1-A SwitchMax VERSAWATT Transistors

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

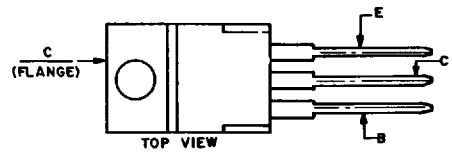
Features:

- *High-temperature parameters guaranteed*
- *Fast switching speed*
- *High voltage ratings:* V_{CEX} *= 350 V to 450 V*
- *Low* V_{CE} *(sat) at* I_C *= 1 A*
- *VERSAWATT package*

Applications:

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

TERMINAL DESIGNATIONS



JEDEC TO-220AB

The 2N6771, 2N6772, and 2N6773* 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 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 tested for parameters that are essential to the design of 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 2N6771, 2N6772, and 2N6773 series transistors are supplied in the JEDEC TO-220AB VERSAWATT plastic packages.

*Formerly RCA8863A, RCA8863B, and RCA8863C, respectively.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N6771	2N6772	2N6773	
* 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)	1			A
* I_C	1			A
I_{CM}	2			A
* I_B	0.6			A
* P_T T_C up to 25°C	40			W
T_C above 25°C, derate linearly	0.32			W/°C
* T_{stg}, T_J	-65 to 150			°C
* T_L At distance ≥ 1/8 in. (3.17 mm) from seating plane for 10 s max.	235			°C

*In accordance with JEDEC registration data.

ELECTRICAL CHARACTERISTICS

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CHARACTERISTIC	TEST CONDITIONS VOLTAGE V dc V_{CE}	V_{BE}	CURRENT A dc I_C	I_B	LIMITS 2N6771 Min.	2N6771 Max.	2N6772 Min.	2N6772 Max.	2N6773 Min.	2N6773 Max.	UNITS
T_C=25°C											
* 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
* $V_{CE(sat)}$			1[a]	0.2	—	1.0	—	1.0	—	1.0	
* $V_{BE(sat)}$			1[a]	0.2	—	1.2	—	1.2	—	1.2	
* h_{FE}	3		0.3[a]		20	100	20	100	20	100	
	3		1[a]		10	50	10	50	10	50	
* V_{CEX}[b] (Clamped $E_{S/b}$) L=450 μH, R_{BB}=50 Ω		−5	1	0.1[e]	350	—	400	—	450	—	V
* $I_{S/b}$	100		0.4		0.5	—	0.5	—	0.5	—	s
* $\|h_{fe}\|$ f=1 MHz	10		0.2		10	50	10	50	10	50	
f_T	10		0.2		10	50	10	50	10	50	MHz
* C_{obo} f=0.1 MHz	10[c]				20	60	20	60	20	60	pF
* t_d[d]			1	0.2	—	0.05	—	0.05	—	0.05	μs
* t_r[d]			1	0.2	—	0.4	—	0.4	—	0.4	
* t_s[d]			1	0.2[e]	—	2.5	—	2.5	—	2.5	
* t_f[d]			1	0.2[e]	—	0.6	—	0.6	—	0.6	
* t_c V_{CC}=200 V, L=450 μH, R_C=200 Ω Collector clamped to V_{CEX}			1	0.2[e]	—	0.6	—	0.6	—	0.6	
T_C=125°C											
* I_{CEV}	450	−1.5			—	1	—	—	—	—	mA
	550	−1.5			—	—	—	1	—	—	
	650	−1.5			—	—	—	—	—	1	
* $V_{CE(sat)}$			1[a]	0.2	—	2	—	2	—	2	V
* t_r[d]			1	0.2	—	0.8	—	0.8	—	0.8	μs
* t_s[d]			1	0.2[e]	—	4.5	—	4.5	—	4.5	
* t_f[d]			1	0.2[e]	—	1.5	—	1.5	—	1.5	
* t_c V_{CC}=200 V, L=450 μH, R_C=200 Ω Collector clamped to V_{CEX}			1	0.2[e]	—	1.5	—	1.5	—	1.5	
* $R_{\theta JC}$	20		1		—	3.12	—	3.12	—	3.12	°C/W
$R_{\theta JA}$					—	70	—	70	—	70	°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} = 200 V, t_p = 20 μs.

[e]$I_{B_1} = -I_{B_2}$.

