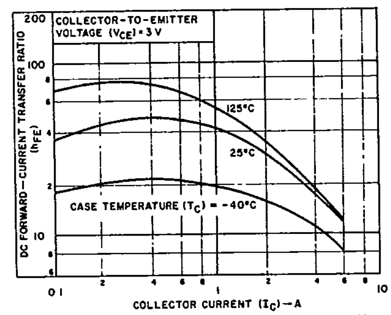

Fig. 5 — Typical dc beta characteristics for all types.

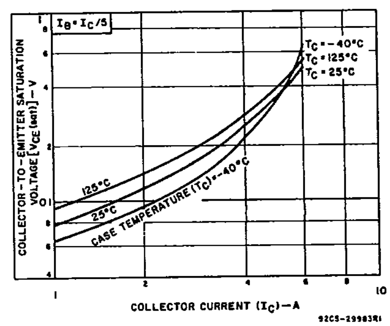

Fig. 6 — Typical collector-to-emitter saturation voltage as a function of collector current for all types.

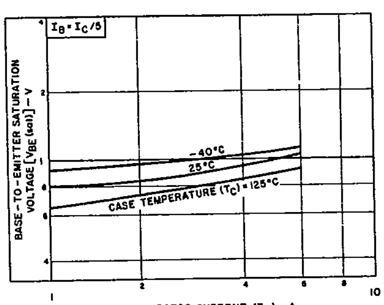

Fig. 7 — Typical base-to-emitter saturation voltage as a function of collector current for all types.

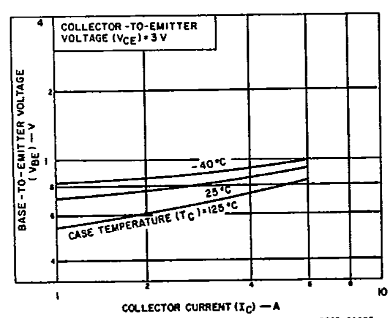

Fig. 8 — Typical base-to-emitter voltage as a function of collector current for all types.

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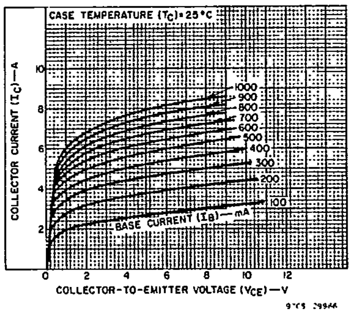

Fig. 9 — Typical output characteristics for all types.

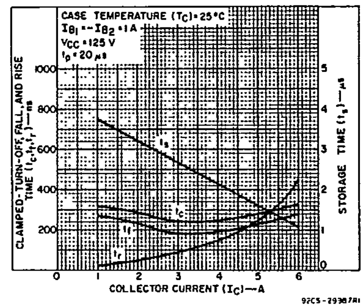

Fig. 10 — Typical saturated switching time characteristics for all types.

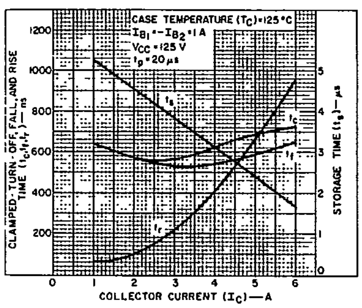

Fig. 11 — Typical saturated switching time characteristics for all types.

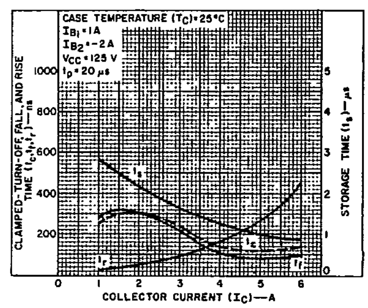

Fig. 12 — Typical saturated switching time characteristics for all types.

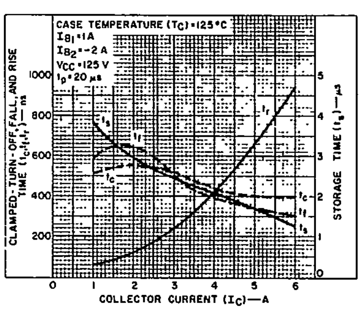

Fig. 13 — Typical saturated switching time characteristics for all types.

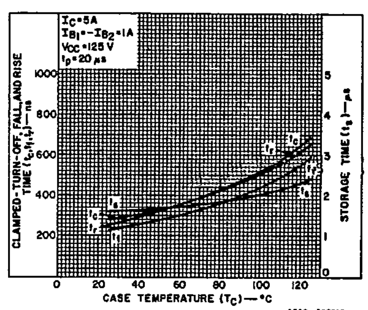

Fig. 14 — Typical saturated switching time characteristics as a function of

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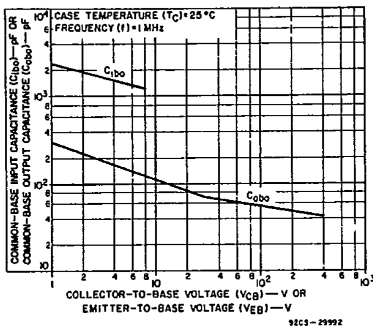


Fig. 15 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for all types.

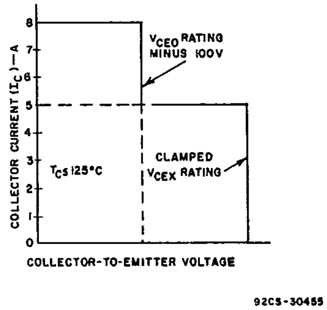


Fig. 16 — Maximum operating conditions for switching between saturation and cutoff.

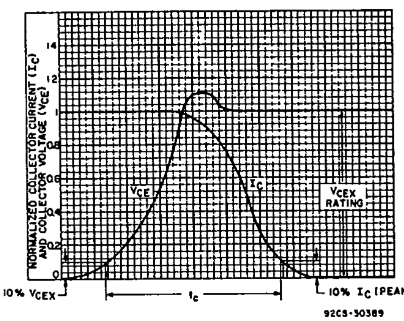


Fig. 17 — Oscilloscope display for measurement of clamped induction switching time (t$_c$).

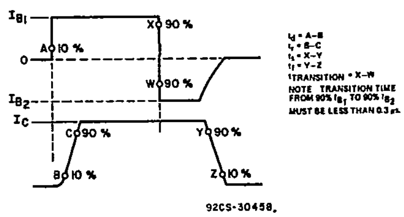
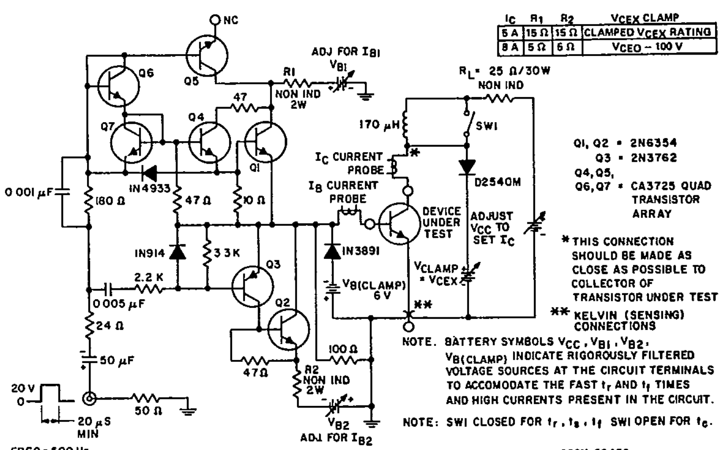


Fig. 18 — Phase relationship between input and output currents showing reference points for specification of switching times.



I$_C$	R1	R2	V$_{CEX}$ CLAMP
5 A	15 Ω	15 Ω	CLAMPED V$_{CEX}$ RATING
8 A	5 Ω	6 Ω	V$_{CEO}$ – 100 V

Fig. 19 — Circuit for measuring switching times.