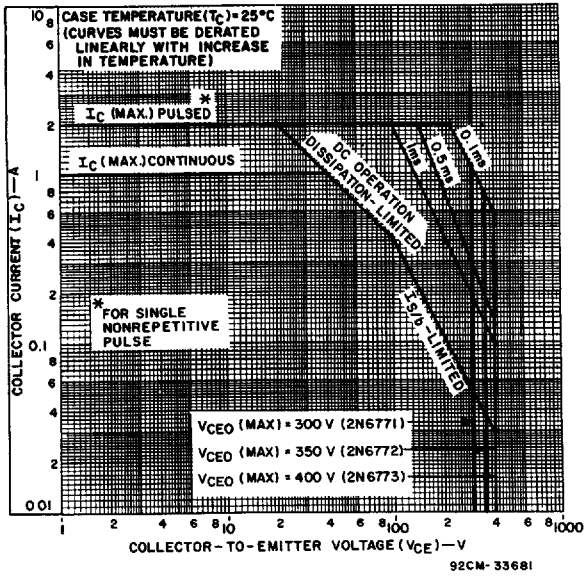

Fig. 1 — Maximum operating areas for all types.

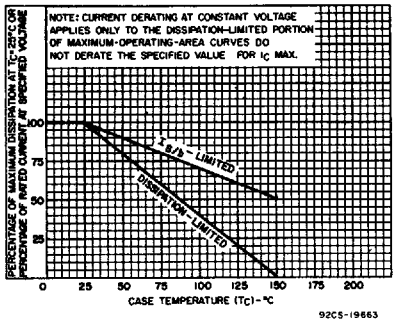

Fig. 2 — Derating curve for all types.

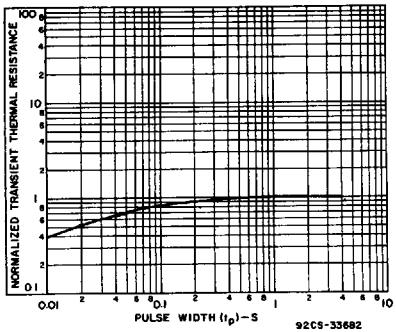

Fig. 3 — Typical thermal-response characteristics for all types.

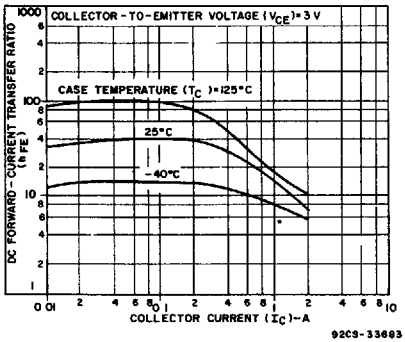

Fig. 4 — Typical dc beta characteristics for all types.

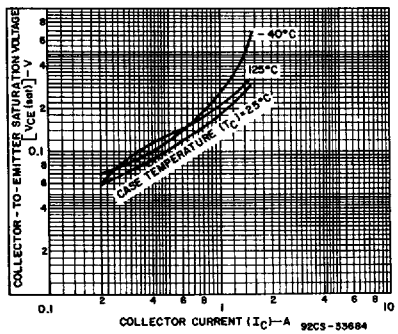

Fig. 5 — Typical collector-to-emitter saturation voltage as a function of collector current for all types.

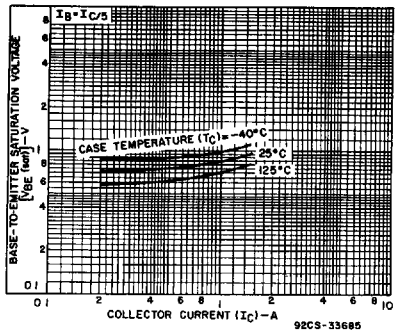

Fig. 6 — Typical base-to-emitter saturation voltage as a function of collector current for all types.

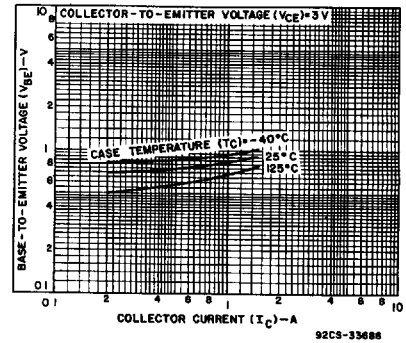

Fig. 7 — Typical base-to-emitter voltage as a function of collector current for all types.

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HARRIS SEMICOND SECTOR

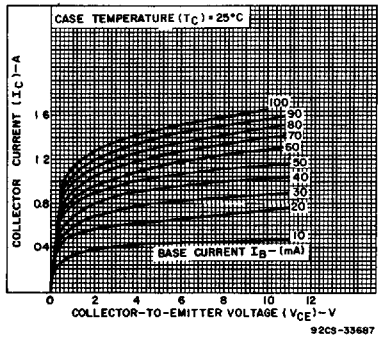

Fig. 8 — Typical output characteristics for all types.

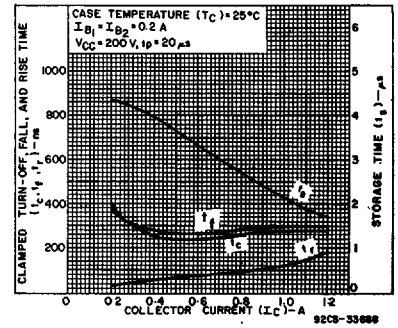

Fig. 9 — Typical saturated-switching-time characteristics for all types.

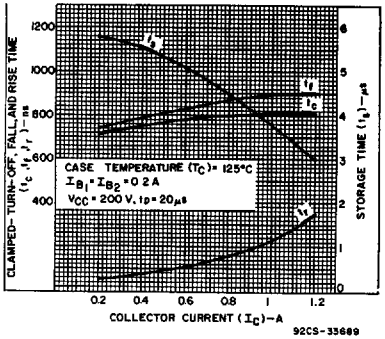

Fig. 10 — Typical saturated-switching-time characteristics as a function of collector current for all types.

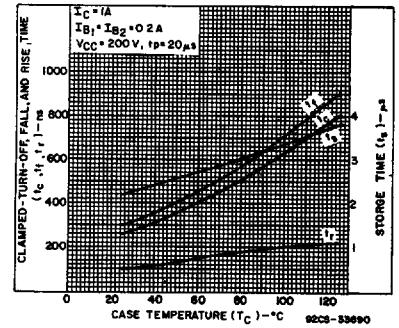

Fig. 11 — Typical saturated-switching-time characteristics as a function of case temperature for all types.

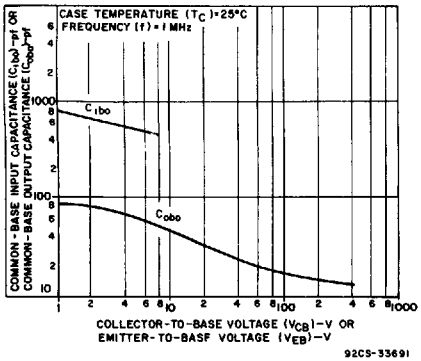

Fig. 12 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for all types.

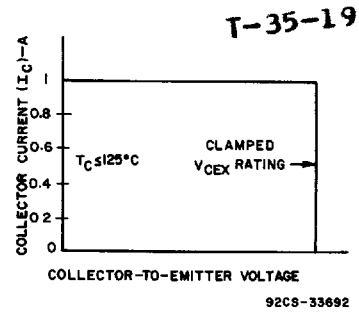

Fig. 13 — Maximum operating conditions for switching between saturation and cutoff.

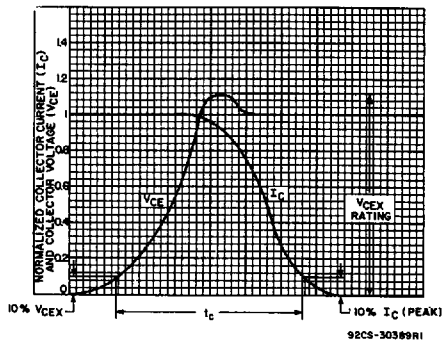

Fig. 14 — Oscilloscope display for measurement of clamped induction switching time (t_c).

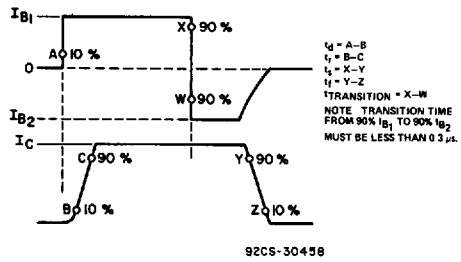

Fig. 15 — Phase relationship between input and output currents showing reference points for specification of switching times.

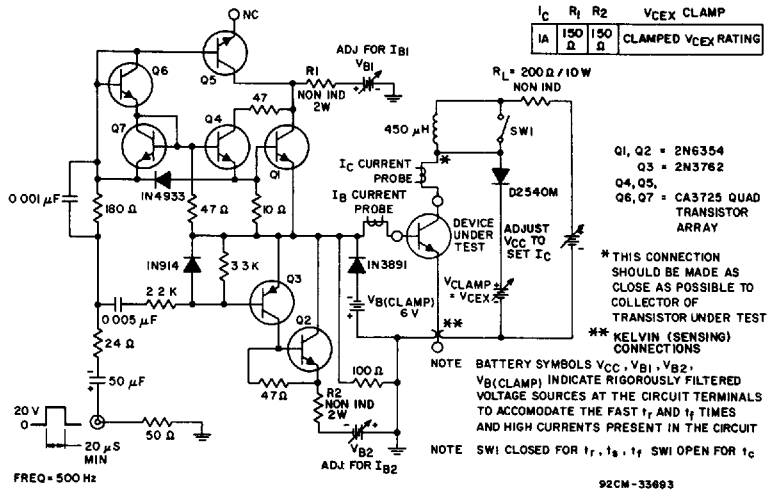

Fig. 16 — Circuit for measuring switching times.